OREGON PUBLIC EMPLOYEES RETIREMENT SYSTEM

Wednesday January 27, 2010 12:00 P.M.	PERS 11410 SW 68th Parkway Tigard, OR

SPECIAL MEETING
PERS BOARD AND OREGON INVESTMENT COUNCIL

The Public Employees Retirement System (PERS) Board
and the
Oregon Investment Council (OIC)
will hold a joint meeting on:

January 27, 2010
12:00 pm
at
PERS Headquarters
11410 S.W. 68th Parkway
Tigard, Oregon

Discussion Items

Asset/Liability Project Overview	SIS
Liability Highlights	Mercer
Discussion of OIC/PERS Objectives	All Participants
Integrating Asset and Liability Forecasts	SIS
Capital Market Assumptions	SIS

Additional information will be posted on PERS website on Monday, January 25, 2010.

Lunch will be provided to PERS Board and OIC members and participating staff.

***Note**: If you have a disability that requires any special materials, services or assistance, call (503) 603-7575 at least 48 hours before the meeting.*

In compliance with the Americans with Disabilities Act, PERS will provide this document in an alternate format upon request. To request this, contact PERS at 888-320-7377 or TTY 503-603-7766.

OREGON PUBLIC EMPLOYEES RETIREMENT FUND

ASSET/LIABILITY DISCUSSION

JANUARY 27, 2010

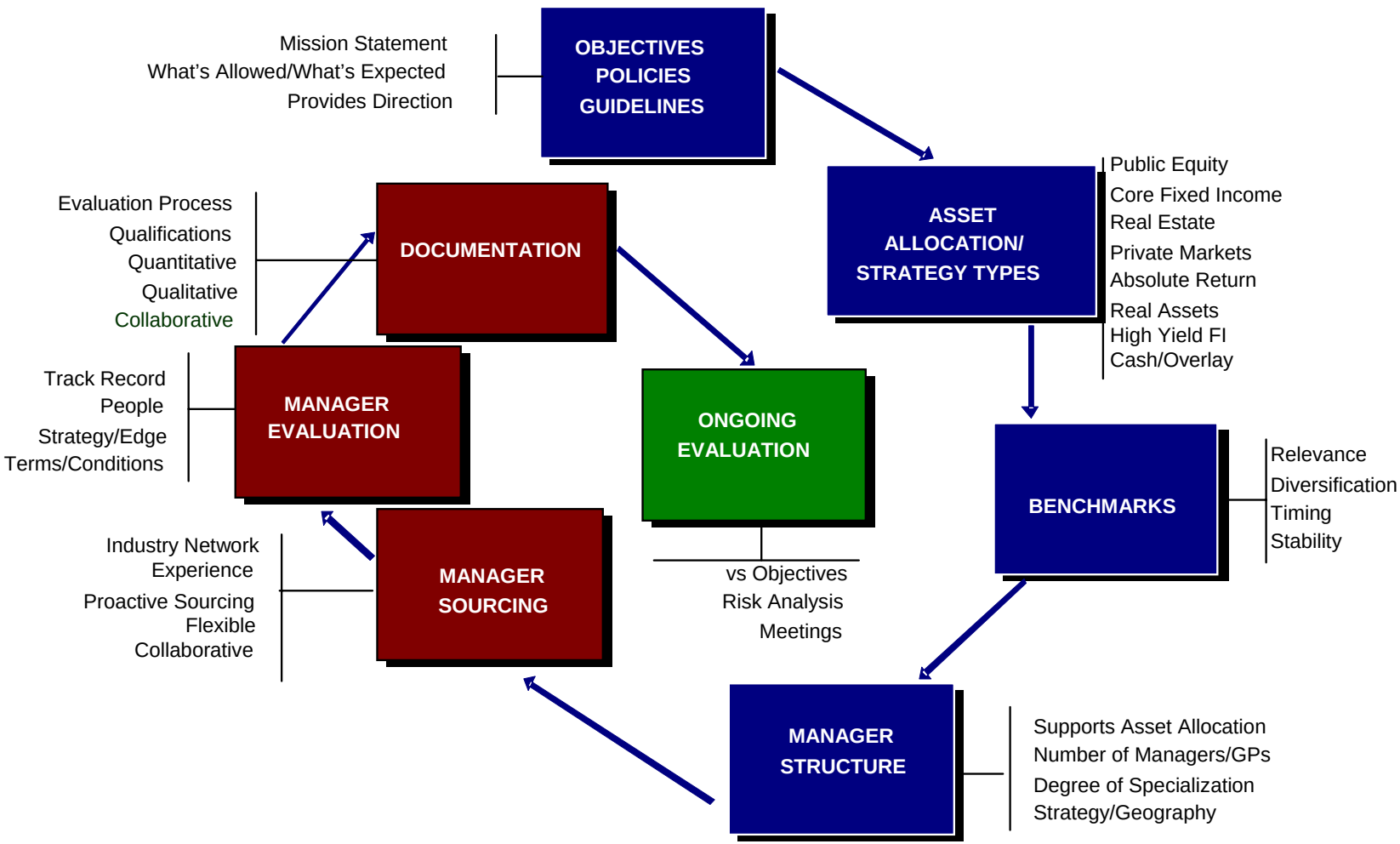
STRATEGIC INVESTMENT SOLUTIONS, INC.

