

Independent advice for the
institutional investor

Asset / Liability Update for the Florida Retirement System
Defined Benefit Program

March 2009

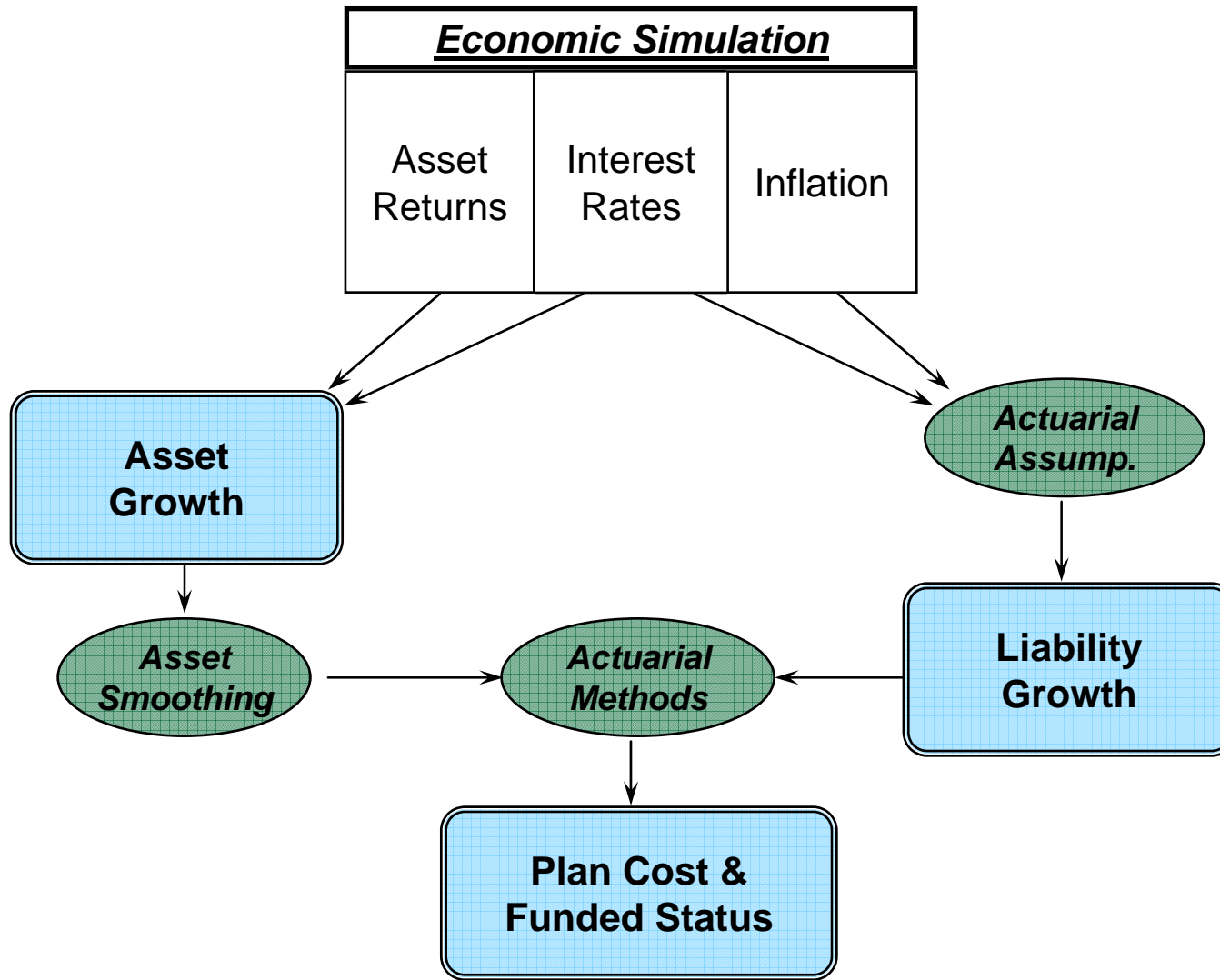
Agenda

- Asset-liability model and process
- Economic assumptions and simulations
- Update of forecast results with current policy mix
- Risk-reward analysis
 - Recap of 2007 risk-reward analysis and policy recommendations
 - Current risk-reward analysis

Steps In The Process

- **Establish assumptions and simulate key economic variables**
 - Inflation
 - Interest rates
 - Asset class returns, volatility and correlations
- **Use simulations to develop plan financial results over forecast period**
 - Liabilities
 - Assets
 - Costs
- **Summarize and graph results**
 - Trends
 - Range and distribution of results (i.e. uncertainty or risk)
- **Test impact of alternative equity allocation targets**

Structure Of Asset-Liability Model



Non-Economic Assumptions

- Demographic

- Total FRS population (DB+DC) grows 0% for 3 years, then 1% per year
- Percent of new hires electing into PEORP grades from 20% up to 25%

- Funding

- Contributions are based on current methods, with full application of surplus credits available under the rate stabilization mechanism
- No future changes in actuarial assumptions are assumed

	<u>Actuarial Assumption</u>	<u>Average AL Model</u>	
Price inflation	3.00%	2.30%	On average, model will reflect "gains" from wage growth.
Real wage growth	1.00%	1.00%	
Total wage growth*	4.00%	3.30%	
Price inflation	3.00%	2.30%	On average, model will reflect minor "gains" from investment return.
Real investment return	4.75%	5.50%	
Total investment return**	7.75%	7.80%	

* Before merit/promotional increases.

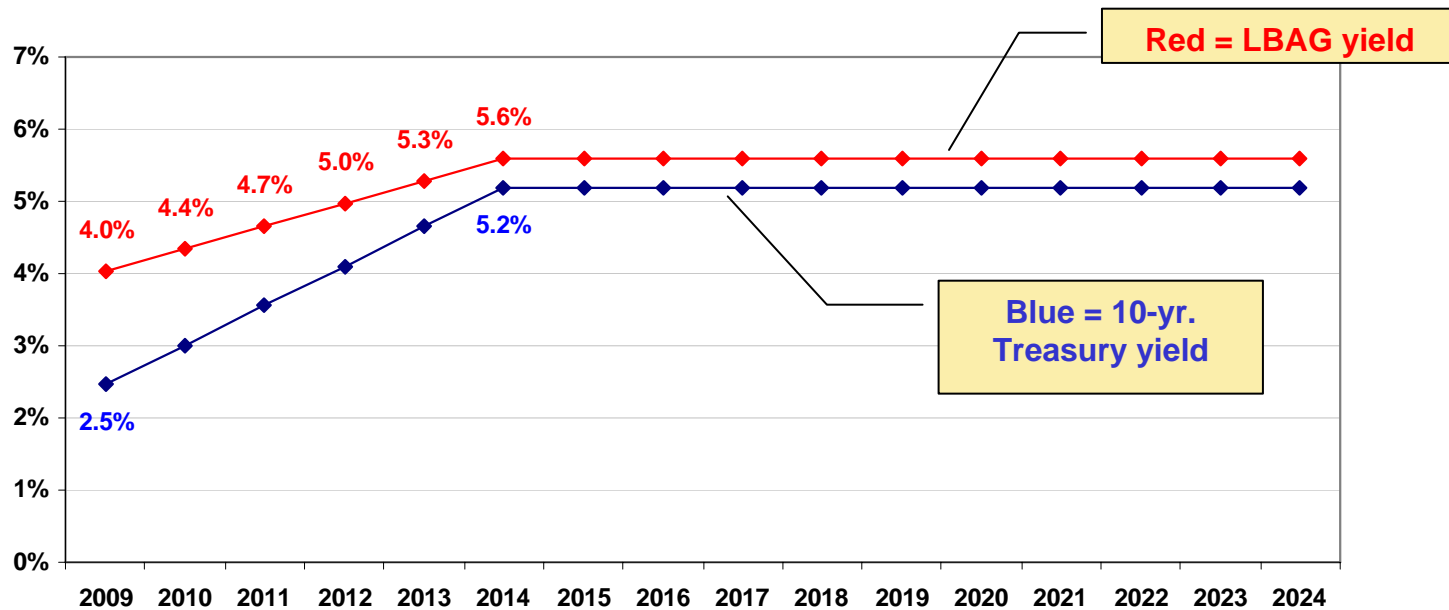
** Compounded multi-year average, net of expenses.

Steps In Developing Expected Returns

- US bonds – based on current yields and expected yield changes
- US equities – add an equity risk premium to the US bond expected return
- All other asset classes – returns will be consistent with US equity and US bonds, in proportion to their relative risk (“beta”)
- Private market premiums have been added to Real Estate (+1.0%) and to Private Equity (+3.0%)
- Volatility and correlation assumptions for all classes are based on historical values since 1978

US Bond Return

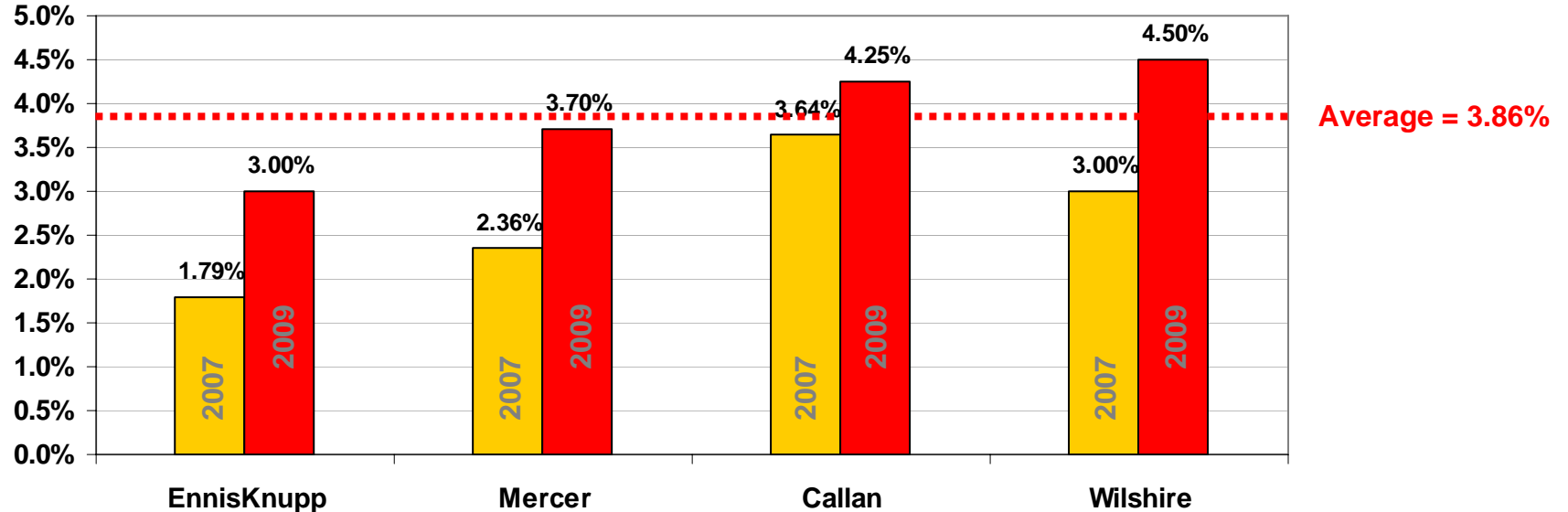
- Projected yield on LB Aggregate increases from 5.36% at 12/31/2008 to an ultimate level of 5.80% [based on (1) Blue Chip Economic Survey, (2) inflation of 2.3%, and (3) historical credit spread]:



