OREGON STATE TREASURY

Oregon Investment Council

November 2, 2022

Cara Samples
Chair

Tobias Read
State Treasurer

Rex Kim
Chief Investment Officer

Investment Division
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Oregon Investment Council

Agenda

November 2, 2022
9:00 AM

Oregon State Treasury
Investment Division
16290 SW Upper Boones Ferry Road
Tigard, OR 97224

Time	A. Action Items	Presenter	Tab
9:00-9:05	**1. Review & Approval of Minutes** September 7, 2022	**Cara Samples** *OIC Chair*	**1**
	2. Committee Reports	**Rex Kim** *Chief Investment Officer*	**2**
9:05-10:00	**3. OPERF Asset/Liability Analysis**	**Karl Cheng** *Senior Investment Officer, Portfolio Risk & Research* **Colin Bebee** *Managing Principal, Meketa* **Raneen Jalajel** *Associate Partner, Aon*	**3**
10:00-10:10	**4. Common School Fund Investment Policy Statement**	**John Hershey** *Director of Investments* **Raneen Jalajel** *Associate Partner, Aon*	**4**

B. Information Items

10:10-10:55	**5. State Accidental Insurance Fund Annual Review**	**Perrin Lim** *Investment Officer – Fixed Income* **Chip Terhune** *Chief Executive Officer, SAIF* **Gina Manley** *Vice President of Finance and Chief Financial Officer, SAIF*	**5**

-------------------- BREAK -------------------

11:05-11:50	**6. Oregon Savings Growth Plan Annual Review**	**Debby Larsen** *Program Manager, OSGP* **Anne Heaphy** *Senior Vice President, Plan Sponsor Consulting, Callan LLC* **Uvan Tseng** *Senior Vice President, Plan Sponsor Consulting, Callan LLC* **Claire Illo** *Investment Officer – Public Equity*	**6**
11:50	**7. Asset Allocation & NAV Updates** a. Oregon Public Employees Retirement Fund b. SAIF Corporation c. Common School Fund	**Rex Kim**	**7**
	8. Calendar — Future Agenda Items	**Rex Kim**	**8**
12:00	**9. Open Discussion**	**OIC Members** **Staff** **Consultants**	
12:00	**10. Public Comments**		

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OREGON STATE TREASURY

TAB 1

REVIEW & APPROVAL OF MINUTES

State of Oregon
Office of the State Treasurer

16290 SW Upper Boones Ferry Road

Tigard, Oregon 97224

OREGON INVESTMENT COUNCIL

September 7, 2022

Meeting Minutes

Members Present:	Cara Sample, John Russell, Lorraine Arvin, Tobias Read, Kevin Olineck
Staff Present:	Rex Kim, John Hershey, Michael Langdon, David Randall, Karl Cheng, Ben Mahon, Caleb Aldridge, Amy Bates, Chris Ebersole, Wil Hiles, Claire Illo, Louise Howard, Michael Mueller, Aadrial Phillips, Caleb Aldridge
Staff Participating Virtually:	Kenny Bao, Tyler Bernstein, Taylor Bowman, Tan Cao, Claudia Ciobanu, Andrew Coutu, Bradley Curran, Debra Day, Ahman Dirks, David Elott, Alli Gordon, Will Hampson, Carolyn Harris, Ian Huculak, Claire Illo, Roy Jackson, Aliese Jacobsen, Kristi Jenkins, Josh Jones, Amanda Kingsbury, Jacqueline Knights, Jeremy Knowles, Paul Koch, Krystal Korthals, Steve Kruth, Perrin Lim, Michael Makale, Ryan Mann, Tim Miller, Dana Millican, Mike Mueller, Dmitri Palmateer, Jen Plett, Tim Powers, Mohammed Quraishi, Jo Recht, Andrew Robertson, Scott Robertson, Faith Sedberry, Mark Selfridge, Aleshia Slaughter, Jennifer Staub, Andrey Voloshinov, Byron Williams, Tiffany Zahas
Consultants Present:	Christy Fields, Colin Bebee, Mika Malone, Paola Nealon (Meketa Investment Group, Inc.); Thomas Martin (Aksia/TorreyCove Capital Partners LLC); Matt Larrabee, Scott Preppernau, Ada Lin (Milliman); Ryan Holaday, Robert Mitchnick, Eric Pinsky, Bandon Shih, Zheng Zeng (Blackrock)
PERS Present:	Michiru Farney, Heather Case
Legal Counsel Present:	Sam Zeigler (Department of Justice)

Before proceeding with the OIC meeting, Chief Investment Officer Rex Kim provided a disclosure pertaining to the hybrid set-up of this OIC meeting, informing those in attendance (virtual and in person) of the guidelines in which this meeting will proceed.

The September 7, 2022 OIC meeting was called to order at 9:01 am by Cara Samples, Chair.

I. 9:01 am Review and Approval of Minutes

MOTION: Chair Samples asked for approval of the July 20, 2022 OIC regular meeting minutes. Vice-Chair Russell moved approval at 9:01 am, and Member Arvin seconded the motion which then passed by a 4/0 vote.

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II. 9:02 am Committee Reports

Private Equity Committee:
None

Real Estate Committee:

August 8	Sculptor Diversified Real Estate Income Trust	$150M

Opportunity Committee:
None

Alternatives Portfolio Committee:
None

III. 9:02 am Cryptocurrency and Blockchain
Dave Randall, Chief Investment Operating Officer introduced the presenters.

Robert Mitchnick, Head of Digital Assets, Blackrock gave an educational presentation about cryptocurrency and blockchain.

IV. 9:54 am Common School Fund Investment Policy Statement
John Hershey, Director of Investments and Raneen Jalajel, Associate Partner, Aon gave an update on the Common School Fund Investment Policy Statement project.

MOTION: At 10:15 am, Treasurer Read moved approval of the Investment Policy Statement, subject to the addition of a clause specifying that the Common School Fund may retain investment managers that have been approved by the OIC on behalf of the Oregon Public Employees Retirement Fund (OPERF). The motion was seconded by Member Arvin and passed by a vote of 4/0.

V. 10:30 am OPERF Preliminary Asset/Liability Analysis
Karl Cheng, Senior Investment Officer, Portfolio Risk & Research, Colin Bebee, Managing Principal, Meketa, Mathew Larrabee, Principal, Milliman, and Scott Preppernau, Principal, Milliman presenting the OPERF preliminary asset/liability analysis.

They reviewed prior discussions including the risk and implementation survey and capital market assumptions, the study process and methodology, how the current portfolio compares to models, funding projections, summary of findings, and next steps.

VI. 11:53 am OPERF Q2 Performance
Allan Emkin, Managing Principal, Meketa, Mika Malone, Managing Principal, Meketa, and Paola Nealon, Managing Principal, Meketa presented the OPERF Q2 performance report.

VII. 12:09 pm Asset Allocation & NAV Updates
Rex Kim, Chief Investment Officer presented the asset allocation and NAV updates.

VIII. 12:11 pm Calendar – Future Agenda Items
Rex Kim presented the forward calendar.

IX. 12:12 am Open Discussion

Vice Chair Russell and Chair Samples discussed asset allocations and manager discretion and flexibility.

X. 12:16 am Public Comments

Chair Samples opened the floor to public comments. Public comments have also been submitted electronically and included with the public meeting book.

Ms. Samples adjourned the meeting at 12:55 pm.

Respectfully submitted,
Aadrial Phillips
Executive Support Specialist

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TAB 2

COMMITTEE REPORTS

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OREGON STATE TREASURY

TAB 3

OPERF ASSET/LIABILITY ANALYSIS

MEKETA
INVESTMENT GROUP

Oregon Investment Council

November 2, 2022

2022
Final Asset-Liability Study Results

Table of Contents

Introduction and Goals for Today

Introduction

→ This presentation seeks to conclude the 2022 Asset-Liability Study.

→ A subset of major asset-liability metrics are analyzed across a series of portfolios:

- Current Policy
- Actual Allocation
- Option #1
- Option #2
- Option #3

Staff/Consultant Recommendations

→ For the OIC, asset allocation design is the most important decision on the asset side.

→ The process for designing and selecting an asset allocation is part art and science.

→ There is no "right" asset allocation for all purposes.

Goals for Today

→ The ultimate goal for today is to select a new long-term policy allocation for OPERF.

→ We will review the major takeaways from the entire process as well as new asset-liability output for a series of proposed portfolio options.

→ After in-depth dialogue in September regarding preliminary results, the following were the major conclusions:

- Based on the asset-liability modeling process, OPERF appears well situated.
- With the currently utilized constraints, improvements in the asset-liability posture are difficult.
  - More "efficient" portfolios would generally rely on even higher allocations to private markets and/or higher allocations to Diversifying Strategies. Both options face headwinds (e.g., liquidity constraints, implementation challenges, etc.).
- Examining materially different portfolios (e.g., less private markets) could shift the asset-liability posture, but the shift would likely be to a less efficient portfolio.
- Any alterations, whether small or large, would represent more of a preference of the OIC rather than a conclusion from the asset-liability modeling process.

→ Staff, Meketa, and Aon incorporated these takeaways and propose three potential new long-term policy allocations for the OIC to consider.

Current, Actual, and Proposed Portfolios | Asset-only Metrics

	Current Policy	Actual Allocation*	Option #1	Option #2	Option #3
Public Equity	30.0%	23.0%	30.0%	25.0%	20.0%
Fixed Income	20.0%	20.0%	20.0%	25.0%	30.0%
Risk Parity	2.5%	2.0%	---	---	---
Private Equity	20.0%	28.0%	22.5%	22.5%	22.5%
Real Estate	12.5%	14.0%	12.5%	12.5%	12.5%
Real Assets	7.5%	8.0%	7.5%	7.5%	7.5%
Diversifying Strategies	7.5%	5.0%	7.5%	7.5%	7.5%
Expected Max Drawdown*	41.4%	44.7%	43.2%	40.0%	37.0%
Expected Volatility*	11.9%	12.7%	12.3%	11.6%	10.8%
Expected Return*	7.7%	8.0%	7.8%	7.6%	7.5%
Illiquids	40.0%	50.0%	42.5%	42.5%	42.5%

→ All proposed options:

- Eliminate allocation to Risk Parity
- Increase Private Equity target by 2.5%
- Maintain allocations to Real Estate, Real Assets, and Diversifying Strategies

→ *Sole difference: Tradeoff between Public Equity and Fixed Income*

*Actual Allocation as of 11/2/2022 will differ. Detailed allocation is as of August 2022 and is consistent with the September A/L presentation.
**See Appendix for methodology/calculation details

Portfolio Options - Rationale

	Decision	Rationale
Public Equity Fixed Income	Range of allocations: Public Equity (20-30%) Fixed Income (20-30%) Total = 50%	• The most liquid elements of OPERF. Total allocation of 50% is prudent for liquidity management. • Tradeoff among the two is the primary mechanism (based on other constraints/decisions) to influence total OPERF risk level.
Risk Parity	Eliminate	• Elimination of the segment is largely an effort to streamline the portfolio and corresponding oversight/management. • At the current target weight, the impact on the total portfolio is immaterial. • Recent experience has failed to meet expectations. • Current cost of leverage is an additional headwind.
Private Equity	Increase target by 2.5%	• Effectively the reallocation away from Risk Parity and to Private Equity. • Actual allocation is materially above current target allocation. • A slight increase in the policy target helps to narrow the difference between actual allocation and policy target. • New target provides a more achievable level.
Real Estate	Maintain at current policy target	• Actual allocation is within a reasonable range of current policy target. • Collective agreement among Staff/Meketa/Aon that policy target is appropriate from risk/return and liquidity perspectives.
Real Assets	Maintain at current policy target	• Actual allocation is within a reasonable range of current policy target. • Collective agreement among Staff/Meketa/Aon that policy target is appropriate from risk/return and liquidity perspectives.
Diversifying Strategies	Maintain at current policy target	• Relatively new class with a newly adopted structure. • Current policy target represents an achievable allocation with a corresponding measurable impact on the total portfolio.

Process Review

3 key high-level steps to the A/L process:

1.

Develop an understanding of **how the financial condition of OPERS/OPERF might vary** based on outcomes of the investment portfolio.

2.

Set a consensus definition and view of the risk(s) the OIC is willing to bear.

3.

Once a view/tolerance for risk has been established, **select an appropriate long-term investment strategy** (i.e., a policy portfolio / strategic allocation).

Simulation-Based Optimization

→ For OPERF, Meketa utilized a proprietary, customizable simulation model.

→ For each asset class, we developed non-normal distribution assumptions (i.e., forward-looking assumptions for expected return, volatility, skew, and kurtosis).

→ Portfolio statistics are based on 10,000 multi-decade simulations (e.g., 20 years).

→ Process requires significant time and computing power, but it allows for custom modeling and performance statistics.

→ Differs from traditional mean-variance optimization.

- Mean-Variance Optimization ("MVO"):
  - Workhorse for asset allocation analysis since the 1950s
  - Single-period model
  - Assumes normal distributions and linear relationships
  - Only examines risk under standard deviation lens
  - Doesn't incorporate crisis situations (i.e., correlations moving to 1)
  - Fails to accurately reflect potential outliers

Liability Structure

→ Output from Meketa's simulation model was provided to Milliman for integration with the liability structure.

→ Milliman utilized the same model as shown to the PERS Board at the December 2021 meeting[1].

→ The model was updated to incorporate the 2021 full-year OPERF returns and inflation.

→ Meketa provided Milliman with 10,000 simulations of 20-year horizons for each potential portfolio under examination.

- The first year of each simulation incorporated OPERF realized returns[2] and inflation for the first six months with simulated data for the remaining six months. All other years were fully simulated.

→ In addition to simulations for different total portfolios, Meketa provided Milliman with corresponding simulations for Public Equity and Inflation.

[1] Please refer to that presentation for information on the data, assumptions, methods, reliance, and disclaimers regarding the model.
[2] To better reflect economic reality, Meketa and OST Staff elected to markdown the Private Equity portfolio by the same amount as Public Equity for the first six months of 2022.

Review of Prior Discussions

→ Up to this point, the 2022 OPERF Asset-Liability Study has revolved around three primary items:

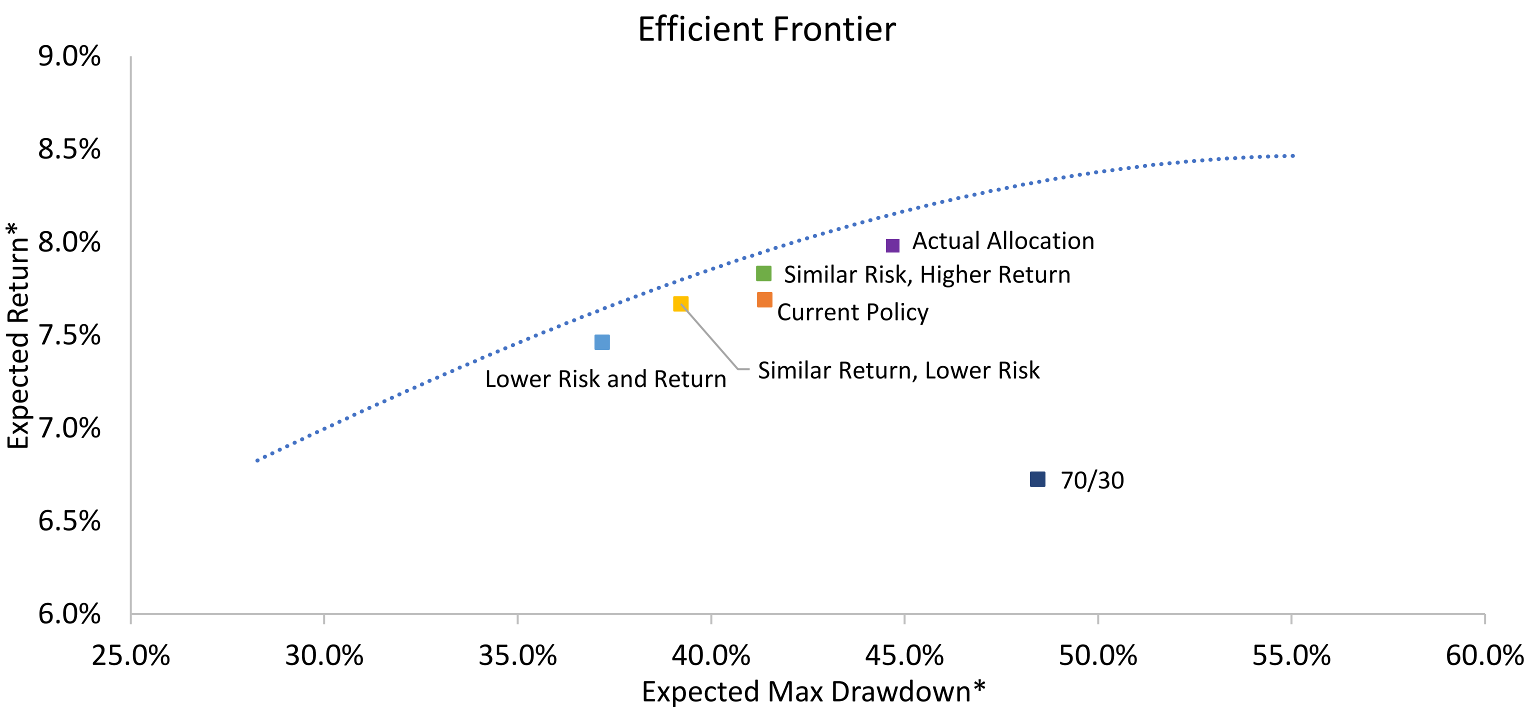
- April | Risk and Implementation Survey Results
- June | Capital Market Assumptions
- September | Exploration of Preliminary Asset-Liability Results

→ Each of these discussions built on top of one another, with today's discussion representing the culmination of the reviewed data and dialogue to date.

- The following two slides were presented in September and are provided again solely for review purposes.

From September OIC Meeting

Efficient Frontier and Examined Portfolios



→ The discussion in September focused on three illustrative portfolios. These represented general "directions" that OPERF could follow based on metrics from an asset-only perspective.

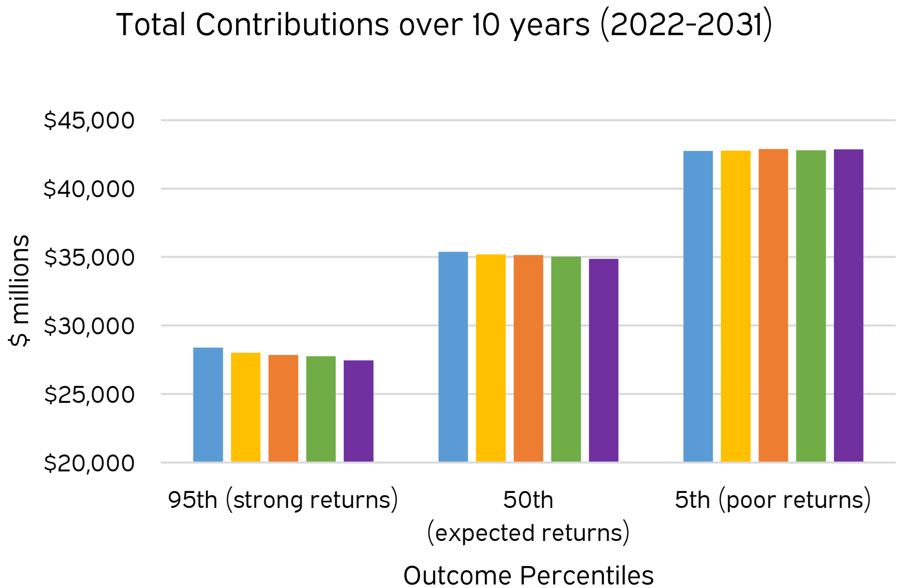
→ In addition to an asset-only view, the OIC examined these same illustrative portfolios under an asset-liability lens.

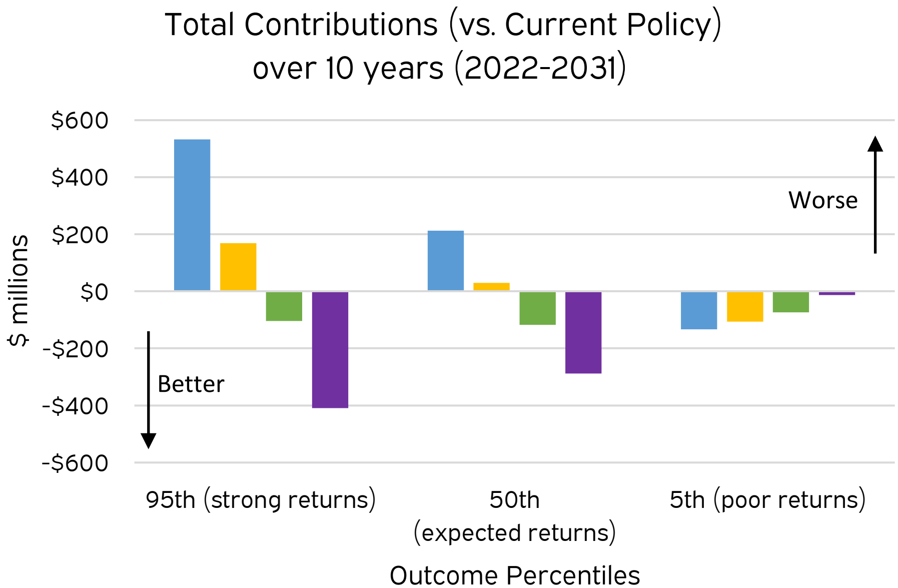
*See Appendix for methodology/calculation details

Illustrative Portfolios - Total Contribution Projections

From September OIC Meeting

Total Contributions over 10 Years*





→ From an asset-liability perspective, the illustrative portfolios exhibited only marginal differences over an intermediate timeframe (i.e., 10 years).

→ Contribution differences were greatest under a strong return environment (top 5th percentile of outcomes).

→ Contribution differences were minimal under a poor return environment (bottom 5th percentile of outcomes).

*Excluding Side Account transfers

Market Update

Market Update

→ 2022 has been an extremely volatile year.

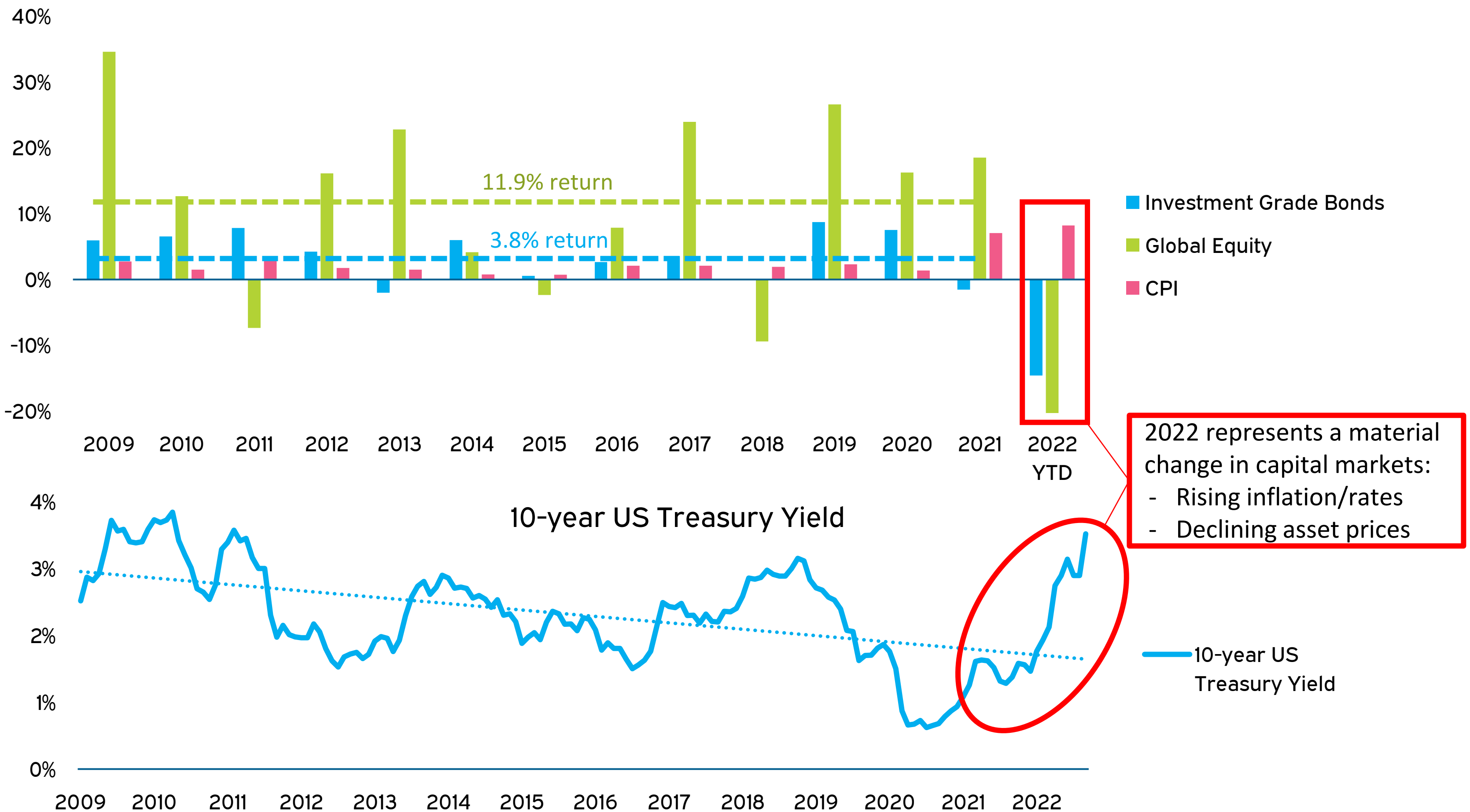
- Major events across the globe (e.g., inflation, rising interest rates, Russia/Ukraine, UK Gilts, etc.) continue to shape and/or be shaped by capital market dynamics.

→ Subsequent to the September meeting, Staff/Meketa/Aon have continued to examine the capital market environment and potential new policy portfolios.

- While forecasting market behavior (particularly over the short-term) is an extremely challenging endeavor, ensuring that the capital market assumptions remain reasonable is necessary.

Looking Back - A Decade+ of Tailwinds

Equities, Bonds, and Inflation | 2009-2022 YTD (as of 9/30/22)



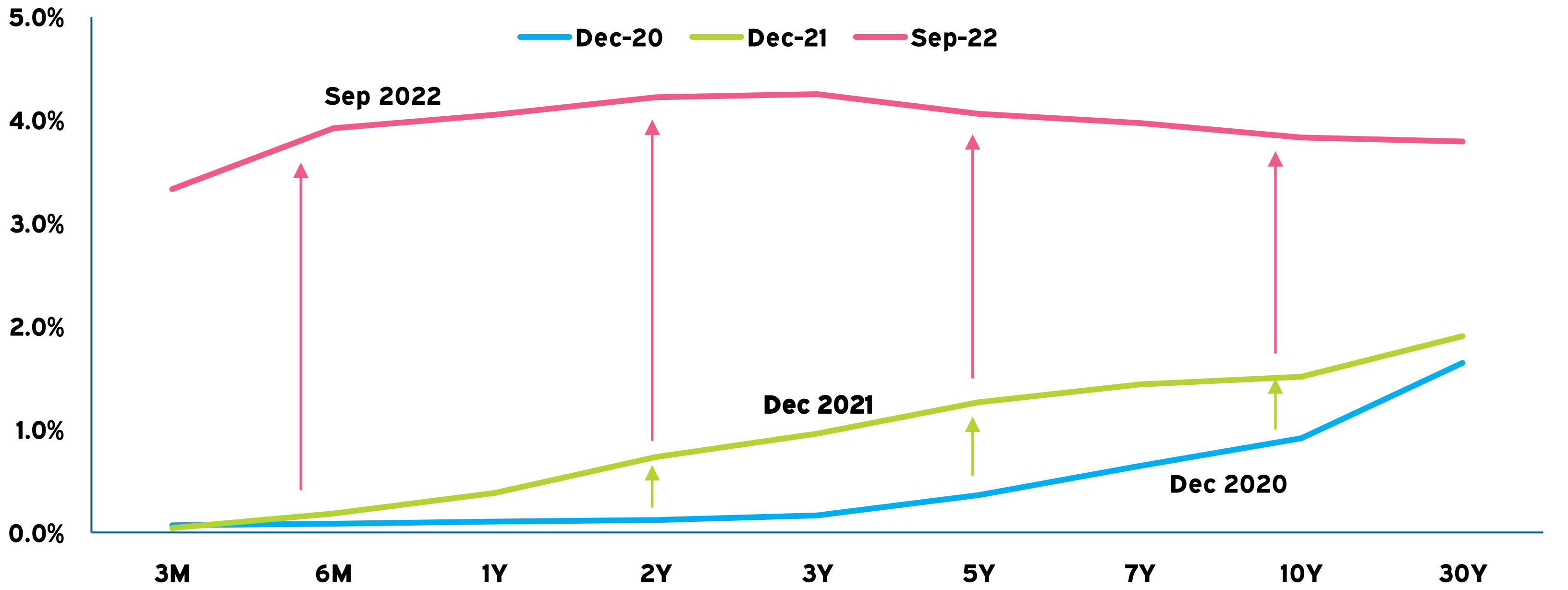
Source: Bloomberg, MPI Stylus

Rising Interest Rates

→ The US Treasury yield curve steepened during 2021, as concerns about inflation battled with the demand for safe-haven assets (e.g., Treasuries) and Federal Reserve polices designed to maintain low rates (e.g., the quantitative easing program).

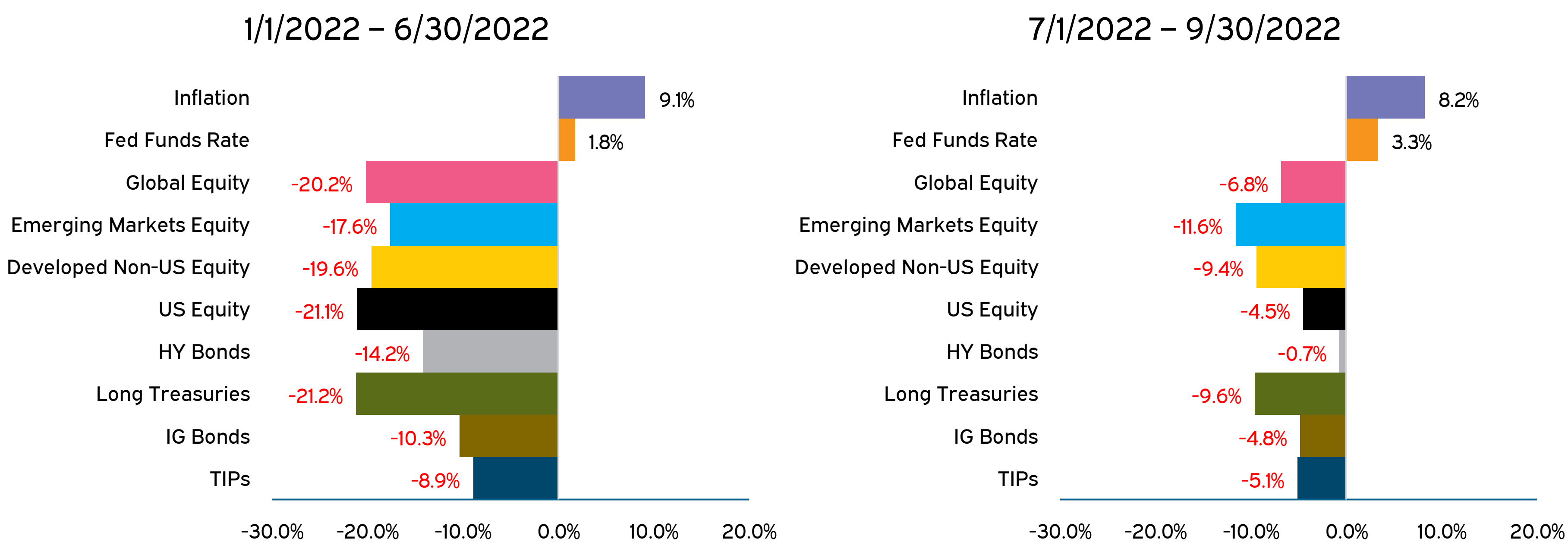
→ Coinciding with elevated and sustained inflation, rates have continued to increase in 2022 YTD.

US Yield Curve



Source: Bloomberg. Data is as of September 30, 2022.

2022 = A Consistent Theme



→ Q3 2022 (right chart) details the additional market declines due to sustained inflation and rising interest rates.

→ Throughout 2022, there has been nowhere to hide in traditional markets.

Source: Bloomberg, MPI Stylus
Note: Inflation data represents trailing 12-month CPI.

Capital Market Assumptions

→ OST Staff, Meketa, and Aon believe that the previously presented capital market assumptions remain prudent.

→ Within risk-oriented markets (e.g., equity, credit, etc.), the tradeoff between more attractive valuations is likely buffered by a deterioration in fundamentals (e.g., earnings, defaults/recoveries, etc.).

→ The prevailing interest rate environment was generally incorporated into prior assumptions.

→ The utilized capital market assumptions remain reasonable for the long-term oriented time horizon of an asset-liability study.

Model Output

Examining the Efficient Frontier

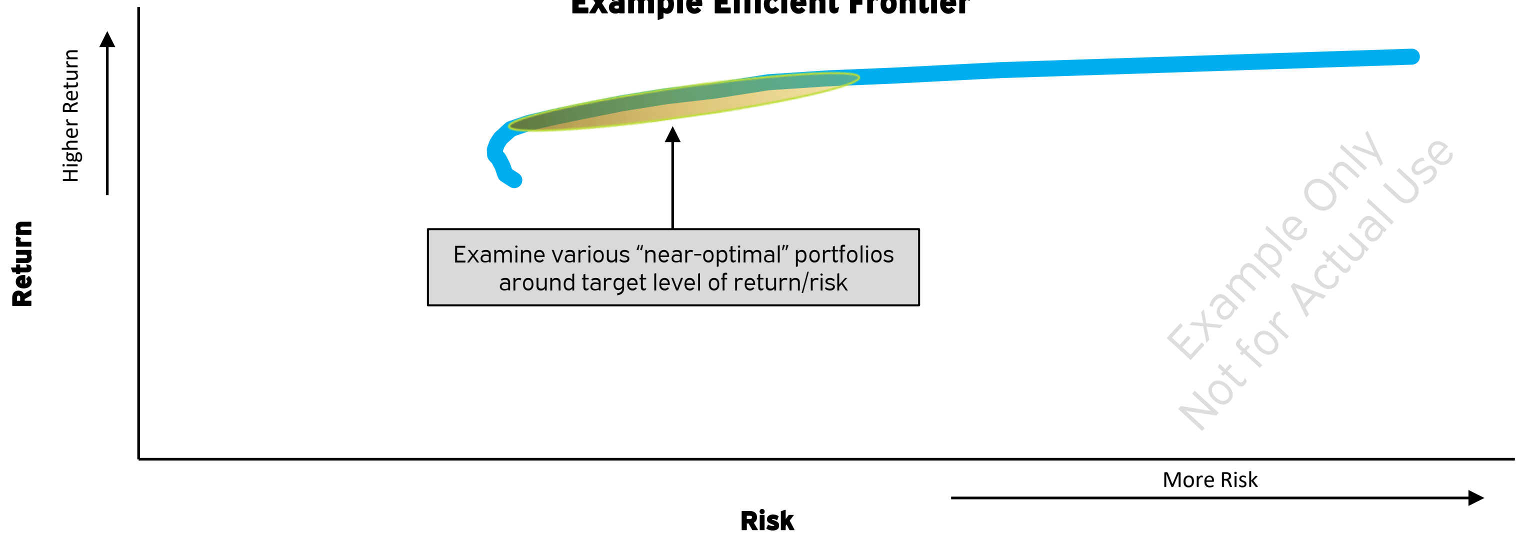
→ Strategic allocation optimizations produce an "efficient frontier," which is a series of portfolios with the highest expected return for a given level of risk.

- Note: the measure of "return" and "risk" can be reframed to be a variety of metrics.

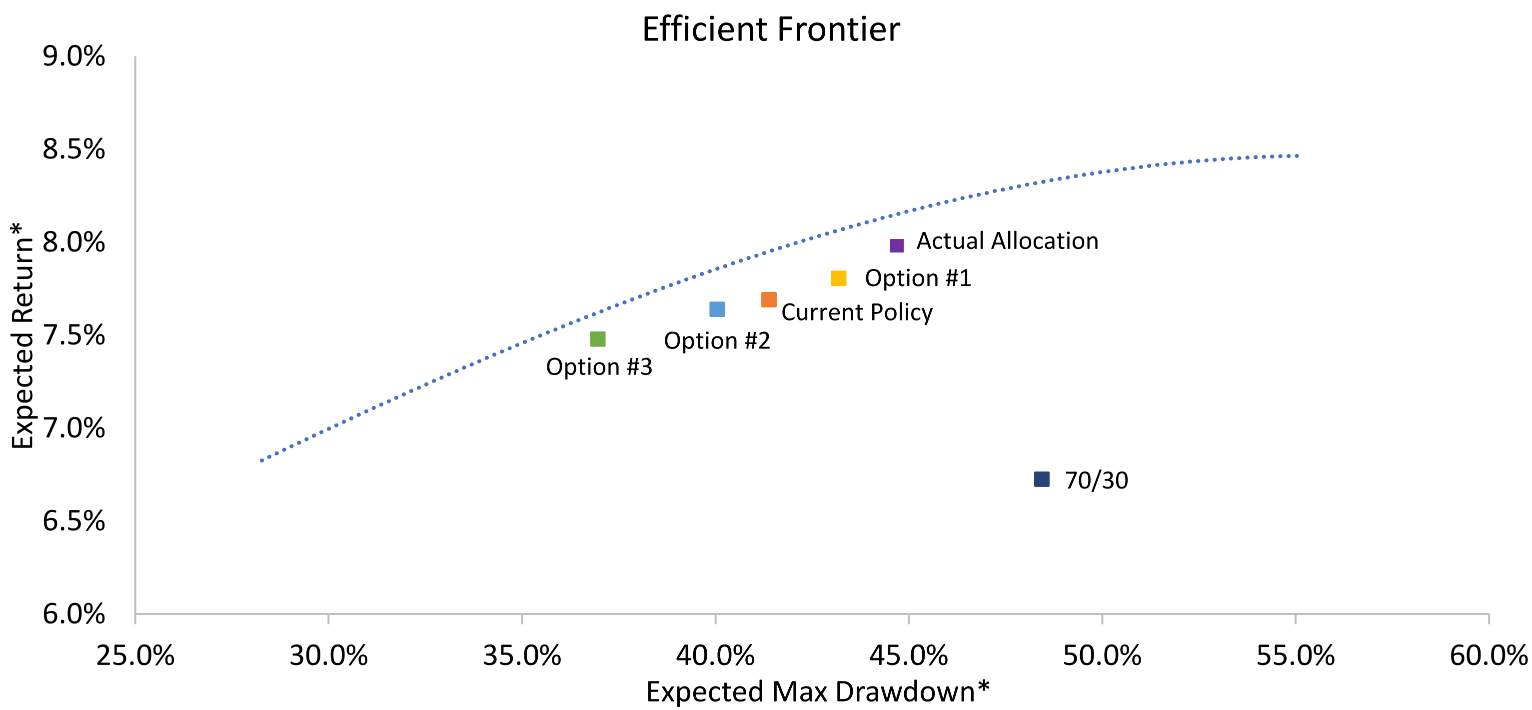
→ It is important to recognize that financial modeling is an imperfect exercise, and, thus, it is crucial to examine "near optimal" portfolios.

