Fresno County Employees' Retirement Association

Economic Assumptions Review

Review of Economic Actuarial Assumptions for the June 30, 2021 Actuarial Valuation

Segal

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Board of Retirement
Fresno County Employees' Retirement Association
7772 N Palm Ave
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Re: Review of Economic Actuarial Assumptions for the June 30, 2021 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report on our review of the June 30, 2021 economic actuarial assumptions for the Fresno County Employees' Retirement Association (FCERA). This report includes our recommendations and the analysis supporting their development.

It has been the general practice of the Board of Retirement to review both the economic and non-economic[1] actuarial assumptions every three years. As the last triennial experience study with our recommended assumptions was adopted and applied starting with the June 30, 2019 valuation, the next triennial experience study is not scheduled until part of the June 30, 2022 valuation. In the June 30, 2020 valuation, we indicated that the employer's Unfunded Actuarial Accrued Liability (UAAL) contributions are expected to decline in the next several years as FCERA's prior UAAL amortization layers are being amortized. Due to this and other considerations, the Board has requested that Segal perform an out-of-cycle review of the economic assumptions for use in the June 30, 2021 valuation. With this review, we have also reflected FCERA's recently revised target asset allocation resulting from their investment consultant's updated asset liability study.

As the non-economic assumptions will not be reviewed until the next triennial experience study as of June 30, 2022, we will continue to apply the same non-economic assumptions used in the June 30, 2020 valuation for the June 30, 2021 valuation.

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.

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

Sincerely,

Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary

Andy Yeung, ASA, MAAA, FCA, EA
Vice President and Actuary

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[1] The non-economic assumptions include rates of service and disability retirement, withdrawals, pre-retirement and post-retirement mortality, merit and promotion salary increases, etc.

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I. Introduction, Summary, and Recommendations

To project the cost and liabilities of the Pension Plan, 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. [2]

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 Economic Assumptions for Measuring Pension Obligations." These Standards of Practice provide guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation.

We are recommending changes to the inflation, cost-of-living adjustment, investment return and administrative expenses assumptions currently used by the Board.

Our recommendations for the economic actuarial assumptions for the June 30, 2021 actuarial valuation are as follows:

[2] We believe it is currently not possible to determine how and to what extent the economy may be affected by the COVID-19 pandemic. For that reason, an analysis of any ongoing impact of the COVID-19 pandemic on economic actuarial assumptions is beyond the scope of this review of economic assumptions.

Pg #	Actuarial Assumption Categories	Recommendation
8	**Inflation:** Future increases in the Consumer Price Index (CPI), which drives investment returns and active member salary increases.	Reduce the inflation assumption from 2.75% to 2.50% per annum as discussed in Section (III)(A).
9	**Retiree Cost-of-Living Increases:** Future increases in the Cost of Living adjustment for Retirees.	Reduce the retiree cost-of-living assumption from 2.75% to 2.50% per annum for General Tiers 1, 2 and 3 and Safety Tiers 1 and 2 members as discussed in Section (III)(A).
11	**Investment Return:** The estimated average future net rate of return on current and future assets of the Association as of the valuation date. This rate is used to discount liabilities.	Reduce the investment return assumption from 7.00% to 6.50% per annum as discussed in Section (III)(B).
18	**Individual 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 salary increases • Real "across the board" salary increases • Merit and promotion increases	Reduce the current inflationary salary increase assumption from 2.75% to 2.50% and maintain the current real "across-the-board" salary increase assumption at 0.50%. This means that the combined inflationary and real "across-the-board" salary increases will decrease from 3.25% to 3.00%. The current merit and promotion salary increase assumption ranges from 8.50% to 1.10% for General and 8.50% to 1.50% for Safety. The merit and promotion increases will remain unchanged; they were reviewed in the last triennial experience study as of June 30, 2019 and will be reviewed again at the next triennial experience study as of June 30, 2022.
20	**Administrative Expenses:** Fees for administration, legal, accounting, and actuarial services, and other functions carried out by the Association.	Increase the explicit administrative expense load from 1.20% to 1.30% of projected payroll as discussed in Section (III)(D).