- Expected average compounded return over next 15 years is 4.7%

US Equity Return

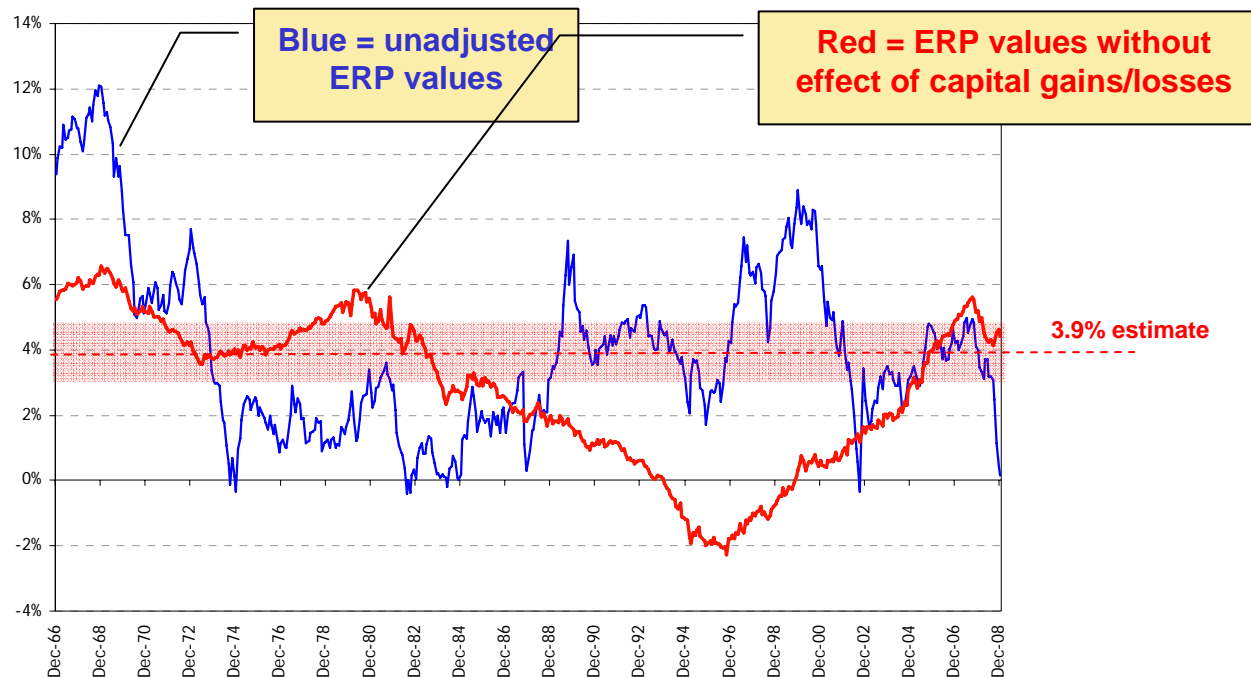
- For the 2009 update we used an equity risk premium assumption equal to 3.86%, the average of the assumptions currently used by the four SBA investment consultants. The resulting expected average compounded return for US equities is equal to 8.6% (the US bond expected return of 4.7% plus the ERP of 3.9%):



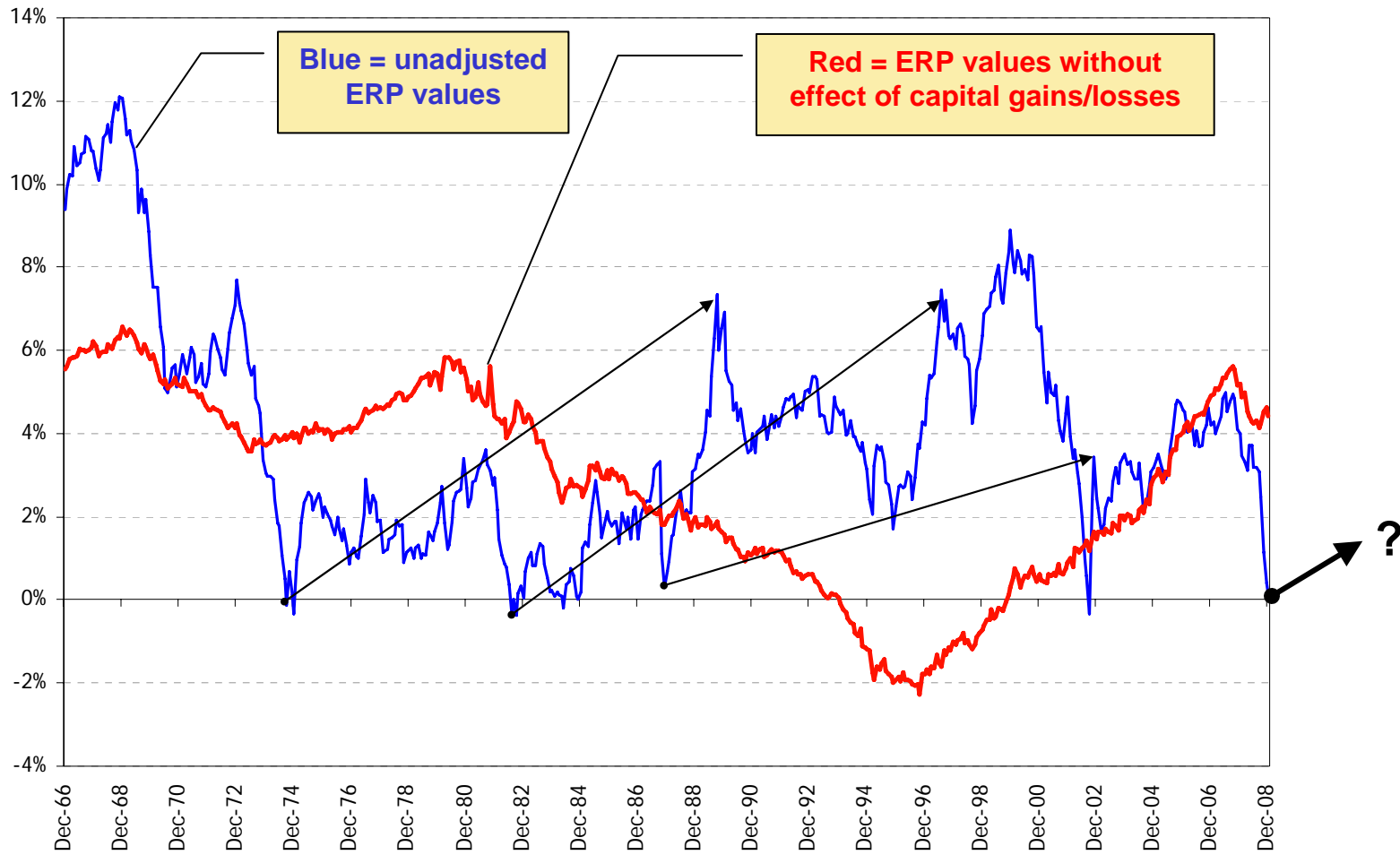
- We also made sensitivity runs using ERP assumptions of 2.9% and 4.9%.
- The ERP assumption used for the 2007 study was 2.70%.

Equity Risk Premium

- The equity risk premium (“ERP”) is the difference between the expected return on US equities and the expected return on US bonds, using compounded returns.
- This is the single most important assumption for an asset-liability study, as it establishes the price of risk.
- Historical ERP’s over 15-year time periods are not very stable:



Equity Risk Premium – Rolling 15-Year Average



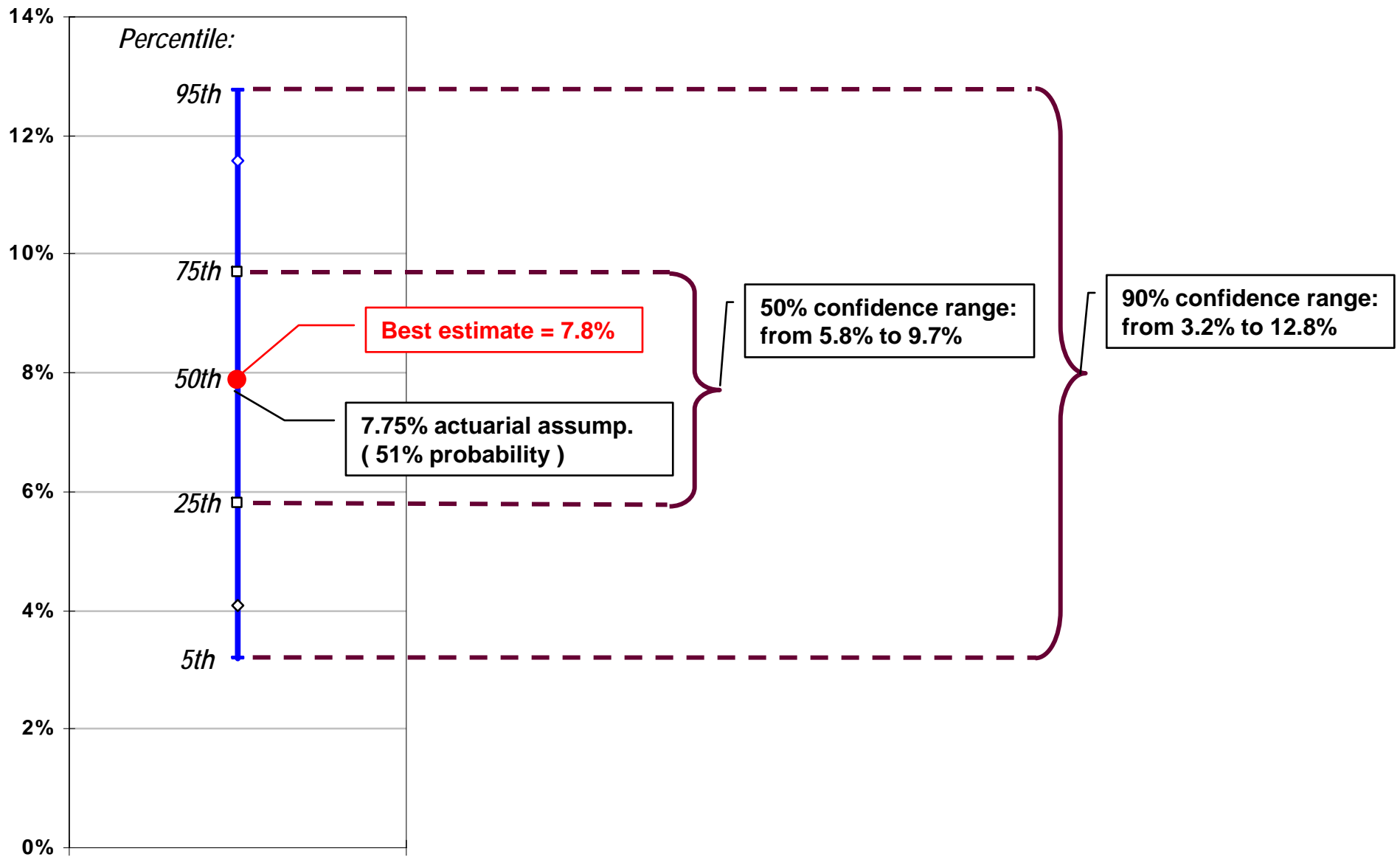
The arrows on this graph indicate how the equity risk premium looks 15 years after an historical low level is reached

