Asset Liability Management: Key Risk Tradeoffs and Risk Appetite

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Today's Discussion

Follow Up From January Risk Activity

Review and Discuss Results and Takeaways

Revisit the Key ALM Risk Tradeoffs

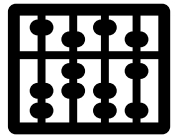
Risk Appetite

Reference Portfolio Plus Active Risk Parameters

January Education Day Follow Up

Informing and Building Towards a Total Portfolio Risk Appetite

Risk Tradeoffs Activity → **More Education and Discussion** → **Board Adopted Risk Appetite** → **Management Constructs and Manages a Portfolio Accordingly**



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A Path for Setting the Board's Risk Appetite is to Establish a Reference Portfolio with Active Risk Limits

Summary of Risk Activity Takeaways

Key ALM Tradeoffs and Risk Appetite

Acceptance of higher investment risk and return volatility for a higher expected return and higher funded ratio, and lower long-term contribution rates. Recovery from loss over a shorter period versus a longer period.

Portfolio Features

Prioritize liquidity for future opportunities and acceptance of concentration for high conviction strategies.

Performance Measurement

Total return objective more important than relative returns and peer comparisons.

Organizational Strategy

Innovation, internal management, and prioritizing returns net of fees are worth the added organizational complexity and cost.

Reference Portfolios | Projected Returns Across Allocations

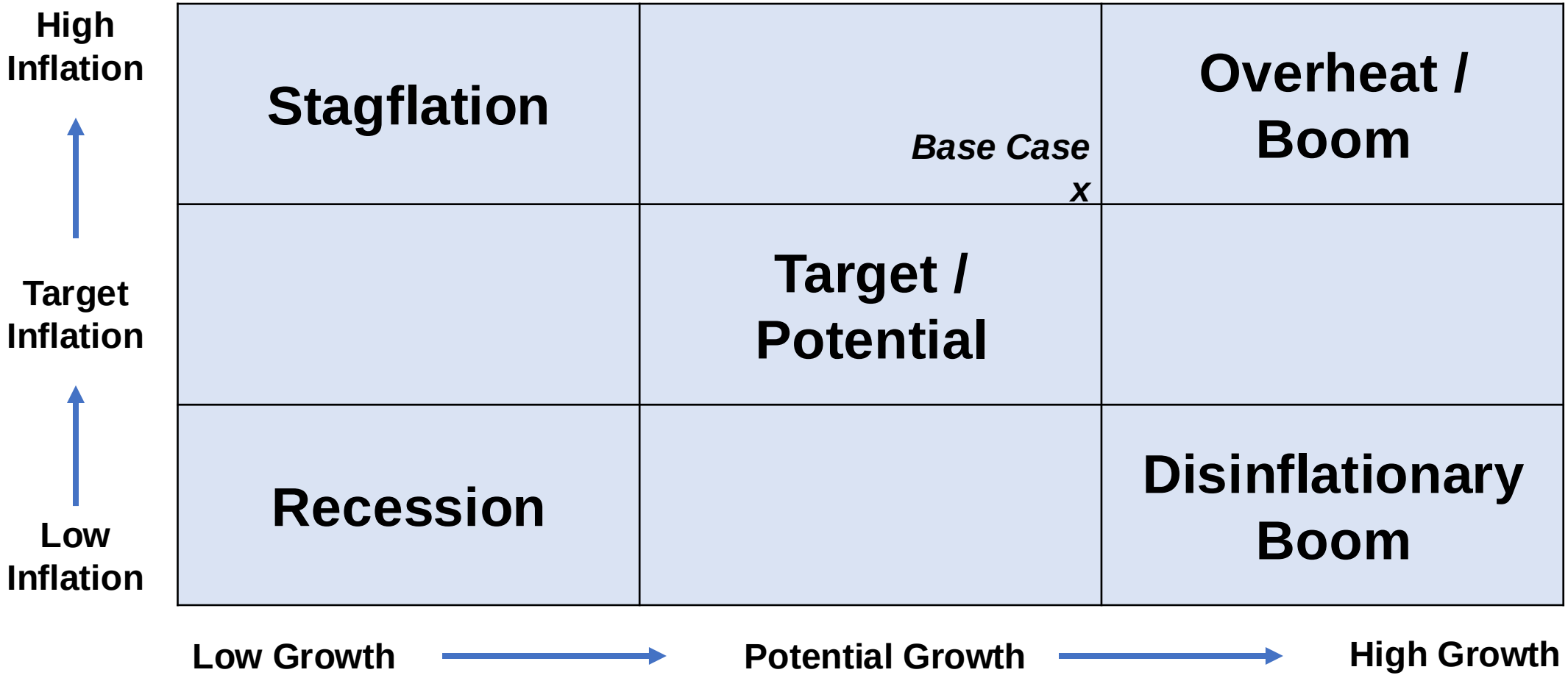
- As the equity allocation increases, the projected returns gradually rise, highlighting the expected higher return potential of equity-heavy portfolios.
- The portfolio optimization adds about 40 basis points above the reference portfolio's expected return based on current capital market assumptions (CMAs).

Equity/Bond Allocation: Portfolio Mixes

Allocation	50/50	60/40	70/30	80/20	90/10
Projected Passive Reference Portfolio Returns	6.13%	6.29%	6.40%	6.48%	6.51%
Value-Add from Risk-Equivalent Asset Selection	0.41%	0.41%	0.42%	0.42%	0.41%
Total Returns	6.54%	6.70%	6.82%	6.90%	6.92%
Return Range	5.2% - 7.6%	5.1% - 7.7%	5.1% - 7.9%	4.9% - 8.1%	4.8% - 8.4%
Portfolio Volatility	9.3%	10.3%	11.7%	13.3%	14.9%
Expected Tail Risk (95%)	-15.5%	-19.4%	-23.9%	-28.8%	-33.9%