- Portfolios with similar expected returns/risks as those on the efficient frontier but with moderately different allocations.

Example Efficient Frontier



Efficient Frontier and Proposed Portfolios

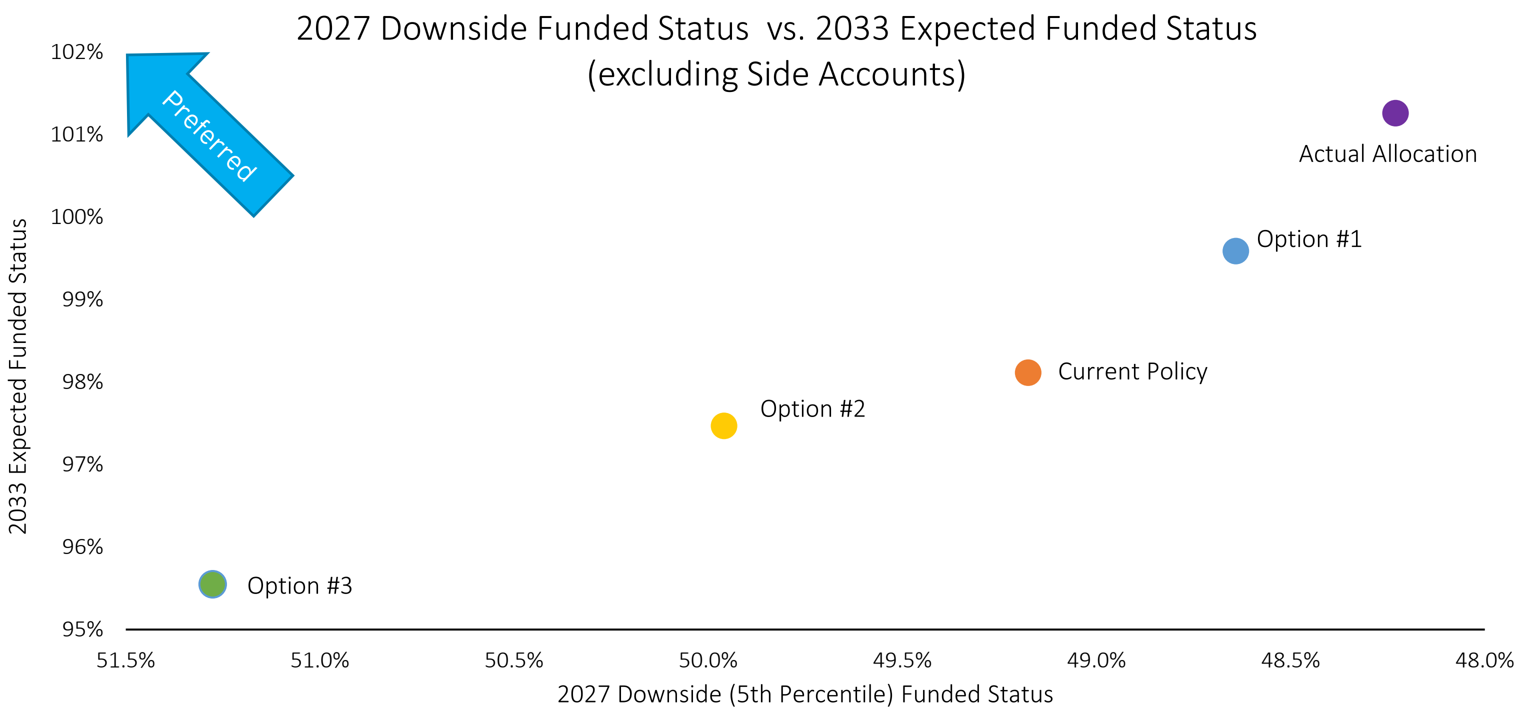


→ The three proposed options/portfolios all reside in the "near-optimal" space from an asset-only perspective.

→ The decrease in risk level from Option #1 to Options #2 and #3 is due to the transfer from Public Equity to Fixed Income. All other class allocations remain the same among the options.

*See Appendix for methodology/calculation details

Funded Status Efficient Frontier – Short and Medium-term Scenarios

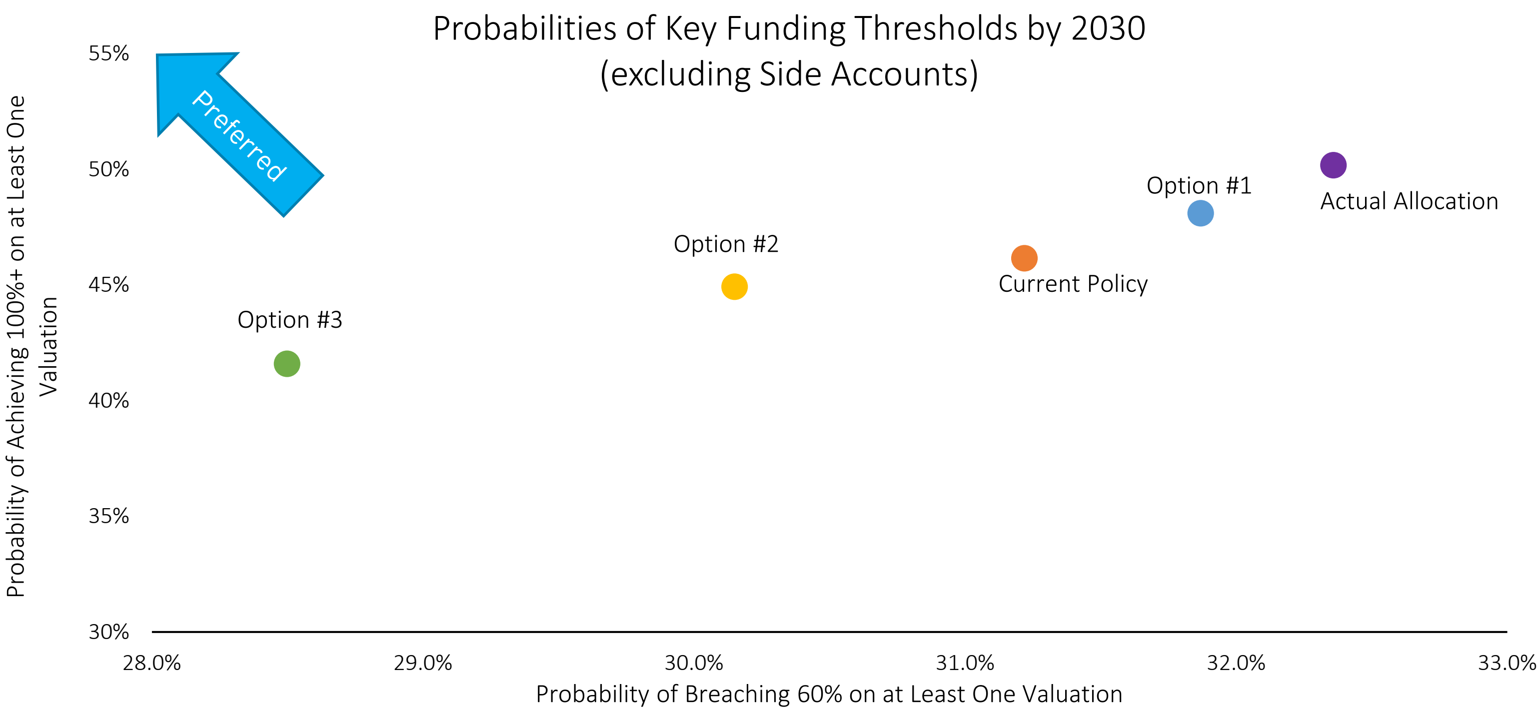


→ Reframing the efficient frontier:

Reward = medium-term funded status | Risk = short-term downside funded status

→ The efficient frontier is shaped how one would expect, but the differences among the portfolio options are generally insignificant.

Funded Status Efficient Frontier – Key Thresholds



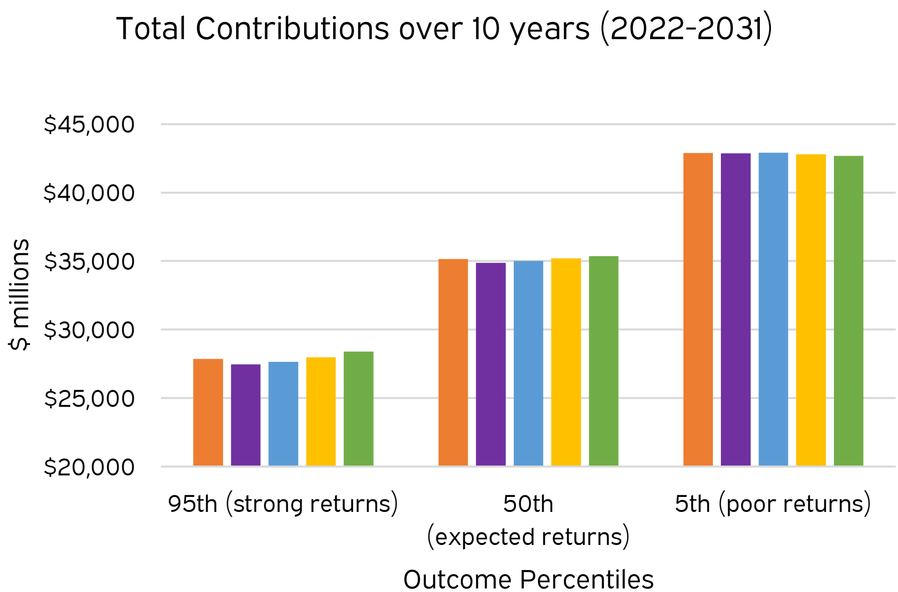
→ Reframing the efficient frontier:

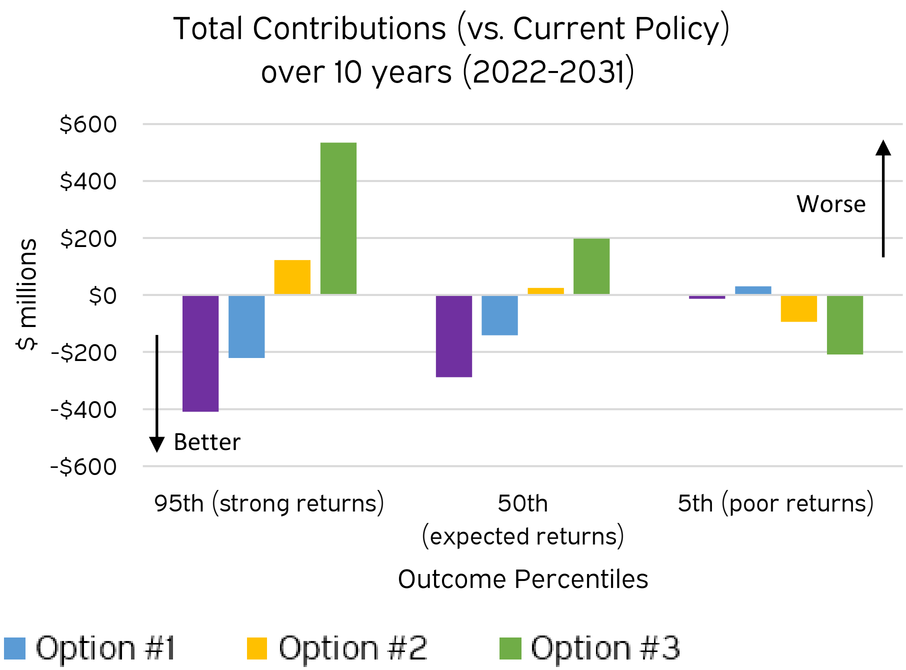
Reward = probability of achieving 100%+ on at least one valuation date on/before 12/2030

Risk = probability of breaching 60% on at least one valuation date on/before 12/2030

→ The efficient frontier is shaped how one would expect, but the differences among the portfolio options are generally insignificant.

Total Contributions over 10 Years*





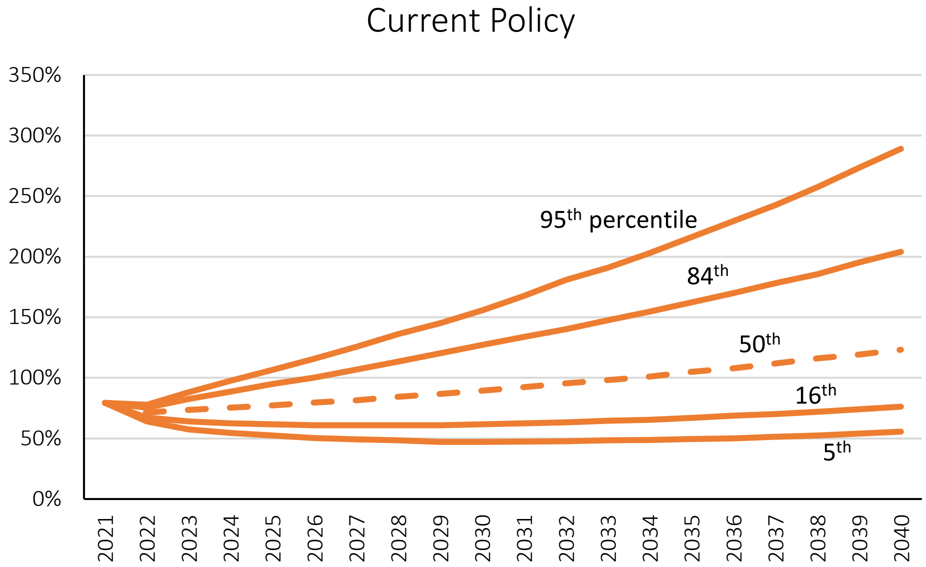
→ From an asset-liability perspective, the proposed options/portfolios exhibited only marginal differences over an intermediate timeframe (i.e., 10 years).

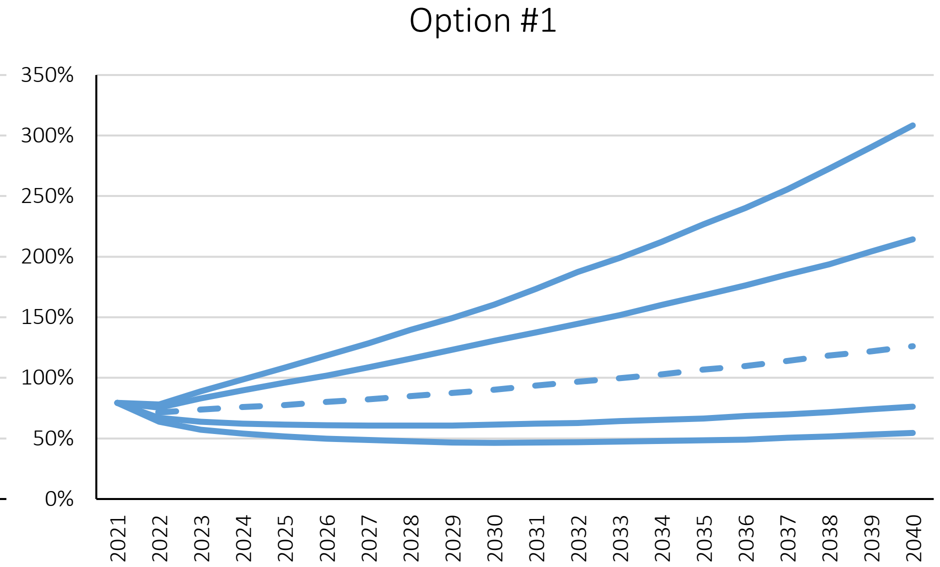
→ Contribution differences are greatest under a strong return environment (top 5th percentile of outcomes).

→ Contribution differences are minimal under a poor return environment (bottom 5th percentile of outcomes).

*Excluding Side Account transfers

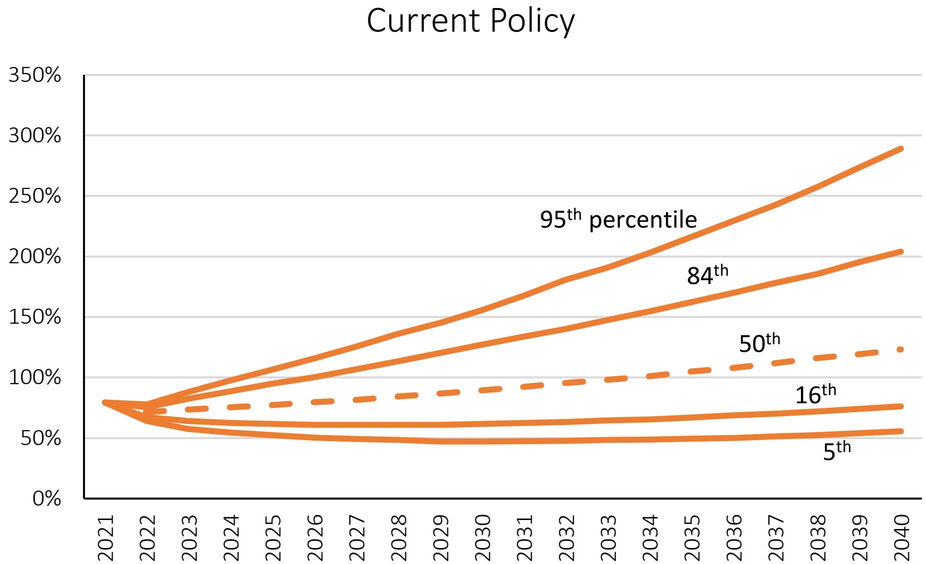
Funded Status (excluding Side Accounts)

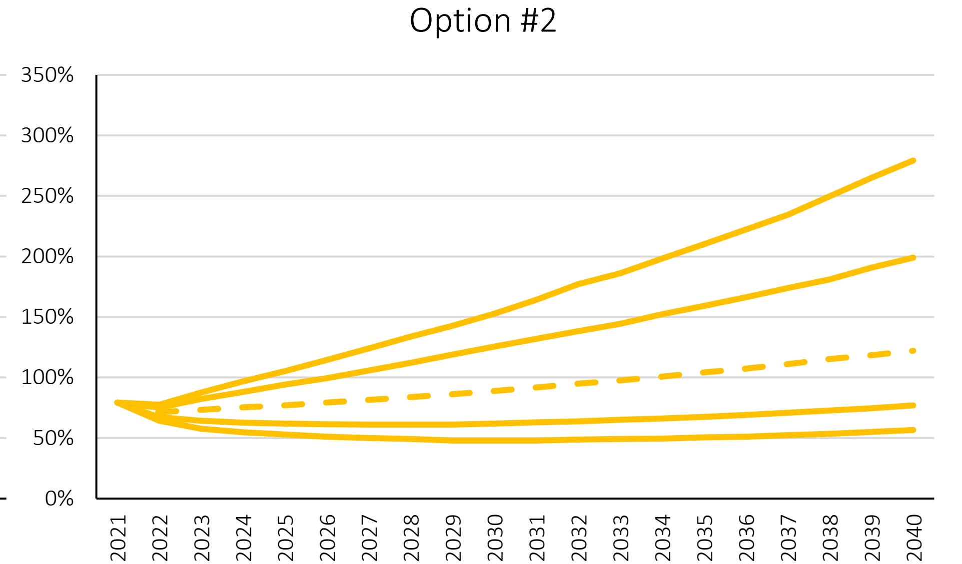




→ Compared to the *Current Policy*, the *Option #1* allocation exhibits similar funded status projections during downside percentiles but marginally higher funded status projections for most scenarios.

Funded Status (excluding Side Accounts)



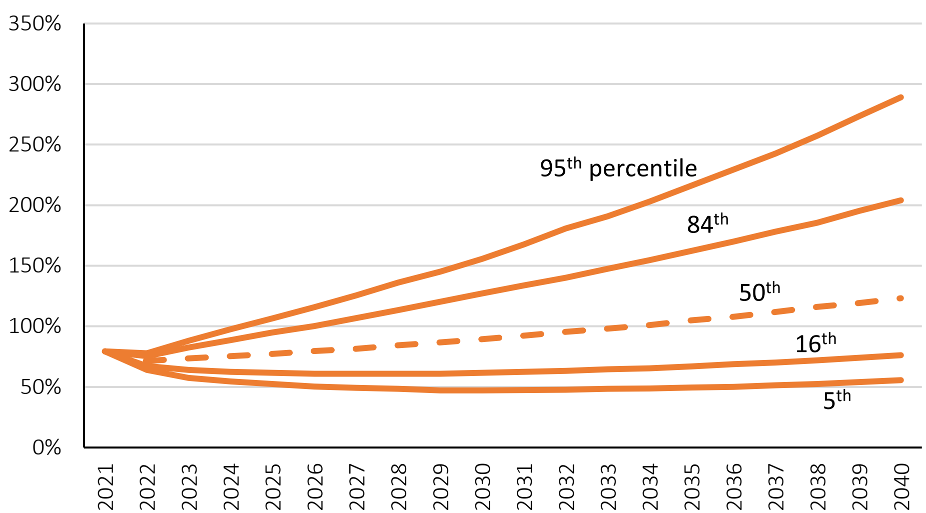


→ Compared to the *Current Policy*, the *Option #2* allocation exhibits slightly lower funded status projections at the median and higher percentiles.

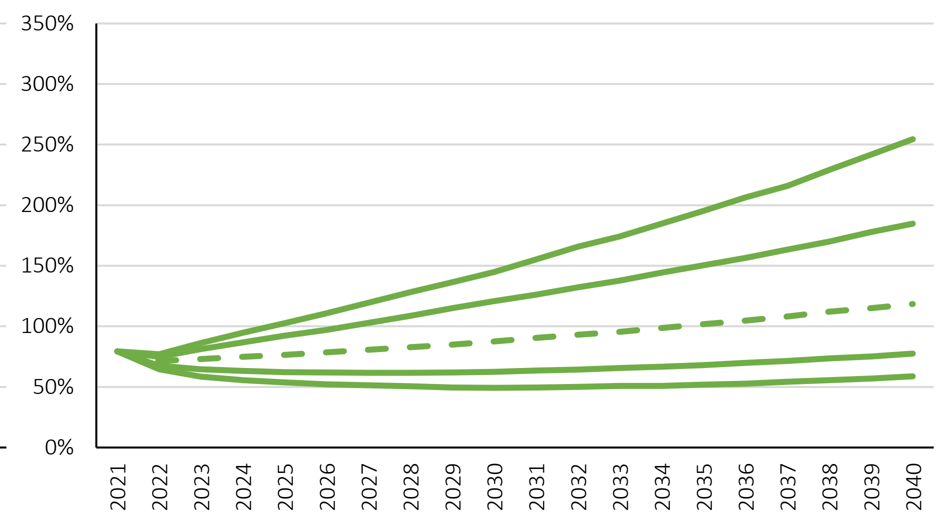
→ Downside percentile projections are marginally better with the *Option #2*.

Funded Status (excluding Side Accounts)

Current Policy



Option #3



→ Compared to the *Current Policy*, the *Option #3* allocation exhibits lower funded status projections at the median and higher percentiles.

→ Downside percentile projections are better with the *Option #3*.

Conclusion

Conclusion

→ OST Staff, Meketa, Aon, and Milliman have completed a comprehensive asset-liability analysis of OPERF and potential portfolios to consider.

→ Based on the asset-liability modeling process, OPERF appears well situated and material alterations do not appear necessary.

- This conclusion is based on OIC viewpoints regarding risk and implementation, the prevailing capital market environment, and the projected interaction among assets and liabilities.

→ The proposed Options #1-3 represent potential options for the OIC to consider. Each of these portfolios are aligned with goals and preferences that the OIC has discussed, thus far.

→ All proposed options:

- Eliminate allocation to Risk Parity
- Increase Private Equity target by 2.5%
- Maintain allocations to Real Estate, Real Assets, and Diversifying Strategies

→ *Sole difference: Tradeoff between Public Equity and Fixed Income*

→ <u>OST Staff, Meketa, and Aon recommend that Option #2 be selected.</u>

Current, Actual, and Proposed Portfolios | Asset-only Metrics

	Current Policy	Actual Allocation*	Option #1	Option #2	Option #3
Public Equity	30.0%	23.0%	30.0%	25.0%	20.0%
Fixed Income	20.0%	20.0%	20.0%	25.0%	30.0%
Risk Parity	2.5%	2.0%	---	---	---
Private Equity	20.0%	28.0%	22.5%	22.5%	22.5%
Real Estate	12.5%	14.0%	12.5%	12.5%	12.5%
Real Assets	7.5%	8.0%	7.5%	7.5%	7.5%
Diversifying Strategies	7.5%	5.0%	7.5%	7.5%	7.5%
Expected Max Drawdown*	41.4%	44.7%	43.2%	40.0%	37.0%
Expected Volatility*	11.9%	12.7%	12.3%	11.6%	10.8%
Expected Return*	7.7%	8.0%	7.8%	7.6%	7.5%
Illiquids	40.0%	50.0%	42.5%	42.5%	42.5%

Recommended new long-term policy portfolio

*Actual Allocation as of 11/2/2022 will differ. Detailed allocation is as of August 2022 and is consistent with the September A/L presentation.
**See Appendix for methodology/calculation details

Appendix

Final CMAs

→ The table below highlights the preliminary CMAs that were presented to the OIC in June as well as the final CMAs that were utilized in the study.

- Reflecting the 2022 drawdown, most expected returns are marginally higher.

Expected Returns (%)

	As presented in June			Final CMA
Strategic Class	Meketa	Aon	Staff	
Public Equity	7.2	7.3	7.0	*7.5*
Fixed Income	2.4	2.8	3.0	*3.8*
Risk Parity	5.2	4.5	5.2	*5.4*
Private Equity	10.0	9.4	9.5	*10.1*
Real Estate	6.8	5.6	7.0	*6.2*
Real Assets	9.0	9.2	7.5	*9.2*
Diversifying Strategies	5.0	7.4	5.5	*5.7*

Annual Volatility (%)

	As Presented in June			Final CMA
Strategic Class	Meketa	Aon	Staff	
Public Equity	18.0	18.5	20.0	*18.8*
Fixed Income	4.0	4.5	4.3	*4.3*
Risk Parity	10.0	10.0	10.0	*10.0*
Private Equity	28.0	25.5	26.0	*26.5*
Real Estate	13.8	17.4	13.8	*15.0*
Real Assets	19.1	15.6	17.0	*17.2*
Diversifying Strategies	8.4	8.1	8.0	*8.2*

Notes:
CMAs are long-term in nature (20-30 years).

Final Expected Returns
Average of updated compound/geometric return assumptions from Meketa and Aon.

Final Volatilities
Average of assumptions from Meketa, Aon, and Staff. *These figures did not change from June.*

Historical Scenario Analysis (Negative)

→ Examining historical (negative) scenarios shows very little difference among the potential portfolios.

Scenario	Current Policy (%)	Actual Allocation (%)	Option #1 (%)	Option #2 (%)	Option #3 (%)
COVID-19 Market Shock (Feb 2020-Mar 2020)	-13.4	-11.5	-13.0	-11.4	-9.8
Taper Tantrum (May - Aug 2013)	0.5	1.2	0.9	0.7	0.6
Global Financial Crisis (Oct 2007 - Mar 2009)	-20.9	-20.2	-21.2	-18.3	-15.4
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-8.0	-6.9	-8.8	-5.0	-1.3
LTCM (Jul - Aug 1998)	-5.5	-4.6	-5.3	-4.5	-3.7
Asian Financial Crisis (Aug 97 - Jan 98)	4.6	6.3	4.9	5.3	5.7
Rate spike (1994 Calendar Year)	4.3	5.3	4.7	4.3	3.9
Early 1990s Recession (Jun - Oct 1990)	-1.6	-0.7	-1.6	-0.8	-0.1
Crash of 1987 (Sep - Nov 1987)	-6.3	-4.7	-6.2	-5.0	-3.9
Strong dollar (Jan 1981 - Sep 1982)	7.1	7.4	5.9	7.9	10.0
Volcker Recession (Jan - Mar 1980)	-3.3	-3.2	-3.0	-3.2	-3.3
Stagflation (Jan 1973 - Sep 1974)	-12.9	-12.2	-13.3	-11.0	-8.6

Historical Scenario Analysis (Positive)

→ Examining historical (positive) scenarios shows very little difference among the potential portfolios.

Scenario	Current Policy (%)	Actual Allocation (%)	Option #1 (%)	Option #2 (%)	Option #3 (%)
Global Financial Crisis Recovery (Mar 2009 - Nov 2009)	24.3	21.1	24.4	21.8	19.3
Best of Great Moderation (Apr 2003 - Feb 2004)	24.6	22.7	24.6	22.5	20.4
Peak of the TMT Bubble (Oct 1998 - Mar 2000)	40.4	43.9	42.2	39.6	36.9
Plummeting Dollar (Jan 1986 - Aug 1987)	49.2	42.2	48.3	43.6	38.9
Volcker Recovery (Aug 1982 - Apr 1983)	26.3	23.7	25.0	24.2	23.4
Bretton Wood Recovery (Oct 1974 - Jun 1975)	22.0	20.2	21.8	20.0	18.2

Stress Testing: Expected Returns under Hypothetical Scenarios*

→ Examining hypothetical scenarios shows very little difference among the potential portfolios.

Scenario	Current Policy (%)	Actual Allocation (%)	Option #1 (%)	Option #2 (%)	Option #3 (%)
10-year Treasury Bond rates rise 100 bps	3.7	3.7	3.9	3.3	2.7
10-year Treasury Bond rates rise 200 bps	-0.8	-0.9	-0.7	-1.2	-1.7
10-year Treasury Bond rates rise 300 bps	-3.5	-3.7	-3.4	-3.9	-4.5
Baa Spreads widen by 50 bps, High Yield by 200 bps	1.1	1.1	1.0	1.3	1.5
Baa Spreads widen by 300 bps, High Yield by 1000 bps	-17.1	-16.8	-17.3	-15.6	-14.0
Trade Weighted Dollar gains 10%	-3.2	-3.0	-3.3	-2.8	-2.3
Trade Weighted Dollar gains 20%	-1.5	-1.7	-1.5	-1.0	-0.5
U.S. Equities decline 10%	-4.9	-5.2	-5.2	-4.5	-3.9
U.S. Equities decline 25%	-14.7	-14.9	-15.0	-13.7	-12.4
U.S. Equities decline 40%	-21.8	-21.3	-21.9	-19.9	-17.9

*Based on historical relationships examined via OLS regressions. Assets not directly exposed to the factor are affected nonetheless.

Stress Testing: Expected Returns under Hypothetical Scenarios (cont'd)*

→ Examining hypothetical scenarios shows very little difference among the potential portfolios.

Scenario	Current Policy (%)	Actual Allocation (%)	Option #1 (%)	Option #2 (%)	Option #3 (%)
Inflation slightly higher than expected	-0.4	-0.3	-0.4	-0.4	-0.4
Inflation meaningfully higher than expected	-4.0	-3.3	-3.8	-3.5	-3.2
Low Growth and Low Inflation	-4.7	-3.9	-4.6	-4.0	-3.5
Low Growth and High Inflation	-7.3	-5.8	-7.1	-6.3	-5.4
Brief, moderate inflation spike	-1.9	-1.8	-2.0	-1.8	-1.6
Extended, moderate inflation spike	-3.8	-3.8	-4.0	-3.5	-3.1
Brief, extreme inflation spike	-5.0	-5.0	-5.1	-4.6	-4.0
Extended, extreme inflation spike	-6.8	-6.9	-7.0	-6.2	-5.4

*Based on historical relationships examined via OLS regressions. Assets not directly exposed to the factor are affected nonetheless.

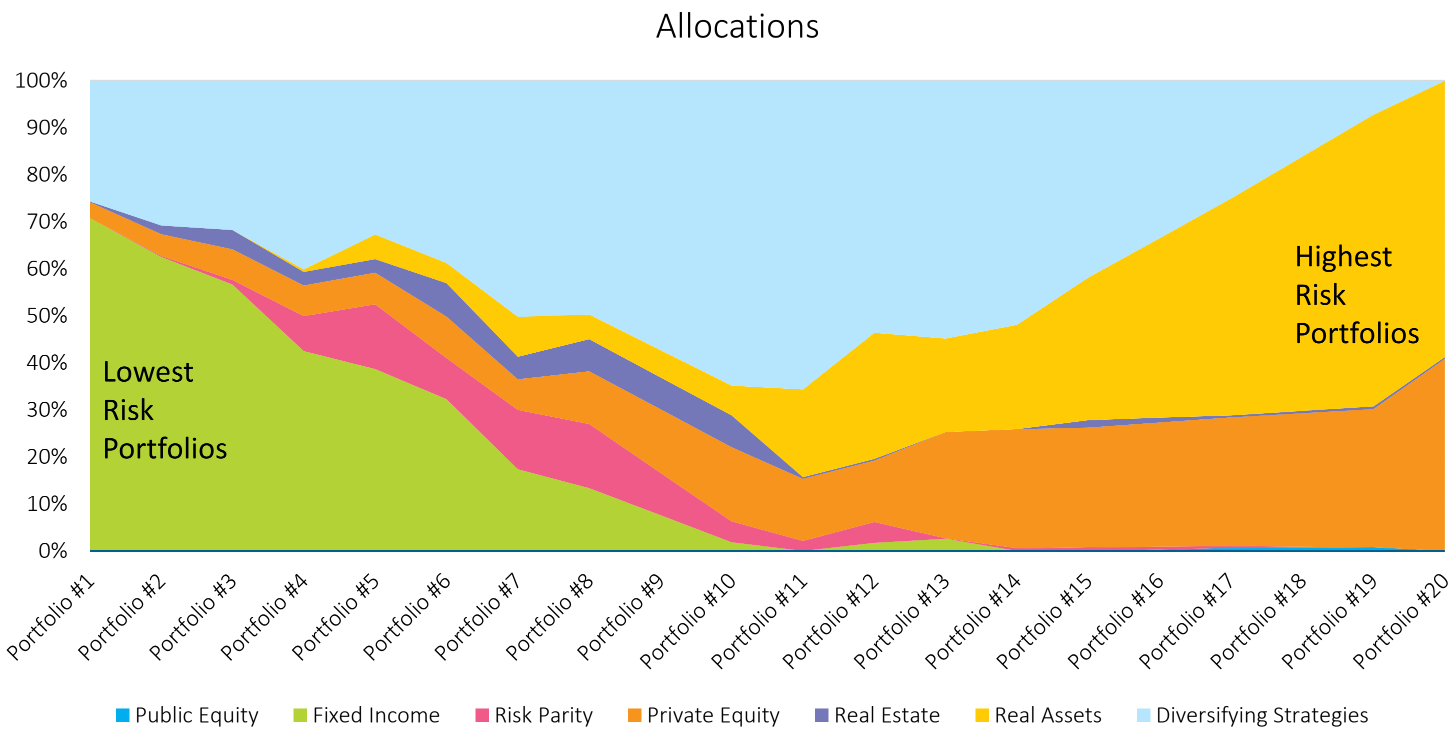
Stress Testing: Expected Returns under Hypothetical Scenarios (cont'd)*

→ Examining hypothetical scenarios shows very little difference among the potential portfolios.

Scenario	Current Policy (%)	Actual Allocation (%)	Option #1 (%)	Option #2 (%)	Option #3 (%)
10-year Treasury Bond rates drop 100 bps	2.0	2.1	2.0	2.2	2.3
10-year Treasury Bond rates drop 200 bps	8.5	7.7	8.3	8.0	7.7
Baa Spreads narrow by 30bps, High Yield by 100 bps	6.6	6.8	6.8	6.3	5.9
Baa Spreads narrow by 100bps, High Yield by 300 bps	9.5	8.7	9.4	8.6	7.9
Trade Weighted Dollar drops 10%	6.9	6.5	6.8	6.4	5.9
Trade Weighted Dollar drops 20%	19.8	18.3	19.8	18.4	17.1
U.S. Equities rise 10%	6.4	6.7	6.6	6.2	5.9
U.S. Equities rise 30%	13.3	12.5	13.3	12.2	11.1
High Growth and Low Inflation	8.1	7.4	7.9	7.0	6.2
High Growth and Moderate Inflation	6.6	6.3	6.4	5.8	5.1
High Growth and High Inflation	4.7	4.8	4.5	4.1	3.7

*Based on historical relationships examined via OLS regressions. Assets not directly exposed to the factor are affected nonetheless.

Initial "Unconstrained" Model



→ On the lower end of the risk spectrum, model favors Fixed Income and Diversifying Strategies.

→ Middle portion of the risk spectrum utilizes several asset classes roughly equally but materially allocates to Diversifying Strategies.

→ High risk allocations are biased towards Real Assets and Private Equity.

Final "Constrained" Model

→ After multiple iterations of optimizations and exploring different minimum/maximum constraints, Meketa, Aon, and Staff agreed on the following constraints.

