City of Fresno
Retirement Systems

Actuarial Experience Study

Review of Economic Actuarial Assumptions for the June 30, 2025 Actuarial Valuation

Segal

June 3, 2025

Boards of Retirement
City of Fresno Retirement Systems
2828 Fresno Street, Suite 201
Fresno, CA 93721-1327

Re: Review of economic actuarial assumptions for the June 30, 2025 actuarial valuation

Dear Members of the Boards:

We are pleased to submit this report of our review of the economic actuarial experience for use in the City of Fresno Retirement Systems' June 30, 2025 actuarial valuations for the Employees and Fire & Police Systems ("The Systems"). This report includes our recommendations and the analysis supporting their development.
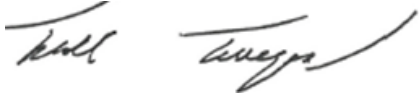
We have also reviewed the demographic "non-economic" actuarial experience for the three-year period from July 1, 2021 to June 30, 2024 for use in the June 30, 2025 actuarial valuations. The non-economic actuarial assumptions we recommend are provided in a separate report for each of the two Systems.

The actuarial calculations were completed under the supervision of Andy Yeung, ASA, MAAA, FCA, Enrolled Actuary. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.
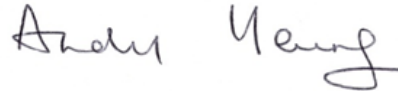
Segal makes no representation or warranty as to the future status of the Plans and does not guarantee any particular result. This document does not constitute legal, tax, accounting or investment advice or create or imply a fiduciary relationship. The Boards are encouraged to discuss any issues raised in this report with the Plans' legal, tax and other advisors before taking, or refraining from taking, any action.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,

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

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JY/jl

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Section 1: Introduction, Summary and Recommendations

To project the cost and liabilities of the Systems, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year, actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are modified, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions means that year's experience is treated as temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding while paying the promised benefit amounts to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined solely by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to review the economic actuarial assumptions. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Assumptions for Measuring Pension Obligations." This Standard of Practice provides guidance for the selection of various actuarial assumptions utilized in a pension plan actuarial valuation.

Section 1: Introduction, Summary and Recommendations

Our recommendations for the economic actuarial assumptions for the June 30, 2025 Actuarial Valuation for each of the two Systems are as follows:

Pg #	Actuarial Assumption Category	Recommendation
8	**Inflation:** Future increases in the Consumer Price Index (CPI), which affects investment returns, active member salary increases and retiree COLAs.	Maintain the inflation assumption at 2.50% per annum as discussed in *Section 3(A)*. **Employees and Tier 2 Fire & Police Members:** • Maintain the COLA assumption at 2.50% per annum as discussed in *Section 3(A)* **Tier 1 Fire & Police Members:** • Maintain the COLA assumption at 3.00% per annum as discussed in *Section 3(A)*
12	**Investment return:** The estimated average net rate of return on current and future assets of the Systems as of the valuation date. This rate is used to discount liabilities.	Maintain the investment return assumption at 6.75% per annum as discussed in *Section 3(B)*.
21	**Salary Increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary increase • Real "across-the-board" increase • Merit and promotion increase **Payroll growth:** Used to amortize the UAAL in determining the UAAL contribution rate (if any).	Maintain the inflationary salary increase assumption at 2.50% and maintain the real "across-the-board" salary increase assumption at 0.50%. The review of the merit and promotional increase component of the salary increase assumption is provided as part of our triennial experience study of non-economic assumptions, along with the other recommended non-economic assumptions for the June 30, 2025 valuation for each of the two Systems. Maintain the payroll growth assumption (combined inflationary and real "across-the-board" salary increases) at 3.00%.

While the cost impact of changes to economic assumptions would typically be included in our separate analyses of the 'non-economic' assumptions for the June 30, 2025 valuations, no changes to the economic assumptions are being recommended as part of this study. Accordingly, there is no associated cost impact to report.

Section 2: Background and Methodology

In this report, we analyzed the "economic" assumptions only. Our analysis of the demographic ("non-economic") assumptions for the June 30, 2025 valuations are provided in separate reports. The primary economic assumptions reviewed are inflation, investment return, and salary increases.

Economic assumptions

Economic assumptions consist of:

- **Inflation:** Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members (if any).

- **Investment return:** Expected long-term rate of return on the Systems' investments after accounting for certain investment expenses and all administrative expenses. This assumption has a significant impact on contribution rates.

- **Salary increases:** In addition to inflationary increases, it is assumed that salaries will also grow by real "across-the-board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers, which are commonly referred to as merit and promotion increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL), if any, are calculated to increase each year by the payroll growth assumption, which is the price inflation rate plus any real "across-the-board" pay increases that are assumed.

The setting of these economic assumptions is described in *Section 3*.

Section 3: Economic Assumptions

A. Inflation

Unless an investment grows at least as fast as prices increase, investors will experience a reduction in the inflation-adjusted value of their investment. There may be times when "riskless" investments return more or less than inflation, but over the long term, investment market forces will generally require an issuer of fixed income securities to maintain a minimum return which protects investors from inflation.