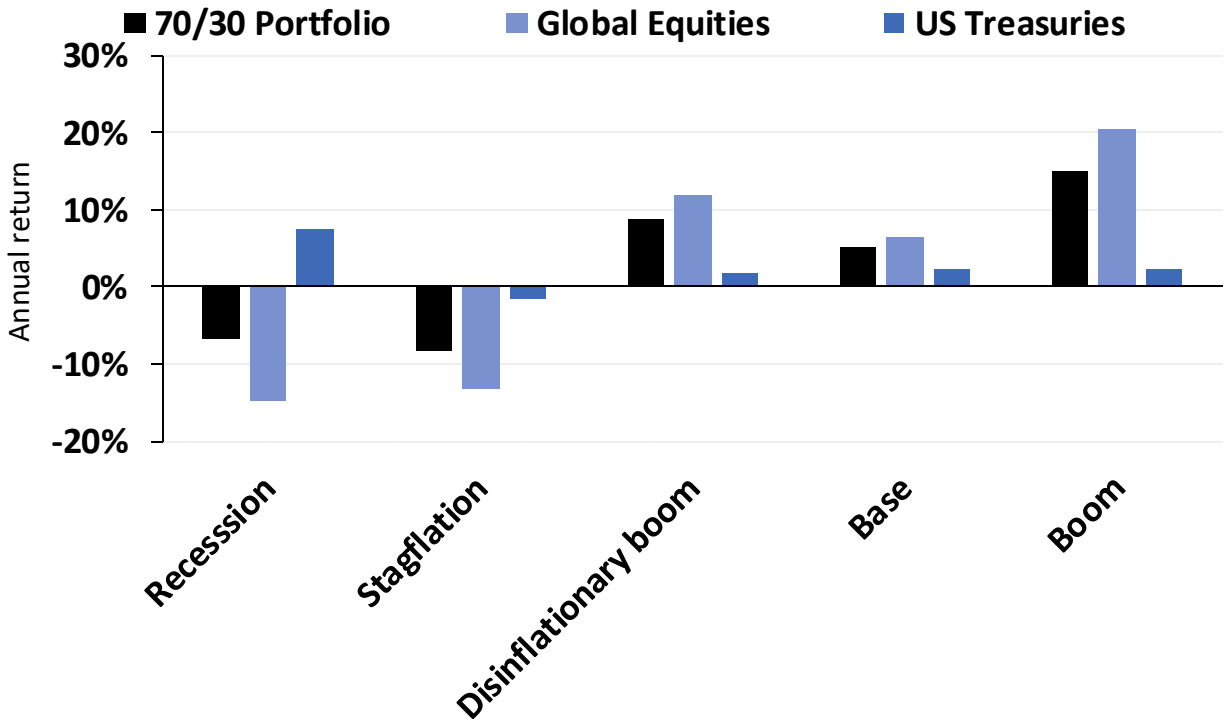
See Appendix for full footnote details. CMAs as of 2024 Q2. The Value-Add metric is the difference in return between the Reference Portfolios and the risk-equivalent SAA portfolio, calculated using the internal SAA process with equal risk levels to the corresponding Reference Portfolios. Tail Risk 95% represents Conditional Value at Risk (95%), or the average loss in the worst 5% of simulated portfolio outcomes in rolling 3-years.

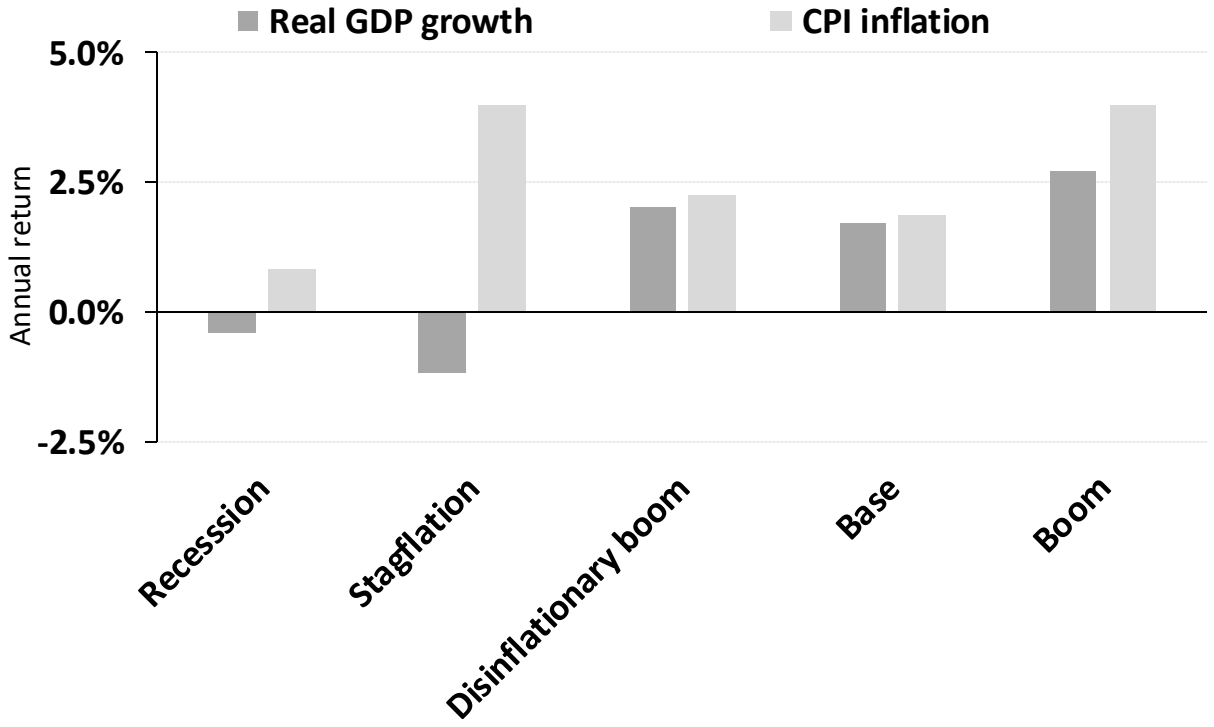
Hypothetical Scenarios | (3-5 years)



Footnotes: X is current position (starting point), Target inflation is FOMC PCE target plus spread to CPI; potential growth is a combination of CBO, FOMC Tealbook, internal statistical analysis designations.

