



Town of Atherton

FINANCE COMMITTEE STAFF REPORT

TO: FINANCE COMMITTEE

FROM: ROBERT BARRON III, FINANCE DIRECTOR

DATE: NOVEMBER 12, 2013

SUBJECT: CALPERS ACTUARIAL CHANGES – SENSITIVITY ANALYSIS

RECOMMENDATION

Review and Discuss.

BACKGROUND | FINDINGS

Pension liability continues to be a significant discussion amongst governmental agencies. For the past several meetings, the Finance Committee has engaged in a discussion over how to handle the Town's CalPERS pension obligations. Because the Town does not have any side-fund liability with CalPERS, the focus has been on the reliability and achievability of the CalPERS discount rate of 7.5% and the funded status of the Town's pension plan.

The Committee discussed alternative approaches to address the possibility that CalPERS does not achieve its projected rate of return. One strategy was to allocate a portion of the Town's reserve toward long-term pension obligations in an effort to "close the gap" in funded status and another was to develop an internal side-fund designed to set aside funds over time that could be used to offset any shortfalls due to CalPERS' selected rate of return.

The Committee discussed the possibility of developing a Request for Proposal (RFP) to solicit services on a sensitivity analysis for pension liability based on varying rates of return. Prior to releasing the RFP staff was asked to contact Joe Nation, Professor of Public Policy at Stanford University, to determine his level of interest in pursuing the project as an exercise for his graduate students.

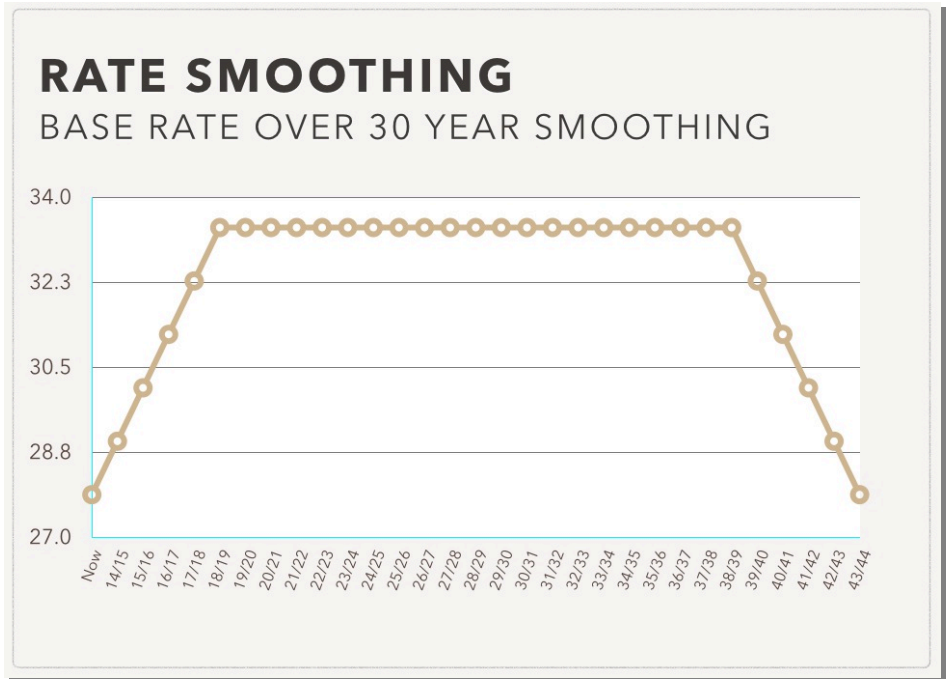
Staff met with Mr. Nation in September to discuss the project. Mr. Nation advised that the Town should hold off on the conduct of the analysis because he is developing a simulation model that will allow agencies to adjust a projected rate of return while holding other factors constant. The

simulation is grant funded and would likely be released in early Spring 2014. The model would assist the Town in reaching its goal for analysis; however, with recent changes put in place by Assembly Bill 340, CalPERS is conducting the same analysis as part of their annual agency actuarials.

As part of the pending amortization and rate smoothing plans, CalPERS also announced that actuarial reports for local agencies would now include scenarios to analyze different rates of return. This is exactly the analysis local agencies are seeking as they evaluate best and worst case scenarios with the selected rate of return by CalPERS.

Beginning in FY 2015/16 CalPERS will implement its 5-year rate smoothing policy. The new policy imposes a 1.1% rate increase on individual employer plan rates each year over 5 years. From years 5 through 25 their projection is a flat smoothing of the rates. At year 25, CalPERS would institute a decline through a reverse cycle of 1.1% decreases per year.

The chart to the right is a simplistic look at the 30-year transition on the local miscellaneous rate and does not reflect impacts due to changes in the employer base rate.



These could occur as a result of the market or plan changes.

The new CalPERS actuarials also include a “best case | worst case” scenario for the rate of return. The scenarios allow agencies to view what their rates would look like if the discount rate changed. Each scenario would also provide the Town the unfunded status gap and allow for policies to be created on that basis. The Town has not yet received its current actuarial from CalPERS but attached is a reflective excerpt from the State Pension Tier actuarial.

There are five scenarios outlined in the actuarial for the State Pension Tier reflective of what the Town’s actuarial will look like upon receipt.

1. The first scenario is the impact of a market with a 5th percentile rate of return from July 1, 2013 through June 30, 2016. The 5th percentile return corresponds to a -4.1% return for each fiscal year.

2. The second scenario is the impact of a market with a 25th percentile rate of return for that same period – corresponding to a 2.6% return for each fiscal year.
3. The third scenario is the impact of a market return at 49th percentile – corresponding to 7.5% (the assumed rate).
4. The fourth scenario is the impact of a 75th percentile return corresponding to an 11.9% return for each fiscal year.
5. The last scenario is a 95th percentile return – 18.5% return for each fiscal year.

I was able to attend a recent CalPERS educational forum in late October walking through the various components of the CalPERS actuarials. CalPERS also provided their historic rates of return based on investment periods:

1 Year – 12.5%
5 Year – 3.8%
10 Year – 7.2%
20 Year – 7.7%
30 Year – 9.5%

CalPERS bases their assumptions on the long-term. Some investment assumptions are rarely realized in a specific given year. Gains or losses occur when actual experience doesn't become realized. Role of the actuary is to prefund the pension plan and understand the various funding sources. The main funding sources are investment income, employer contributions, and employee contributions. Assumptions are developed through experience studies (past experience), professional judgment about potential future economic and demographic assumptions. CalPERS realizes that as actuarial assumptions are long term there could be volatility in liabilities and investments. A major focus is how to deal with the volatility.

When gains and losses occur, the percentage funded of an agency's plan is affected. Decisions must be made on how quickly to recover the funded status to 100%. Most agency plans are 75% funded. The CalPERS actuary understands this and the April 2013 decision involves amortization and smoothing methods to achieve a 100% funded status over a fixed 30-year period with the following framework:

- Amortize all gains and losses over a fixed 30-year period.
- Rates are smoothed (adjusted) in the first and last five years of the amortization period, beginning in FY 15/16.

Any unfunded liability will be amortized over the fixed 30-year period to ensure it is funded. The new methods will not have an impact on net normal costs but impacts the amounts paid toward the underfunded status of the plan. Using this new method, a funded status increase will reflect much faster than in previous years.

The average employer contribution rate in Fiscal Year 13/14 for public agency miscellaneous plans is 15.3% and public safety plans is 32%. Atherton's actuarial for June 30, 2012 will be released within the next month. Staff was able to find identify what the Town's employer

contribution rates will be as a result of that actuarial. The Town's local miscellaneous rate for FY 14/15 is 11.5% and 29.9% for Public Safety.

The new actuarial will include the CalPERS amortization and smoothing policies that take effect FY 15/16, as well as the risk measure scenarios of discount rate sensitivity analysis. Once the new actuarial valuations are released, staff will analyze the impact and present the Finance Committee with a report. Staff anticipates that the January Committee meeting will include a review of the actuarial reports and the new risk scenarios in the continuing development of a recommendation to the City Council.

Staff does not recommend release of an RFP for a sensitivity analysis at this time.

FISCAL IMPACT

None

ATTACHMENT

CalPERS Risk Measure Scenarios – Excerpt from State Pension Tier
Understanding Actuarial Information

Volatility Ratios

The actuarial calculations supplied in this communication are based on a number of assumptions about very long-term demographic and economic behavior. Unless these assumptions (terminations, deaths, disabilities, retirements, salary growth, and investment return) are exactly realized each year, there will be differences on a year-to-year basis. The year-to-year differences between actual experience and the assumptions are called actuarial gains and losses and serve to lower or raise the employer's rates from one year to the next. Therefore, the rates will inevitably fluctuate, especially due to the ups and downs of investment returns.

Asset Volatility Ratio

Plans that have higher asset to payroll ratios produce more volatile employer rates due to investment return volatility. For example, a plan with an asset to payroll ratio of 8 may experience twice the contribution volatility due to investment return volatility than a plan with an asset to payroll ratio of 4. Below we have shown the asset volatility ratio. It should be noted that this ratio is a measure of the current situation. It increases over time but generally tends to stabilize as the plan matures.

Liability Volatility Ratio

Plans that have higher liability to payroll ratios produce more volatile employer rates due to investment return and changes in liability. For example, a plan with a liability to payroll ratio of 8 is expected to have twice the contribution volatility of a plan with a liability to payroll ratio of 4. The liability volatility ratio is also included in the table below. It should be noted that this ratio indicates a longer-term potential for contribution volatility and the asset volatility ratio, described above, will tend to move closer to this ratio as the plan matures.