333 Bush Street, Suite 2000
San Francisco, CA 94104
(415) 362-3484

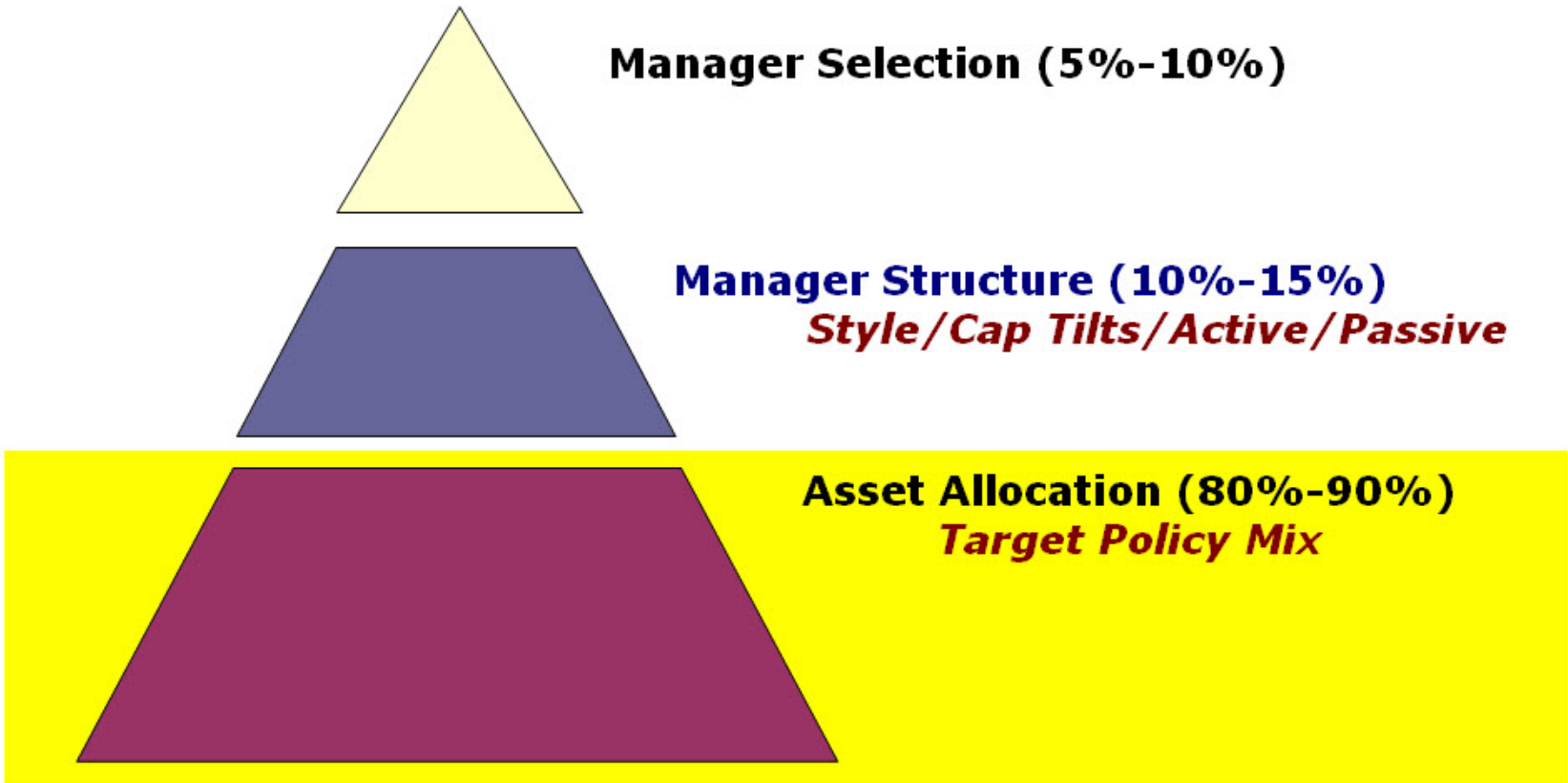
Michael R. Beasley
Managing Director

John P. Meier, CFA
Managing Director

Investment Process

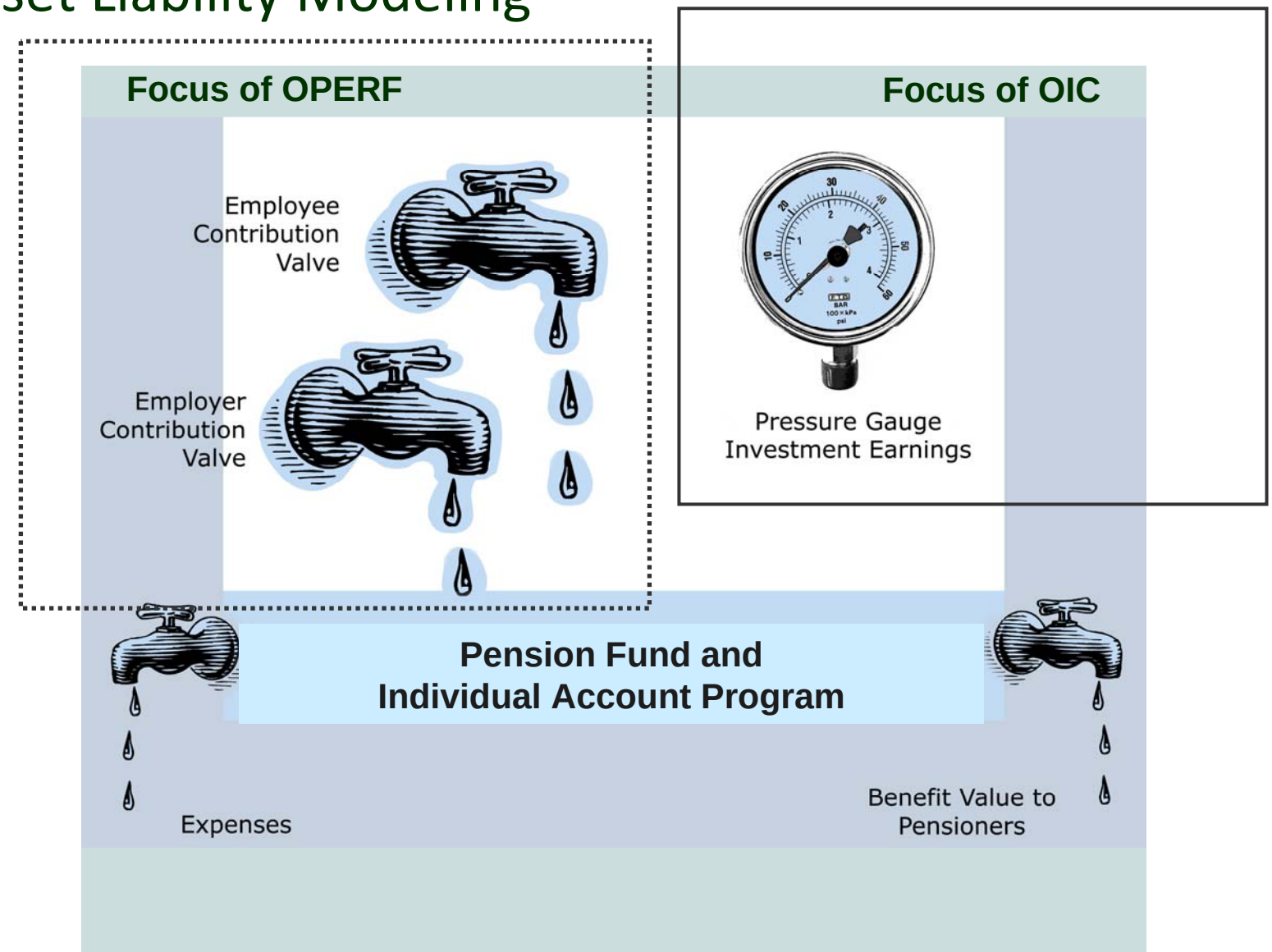


Plan Management Framework



Asset Allocation is the primary driver of investment results.

Asset Liability Modeling



Typical Pension Funding Objectives

- Meet Actuarial Earnings Rate
- Limit Contribution Rates
- Limit Contribution Rate Volatility
- Maintain Certain Funded Status
- Sustain Benefit Structure
- 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).

Relationship Between Assets and Liabilities

- Funded status affects asset allocation decision
- Well-funded
  - Easier to absorb short-term, temporary, adverse investment experience
  - Can be more aggressive in risk/reward tradeoffs
  - Can be more conservative and reduce risks
- Poorly funded
  - Can tolerate less downside risks
  - Asset allocation may need to be more conservative
  - Sometimes will take more risk in attempt to improve funded status

Possible OIC/OPERF Objectives

- What are OIC/OPERF Trying to Achieve?
  - 100% Funded Status
  - Low Cost/Average Contribution Rate
  - Assumed Earnings Rate Return (Currently 8%)
  - Intergenerational Equity
- What Are OIC/OPERF Trying to Avoid?
  - Minimum Funded Status Over the Short-Term
  - High Cost/Average Contribution Rate
  - Large Changes in Contribution Rates Over Short-Term
  - Significant Negative Cash Flow or Liquidity Problems
- What Are “Unacceptable Outcomes”?
  - Funded Status?
  - Contribution Level?
  - Changes in Contribution Level?
  - Pension System Failure

Risk Options

Note: There is nothing wrong or bad about having an unfunded liability if systematic progress is being made to amortize it over a reasonable time period.

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
- Output Is Expected and Range of Possibilities of:
  - Range of Realized Returns/Market Values
  - Contributions as a Percentage of Pay
  - Funded Status
  - Plan Membership Demographics
  - Projected Payroll
  - Benefit Payments
  - Actuarial Liability
  - Ultimate Net Cost of the Plan

Integrating Asset and Liability Forecasts

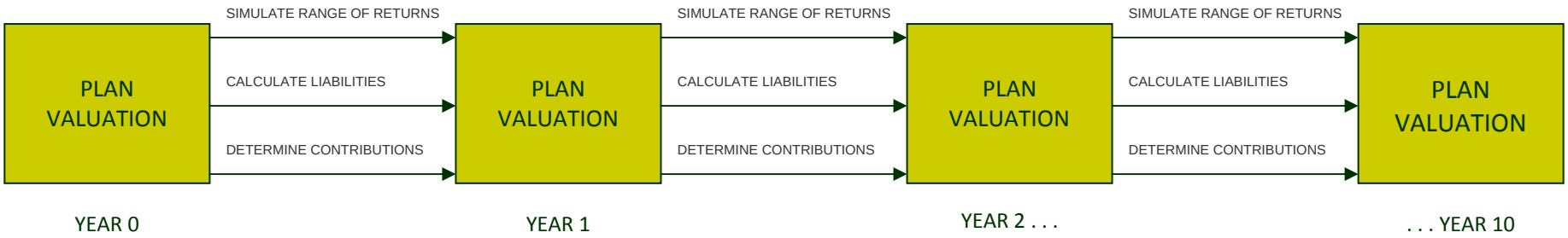
- Liability projections are integrated with range of asset projections (5th to 95th percentile) each year via Monte Carlo* simulations (5000 scenarios per year).
- Review 99th percentile outcomes to preview "2008" experience.
- Model estimates actuarial valuation at start of each new year, using actuary's assumptions and methods.
- Model incorporates Mercer's Actuarial Assumptions, Projections, etc.
- Decision Making.
- Project future financial condition under range of policy portfolios over five (base case) and seven (supplemental) years.
- Focus on Ultimate Net Cost (PV of Cumulative Contributions plus PV of Unfunded Liability) less any surplus at horizon.
- Trade off gains (lower Ultimate Net Costs) at median versus shortfalls (higher costs) at 95th (worst 1 in 20) percentile.

* *See Appendix for Glossary of Terms*

Asset/Liability Modeling

- 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 of OIC/OPERF Boards**: 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/Liability Modeling



- Asset Simulations
  - Monte Carlo – 5000 “Random” Investment Outcomes Per Year
- Liability Simulations/Contribution Determinations
  - Based on Range of Investment Results
  - Annual Valuation for Range of Outcomes
  - Year-by-Year, NOT Straight-Line Projection

Asset Allocation: Risk Management

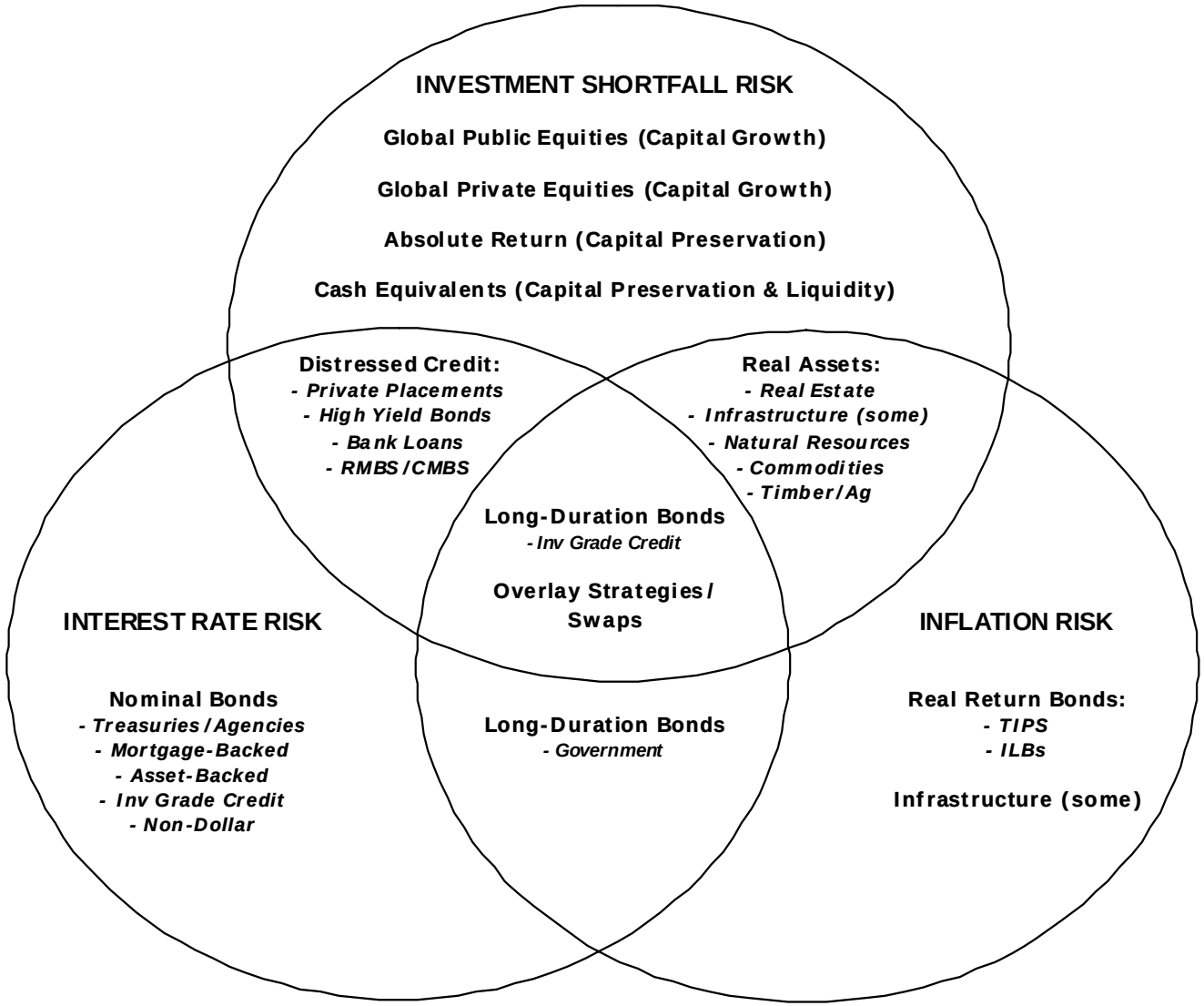
Asset Allocation Policy Addresses Three Primary Risks:

- Asset Shortfall Risk (liquid assets insufficient to meet current obligations)
- Interest Rate Risk (changes in liabilities related to change in interest rates)
- Inflation Risk (changes in liabilities related to changes in inflation)
- **Goal**: To simultaneously hedge these risks, given investment opportunity set and resources available to the sponsor.
- A Written Investment Policy Documents a Plan Sponsor's Strategy to Address These Risks.
- **Goal**: To mitigate the greatest risk all investors face: Human Nature Risk, the risk you will abandon a very well conceived strategy at its least comfortable moment.