We have estimated the impact of the recommended economic assumption changes as if they were applied to the June 30, 2020 actuarial valuation without taking into consideration the expected reduction in the employer's UAAL contribution rate discussed in the cover letter[3]. On that basis, the following table shows the changes in the average employer and member contribution rates due to the recommended economic assumption changes (as recommended in Section III of this report).

[3] As the Association's prior UAAL amortization layers are fully amortized, the average employer's UAAL rates (excluding explicit administrative expense load of 0.86% of payroll as determined in the June 30, 2020 valuation) are expected to change as follows in the next five valuations before taking into consideration the deferred investment losses as of the June 30, 2020 and assuming all the actuarial assumptions in the June 30, 2020 valuations are met in future years:

Valuation Date	UAAL Rate (%)	UAAL Rate Change
Baseline June 30, 2020	38.36%	
June 30, 2021	34.58	(3.78%)
June 30, 2022	30.77	(3.81)
June 30, 2023	28.56	(2.21)
June 30, 2024	24.31	(4.25)
June 30, 2025	15.98	(8.33)

Cost Impact of the Recommended Economic Assumptions Based on June 30, 2020 Actuarial Valuation

Impact on Average Employer Contribution Rates	
Total increase in average employer rate	4.65%
Total estimated increase in annual dollar amount ($000s)	$21,866
Impact on Average Member Contribution Rates	
Total increase in average member rate	0.63%
Total estimated increase in annual dollar amount ($000s)	$2,960
Impact on UAAL and Funded Percentage	
Increase in UAAL	$194 million
Change in Funded Percentage	From 82.69% to 80.22%

Section II provides some background on the basic principles and methodology used for the review of the economic actuarial assumptions. A detailed discussion of each assumption and reasons for the proposed changes are found in Section III. The cost impact of the proposed changes is detailed in Section IV.

II. Background and Methodology

In this report, we analyzed the economic assumptions only. The primary economic assumptions reviewed are inflation, retiree cost-of-living increases, investment return, administrative expenses and the inflationary and real "across-the-board" components of 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.
- **Investment Return:** Expected long-term rate of return on the Association's investments after investment. 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. These are commonly referred to as merit and promotion increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by 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 III.

III. 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 an analysis of 15 and 30 year moving averages of historical inflation rates:

Historical Consumer Price Index – 1930 to 2020[4]
(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.4%	3.3%	4.4%
30-year moving averages	2.9%	3.7%	4.8%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary environment over the past two decades. Also, the later 15-year averages during the period are lower because they do not include the high inflation years of the mid-1970s and early 1980s.

Based on information found in the Public Plans Data website, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 178 large public retirement funds in their 2019 fiscal year valuations was 2.50%.[5] In California, CalSTRS, and sixteen 1937 Act CERL systems use an inflation assumption of 2.75% while CalPERS and four 1937 Act CERL systems use an inflation assumption of 2.50%.[6]

FCERA's investment consultant, Verus, anticipates an annual inflation rate of 1.80%, while the average inflation assumption provided by Verus and five other investment advisory firms retained by Segal's California public sector clients was 2.23%. Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.[7]

To find a forecast of inflation based on a longer time horizon, we referred to the Social Security Administration's (SSA) 2020 report on the financial status of the Social Security program.[8] The

[4] 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).
[5] Among 199 large public retirement funds, the inflation assumption was not available for 21 of the public retirement funds in the survey data.
[6] One of these 1937 Act CERL systems uses a 2.50% inflation assumption with a 2.75% COLA assumption.
[7] The time horizon used by the six investment consultants in our review generally ranges from 10 years to 30 years and Verus uses both 10-year and 30-year horizons.
[8] Source: Social Security Administration: The 2020 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds

projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.40%. 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.[9] As of April 2021, the difference in yields is about 2.25% which provides a measure of market expectations of inflation. (We note that there has been an increase in this market measurement of thirty-year inflation as the yield as of January 2019 was about 1.85% at the time of our last review of the economic assumptions.)

Based on all of the above information, we recommend that the current 2.75% annual inflation assumption be reduced to 2.50% for the June 30, 2021 actuarial valuation.

