Asset Liability Management

Stephen Gilmore, Chief Investment Officer
Scott Terando, Chief Actuary

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Today’s Discussion

Seeking the Board’s feedback on the following:

I. Some Key Concepts

II. Risk

III. Total Portfolio Approach

IV. 2025 Asset Liability Management

Framework Considerations

To Guide Us During 2025 Asset Liability Management

- **Understanding the Portfolio and Value Creation**
  We can approximate our portfolio using simple liquid strategies, and we should expect to add value to those strategies

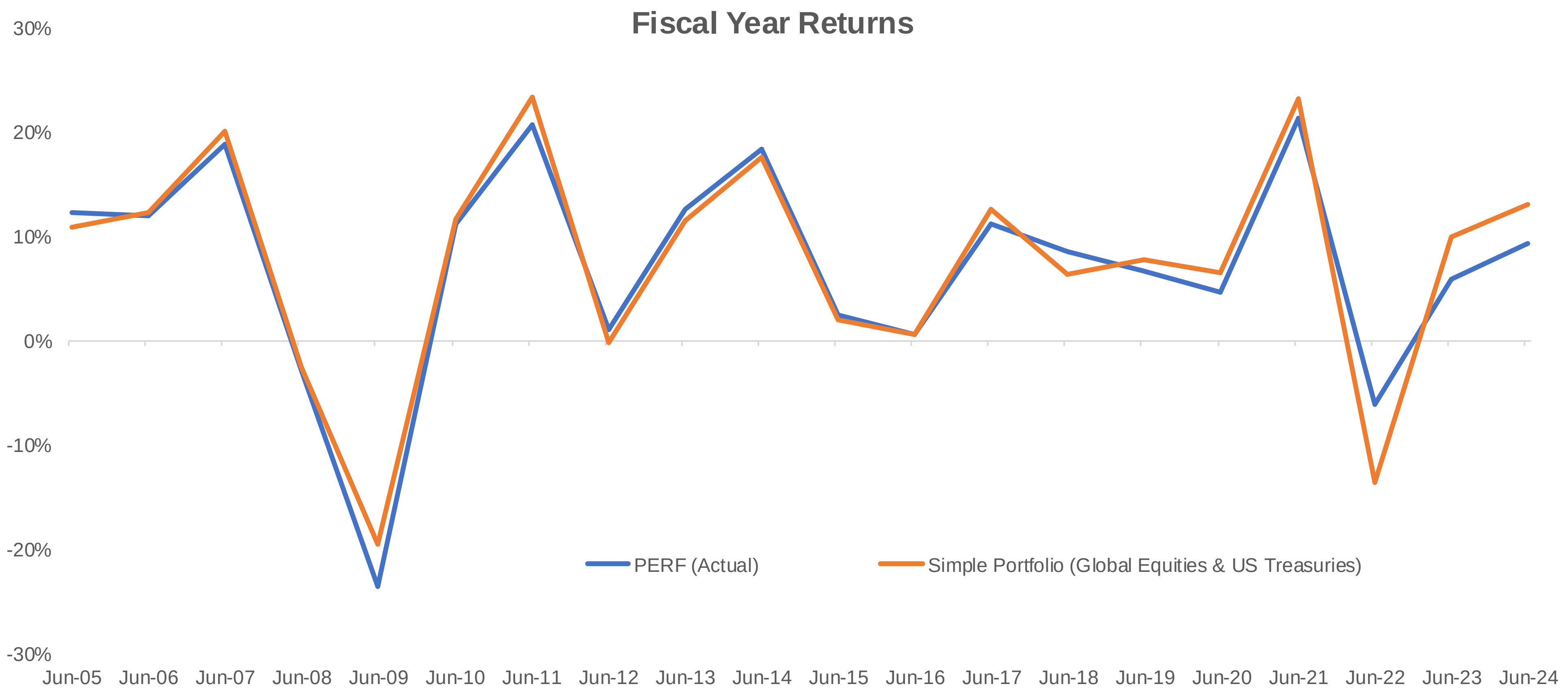
- **Portfolio Implementation and Risk Alignment**
  The team has flexibility to implement the portfolio, but a key step in portfolio implementation is agreeing on our risk appetite

- **Return Objectives and Valuations**
  Our return objective remains challenging, especially as higher valuations are associated with lower future expected returns

- **Holistic, Long-term Portfolio Approach**
  A total portfolio approach, with a genuine long horizon, can add value; the return assumption should be based on the asset allocation, which is in turn a function of risk appetite.

