Wilshire

Employees' Retirement Fund of the City of Dallas
Asset Allocation Education

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Employees' Retirement Fund of the City of DALLAS

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The Role of Asset Allocation

- Wilshire believes that the core mission of a defined benefit plan is to fund the benefits promised to participants.
- The role of asset allocation is to manage the risk to that core mission.
- Primary goal of asset allocation:
  - ***Maximize the safety*** of promised benefits
  - ***Minimize the cost*** of funding these benefits
- Wilshire's Asset Liability Valuation (ALV) model provides a methodology for selecting a policy portfolio that considers both goals.
- Short-term volatility is also important. Further analysis identifies the impact of the asset allocation decision on asset return, contribution rates, and funded ratios.

Asset Allocation – Goals

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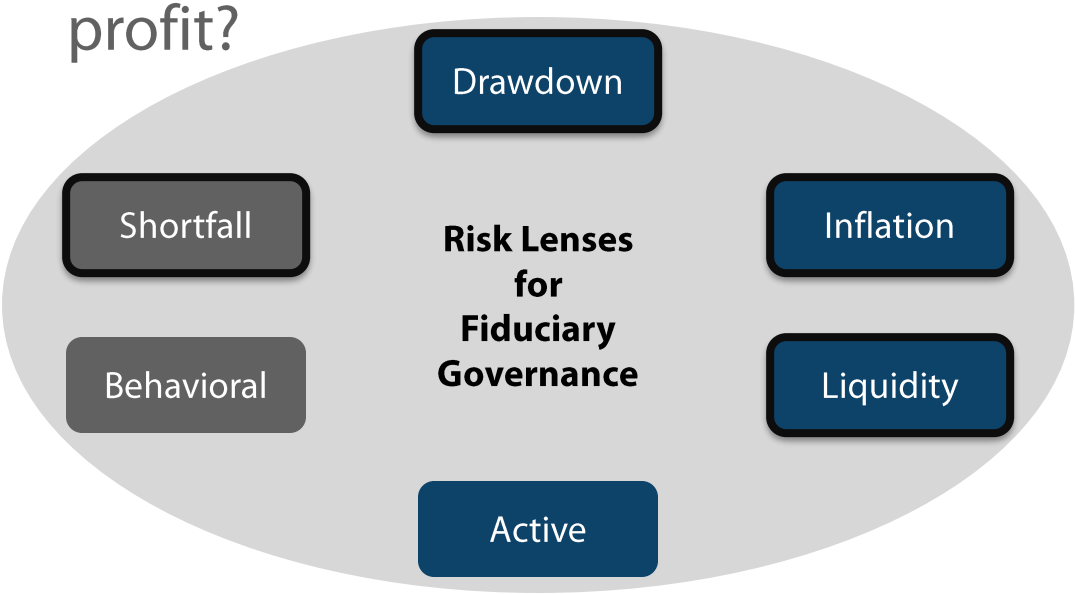
The goal of asset allocation is to select a diversified mix of suitable asset classes that minimizes risk for a given level of expected return.

- The appropriate asset allocation policy is determined by an investor's **risk tolerance** and **return expectation** requirements.
- Each investor's risk tolerance and return requirements should be viewed in the context of the **liabilities** that the assets are supporting.
- The purpose of the exercise is to build a portfolio that can help **to meet the financial goals** of the investor.

Objectives and Risks

The asset allocation process is risk management in action. Wilshire guides clients through the process by addressing several key questions:

- Where are the risks?
- How can these risks be mitigated?
- Which risks have the most potential for yielding a profit?
- How should we balance risk mitigation and the opportunity to profit?



Asset allocation decisions can influence exposures across all six risk lenses, but particularly Shortfall, Drawdown, Inflation and Liquidity.

The World Through Risk Lenses

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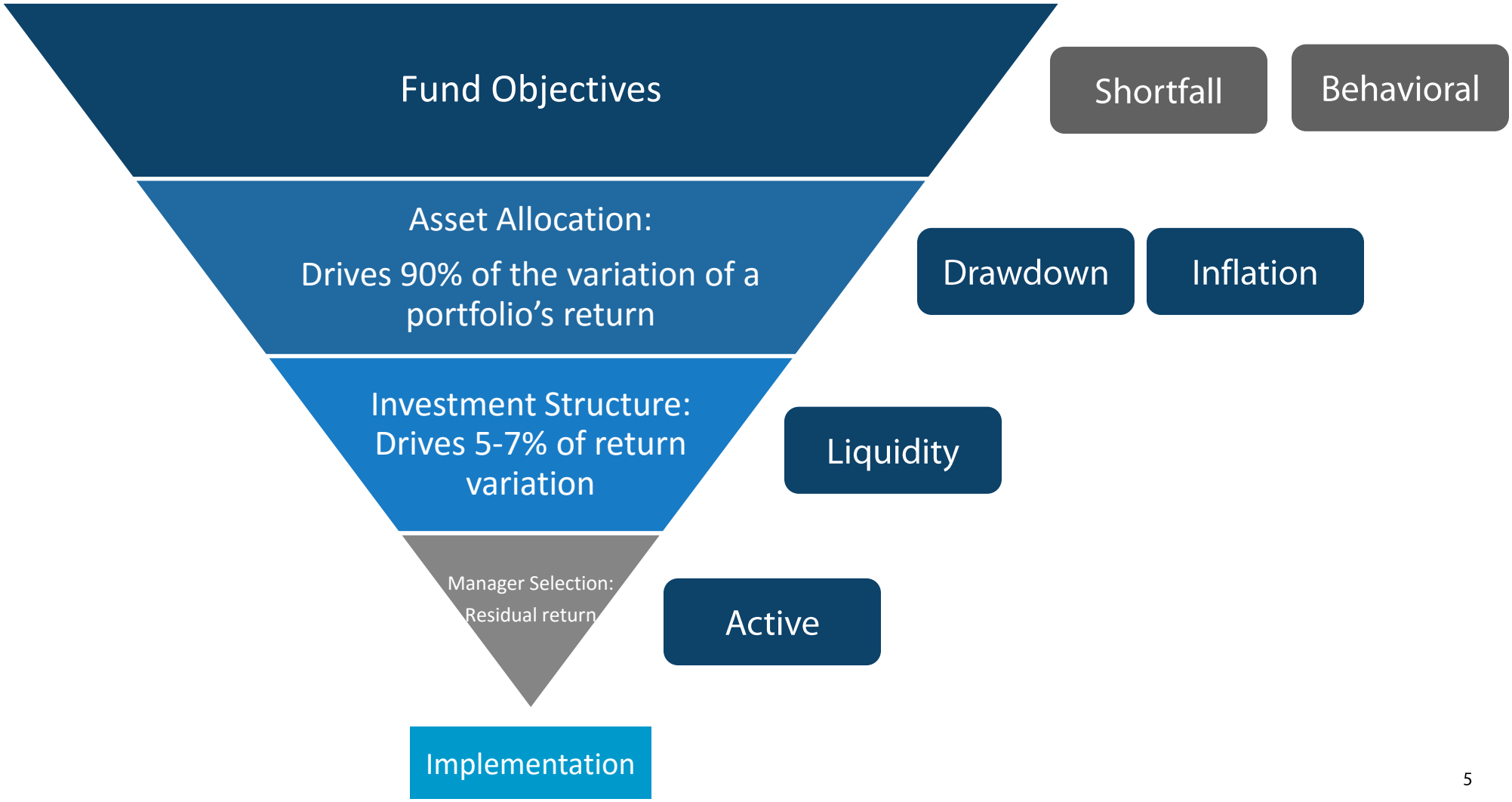
Address Key Risks Throughout the Investment Process

Many of the six key risks are present at multiple points in the investment process, but each distinct step in the process is focused on one or two primary risks.