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 of the above metrics, beginning in 2021 we are generally recommending the same 2.50% inflation assumption in our experience studies for our California public retirement system clients.

Retiree Cost-of-Living Increases

Consistent with our recommended inflation assumption, we also recommend reducing the current assumptions to value the post-retirement COLA benefit from 2.75% to 2.50% per year for all General Tiers 1, 2 and 3 and Safety Tiers 1 and 2 members.[10]

Note that members in Tiers 4 and 5 receive no COLA increases.

In recommending the above reduction in the COLA assumption, we have also compared the CPI measure used by FCERA for setting actual COLA increases based on annual change in CPI for the West Region with the CPI measure used by Segal to study change in prices based on annual change in CPI for all U.S. City Average. While the West Region changes have been greater than the U.S. City Average, they are consistent with the recommended reduction in the COLA assumption.

	Change in Average Annual CPI for West Region	Change in Average Annual CPI for U.S. City Average
5-year period	2.51%	1.77%
10-year period	2.20%	1.73%
20-year period	2.29%	2.06%

In developing the COLA assumption for this study, we considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur before COLA banks could be established for new retirees. Although the results of this type of analysis might justify the use of a lower COLA assumption, we are not recommending that at this time. The reasons for this conclusion include the following:

[9] Source: Board of Governors of the Federal Reserve Association.

[10] For current retires and beneficiaries, we would utilize the accumulated COLA banks to value an annual 3.00% COLA increase to General Tiers 1, 2 and 3 and Safety Tiers 1 and 2 payees until those banks become depleted.

- The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumptions.
- Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption is met in a year. We question the reasonableness of this result.

We do not see the stochastic possibility of COLAs averaging less than those predicted by the assumed rate of inflation as a reliable source of cost savings that should be anticipated in our COLA assumptions. Therefore, we continue to recommend setting the COLA assumptions based on the lesser of the Tier specific COLA and the long-term annual inflation assumption, as we have in prior years.

B. Investment Return

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

Real Rate of Investment Return

This component represents the portfolio's incremental investment market returns over inflation. Theory has it that as an investor takes a greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional 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 Association's portfolio will vary with the Board's asset allocation among asset classes.

The Association's 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 Verus' total or "nominal" 2021 30-year return assumptions by their assumed 1.80% inflation rate. The second column of returns (except for Value-Add Real Estate, Opportunistic Real Estate and Infrastructure) 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 Verus and five other investment advisory firms retained by Segal's public sector clients. We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[11]

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

FCERA's Target Asset Allocation and Assumed Arithmetic Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	Verus' Assumed Real Rate of Return[12]	Average Assumed Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[13]
Large Cap Equity	22.50%	4.90%	5.39%
Small Cap Equity	5.50%	5.90%	6.58%
Developed Int'l Large Cap Equity	12.50%	5.10%	6.39%
Developed Int'l Small Cap Equity	3.00%	5.00%	5.64%
Emerging Market Equity	5.50%	6.50%	8.60%
Core Bonds	15.00%	0.70%	0.83%
High Yield Bonds	2.00%	3.10%	3.06%
Bank Loans	2.00%	1.00%	2.73%
Global Sovereign ex U.S.	4.00%	-0.50%	-0.73%
Local Emerging Market Debt	3.00%	3.20%	2.72%
Core Real Estate	4.00%	4.50%	5.01%
Private Credit	8.00%	2.90%	5.02%
Private Equity	6.00%	10.90%	10.00%
Value-add Real Estate	1.50%	7.10%	7.10%[13]
Opportunistic Real Estate	1.50%	9.80%	9.80%[13]
Infrastructure	4.00%	7.60%	7.60%[14]
Total	**100.00%**	**4.46%**	**5.07%**

The above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.8.3.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 has reason to believe, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the long term."

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients 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 durations of a retirement plan's liabilities.
2. Using a sample average of expected real rates of return allows FCERA's 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.

[12] Derived by reducing Verus' nominal rate of return assumptions by their assumed 1.80% inflation rate over a 30-year horizon.

