

Asset-Liability Study Results

Omaha School Employees' Retirement System (OSERS)
November 2016

Aon Hewitt
Retirement and Investment

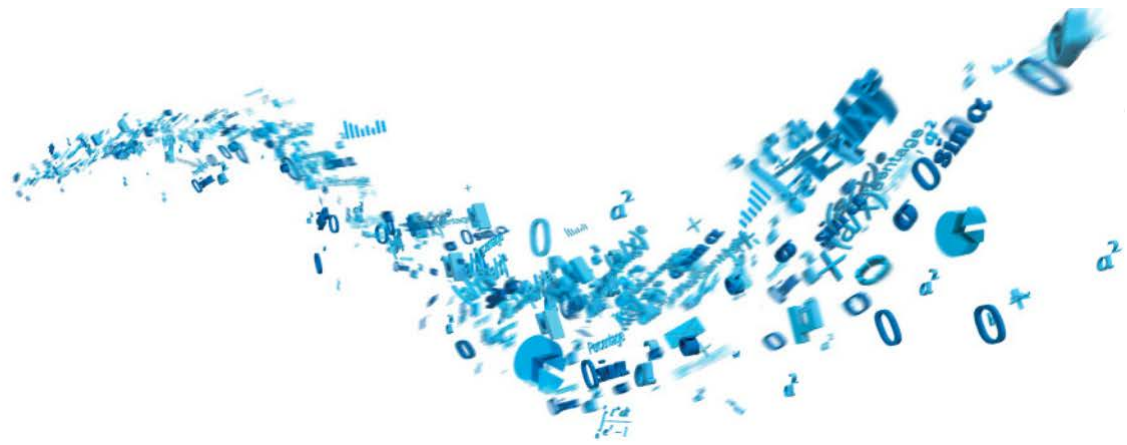
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Table of Contents

- Executive Summary
- Analysis
 - Portfolio Analysis
 - Asset-Liability Projection Results
- Summary and Conclusions
- Appendices



Executive Summary

Executive Summary

Summary and Conclusions

Asset Class	OSERS Long-Term Policy Target Allocation – Recommended
U.S. Equities	29.0%
Global Equities	15.0%
Non-U.S. Equities	13.5%
Real Estate	7.5%
Private Equity	5.0%
Fixed Income*	30.0%
Total	100.0%

- We recommend that the Council adopt an asset allocation policy for the OSERS DB Plan that mirrors the policy currently in place for the NPERS DB Plan

*"Fixed Income" consists of 20% core bonds, 1.5% international bonds, 3.5% high yield bonds, and 5% bank loans. As such, the allocation to return-seeking and risk-reducing assets would be split 80% return-seeking / 20% risk-reducing.

Executive Summary

Summary and Conclusions (Cont'd)

- In July, AHIC reviewed the results of the A/L Study for the NPERS DB Plan with the Council
- During that review, we discussed two broad approaches to portfolio construction – “Opportunity” investing, and “Efficiency” investing
 - Opportunity investing makes heavy use of alternatives and active management
 - ♦ Offers the potential for better diversification and increased returns, BUT:
 - Higher fees
 - Less liquidity
 - Is dependent upon the success of active management
 - Efficiency investing seeks to access market returns in an efficient and cost effective manner
- Historically, the Council has preferred the Efficiency approach to investing
- OSERS’ current asset allocation resembles the Opportunity approach
- While there are arguments to be made for each approach, we are of the view that it would be sub-optimal to utilize different investment philosophies to invest the OSERS assets and the NPERS assets once the OSERS assets come under the Council’s authority
- As such, our recommendation for the OSERS portfolio would be to utilize the same investments / asset classes that are found in the NPERS portfolio in a combination that provides the appropriate risk posture for OSERS.
- With regards to the appropriate risk posture for OSERS:
 - OSERS is less well funded relative to NPERS
 - All else equal, this could argue for increased risk-taking within the portfolio
 - OSERS currently has a contribution policy that employs a closed amortization period. This forces full funding at the end of 28 years with increasing volatility until that point as (gains)/losses have less time to be smoothed into contribution amounts. (This is the reason for some of the unique spikes/drops in the stochastic exhibits in the slides that follow)
 - All else equal, this could argue for decreased risk-taking within the portfolio
- On balance, it appears to us that a risk posture similar to NPERS’ portfolio (i.e., 80% return seeking, 20% risk reducing) is appropriate for OSERS

Executive Summary

Summary and Conclusions (Cont'd)

Portfolio Analysis

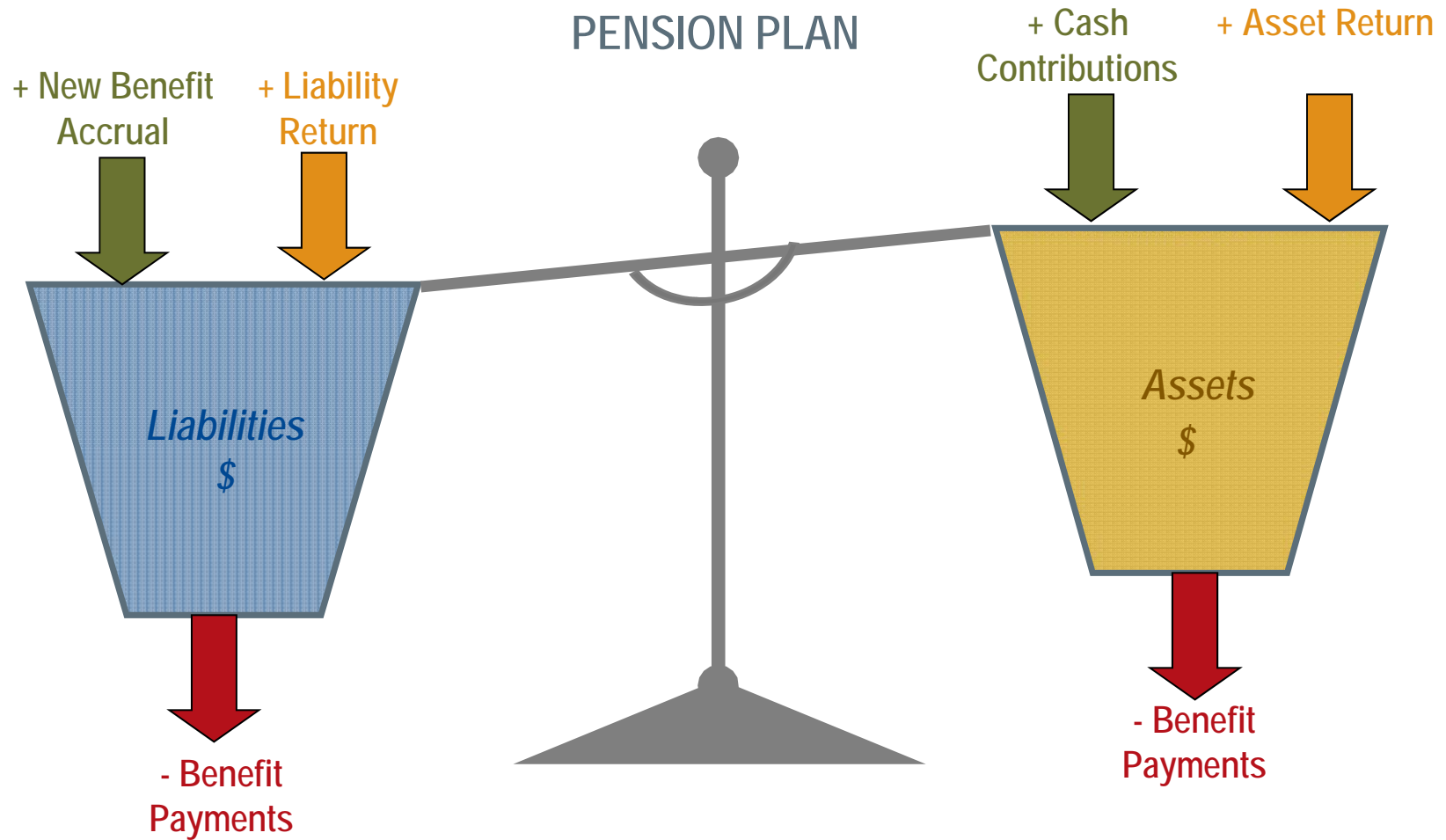
- Longer time horizons are expected to reward higher levels of risk; shorter time horizons are not
- Nebraska should consider its desired balance between funding and investment returns in order to determine the ideal investment portfolio as deviations along the NPERS frontier of portfolios exhibit the standard risk/reward trade-off of expected costs and risks

Financial Projection Trend Analysis

- Asset returns are not expected to keep pace with the actuarial assumed rate of return
- Contribution volatility will increase as the closed amortization period declines to immediate recognition
- Contribution policy will close the funding shortfall; however, adverse market conditions can lead to substantial risk in the plan contribution amount
- Above findings assume that the contribution policy today extends throughout the next 30 years along with no changes to the current plan design or actuarial assumptions

Executive Summary

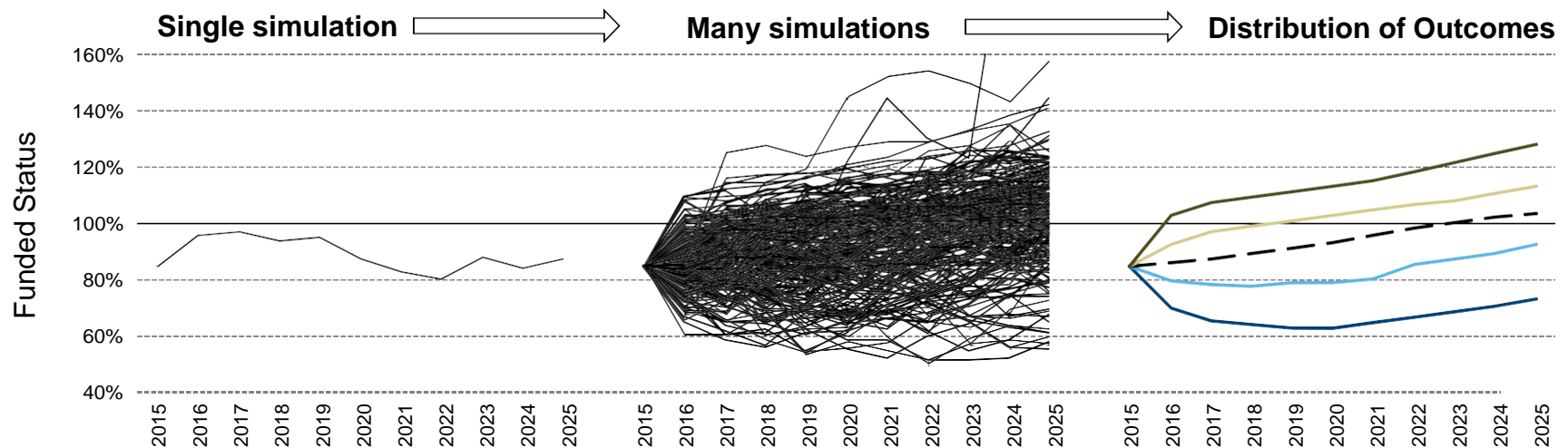
Asset-Liability Management Background: Balance of Liabilities and Assets



Executive Summary

Asset-Liability Management Background: Asset-Liability Modeling Metrics

- Thousands of simulations plotted in one graph would be impossible to interpret
- Instead, we rank the simulations at each point over the future
 - This produces a distribution of outcomes illustrating the degree of uncertainty of a plan's financial position over the projection period
- Different investment strategies will produce different distributions of outcomes

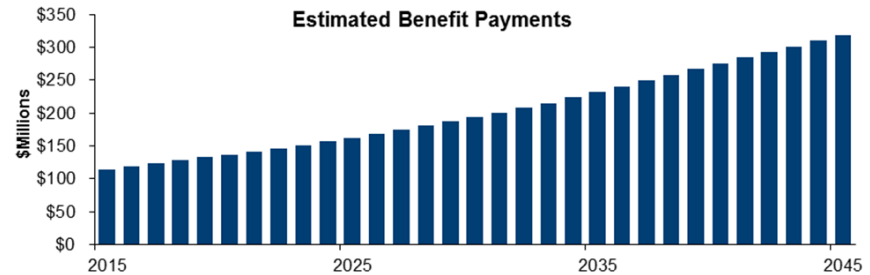


* The path of a given scenario will follow a much less smooth pattern than the distribution suggests, as illustrated above

Executive Summary

Current State Asset-Liability Profile as of September 1, 2015

Asset-Liability Snapshot as of 9/1/2015		
Metric (\$, Millions)	Value	Fund %
Market Value of Assets	\$1,211.1	67.6%
Actuarial Value of Assets	\$1,312.9	73.3%
Liability Metrics		
Actuarial Liability (AL) - Funding	\$1,792.1 ¹	



Asset-Liability Growth Metrics			
Metric (\$, Millions)	Value	% Liability	% Assets
AL Interest Cost	\$143.4	8.0%	11.8%
AL Normal Cost	\$36.5	2.0%	3.0%
Total Liability Hurdle Rate	\$179.9	10.0%	14.8%
Expected Return on Assets	\$96.9	5.4%	8.0%
ER + EE Contributions	\$70.5	3.9%	5.8%
Total Exp. Asset Growth	\$167.4	9.3%	13.8%
Hurdle Rate Shortfall²	\$12.5	0.7%	1.0%
Est. Benefit Payments	\$113.5	6.3%	9.4%

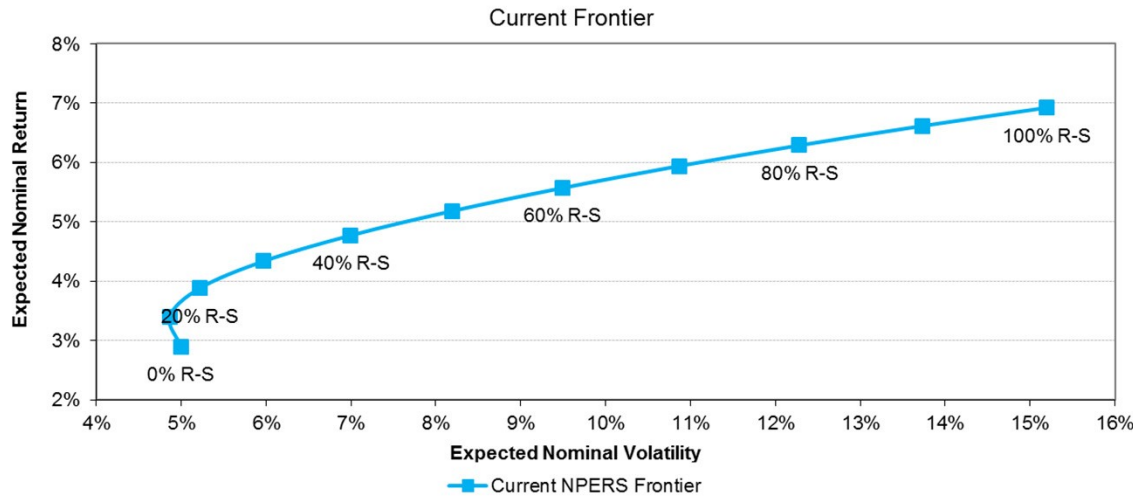
Target Asset Allocation as of 9/1/2015		
Metric (\$, Millions)	Value	Alloc %
Return-Seeking		
- U.S. Equity	\$145.3	12.0%
- Global Equity	\$181.7	15.0%
- Private Equity	\$151.4	12.5%
- Hedge Funds	\$151.4	12.5%
- Real Estate	\$145.3	12.0%
- High Yield Bonds / Bank Loans	\$193.8	16.0%
- Real Assets	\$181.7	15.0%
- Total	\$1,150.6	95.0%
Risk-Reducing		
- Core Fixed Income	\$60.6	5.0%
- Total	\$60.6	5.0%
Total	\$1,211.1	100.0%

¹Based on a 8.00% discount rate consistent with the September 1, 2015 valuation results.

²Based on plan's valuation interest rate of 8.00%. Using AHIC's 30-year capital market assumptions as of June 30, 2016, the expected return is 6.85%, which results in a hurdle rate shortfall/(surplus) of \$26.4M.