Forecasted Scenario-based Returns

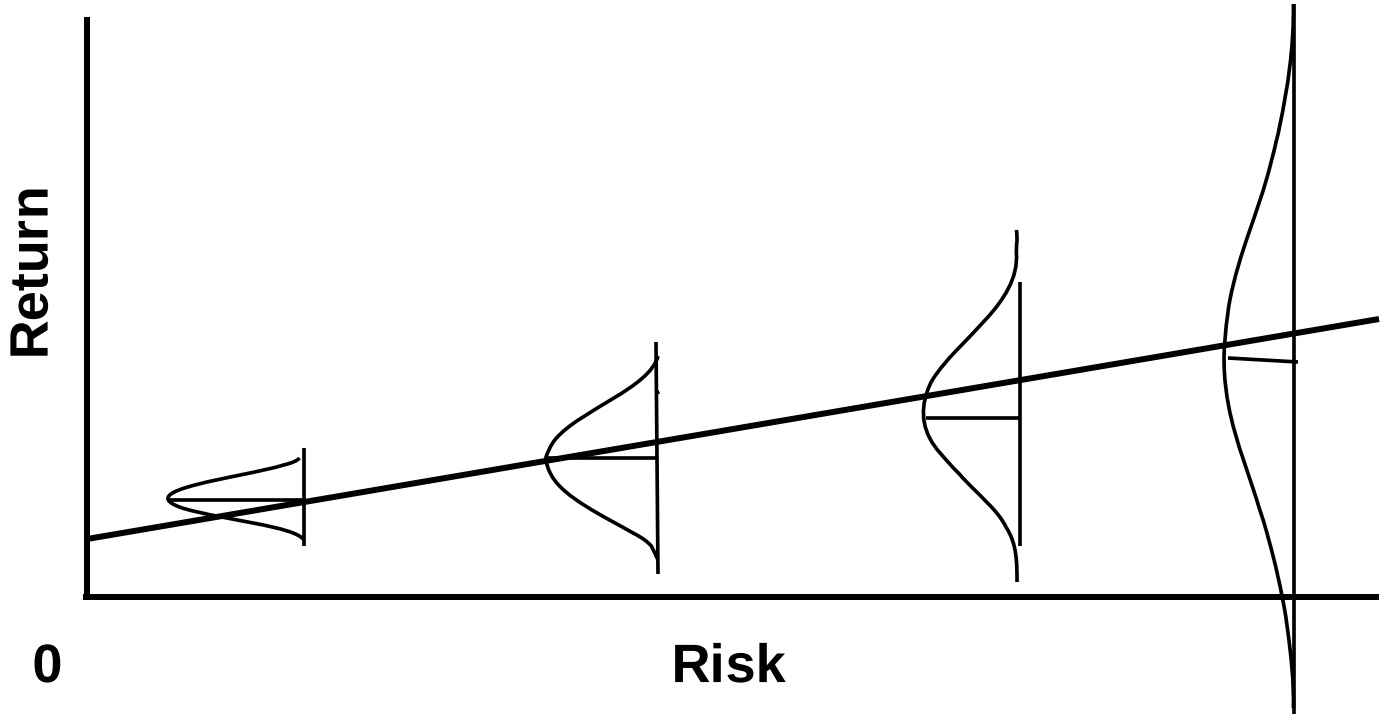




Footnotes: Data are estimated, twelve-month projection following shock. Annual return. Average of estimated projections.
Sources: Blackrock, MSCI, Oxford Economics Global Economic Model, CalPERS calculations.

How To Think About Risk

What is the relationship between risk and return?



As risk increases...

...the expected return rises,...

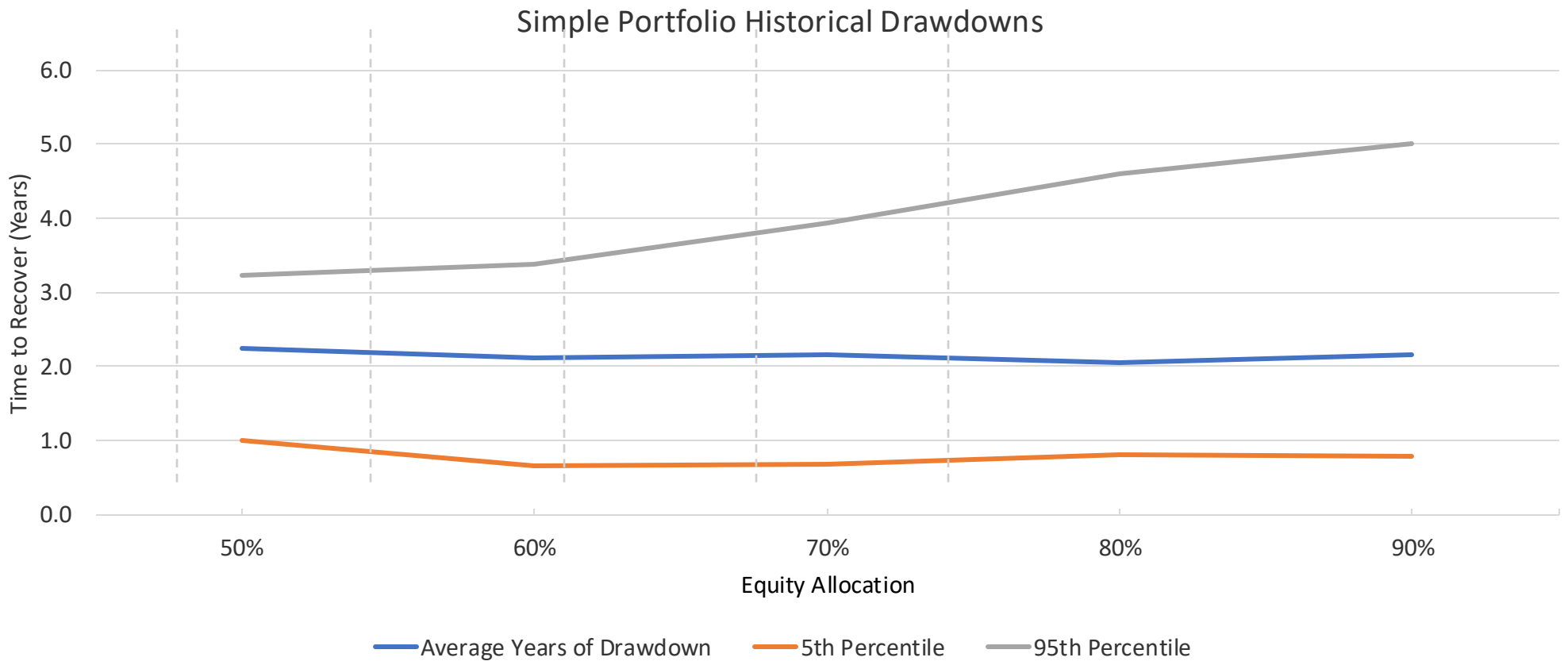
...the range of possible outcomes becomes wider, and...

...the worst outcome worsens and ultimately becomes negative.

This is the right way to think about the risk/return relationship.