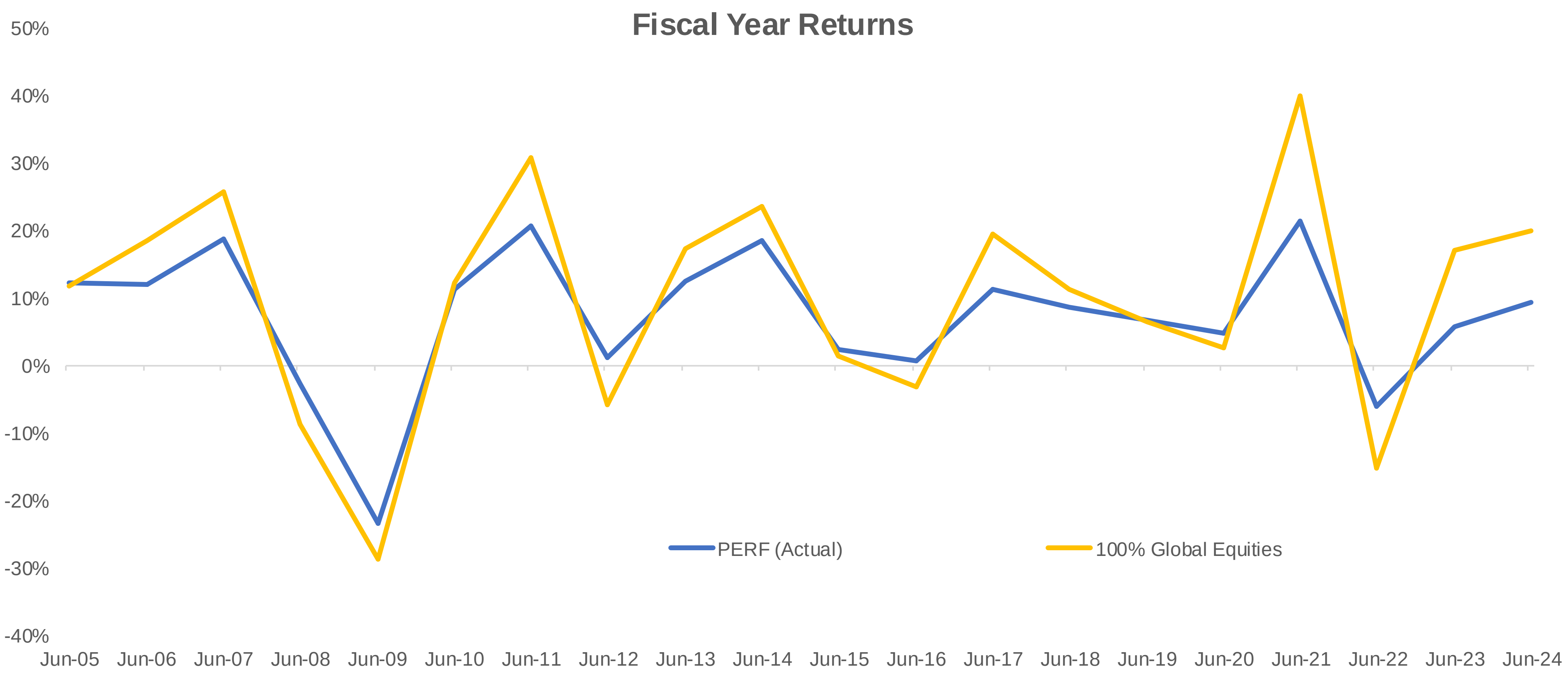
PERF Returns Versus Simple Portfolio

Approximate PERF Using Simple Liquid Strategies



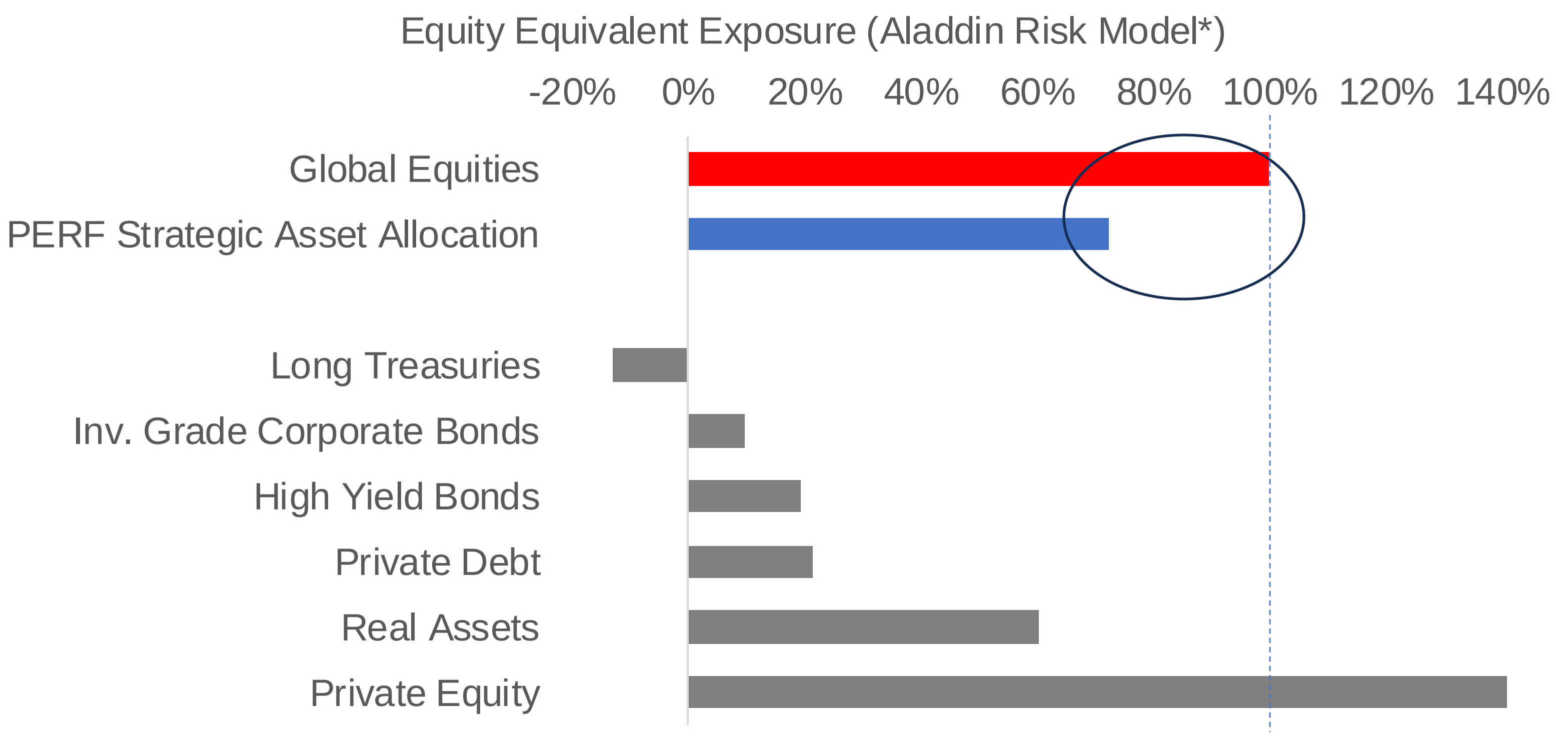
PERF Returns Versus 100% Equity

Equity Returns Explain Most of PERF Risk



Equity Equivalent Exposure

Relative Sensitivity to Equity Market Movements

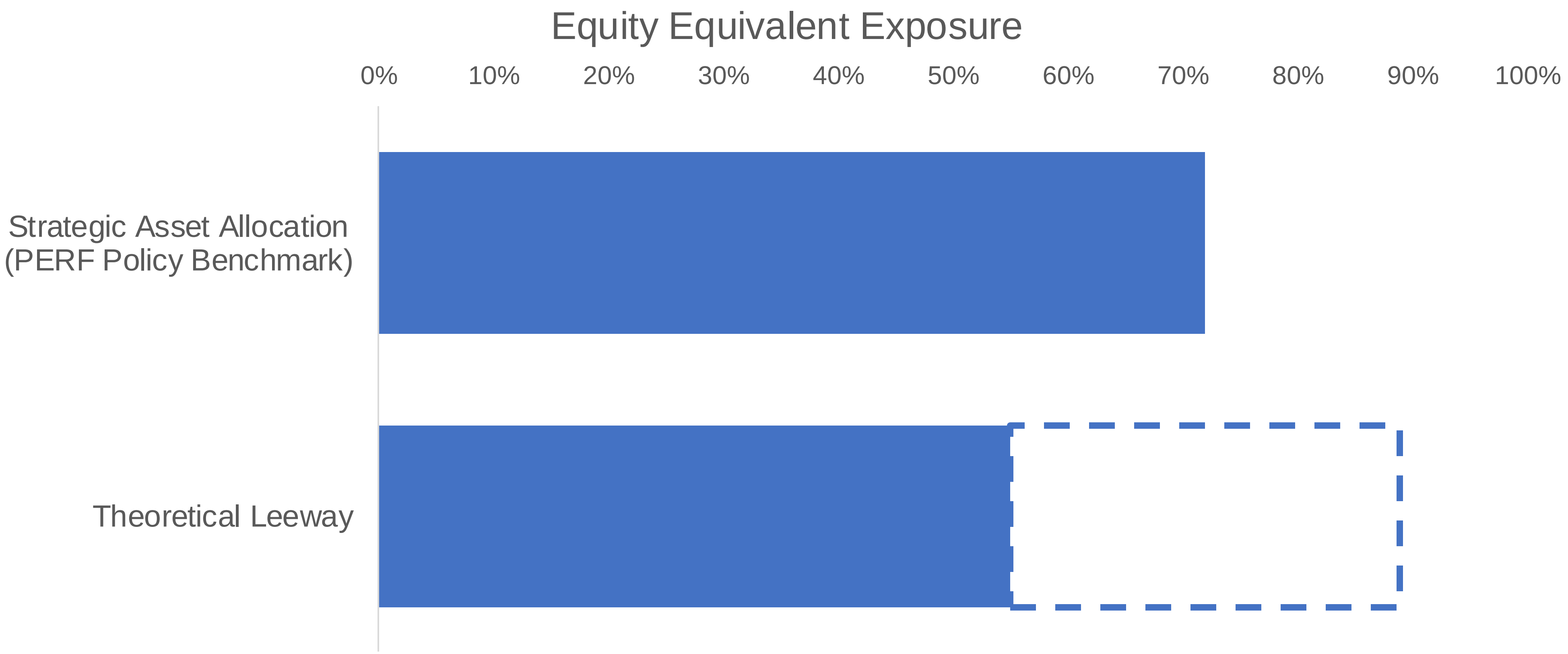


We define "Equity Equivalent Exposure (EEE)" as: Expected change on an asset/portfolio relative to change in the equity market, during a sustained equity move

* Source: CalPERS implementation of Aladdin risk model. The model is based on an economic fair value representation of the assets and does not consider valuation lags in illiquid assets. Realized EEE of private assets based on valuations over shorter horizons is expected to be significantly lower.

Portfolio Implementation

The Team Has Flexibility To Implement The Portfolio



Risk Considerations and Tradeoffs

Risk Considerations		Tradeoffs	
ALM Central to Mission	Target lower investment risk for more consistent contribution rates and stable funding ratios	**Contribution & Funding**	Target higher investment returns, leading to lower expected total contributions over time
	Use more conservative return assumptions, generally leading to the probability of higher contributions today	**Discount Rate**	Use more aggressive return assumptions, generally leading to the probability of higher contributions tomorrow
Business Model Investment Governance, Organization, Process, & Reputation	Adhere more closely to industry norms and proven approaches to reduce risk of failures	**Innovation**	Make greater use of innovative / non-standard approaches, with potential for upside