Executive Summary

Current Frontier



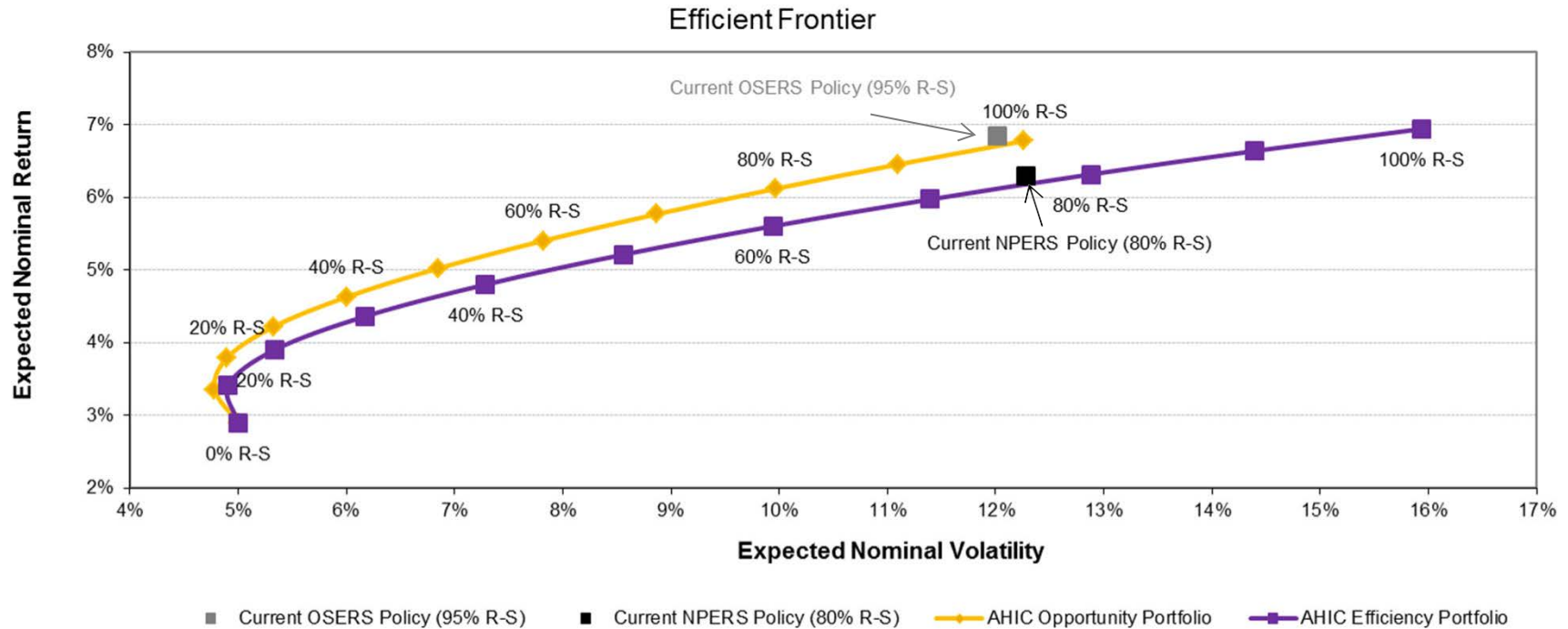
Key Takeaway:

- Portfolios consist of broadly diversified return-seeking assets and safety asset allocations which should withstand stressed markets

	Expected Nominal Return	Expected Nominal Volatility	Sharpe Ratio	Equity Returns			Diversified Returns				Skill	Safety
				U.S. Equity	Non-U.S. Equity	Global Equity	High Yield Bonds	Developed Int'l Debt	Bank Loans	Real Estate	Private Equity	Core Bonds
Current NPERS Frontier												
0% Return-Seeking	2.9%	5.0%	0.2001	0%	0%	0%	0%	0%	0%	0%	0%	100%
10% Return-Seeking	3.4%	4.9%	0.3088	4%	2%	2%	0%	0%	1%	1%	1%	90%
20% Return-Seeking	3.9%	5.2%	0.3797	7%	3%	4%	1%	0%	1%	2%	1%	80%
30% Return-Seeking	4.3%	6.0%	0.4083	11%	5%	6%	1%	1%	2%	3%	2%	70%
40% Return-Seeking	4.8%	7.0%	0.4104	15%	7%	8%	2%	1%	3%	4%	3%	60%
50% Return-Seeking	5.2%	8.2%	0.4008	18%	8%	9%	2%	1%	3%	5%	3%	50%
60% Return-Seeking	5.6%	9.5%	0.3868	22%	10%	11%	3%	1%	4%	6%	4%	40%
70% Return-Seeking	5.9%	10.9%	0.3720	25%	12%	13%	3%	1%	4%	7%	4%	30%
80% Return-Seeking	6.3%	12.3%	0.3574	29%	14%	15%	4%	2%	5%	8%	5%	20%
90% Return-Seeking	6.6%	13.7%	0.3436	33%	15%	17%	4%	2%	6%	8%	6%	10%
100% Return-Seeking	6.9%	15.2%	0.3307	36%	17%	19%	4%	2%	6%	9%	6%	0%

Executive Summary

Alternative Frontiers



- Current OSERS portfolio resembles AHIC’s best thinking for “Opportunity” investors
 - I.e., those investors that have large allocations to alternative assets (e.g., hedge funds, non-core real estate, private equity)
- The Nebraska Investment Council (NIC) has historically preferred asset allocations more reminiscent of AHIC best thinking for “Efficiency” investors
 - I.e., those investors that seek to access markets in a cost efficient manner

Executive Summary

Efficient Frontiers vs. Historical Experience

Periods Ending 6/30/2016

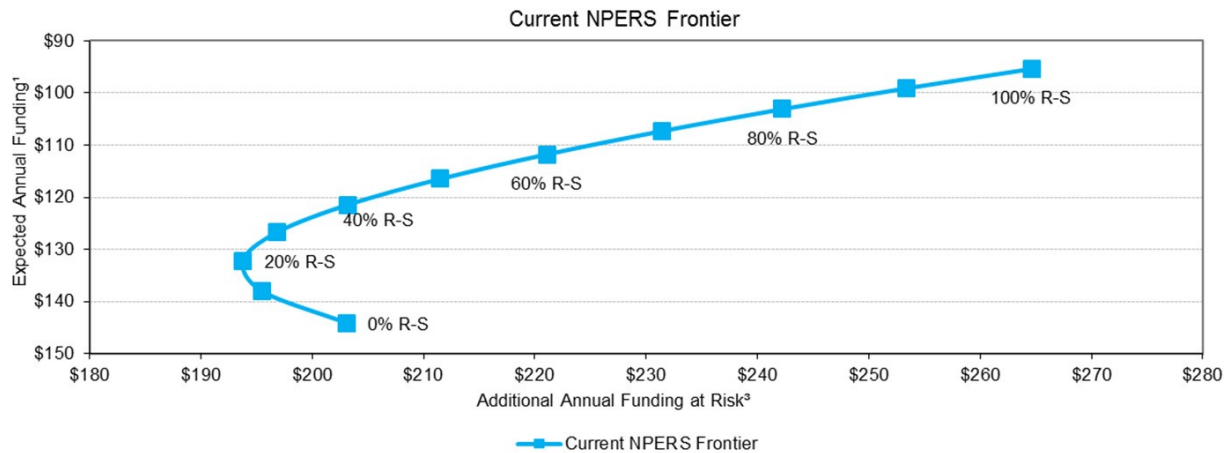
	Trailing 3 Years	Trailing 5 Years	Trailing 10 Years
OSERS DB*	3.5%	4.7%	4.9%
<i>Policy Index</i>	5.5%	6.6%	5.7%
NPERS DB	7.6%	7.2%	6.0%
<i>Policy Index</i>	7.2%	7.1%	6.0%

- The “Opportunity Portfolio” efficient frontier appears more attractive than the “Efficiency Portfolio” efficient frontier based on our modeling
- It is important to note, however, that Opportunity Portfolios rely on successful active management (and Opportunity investors to successfully identify active managers), while Efficiency Portfolios seek primarily to access market returns inexpensively
- If active management results are poor, the efficient frontier analysis on the previous page will overstate Opportunity Portfolio results and/or understate risk (volatility)
- This is observable in the actual experience of the NPERS and OSERS DB Plans over the past decade

*OSERS reports results gross of fees. For the purposes of this comparison, we have reduced reported results by the current estimated annual fee of 0.57%

Executive Summary

Funding / Investment Analysis



Key Takeaways:

- The growth rate required of the assets to keep pace with the liability growth (the “hurdle rate”) is currently 14.8%:

Interest Cost	11.8%
<u>Normal Cost</u>	<u>3.0%</u>
Total	14.8%

Modeling Metric						
	Expected Nominal Return	Shortfall Versus Required Return	Expected Annual Funding ¹	Expected Nominal Volatility	1-Year Downside Return ²	Additional Annual Funding at Risk ³
Current NPERS Frontier						
0% Return-Seeking	2.9%	11.9%	\$144.1	5.0%	-2.0%	\$203.1
10% Return-Seeking	3.4%	11.4%	\$138.0	4.9%	-1.3%	\$195.5
20% Return-Seeking	3.9%	10.9%	\$132.2	5.2%	-1.2%	\$193.8
30% Return-Seeking	4.3%	10.5%	\$126.7	6.0%	-1.5%	\$196.8
40% Return-Seeking	4.8%	10.0%	\$121.5	7.0%	-2.0%	\$203.2
50% Return-Seeking	5.2%	9.6%	\$116.5	8.2%	-2.7%	\$211.5
60% Return-Seeking	5.6%	9.2%	\$111.7	9.5%	-3.5%	\$221.1
70% Return-Seeking	5.9%	8.9%	\$107.3	10.9%	-4.3%	\$231.4
80% Return-Seeking	6.3%	8.5%	\$103.1	12.3%	-5.2%	\$242.2
90% Return-Seeking	6.6%	8.2%	\$99.1	13.7%	-6.1%	\$253.3
100% Return-Seeking	6.9%	7.9%	\$95.4	15.2%	-7.0%	\$264.6

- The hurdle rate is covered by a combination of investment returns and cash funding
- Higher allocations to return-seeking assets produce lower expected funding amounts, but with more volatility

¹ Expected annual funding to maintain the current funded ratio is equal to the sum of the net interest cost and normal cost

² Expected annual return under a one standard deviation adverse event

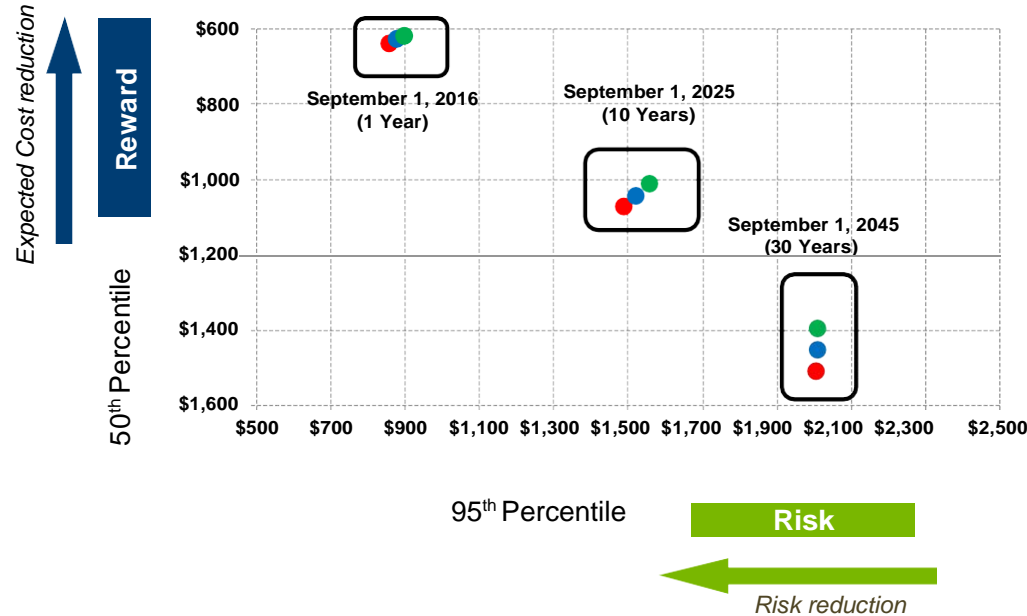
³ Additional annual funding under a one standard deviation adverse event to maintain current funded status

Executive Summary

Economic Cost Analysis

Economic Cost

Present Value of Contributions plus AL Funding Shortfall/(Surplus)* at 8.00%, \$millions



Key Takeaways:

- The magnitude of the risk/reward trade-off changes over a longer-term projection
- Under the Current NPERS 80% Return-Seeking allocation over a 30-year time horizon, the expected Economic Cost is \$1,435.5M and the potential risk is \$2,009.9M
- Adjustments to the return-seeking allocation may have desirable risk/reward characteristics relative to the current policy

* Liability projections assume discount rates of 8.00% for all investment policies studied; Reflects a *utility function*: Excludes 50% of surplus in excess of 120% of Actuarial liability, and includes twice the shortfall below 40% of Actuarial liability, on a market value basis

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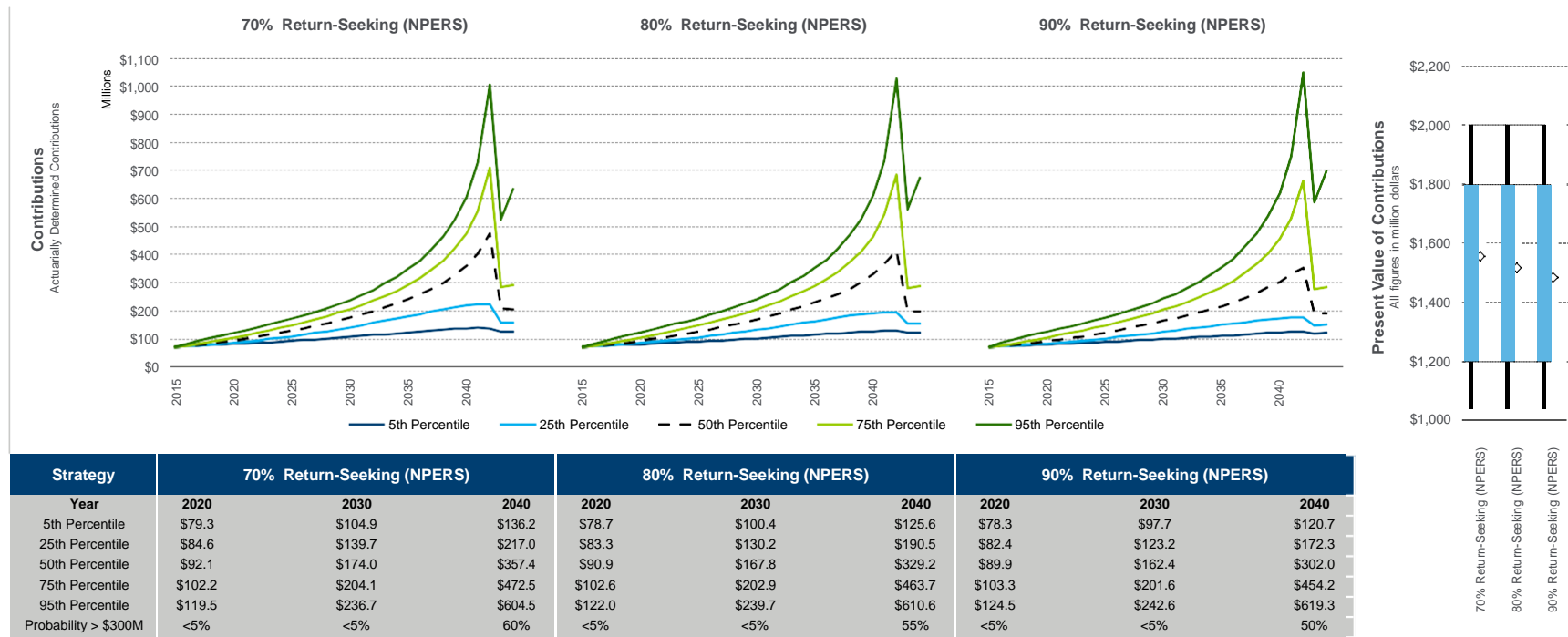
Economic Cost September 1, 2016		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$639.7	\$857.6
80% Return-Seeking (NPERS)	\$631.0	\$877.6
90% Return-Seeking (NPERS)	\$623.1	\$898.7

September 1, 2025		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$1,073.8	\$1,490.8
80% Return-Seeking (NPERS)	\$1,043.5	\$1,522.9
90% Return-Seeking (NPERS)	\$1,013.0	\$1,559.5

September 1, 2045		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$1,508.2	\$2,007.9
80% Return-Seeking (NPERS)	\$1,453.5	\$2,009.9
90% Return-Seeking (NPERS)	\$1,396.8	\$2,011.7

Executive Summary

Gross Contribution Amount



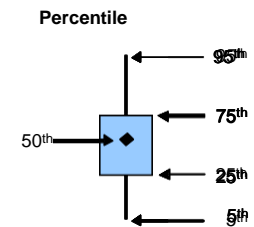
Key Takeaways:

- The OSERS contribution policy recognizes (gains)/losses over a closed period of 28 years (as of 9/1/2015) decreasing by one each ensuing year
- Contribution volatility will increase as the closed amortization period declines to immediate recognition
- Increases to the return-seeking allocation will lower expected (50th percentile) outcomes while increasing the volatility of those amounts
- Adverse market conditions (75th or 95th percentile) could see the actuarially determined contributions reach 2–3 times the central expectation at the peak years

* Liability projections assume discount rates of 8.00% for all investment policies studied

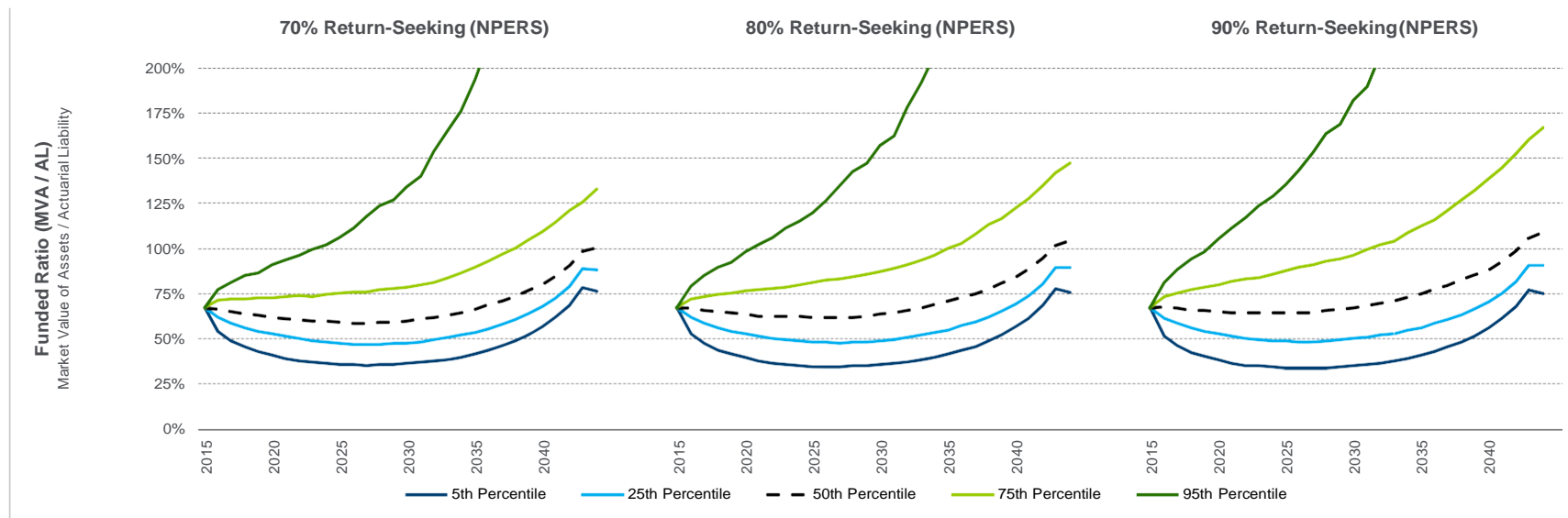
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Executive Summary