Simple Portfolio | Equity Allocation and Drawdown Extremes

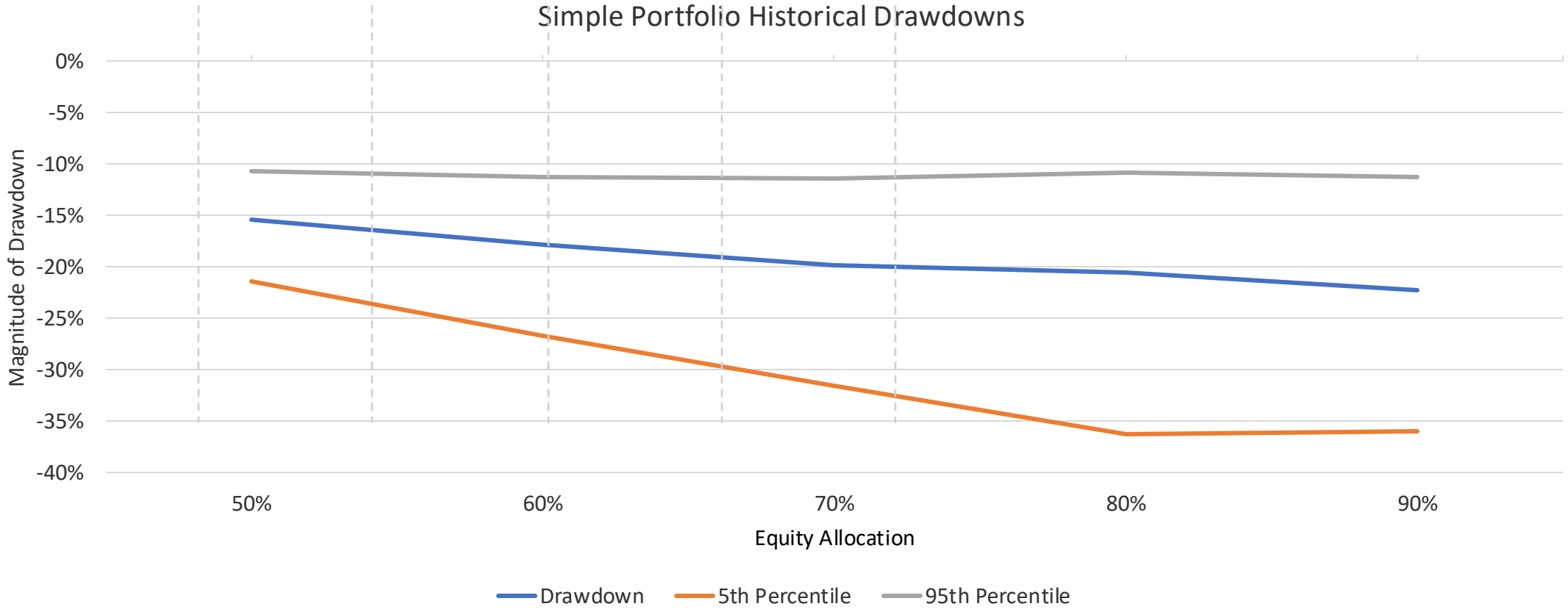
Time to drawdown becomes more uncertain as the equity allocation increases



Source: Historical US Large Cap Equity and 10-Year Treasury Note return data is from Yale Professor Robert Shiller (Shiller data) 1953-present.

Increasing Equity Exposure Increases Uncertainty

Expected drawdown and the range of drawdown increases as equity exposure increases



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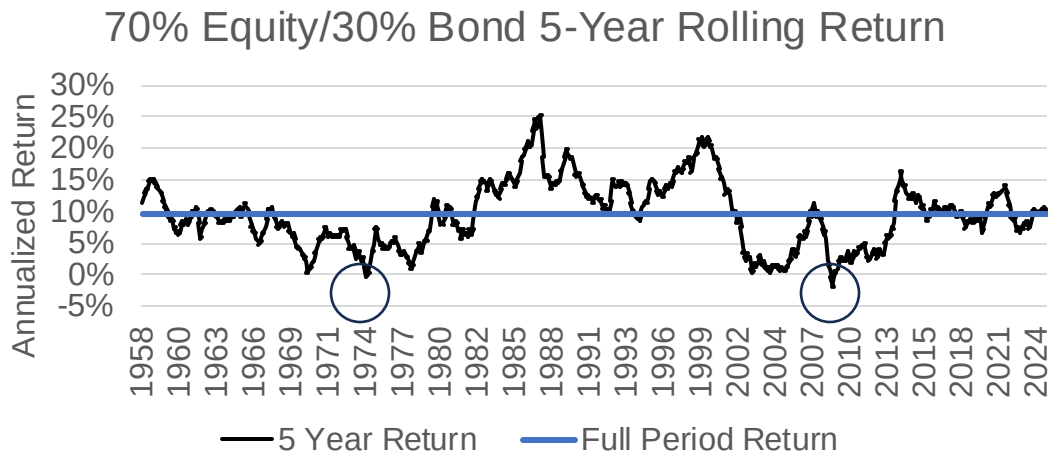
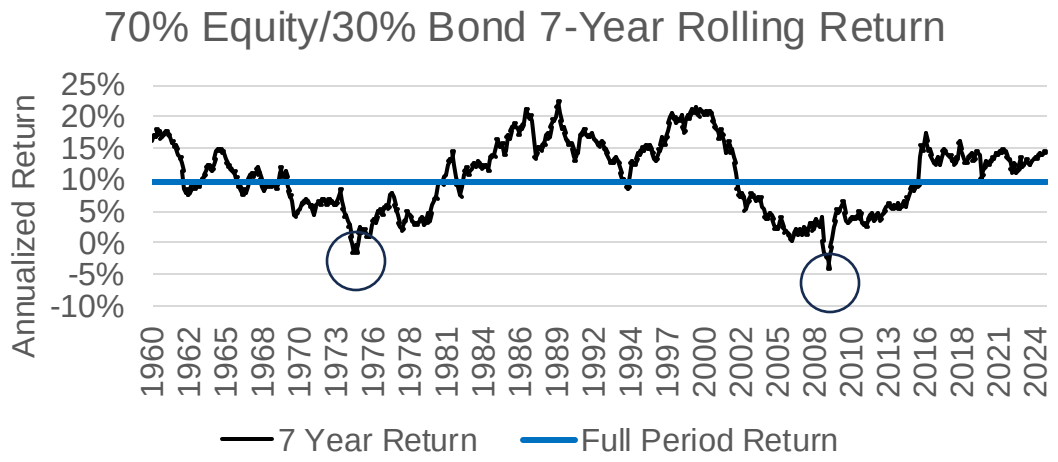
Simple Portfolio | Annualized Rolling Returns





- The simple 70/30 portfolio is volatile over the Board's preferred horizon
- This volatility is driven by market outcomes
- Worth noting the 5-, 7-, and 10-year rolling windows had incidents of negative returns.