	Run fewer, simpler, more scalable strategies, reducing management and oversight burden	**Complexity**	Run more complex, less scalable strategies to target incremental value add
	More use of external managers to maximize breadth of expertise we can access	**Internal vs External**	More use of internal staff and supporting infrastructure, to internalize skillsets and reduce costs
	Minimize costs (and the risk of paying something that doesn't deliver on expectations)	**Costs**	Maximize after-cost returns (i.e., expensive strategies that generate higher net returns)
Portfolio Exposure of Assets to the Market	Target lower and shorter markdowns in portfolio value, improving consistency	**Drawdown**	Accept higher and longer markdowns to increase long term expected returns
	More closely track benchmarks, external indices, and peer returns, reducing risk of behavioral mistakes	**Benchmark Relative**	Accept greater divergence from external reference points in pursuit of long- term outcomes
	Maintain more excess liquidity to improve ability to dynamically respond to opportunities	**Liquidity**	Make fuller use of available liquidity today to harvest premiums from illiquid strategies
Sustainability Institutional Priority	Minimize climate risk impact on portfolio by excluding companies/ industries with stranded asset risk	**Climate Change**	Manage climate risk impact by seeking to generate returns through awareness of climate-related risks and opportunities across assets (e.g. transition solutions)
	Seek to drive change by withdrawing capital from companies not fully aligned with CalPERS' values	**Values Alignment**	Leverage CalPERS' ownership positions and peer leadership to drive change through engagement