Objectives and Risks (Examples)

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Shortfall

Objective: Match the actuary's assumed rate of return over the long term

Risk: Volatile returns over the shorter term

Drawdown/ Liquidity

Objective: Profit by owning illiquid assets with higher expected return

Risk: Selling assets at discounted prices to meet short term obligations

Inflation

Objective: Maintain real spending power over time

Risk: Spending power is eroded by inflation

Portfolio Theory Primer

Investment returns are uncertain. The greater the risk taken, the higher the return should be in theory.

According to Modern Portfolio Theory ("MPT"), investments can be combined so that the portfolio maximizes expected return for a given level of expected return volatility.

Three Main Factors:

- Expected Return
- Expected Risk (Standard Deviation)
- Diversification (Correlation)

Asset Class Expectations

Expected Return

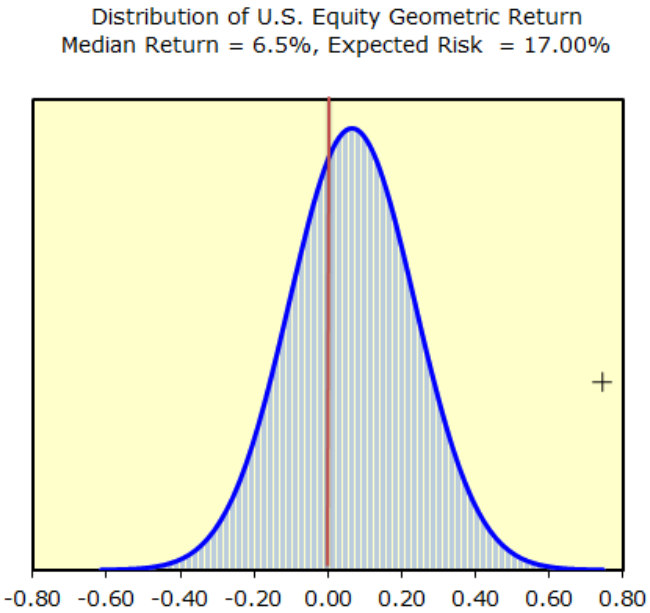
- Median return with a 50% probability that the asset class return will be greater than the expected return and a 50% probability that it will be less than the expected return.

Standard Deviation

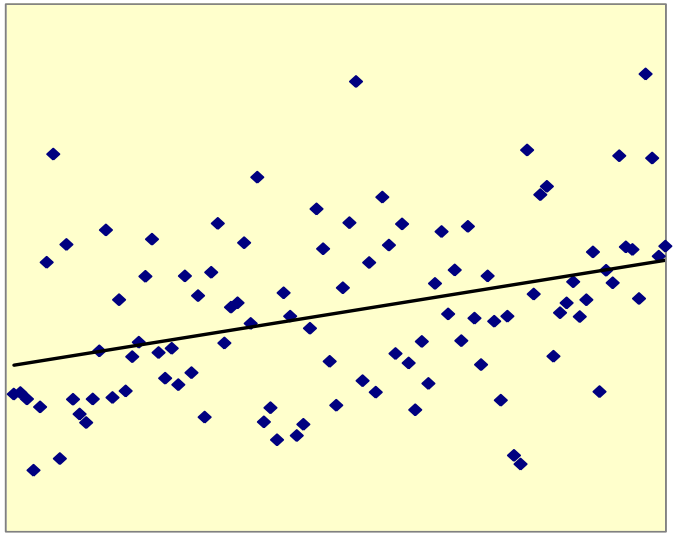
- Measures the dispersion of asset class returns around the expected return.

Correlation

- Measures the movement of asset class returns in relation to one another.



Correlation = .35



Wilshire Asset Class Assumptions

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At the beginning of each quarter, Wilshire reviews its 10-year risk and return assumptions for the major asset classes.

Due to the longer-term nature of the forecasts, Wilshire's assumptions typically only experience a moderate level of change on period-to-period basis.

- Volatile or transformative periods (e.g. 2008-2009) can result in more significant forecasting adjustments.