Rate Volatility

Plan	Market Value of Assets without Receivables	Annual Covered Payroll	Asset Volatility Ratio	Accrued Liability	Liability Volatility Ratio
	(1)	(2)	(1)/(2)	(3)	(3)/(2)
State Miscellaneous	54,775,231,553	9,665,137,942	5.7	83,523,526,246	8.6
State Industrial	2,148,979,669	545,112,340	3.9	2,968,403,342	5.4
State Safety	5,511,156,902	1,789,794,486	3.1	7,827,253,833	4.4
POFF	20,479,556,138	2,951,833,630	6.9	31,335,588,660	10.6
CHP	5,207,738,960	728,467,347	7.1	8,659,143,106	11.9
Schools	44,824,395,294	9,654,303,484	4.6	59,439,130,743	6.2

The above analysis shows that the CHP, POFF and Miscellaneous plans are expected to have more volatile contributions than the Schools pool, Industrial and Safety plans. It also shows that the contribution volatility is expected to increase as the plans become better funded. The contribution volatility would be 33% to 66% greater if the plans were 100% funded.

Projected Rates

On April 17, 2013, the CalPERS Board of Administration approved a recommendation to change the CalPERS amortization and smoothing policies. Beginning with the June 30, 2014 valuation that will set the 2015-16 rates, CalPERS will employ an amortization and rate smoothing policy that will pay for all gains and losses over a fixed 30-year period with the increases or decreases in the rate spread over a 5-year period. The table below shows projected employer contribution rates for the next six Fiscal Years, assuming CalPERS earns 12% for fiscal year 2012-13 and 7.50 percent every fiscal year thereafter, and assuming that all other actuarial assumptions will be realized and no changes to assumptions, contributions, benefits, or funding. These projections do not take into account potential rate increases from likely future assumption changes. They do take into account the positive impact PEPPRA is expected to gradually have on the normal cost.

Plan	New Rate	Projected Future Employer Contribution Rates					
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
State Miscellaneous Tier 1	21.121%	21.3%	22.4%	23.5%	24.7%	25.8%	26.9%
State Miscellaneous Tier 2	20.992%	21.0%	22.3%	23.6%	24.9%	26.2%	27.5%
State Industrial	15.682%	15.7%	16.3%	16.9%	17.5%	18.1%	18.7%
State Safety	17.205%	16.6%	16.8%	16.9%	17.1%	17.4%	17.6%
POFF	30.495%	29.6%	30.9%	32.2%	33.5%	34.8%	36.1%
CHP	34.616%	35.1%	36.6%	38.1%	39.6%	41.1%	42.6%
Schools	11.442%	11.7%	12.6%	13.6%	14.5%	15.5%	16.4%

Analysis of Future Investment Return Scenarios

As part of this report, different scenarios were performed to determine the effects of various investment returns during fiscal years 2013-14, 2014-15 and 2015-16 on the 2015-16, 2016-17 and 2017-18 employer rates. The projected rates assume that all other actuarial assumptions will be realized and that no further changes to assumptions, contributions, benefits, or funding will occur. These projected rates also reflect that new hires will be entering into lower benefit formulas with a lower normal cost and the April 17, 2013 CalPERS Board-approved amortization and rate smoothing method change.

Five different investment return scenarios were selected.

- The first scenario is what one would expect if the markets were to give us a 5th percentile return from July 1, 2013 through June 30, 2016. The 5th percentile return corresponds to a -4.10% return for each of the 2013-14, 2014-15 and 2015-16 fiscal years.
- The second scenario is what one would expect if the markets were to give us a 25th percentile return from July 1, 2013 through June 30, 2016. The 25th percentile return corresponds to a 2.60% return for each of the 2013-14, 2014-15 and 2015-16 fiscal years.
- The third scenario assumed the return for 2013-14, 2014-15, and 2015-16 would be our assumed 7.50% investment return which represents about a 49th percentile event.
- The fourth scenario is what one would expect if the markets were to give us a 75th percentile return from July 1, 2013 through June 30, 2016. The 75th percentile return corresponds to a 11.90% return for each of the 2013-14, 2014-15 and 2015-16 fiscal years.
- Finally, the last scenario is what one would expect if the markets were to give us a 95th percentile return from July 1, 2013 through June 30, 2016. The 95th percentile return corresponds to a 18.50% return for each of the 2013-14, 2014-15 and 2015-16 fiscal years.

The tables below show the projected contribution rates for 2015-16 through 2017-18 for the various State Plans under the five different scenarios.

Estimated: 2015-16 Rates as a % of Payroll

Plan	Investment Scenario				
	1 st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
	-4.10%	2.60%	7.50%	11.90%	18.50%
State Miscellaneous Tier 1	23.4%	22.8%	22.4%	22.0%	21.5%
State Miscellaneous Tier 2	23.3%	22.7%	22.3%	22.0%	21.4%
State Industrial	17.0%	16.6%	16.3%	16.0%	15.7%
State Safety	17.3%	17.0%	16.8%	16.6%	16.2%
POFF	32.1%	31.4%	30.9%	30.5%	29.8%
CHP	37.8%	37.1%	36.6%	36.1%	35.4%
Schools	13.4%	12.9%	12.6%	12.3%	11.9%

Estimated: 2016-17 Rates as a % of Payroll

Plan	Investment Scenario				
	1 st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
	-4.10%	2.60%	7.50%	11.90%	18.50%
State Miscellaneous Tier 1	26.3%	24.7%	23.5%	22.4%	20.7%
State Miscellaneous Tier 2	26.3%	24.8%	23.6%	22.5%	20.8%
State Industrial	18.9%	17.8%	16.9%	16.1%	14.9%
State Safety	18.6%	17.6%	16.9%	16.3%	15.3%
POFF	35.7%	33.7%	32.2%	30.8%	28.7%
CHP	41.6%	39.6%	38.1%	36.7%	34.5%
Schools	15.8%	14.5%	13.6%	12.7%	11.3%

Estimated: 2017-18 Rates as a % of Payroll

Plan	Investment Scenario				
	1 st Scenario	2nd Scenario	3rd Scenario	4th Scenario	5th Scenario
	-4.10%	2.60%	7.50%	11.90%	18.50%
State Miscellaneous Tier 1	29.9%	27.0%	24.7%	22.4%	18.8%
State Miscellaneous Tier 2	30.2%	27.2%	24.9%	22.7%	19.1%
State Industrial	21.4%	19.3%	17.5%	15.9%	13.2%
State Safety	20.3%	18.5%	17.1%	15.8%	13.6%
POFF	40.3%	36.5%	33.5%	30.7%	26.1%
CHP	46.5%	42.6%	39.6%	36.7%	32.1%
Schools	18.9%	16.4%	14.5%	12.7%	9.7%

Analysis of Discount Rate Sensitivity & Government Code Section 20229

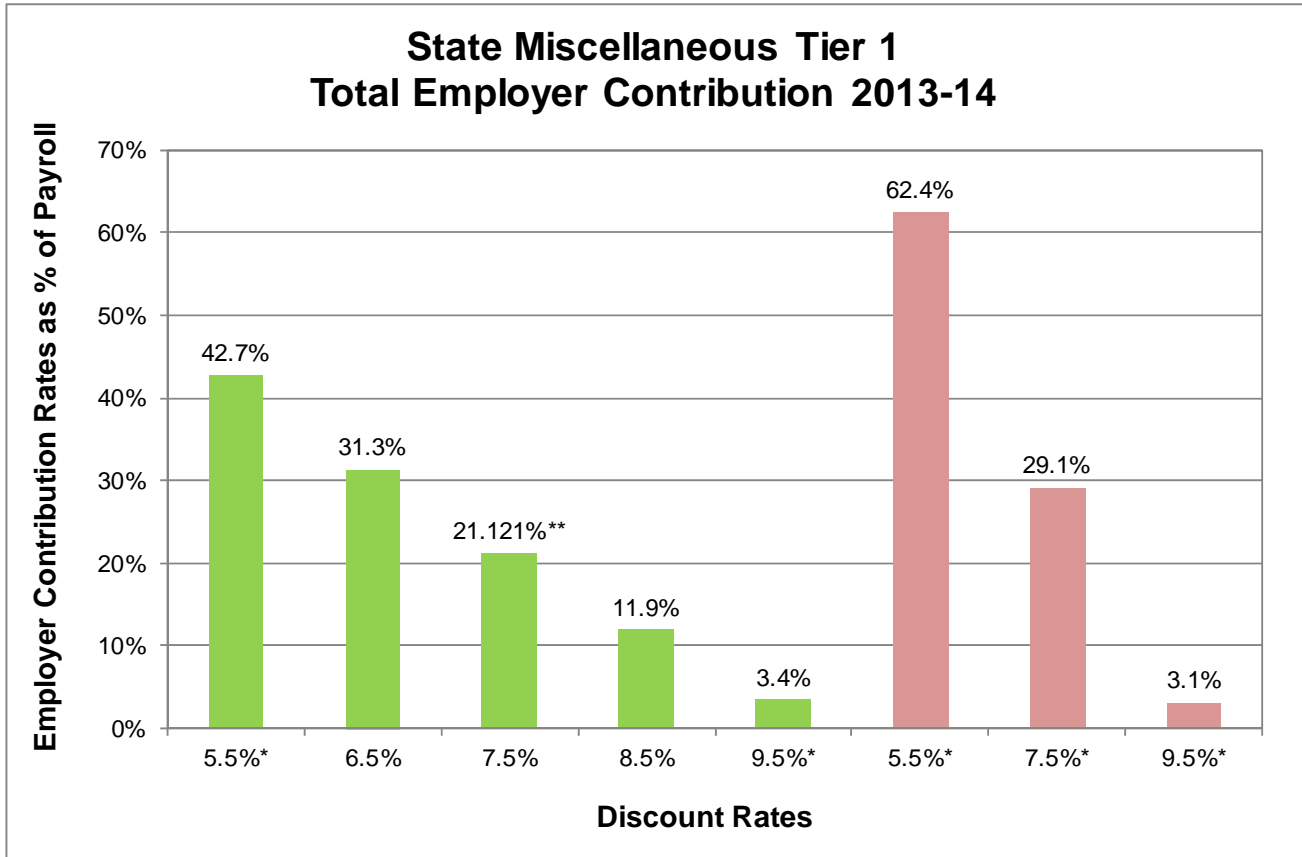
The discount rate reflects expectations of what the markets will deliver in the future and it is calculated based on two components: expected price inflation and real rate of return. A change in either of those components over the long term would necessitate further evaluation of the discount rate.