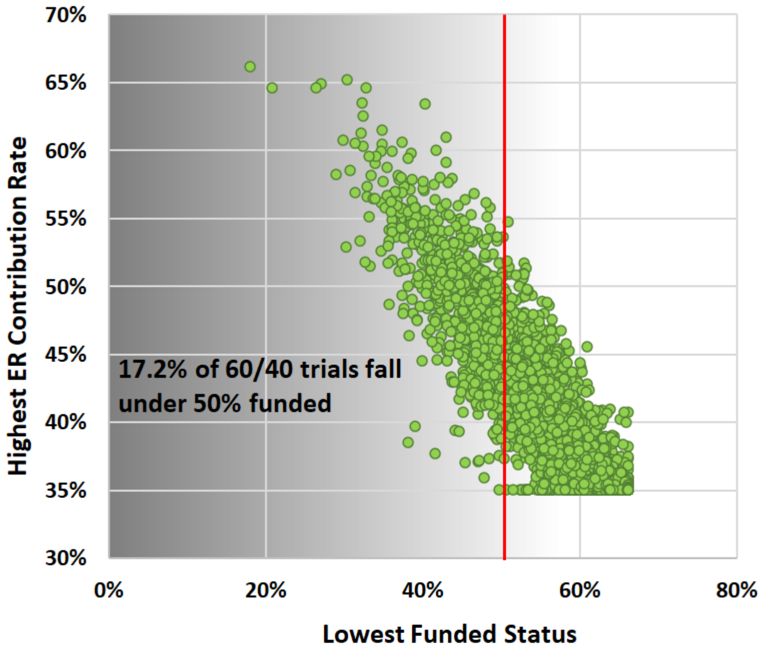
A Key Tradeoff

Contribution / Funding Level

60% /40% Portfolio

Median Employer Contribution Rate	30.3%
Median Funded %	78.8%

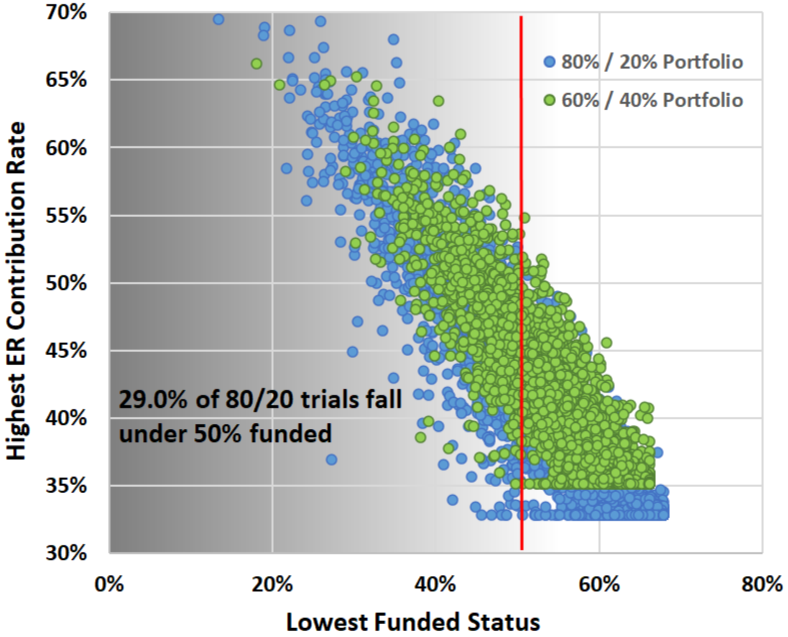
Advantage 60/40 Portfolio



80% /20% Portfolio

Median Employer Contribution Rate	28.4%
Median Funded %	79.9%

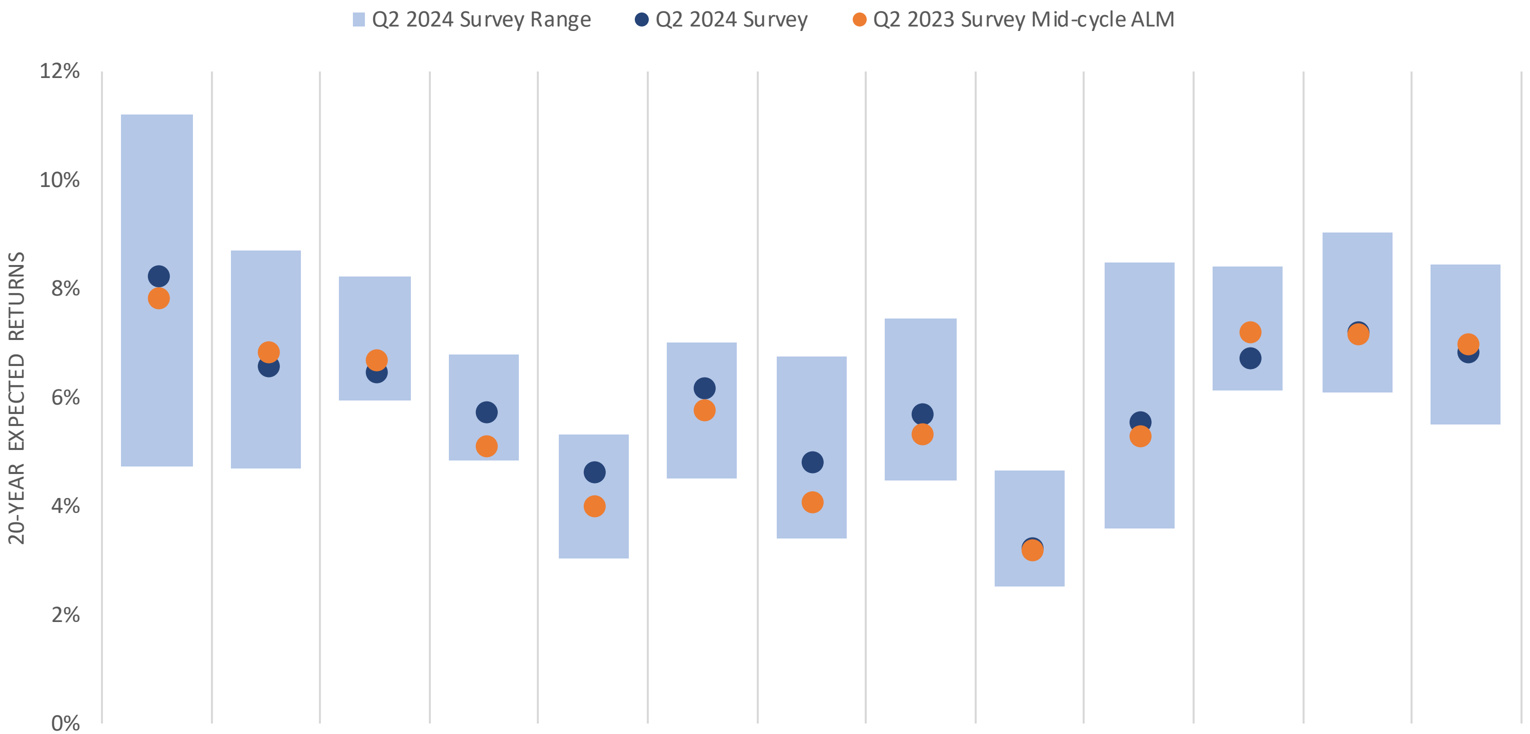
Advantage 80/20 Portfolio



Results based on 5,000 trials of simulated investment returns under the two portfolios over a 20-year period.

