

Montana Public Employees' Retirement Board Economic Experience Study

As of June 30, 2013

September 12, 2013

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Agenda

- Assumptions studied
- Economic analysis
- Comparative valuation results



Assumptions Studied

- Inflation
- Investment return
- Wage growth
- Interest on member contributions



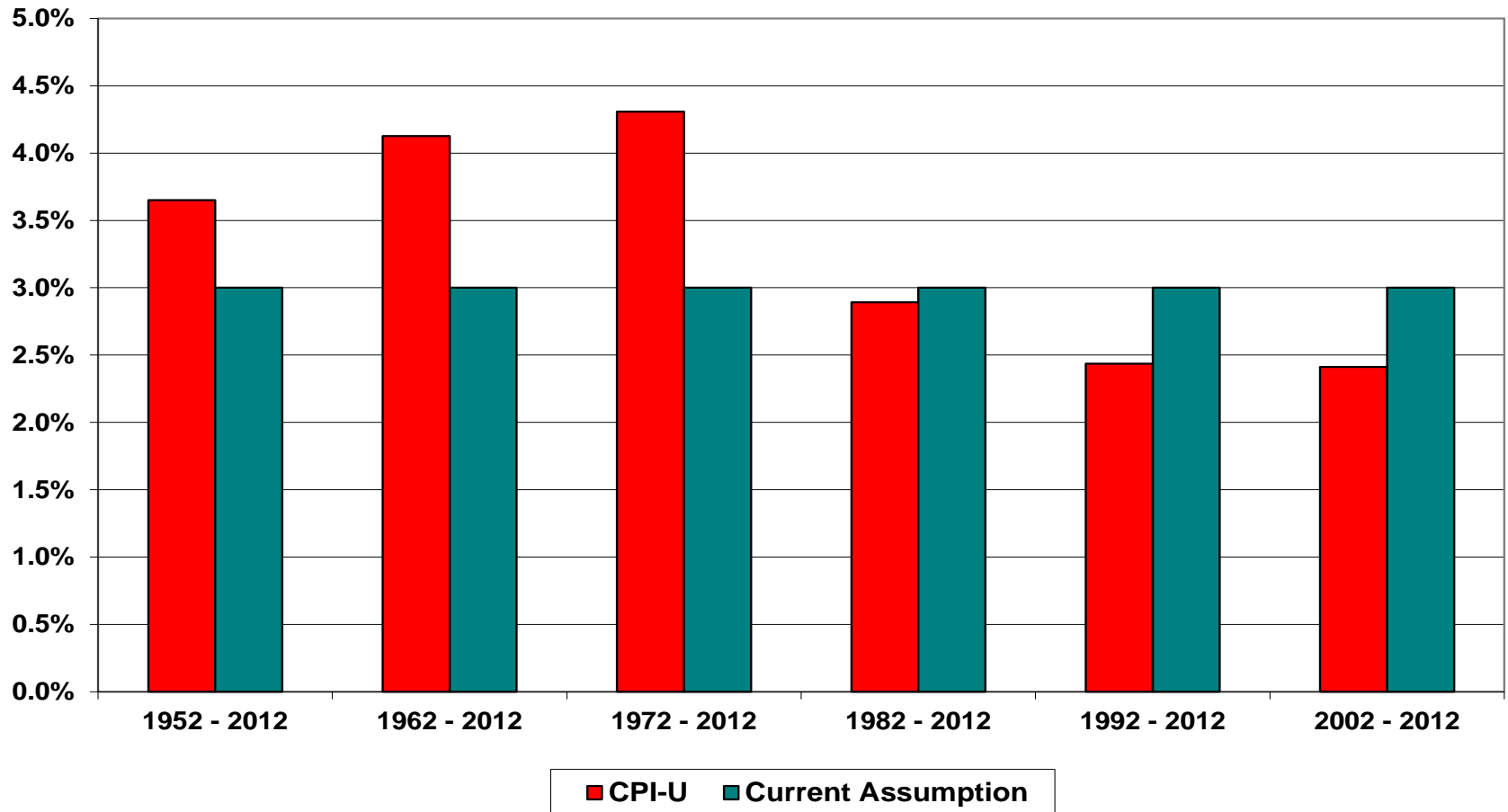
Economic Assumptions Factors to Consider