Best Estimate Return – 69% “Risk Assets” + 31% Fixed Income

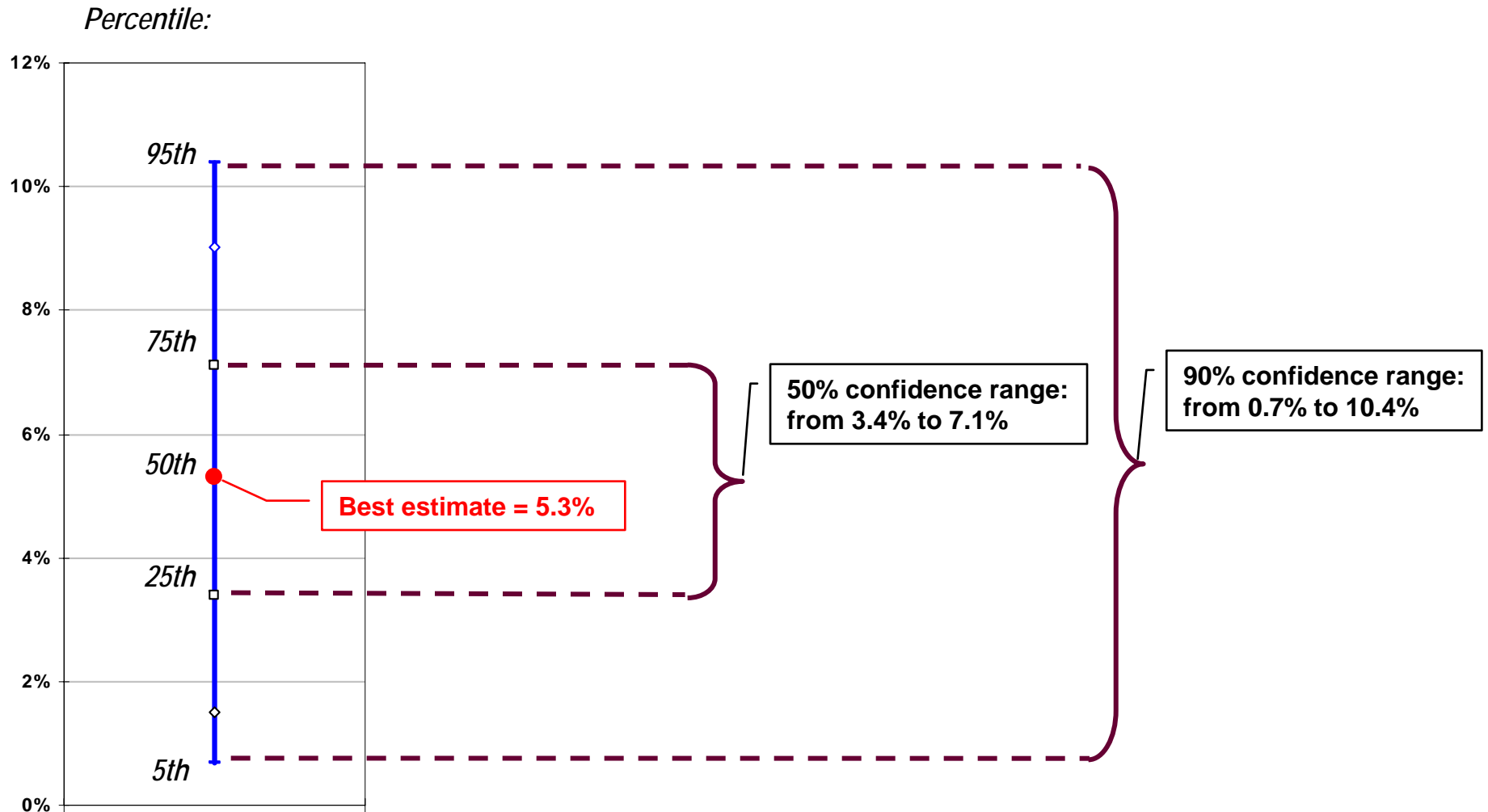
	<u>Current Policy Targets*</u>	--- Expected Average Return ---		<u>Standard Deviation</u>	
		<u>Compounded</u>	<u>Single Year</u>		
Domestic Equity	38%	8.6%	10.0%	16.8%	Risk Assets
International Equity	20%	8.4%	10.2%	19.1%	
Private Equity	4%	10.8%	15.4%	30.3%	
Real Estate	7%	6.6%	7.3%	11.6%	
US Bonds + Cash	31%	4.9%	5.1%	6.4%	Fixed Income
Inflation		2.3%			
Total Portfolio					
Gross		7.9%	8.6%		
Expenses		0.13%	0.13%		
Net - Nominal Return		7.8%	8.5%	11.4%	
Net - Real Return		5.3%			
Return Under 2007 Assumptions					
Net - Nominal Return		7.6%	8.3%		
Net - Real Return		5.0%			

* Allocation targets excluding Strategic Investment class.

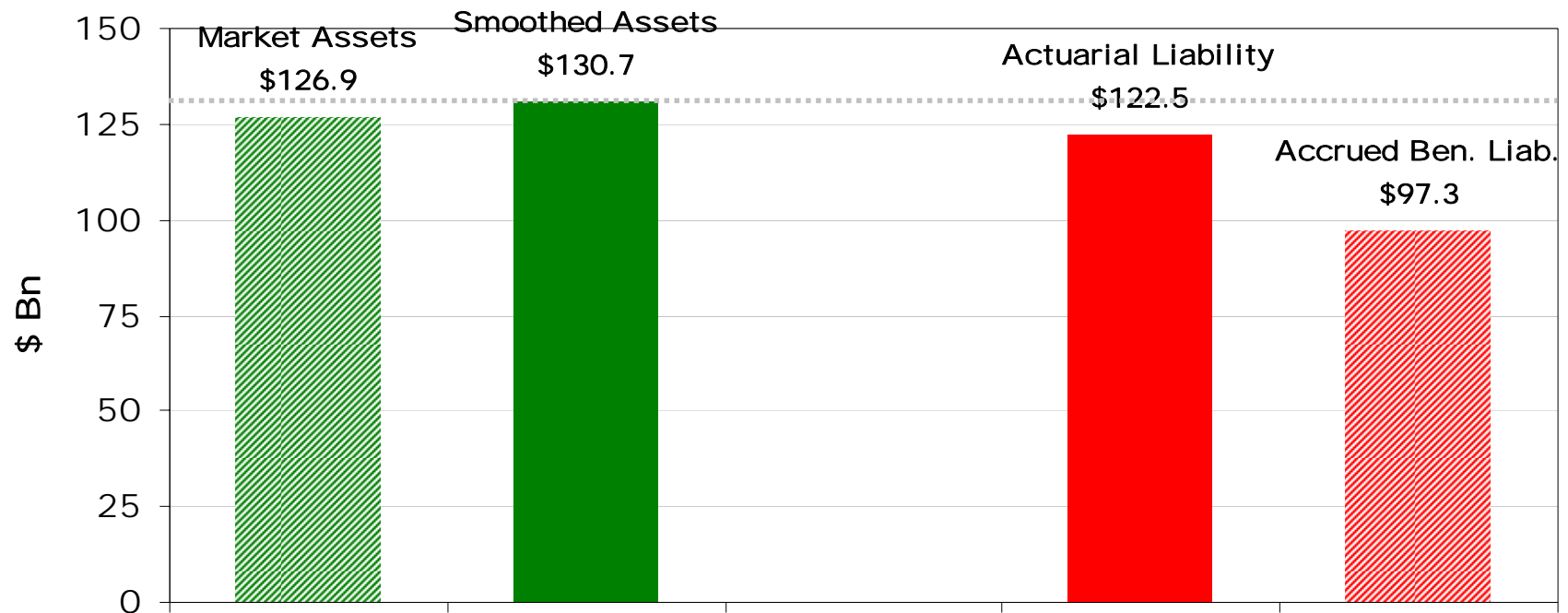
Range Of Possible 15-Year Compound Returns -- Nominal