This section includes an analysis of discount rate sensitivity on employer contribution rates under two different discount rate scenarios. This type of analysis gives the reader a sense of the long-term risk to the employer contribution rates and changes to the funded status on a Market Value of Assets basis.

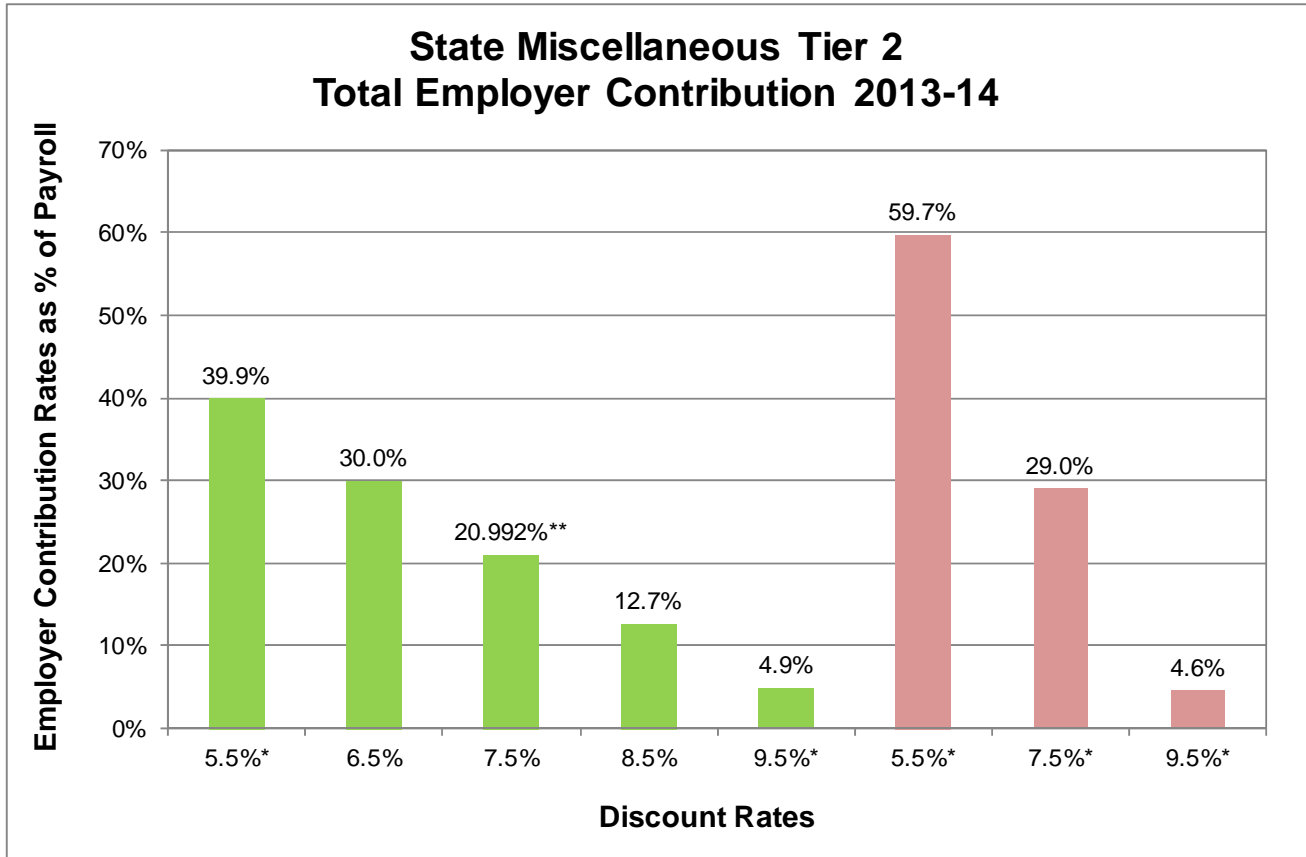
The first section shows the impact on employer contribution rates assuming discount rates that are 1 percentage point above and 1 percentage point below the current valuation discount rate and under current unfunded liability amortization methods. This analysis gives an indication of the potential required employer contribution rates if the discount rate was changed to 6.50% or 8.50% over the long-term.

The second section is in response to Government Code section 20229 which requires the CalPERS Board to provide an annual report which includes a calculation of the contribution rates and liabilities utilizing investment return and discount rate assumptions which are 2 percentage points above and 2 percentage points below the current investment return and discount rate assumptions utilized by the board, and a calculation of the rates based on an amortization period equal to the estimated average remaining service periods (EARSP) of the employees covered by the contributions. The results are presented for three different investment return assumptions (5.50%, 7.50% and 9.50%) for all the State plans. For comparison, contribution rates for the current fiscal year have been calculated using both the current amortization method and amortization over the estimated average remaining service periods of the employees covered by the contributions.

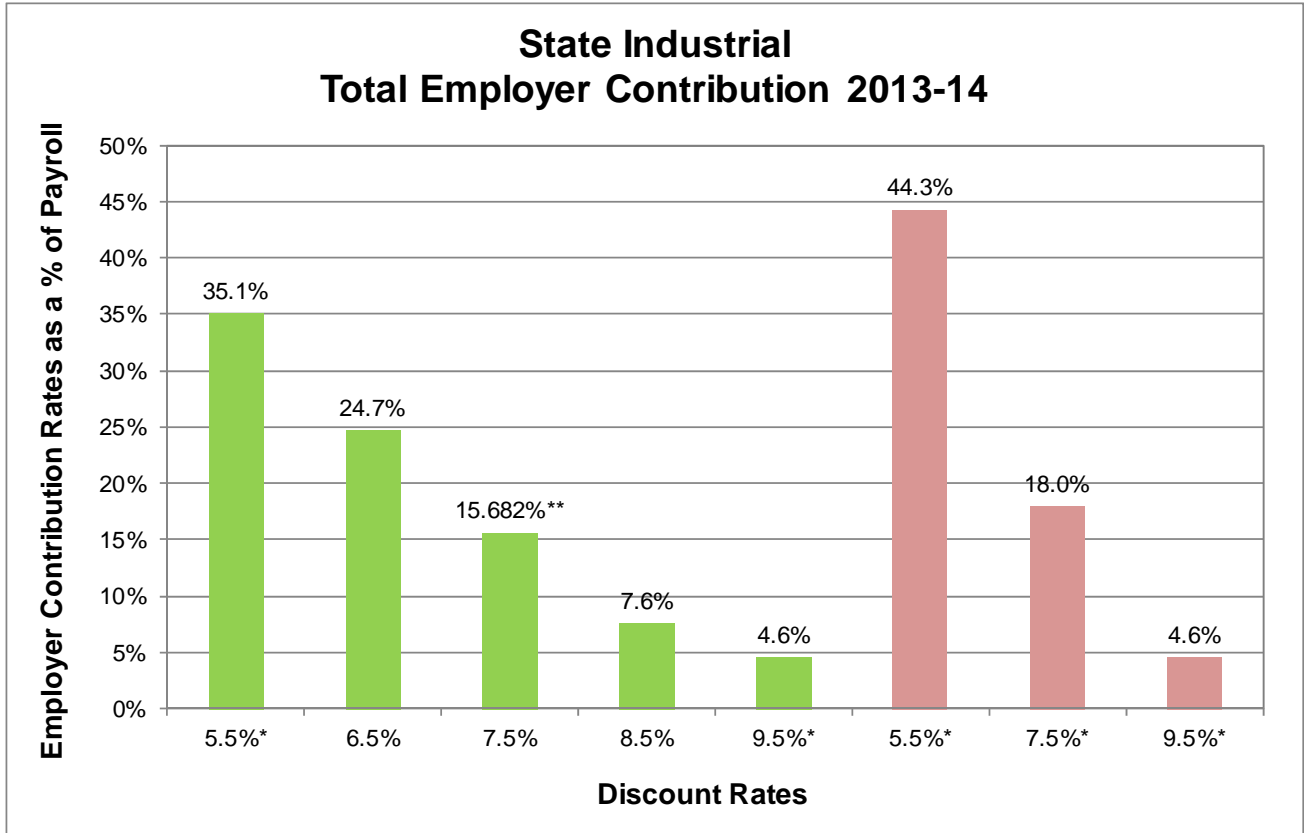
The results of the analysis are presented in three sections. The first section is a graphical representation of the impact on employer rates for both +/- 1% change in discount rate, and +/- 2% change in discount rate due to G.C. 20229. The second and third sections are the numeric representations. The reader may use the data points presented in the graph to estimate data points of interest using interpolation.