- What other funds are doing
- Past experience of the Plan
- Historical data in general
- Outlook for the future
- Board preference regarding risk



Inflation (CPI – U)

Historical CPI-U





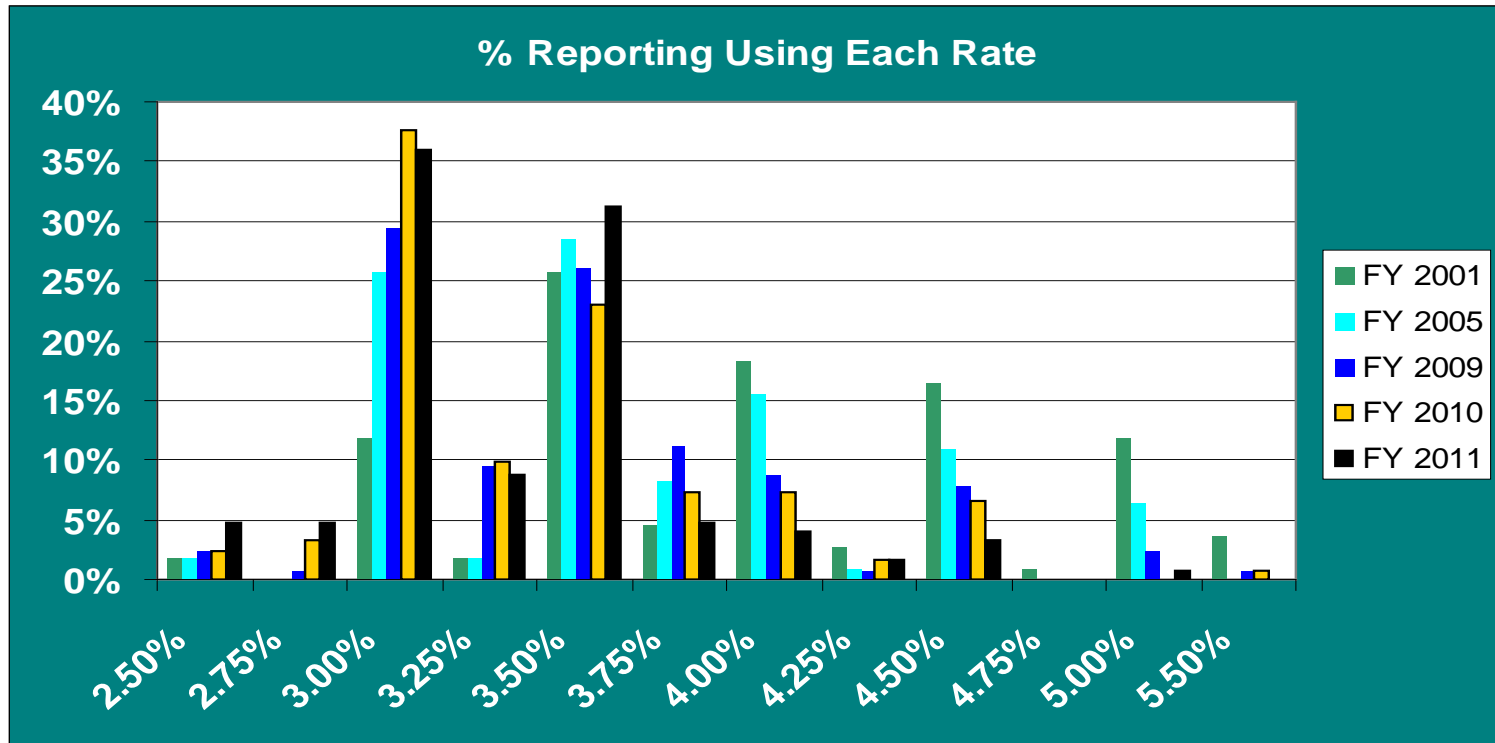
Inflation Outlook for the Future

Bond Yields*			
Time to Maturity	Conventional Yield	TIPS Yield	Implied Inflation
5 years	1.41%	-0.35%	1.76%
10 years	2.52%	0.53%	1.99%
20 years	3.22%	1.12%	2.10%
30 years	3.52%	1.31%	2.21%