Range Of Possible 15-Year Compound Returns -- Real



Funded Status At 7/1/2008



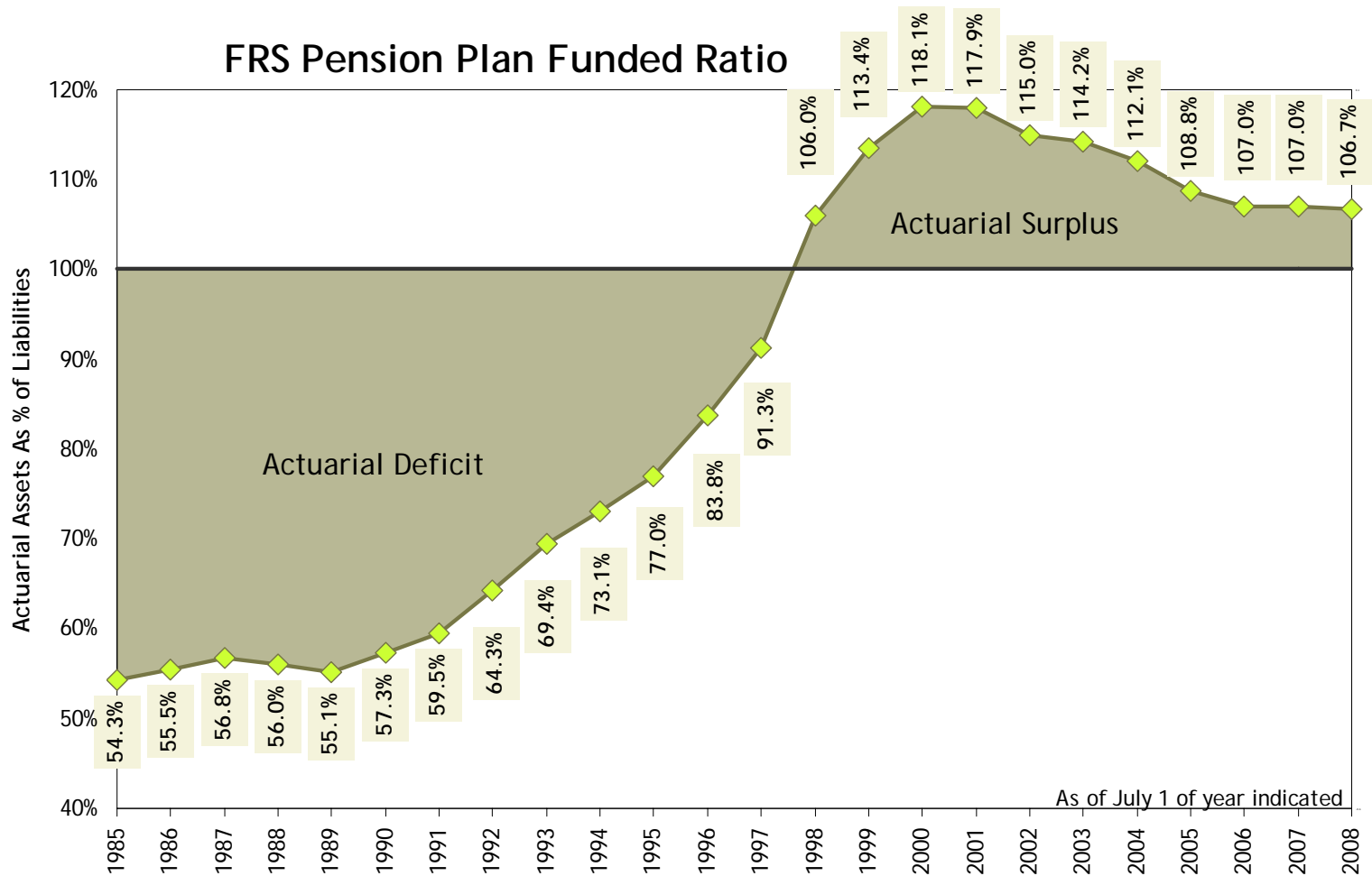
Funded Status

	<u>7/1/2007</u>	<u>7/1/2008</u>	<u>Projected 7/1/2009*</u>
Actuarial Liability	\$ 117.4 <i>bn</i>	\$ 122.5 <i>bn</i>	\$ 129.1 <i>bn</i>
Assets			
Market Value	\$ 136.7 <i>bn</i>	\$ 126.9 <i>bn</i>	\$ 100.3 <i>bn</i>
Smoothed/"Actuarial" Value	\$ 125.6 <i>bn</i>	\$ 130.7 <i>bn</i>	\$ 120.4 <i>bn</i>
Funded Ratio			
Using Market Value	116%	104%	78%
Using Smoothed Value	107%	107%	93%

* Assumes portfolio return from 7/1/2008 through 6/30/2009 of -19%, reflecting actual return of - 22% for the first six months through 12/31/2008.

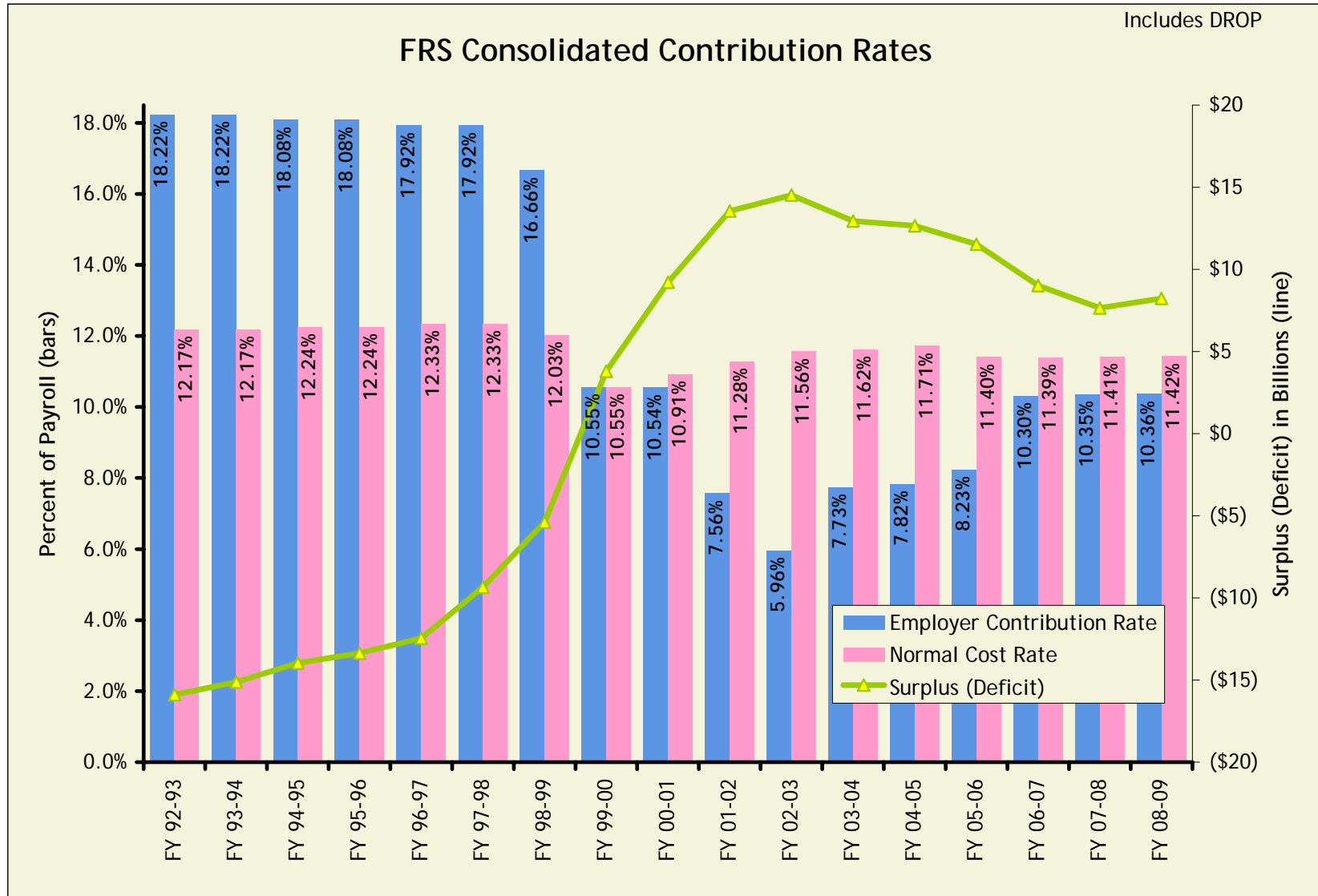
Note that the smoothed asset value is constrained by the "corridor" test to be no more than 120% of market value.

Funded Ratio – Historical Perspective

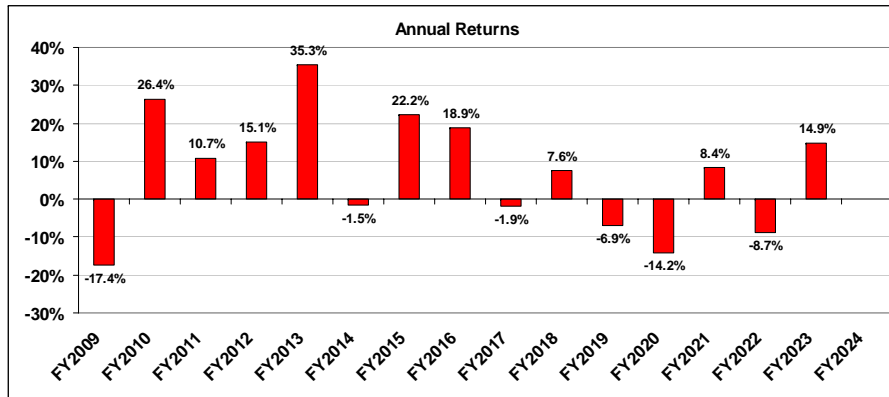


Note: Amounts are interpolated for 1986, 1988, 1990, 1992, 1994 and 1996. Actuarial valuations were conducted biennially prior to 1997.

Contribution Rates -- Historical Perspective

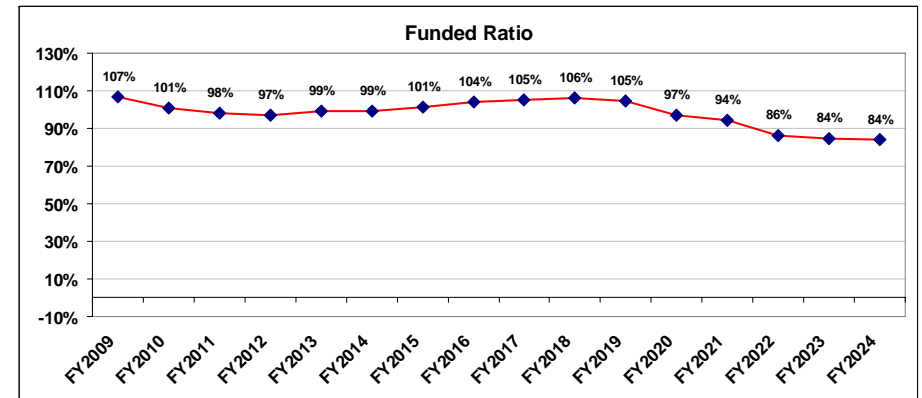
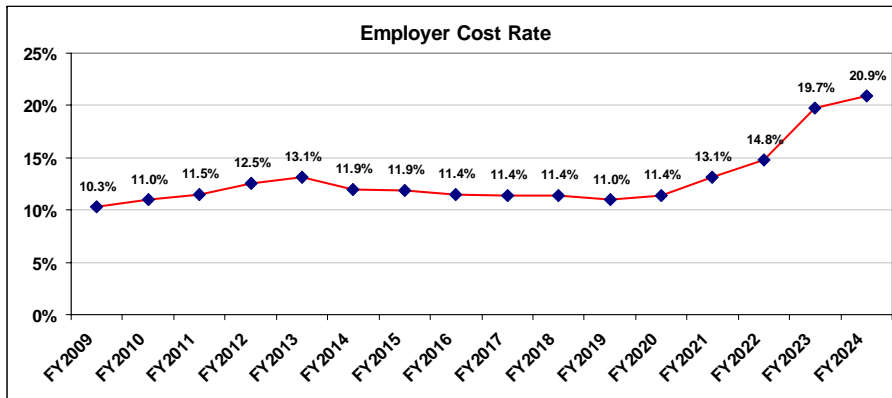