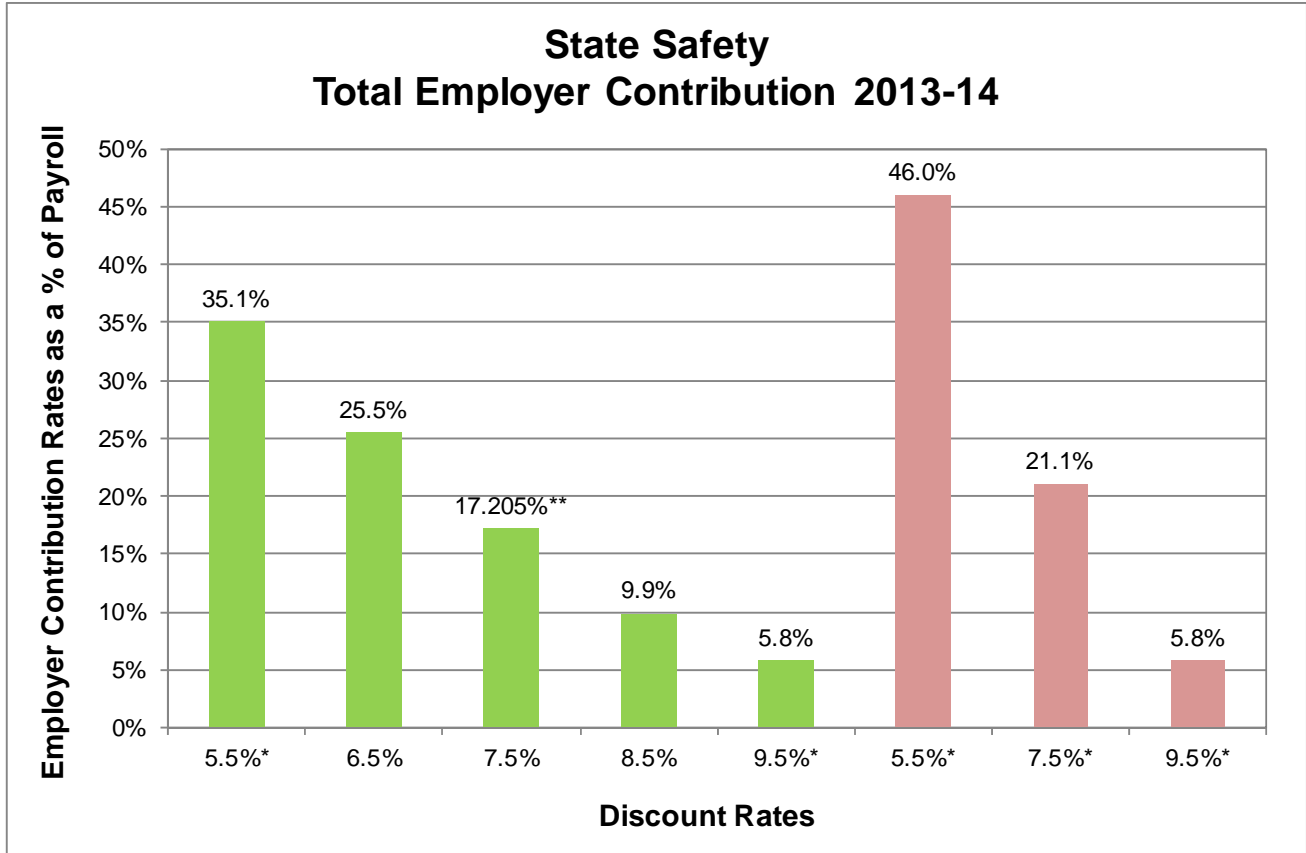
- Analysis of discount rate sensitivity based on current amortization method (varies from 11 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (10 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board



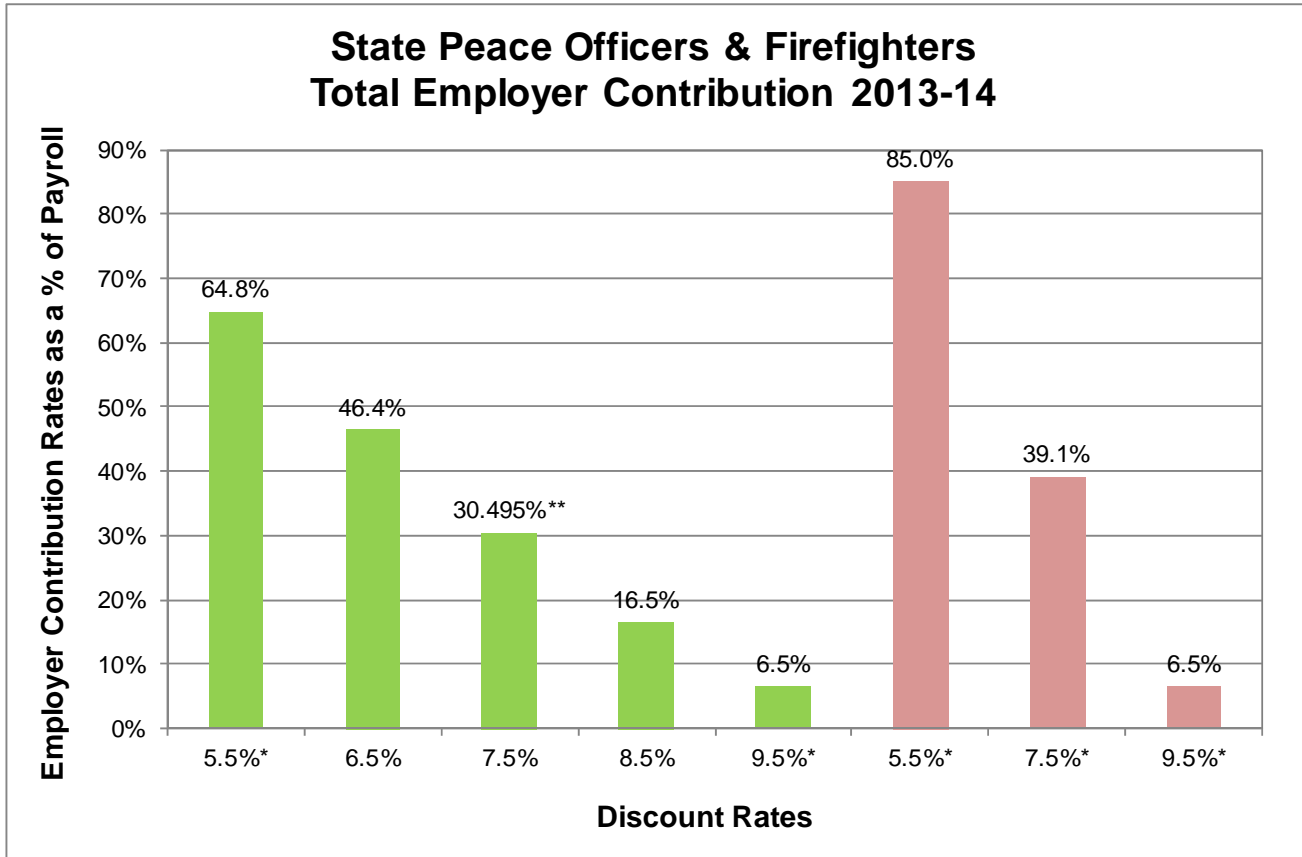
- Analysis of discount rate sensitivity based on current amortization method (varies from 11 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (10 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board



