



Retirement Plan Risk Management

What is Risk?

- Investment returns falling short of actuarial interest rate/discount rate
- Large loss on investments
- Funding shortfall risk over time
- *Don't forget:* inflation risk, liquidity risk, longevity risk

Asset-liability study to determine appropriate pension investment policy

- **Risk/reward framework should be set within the context of the pension plan**

Integrated Pension Risk Management

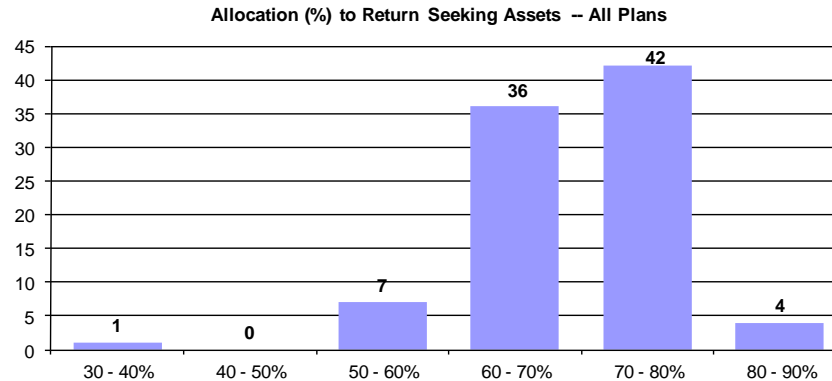
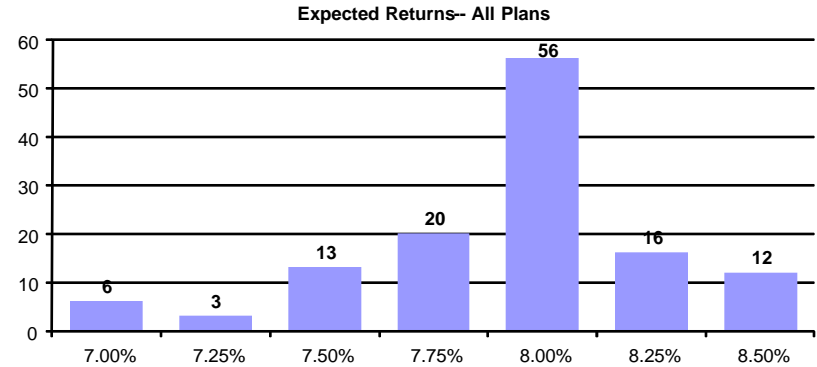
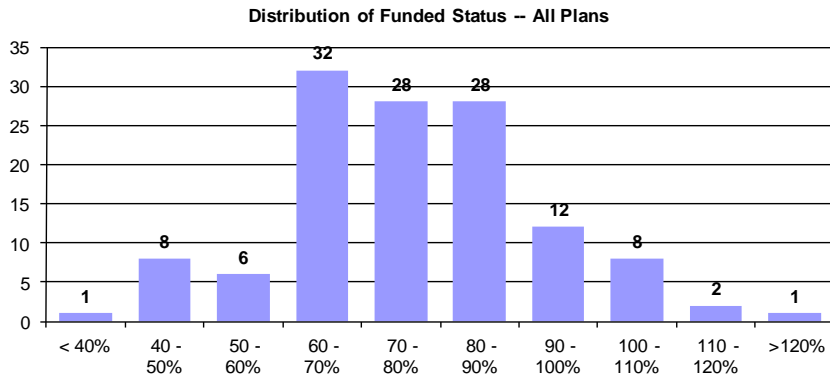


Effective plan management and governance requires integrated consideration of all aspects of plan management for success

Key Risks for Public Pension Plans

Types of Risk	Time Horizon	Risk Management Tools and Controls
<p>Return Shortfall</p> <ul style="list-style-type: none"> Assets do not grow with liabilities Investment return + contributions less than liability growth 	<p>Long Term (10+ years)</p>	<ul style="list-style-type: none"> Funding policy Plan design Investment policy Assumptions & methods
<p>Liquidity</p> <ul style="list-style-type: none"> Cannot liquidate assets efficiently to meet needs Lose control of asset allocation 	<p>Short to Medium Term (<5 years)</p>	<ul style="list-style-type: none"> Funding policy Benefit accruals Use of Illiquid investments Scenario analysis Monitoring
<p>Investment</p> <ul style="list-style-type: none"> Asset allocation (policy) Investment structure Manager selection Rebalancing 	<p>Short to Medium Term (<5 years)</p>	<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 Market views Scenario analysis
<p>Others: Longevity, Legal/Compliance, Inflation, etc.</p>		

Peer Comparison: NASRA Public Fund Universe



Key Takeaways

- Most public pension funds 60-90% funded
- Median public pension fund expected return on assets 8.00%
- Most public pension funds 60-80% allocated to return-seeking assets