Sample Scenario – Average Returns – But Front-Loaded

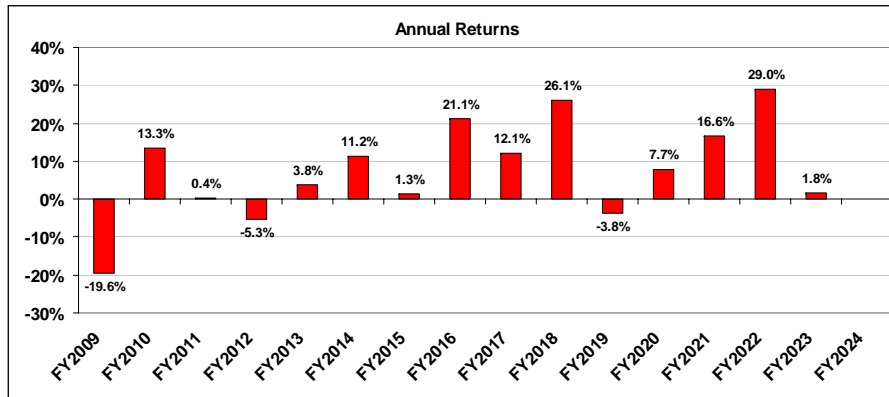


Compound return over 15 years:

Nominal **7.24%**
Real **5.40%**



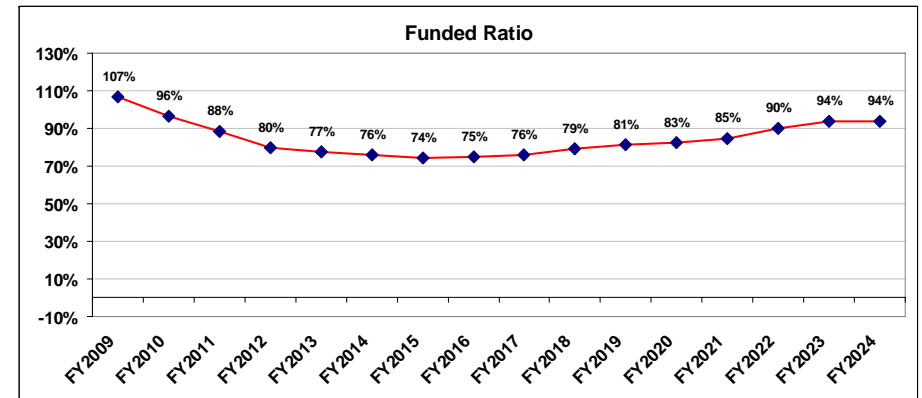
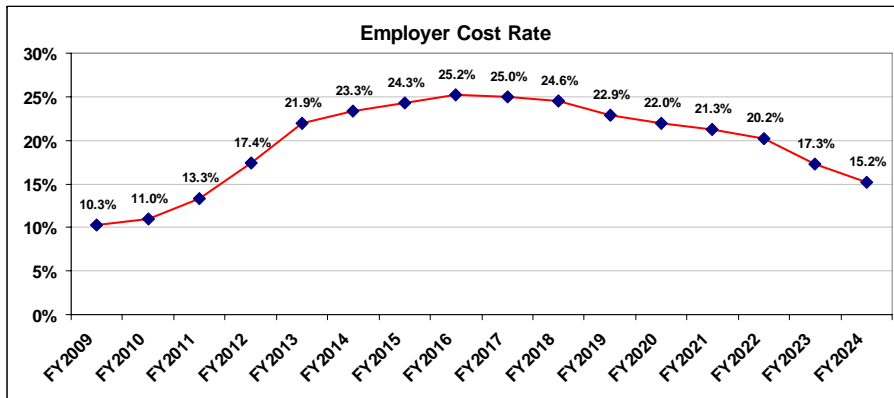
Sample Scenario – Average Returns – Not Front-Loaded



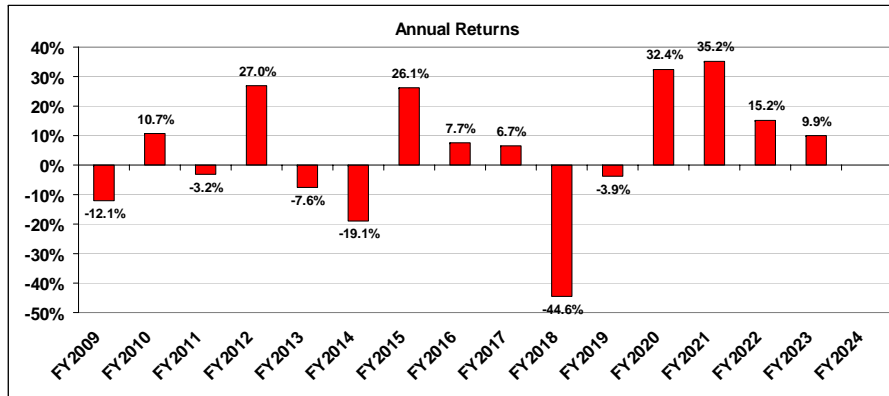
Compound return over 15 years:

Nominal **7.84%**

Real **5.29%**



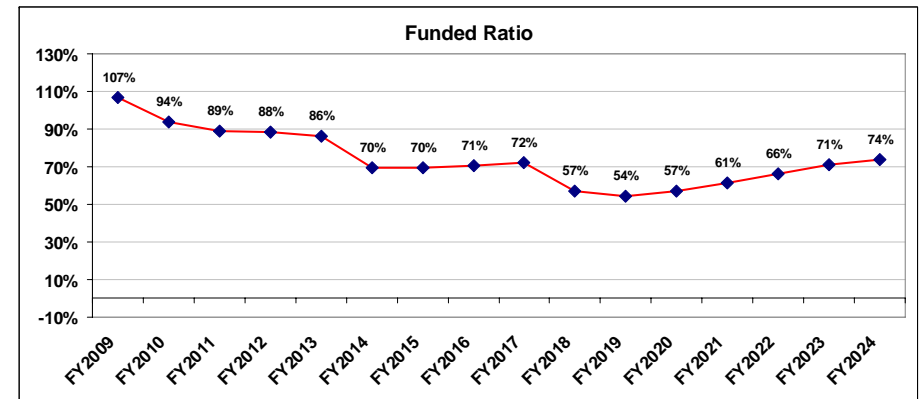
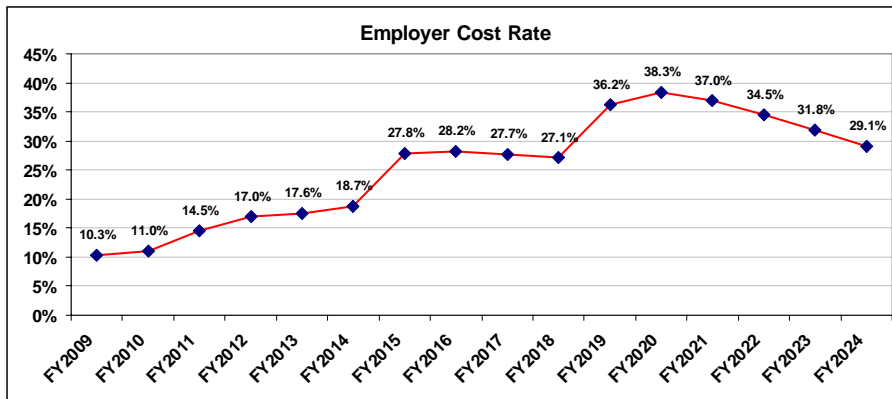
Sample Scenario – Bad News = 25th %-tile Returns



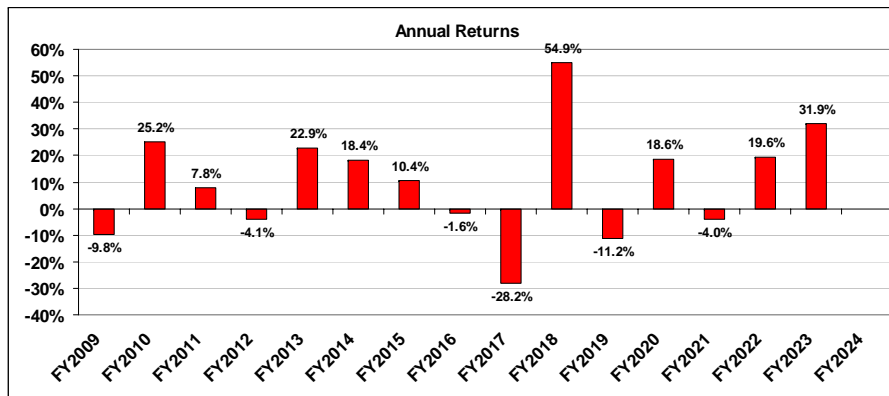
Compound return over 15 years:

Nominal **5.69%**

Real **3.52%**

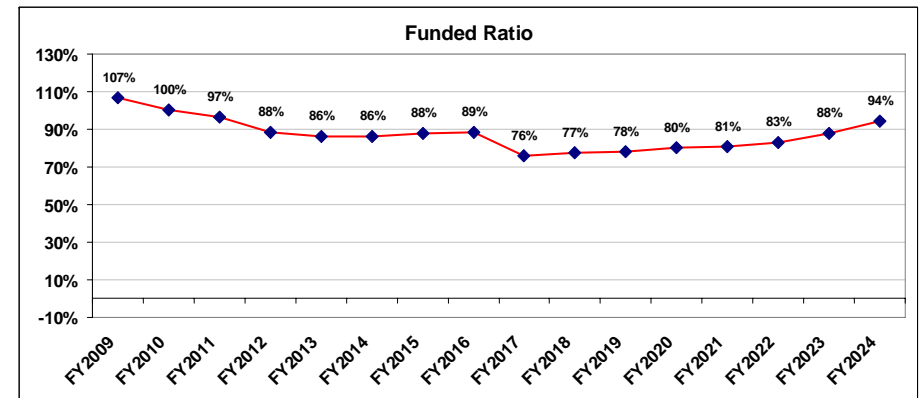
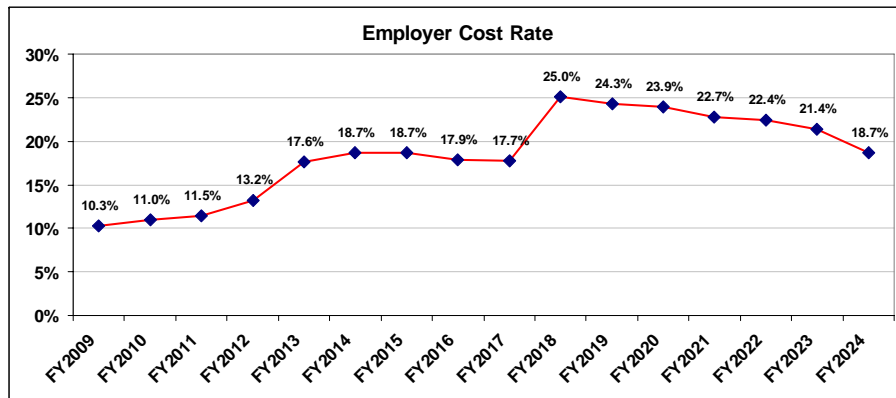


