



Investment Return Scenarios

The 2015 Actuarial Experience Study

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GRS

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Reasonable Assumptions, per ASOP 27

- ◆ An assumption is reasonable if
 - ▶ It is appropriate for the purpose of the measurement
 - ▶ It reflects the actuary's professional judgement
 - ▶ It takes into account historical and current economic data that is relevant as of the measurement date
 - ▶ It reflects the actuary's estimate of future experience
 - ▶ It has no significant bias (i.e., it is not significantly optimistic or pessimistic)
 - Although some allowance for adverse experience may be appropriate



Inflation

- ◆ We looked at several indicators
 - ▶ Investment firms: 2.11% - 2.50%
 - RVK: 2.50%
 - ▶ Social Security Trustee's Report: 2.70% (intermediate, unchanged for over 10 years)
 - ▶ TIPs vs. Nominal US Treasuries: 1.78%
 - ▶ Professional forecasters: 2.10%
 - ▶ Public Funds Survey: 3.14%
- ◆ In December, we will likely recommend lowering this assumption to 2.50%
 - ▶ Closer to recent levels (2.31% over last 10 years)
 - ▶ Closer to levels expected in the bond market
 - ▶ Closer to investment consultants and professional forecaster estimates



Investment Return Assumption

- ◆ The current assumption is 7.00%
 - ▶ Currently represents the return, net of all administrative and investment expenses
 - ▶ Current assumption equals 7.07% gross less 0.07% for administrative expenses = 7.00% net/net



Return Expectations

- ◆ To analyze the expected return, we combine:
 - ▶ The plan's target asset allocation (or potential allocations) with
 - ▶ Economic capital market expectations
- ◆ We examine the most recent capital market return assumptions developed by eight investment consulting firms
 - ▶ Will emphasize information from RVK
 - ▶ Mostly 5-10 year time horizons
- ◆ Then, we will adjust the results for a difference in time horizon
 - ▶ Duration of the Plan liabilities is over 20 years



Putting it Together

- ◆ Using the arithmetic mean is the more aggressive approach, while using the geometric mean is the more conservative approach
- ◆ Adjusting for differences in time is the more aggressive approach, while not adjusting for time is the more conservative approach
- ◆ So, we believe a middle of the road, defensible, and more stable process is to:
 - ▶ use the arithmetic mean (aggressive) *without* an adjustment for time (conservative)
 - ▶ use the geometric mean (conservative) *with* an adjustment for time (aggressive)
- ◆ And then focus on the area between the two measures



Illustrative Recommendation

- ◆ Based on the current allocation, GRS would likely recommend to the TMRS Board to decrease the investment return assumption to 6.25%
 - ▶ 0.50% is from the decrease in inflation expectations
 - ▶ Per RVK, the current allocation has a 6.25% arithmetic and 5.79% geometric expectation over a 10-year horizon
 - ▶ Per group of eight, 6.25% would be lower than the arithmetic mean of 6.34% over 10-year horizon
 - ▶ Per group of eight, close to the geometric return adjusted for time horizon of 6.24%-6.34%
 - ▶ Close to the expected geometric return (6.34%) from longer term collective source
 - ▶ Although historical returns are not reflective of future returns, TMRS' trust has returned 6.36% over the past 10 years



Illustrated Portfolios

	1	2	3	4	5	6	7	8	9	10	C	T	P1	P2	P3	P4	
Expected Return	6.42%	6.51%	6.60%	6.68%	6.77%	6.86%	6.94%	7.03%	7.12%	7.20%	5.86%	6.25%	6.69%	6.77%	6.82%	6.99%	
Compound Return (Time Adjusted)	6.36%	6.43%	6.50%	6.56%	6.62%	6.68%	6.72%	6.78%	6.83%	6.87%	5.80%	6.17%	6.51%	6.62%	6.59%	6.75%	
Average	6.39%	6.47%	6.55%	6.62%	6.70%	6.77%	6.83%	6.91%	6.98%	7.04%	5.83%	6.21%	6.60%	6.70%	6.71%	6.87%	
Standard Deviation	9.67%	9.88%	10.11%	10.38%	10.70%	11.03%	11.35%	11.68%	12.05%	12.43%	9.72%	9.87%	10.93%	10.72%	11.43%	11.56%	
25 th Percentile	3.89%	3.92%	3.94%	3.93%	3.92%	3.91%	3.88%	3.86%	3.83%	3.79%	3.32%	3.66%	3.77%	3.91%	3.74%	3.86%	
GRS' Likely Recommended Assumption	6.25%	6.50%	6.50%	6.50%/	6.75%	6.75%	6.75%/	6.75%/	7.00%	7.00%	7.00%	7.00%	6.00%	6.25%	6.50%/	6.75%	6.75%/