[13] These are based on the projected arithmetic returns provided by Verus and five other investment advisory firms serving the county retirement association of Fresno and 16 other city and county retirement systems in California. These return assumptions are gross of any applicable investment expenses.

[14] For this asset class, Verus' assumption is applied in lieu of the average because there is a larger disparity in returns for this asset class among the firms surveyed and using Verus' assumption should more closely reflect the underlying investments made specifically for FCERA.

3. Therefore, we recommend that the 5.07% portfolio real rate of return be used to determine FCERA's investment return assumption. This is 0.32% lower than the return that was used two years ago in the review to prepare the recommended investment return assumption for the June 30, 2019 valuation. The difference is due to changes in the FCERA's target asset allocation (0.04%), changes in the real rate of return assumptions provided to us by the investment advisory firms (-0.35%), and the interaction of those two items (-0.01%).

Investment 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. The following table provides the investment expenses in relation to the actuarial value of assets for the five years ending June 30, 2020.

Investment Expenses as a Percentage of Actuarial Value of Assets (Dollars in 000's)

Year Ending June 30	Actuarial Value of Assets[15]	Investment Expenses[16]	Investment %
2016	$4,093,377	$17,766	0.43%
2017	4,278,161	24,608	0.58
2018	4,529,508	26,422	0.58
2019	4,802,958	27,957	0.58
2020	4,971,255	26,300	0.53
Five-Year Average			**0.54%**
Three-Year Average			**0.56%**
Current Assumption			**0.60%**
Proposed Assumption			**0.60%**

Based on the information presented above, we recommend that the FCERA's future expense component of the investment return assumption be maintained at 0.60%.

Note related to investment expenses paid to active managers – As cited above, under Section 3.6.3.d of ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses" when determining whether "the actuary has reason to believe, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the long term."

For FCERA, of the $26.3 million in investment expenses and fees paid in fiscal year ending June 30, 2020, FCERA identified that about $25.4 million (or about 0.5% of plan assets) was associated with active portfolio management expenses. 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.

[15] As of beginning of plan year.

[16] 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.

For this study, we have continued 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. For example, 0.25% of alpha would increase the confidence level by 3% (see discussions that follow on definitions of risk adjustment and confidence level).

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 Association's 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.

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.[17] This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

The 5.07% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. In our model, the confidence level associated with a particular risk adjustment represents the relative likelihood that future investment earnings would equal or exceed the assumed earnings over a 15-year period on an expected value basis.[18] 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. Note that, based on the investment return assumptions recently adopted by systems that have been analyzed under this model, we observe a confidence level in the range of 50% to 60%.

Two years ago, the Board adopted an investment return assumption of 7.00%. That return implied a risk adjustment of 0.54%, reflecting a confidence level of 57% that the actual average return over 15 years would not fall below the assumed return, assuming that the distribution of returns over that period follows the normal statistical distribution.[19]

If we use the same 57% confidence level from our last study to set this year's risk adjustment, based on the current long-term portfolio standard deviation of 12.10% provided by Verus, the corresponding risk adjustment would be 0.53%. Together with the other investment return components, this would result in an investment return assumption of 6.44%, which is 0.56% lower than the current assumption of 7.00%.

Based on the general practice of using one-quarter percentage point increments for economic assumptions, we recommend a net investment return assumption of 6.50%, together with the other investment return components, would produce a risk adjustment of 0.47%, which corresponds to a confidence level of 56%.

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

[18] 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.

[19] Based on an annual portfolio return standard deviation of 12.40% provided by Verus in 2018. Strictly speaking, future compounded long-term investment returns will tend to follow a log-normal distribution. However, we believe the normal distribution assumption is reasonable for purposes of setting this type of risk adjustment.

The table below shows FCERA's historical investment return assumptions, risk adjustments and corresponding confidence levels for the current and prior studies, for the years when this analysis was performed.

