Asset Liability Management:

Affiliate Funds - Health, Defined Benefit, and Pre-Funding Trusts

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Investment Committee
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Summary

- The Affiliate Funds covered in this review are[1]: Health Care Fund, Legislators' Retirement System Fund, Judges' Retirement System Fund, Judges' Retirement System II Fund, California Employers' Retiree Benefit Trust Fund, and the California Employers' Pension Prefunding Trust Fund.
- The Investment, Actuarial, and Financial Office teams have developed this review and recommendations in partnership.
- CalPERS' objectives of minimizing potential losses, maximizing projected returns, maintaining sufficient liquidity, and minimizing costs have been integral in the construction of the candidate portfolios.
- The risk assessment is multi-faceted and includes the potential for losses (drawdown), return volatility, and in the case of the defined benefit plans, includes contribution volatility and funding ratio.
- Review highlights:
  - The Capital Market Assumptions (CMAs) for the Affiliate Funds were adopted at the November 2021 Investment Committee meeting.
  - The portfolio construction process is the same process that was used for the 2021 PERF ALM Review.
  - Adding Private Equity as an asset class for JRS II was evaluated and is not being recommended due to operational complexity and additional expenses associated with a fund-of-funds implementation structure.
  - The Fixed Income Long Liability benchmark sub-asset class weights have been updated to improve the risk/return profile. This modification is in alignment with changes made for the PERF benchmark.
  - All other benchmarks and the portfolio asset class constraints are unchanged from the prior ALM review in 2018.
  - The CEPPT has a shorter investment time horizon of 10 years. To adjust for this, projected 10-year returns are calculated from the adopted 5-year and 20-year CMAs and compared to the 10-year survey returns for reasonability. Projected volatility is the 10-year survey median.

[1] The Supplemental Income Plan Defined Contribution Funds will be presented at the June 2022 Investment Committee meeting.

Affiliate Trusts - Program Overview

Plan / Fund	ID	Purpose	Established	Status	Participants[1]	Invested Assets[2]
Health Care Fund	HCF	Provides reserves for CalPERS self-funded health plans.	1997	Open	State of California	$519M
Legislators' Retirement System Fund	LRS	Provides pre-funded retirement and ancillary benefits for members of the Legislature elected prior to November 7, 1990, and Elected Constitutional and Legislative Statutory Officers elected prior to December 31, 2012.	1947	Closed 2013	208 members	$123M
Judges' Retirement System Fund	JRS	Provides a reserve of 2-3 months of benefit payments to be used in the case of a State budget delay for the unfunded ('pay-as-you-go') retirement system for eligible judges elected before November 9, 1994.	1937	Closed 1994	1,939 members	$57M
Judges' Retirement System II Fund	JRS II	Provides pre-funded retirement and ancillary benefits for eligible judges elected on or after November 9, 1994. Options include a defined benefit plan and a monetary credit plan.	1994	Open	2,031 members	$2.5B
California Employers' Retiree Benefit Trust Fund	CERBT	Provides employers ability to voluntarily pre-fund non-pension, other post-employment benefits (OPEB). Employers can select from three strategies, depending on risk tolerance.	2007	Open	591 employers	$17.7B
California Employers' Pension Prefunding Trust Fund	CEPPT	Provides employers ability to voluntarily pre-fund required pension contributions. Employers can select from two strategies, depending on risk tolerance.	2019	Open	58 employers	$72M

[1] Participants as of 06/30/21 for LRS, JRS, JRS II and as of 12/31/21 for HCF, CERBT, & CEPPT.
[2] Invested assets as of 12/31/21 for all trusts.

Glossary

Term	Definition	CalPERS Implementation
Downside Risk	An estimate of potential for losses (compare with Volatility)	CalPERS Asset Liability Management modelling estimates the size of large losses that could occur over any three-year period. This estimate is called conditional drawdown at risk. To estimate it, start with the range of outcomes for returns. Then focus on only the losses, the part of the range where returns are negative. Conditional drawdown is based on the larger losses. CalPERS has a constitutional objective to 'minimize the risk of loss.'
Portfolio Strategy	A plan for managing assets to achieve financial objectives	CalPERS portfolio strategy balances the desire for higher returns against potential risk of portfolio losses and includes the ALM process to regularly review and, if need be, revise Capital Market Assumptions and portfolio allocations.
Return Term Structure	A return projection that includes estimates for different investment horizons	CalPERS CMAs survey results include return projections for 5-year and 20-year investment horizons.
Volatility	An estimate of the width of a return distribution (compare with Downside Risk)	CalPERS Asset Liability Management uses volatility when estimating the range of return outcomes. As an example, the width of a Bell curve is measured using both the upside and the downside. Downside risk is related to loss, which is what conditional drawdown measures.

Pros and Cons of Key Decisions

If we choose	Pros	Cons
Higher discount rate	Lower projected contributions	Increased contribution risk Increased funding ratio risk
Higher projected returns	Increased discount rate	Increased portfolio risk
Managing near-term risk	Avoid excessive risk taking in near-term horizon	Lower projected returns in near-term horizon
Adding Private Equity	Enhanced returns Increased diversification	Fund-of-funds implementation is costly Net returns may not exceed public equity Challenging to implement Increased complexity Policy changes required
Increasing exposure to emerging market equities	Improved projected returns	Potential increase in some ESG related issues

Private Equity Analysis Findings

As the Affiliate Funds have grown substantially in size, an evaluation was conducted to determine if Private Equity could be added as an asset class. The analysis focused on the JRS II defined benefit program, which is a cash flow positive, relatively young defined benefit program that meets the liquidity profile for investing in Private Equity. Based on the evaluation results, we do not recommend adding Private Equity to the Affiliate Funds.

Liquidity:

- The JRS II fund is 28 years old and cash flow positive. There are no liquidity concerns with allocating a portion of the fund (e.g., <15%) to Private Equity.

Implementation:

- Current structure does not enable participation by Affiliate Trusts in PERF Private Equity program.
- A Fund-of-Funds implementation would be required.

Fees and Performance:

- Fees for Fund-of-Funds are approximately 1.50% higher than other Private Equity implementation structures.
- Performance for Fund-of-Funds over the last 10-15 years has trailed direct buyout strategies by ~2%.
- CalPERS also experienced underperformance by Fund-of-Funds vs. other structures during the last 10 years.
- Private Equity performance during ramp-up can be negative for 5+ years, which would more adversely impact JRS II participants that select the monetary credit benefit, since actual returns are used to calculate this benefit.
- Further details on fees and performance are in the Appendix.

Fixed Income Benchmark: Long Liability

- The Affiliate Fund Fixed Income Long Liability benchmark[1] has the same sub-components as the PERF Fixed Income segment.
- Historically, the asset weights have been similar to the Bloomberg U.S. Aggregate Bond benchmark, but with a longer duration. The new weights are modeled from the re-optimized PERF Fixed Income segment and improve the risk/return profile.
- A sensitivity analysis was conducted that shows that weightings based on the PERF modeling are reasonable for the Affiliate Funds. Details of the sensitivity analysis are in the Appendix.
- We recommend adopting the proposed weights for the Affiliate Long Liability Fixed Income benchmark.

Benchmark Index	Asset Segment	Bloomberg U.S. Aggregate	Current Weight	Proposed Weight
Bloomberg AIP LGOV7+	Long U.S. Treasuries	39.2%	40%	22%
Bloomberg AIP Long Liability MBS	Mortgage-Backed Securities	27.6%	30%	22%
Bloomberg AIP Long Liability Corp ex Sov	Investment Grade Corporates	25.3%	24%	17%
Bloomberg AIP Long Liability HY Cash Pay	High Yield	0%	3%	17%
Bloomberg AIP Long Liability Sovereign	Sovereigns	1%	3%	22%
	Other[2]	6.9%	0%	0%
	Total	100%	100%	100%

[1] Affiliate Funds that will use the new weights in the Long Liability Benchmark are: LRS, JRS II, and CERBT.
[2] Bloomberg Aggregate 'Other' Asset Segment includes Agencies, Local Authorities, Supranational, CMBS, and ABS.

Sample 60/40 Portfolio

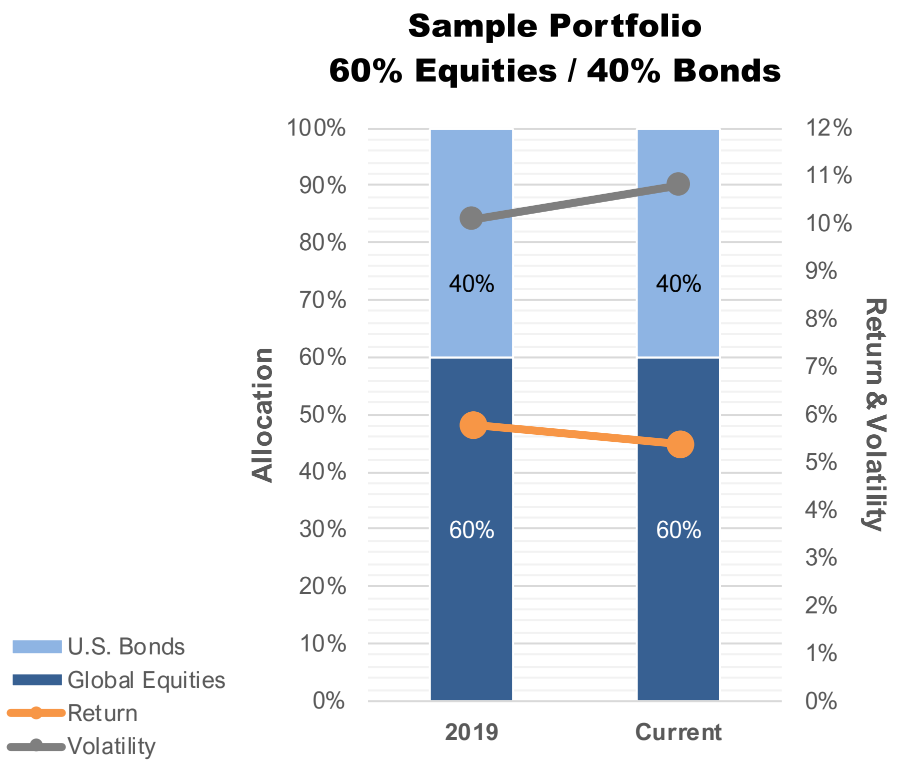
As a frame of reference for the Affiliate Fund current and candidate portfolio results, presented is a 60/40 portfolio constructed of 60% Global Equities and 40% U.S. Bonds.