Investment Policy Today

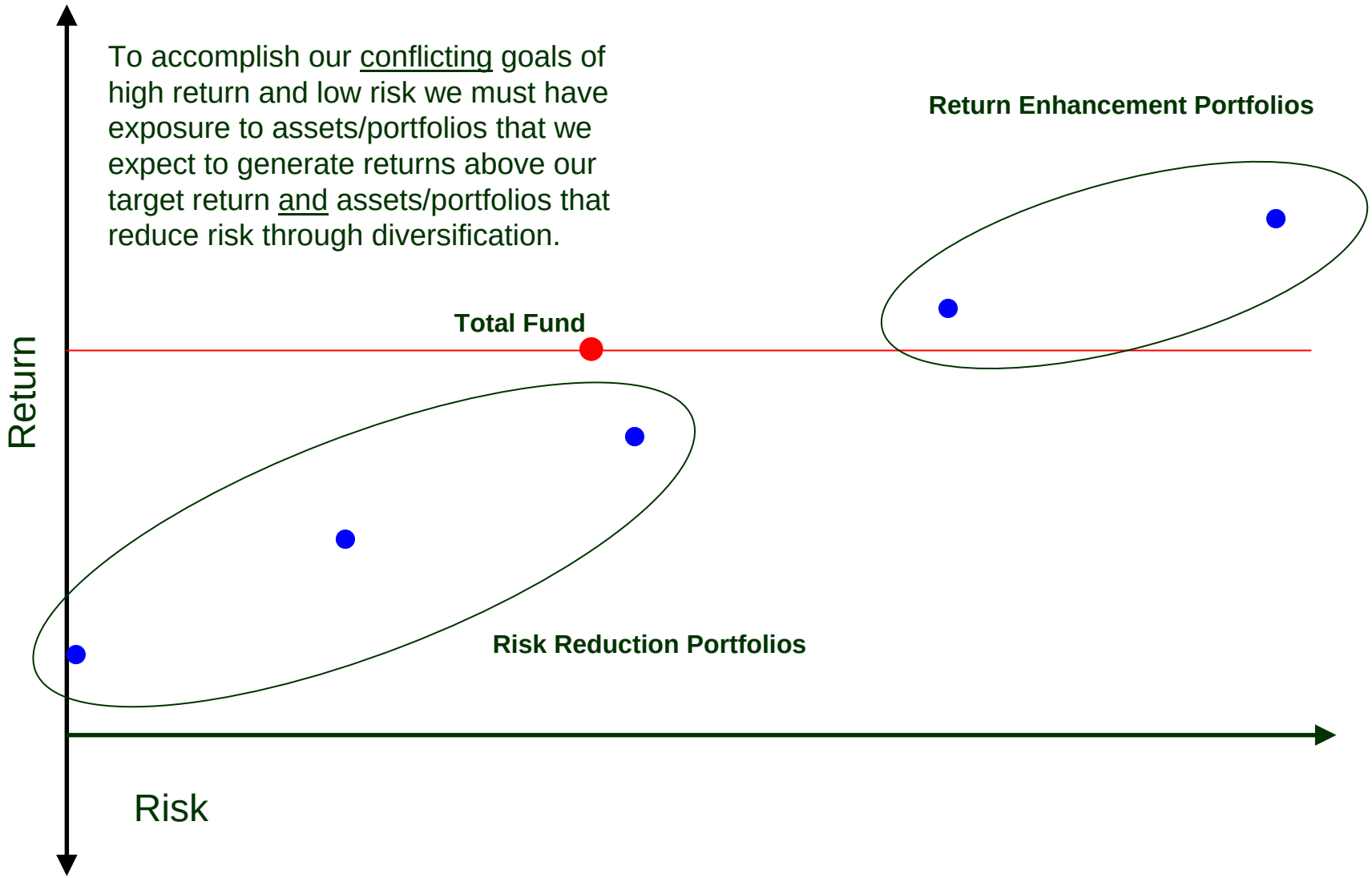
- Current Investment Climate
  - Huge deterioration in pension plan funded status – recent rally, some relief
  - Volatile capital markets – recent global “crisis of trust” has passed
  - Illiquidity challenges still prevalent – “deleveraging — risk repricing”
  - More stringent regulatory environment 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

Asset Allocation: Role in Hedging Risks



Asset Allocation Example

To accomplish our conflicting goals of high return and low risk we must have exposure to assets/portfolios that we expect to generate returns above our target return and assets/portfolios that reduce risk through diversification.



“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 need to capture the Interest Rate and Inflation Risks imbedded in the liabilities.

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
  - Certain Assets Are Difficult to Price and Model in Mean Variance Optimization
  - Efficient Frontier* — Lowest Level of Risk Per Unit of Return; Highest Available Return Per Unit of Risk

** See Appendix for Glossary of Terms*

SIS Capital Market Assumptions

- Strategic Purpose - Horizon = 2 to 3 Market Cycles
- Based on Capital Asset Pricing Model (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)

** See Appendix for Glossary of Terms*

SIS Capital Markets Expectation Methodology

Fixed Income	Yield to Worst on Aggregate Index (compare to historic bond risk premium); adjusted for OPERF's duration target and unique sector allocations
Inflation	Consensus of economists' forecasts, TIPS
US Large Cap	CAPM, 3% to 6% equity premium, macroeconomic DDM
Cash	Inflation + 1% to 2% premium
US Small Cap	CAPM, (beta of ~1.2)
Private Equity	CAPM, (beta of ~1.6); adjusted for OPERF
International Equity	Weighted sum of local market premium + local risk free rate; composition is World ex-US
Emerging Mkt Equity	Weighted sum of local market premium + local risk free rate; composition is Emerging Markets
Real Estate	Historical behavior of equity REITs; current appraisal cap rates; CAPM; adjusted for OPERF's leverage policy
Absolute Return	Expected net premium to LIBOR (2-4%); 0.30 Sharpe Ratio
High Yield FI	Historical ratio: spread of High Yield over US Fixed Income divided by spread of Large Cap over US Fixed Income
TIPs*	Current real yield on Barclay's US TIPs Index plus SIS inflation expectation

** See Appendix for Glossary of Terms*

SIS Capital Market Expectations (10/30/2009)

ASSET CLASS	EXPECTED RETURN	EXPECTED RISK	SHARPE RATIO
US EQUITY	8.5%	17.0%	0.324
CORE FIXED INCOME	4.0%	4.5%	0.222
INTERNATIONAL EQUITY	8.5%	17.5%	0.314
EMERGING MARKET EQUITY	9.2%	30.0%	0.207
INTERNATIONAL BONDS	4.1%	10.0%	0.110
CORE REAL ESTATE	6.5%	15.0%	0.233
PRIVATE MARKETS	11.0%	35.0%	0.229
HEDGE FUNDS	6.0%	10.0%	0.300
HIGH YIELD FIXED INCOME	6.4%	11.0%	0.309
EMERGING MARKET DEBT	5.7%	12.5%	0.216
CASH EQUIVALENTS	3.0%	1.3%	0.000
US TIPS	4.0%	5.0%	0.200
COMMODITIES	7.0%	28.0%	0.143

Expected Risk or Standard Deviation of US Equity implies 8.5% ± 17% or a range of +25.5% to -8.5%; Core Fixed Income +8.5% to -0.5%, etc.

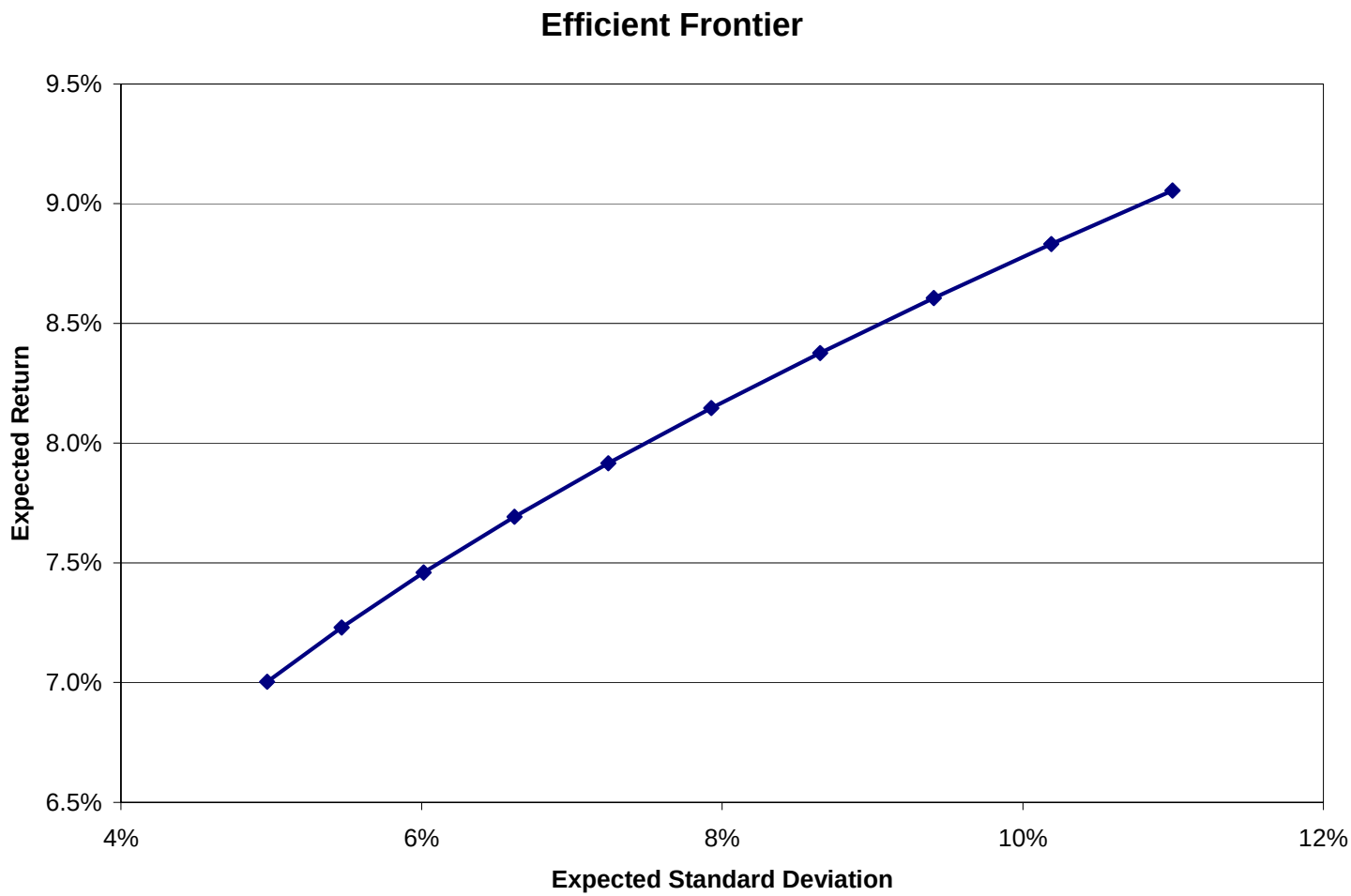
Sharpe Ratio* = Excess Return (or Risk Premium) per unit of Risk.