The inflation assumption is long term in nature, so our analysis begins with a review of historical information. Following is a graph showing historical inflation rates and a comparison with the inflation assumption of 2.50% that we recommend in this report.

Historical Consumer Price Index — 1930 to 2024[1]
(U.S. City Average — All Urban Consumers)
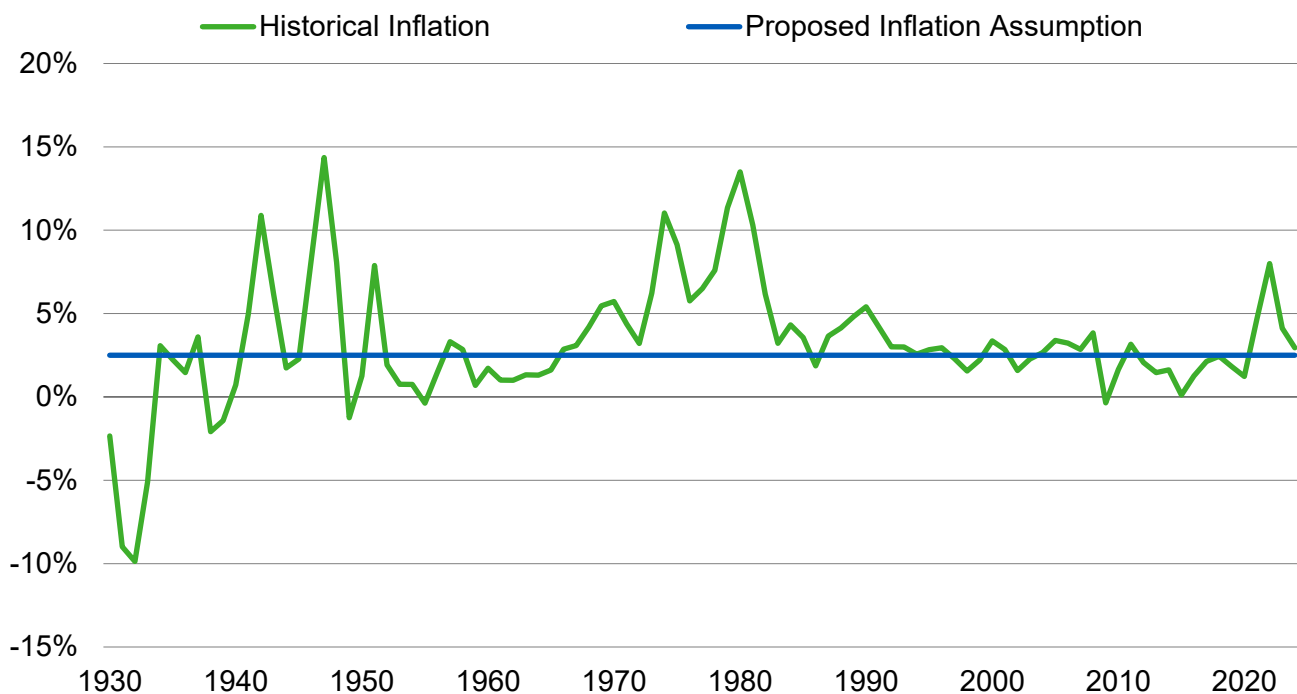
There was a spike in inflation that started in the second quarter of 2021 and continued into 2022. The rate of inflation started to decrease after the Federal Reserve began to increase interest rates starting around the second quarter of 2022. The Federal Reserve then changed course and reduced interest rates three times since the third quarter of 2024 in reaction to a continued reduction in inflation. However, they have recently signaled a pause in their adjustment to the interest rates until more economic data becomes available. Based on the most recent inflation data, the change in the CPI from April 2024 to April 2025 was 2.3%.

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[1] Source: Bureau of Labor Statistics – Based on CPI for All Items in U.S. city average, all urban consumers, not seasonally adjusted (Series ID: CUUR0000SA0).

Section 3: Economic Assumptions

Based on information found in the Public Plans Database, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 220[1] large public retirement funds in their 2023 fiscal year valuations was 2.50%. In California, CalSTRS and five[2] 1937 Act CERL systems currently use an inflation assumption of 2.75%, the other 15 1937 Act CERL systems use an inflation assumption of 2.50%[3] (including the Systems) and CalPERS uses an inflation assumption of 2.30%.

The Systems' investment consultant, NEPC, anticipates an annual inflation rate of 2.70% over a 30-year horizon, while the average inflation assumption provided by NEPC and five other investment advisory firms retained by Segal's California public sector clients, as well as Segal's investment advisory division (Segal Marco Advisors), was 2.47%. Note that, in general, some investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.[4]

To find a forecast of inflation based on a longer time horizon, we referred to the Social Security Administration's (SSA) 2024 report on the financial status of the Social Security program.[5] The projected average increase in the CPI over the next 75 years under the intermediate cost assumptions used in that report was 2.40%, which the SSA has maintained for several years. The SSA report also includes alternative projections using lower and higher inflation assumptions of 1.80% and 3.00%, respectively.