Portfolios with two values would likely need/allow for an offsetting adjustment to another assumption (salary, for example) to balance the risk

Numbers above based on RVK's materials, adjusted for 7bps admin expense and 38bps for time as appropriate



Risk Management

- ◆ The level of contributions is the most impactful risk-management tool in the funding process
- ◆ Lower contributions is always riskier than higher contributions in relation to benefit security and the risk of higher costs at a future point in time
- ◆ The Board is currently considering various asset allocation strategies, some of which increase the “risk” of the portfolio
- ◆ If the decision to utilize a riskier portfolio led to lower relative contributions than current levels, that would be adding on additional risk
- ◆ Thus, our recommendation would be to not let contributions decrease based on a decision to change assumptions/asset allocations, but instead change the amortization period and/or implement rate stabilization techniques to accelerate the time to full funding



Illustrative Results

- ◆ The following slides provide illustrative valuation results based on
 - ▶ The specified investment return assumption
 - ▶ A 2.50% inflation assumption
 - ▶ No changes to any other assumptions
 - ▶ Amortization periods adjusted similar to the 2013 changes to attempt to hold contribution rates constant at current levels within the provisions of the current statutes
- ◆ Final results shown based on the new assumptions and any suggested changes to methods will be provided this fall



Summary of System-wide Results (All cities)

Investment Return Assumption

\$ amounts in millions	Dec 31, 2014 Valuation	6.25%	6.50%	6.75%	7.00%
Actuarial Accrued Liability (AAL)	\$26,647	\$28,469	\$27,548	\$26,671	\$25,837
Actuarial Value of Assets	<u>\$22,861</u>	<u>\$22,861</u>	<u>\$22,861</u>	<u>\$22,861</u>	<u>\$22,861</u>
Unfunded Actuarial Accrued Liability (UAAL)	\$3,786	\$5,608	\$4,687	\$3,810	\$2,976
Funded Ratio	85.8%	80.3%	83.0%	85.7%	88.5%
Full Contribution Rates:					
Straight Average	8.39%	10.30%	9.22%	8.52%	8.15%
Payroll Weighted Average	12.63%	15.10%	13.53%	12.67%	12.44%
Normal Cost %	7.86%	9.43%	8.57%	7.77%	7.02%
Prior Service %	4.77%	5.67%	4.96%	4.90%	5.42%
Average Amortization Period	21.0	28.9	27.9	21.0	13.0



Summary of System-wide Results (Cities without Repeating COLAs)

Investment Return Assumption

\$ amounts in millions	Dec 31, 2014 Valuation	6.25%	6.50%	6.75%	7.00%
Actuarial Accrued Liability (AAL)	\$7,177	\$7,780	\$7,549	\$7,329	\$7,119
Actuarial Value of Assets	<u>\$6,608</u>	<u>\$6,608</u>	<u>\$6,608</u>	<u>\$6,608</u>	<u>\$6,608</u>
Unfunded Actuarial Accrued Liability (UAAL)	\$569	\$1,172	\$941	\$721	\$511
Funded Ratio	92.1%	84.9%	87.5%	90.2%	92.8%
Full Contribution Rates:					
Straight Average	4.46%	6.21%	5.44%	4.75%	4.24%
Payroll Weighted Average	8.64%	11.59%	10.21%	8.96%	8.53%
Normal Cost %	5.70%	7.28%	6.58%	5.93%	5.33%
Prior Service %	2.94%	4.31%	3.63%	3.03%	3.20%



Summary of System-wide Results (Cities with Repeating COLAs)

