NEW JERSEY STATE INVESTMENT COUNCIL

ASSET ALLOCATION AND PERFORMANCE MEASUREMENT BEST PRACTICES

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Table of Contents

Asset Allocation Overview

Investment Policy Today

- Current Investment Climate
  - Huge deterioration in pension plan funded status
  - Volatile capital markets
  - Illiquidity challenges still prevalent
  - More stringent regulatory environment likely

- Key Elements to Investment Policy:
  - Establish strategic (long-term) asset allocation targets and investment guidelines
  - Develop tactical (short-term) strategy to consider market environment and take advantage of available opportunities
  - Continued monitoring and evaluation
  - Disciplined but intelligent approach to rebalancing
  - Use of asset allocation <u>ranges</u> to allow for short-term flexibility (these have been widened by some plan sponsors recently due to illiquidity problems preventing rebalancing and some attractive investment opportunities)

Asset Allocation

- A Dynamic Process Designed to Enhance the Long-Term Return and Risk Profile of a Multiple Asset Class Portfolio
- Portfolio Management at its Highest Level
- Risk Management at its Most Fundamental Level
- Greatly Impacts the Long-Term Level and Variability of Total Fund Returns
- Dependent Upon a Rational Interpretation of Existing Capital Market Risk and Return Characteristics

Goal: To Achieve the Systematic Construction of a Total Fund Portfolio Consistent with the Investment Objective of Maximizing the Expected Return for the Chosen Level of Risk

Asset Allocation: Risk Management

Asset Allocation Policy Seeks to Address Three Primary Risks:

- Asset Shortfall Risk: liquid assets insufficient to meet current obligations due to lack of growth, capital losses, or inadequate short-term liquidity
- Interest Rate Risk: changes in liabilities related to change in interest rates
- Inflation Risk: changes in liabilities related to changes in inflation
- Interest Rate and Inflation Risks are imbedded in both the assets and liabilities

Goal: To Simultaneously Hedge these Risks, Given Investment Opportunity Set and Resources Available to the Sponsor.

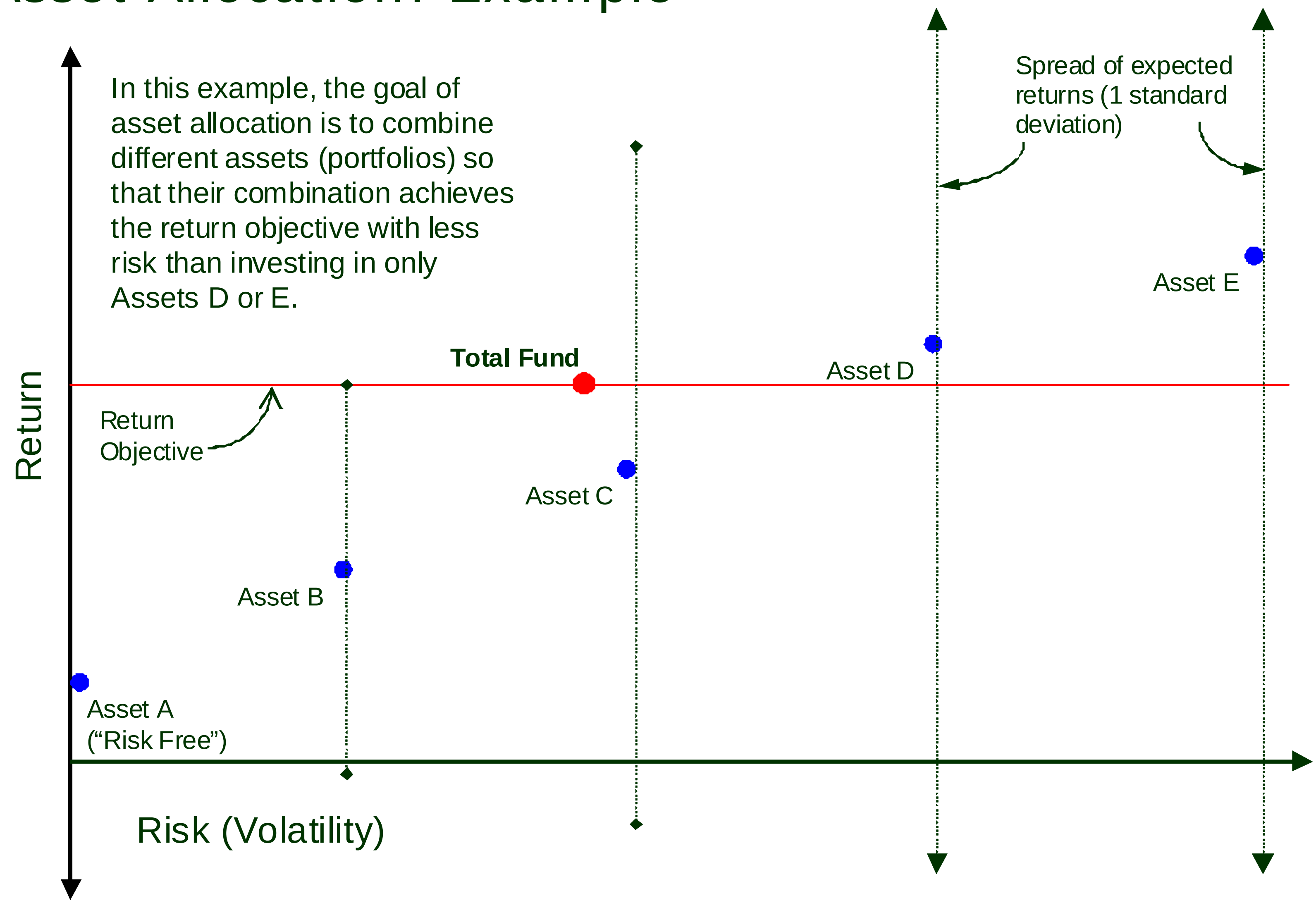
Asset Mix Optimization

- Three Inputs (In Order of Importance)
  - Return (Geometric; Annual Growth Rate)
  - Risk (Standard Deviation Around Expectation)
  - Correlation (Degree to Which Assets Move Together)
- Determining Inputs
  - How Are You Going to Use Them? Tactically or Strategically?
  - Extrapolate Trends, Mean Reversion or Full History?
- Output
  - Efficient Frontier — Lowest Level of Risk Per Unit of Return; Highest Available Return Per Unit of Risk