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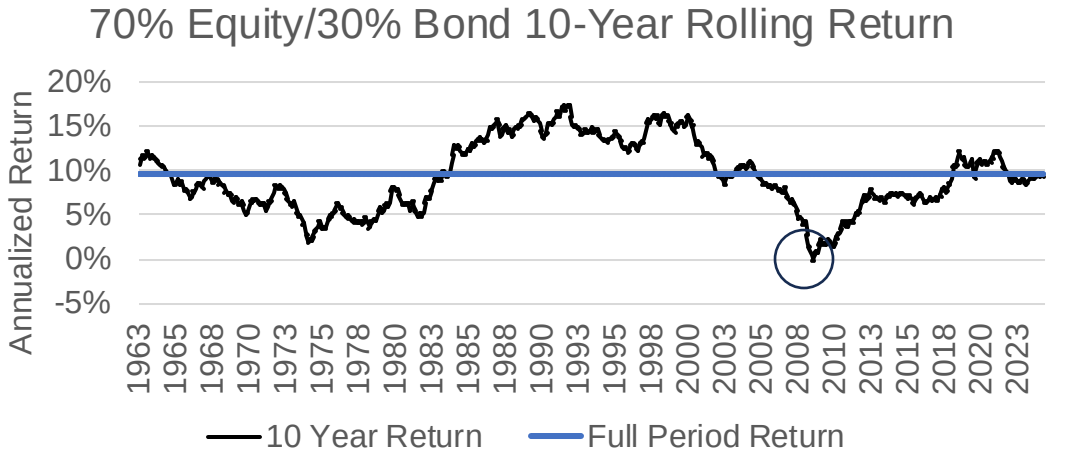
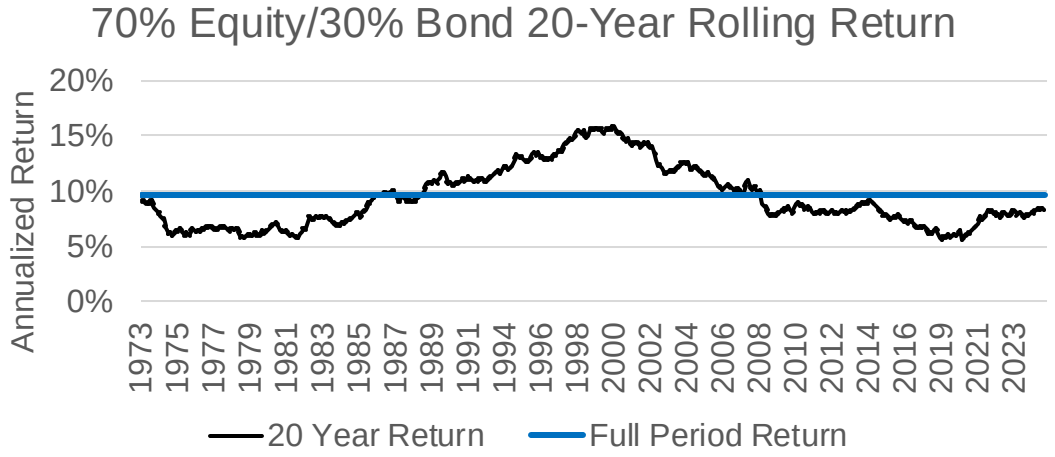
Simple Portfolio | Annualized Rolling Returns





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Innovation, internal management, and prioritizing returns net of fees are worth the added organizational complexity and cost.

Risk Appetite

It is the board's role to define its risk appetite regardless of whether it follows an SAA or a TPA.

A risk appetite can be expressed various ways, ranging from a simple statement setting limits to frameworks with risk and loss tolerances

CalPERS has historically relied on the strategic asset allocation (SAA) and its ranges for risk governance

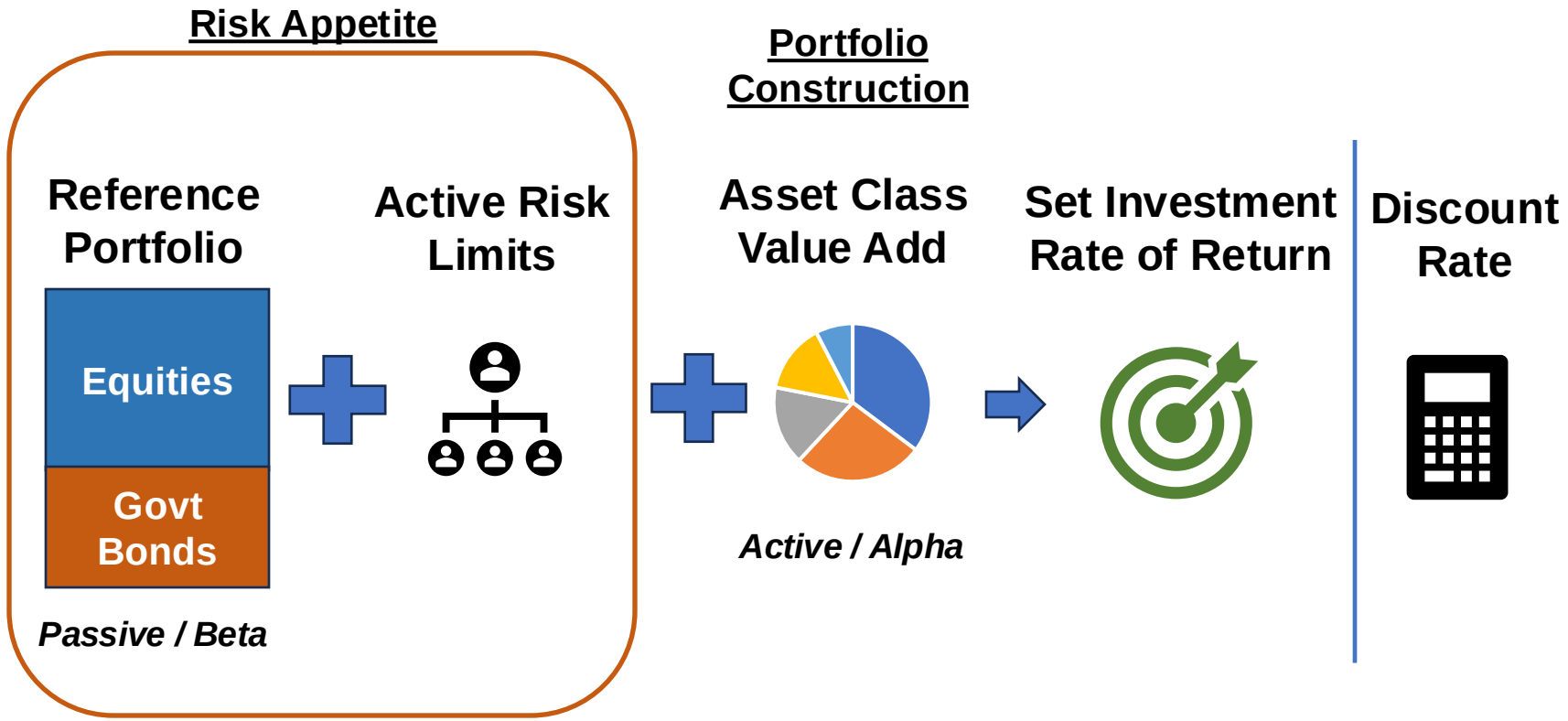
A formal risk appetite sets total portfolio risk limits, along with defining management's active risk limits

ALM Board Decisions and Governance

Current

Board adopts a **Strategic Asset Allocation** tied to a **Return Goal**, **Discount Rate and Risk**, and determines an investment strategy for 4 years. Asset class ranges provide flexibility, but most active risk is built into the SAA.