The chart compares projected return (orange) and Projected volatility (grey) from 2019[1] to current values.

The results show that with no change to the portfolio:

- projected returns are down 0.4%, from 5.8% to 5.4%
- projected volatility is up 0.7%, from 10.1% to 10.8%

Projected drawdown for the 60/40 portfolio is 22.9%. This is a new risk measure introduced in this ALM review and not used as a measure for the 2019 period.



20-year Projections	2019[1] Values	Current Values
Return	5.8%	5.4%
Drawdown	-	22.9%
Volatility	10.1%	10.8%

[1]Prior to this ALM review, the most recently evaluated CMAs for these two asset classes for the Affiliate Funds are from 2019 when the CEPPT was established.

Health Care Fund and Judges' Fund Candidate Portfolios

Health Care Fund Profile

- Reserve fund for self-funded health programs
- Very conservative investment strategy

Recommendation: Current Portfolio
100% U.S. Bonds

Projected Return[1] : 2.7%
Drawdown Risk: 7.5%
Volatility: 4.5%

Judges' Fund Profile

- Closed defined benefit program and 'pay-as-you-go'
- Reserve fund for 2-3 months of benefit payments
- Highly liquid, short-term cash investment strategy

Recommendation: Current Portfolio
100% Cash Equivalents

Projected Return[1] : 1.7%
Drawdown Risk: 3.1%
Volatility: 0.8%

[1] Returns are geometric and net of expenses of 0.03% for HCF and 0.01% for JRS

Legislators' Fund Candidate Portfolios

Fund Profile – Defined Benefit Plan

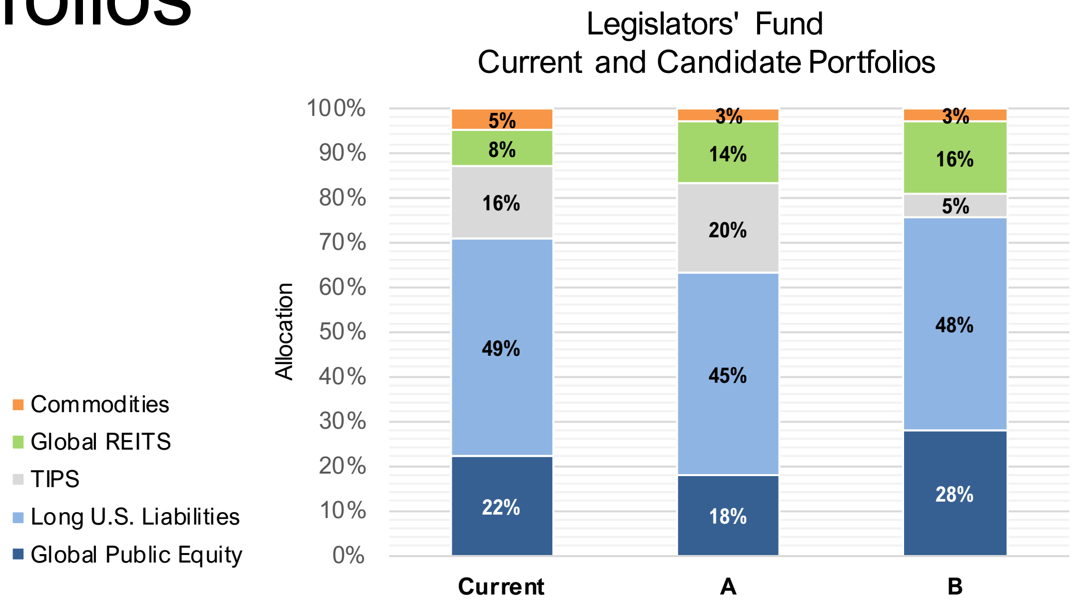
- Closed and cash flow negative (approximately -$7m/year)
- Funded ratio at 06/30/20 was 119.9%
- Current employer contribution rate is 29.4%
- Current employee rate is 8% and will not change
- Moderately conservative investment strategy
- Investment earnings are primary source of funding

Recommendation: Candidate Portfolio A

Projected Return : 4.5%
Drawdown Risk: 14.1%
Volatility: 7.7%

Rationale for Recommendation

- Increases return from current 4.2% to 4.5%, which is consistent with a 0.50% reduction in discount rate to 4.5%.
- Lower drawdown and similar volatility as current portfolio, whereas Candidate B risk is much higher.
- Funded ratio maintained above 100% without taking the added risk of Candidate B.
- Employer rate is 4% higher than Candidate B, however payroll is very small with a low number of active participants.



20-year Projections	2018[2] Values	Current Portfolio	Candidate A	Candidate B
Return[1]	5.0%	4.2%	4.5%	5.0%
Drawdown	-	14.2%	14.1%	17.7%
Volatility	7.3%	7.5%	7.7%	9.2%
Actuarial Statistics			**Candidate A**	**Candidate B**
Estimated Funded Ratio at 6.30.2021			129.3%	136.6%
Estimated Employer Rate for FY 22-23			32.3%	28.5%
Estimated Employee PEPRA Rate for FY 22-23			N/A	N/A

[1] Returns are geometric and net of expenses of 0.35%, which is an increase of 0.10% from 2018.
[2] The 2018 returns were estimated to 60 years, the 2018 10-year estimated return was 3.9%.

Judges' II Fund Candidate Portfolios

Fund Profile – Defined Benefit Plan

- Open and cash flow positive (approximately +$65m/year)
- Funded ratio at 06/30/20 was 98.6%
- Current employer contribution rate is 24.2%
- Current employee rate is 9.62% and 16% for PEPRA members
- Moderately aggressive investment strategy

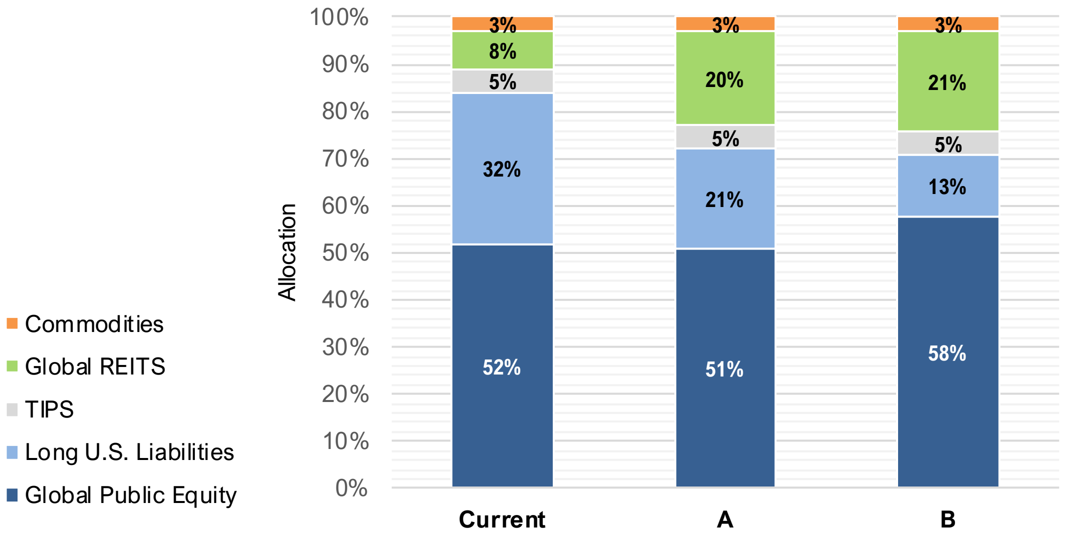
Recommendation: Candidate Portfolio A

Projected Return : 6.0%
Drawdown Risk: 26.4%
Volatility: 12.4%

Rationale for Recommendation

- Increases return from current 5.6% to 6.0%, which is consistent with a 0.50% reduction in discount rate.
- Higher drawdown and volatility than current portfolio, but Candidate B risk is much higher for an additional 0.20% return
- Funded ratio maintained above 100% without taking the added risk of Candidate B.
- Employer rate is 1% higher than Candidate B, but 1.5% lower than the current rate.

JRS II Fund
Current and Candidate Portfolios



20-year Projections	2018[2] Values	Current Portfolio	Candidate A	Candidate B
Return[1]	6.5%	5.6%	6.0%	6.2%
Drawdown	-	23.3%	26.4%	29.2%
Volatility	10.7%	11.0%	12.4%	13.4%

Actuarial Statistics	Candidate A	Candidate B
Estimated Funded Ratio at 6.30.2021	122.6%	125.4%
Estimated Employer Rate for FY 22-23	22.8%	21.7%
Estimated Employee PEPRA Rate for FY 22-23	16.0%	15.5%

[1] Returns are geometric and net of expenses of 0.15%.
[2] The 2018 returns were estimated to 60 years, the 2018 10-year estimated return was 5.5%.