Market Value of Assets / Actuarial Liability Funded Ratio



Strategy	70% Return-Seeking (NPERS)			80% Return-Seeking (NPERS)			90% Return-Seeking (NPERS)		
Year	2020	2030	2040	2020	2030	2040	2020	2030	2040
5th Percentile	41%	36%	57%	40%	36%	56%	38%	35%	56%
25th Percentile	53%	48%	68%	53%	49%	69%	53%	50%	70%
50th Percentile	62%	60%	80%	64%	64%	84%	65%	67%	88%
75th Percentile	73%	78%	109%	76%	86%	122%	80%	96%	138%
95th Percentile	90%	134%	324%	98%	157%	382%	105%	182%	443%
Probability > 100%	<5%	17%	33%	<5%	21%	39%	9%	24%	44%

Key Takeaways:

- Due to the OSERS contribution policy, adverse economic environments will not quickly correct through contributions alone until the Plan reaches more immediate recognition of (gains)/losses
- Higher allocations to return-seeking assets will increase the volatility of the Plan's funded status

* Liability projections assume discount rates of 8.00% for all investment policies studied

Executive Summary

Glossary of Terms

- **AVA** = Actuarial Value of Assets (i.e., incorporates smoothing of gains and losses)
- **Asset Growth Rate or “Hurdle Rate”** – The required rate of growth of the assets (through both contributions and investment returns) to keep pace with the growth of the liability
- **Current NPERS Frontier** – uses Nebraska’s mix of asset classes within the Return Seeking allocation, then dials the Return Seeking allocation up and down from 0% to 100% to illustrate forecasted returns at various Return Seeking / Safety Asset mixes
- **Current OSERS Policy** – represents OSERS’ current mix of asset classes
- **Economic Cost** – Present Value of forecasted future contributions + Funding Shortfall / (Surplus)
- **Efficient Frontier (“Frontier”)** – Various combinations of return-seeking and safety assets that produce the highest returns per unit of risk assumed
- **Efficiency Portfolio** – a mix of Return Seeking assets that seeks to access markets in a cost efficient manner
- **Liability Growth Rate** – the projected growth of the liability over the coming year as measurement by the sum of the Normal Cost (new benefit accruals) and Interest Cost (one year of discounting)
- **MVA** = Market Value of Assets (i.e., un-smoothed / economic reality)
- **Opportunity Portfolio** – a mix of Return Seeking assets that includes large allocations to higher-cost, skill-based asset classes
- **Return Seeking Assets (“R-S”)** – All non “Safety” assets
 - Return Seeking assets are further divided into three categories:
 - **Equity returns** – asset classes that provide exposure to the equity risk premium
 - **Diversified returns** – asset classes that provide exposure to other market risk premiums
 - **Skill** – asset classes that rely on manager skill (rather than market risk premiums) to drive returns
- **Safety Assets** – Assets where the primary function is risk control / downside mitigation. (For Nebraska, core bonds.)
- **Target Mix** – the allocation of assets between Return-Seeking Assets and Safety Assets

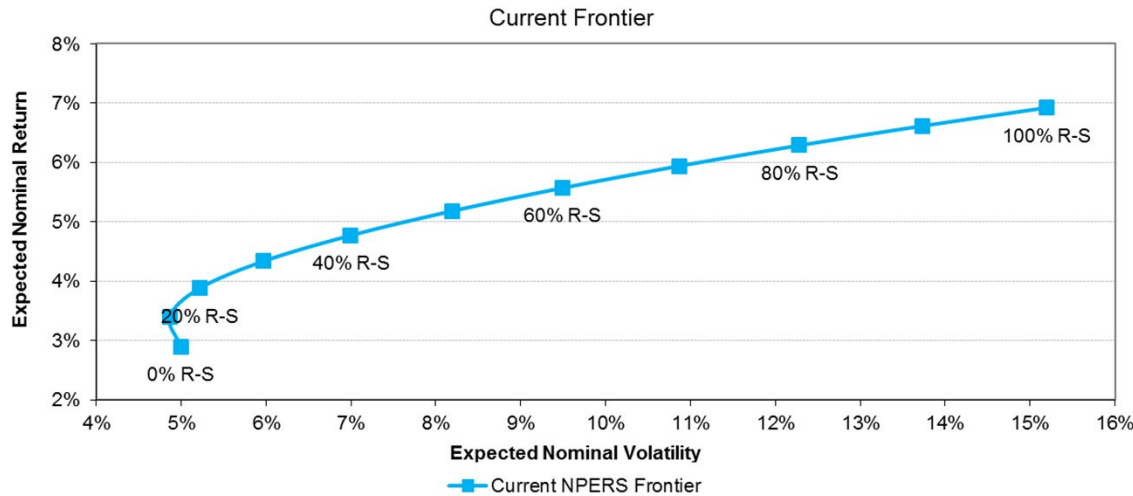


Analysis

Portfolio Analysis

Portfolio Analysis

Current Frontier



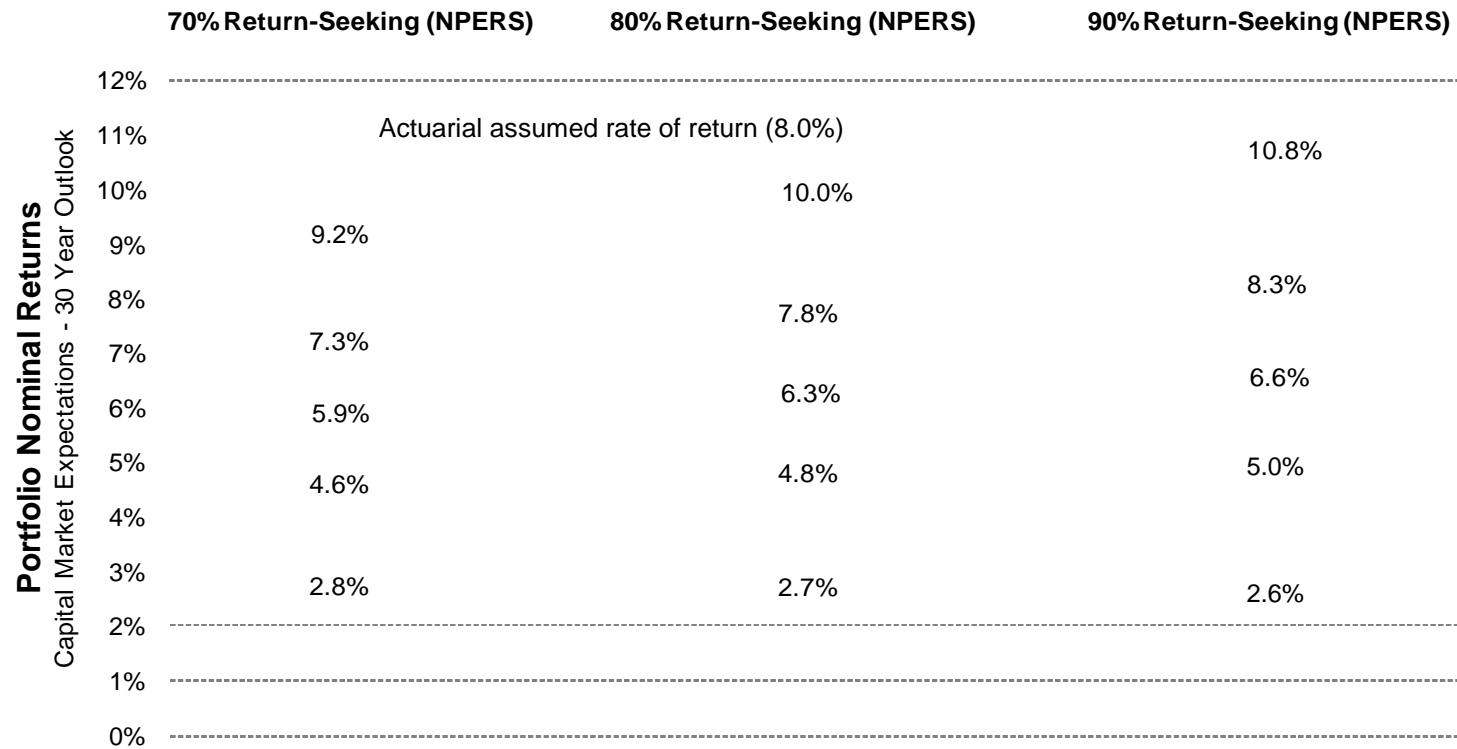
Key Takeaway:

- Portfolios consist of broadly diversified return-seeking assets and safety asset allocations which should withstand stressed markets

	Expected Nominal Return	Expected Nominal Volatility	Sharpe Ratio	Equity Returns			Diversified Returns				Skill	Safety
				U.S. Equity	Non-U.S. Equity	Global Equity	High Yield Bonds	Developed Int'l Debt	Bank Loans	Real Estate	Private Equity	Core Bonds
Current NPERS Frontier												
0% Return-Seeking	2.9%	5.0%	0.2001	0%	0%	0%	0%	0%	0%	0%	0%	100%
10% Return-Seeking	3.4%	4.9%	0.3088	4%	2%	2%	0%	0%	1%	1%	1%	90%
20% Return-Seeking	3.9%	5.2%	0.3797	7%	3%	4%	1%	0%	1%	2%	1%	80%
30% Return-Seeking	4.3%	6.0%	0.4083	11%	5%	6%	1%	1%	2%	3%	2%	70%
40% Return-Seeking	4.8%	7.0%	0.4104	15%	7%	8%	2%	1%	3%	4%	3%	60%
50% Return-Seeking	5.2%	8.2%	0.4008	18%	8%	9%	2%	1%	3%	5%	3%	50%
60% Return-Seeking	5.6%	9.5%	0.3868	22%	10%	11%	3%	1%	4%	6%	4%	40%
70% Return-Seeking	5.9%	10.9%	0.3720	25%	12%	13%	3%	1%	4%	7%	4%	30%
80% Return-Seeking	6.3%	12.3%	0.3574	29%	14%	15%	4%	2%	5%	8%	5%	20%
90% Return-Seeking	6.6%	13.7%	0.3436	33%	15%	17%	4%	2%	6%	8%	6%	10%
100% Return-Seeking	6.9%	15.2%	0.3307	36%	17%	19%	4%	2%	6%	9%	6%	0%

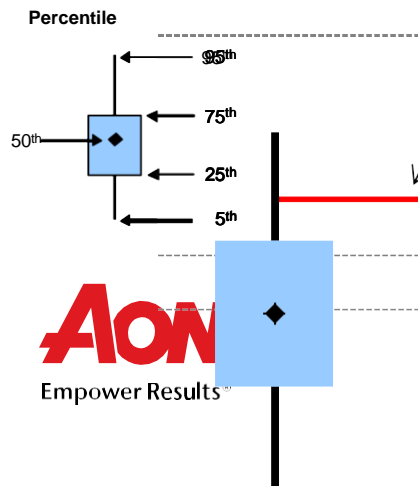
Portfolio Analysis

Range of Nominal Returns



Key Takeaway:

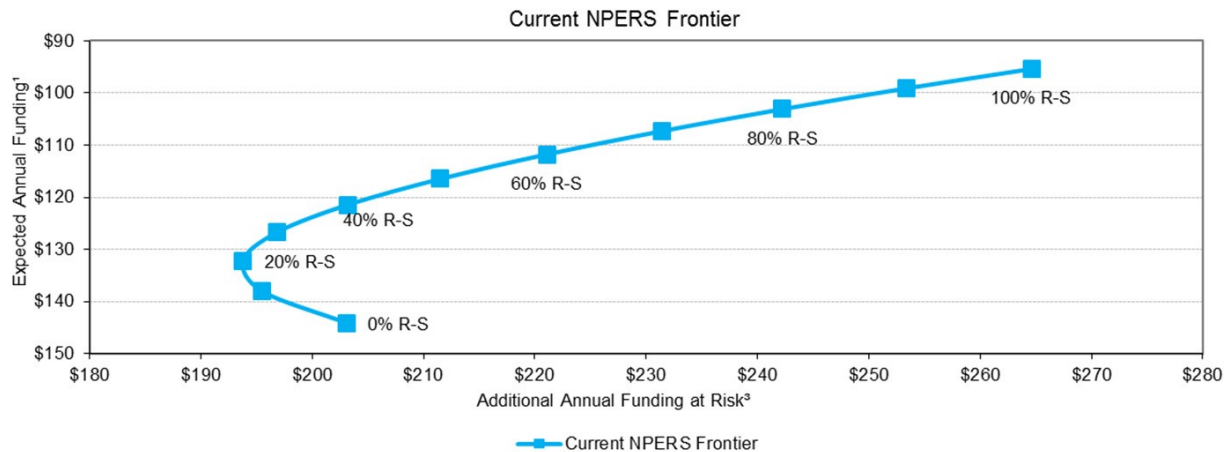
- Median expected returns are projected to trail the actuarial assumed rate of return (8.0%)



Note: Returns based on AHIC's 30 Year Capital Market Assumptions as of June 30, 2016

Portfolio Analysis

Funding / Investment Analysis



Key Takeaways:

- The growth rate required of the assets to keep pace with the liability growth (the “hurdle rate”) is currently 14.8%:

Interest Cost	11.8%
<u>Normal Cost</u>	<u>3.0%</u>
Total	14.8%

	Modeling Metric					
	Expected Nominal Return	Shortfall Versus Required Return	Expected Annual Funding ¹	Expected Nominal Volatility	1-Year Downside Return ²	Additional Annual Funding at Risk ³
Current NPERS Frontier						
0% Return-Seeking	2.9%	11.9%	\$144.1	5.0%	-2.0%	\$203.1
10% Return-Seeking	3.4%	11.4%	\$138.0	4.9%	-1.3%	\$195.5
20% Return-Seeking	3.9%	10.9%	\$132.2	5.2%	-1.2%	\$193.8
30% Return-Seeking	4.3%	10.5%	\$126.7	6.0%	-1.5%	\$196.8
40% Return-Seeking	4.8%	10.0%	\$121.5	7.0%	-2.0%	\$203.2
50% Return-Seeking	5.2%	9.6%	\$116.5	8.2%	-2.7%	\$211.5
60% Return-Seeking	5.6%	9.2%	\$111.7	9.5%	-3.5%	\$221.1
70% Return-Seeking	5.9%	8.9%	\$107.3	10.9%	-4.3%	\$231.4
80% Return-Seeking	6.3%	8.5%	\$103.1	12.3%	-5.2%	\$242.2
90% Return-Seeking	6.6%	8.2%	\$99.1	13.7%	-6.1%	\$253.3
100% Return-Seeking	6.9%	7.9%	\$95.4	15.2%	-7.0%	\$264.6

- The hurdle rate is covered by a combination of investment returns and cash funding
- Higher allocations to return-seeking assets produce lower expected funding amounts, but with more volatility

¹ Expected annual funding to maintain the current funded ratio is equal to the sum of the net interest cost and normal cost

² Expected annual return under a one standard deviation adverse event

³ Additional annual funding under a one standard deviation adverse event to maintain current funded status



Analysis

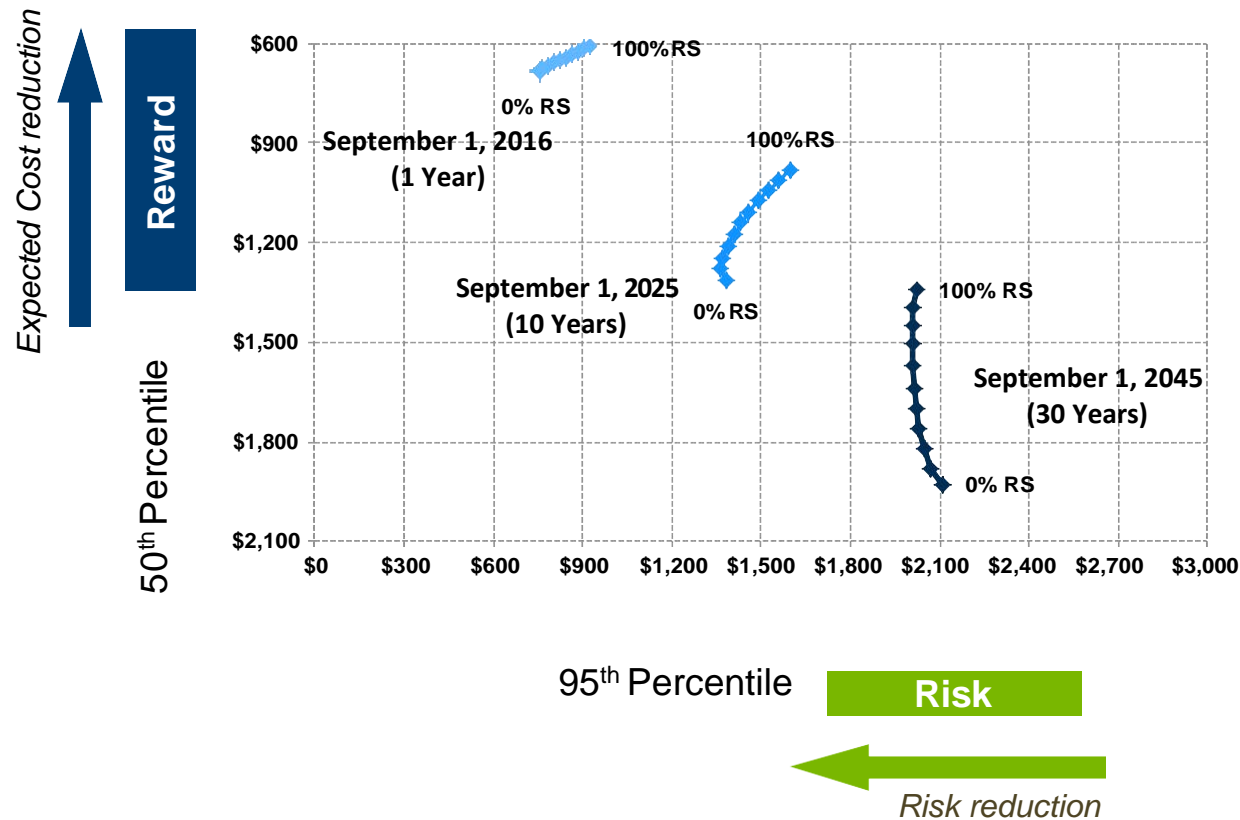
Asset-Liability Projection Results

Asset-Liability Projection Results

Economic Cost Analysis—1 Year, 10 Year, and 30 Year Horizons

Economic Cost

Present Value of Contributions plus AL Funding Shortfall/(Surplus)* at 8.00%, \$millions