We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds.[6] This "break-even rate" is commonly regarded as a market-based gauge of future inflation expectations. As of April 2025, the difference in yields is about 2.20% which provides a measure of market expectations of inflation. It is worth noting that even during the peak of the recent inflation spike this break-even rate exceeded 2.50% in only a single month, April 2022 (2.55%). This measure of market expectation for long-term inflation can be quite volatile, which is illustrated in the table on the following page.

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[1] Among 228 large public retirement funds, the 2023 fiscal year inflation assumption was not available for 8 of the public retirement funds in the survey data as of April 2025.

[2] We note that none of these five 1937 Act CERL Systems are served by Segal.

[3] Eight of these 1937 Act CERL systems use a 2.50% inflation assumption with a 2.75% COLA assumption.

[4] The time horizon used by the six investment consultants included in our review, with the exception of one investment consultant that uses a 1-year horizon, generally ranges from 20 years to 30 years, with NEPC using a 30-year horizon.

[5] Source: "Social Security Administration: The 2025 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds."

[6] Source: Board of Governors of the Federal Reserve System.

Section 3: Economic Assumptions

Observation Month	Difference in Yields	Observation Month	Difference in Yields
January 2022	2.24%	September 2023	2.34%
February 2022	2.18%	October 2023	2.47%
March 2022	2.49%	November 2023	2.40%
April 2022	2.55%	December 2023	2.19%
May 2022	2.47%	January 2024	2.24%
June 2022	2.47%	February 2024	2.26%
July 2022	2.21%	March 2024	2.27%
August 2022	2.29%	April 2024	2.35%
September 2022	2.27%	May 2024	2.34%
October 2022	2.33%	June 2024	2.27%
November 2022	2.40%	July 2024	2.28%
December 2022	2.26%	August 2024	2.12%
January 2023	2.24%	September 2024	2.11%
February 2023	2.29%	October 2024	2.28%
March 2023	2.26%	November 2024	2.29%
April 2023	2.23%	December 2024	2.27%
May 2023	2.26%	January 2025	2.35%
June 2023	2.23%	February 2025	2.33%
July 2023	2.27%	March 2025	2.25%
August 2023	2.31%	April 2025	2.20%

The following graph shows the Systems' historical and current proposed inflation assumptions compared to the two other metrics just discussed, going back to 2011. In effect, this compares the Systems' assumption to two separate independent forecasts, one based on market observations and one developed by economists at the SSA. The graph shows that over the observed period, the Systems' assumption has been higher but consistently moving towards these other forecasts and seems to be in a stable place at this point in time.

Historical Inflation Forecasts
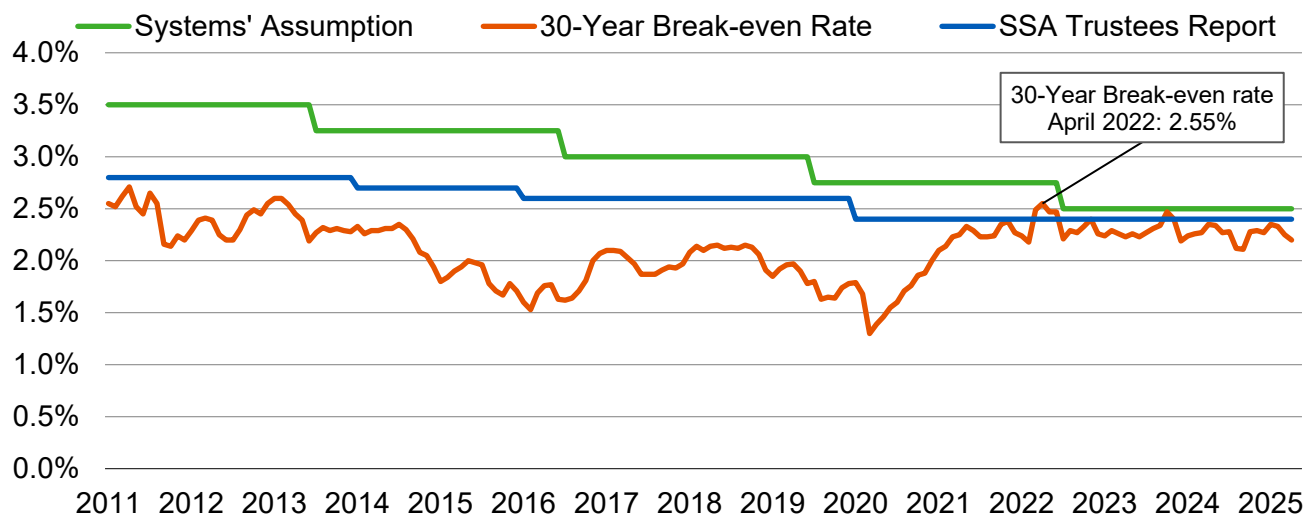
Section 3: Economic Assumptions

The setting of the inflation assumption using the information outlined above is a somewhat subjective process, and Segal does not apply a specific weight to each of the metrics in determining our recommended inflation assumption. Based on a consideration of all the above metrics, beginning in 2021 we have been recommending the same 2.50% inflation assumption in our experience studies for our California public retirement system clients.