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CERBT Strategy 1 Candidate Portfolios

Fund Profile – OPEB Pre-funding Plan

- OPEB: Other Post-Employment Benefits (e.g. health premiums)
- Voluntary program with variable contributions
- Strategy 1 is moderately aggressive, Strategy 2 is moderate, and Strategy 3 is moderately conservative

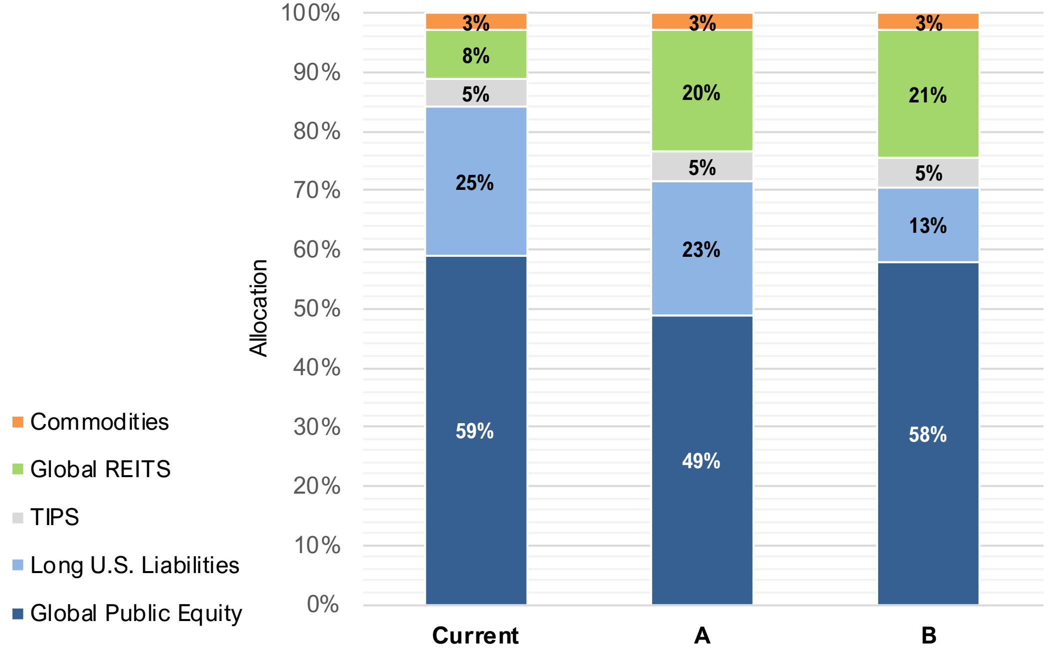
Recommendation: Candidate Portfolio A

Projected Return : 6.0%
Drawdown Risk: 25.6%
Volatility: 12.1%

Rationale for Recommendation

- Increases return from current 5.9% to 6.0%, while drawdown and volatility change slightly.
- Volatility is 0.3% higher than 2018 values, whereas Candidate B is 1.6% higher for only an additional 0.2% return.

CERBT Strategy I
Current and Candidate Portfolios



20-year Projections	2018[2] Values	Current Portfolio	Candidate A	Candidate B
Return[1]	7.6%	5.9%	6.0%	6.2%
Drawdown	-	25.8%	25.6%	29.2%
Volatility	11.8%	12.0%	12.1%	13.4%

[1] Returns are geometric and net of expenses of 0.10%.
[2] The 2018 returns were estimated to 60 years, the 2018 10-year estimated return was 5.8%.

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CERBT Strategy 2 Candidate Portfolios

Fund Profile – OPEB Pre-funding Plan

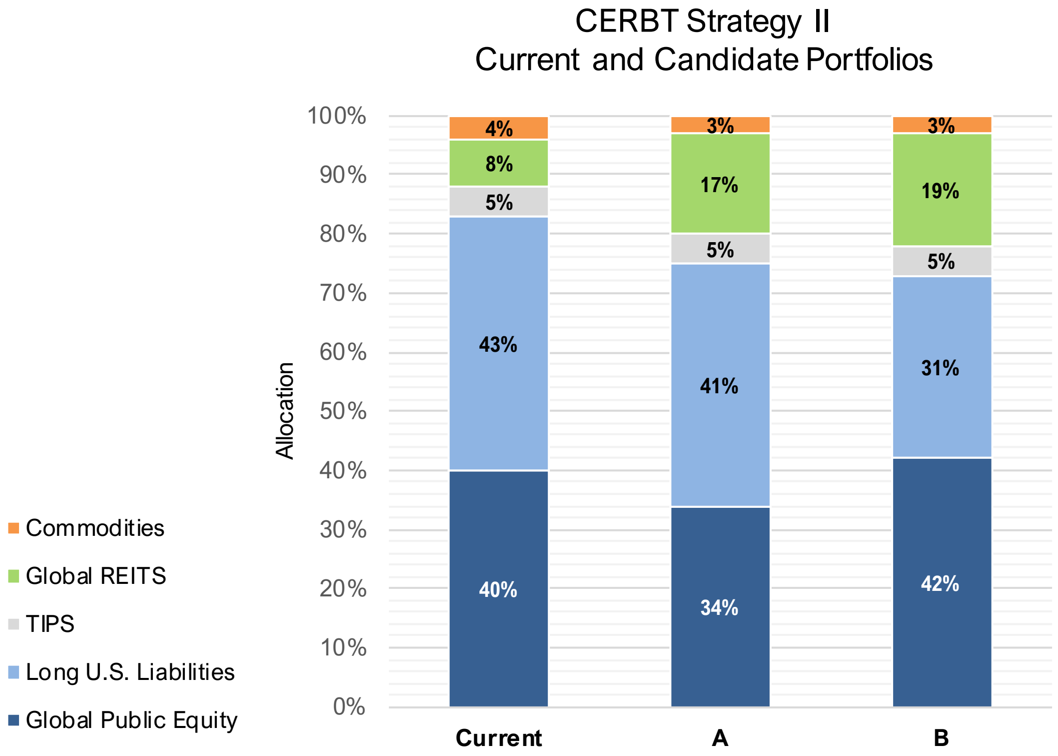
- OPEB: Other Post-Employment Benefits (e.g. health premiums)
- Voluntary program with variable contributions
- Strategy 1 is moderately aggressive, Strategy 2 is moderate, and Strategy 3 is moderately conservative

Recommendation: Candidate Portfolio A

Projected Return : 5.5%
Drawdown Risk: 19.8%
Volatility: 9.9%

Rationale for Recommendation

- Increases return from current 5.2% to 5.5.%, while drawdown and volatility change slightly.
- Volatility is 0.7% higher than 2018 values, whereas Candidate B is 1.9% higher for only an additional 0.3% return.



20-year Projections	2018[2] Values	Current Portfolio	Candidate A	Candidate B
Return[1]	7.0%	5.2%	5.5%	5.8%
Drawdown	-	19.5%	19.8%	22.9%
Volatility	9.2%	9.5%	9.9%	11.1%

[1] Returns are geometric and net of expenses of 0.10%.
[2] The 2018 returns were estimated to 60 years, the 2018 10-year estimated return was 5.1%.

CalPERS

CERBT Strategy 3 Candidate Portfolios

Fund Profile – OPEB Pre-funding Plan

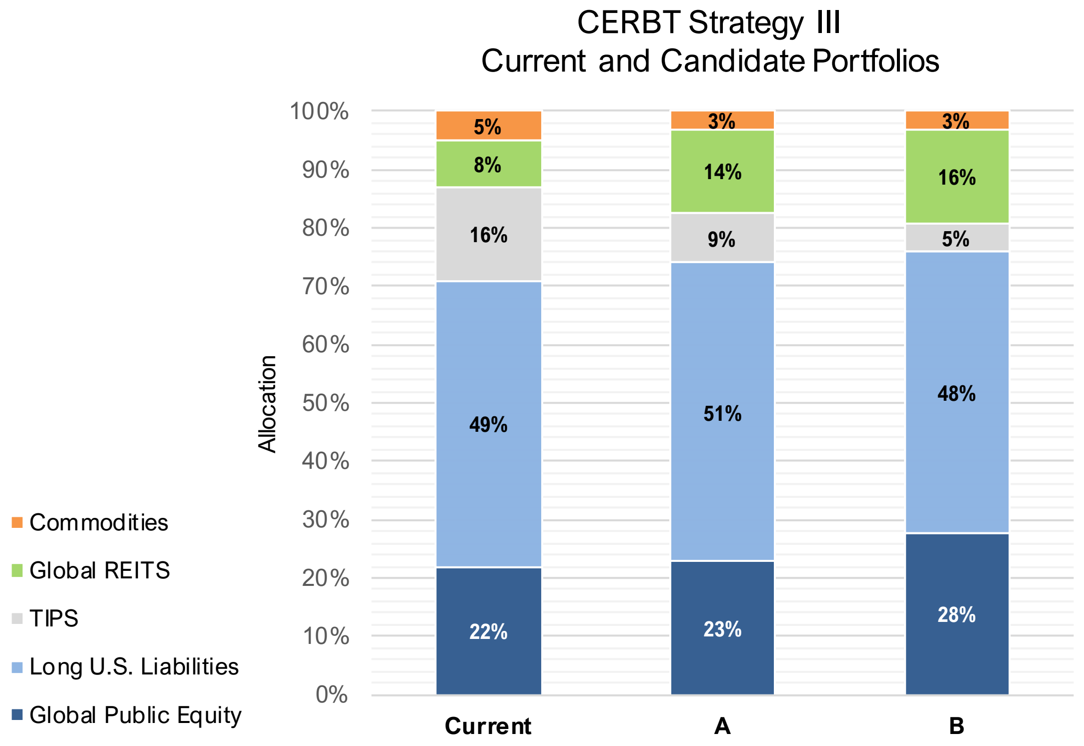
- OPEB: Other Post-Employment Benefits (e.g. health premiums)
- Voluntary program with variable contributions
- Strategy 1 is moderately aggressive, Strategy 2 is moderate, and Strategy 3 is moderately conservative

Recommendation: Candidate Portfolio A

Projected Return : 5.0%
Drawdown Risk: 15.8%
Volatility: 8.4%

Rationale for Recommendation

- Increases return from current 4.5% to 5.0.%.
- Drawdown and volatility are higher than the current portfolio by 1.6% and 0.9% respectively, but significantly lower than Candidate B for only an additional 0.3% return.