Key Takeaway:

- Longer time horizons are expected to reward higher levels of risk whereas shorter time horizons are not

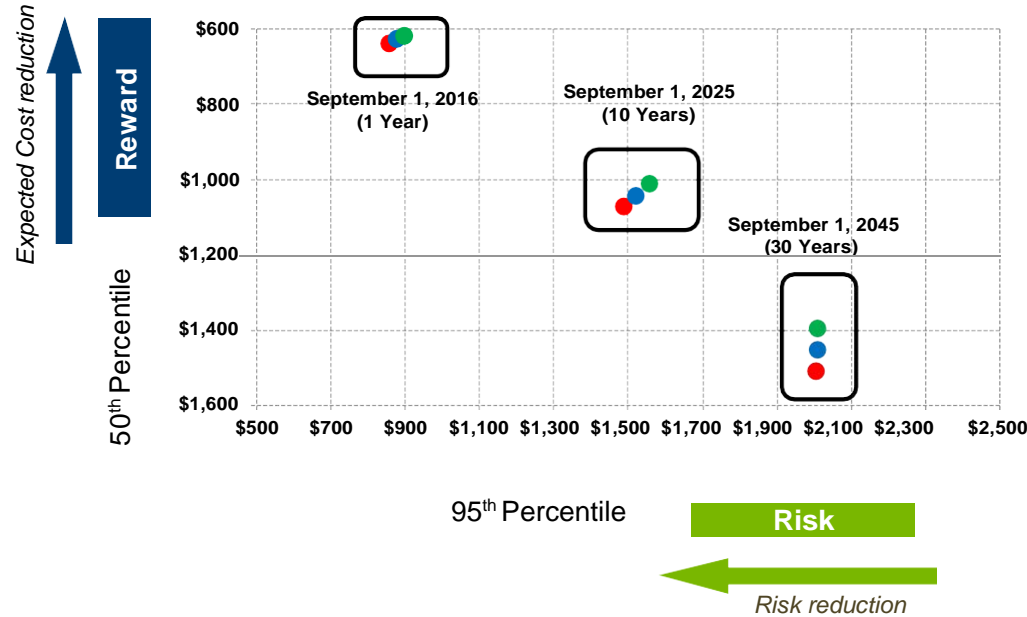
* Liability projections assume discount rates of 8.00% for all investment policies studied; Reflects a *utility function*: Excludes 50% of surplus in excess of 120% of Actuarial liability, and includes twice the shortfall below 40% of Actuarial liability, on a market value basis

Asset-Liability Projection Results

Economic Cost Analysis

Economic Cost

Present Value of Contributions plus AL Funding Shortfall/(Surplus)* at 8.00%, \$millions



Economic Cost September 1, 2016		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$639.7	\$857.6
80% Return-Seeking (NPERS)	\$631.0	\$877.6
90% Return-Seeking (NPERS)	\$623.1	\$898.7

September 1, 2025		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$1,073.8	\$1,490.8
80% Return-Seeking (NPERS)	\$1,043.5	\$1,522.9
90% Return-Seeking (NPERS)	\$1,013.0	\$1,559.5

September 1, 2045		
Strategy (\$Millions)	Cost	Risk
70% Return-Seeking (NPERS)	\$1,508.2	\$2,007.9
80% Return-Seeking (NPERS)	\$1,453.5	\$2,009.9
90% Return-Seeking (NPERS)	\$1,396.8	\$2,011.7

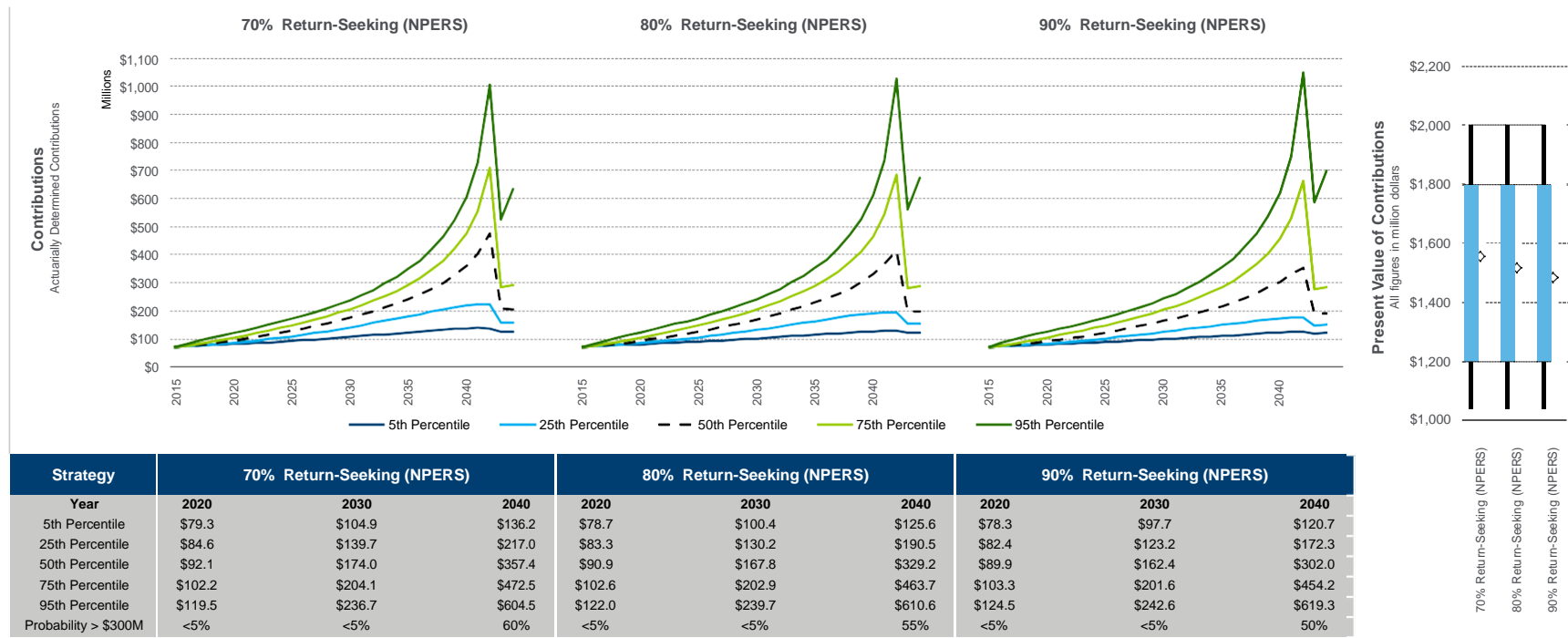
Key Takeaways:

- The magnitude of the risk/reward trade-off changes over a longer-term projection
- Under the Current NPERS 80% Return-Seeking allocation over a 30-year time horizon, the expected Economic Cost is \$1,435.5M and the potential risk is \$2,009.9M
- Adjustments to the return-seeking allocation may have desirable risk/reward characteristics relative to the current policy

* Liability projections assume discount rates of 8.00% for all investment policies studied; Reflects a *utility function*: Excludes 50% of surplus in excess of 120% of Actuarial liability, and includes twice the shortfall below 40% of Actuarial liability, on a market value basis

Asset-Liability Projection Results

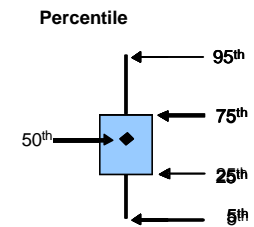
Gross Contribution Amount



Key Takeaways:

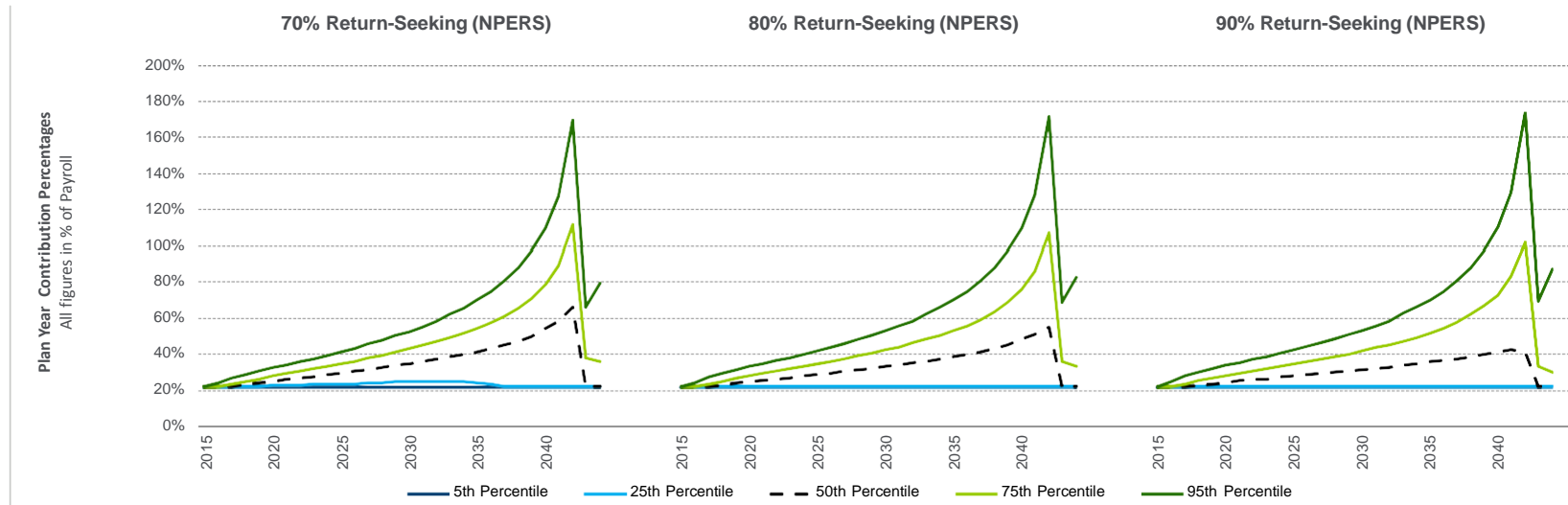
- Contribution volatility will increase as the closed amortization period declines to immediate recognition
- Increases to the return-seeking allocation will lower expected (50th percentile) outcomes while increasing the volatility of those amounts

* Liability projections assume discount rates of 8.00% for all investment policies studied



Asset-Liability Projection Results

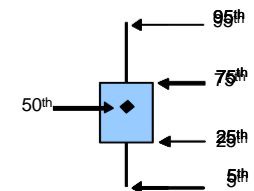
Gross Contribution Percentage of Payroll



Strategy	70% Return-Seeking (NPERS)			80% Return-Seeking (NPERS)			90% Return-Seeking (NPERS)		
Year	2020	2030	2040	2020	2030	2040	2020	2030	2040
5th Percentile	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2
25th Percentile	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2
50th Percentile	\$0.2	\$0.3	\$0.5	\$0.2	\$0.3	\$0.5	\$0.2	\$0.3	\$0.4
75th Percentile	\$0.3	\$0.4	\$0.8	\$0.3	\$0.4	\$0.8	\$0.3	\$0.4	\$0.7
95th Percentile	\$0.3	\$0.5	\$1.1	\$0.3	\$0.5	\$1.1	\$0.3	\$0.5	\$1.1
Probability > 30%	14%	61%	68%	16%	56%	67%	17%	53%	64%

Key Takeaways:

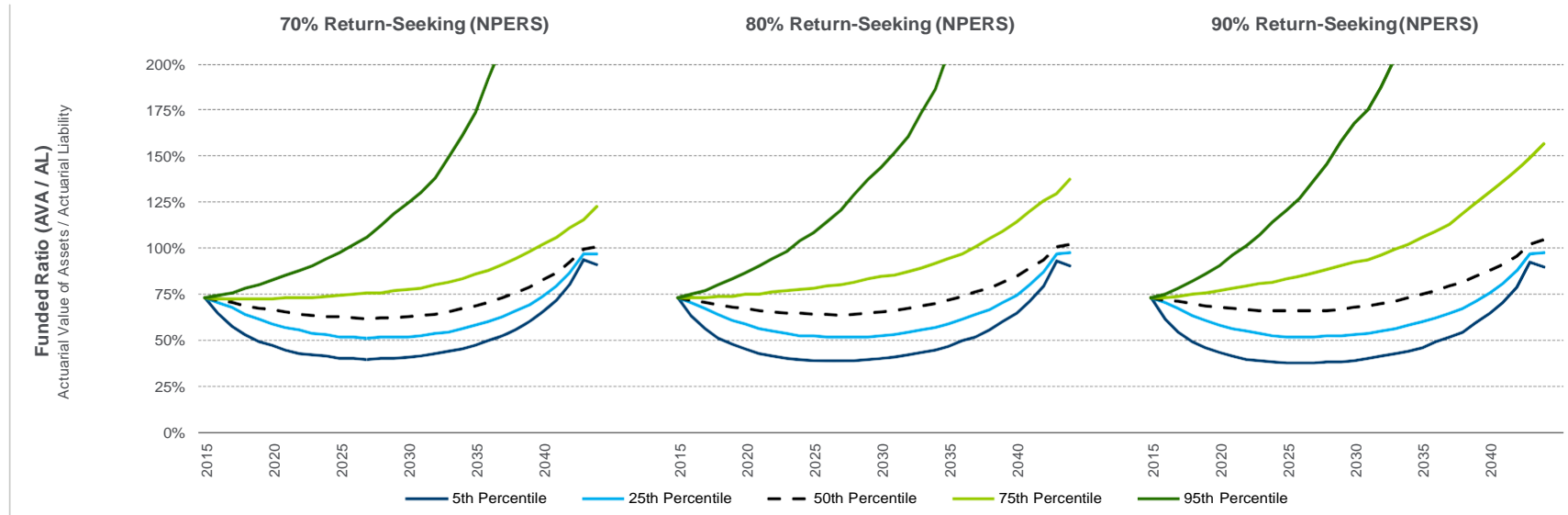
- Contribution percentages are projected to have a floor of the current statutory, payroll-based level (21.66%) until such time as the actuarial contribution exceeds that level
- Contribution volatility will increase as the closed amortization period declines to immediate recognition



* Liability projections assume discount rates of 8.00% for all investment policies studied

Asset-Liability Projection Results

Actuarial Value of Assets / Actuarial Liability Funded Ratio



Strategy	70% Return-Seeking (NPERS)			80% Return-Seeking (NPERS)			90% Return-Seeking (NPERS)		
Year	2020	2030	2040	2020	2030	2040	2020	2030	2040
5th Percentile	47%	41%	66%	46%	40%	65%	44%	40%	65%
25th Percentile	59%	52%	74%	59%	53%	75%	59%	53%	76%
50th Percentile	67%	63%	83%	67%	65%	85%	68%	68%	88%
75th Percentile	73%	78%	102%	75%	85%	114%	77%	92%	131%
95th Percentile	83%	125%	291%	87%	144%	342%	91%	168%	399%
Probability > 100%	<5%	16%	28%	<5%	20%	37%	<5%	23%	43%