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

Year Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2010-2012	7.75%	1.05%	64%
2013 (Full Study)	7.25%	0.68%	59%
2014-2015 (Interim Study)	7.25%[20]	0.80%	61%
2016-2018	7.00%[19]	0.58%	58%
2019	7.00%[19]	0.54%	57%
2021 (Recommended)	6.50%[19]	0.47%	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 FCERA has positioned itself relative to risk over periods of time.[21] For the June 30, 2021 valuation, the use of a confidence level of 56% 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.
- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by Verus. 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.
- A confidence level of 56% is within the range of about 50% to 60% confidence levels that correspond to the risk adjustments currently used by most of Segal's other California public retirement system clients.
- 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 "Comparison with Other Public Retirement Systems."

Taking into account the factors above, our recommendation is to reduce the net investment return assumption from 7.00% to 6.50%. As noted above, this return implies a 0.47% risk adjustment, reflecting a confidence level of 56%.

[20] These investment return assumptions are gross of administrative expenses.

[21] 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."

Recommended Investment Return Assumption

The following table summarizes the components of the investment return assumption developed in the previous discussion. For comparison purposes, we have also included similar values from the last study.

Calculation of Investment Return Assumption

Assumption Component	June 30, 2021 Recommended	June 30, 2019 Adopted Value
Inflation	2.50%	2.75%
Plus Portfolio Real Rate of Return	5.07%	5.39%
Minus Expense Adjustment	(0.60%)	(0.60%)
Minus Risk Adjustment	(0.47%)	(0.54%)
Total	**6.50%**	**7.00%**
Confidence Level	**56%**	**57%**

Based on this analysis, we recommend that the investment return assumption be reduced from 7.00% to 6.50%.

Comparison with Alternative Model used to Review Investment Return Assumption

Since our appointment as actuary for FCERA in 2006, we have consistently reviewed investment return assumptions based on our model that incorporates expected arithmetic real returns for the different asset classes and for the entire portfolio as one component of that model.[22] The use of "forward looking expected arithmetic returns" is one of the approaches discussed for use in the Selection of Economic Assumptions for measuring Pension Obligations under ASOP No. 27.

Besides using forward looking expected arithmetic returns, ASOP No. 27 also discussed setting investment return assumptions using an alternative "forward looking expected geometric returns" approach.[23] Even though expected geometric returns are lower than expected arithmetic returns, those California public retirement systems that have set investment return assumptions using this alternative approach have in practice adopted investment return assumptions that are comparable to those adopted by the Board for FCERA. This is because under the model used by those retirement systems, their investment return assumptions are not reduced to anticipate future investment expenses.[24]

For comparison, we evaluated the 6.50% recommended assumption based on the expected geometric return for the entire portfolio, gross of the investment expenses. Under that model,

[22] Again, as discussed in the footnote to "Risk Adjustment", 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.

[23] 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.

[24] This means that if the model were to be applied to FCERA, the expected geometric return would not be adjusted for the assumed 0.60% investment expenses paid by FCERA.

over a 15-year period, there is a 65% likelihood that future average geometric returns will meet or exceed 6.50%.[25]

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 7.00% or lower is becoming more common among California public sector retirement systems. In particular, of the twenty 1937 Act CERL systems, thirteen use a 7.00% investment return assumption, three use 6.75% and one uses 6.50%. The remaining three 1937 Act CERL systems currently use a 7.25% earnings assumption. Furthermore, both CalPERS and CalSTRS currently use a 7.00% earnings assumption, while the San Jose and San Diego City retirement systems use investment return assumptions of 6.625% and 6.50%, respectively.

The following table compares FCERA's recommended net investment return assumption against those of the 199 large public retirement funds in their 2019 fiscal year valuations based on information found in the Public Plans Data website, which is produced in partnership with NASRA:[26]

		Public Plans Data[27]		
Assumption	**FCERA**	**Low**	**Median**	**High**
Net Investment Return	6.50%	4.50%	7.25%	8.25%

The detailed survey results show that more than 80% of the systems have an investment return assumption in the range of 6.75% to 7.50%. Also, almost half of the systems have reduced their investment return assumption from 2017 to 2019. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

In summary, we believe the recommended assumption of 6.50% provides for a risk margin within the risk adjustment model and is consistent with FCERA's current practice relative to other public systems.

[25] We performed this stochastic simulation using the capital market assumptions included in the 2020 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 2020 survey that included responses from 39 investment advisors.

