



## Finance and Administration Committee Agenda Item 7b

September 19, 2017

**Item Name:** Longevity and Inflation Risk

**Program:** Actuarial Office

**Item Type:** Information

### **Executive Summary**

In order to align assets and liabilities, it is necessary to understand how liabilities respond to various risks. The following analysis examines how changing inflation and mortality assumptions impact system liabilities and how the risks associated with those changes are mitigated.

### **Strategic Plan**

Fund Sustainability – This material will serve to educate the Board, employers, members, and stakeholders on system risks and mitigation strategies.

### **Background**

CalPERS sets assumptions for the annual rate of inflation and for mortality, and both assumptions are used to measure liability. The liability is compared to the assets, and the difference between the two is used to determine the unfunded liability portion of the employer contribution requirement.

The inflation assumption affects the liability because it underlies economic assumptions such as the investment return assumption and future retiree Cost of Living Adjustments (COLAs). The mortality assumption affects the liability, because it determines the number of payments retirees, current as well as future, and their beneficiaries, are expected to receive. When actual inflation or mortality differs from that expected, the liability is affected. If assets are not also affected in a corresponding manner, the employer contribution requirement will change.

### **Analysis**

The term “inflation” specifically refers to price inflation. The inflation assumption underlies most of the economic assumptions used in an actuarial valuation, including the investment return assumption (which is also the discount rate), individual salary increases, payroll growth, and retiree Cost of Living Adjustments (COLAs). All of these assumptions are correlated with the liability, some positively and others negatively.

Investment Return / Discount Rate: Changing the inflation assumption has a direct impact on the discount rate since the discount rate is calculated as the sum of inflation plus the real rate of return. Therefore, a change in the inflation assumption corresponds to an equivalent change in the discount rate. A reduction in the discount rate would translate to higher costs, a lower funded ratio, and no change in projected benefits.

Individual Salary Increases: Salary increases are also made up of distinct components. These are wage inflation (price inflation plus productivity increases) and individual seniority, merit and promotion. So, a change in the inflation assumption corresponds to an equivalent change in the assumed future salary increases for every active member, for every year until retirement. A reduction in projected salaries would mean a reduction in the normal cost and accrued liability for active members, which translates to lower costs, a higher funded ratio, and a reduction in projected benefits.

Retiree COLAs: In most years CalPERS retirees receive an annual COLA which depends on the COLA provision applicable to the member and actual inflation (in the previous year as well as cumulative inflation since retirement). In any given year, a retiree can receive a COLA less than, equal to, or greater than inflation in the previous year. However, ignoring the possibility of deflation, a retiree's cumulative COLAs since retirement can never exceed cumulative inflation since retirement, and can actually be substantially less. A reduction in the inflation assumption means lower projected COLAs, which would translate to lower costs, a higher funded ratio, and lower projected benefits, although the impact would be modest.

The combined impact of a 0.25 percent reduction in the inflation assumption in all economic assumptions including the discount rate is shown below.

Impact of Reducing Inflation Assumption by 0.25%				
	Change in Normal Cost (% of Payroll)	Change in Funded Ratio	First year Change in UAL Amortization (% of Payroll)	Change in UAL Amortization after five years (% of Payroll)
State Misc. Tier 1	0.44%	-1.4%	0.40%	2.45%
State Industrial	0.51%	-1.7%	0.30%	2.00%
CHP	0.83%	-1.5%	0.74%	4.54%
POFF	0.86%	-1.7%	0.68%	4.24%
State Safety	0.63%	-1.7%	0.26%	1.93%
Schools	0.41%	-1.6%	0.28%	1.82%

It may seem counterintuitive that lower inflation translates to higher costs and a lower funded ratio, but this is indeed the case. A higher inflation assumption would do the opposite, lower costs and increase the funded ratio. This is because the impact of the inflation assumption on projected assets outweighs the opposite impact on projected benefits.

Next consider what happens when inflation is higher or lower than expected. It is not true that a year of lower than expected inflation means a year of lower than expected investment returns, salary increases, payroll growth and retiree COLAs. This is because the other components of the investment return could be higher than expected even though inflation was lower than expected and vice versa. Also, salary increases depend more on inflation in the years leading up to a collective bargaining cycle than inflation in the current year, while payroll growth depends in large part on revenue growth which may or may not be perfectly in sync with inflation. Only retiree COLAs will be lower than expected when inflation is lower than expected, but the impact is muted by the structure of the COLA, the COLA bank, and purchasing power protection provisions.

It is generally true, however, that a period of several years of lower (or higher) than expected inflation will cause these factors to grow slower (or faster) than expected. It is important to

understand that the relationship between inflation and plan costs is the reverse of what many people initially presume.

Also, note that during a period of high inflation, the increase in liability is partly due to greater than expected increases in salaries. If contributions are to remain a level percentage of payroll, as is CalPERS goal, then contributions should be expected to increase accordingly. Although high inflation causes benefit payments to increase in terms of nominal dollars, high inflation can also be viewed as a decrease in the value of a dollar. In terms of asset liability management, it appears that the risk of high inflation in the liabilities is hedged through CalPERS ability to collect higher contributions and earn higher investment returns.

Next consider the mortality assumption.

Unlike the inflation assumption, the mortality assumption is not a single number for all future years. The mortality assumption consists of probabilities for each year of age up to age 120. The value at a certain age is the probability that someone who has attained that age will die prior to attaining the next age. There are separate mortality assumptions for males and females since life expectancies between the two differ.

With mortality, CalPERS also needs to consider the mortality improvement that is expected to occur in the coming years. That is, these probabilities are expected to decline slightly as time goes on, and the rate of decline also depends on age and gender. Like the inflation assumption, the sensitivity of the liability to the mortality assumption can be illustrated by varying the assumption and measuring the change in the liability. The simplest way to vary the mortality assumption is to use "age setbacks". An age setback of one year means that everyone is valued as if they are one year younger than actual. This increases everyone's life expectancy in a realistic manner.

A two-year age setback for post-retirement mortality increases the life expectancy of a 60-year old retiree by approximately 1.7 years. Using a two-year age setback has the following impact. The accrued liability increases by approximately 4 percent for miscellaneous plans and approximately 3 percent for safety plans. The normal cost rate also increases by approximately 0.5 percent of payroll. This corresponds to an ultimate increase in the contribution requirement (after the five-year phase-in) of 3.5 percent of payroll for miscellaneous plans and 4.5 percent of payroll for safety plans.

While a two-year age setback represents a significant change in the mortality assumption, the impact is relatively minor. This is because even though the setback means a 60-year old retiree is expected to live 1.7 years longer, and to receive an additional 20 monthly pension payments, those 20 payments are 25 years in the future. CalPERS has 25 years to collect contributions and earn investment returns which will then be available to pay those additional 20 monthly payments.

CalPERS manages the mortality risk by performing an experience study every four years. The actuarial team constructs new mortality tables based on CalPERS experience. The team also measures actual mortality improvement and compares CalPERS experience to the most recently published improvement scales. The new tables with the new projections are then used to value the liabilities, and contribution rates are adjusted to reflect the difference between the old and new mortality assumptions. Doing the study every four years ensures that the change in the accrued liability and normal cost will be moderate, which is one way of keeping the overall risk at acceptable levels.



The results of the current experience study are expected to be presented to the Board in November.

**Budget and Fiscal Impacts**

Not applicable

**Benefits and Risks**

Not applicable

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