Based on all of the above information, we recommend maintaining the annual inflation assumption at 2.50%.

Retiree Cost of Living Increases

The retiree cost-of-living adjustments assumed in the prior valuations were 2.50% for the Employees System; and 3.00% and 2.50% for Tier 1 and Tier 2 employees, respectively, in the Fire and Police System.

Consistent with our 2.50% inflation assumption, **we recommend maintaining a 2.50% COLA assumption for the Employees System and the Tier 2 Fire and Police System. As the Tier 1 Fire and Police System has a "pay" based COLA, we recommend maintaining a 3.00% COLA assumption consistent with the total of the recommended price inflation assumption plus the "across-the-board" real pay increase assumption of 0.50% detailed later in this report.**

Section 3: Economic Assumptions

B. Investment return

The investment return assumption is comprised of two primary components, inflation and real rate of investment return, with adjustments for certain expenses and risk.

Real rate of investment return

This component represents the portfolio's incremental investment market returns over inflation. Generally, when an investor takes on greater investment risk, the return on the investment is expected to also be greater, at least in the long run[1]. This additional risk and return is expected to vary by asset class and empirical data supports that expectation. For that reason, the real rate of return assumptions are developed by asset class. Therefore, the real rate of return assumption for a retirement plan's portfolio will vary with the Board's asset allocation among asset classes.

The Systems' current target asset allocation and the assumed real rate of return assumptions by asset class are shown in the following table. The first column of real rate of return assumptions are determined by reducing NEPC's total or "nominal" 30-year return assumptions for 2025 by their assumed 2.70% inflation rate. The second column of returns (except for certain asset classes as noted in the table) represents the average of a sample of real rate of return assumptions. The sample includes the expected annual real rate of return provided to us by NEPC and five other investment advisory firms retained by Segal's public sector clients, as well as Segal's investment advisory division (Segal Marco Advisors). We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[2]

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[1] However, an argument can also be made that taking on more risk in the portfolio could justify a greater risk margin in the actuarial assumption used, to help manage that risk.

[2] Note that, just as for the inflation assumption, the time horizon used by some of the investment consultants in determining the real rate of return assumption is generally shorter than the time horizon encompassed by the actuarial valuation.

Section 3: Economic Assumptions

The Systems' Target Asset Allocation and Assumed Arithmetic Net Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	NEPC's Assumed Net Real Rate of Return[1]	Average Assumed Net Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[2]
Large Cap Equities	18.00%	5.75%	5.59%
Small/Mid Cap Equities	3.00%	6.48%	6.45%
Int'l Equities (Unhedged)	13.00%	5.66%	6.23%
Emerging Int'l Equities	5.00%	9.44%	7.89%
Core Bonds	12.00%	2.74%	2.47%
Private Equity	8.00%	10.53%	9.31%
Private Debt	14.00%	7.12%	6.47%
Core Real Estate	6.00%	4.78%	4.58%
Cash	1.00%	0.90%	0.98%
Non-Core Real Estate	9.00%	8.19%	8.19%[3]
Private Real Assets - Infrastructure/Land	7.00%	4.63%	4.63%[3]
Private Debt - Credit Opportunities	3.00%	7.09%	7.09%[3]
Absolute Return Fixed Income	1.00%	3.50%	3.50%[3]
Total	**100.00%**	**6.21%**	**5.94%**

Generally, the above are representative of "indexed" returns for securities that are publicly traded, returns net of fees for securities that are non-publicly traded and do not include any additional returns ("alpha") from active management. Consideration of returns without alpha is consistent with the Actuarial Standard of Practice No. 27, Section 3.7.3.d, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

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[1] The rates shown have been estimated by Segal by taking NEPC's nominal arithmetic returns and reducing by NEPC's assumed 2.70% inflation rate to develop the assumed real rate of return shown. These return assumptions are net of any applicable investment management expenses.

[2] These are based on the projected arithmetic returns provided by NEPC and five other investment advisory firms serving Segal's public sector retirement clients in California, as well as Segal's investment advisory division. These return assumptions are net of any applicable investment management expenses.

[3] For these asset classes, NEPC's assumptions are applied in lieu of the average because there is a larger disparity in returns for these asset classes among the firms surveyed and using NEPC's assumptions should more closely reflect the underlying investments made specifically for the Systems.

Section 3: Economic Assumptions

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients, as well as Segal's investment advisory division, have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods that are shorter than the duration of a retirement plan's liabilities.

2. As discussed in the next section, the real rates of return provided this year by the investment consultants reflect a change in how investment expenses are reported.

3. Using a sample average of expected real rate of returns allows the Systems' investment return assumption to reflect a broader range of capital market information and should help reduce year to year volatility in the investment return assumption.