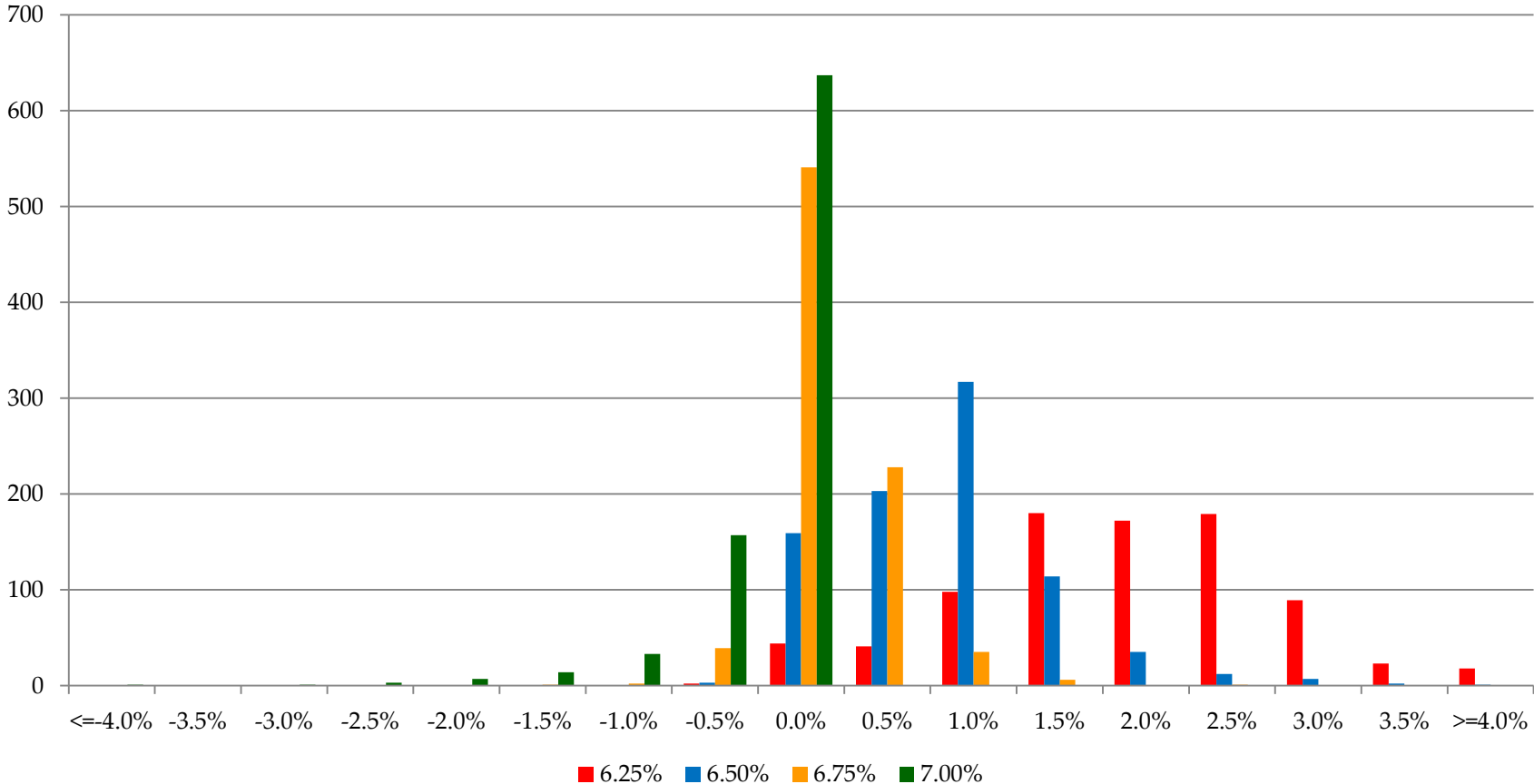
Investment Return Assumption

\$ amounts in millions	Dec 31, 2014 Valuation	6.25%	6.50%	6.75%	7.00%
Actuarial Accrued Liability (AAL)	\$19,470	\$20,689	\$19,999	\$19,342	\$18,719
Actuarial Value of Assets	<u>\$16,253</u>	<u>\$16,253</u>	<u>\$16,253</u>	<u>\$16,253</u>	<u>\$16,253</u>
Unfunded Actuarial Accrued Liability (UAAL)	\$3,217	\$4,436	\$3,746	\$3,089	\$2,466
Funded Ratio	83.5%	78.6%	81.3%	84.0%	86.8%
Full Contribution Rates:					
Straight Average	11.77%	13.74%	12.40%	11.68%	11.45%
Payroll Weighted Average	14.32%	16.59%	14.93%	14.23%	14.09%
Normal Cost %	8.78%	10.33%	9.40%	8.54%	7.74%
Prior Service %	5.54%	6.26%	5.53%	5.69%	6.35%