* *See Appendix for Glossary of Terms*

SIS Capital Market Expectations (10/30/2009)

ASSET	US Equity	US Fixed	Intl Stock	EM Stock	Intl Bond	Real Est	Pvt Mkts	HF	HY FI	EM Debt	Cash	TIPS	Commod	Inflation
US Lrg Cap	1.00													
US Fixed	0.80	1.00												
Intl Stock	0.11	0.04	1.00											
EM Stock	0.77	0.71	0.02	1.00										
Intl Bond	0.60	0.66	0.00	0.71	1.00									
Real Est	0.07	0.00	0.42	0.21	0.09	1.00								
Pvt Markets	0.50	0.55	0.10	0.50	0.40	0.00	1.00							
Abs Ret	0.63	0.63	0.00	0.52	0.53	0.00	0.40	1.00						
High Yield	0.65	0.61	0.25	0.63	0.52	0.02	0.39	0.46	1.00					
EM Debt	0.67	0.71	0.28	0.62	0.53	0.33	0.64	0.36	0.42	1.00				
Cash	0.41	0.55	0.15	0.32	0.37	0.28	0.47	0.32	0.52	0.49	1.00			
TIPS	0.03	0.03	0.35	0.03	0.06	0.29	0.20	-0.13	0.25	0.18	0.17	1.00		
Commod	0.20	0.10	0.42	0.18	0.04	-0.10	0.06	0.17	0.47	0.11	0.02	0.14	1.00	
Inflation	0.58	0.57	0.00	0.63	0.68	0.10	0.39	0.54	0.41	0.31	0.38	0.24	0.14	1.00

Efficient Frontiers*



* *See Appendix for Glossary of Terms*

Capital Markets: Long-Term Perspective

- Cycles
  - Economic
  - Stock Markets
  - Availability of Credit/Interest Rates
  - Political, Economic and Security Conditions
- The direction of change may be logical but the magnitude is usually extreme, and the duration is unknown.
  - Growth Stocks – Late 60's, Early 70's, Late 90's — Next?
  - PC Stocks – Mid 80's, Late 90's
  - Conglomerates – Late 80's
  - Biotech Stocks – Early 90's
  - Gambling Stocks – Mid 90's
  - Dot Coms/VC – Late 90's
  - Gold Stocks – Mid 70's, 2005-Current
  - Energy Stocks – Late 70's, 2005-2007
  - Housing Market — Late 80's, 2000-2006
  - Value Investing — Late 80's, Early 90's-Current
  - Reaching for Yield/Leverage/Mega-Buyouts — 2002-2007
  - De-Leveraging/Re-Pricing of Risk – 2007-?
- Investment cycles do not last forever and are always self-correcting

APPENDIX

Glossary of Terms

- **Asset Allocation** – (1) The way investments are distributed and weighted among different asset classes. (2) The distribution of investments among categories of assets, such as equities, fixed income, cash equivalents, and real estate.
- **CAPM** – Capital Asset Pricing Model. A system of equations that describes the way prices of individual assets are determined in efficient markets, that is, in markets where information is freely available and reflected instantaneously in asset prices. According to this model, prices are determined in such a way that risk premiums are proportional to systematic risk, measured by the beta coefficient, which cannot be eliminated by diversification. CAPM provides an explicit expression of the expected returns for all assets. Basically, the model holds that if investors are risk averse, high-risk stocks must have higher expected returns than low-risk stocks. CAPM maintains that the expected return of a security or a portfolio is equal to the rate on a risk-free investment plus a risk premium.
- **Correlation** – A relationship between two quantities, such that when one changes, the other does. A measure (ranging in value from 1.00 to -1.00) of the association between a dependent variable (fund, portfolio) and one or more independent variables (index). Correlation is a measure, not necessarily of causality, but rather of the strength of a relationship. A correlation coefficient of 1.00 implies that the variables move perfectly in lockstep; a correlation coefficient of -1.00 implies that they move inversely in lockstep; and a coefficient of 0.00 implies that the variables as calibrated are uncorrelated.
- **Efficient Frontier** – A set of optimal portfolios, one for each level of expected return, with minimum risk.
- **Expected Return** -- Estimate of the return of an investment or portfolio from a probability distribution curve of all possible rates of return; statistically, it is the mean (ether geometric mean or arithmetic mean) of the distribution or the "most likely" outcome.
- **Factor Model** – Regression-based mathematical calculation used to determine the extent to which macroeconomic factors or other explanatory variables affect the value or price movement of a specific security or portfolio.

Glossary of Terms

- **Geometric Return** – Similar to the arithmetic mean, which is what most people think of with the word "average", except that instead of adding the set of returns and then dividing the sum by the number of return observations (N), the numbers are multiplied and then the Nth root of the resulting product is taken. Also known as compound return.
- **Mean Reversion** – Statistical phenomenon stating that the greater the deviation of a given observation (e.g. a quarterly or annual return) from its mean, the greater the probability that the next measured observation will deviate less far. In other words, an extreme event is likely to be followed by a less extreme event.
- **Monte Carlo Simulation** – Uses stochastic processes to simulate the various sources of uncertainty that affect the value of the instrument, portfolio or investment in question, and calculates a representative value or distribution of possible outcomes given the simulated values of the underlying inputs.
- **Optimization** – Process of determining the portfolio composition such that expected return is maximized for a given risk level, or risk is minimized for a given expected return level. Other optimizations could target risk of shortfall, maximization of Sharpe ratio, or minimization of tracking error.
- **Sharpe Ratio** – A ratio of return to volatility, useful in comparing two portfolios or stocks in terms of risk-adjusted return. The higher the Sharpe Ratio, the more sufficient are returns for each unit of risk. It is calculated by first subtracting the risk free rate from the return of the portfolio, then dividing by the standard deviation of the portfolio.
- **Treasury Inflation-Protected Securities (TIPS) – I**nflation-indexed bonds issued by the U.S. Treasury. The principal is adjusted to the Consumer Price Index (CPI), the commonly used measure of inflation. The coupon rate is constant, but generates a different amount of interest when multiplied by the inflation-adjusted principal, thus protecting the holder against inflation. TIPS are currently offered in 5-year, 10-year and 20-year maturities. Beginning in February 2010, the U.S. Treasury will once again offer 30-year TIPS bonds.

Professional Biographies

- **MICHAEL R. BEASLEY**. *Managing Director*. Co-founded Strategic Investment Solutions, Inc. (SIS) with Barry Dennis in 1994. Former EVP and Head of Consulting of Callan Associates, which he joined in 1986 and left in 1993. Founded Callan's Atlanta Office in 1986 and concurrently managed its New York Office in 1988. Served as Chairman of Callan's Manager Search Committee for two years. Brings 30 years of consulting and institutional investment experience to SIS. Prior experience includes 13 years with Merrill Lynch's Capital Markets Group in Jacksonville and Atlanta. Former Editorial Board member of the *Journal of Pension Plan Investing.* Frequent speaker on institutional investment issues. Graduate of the New Mexico Military Institute and an officer of the U.S. Army for five years that included a combat tour of duty in Vietnam.

- **JOHN P. MEIER, CFA**. *Managing Director and Head of Quantitative Services.* Highly experienced specialist in strategic planning, capital markets analysis, and quantitative investment strategies. A leading authority in the fields of perform-ance benchmarking and portfolio perform-ance attribution, whose ideas have been published in Pensions and Investments, Futures, Risk and Quantitative International Investing. Senior Product Manager at BARRA from 1988 to 1994, responsible for equi-ty risk and valuation models and services. B.S. in Chem. Eng. From Michigan State, MBA in Finance from UC Berkeley.

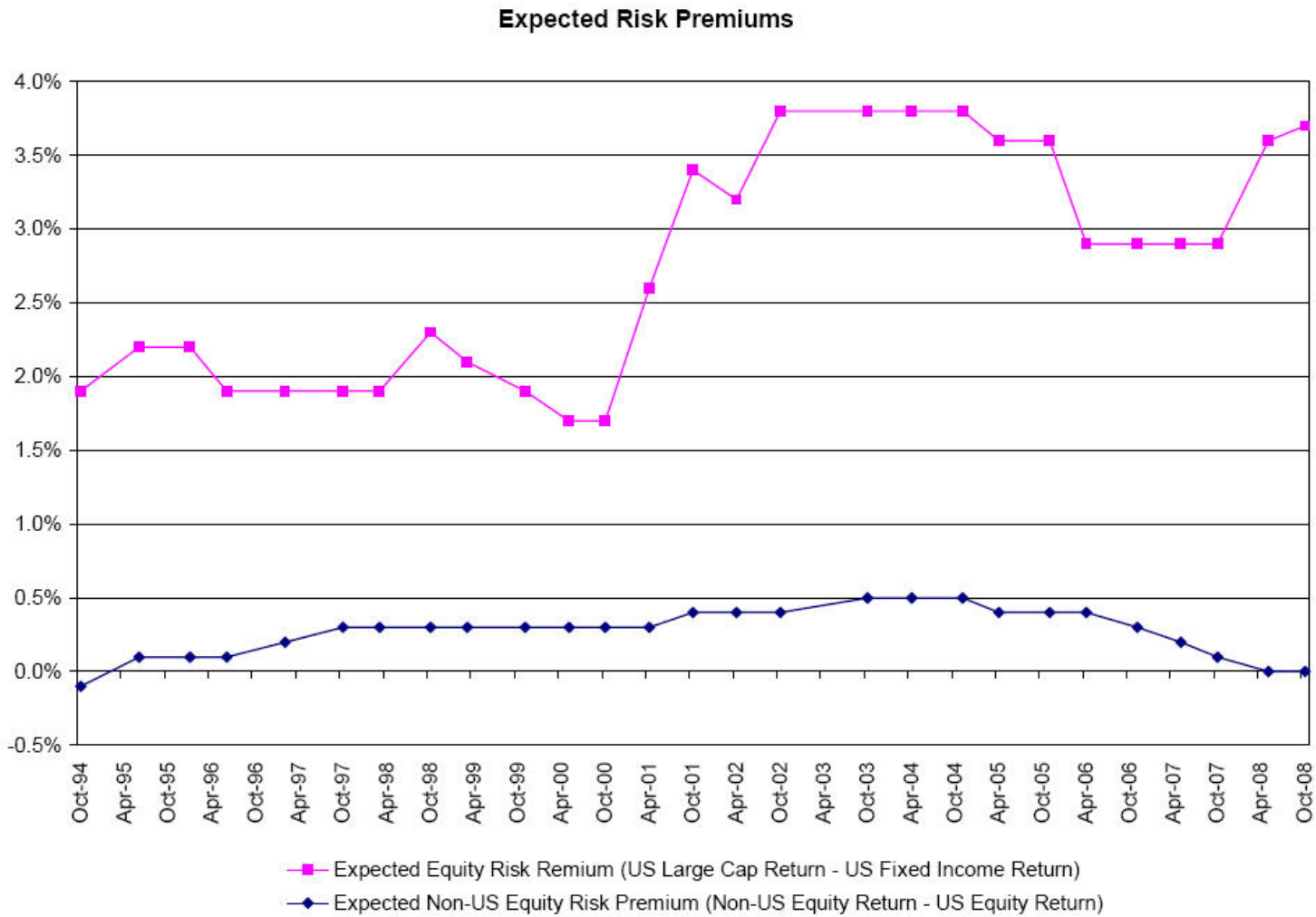
- **MARC GESELL, CFA**. *Vice President.* Quantitative analysis, statistical research, and systems deve-lopment specialist responsible for strategic planning. Seven years experi-ence in software R&D, asset allocation modeling, and investment analysis. Most recently AVP and portfolio manager for First Interstate Bank (now Wells Fargo), responsible for managing $200 million in private client portfolios. Helped establish clients' strategic plans, investment objectives, asset allocation mixes, and portfolio structure. B.S. in Computational Mathematics, Arizona State University, MBA in Finance, San Francisco State University, Chartered Financial Analyst. Former Officer, United State Army.