Sample Scenario – Good News = 75th %-tile Returns

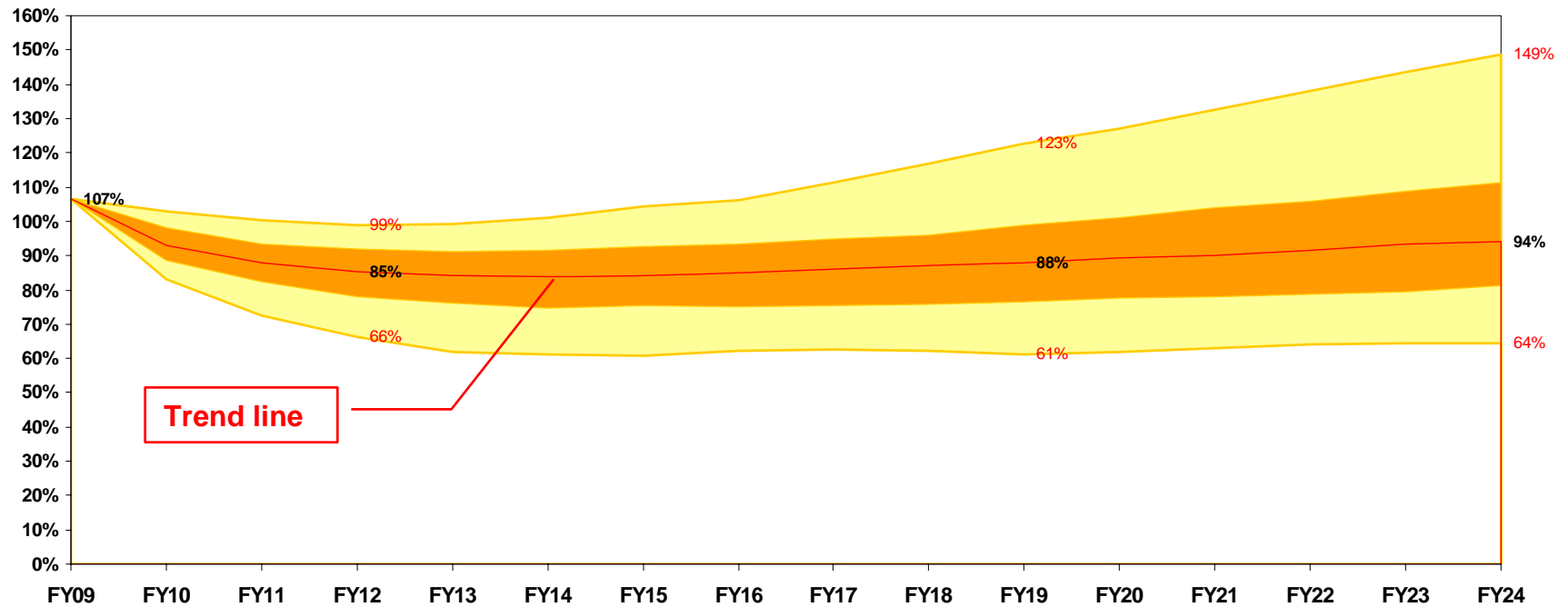


Compound return over 15 years:

Nominal **9.52%**
Real **7.14%**



Range Of Funded Ratios – Current 69% Risk Asset Allocation

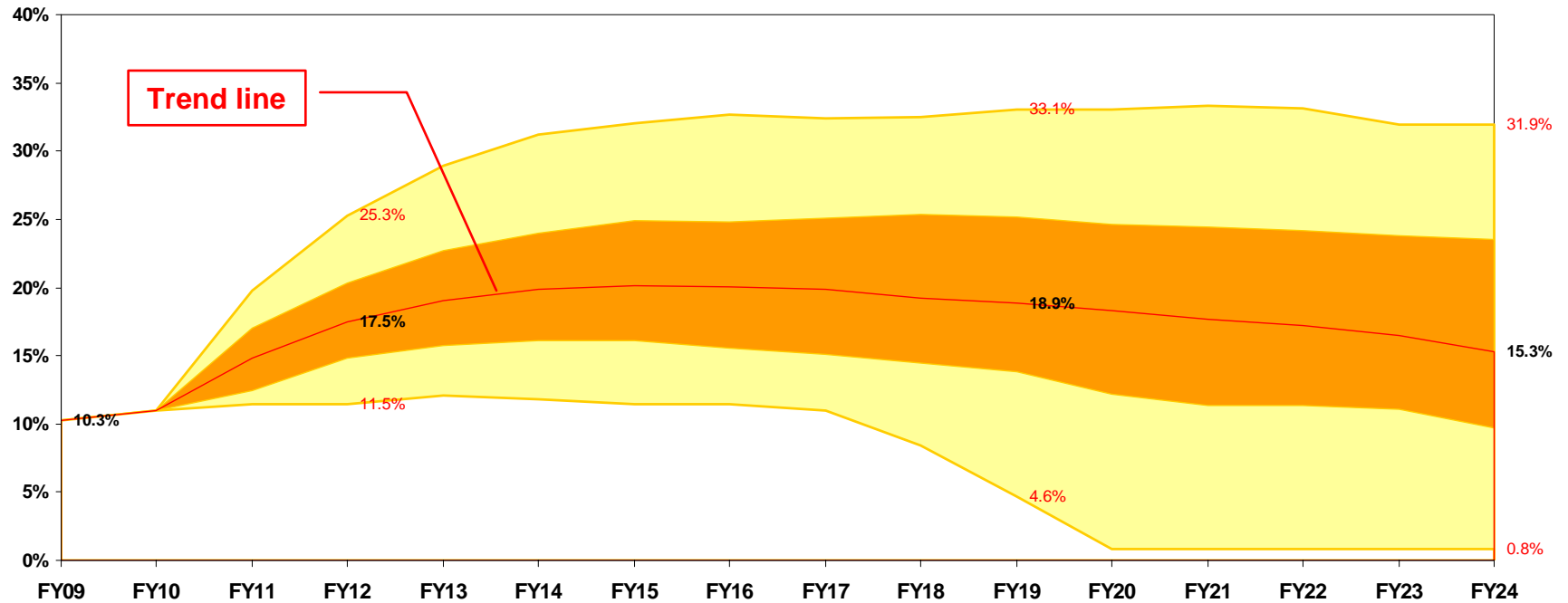


%-tile values:

5%	107%	83%	72%	66%	62%	61%	61%	62%	63%	62%	61%	62%	63%	64%	64%	64%
25%	107%	89%	82%	78%	76%	75%	75%	75%	75%	76%	77%	77%	78%	79%	79%	81%
50%	107%	93%	88%	85%	84%	84%	84%	85%	86%	87%	88%	89%	90%	91%	94%	94%
75%	107%	98%	93%	92%	91%	91%	92%	93%	95%	96%	99%	101%	104%	106%	109%	111%
95%	107%	103%	100%	99%	99%	101%	105%	106%	111%	117%	123%	127%	132%	138%	143%	149%

Dark shaded area indicates the 50% probability zone, and light shaded area indicates the 90% probability zone.

Range Of Employer Contribution Rates – Current 69% Risk Asset Allocation

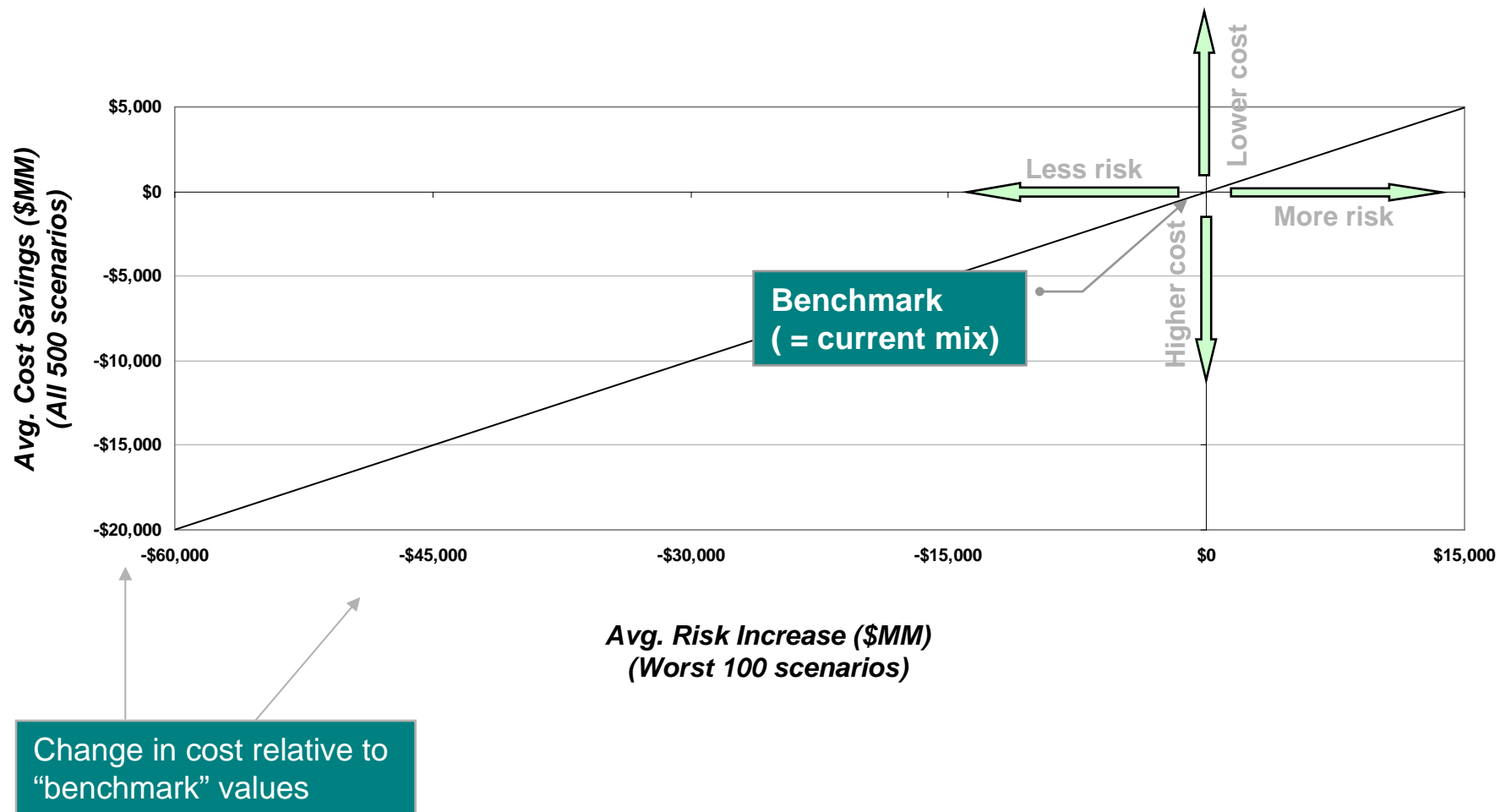


%-tile values:

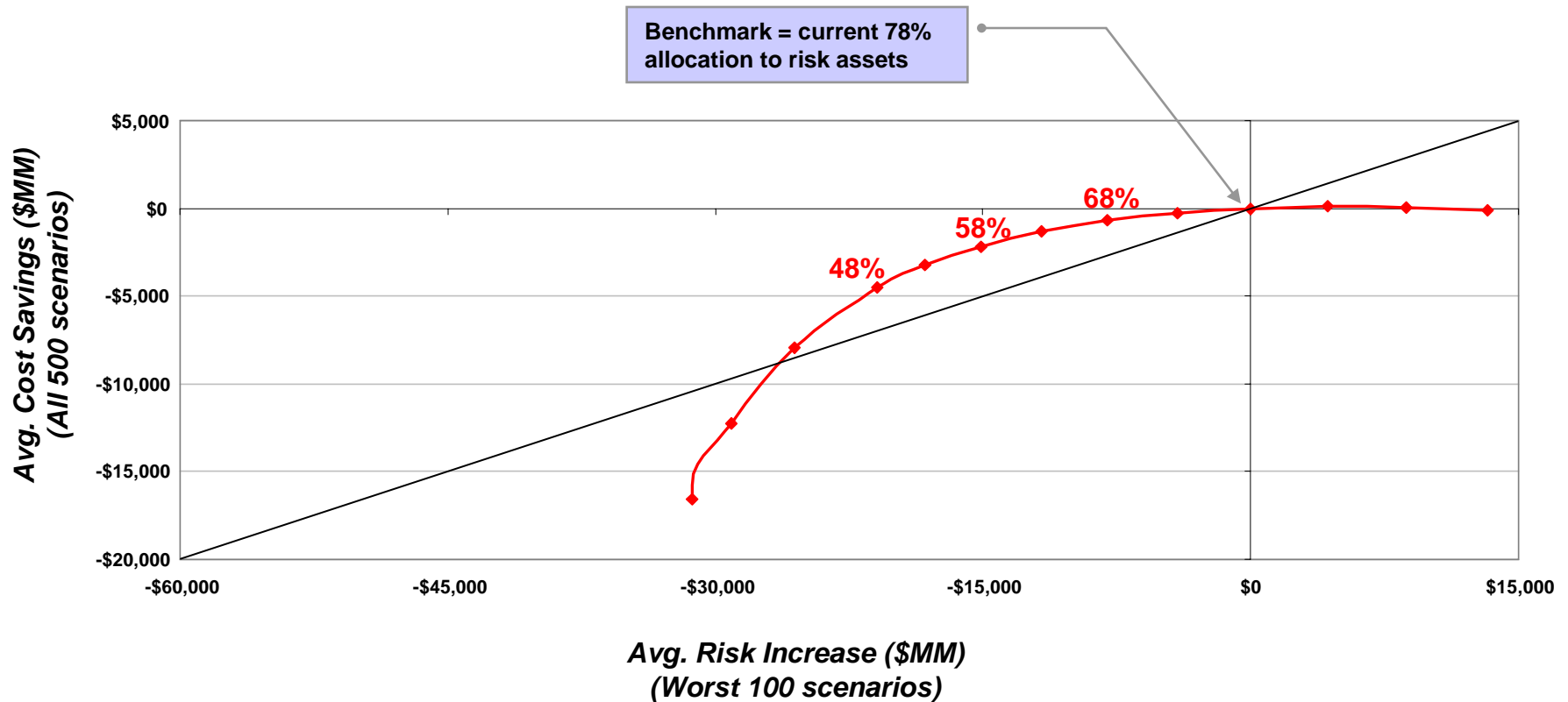
5%	10.3%	11.0%	11.5%	11.5%	12.0%	11.8%	11.4%	11.4%	11.0%	8.4%	4.6%	0.8%	0.8%	0.8%	0.8%	0.8%
25%	10.3%	11.0%	12.5%	14.8%	15.7%	16.1%	16.1%	15.6%	15.1%	14.5%	13.8%	12.2%	11.4%	11.4%	11.1%	9.7%
50%	10.3%	11.0%	14.9%	17.5%	19.1%	19.9%	20.2%	20.1%	19.9%	19.2%	18.9%	18.3%	17.7%	17.2%	16.5%	15.3%
75%	10.3%	11.0%	17.0%	20.3%	22.7%	24.0%	24.9%	24.8%	25.1%	25.3%	25.1%	24.6%	24.5%	24.2%	23.8%	23.5%
95%	10.3%	11.0%	19.8%	25.3%	29.0%	31.2%	32.1%	32.7%	32.4%	32.5%	33.1%	33.0%	33.3%	33.1%	32.0%	31.9%

Dark shaded area indicates the 50% probability zone, and light shaded area indicates the 90% probability zone.

Risk / Reward Analysis Based On Long-Term Economic Cost



2007 Risk-Reward Analysis



The risk-reward curve from the 2007 study indicated that the optimal allocation to risk assets was between 48% and 68%, based on the baseline set of assumptions – these are the points that lie furthest above the diagonal line.

2007 Decision On Asset Allocation

Alternative Asset Allocations					
	(1)	(2)	(3)	(4)	(5)
	Current Asset Allocation Level	Optimized Portfolio with Moderate Risk Reduction Level	Change	Optimized Portfolio with Substantial Risk Reduction Level	Change
Domestic Equities ¹	50.00%	38.45%	-11.55%	28.59%	-21.41%
Foreign Equities ¹	16.00%	20.00%	4.00%	17.51%	1.51%
Fixed Income ²	21.00%	27.55%	6.55%	34.91%	13.91%
High Yield	0.00%	2.00%	2.00%	2.00%	2.00%
TIPS	0.00%	0.00%	0.00%	5.00%	5.00%
Real Estate	7.00%	7.00%	0.00%	7.00%	0.00%
Private Equity	5.00%	4.00%	-1.00%	4.00%	-1.00%
Cash Equivalents	1.00%	1.00%	0.00%	1.00%	0.00%
Public & Private Equities	78.00%	69.45%	-8.55%	57.10%	-20.90%
Bonds, TIPS & CA	22.00%	30.55%	8.55%	42.91%	20.91%

Final decision was for moderate risk reduction.

¹ Current allocation includes 2% weight from Global Equities

² Current allocation includes a market weight to High Yield, approx. 1.5% of the total fund

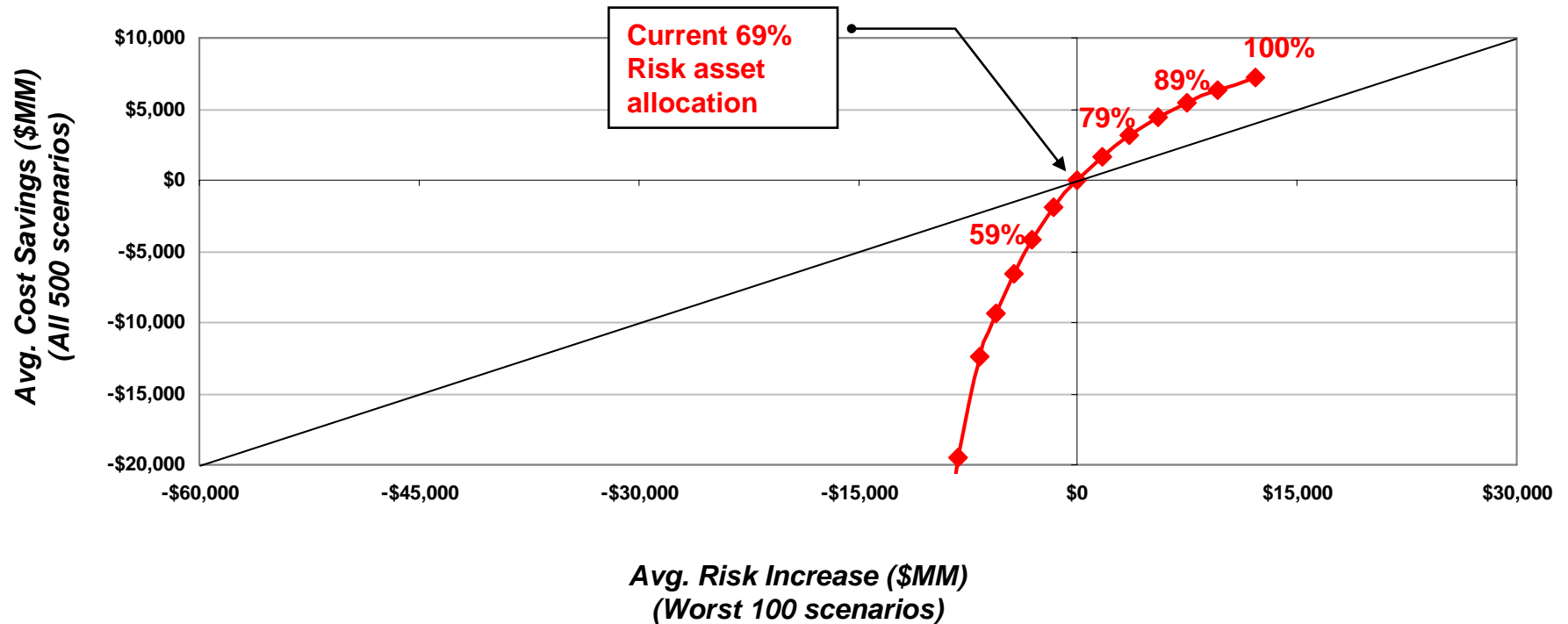
2007 Decision On Asset Allocation

Final decision was for moderate risk reduction.