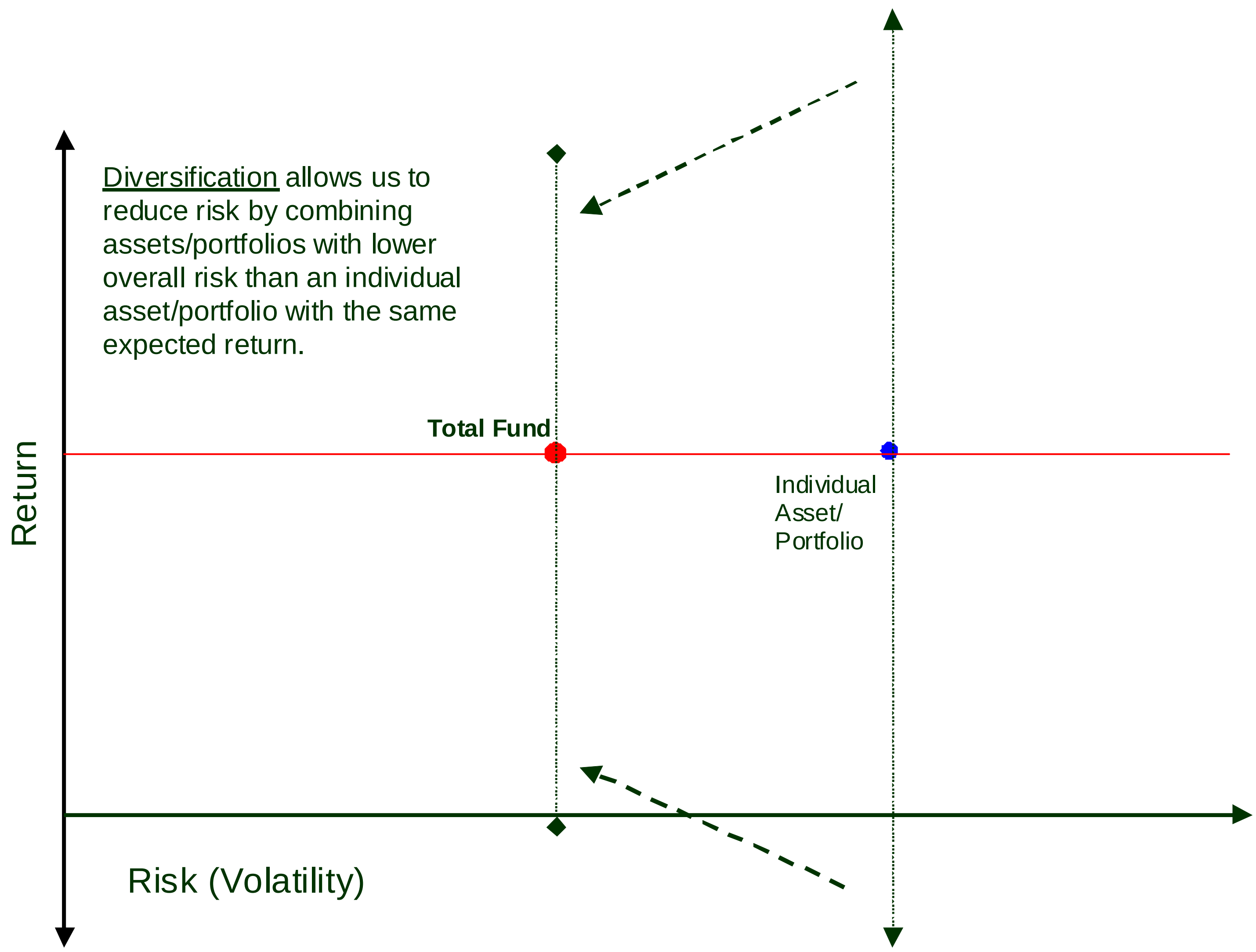
“Asset-Only Space”

Asset Allocation: Example

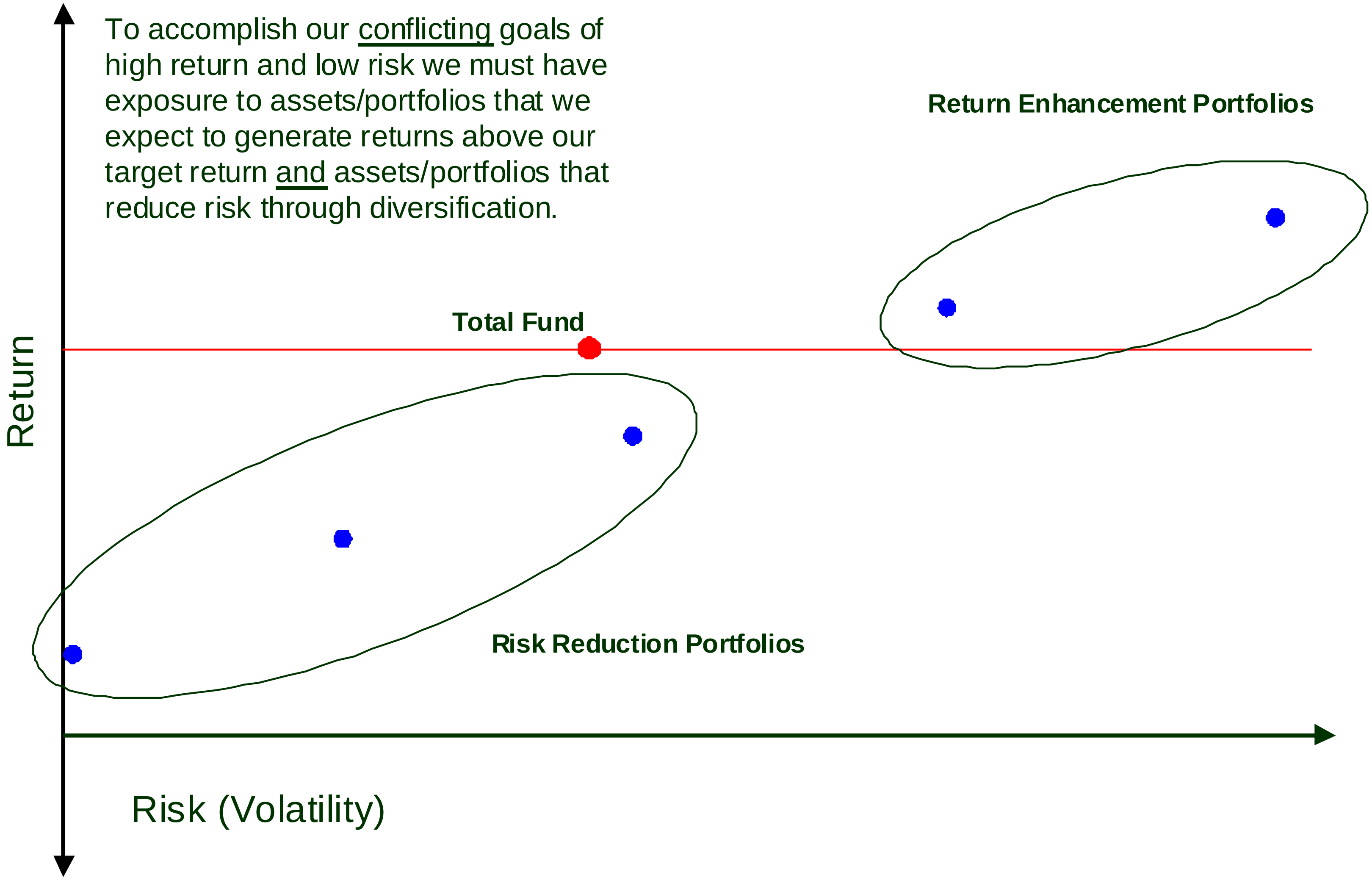
In this example, the goal of asset allocation is to combine different assets (portfolios) so that their combination achieves the return objective with less risk than investing in only Assets D or E.