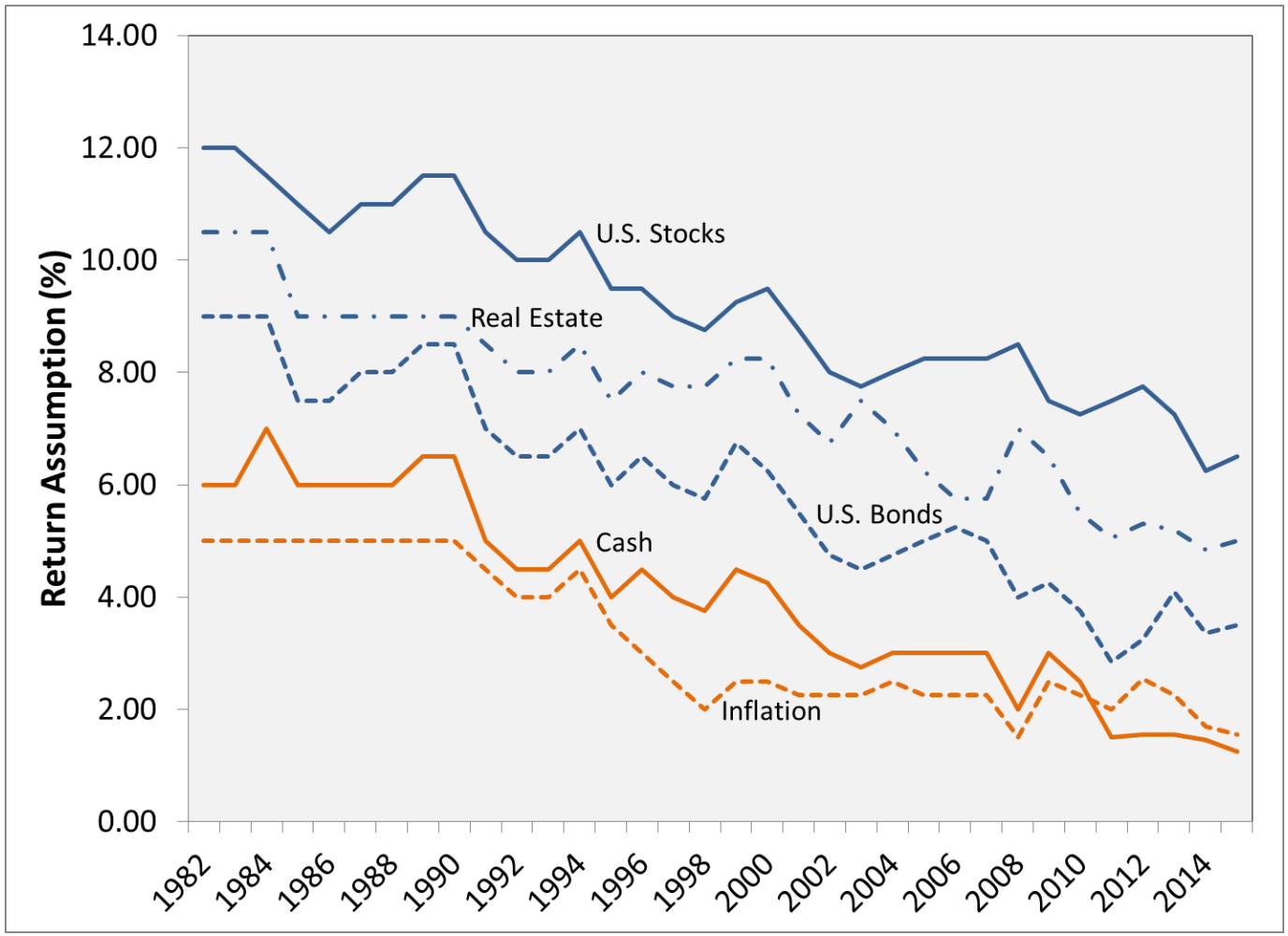
Wilshire also publishes longer-term (30 year) assumptions as some obligations are longer-term.

June 2016 Asset Class Assumptions

Wilshire

	Total Return (%)			Risk (%)
	Dec. 2015	Q2 2016	Change vs YE	Dec. 2015
Investment Categories:				
U.S. Stocks	6.50	6.25	(0.25)	17.00
Dev ex-U.S. Stocks	6.50	6.25	(0.25)	18.00
Emerging Mkt Stocks	6.50	6.25	(0.25)	26.00
Global Stocks	6.70	6.45	(0.25)	17.10
Private Markets	9.50	8.95	(0.55)	27.50
Cash Equivalents	1.25	1.15	(0.10)	1.25
Core Bonds	3.50	2.75	(0.75)	5.00
LT Core Bonds	4.30	3.15	(1.15)	10.00
TIPS	3.25	2.35	(0.90)	6.00
High Yield Bonds	6.35	5.65	(0.70)	10.00
EMD Local Currency (h)	5.60	4.70	(0.90)	5.00
U.S. RE Securities	5.00	4.70	(0.30)	17.00
Private Real Estate	5.80	5.85	0.05	14.00
Commodities	3.55	3.45	(0.10)	15.00
MLPs	9.65	8.35	(1.30)	17.00
Real Asset Basket	6.40	5.85	(0.55)	8.40
Inflation:	1.55	1.45	(0.10)	1.75
Returns minus Inflation:				
U.S. Stocks	4.95	4.80	(0.15)	
U.S. Bonds	1.95	1.30	(0.65)	
Cash Equivalents	(0.30)	(0.30)	-	
Stocks minus Bonds:	3.00	3.50	0.50	
Bonds minus Cash:	2.25	1.60	(0.65)	

Wilshire Forecasts Over Time



- Expected returns over the 10 year time horizon have moved lower across major asset classes
- With lower risk premiums, total portfolio expected returns are likely to be more muted than 15-20 years ago

Source: Wilshire Consulting

Optimization Models – Incorporating Liabilities

Evolution of Pension Management

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Mean-Variance Optimization (MVO)

- "Efficient Frontier" based upon expected return, volatility, and correlation among asset classes
- Asset-only approach does not factor in plan liabilities, creating the potential for significant funded status volatility

Liability Driven Investing (LDI)*

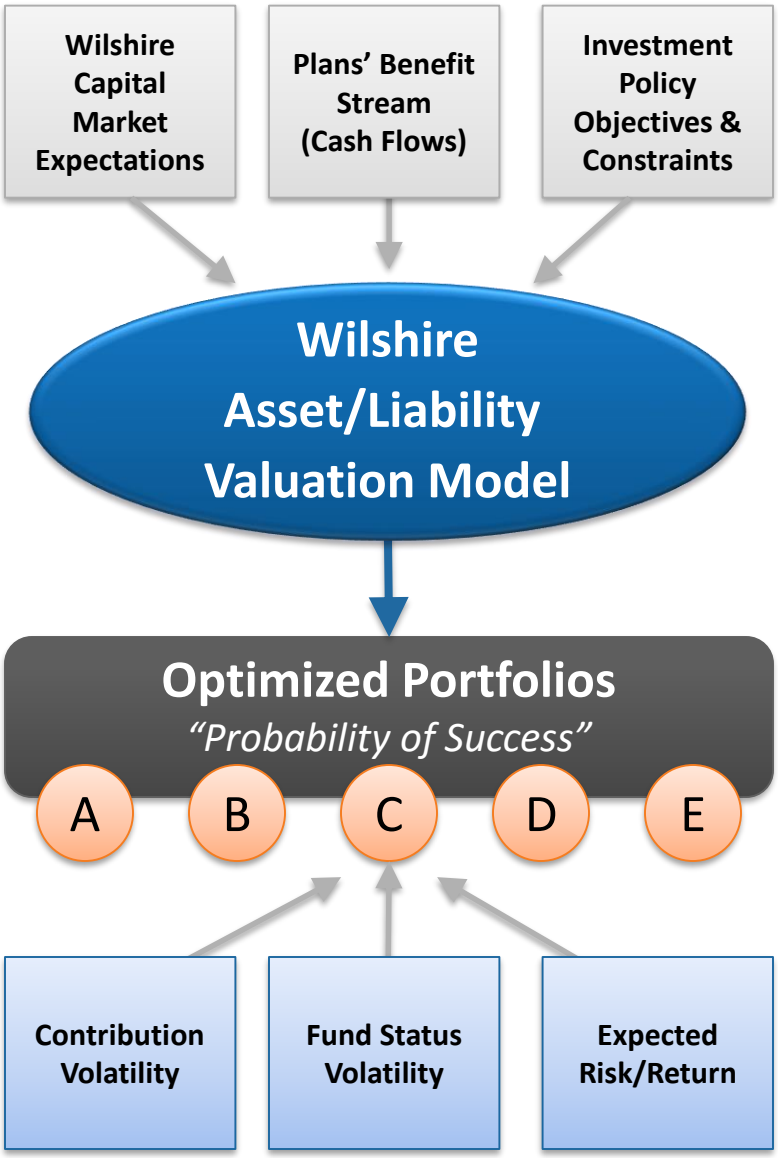
- Investors began considering accounting liabilities
- Potential to mitigate funded status volatility using:
  - Cash Flow Matching
  - Immunization
  - Surplus Optimization
  - Swap / Derivatives Overlay
  - Duration Extension

Wilshire Asset Liability Valuation Model (ALV)

- Wilshire's proprietary asset / liability model (ALV)
- Considers the benefit commitment – the true economic liability – while also incorporating the merits of MVO

* There is no standard definition for Liability Driven Investing. Vendors of LDI-based products (insurance companies, investment managers, brokers, etc.) tend to define it in ways that align with their individual product offerings.