[26] Among 199 large public retirement funds, the investment return assumption was not available for 12 of the public retirement funds in the survey data.

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

C. Salary Increase

Salary increases impact plan costs in two ways: (i) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (ii) by increasing total active member payroll which in turn generates lower UAAL contribution rates as a percent of payroll. These two impacts are discussed separately as follows:

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 are recommending that the assumed rate of inflation be reduced from 2.75% to 2.50% per year. 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 0.5% – 0.8% 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 April 2020. In that report, real "across the board" pay increases are forecast to be 1.1% 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, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that for FCERA's active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over the three year period ending June 30, 2020 was 3.10%, which is higher than the change in CPI for the West Region of 2.64% during that same period.

Valuation Date	Actual Average Increase[28]	Actual Change in CPI[29]
June 30, 2018	2.86%	3.29%
June 30, 2019	3.03%	2.67%
June 30, 2020	3.42%	1.94%
Three-Year Average	**3.10%**	**2.64%**

Considering these factors, 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 decrease from 3.25% to 3.00%.

3. **Merit and Promotion Increases:** As the name implies, these increases come from an employee's career advances. This form of pay increase differs from the previous two, since it is specific to the individual. For FCERA, there are service-specific merit and promotional increases. The assumed increases range from 8.50% to 1.10%. Generally, we review this merit and promotional component as part of the triennial experience study.

   We recommend maintaining the merit and promotional assumptions discussed above in the June 30, 2021 actuarial valuation.

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 an influence, because this average pay is not specific to an individual.

Under the Board's current practice, the UAAL contribution rate is developed by assuming 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 member's future benefits.

We recommend that the active member payroll increase assumption be decreased from 3.25% to 3.00% annually, consistent with the combined inflation plus real "across the board" salary increase assumptions.

[28] 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.

[29] Based on the change in 1st Semiannual CPI for the West Region compared to the prior year.

D. Administrative Expenses

The following table provides the administrative expenses in relation to the projected payroll for each of the five years ending June 30, 2020.

Administrative Expenses as a Percentage of Actuarial Value of Assets (Dollars in 000's)

Year Ending June 30	Projected Payroll	Administrative Expenses	Administrative Expenses as a Percent of Payroll%
2016	$383,775	$4,814	1.25%
2017	402,535	4,762	1.18
2018	413,760	5,677	1.37
2019	431,678	5,981	1.39
2020	457,759	6,422	1.40
Five-Year Average			**1.32%**
Three-Year Average			**1.39%**
Current Assumption			**1.20%**
Proposed Assumption			**1.30%**

The average administrative expenses percentage over this five-year period is 1.32% of projected payroll with higher expenses for the most recent year as of June 30, 2020. Based on this experience, we recommend increasing the current administrative expense assumption from 1.20% to 1.30% of projected payroll. This expense will be allocated to both the employer and member based on the total average contribution rates in the upcoming June 30, 2021 actuarial valuation, as determined before including the administrative expenses.

IV. Cost Impact

Without taking into consideration the expected reduction in the employer's UAAL contribution rate discussed in the cover letter,[30] the tables below show the changes in the average employer and member contribution rates due to the recommended assumption changes, as if they were applied in the June 30, 2020 actuarial valuation.

The results include the change in the administrative expense load from 1.20% to 1.30% of payroll. The cost associated with the administrative expense load has continued to be allocated to both the employer and the member based on the components of the total contribution rate (before expenses) for the employer and the member.

Cost Impact of the Recommended Economic Assumptions Based on June 31, 2020 Actuarial Valuation

Impact on Average Employer Contribution Rates	
Total increase in average employer rate	4.65%
Total estimated increase in annual dollar amount ($000s)	$21,866
Impact on Average Member Contribution Rates	
Total increase in average member rate	0.63%
Total estimated increase in annual dollar amount ($000s)	$2,960
Impact on UAAL and Funded Percentage	
Increase in UAAL	$194 million
Change in Funded Percentage	From 82.69% to 80.22%

We have also analyzed in the tables below the average employer and member contribution rate impacts by each Tier due to the recommended assumption changes as if they were applied to the June 30, 2020 actuarial valuation.