- **LOUIS KINGSLAND, JR.** *Adviser and Chair, Investment Policy Committee.* Developed first commercially available asset allocation and liability simulation model and asset mix optimizer, both still widely used today. Most recently EVP of Mellon Capital Management. Graduate, Air Force Academy. MA in Engineering, CalTech. Served as Deputy Mission Director of The Viking Space Project, and received a Distinguished Service Medal from NASA.

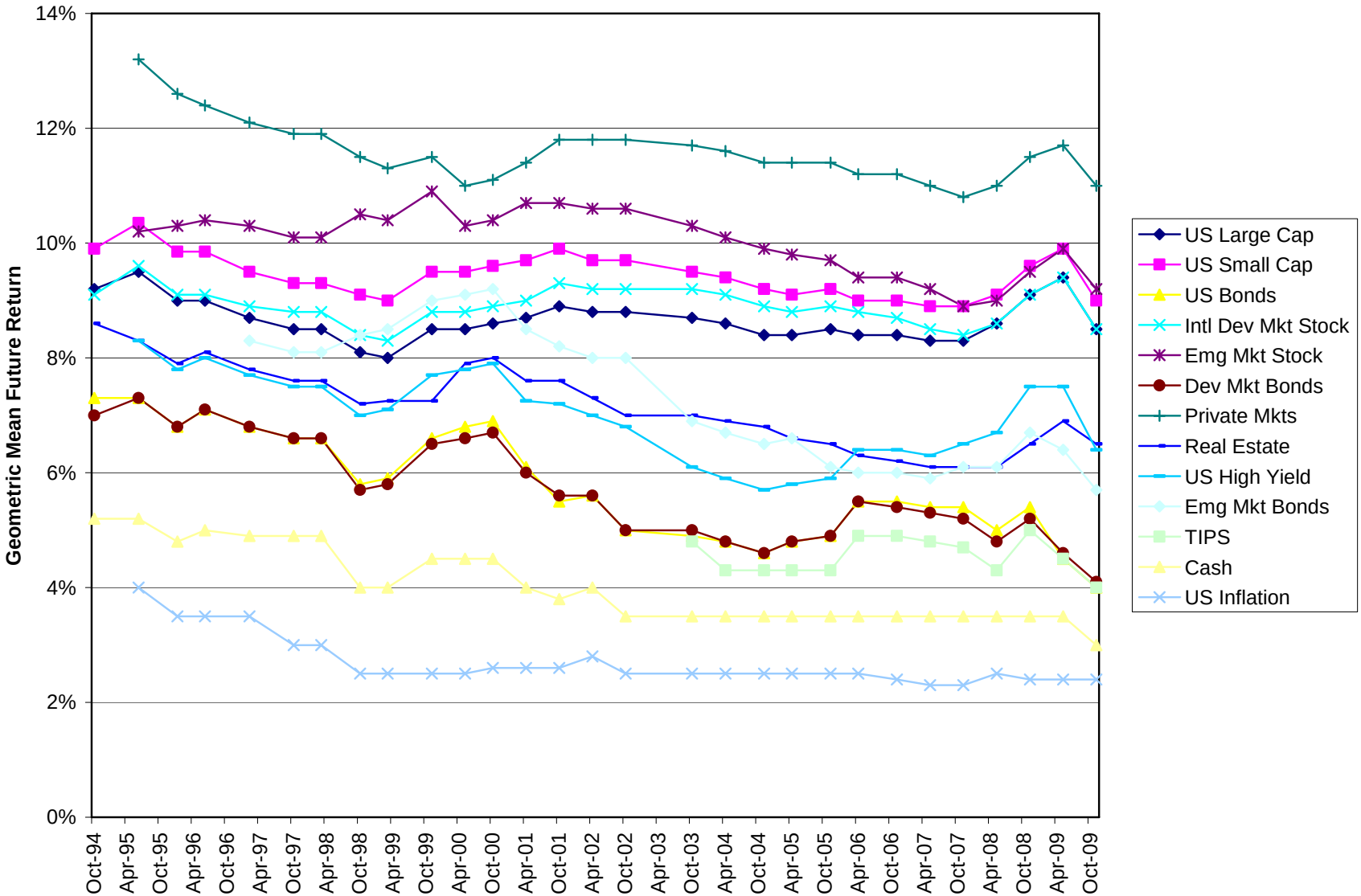
Defining Risk

- The basic definition of investment risk is variability of return. The alternative policies, or “asset mixes,” examined here are built to minimize this variability given an expected level of return over a long period of time. These mixes we call efficient. The method used to build them is an improved version of standard mean-variance optimization. The probabilities of continuously compounded returns to each asset class are assumed to approximate a bell shaped curve, or normal distribution. In other words, returns are random, and returns near the expected average are more likely than extreme returns. The likelihood of extreme returns is expressed as standard deviation. The probability of a particular asset-class return depends on the returns provided by every other asset class; this interdependence is expressed as correlation. Thus asset-class return expectations are commonly presented as three sets of numbers: mean returns, standard deviations, and correlations.

History of Key Relationships



Expected Returns



MERCER

Consulting. Outsourcing. Investments

MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN

January 27, 2010

Oregon PERS
Liability Primer for OIC

Matt Larrabee

Introduction
Who We Are / Who We Are Not

- We are the actuary for PERS, and our responsibilities include:
  - Actuarial valuation of system liabilities
  - Calculation of recommended employer contribution rates
  - Financial projections of assets, liabilities, and contribution rates
  - Recommendations on valuation assumptions, calculation methodologies
  - Review of system demographic and economic experience
- We are not an investment consultant to PERS
  - We are neither retained nor licensed to provide investment advice
  - As such, nothing in this presentation is intended to be or should be construed to be investment advice

The intent of this presentation is to provide background on the PERS benefit structure and dynamics to assist OIC and SIS in their analysis by providing an understanding of system liabilities and employer contribution rates

PERS Benefit Structure, System Dynamics, Return Assumption
Executive Summary

- System liabilities and benefit payments are mature and predictable
  - The historical earnings guarantee accelerated system's maturation
  - The current guarantee level is diminishing as a factor in liability levels
- Employer rates, which are established in advance, are projected to rise steadily due to the 2008-2009 market downturn
- Some current assets will be used for net cash outflows over the next ten years
- Contribution rates are more sensitive to investment return volatility than other western states' systems
  - For the same level of investment return variance, PERS has a larger change in funded status and employer contribution rates
- The investment return assumption (currently 8%) is set by PERB based on the actuary's analysis of the OIC allocation policy
  - The selected assumption is not a target return for the OIC to achieve
  - An assumption change would affect employer rates and some benefit levels

Introduction
Overview of Contributions

- Employer contribution rates are set by PERB
  - Based on recommendations from the actuary
- In setting rates, PERB has identified the following guiding principles:
  - ***Transparent***
  - ***Predictable and stable rates***
  - ***Protect funded status***
  - ***Equitable across generations***
  - ***Actuarially sound***
  - ***GASB compliant***

Introduction
Overview of Contributions

- PERS-related contributions have various sources and destinations
- Fixed Member contributions to the Individual Account Program (IAP)
  - 6% of payroll; "picked up" by many employers
- Fixed employer contributions to Pension Obligation Bond (POB) debt service
  - For those employers who have chosen to issue POBs
- Variable employer contributions to the Tier 1/Tier 2/OPSRP program
  - Determined by actuarial valuation in advance

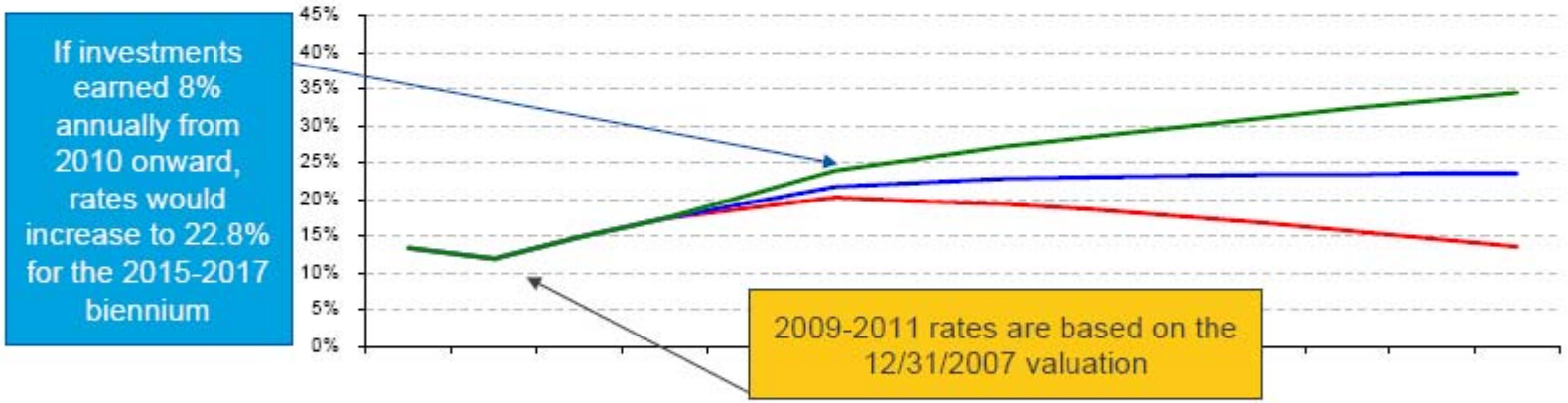
Valuation	Employer Contribution Rates
12/31/2007	7/1/2009 – 6/30/2011
12/31/2009	7/1/2011 – 6/30/2013