20-year Projections	2018[2] Values	Current Portfolio	Candidate A	Candidate B
Return[1]	6.2%	4.5%	5.0%	5.3%
Drawdown	-	14.2%	15.8%	17.8%
Volatility	7.3%	7.5%	8.4%	9.2%

[1] Returns are geometric and net of expenses of 0.10%.
[2] The 2018 returns were estimated to 60 years, the 2018 10-year estimated return was 4.4%.

CEPPT Strategy 1 Candidate Portfolios – 10 year

Fund Profile – Pension Pre-funding Plan

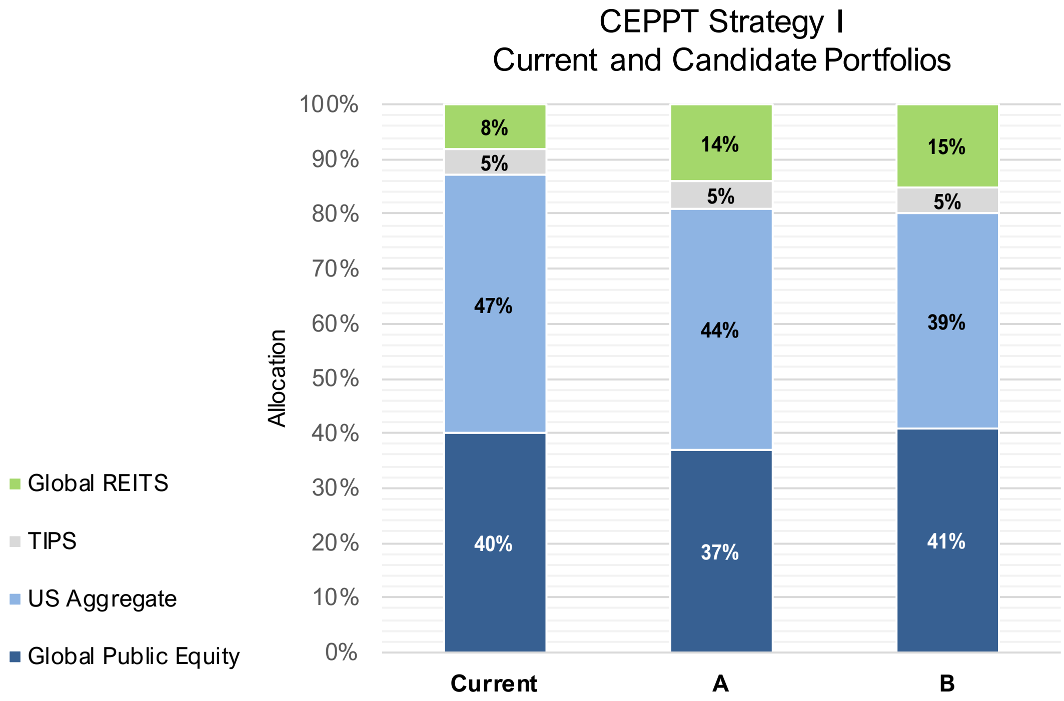
- Voluntary program with variable contributions
- Shorter investment horizon, approximately 10-years
- Strategy 1 is moderate and Strategy 2 is conservative
- Asset class differences – Commodities excluded due to volatility; Fixed Income segment has shorter duration.

Recommendation: Candidate Portfolio A

Projected Return : 4.5%
Drawdown Risk: 18.2%
Volatility: 8.8%

Rationale for Recommendation

- Increases return from current 4.4% to 4.5%, while increasing drawdown and volatility 0.6% and 0.4% respectively.
- Higher drawdown and volatility than current portfolio, but Candidate B risk is much higher for an additional 0.30% return.



10-year[1] Projections	2019[2] Values	Current Portfolio	Candidate A	Candidate B
Return[3]	5.0%	4.4%	4.5%	4.8%
Drawdown	-	17.6%	18.2%	19.9%
Volatility	8.2%	8.4%	8.8%	9.4%

[1] CEPPT 10-year projections are calculated based on the Board-approved CMA's.
[2] CEPPT was established in 2019.
[3] Returns are geometric and net of expenses of 0.25%.

CEPPT Strategy 2 Candidate Portfolios – 10 year

Fund Profile – Pension Pre-funding Plan

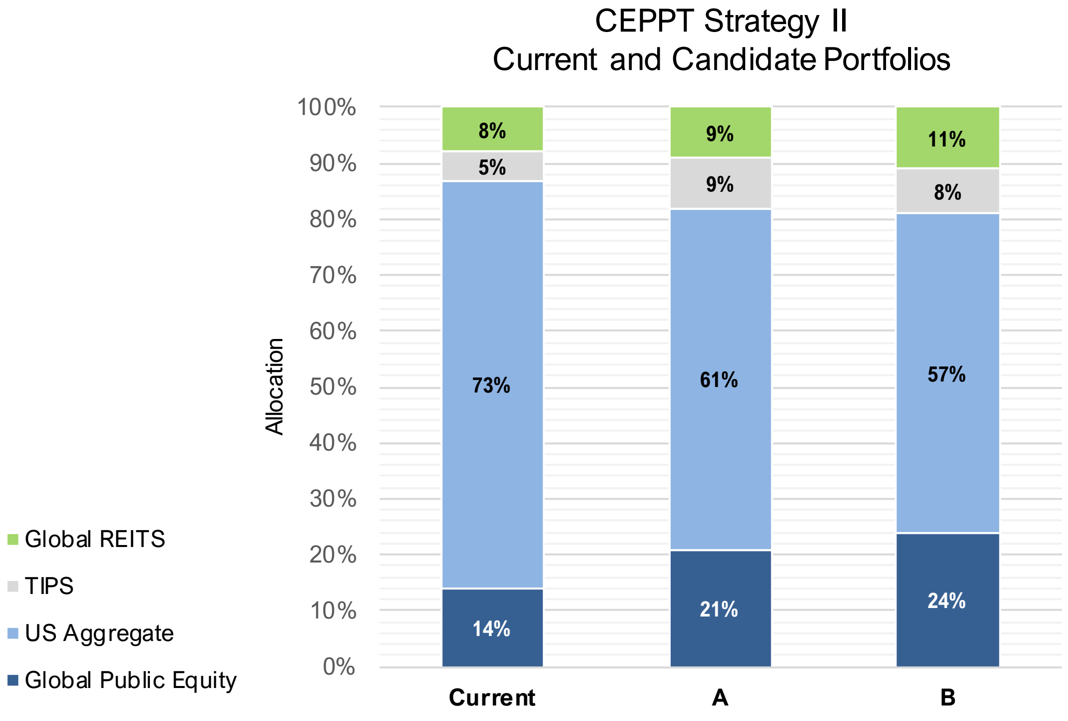
- Voluntary program with variable contributions
- Shorter investment horizon, approximately 10-years
- Strategy 1 is moderate and Strategy 2 is conservative
- Asset class differences – Commodities excluded due to volatility; Fixed Income segment has shorter duration.

Recommendation: Candidate Portfolio A

Projected Return : 3.5%
Drawdown Risk: 11.7%
Volatility: 6.1%

Rationale for Recommendation

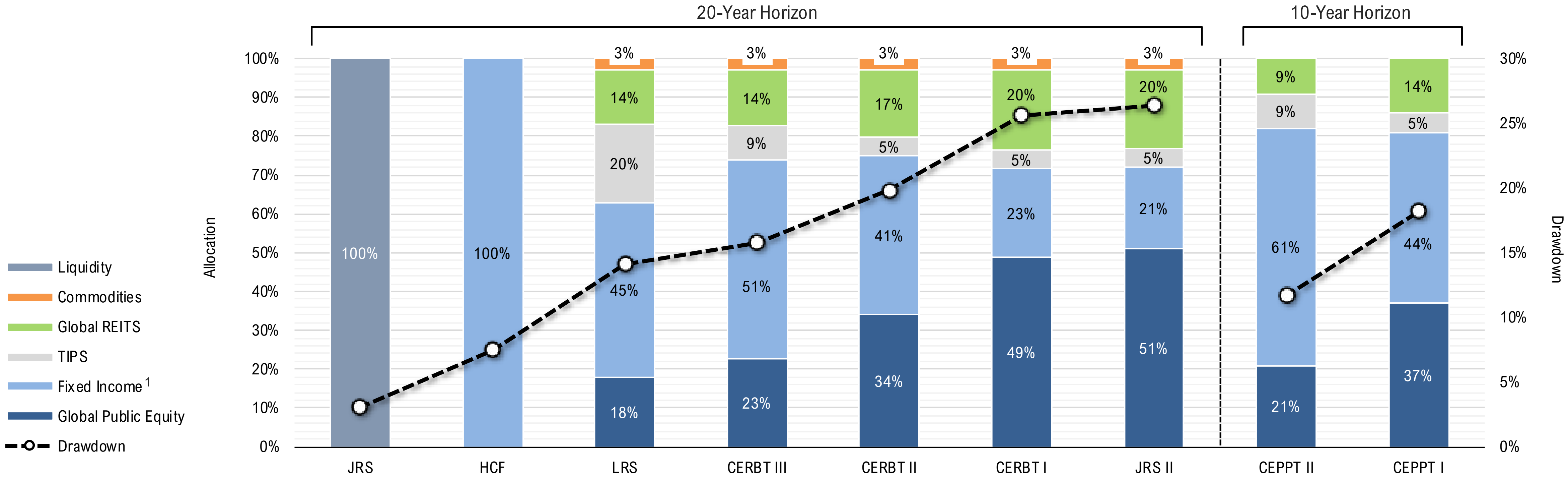
- Increases return from current 3.1% to 3.5%, while increasing drawdown and volatility 2.0% and 0.8% respectively.
- Higher drawdown and volatility than current portfolio, but Candidate B risk is much higher for an additional 0.30% return.



10-year[1] Projections	2019[2] Values	Current Portfolio	Candidate A	Candidate B
Return[3]	4.0%	3.1%	3.5%	3.8%
Drawdown	-	9.7%	11.7%	13.1%
Volatility	5.2%	5.3%	6.1%	6.7%

[1] CEPPT 10-year projections are calculated based on the Board-approved CMA's.
[2] CEPPT was established in 2019.
[3] Returns are geometric and net of expenses of 0.25%.

