CITY OF FRESNO
RETIREMENT SYSTEMS

Review of Economic Actuarial Assumptions for the June 30, 2010 Actuarial Valuation (Revised)

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JUNE 2010

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June 24, 2010

Boards of Retirement
City of Fresno Retirement Systems
2828 Fresno Street, Suite 201
Fresno, CA 93721-1357

Re: Review of Economic Actuarial Assumptions for the June 30, 2010 Actuarial Valuations

Dear Members of the Boards:

We are pleased to submit this report of our review of the June 30, 2010 economic actuarial assumptions for the two City of Fresno Retirement Systems. This report includes our recommendations and the analysis supporting their development.

Also, in a separate report, we have conducted a review of the non-economic assumptions for the period of July 1, 2006 through June 30, 2009. Those assumptions may be adopted by the Boards for the June 30, 2010 valuations.

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,

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Senior Vice President and Actuary

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Vice President and Associate Actuary

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I. INTRODUCTION, SUMMARY, AND RECOMMENDATIONS

To project the cost and liabilities of the Pension Funds, 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 changed, 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. Adjusting contributions as gains or losses occur without making a change in the assumptions is appropriate if the deviation from projections is considered temporary and if, over the long run, experience is expected to return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and it has a much greater effect on the current contribution requirements than the gain or loss for a single year.

The use of realistic actuarial assumptions is important to maintain adequate funding, while fulfilling benefit commitments to participants already retired and to those near retirement. The actuarial assumptions 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." This Standard of Practice puts forth guidelines for the selection of the economic actuarial assumptions utilized in a pension plan actuarial valuation.

Please note that the investment return assumption recommended in this report has been developed without taking into consideration any impact the Systems' surplus distribution practices may have on the development of that assumption.

We are recommending changes in the economic assumptions currently used by the Boards. Our recommendations for the economic actuarial assumptions for the June 30, 2010 Actuarial Valuations are as follows:

Investment Return - The estimated average future net rate of return on current and future assets of the Systems as of the valuation date. This rate is used to discount liabilities.
Recommendation: Reduce the rate from 8.25% per annum to no greater than 8.00%.

Inflation – Future increases in the cost-of-living index which drives investment returns and active member salary increases, as well as COLA increases to retired employees.
Recommendation: Reduce the current 3.75% inflation assumption to 3.50% per annum.

Retiree Cost-of-Living Increases – The annual increases to retirees' retirement allowances for inflation.
Recommendation: Reduce the current 3.75% assumption to 3.50% for the Employees System and maintain the 4.00% and 3.00% assumption for the Fire and Police Tier 1 and Tier 2 plan, respectively.

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.
- Promotional and merit increases.

Recommendation: Reduce the current inflationary salary increase from 3.75% to 3.50% per annum consistent with our recommended general inflation assumption, and increase the real "across the board" salary increase assumption from 0.25% to 0.50% per annum. This means that the combined inflationary and real "across the board" salary increases will remain at 4.00% per annum. The recommended promotional and merit increase assumptions are provided in our June 30, 2009 experience study report.

Section II provides some background on basic principles and the methodology used for the review of the economic actuarial assumptions. A detailed discussion of each of the economic assumptions and reasons behind the recommendations is found in Section III.

II. BACKGROUND AND METHODOLOGY

In this report, we only analyzed the "economic" assumptions. Our analysis of the "non-economic" assumptions for the June 30, 2010 valuation will be provided in a separate report. 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. Amortization of any Unfunded Actuarial Accrued Liability (UAAL) or Prefunded Actuarial Accrued Liability (PAAL) follows a pattern that increases each year by the total of the inflation rate plus any "across the board" pay increases that are assumed.

Investment Return – Expected long term rate of return on the Systems' investments after expenses. This assumption has a significant impact on contribution rates.

Salary Increases – In addition to inflationary increases, it is assumed that employees will receive raises from promotions and step increases. These are commonly referred to as promotional and merit increases. Salaries will also grow by any "across the board" real pay increases in excess of price inflation.

The setting of these assumptions is described in Section III.

III. ECONOMIC ASSUMPTIONS

The investment return assumption is comprised of two components: (i) Inflation; and (ii) the Real Rate of Investment Return.

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 it is set using primarily historical information. Following is an analysis of 15 and 30 year moving averages of historical inflation rates:

Historical Consumer Price Index – 1930 to 2009

(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15 year moving averages	2.7%	3.5%	4.8%
30 year moving averages	3.3%	4.3%	5.0%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period in the 1990s and early 2000s. However, the inflation rates for the past few years have started to show some increase. Also, the later of the 15-year averages during the period are lower as they do not include the high inflation years of the mid-1970s and early 1980s.