4. We recommend that the 5.94% portfolio **net** real rate of return be used in the determination of the Systems' investment return assumption, but with some caution. This return is 0.38% higher than the 5.56% **gross** return that was used three years ago in the review of the recommended investment return assumption for the June 30, 2022 valuation. This is even before we consider the approximately 1.00% in investment management expense that, as discussed in the next section, will no longer be subtracted from this year's 5.94% net real rate of return.

5. The 0.38% increase in the portfolio real rate of return since 2022 is due to changes in the real rate of return assumptions provided to us by the investment advisory firms (+0.31% under the 2022 asset allocation), changes in the Systems' target asset allocation (-0.12%) and the interaction effect between these changes (0.19%). We believe the increase in the real rates of return provided to us by the investment advisory firms may be in part due to the very low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate starting in 2022 (even though recently they have started to decrease). Additionally, it is worth noting that the real rates of return provided in these capital market assumptions are generally higher than the ten-year period following the Global Financial Crisis, and so altogether should be used with caution in selecting a long-term investment return assumption.

Systems' expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for investment expenses expected to be paid from investment income. Current practice for the Systems also adjusts for expected administrative expenses. In prior experience studies, we adjusted the **gross** real rate of return developed using the target asset allocation by the investment expenses expected to be paid by the Systems.

However, as prevailing practice by investment advisory firms is to provide us with the real rates of return **net** of expected investment expenses, especially for active portfolio management, we now need to make adjustments only for investment consulting fees, custodian fees and other miscellaneous investment expenses excluding investment manager fees.

The following table provides these investment and administrative expenses in relation to the actuarial value of assets for the six years ending June 30, 2024.

Section 3: Economic Assumptions

City of Fresno Employees Retirement System
Investment and Administrative Expenses as a Percentage of Actuarial Value of Assets *($ in '000s)*

Year Ending June 30	Actuarial Value of Assets[1]	Administrative Expenses	Investment Expenses[2,3]	Administrative %	Investment %	Total %
2019	$1,202,691	$1,663	$1,111	0.14	0.09	0.23
2020	1,238,651	1,749	1,703	0.14	0.14	0.28
2021	1,269,173	2,058	2,080	0.16	0.16	0.32
2022	1,380,265	2,050	2,320	0.15	0.17	0.32
2023	1,449,730	2,146	2,461	0.15	0.17	0.32
2024	1,509,532	2,318	2,205	0.15	0.15	0.30

City of Fresno Fire & Police Retirement System
Investment and Administrative Expenses as a Percentage of Actuarial Value of Assets *($ in '000s)*

Year Ending June 30	Actuarial Value of Assets[1]	Administrative Expenses	Investment Expenses[2,3]	Administrative %	Investment %	Total %
2019	$1,436,725	$1,897	$1,275	0.13	0.09	0.22
2020	1,495,023	1,839	1,999	0.12	0.13	0.25
2021	1,547,641	2,282	2,458	0.15	0.16	0.31
2022	1,695,906	2,126	2,748	0.13	0.16	0.29
2023	1,791,487	2,401	2,923	0.13	0.16	0.29
2024	1,876,149	2,458	2,595	0.13	0.14	0.27

Investment and Administrative Expenses Averages and Assumptions

Averaging Period and Assumption	Investment and Administrative Expenses
Three-year average (2022 – 2024)	0.30%
Six-year average (2019 – 2024)	0.28%
Current assumption (including investment management fees)	**1.00%**
Proposed assumption (excluding investment management fees)	**0.30%**

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[1] As of beginning of plan year.
[2] Equals the sum of investment consulting fees, custodian fees and other miscellaneous investment expenses. Excludes investment manager fees.
[3] Net of securities lending expenses. Because we do not assume any additional net return for this program, we effectively assume that any securities lending expenses will be offset by related income.

Section 3: Economic Assumptions

Based on the above experience, we recommend reducing the investment and administrative expense component of the investment return assumption from 1.00% to 0.30%.

Note related to investment expenses paid to active managers – As cited above, under Section 3.7.3.d of ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses…unless the actuary believes, based on relevant data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

We have not performed a detailed analysis to measure how much of the investment expenses paid to active managers might have been offset by additional returns ("alpha") earned by that active management. For this study, we will continue to use the current approach that any "alpha" that may be identified would be treated as an increase in the risk adjustment and corresponding confidence level that are discussed in the next section. However, as discussed above, the real return assumptions provided by the investment advisory firms assume that active management will generate additional returns to cover the expense of such management, an assumption that is consistent with ASOP No. 27.

Model change

The 5.94% expected real rate of return developed earlier in this report was based on expected arithmetic average returns. A retirement system using an expected arithmetic average return as the discount rate in a funding valuation is expected on average to have no surplus or asset shortfall relative to its expected obligations assuming all other actuarial assumptions are met in the future.[1] That is the basis used in Segal's previous experience studies for the Systems.