Recommended Policy Portfolios



	JRS	HCF	LRS	CERBT III	CERBT II	CERBT I	JRS II	CEPPT II	CEPPT I
Projected Return (gross)	1.7%	2.7%	4.9%	5.1%	5.6%	6.1%	6.2%	3.8%	4.8%
Projected Drawdown	3.1%	7.5%	14.1%	15.8%	19.8%	25.6%	26.4%	11.7%	18.2%
Projected Volatility	0.8%	4.5%	7.7%	8.4%	9.9%	12.1%	12.4%	6.1%	8.8%
Expenses	0.01%	0.03%	0.35%	0.10%	0.10%	0.10%	0.15%	0.25%	0.25%
Projected Return (net)	1.7%	2.7%	4.5%	5.0%	5.5%	6.0%	6.0%	3.5%	4.5%

[1] The Fixed Income benchmark for HCF and CEPPT is U.S. Aggregate and for JRS II, LRS, and CERBT is the Long Liability.

Recommendation and Next Steps

Recommendation:

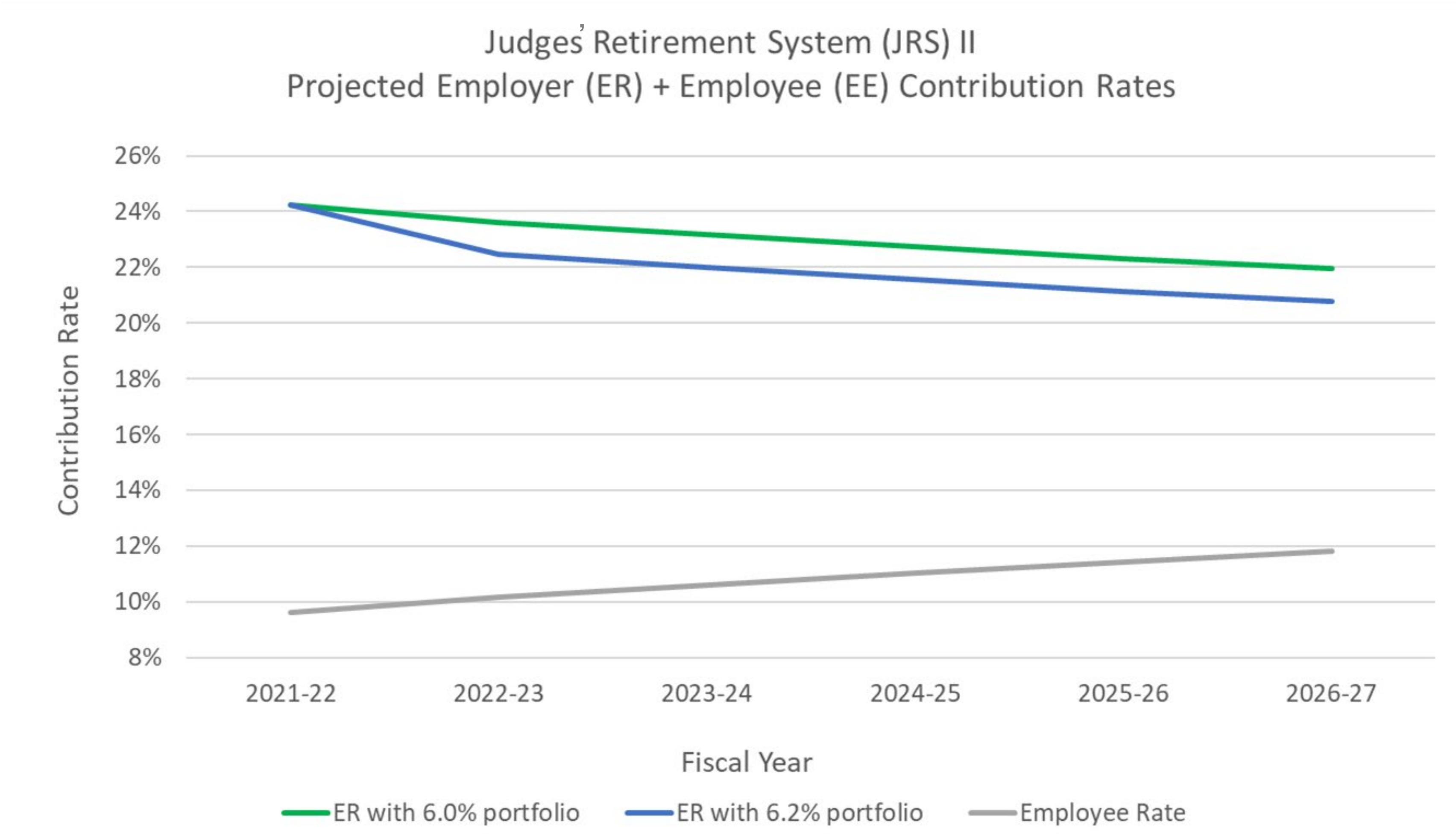
- Adopt the updated Fixed Income Long Liability benchmark weights for the Affiliate Funds.
- Adopt the recommended Candidate Portfolio for each Affiliate Trust as the Policy Portfolio.

Next Steps:

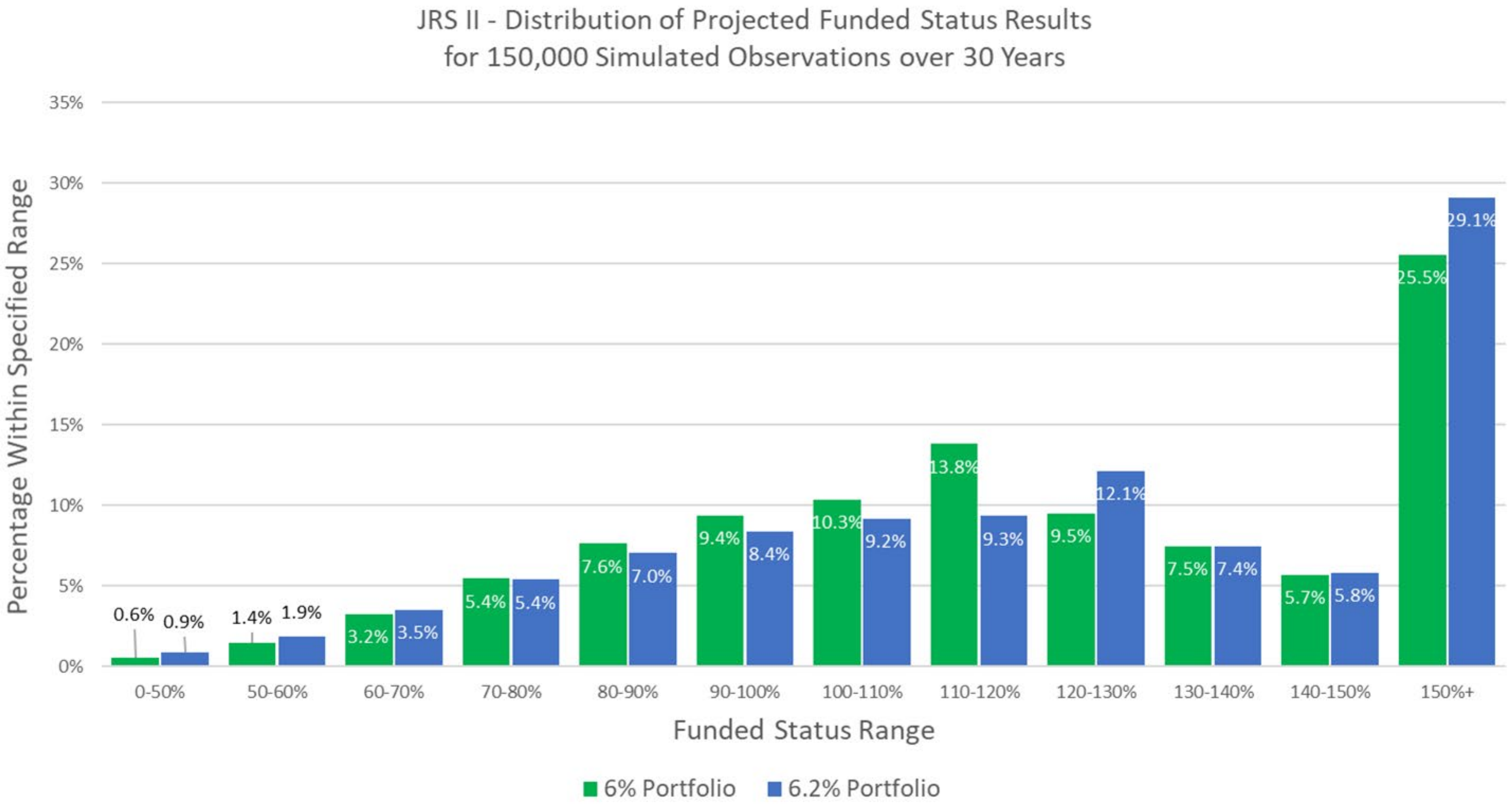
- Communicate with stakeholders regarding the Board decisions and potential implications.
- In the April Finance and Administration Committee meeting, adopt the Experience Study assumptions and select a discount rate for LRS, JRS, and JRS II.
- Present implementation plan with asset class ranges and timeline at June Investment Committee.
- Present SIP Glidepath Asset Allocation to June Investment Committee.