The City of Fresno Retirement Systems' investment consultant, Wilshire Consulting, anticipates an annual inflation rate of 2.50%. 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.

In a 2009 public fund survey published by the National Association of State Retirement Administrators, the median inflation assumption used by 113 large public retirement funds in their 2008 valuations has remained unchanged from the 3.50% used in the 2007 valuations.

Based on all of the above information, we recommend that the current 3.75% annual inflation assumption be reduced to 3.50% for the June 30, 2010 actuarial valuation.

Retiree Cost-of-Living Increases

The retiree cost-of-living adjustments assumed in the prior valuations were 3.75% for the Employees System; and 4.00% and 3.00% for Tier 1 and Tier 2 employees, respectively, in the Fire and Police System. Consistent with our 3.50% inflation assumption, we recommend a 3.50% COLA assumption for the Employees System. As the Tier 1 Fire and Police Plan has a "pay" based COLA, we recommend a 4.00% COLA assumption consistent with the total inflation plus "across the board" pay increase assumptions of 4.00% detailed later in this report. For the Tier 2 Fire and Police Plan, we recommend maintaining the 3% COLA assumption, which is the annual maximum increase payable to members of the Tier 2 Fire and Police System.

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 system's portfolio will vary with the Board's asset allocation among asset classes.

Following is the Systems' target asset allocation adopted by the Board in 2008 and the assumed real rate of return assumptions by asset class. The first column of real rate of return assumptions are determined by netting Wilshire's total 2010 return assumptions by their assumed 2.50% for inflation. The second column of returns represents the average of a sample of real rate of return assumptions. The sample includes the expected annual real rates of return provided to us by Wilshire and by eight 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.

The City of Fresno Retirement Systems' Target Asset Allocation Adopted by the Board in 2008 and Assumed Arithmetic Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	Wilshire's Assumed Real Rate of Return[1]	Average from a Sample of Consultants to Segal's Public Sector Clients' Real Rates of Return[2]
Domestic Equity - Large Cap	22.5%	6.28%	6.45%
Domestic Equity - Small Cap	7.5%	6.28%	6.98%
Developed International Equity	25.0%	6.45%	6.95%
Emerging Market Equity	5.0%	7.88%	9.29%
Domestic Fixed Income	24.0%	1.88%	1.77%
High Yield Fixed Income	6.0%	4.00%	5.04%
Real Estate	10.0%	5.60%	4.83%
Total Portfolio	100.0%	5.14%	5.39%

(1) Derived by netting Wilshire's 2010 rate of return assumption by their assumed 2.50% inflation rate.
(2) Including City of Fresno; the County retirement systems of Orange, San Bernardino, Alameda, Contra Costa, Fresno, San Diego, Sacramento; and the LA City Employees' Retirement System.

Please note that 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 3.6.3.e, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (pessimistic). Few investment managers consistently achieve significant above-market returns net of expenses over long periods."

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 shorter than the durations of a retirement plan's liabilities.

2. Using a sample average of expected real rates of return allows the Systems' investment return assumption to reflect a broad range of capital market information and should help reduce volatility in the Systems' investment return assumption from one assumption review to the next.

3. Therefore, we recommend that the 5.39% portfolio real rate of return be used to determine the Systems' investment return assumption.

Systems' Expenses

The real rate of return assumption for the portfolio needs to be adjusted for administrative and investment expenses expected to be paid from investment income.

The following table provides these expenses in relation to the actuarial value of assets for the five years ending June 30, 2009.

City of Fresno Employees Retirement System
Administrative and Investment Expenses as a Percentage of Actuarial Value of Assets

FYE	Actuarial Value of Assets*	Administrative Expenses	Investment Expenses**	Administrative %	Investment %	Total %
2005	$741,766,367	$642,349	$4,067,566	0.09%	0.55%	0.64%
2006	790,857,722	797,948	4,883,307	0.10	0.62	0.72
2007	847,515,671	916,494	5,808,135	0.11	0.69	0.80
2008	926,525,370	898,355	5,617,356	0.10	0.61	0.71
2009	980,961,408	894,267	4,396,421	0.09	0.45	0.54
					Average	0.68%

* As of the beginning of the plan year.
** Net of securities lending expenses and interest paid to prepaid employer contributions.