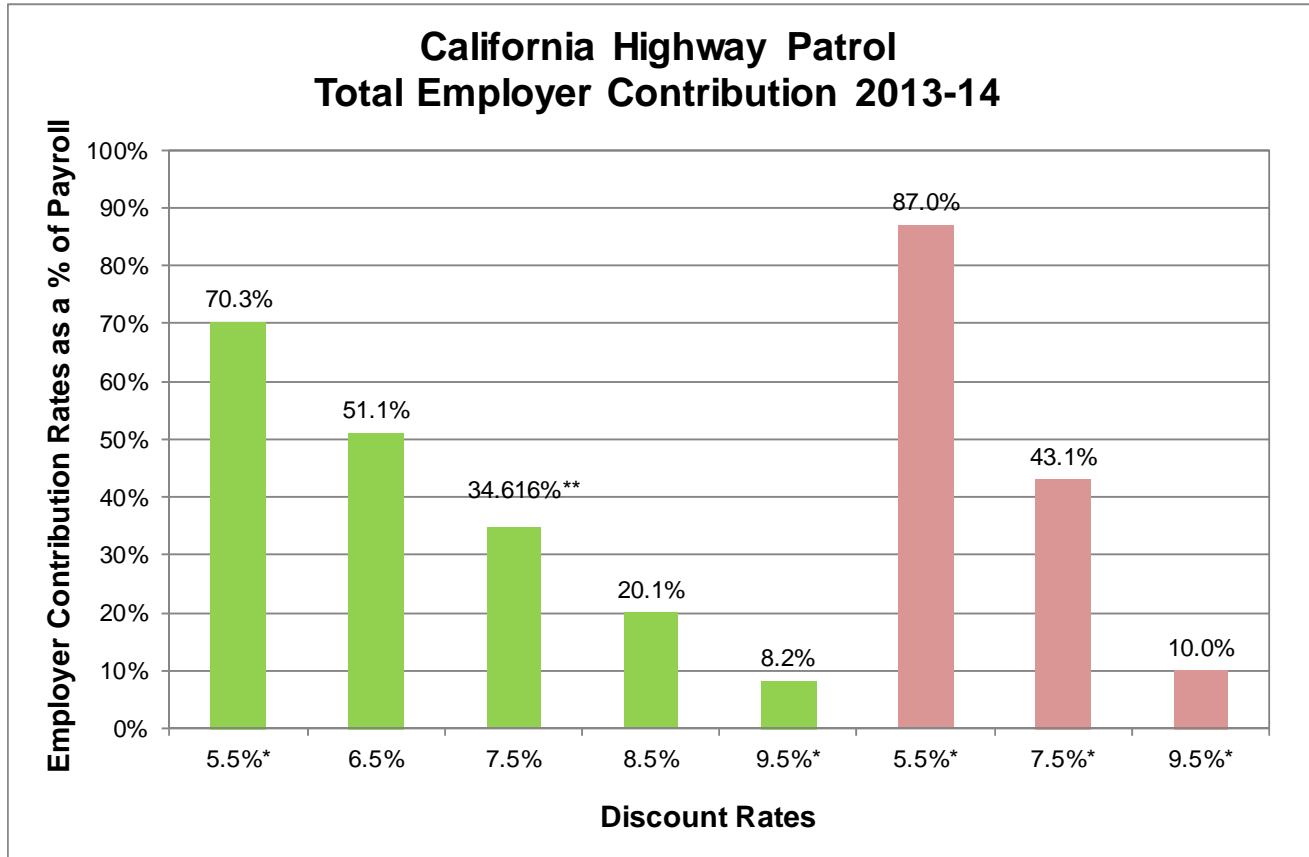
- Analysis of discount rate sensitivity based on current amortization method (varies from 11 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (11 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board



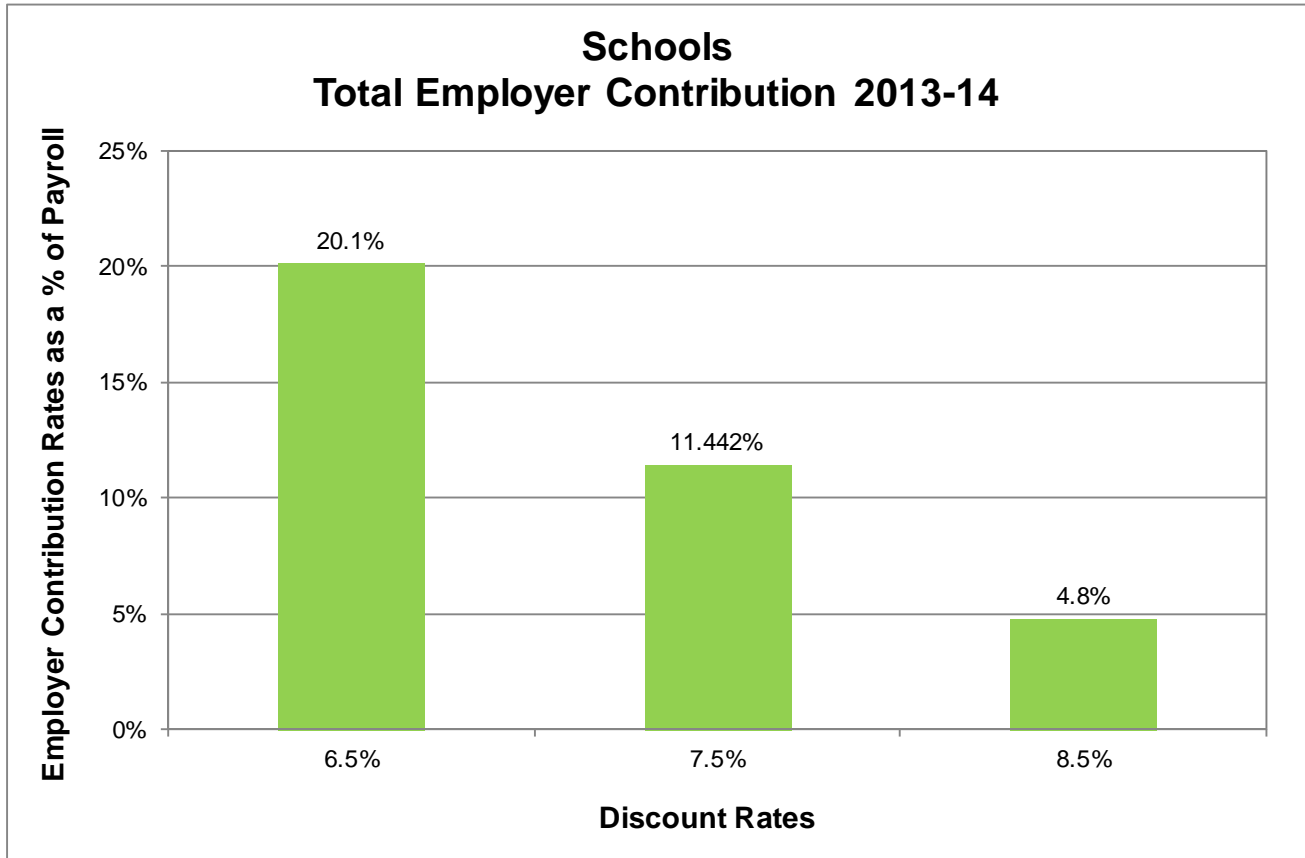
- Analysis of discount rate sensitivity based on current amortization method (varies from 10 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (10 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board




- Analysis of discount rate sensitivity based on current amortization method (varies from 11 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (12 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board



- Analysis of discount rate sensitivity based on current amortization method (varies from 9 to 30 years) or normal cost if in a surplus position
- Analysis of discount rate sensitivity based on amortization of UL over EARSP (14 years)
- * Required by Government Code Section 20229
- ** Actuarially required contribution rate for 2013-14 adopted by the CalPERS Board



 Analysis of discount rate sensitivity based on current amortization method (varies from 19 to 20 years)

Analysis of Discount Rate Sensitivity (+/- 1% change in discount rate)

Discount Rate		6.50%	7.50%	8.50%
State Miscellaneous Tier 1	Normal Cost	11.9%	8.089%	5.2%
	UAL Payment	19.3%	12.961%	6.6%
	GTLI	<u>0.1%</u>	<u>0.071%</u>	<u>0.1%</u>
	Total	31.3%	21.121%	11.9%
	Funded Status	59.2%	66.3%	73.7%
State Miscellaneous Tier 2	Normal Cost	10.6%	7.960%	6.0%
	UAL Payment	19.3%	12.961%	6.6%
	GTLI	<u>0.1%</u>	<u>0.071%</u>	<u>0.1%</u>
	Total	30.0%	20.992%	12.7%
	Funded Status	59.2%	66.3%	73.7%
State Industrial	Normal Cost	14.4%	10.325%	7.1%
	UAL Payment	10.3%	5.357%	0.5%
	GTLI	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
	Total	24.7%	15.682%	7.6%
	Funded Status	64.4%	73.0%	82.1%
State Safety	Normal Cost	16.4%	12.007%	8.6%
	UAL Payment	9.1%	5.198%	1.4%
	GTLI	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
	Total	25.5%	17.205%	9.9%
	Funded Status	62.2%	70.6%	79.4%
POFF	Normal Cost	22.1%	15.489%	10.4%
	UAL Payment	24.3%	15.006%	6.1%
	GTLI	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
	Total	46.4%	30.495%	16.5%
	Funded Status	57.5%	65.5%	73.9%
CHP	Normal Cost	19.5%	12.895%	7.9%
	UAL Payment	31.5%	21.683%	12.2%
	GTLI	<u>0.0%</u>	<u>0.038%</u>	<u>0.0%</u>
	Total	51.1%	34.616%	20.1%
	Funded Status	53.0%	60.3%	68.0%
Schools	Normal Cost	10.6%	7.313%	4.8%
	UAL Payment	9.5%	4.129%	0.0%
	GTLI	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
	Total	20.1%	11.442%	4.8%
	Funded Status	67.0%	75.5%	84.4%

*Rates were calculated with a 30-year Fresh Start to the amortization bases in the case of an average amortization period greater than 30.