Asset Class/Strategy	Minimum Weight	Maximum Weight
Public Equity	20.0	40.0
Fixed Income	10.0	40.0
Risk Parity	0.0	10.0
Private Equity	15.0	30.0
Real Estate	10.0	20.0
Real Assets	5.0	10.0
Diversifying Strategies	0.0	10.0

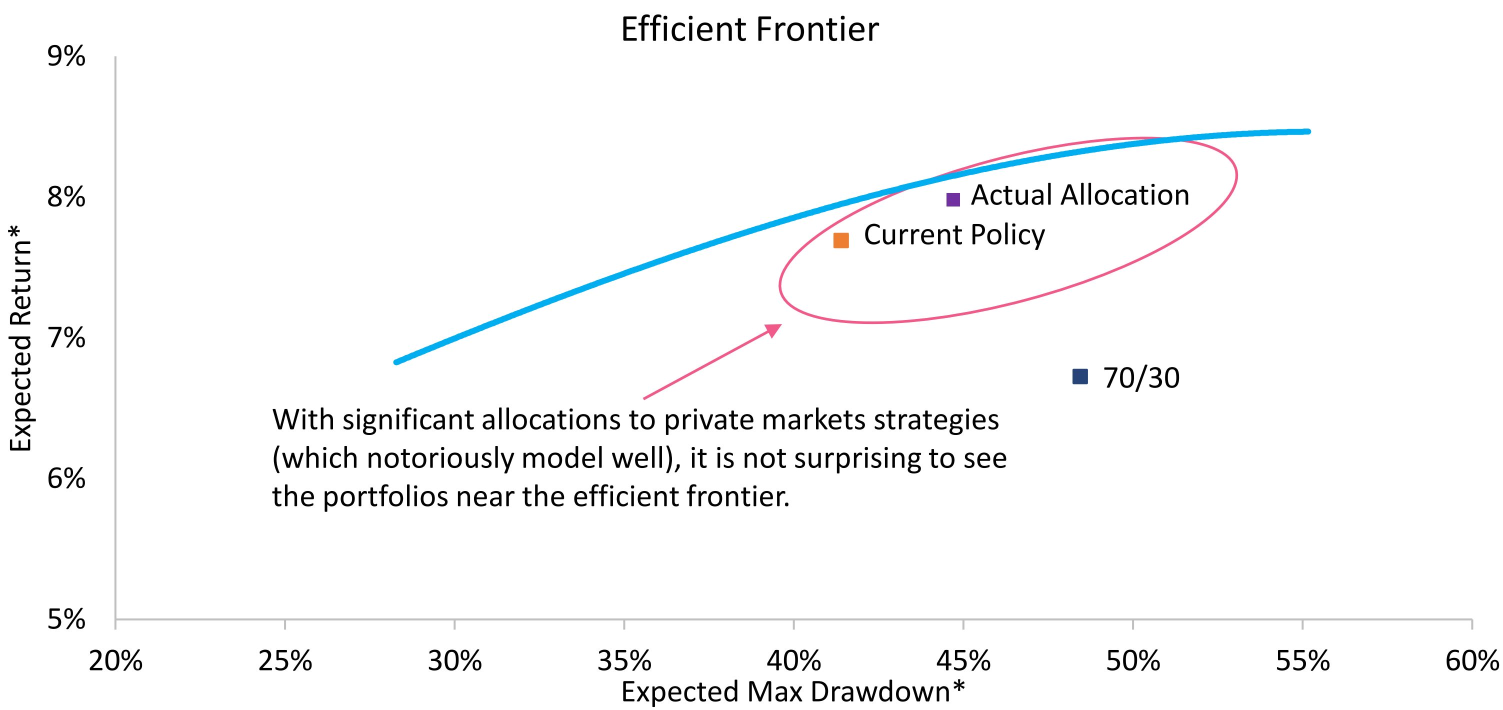
→ The minimums are primarily focused on addressing allocations that cannot be easily shifted away from in the near-term (i.e., within 3-5 years).

→ The maximums were put in place to: 1) protect against biases/concentrations that often show up with optimizations, 2) encourage implementable allocations, and 3) limit meaningful increases in illiquidity.

→ OIC may discuss implementing more meaningful changes via other mechanisms (e.g., secondary sales).

→ The utilized constraints will inherently limit material asset-liability differences (e.g., contribution levels, funding ranges, etc.) among examined portfolios.

Final "Constrained" Model



→ With final constraints, both the *Current Policy* and *Actual Allocation* portfolios are near the efficient frontier, but potential modest improvements can be made.

→ The 70/30 portfolio is materially away from the efficient frontier.

*See Appendix for methodology/calculation details

From September OIC Meeting

Asset-Liability Integration

→ In order to examine OPERF under a full asset-liability lens, simulations for the Current Policy, Actual Allocation, and three illustrative portfolios were integrated with Milliman's model.

→ The illustrative portfolios represent likely high-level tradeoffs that the OIC may want to pursue.

- While a final selection by the OIC may look similar to one of these portfolios, they are not intended to be recommendations.

→ Examined Portfolios (*from September OIC Meeting*)

1. Current Policy
2. Actual Allocation
3. Similar Return, Lower Risk (compared to policy)
4. Lower Risk and Return (compared to policy)
5. Similar Risk, Higher Return (compared to policy)

Illustrative Portfolios

From September OIC Meeting

Examined Portfolios | Asset-only Metrics

	Current Policy	Actual Allocation	Similar Return, Lower Risk	Lower Risk and Return	Similar Risk, Higher Return
Public Equity	30.0%	23.0%	25.0%	25.0%	25.0%
Fixed Income	20.0%	20.0%	15.0%	20.0%	12.5%
Risk Parity	2.5%	2.0%	10.0%	10.0%	10.0%
Private Equity	20.0%	28.0%	20.0%	17.5%	22.5%
Real Estate	12.5%	14.0%	12.5%	12.5%	12.5%
Real Assets	7.5%	8.0%	7.5%	7.5%	7.5%
Diversifying Strategies	7.5%	5.0%	10.0%	7.5%	10.0%
Expected Max Drawdown*	41.4%	44.7%	39.2%	37.2%	41.4%
Expected Volatility*	11.9%	12.7%	11.5%	10.9%	12.0%
Expected Return*	7.7%	8.0%	7.7%	7.5%	7.8%
Illiquids	40.0%	50.0%	40.0%	37.5%	42.5%

→ Despite what may appear to be different allocations, there is a high degree of commonality among the examined portfolios.

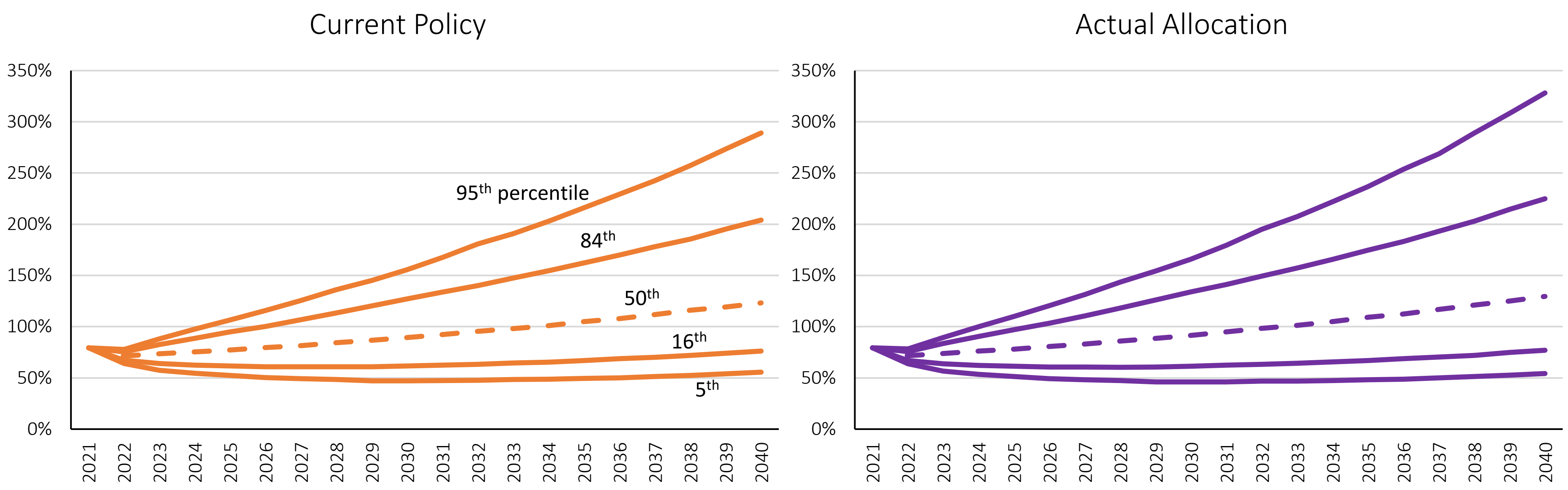
→ Major risk/return metrics are similar across the examined portfolios.

→ Due to the high level of commonality, asset-liability metrics are unlikely to show meaningful differences across portfolios.

*See Appendix for methodology/calculation details

From September OIC Meeting

Funded Status (excluding Side Accounts)

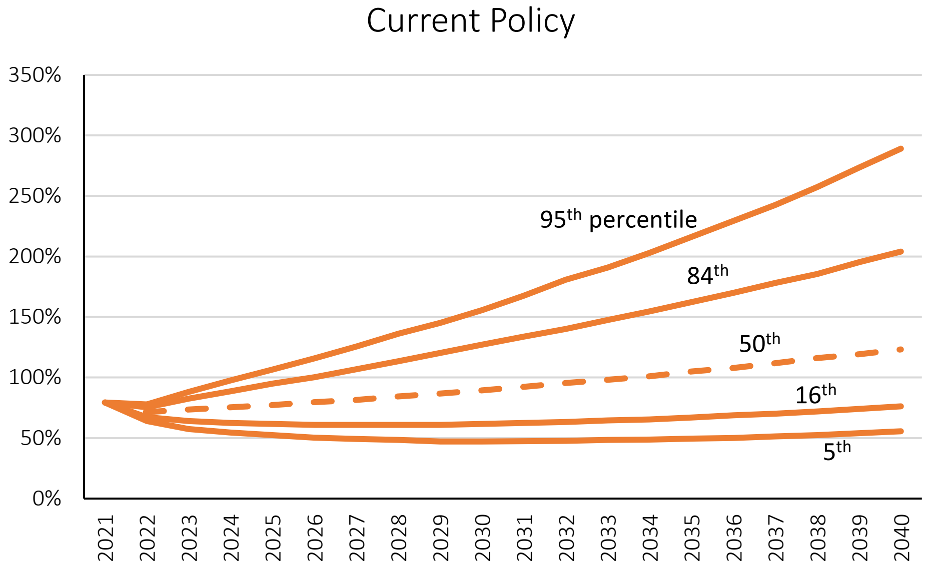


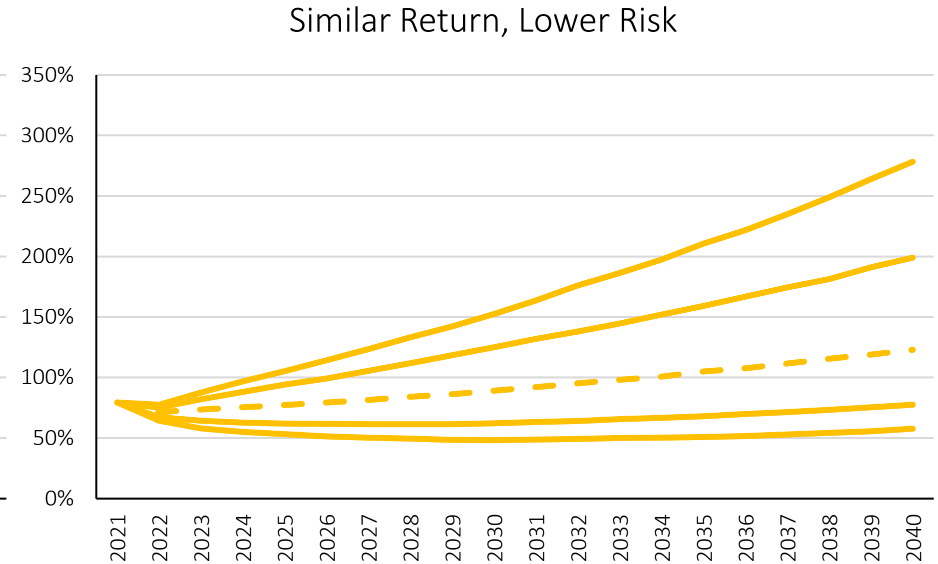
→ Compared to the *Current Policy*, the *Actual Allocation* exhibits slightly higher funded status projections at the median and higher percentiles.

→ Downside percentile projections are similar between the two.

From September OIC Meeting

Funded Status (excluding Side Accounts)



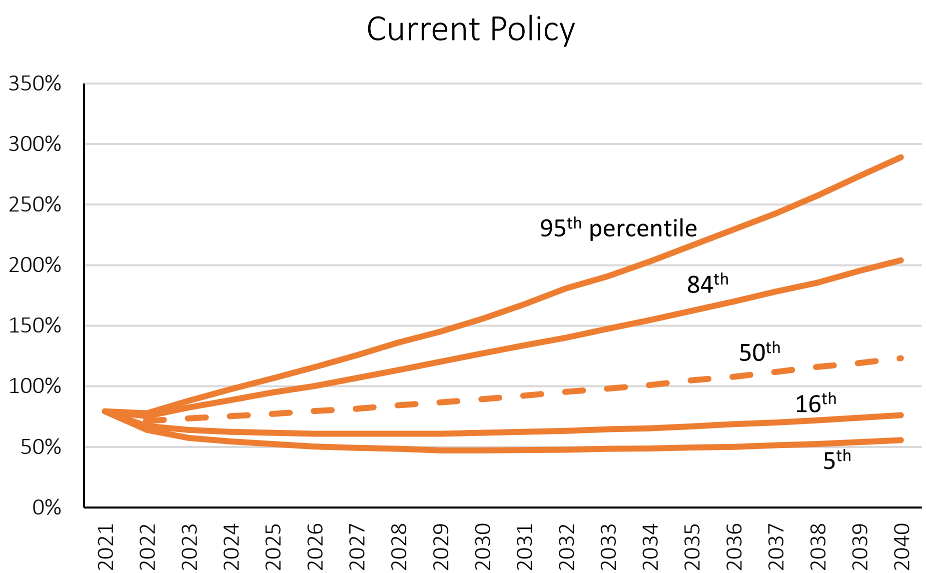


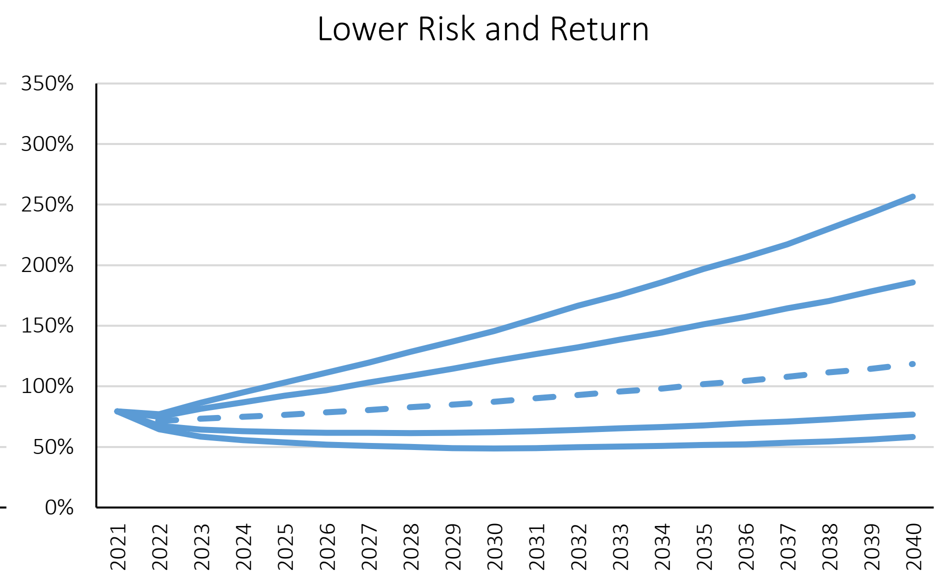
→ Compared to the *Current Policy*, the *Similar Return, Lower Risk* allocation exhibits slightly lower funded status projections at the median and higher percentiles.

→ Downside percentile projections are marginally better with the *Similar Return, Lower Risk* allocation.

From September OIC Meeting

Funded Status (excluding Side Accounts)

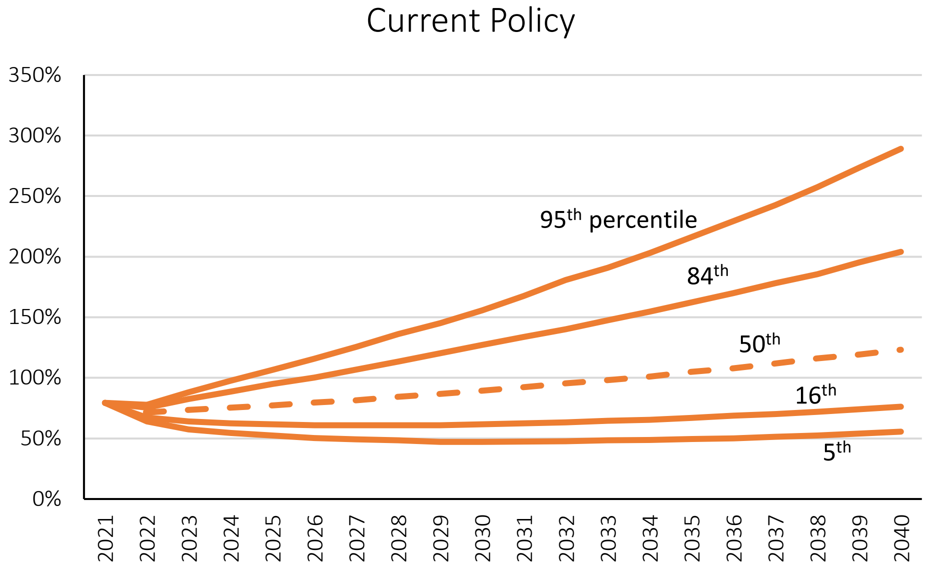


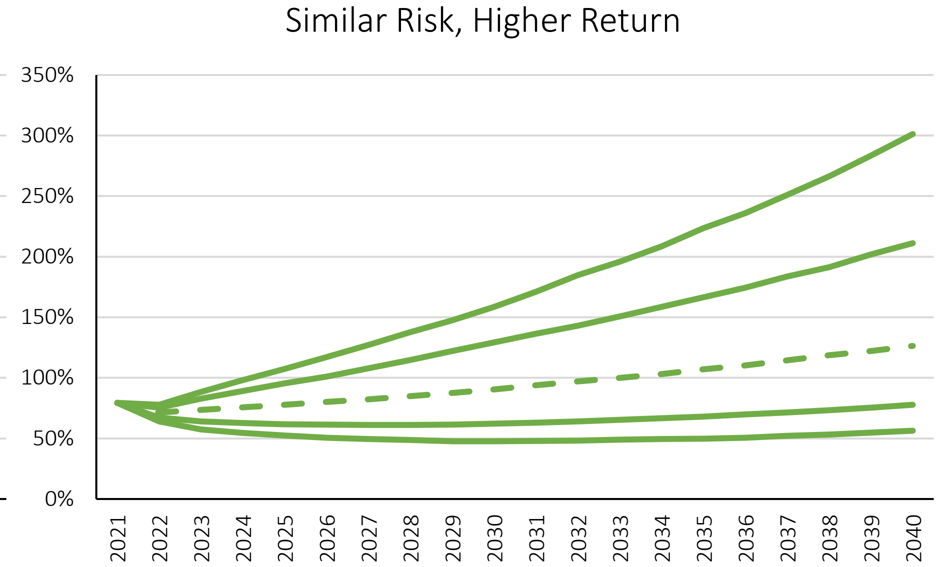


→ Compared to the *Current Policy*, the *Lower Risk and Return* allocation exhibits slightly higher funded status projections during downside percentiles but lower funded status projections for most scenarios.

From September OIC Meeting

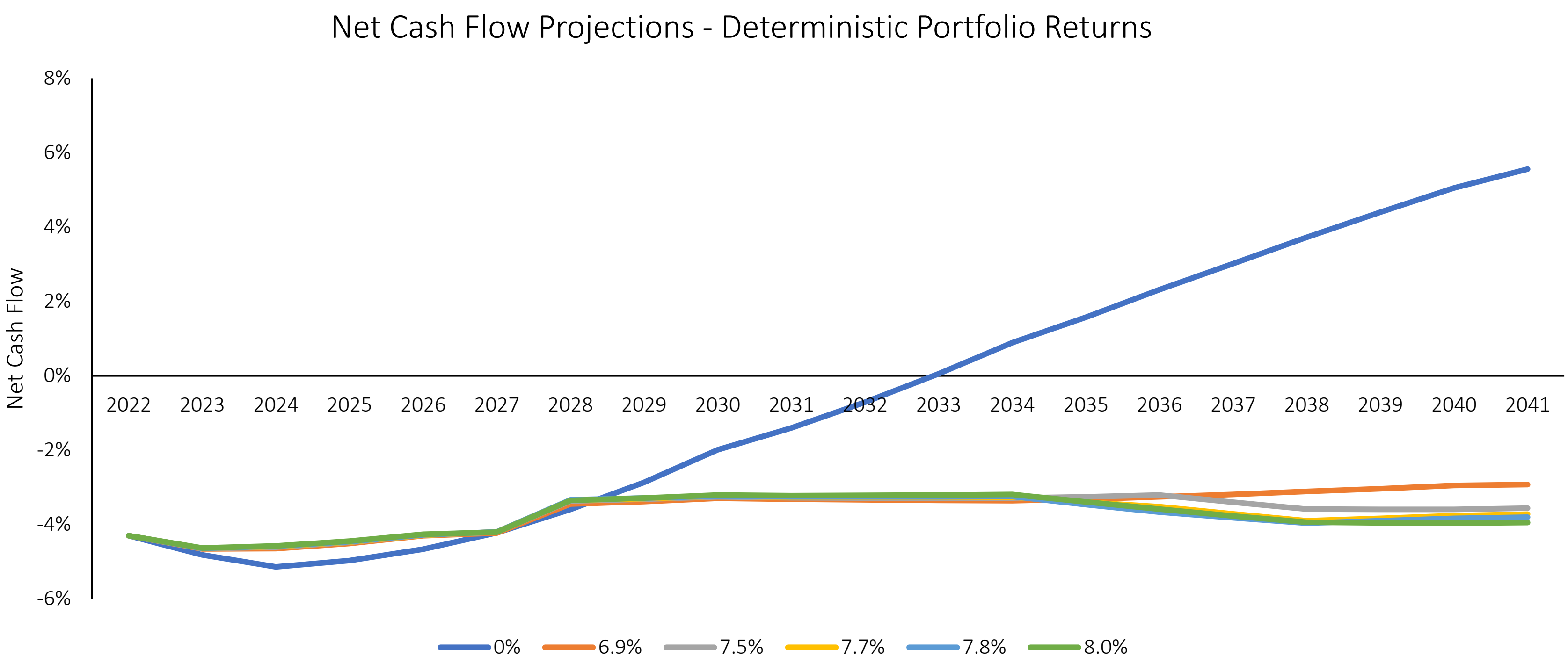
Funded Status (excluding Side Accounts)





→ Compared to the *Current Policy*, the *Similar Risk, Higher Return* allocation exhibits slightly higher funded status projections at all percentiles.

Net Cash Flow Projections



→ Net cash flow position is expected to marginally worsen in the near-term before improving and settling in the -3.0% to -4.0% range.

Note: For the period 1/1/2022-6/30/22, model seeks to capture realized 2022 YTD experience. After 6/30/22, model utilizes annualized effective rates of deterministic returns.

Definitions

→ Note: Each portfolio is run through 10,000 simulations that are 20-years in length. The statistics are derived from these simulation results.

Simulation Statistic	Definition/Description
Expected Compound Return	This is a portfolio's expected geometric/compound return. This metric is analogous to an actuarial assumed rate of return. This is calculated as the median geometric/compound return from all 10,000 simulations.
Expected Volatility	This is a portfolio's expected volatility (i.e., a common measure of risk). This is calculated as the average volatility from all 10,000 simulations.
Expected Maximum Drawdown	This is a measure of a "worst case" scenario. This is a peak-to-trough result that can occur over a series of years before recovering. This is calculated as the average of the 1,000 worst drawdowns from all 10,000 simulations (i.e., the average of the tail of the distribution).

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Liquidity Analysis

Oregon Investment Council

November 2022

Table of Contents

Overview
Background

The liquidity analysis for Oregon Public Employees Retirement Fund (OPERF) is performed under five portfolio scenarios. These include OPERF's Current Policy, OPERF's Actual Allocation[1], and three alternative portfolios.

Intended as a stress-testing model, incorporating the profile of the liabilities as well as expected future contributions

Uses different scenarios for economic environments and other relevant events

Shows how the portfolio's liquidity profile could evolve with a given investment strategy

We categorized investments by liquidity into five buckets

Liquid (Risk-Reducing Assets): less than 3 months needed for return of capital (e.g. publicly traded securities)

Liquid (Return-Seeking Assets): less than 3 months needed for return of capital (e.g. publicly traded securities)

Quasi-Liquid: Typical lock-up of 3–12 months. Conservatively, we assumed a 1-year lock-up in most economic environments, 2 years in a Recession scenario, and 3 years in a Dark Skies scenario (e.g. many hedge funds, open-end real assets)

Illiquid: Potential lock-up of 5–10 years, depending on economic environment (e.g. closed-end real assets)

Illiquid: Potential lock-up of 10+ years (e.g. typical private equity)

This is intended to be a conservative approximation of the actual liquidity properties of the assets

[1]Actual Allocation is as of August 2022

Overview
Asset allocation and liquidity category

	Current Policy	Actual	Option 1	Option 2	Option 3
Liquid (Risk-Reducing Assets)					
Core Fixed Income	20.0%	20.0%	20.0%	25.0%	30.0%
Subtotal	*20.0%*	*20.0%*	*20.0%*	*25.0%*	*30.0%*
Liquid (Return-Seeking Assets)					
Public Equity	30.0%	23.0%	30.0%	25.0%	20.0%
Risk Parity	2.5%	2.0%	--	--	--
Subtotal	*32.5%*	*25.0%*	*30.0%*	*25.0%*	*20.0%*
Quasi-Liquid Assets					
Alternatives (Diversifying Strategies)	7.5%	5.0%	7.5%	7.5%	7.5%
Real Estate	10.0%	11.2%	10.0%	10.0%	10.0%
Subtotal	*17.5%*	*16.2%*	*17.5%*	*17.5%*	*17.5%*
Illiquid 5-10 Years					
Real Estate	2.5%	2.8%	2.5%	2.5%	2.5%
Alternatives (Infrastructure)	4.5%	4.8%	4.5%	4.5%	4.5%
Alternatives (Natural Resources)	3.0%	3.2%	3.0%	3.0%	3.0%
Subtotal	*10.0%*	*10.8%*	*10.0%*	*10.0%*	*10.0%*
Illiquid 10+ Years					
Private Equity	20.0%	28.0%	22.5%	22.5%	22.5%
Subtotal	*20.0%*	*28.0%*	*22.5%*	*22.5%*	*22.5%*
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total Quasi + Illiquid Assets	**47.5%**	**55.0%**	**50.0%**	**50.0%**	**50.0%**

Overview
Economic scenarios

Base Case Scenario

Markets perform consistent with Aon's Capital Market Assumptions

Recession Scenario

Somewhat pessimistic outlook for the markets

Return-seeking assets decline in the first two years with a modest rebound in later years

Dark Skies Scenario

Very pessimistic outlook for markets

Return-seeking assets decline significantly

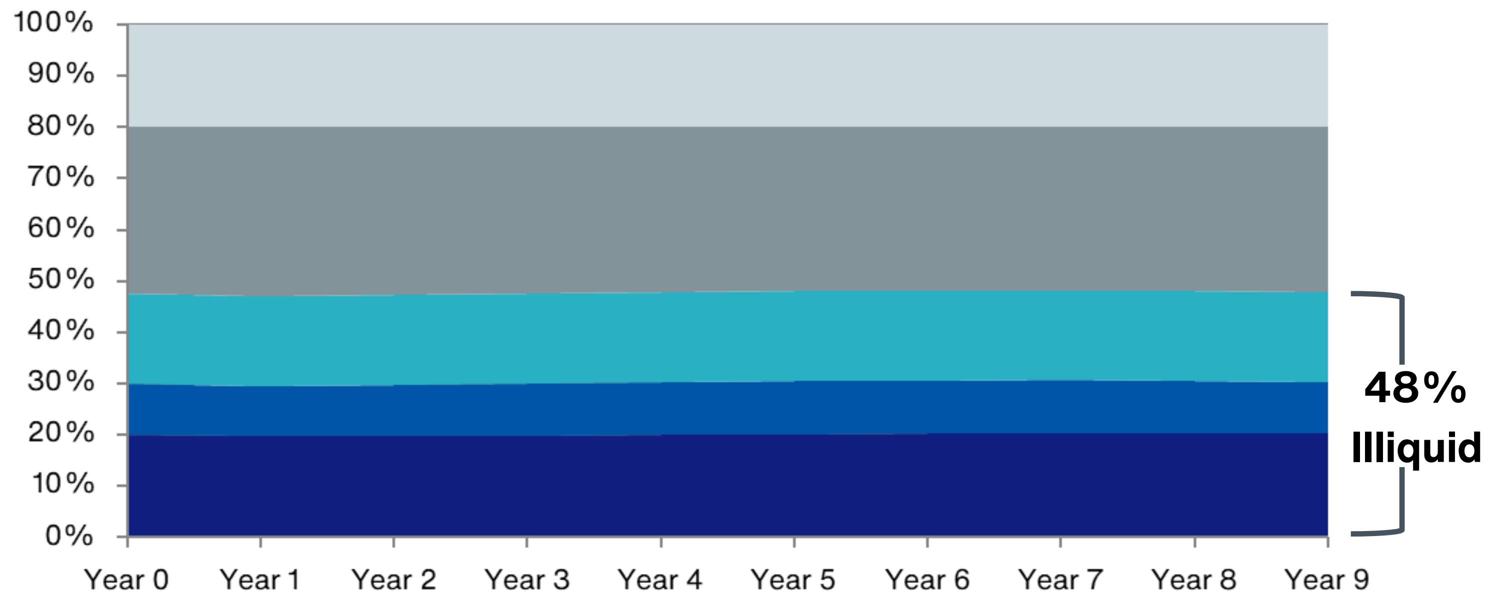
The value of public equities declines approximately 50% over three years, without an immediate rebound

Liquidity Analysis
Base Case

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

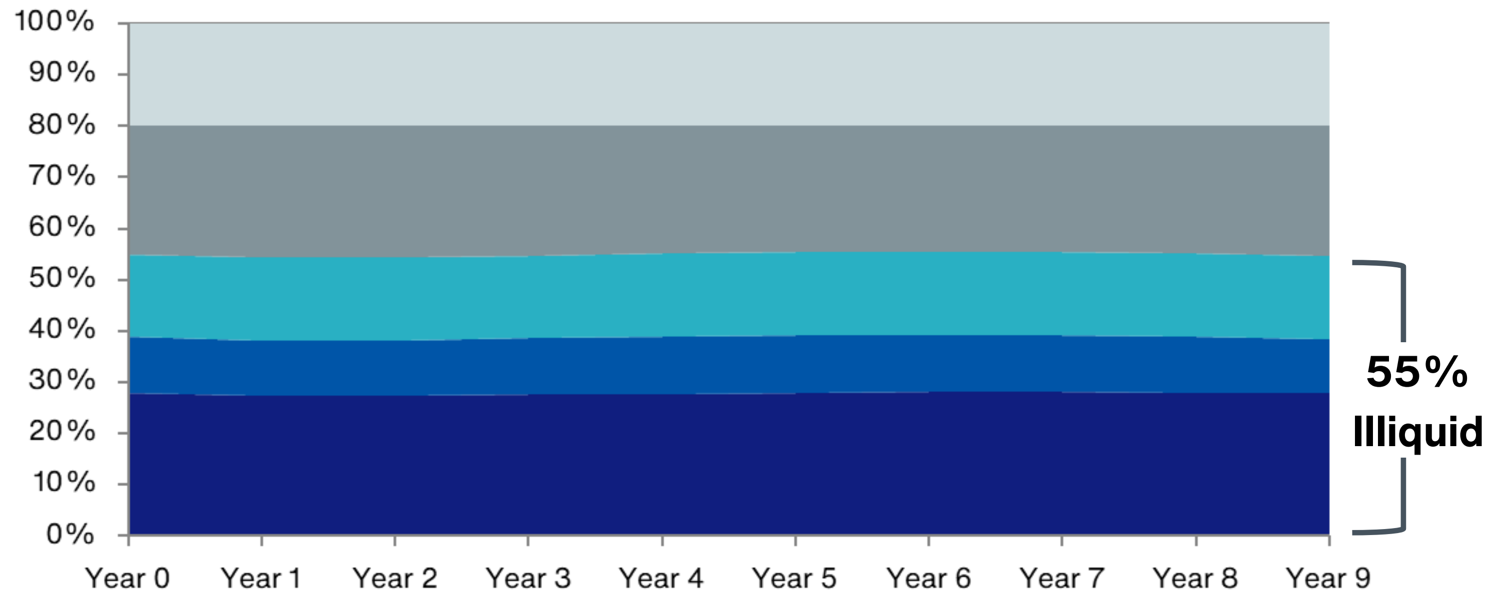
Current Policy

Scenario: Base - OPERF (in Percentages)



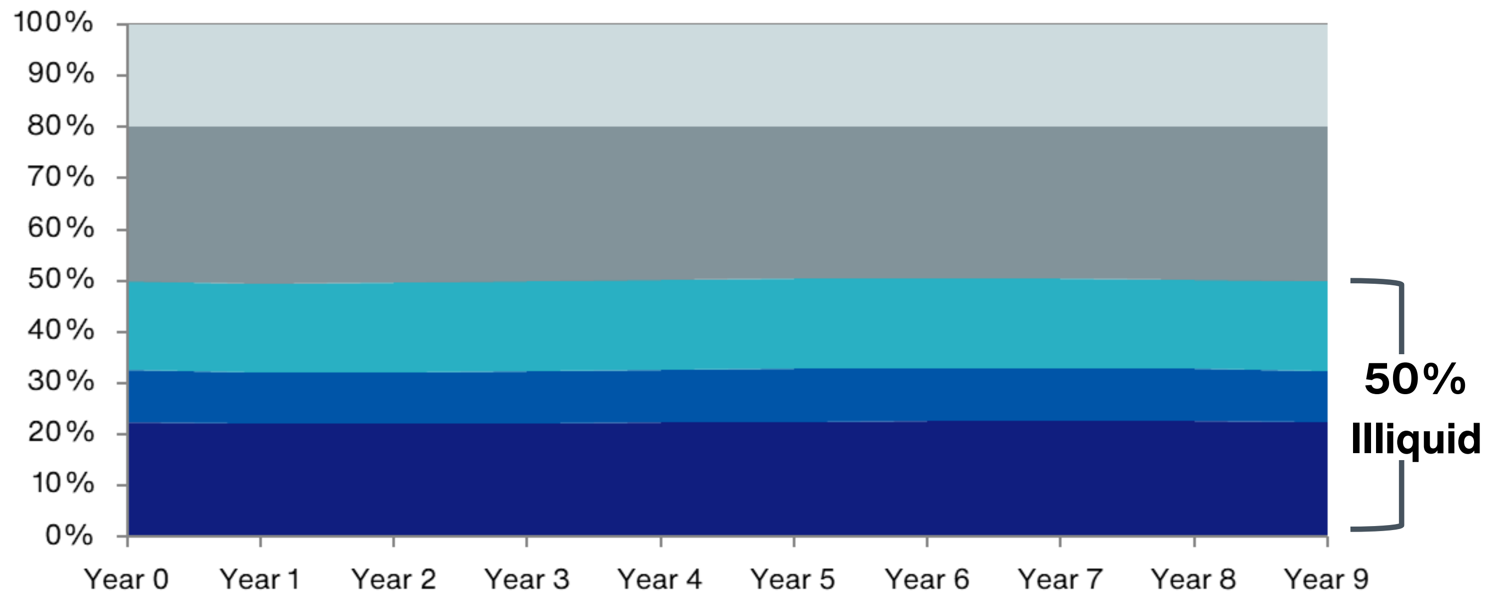
Actual

Scenario: Base - OPERF (in Percentages)



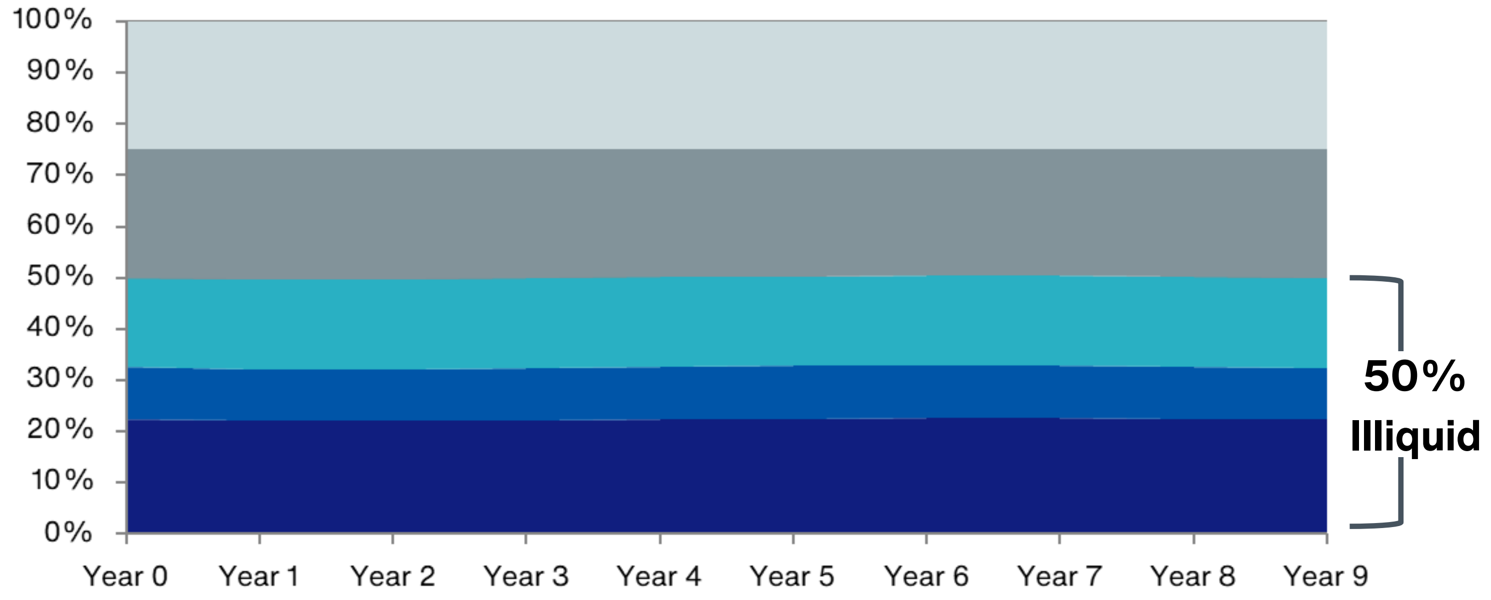
Option 1

Scenario: Base - OPERF (in Percentages)



