



Rhode Island State Investment Commission

ERSRI 2011 Asset Liability Study – second meeting

Presented by:

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Today's Focus

- Review Strategic Asset Classes (The Role of Assets)
- Review the asset-liability model input
 - Mean-Variance Optimization vs. Resampling
- Review model asset class constraints
- Consider a new investment philosophy for the Equity Portfolio

Strategic Classes and Their Assumptions

- At the March SIC meeting, the Board reviewed the following strategic classes:

Modeled Class	Comments
Cash	Modeled as diversified cash
Fixed Income	Modeled as diversified US fixed income, primarily investment grade
Real Estate	Modeled as private core real estate, with 30% leverage
Real Return	Modeled as diversified portfolio, TIPS, Commodities, Absolute ROR
US Equity	Modeled as diversified domestic equity
International Equity	Modeled as diversified international equity, with Emerging Markets
Private Equity	Modeled as diversified private equity

Note: Asset returns are modeled with no expected alpha



Asset – Liability Model Input

- PCA/EFI asset-liability approach does not rely on traditional mean-variance optimization (MVO)
- There are several short-comings associated with MVO
 - Assumes class returns to be normally distributed, most are not
 - Assumes all time series returns are independent, many are not
 - Assumes cross-class correlations are constant, they are not
- MVO short-comings are exposed during stressed market conditions when the simplifying assumptions become undone (2008)
- If MVO is not ideal, why do people use it?
 - Simplicity
 - Mathematical elegance
- Instead of MVO, the PCA/EFI model input is simulation-based re-sampled return data



Establishing Strategic Class Simulation Data Sample

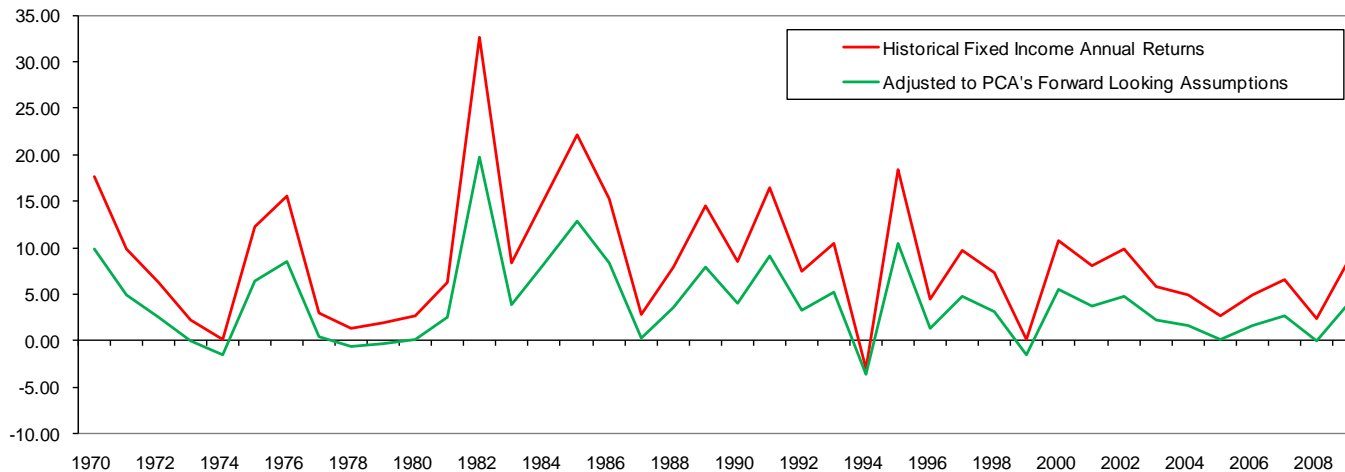
Process for establishing strategic class simulation data sample:

- **Begin with** two items: (i) PCA's capital market assumptions and (ii) database of historical and modeled annual strategic class returns
 - Historical data for publicly-traded assets
 - Modeled data for illiquid assets or customized portfolio allocations
 - Data back to 1970
- **Modify** historical database to conform to PCA assumptions: (i) expected average level of returns and (ii) long-term volatility
- **Retain** historical time-varying return patterns and correlations of strategic classes
- **Result:** Simulations based on more life-like history that
 - Is not necessarily “normally” distributed
 - Incorporates the possibility of rare events / outcomes that are entirely remote or missing when assuming normal or lognormal distributions
 - Correlations are variable and not assumed to be constant
 - **More realistic set of possible outcomes**