  - Consists of new benefit costs plus amortization of any funding shortfalls on prior benefits
  - Varies primarily due to investment performance and associated changes in system funded status

Introduction

Overview of Funded Status; Contribution Rate Projections

- Estimated funded status at December 31, 2009 on a fair market basis:
  - 75% excluding side accounts; 85% including side accounts
    - Side accounts are prepaid contributions that provide rate offsets, reducing required future contributions
- The chart below illustrates projected changes in the variable "base" employer rate under several investment return scenarios



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
10.5% Return	13.4%	12.1%	14.8%	17.4%	18.9%	20.3%	19.8%	19.4%	18.6%	17.8%	16.8%	15.8%	14.7%	13.6%
8% Return	13.4%	12.1%	14.8%	17.4%	19.7%	21.8%	22.3%	22.8%	23.0%	23.2%	23.4%	23.5%	23.5%	23.5%
4.5% Return	13.4%	12.1%	14.8%	17.4%	20.7%	23.9%	25.6%	27.2%	28.5%	29.8%	31.0%	32.2%	33.3%	34.4%

Although fair market asset values are used for the actuarial calculations, rates are smoothed via a "rate collar" mechanism

PERS Benefit Structure and System Dynamics

PERS Benefit Structure
Overview

- PERS Members receive life annuity retirement benefits according to one of three different benefit tiers, depending on hire date

Benefit Tier	Date of Hire
Tier 1	Before January 1, 1996
Tier 2	January 1, 1996 to August 28, 2003
OPSRP	After August 28, 2003

- PERS reform legislation passed in 2003:
  - Created the OPSRP benefit tier
  - Significantly changed the dynamics of Tier 1 and Tier 2 liabilities
    - Directed post-2003 Member contributions away from Tier 1 and Tier 2 and into the Individual Account Program (IAP)
      - OPSRP Members also participate in the IAP

PERS Benefit Structure
Overview of Structure

- In general, Tier 1 and Tier 2 Members receive the greater of benefits calculated under two approaches:
  - Account balance-based (a.k.a. "Money Match"):
    - Member's pre-reform contributions are accumulated with earnings to retirement
    - At retirement, the balance is matched by the employer and the total is converted to a life annuity
  - Traditional defined benefit annuity formula (a.k.a. "Full Formula"):
    - (Final pay) x (Final service) x (Percentage Multiplier)
- All OPSRP benefits are calculated under a Full Formula-like approach
  - Key differences (illustrated below for General Service Members):
    - Lower percentage multiplier
      - *Tier 1 – 1.67%; Tier 2 – 1.67%; OPSRP – 1.50%*
    - Later normal retirement age
      - *Tier 1 – Age 58; Tier 2 – Age 60; OPSRP – Age 65*

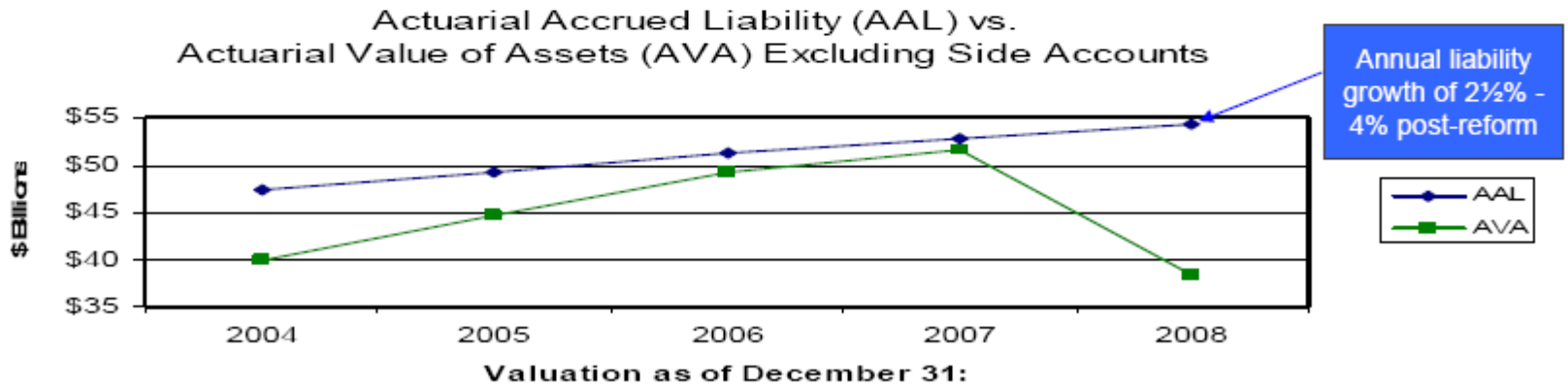
PERS Benefit Structure

Growth of Tier 1 / Tier 2 Member Money Match Account Balances

- Money Match Member Account Balance earnings crediting is done as follows:
  - Tier 1 Member Accounts
    - Cannot be credited with less than the investment return assumption (currently 8% per year)
    - Since 2003, also cannot be credited more than the assumption rate until a special "Rate Guarantee Reserve" is fully funded
      - This reserve is presently in deficit status as a result of the market downturn
  - Tier 2 Member Accounts
    - Credited with actual market returns on regular accounts

PERS Benefit Structure
Effect of Reform

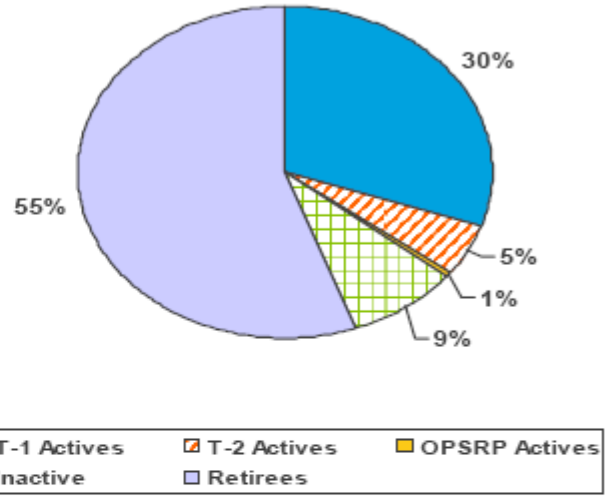
- There are no new Member contributions to Money Match accounts
  - Accounts only go up (or down) with earnings credited
    - Crediting stops at Member retirement, at which point the account balance is annuitized
- Liabilities for active Members have been shifting from the Money Match approach to the Full Formula approach
  - Some Tier 1 Members still retire under Money Match
  - Substantially all Tier 2 Members will retire under Full Formula
- Post-reform, liabilities have shown slow, predictable growth



Plan Demographics and System Dynamics
System Maturity

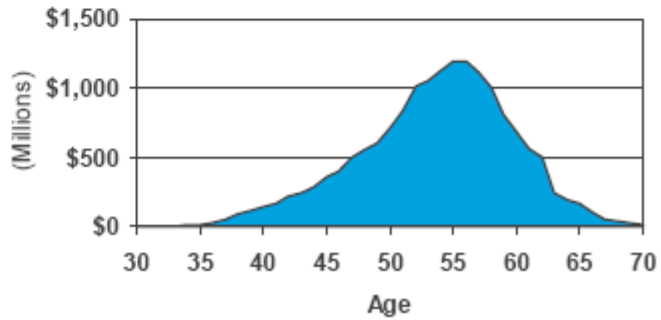
- 64% of PERS liabilities are for retired and inactive Members
- Of the active liability, over 80% is for Tier 1 Members, with the majority of that liability for Members over age 52
  - The over 52 group will be the last one with "Money Match" retirement benefits (others will receive "Full Formula" benefits)
  - Once those retirements have occurred, a change to the Tier 1 earnings guarantee would not affect projected benefit payments
- The maturity of the system means that future benefit payment levels and associated liabilities are quite predictable

Actuarial Accrued Liability by Member Category



Information from December 31, 2008 Actuarial Valuation

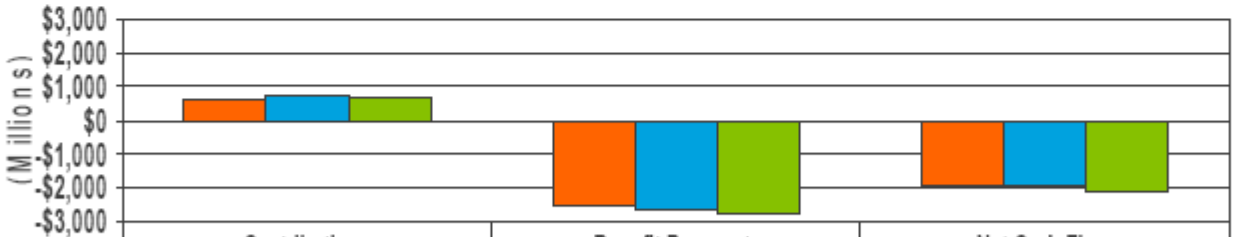
Distribution of Tier 1 Active Liability



Plan Demographics and System Dynamics
Tier 1/Tier 2/OPSRP Cash Flow

- As shown in the graph below, for the Tier 1/Tier 2/OPSRP program:
  - Benefit payments currently exceed new employer contributions, which is typical of mature systems
  - Benefit payments are projected to grow to $5 billion annually by 2017
- Contribution rates will not increase until July 2011, but will rise steadily thereafter even if the 8% annual investment return assumption is met
- IAP contributions (not included in this slide) are approximately $500 million

Changes in Tier 1/Tier 2 & OPSRP Assets (Including Side Accounts & Reserves)