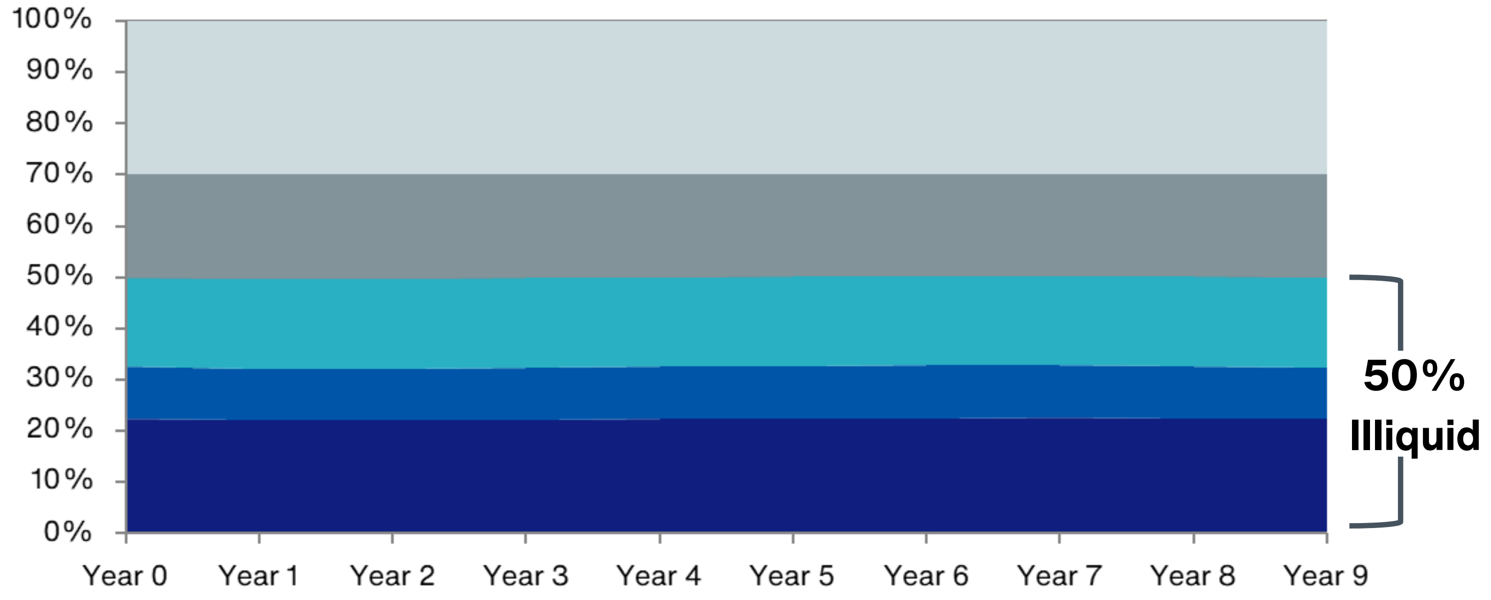
Option 2

Scenario: Base - OPERF (in Percentages)



Option 3

Scenario: Base - OPERF (in Percentages)



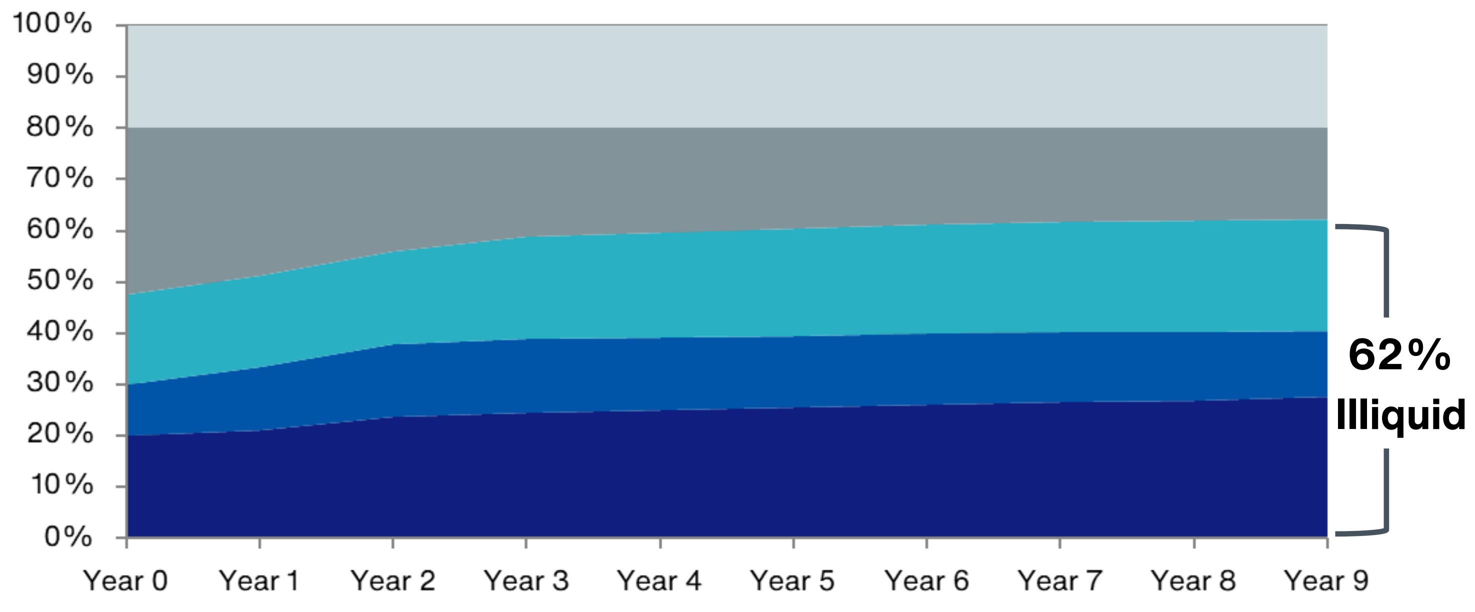
Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis
Recession

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

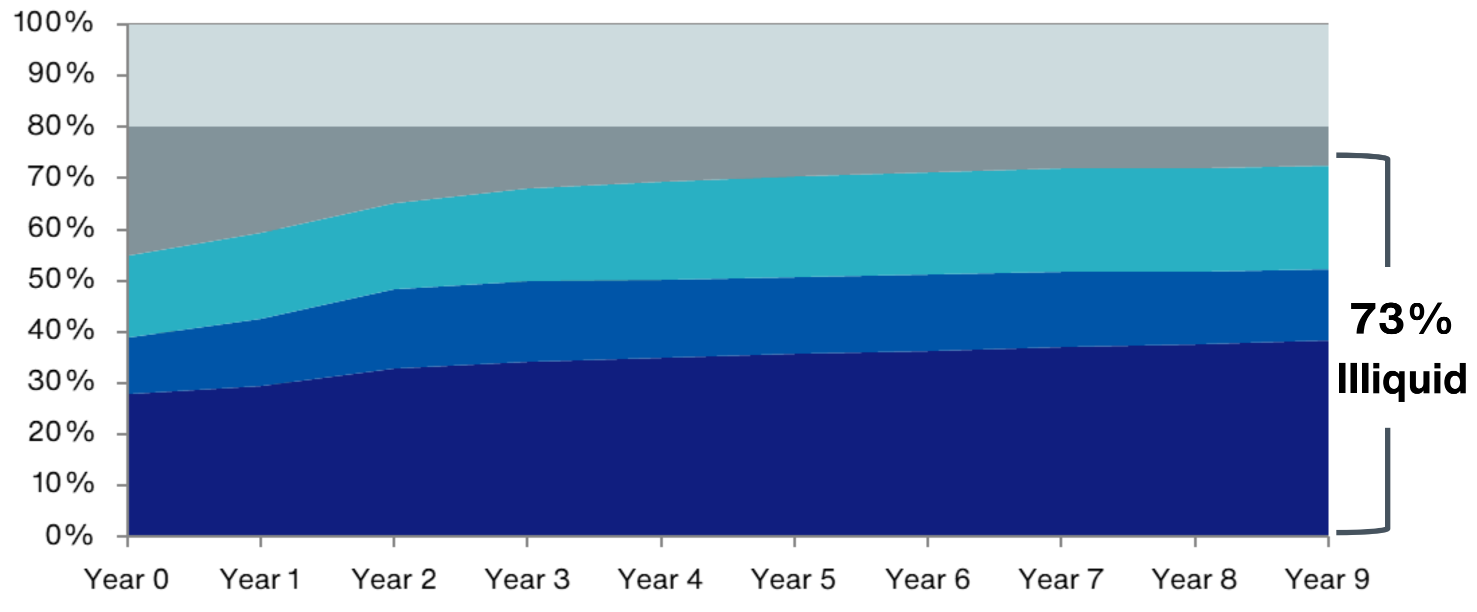
Current Policy

Scenario: Recession - OPERF (in Percentages)



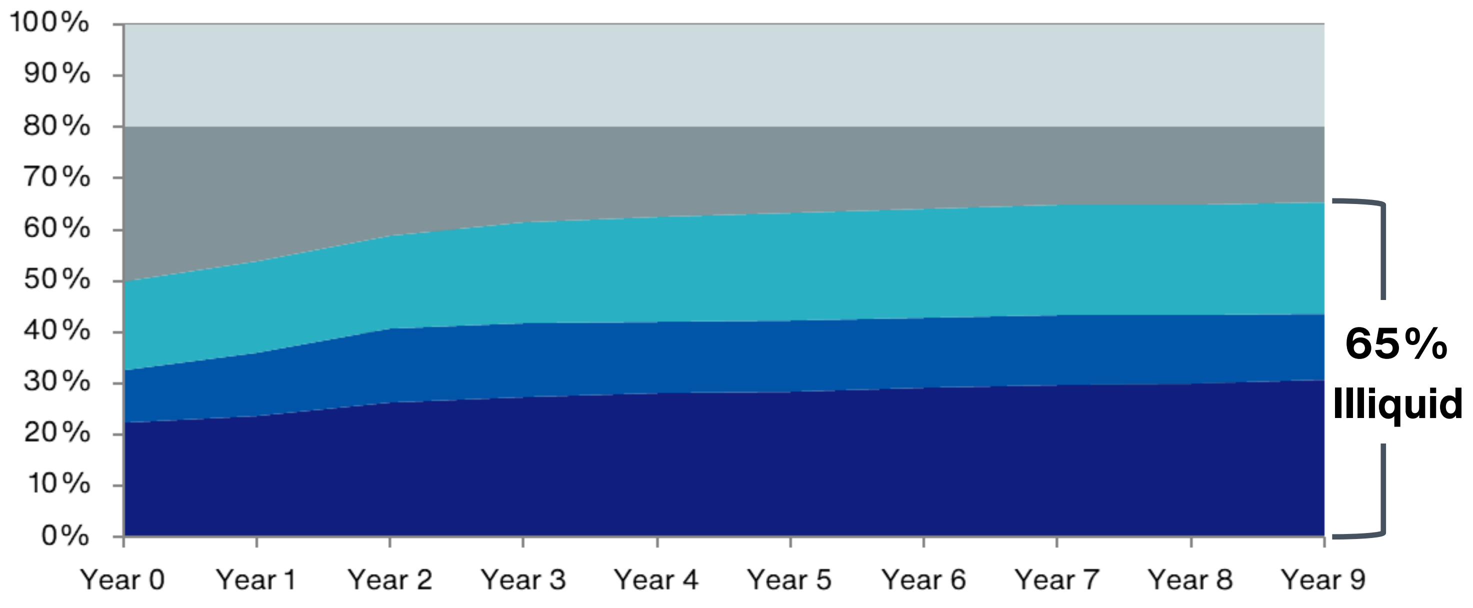
Actual

Scenario: Recession - OPERF (in Percentages)



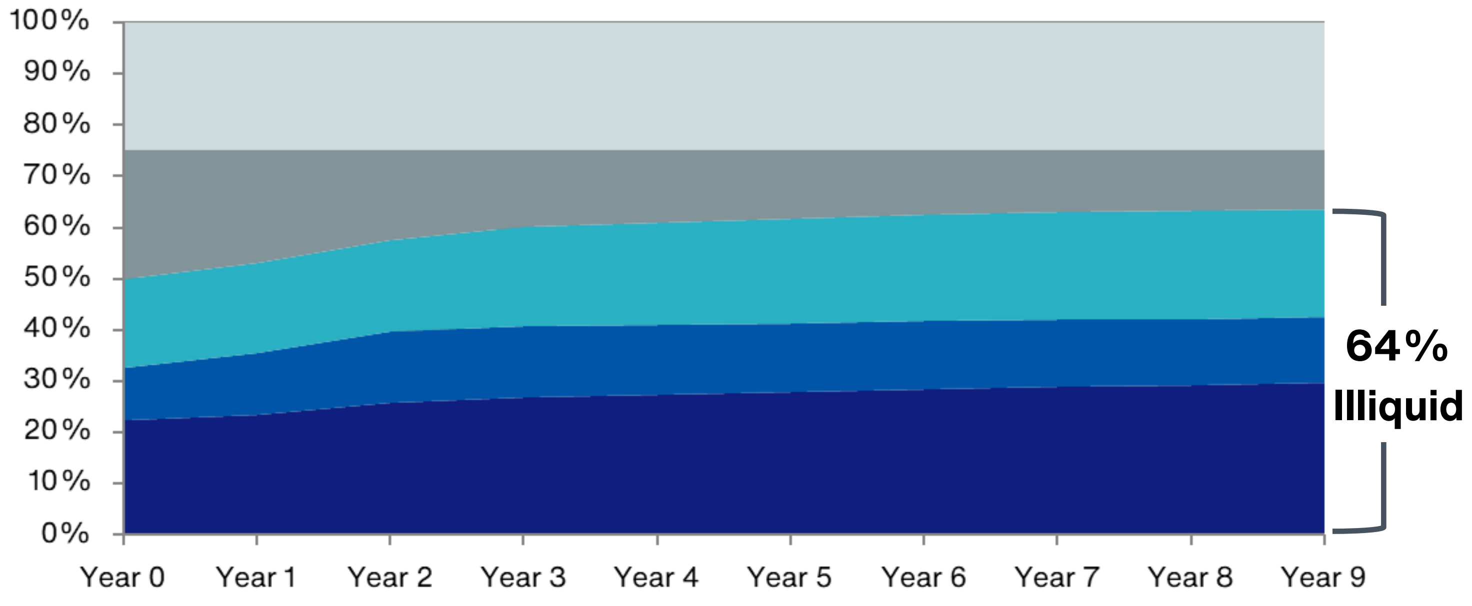
Option 1

Scenario: Recession - OPERF (in Percentages)



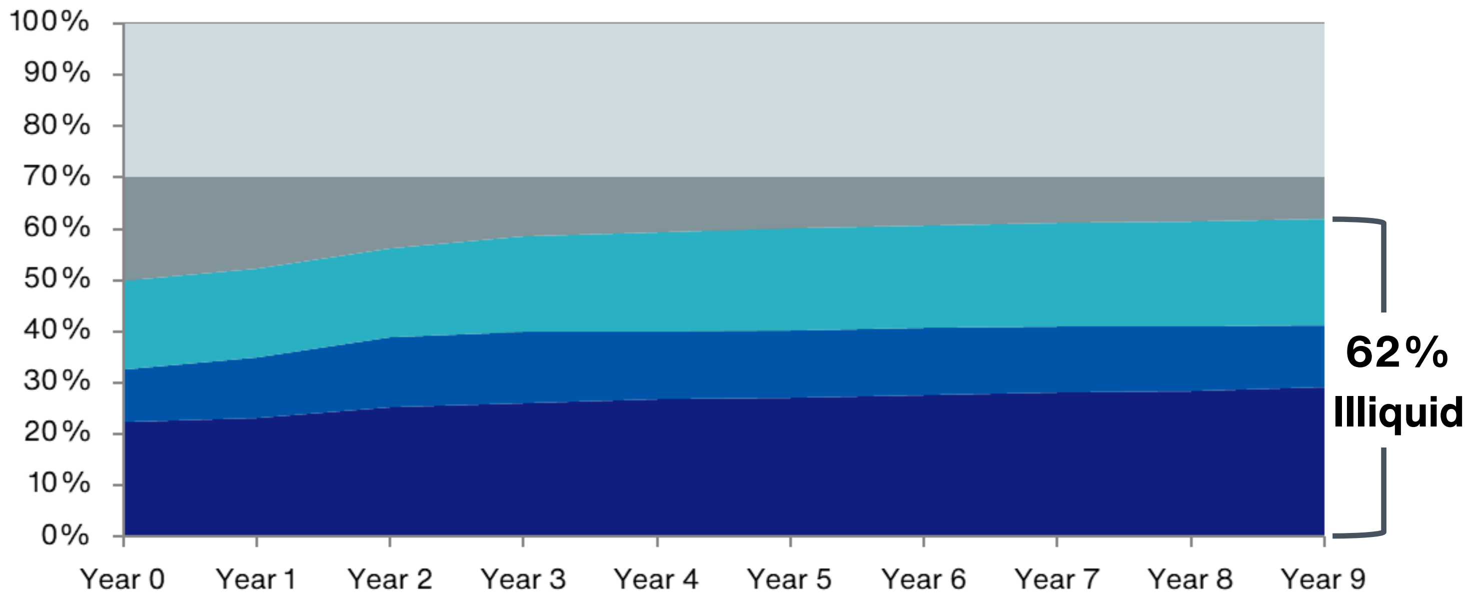
Option 2

Scenario: Recession - OPERF (in Percentages)



Option 3

Scenario: Recession - OPERF (in Percentages)



Note: Year 0 represents a starting point of June 30, 2022

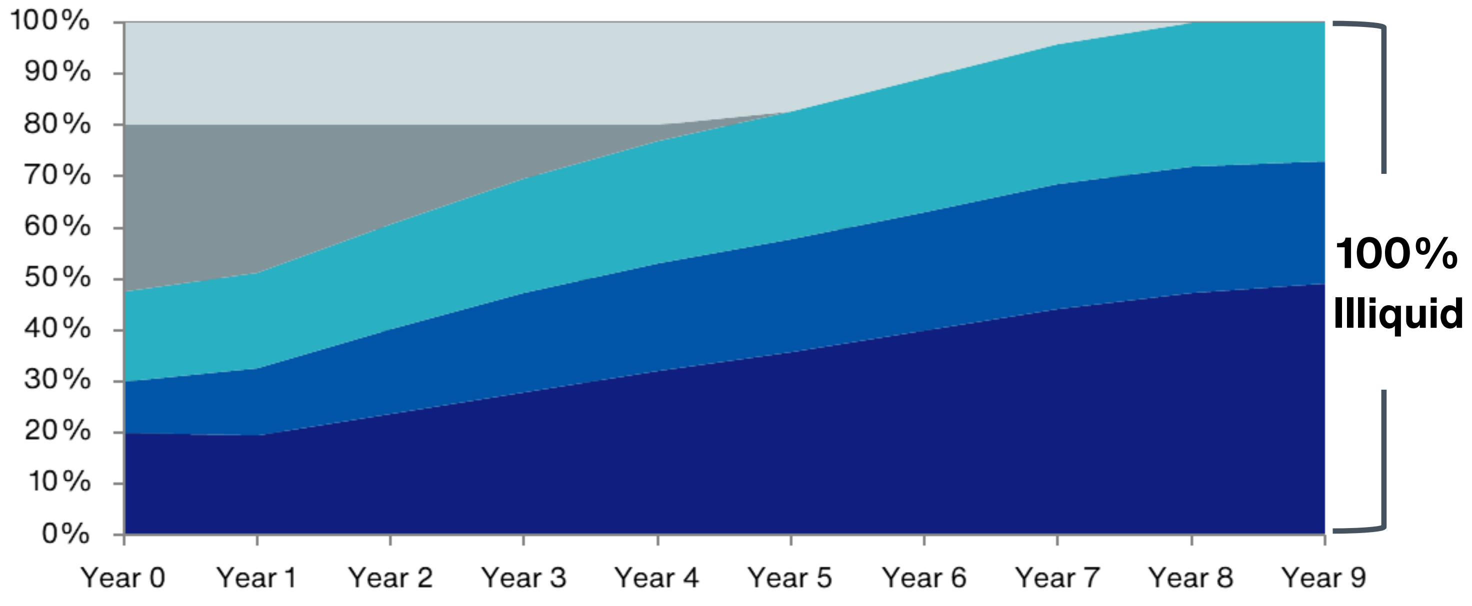
Liquidity Analysis

Dark Skies

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

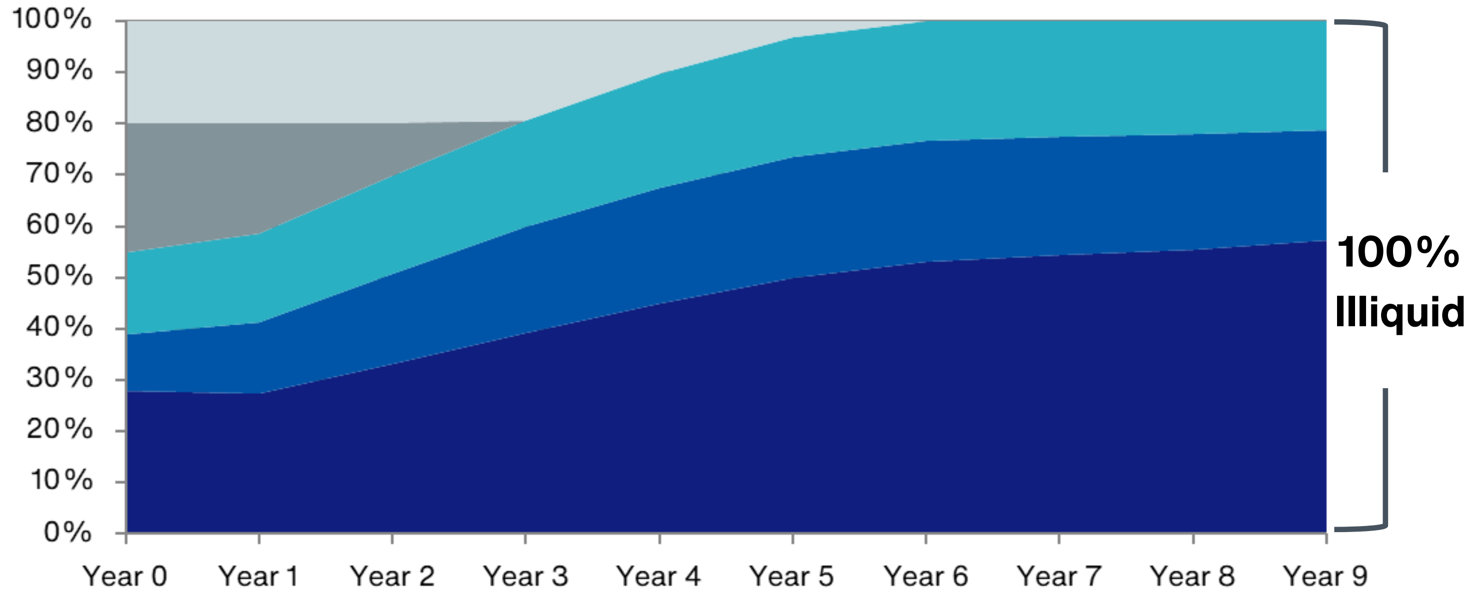
Current Policy

Scenario: Dark Skies - OPERF (in Percentages)



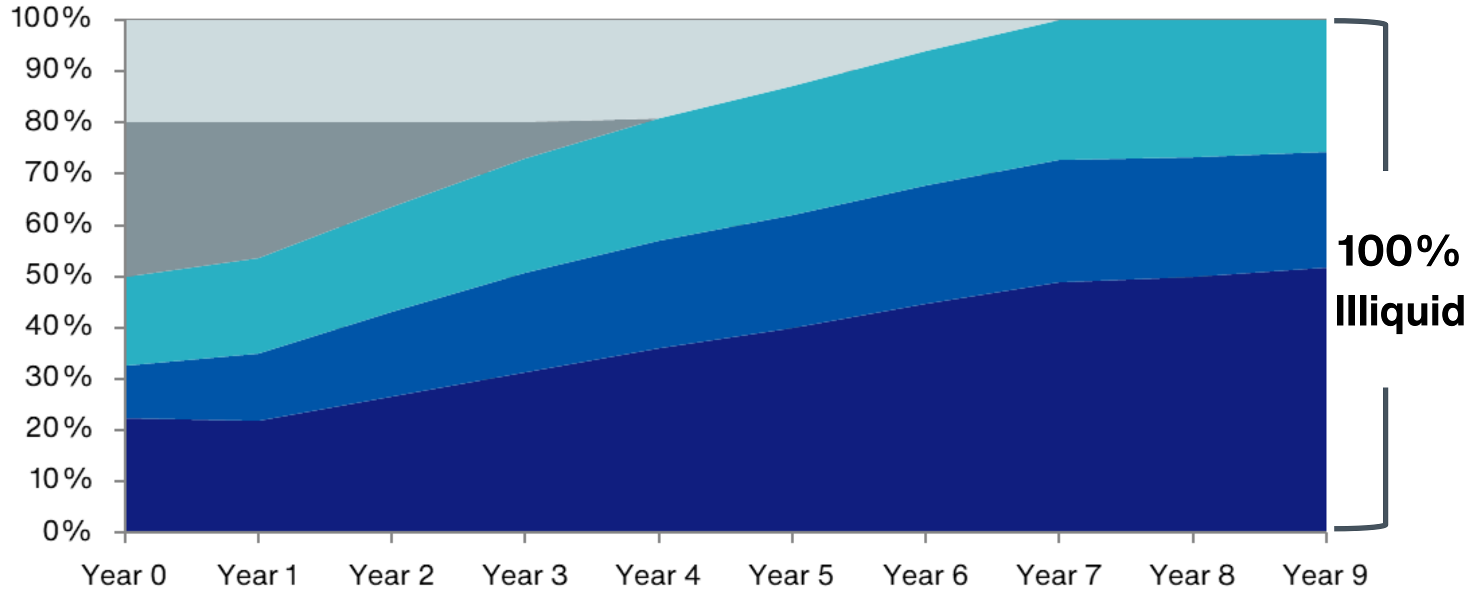
Actual

Scenario: Dark Skies - OPERF (in Percentages)



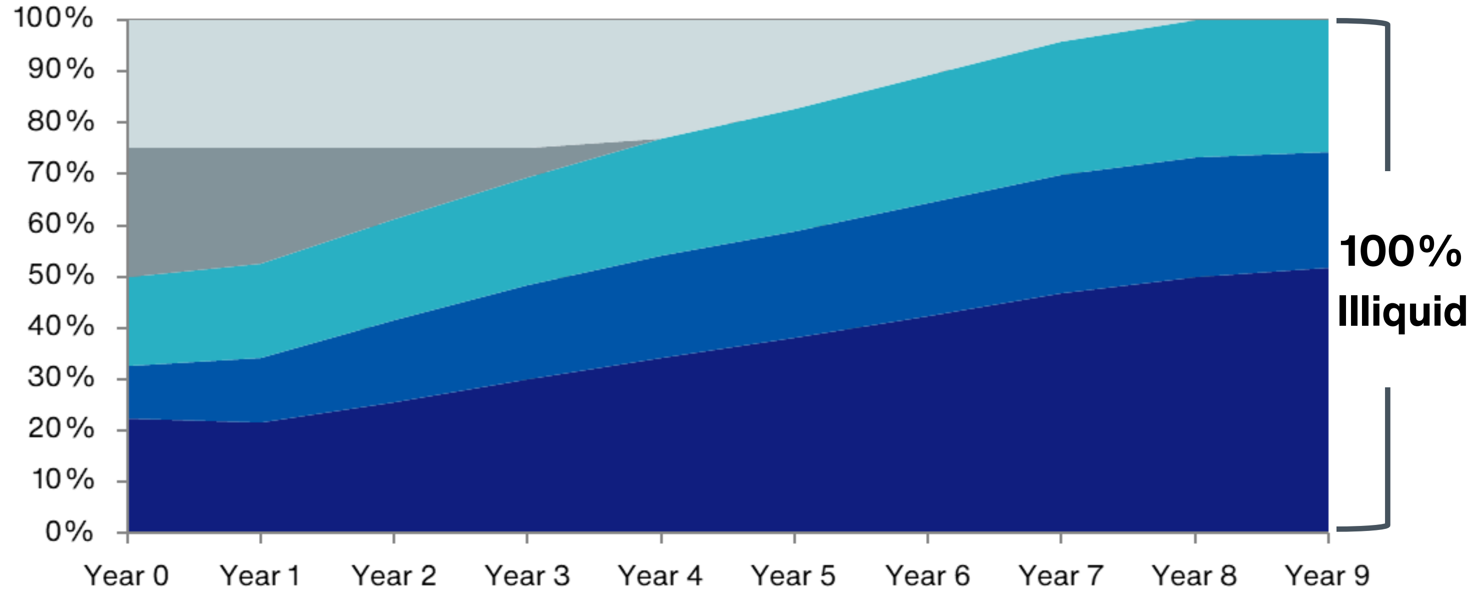
Option 1

Scenario: Dark Skies - OPERF (in Percentages)



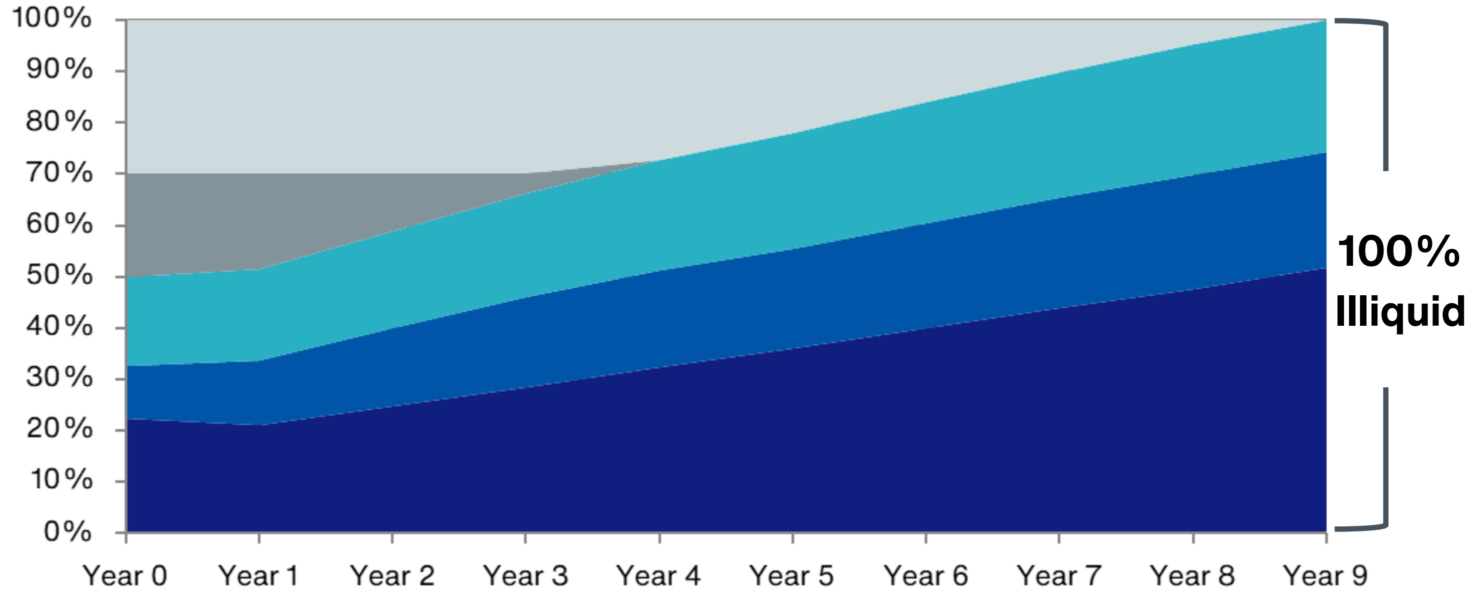
Option 2

Scenario: Dark Skies - OPERF (in Percentages)



Option 3

Scenario: Dark Skies - OPERF (in Percentages)



Note: Year 0 represents a starting point of June 30, 2022

Conclusions

Across all five portfolios, OPERF is expected to have sufficient liquidity in the modeled Base Case and Recession economic scenarios

In a Dark Skies economic scenario, the Plan's assets are projected to be 100% illiquid in 6 to 9 years based on the liquidity profile of each portfolio which would compromise plan operations and force selling on the secondary market.

Dark Skies Scenario	Current Policy	Actual	Option 1	Option 2	Option 3
Projected # of Years to be 100% Illiquid	8 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.