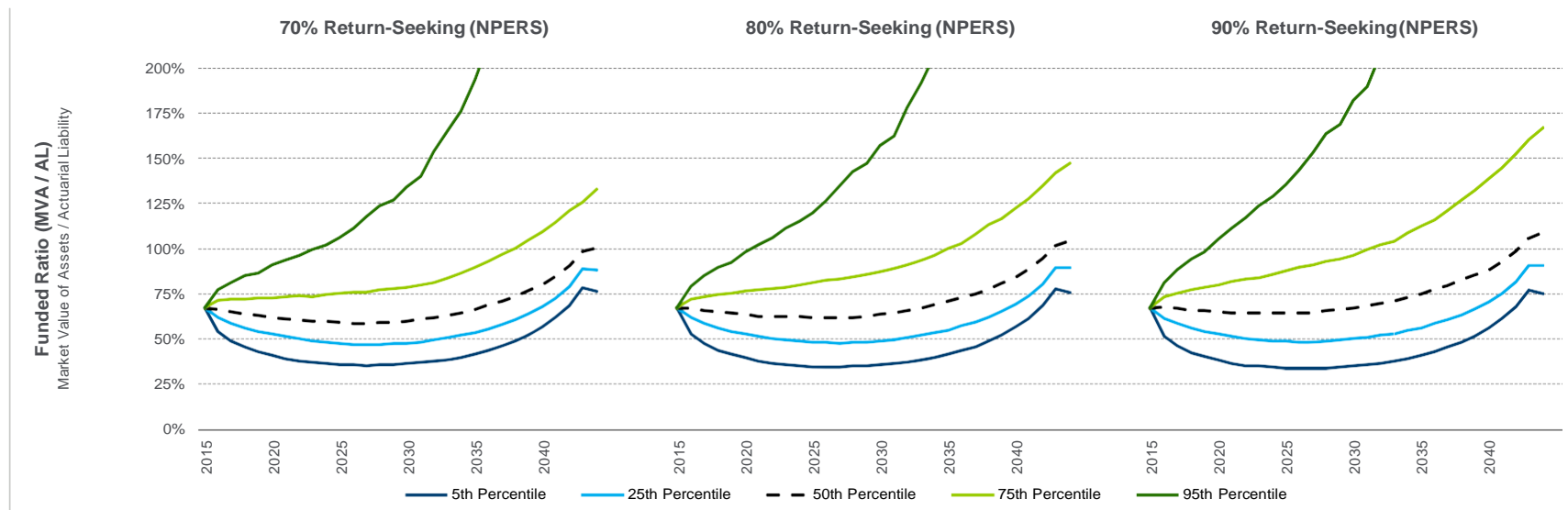
Key Takeaways:

- Contribution policy will close the funding shortfall
- Higher allocations to return-seeking assets will increase the volatility of the Plan's funded status

* Liability projections assume discount rates of 8.00% for all investment policies studied

Asset-Liability Projection Results

Market Value of Assets / Actuarial Liability Funded Ratio



Strategy	70% Return-Seeking (NPERS)			80% Return-Seeking (NPERS)			90% Return-Seeking (NPERS)		
Year	2020	2030	2040	2020	2030	2040	2020	2030	2040
5th Percentile	41%	36%	57%	40%	36%	56%	38%	35%	56%
25th Percentile	53%	48%	68%	53%	49%	69%	53%	50%	70%
50th Percentile	62%	60%	80%	64%	64%	84%	65%	67%	88%
75th Percentile	73%	78%	109%	76%	86%	122%	80%	96%	138%
95th Percentile	90%	134%	324%	98%	157%	382%	105%	182%	443%
Probability > 100%	<5%	17%	33%	<5%	21%	39%	9%	24%	44%

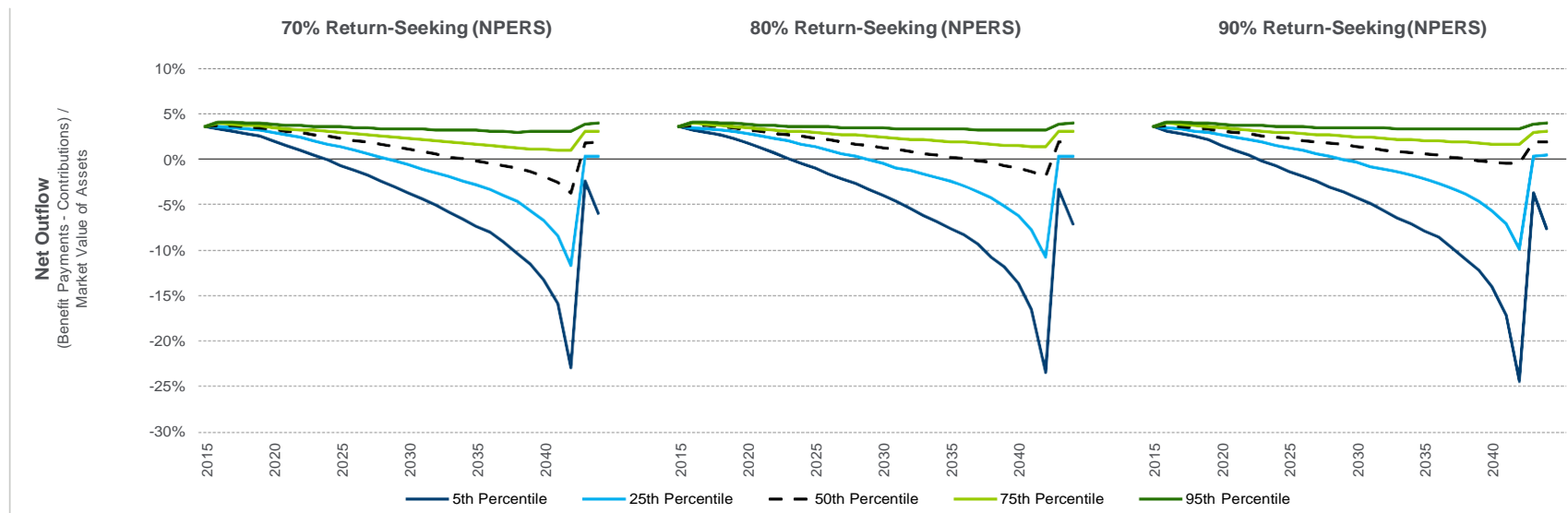
Key Takeaways:

- Market values of assets do not contain the smoothing parameters of the actuarial value of assets resulting in wider dispersions of results
- Higher allocations to return-seeking assets will increase the volatility of the Plan's funded status

* Liability projections assume discount rates of 8.00% for all investment policies studied

Asset-Liability Projection Results

Net Outflow Analysis: (Benefit Payments less Contributions) / Market Value of Assets



Strategy	70% Return-Seeking (NPERS)			80% Return-Seeking (NPERS)			90% Return-Seeking (NPERS)		
Year	2020	2030	2040	2020	2030	2040	2020	2030	2040
5th Percentile	2%	-4%	-13%	2%	-4%	-14%	1%	-4%	-14%
25th Percentile	3%	-1%	-7%	3%	-1%	-6%	3%	0%	-6%
50th Percentile	3%	1%	-2%	3%	1%	-1%	3%	1%	0%
75th Percentile	3%	2%	1%	3%	2%	1%	3%	2%	2%
95th Percentile	4%	3%	3%	4%	3%	3%	4%	3%	3%
Probability > 0%	>95%	65%	34%	>95%	67%	39%	>95%	69%	46%

Key Takeaway:

- Net Outflow is consistent across the policies modeled

* Liability projections assume discount rates of 8.00% for all investment policies studied

Asset-Liability Projection Results

Summary of Results

All Scenarios \$ millions	30-year Economic Cost		30-year Present Value of Contributions		30-year Ending Funded Ratio (MVA / AL)	
	Expected ¹	Downside ²	Expected ¹	Downside ²	Expected ¹	Downside ²
0% Return-Seeking (NPERS)	\$1,929.1	\$2,107.6	\$1,889.3	\$2,018.4	86%	77%
10% Return-Seeking (NPERS)	\$1,878.8	\$2,071.8	\$1,841.8	\$1,988.5	88%	77%
20% Return-Seeking (NPERS)	\$1,822.4	\$2,047.7	\$1,792.1	\$1,975.6	89%	77%
30% Return-Seeking (NPERS)	\$1,762.6	\$2,031.8	\$1,741.4	\$1,966.6	91%	77%
40% Return-Seeking (NPERS)	\$1,701.2	\$2,019.6	\$1,691.3	\$1,963.7	93%	77%
50% Return-Seeking (NPERS)	\$1,637.2	\$2,014.6	\$1,642.5	\$1,966.9	95%	77%
60% Return-Seeking (NPERS)	\$1,570.8	\$2,009.9	\$1,598.8	\$1,974.1	98%	76%
70% Return-Seeking (NPERS)	\$1,508.2	\$2,007.9	\$1,558.2	\$1,981.2	101%	76%
80% Return-Seeking (NPERS)	\$1,453.5	\$2,009.9	\$1,519.3	\$1,992.5	106%	75%
90% Return-Seeking (NPERS)	\$1,396.8	\$2,011.7	\$1,485.5	\$2,005.4	111%	75%
100% Return-Seeking (NPERS)	\$1,343.0	\$2,018.9	\$1,455.4	\$2,022.7	117%	75%

Key Findings:

- Plan is projected to reach full funding due to the contribution policy
- Contribution volatility will increase as the closed amortization period declines to immediate recognition
- Adjusting the return-seeking vs. risk-reducing allocation will exhibit standard risk/reward trade-off of expected costs and risks

¹ Expected = 50th percentile outcome or central expectation across all 5,000 simulations

² Downside = 95th percentile outcome across all 5,000 simulations



Summary and Conclusions

Executive Summary

Summary and Conclusions

Portfolio Analysis

- Longer time horizons are expected to reward higher levels of risk; shorter time horizons are not
- Nebraska should consider its desired balance between funding and investment returns in order to determine the ideal investment portfolio as deviations along the NPERS frontier of portfolios exhibit the standard risk/reward trade-off of expected costs and risks

Financial Projection Trend Analysis

- Asset returns are not expected to keep pace with the actuarial assumed rate of return
- Contribution volatility will increase as the closed amortization period declines to immediate recognition
- Contribution policy will close the funding shortfall; however, adverse market conditions can lead to substantial risk in the plan contribution amount
- Above findings assume that the contribution policy today extends throughout the next 30 years along with no changes to the current plan design or actuarial assumptions



Appendix

Actuarial Assumptions and Methods

Actuarial Assumptions and Methods

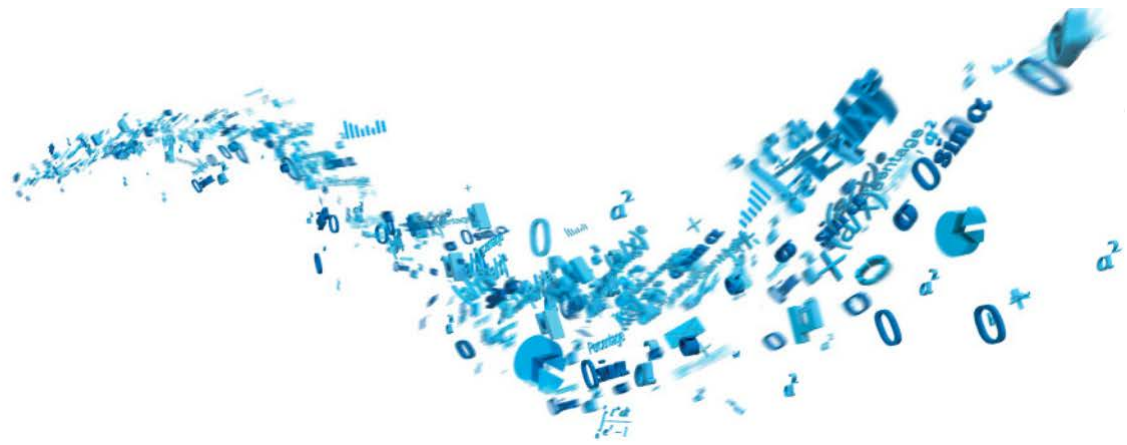
Actuarial assumptions:

- Valuation Rate of Interest = 8.00%
- Inflation = 3.00%
- Projected Cost of Living Adjustments (COLA):
 - 1.50% for members hired before 7/1/2013
 - 1.00% for members hired on or after 7/1/2013
- Payroll Growth = 4.00%
- Actuarial Value of Assets: assets are valued at expected value at the valuation date plus 25% of the difference between the market value and expected value; the actuarial value must fall within a corridor of 80% to 120% of market value
- All other assumptions as documented in the Actuarial Valuation Report as of September 1, 2015

Actuarially Determined Contribution Calculation = Normal Cost plus a level percent amortization of the unfunded liability over a closed period (28 years as of 9/1/2015 decreasing by one each ensuing year), and a 4.00% salary scale

Contributions:

- Member = 9.78% of annual compensation
- School = 101% of the members' contributions (or 9.88%) plus any additional contributions that are necessary each year to pay the excess of the normal cost plus an amortization payment to fund unfunded actuarial accrued liability bases, over member, school, and state contributions
- State = 2.00% of annual compensation



Appendix

Capital Market Assumptions

AHIC Capital Market Assumptions

As of June 30, 2016 (30 Years)

	Expected Real Return ¹	Expected Nominal Return ¹	Expected Nominal Volatility
Equity			
1 Large Cap U.S. Equity	4.1%	6.3%	17.0%
2 Small Cap U.S. Equity	4.6%	6.8%	23.5%
3 Global Equity IMI	5.0%	7.2%	19.0%
4 International Equity (Developed)	5.0%	7.2%	20.0%
5 Emerging Markets Equity	5.3%	7.5%	30.5%
Fixed Income			
6 Cash (Gov't)	-0.2%	1.9%	2.0%
7 Cash (LIBOR)	0.2%	2.3%	2.0%
8 TIPS	1.0%	3.1%	4.5%
9 Core Fixed Income	0.8%	2.9%	5.0%
10 Short Gov't Bonds (2-Year Duration)	-0.1%	2.0%	2.0%
11 Short Corporate Bonds (2-Year Duration)	0.6%	2.7%	2.5%
12 Intermediate Gov't Bonds (4-Year Duration)	0.0%	2.1%	3.5%
13 Intermediate Corporate Bonds (4-Year Duration)	1.1%	3.2%	5.0%
14 Long Duration Bonds – Gov't / Credit	1.3%	3.4%	13.5%
15 Long Duration Bonds – Credit	1.9%	4.0%	15.0%
16 Long Duration Bonds – Gov't	0.6%	2.7%	13.0%
17 25-year Government Bond	0.4%	2.5%	21.0%
18 High Yield Bonds	3.2%	5.4%	12.0%
19 Bank Loans	2.3%	4.4%	7.5%
20 Non-US Developed Bond (0% Hedged)	0.0%	2.1%	11.0%
21 Non-US Developed Bond (50% Hedged)	0.1%	2.2%	6.5%
22 Non-US Developed Bond (100% Hedged)	0.2%	2.3%	4.0%
23 Emerging Market Bonds	2.7%	4.9%	13.5%
24 Emerging Market Bonds (Corporate USD)	2.4%	4.6%	11.5%
25 Emerging Market Bonds (Sov. Local)	3.5%	5.7%	14.5%
Alternatives			
26 Hedge Funds Universe ²	1.7%	3.8%	9.5%
27 Hedge Funds Buy List ²	2.8%	5.0%	9.5%
28 Direct Hedge Funds ³	3.1%	5.3%	9.5%
29 Real Estate (Broad Market)	3.5%	5.7%	12.5%
30 Core Real Estate	2.9%	5.1%	11.5%
31 Global REITs	3.7%	5.9%	19.0%
32 Commodities	2.3%	4.4%	17.0%
33 Private Equity	6.3%	8.5%	24.5%
34 Infrastructure	4.4%	6.6%	14.5%
35 Hedge Funds - Equity Long/Short	3.0%	5.2%	14.5%
36 Master Limited Partnerships (MLPs)	4.4%	6.6%	23.5%
37 Timber	3.2%	5.4%	15.0%
Inflation			
38 Inflation	0.0%	2.1%	1.5%

¹ All expected returns are geometric (long-term compounded; rounded to the nearest decimal) and net of investment fees.

² Represents diversified portfolio of Fund of funds investments (includes additional layer of fees at the FoF level).

³ Represents diversified portfolio of Direct hedge fund investments.