City of Fresno Fire and Police Retirement System
Administrative and Investment Expenses as a Percentage of Actuarial Value of Assets

FYE	Actuarial Value of Assets*	Administrative Expenses	Investment Expenses**	Administrative %	Investment %	Total %
2005	$793,058,514	$688,413	$4,521,965	0.09%	0.57%	0.66%
2006	846,718,158	802,502	5,403,021	0.09	0.64	0.73
2007	906,222,782	887,983	6,501,746	0.10	0.72	0.82
2008	1,000,961,198	944,599	6,271,295	0.09	0.63	0.72
2009	1,066,777,845	952,104	4,942,290	0.09	0.46	0.55
					Average	0.70%

* As of the beginning of the plan year.
** Net of securities lending expenses and interest paid to prepaid employer contributions.

The average expenses percentage over this five year period for the two plans combined was about 0.69%. We believe a future expense assumption of 0.70% is reasonable. We will continue to monitor this assumption as new data becomes available.

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 also are expected to vary by asset class. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment is to increase the likelihood of achieving the actuarial investment return assumption in the long term. The 5.39% expected real rate of return developed earlier in this report was based on expected mean or average returns. This means there is a 50% chance of the actual return being at least as great as the average. The risk adjustment is intended to increase that probability.

In 2007, Segal recommended an investment return assumption of 8.00%. That 8.00% return would have implied a risk adjustment of 0.59%. Together with a portfolio return standard deviation of 10.58% provided by Wilshire, that would reflect a confidence level of 58% 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.[1]

If we continue to use the same 58% confidence level to set this year's risk adjustment then, based on a portfolio return standard deviation of 11.19%, the result is a risk adjustment of 0.63%. Note that the portfolio return standard deviation was calculated by Wilshire in conjunction with the asset allocation adopted by the Boards in 2008 but has not been updated since then. Together with the other investment return components, this produces a net investment return assumption of 7.56%, which is substantially lower than either the current assumption of 8.25% or the 2007 Segal recommendation of 8.00%.

Returning to 2007, if instead of using the 8.00% recommended assumption we use the 8.25% adopted assumption, the actual risk adjustment reduces to 0.34%, for an actual confidence level of 55%. If we use this same confidence level to set this year's risk adjustment, the result is a risk adjustment of 0.36%. Together with the other investment return components, this produces a net investment return assumption of 7.83%.

[1] The theory that long term investment returns follow a Normal distribution is debatable; however, we believe the Normal distribution assumption is not unreasonable for purposes of setting the risk adjustment.

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how the Systems have positioned themselves over periods of time. Any discussion of the 58% recommended confidence level or the 55% implicit confidence level included in the Boards' investment return assumption adopted in 2007 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 by Wilshire. 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 lower level of inflation should reduce the overall risk of failing to meet the investment return assumption. Lowering the confidence level to some extent could be justified as consistent with the change in the inflation assumption.

- As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the following "Test of Risk Adjustment" section, including (1) a discussion of the relationship between the inflation assumption and the risk adjustment and (2) a comparison with assumptions adopted by similarly situated public sector retirement sections.

Taking into account the factors above, our recommendation is for a change in the net investment return assumption from 8.25% to no greater than 8.00%. For instance, adopting an 8.00% investment return assumption implies a risk adjustment of 0.19%, reflecting a confidence level of about 53% that the actual average return over 15 years would not fall below the assumed return. This is lower than the 55% confidence level implicit in the 2007 assumption of 8.25%.

Recommended Investment Return Assumption

By using the above example of an 8.00% assumption, the following table illustrates the components of the investment return assumption developed in the previous discussion.

Calculation of Investment Return Assumption

Assumption Component	Recommended Value
Inflation	3.50%
Plus Portfolio Real Rate of Return	5.39%
Minus Expense Adjustment	(0.70%)
Minus Risk Adjustment	(0.19%)
Total	8.00%

Based on this analysis, we recommend that the investment return assumption be reduced from 8.25% per annum to no greater than 8.00%

Test of Risk Adjustment

The original development of the risk adjustment component of our investment earnings assumption model arose from our experience with many retirement boards over many years. Quite simply, combining the various boards' inflation assumptions with the real return and expense components produced – and produces – a substantially higher assumed return than what the boards actually adopt, regardless of the consulting actuary or the methods involved in the process.