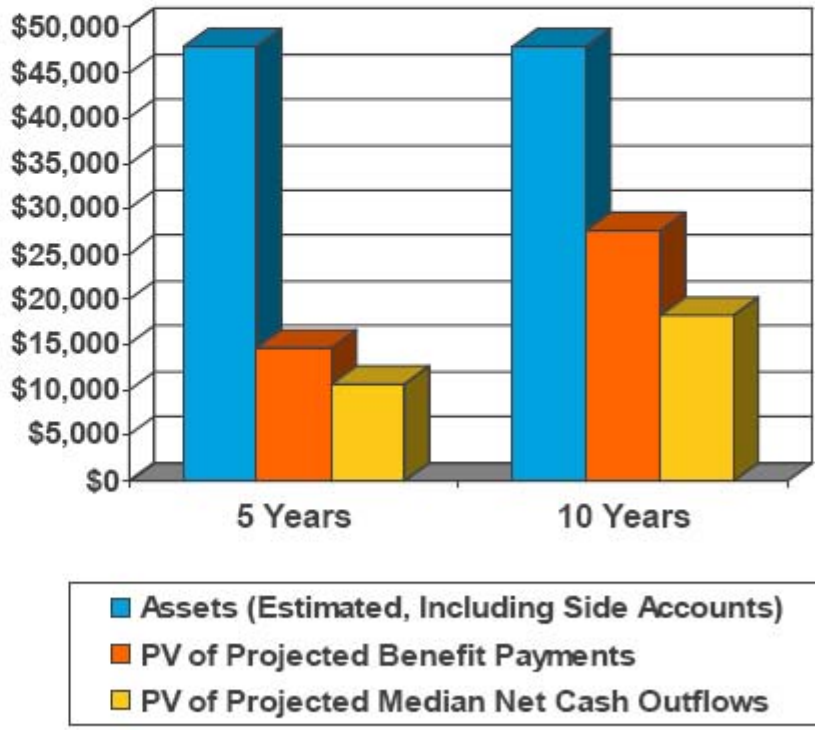
	Contributions	Benefit Payments	Net Cash Flow
2006	616.3	(2,575.6)	(1,959.3)
2007	760.7	(2,668.4)	(1,907.7)
2008	646.5	(2,811.3)	(2,164.8)

Plan Demographics and System Dynamics

Tier 1/Tier 2/OPSRP Cash Flow

- Even with projected contribution rate increases, negative cash flow will persist as benefit payments escalate
  - A portion of current assets will be needed to cover net cash outflows
  - With 8% annual investment return:
    - 22% of current assets will be needed for 5-year net outflows
    - 38% of current assets will be needed for 10-year net outflows
- The present value of benefit payments over the next ten years (at an 8% discount rate) is over half of the current value of assets

Comparison of Year-End 2009 Assets to Present Value (PV) of 5 & 10 Year Cash Flows ($ millions)



Plan Demographics and System Dynamics
Benchmarking Metrics

- Like all funded systems, PERS pays for benefits using a combination of contributions and investment earnings. The immutable and fundamental long-term relationship is:

Benefits Paid + Expenses = Contributions + Investment Earnings

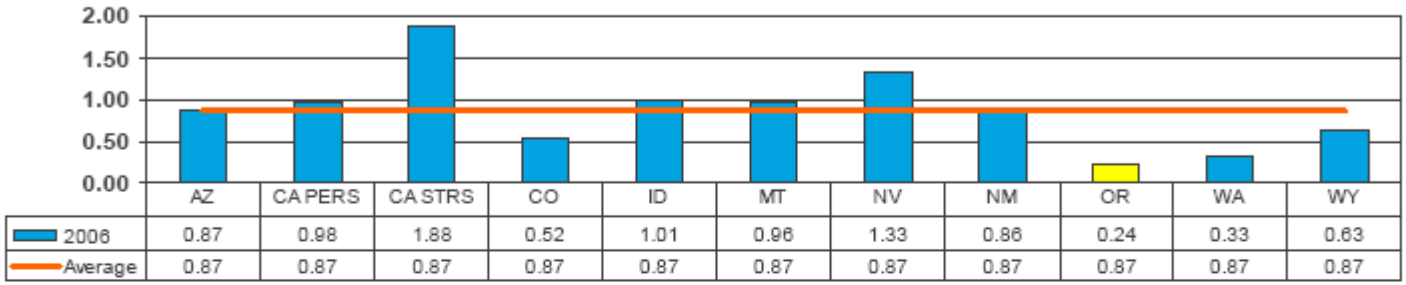
- When investment earnings deviate from the assumed level, the amount of contributions required changes
- While this is true for all systems, the impact of investment return volatility on contribution rates varies by system
  - Contribution rates are more sensitive to investment volatility when:
    - The ratio of contributions to benefit payments is low,
    - The ratio of active Members to retirees is low, and/or
    - The ratio of assets to active payroll is high

PERS contribution rates are significantly more sensitive to investment volatility than those of other western states' systems

Plan Demographics and System Dynamics

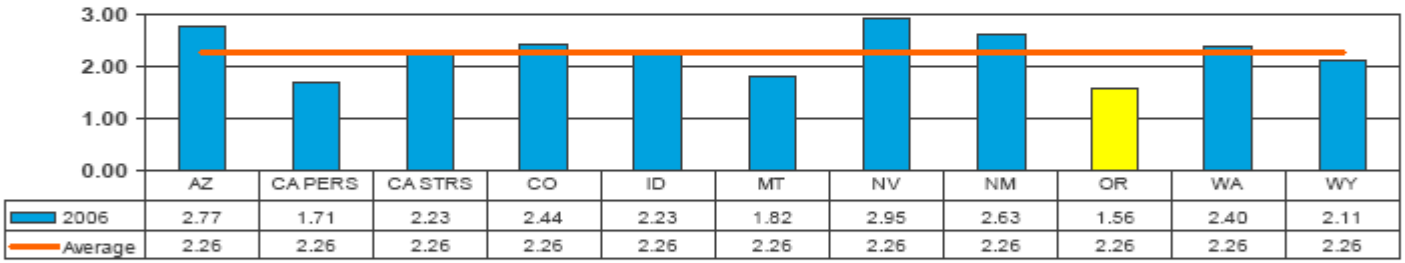
Benchmarking – Contribution Rate Sensitivity to Investment Returns

Contributions / Benefit Payments



	AZ	CA PERS	CA STRS	CO	ID	MT	NV	NM	OR	WA	WY
2006	0.87	0.98	1.88	0.52	1.01	0.96	1.33	0.86	0.24	0.33	0.63
Average	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87

Active Members / Retirees and Beneficiaries



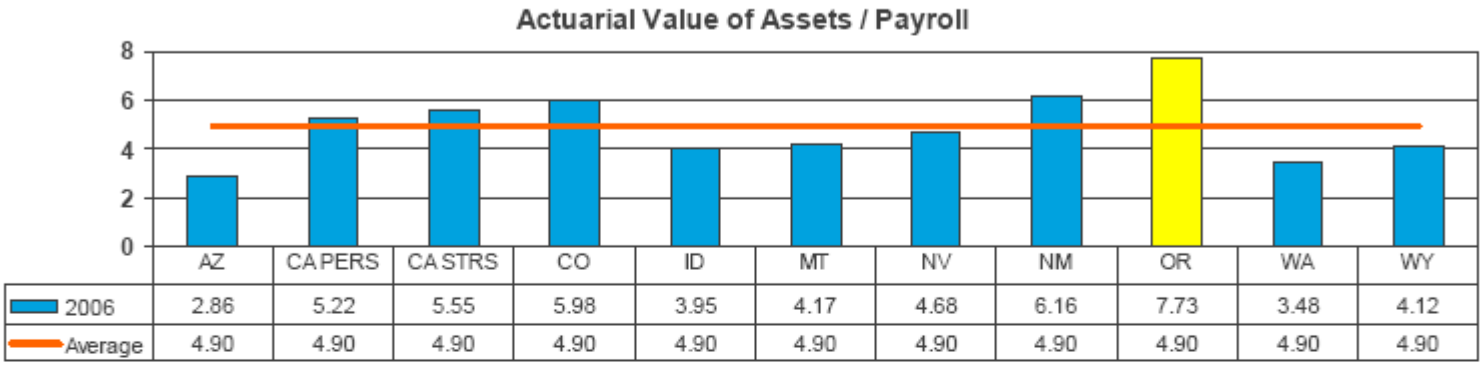
	AZ	CA PERS	CA STRS	CO	ID	MT	NV	NM	OR	WA	WY
2006	2.77	1.71	2.23	2.44	2.23	1.82	2.95	2.63	1.56	2.40	2.11
Average	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26

- Based on a 2006 survey of large public retirement systems, among western states' systems, PERS had:
  - The lowest ratio of contributions to benefit payments, and
  - The lowest active member to retiree ratio

Note: Data above is based upon the Comprehensive Annual Financial Reports of each retirement system as published on their respective web sites. There are differences in reporting dates and other factors that may make direct comparisons imperfect.

Plan Demographics and System Dynamics

Benchmarking – Contribution Rate Sensitivity to Investment Returns



	AZ	CA PERS	CA STRS	CO	ID	MT	NV	NM	OR	WA	WY
2006	2.86	5.22	5.55	5.98	3.95	4.17	4.68	6.16	7.73	3.48	4.12
Average	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90

- Any variation in investment performance from the investment earnings assumption is amortized as a level percentage of payroll through employer contribution rates
- Contribution rates for systems with higher asset to payroll ratios are more sensitive to actual investment returns
  - For a given deviation from expected return, a larger contribution rate adjustment is needed to address the shortfall (or surplus) created
- Among these systems, PERS has the highest assets to payroll ratio and, consequently, is the most sensitive to volatility in investment experience

Note: Data above is based upon the Comprehensive Annual Financial Reports of each retirement system as published on their respective web sites. There are differences in reporting dates and other factors that may make direct comparisons imperfect.

PERS Benefit Structure and System Dynamics
Summary

- Projected benefit payments and associated liabilities are predictable
- Employer rates, which are established in advance, are projected to rise steadily due to the 2008-2009 market downturn
- System cash flow is negative, and a portion of current assets will likely be needed for net cash outflows over the next ten years
- Benchmarking indicates PERS contribution rates are more sensitive to investment return volatility than other western states' systems
  - For the same level of investment return variance, PERS has a larger change in funded status and employer contribution rates
- The historical level of the earnings crediting guarantee to Tier 1 Members played a role in the maturation of the system's liability
  - The current guarantee level is diminishing as a factor in liabilities
    - Only Members who retire in the future under Money Match are affected by the current guarantee level, and Members in that group are likely to retire within the next several years

Investment Return Assumption

Investment Return Assumption
Uses of Assumption

- The investment return assumption is 8%, and has been so since 1989
- This key assumption is used for a variety of important purposes
  - Earnings crediting level for Tier 1 Member Accounts
  - Interest rate used to annuitize Money Match account balances
  - Interest rate used to convert annuities to optional forms of benefit in a financially equivalent manner
  - Rate used to "net present value" projected benefit cash flows to calculate system liabilities
    - **All of these factors directly affect employer contribution rates**
- Despite its significance, there is a fair amount of confusion over how the 8% assumption was developed and how it should be used
  - One misconception is that it is a investment return target to meet or exceed against which OIC should develop an asset allocation

Investment Return Assumption
Development of Assumption

- This investment return assumption is developed by the actuary and reviewed and approved by PERB
  - We use two key inputs to advise on an appropriate rate:
    - Asset allocation policy as developed by OIC
    - Long-term capital market expectations of both Mercer & SIS
- The assumption is the expected (i.e., mean) return **given the allocation selected**
  - It is **not** intended as an investment target that must be met or exceeded each year
- If allocation policy or capital market expectations change, the return assumption would be revisited and could be revised
  - An assumption change would affect benefit levels for some Members, and reported liabilities and contribution rates for all employers
    - This was covered in detail in our July 2009 presentation to PERB

Possible Risk Tolerance Metrics

Possible Risk Tolerance Metrics
Overview

- When conducting risk analyses, systems are more frequently looking at metrics beyond asset risk and return
  - Typical metrics involve funded status or contribution rates
- Possible risk tolerance metrics for PERS could include:
  - Identifying a "maximum sustainable employer contribution rate", and developing policies in which rates have a particular likelihood (95%+, for example) of not exceeding that rate
  - Creating a similar metric for "minimum acceptable funded status"
  - Identifying a "maximum permissible funded status volatility" level
  - Identifying a minimum liquidity measure
- Development of these risk tolerance metrics should be based on input from PERS, OIC and other stakeholders

Actuarial Certification

Mercer has prepared this presentation exclusively for the Public Employees Retirement Board (PERB) to inform PERB and other stakeholders on actuarial considerations related to asset/liability analysis to be undertaken by Strategic Investment Solutions (SIS) and the Oregon Investment Council (OIC). This presentation may not be used or relied upon by any other party or for any other purpose; Mercer is not responsible for the consequences of any unauthorized use.