OPERF's liquidity is strained due to the combined impact of asset returns, biennium rate setting, and employer contribution rate collars that slow the replenishing of Plan assets

As the risk reducing asset allocation increases from Option portfolio 1 to 3, the lower risk profile and additional liquidity extends the number of years it takes for Plan assets to become 100% illiquid

Potential remedies for the Dark Skies scenario include 1) accepting this risk; 2) paring back commitments, selling on the secondary market, and/or redeeming quasi-liquid assets a few years into a deep bear market; 3) adjusting the target asset allocation; and 4) adjusting the funding policy

This analysis is highly sensitive to the assumed contributions

If OPERF receives less contributions than assumed, especially in a Dark Skies environment, then illiquid and quasi-liquid investments drift even further from target and the potential for liquidity issues increases

Appendix

- Liquidity Analysis Background
- Current Policy (80% R-S)
- Actual Allocation (80% R-S)
- Option 1
- Option 2
- Option 3
- Assumptions and Methods
- Economic Scenarios
- About This Material

Liquidity Analysis Background

Section: Appendix

Background

Aon Investments' approach to analyzing liquidity risk from alternatives

Intended as a stress-testing model

Develops multi-year projections of assets and spending needs

Uses different scenarios for economic environments and other relevant events

Shows how the portfolio's liquidity profile could evolve with a given investment strategy

Incorporates the profile of the liabilities as well as expected future contributions

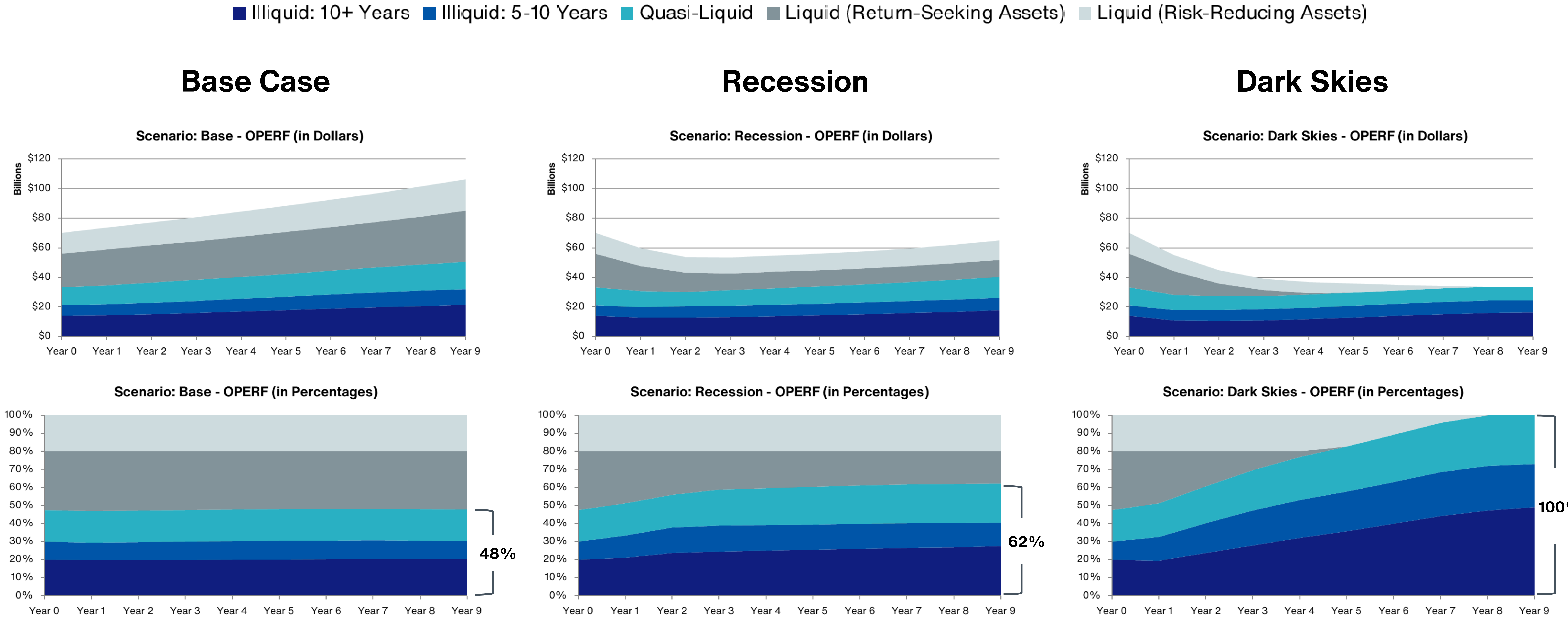
Background

Process inputs and outputs

Current Policy (80% R-S)

Section: Appendix

Liquidity Analysis
Current Policy (80% Return-Seeking)



Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Current Policy (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Base Case economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	33	33	33	33	32	32	32	32	32	32
Total Liquid	**53%**	**53%**	**53%**	**53%**	**52%**	**52%**	**52%**	**52%**	**52%**	**52%**
Quasi-Liquid	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Illiquid: 5-10 Year Lock-up	10	10	10	10	10	10	10	10	10	10
Illiquid: 10+ Year Lock-up	20	20	20	20	20	20	20	20	20	20
Total Quasi + Illiquid	**48%**	**47%**	**47%**	**47%**	**48%**	**48%**	**48%**	**48%**	**48%**	**48%**

Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	72%	73%	75%	77%	79%	81%	84%	86%	89%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.1	$3.3	$3.8	$4.3	$4.5	$4.6	$4.7

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

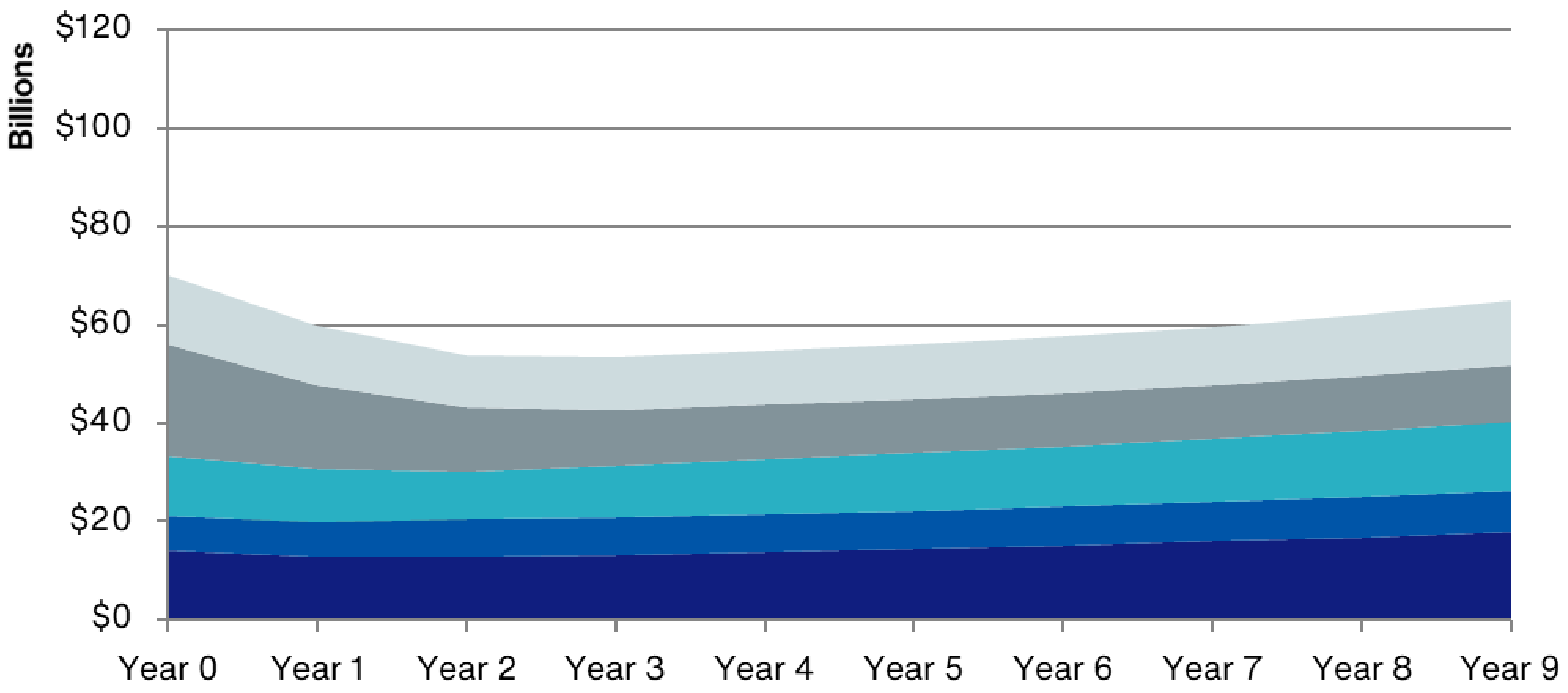
Liquidity Analysis

Recession economic scenario – Current Policy (80% R-S)

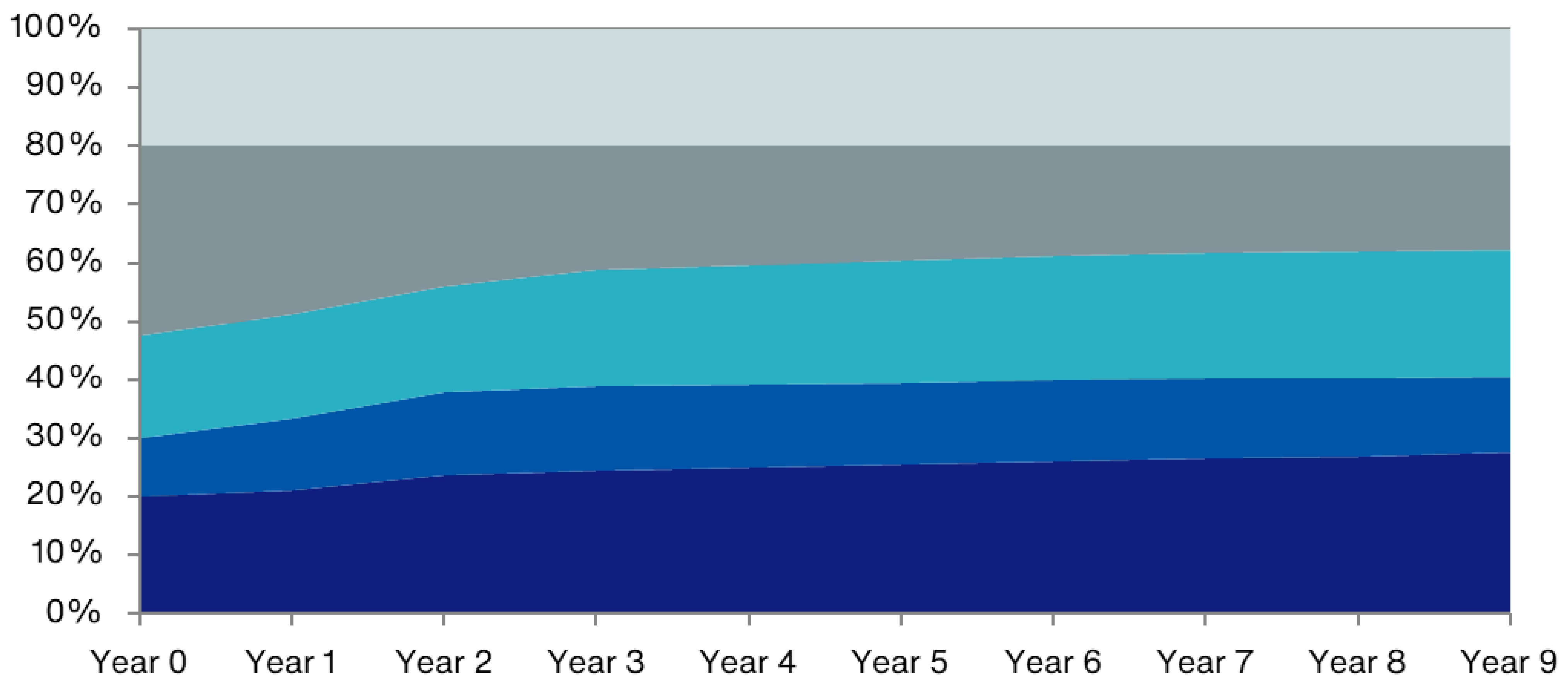
The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Recession economic scenario, assuming commitments are continued as expected

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

Scenario: Recession - OPERF (in Dollars)



Scenario: Recession - OPERF (in Percentages)



Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but recessionary markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 62% of the Plan due to the shrinking market value of the total Plan in this scenario
- There would not be a concern with the ability to pay benefits
- The OIC may need to redeem some quasi-liquid assets to stay close to its target allocation (48% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Recession economic scenario – Current Policy (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Recession economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	33	29	24	21	20	20	19	18	18	18
Total Liquid	**53%**	**49%**	**44%**	**41%**	**40%**	**40%**	**39%**	**38%**	**38%**	**38%**
Quasi-Liquid	18%	18%	18%	20%	21%	21%	21%	21%	22%	22%
Illiquid: 5-10 Year Lock-up	10	12	14	14	14	14	14	14	13	13
Illiquid: 10+ Year Lock-up	20	21	24	24	25	26	26	27	27	28
Total Quasi + Illiquid	**48%**	**51%**	**56%**	**59%**	**60%**	**60%**	**61%**	**62%**	**62%**	**62%**

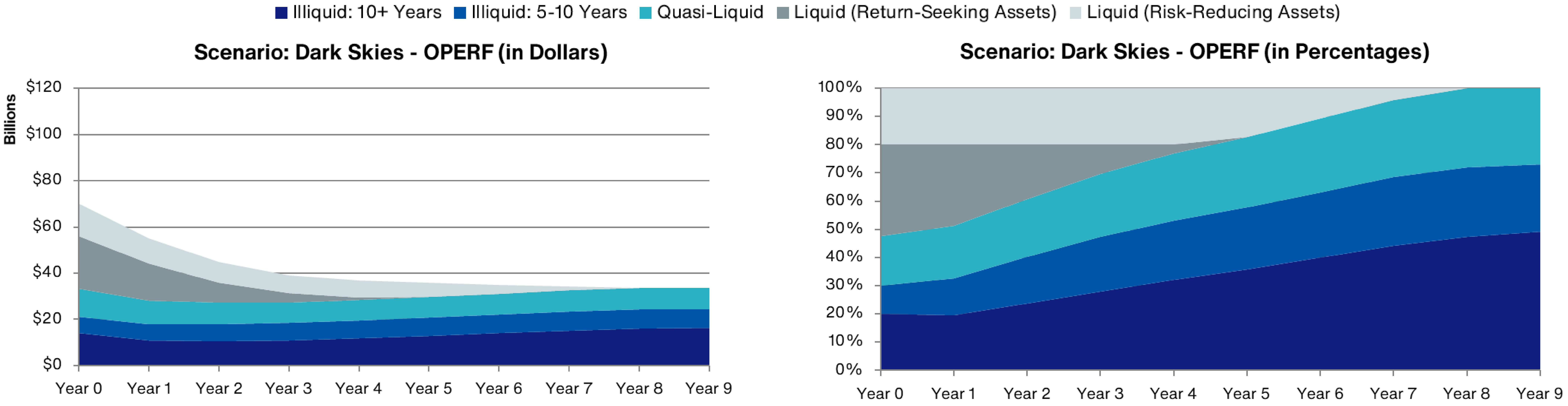
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	58%	52%	50%	51%	51%	52%	53%	54%	56%
Total Contribution Amt (in $B)	$2.5	$2.7	$3.0	$3.5	$4.1	$4.7	$5.3	$5.8	$6.3	$6.7

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Dark Skies economic scenario – Current Policy (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Dark Skies economic scenario, assuming commitments are continued as expected



Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but subpar markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 100% of the Plan due to the shrinking market value of the total Plan in this scenario
- In this scenario, the OIC may want to pare back future commitments to stay closer to the target allocations; however, the allocation would still be significantly different from the target allocation (48% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Dark Skies economic scenario – Current Policy (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	20%	20%	17%	11%	4%	0%	0%
Liquid Return-Seeking	33	29	19	10	3	0	0	0	0	0
Total Liquid	**53%**	**49%**	**39%**	**30%**	**23%**	**17%**	**11%**	**4%**	**0%**	**0%**
Quasi-Liquid	18%	19%	21%	22%	24%	25%	26%	27%	28%	27%
Illiquid: 5-10 Year Lock-up	10	13	17	19	21	22	23	24	25	24
Illiquid: 10+ Year Lock-up	20	20	24	28	32	36	40	44	47	49
Total Quasi + Illiquid	**48%**	**51%**	**61%**	**70%**	**77%**	**83%**	**89%**	**96%**	**100%**	**100%**

Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	54%	43%	37%	35%	33%	32%	31%	30%	30%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.6	$4.2	$4.7	$5.1	$5.5	$5.9	$6.4

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Actual Allocation (80% R-S)

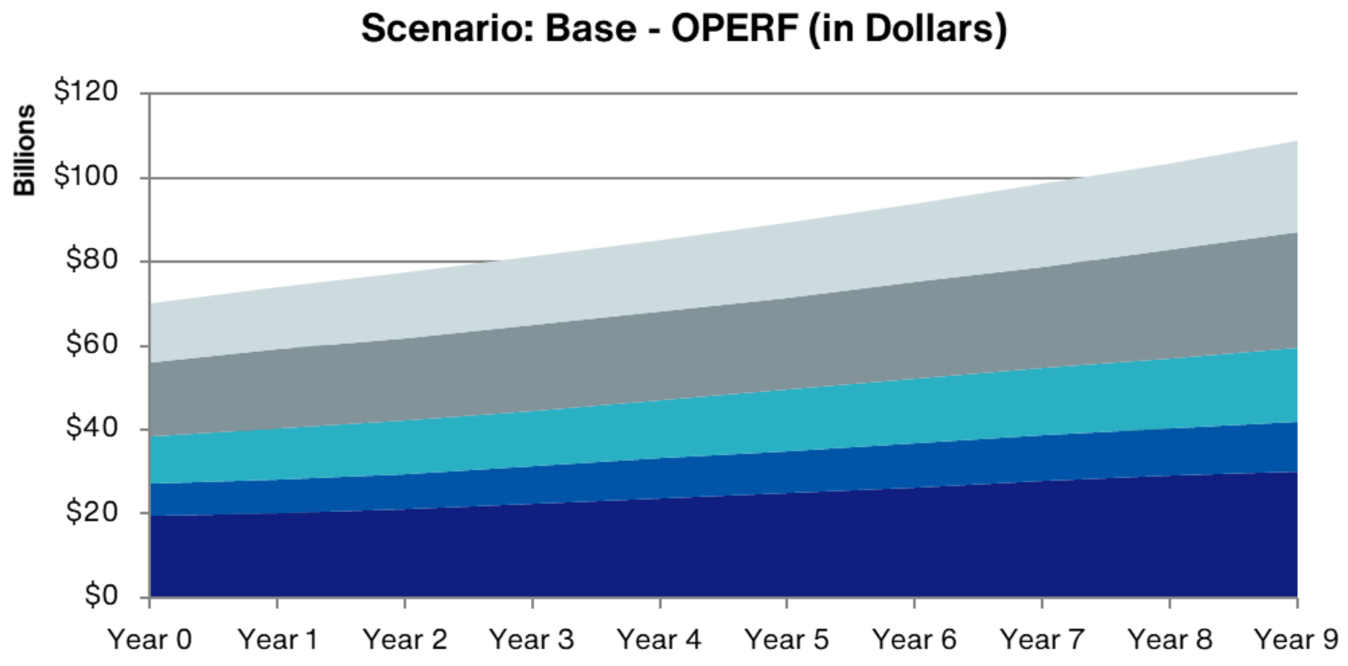
Section: Appendix

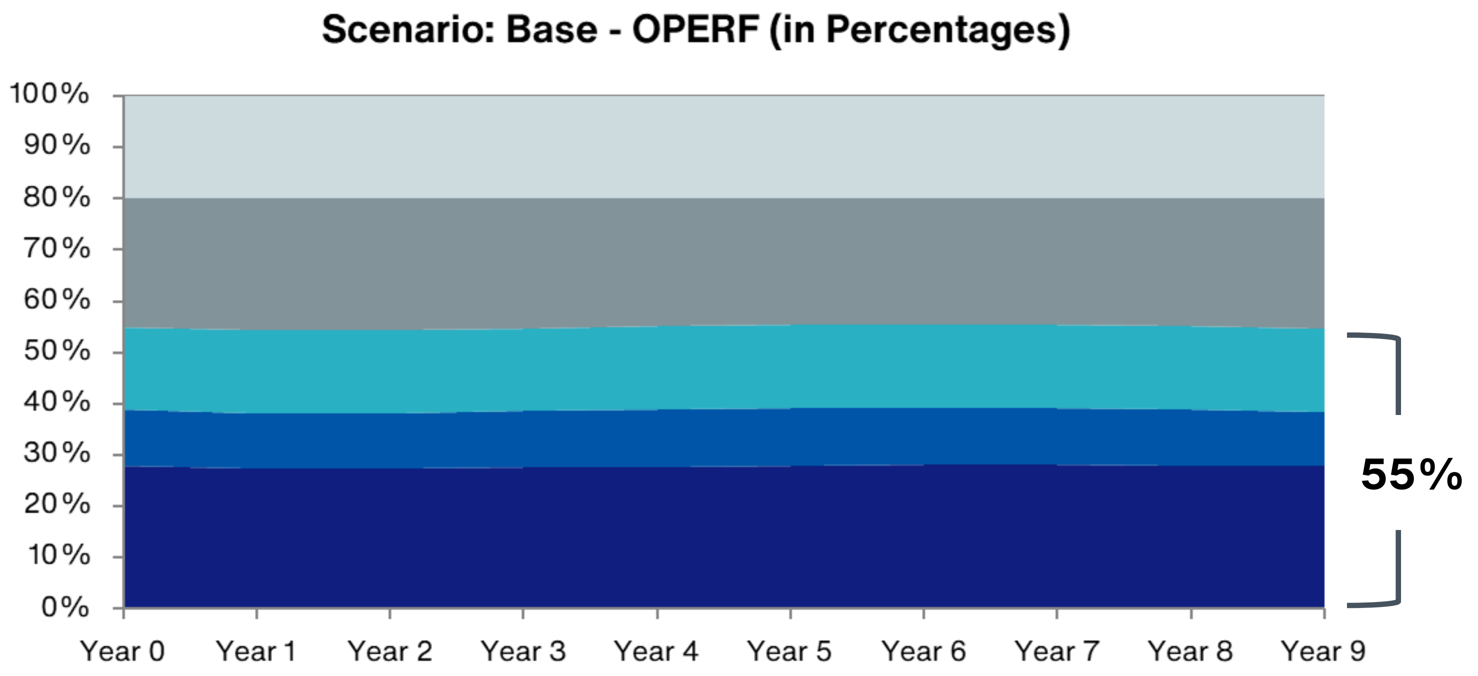
Liquidity Analysis

Actual Allocation (80% Return-Seeking)

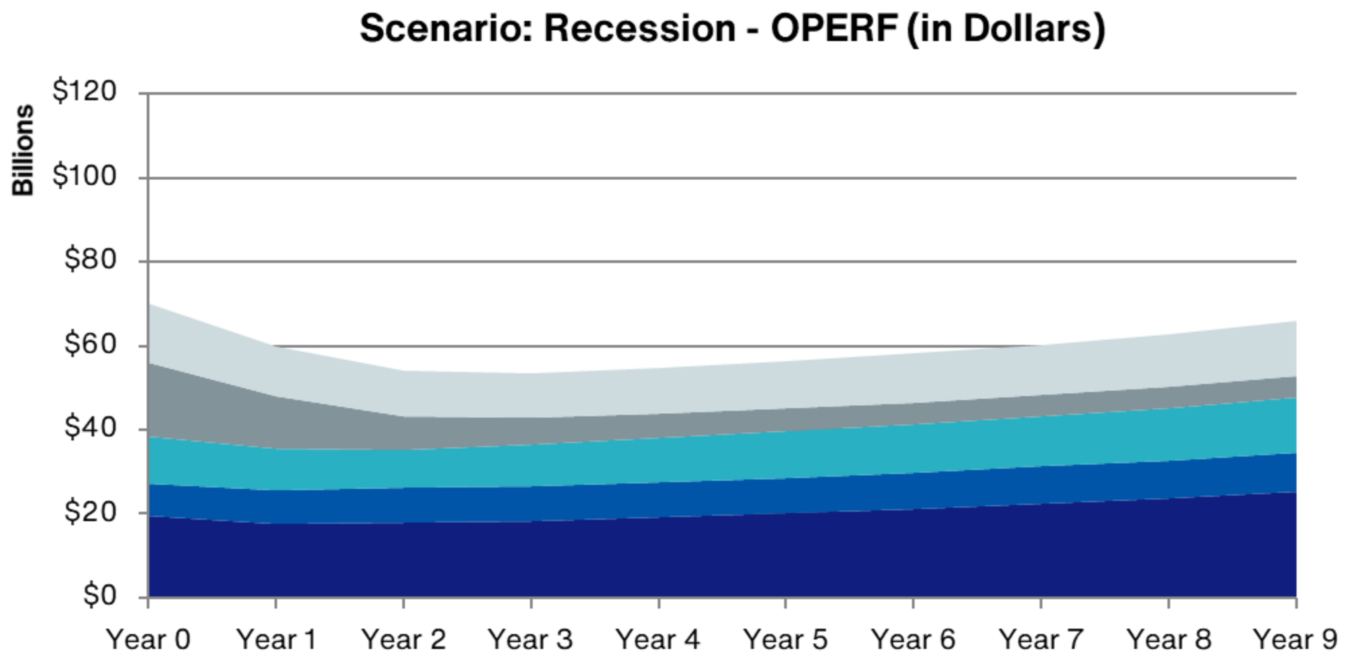
■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

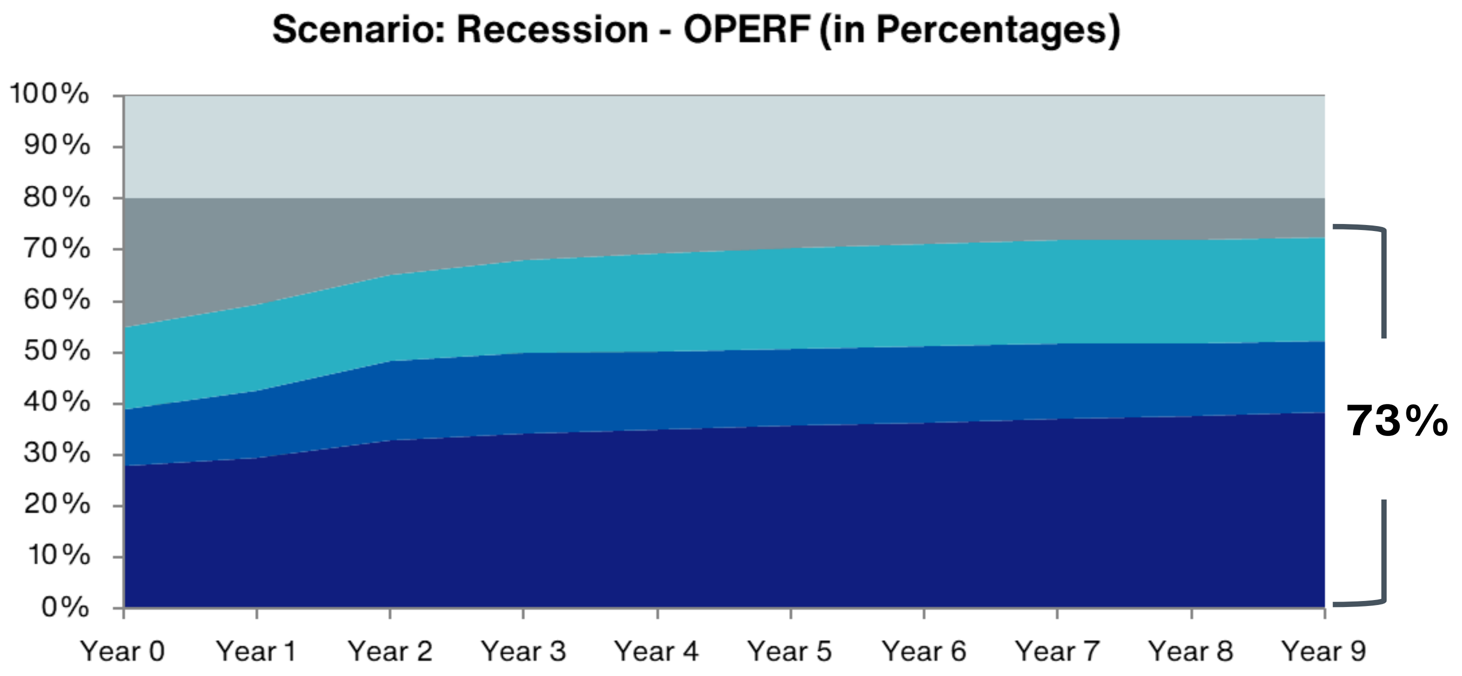
Base Case



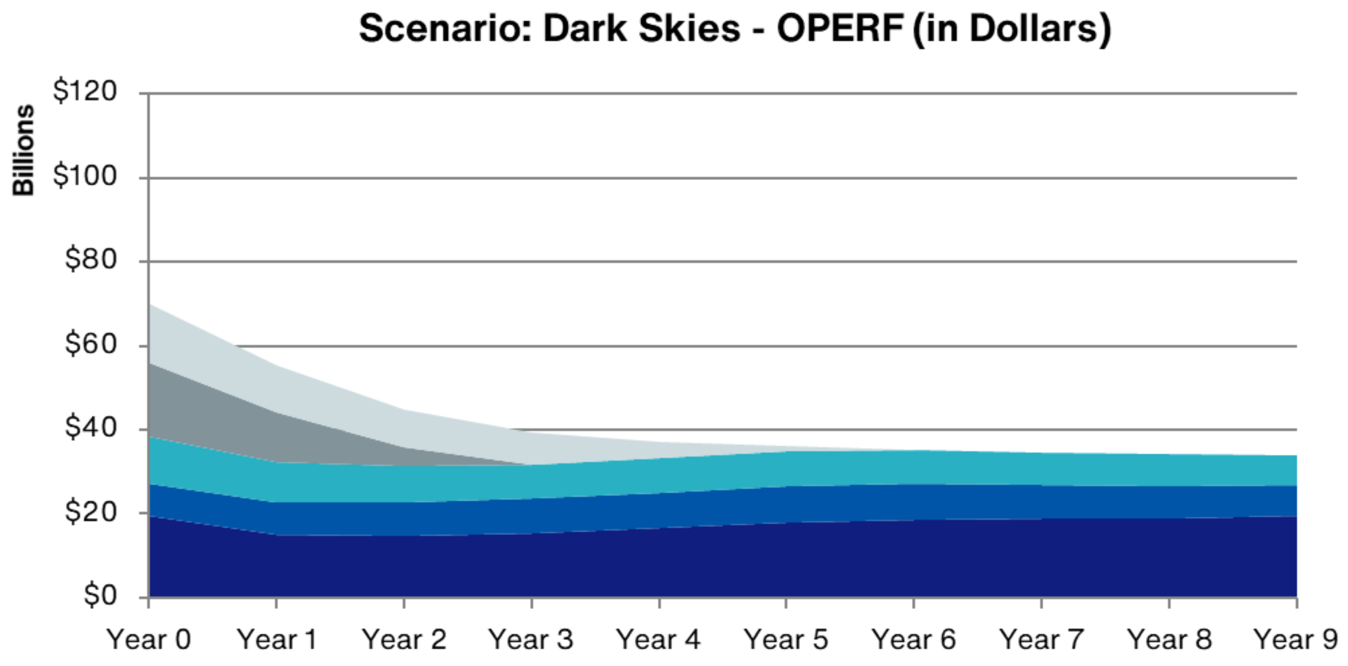


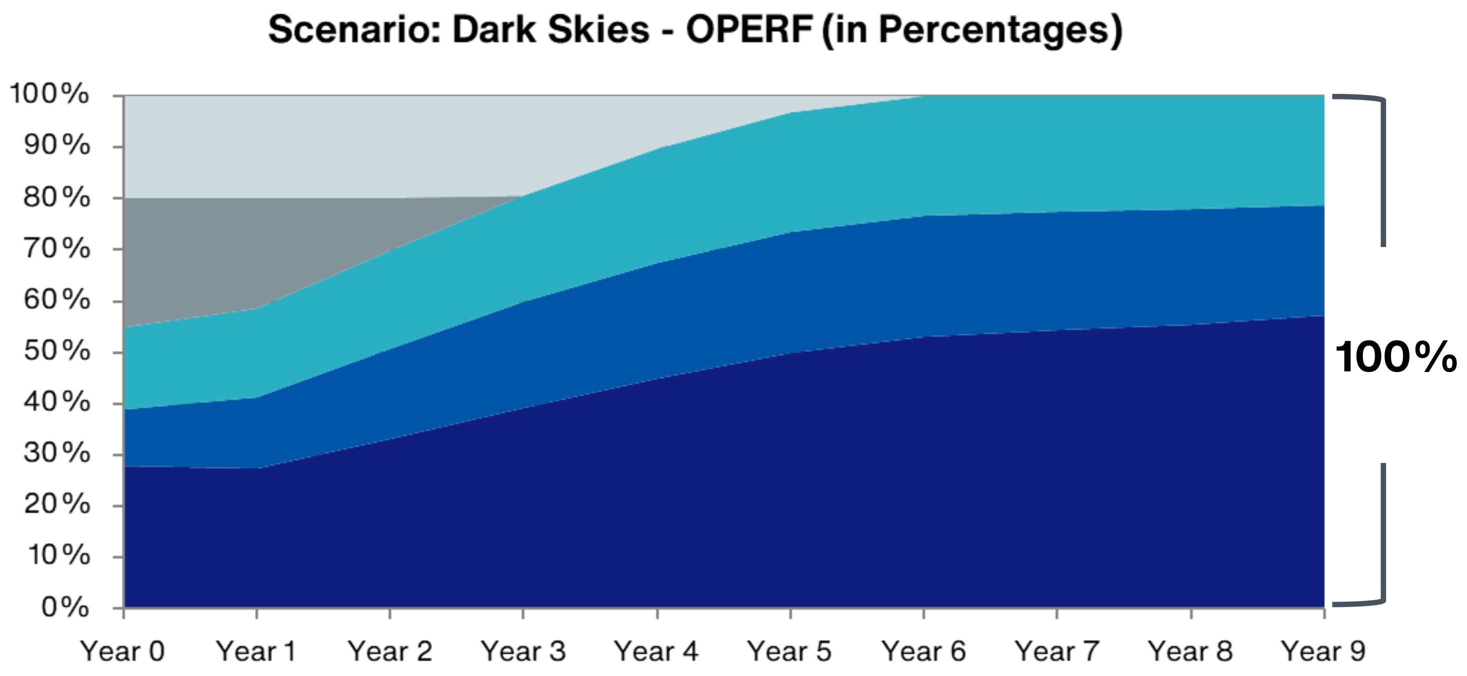
Recession





Dark Skies





Note: Year 0 represents a starting point of June 30, 2022

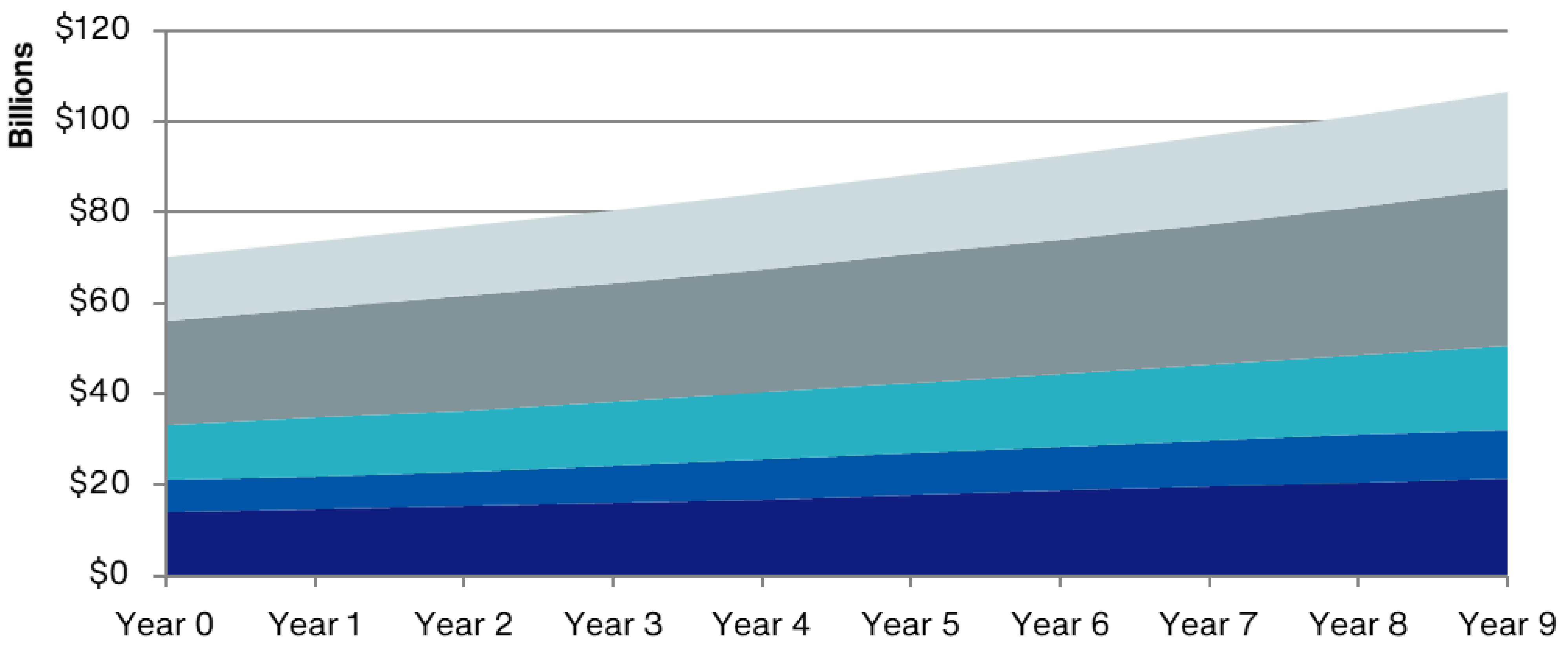
Liquidity Analysis

Base Case economic scenario – Current Policy (80% R-S)

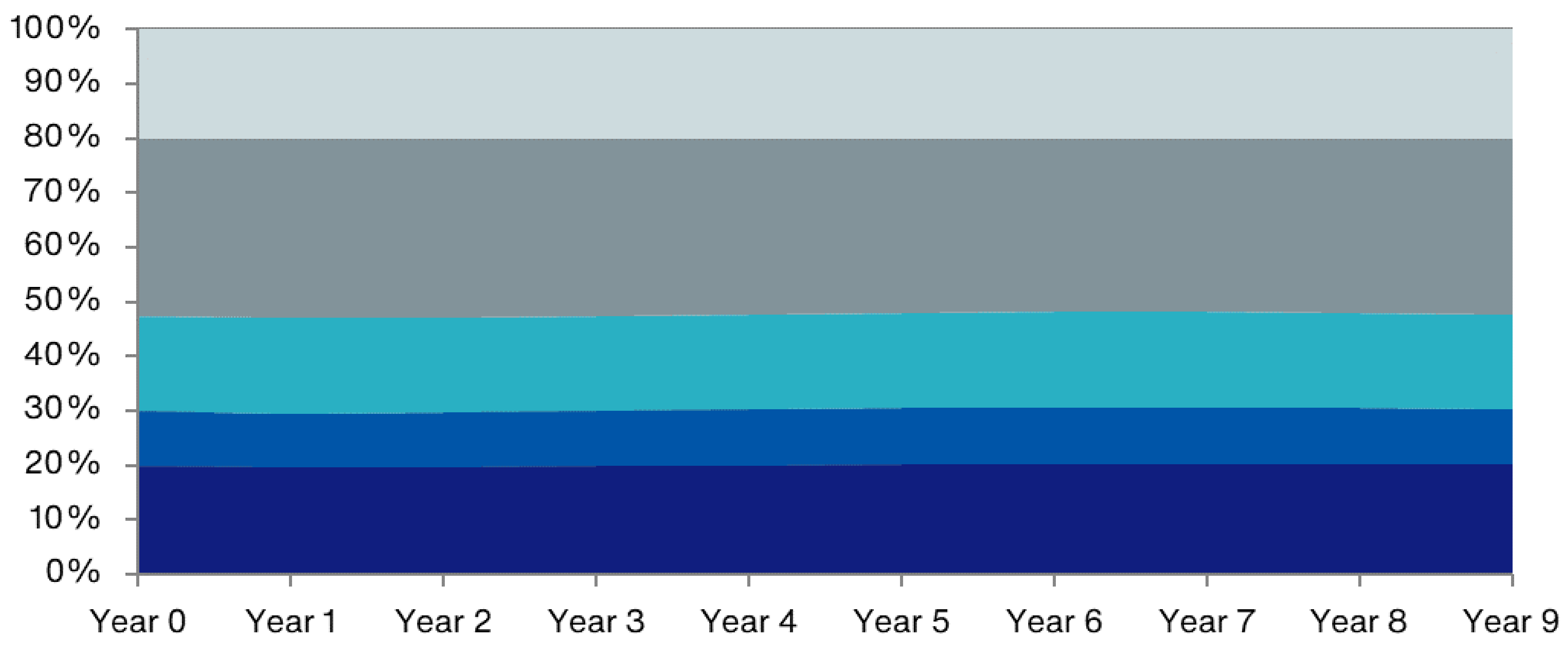
The exhibit below shows the projected liquidity lock-up of the Current Policy allocation in the Base Case economic scenario, assuming commitments are continued as expected

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

Scenario: Base - OPERF (in Dollars)



Scenario: Base - OPERF (in Percentages)



Key Takeaway:

- Total illiquid and quasi-liquid assets are projected to stay near 48% of the Plan and can be maintained near the target with no cash flow problems