Capital Market Assumptions Survey

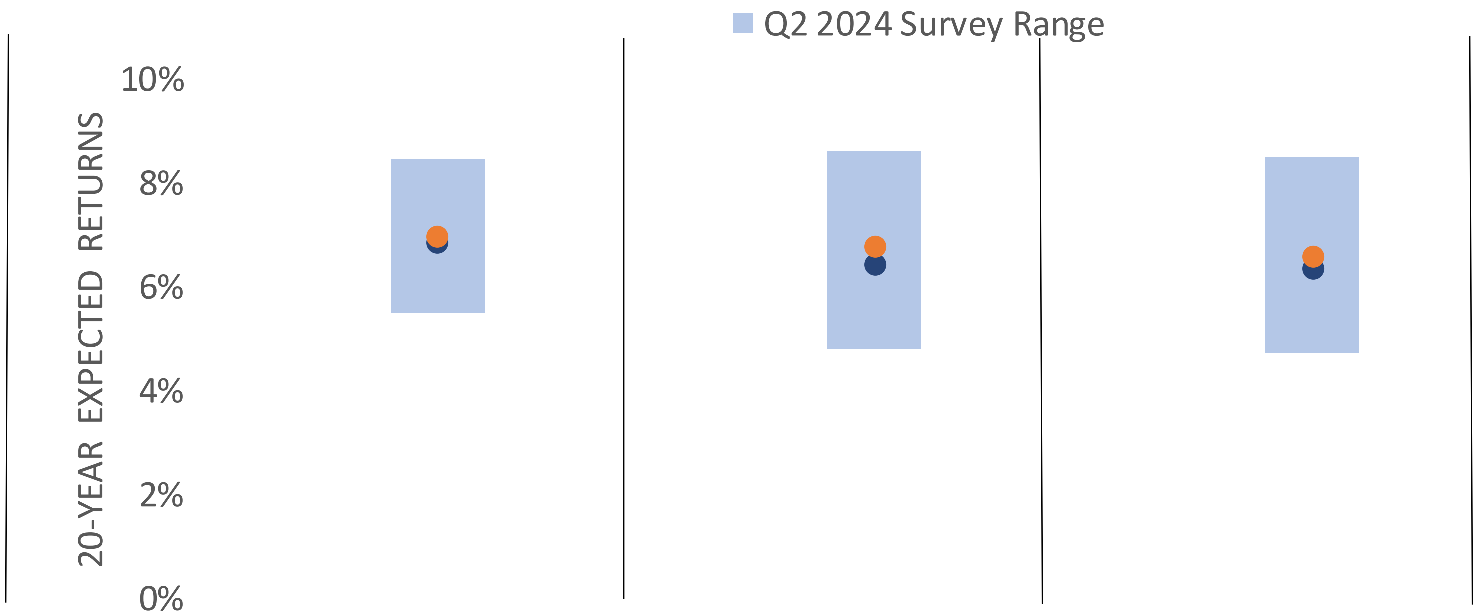
Survey Median and Range – 20-Year Outlook



	PE	Eq.C	Eq.F	EM	MBS	HY	Tsy	IG	Liq	RE	PD	Infra	Policy.P
Q2 2024 Survey	8.3%	6.6%	6.5%	5.8%	4.7%	6.2%	4.8%	5.7%	3.2%	5.6%	6.7%	7.2%	6.9%
Q2 2023 Survey Mid-cycle ALM	7.9%	6.9%	6.7%	5.1%	4.0%	5.8%	4.1%	5.3%	3.2%	5.3%	7.2%	7.2%	7.0%

Projecting 20-Year Returns

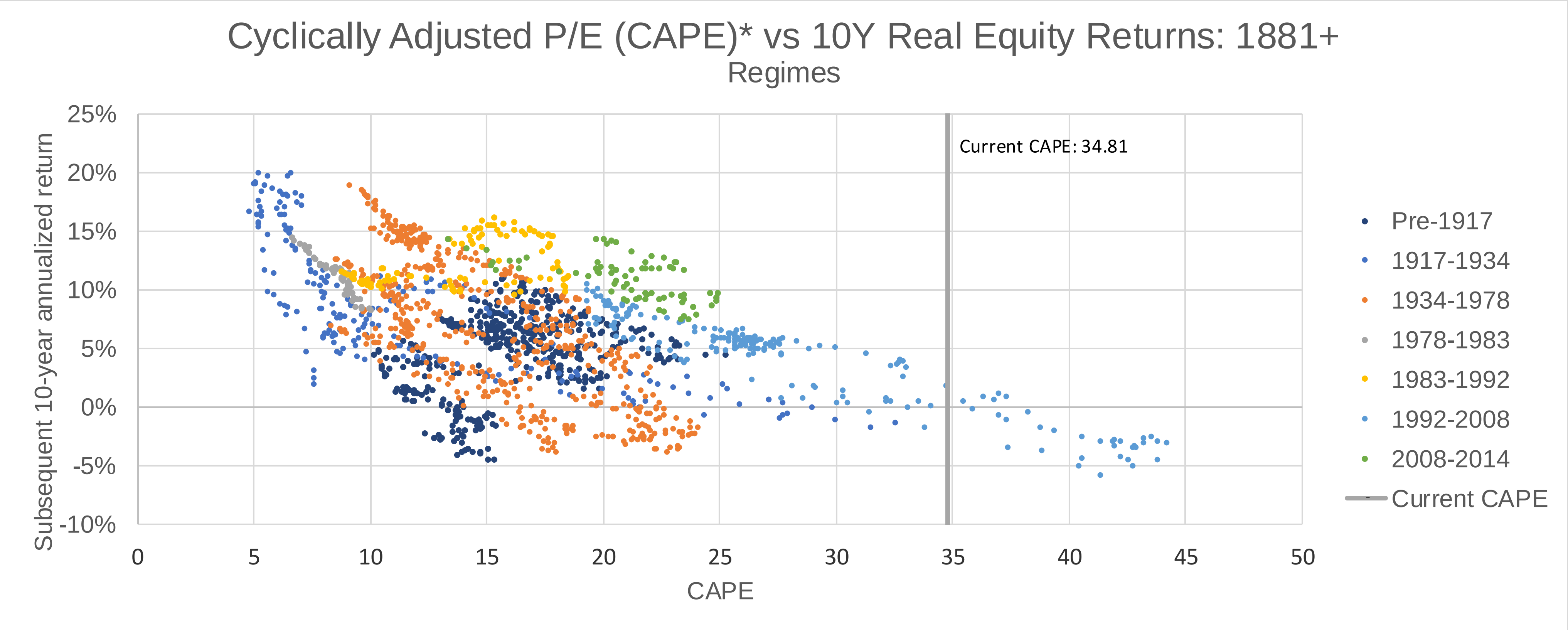
Projecting 20-Year Returns: Comparing Policy Portfolio and Simple Mix