AHIC Capital Market Assumptions

As of June 30, 2016 (30 Years)

Nominal Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
1 Large Cap U.S. Equity	1.00	0.92	0.95	0.79	0.72	0.09	0.09	-0.06	0.06	0.04	0.11	-0.05	0.10	-0.01	0.08	-0.11	-0.12	0.62	0.42	-0.03	-0.02	0.01	0.43	0.41	0.47	0.70	0.56	0.69	0.40	0.39	0.67	0.31	0.69	0.38	0.75	0.38	0.01	0.05
2 Small Cap U.S. Equity	0.92	1.00	0.90	0.73	0.67	0.07	0.07	-0.06	0.05	0.02	0.09	-0.05	0.09	-0.01	0.07	-0.10	-0.11	0.57	0.39	-0.03	-0.02	0.01	0.40	0.37	0.42	0.64	0.51	0.63	0.38	0.36	0.61	0.27	0.65	0.36	0.69	0.36	0.01	0.04
3 Global Equity IMI	0.95	0.90	1.00	0.92	0.84	0.08	0.07	-0.06	0.06	0.03	0.10	-0.05	0.10	0.00	0.09	-0.11	-0.12	0.67	0.44	0.16	0.14	0.01	0.48	0.46	0.57	0.67	0.54	0.67	0.41	0.39	0.64	0.38	0.67	0.37	0.73	0.37	0.01	0.07
4 International Equity (Developed)	0.79	0.73	0.92	1.00	0.75	0.05	0.05	-0.04	0.06	0.01	0.07	-0.04	0.09	0.00	0.08	-0.09	-0.10	0.60	0.39	0.40	0.34	-0.01	0.44	0.44	0.61	0.58	0.47	0.58	0.37	0.36	0.54	0.42	0.56	0.32	0.63	0.32	0.01	0.08
5 Emerging Markets Equity	0.72	0.67	0.84	0.75	1.00	0.06	0.06	-0.05	0.07	0.02	0.09	-0.04	0.10	0.01	0.09	-0.09	-0.10	0.67	0.39	0.18	0.16	0.02	0.49	0.46	0.54	0.50	0.41	0.50	0.34	0.32	0.49	0.30	0.53	0.30	0.53	0.30	0.01	0.06
6 Cash (Gov't)	0.09	0.07	0.08	0.05	0.06	1.00	0.99	0.45	0.50	0.93	0.79	0.66	0.52	0.24	0.21	0.26	0.17	0.14	0.12	0.14	0.32	0.63	0.16	0.07	0.00	-0.03	-0.02	-0.03	0.14	0.15	0.09	0.23	0.09	0.11	-0.06	0.11	0.08	0.54
7 Cash (LIBOR)	0.09	0.07	0.07	0.05	0.06	0.99	1.00	0.44	0.50	0.92	0.80	0.65	0.53	0.24	0.21	0.26	0.17	0.14	0.14	0.14	0.31	0.62	0.17	0.08	0.00	-0.03	-0.02	-0.03	0.13	0.15	0.09	0.23	0.08	0.11	-0.05	0.11	0.08	0.53
8 TIPS	-0.06	-0.06	-0.06	-0.04	-0.05	0.45	0.44	1.00	0.44	0.56	0.49	0.54	0.43	0.25	0.23	0.26	0.19	0.09	-0.05	0.08	0.14	0.23	0.12	0.03	-0.03	-0.11	-0.10	-0.11	0.01	0.02	-0.03	0.19	-0.05	0.00	-0.14	0.00	0.07	0.42
9 Core Fixed Income	0.06	0.05	0.06	0.06	0.07	0.50	0.50	0.44	1.00	0.69	0.76	0.88	0.95	0.85	0.86	0.77	0.66	0.33	0.07	0.22	0.39	0.65	0.50	0.22	0.12	0.05	0.03	0.05	0.08	0.08	0.06	0.10	0.06	0.06	0.01	0.06	0.03	0.18
10 Short Gov't Bonds (2-Year Duration)	0.04	0.02	0.03	0.01	0.02	0.93	0.92	0.56	0.69	1.00	0.86	0.87	0.68	0.40	0.35	0.43	0.31	0.14	-0.02	0.17	0.36	0.66	0.21	0.07	0.00	-0.11	-0.09	-0.11	0.11	0.12	0.06	0.22	0.04	0.08	-0.15	0.08	0.08	0.51
11 Short Corporate Bonds (2-Year Duration)	0.11	0.09	0.10	0.07	0.09	0.79	0.80	0.49	0.76	0.86	1.00	0.74	0.86	0.42	0.44	0.37	0.26	0.29	0.24	0.17	0.35	0.63	0.37	0.19	0.09	0.07	0.06	0.07	0.12	0.14	0.10	0.19	0.10	0.11	0.05	0.11	0.06	0.43
12 Intermediate Gov't Bonds (4-Year Duration)	-0.05	-0.05	-0.05	-0.04	-0.04	0.66	0.65	0.54	0.88	0.87	0.74	1.00	0.78	0.72	0.63	0.77	0.64	0.06	-0.26	0.21	0.38	0.66	0.24	0.04	-0.02	-0.21	-0.17	-0.21	0.04	0.05	-0.01	0.13	-0.03	0.02	-0.25	0.02	0.05	0.30
13 Intermediate Corporate Bonds (4-Year Duration)	0.10	0.09	0.10	0.09	0.10	0.52	0.53	0.43	0.95	0.68	0.86	0.78	1.00	0.71	0.76	0.59	0.49	0.39	0.25	0.20	0.37	0.62	0.54	0.27	0.16	0.14	0.11	0.14	0.10	0.11	0.09	0.11	0.09	0.09	0.12	0.09	0.03	0.23
14 Long Duration Bonds - Gov't / Credit	-0.01	-0.01	0.00	0.00	0.01	0.24	0.24	0.25	0.85	0.40	0.42	0.72	0.71	1.00	0.96	0.95	0.92	0.15	-0.15	0.20	0.34	0.55	0.38	0.11	0.06	-0.04	-0.03	-0.04	0.02	0.02	0.01	0.00	0.00	0.01	-0.07	0.01	-0.01	-0.06
15 Long Duration Bonds - Credit	0.08	0.07	0.09	0.08	0.09	0.21	0.21	0.23	0.86	0.35	0.44	0.63	0.76	0.96	1.00	0.84	0.81	0.35	0.08	0.19	0.33	0.52	0.52	0.24	0.15	0.13	0.10	0.13	0.06	0.06	0.07	0.01	0.07	0.05	0.10	0.05	-0.01	-0.06
16 Long Duration Bonds - Gov't	-0.11	-0.10	-0.11	-0.09	-0.09	0.26	0.26	0.26	0.77	0.43	0.37	0.77	0.59	0.95	0.84	1.00	0.97	-0.10	-0.40	0.19	0.33	0.54	0.18	-0.04	-0.06	-0.22	-0.18	-0.22	-0.03	-0.02	-0.06	-0.02	-0.09	-0.04	-0.26	-0.04	-0.01	-0.06
17 25-Year Government Bond	-0.12	-0.11	-0.12	-0.10	-0.10	0.17	0.17	0.19	0.66	0.31	0.26	0.64	0.49	0.92	0.81	0.97	1.00	-0.14	-0.39	0.17	0.29	0.47	0.14	-0.06	-0.07	-0.21	-0.17	-0.21	-0.04	-0.04	-0.07	-0.05	-0.10	-0.05	-0.25	-0.05	-0.02	-0.13
18 High Yield Bonds	0.62	0.57	0.67	0.60	0.67	0.14	0.14	0.09	0.33	0.14	0.29	0.06	0.39	0.15	0.35	-0.10	-0.14	1.00	0.73	0.19	0.20	0.12	0.73	0.62	0.58	0.64	0.52	0.64	0.28	0.27	0.42	0.38	0.46	0.27	0.66	0.27	0.03	0.19
19 Bank Loans	0.42	0.39	0.44	0.39	0.39	0.12	0.14	-0.05	0.07	-0.02	0.24	-0.26	0.25	-0.15	0.08	-0.40	-0.39	0.73	1.00	0.08	0.08	0.03	0.40	0.55	0.44	0.66	0.53	0.66	0.19	0.19	0.29	0.20	0.31	0.19	0.69	0.19	0.02	0.15
20 Non-US Developed Bond (0% Hedged)	-0.03	-0.03	0.16	0.40	0.18	0.14	0.14	0.08	0.22	0.17	0.17	0.21	0.20	0.20	0.19	0.17	0.19	0.08	1.00	0.95	0.31	0.23	0.21	0.50	0.02	0.02	0.02	0.00	0.01	-0.02	0.43	0.00	0.02	0.00	0.02	0.03	0.15	
21 Non-US Developed Bond (50% Hedged)	-0.02	-0.02	0.14	0.34	0.16	0.32	0.31	0.14	0.39	0.36	0.35	0.38	0.37	0.34	0.33	0.33	0.29	0.20	0.95	1.00	0.58	0.28	0.22	0.45	0.01	0.01	0.01	0.02	0.03	0.00	0.40	0.00	0.03	-0.02	0.03	0.03	0.20	
22 Non-US Developed Bond (100% Hedged)	0.01	0.01	0.01	-0.01	0.02	0.63	0.62	0.23	0.65	0.66	0.63	0.66	0.62	0.55	0.52	0.54	0.47	0.12	0.03	0.31	0.58	1.00	0.27	0.11	0.06	-0.02	-0.02	-0.02	0.06	0.07	0.03	0.11	0.02	0.05	-0.05	0.05	0.04	0.24
23 Emerging Market Bonds	0.43	0.40	0.48	0.44	0.49	0.16	0.17	0.12	0.50	0.21	0.37	0.24	0.54	0.38	0.52	0.18	0.14	0.73	0.40	0.23	0.28	0.27	1.00	0.70	0.61	0.52	0.42	0.51	0.20	0.19	0.30	0.22	0.32	0.19	0.53	0.19	0.01	0.09
24 Emerging Market Bonds (Corporate USD)	0.41	0.37	0.46	0.44	0.46	0.07	0.08	0.03	0.22	0.07	0.19	0.04	0.27	0.11	0.24	-0.04	-0.06	0.62	0.55	0.21	0.22	0.11	0.70	1.00	0.60	0.57	0.45	0.56	0.17	0.16	0.27	0.25	0.28	0.17	0.60	0.17	0.01	0.09
25 Emerging Mkt Bonds (Gov. Local)	0.47	0.42	0.57	0.61	0.54	0.00	0.00	-0.03	0.12	0.00	0.09	-0.02	0.16	0.06	0.15	-0.06	-0.07	0.58	0.44	0.50	0.45	0.06	0.61	0.60	1.00	0.49	0.39	0.48	0.12	0.11	0.29	0.44	0.21	0.13	0.51	0.13	0.00	0.02
26 Hedge Funds Universe²	0.70	0.64	0.67	0.58	0.50	-0.03	-0.03	-0.11	0.05	-0.11	0.07	-0.21	0.14	-0.04	0.13	-0.22	-0.21	0.64	0.66	0.02	0.01	-0.02	0.52	0.57	0.49	1.00	0.72	0.99	0.27	0.26	0.46	0.28	0.47	0.26	0.93	0.26	0.01	0.03
27 Hedge Funds Buy List²	0.56	0.51	0.54	0.47	0.41	-0.02	-0.02	-0.10	0.03	-0.09	0.06	-0.17	0.11	-0.03	0.10	-0.18	-0.17	0.52	0.53	0.02	0.01	-0.02	0.42	0.45	0.39	0.72	1.00	0.71	0.22	0.21	0.37	0.23	0.38	0.21	0.74	0.21	0.00	0.02
28 Direct Hedge Funds³	0.69	0.63	0.67	0.58	0.50	-0.03	-0.03	-0.11	0.05	-0.11	0.07	-0.21	0.14	-0.04	0.13	-0.22	-0.21	0.64	0.66	0.02	0.01	-0.02	0.51	0.56	0.48	0.99	0.71	1.00	0.27	0.26	0.45	0.28	0.47	0.26	0.92	0.26	0.01	0.03
29 Real Estate (Broad Market)	0.40	0.38	0.41	0.37	0.34	0.14	0.13	0.01	0.08	0.11	0.12	0.04	0.10	0.02	0.06	-0.03	-0.04	0.28	0.19	0.00	0.02	0.06	0.20	0.17	0.12	0.27	0.22	0.27	1.00	0.96	0.49	0.08	0.35	0.20	0.30	0.20	0.02	0.08
30 Core Real Estate	0.39	0.36	0.39	0.36	0.32	0.15	0.15	0.02	0.08	0.12	0.14	0.05	0.11	0.02	0.06	-0.02	-0.04	0.27	0.19	0.01	0.03	0.07	0.19	0.16	0.11	0.26	0.21	0.26	0.96	1.00	0.47	0.08	0.33	0.20	0.29	0.20	0.02	0.09
31 Global REITs	0.67	0.61	0.64	0.54	0.49	0.09	0.09	-0.03	0.06	0.06	0.10	-0.01	0.09	0.01	0.07	-0.06	-0.07	0.42	0.29	-0.02	0.00	0.03	0.30	0.27	0.29	0.46	0.37	0.45	0.49	0.47	1.00	0.20	0.48	0.27	0.50	0.27	0.01	0.05
32 Commodities	0.31	0.27	0.38	0.42	0.30	0.23	0.23	0.19	0.10	0.22	0.19	0.13	0.11	0.00	0.01	-0.02	-0.05	0.38	0.20	0.43	0.40	0.11	0.22	0.25	0.44	0.28	0.23	0.28	0.08	0.08	0.20	1.00	0.11	0.08	0.26	0.08	0.07	0.42
33 Private Equity	0.69	0.65	0.67	0.56	0.53	0.09	0.08	-0.05	0.06	0.04	0.10	-0.03	0.09	0.00	0.07	-0.09	-0.10	0.46	0.31	0.00	0.00	0.02	0.32	0.28	0.21	0.47	0.38	0.47	0.35	0.33	0.48	0.11	1.00	0.32	0.52	0.32	0.02	0.05
34 Infrastructure	0.38	0.36	0.37	0.32	0.30	0.11	0.11	0.00	0.06	0.08	0.11	0.02	0.09	0.01	0.05	-0.04	-0.05																					

Explanation of Capital Market Assumptions

As of June 30, 2016 (30 Years)

The following capital market assumptions were developed by Aon Hewitt's Global Asset Allocation Team and represent the long-term capital market outlook (i.e., 30 years) based on data at the end of the second quarter of 2016. The assumptions were developed using a building block approach, reflecting observable inflation and interest rate information available in the fixed income markets as well as Consensus Economics forecasts. Our long-term assumptions for other asset classes are based on historical results, current market characteristics, and our professional judgment.

Inflation – Expected Level (2.1%)

Based on Consensus Economics long-term estimates and our near-term economic outlook, we expect U.S. consumer price inflation to be approximately 2.1% during the next 30 years.

Real Returns for Asset Classes

Fixed Income

- **Cash (-0.2%)** – Over the long run, we expect the real yield on cash and money market instruments to produce a real return of -0.2% in a moderate- to low-inflationary environment.
- **TIPS (1.0%)** – We expect intermediate duration Treasury Inflation-Protected Securities to produce a real return of about 1.0%.
- **Core Fixed Income (i.e., Market Duration) (0.8%)** – We expect intermediate duration Treasuries to produce a real return of about 0.0%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.8%, resulting in a long-term real return of 0.8%.
- **Long Duration Bonds – Government and Credit (1.3%)** – We expect Treasuries with a duration comparable to the Long Government Credit Index to produce a real return of 0.6%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.7%, resulting in an expected real return of 1.3%.

Explanation of Capital Market Assumptions

As of June 30, 2016 (30 Years)

- **Long Duration Bonds – Credit (1.9%)** – We expect Treasuries with a duration comparable to the Long Credit Index to produce a real return of 0.6%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 1.3%, resulting in an expected real return of 1.9%.
- **Long Duration Bonds – Government (0.6%)** – We expect Treasuries with a duration of ~12 years to produce a real return of 0.6% during the next 30 years.
- **High Yield Bonds (3.2%)** – We expect intermediate duration Treasuries to produce a real return of about 0.0%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 3.2%, resulting in an expected real return of 3.2%.
- **Bank Loans (2.3%)** – We expect LIBOR to produce a real return of about 0.2%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults) to be 2.1%, resulting in an expected real return of 2.3%.
- **Non-US Developed Bonds: 50% Hedged (0.1%)** – We forecast real returns for non-US developed market bonds to be 0.1% over a 30-year period after adjusting for a 50% currency hedge. We assume a blend of one-third investment grade corporate bonds and two-thirds government bonds. We also produce assumptions for 0% hedged and 100% hedged non-US developed bonds.
- **Emerging Market Bonds (Sovereign; USD) (2.7%)** – We forecast real returns for emerging market sovereign bonds denominated in USD to be 2.7% over a 30-year period.
- **Emerging Market Bonds (Corporate; USD) (2.4%)** – We forecast real returns for emerging market corporate bonds denominated in USD to be 2.4% over a 30-year period.
- **Emerging Market Bonds (Sovereign; Local) (3.5%)** – We forecast real returns for emerging market sovereign bond denominated in local currency to be 3.5% over a 30-year period.
- **Multi Asset Credit (MAC) (4.0%)** – We assume nominal returns from beta exposure to high yield, bank loans and emerging market debt to add 5.2% plus 1.0% from alpha (net of fees) over a 30-year period.

Explanation of Capital Market Assumptions

As of June 30, 2016 (30 Years)

Equities

- **Large Cap U.S. Equity (4.1%)** – This assumption is based on our 30-year outlook for large cap U.S. company dividends and real earnings growth. Adjustments are made for valuations as needed.
- **Small Cap U.S. Equity (4.6%)** – Adding a 0.5% return premium for small cap U.S. equity over large cap U.S. equity results in an expected real return of 4.6%. This return premium is theoretically justified by the higher risk inherent in small cap U.S. equity versus large cap U.S. equity, and is also justified by historical data. In recent years, higher small cap valuations relative large cap equity has reduced the small cap premium.
- **Global Equity (Developed & Emerging Markets) (5.0%)** – We employ a building block process similar to the U.S. equity model using the developed and emerging markets that comprise the MSCI All-Country World Index. Our roll-up model produces an expected real return of 5.0% for global equity.
- **International (Non-U.S.) Equity, Developed Markets (5.0%)** – We employ a building block process similar to the U.S. equity model using the non-U.S. developed equity markets that comprise the MSCI EAFE Index.
- ☐ **Emerging Market Stocks (5.3%)** - We employ a building block process similar to the U.S. equity model using the non-U.S. emerging equity markets that comprise the MSCI Emerging Markets Index.
- **Equity Risk Insurance Premium Strategies- High Beta (4.1%)** – We expect nominal returns from insurance equity risk premium to average 4.4% plus 1.9% from cash & dividends over the next 30 years.

Alternative Asset Classes

- **Hedge Fund-of-Funds Universe (1.7%)** – The generic category “hedge funds” encompasses a wide range of strategies accessed through “fund-of-funds” vehicles. We also assume the **median** manager is selected and also allow for the additional costs associated with Fund-of-Funds management. A top-tier portfolio of funds (hedge fund-of-funds buy-list) could add an additional 1.1% in return at similar volatility based on alpha, lower fees and better risk management.