Appendix

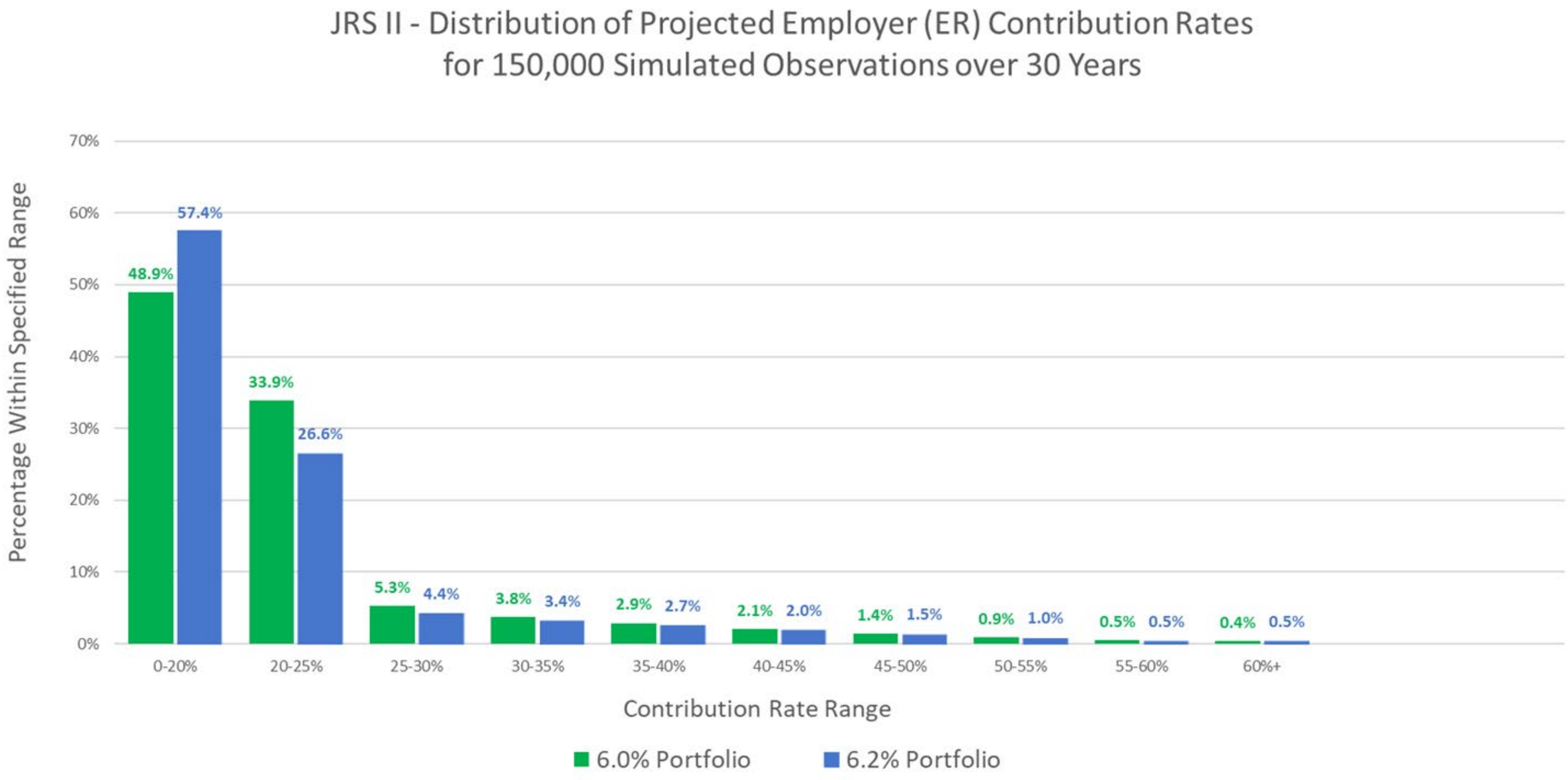
Actuarial Analysis – JRS II Contribution Rate Estimates



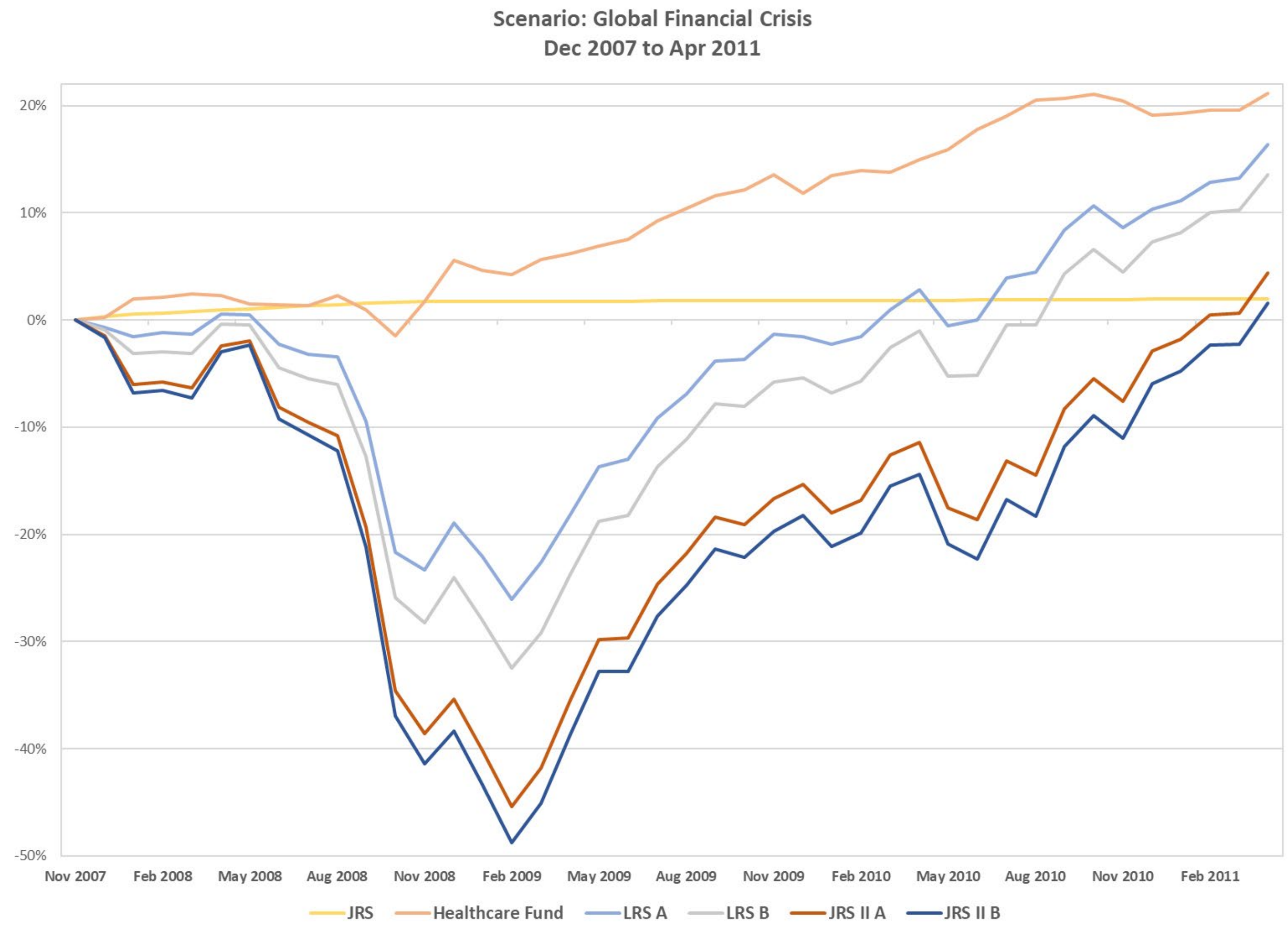
Actuarial Analysis – JRS II Funded Status Estimates



Actuarial Analysis – JRS II Contribution Rate Ranges



Historical Stress Test – HCF, JRS, JRS II, & LRS



Trust / Candidate	Annual Return	Annual Volatility	Maximum Drawdown
HCF	5.8%	4.0%	-3.8%
LRS – A	4.6%	12.3%	-26.5%
LRS – B	3.8%	14.6%	-32.5%
JRS	0.6%	0.2%	0.0%
JRS II – A	1.3%	19.9%	-45.4%
JRS II - B	0.5%	21.4%	-48.8%

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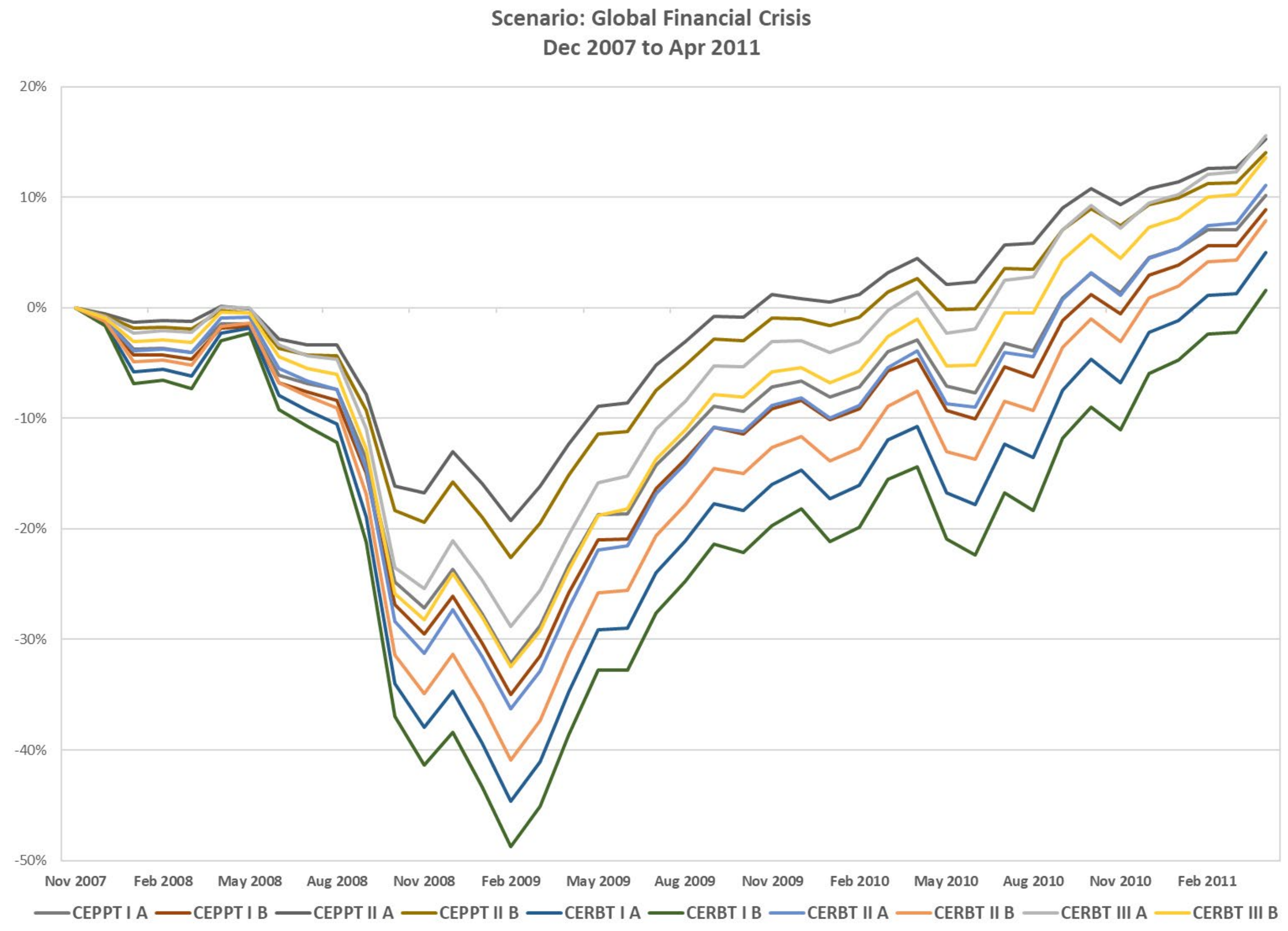
Historical Stress Test – CEPPT & CERBT



