ASSET-LIABILITY STUDY UPDATE

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

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Kevin M. Leonard, Partner
Matt Maleri, Principal, Sr. Consultant
Phillip Nelson, CFA, Partner
Robert Goldthorpe, ASA, Investment Director

ASSET/LIABILITY STUDY UPDATE

- **NEPC and State of RI Staff continue to make progress on the 2023 asset/liability.**
- **Today's discussion is focused on alternative portfolio mixes.**
- **We expect this to be the first of several discussion aimed at identifying the appropriate policy mix.**
- **An updated study timeline is included on the following slide.**

ASSET/LIABILITY STUDY TIMELINE

Step/Milestone	Timing
Asset/Liability Study Kickoff Discussion	February – COMPLETE
NEPC Coordinates with Plan Actuary on Data Needs	February – COMPLETE
Preliminary Capital Market Assumption Discussion	March – COMPLETE
Finalize Capital Market Assumptions	April – COMPLETE
NEPC Receives Actuarial Forecasts	June – COMPLETE
NEPC Prepares Baseline Forecast Results	July – COMPLETE
Discussion of Baseline Output and Scenario Analysis	July – COMPLETE
Discuss Alternative Portfolios and Preliminary Findings	**August – Today's Discussion**
NEPC and State of RI Staff Prepare Recommendation	August / September
Final Recommendation Delivered to SIC	September or October SIC Meeting
Portfolio Implementation Discussion	Post-A/L Study

Note: Timing is estimated and subject to change.

DISCUSSION OF ALTERNATIVE PORTFOLIOS

ALTERNATIVE PORTFOLIO OVERVIEW

- **NEPC has developed several alternative portfolio mixes as a starting point for discussion.**
- **Two of the portfolios are based on optimized allocations and the third portfolio is based on qualitative considerations.**
- **Importantly, we expect this to be an iterative process as we work towards developing a final recommendation.**
- **Following today's discussion, we will prepare another set of portfolio mixes for consideration and will also generate the full asset/liability modeling output for review based on the refined mixes.**

PORTFOLIO OPTIMIZATION SUMMARY

- **NEPC ran two portfolio optimizations with varying constraints**
  - Fully Unconstrained: Each asset class has an allowable range of 0 to 100%
  - Constrained: See table for min/max ranges
- **Both optimizations were designed to identify the maximum Sharpe ratio portfolio while maintaining a 7.4% compound return expectation.**
- **A third portfolio is also included which focuses on increasing the allocation to income generating assets.**

			Optimization Constraints	
		Current Target	**Min.**	**Max.**
Growth	**Global Equity**	**40.0%**	**25.0%**	**100.0%**
	Private Equity	12.5%	7.5%	20.0%
	Non-Core Real Estate	2.5%	0.0%	7.5%
	Private Growth	**15.0%**	**n/a**	**n/a**
	TOTAL GROWTH	**55.0%**	**n/a**	**n/a**
Income	Equity Options	2.0%	0.0%	7.5%
	Liquid Credit	3.0%	0.0%	15.0%
	EMD (Blended)	2.0%	0.0%	10.0%
	CLO Mezz/Equity	2.0%	0.0%	10.0%
	Private Credit	3.0%	0.0%	10.0%
	TOTAL INCOME	**12.0%**	**n/a**	**n/a**
Stability	Long Treasuries	5.0%	0.0%	20.0%
	Systematic Trend	5.0%	0.0%	10.0%
	CPC	**10.0%**	**n/a**	**n/a**
	Core Real Estate	4.0%	0.0%	8.0%
	Private Real Assets (ex-Real Estate)	4.0%	0.0%	8.0%
	Inflation Protection	**8.0%**	**n/a**	**n/a**
	Inv. Grade Fixed (ex-Treasuries)	6.5%	0.0%	100.0%
	Absolute Return	6.5%	0.0%	10.0%
	Strategic Cash	2.0%	0.0%	5.0%
	Volatility Protection	**15.0%**	**n/a**	**n/a**
	TOTAL STABILITY	**33.0%**	**n/a**	**n/a**