** In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.

***Numbers may not add due to rounding.

Government Code Section 20229 (+/-2% change in discount rate based on current amortization method and amortization over EARSP)

State Miscellaneous Tier 1 & Tier 2			
Discount Rate	5.50%	7.50%	9.50%
Accrued Liability	105,482,210,701	83,523,526,246	68,010,307,665
Market Value of Assets (MVA)	55,371,256,388	55,371,256,388	55,371,256,388
Funded Status MVA basis	52.5%	66.3%	81.4%
Unfunded Liability MVA basis	50,110,954,313	28,152,269,858	12,639,051,277
State Miscellaneous Tier 1			
Current Amortization Method			
Payment on Normal Cost	16.8%	8.089%	3.0%
Payment on UL	25.8%	12.961%	0.3%
<u>Group Term Life Insurance</u>	<u>0.1%</u>	<u>0.071%</u>	<u>0.1%</u>
Total ER Contribution 2013-14	42.7%	21.121%	3.4%
State Miscellaneous Tier 1			
Amortization of UL over EARSP			
Payment on Normal Cost	16.8%	8.1%	3.0%
Payment on UL (over EARSP=10 yrs)	45.6%	20.9%	0.0%
<u>Group Term Life Insurance</u>	<u>0.1%</u>	<u>0.1%</u>	<u>0.1%</u>
Total ER Contribution 2013-14	62.4%	29.1%	3.1%
State Miscellaneous Tier 2			
Current Amortization Method			
Payment on Normal Cost	14.0%	7.960%	4.5%
Payment on UL	25.8%	12.961%	0.3%
<u>Group Term Life Insurance</u>	<u>0.1%</u>	<u>0.071%</u>	<u>0.1%</u>
Total ER Contribution 2013-14	39.9%	20.992%	4.9%
State Miscellaneous Tier 2			
Amortization of UL over EARSP			
Payment on Normal Cost	14.0%	8.0%	4.5%
Payment on UL (over EARSP=10 yrs)	45.6%	20.9%	0.0%
<u>Group Term Life Insurance</u>	<u>0.1%</u>	<u>0.1%</u>	<u>0.1%</u>
Total ER Contribution 2013-14	59.7%	29.0%	4.6%

State Industrial			
Discount Rate	5.50%	7.50%	9.50%
Accrued Liability	3,846,926,768	2,968,403,342	2,363,890,177
Market Value of Assets (MVA)	2,168,103,394	2,168,103,394	2,168,103,394
Funded Status MVA basis	56.4%	73.0%	91.7%
Unfunded Liability MVA basis	1,678,823,374	800,299,948	195,786,783
<i>Current Amortization Method</i>			
Payment on Normal Cost	19.7%	10.325%	4.6%
Payment on UL	15.3%	5.357%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	35.1%	15.682%	4.6%
<i>Amortization of UL over EARSP</i>			
Payment on Normal Cost	19.7%	10.3%	4.6%
Payment on UL (over EARSP=11 yrs)	24.6%	7.7%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	44.3%	18.0%	4.6%

State Safety			
Discount Rate	5.50%	7.50%	9.50%
Accrued Liability	10,149,134,494	7,827,253,833	6,220,770,789
Market Value of Assets (MVA)	5,524,386,200	5,524,386,200	5,524,386,200
Funded Status MVA basis	54.4%	70.6%	88.8%
Unfunded Liability MVA basis	4,624,748,294	2,302,867,633	696,384,589
<i>Current Amortization Method</i>			
Payment on Normal Cost	22.0%	12.007%	5.8%
Payment on UL	13.1%	5.198%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	35.1%	17.205%	5.8%
<i>Amortization of UL over EARSP</i>			
Payment on Normal Cost	22.0%	12.0%	5.8%
Payment on UL (over EARSP=10 yrs)	24.0%	9.1%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	46.0%	21.1%	5.8%

State Peace Officers and Firefighters			
Discount Rate	5.50%	7.50%	9.50%
Accrued Liability	41,009,093,707	31,335,588,660	24,793,962,705
Market Value of Assets (MVA)	20,525,705,429	20,525,705,429	20,525,705,429
Funded Status MVA basis	50.1%	65.5%	82.8%
Unfunded Liability MVA basis	20,483,388,278	10,809,883,231	4,268,257,276
<i>Current Amortization Method</i>			
Payment on Normal Cost	30.9%	15.489%	6.5%
Payment on UL	33.9%	15.006%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.000%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	64.8%	30.495%	6.5%
<i>Amortization of UL over EARSP</i>			
Payment on Normal Cost	30.9%	15.5%	6.5%
Payment on UL (over EARSP=12 yrs)	54.1%	23.6%	0.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	85.0%	39.1%	6.5%

California Highway Patrol			
Discount Rate	5.50%	7.50%	9.50%
Accrued Liability	11,325,000,507	8,659,143,106	6,855,898,165
Market Value of Assets (MVA)	5,220,072,829	5,220,072,829	5,220,072,829
Funded Status MVA basis	46.1%	60.3%	76.1%
Unfunded Liability MVA basis	6,104,927,678	3,439,070,277	1,635,825,336
<i>Current Amortization Method</i>			
Payment on Normal Cost	28.4%	12.895%	4.1%
Payment on UL	41.8%	21.683%	4.0%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.038%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	70.3%	34.616%	8.2%
<i>Amortization of UL over EARSP</i>			
Payment on Normal Cost	28.4%	12.9%	4.1%
Payment on UL (over EARSP=14 yrs)	58.6%	30.2%	5.9%
<u>Group Term Life Insurance</u>	<u>0.0%</u>	<u>0.0%</u>	<u>0.0%</u>
Total ER Contribution 2013-14	87.0%	43.1%	10.0%

* Rates calculated using current amortization methods were calculated with a 30-year Fresh Start to the amortization bases in the case of an average amortization period greater than 30.

** In the case of a surplus, rates were calculated to equal the employer normal cost rate. This is based on a provision in the Public Employees' Pension Reform Act of 2013 (PEPRA) that requires a minimum employer contribution rate in combination with employee contributions shall not be less than the normal cost rate.

***Numbers may not add due to rounding.



Understanding Actuarial Information

BY RICHARD H. HARRIS

Anual required contributions for state and local government pension plans are based on plan data, plan provisions, and actuarial assumptions of the assets the pension fund will need to pay future liabilities. By making this required contribution each year, plan sponsors keep their plans fully funded over the long term, making allowances, as needed, for the accuracy of the actuary's projections, as well as occasional events such as financial downturns.

Given the vital role of actuarial information in keeping pension plans funded, it is crucial that finance officers fully understand the process, especially given the recent changes from the Governmental Accounting Standards Board, which remove the direct link between measurements for funding purposes and measurement of pension expense for accounting and financial reporting purposes. (See the GFOA's pension funding guidelines sidebar at the end of this article, as well as "Books, Budgets, and Bonds: What Do All Those Pension Number Mean?" by Keith Brainard, in this issue of *Government Finance Review*.)

There are three simple rules for pension system sustainability:

- Manage the investment assets of the system.
- Assure that the full actuarially required contribution is paid every year.
- Understand the pension system's actuarial liabilities.

The actuarial valuation report, which the actuary provides for the pension plan no less frequently than every two years, provides the funding guidelines for the plan. Government finance officers need to understand this document and help all relevant stakeholder groups understand its implications. The following is an example of how this actuarial information, which seems complex, can be boiled down into much simpler terms.

THE BASIC CONTRIBUTION MODEL

The next few exhibits illustrate a basic contribution model that shows, from a finance officer's point of view, how actuaries calculate the annually required contribution. We start with the basic building block of the annual required contribution, which is called normal cost (see Exhibit 1).¹

Normal cost is the present value of the future benefit, for one additional year of service. If a plan's design is to pay participants 2 percent of average annual salary (end-of-career average) per year of service, and an employee is going to retire making \$50,000 per year, then the plan is promising the employee, just for that current year of service, \$1,000 per year from the date of retirement through assumed mortality. If the

employee works 30 years, that calculates to a \$30,000 annual pension, but the portion that is attributable to a single year of service is \$1,000.

Now for the math, which is really algebra. It's a two-part process.

Part 1. How much does the pension plan need when an employee retires to pay the pension promised for the current year (first year) of service? The \$1,000 per year life annuity from retirement at age 65 to mortality at age 83 has a value at the date of retirement. Calculating it requires us to assume an investment earnings rate for those future years, and the most common assumption among state and local pension plans is 8 percent per year (although the *average* is 7.8 percent, according to the National Association of State Retirement Administrators). The present value (at age 65) of that \$1,000 per year annuity stream for 18 years, assuming annual earnings of 8 percent, is \$9,372. If a pension plan has \$9,372 invested when the employee turns 65, and the plan earns an average investment return of 8 percent annually on that money, it will be able to pay the retiree \$1,000 a year for 18 years until mortality. (The Microsoft Excel present value function makes it easy to calculate that number.)²

Part 2. The pension plan does not need that \$9,372 now — it will need it in 30 years, when the employee retires. That's another present value calculation: the present value of a future amount, or how much the pension plan needs now, when the employee is age 35, if it earns 8 percent per year on its investments, to accumulate that \$9,372 in 30 years. The answer is \$931. (Again, it's much easier to calculate this number using the present value function in Excel.)³ Invest \$931 and earn 8 percent (on average) for 30 years, and it grows to \$9,372.

To accumulate the total amount needed to pay the whole \$30,000 annual pension by the time the employee retires in 30 years, the process gets repeated every year. Of course, it gets a little more expensive for that particular employee each year because there is one less year to earn 8 percent on what has been collected and invested. In any time value of money scenario, the less time you have, the more money you need.

Exhibit 1: Building Blocks of the Annual Required Contribution



That is a simple explanation of normal cost. It gets calculated for every employee in the active workforce, aggregated, and then expressed as a percentage of payroll. Accountants should be able to appreciate the underlying "matching" concept, in that part of the cost of an employee's current year total compensation is the current year cost of the employee's future pension, which is "attributable" to the current year of service. That's normal cost. In the perfect world, normal cost gets contributed every year, all other actuarial assumptions are met, and the amount needed to pay promised benefits from retirement to mortality is accumulated.

THE ASSET SIDE OF THE MODEL

Exhibit 2 shows how normal cost is added to the market value of assets, which are exposed to market volatility. To dampen the effect of that market volatility, actuaries use what is called a "smoothing method." Smoothing methods consider an assumed rate of return (8 percent in our example). Smoothing removes some of the market volatility, and the resulting asset value is therefore termed the actuarial value of assets.