Strategy / Candidate	Annual Return	Annual Volatility	Maximum Drawdown
CERBT I – A	1.4%	19.5%	-44.7%
CERBT I - B	0.5%	21.4%	-48.8%
CERBT II – A	3.1%	16.0%	-36.3%
CERBT II – B	2.3%	17.9%	-40.9%
CERBT III – A	4.3%	13.3%	-28.9%
CERBT III – B	3.8%	14.6%	-32.5%
CEPPT I – A	2.9%	13.8%	-32.1%
CEPPT I – B	2.5%	14.9%	-35.0%
CEPPT II – A	4.2%	9.1%	-19.3%
CEPPT II – B	3.9%	10.2%	-22.6%

Fixed Income: Long Liability Risk Analysis

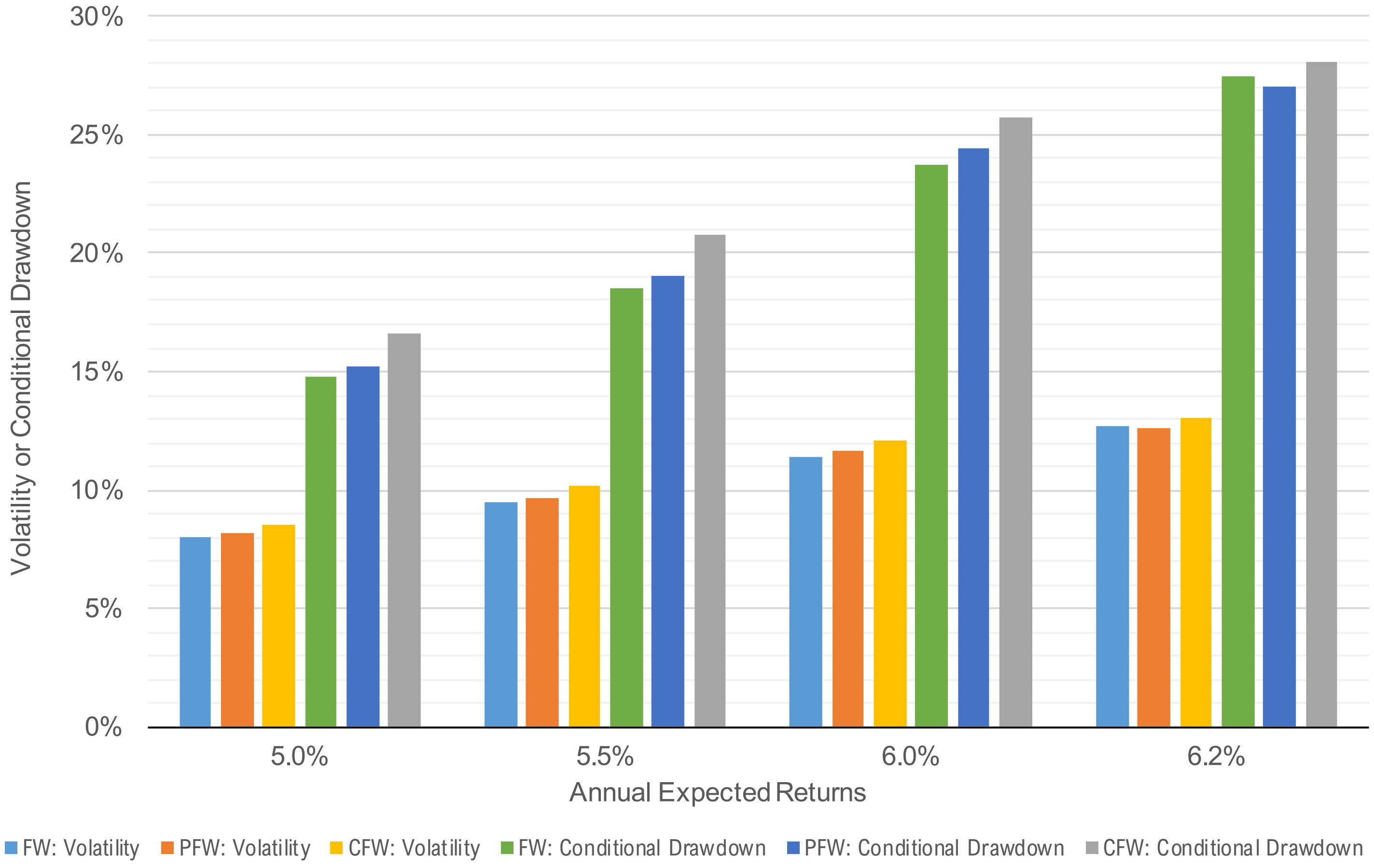
The Affiliates' Long Liability asset class is implemented as a single investment fund requiring a single set of sub-asset class target weights in the benchmark that cannot be different (free weights) for each Affiliate Fund.

The benchmark sub-asset class target weights, as recently optimized for the PERF, were tested for the Affiliates for reasonability. Four sample portfolios were tested using:

- free weights optimized for each Affiliate Fund (technically not achievable with a single fund implementation)
- fixed weights based on the optimized PERF benchmark
- fixed weights based on the current benchmark weights

The projected drawdown and volatility for the PERF model and free weights are similar and in all cases are lower than using the current benchmark weights.

Our conclusion is using the PERF model for the Affiliate Funds' Long Liability benchmark sub-asset class weights is reasonable and improves the risk/return profile compared to the current benchmark.



FW: Free Weights - Sub-asset weights are not fixed. There are constraints on each sub-assets that are consistent with the PERF.
PFW: PERF Fixed Weights - Sub-asset weights are fixed and modeled on the PERF 6.8% target returns and 0% Leverage.
CFW: Current Fixed Weights - Sub-asset weights are fixed and the same as current weights.

Private Equity Analysis – Performance and Fees

- The Private Equity CMA used in constructing candidate portfolios was adopted from the PERF CMA, which is predominately based on a buyout strategy. An outsourced, non-direct, fund-of-funds implementation has a higher expense structure.
- Private-equity fund-of-funds typically charge investors an annual fee of around 1% and management retains 5% of all gains. This is in addition to the standard "2-and-20" (2% of total asset value and 20% of any additional profits) usually charged by each of the private-equity firms in which fund-of-funds invest.[1] Historically, fund-of-funds have underperformed buyout in past 10 and 15 years by ~2-2.5%.

Relative to Buyout:

Net IRR[2]	10-Year	15-Year
Fund-of-Funds	-1.80%	-2.60%

- The Fund of Funds portfolio in CalPERS PERF portfolio has underperformed across all time periods, in part due to their higher fees.

Structure[3]

	NAV ($ mm)	1 Year (%)	3 Year (%)	5 Year (%)	10 Year (%)
Customized Investment Accounts	6,822	39.5	14.7	13.7	9.7
Co-Investments / Direct	2,808	43.1	9.5	16.6	10.2
Fund of Funds / Secondaries	1,758	15.6	7.4	7.2	9.1
Funds	27,026	47.9	14.6	15.0	12.6
Other[4]	358	NA	NA	NA	NA
CalPERS PE Program	**38,772**	**43.8**	**13.7**	**14.2**	**12.0**

CalPERS Sep 2021 Investment Committee, Item 8c, Attachment 5, Semi-Annual Private Equity Performance Review as of June 30, 2021