PORTFOLIO ALLOCATION DETAIL

		Current Target	Increase Income Exposure	Unconstrained Optimization	Constrained Optimization
Growth	**Global Equity**	**40.0%**	**35.0%**	**0.0%**	**25.0%**
	Private Equity	12.5%	12.5%	0.0%	7.5%
	Non-Core Real Estate	2.5%	2.5%	0.0%	0.4%
	Private Growth	**15.0%**	15.0%	0.0%	7.9%
	TOTAL GROWTH	**55.0%**	**50.0%**	**0.0%**	**32.9%**
Income	Equity Options	2.0%	2.0%	0.0%	0.0%
	Liquid Credit	3.0%	6.0%	0.0%	15.0%
	EMD (Blended)	2.0%	0.0%	0.0%	0.0%
	CLO Mezz/Equity	2.0%	2.0%	36.0%	10.0%
	Private Credit	3.0%	5.0%	35.9%	10.0%
	TOTAL INCOME	**12.0%**	**15.0%**	**71.9%**	**35.0%**
Stability	Long Treasuries	5.0%	5.0%	19.0%	20.0%
	Systematic Trend	5.0%	5.0%	0.0%	0.0%
	CPC	**10.0%**	**10.0%**	**19.0%**	**20.0%**
	Core Real Estate	4.0%	4.0%	0.0%	0.0%
	Private Real Assets (ex-Real Estate)	4.0%	4.0%	7.4%	8.0%
	Inflation Protection	**8.0%**	**8.0%**	**7.4%**	**8.0%**
	Inv. Grade Fixed (ex-Treasuries)	6.5%	8.5%	0.0%	4.1%
	Absolute Return	6.5%	6.5%	0.0%	0.0%
	Strategic Cash	2.0%	2.0%	1.7%	0.0%
	Volatility Protection	**15.0%**	**17.0%**	**1.7%**	**4.1%**
	TOTAL STABILITY	**33.0%**	**35.0%**	**28.1%**	**32.1%**
	TOTAL PORTFOLIO	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	EXPECTED RETURN - ARITHMETIC	**8.1%**	**8.0%**	**7.6%**	**7.8%**
	EXPECTED RETURN - GEOMETRIC	**7.4%**	**7.4%**	**7.4%**	**7.4%**
	EXPECTED RISK	**12.9%**	**12.3%**	**7.2%**	**9.8%**
	EXPECTED SHARPE RATIO	**0.38**	**0.39**	**0.61**	**0.47**

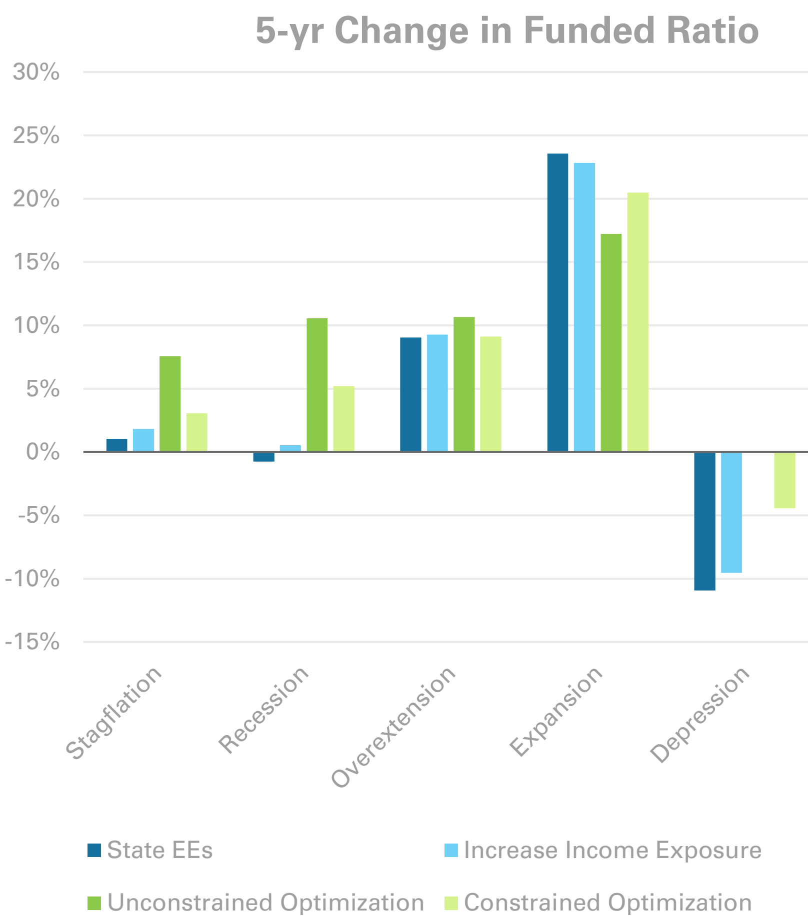
Increase in allocation relative to Current Target