Explanation of Capital Market Assumptions

As of June 30, 2016 (30 Years)

- **Hedge Fund-of-Funds Buy List (2.8%)** – The generic category of top-tier “hedge funds” encompasses a wide range of strategies accessed through “fund-of-funds” vehicles. We assume additional costs associated with Funds-of-Funds management. To use this category the funds must be buy rated or we advise on manager selection.
- **Broad Hedge Funds (3.1%)** – Represents a diversified portfolio of direct hedge fund investments. This investment will tend to be less diversified than a typical “fund-of-funds” strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure.
- **Broad Hedge Funds Buy List (4.4%)** – Represents a diversified portfolio of top-tier direct hedge fund investments. This investment will tend to be less diversified than a typical “fund-of-funds” strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure. To use this category the funds must be buy rated or we advise on manager selection.
- **Real Estate (3.5%)** – Our real return assumption for broad real estate market is based on a gross income of about 5.5%, management fees of roughly 2%, and future capital appreciation near the rate of inflation during the next 30 years. We assume a portfolio of equity real estate holdings that is diversified by property type and by geographic region.
- **Core Real Estate (2.9%)** – Our real return assumption for core real estate is based on a gross income of about 4.9%, management fees of roughly 2%, and future capital appreciation near the rate of inflation during the next 30 years. We assume a portfolio of equity real estate holdings that is diversified by property type and geographic region.
- **U.S. REITs (3.7%)** – Our real return assumption for U.S. REITs is based on income of 3.7% and future capital appreciation near the rate of inflation over the next 30 years. REITs are a sub-set of the U.S. small/mid cap equities.
- **Commodities (2.3%)** – Our commodity assumption is for a diversified portfolio of commodity futures contracts. Commodity futures returns are composed of three parts: spot price appreciation, collateral return, and roll return (positive or negative change implied by the shape of the future curve). We believe that spot prices will converge with CPI over the long run (i.e., 2.1%). Collateral is assumed to be LIBOR cash 0.2%. Also, we believe the roll effect will be near zero, resulting in a real return of approximately 2.3% for commodities.

Explanation of Capital Market Assumptions

As of June 30, 2016 (30 Years)

- **Private Equity (6.3%)** – Our private equity assumption reflects a diversified fund of funds with exposure to buyouts, venture capital, distressed debt, and mezzanine debt.
- **Infrastructure (4.4%)** – Our infrastructure assumption is formulated using a cash flow based approach that projects cash flows (on a diversified portfolio of assets) over a 30 year period. Income and capital growth as well as gearing levels, debt costs and terms, relevant tax and management expenses are all taken into consideration. Our approach produces an expected real return of 4.4% for infrastructure.
- **Equity Risk Insurance Premium Strategies- Low Beta (3.2%)** – We assume nominal returns from cash of 2.3% + 3.1% from alpha.

Volatility / Correlation Assumptions

Assumed volatilities are formulated with reference to implied volatilities priced into option contracts of various terms, as well as with regard to historical volatility levels. For asset classes which are not marked to market (for example real estate), we “de-smooth” historical returns before calculating volatilities. Importantly, we consider expected volatility trends in the future – in recent years we assumed the re-emergence of an economic cycle and a loss of confidence in central bankers would lead to an increase in volatility. Correlation assumptions are generally similar to actual historical results; however, we do make adjustments to reflect our forward-looking views as well as current market fundamentals.



Appendix

Public Pension Peer Comparison

Public Pension Peer Comparison Overview

- Public Fund Peer Asset Allocation Comparison
 - Asset allocation should be matched to each defined benefit plan's unique design
 - Peer comparison is meant to inform and not dictate policy

Public Pension Peer Comparison

OSERS' Asset Allocation versus Public Peers

Asset Allocation	OSERS	Large Public Pension Plans (\$1-5B)*	Large Public Pension Plans (>\$5B)*	Total Public Pension Universe*	Wilshire Report on State Retirement Systems **	AHIC Public Peer Average ***
Equity Exposure						
Global Equity	15.0%	3.2%	3.9%	3.8%		45.5%
Total U.S. Equity	12.0%	28.5%	24.9%	25.3%	27.9%	
Total Int'l Equity	0.0%	16.9%	18.5%	18.4%	21.0%	
Private Markets	12.5%	5.4%	8.3%	8.1%	10.1%	12.1%
Total Equity	39.5%	54.0%	55.6%	55.6%	59.0%	57.6%
Fixed Income Exposure						
U.S. Fixed Income	5.0%	17.7%	20.8%	20.7%	21.4%	
High Yield Bonds / Bank Loans	16.0%					
Non-US Developed Bonds	0.0%	4.1%	2.6%	2.7%	2.1%	
Emerging Market Debt	0.0%	1.0%	0.7%	0.7%		
Inflation Protected	0.0%					
Total Fixed Income	21.0%	22.8%	24.1%	24.1%	23.5%	21.3%
Real Asset Exposure						
US Infrastructure	1.5%					
Commodities	0.0%	1.1%	1.2%	1.2%		
Timber	2.5%					
Master Limited Partnerships	11.0%					
Real Estate	12.0%	7.0%	8.5%	8.4%	7.2%	
Total Real Assets	27.0%	8.1%	9.7%	9.6%	7.2%	12.9%
Hedge Funds / Opportunistic	12.5%	7.3%	4.3%	4.4%		5.8%
Multi-Asset / Risk Parity		5.0%	1.4%	1.5%		2.3%
Money Market / Cash	0.0%	0.6%	1.8%	1.8%		0.4%
Other	0.0%	2.3%	3.0%	3.0%	10.3%	
Net Other	12.5%	15.2%	10.5%	10.7%	10.3%	8.5%
Total	100%	100%	100%	100%	100%	100%

* Source: "Institutional Investors Market Trends 2015"; Greenwich Associates

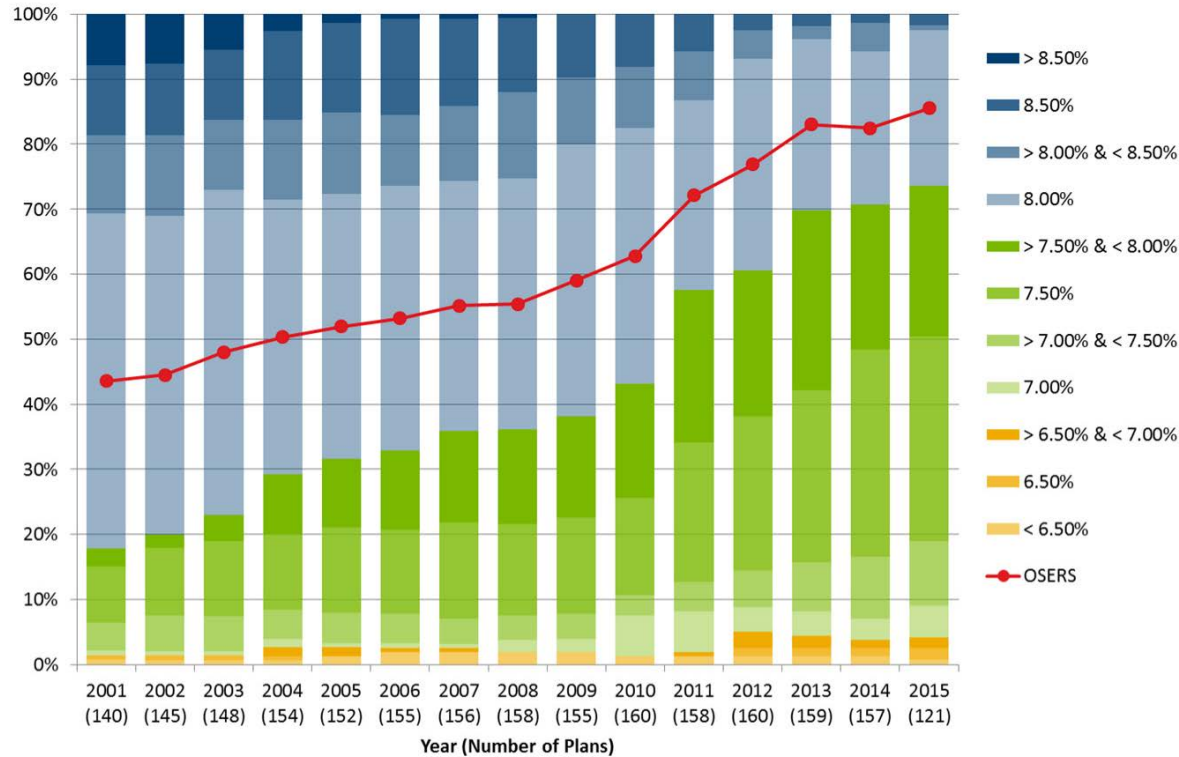
** Source: "2015 Report on State Retirement Systems: Funding Levels and Asset Allocation"; Wilshire Consulting

*** Source: AHIC Public Peer Average is based on a universe of AHIC's 11 largest public pension plans with total assets ranging from \$14B-\$142B

Public Pension Peer Comparison

OSERS' Investment Return Assumption versus Public Peers

Distribution of Public Pension Investment Return Assumptions



□ The chart to the left illustrates the trend in investment return assumptions over the past 15 years according to information compiled by the Public Plans Data (PPD)

□ The median Investment return assumption has declined from 8.00% in 2001-2010 to 7.50% based on the latest survey data

■ OSERS' historical return assumption has been plotted to show how it lines up with the historical trends.

Source: Public Plans Data (publicplansdata.org) as of October 2016



Appendix

Investment Guidance for Public Employee Retirement System Trustees

Investment Guidance for Public Employee Retirement System Trustees¹

1. **PERS trustees should look to the state for statutory direction on behalf of the taxpayers**
 - a) Prudent-person rule
 - b) Peer analysis
2. **PERS trustees should not be daunted by a liability value that exceeds the value of assets**
 - a) Do not feel obliged to incur greater risk in an effort to narrow the gap
 - b) Funded status has less to do with investment performance than it does with public policy and politics
3. **PERS trustees should not assume that an equity-oriented investment policy is suitable for their fund**
 - a) Discern the risk tolerance of taxpayers
 - b) May conclude that a moderate level of risk is warranted
4. **Trustees of individual PERSs should be cognizant of the existence and implications of the unitary state pension fund**
 - a) Unitary state pension fund is the only fund of economic consequence to the taxpayers
 - b) Multiple actively managed funds may form, in total, a closet index fund
5. **PERS investments should be exposed to rewarded risks, and insulated from unrewarded risks**
 - a) Market risk (equity exposure) is rewarded risk, on average
 - b) Diversifiable risk is not

¹ Richard M. Ennis, *Is a Statewide Pension Fund a Person or a Cookie Jar? The Answer Has Implications for Investment Policy*, Financial Analysts Journal, November-December 1988



Appendix

Horizon Survey of Capital Market Assumptions

Capital Market Assumption Overview

- We have what we consider a consistent and conservative approach to modeling asset class returns, risk, and correlations
- AHIC regularly reviews these critical inputs relative to peer consultants as well as the investment management community
- The following slides include a review of 2016 assumptions relative to a study of peer averages
 - AHIC is often more conservative from an expected return standpoint than the peer average
 - While we do not seek to change our approach based on how we stack up to peers, it is a helpful double-check to make sure we are not too far off from others in the industry

2016 Horizon Survey Results

AHIC vs. Other Advisors

- The 2016 Horizon Survey generally showed return expectations slightly lower in 2016 than 2015
 - Equity return assumptions are lower by an average of 0.1%
 - Fixed income return assumptions are higher by an average of 0.1%
 - Alternative asset class return assumptions are lower by an average of 0.1%

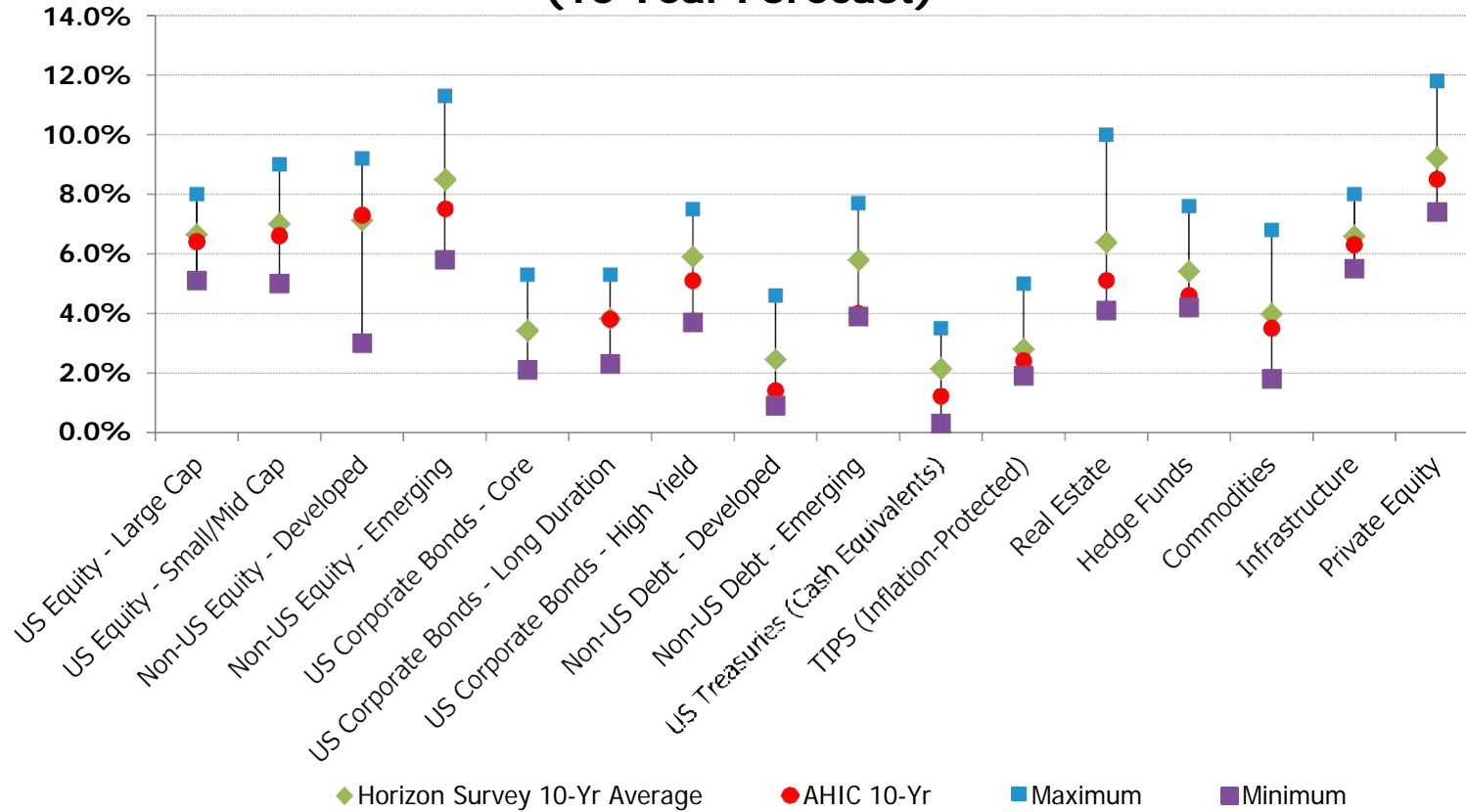
- 2016 AHIC 10-year forecast assumptions tend to be similar to the survey average in some asset classes (e.g., public equities), and somewhat lower in others (e.g., alternatives)
 - AHIC equity assumptions are driven by market valuations, earnings growth expectations and assumed payouts to investors. Recent experience suggests strong equity market performance has been driven more by increasing valuations than increasing profits. As markets have become more expensive, our equity return assumptions have consequently fallen
 - AHIC fixed income assumptions reflect falling yields and flattening of yield curves during the first two quarters of 2016
 - AHIC alternative asset class assumptions are generally lower due to methodological and inflation forecast differences compared to survey participant forecasts

- In conclusion, AHIC assumptions appear somewhat more conservative than peers included in the 2016 Horizon Survey of capital market assumptions

2016 Horizon Survey Results

Distribution of Expected Returns from 35 Consultants

Expected Geometric Returns by Asset Class (10 Year Forecast)



SOURCE: Horizon Actuarial survey of 2016 capital market assumptions from 35 independent investment advisors
 Expected returns of the survey are annualized over 10-years (geometric).
 AHIC expected returns are annualized over 10-years as of June 30, 2016

2016 Horizon Survey Results

AHIC Versus Peers

Asset Class	Horizon Survey				AHIC			
	Expected Geometric Returns (10-Yr)			Expected Risk	10 Year Forecasts		30 Year Forecasts	
	Maximum	Minimum	Average	Average	Expected Return	Expected Risk	Expected Return	Expected Risk
US Equity - Large Cap	8.0%	5.1%	6.6%	16.9%	6.4%	17.0%	6.3%	17.0%
US Equity - Small/Mid Cap	9.0%	5.0%	7.0%	21.0%	6.6%	23.0%	6.8%	23.5%
Non-US Equity - Developed	9.2%	3.0%	7.1%	19.5%	7.3%	20.0%	7.2%	20.0%
Non-US Equity - Emerging	11.3%	5.8%	8.5%	26.4%	7.5%	30.0%	7.5%	30.5%
US Fixed Income - Core	5.3%	2.1%	3.4%	6.0%	2.1%	3.5%	2.9%	5.0%
US Fixed Income - Long Duration Corp	5.3%	2.3%	3.8%	10.5%	3.8%	11.5%	4.0%	15.0%
US Fixed Income - High Yield	7.5%	3.7%	5.9%	11.0%	5.1%	12.0%	5.4%	12.0%
Non-US Fixed Income - Developed	4.6%	0.9%	2.4%	7.6%	1.4%	5.5%	2.2%	6.5%
Non-US Fixed Income - Emerging	7.7%	3.9%	5.8%	11.6%	4.0%	13.0%	4.9%	13.5%
Treasuries (Cash Equivalents)	3.5%	0.3%	2.1%	2.8%	1.2%	1.0%	1.9%	2.0%
TIPS (Inflation-Protected)	5.0%	1.9%	2.8%	6.5%	2.4%	4.5%	3.1%	4.5%
Real Estate	10.0%	4.1%	6.4%	14.7%	5.1%	11.5%	5.1%	11.5%
Hedge Funds	7.6%	4.2%	5.4%	8.4%	4.6%	9.0%	5.0%	9.5%
Commodities	6.8%	1.8%	4.0%	18.5%	3.5%	17.0%	4.4%	17.0%
Infrastructure	8.0%	5.5%	6.6%	13.8%	6.3%	14.5%	6.6%	14.5%
Private Equity	11.8%	7.4%	9.2%	23.1%	8.5%	24.0%	8.5%	24.5%
Inflation			2.2%	1.8%	2.1%	1.0%	2.1%	1.5%

Notes (Horizon Survey):

Source: Horizon Actuarial survey of 2016 capital market assumptions from 35 independent investment advisors
Expected returns are annualized (geometric).