Wilshire ALV Model



- Wilshire believes the mission of a defined benefit plan is to fund benefits promised to participants
- The role of asset allocation is to manage risk in order to fulfill that core mission
  - *Maximize safety* of promised benefits (*Addressed by managing drawdown and liquidity risk)*
  - *Minimize cost* of funding these benefits *(Addressed by managing inflation and shortfall risk)*
- Wilshire's Asset Liability Valuation (ALV) model provides methodology for selecting policy portfolio that considers both goals
- Given that short-term volatility is also important, we identify the impact of the asset allocation decision on funded ratios, annual contribution requirements, and other metrics.

Scenario Analysis – 2014 Simulation

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ERF funded ratio was projected over a period of ten years (2014 to 2024)

Asset returns were simulated 5,000 times a year over that period.

The simulation was done using liability and cash flow data provided from the system actuary.

- The system liability ranges from $3.67 billion as of June 30 2014to $4.63 billion at June 30, 2024
- Benefit payments range from $244 million to $374 million over the projection period.
- Employee contributions range from $46 million to $61 million over the projection period.
- Employee contributions (into the plan) range from $46 million to $58 million over the projection period.

Alternative Policies – Example of Initial Modeling from 2014

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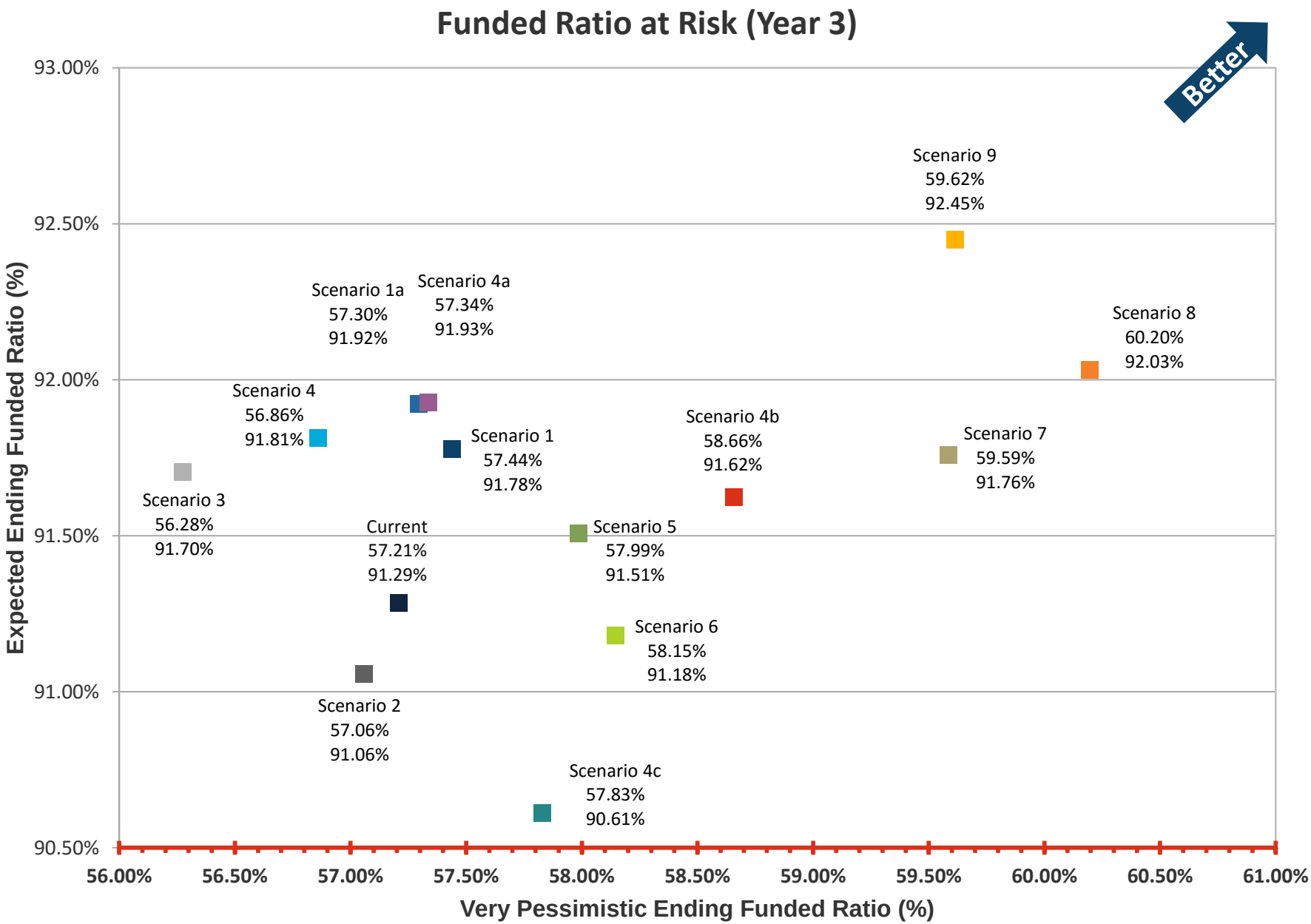
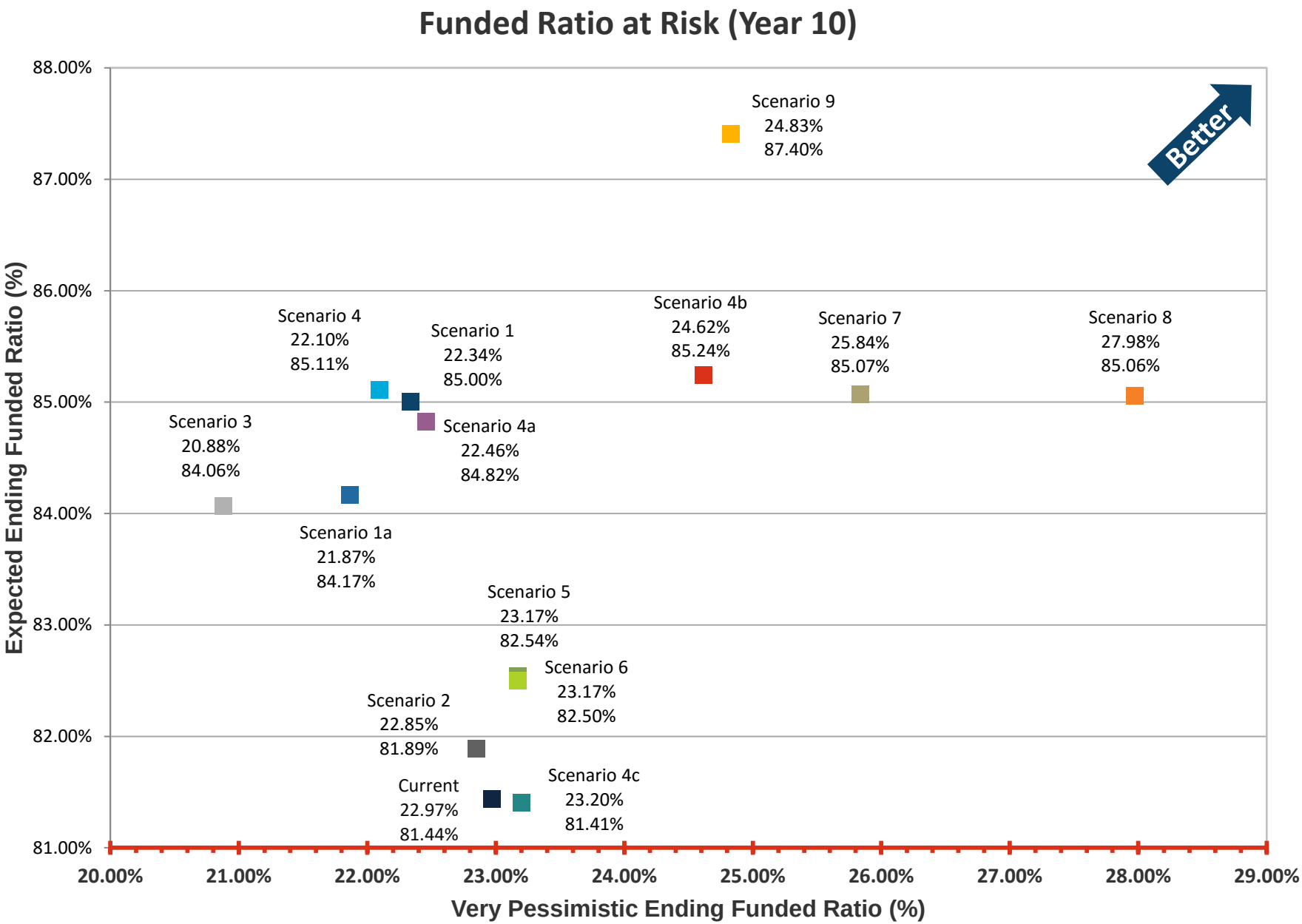
	Current Policy	Scenario 4	Scenario 4a	Scenario 4b	Scenario 4c
Domestic Equity	22.5%	20.0%	20.0%	15.0%	15.0%
International Equity	22.5%	22.5%	20.0%	15.0%	15.0%
Global Equity	5.0%	5.0%	5.0%	5.0%	5.0%
Domestic Low Volatility Equity	0.0%	0.0%	0.0%	0.0%	0.0%
Global Low Volatility Equity	0.0%	0.0%	0.0%	10.0%	10.0%