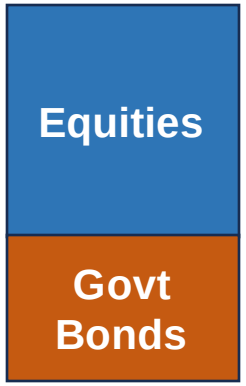
Possible Governance Package Under TPA



No proposed changes to 4-year ALM cycle, mid-cycle review, or actuarial board deliverables

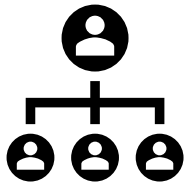
Board Risk Appetite

Proposed Governance Package



1. Reference Portfolio

- A single benchmark for passive (beta) performance
- Clarifies performance accountability
- Simple, easy to explain sources of risk and return
- Built using the two most scalable and liquid asset classes: Equities and Bonds
- Low cost
- An investable, viable and transparent alternative

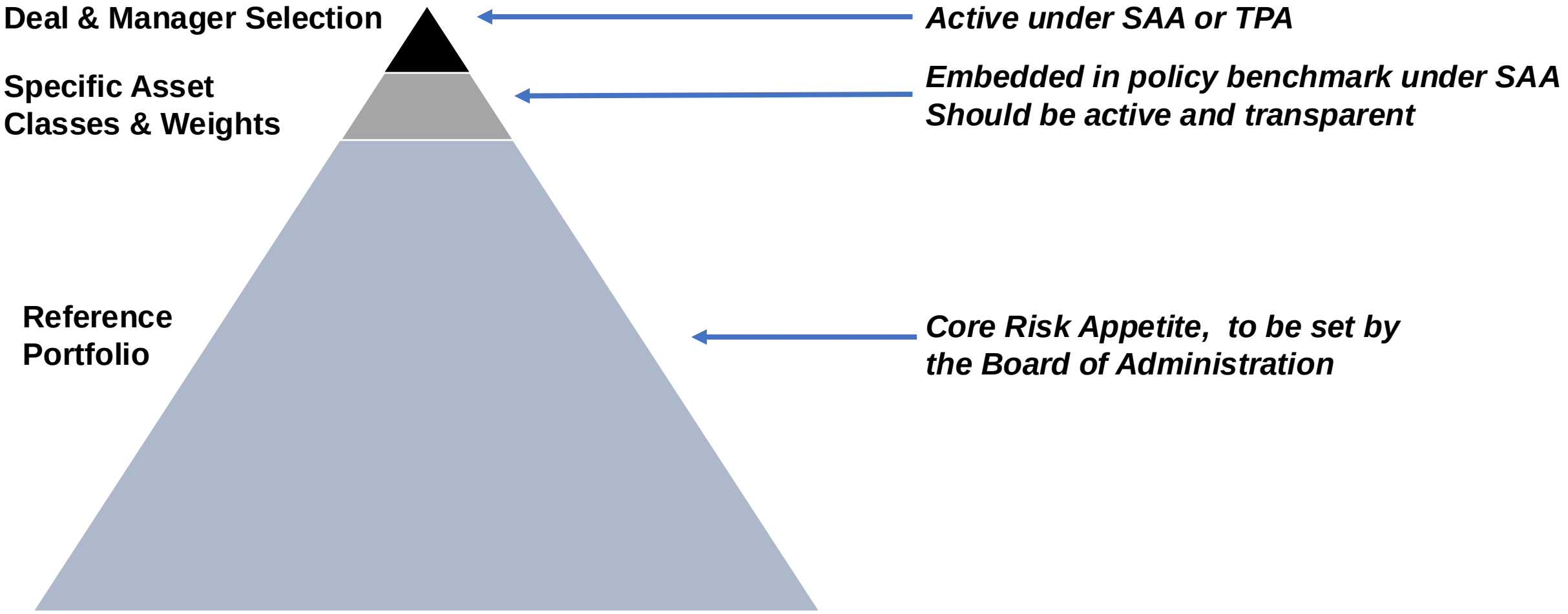


2. Active Risk Limits

- A limit on management's discretion to pursue value-adding and risk mitigating strategies, including new asset classes