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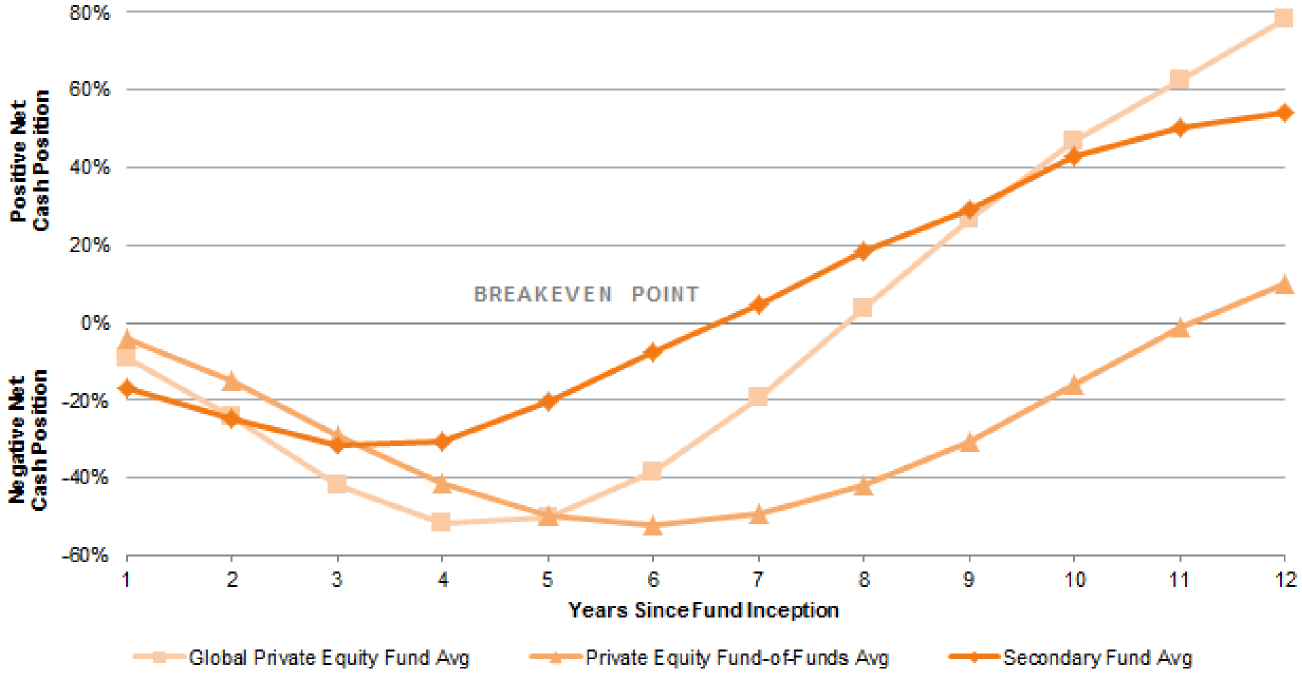
[1] https://www.chicagobooth.edu/review/only-one-type-private-equity-fund-funds-earns-its-fees
[2] Preqin Pro Private Capital Benchmarks as of June 2021, Horizon IRR, US Focused
[3] Source: State Street. All trailing returns included in this report are time-weighted.
[4] Includes currency and stock holdings.

Private Equity Analysis – Projected Returns

Private Equity projected returns usually follow a J-curve – returns are low or negative in early years as the manager draws capital for investments and fees. Returns increase as the value increases over time and exits occur.



Cambridge Associates, LLC

Asset Classes - Benchmarks, CMAs[1], & Constraints

Asset Class/Segment	Benchmark Index	5-Year Projected Return	20-Year Projected Return	20-Year Projected Volatility	Minimum Constraint	Maximum Constraint
Global Public Equity	MSCI ACWI IMI (Net)	6.8%	6.8%	17.0%	0%	100%
U.S. Fixed Income Intermediate	Bloomberg U.S. Aggregate Bond Index	0.9%	2.7%	4.5%	0%	100%
U.S. Fixed Income Long	Bloomberg U.S. Long Liability Index (custom)	1.4%	3.7%	8.2%	0%	100%
U.S. Treasuries Long	Bloomberg AIP LGOV7+	0.1%	2.6%	12.4%	0%	100%
Mortgage-Backed Securities	Bloomberg AIP Long Liability MBS	1.2%	2.8%	3.1%	0%	100%
Investment Grade Corporates	Bloomberg AIP Long Liability Corp ex Sov	0.1%	3.9%	8.5%	0%	100%
High Yield	Bloomberg AIP Long Liability HY Cash Pay	2.2%	4.7%	9.2%	0%	100%
Sovereigns	Bloomberg AIP Long Liability Sovereign	3.2%	4.5%	10.4%	0%	100%
TIPS	Bloomberg U.S. TIPs Index, Series L	0.6%	2.8%	5.9%	5%	100%
Global REITS	FTSE EPRA/NAREIT Developed Index	5.4%	6.0%	18.7%	8%	100%
Commodities	S&P GSCI Total Return Daily	3.2%	3.4%	15.3%	3%	100%
Liquidity	91-day Treasury Bill	0.3%	1.7%	0.8%	0%	100%

[1]CMAs shown here are Projected Return and Projected Volatility. Correlations are shown on the following page.

Asset Classes – CMAs: Correlations

Asset Class/Segment Correlations	Global Public Equity	US Aggregate Bonds	Long U.S. Treasuries	Mortgage-Backed Securities	Investment Grade Corporates	High Yield Bonds	Sovereign Bonds	TIPS	Global REITs	Commodities	Liquidity
Global Public Equity	1.00	0.19	0.11	0.13	0.29	0.38	0.21	0.14	0.68	0.30	0.11
US Aggregate Bonds	0.19	1.00	0.98	0.83	0.96	0.86	0.98	0.61	0.14	0.01	0.12
Long U.S. Treasuries	0.11	0.98	1.00	0.77	0.91	0.79	0.96	0.59	0.08	-0.03	0.09
Mortgage-Backed Securities	0.13	0.83	0.77	1.00	0.72	0.66	0.78	0.59	0.09	0.02	0.19
Investment Grade Corporates	0.29	0.96	0.91	0.72	1.00	0.93	0.94	0.56	0.21	0.01	0.10
High Yield Bonds	0.38	0.86	0.79	0.66	0.93	1.00	0.86	0.51	0.30	0.20	0.10
Sovereign Bonds	0.21	0.98	0.96	0.78	0.94	0.86	1.00	0.59	0.16	0.01	0.11
TIPS	0.14	0.61	0.59	0.59	0.56	0.51	0.59	1.00	0.10	0.10	0.20
Global REITs	0.68	0.14	0.08	0.09	0.21	0.30	0.16	0.10	1.00	0.10	0.08
Commodities	0.30	0.01	-0.03	0.02	0.01	0.20	0.01	0.10	0.10	1.00	0.09
Liquidity	0.11	0.12	0.09	0.19	0.10	0.10	0.11	0.20	0.08	0.09	1.00

Portfolios - Current & Recommended: HCF, LRS, JRS, & JRS II

Trust Name	HCF	LRS			JRS	JRS II		
Asset Class Allocation	**Current & Recommended**	**Current**	**Recommended**	**Delta**	**Current & Recommended**	**Current**	**Recommended**	**Delta**
Global Public Equity		22%	18%	-4%		52%	51%	-1%
Fixed Income[1]	100%	49%	45%	-4%		32%	21%	-11%
TIPS		16%	20%	4%		5%	5%	0%
Global REITS		8%	14%	6%		8%	20%	12%
Commodities		5%	3%	-2%		3%	3%	0%
Liquidity					100%			
Gross Projected Return	2.7%	4.6%	4.9%	0.3%	1.7%	5.8%	6.2%	0.4%
Projected Drawdown	7.5%	14.2%	14.1%	-0.1%	3.1%	23.3%	26.4%	3.1%
Projected Volatility	4.5%	7.5%	7.7%	0.2%	0.8%	11.0%	12.4%	1.4%
Expenses	0.03%	0.35%	0.35%	-	0.01%	0.15%	0.15%	-
Net Projected Return	2.7%	4.2%	4.5%	0.3%	1.7%	5.6%	6.0%	0.4%

[1] The Fixed Income benchmark for HCF is U.S. Aggregate and for JRS II and LRS is the Long Liability.

Portfolios – Current & Recommended: CERBT

Trust Name	CERBT I			CERBT II			CERBT III		
Asset Class Allocation	**Current**	**Recommended**	**Delta**	**Current**	**Recommended**	**Delta**	**Current**	**Recommended**	**Delta**
Global Public Equity	59%	49%	-10%	40%	34%	-6%	22%	23%	1%
Fixed Income[1]	25%	23%	-2%	43%	41%	-2%	49%	51%	2%
TIPS	5%	5%	0%	5%	5%	0%	16%	9%	-7%
Global REITS	8%	20%	12%	8%	17%	9%	8%	14%	6%
Commodities	3%	3%	0%	4%	3%	-1%	5%	3%	-2%
Gross Projected Return	6.0%	6.1%	0.1%	5.3%	5.6%	0.3%	4.6%	5.1%	0.5%
Projected Drawdown	25.8%	25.6%	-0.2%	19.5%	19.8%	0.3%	14.2%	15.8%	1.6%
Projected Volatility	12.0%	12.1%	0.1%	9.5%	9.9%	0.4%	7.5%	8.4%	0.9%
Expenses	0.10%	0.10%	-	0.10%	0.10%	-	0.10%	0.10%	-
Net Projected Return	5.9%	6.0%	0.1%	5.2%	5.5%	0.3%	4.5%	5.0%	0.5%

[1] The Fixed Income benchmark for CERBT is the Long Liability.

Portfolios – Current & Recommended: CEPPT

Trust Name	CEPPT I			CEPPT II		
Asset Class Allocation	**Current**	**Recommended**	**Delta**	**Current**	**Recommended**	**Delta**
Global Public Equity	40%	37%	-3%	14%	21%	7%
Fixed Income[1]	47%	44%	-3%	73%	61%	-12%
TIPS	5%	5%	-	5%	9%	4%
Global REITS	8%	14%	6%	8%	9%	1%
Gross Projected Return	4.7%	4.8%	0.1%	3.4%	3.8%	0.4%
Projected Drawdown	17.6%	18.2%	0.6%	9.7%	11.7%	2.0%
Projected Volatility	8.4%	8.8%	0.4%	5.3%	6.1%	0.8%
Expenses	0.25%	0.25%	-	0.25%	0.25%	-
Net Projected Return	4.4%	4.5%	0.1%	3.1%	3.5%	0.4%

[1] The Fixed Income benchmark for CEPPT is the U.S. Aggregate.

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