Notes (AHIC Forecasts):

AHIC Forecasts are as of June 30, 2016

US Equity - Small/Mid Cap forecasts represents AHIC forecasts for US Small Cap

US Fixed Income - Long Duration forecasts represents AHIC forecasts for Long Duration Credit

Non-US Fixed Income - Developed forecasts represents AHIC forecasts for Non-US Fixed Income - Developed (50% Hedged)

Non-US Fixed Income- Emerging forecasts represents AHIC forecasts for Non-US Fixed Income- Emerging Sovereign USD

Real Estate forecasts represents AHIC forecasts for Core Private Real Estate

Hedge Funds forecasts represents AHIC forecasts for Hedge Fund-of-Funds (Buy List)

2016 Horizon Survey Results

Leading Methodologies & Reasons for Differences

Leading Methodologies

- Building Block
- Global Capital Asset Pricing Model (Global CAPM)
- Surveys
- Historical data (as a guide to future)
- Black-Litterman (combination of building block and CAPM)

Reasons for Differences

- Methodology
- Time Horizon
- Arithmetic vs. Geometric forecasts*
- Alpha (active management)*
- Inflation
- Investment Fees
- Asset class definition

* While some firms in Horizon survey responded with Arithmetic forecasts, the results have been converted to Geometric forecasts for comparison purposes. Additionally, the return expectations included in the Horizon survey are based on indexed returns (no "alpha"). However, AHIC return assumptions for certain asset classes include "alpha" or active management premium (e.g., Private Equity and Hedge Funds)



Appendix

Asset-Liability Management Background

Asset-Liability Management Background

What is an Asset-Liability Study?

- Provides fiduciaries with an understanding of the dynamic relationship between plan assets and liabilities over time
- Illustrates the impact of various asset allocation targets on required contributions and funded status under a range of different macro-economic scenarios
- Identifies future trends in the financial health of the plan based on economic uncertainties that may not be evident from an actuarial valuation, which provides only a snapshot at a point in time
- Helps determine the level of risk that is appropriate in the context of the Plan's liabilities

An asset-liability study provides the tools to align
a plan's risk taking with its liabilities

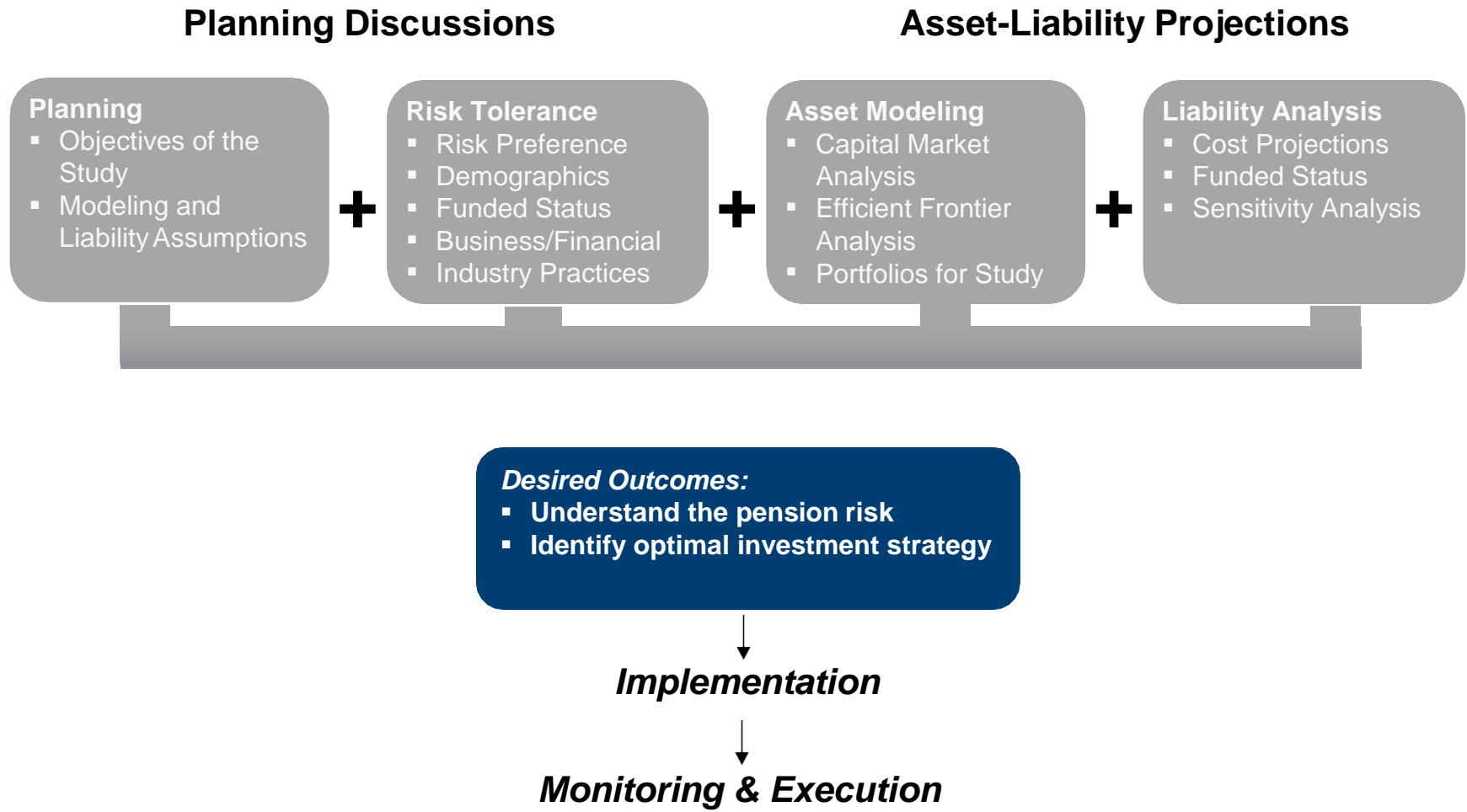
Asset-Liability Management Background

Key Risks for Public Pension Plans

Types of Risk	Time Horizon	Risk Management Tools and Controls
Return Shortfall <ul style="list-style-type: none"> ▪ Assets do not grow with liabilities ▪ Investment return & contribution less than liability growth 	Long-Term (10+ years)	<ul style="list-style-type: none"> ▪ Funding policy ▪ Plan design ▪ Investment policy ▪ Assumptions & methods
Liquidity <ul style="list-style-type: none"> ▪ Cannot liquidate assets efficiently to meet needs ▪ Lose control of asset allocation 	Short- to Medium-Term (<5 years)	<ul style="list-style-type: none"> ▪ Funding policy ▪ Benefit accruals ▪ Use of Illiquid investments ▪ Scenario analysis ▪ Monitoring
Investment <ul style="list-style-type: none"> ▪ Asset allocation (policy) ▪ Investment structure ▪ Manager selection ▪ Rebalancing ▪ Scenario (or path risk) ▪ Factor 	Short-to Medium-Term (<5 years)	<ul style="list-style-type: none"> ▪ Investment policy statement <ul style="list-style-type: none"> – Static/dynamic – Asset allocation – Rebalancing – Manager guidelines – Monitoring/roles & responsibilities ▪ Risk budgeting ▪ Monitoring / dashboards ▪ Medium term views ▪ Regression and scenario analysis

Asset-Liability Management Background

Overview of the Asset-Liability Study Process



Asset-Liability Management Background

Modeling Process

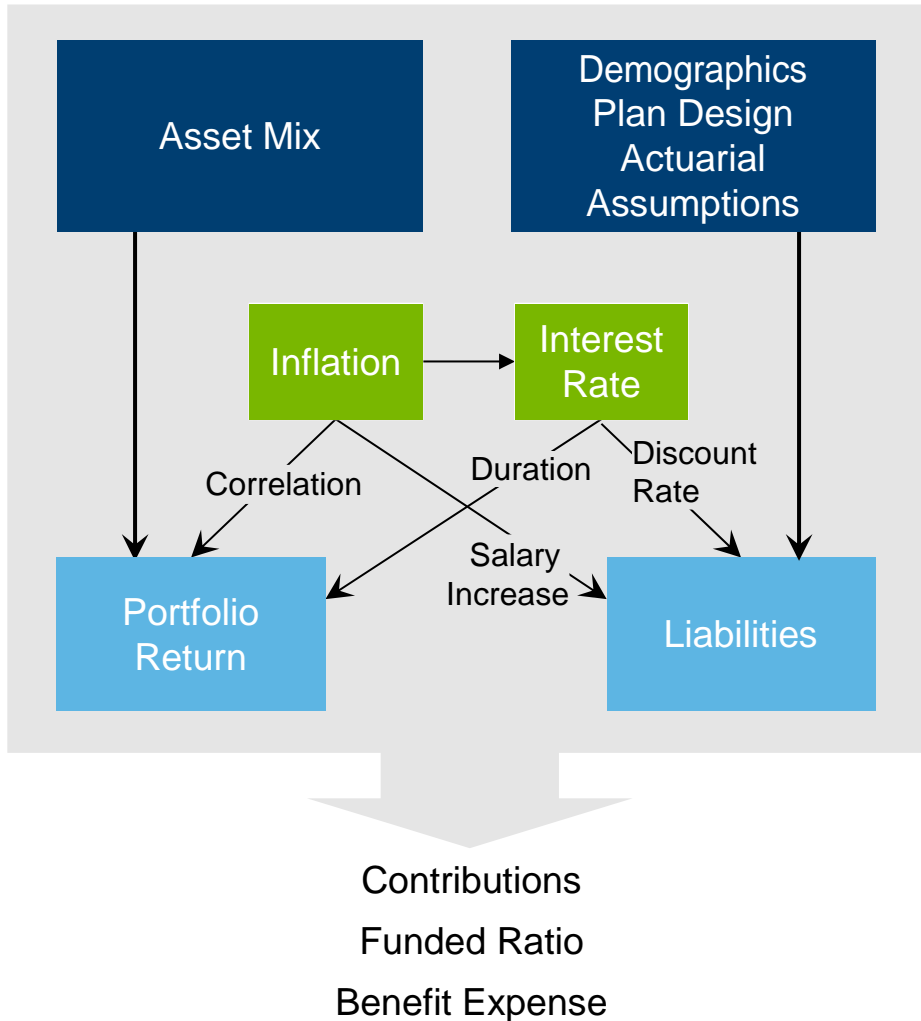
- Goals of an asset-liability study:
 - Understand the pension plan's asset-liability risk, and
 - Identify the optimal investment strategies

- Stochastic, Monte Carlo simulation analysis used
 - 5,000 independent economic trials
 - Building block approach
 - Starts with inflation and interest rates
 - Using a multi-factor regression analysis, other asset classes are then modeled
 - Assets and liabilities are modeled over the projection period
 - Projections include contribution requirements and funded ratios

- Asset-liability studies are best-suited to determine the optimal mix of return-seeking (e.g., equity) and fixed income assets for the pension fund
 - Asset mix is the single most important investment decision for the plan sponsor
 - Is it worthwhile to have a more aggressive allocation in order to reduce long term cost in exchange for risk of higher costs in a bad outcome?
 - Is it worthwhile to have a more conservative allocation in order to have a more predictable cost in exchange for potentially higher average costs?

Asset-Liability Management Background

Mechanics of Asset-Liability Modeling Process



Asset and liability modeling integrated in single platform

- Integrates impact of key economic variables

Flexibility in modeling parameters and output to client preferences

Stochastic and deterministic modeling performed

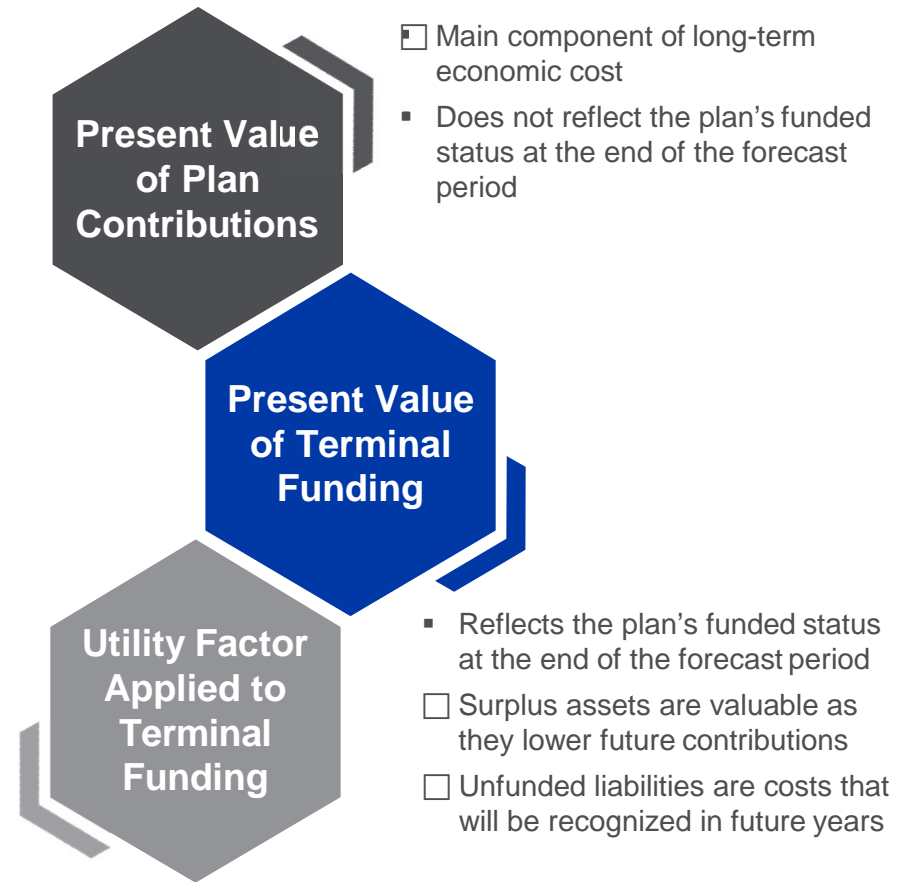
Asset-Liability Management Background

Long-Term Economic Cost of Plan

Long-Term Economic Cost =

- Present Value of Plan Contributions +**
- Present Value of Terminal Funding, adjusted by a utility factor**

Terminal Funding	Surplus	Shortfall
Utility Rationale	Declining value, or utility, from very high funded ratios	Increasing "pain" as unfunded amounts grow to high levels
Threshold	PVB / AL	(5 Yrs. of Benefit Payments) / AL
Utility Factor above/below threshold	50%	200%



Asset-Liability Management Background

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

Asset-Liability Management Background

Risk and Return in an Asset-Liability Context

▪ **Traditional:**

- Return = Investment performance
- Risk = Annual volatility of investment gains and losses (e.g. weak/negative capital market returns)

□ **Asset-Liability:**

- Return = Potential cost reduction or funded status improvement under average economic conditions
- Risk = During the worst economic conditions, contributions need to increase or funded status declines (e.g., stocks decline, inflation/deflation shocks and/or interest rates decline)

Asset-Liability Management Background

Key Factors Affecting the Risk/Reward Trade-off

- The key take-away from the A/L study is the allocation between equity (“return-seeking”) vs. fixed income (“risk-reducing”)

- Major factors affecting the ultimate mix are:
 - Time horizon (or amortization period of unfunded liability) to fund the liability: a longer time horizon supports more risk taking
 - Characteristics of plan participants: a growing population of active participants supports more risk taking; a mature population with significant retirees might need a more conservative policy
 - Funded status: a less funded plan can utilize additional returns from equity investments
 - Nature of plan benefits: a pension with sensitivity to wage inflation growth can benefit from equities in the long-term; an increased need in liquidity due to significant benefit payments in the near future can have a more conservative policy



Appendix

About This Material

About This Material

This material includes a summary of calculations and consulting related to the finances of Omaha School Employees' Retirement System (OSERS). The following variables have been addressed:

- Contributions
- Economic Cost
- Funded Ratio
- Hurdle Rate
- Net Outflow

This analysis is intended to assist the Investment Committee with a review of the associated issues and options, and its use may not be appropriate for other purposes. This analysis has been prepared solely for the benefit of the Investment Committee. Any further dissemination of this report is not allowed without the written consent of Aon Hewitt Investment Consulting, Inc.

Our calculations were generally based on the methodologies identified in the actuary's valuation report for OSERS. We believe the methodology used in these calculations conforms to the applicable standards identified in the report.

Experience different than anticipated could have a material impact on the ultimate costs of the benefits. In addition, changes in plan provisions or applicable laws could have a significant impact on cost. Actual experience may differ from our modeling assumptions.

Our calculations were based on data provided by the plan actuary. The actuarial assumptions and methods and plan provisions reflected in these projections are the same as those used for the 2015 actuarial valuation for OSERS as noted in the actuarial reports, except where noted in this report. Unless specifically noted, our calculations do not reflect any other changes or events after September 1, 2015.

In conducting these projections, we have relied on plan design, demographic and financial information provided by other parties, including the plan's actuary and plan sponsor. While we cannot verify the accuracy of all of the information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it has produced appropriate results.

These projections have been conducted in accordance with generally accepted actuarial principles and practices, including applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board. The undersigned actuary is familiar with the near-term and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Aon Hewitt Investment Consulting, Inc. providing services to OSERS has any direct financial interest or indirect material interest in OSERS. Thus, we believe there is no relationship existing that might affect our capacity to prepare and certify this report for OSERS.

Aon Hewitt Investment Consulting, Inc.

Phil Kivarkis FSA, EA, CFA

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