In addition to the generally risk adverse attitude of retirement boards noted above, we believe another reason for this involves the inflation assumption. As noted earlier, the inflation assumption for actuarial valuations is generally longer term than that used by investment consultants. For many years, that has lead to higher actuarial valuation inflation assumptions. A higher inflation assumption has a conservative effect - higher current cost - on the wage increase and COLA assumption, but is less conservative as part of the investment earnings assumption. In effect, the risk adjustment compensates for this by offsetting the effect of the higher inflation assumption on assumed investment earnings.

One way to test the reasonableness of the risk adjustment incorporated in our recommendation is to compare our risk adjusted investment return against the expected net investment return that would

result from using the average of all the capital market assumptions -- including the lower inflation assumption -- of the investment consultants in our sample.

Here is the comparison. It shows that the difference between our recommended return and that derived using the average of all the capital market assumptions of the investment consultants in our sample comes from the relationship between inflation assumptions and the risk adjustment.

Assumption Element:	Risk Adjusted Method	Average of Investment Consultant Sample	Difference
Inflation	3.50%	2.73%	0.77%
Risk Adjustment	-0.19%	0.00%	-0.19%
Real Rate of Return	5.39%	5.39%	0.00%
Expenses	-0.70%	-0.70%	0.00%
Total	8.00%	7.42%	+0.58%

The 0.58% (58 basis points) difference between the two calculations represents about a 7% to 8% lower confidence level under the risk adjusted method. Note that this generally corresponds to the difference between the net investment return based on the 58% confidence level recommended in 2007 that leads to an investment return of 7.56% and the recalculated 55% confidence level shown earlier that leads to an investment return assumption of 7.83%. This indicates that with the lower 55% confidence level the risk adjustment offsets only about one-fourth of the effect of using an inflation assumption higher than that used in the capital market assumptions.

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 assumption no greater than 8.00% is within the most common range for this assumption among most California public sector retirement systems. That range, with few exceptions, is from 7.75% to 8.00%. In particular two of the largest California systems, CalPERS and LACERA, use a 7.75% earnings assumption. Note that CalPERS uses a lower inflation assumption of 3.00% while LACERA uses a comparable inflation assumption of 3.50%.

The following table compares the City of Fresno Retirement Systems' recommended net investment return assumptions against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) public fund survey published in 2009:

Assumption	City of Fresno Retirement System	NASRA Public Fund Survey Published in 2009		
		Low*	Median	High*
Net Investment Return	No greater than 8.00%	7.25%	8.00%	8.50%
* After eliminating very lowest and highest as outliers				

As you can see, the recommended return assumption of no greater than 8.00% is somewhere between the low and the median. The detailed survey results show 49 systems at 8.00%, 28 at 7.50% or 7.75%, and 30 at 8.25% or 8.50%. The survey also notes that "as with inflation assumptions, investment return assumptions for many plans have been reduced in recent years."

In summary, we believe that while both the risk adjustment model and other considerations indicate a lower earnings assumptions, the model result of 7.56% (leaving the confidence level unchanged at the recommended level in 2007) or even a rounded result of 7.75% is a large change for a long term assumption. We believe adopting any assumption no greater than 8.00% provides for some risk margin within the risk adjustment model and is consistent with the Systems' current practice relative to other public systems.

Salary Increase Assumption

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 higher UAAL amortization payments (or higher amortization credits if the UAAL is negative). 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 will require an employer to maintain its employees' standards of living.

   As discussed earlier in this report, we are recommending the assumed rate of inflation be reduced from the current 3.75% to 3.50% per annum, consistent with our recommended general inflation assumption. This inflation component will be used as part of the salary increase assumption.

2. Real "Across the Board" Pay Increases – These increases are sometimes 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 0.7% - 1.0% annually during the last 10 - 20 years.

   We recommend increasing the real "across the board" salary increase assumption from 0.25% to 0.50% for the June 30, 2010 actuarial valuation so that the combined inflation and "across the board" salary increase assumption remains unchanged at 4.00%.

3. Promotional and Merit 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 the City of Fresno Retirement Systems, there is a service specific promotional and merit increase assumption. These assumptions have been reviewed as part of our June 30, 2009 experience study.

   We recommend adopting the promotional and merit assumptions included in our June 30, 2009 experience study report.

Active Member Payroll

Projected active member payrolls are used to develop the UAAL contribution rate or distributable actuarial surplus as a level percentage of pay. 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 of employees increases by inflation and real "across the board" pay increases. The promotional and merit increases are not an influence, because this average pay is not specific to an individual.

The active member payroll increase assumption to be used in the June 30, 2010 valuation will remain unchanged at 4.00% annually, consistent with the combined inflation and "across the board" salary increase assumptions. This is the same as the prior valuation.

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