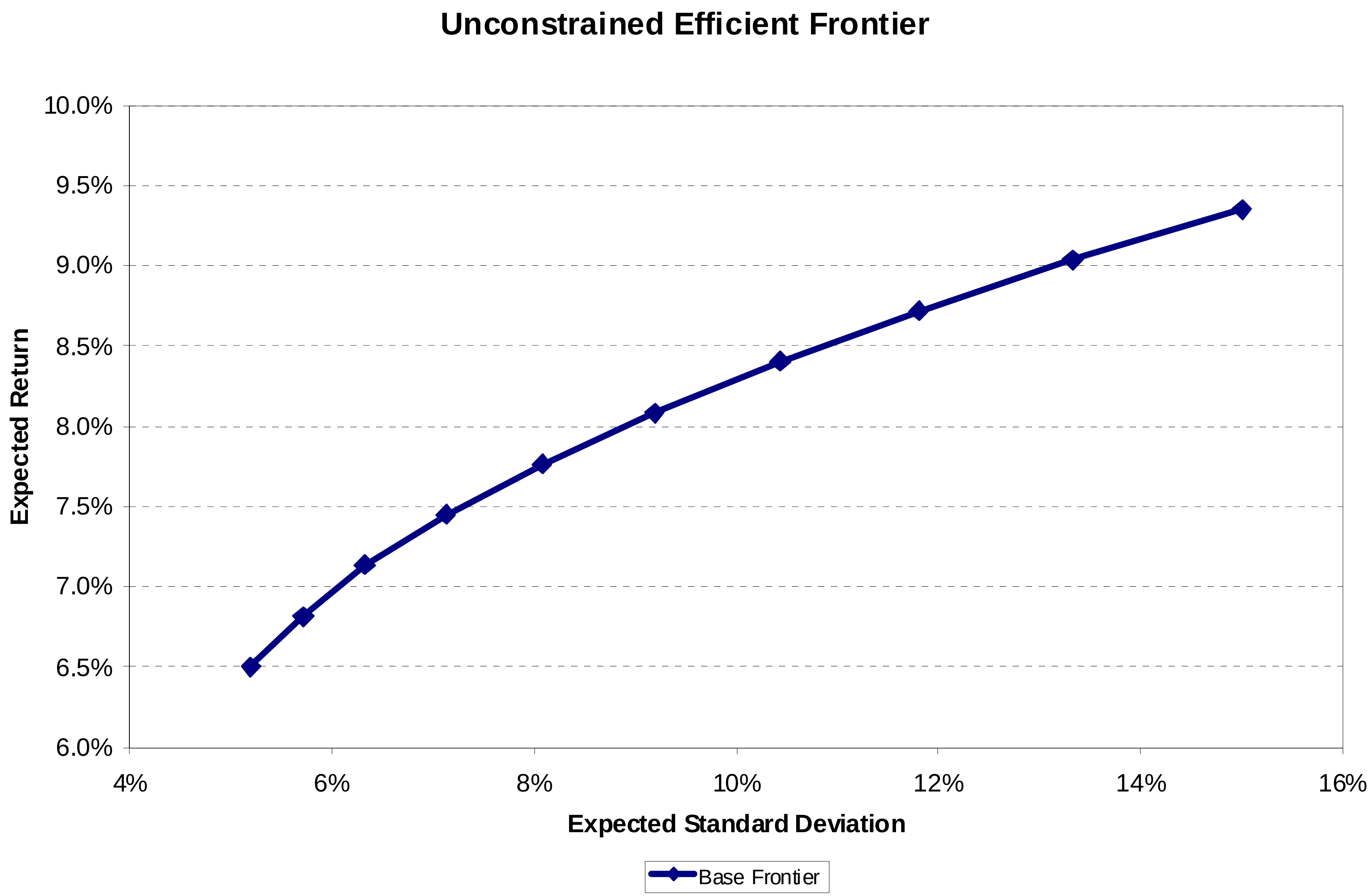
Asset Allocation: Example



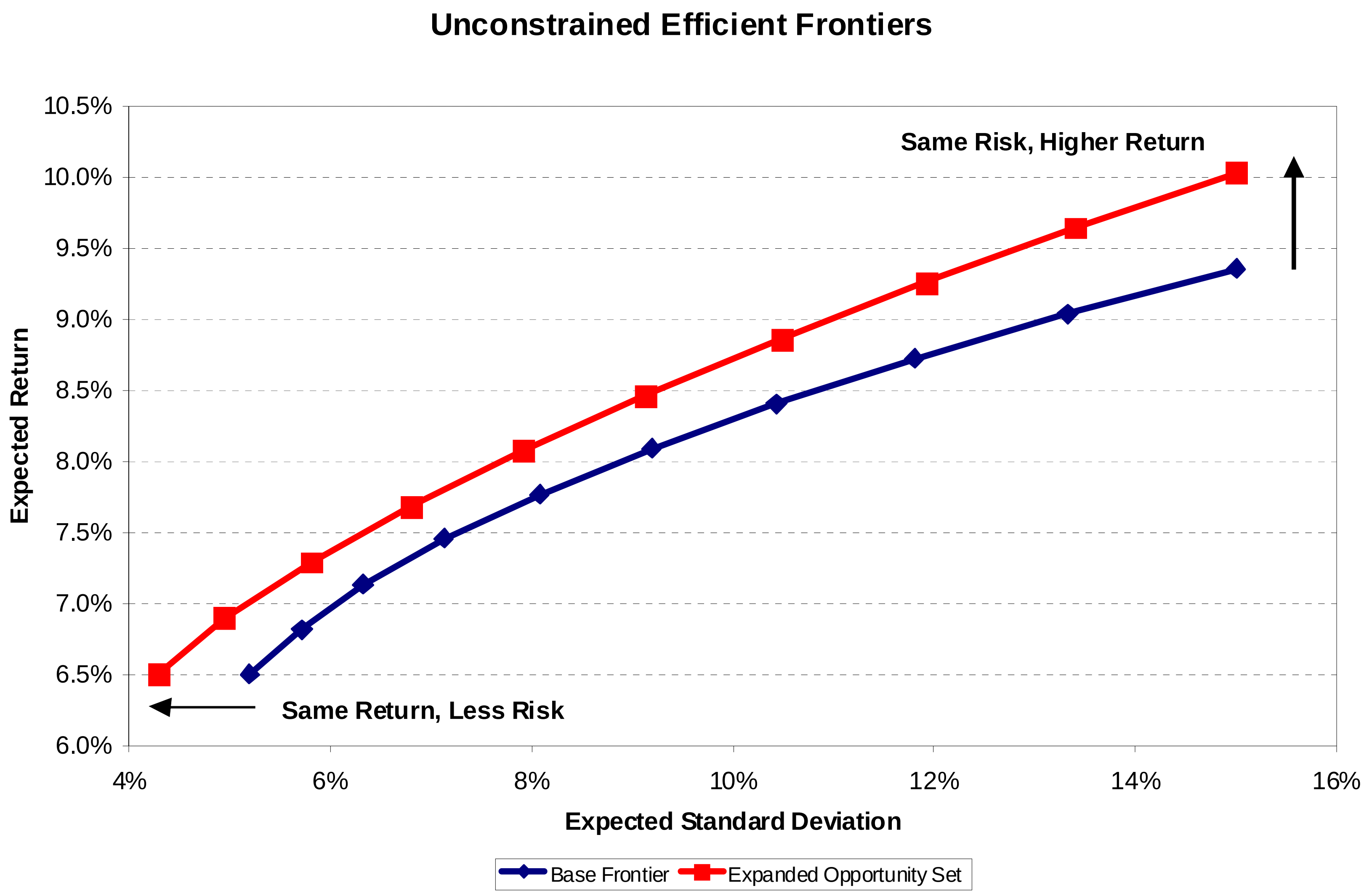
Asset Allocation: Example



Efficient Frontier (SIS Capital Market Assumptions)



Efficient Frontiers (Additional NJDOI Asset Classes)



Efficient Frontiers

- Asset Classes in **Base Frontier** (pre-2004 NJDOI asset classes):
  - Domestic Equity
  - International Equity
  - US Fixed Income
  - Cash Equivalents

- Asset Classes in **Expanded Opportunity Set**:
  - Inflation-Indexed Bonds (TIPS)
  - High Yield Bonds
  - International Bonds
  - Private Equity
  - Real Estate
  - Infrastructure
  - Absolute Return
  - Commodities

- Expanding the Investment Opportunity Set, in large part by adding Common Pension Fund E, has substantially improved the risk-return profile of the Total Fund.

"Asset-Only Space" Allocation Strategy