Private Equity	5.0%	5.0%	5.0%	5.0%	5.0%
Total Equity	**55.0%**	**52.5%**	**50.0%**	**50.0%**	**50.0%**
Investment Grade Fixed Income	15.0%	12.5%	12.5%	12.5%	12.5%
High Yield Fixed Income	15.0%	15.0%	15.0%	15.0%	15.0%
Credit Opportunities	0.0%	2.5%	2.5%	2.5%	2.5%
Total Fixed Income	**30.0%**	**30.0%**	**30.0%**	**30.0%**	**30.0%**
REITs	5.0%	5.0%	5.0%	5.0%	7.5%
Private RE	5.0%	5.0%	5.0%	5.0%	5.0%
MLPs	5.0%	7.5%	10.0%	10.0%	7.5%
Timber	0.0%	0.0%	0.0%	0.0%	0.0%
Total Real Assets	**15.0%**	**17.5%**	**20.0%**	**20.0%**	**20.0%**
Hedge Funds	0.0%	0.0%	0.0%	0.0%	0.0%
Total Alternatives	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Allocation	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Expected (Median) Return (%)	**6.59**	**6.72**	**6.78**	**6.77**	**6.67**
Standard Deviation of Return (%)	**11.66**	**11.56**	**11.35**	**10.97**	**10.98**
Cash Yield (%)	**3.72**	**3.81**	**3.88**	**3.92**	**3.87**
+/(-) in Expected Return (bps)		13	19	18	8
+/(-) in Standard Deviation of Return (bps)		(10)	(31)	(69)	(68)
Return/Risk	**0.57**	**0.58**	**0.60**	**0.62**	**0.61**
Contribution to Asset Volatility:					
Equity	80.6	77.2	74.2	73.0	73.1
Fixed Income	10.3	11.5	11.9	12.3	12.3
Real Assets	9.1	11.3	14.0	14.7	14.6
Alternatives	0.0	0.0	0.0	0.0	0.0

Funded Ratio At Risk Chart



Funded Ratio At Risk Chart



Research and Enhancements - Factor Based Asset Allocation Framework

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Including factors within the asset allocation process provides an opportunity to measure asset class (and portfolio) exposures to key economic factors

If the underlying economic activity that drives asset performance can be identified, perhaps it can be used to assist in building economically-efficient portfolios

Macroeconomic risk factors – when separated from the valuation component inherent in investment pricing – may exhibit more stable correlations and, therefore, can better inform the allocation process