	Policy Portfolio	80-20 Portfolio	70-30 Portfolio
Q2 2024 Survey	6.9%	6.5%	6.4%
Q2 2023 Survey Mid-cycle ALM	7.0%	6.8%	6.6%

Elevated Valuations Impact Long-Term Returns

Historical Lesson: Periods of elevated valuations have often resulted in subpar long-term performance

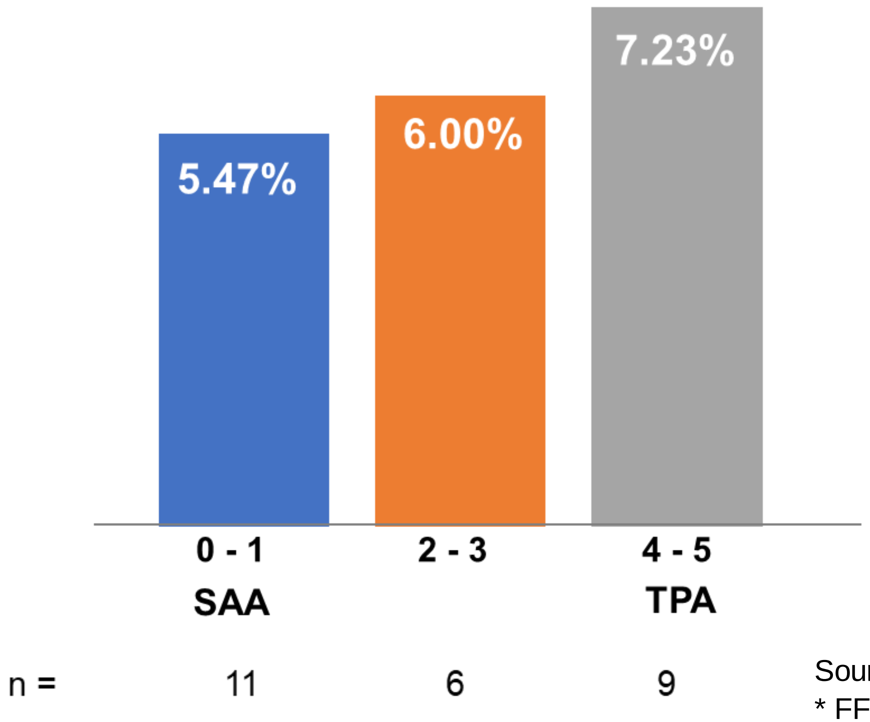


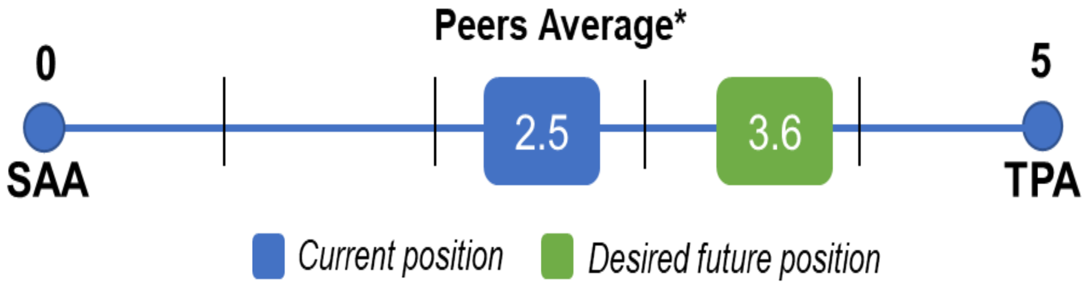
Source: Shiller data
** CAPE: A valuation metric that compares current prices to the 10-year average of inflation-adjusted earnings.*

Total Portfolio Approach

Performance Impact (TPA vs SAA)

10-Year annualized real net return





Source: Global Asset Owner Peer Study Report 2024, Willis Towers Watson Thinking Ahead Institute
* FF-TAI Peer Study 2024 (n=26)
https://www.thinkingaheadinstitute.org/content/uploads/2024/07/FF-TAI_AOPS24_Summary-Report.pdf

Total Portfolio Approach

SAA to TPA Spectrum

	SAA 0	1	2	3	4	TPA 5
Performance assessed vs.	Benchmarks					Fund goals
Success measured by:	**Relative value added**					**Total fund return**
Opportunities for Investment defined by:	Asset classes					Contribution to total portfolio outcome
Diversification principally via:	**Asset classes**					**Risk factors**
Asset allocation determined by a:	Board-centric process					CIO-centric process
Frequency of change:	**Infrequent, calendar meeting based**					**Continuously monitored, changes made in real time**
Portfolio implemented by:	Multiple teams competing for capital					One team collaborating together
Integrated ESG+ stewardship/ divestment:	Bottom-up only					Top-down and bottom-up integrated
3D investing, net zero investing:	Separate bottom up / top-down process					Top-down and bottom-up integrated on risk, return and impact