*As of June 30, 2013



Inflation Assumption Comparison to Other Systems



Source: NASRA Public Fund Survey Summary of Findings



Average NASRA Inflation Assumption by Year

Year	Average
2001	3.97%
2005	3.66%
2009	3.51%
2010	3.39%
2011	3.30%



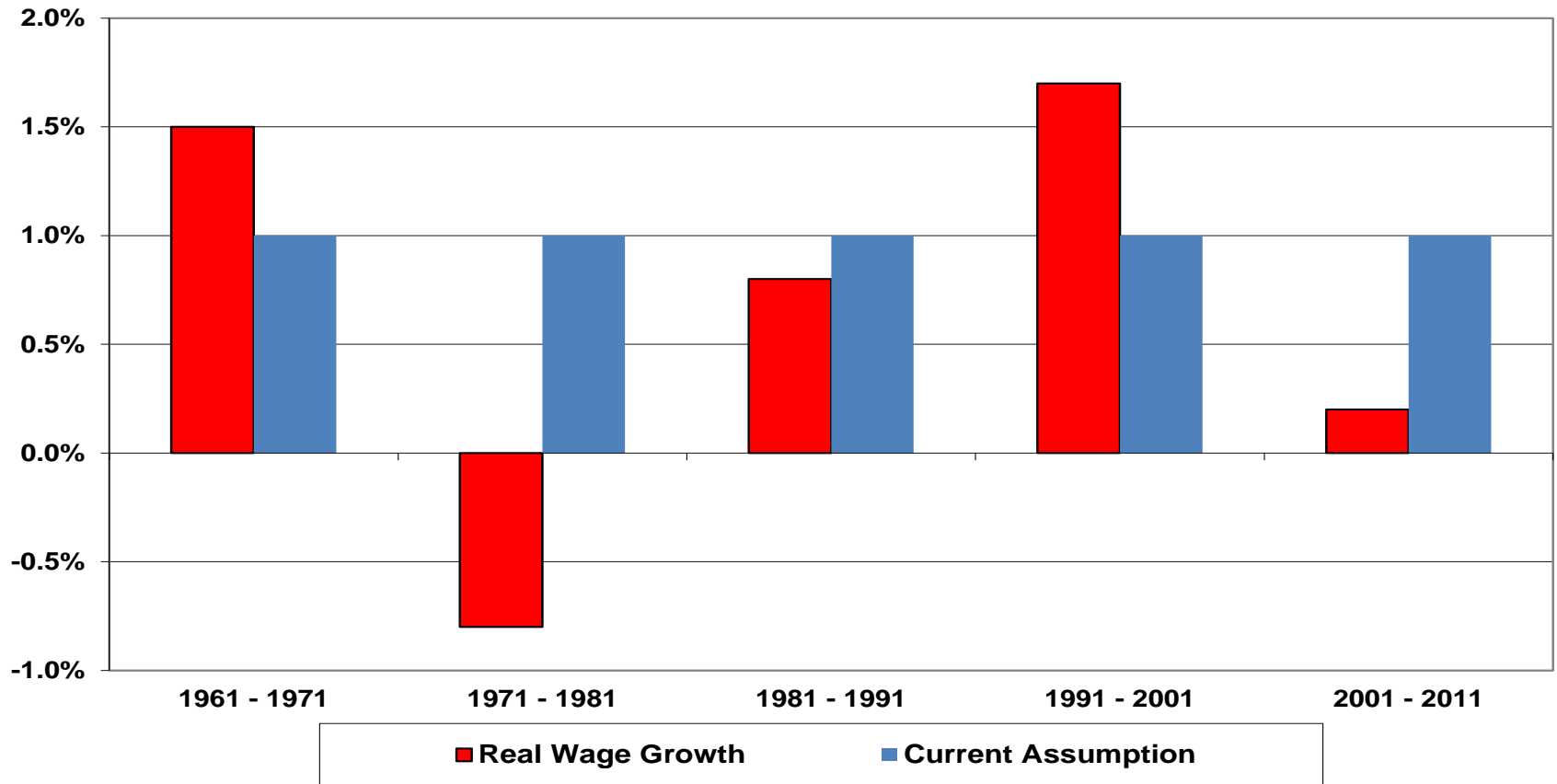
Comments on Inflation

- Over last decade, inflation has been less than 2.5%
- Assumed inflation in current long term bond rates is about 2.2%
- Current assumption of 3% is still less than the average assumption of 3.3% in the NASRA survey
- Recommend no change in the 3% assumption at this time