Research and Enhancements - Factor Based Asset Allocation Framework

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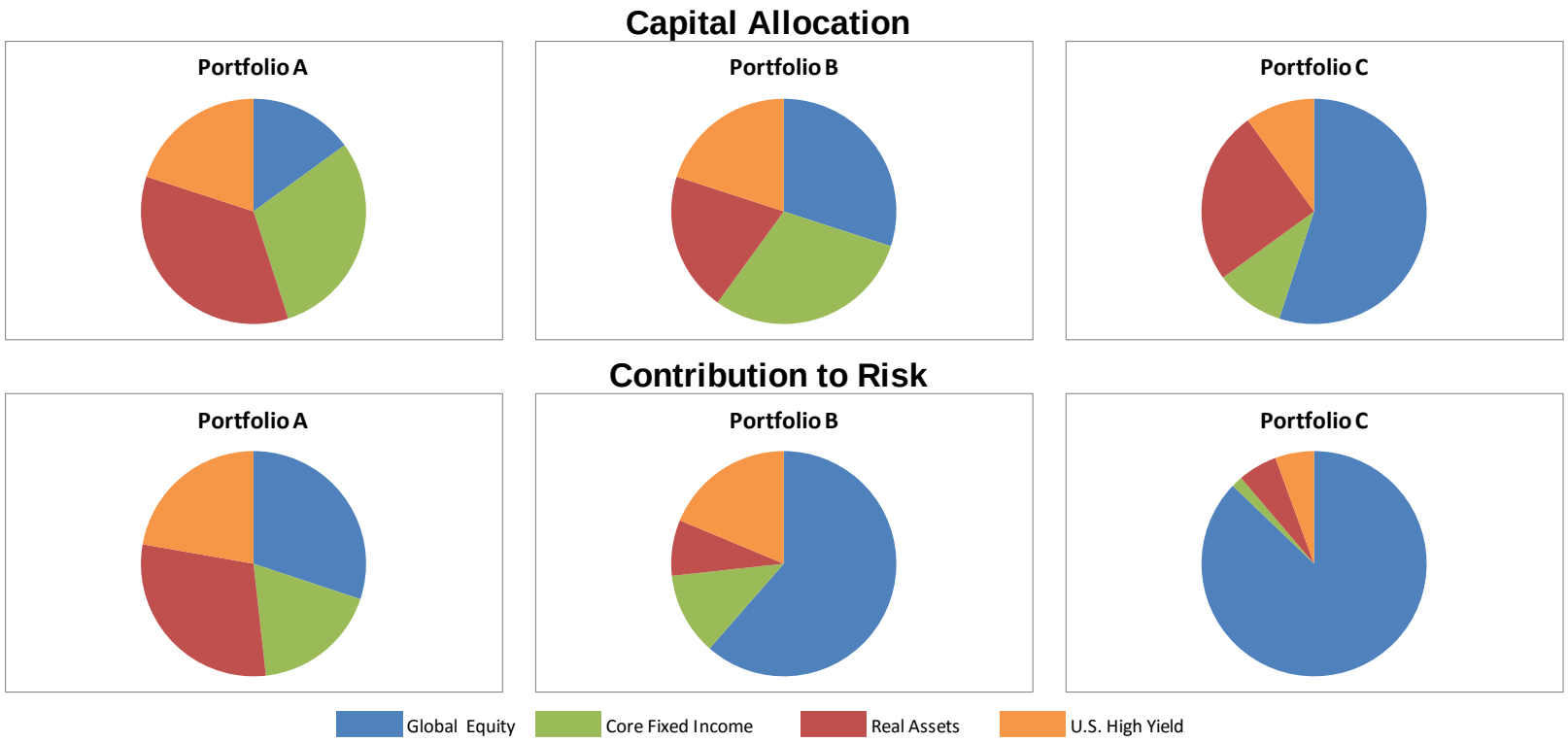
Utilize factor exposures as another way to look at risk

Consider 3 example portfolios – low, moderate and high risk – from the perspectives of capital and risk allocations



All 3 are fairly well diversified in terms of capital allocation

Concentration to global equity begins to emerge in terms of risk contribution, particularly in portfolio C

Research and Enhancements - Factor Based Asset Allocation Framework

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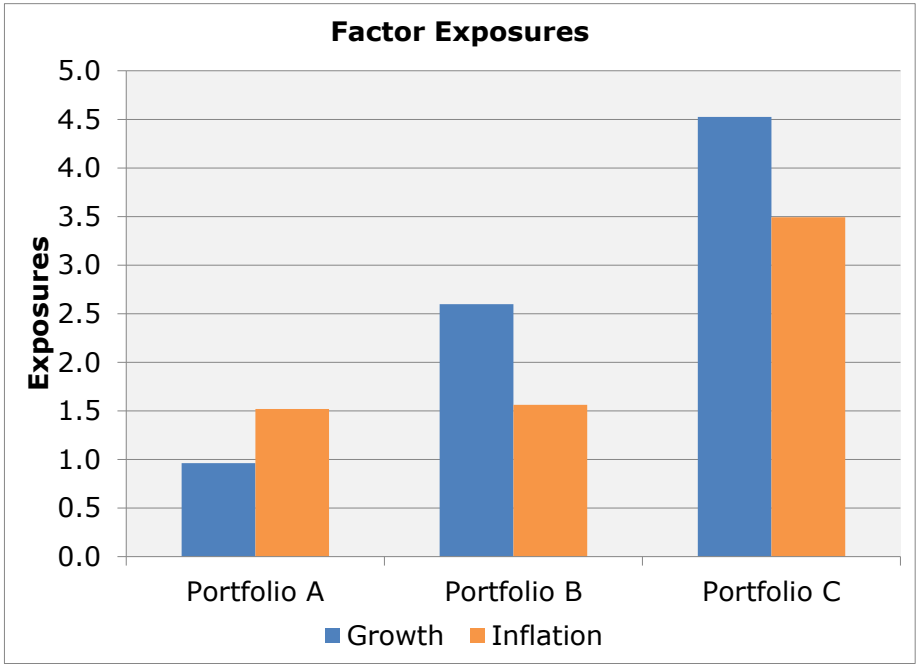
Portfolio exposures can help identify risk concentrations that may not have been readily apparent previously

Portfolio B, which showed reasonable balance across investment buckets, reveals notable exposure to growth (2.6)

- Suggests portfolio may be particularly vulnerable to periods of slowing or contracting growth
- Due to heavy growth exposures of equities and high yield bonds, whose similar behavior during a downturn would be masked by a static correlation estimate