ACTUARIAL LIABILITIES

Now, we'll add the liability side to the model (see Exhibit 3).⁴ Normal cost is calculated every year for the whole active employee population. It accumulates year after year into what is called the actuarially accrued liability. Remember also that normal cost was a discounted value. Therefore, to reflect the passage of time and the fact that each year, all liabilities

recorded in the prior year move one year closer to having to be paid out, interest on the liability has to be added to the actuarially accrued liability to reflect the passage of one more year. The interest rate used to calculate the annual liability growth is the same rate used for the investment return assumption. Therefore, assets and liabilities are assumed to grow at the same rate annually.

To complete the model, actuarial assets are compared to actuarial liabilities and the difference is the unfunded liability (assuming the liabilities are larger). (See Exhibit 4.) That amount is amortized, like a mortgage, and that amortization is added to normal cost, resulting in the total required contribution. That total required contribution includes contributions that need to be received from both employees and employers. The total required contribution has only two components: normal cost and the amortization of the unfunded actuarially accrued liability.

THE ROLE OF ASSET ALLOCATION

Before the 1990s, public-sector pensions were invested mostly in bonds (see Exhibit 5). But equity allocations rose to more than 50 percent in that decade and kept growing, and they remain at that level today. An increased allocation to equities often leads to higher investment returns when economic conditions are favorable, but it does increase a plan's exposure to risk, making it more vulnerable to financial downturns. This volatility means that annual required contributions cannot remain stable, even with smoothing.

Exhibit 2: Adding Contributed Normal Cost to the Market Value of Assets

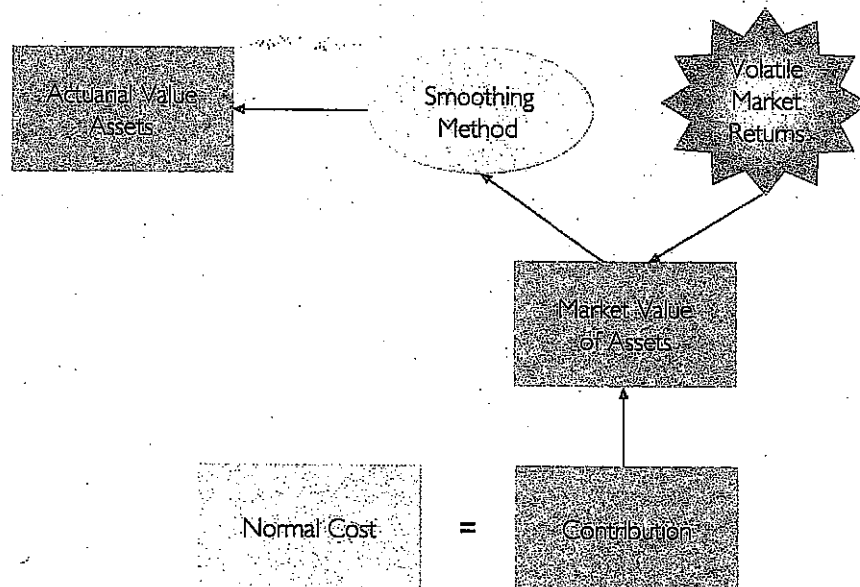


Exhibit 3: Adding Liability to the Market Value of Assets

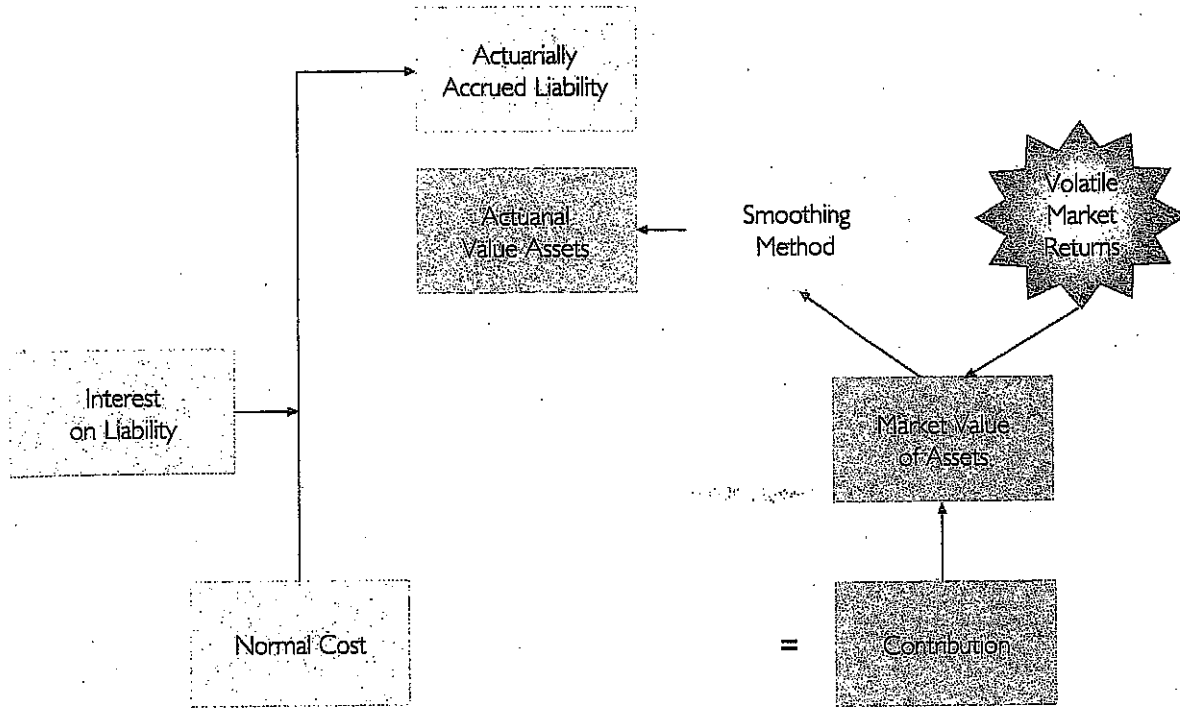
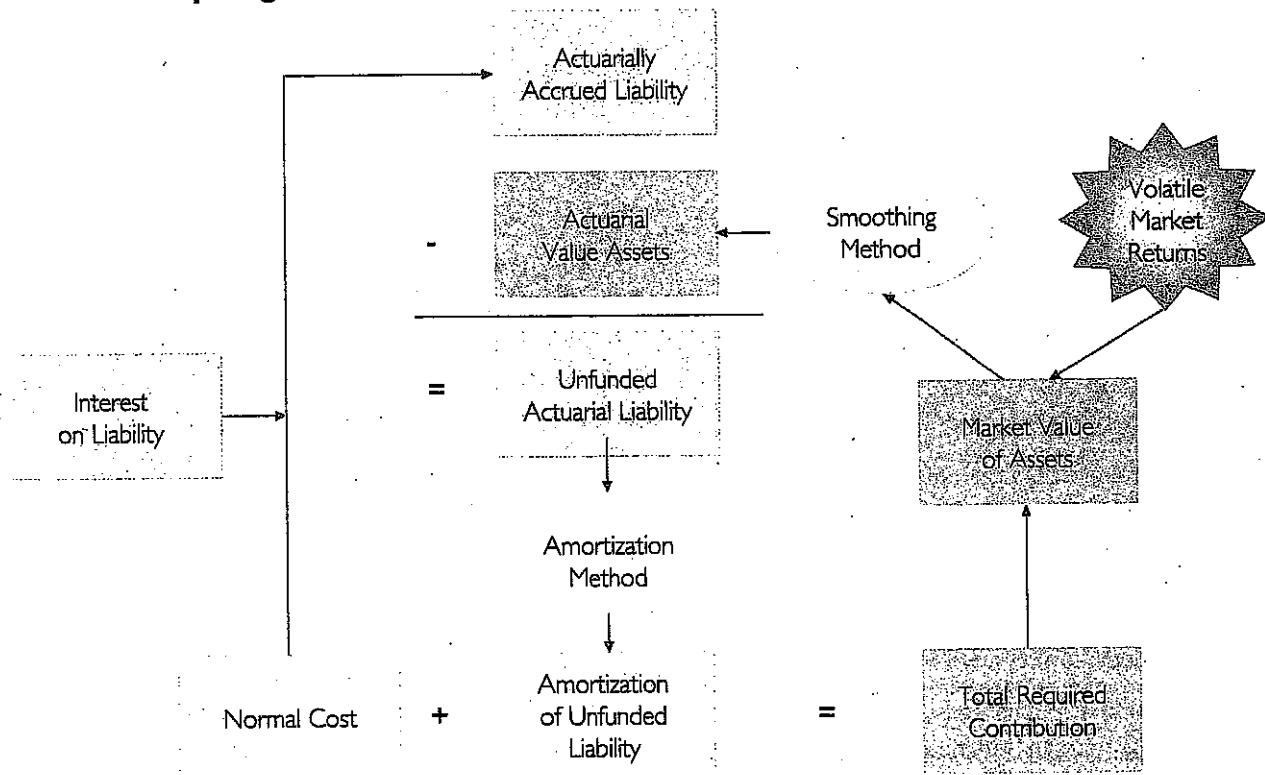
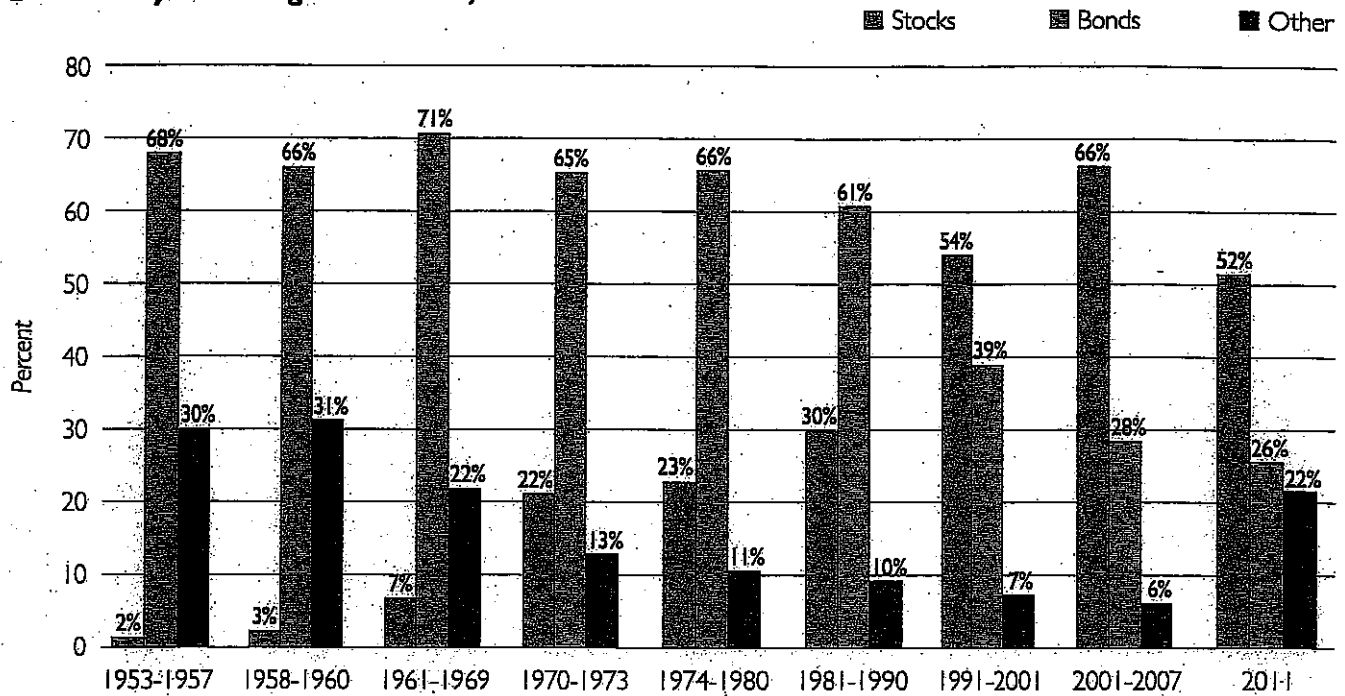