Real Wage Growth

Real Wage Growth By Decade



Source: Social Security Administration national average earnings reduced by CPI-U

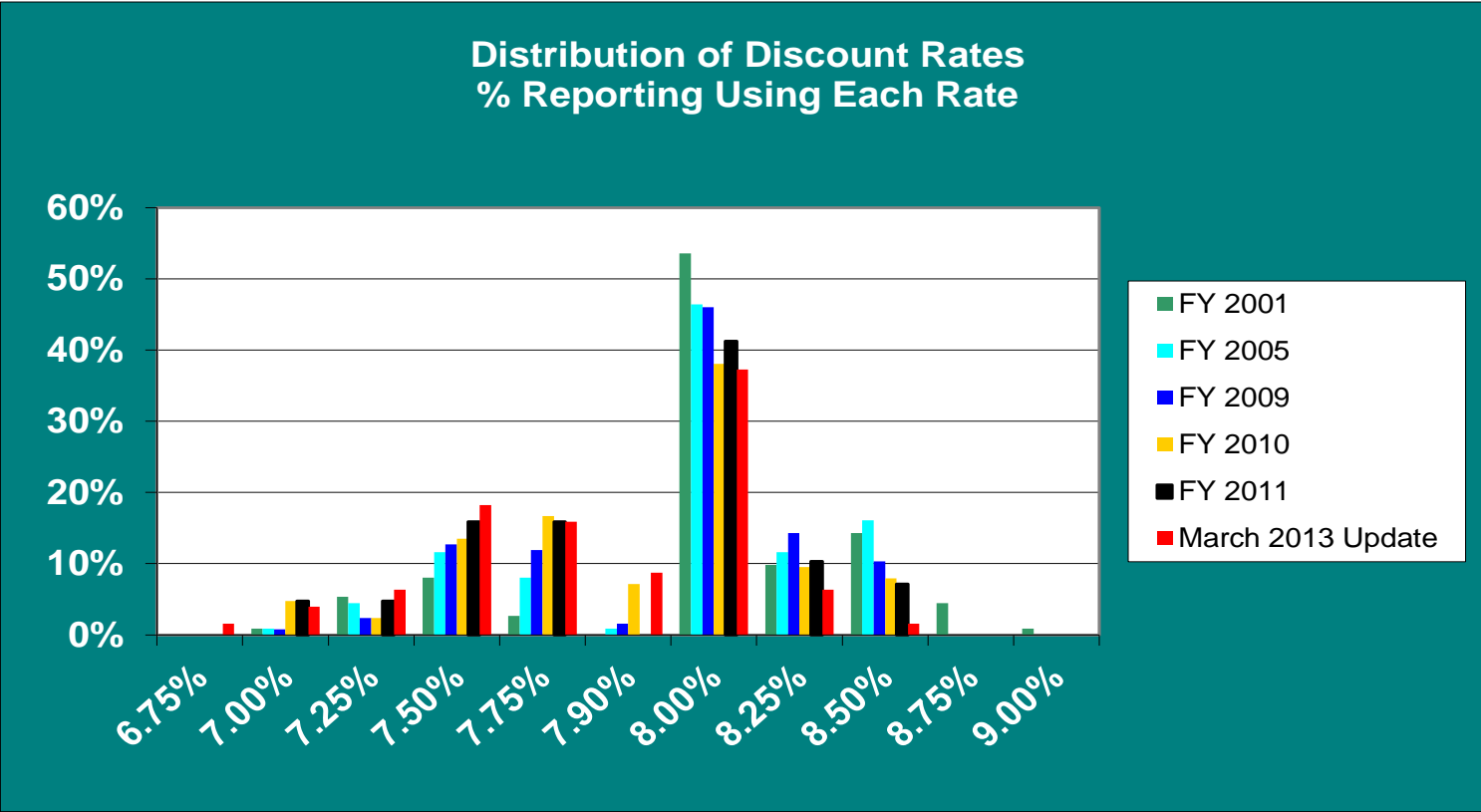


Comments on Wage Growth

- Current overall salary increase assumption is 4.0% (i.e., 1% over inflation) plus the merit scale
- Assumption is used for:
 - Base level for individual salary increases to be added to merit salary scales
 - Future wage growth for amortization of unfunded actuarial liability
- Real wage growth was only about 0.2% for the most recent decade
- Recommend reduction of the real wage growth assumption to 0.5% which when added to inflation rate of 3.0% results in new wage growth assumption of 3.5%



Investment Return Assumption Comparison to Other Systems



Source: NASRA Public Fund Survey Summary of Findings for years shown



NASRA Average Investment Return Assumption by Year

Year	Average
2001	8.04%
2005	7.99%
2009	7.97%
2010	7.88%
2011	7.86%
2013 Update	7.78%



Actual Investment Returns

Annual Rates of Return (PERS Only)		
Year Ending June 30	Market Value	Actuarial Value
2004	13.35%	1.27%
2005	8.03%	5.32%
2006	8.98%	9.25%
2007	17.92%	11.94%
2008	-4.91%	7.62%
2009	-20.85%	-0.16%
2010	12.91%	-1.18%
2011	21.70%	-0.08%
2012	2.27%	3.28%
2013	12.99%	11.91%
Average Return	6.52%	4.81%



Investment Return Rate Approach

- Current assumption is 7.75%
- Obtained current asset allocation assumptions used by RV Kuhns, the investment consultant for the Board of Investments
- Applied RV Kuhns assumptions to the PERA asset allocation as of June 30, 2013
- Results were then adjusted for the PERA assumed inflation rate
- Adjusted rate of return was then potentially reduced by the assumed expenses to be paid by the fund
- Expressed results as a probability distribution



Investment Expenses

	System Expenses
	Percent of Assets
	<hr/>