Beginning with this study, in addition to no longer including an explicit adjustment for investment management fees, we are calculating the portfolio's expected geometric average return using its expected arithmetic average return and associated volatility. A retirement system using an expected geometric average return as the discount rate in a funding valuation will, over long periods of time, have an equal likelihood of having a surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.[2] For any given asset portfolio that contains volatility, the expected geometric average return will be less than the expected arithmetic average return.[3]

Risk adjustment

The real rate of return assumption for the portfolio is adjusted to reflect the potential risk of shortfalls in the return assumptions. The Systems' asset allocation determines this portfolio risk, since risk levels are driven by the variability of returns for the various asset classes and the correlation of returns among those asset classes. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

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[1] The mathematical terminology for this is that the mean (or average) surplus or asset shortfall is expected to be zero.
[2] The mathematical terminology for this is that over time the median surplus or asset shortfall is expected to be zero.
[3] This is because the expected geometric average return reflects expected median outcomes, while the expected arithmetic average return reflects expected average or mean outcomes. Expected median outcomes are lower than expected average outcomes because they are less affected by the possibility of extraordinary ("outlier") favorable outcomes.

Section 3: Economic Assumptions

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term.[1] It also acknowledges that investment results carry significant volatility over time, and yet the proposed assumption is a static number that does not explicitly convey this risk. This practice of a risk adjustment is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

Under either the arithmetic or geometric model, the confidence level associated with a particular risk adjustment represents a relative likelihood that future investment earnings would equal or exceed the assumed earnings over a 15-year period. The 15-year time horizon represents an approximation of the "duration" of the fund's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

For comparison purposes we first consider how the model used in previous experience studies for the Systems would look if used in this year's study. Three years ago, the Boards adopted an investment return assumption of 6.75%. Under the model used in that experience study, that return implied a risk adjustment of 0.31%, corresponding to a 15-year confidence level of 54%, based on an annual portfolio return standard deviation of 12.70% provided by NEPC in 2022.

Based on the general practice of using one-quarter percentage point increments for economic assumptions, we evaluated the effect on the confidence level of alternative investment return assumptions. We also considered that, as discussed above, the increase in the real rates of return provided by the investment consultants may reflect the low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate starting in 2022 (even though recently they have started to decrease), and so could be overly optimistic for use in selecting a long-term investment return assumption. For that reason, for this comparison value we evaluated a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 0.69% which corresponds to a confidence level of 58% **under the model and expense adjustment used in prior studies**. We believe this increase in confidence level is appropriate given the concerns stated.

As noted above, beginning with this study, in addition to no longer including an explicit adjustment for investment management fees, we are converting the portfolio's expected arithmetic average return to an expected geometric average return. For any given asset portfolio, the expected geometric average return will be less than the expected arithmetic average return. The difference depends on the variability of the portfolio as measured by its standard deviation. The annual portfolio standard deviation provided by NEPC is 13.74%, which produces a conversion factor to the expected return of 0.88%. This results in an expected geometric average real return of 5.06% (the expected arithmetic average real return of 5.94% reduced by 0.88%).

Together with the other investment return components (now excluding investment management expenses) and **prior to any risk adjustment**, this would result in a median expected (or geometric average return) assumption of 7.26%, which is higher than the current assumption of 6.75%. In applying this model to CFRS for the first time, we again evaluated a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 0.51% and a corresponding confidence level of 56%.

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[1] This type of risk adjustment is referred to in the Actuarial Standards of Practice as a "margin for adverse deviation."

Section 3: Economic Assumptions

Recommended investment return assumption

The following table summarizes the components of the recommended investment return assumption developed in the previous discussion. For comparison purposes, we have also included similar values from the last study as well as the comparison values discussed above that apply the prior study's model to this year's information.

Assumption Component	June 30, 2025 Geometric Model Recommended[1] Value	June 30, 2025 Arithmetic Model For Comparison[2] Only	June 30, 2022 Adopted[2] Value
Inflation	2.50%	2.50%	2.50%
Portfolio expected arithmetic real rate of return	5.94%	5.94%	5.56%
Adjustment to expected geometric real rate of return	(0.88)%	N/A	N/A
Expense adjustment	(0.30)%	(1.00)%)	(1.00)%
Risk adjustment	(0.51)%	(0.69)%	(0.31)%
Total	**6.75%**	**6.75%**	**6.75%**
Confidence level	**56%**	**58%**	**54%**

Based on this analysis, we recommend maintaining the investment return assumption at 6.75% per annum.

The table below shows the Systems' recommended investment return assumption and the corresponding risk adjustment and confidence level compared to the similar values for prior studies.

Historical Investment Return Assumptions, Risk Adjustments and Confidence Levels based on Assumptions Adopted by the Boards

Years Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2007	8.25%	0.34%	55%
2010	8.00%	0.19%	53%
2013	7.50%	0.07%	51%
2016	7.25%	0.37%	54%
2019	7.00%	0.50%	56%
2022	6.75%	0.31%	54%
2025 (Recommended)	6.75%	0.51%	56%

As we have discussed in prior experience studies, the risk adjustment model and associated confidence level is most useful as a means for comparing how the Systems have positioned

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[1] Based on expected geometric average returns.
[2] Based on expected arithmetic average returns.

themselves relative to risk over periods of time.[1] The use of either a 56% confidence level should be considered in context with other factors, including:

- As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons. This is particularly true when comparing confidence levels developed using different models, as we are doing in this transitional year from one model to another.

- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by NEPC. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.

- We have not taken into account any additional returns ("alpha") that might be earned on active management. This means that if active management generates enough alpha to cover its related expenses, this would increase returns. This aspect of Segal's model is further evaluated below.

- As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the later section on "Comparing with other public retirement systems".

Comparison with alternative model used to review investment return assumption

In previous studies, we have consistently reviewed investment return assumptions based on our old model that incorporates expected arithmetic real returns for the different asset classes and for the entire portfolio as one component of that model.[2] The use of "forward looking expected arithmetic returns" is one of the approaches discussed for use in the Selection of Assumptions for measuring Pension Obligations under Actuarial Standards of Practice (ASOP) No. 27.

Besides using forward looking expected arithmetic returns, ASOP No. 27 also discusses setting investment return assumptions using an alternative "forward looking expected geometric returns" approach, which is the model we have used in this study.[3] Even though as noted earlier expected geometric returns are lower than expected arithmetic returns, public retirement systems that have set investment return assumptions using this geometric approach have in practice adopted investment return assumptions that are comparable to those adopted by the Boards for the Systems under the arithmetic approach. This is because under the model used by those retirement systems and by Segal in this report, the investment return assumption is **not** reduced to anticipate future investment management expenses. However, for the Systems, these two changes do not completely offset each other because the difference in the future investment management expenses is lower than the 0.88% adjustment factor used to convert from an expected arithmetic return to a median geometric return. That is why, as shown earlier,

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[1] In particular, it would not be appropriate to use this type of risk adjustment as a measure of determining an investment return rate that is "risk-free."

[2] Again, as discussed earlier in this section, if a retirement system uses the expected arithmetic average return as the discount rate in the funding valuation, that retirement system is expected to have no surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.

[3] As also noted earlier in slightly different terms, if a retirement system uses the expected geometric average return as the discount rate in the funding valuation, that retirement system is expected to have an asset value that generally converges to the median accumulated value as the time horizon lengthens assuming all actuarial assumptions are met in the future.

Section 3: Economic Assumptions

the same 6.75% assumption does not have the same confidence level under the two models (comparison value has a lower confidence level than the recommended value).

In the interest of still having an alternative model for comparison, we evaluated the recommended 6.75% assumption based on the expected geometric return for the entire portfolio net of investment management expenses, but using a fully stochastic approach and a different source for capital market assumptions. Under this alternative model, over a 15-year period, there is a 61% likelihood that future average geometric returns will meet or exceed 6.75%[1] developed using the capital market assumptions compiled by Horizon Actuarial Services based on their most recent survey published in August 2024. This 61% likelihood of achieving a 6.75% return is higher than the corresponding likelihood of 57% (for achieving a 6.75% return) that we observed in this comparison during the assumption review in 2022.

Comparing with other public retirement systems

One final test of the recommended investment return assumption is to compare it against those used by other public retirement systems, both in California and nationwide.

We note that an investment return of 6.75% or lower is becoming more common among California public sector retirement systems. Of the twenty 1937 Act CERL systems, one uses a 7.25% investment assumption, six use 7.00%, nine use 6.75% (including the Systems), three use 6.50%, and one uses 6.25%. Furthermore, CalSTRS currently uses a 7.00% investment return assumption and CalPERS uses a 6.80% investment return assumption.

The following table compares the Systems' recommended investment return assumption against those of the 221[2] large public retirement funds in their 2023 fiscal year valuations based on information found in the Public Plans Database, which is produced in partnership with NASRA:

The Systems' Investment Return vs. Public Plans Database[3] Investment Return Assumptions

Assumption	City of Fresno Retirement Systems	Public Plan Data Low	Public Plan Data Median	Public Plan Data High
Net investment return	6.75%	4.31%	7.00%	8.25%

The detailed survey results show that over 80% of the systems have an investment return assumption in the range of 6.75% to 7.50%. Also, over three quarters of the systems have reduced their investment return assumption from 2017 to 2023. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

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[1] We performed this stochastic simulation using the capital market assumptions included in the 2024 survey prepared by Horizon Actuarial Services. That simulation was performed using 10,000 trial outcomes of future market returns, using assumptions from 20-year arithmetic returns, standard deviations and correlation matrix that were found in the 2024 survey that included responses from 26 investment advisors.

[2] Among 228 large public retirement funds, the 2023 fiscal year investment return assumption was not available for 7 of the public retirement funds in the Public Plans Database as of April 2025.

[3] Public Plans Data website – Produced in partnership with the National Association of State Retirement Administrators (NASRA).

Section 3: Economic Assumptions

C. Salary increases

Salary increases impact plan costs in two ways:

1. Increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and

2. Increasing total active member payroll which in turn generates lower UAAL contribution rates as a percent of payroll.

These two impacts are discussed separately below.