This report material includes or is derived from projections of future funding and/or accounting costs and/or benefit related results. To prepare these projections or results, various *actuarial assumptions*, as described in the Appendix, were used to project a limited number of scenarios from a range of possibilities. However, the future is uncertain, and the system's actual experience will likely differ from the assumptions utilized and the scenarios presented; these differences may be significant or material. In addition, different assumptions or scenarios may also be within the reasonable range and results based on those assumptions would be different. This report has been created for a limited purpose, is presented at a particular point in time and should not be viewed as a prediction of the system's future financial condition. To prepare the results shown in this report, various *actuarial methods*, as described in the Appendix, were used.

Because actual system experience will differ from the assumptions, decisions about benefit changes, investment policy, funding amounts, benefit security and/or benefit-related issues should be made only after careful consideration of alternative future financial conditions and scenarios and not solely on the basis of a valuation report or reports.

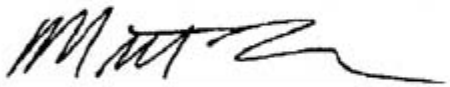
This report is based on data and system provisions as described in the Appendix. Oregon PERS is solely responsible for the validity, accuracy and comprehensiveness of this information. If the data or plan provisions supplied are not accurate and complete, the valuation results may differ significantly from the results that would be obtained with accurate and complete information; this may require a later revision of this report.

Actuarial Certification - Continued

Professional Qualifications

We are available to answer any questions on the material in this report or to provide explanations or further details as appropriate. The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services that could create a conflict of interest, that would impair the objectivity of our work.

We are available to answer any questions on the material contained in the report, or to provide explanations or further details as may be appropriate.



January 27, 2010

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Date

January 27, 2010

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Appendix

Financial Projections
Overview

- Basis for modeling
  - 12/31/2008 Tier 1/Tier 2/OPSRP actuarial valuation
  - Contribution rates and funded status are modeled on a system-wide basis, and do not include retiree healthcare or IAP contributions
  - **Based on published investment returns through November 30, 2009**
    - The OIC published November 2009 return on general account assets of +15.55% was treated as the 2009 12-month annual investment return
  - 2009 investment experience is assumed to improve funded status 4%
- Projected effects of 10.5%, 8.0%, 4.5% annual investment returns
  - Represents 25-year earnings average, valuation interest rate, and 10-year earnings average, respectively

Charts shown without consideration of side accounts or associated rate offsets

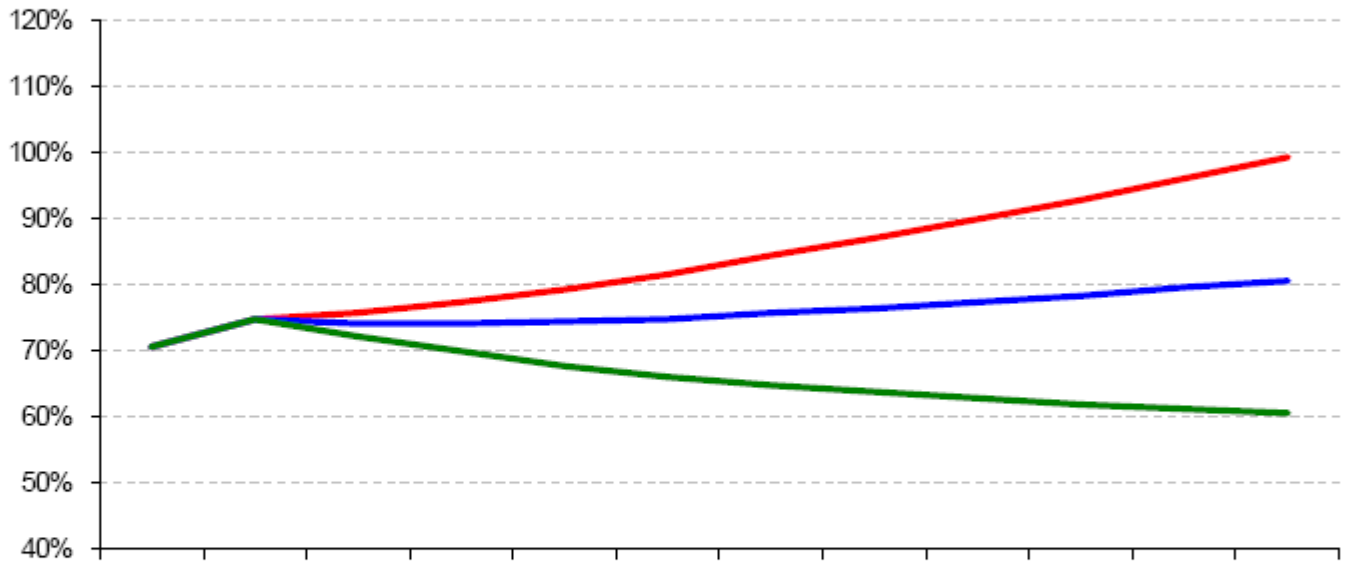
Base Rates Versus Net Rates

- The modeled base contribution rate consists of two parts:
  - Normal Cost Rate
    - Economic value of new benefits earned each year
  - Unfunded Actuarial Liability (UAL) Rate
    - Amortization payment of shortfalls for benefits already earned
- Base rates exclude the effects of:
  - Side account rate offsets
  - Payments for Individual Account Program (IAP), retiree healthcare, and debt service on Pension Obligation Bonds (POBs)
- Net rates include the effect of side account rate offsets

Usefulness / Limitations of Models

- The recent downturn and subsequent partial recovery help to illustrate both the usefulness and limitations of actuarial modeling
- Models are useful because they can provide:
  - Long-term forecasting using "best estimate" assumptions
  - Sensitivity analysis on the effect of a key factor varying from assumption
    - Example: September 2009 Board meeting projections
  - An estimate of the likely range of possible outcomes (with percentiles) for a robust variety of possible future experience
    - Examples: Annual financial modeling presentations to the Board
  - The ability for policymakers and stakeholders to quantify the projected long-term effects of significant recent changes
- Models are limited because they look at a limited set of possible future outcomes
  - Accordingly, there is no guarantee that actual future experience will fall within the range of outcomes modeled

Ten-Year Financial Projections – Funded Status
Excludes Side Accounts



As of 12/31	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
10.5% Return	71%	75%	76%	77%	79%	82%	84%	87%	90%	93%	96%	99%
8% Return	71%	75%	74%	74%	74%	75%	76%	77%	78%	79%	80%	81%
4.5% Return	71%	75%	72%	70%	68%	66%	65%	64%	63%	62%	61%	61%

Appendix
Actuarial Basis

Data

We have based our financial projections of the liabilities on the data, methods, assumptions and plan provisions described in the December 31, 2008, Actuarial Valuation ("2008 Valuation Report") for the Oregon Public Employees Retirement System.

Assets as of December 31, 2008, were based on values provided by Oregon PERS reflecting the Board's earnings crediting decisions for 2008. Assets and year-to-date returns as of November 30, 2009 as published by the Oregon Investment Council (OIC) were used as the basis for estimating December 31, 2009 assets.

As the starting point for the financial projections, assets were updated based on year-to-date investment results through November 30, 2009 as published by the Oregon Investment Council (OIC). Year-to-date 2009 returns as of that date on regular accounts are +15.55%.

We have assumed that the active participant data reflected in the valuation of the Plan remains stable over the projection period (i.e. – participants leaving employment are replaced by new hires in such a way that the total counts, average age, and average service remain stable from year to year). No new members are assumed to be eligible for Tier 1 and Tier 2 benefits; all new entrants are assumed to become members under the OPSRP benefit formula.

Methods / Policies

Liabilities are based on the Projected Unit Credit method and are rolled forward according to the following rules:

Normal cost: Normal cost increases with assumed wage growth adjusted for wage experience, demographic experience and asset return experience (if applicable). Demographic experience follows assumptions described in the 2008 Valuation Report.

Accrued liability: Liabilities increase with normal cost and decrease with benefit payments. Results are adjusted for wage, demographic and asset experience (if applicable).

Contribution Rates: The projected contribution rates are calculated on each odd valuation date in accordance with methodologies described in the 2007 and 2008 Valuation Reports. Rates are applied 18 months after the biennial determination date.

Expenses: Administration expenses for financial projections were assumed to be equal to $6.6M plus .05% of Market Value of Assets.

Actuarial Value of Assets: Equal to Market Value of Assets excluding Contingency, Capital Preservation and Tier 1 Rate Guarantee Reserves

Appendix
Actuarial Basis

Assumptions

In general, assumptions for ten-year financial projections are as described in the 2008 Valuation Report.

The major assumptions used in our ten-year financial projections are shown below. They are aggregate average assumptions that apply to the whole population and were held constant throughout the projection period. The economic experience adjustments were allowed to vary in future years given the conditions defined in each economic scenario.

- Valuation interest rate — 8.00%
- General Accounts Growth — 8.00%
- Variable Account Growth — 8.50%
- Wage growth assumption — 3.75%
- Wage growth experience — inflation + 1.25%
- Demographic experience — reflects decrement assumptions as described in the 2008 Valuation Report.

Reserve Projections

Contingency Reserve as of 12/31/2008 is $653.2M. No future increases or decreases from this reserve were assumed.

Capital Preservation Reserve was assumed to be $0 throughout the projection period.

Tier 1 Rate Guarantee Reserve ("T1RGR") is a deficit of $0.98B as of 12/31/2008. The reserve was assumed to grow with returns in excess of 8% on Tier 1 Member Accounts plus T1RGR. When aggregate returns were below 8%, applicable amounts from the T1RGR were transferred to the Tier 1 Member Accounts to maintain the 8% target growth on the member accounts. No contributions were allocated to the T1 RGR and the 5-year call on a deficit was not modeled.

Provisions

Provisions valued are as detailed in the 2008 Valuation Report.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