Retirement Funds Bond Pool (RFBP)	0.12%
Montana Domestic Equity Pool (MDEP)	0.23%
Montana International Equity Pool (MTIP)	0.25%
Montana Private Equity Pool (MPEP)	1.59%
Montana Real Estate Pool (MTRP)	1.25%
Short Term Investment Pool (STIP)*	0.03%
Weighted Average	0.47%
Average excluding MPEP and MTRP	0.20%



Comments on Expenses

- Investment expenses for MPEP and MTRP are likely necessary to obtain returns in excess of index returns derived by R.V. Kuhns
- Expense rate of 0.20% for other asset pools is consistent with passive investments usually reflected in capital market assumptions
- Have used expense rate of 0.20% in analysis



Arithmetic Rate of Return

	Expected Return (Arithmetic)	
	RV Kuhns Asset Allocation Assumptions	
Asset Category	6/30/2013 Allocation	Expected Return
STIP	1.3%	2.25%
Bond Pool	22.2%	3.50%
Total Fixed income	23.4%	
Domestic equity pool	38.3%	7.90%
International pool	16.6%	8.65%
Private equity pool	12.5%	11.75%
Total equities	67.4%	
Real Estate Pool	9.2%	7.00%
Total Nominal Rate of Return	100.0%	7.38%
Less: Assumed inflation		-2.50%
Total Real Rate of Return		4.88%
Plus: PERB assumed inflation		3.00%
Less: Investment expenses		-0.20%
Total Net Rate of Return		7.68%



Arithmetic and Geometric Rates of Return

- Arithmetic return is the expected return over one year ignoring volatility
- Geometric return takes into account expected volatility to compute annualized rates of return
 - For example, assume 28% one year and then negative 12% the next year
 - Average of the returns is 8%
 - However, compound average annual return over two years is 6.1%



Adjusting to Geometric Rate of Return

- Arithmetic rate of return:
7.68%
- Risk (standard deviation):
13.60%
- Geometric rate of return:
6.70%
- Based on current asset allocation and RV Kuhns Capital Market
 - Assumptions adjusted for PERA assumed inflation and expenses