Plus asset class value add of current SAA

Portfolio Risk Hierarchy

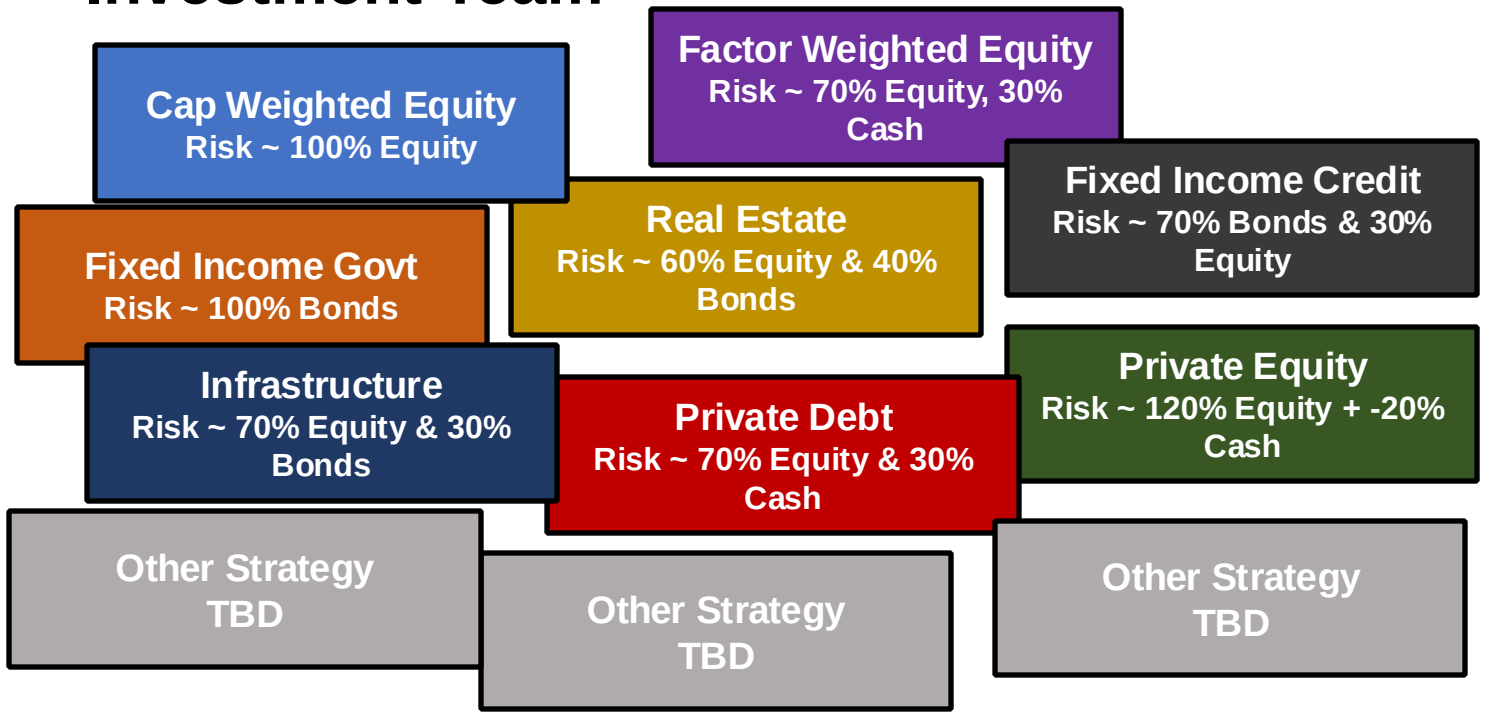


From a Reference Portfolio to a Risk Equivalent Actual Portfolio

Reference Portfolio Asset Classes

- Global Equity
- Government Bonds

Building Blocks: Strategies Available to Investment Team



Leverage is both inherent in some of the strategies and utilized at the total portfolio level. Sustainability is integrated into our investment processes.

From a Reference Portfolio to a Risk Equivalent Actual Portfolio

Building Blocks

Cap Weighted Equity
Risk ~ 100% Equity

Factor Weighted Equity
Risk ~ 70% Equity, 30% Cash

Fixed Income Govt
Risk ~ 100% Bonds

Real Estate
Risk ~ 60% Equity & 40% Bonds

Infrastructure
Risk ~ 70% Equity & 30% Bonds

Fixed Income Credit
Risk ~ 70% Bonds & 30% Equity

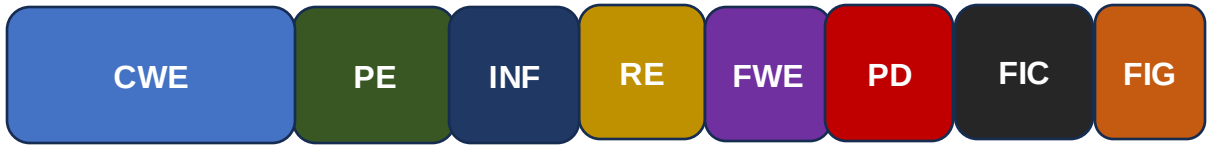
Private Debt
Risk ~ 70% Equity & 30% Cash

Private Equity
Risk ~ 120% Equity + -20% Cash

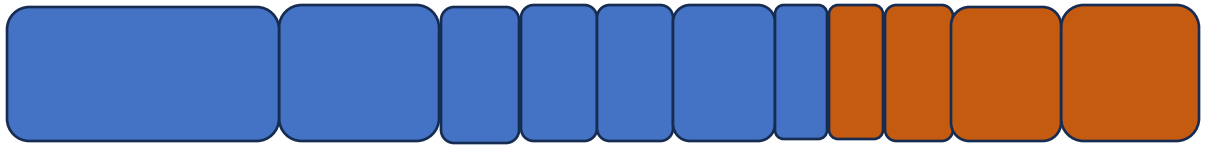
Other Strategy
TBD

Other Strategy
TBD

Portfolio Asset Allocation 100%



Risk Allocation 100%



Equity Risk

Govt Bond Risk

Evaluating Performance Using a Reference Portfolio

	Annualized 5 Year Returns		
	PERF	Reference Portfolio	Difference
FY 2017 - 2021	10.4%	11.7%	-130 bps
FY 2018 - 2022	6.7%	5.9%	+82 bps

2022 market downturn pulls down 5-year performance to just under discount rate

But without active strategies, a simple portfolio was worse

Evaluating Performance Using a Reference Portfolio

Annualized 5 Year Returns

	PERF	Reference Portfolio	Difference
FY 2017 - 2021	**10.4%**	**11.7%**	**-130 bps**

Great 5-year period for PERF

But we would have been better off in a simple mix of stocks and bonds

Asset Liability Management (ALM) Timeline

2025

January

- Board Education Day:
  Risk Tradeoff Activity
  TPA Considerations

February

- Risk Activity Follow Up and Risk Appetite
- *ALM Strategy Session**

March

- ALM Governance
- *ALM Strategy Session**

June

- ALM Education Session
- *ALM Strategy Session**

July

- Board Offsite:
  ALM Education Session

September

- First Reading: Proposed Reference Portfolio and Active Risk, Experience Study, Actuarial Assumptions, and Discount Rate
- *ALM Strategy Session**

November

- Final Approval of Proposed Reference Portfolio and Active Risk, Experience Study, Actuarial Assumptions, and Discount Rate
- *ALM Strategy Session**

2026

July 1 Effective Date

Stakeholder Engagement Throughout Cycle

* *Closed session*

Appendix

Appendix: Methodology Behind Equity Bond Allocation: Portfolio Mix Table

Data Sources and Inputs

- Analysis is based on the internal CMA Survey data as of (Q2, 2024), incorporating Global Equity and US Long Treasuries indexes.