Research and Enhancements - Factor Based Asset Allocation Framework

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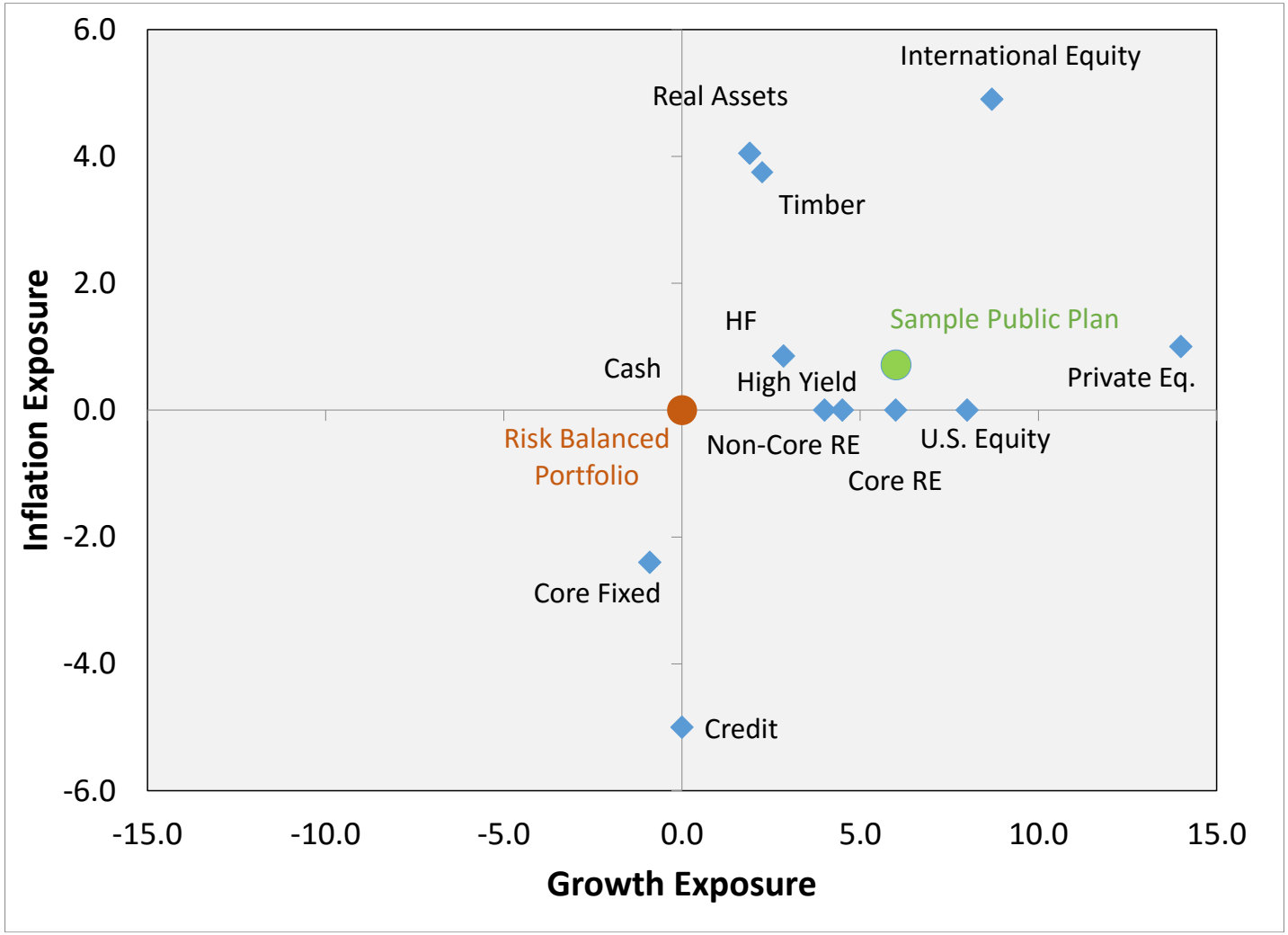
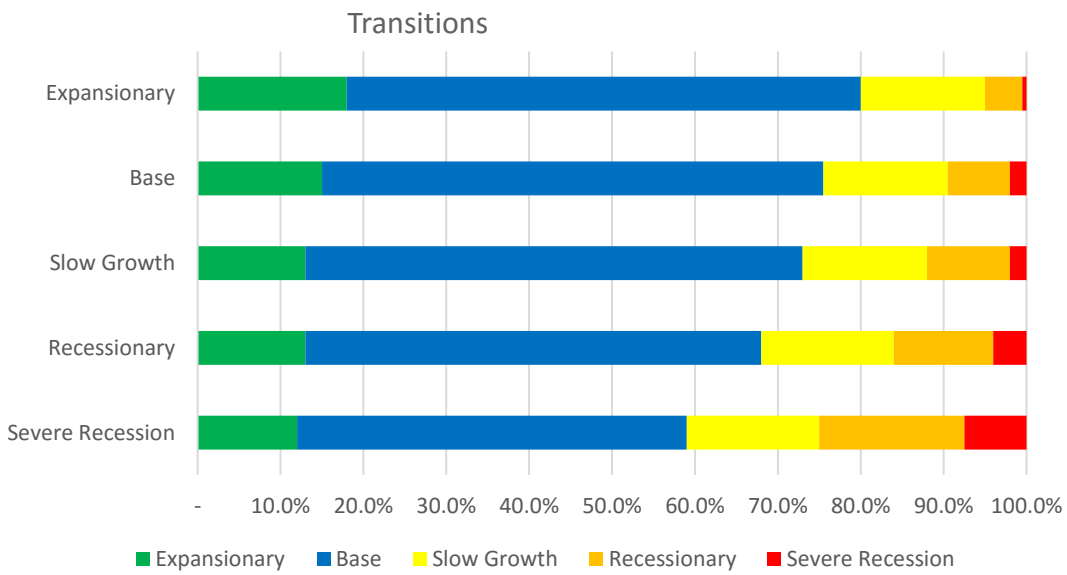
- Concentrated factor tilts can represent portfolio vulnerability to certain economic regimes
- To the extent possible, portfolios with factor neutrality are desirable



Research and Enhancements - Regime Switching Model

- Many simulation and optimization models assume investment returns are log-normally distributed. While a log-normal return is a good match for returns in most years, left tails have been much larger than predicted.

	expansionary	base	slow growth	recessionary	severe recession
expansionary	18.0%	62.0%	15.0%	4.5%	0.5%
base	15.0%	60.5%	15.0%	7.5%	2.0%
slow growth	13.0%	60.0%	15.0%	10.0%	2.0%
recessionary	13.0%	55.0%	16.0%	12.0%	4.0%
severe recession	12.0%	47.0%	16.0%	17.5%	7.5%



- Wilshire can incorporate an economic regime switching model with distributions assigned to each asset class in different economic regimes. A transition matrix determines the probability of moving from one regime to the next in any period.

Summary

- Determining an asset allocation policy is the most important decision a plan sponsor makes when affecting the investment return and risk level of their plan assets and their ability to service the financial objectives of the plan.

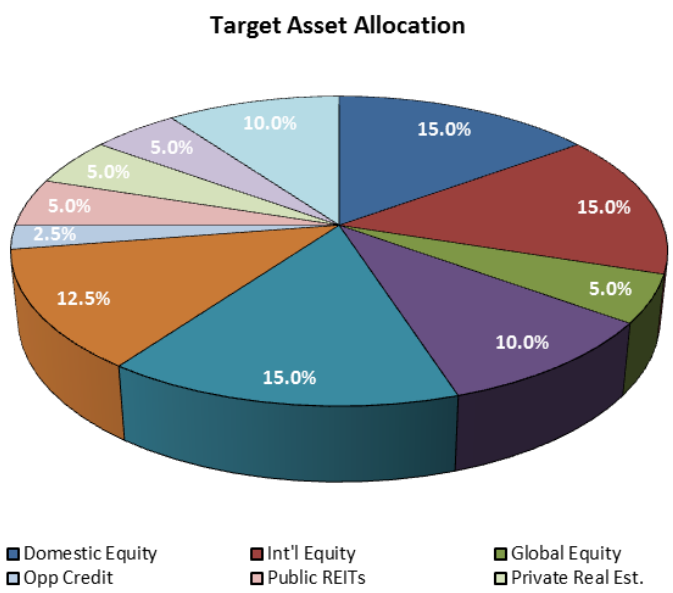
- Asset class risk, return and correlation assumptions are key drivers in determining the return and volatility expectations of a plan's portfolio.