Long Term Expected Returns

Expected Distribution of Average Annual Nominal Net Returns*					
Percentile	Years				
	1	5	10	20	30
5%	-15.7%	-3.3%	-0.4%	1.7%	2.6%
25%	-2.5%	2.6%	3.8%	4.6%	5.0%
50%	6.7%	6.7%	6.7%	6.7%	6.7%
75%	15.9%	10.8%	9.6%	8.8%	8.4%
95%	29.1%	16.7%	13.8%	11.7%	10.8%
*Inflation:	3.00%				
Expenses:	0.20%				



Other Considerations

- Negative or positive net cash flow (contributions minus benefit payments)
 - Negative cash flow tends to result in lower returns over time than the median returns developed by investment consultants

	Cash Flow as Percent of Market Value Year Ended 6/30/2013
PERS	-3.31%
JRS	-0.58%
HPORS	-2.47%
SRS	-0.44%
GWPORS	3.06%
MPORS	0.97%
FURS	1.73%
VFCA	-5.04%

- Risk preference of plan sponsor
 - What are the effects on PERB and the State if expected returns are not achieved?



Investment Return Assumption - Comments

- Current assumption of 7.75% is still within a reasonable range and is slightly below the average in the latest NASRA survey
- Average arithmetic return before expenses of 7.38% using RVK assumptions compares 7.65% derived in 2010 (i.e. a decrease of 0.27%)
- NASRA average return has decreased 0.10% since 2010
- Recommend Board consider decrease in investment return assumption up to 0.25% which would result in new rate of 7.50%



Administrative Expenses

- Prior investment return assumption assumed that administrative expenses were to be deducted in determining the investment return assumption
- Under GASB 67, rate of return is assumed net of investment expenses, but not administrative expenses
- Recommend a specific assumption for administrative expenses as an addition to normal cost based upon five year averages



Five Year Average Administrative Expenses

	Percent of Pay	Dollar Amount
PERS	0.30%	
JRS	1.21%	
HPORS	0.68%	
SRS	0.29%	
GWPORS	0.34%	
MPORS	0.35%	
FURS	0.37%	
VFCA		\$125,000



Interest on Member Contributions

- Policy Board Admin 03: Interest rate to be based on short term treasury bills and notes
- Current assumption is 3.5%, based upon the inflation rate of 3.0% plus 0.5%, which was prior RVK assumption for real return for cash equivalents
- The 2013 RVK assumption for cash equivalents is a real return of negative 0.25%.
- Recommend using the inflation rate of 3.0% for assumed interest on member contributions



Summary of Economic Recommendations

- Inflation
 - No change, keep at 3.00%
- Wage Increases
 - Decrease real wage growth rate from 1.00% to 0.50% (nominal rate from 4.0% to 3.5%)
- Investment return rate
 - Consider decrease from 7.75% to 7.50%
- Administrative expenses
 - Add to normal cost based upon five year history
- Interest on member contributions
 - Reduce from 3.5% to 3.0%



Comparative Valuation Results

Funded Status

	Actuarial Liabilities (millions)				Funded Ratios			
	2012	2013			2012	2013		
		Prior Assump.	Change (1)	Change (2)		Prior Assump.	Change (1)	Change (2)
PERS	5,661	5,242	5,380	5,328	67%	79%	77%	78%
JRS	46	49	50	50	137%	143%	140%	140%
HPORS	168	176	181	180	58%	60%	58%	59%
SRS	285	304	314	310	74%	77%	75%	76%
GWPORS	129	140	145	143	76%	80%	77%	79%
MPORS	427	450	465	462	55%	58%	56%	57%
FURS	377	397	410	406	62%	66%	64%	65%
VFCA	36	38	39	39	73%	75%	73%	73%

(1) Discount rate to 7.5%; interest on employee contributions to 3.0%

(2) Discount rate to 7.5%; interest on employee contributions to 3.0%; wage growth to 3.5%