Impact of Expected Risk on Long-Term Economic Cost

	\$ billions	Current expected risk level	~3% over moderate reduction	Moderate reduction	~3% under moderate reduction	Substantial reduction
Risk Level		12.67%	11.81%	11.48%	11.15%	9.84%
Long-Term Economic Cost						
Average	\$	37.1	\$ 37.0	\$ 37.0	\$ 37.0	\$ 37.6
Average - worst 20%	\$	105.3	\$ 101.6	\$ 100.0	\$ 98.7	\$ 92.9
Change in Long-Term Economic Cost re. Current Risk Level						
Average	\$	-	\$ (0.1)	\$ (0.1)	\$ (0.1)	\$ 0.5
Average - worst 20%	\$	-	\$ (3.7)	\$ (5.3)	\$ (6.6)	\$ (12.4)

2009 Risk-Reward Analysis

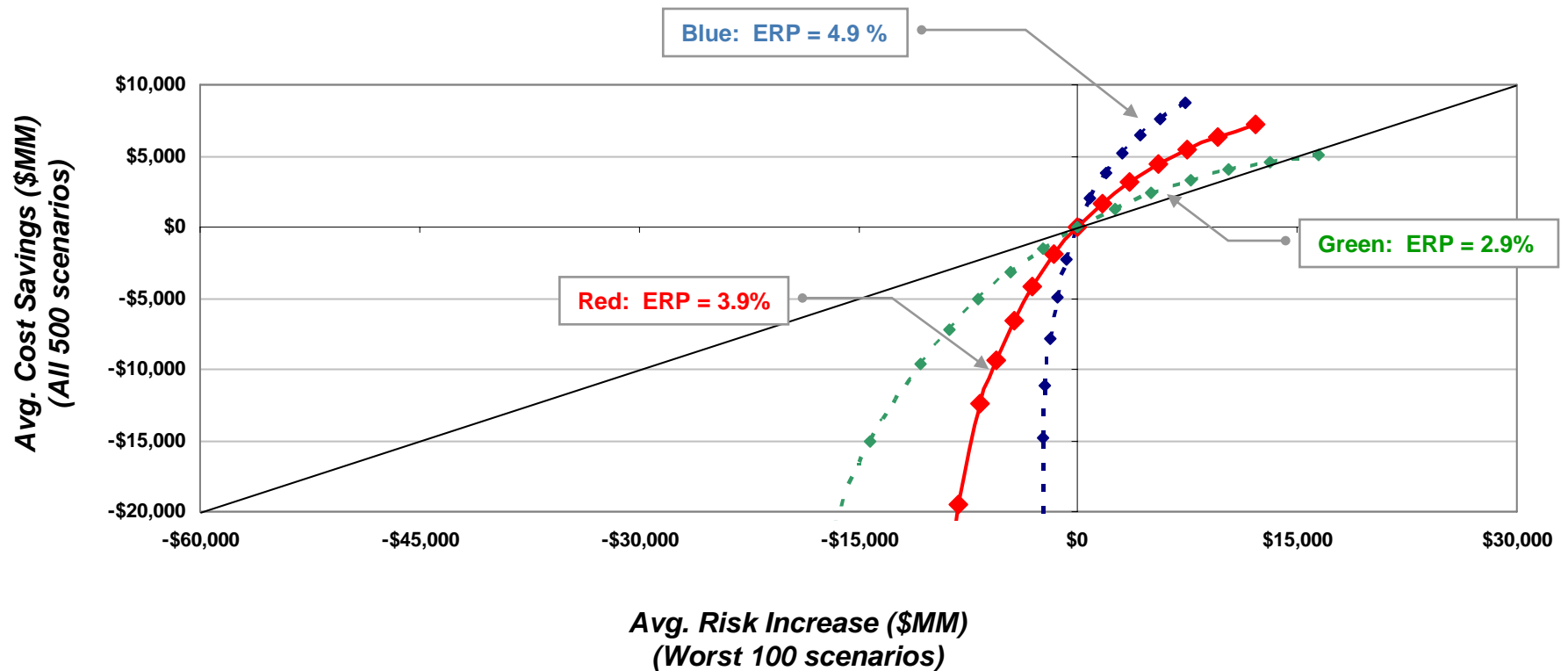


The risk-reward curve has changed significantly from the 2007 study – in the direction of suggesting that a higher allocation to risk assets may be appropriate. This change is driven by the higher equity risk premium assumption, and by the decrease in the plan's funded status.

Impact Of Allocation On Long-Term Economic Cost

<u>Allocation To Risk Assets</u>	====>	<u>64%</u>	<u>69%</u>	<u>74%</u>
Long-Term Economic Cost (\$ billions)				
Average		\$ 72.2	\$ 70.3	\$ 68.5
Average - worst 20%		\$ 138.5	\$ 140.1	\$ 141.9
Change In Long-Term Economic Cost vs. Current Risk Level (69%)				
Average		\$ 1.9	\$ -	\$ (1.7)
Average - worst 20%		\$ (1.6)	\$ -	\$ 1.7

Risk-Reward Analysis – Sensitivity To Equity Risk Premium Assumption



The equity risk premium (ERP) assumption is very significant in any risk-reward analysis – it is the measure the expected pay-off for risk taking. This chart shows how the curve shifts when we change the ERP by 100bps.

Appendix

- Explanation of risk-reward measures
- Background on funded status utility functions

Long-Term Economic Cost Of Plan

- Discounted PV of cash contributions is the main component of true long-term economic cost, but it does not reflect the plan's funded status at the end of the forecast period
 - Surplus assets are valuable since they will lower future contributions
 - Unfunded liabilities are costs that will be recognized over future years

- Long-term economic cost =

PV of cash contributions

plus

PV of terminal funding shortfall

minus

PV of terminal funding surplus



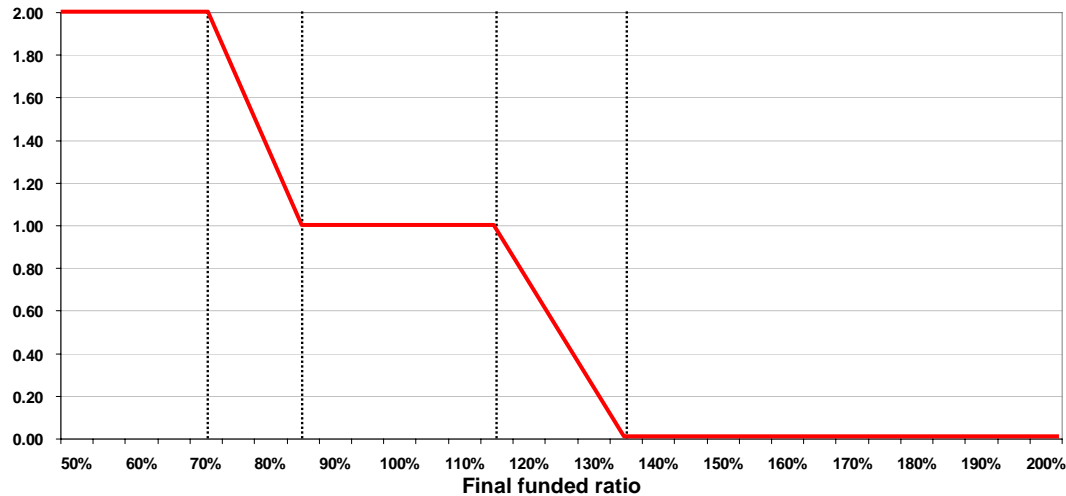
adjusted by a utility factor

Utility Factor For Terminal Funded Status

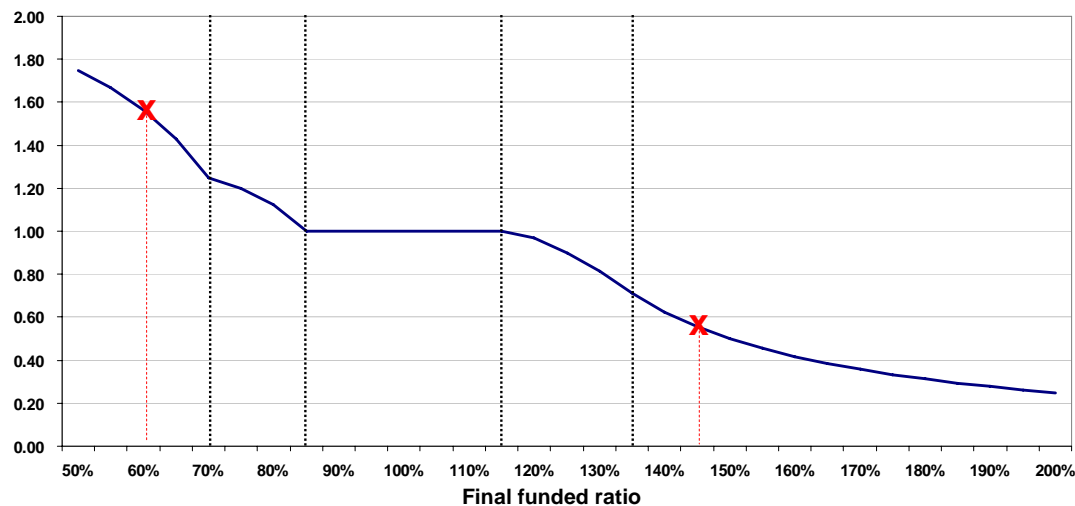
- Modest deviations from 100% funding are normal, and no special adjustment is needed for these scenarios – the amount of surplus or unfunded liability can be reflected at its dollar value.
- As surplus amounts grow to very high levels, there is a declining value, or utility, to the surplus:
 - Contributions cannot go below zero.
 - Long contribution holidays may create a false sense of how much the plan really costs, and lead to confusion when cost levels revert to “normal”.
 - Large surplus amounts can become a potential target for non-pension applications.
- As unfunded amounts grow to very high levels, there is an increasing amount of “pain” as contributions rise to unacceptable levels:
 - May be viewed as “breaking trust” with future taxpayers.
 - Freezing of the pension plan becomes a possibility.

Utility Function

Graph of marginal utility factors



Graph of utility factors



The marginal utility factors are applied to the changes in the surplus or unfunded amounts.

Any surplus beyond a 115% funded ratio is valued at a gradually decreasing fraction of its full value, until the funded ratio hits 135% where no additional surplus is recognized.

Any unfunded below an 85% funded ratio is valued at a gradually increasing multiple of its value, until the funded ratio hits 70% where each increment of further unfunded is valued at 2x its value.

The final utility factors are shown in the bottom graph. For example, if the final funded ratio is 145% then only [0.56 x surplus] is included in the economic cost. If the final funded ratio is 60% then [1.56 x unfunded] is included in the economic cost.

Risk / Reward Analysis

- Reward = average “economic cost” of all 500 simulated scenarios
- Risk = average “economic cost” of the worst 100 simulated scenarios
- “Economic cost” risk / reward analysis
 - Analyzes risk / reward trade-offs among different asset allocation strategies
 - Plots the changes in risk and reward measures vs. a selected benchmark strategy