Distribution of Changes: By City

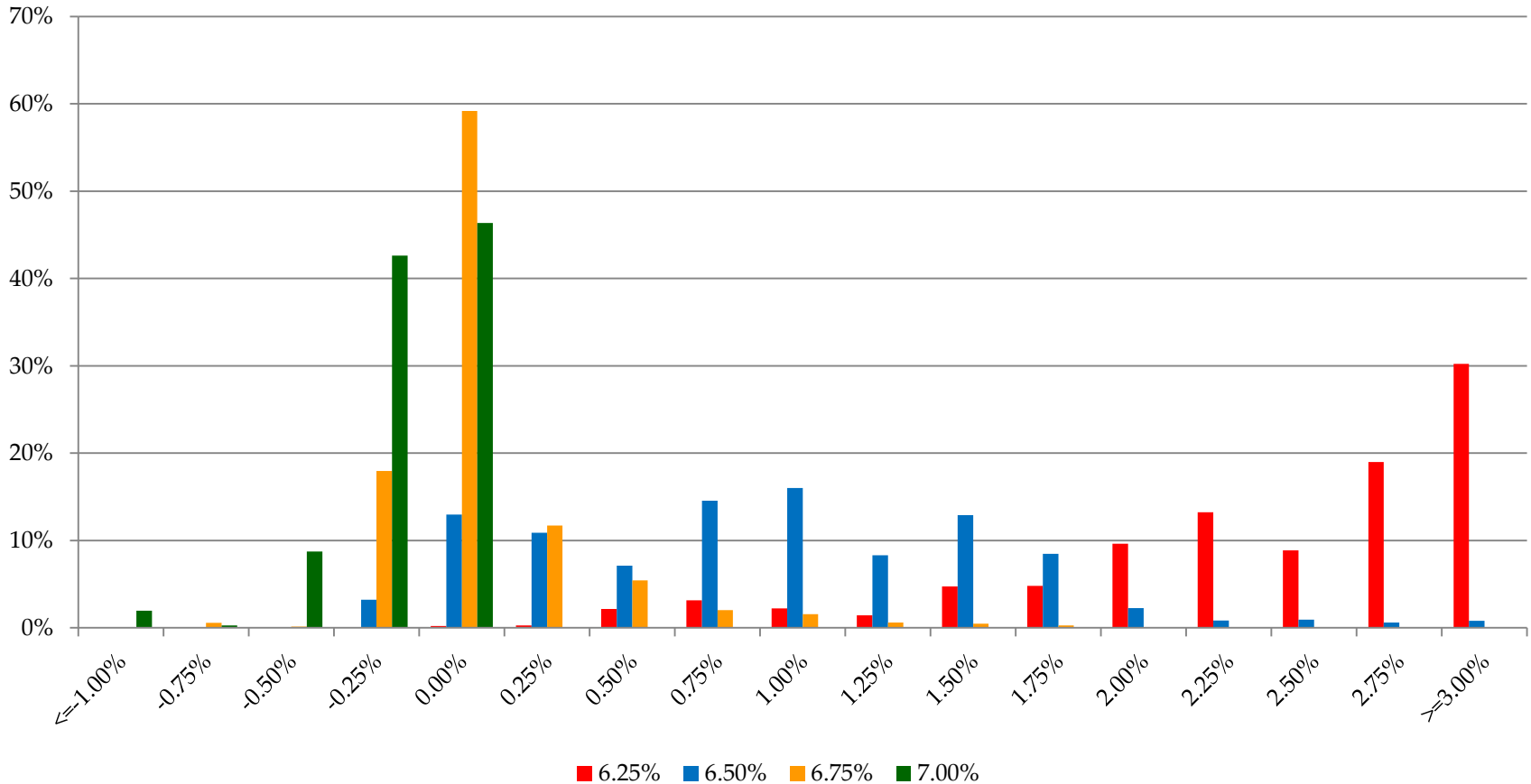
Total Changes in Full Retirement Rate



Rounded to nearest 0.5% change in rate



Distribution of Changes: Payroll Weighted Total Changes in Full Retirement Rate



Rounded to nearest 0.25% change in rate



Questions?