- The **Return Enhancement** portfolios allow us to **create wealth** by maximizing total return. These must have expected returns that meet or exceed the Total Fund return objective.
  - Public Equity
  - Private Equity
  - Opportunistic Real Estate
  - High Yield / Distressed Debt

- The Risk Reduction portfolios allow us to **preserve wealth** during weak market conditions. These must have expected returns with a relatively **low or negative correlation** with the Return Enhancement portfolios.
  - Core Fixed Income
  - Core Real Estate
  - Absolute Return Strategies
  - Cash Equivalents

Problem*: Asset Only optimization only deals explicitly with the first of these three risks (Investment Shortfall Risk). We also wish to capture the Interest Rate and Inflation Risks imbedded in the liabilities.*

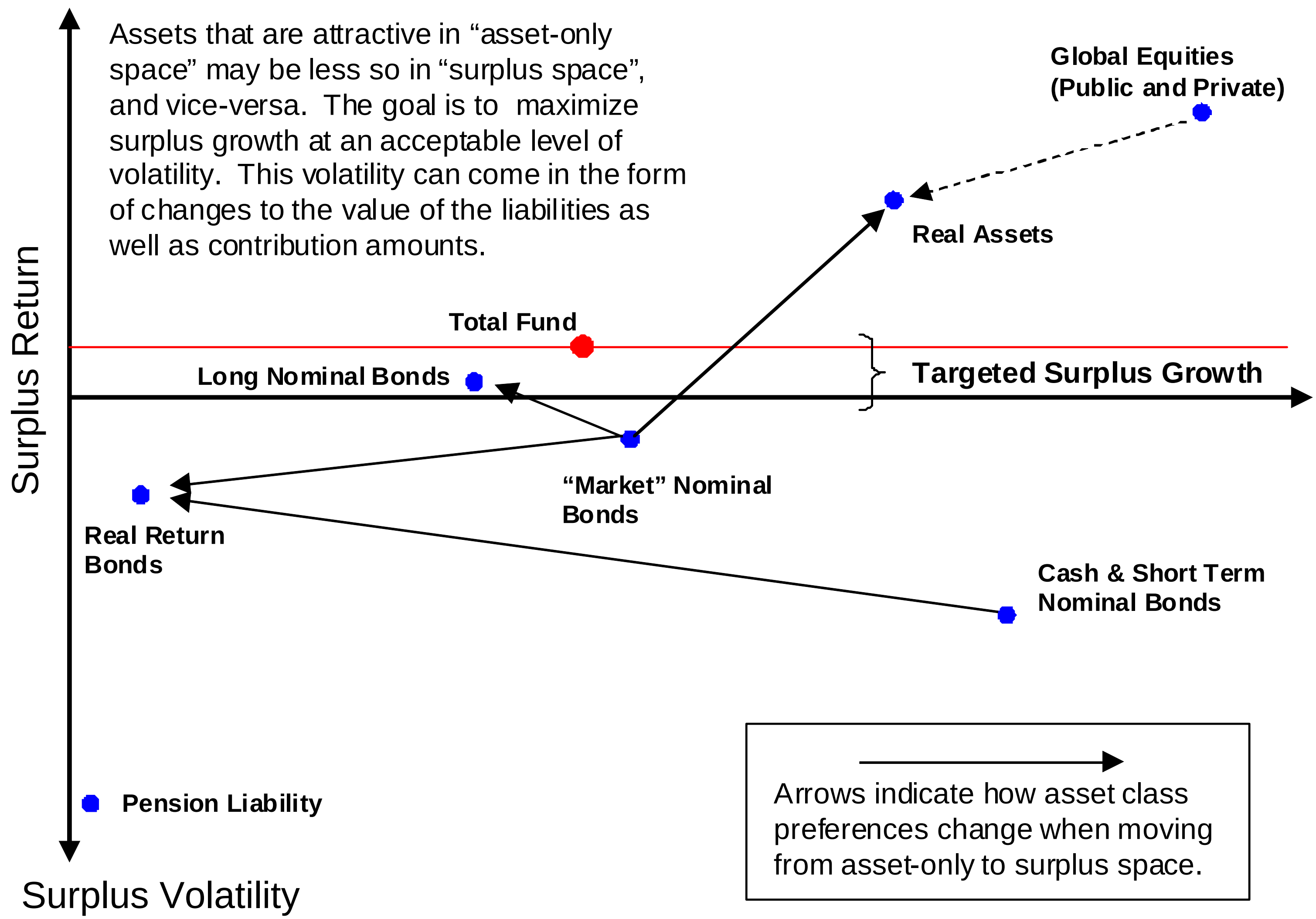
What About Liabilities?