Note: Year 0 represents a starting point of June 30, 2022

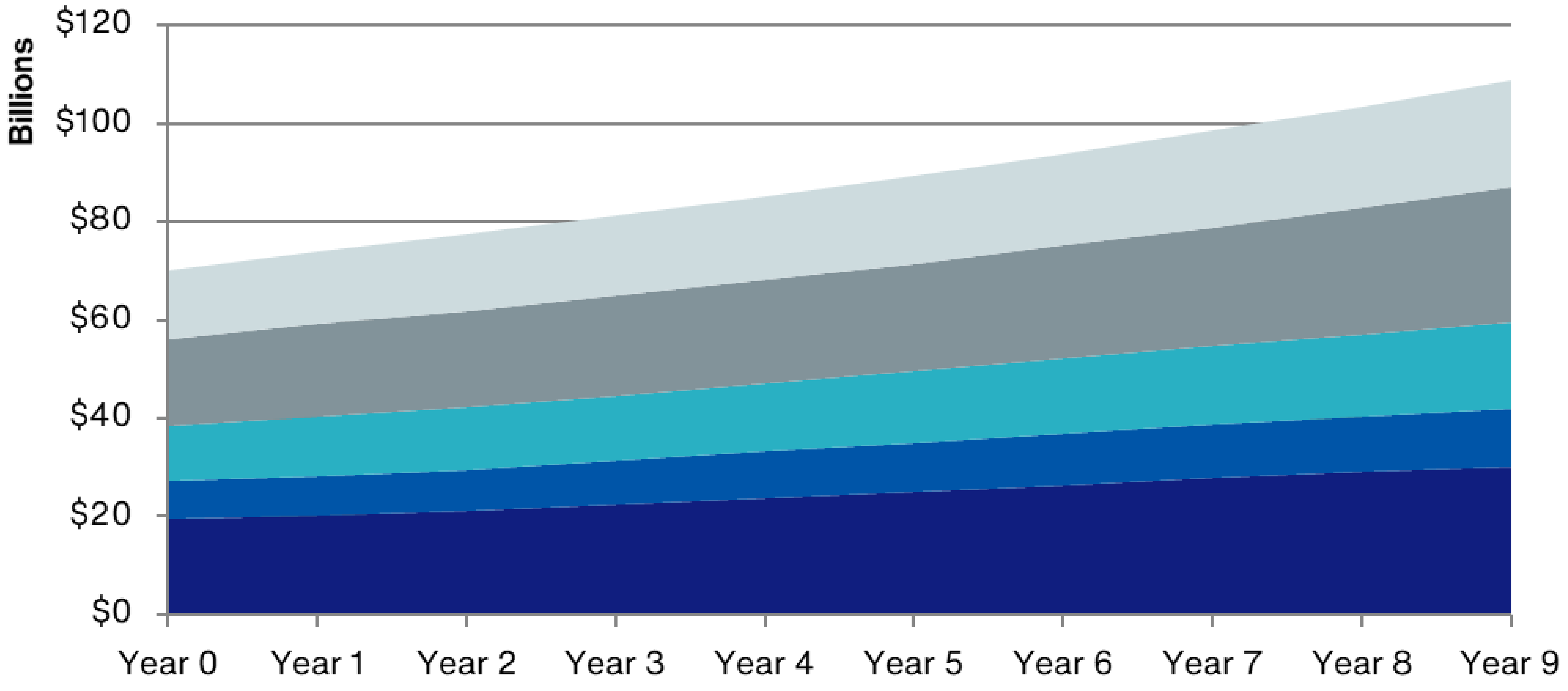
Liquidity Analysis

Base Case economic scenario – Actual Allocation (80% R-S)

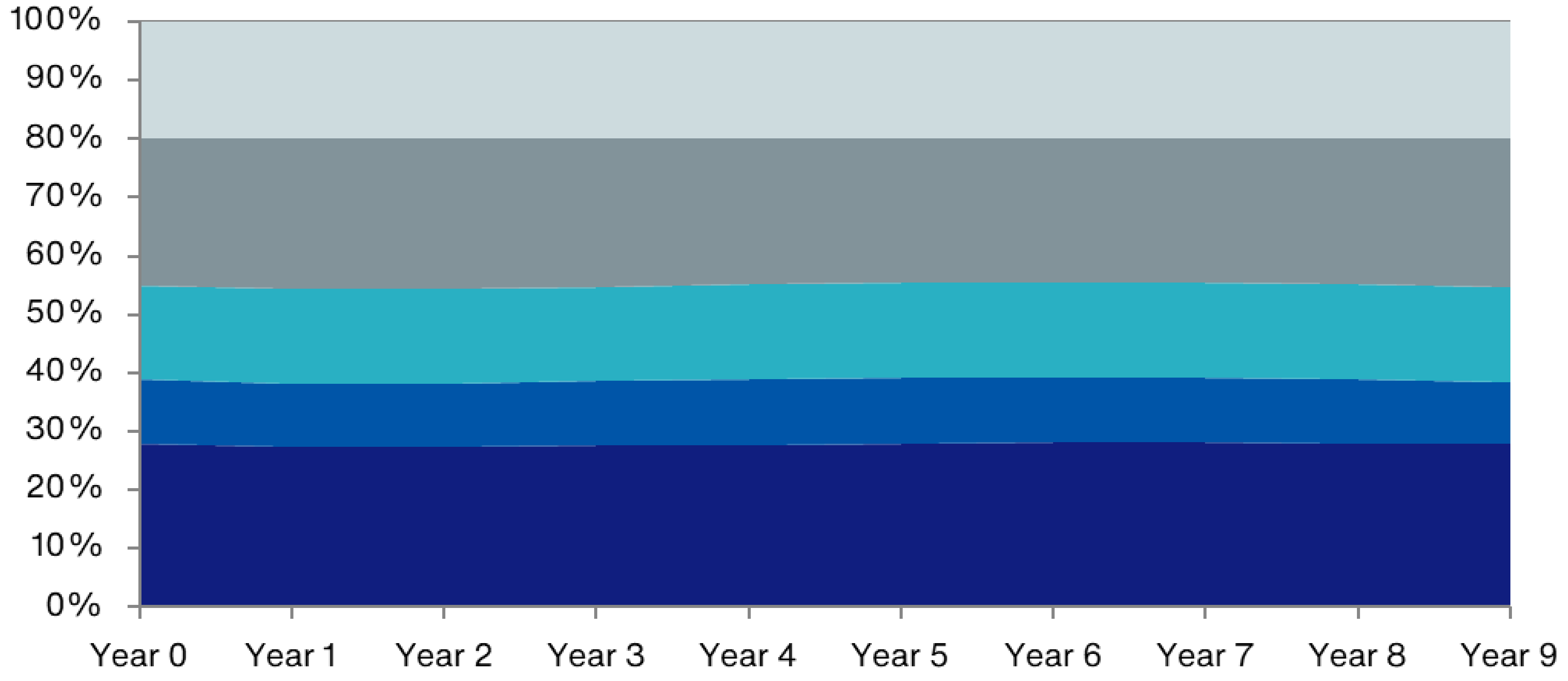
The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Base Case economic scenario, assuming commitments are continued as expected

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

Scenario: Base - OPERF (in Dollars)



Scenario: Base - OPERF (in Percentages)



Key Takeaway:

- Total illiquid and quasi-liquid assets are projected to stay near 55% of the Plan and can be maintained near the target with no cash flow problems

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Actual Allocation (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Base Case economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	25	26	26	25	25	25	25	25	25	25
Total Liquid	**45%**	**46%**	**46%**	**45%**	**45%**	**45%**	**45%**	**45%**	**45%**	**45%**
Quasi-Liquid	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%
Illiquid: 5-10 Year Lock-up	11	11	11	11	11	11	11	11	11	11
Illiquid: 10+ Year Lock-up	28	27	27	28	28	28	28	28	28	28
Total Quasi + Illiquid	**55%**	**54%**	**54%**	**55%**	**55%**	**55%**	**55%**	**55%**	**55%**	**55%**

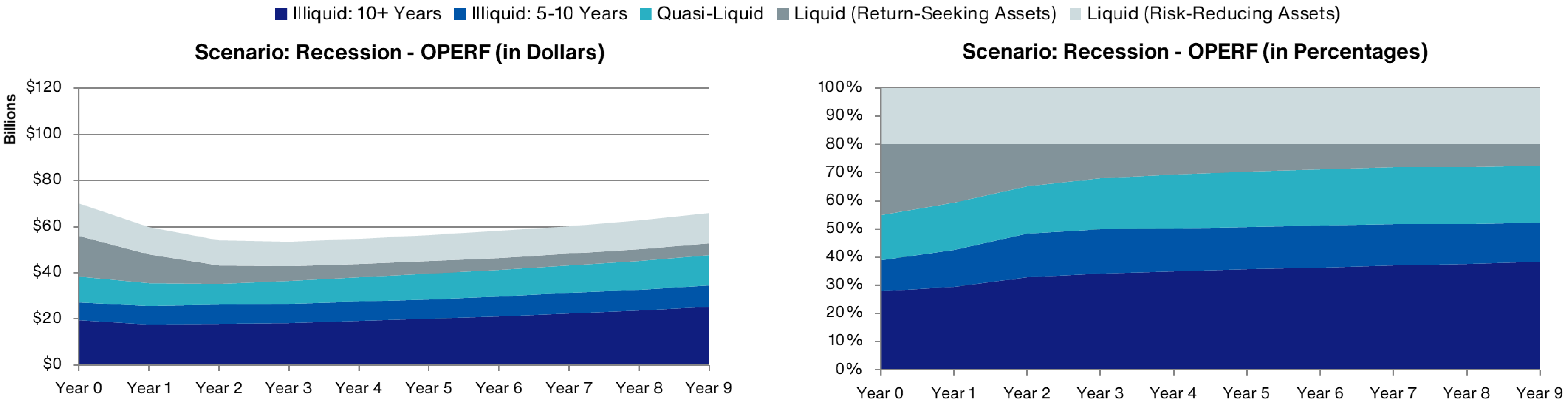
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	72%	74%	76%	78%	80%	83%	85%	88%	91%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.1	$3.3	$3.8	$4.3	$4.4	$4.6	$4.6

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Recession economic scenario – Actual Allocation (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Recession economic scenario, assuming commitments are continued as expected



Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but recessionary markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 73% of the Plan due to the shrinking market value of the total Plan in this scenario
- There would not be a concern with the ability to pay benefits
- The OIC may need to redeem some quasi-liquid assets to stay close to its target allocation (55% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Recession economic scenario – Actual Allocation (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Recession economic scenario, assuming commitments are continued as expected

Asset Allocation	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	25	21	15	12	11	10	9	8	8	7
Total Liquid	**45%**	**41%**	**35%**	**32%**	**31%**	**30%**	**29%**	**28%**	**28%**	**27%**
Quasi-Liquid	16%	17%	17%	18%	19%	19%	20%	20%	20%	20%
Illiquid: 5-10 Year Lock-up	11	13	15	16	15	15	15	15	14	14
Illiquid: 10+ Year Lock-up	28	30	33	34	35	36	36	37	37	38
Total Quasi + Illiquid	**55%**	**59%**	**65%**	**68%**	**69%**	**70%**	**71%**	**72%**	**72%**	**73%**

Other Metrics	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Funded Ratio (MVA / AL)	70%	58%	52%	50%	51%	52%	52%	54%	55%	57%
Total Contribution Amt (in $B)	$2.5	$2.7	$3.0	$3.5	$4.1	$4.7	$5.3	$5.8	$6.3	$6.7

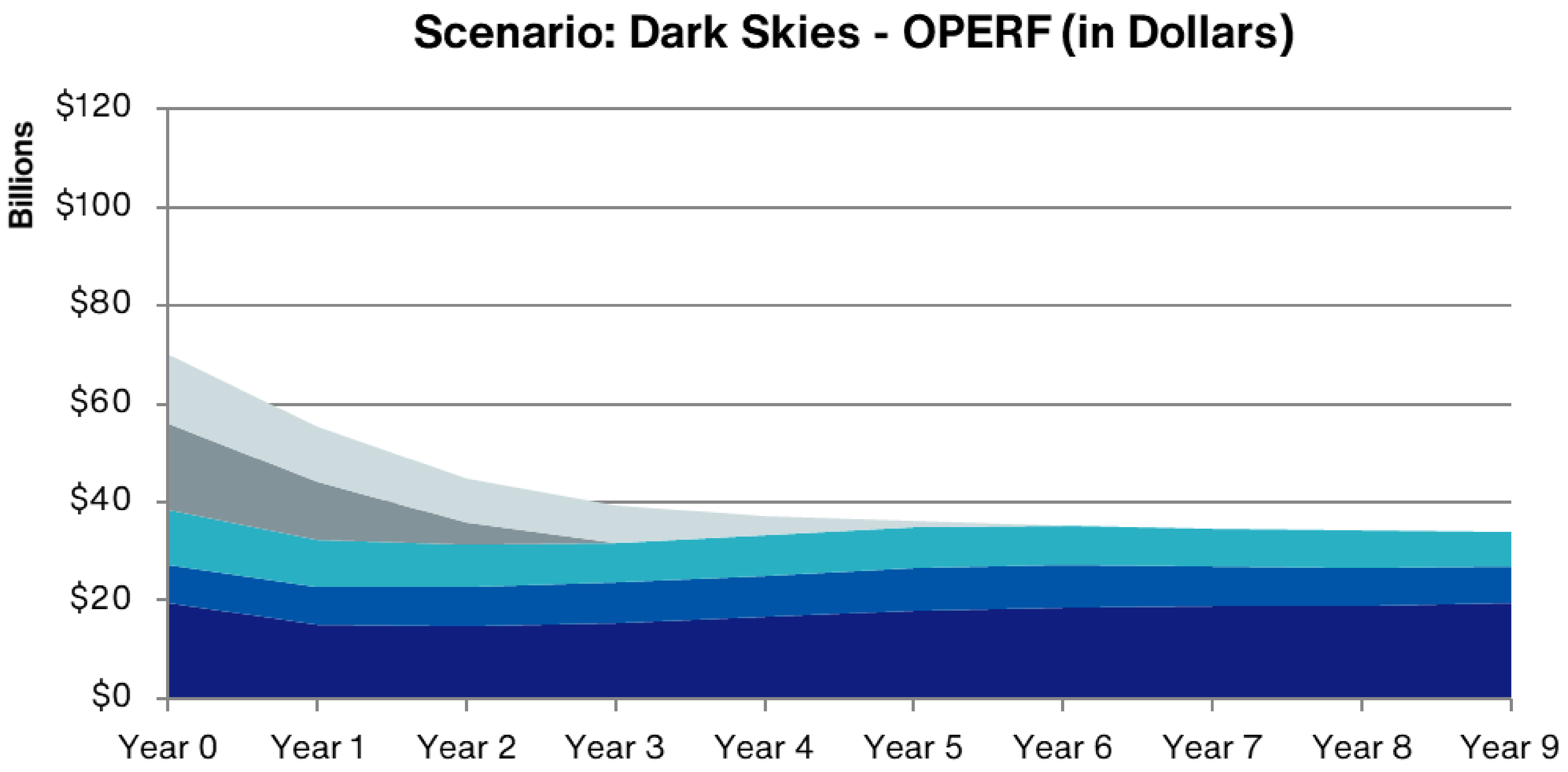
Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

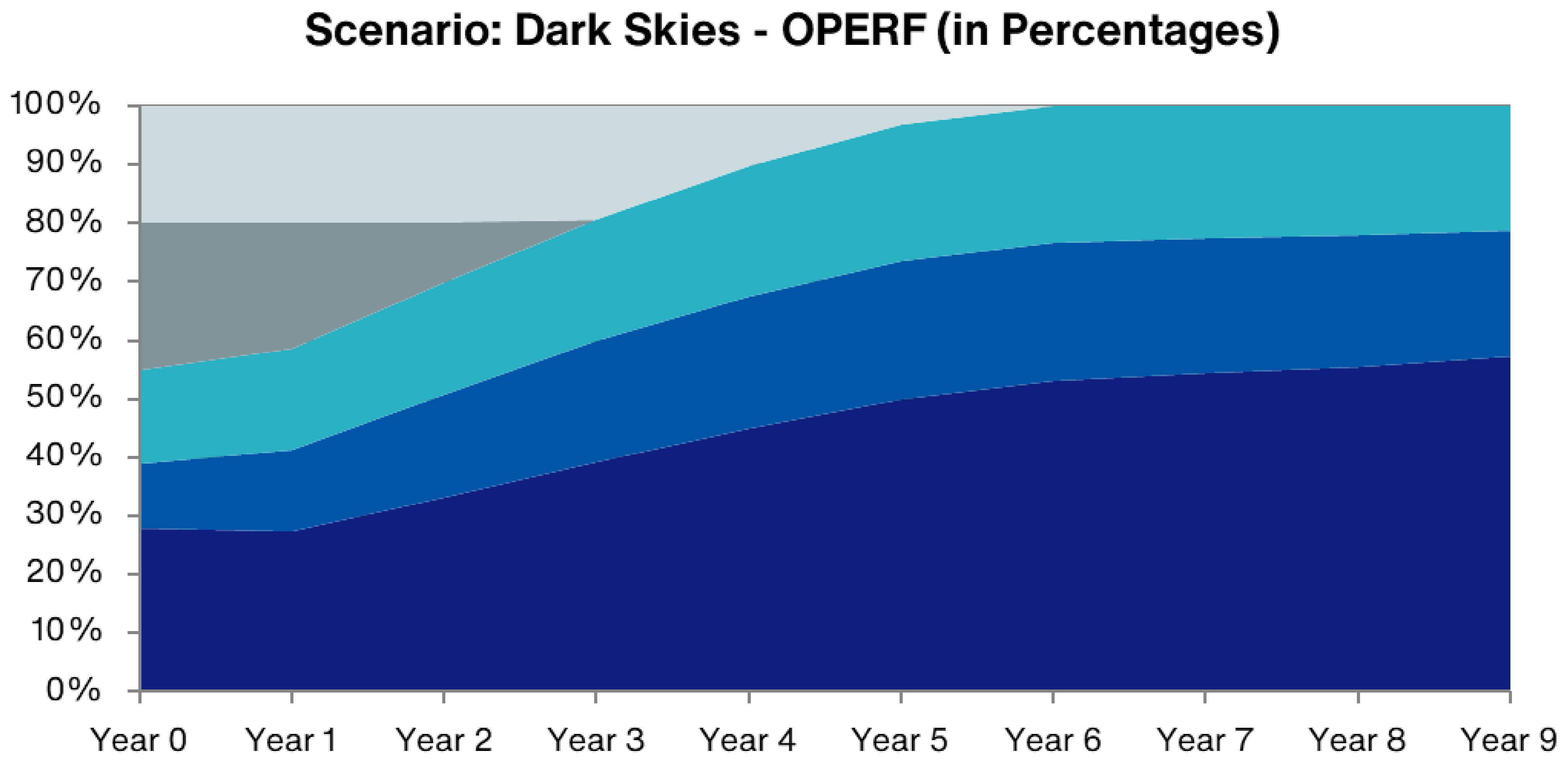
Liquidity Analysis

Dark Skies economic scenario – Actual Allocation (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)





Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but subpar markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 100% of the Plan due to the shrinking market value of the total Plan in this scenario
- In this scenario, the OIC may want to pare back future commitments to stay closer to the target allocations; however, the allocation would still be significantly different from the target allocation (55% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Dark Skies economic scenario – Actual Allocation (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Actual allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	19%	10%	3%	0%	0%	0%	0%
Liquid Return-Seeking	25	21	10	0	0	0	0	0	0	0
Total Liquid	**45%**	**41%**	**30%**	**19%**	**10%**	**3%**	**0%**	**0%**	**0%**	**0%**
Quasi-Liquid	16%	17%	19%	21%	22%	23%	23%	23%	22%	21%
Illiquid: 5-10 Year Lock-up	11	14	18	21	23	24	24	23	23	22
Illiquid: 10+ Year Lock-up	28	27	33	39	45	50	53	54	55	57
Total Quasi + Illiquid	**55%**	**59%**	**70%**	**81%**	**90%**	**97%**	**100%**	**100%**	**100%**	**100%**

Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	54%	43%	37%	35%	34%	32%	31%	31%	30%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.6	$4.2	$4.7	$5.1	$5.5	$5.9	$6.4

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Option 1 (80% R-S)

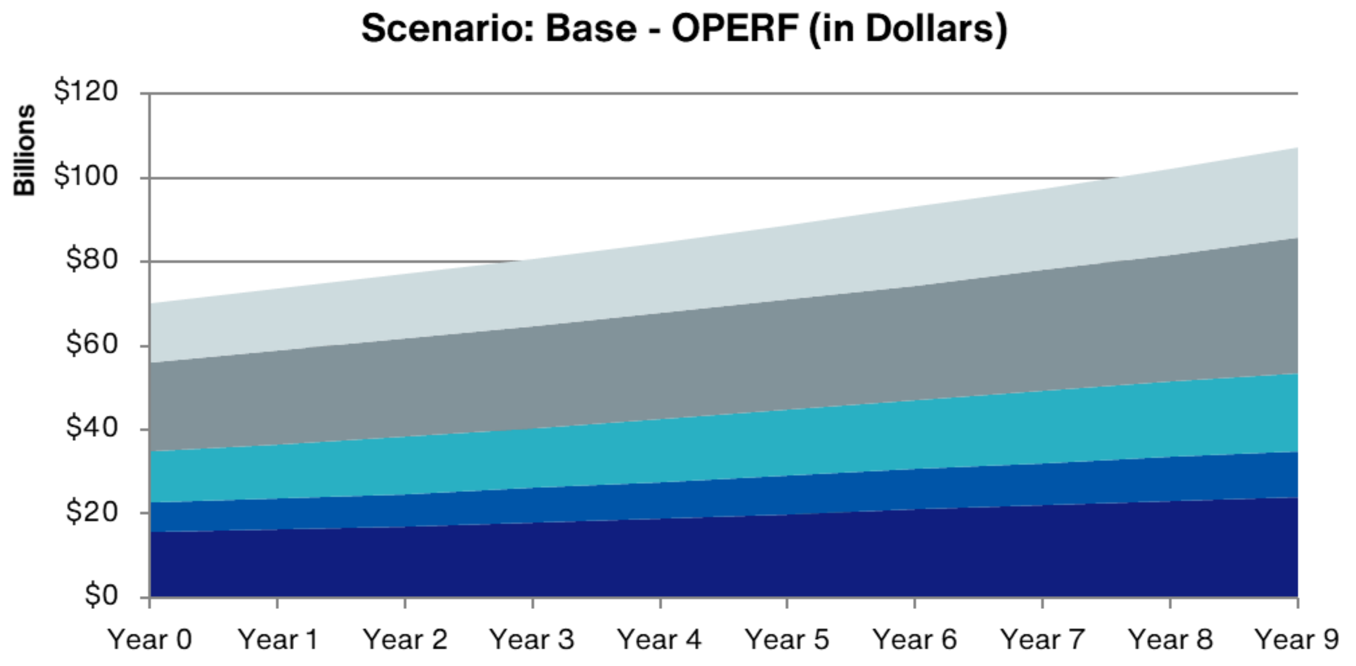
Section: Appendix

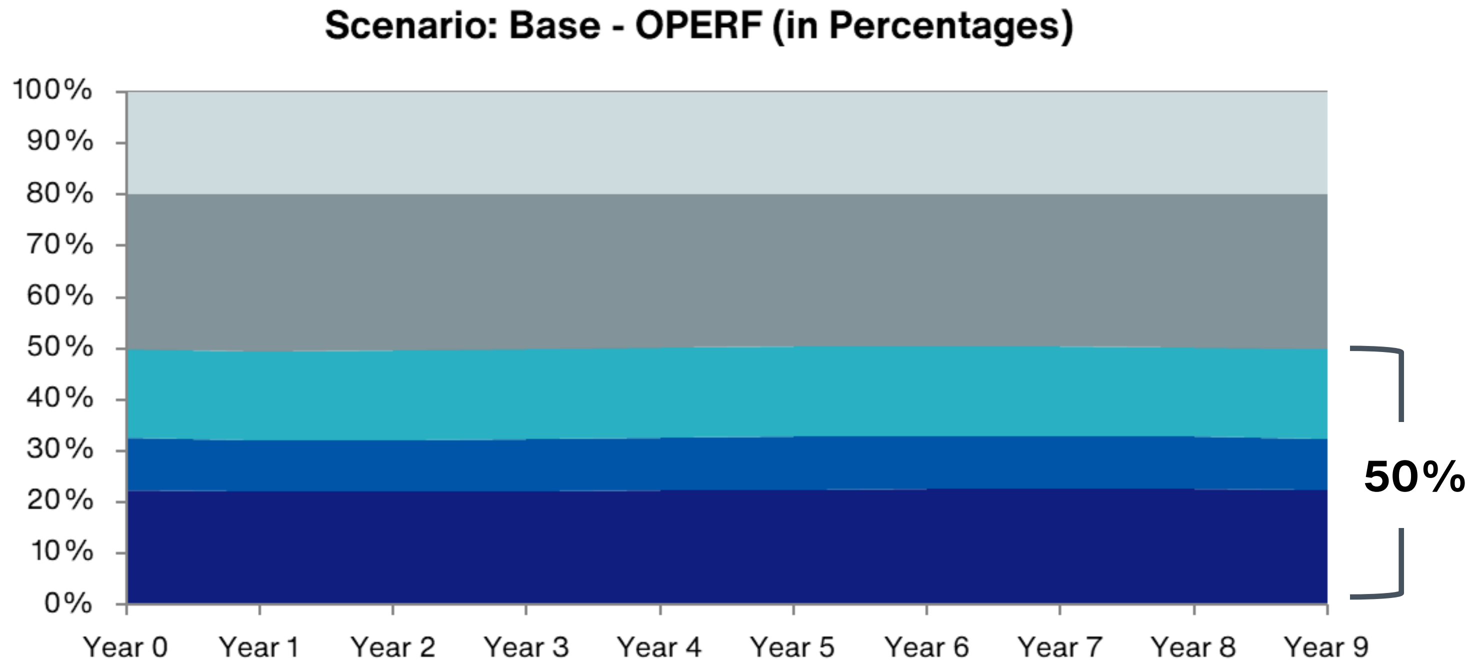
Liquidity Analysis

Option 1 (80% Return-Seeking)

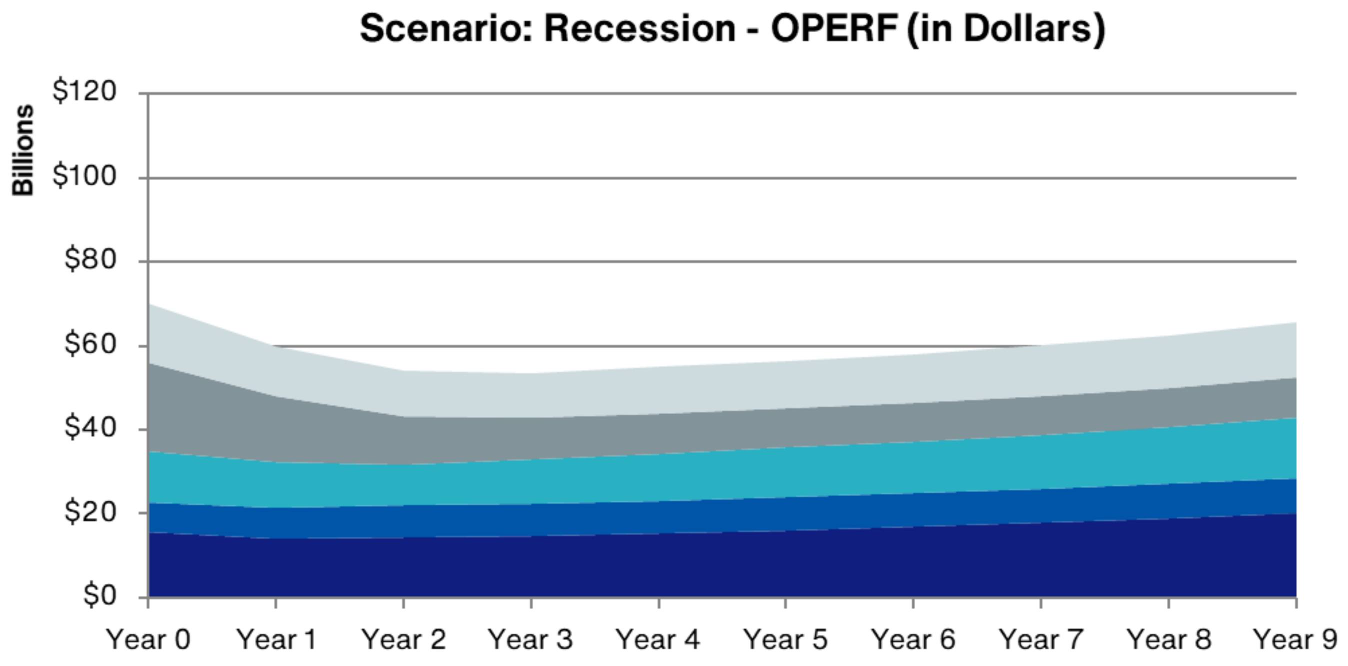
■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

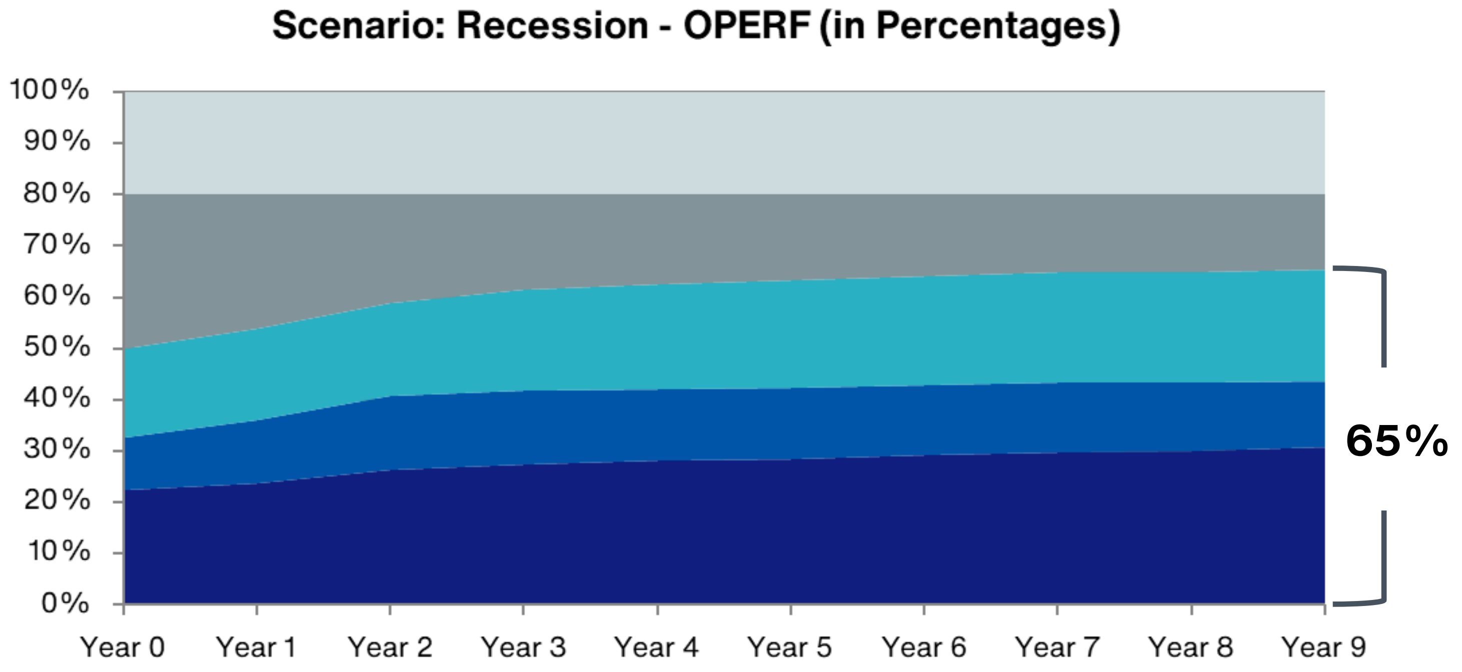
Base Case



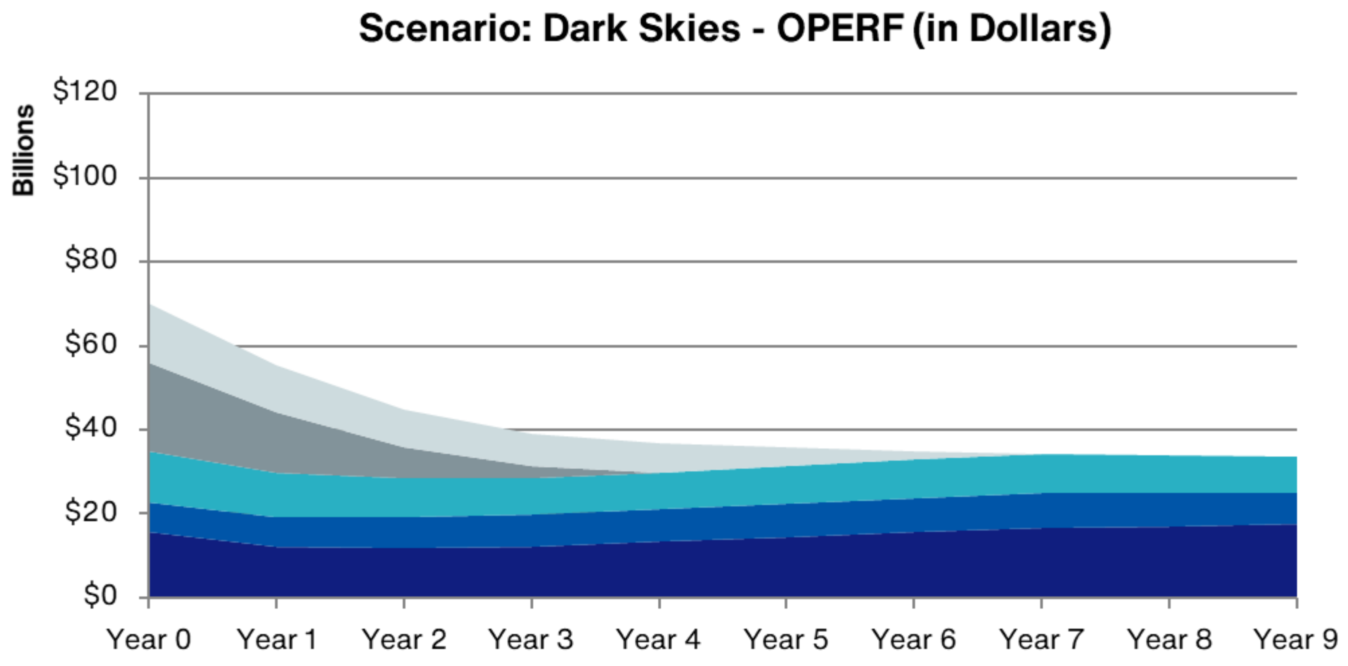


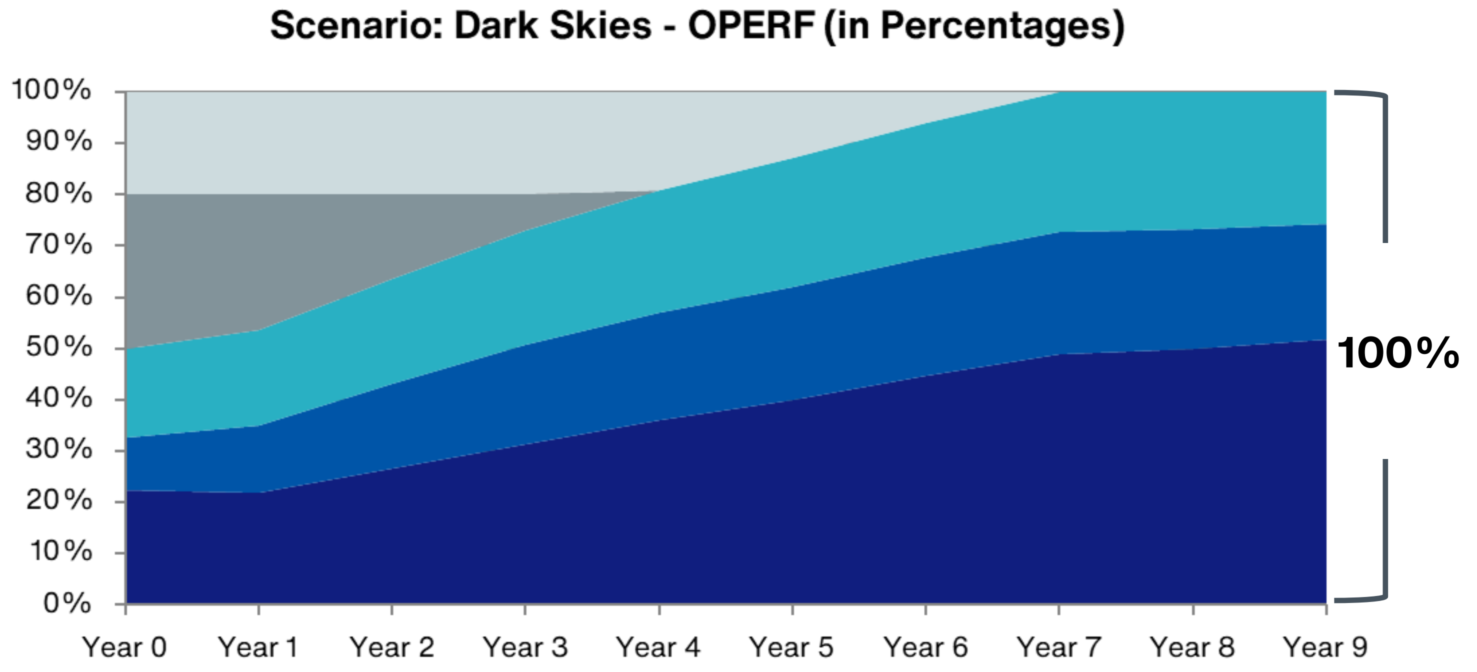
Recession





Dark Skies



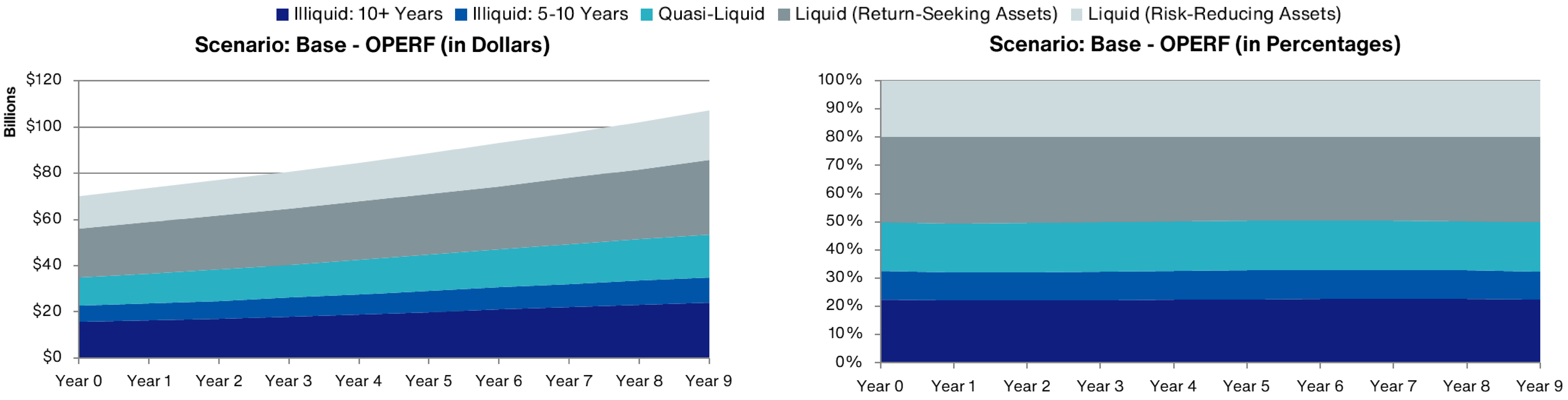


Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 1 (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Base Case economic scenario, assuming commitments are continued as expected