Source: Global Asset Owner Peer Study Report 2024, Willis Towers Watson Thinking Ahead Institute
* FF-TAI Peer Study 2024 (n=26)
https://www.thinkingaheadinstitute.org/content/uploads/2024/07/FF-TAI_AOPS24_Summary-Report.pdf

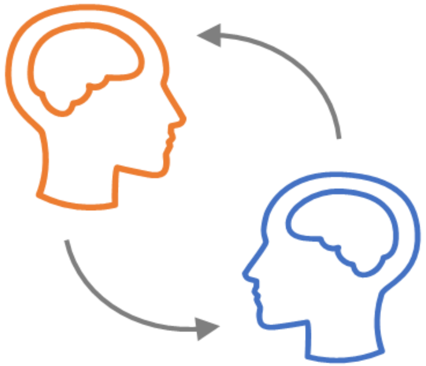
Leveraging Our Strengths

Size

Long Horizon

Brand

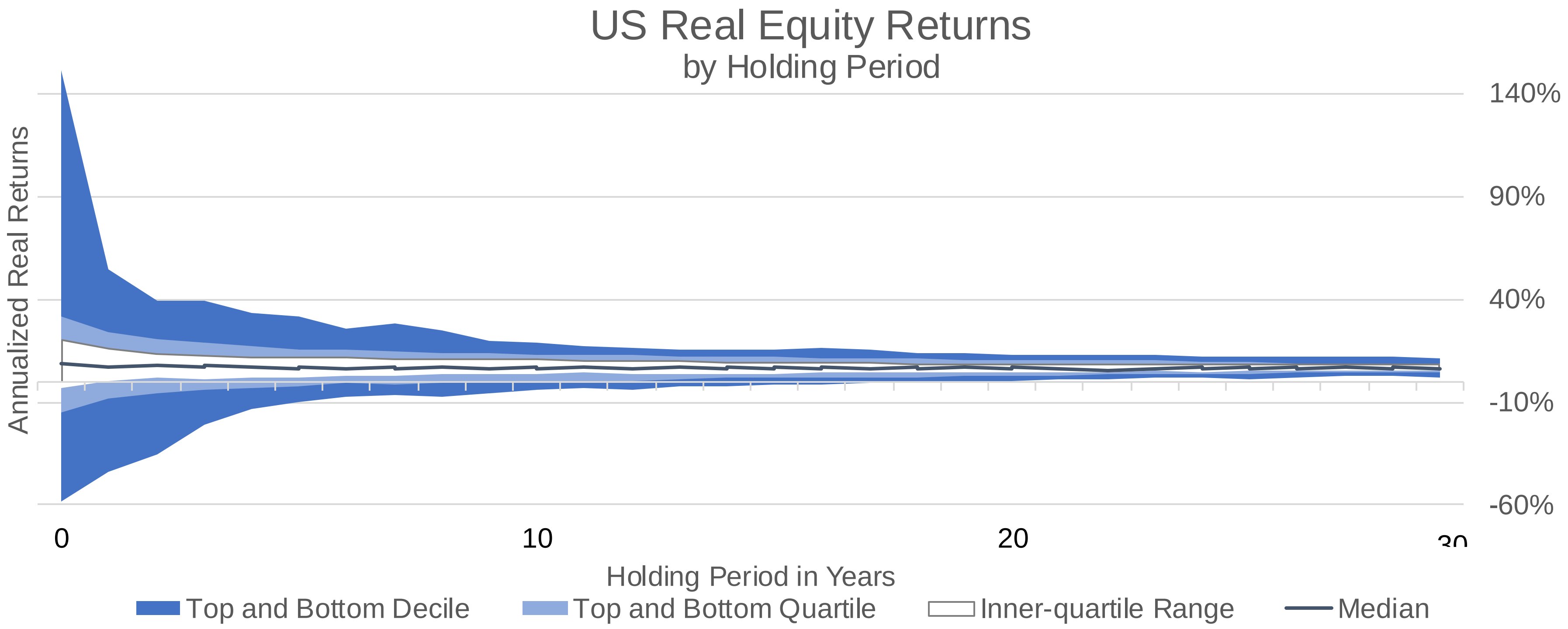
Internal Knowledge



The Time Horizon Effect

How Outcomes Vary With Timeframes

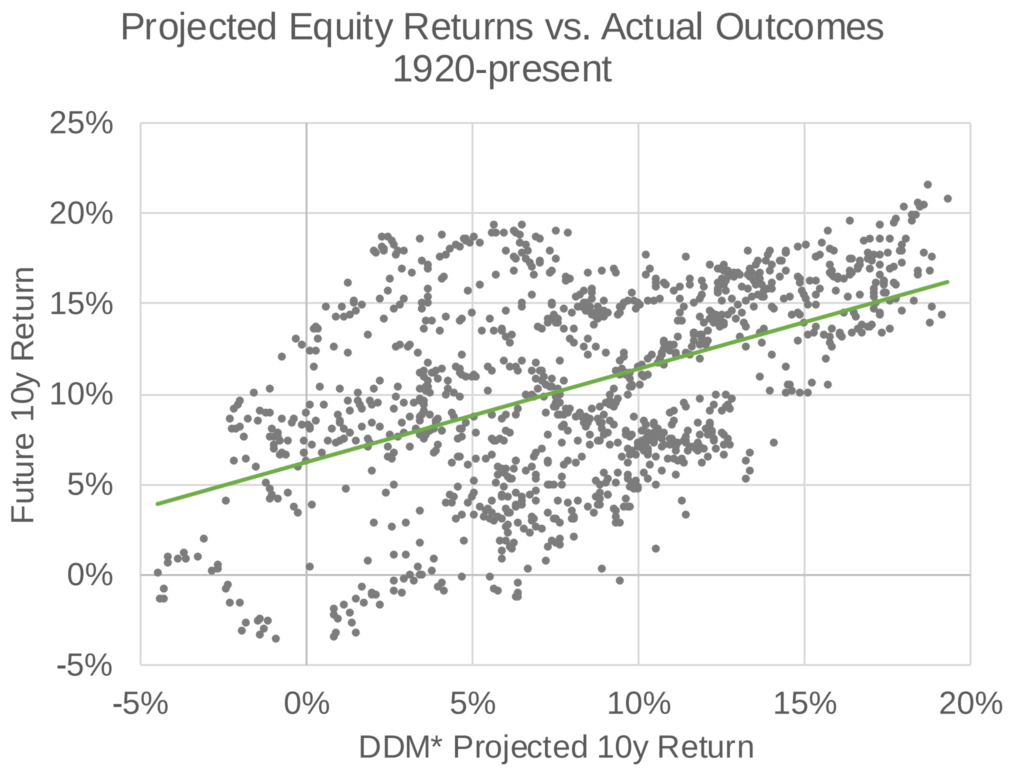
Short-horizon returns exhibit greater variability than long-horizon returns, resulting in low forecasting accuracy.