Liabilities

- The Actuarial Liability of the Plan Is the Sum of Several Components:
  - Present Value of Benefits to Retirees
  - Present Value of Benefits to Former Employees With Vested Pension Rights But Not Yet Retired
  - Present Value of Vested Benefits Accrued to Date for Active Employees
  - Present Value of Non-Vested Benefits for Active Employees
  - Present Value of Future Salary Increases on Service Benefits Accrued to Date

- Asset/Liability Study Output:
  - Range of Realized Returns/Market Values
  - Contributions as a Percentage of Pay
  - Pension Surplus (Deficit)
  - Plan Membership Growth
  - Projected Payroll
  - Benefit Payments
  - Actuarial Liability
  - Ultimate Net Cost of the Plan

Surplus Asset Allocation: Example



Surplus Asset Allocation Implications

- Changes the attractiveness of certain asset classes:
  - *More Attractive*: Real Return Bonds (TIPS), Real Assets, and Long Duration Bonds
  - *Less Attractive*: Cash and Short-Term Nominal Bonds
  - *No Change*: Equities (still need to grow assets above discount rate)
- These changes occur “at the margin”:
  - Optimal mix of equities and fixed income doesn’t change greatly vs. asset-only mix unless fixed income > 50% of plan assets
- Fixed income duration extended
- Fixed income portfolio more customized to structure of liabilities
- More closely monitor level and changes of funded status
- Key Accounting Considerations:
  - From an accounting standpoint and for calculating required contributions, surplus optimization is currently more relevant for Corporate pension plans (due to PPA 2006 / FAS 158).
  - Government accounting standards currently allow for smoothing but these often are changed to mirror Corporate standards (sometimes with a considerable lag).
  - Unlike Corporate plans, the discount rates used to value Public pension plan liabilities do <u>not</u> vary with interest rates.

"Surplus Space" Asset Allocation Strategy

- The **Return Enhancement** portfolios are intended to improve funded status and reduce required contributions to the Fund. These must have expected real returns that **meet or exceed** the inflation-adjusted growth in pension benefits.
  - Public Equity
  - Private Equity
  - Real Assets (Real Estate, Commodities, Natural Resources)
  - Long-Duration Bonds

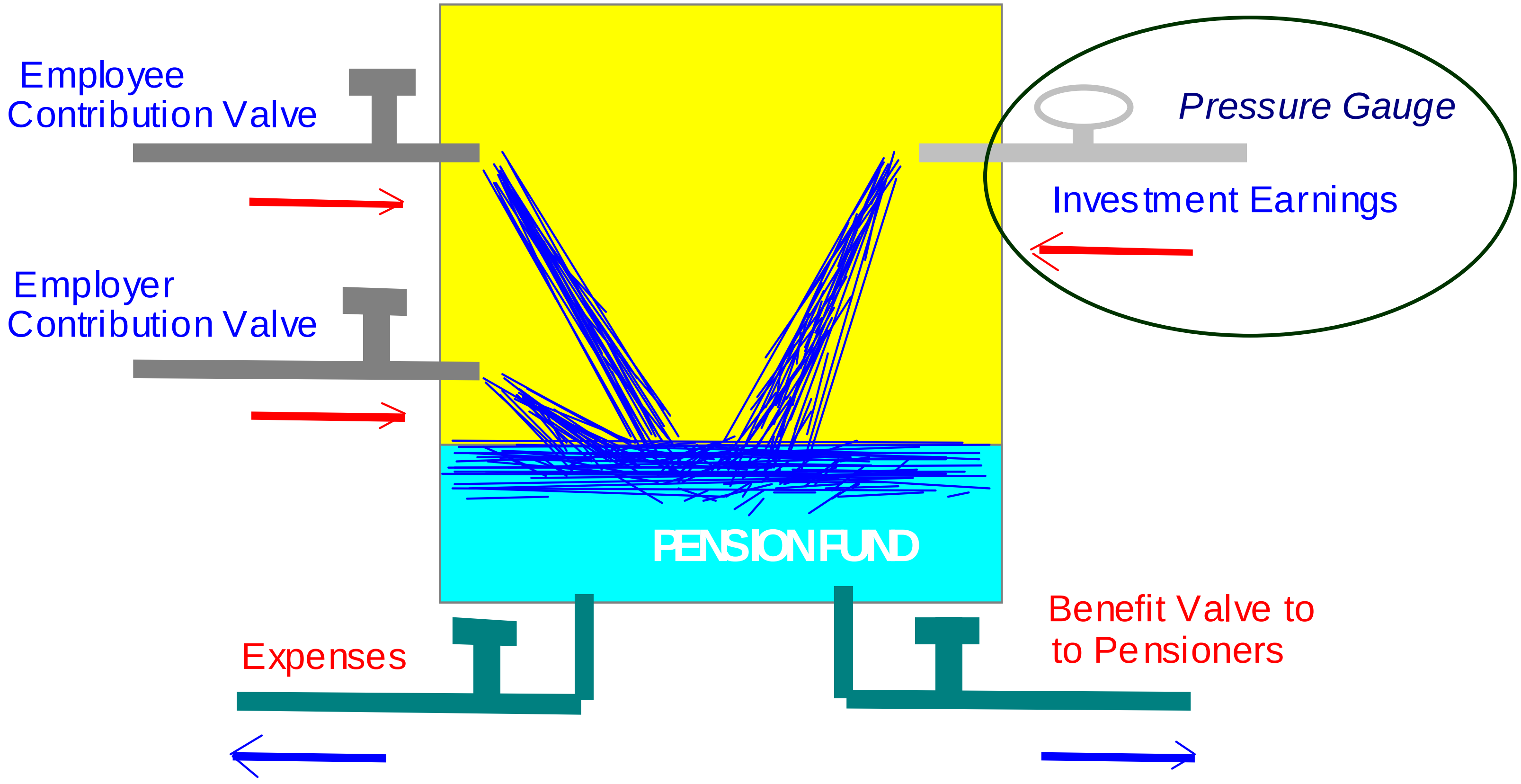
- The **Risk Reduction** portfolios allow us to **preserve wealth** in the form of lessening the deterioration of the surplus during weak market conditions. These must have expected returns with a relatively high correlation with projected liabilities and help minimize interest rate and inflation risk.
  - Real Return Bonds (TIPS/Linkers)
  - Real Assets (Infrastructure, Commodities)
  - Long-Duration Bonds