As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1. **Inflation:** Unless pay grows at least as fast as consumer prices grow, employees will experience a reduction in their standard of living. There may be times when pay increases lag or exceed inflation, but over the long term, labor market forces may require an employer to maintain its employees' standards of living.

    As discussed earlier in this report, we recommend maintaining the annual inflation assumption at 2.50%. This inflation component is used as part of the salary increase assumption.

2. **Real "across-the-board" pay increases:** These increases are typically termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across-the-board." The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across-the-board" pay increases have averaged about 0.2% – 0.4% annually during the last ten to twenty years.

    We also referred to the annual report on the financial status of the Social Security program published in May 2024. In that report, real "across-the-board" pay increases are forecast to be 1.14% per year under the intermediate assumptions.

    The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, the following table compares the Systems' recent salary experience to the change in CPI over the three-year period ending June 30, 2024 in the following table:

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Valuation Date	Actual Average Wage Inflation for active non-DROP and DROP members[1]	Actual Annual-to-Annual Change in CPI[2]
June 30, 2019	4.12%	2.67%
June 30, 2020	3.98%	1.94%
June 30, 2021	2.31%	3.18%
June 30, 2022	1.53%	8.33%
June 30, 2023	3.63%	5.03%
June 30, 2024	4.33%	3.33%
Three-year average (2018-2021)	**3.47%**	**2.60%**
Three-year average (2021-2024)	**3.16%**	**5.54%**

Based on the above information, we recommend maintaining the real "across-the-board" salary increase assumption at 0.50%. This means that the combined inflation and "across-the-board" salary increase assumption will remain at 3.00%.

Active member payroll

Projected active member payrolls are used to develop the UAAL contribution rate. Future values are determined as a product of the number of employees in the workforce and the average pay for all employees. The average pay for all employees increases only by inflation and real "across-the-board" pay increases. The merit and promotion increases are not included, because this average pay is not specific to an individual.

Under the Boards' current practice, the UAAL contribution rate (if any) is developed by assuming that the number of active members will remain about the same, so that the total payroll for all active members will increase annually over the amortization periods at the same assumed rates of inflation plus real "across-the-board" salary increase assumptions as are used to project the members' future benefits. Note again that this does not include the assumed merit and promotion increases, because longer service members are assumed to be replaced by new members.

Consistent with the combined recommended inflation and real "across the board" salary increase assumptions, we recommend maintaining the payroll growth assumption at 3.00% annually.

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[1]   Reflects the increase in average salary for members at the beginning of the year versus those at the end of the year. It does not reflect the average salary increases received by members who worked the full year.
[2]   Based on the change in 1st Semiannual CPI for the Western Region compared to the prior year.

Appendix A: Current Actuarial Assumptions

Economic assumptions

Net investment return

6.75%, net of investment and administrative expenses.

Inflation rate

Increase of 2.50% per year.

Cost-of-Living Adjustment (COLA)

Retiree COLA increases of 2.50% per year, limited to a maximum of 5.00% per year for Employees System members and 3.00% per year for Tier 2 Fire & Police System members. For members that have COLA banks, we assume that Employees System members receive 5.00% COLA increases until their COLA banks are exhausted and 2.50% thereafter, and Fire & Police members receive 3.00% COLA increases until their COLA banks are exhausted and 2.50% thereafter.

Tier 1 Fire & Police System members' COLA increases due to changes in average compensation or new salaries adopted are equal to total wage growth of 3.00% per year (composed of 2.50% CPI plus 0.50% across-the-board salary increase), limited to maximum of 5.00% per year.

Employee contribution crediting rate

6.75%, assumed in the valuation.

Payroll growth

Inflation of 2.50% per year plus "across-the-board" salary increase of 0.50% per year.

Inflationary and real "across-the-board" salary increases

Inflation of 2.50% per year plus "across the board" real salary increases of 0.50% per year.

Appendix B: Proposed Actuarial Assumptions

Economic assumptions

Net investment return

6.75%, net of investment and administrative expenses.

Inflation rate

Increase of 2.50% per year.

Cost-of-Living Adjustment (COLA)

Retiree COLA increases of 2.50% per year, limited to a maximum of 5.00% per year for Employees System members and 3.00% per year for Tier 2 Fire & Police System members. For members that have COLA banks, we assume that Employees System members receive 5.00% COLA increases until their COLA banks are exhausted and 2.50% thereafter, and Fire & Police members receive 3.00% COLA increases until their COLA banks are exhausted and 2.50% thereafter.

Tier 1 Fire & Police System members' COLA increases due to changes in average compensation or new salaries adopted are equal to total wage growth of 3.00% per year (composed of 2.50% CPI plus 0.50% across-the-board salary increase), limited to maximum of 5.00% per year.

Employee contribution crediting rate

6.75%, assumed in the valuation.

Payroll growth

Inflation of 2.50% per year plus "across-the-board" salary increase of 0.50% per year.

Inflationary and real "across-the-board" salary increases

Inflation of 2.50% per year plus "across the board" real salary increases of 0.50% per year.

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