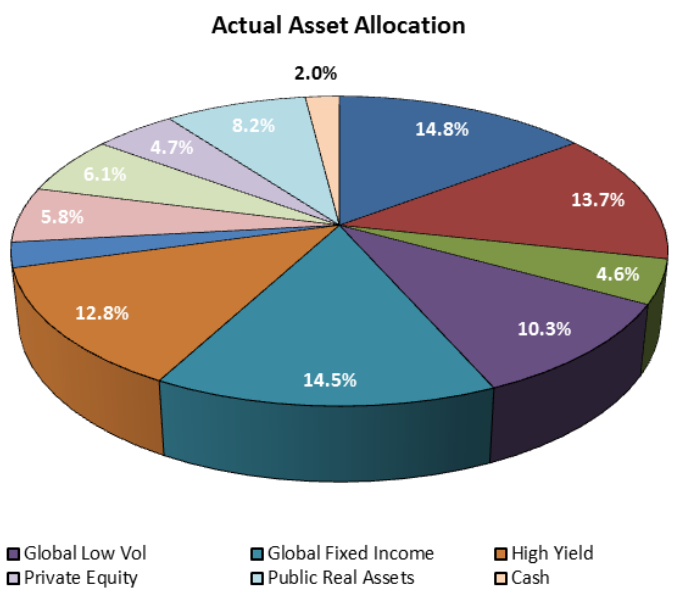
- While diversification typically improves with additional asset classes, client risk tolerance and return objectives may provide a qualitative guide to the optimization process.

- Asset-liability optimization models can be used to analyze multiple scenarios across the risk/return and cost/benefit spectrum.

Current Asset Allocation

Current Asset Allocation





Strategic Objectives that drove shifts in 2014 Asset Allocation study

Return and yield enhancers:

- Increase MLPs

Increase risk/return tradeoff by potentially reducing equity volatility

- Add Low Volatility Equity strategies

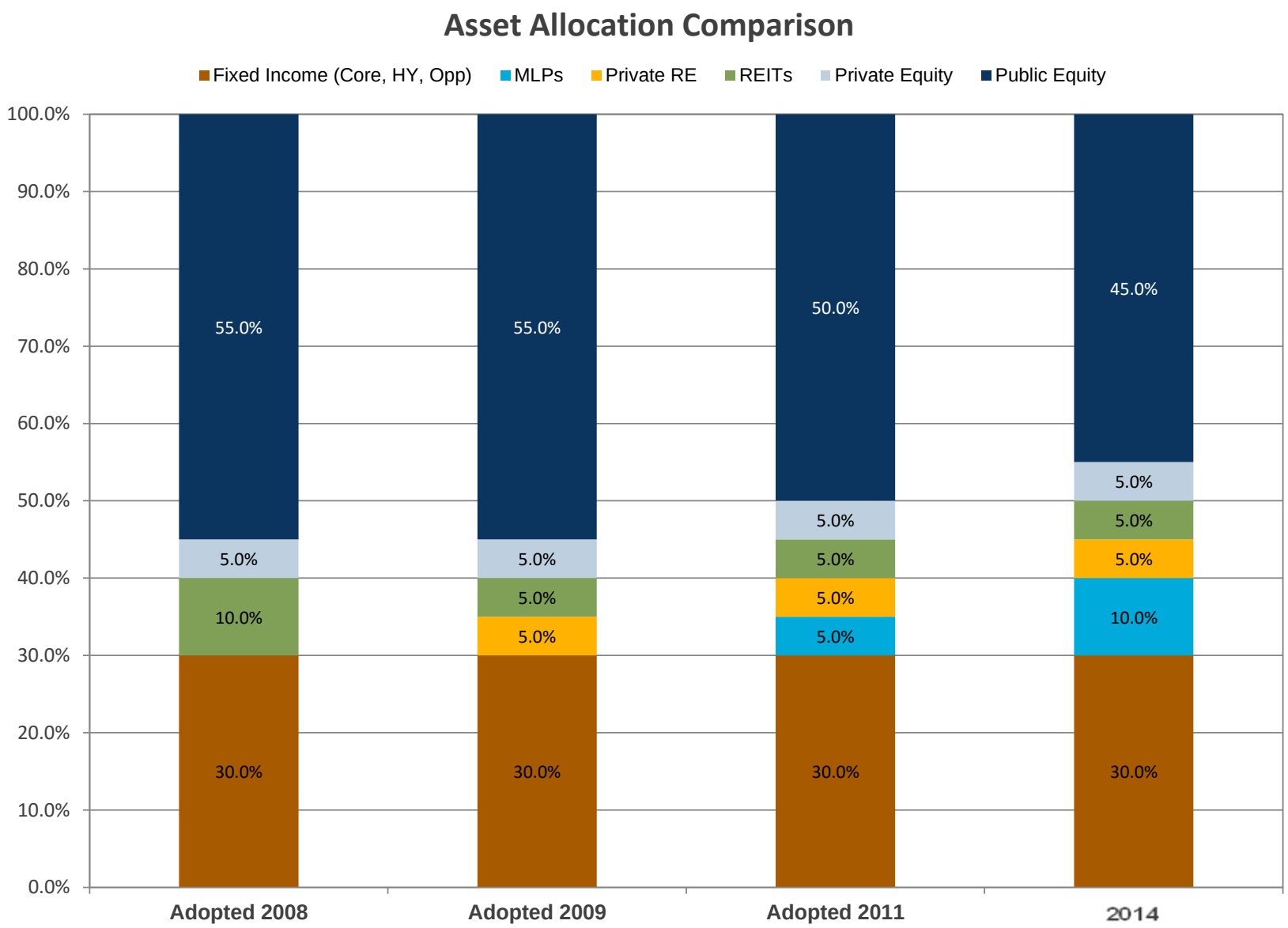
Diversify fixed income exposure

- Add Credit Opportunities

Timber and Hedge Funds were considered but not implemented at the time because of complexity, cost, and Board preferences

New policy portfolio increased the overall diversification of the Fund and reduces the reliance on public equities to drive future returns

Asset Allocation Evolution



Importantly, the composition of Public Equity and Fixed Income continued to evolve with addition of Low Volatility Equity and Credit Opportunities.

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