Typical Pension Funding Objectives

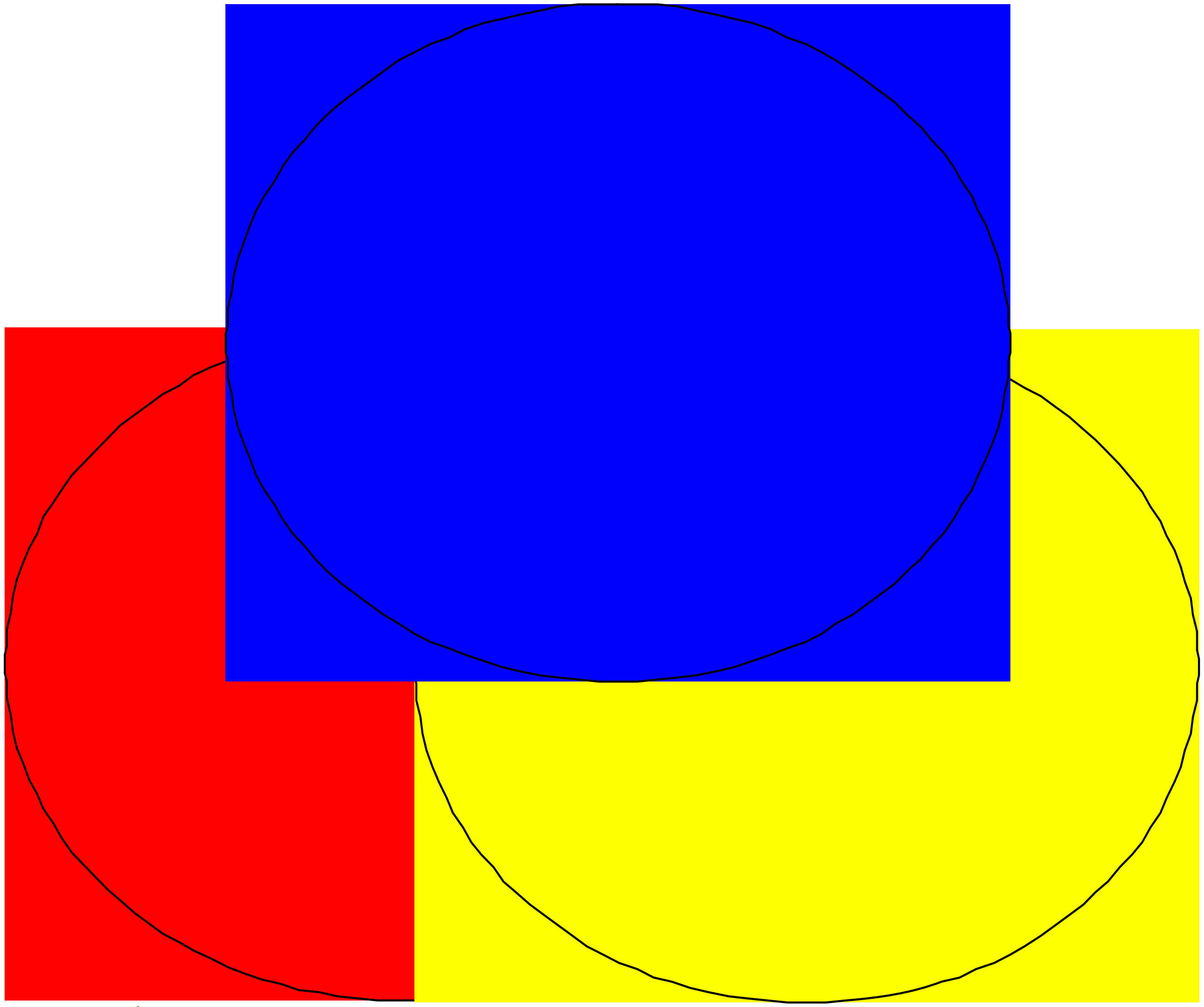
- Meet Actuarial Earnings Rate
- Limit Contribution Rates
- Improve Benefit Structure
- Maintain Certain Funded Status
- Limitation
  - While these objectives may be achievable over a long time period (30+ years), none of them recognizes the market's risk characteristics (*i.e.*, they all may be impossible to meet in a protracted bear market).

Asset Liability Modeling

Focus of the SIC and DOI:



Alternative Asset Allocation Methodology:
Asset Allocation by Role in Hedging Risks, not just by Asset Class



Asset Allocation Comparison (NJDOI vs. Peers)

Historical Asset Allocation Comparison
Public Funds > $5 billion for 2008

2003 (pre-alternatives)	Domestic Equity	International Equity	Fixed Income	Alternative Investments: Real Estate	Alternative Investments: Private Equity	Alternative Investments: Hedge Funds	Other
NJDOI (FY 2004 Targets)	50.0%	15.0%	30.0%	0.0%	0.0%	0.0%	0.0%
Survey Median	45.4%	14.5%	29.5%	5.2%	3.8%	0.2%	1.3%
Difference	*4.6%*	*0.5%*	*0.5%*	*-5.2%*	*-3.8%*	*-0.2%*	*-1.3%*

2008 (post-alternatives)	Domestic Equity	International Equity	Fixed Income	Alternative Investments: Real Estate (1)	Alternative Investments: Private Equity	Alternative Investments: Hedge Funds	Other (2)
NJDOI (FY 2009 Midpoints)	23.0%	18.5%	38.0%	7.0%	5.5%	5.0%	3.0%
Survey Median (12/31/07)	39.0%	21.4%	26.9%	5.5%	4.6%	1.0%	1.6%
Difference	*-16.0%*	*-2.9%*	*11.1%*	*1.5%*	*0.9%*	*4.0%*	*1.4%*

(1) For NJDOI allocation, Real Estate includes Commodities and other Real Assets
(2) For NJDOI allocation, "Other" consists of cash equivalents only.
Source: Greenwich Associates

- In 2003, NJDOI was an outlier by having no Alternatives.
- By 2008, NJDOI's allocations were generally in line with their peer plans with two exceptions:
  - Lower allocation to Domestic Equity
  - Higher allocations to Fixed Income and Hedge Funds
- Improved diversification has helped during the recent market turmoil: the Hedge Fund allocation alone has saved NJDOI over $300m in 2008, as the Hedge Fund program outperformed Common Pension Fund A by 10%.