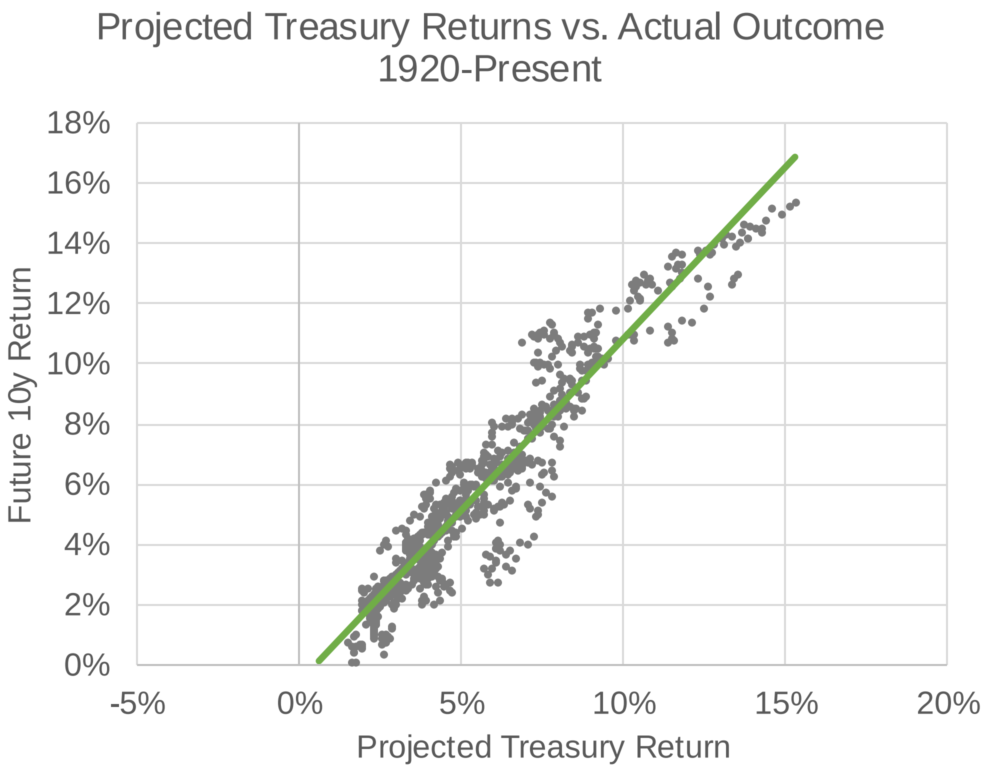


Source: Shiller Data (1871-present)

The Uncertainty of Long-term Return Predictions

The Dividend Discount Model (DDM) for equity shows significant deviations from actual 10-year returns





Source: Shiller data

All numbers are annualized.

** DDM refers to the Dividend Discount Model, a common valuation approach.*

American Academy of Actuaries Guidance

July 2020 Issue Brief "Don't Put the Cart Before the Horse"

ALM Realignment

Set Risk Appetite → **Construct Portfolio** → **Set Investment Rate of Return** | **Set Discount Rate**

https://www.actuary.org/sites/default/files/2020-07/IB.CartB4Horse.pdf

Rate of Return and Discount Rate Don't Need to Match

Different Objectives, Risk, Return, and Discount Rates Across Trusts

Trust	Equity Equivalent Exposure	Expected Return Before Deducting Admin Expenses	Discount Rate	Type	Funded Ratio - June 30, 2023
Public Employees' Retirement Fund (PERF)	72%	7.10%	6.80%	Defined Benefit (Open)	71.40%
Judges Retirement System II Fund	65%	6.45%	6.00%	Defined Benefit (Open)	98.80%
Judges Retirement System Fund*	0%	3.20%	3.00%	Defined Benefit (Closed)	1.90%
Legislators' Retirement System Fund	23%	5.15%	4.50%	Defined Benefit (Closed)	99.90%
Public Employees' Long-Term Care Fund	29%	5.50%	4.75%	Health Care (Closed)	90.00%
California Employers' Pension Prefunding Trust 1	49%	5.65%	n/a	Pre-Funding (Pension)	n/a
California Employers' Pension Prefunding Trust 2	28%	5.15%	n/a	Pre-Funding (Pension)	n/a
California Employers' Retiree Benefit Trust 1	70%	6.50%	n/a	Pre-Funding (Health Care)	n/a
California Employers' Retiree Benefit Trust 2	54%	6.20%	n/a	Pre-Funding (Health Care)	n/a
California Employers' Retiree Benefit Trust 3	42%	5.90%	n/a	Pre-Funding (Health Care)	n/a
Public Employees' Health Care Fund*	0%	3.93%	n/a	Health Care (Open)	n/a

*Cash holding trusts

Asset Liability Management (ALM) Timeline

2024

November

- ALM Concepts & Framework
- *ALM Strategy Session**

2025

January

- Board Education Day
- Stakeholder Forum

February

- *ALM Strategy Session**

March

- ALM Concepts & Framework
- *ALM Strategy Session**

June

- ALM Concepts & Framework
- *ALM Strategy Session**

July

- ALM Concepts & Framework

September

- 1st Reading Proposed Actuarial and Investment Objectives
- *ALM Strategy Session**

November

- Final Approval of Proposed Actuarial and Investment Objectives
- Affiliate Funds Capital Market Assumptions

2026

March

- Affiliate Funds Final Approval of Strategic Asset Allocation
- *PERF Implementation Plan**

June

- *Affiliate Funds Implementation Plan**

** Closed session*