Key Takeaway:

- Total illiquid and quasi-liquid assets are projected to stay near 50% of the Plan and can be maintained near the target with no cash flow problems

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 1 (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Base Case economic scenario, assuming commitments are continued as expected

Asset Allocation	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	30	30	30	30	30	30	30	30	30	30
Total Liquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**
Quasi-Liquid	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Illiquid: 5-10 Year Lock-up	10	10	10	10	10	10	10	10	10	10
Illiquid: 10+ Year Lock-up	23	22	22	22	22	22	23	23	23	22
Total Quasi + Illiquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**

Other Metrics	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Funded Ratio (MVA / AL)	70%	72%	73%	75%	77%	80%	82%	84%	87%	90%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.1	$3.3	$3.8	$4.3	$4.5	$4.6	$4.7

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

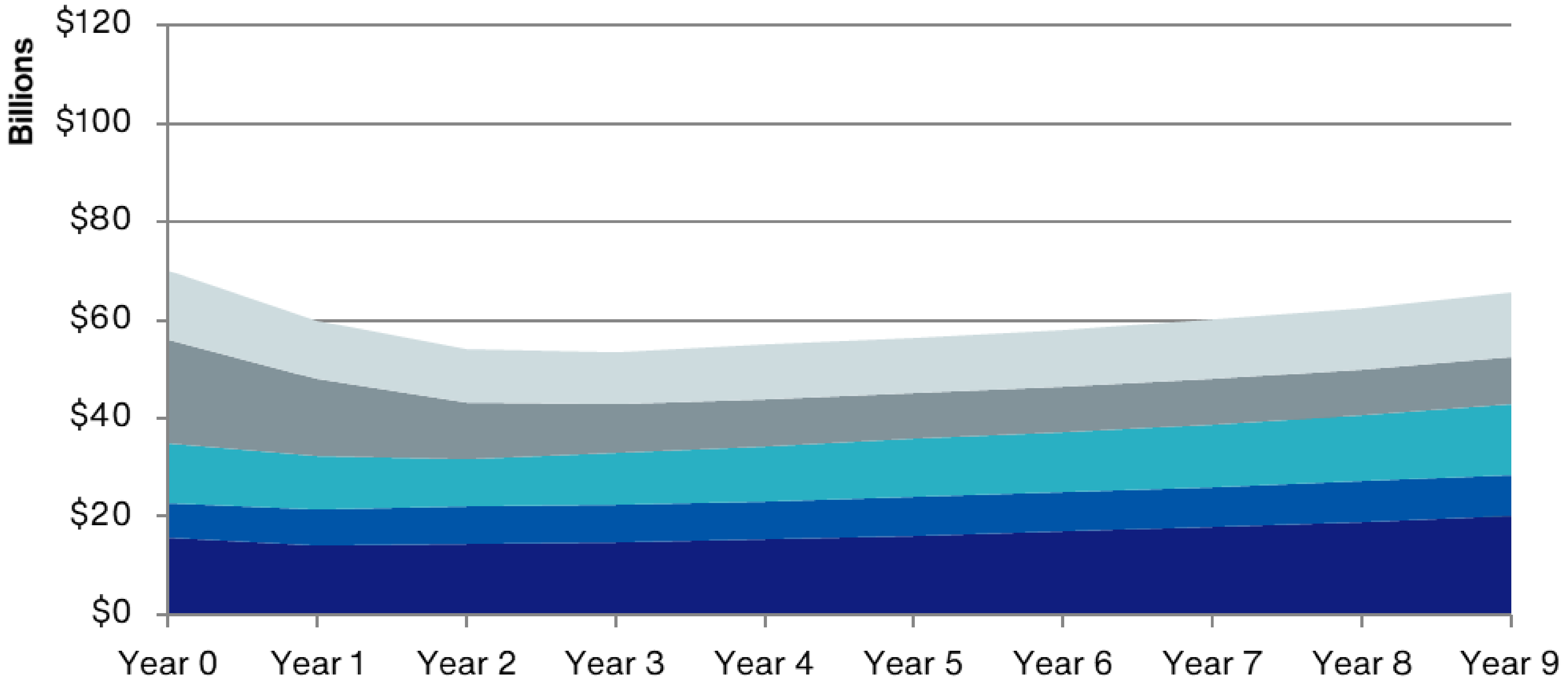
Liquidity Analysis

Recession economic scenario – Option 1 (80% R-S)

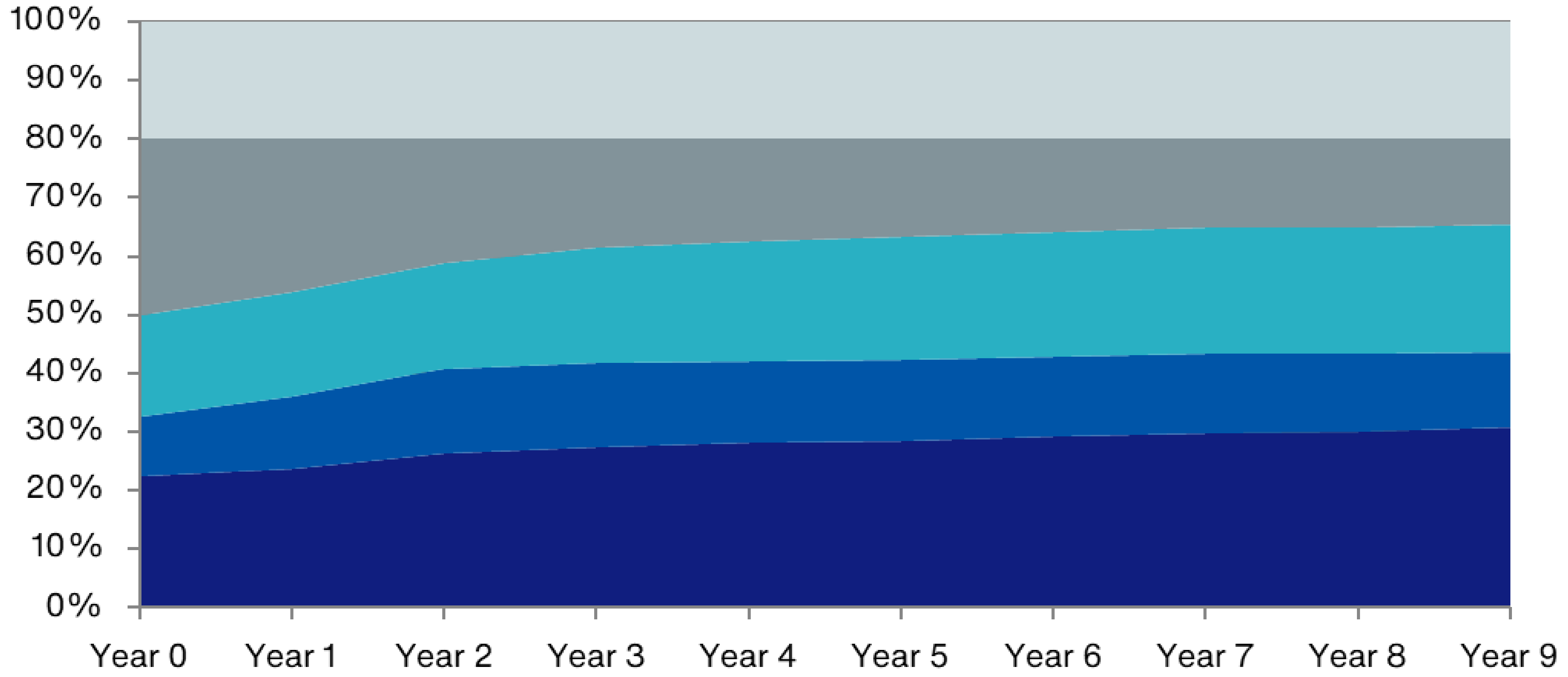
The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Recession economic scenario, assuming commitments are continued as expected

■ Illiquid: 10+ Years ■ Illiquid: 5-10 Years ■ Quasi-Liquid ■ Liquid (Return-Seeking Assets) ■ Liquid (Risk-Reducing Assets)

Scenario: Recession - OPERF (in Dollars)



Scenario: Recession - OPERF (in Percentages)



Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but recessionary markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 65% of the Plan due to the shrinking market value of the total Plan in this scenario
- There would not be a concern with the ability to pay benefits
- The OIC may need to redeem some quasi-liquid assets to stay close to its target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Recession economic scenario – Option 1 (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Recession economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Liquid Return-Seeking	30	26	21	18	18	17	16	15	15	15
Total Liquid	**50%**	**46%**	**41%**	**38%**	**38%**	**37%**	**36%**	**35%**	**35%**	**35%**
Quasi-Liquid	18%	18%	18%	20%	20%	21%	21%	21%	22%	22%
Illiquid: 5-10 Year Lock-up	10	12	14	14	14	14	14	14	13	13
Illiquid: 10+ Year Lock-up	23	24	26	27	28	29	29	30	30	31
Total Quasi + Illiquid	**50%**	**54%**	**59%**	**62%**	**62%**	**63%**	**64%**	**65%**	**65%**	**65%**

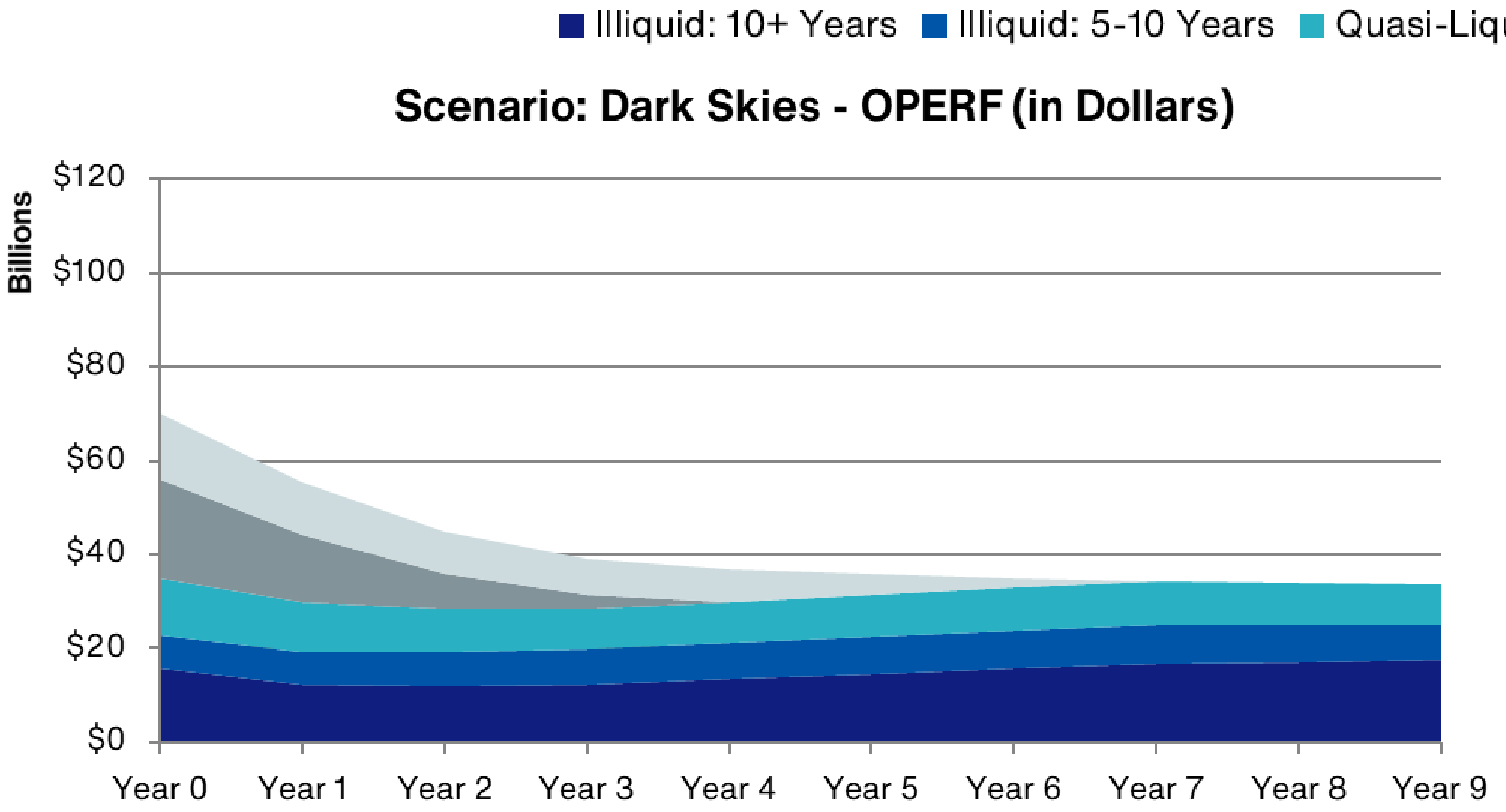
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	58%	52%	51%	51%	52%	52%	53%	55%	57%
Total Contribution Amt (in $B)	$2.5	$2.7	$3.0	$3.5	$4.1	$4.7	$5.3	$5.8	$6.3	$6.7

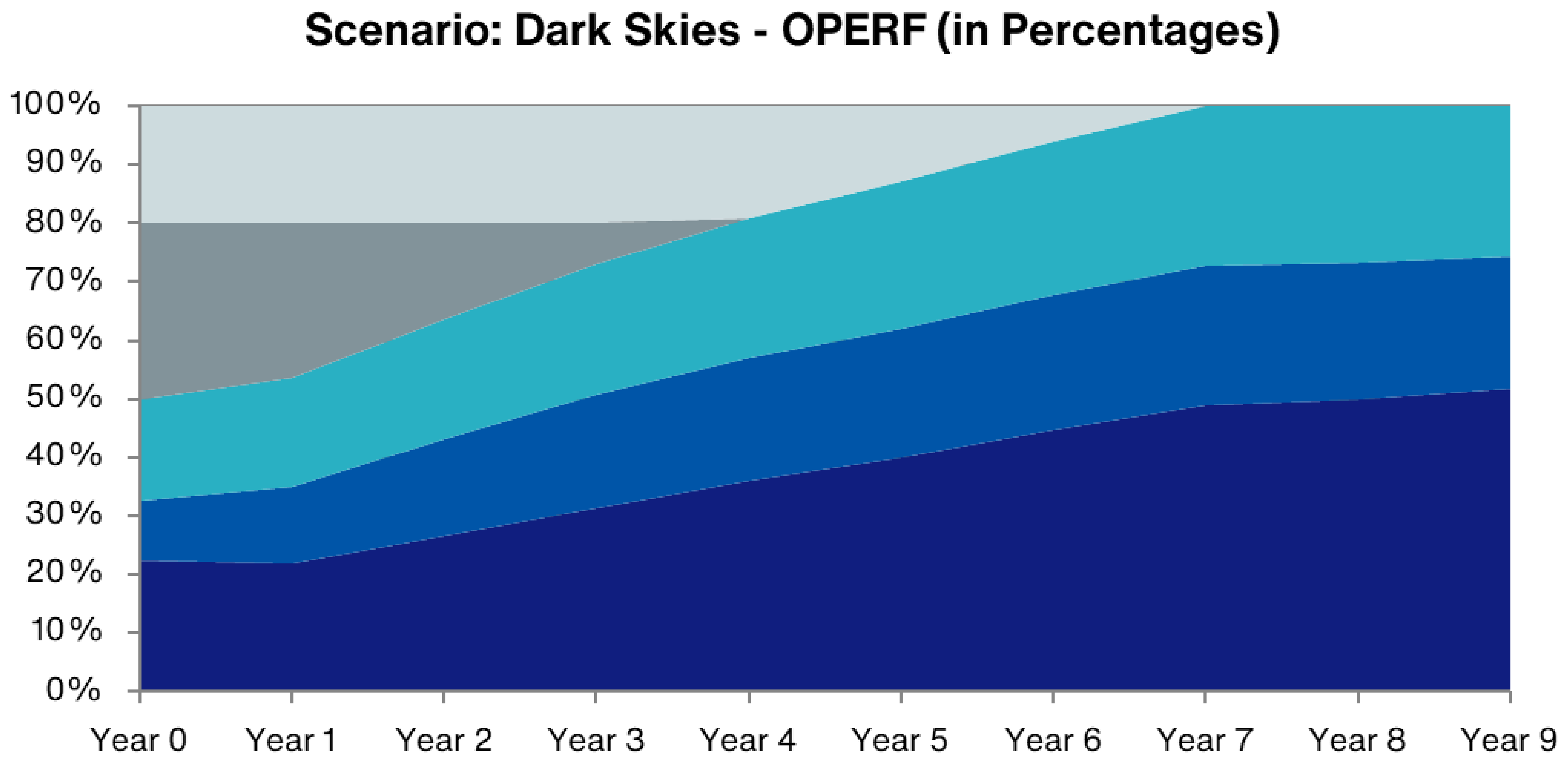
Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Dark Skies economic scenario – Option 1 (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected





Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but subpar markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 100% of the Plan due to the shrinking market value of the total Plan in this scenario
- In this scenario, the OIC may want to pare back future commitments to stay closer to the target allocations; however, the allocation would still be significantly different from the target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Dark Skies economic scenario – Option 1 (80% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 1 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

Asset Allocation	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Risk-Reducing Assets	20%	20%	20%	20%	19%	13%	6%	0%	0%	0%
Liquid Return-Seeking	30	26	16	7	0	0	0	0	0	0
Total Liquid	**50%**	**46%**	**36%**	**27%**	**19%**	**13%**	**6%**	**0%**	**0%**	**0%**
Quasi-Liquid	18%	19%	21%	22%	24%	25%	26%	27%	27%	26%
Illiquid: 5-10 Year Lock-up	10	13	16	19	21	22	23	24	23	23
Illiquid: 10+ Year Lock-up	23	22	27	31	36	40	45	49	50	52
Total Quasi + Illiquid	**50%**	**54%**	**64%**	**73%**	**81%**	**87%**	**94%**	**100%**	**100%**	**100%**

Other Metrics	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Funded Ratio (MVA / AL)	70%	54%	43%	37%	35%	33%	32%	31%	30%	30%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.6	$4.2	$4.7	$5.1	$5.5	$5.9	$6.4

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Option 2 (75% R-S)

Section: Appendix

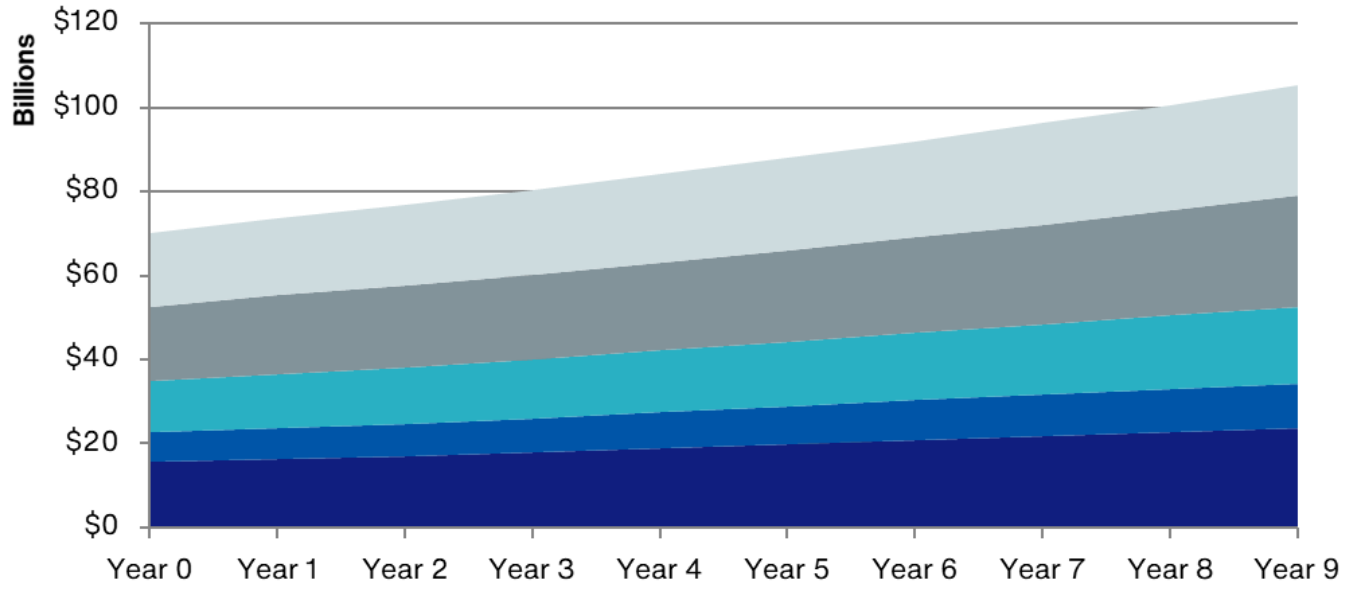
Liquidity Analysis

Option 2 (75% Return-Seeking)

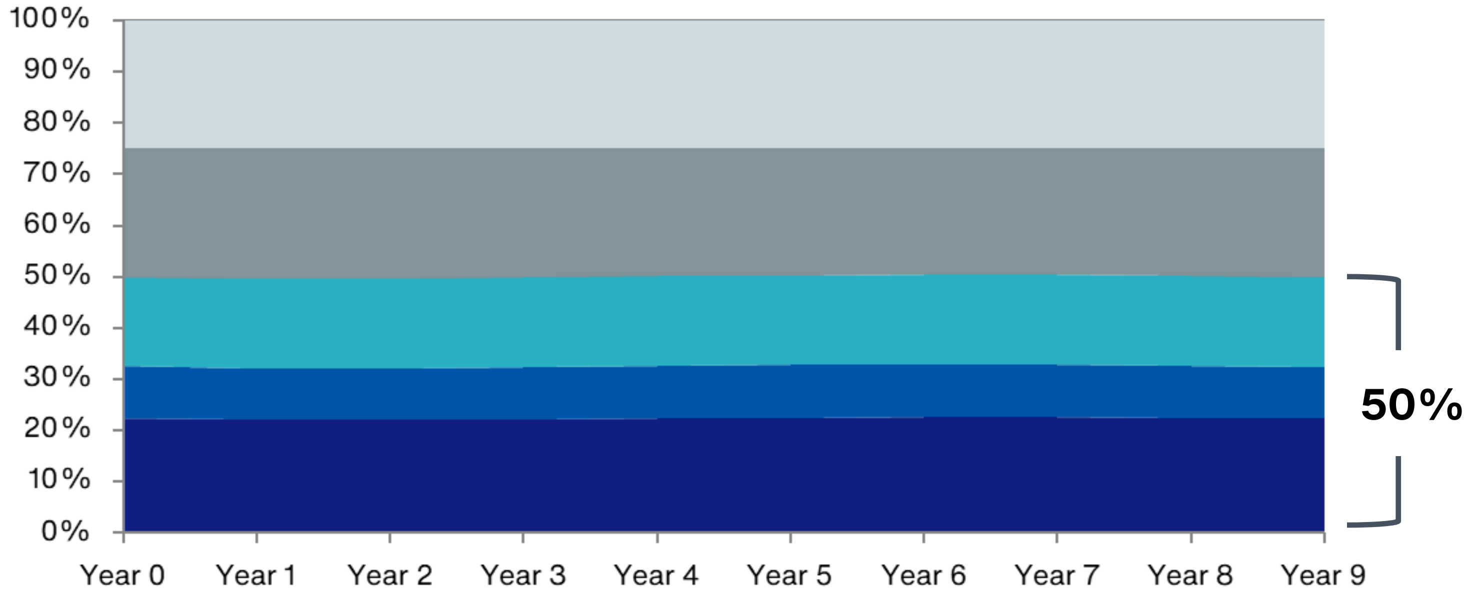
Illiquid: 10+ Years | Illiquid: 5-10 Years | Quasi-Liquid | Liquid (Return-Seeking Assets) | Liquid (Risk-Reducing Assets)

Base Case

Scenario: Base - OPERF (in Dollars)

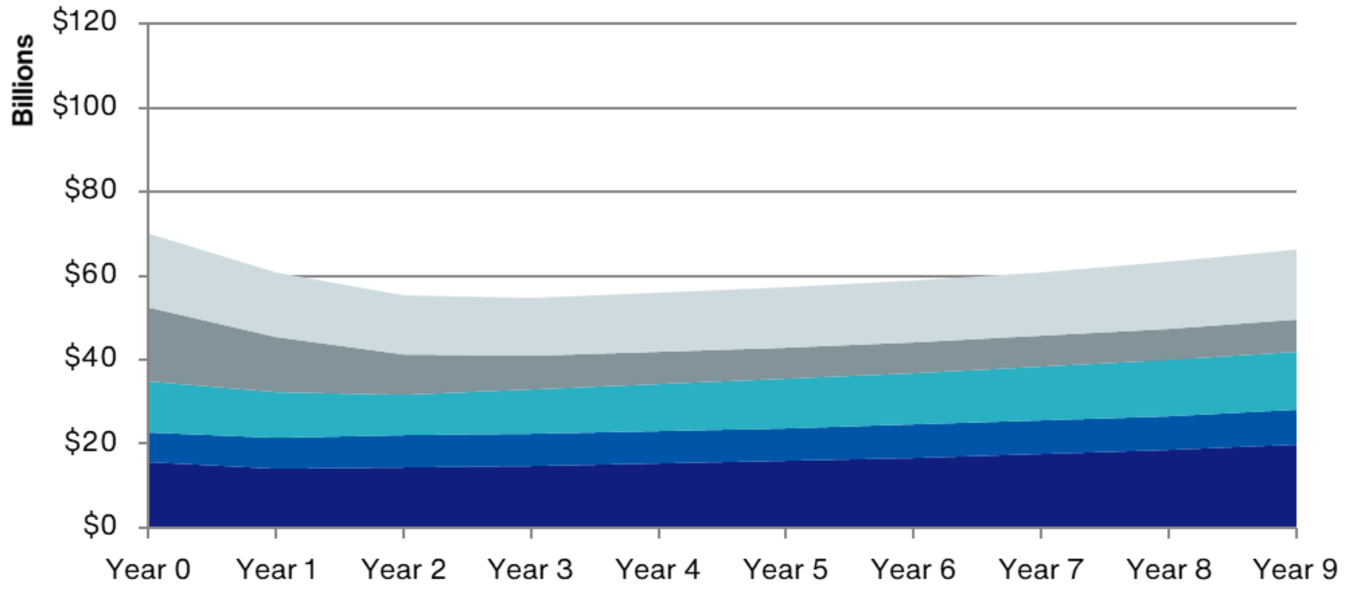


Scenario: Base - OPERF (in Percentages)

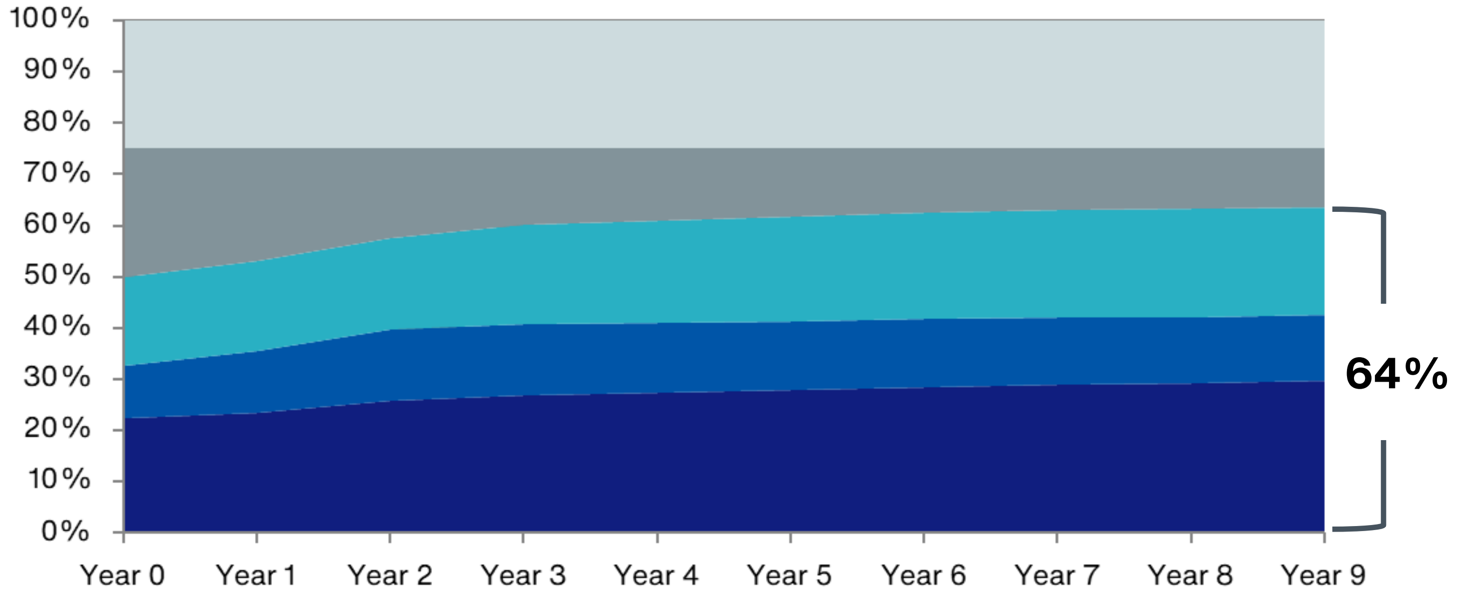


Recession

Scenario: Recession - OPERF (in Dollars)

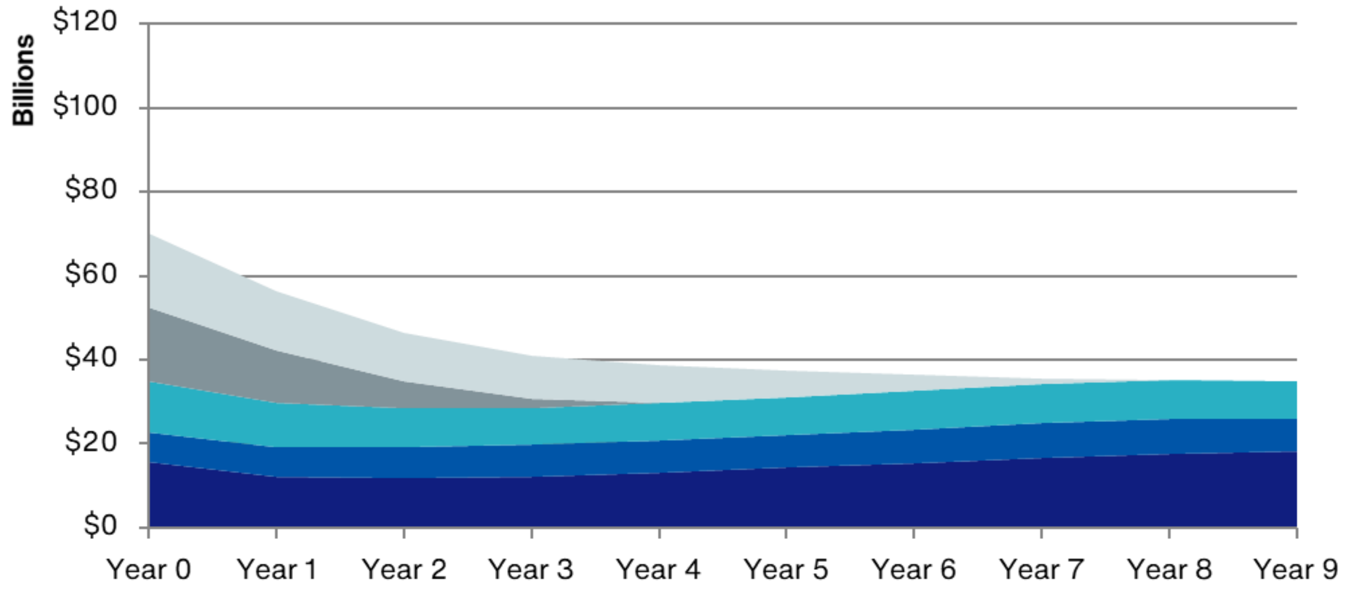


Scenario: Recession - OPERF (in Percentages)

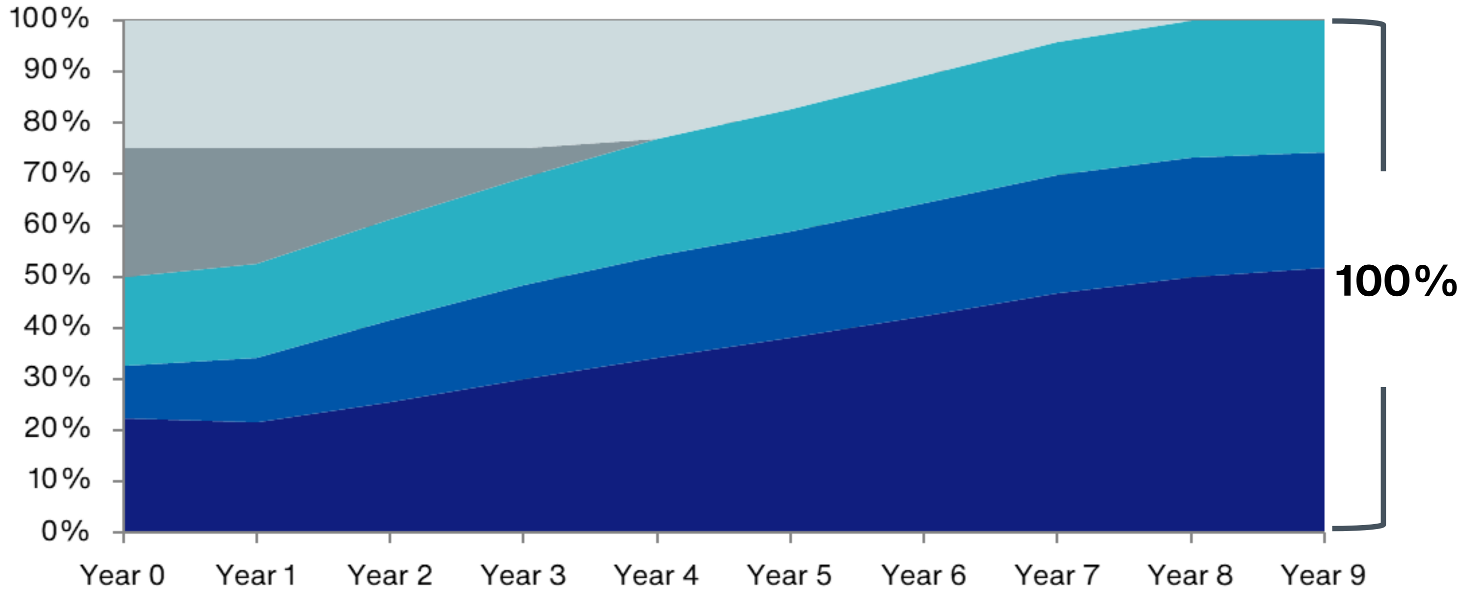


Dark Skies

Scenario: Dark Skies - OPERF (in Dollars)



Scenario: Dark Skies - OPERF (in Percentages)

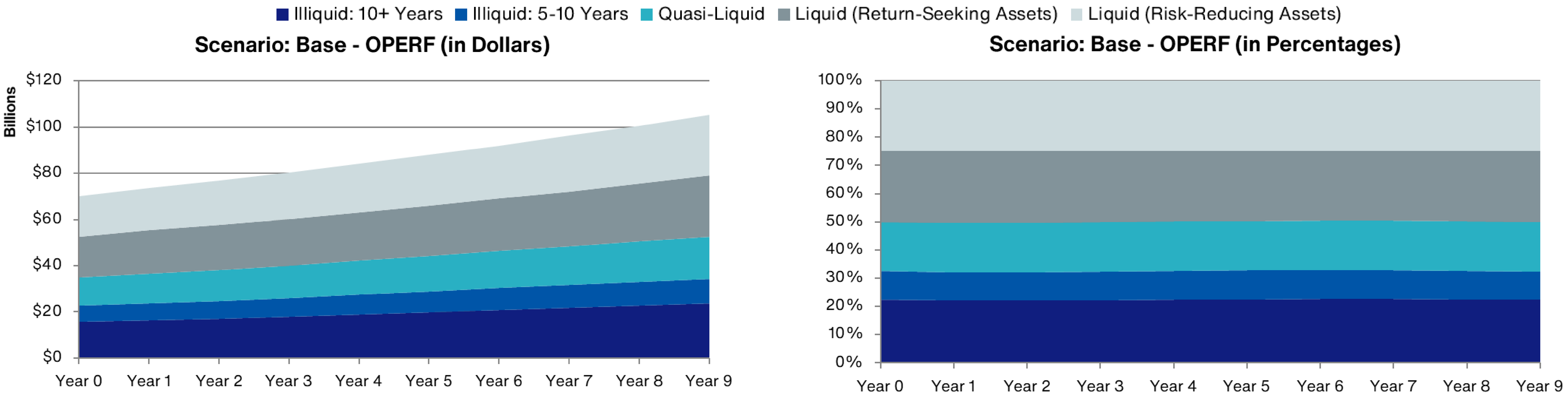


Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 2 (75% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Base Case economic scenario, assuming commitments are continued as expected