SIS Capital Market Projections

SIS Capital Market Assumptions

- Strategic Purpose - Horizon = 2 to 3 Market Cycles
- Based on CAPM — Investor Must Be Compensated for Taking Higher Risk
- Economic Growth Forecasts
- Stay Within Long-Term Real Return Corridors, Combined with Mean Reversion
- Qualitative Overlay — Expectations Must Produce Reasonable Portfolios and a “Stable Frontier”
- Data Sources/Return
  - Complete Monthly Return History
  - Blue Chip Economic Forecast (Inflation, GDP Growth Estimates)
  - Wall Street Forecasts
  - Global Manager Forecasts
  - CAPM (For “Difficult” Asset Classes)
- Correlations — Most Stable (90-Month Half-Life, 1985 to Present)
- Risks — Fairly Stable (Two Factor Model; Historical 1976 to present, Half-Life 1985 to Present)

Current Expectations (Selected Asset Classes)

	EXPECTED RETURN	STANDARD DEVIATION	SHARPE RATIO
US INFLATION	2.4%		
US LARGE CAP STOCK	9.1%	15.5%	0.361
US SMALL CAP STOCK	9.6%	20.5%	0.298
US FIXED INCOME	5.4%	5.0%	0.380
INTL DEVELOP MKT STOCK	9.1%	17.0%	0.329
EMERGING MKT STOCK	9.6%	28.0%	0.218
INTL FIXED INCOME	5.2%	11.0%	0.155
PRIVATE MARKETS	11.5%	35.0%	0.229
REAL ESTATE	6.5%	10.0%	0.300
US HIGH YIELD	7.5%	11.7%	0.342
EMERGING MKT DEBT	6.6%	13.0%	0.238
US TIPS	5.0%	4.5%	0.333
COMMODITIES	7.0%	25.0%	0.140
CASH	3.5%	1.3%	0.000

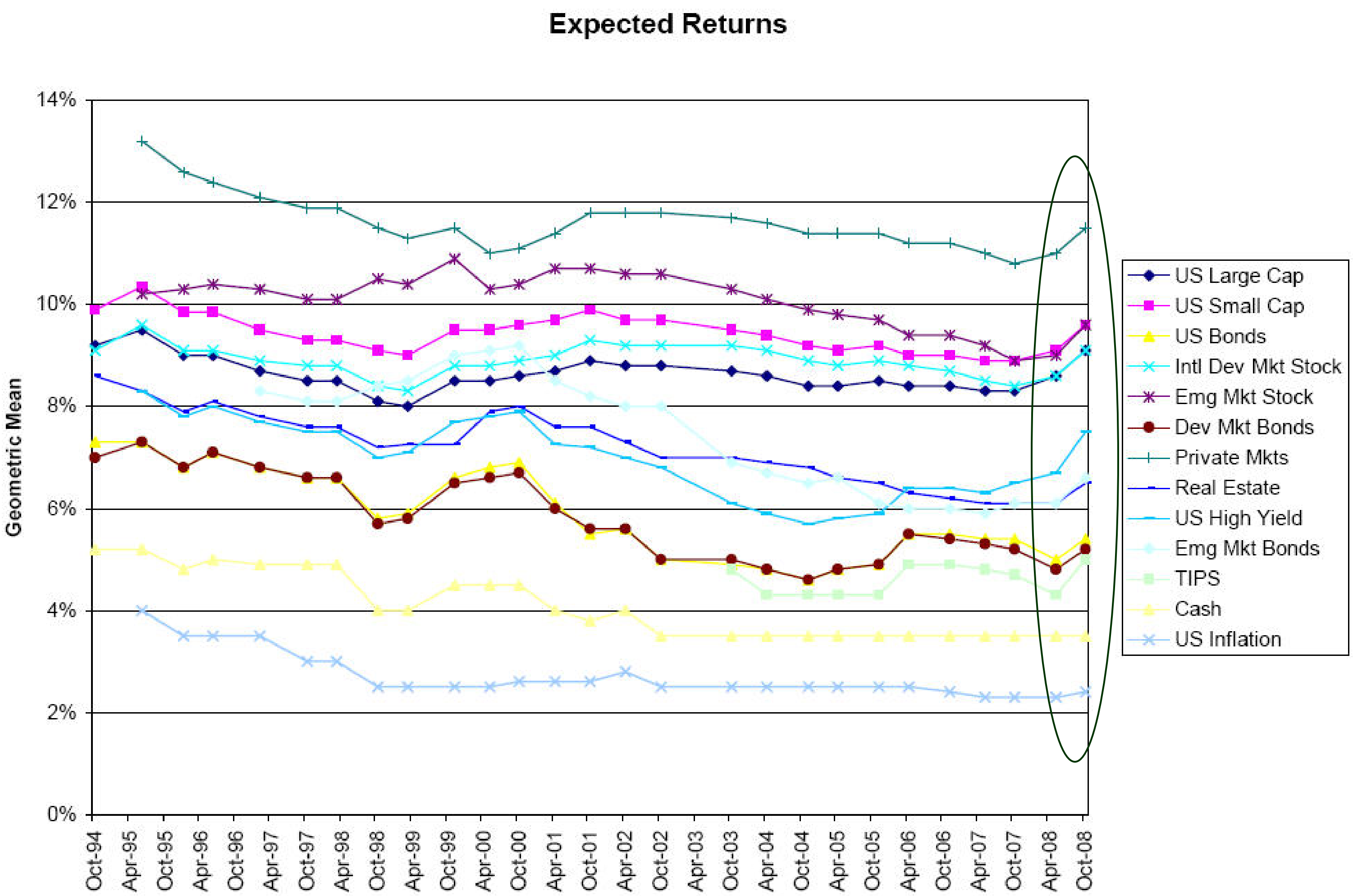
Correlation Matrix (Selected Asset Classes)

	US LARGE CAP STK	US SMALL CAP STK	US FIXED INCOME	INTL DEVELOP MKT STK	EMERG MKT STK	INTL FIXED INCOME	PRIVATE MKTS	REAL ESTATE	US HIGH YIELD	EMERG MKT DEBT	US TIPS	COMMO-DITIES	CASH
US LARGE CAP	1.00												
US SMALL CAP	0.78	1.00											
US FIXED INCOME	0.01	0.00	1.00										
INTL	0.74	0.69	-0.01	1.00									
EMERGING MKTS	0.60	0.64	-0.01	0.69	1.00								
INTL FIXED INC	0.00	0.00	0.40	0.13	0.00	1.00							
PVT MKTS	0.61	0.59	-0.01	0.48	0.46	0.00	1.00						
REAL ESTATE	0.35	0.45	0.01	0.40	0.26	0.00	0.20	1.00					
US HIGH YIELD	0.63	0.71	0.27	0.55	0.40	0.28	0.40	0.59	1.00				
EMERG MKT DEBT	0.39	0.54	0.14	0.31	0.36	0.29	0.33	0.47	0.52	1.00			
US TIPS	-0.19	-0.19	0.27	-0.16	-0.02	0.17	-0.16	-0.02	-0.09	0.21	1.00		
COMMODITIES	-0.07	-0.03	-0.14	-0.03	0.17	0.07	0.11	-0.16	-0.20	0.36	0.45	1.00	
CASH	0.19	0.00	0.36	-0.01	-0.15	-0.18	0.08	-0.23	-0.13	0.01	0.14	-0.12	1.00