Asset-Liability Profile – Understanding the Holistic View

June 30, 2011 Asset-Liability Snapshot

Metric (\$M)	Value	Funded Ratio (MV Assets)	Funded Ratio (AV Assets)
Market Value of Assets	\$3,156		
Actuarial Value of Assets	\$3,220		
Actuarial Liability	\$3,995	79%	81%

Asset-Liability Return-Seeking Metrics

Metric (\$ '000s)	Value	% of MV Assets	% of Liability
Employer Normal Cost	\$62,293	1.9%	1.6%
Interest Cost	\$319,629	10.1%	8.0%
Total Liability Growth Rate	\$381,922	12.0%	9.6%
Expected Return on Assets	\$252,520	8.0%	6.3%
Employer Contributions	\$146,876	4.7%	3.7%
Total Expected Asset Increase	\$399,876	12.7%	10.0%
Net Rate	(\$17,474)	(0.7%)	(0.4%)
Benefit Payments	\$181,294	5.7%	4.5%

Diversified Portfolios Improve Risk/Reward Characteristics

Asset Allocation					
	Expected Nominal Return¹	Expected Risk (Volatility)	Allocation # 1	Allocation # 2	Allocation # 3
Equity					
Large Cap U.S. Equity	7.5%	19.0%	45.00%	0.00%	0.00%
Small Cap U.S. Equity	8.0%	25.0%	5.00%	0.00%	0.00%
Global Equity (Developed & Emerging)	8.7%	19.5%	0.00%	60.00%	50.00%
International (Non-U.S.) Equity (Developed)	8.9%	21.0%	10.00%	0.00%	0.00%
Emerging Markets Equity	10.5%	30.0%	0.00%	0.00%	0.00%
Fixed Income					
Core U.S. Fixed Income (Market Duration)	3.3%	5.0%	40.00%	40.00%	30.00%
Alternative Investments					
Hedge Funds Universe (Median Manager)	6.2%	8.5%	0.00%	0.00%	5.00%
Real Estate (Broad Market)	7.3%	14.5%	0.00%	0.00%	5.00%
Private Equity	9.7%	27.0%	0.00%	0.00%	5.00%
Infrastructure	8.7%	17.0%	0.00%	0.00%	5.00%
Total Portfolio			100.00%	100.00%	100.00%
U.S. Inflation (CPI)	2.3%				
Expected Nominal Return			6.46%	6.94%	7.48%
Expected Real Return			4.07%	4.53%	5.07%
Expected Risk (Volatility)			11.68%	11.97%	11.56%
Sharpe Ratio			0.322	0.354	0.414

Asset-Liability Study Process

Planning Discussions

Planning

- Objectives of the study
- Modeling and liability assumptions



Risk Tolerance

- Risk preference
- Risk budget
- Funded status
- Liability profile



Asset/Liability Projections

Asset Modeling

- Capital market analysis
- Efficient frontier analysis
- Portfolios for study



Liability Analysis

- Projected surplus
- Surplus volatility analysis
- Cash flow analysis



Desired Outcomes:

- Understand the risk
- Identify optimal investment strategy

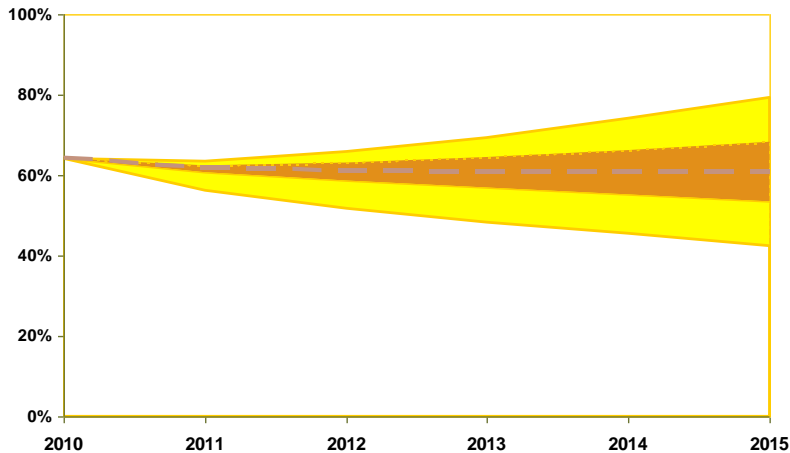
↓
Implementation

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Monitoring

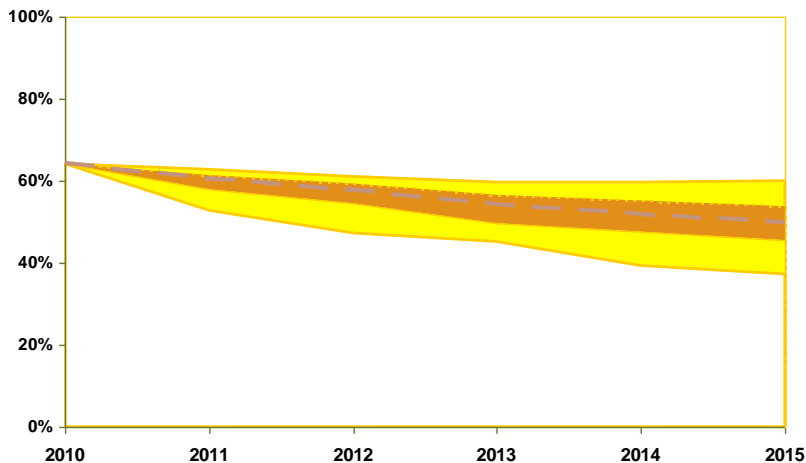
Sample Asset-Liability Study Results

Funded Status Risk

Baseline



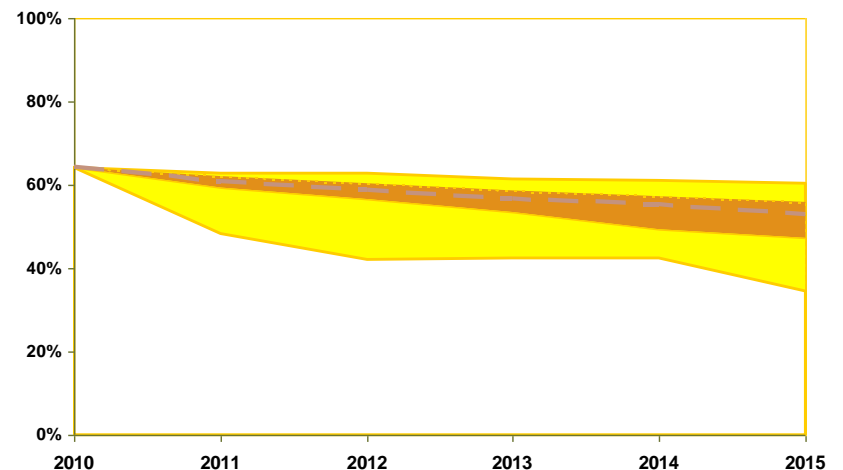
Stagflation (Low Growth/ High Inflation)



Key Takeaways

- Expected ending funded status similar to today's funded status
- Significant risk associated with a predominantly risky portfolio
- Further improvement to funded status may be attained via modification to other strategies (e.g., funding strategy)

Deflation (Low Growth/ Low Inflation)



Risk/Reward Trade-off

- Key take-aways from study:
 - Understand the nature of the pension risk
 - Determine optimal allocation between **return-seeking** (e.g., equities) and **safety** (e.g., fixed income) assets

- Major factors affecting the asset allocation are:
 - Time horizon to fund the liability
 - Characteristics of the liability
 - Surplus status
 - Nature of cash flows

Portfolio Structure Approach



- **Review:** Perform ongoing due diligence
- **Manager research:** Identify investment managers that add value
- **Investment structure:** Determine number and types of investment managers
- **Investment policy:** Incorporate the liability characteristics in asset allocation/asset-liability review, risk tolerances, preferences and circumstances

Return-Seeking Portfolio: Toolkit

Category	Tool	Description
Beta Diversification	Global Equity	Diversify toward a market-weighted portfolio of global stocks
Style Diversification	Investment Manager Structure	Select managers with complementary styles and focus on mitigating downside capture relative to the market
Alpha Engine	Alternative Assets	Diversify into hedge funds, real estate and private equity as appropriate for plan's liquidity needs and time horizon
Medium Term Views	Credit Oriented Strategies	Add credit strategies to take advantage of market opportunities

Safety/Liability-Hedging Portfolio: Toolkit

Category	Tool	Description
Safety	Government Bonds Low Duration	Government bonds protect in the “flight to quality” environment; low duration protects in rising interest rate environment
Inflation Hedge	TIPS Real Estate Commodities Infrastructure	TIPS directly hedge inflation risk; real estate, commodities, and infrastructure indirectly hedge inflation risk; commodities have high inflation beta; note pension liability’s inflation risk exposure
Medium Term Views	Credit Oriented Strategies Low Duration	Add credit strategies to take advantage of market opportunities; low duration protects in inflationary environment

Pension Risk Management

Summary of Potential Solutions

- **Optimizing the Return-Seeking Portfolio**
 - Diversification should produce smoother pattern of returns
 - Variety of asset classes should lead to protection if one asset class falters

- **Optimizing the Safety Portfolio**
 - Safety asset should protect in the stressed market
 - Understand definition of safety within the context of the pension plan
 - Avoid reaching for return with this portion of the portfolio

- **Optimizing the Overall Portfolio Construction**
 - Determine appropriate return vs. risk profile, based on ultimate objectives
 - Understand the holistic asset-liability view
 - Investment strategy should be set in concert with funding, plan design, and actuarial methods