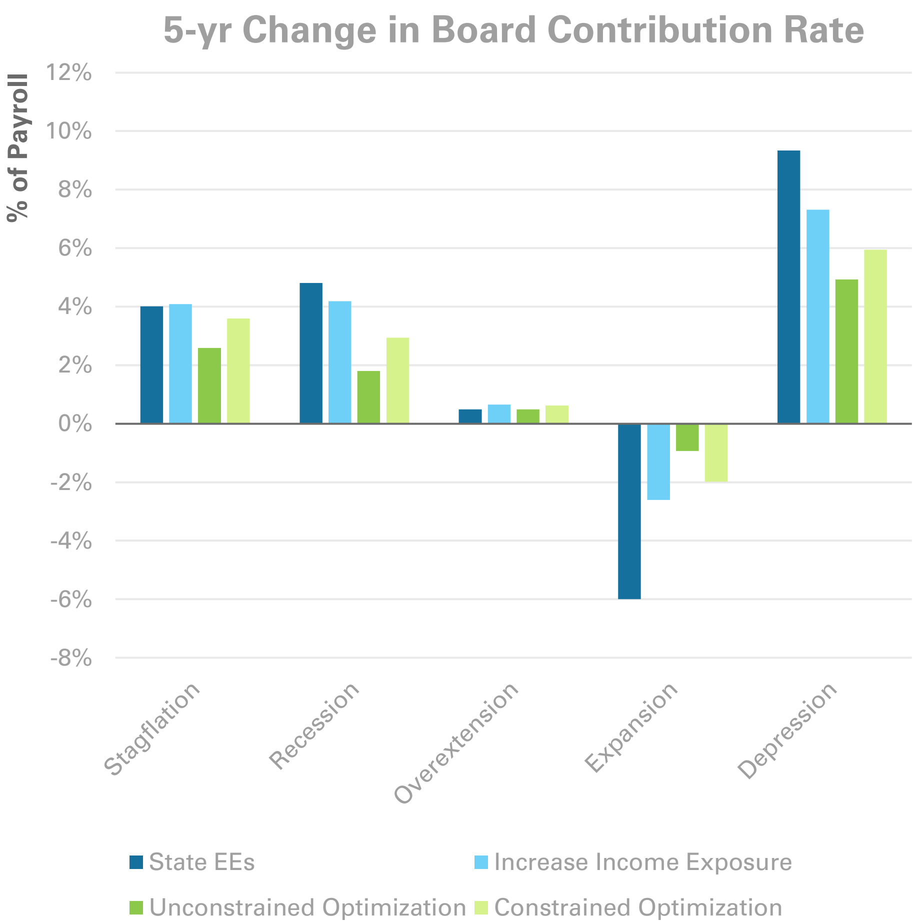
Decrease in allocation relative to Current Target

10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk. See appendix for details.

SCENARIO ANALYSIS

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND





Notes: Change in funded ratio represents change in percentage points from current funded ratio of 58.7% for State EEs; change in contribution rate represents change in percentage points from FY2023 employer contribution rate of 28.0% for State EEs

APPENDIX

SCENARIO ANALYSIS: REGIME CHANGES

NEPC scenario analysis highlights the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes

- Risk asset returns are informed by credit returns which are based on changes in real rate, inflation, and credit spreads experienced across market regimes

Expansion

Informed by rising interest rates, moderately rising inflation, elevated positive real rates, spread tightening, and increasing growth

Stagflation

Informed by rising interest rates, rising inflation, depressed negative real rates, spread widening, and slowing growth

Overextension

Informed by rising interest rates, high inflation, negative real rates, spread tightening, and increasing growth

Recession

Informed by depressed interest rate levels, falling inflation, depressed positive real rates, spread widening and slowing growth

Depression

Informed by negative interest rates, deflation, severe credit defaults and downgrades, and negative growth

SCENARIO ANALYSIS: REGIME RETURNS

Expansion Scenario Return*

Cash: 2.7%
Treasuries: 5.4%
Long Treasuries: 8.5%
US TIPS: 5.1%
US IG Credit: 8.1%
High Yield Bonds: 8.0%
US Large-Cap Equity: 10.2%
Emerging Market Equity: 17.9%
Commodities: 12.1%

Depression Scenario Return*

Cash: 0.8%
Treasuries: 5.4%
Long Treasuries: 10.0%
US TIPS: 5.4%
US IG Credit: 7.0%
High Yield Bonds: 2.1%
US Large-Cap Equity: -8.1%
Emerging Market Equity: -22.8%
Commodities: 12.9%