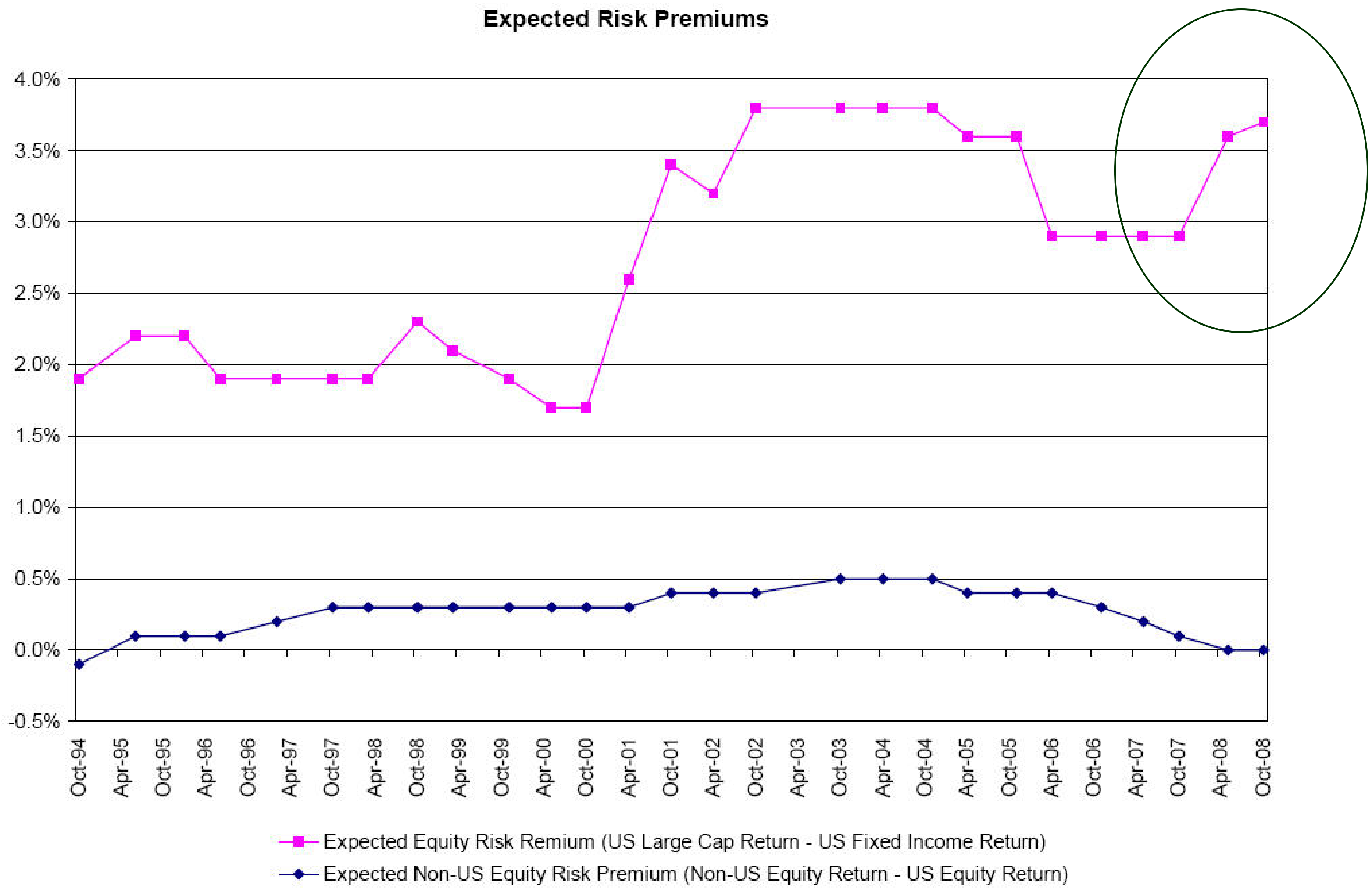
Capital Markets Expectation Methodology

ASSET CLASS	DERIVATION
Inflation	Consensus of Economists' Forecasts, TIPS
Cash	Inflation + 1% to 2% Premium
US Large Cap	CAPM, 3% to 6% Equity Premium, Macroeconomic DDM
US Fixed	Yield to Worst on Aggregate (Compare to Historic Bond Risk Premium, Adjust if Necessary)
US Small Cap	CAPM, (Beta of ~1.2)
Private Equity	CAPM, (Beta of ~1.6)
International Equity	Weighted Sum of Local Market Premium + Local Risk Free Rate
International Bond	US Fixed Return, Adjusted for Quality and Duration (Potential Currency Effects Based on PPP)
Real Estate	Historical Behavior of Equity REITs; Current Appraisal Cap Rates; CAPM
Hedge Funds	Expected Net Premium to LIBOR (3-4%); 0.40 Sharpe Ratio
High Yield	Historical Ratio: Spread of High Yield Over US Fixed Income Divided By Spread of Large Cap Over US Fixed Income

History of SIS Expected Returns



History of SIS Key Relationships



Performance Measurement

Best Practices

SIS Performance Measurement Overview

- Founding Member of CIPM Advisory Council
- Conforms with Industry Standards and Supports the Use of GIPS
- Data/Information from Multiple Sources
- ICC/State Street
- Insignis
  - BARRA
  - MPI
  - Internal Attribution Analysis
- Focus on Risk Versus Benchmark/Peers/Policy Benchmark
- Customized Exhibits/Presentations/Summaries
- Database Credibility/Flexibility
  - ICC Universe Used by Federal Reserve Bank to Monitor Pension Funds
  - 1,472 Plans, 22,426 Portfolios, $2.2 Trillion Market Value at 12/31/2007
- Hands-On Solutions to Problematic Situations
- Interpretations by Highly Experienced Professionals

Global Investment Performance Standards

- GIPS created and administered by the CFA Institute; last update 2005
- Recognizes that financial markets and investing are global
- Objectives are to:
  - Obtain worldwide acceptance of a fair, comparable, and full standard
  - Ensure accurate and consistent investment performance data
  - Promote fair, global competition among investment managers
  - Foster industry “self-regulation”
- 25 countries, including the US, have adopted GIPS
- Global Investment Performance Standards Provisions:

Input Data	Presentation and Reporting
Calculation Methodology	Real Estate
Composite Construction	Private Equity
Disclosures	

- Required Verification Procedures for firms claiming compliance
- Additional information available at www.gipsstandards.org