Value Add Calculation

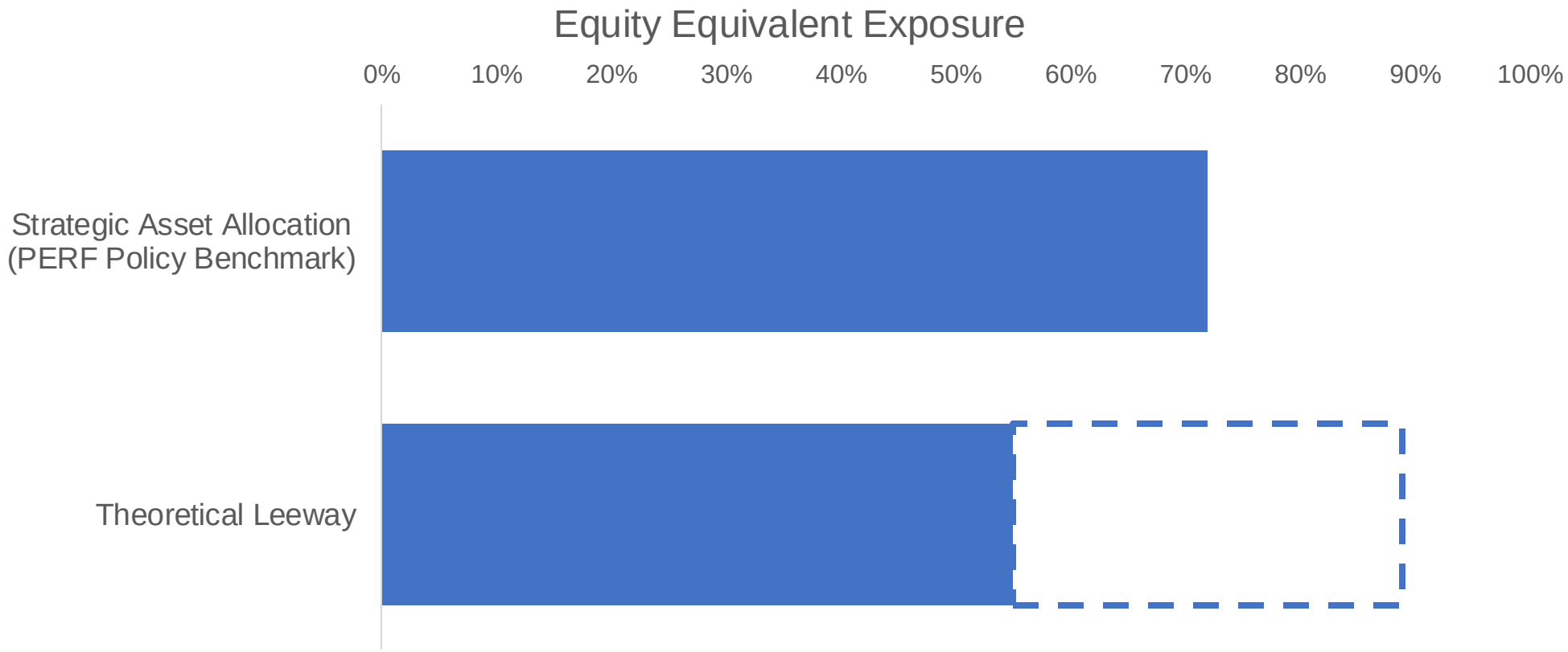
- The Value-Add metric is the difference in return between the Reference Portfolios and the risk-equivalent SAA portfolio, calculated using the internal SAA process with equal risk levels to the corresponding Reference Portfolios.
- Reference Portfolios exclude alternative asset classes and alpha strategies (e.g., Private Equity and Private Real Estate). The Reference Portfolios represent various levels of Risk Appetite rather than actual or targeted portfolio positions. The objective of an actual portfolio is to outperform the Reference Portfolio by utilizing various investment vehicles and expertise, including additional asset classes and alpha-generating strategies.

Tail Risk, or Conditional Value at Risk (CVaR 95%) Calculation

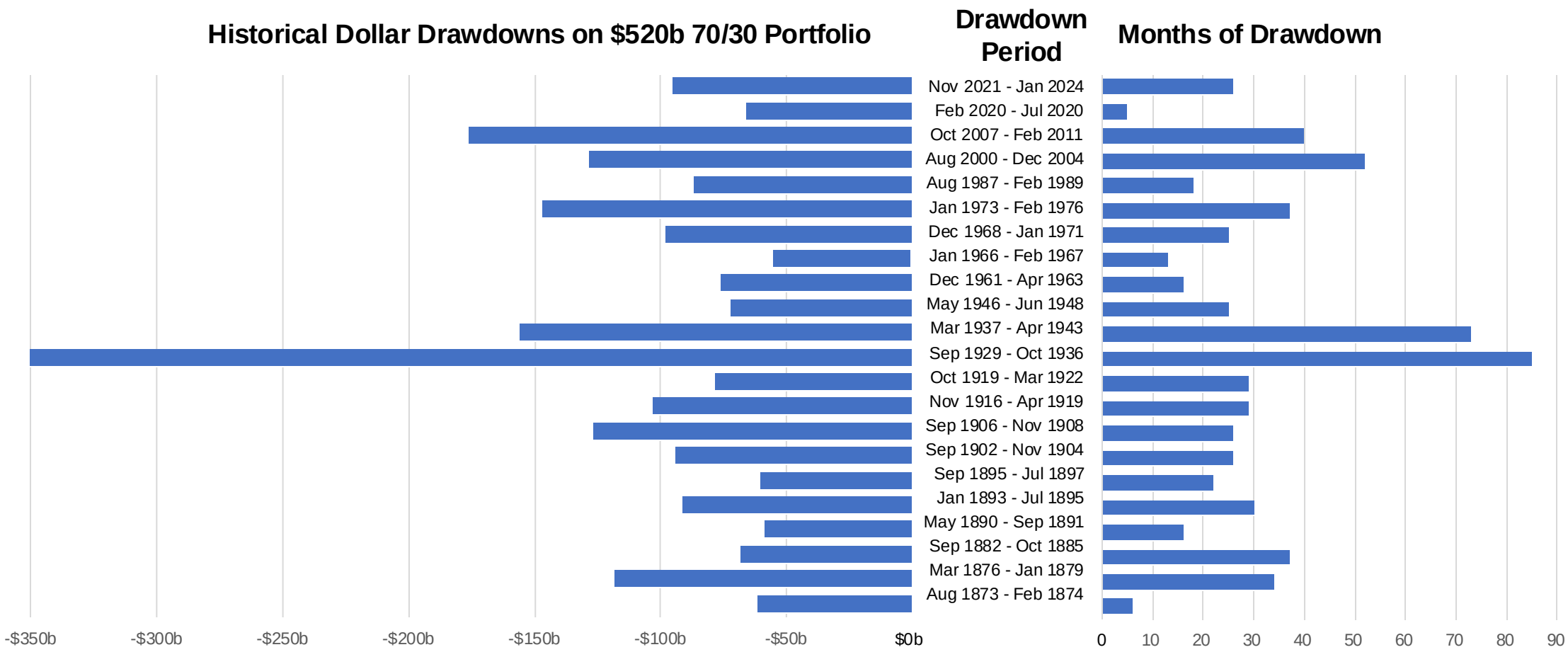
- Definition**:** CVaR 95% represents the average loss in the worst 5% of simulated portfolio outcomes in rolling 3-years.
- Methodology: The Conditional Value at Risk (CVaR 95%) is calculated by first determining the Value at Risk (VaR) at the 95% confidence level, which marks the threshold where only 5% of outcomes are worse. Losses beyond this threshold are then averaged to derive CVaR, using estimates generated through the current SAA asset simulation framework.

Portfolio Implementation

The Team Has Flexibility To Implement The Portfolio



Tolerance for Loss



Source: Robert Shiller, data available at [http://www.econ.yale.edu/~shiller/data.htm.](http://www.econ.yale.edu/~shiller/data.htm)