Overextension Scenario Return*

Cash: 5.4%
Treasuries: 4.0%
Long Treasuries: 2.6%
US TIPS: 7.0%
US IG Credit: 4.7%
High Yield Bonds: 5.8%
US Large-Cap Equity: 2.3%
Emerging Market Equity: 4.5%
Commodities: 13.4%

Recession Scenario Return*

Cash: 1.2%
Treasuries: 5.0%
Long Treasuries: 8.5%
US TIPS: 4.8%
US IG Credit: 7.3%
High Yield Bonds: 8.2%
US Large-Cap Equity: -2.9%
Emerging Market Equity: -5.0%
Commodities: 11.2%

Stagflation Scenario Return*

Cash: 6.4%
Treasuries: 2.6%
Long Treasuries: -1.6%
US TIPS: 9.5%
US IG Credit: 3.1%
High Yield Bonds: 7.0%
US Large-Cap Equity: -2.4%
Emerging Market Equity: -3.9%
Commodities: 23.5%

Scenario returns are a 5 year annualized returns

ERSRI FINAL ASSET CLASS ASSUMPTIONS

		Current Target	10-Year Arithmetic Returns: NEPC	Meketa	Cliffwater	Average	10-Year Geometric Return*	NEPC Expected Risk
Growth	**Global Equity**	**40.0%**	**7.7%**	**10.1%**	**8.8%**	**8.9%**	**7.5%**	**18.1%**
	Private Equity	12.5%	11.8%	12.5%	12.3%	12.2%	9.6%	25.7%
	Non-Core Real Estate	2.5%	6.7%	8.1%	12.5%	9.1%	7.7%	18.5%
	Private Growth	**15.0%**	**10.9%**	**11.8%**	**12.3%**	**11.7%**	**9.5%**	**23.4%**
	TOTAL GROWTH	**55.0%**	**8.3%**	**10.6%**	**9.9%**	**9.6%**	**8.2%**	**18.9%**
Income	Equity Options	2.0%	6.5%	7.4%	5.0%	6.3%	5.8%	11.1%
	Liquid Credit	3.0%	7.7%	8.5%	7.5%	7.9%	7.5%	9.5%
	EMD (Blended)	2.0%	7.9%	7.1%	7.1%	7.4%	6.7%	12.6%
	CLO Mezz/Equity	2.0%	6.1%	8.7%	7.1%	7.3%	7.1%	7.6%
	Private Credit	3.0%	9.4%	10.3%	9.6%	9.8%	9.2%	11.8%
	TOTAL INCOME	**12.0%**	**7.7%**	**8.6%**	**7.5%**	**7.9%**	**7.5%**	**9.3%**
Stability	Long Treasuries	5.0%	4.6%	4.9%	4.2%	4.6%	4.0%	11.8%
	Systematic Trend	5.0%	6.2%	5.3%	4.1%	5.2%	4.8%	9.3%
	CPC	**10.0%**	**5.4%**	**5.1%**	**4.2%**	**4.9%**	**4.6%**	**7.8%**
	Core Real Estate	4.0%	5.0%	4.9%	7.1%	5.7%	4.7%	15.0%
	Private Real Assets (ex-Real Estate)	4.0%	7.2%	7.8%	8.0%	7.7%	7.0%	12.4%
	Inflation Protection	**8.0%**	**6.1%**	**6.4%**	**7.6%**	**6.7%**	**6.1%**	**11.8%**
	Inv. Grade Fixed (ex-Treasuries)	6.5%	5.8%	5.3%	5.6%	5.6%	5.3%	7.7%
	Absolute Return	6.5%	6.9%	5.6%	5.3%	5.9%	5.6%	8.6%
	Strategic Cash	2.0%	4.0%	3.1%	2.5%	3.2%	3.2%	0.6%
	Volatility Protection	**15.0%**	**6.0%**	**5.1%**	**5.0%**	**5.4%**	**5.2%**	**6.1%**
	TOTAL STABILITY	**33.0%**	**5.8%**	**5.4%**	**5.4%**	**5.5%**	**5.4%**	**6.5%**
	TOTAL PORTFOLIO	**100.0%**	**7.4%**	**8.6%**	**8.1%**	**8.1%**	**7.4%**	**12.9%**

*10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk.
Based on NEPC's 12/31/2023 assumptions, Meketa's 2023 assumptions, and Cliffwater's 2023 assumptions.

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Past performance is no guarantee of future results.

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