Strategic Classes and Their Assumptions

EXAMPLE of SAMPLE ADJUSTMENT

Comparison of Historical and Assumed Fixed Income Time Series



Fixed Income Proxy	Average	Std. Dev.
Historical Time Series	8.52	6.72
Adjusted to PCA Assumptions	3.30	4.50

- Lower PCA assumptions for fixed income translate into lower returns across all scenarios
- Behavior patterns mirror history

Strategic Classes and Their Assumptions

- Proposed allocation constraints used in Asset-Liability simulations and policy portfolio selection:

Modeled Class	Current Policy	Min	Max
Cash	2.0%	2%	2%
Fixed Income	22.0%	15%	30%
Real Estate	5.0%	3%	8%
Real Return	10.0%	5%	10%
US Equity	36.0%	25%	40%
International Equity	17.5%	15%	30%
Private Equity	7.5%	8%	10%

- Fund requires a minimum level of cash: 2% is a reasonable proxy
- Core Real Estate could provide valuable diversification benefits: consider 10% max
- Real return policy allocation exists – allocation not currently funded to 10% level: no need to change max

NEW INVESTMENT CONCEPT:

- Consider a more “Global” equity portfolio - larger allocation to non-U.S. Equity for risk management purposes : consider Max 30%



*New Investment Philosophy: Consider a **Global** Equity Orientation*

The current Equity portfolio is top-heavy U.S. Equity: 2:1 U.S. Equity to non-U.S. Equity
Recommendation: *Consider a more balanced equity allocation; closer to 1:1*

- **Potential Benefits:**

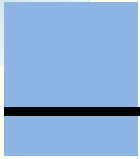
- Risk Management – better balance of equity portfolio risk factors
- Greater participation in Emerging Equity Markets growth
- Equity portfolio would be better aligned with investment opportunity universe

- **Potential Risks:**

- Larger exposure to geopolitical risk
- Increased Currency risk

- **Other:**

- An allocation to non-U.S. Equity > 20% would require consideration of a currency overlay to manage currency volatility
- The additional allocation to non-U.S. could include a larger non-market cap weighted allocation to the Emerging Markets



Appendix



PCA 2011 Capital Market Assumptions

	Expected Avg. Nominal Annual Return	Expected Geo. Compound Nominal Annual Return	Expected Risk of Nominal Returns (Annl. SD)
Cash	3.00	3.00	2.00
Treasury Infl. Protected Securities	3.75	3.60	6.00
Domestic US Fixed Income	3.30	3.20	4.50
International Fixed Income	3.30	2.80	10.00
Global Fixed Income	3.30	3.00	8.00
Core Real Estate	7.00	6.50	10.00
Real Return	6.50	6.20	8.00
Domestic Equity	8.75	7.30	17.00
International Equity	9.00	7.00	20.00
Global Equity	8.90	7.40	17.50
Hedged International Equity	8.90	7.10	19.00
Private Equity/Venture Capital	12.00	8.90	25.00
Inflation	2.75	2.75	2.00

Capital Market Assumptions (10 year)

	Wilshire 2003	PCA 2011
U.S. Equity	8.00%	8.75%
Non-U.S. Equity	8.00%	9.00%
U.S. Fixed Income	5.25%	3.30%
Real Estate	6.75%	7.00%
Private Equity	11.00%	12.00%
Cash Equivalents	3.25%	3.00%
Inflation (CPI)	2.25%	2.75%

Capital Market Assumptions (10 year)

Spread over inflation [Real Returns]

	Wilshire 2003	PCA 2011	2011 vs 2003
U.S. Equity	5.75%	6.00%	0.25%
Non-U.S. Equity	5.75%	6.25%	0.50%
U.S. Fixed Income	3.00%	0.55%	-2.45%
Real Estate	4.50%	4.25%	-0.25%
Private Equity	8.75%	9.25%	0.50%
Cash Equivalents	1.00%	0.25%	-0.75%
Inflation (CPI)	2.25%	2.75%	0.50%

Primary difference between 2011 and 2003 – real return expectations for Fixed Income