[30] As the Association's prior UAAL amortization layers fully amortized, the average employer's UAAL rates (excluding explicit administrative expense load of 0.86% of payroll as determined in the June 30, 2020 valuation) are expected to change as follows in the next five valuations before taking into consideration the deferred investment losses as of the June 30, 2020 and assuming all the actuarial assumptions in the June 30, 2020 valuations are met in future years:

Valuation Date	UAAL Rate (%)	UAAL Rate Change
Baseline June 30, 2020	38.36%	
June 30, 2021	34.58	(3.78%)
June 30, 2022	30.77	(3.81)
June 30, 2023	28.56	(2.21)
June 30, 2024	24.31	(4.25)
June 30, 2025	15.98	(8.33)

Employer Contribution Rate Impact (%of Payroll)				
Plan	Normal Cost	UAAL	Total	Estimated Dollar Amounts (in thousands)[31]
General Tier 1	1.90%	3.09%	4.99%	$8,474
General Tier 2	1.44%	3.09%	4.53%	341
General Tier 3	1.51%	3.09%	4.60%	1,474
General Tier 4	0.86%	3.09%	3.95%	610
General Tier 5	0.66%	3.09%	3.75%	6,271
Safety Tier 1	1.92%	4.36%	6.28%	2,385
Safety Tier 2	2.31%	4.36%	6.67%	295
Safety Tier 4	1.42%	4.36%	5.78%	280
Safety Tier 5	1.10%	4.36%	5.46%	1,736
Combined	**1.34%**	**3.31%**	**4.65%**	**$21,866**

Member Contribution Rate Impact (%of Payroll)		
Plan	Rate	Estimated Dollar Amounts (in thousands)[30]
General Tier 1	0.56%	$936
General Tier 2	0.33%	25
General Tier 3	0.44%	139
General Tier 4	0.58%	89
General Tier 5	0.66%	1,105
Safety Tier 1	0.66%	248
Safety Tier 2	0.56%	25
Safety Tier 4	0.87%	42
Safety Tier 5	1.10%	351
Combined	**0.63%**	**$2,960**

[31] Based on June 30, 2020 projected annual payrolls as determined under each set of assumptions.

Appendix A: Current Actuarial Assumptions

Economic Assumptions

Net Investment Return:	7.00%, net of investment expenses.
Administrative Expenses:	1.20% of payroll allocated to both the employer and member based on the components of the total contribution rate (before expenses) for the employer and member.
Employee Contribution Crediting Rate:	2.75%, compounded semi-annually. (The difference between the 7.00% net investment return assumption and 2.75% is credited to the other valuation reserves.)
Consumer Price Index:	Increase of 2.75% per year, retiree COLA increases due to CPI subject to a 3.00% maximum change per year for General Tiers 1, 2 and 3, and Safety Tiers 1 and 2. General and Safety Tiers 4 and 5 receive no COLA increases.
Payroll Growth:	Inflation of 2.75% per year plus “across the board” real salary increases of 0.50% per year.
Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 2.75% per year from the valuation date.
Increase in California Government Code Section 7522.10 Compensation Limit:	Increase of 2.75% per year from the valuation date.

Appendix B: Proposed Actuarial Assumptions

Economic Assumptions

Net Investment Return:	6.50%, net of investment expenses.
Administrative Expenses:	1.30% of payroll allocated to both the employer and member based on the components of the total contribution rate (before expenses) for the employer and member.
Employee Contribution Crediting Rate:	2.50%, compounded semi-annually. (The difference between the 6.50% net investment return assumption and 2.50% is credited to the other valuation reserves.)
Consumer Price Index:	Increase of 2.50% per year, retiree COLA increases due to CPI subject to a 3.00% maximum change per year for General Tiers 1, 2 and 3, and Safety Tiers 1 and 2. General and Safety Tiers 4 and 5 receive no COLA increases.
Payroll Growth:	Inflation of 2.50% per year plus “across the board” real salary increases of 0.50% per year.
Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 2.50% per year from the valuation date.
Increase in California Government Code Section 7522.10 Compensation Limit:	Increase of 2.50% per year from the valuation date.