Note: 2013 results are preliminary



Comparative Valuation Results

Normal Costs

Normal Cost Rates						
	Without Administration Expense Load				Incl. Admin. Expense Load	
	2012	2013 Prior Assump.	2013 Change (1)	2013 Change (2)	2013 Change (1)	2013 Change (2)
PERS	11.80%	10.76%	11.24%	10.72%	11.54%	11.02%
JRS	23.80%	24.67%	25.69%	24.76%	26.90%	25.97%
HPORS	23.60%	25.23%	26.79%	25.45%	27.47%	26.13%
SRS	18.73%	18.52%	19.49%	18.56%	19.78%	18.85%
GWPORS	18.98%	18.82%	19.75%	18.86%	20.09%	19.20%
MPORS	26.26%	26.29%	27.86%	26.64%	28.21%	26.99%
FURS	26.50%	26.59%	28.29%	26.78%	28.66%	27.15%
VFCA (000's)	\$199	\$198	\$210	\$210	\$335	\$335

(1) Discount rate to 7.5%; interest on employee contributions to 3.0%

(2) Discount rate to 7.5%; interest on employee contributions to 3.0%; wage growth to 3.5%



Comparative Valuation Results

Annual Required Contributions

Annual Required Contributions						
	Without Administration Expense Load				Incl. Admin. Expense Load	
	2012	2013			2013	
		Prior Assump.	Change (1)	Change (2)	Change (1)	Change (2)
PERS	20.71%	15.99%	16.96%	16.55%	17.26%	16.85%
JRS	9.22%	6.65%	9.13%	6.88%	10.34%	8.09%
HPORS	51.16%	53.31%	56.26%	56.33%	56.94%	57.01%
SRS	25.21%	24.36%	25.99%	25.14%	26.28%	25.43%
GWPORS	23.20%	22.51%	23.99%	23.03%	24.33%	23.37%
MPORS	50.46%	49.34%	52.05%	52.00%	52.40%	52.35%
FURS	47.48%	45.03%	47.95%	47.19%	48.32%	47.56%
VFCA (000's)	\$1,125	\$1,116	\$1,199	\$1,199	\$1,324	\$1,324

(1) Discount rate to 7.5%; interest on employee contributions to 3.0%

(2) Discount rate to 7.5%; interest on employee contributions to 3.0%; wage growth to 3.5%



Comparative Valuation Results

Amortization Periods

Amortization Periods						
	Without Administrative Expense Load				Incl. Admin. Expense Load	
	2012	2013			2013	
		Prior Assump.	Change (1)	Change (2)	Change (1)	Change (2)
PERS	Does not amortize	15.6	19.6	17.7	20.7	18.7
PERS (w/o Temp)	Does not amortize	26.2	36.0	31.2	40.7	34.8
JRS	0.0	0.0	0.0	0.0	0.0	0.0
HPORS	49.7	35.9	44.8	46.5	48.0	50.2
SRS	Does not amortize	Does not amortize	Does not amortize	Does not amortize	Does not amortize	Does not amortize
GWPORS	Does not amortize	Does not amortize	Does not amortize	Does not amortize	Does not amortize	Does not amortize
MPORS	25.7	23.8	28.5	28.4	29.2	29.1
FURS	16.4	13.9	16.5	15.7	16.8	16.0
VFCA (000's)	9.3	8.5	9.7	9.7	11.0	11.0

(1) Discount rate to 7.5%; interest on employee contributions to 3.0%

(2) Discount rate to 7.5%; interest on employee contributions to 3.0%; wage growth to 3.5%

Note: 2013 results are preliminary



Required Disclosures

- In preparing this presentation, we relied without audit, on information supplied by the Public Employee Retirement Board (PERB).
- The actuarial assumptions, data and methods are those being used in the preparation of the current actuarial valuation reports prepared for PERB as of June 30, 2013.
- The assumptions reflect our understanding of the likely future experience of the Systems and the assumptions as a whole represent our best estimate for the future experience of these plans. The results of this report are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the true cost of the plans could vary from our results.
- I hereby certify that, to the best of my knowledge, this report and its contents, which are based on the information and data supplied by PERB, have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as a credentialed actuary, I meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. I am not an attorney and our firm does not provide any legal services or advice.
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