Exhibit 4: Comparing Actuarial Assets to Actuarial Liabilities to Determine Unfunded Liability



**Exhibit 5: Asset Allocation of Public-Sector Pension Plans
Business Cycle Averages 1953-2007, and 2012**



Source: Political Economy Research, July 2008; NASRA Public Fund Survey, October 2012

Through the 1990s, that risk was mostly rewarded with higher investment returns — the average annual investment return from 1990 through the end of 1999 and the dot-com rally was more than 13 percent. And from 1990 through the end of 2011, the average annual return was approximately 8.5 percent. Therefore, even after actuarial smoothing, there will always be year-to-year fluctuations in the funded positions of pension plans. For example, the median funded position, based on actuarial values of assets and liabilities of the 126 plans reported in the National Association of State Retirement Association Public Fund Survey, was more than 100 percent at the end of fiscal 2000;⁵ it was 75.2 percent as of fiscal 2011.

GUIDING THE PROCESS

Understanding the role of actuarial information in funding the pension plan allows pension officers to avoid pitfalls that have befallen some plan sponsors. The finance officer can play a vital role in making sure that all stakeholders understand the funding process, and that all decisions about the level of benefits are informed by this information.

Disparate Stakeholders. Public pension systems are complicated. Each one has its own structural idiosyncrasies, but many have organizational structures that look something like

what is shown in Exhibit 6. There are numerous stakeholders — employees, employers, retirees, beneficiaries, pension plan administrators and their boards, plan sponsor budget/finance departments, state legislators, city councils, county commissioners — who might have a say in how the plan is managed. These stakeholders sometimes have different objectives. The data from the actuarial valuation report is what puts everyone on the same page so they can make well-informed decisions.

Adding Benefits. The contribution model outlined above shows the difference between the actuarial value of assets and the accrued actuarial liability as the unfunded liability. That can also work the other way. If a plan is overfunded, the result would be negative amortization that offsets normal cost, which, according to the model, would lead to lower total required contributions. When funding levels increase to more than 100 percent, stakeholders sometimes consider increasing benefits, and stakeholders sometimes argue for making those increases retroactive for years of service that have already been performed. In making decisions about new and retroactive benefits years, finance officers are in the perfect position to remind stakeholders about the effect of those changes on the actuarial cost and to make sure the changes are affordable and sustainable.

Exhibit 6: Typical Pension System Organizational Structure

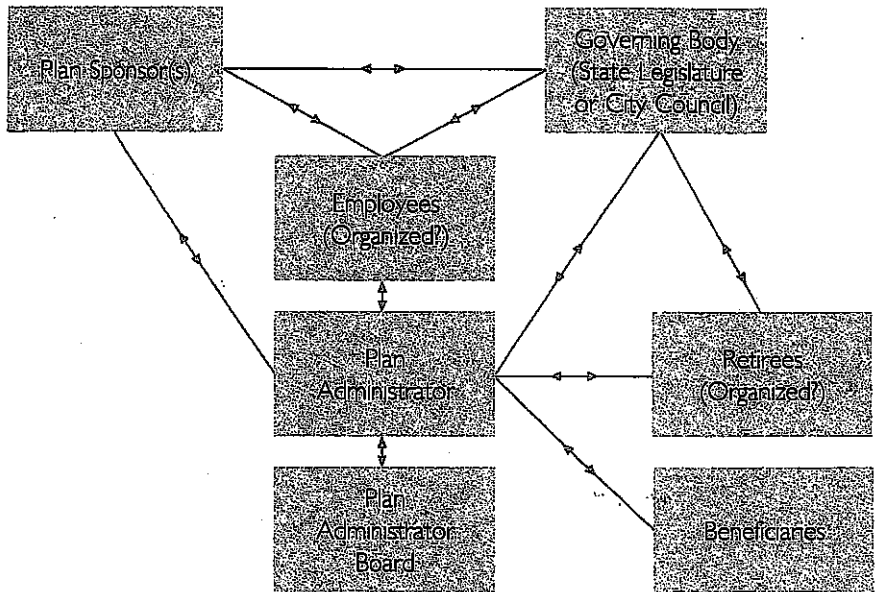
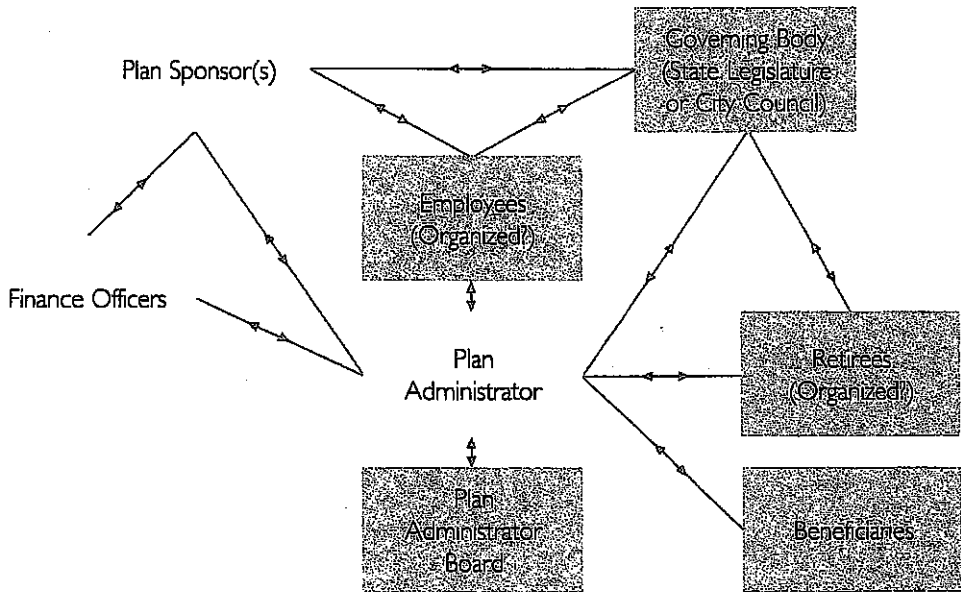


Exhibit 7: Revised Typical Pension System Organizational Structure



CONCLUSIONS

Take another look at all the stakeholder groups shown in Exhibit 6. It is unreasonable to expect the members of all of those stakeholder groups to understand the actuarial information found in actuarial valuation reports. Exhibit 7 shows the same chart, but it adds in finance officers (and the areas in which they are typically found in the pension system), who can explain this information and its implications, ensuring that the pension fund is sustainable. ¶

Notes

1. The normal cost example here uses the projected unit credit method.
2. $=pv(.08,18,-\$1,000) = \$9,372$
3. $=pv(.08,30,-\$9,372) = \931
4. For the sake of simplicity, the contribution model diagrams omit certain components such as benefit payments, which come out of both sides equally, and actuarial gains and losses on the liability side, which are not typically large.
5. The Public Fund Survey represents approximately 85 percent of all the assets and liabilities of U.S. state and local retirement plans.