Key Takeaway:

- Total illiquid and quasi-liquid assets are projected to stay near 50% of the Plan and can be maintained near the target with no cash flow problems

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 2 (75% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Base Case economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Liquid Return-Seeking	25	25	25	25	25	25	25	25	25	25
Total Liquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**
Quasi-Liquid	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Illiquid: 5-10 Year Lock-up	10	10	10	10	10	10	10	10	10	10
Illiquid: 10+ Year Lock-up	23	22	22	22	22	22	23	23	22	22
Total Quasi + Illiquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**

Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	72%	73%	75%	77%	79%	81%	83%	86%	88%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.1	$3.3	$3.8	$4.3	$4.5	$4.6	$4.7

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

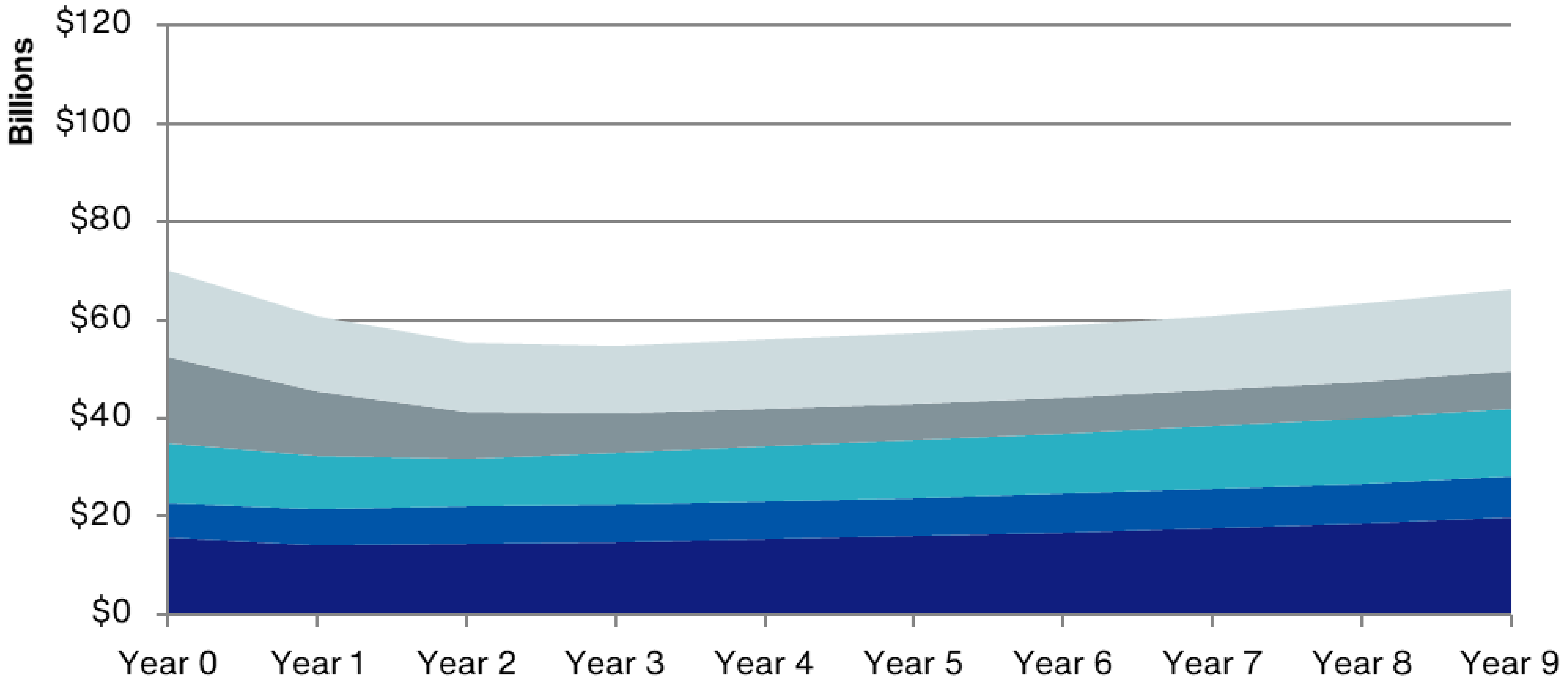
Liquidity Analysis

Recession economic scenario – Option 2 (75% R-S)

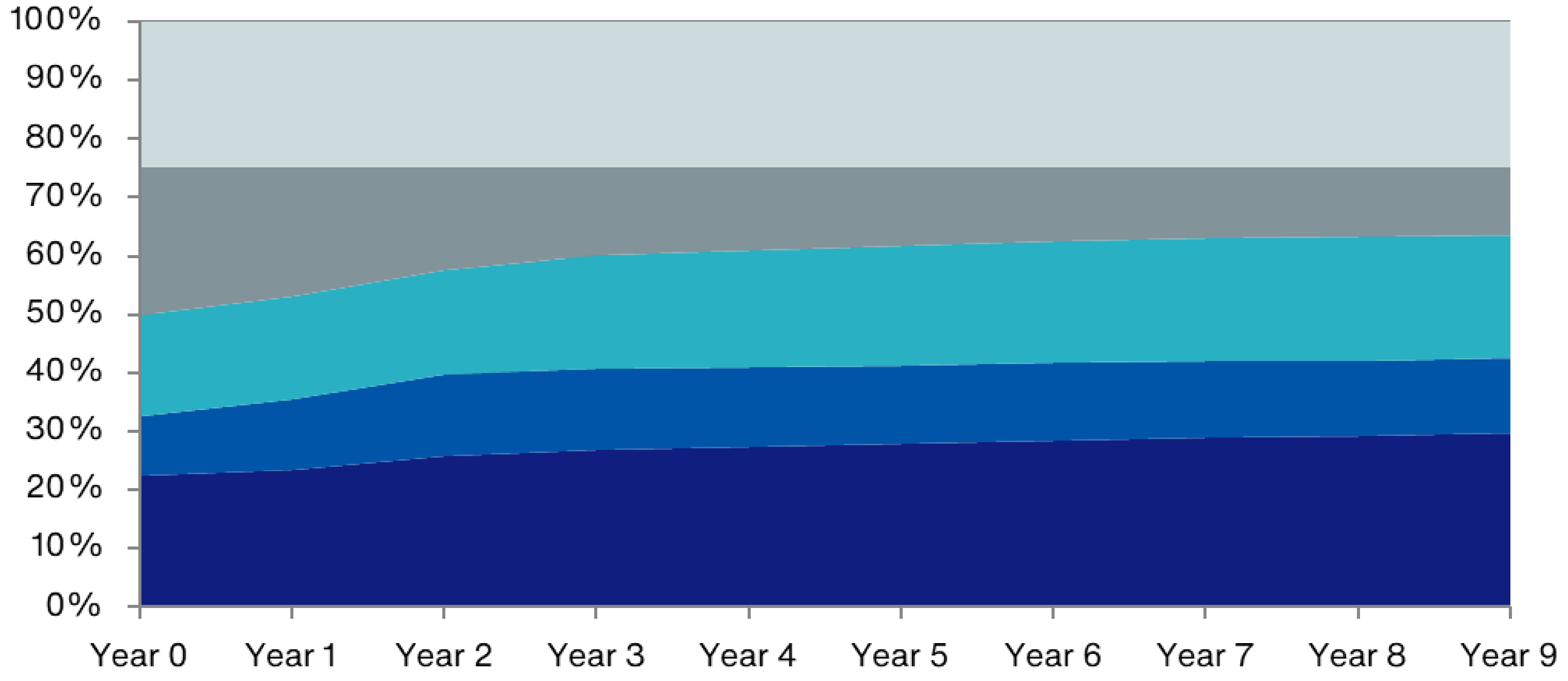
The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Recession economic scenario, assuming commitments are continued as expected

Illiquid: 10+ Years | Illiquid: 5-10 Years | Quasi-Liquid | Liquid (Return-Seeking Assets) | Liquid (Risk-Reducing Assets)

Scenario: Recession - OPERF (in Dollars)



Scenario: Recession - OPERF (in Percentages)



Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but recessionary markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 64% of the Plan due to the shrinking market value of the total Plan in this scenario
- There would not be a concern with the ability to pay benefits
- The OIC may need to redeem some quasi-liquid assets to stay close to its target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Recession economic scenario – Option 2 (75% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Recession economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Liquid Return-Seeking	25	22	18	15	14	13	13	12	12	11
Total Liquid	**50%**	**47%**	**43%**	**40%**	**39%**	**38%**	**38%**	**37%**	**37%**	**36%**
Quasi-Liquid	18%	18%	18%	19%	20%	20%	21%	21%	21%	21%
Illiquid: 5-10 Year Lock-up	10	12	14	14	14	14	13	13	13	13
Illiquid: 10+ Year Lock-up	23	23	26	27	27	28	28	29	29	30
Total Quasi + Illiquid	**50%**	**53%**	**57%**	**60%**	**61%**	**62%**	**62%**	**63%**	**63%**	**64%**

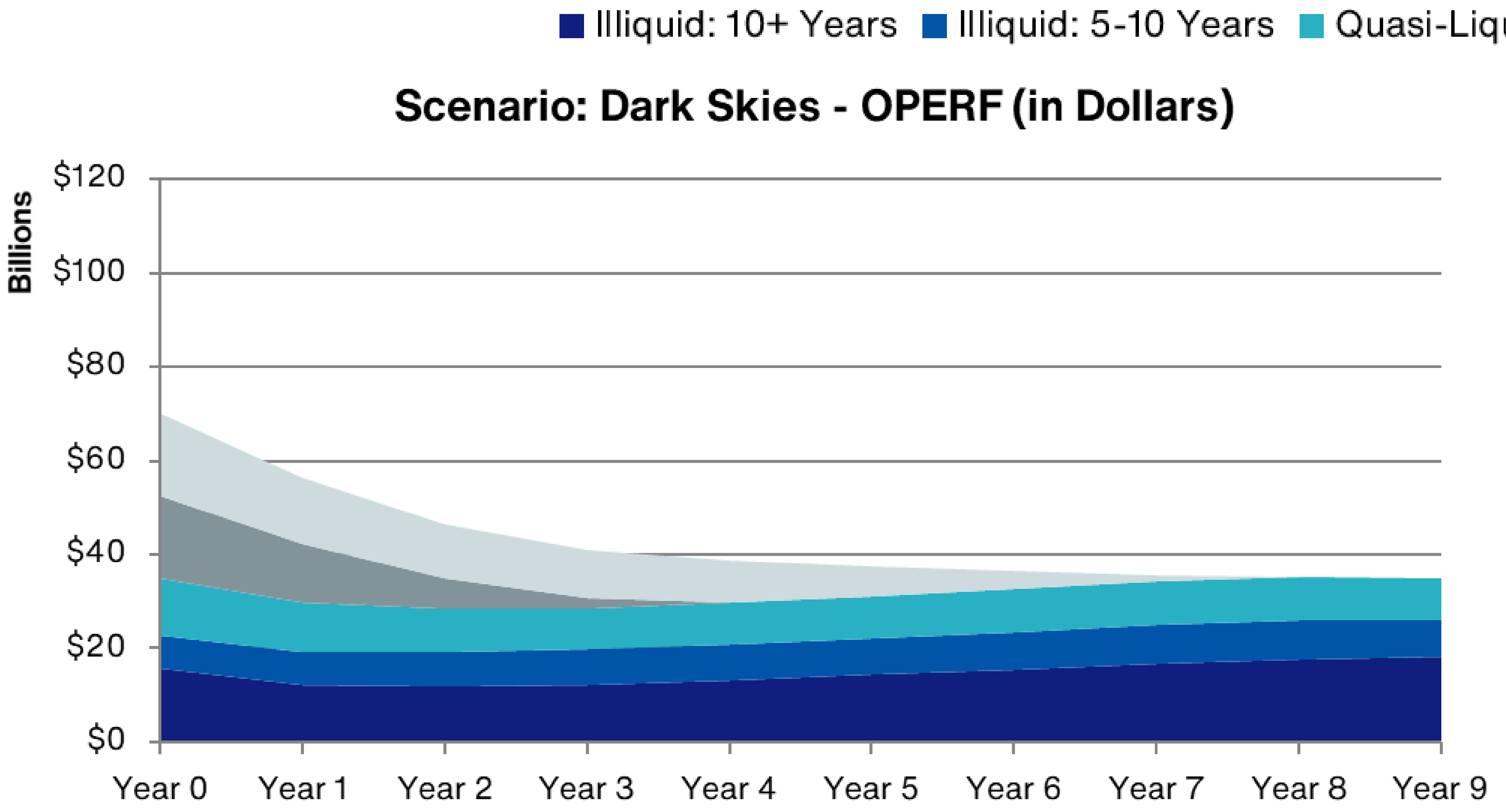
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	59%	53%	52%	52%	52%	53%	54%	56%	57%
Total Contribution Amt (in $B)	$2.5	$2.7	$3.0	$3.5	$4.1	$4.7	$5.2	$5.8	$6.3	$6.7

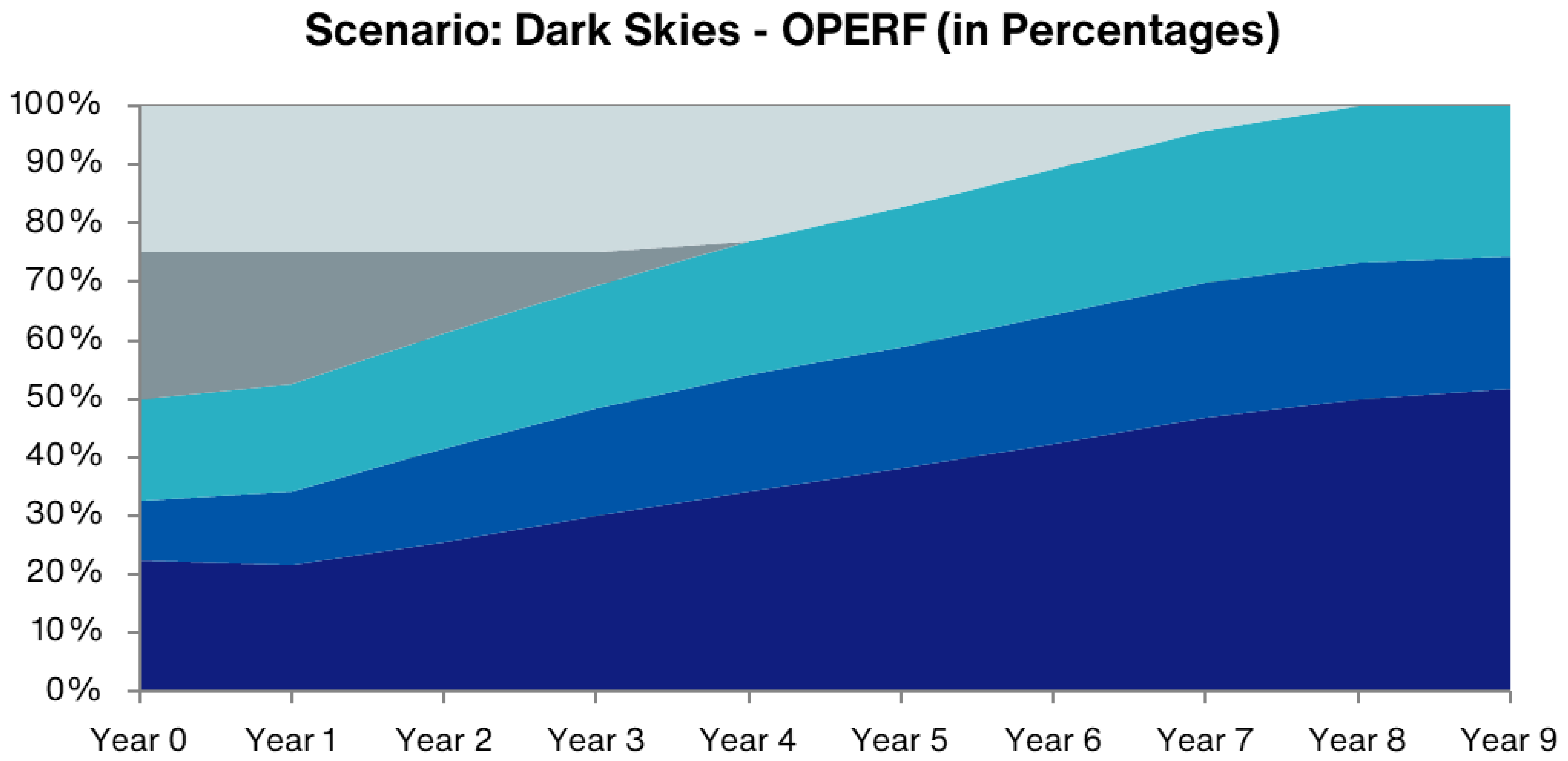
Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Dark Skies economic scenario – Option 2 (75% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected





Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but subpar markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 100% of the Plan due to the shrinking market value of the total Plan in this scenario
- In this scenario, the OIC may want to pare back future commitments to stay closer to the target allocations; however, the allocation would still be significantly different from the target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Dark Skies economic scenario – Option 2 (75% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 2 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

Asset Allocation	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Risk-Reducing Assets	25%	25%	25%	25%	23%	17%	11%	4%	0%	0%
Liquid Return-Seeking	25	22	14	6	0	0	0	0	0	0
Total Liquid	**50%**	**47%**	**39%**	**31%**	**23%**	**17%**	**11%**	**4%**	**0%**	**0%**
Quasi-Liquid	18%	18%	20%	21%	23%	24%	25%	26%	27%	26%
Illiquid: 5-10 Year Lock-up	10	13	16	18	20	21	22	23	24	23
Illiquid: 10+ Year Lock-up	23	22	26	30	34	38	42	47	50	52
Total Quasi + Illiquid	**50%**	**53%**	**61%**	**69%**	**77%**	**83%**	**89%**	**96%**	**100%**	**100%**

Other Metrics	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Funded Ratio (MVA / AL)	70%	55%	45%	39%	36%	35%	33%	32%	32%	31%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.4	$4.0	$4.6	$5.1	$5.5	$5.9	$6.4

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Option 3 (70% R-S)

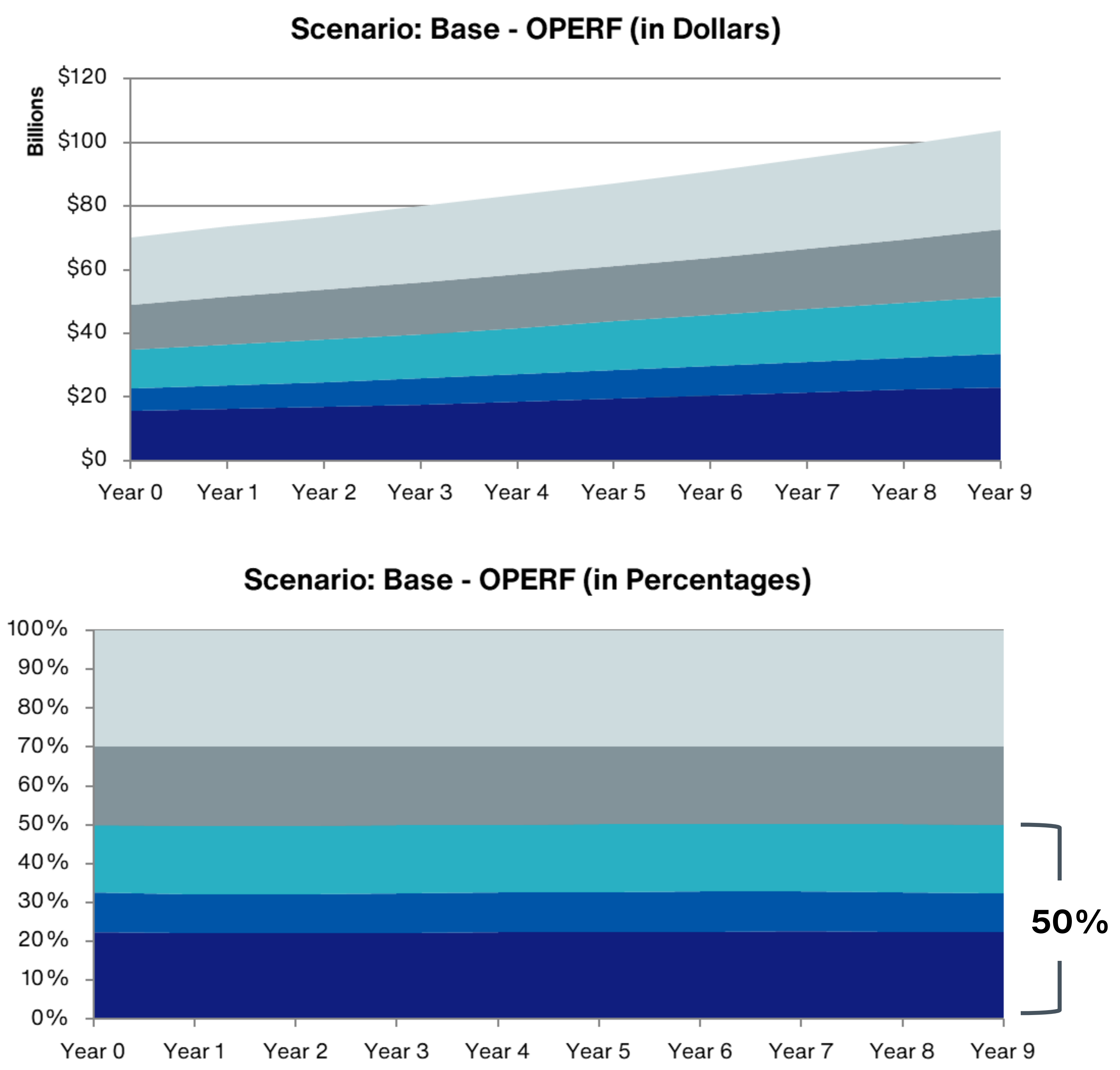
Section: Appendix

Liquidity Analysis

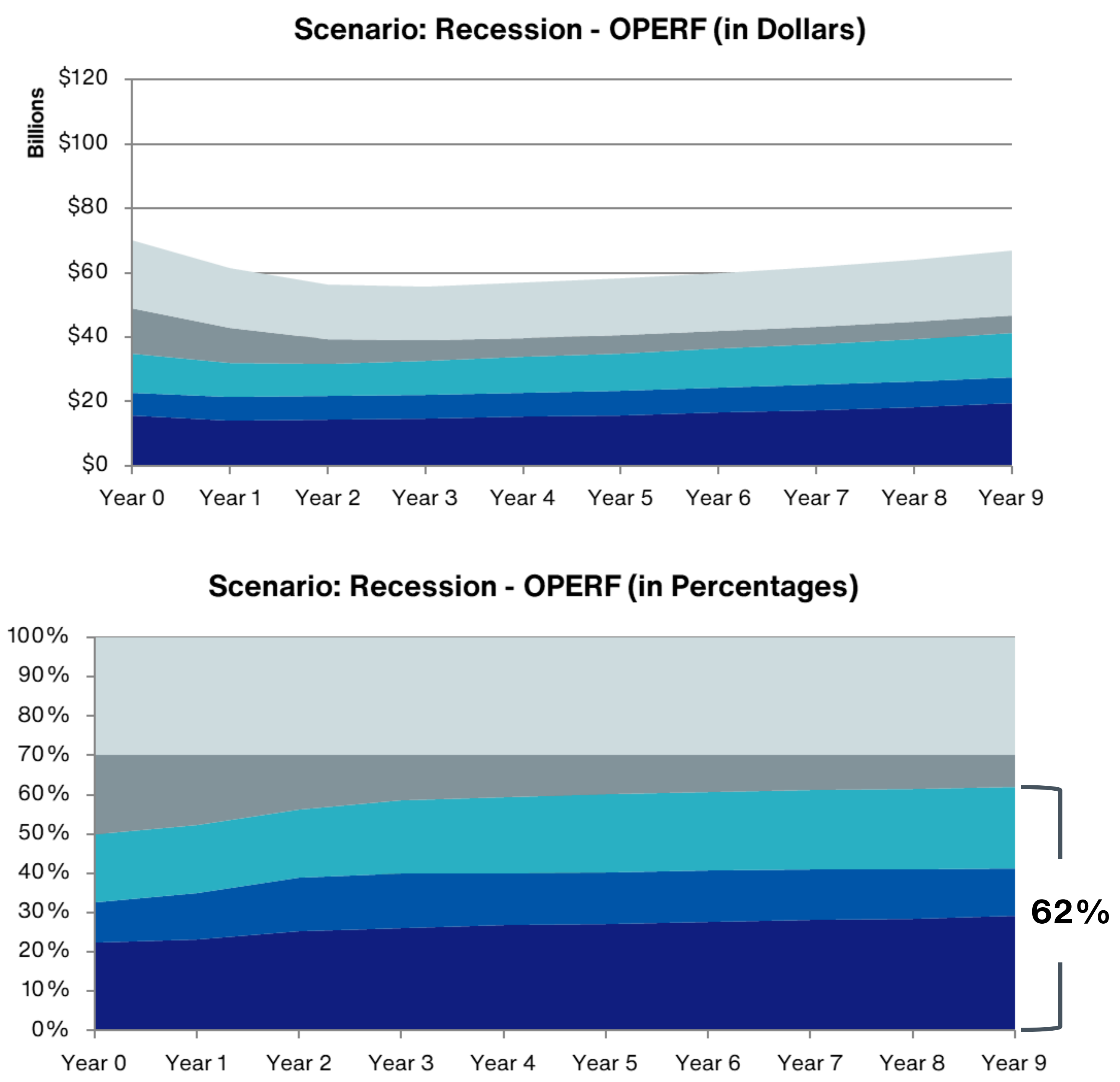
Option 3 (70% Return-Seeking)

Illiquid: 10+ Years | Illiquid: 5-10 Years | Quasi-Liquid | Liquid (Return-Seeking Assets) | Liquid (Risk-Reducing Assets)

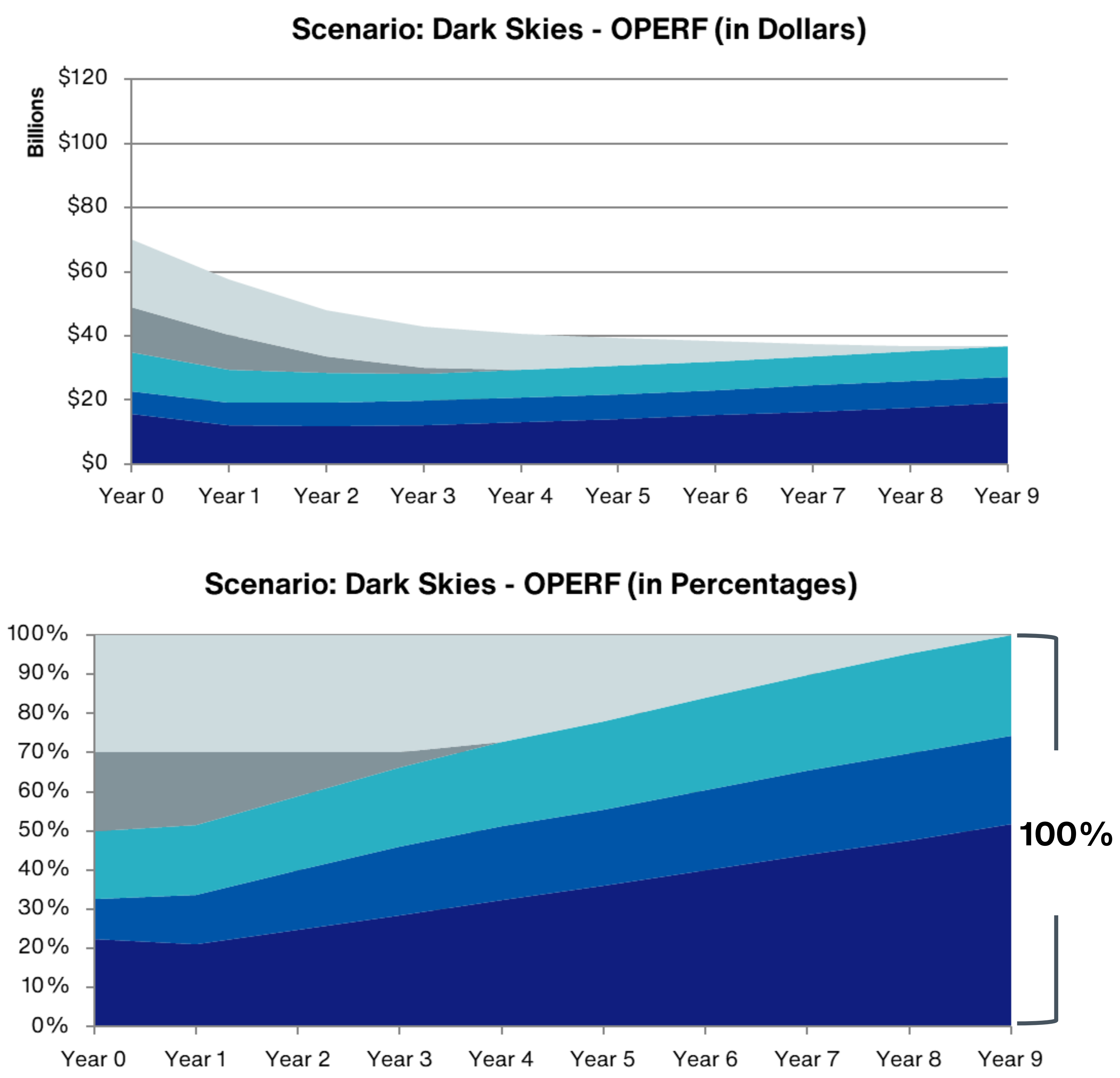
Base Case



Recession



Dark Skies

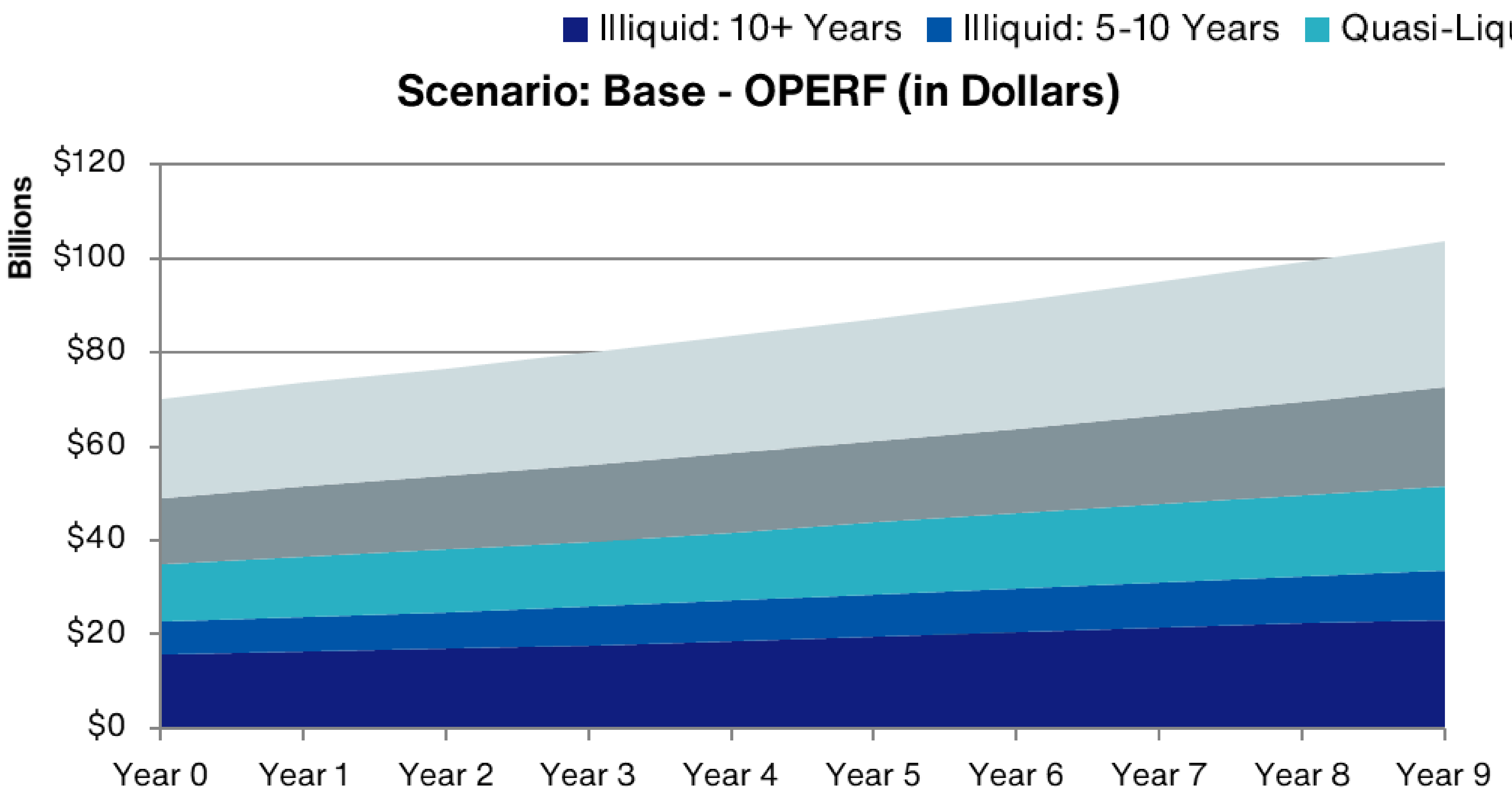


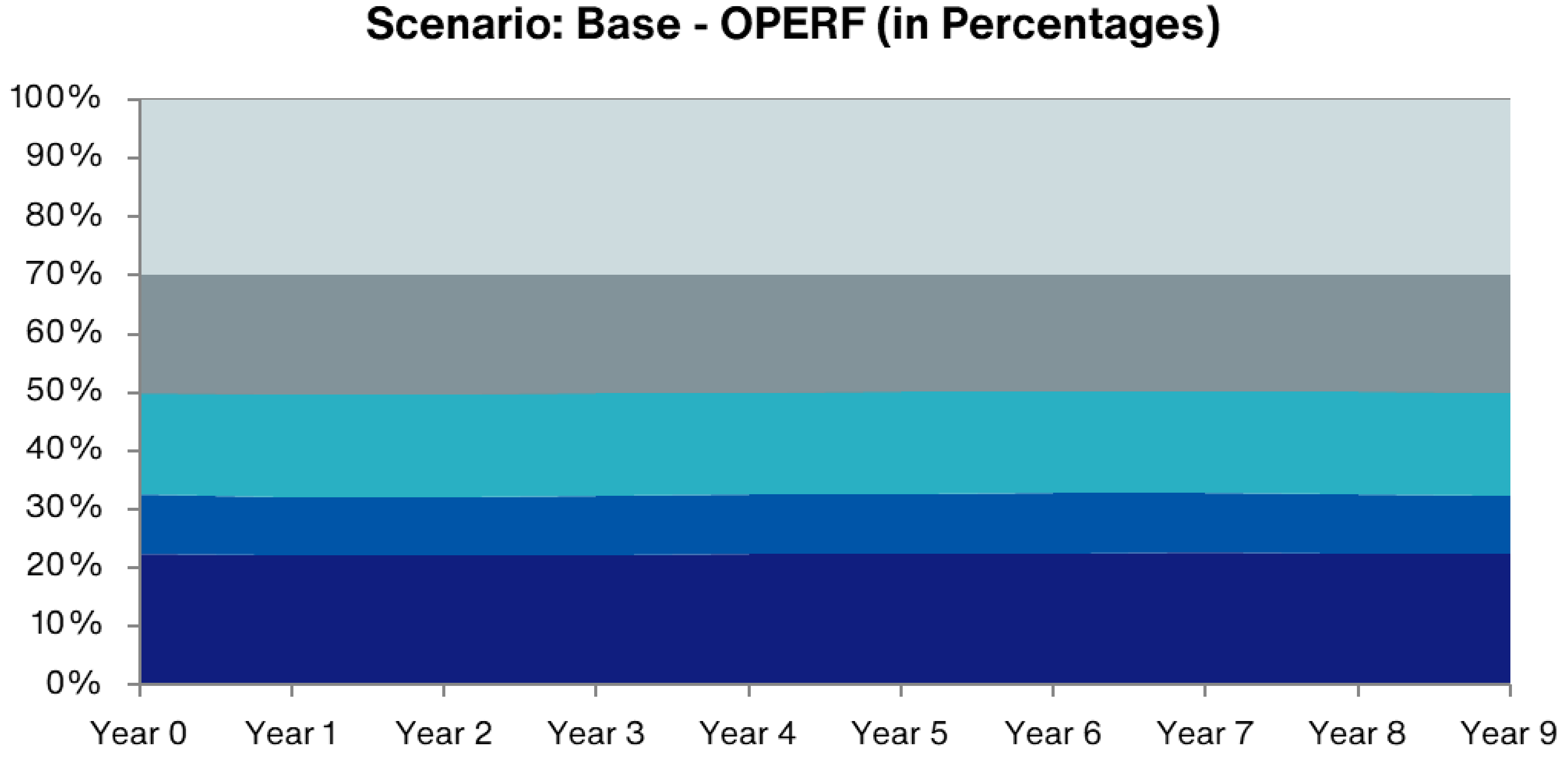
Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Base Case economic scenario, assuming commitments are continued as expected





Key Takeaway:

- Total illiquid and quasi-liquid assets are projected to stay near 50% of the Plan and can be maintained near the target with no cash flow problems

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Base Case economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Base Case economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Liquid Return-Seeking	20	20	20	20	20	20	20	20	20	20
Total Liquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**
Quasi-Liquid	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Illiquid: 5-10 Year Lock-up	10	10	10	10	10	10	10	10	10	10
Illiquid: 10+ Year Lock-up	23	22	22	22	22	22	23	23	22	22
Total Quasi + Illiquid	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**	**50%**

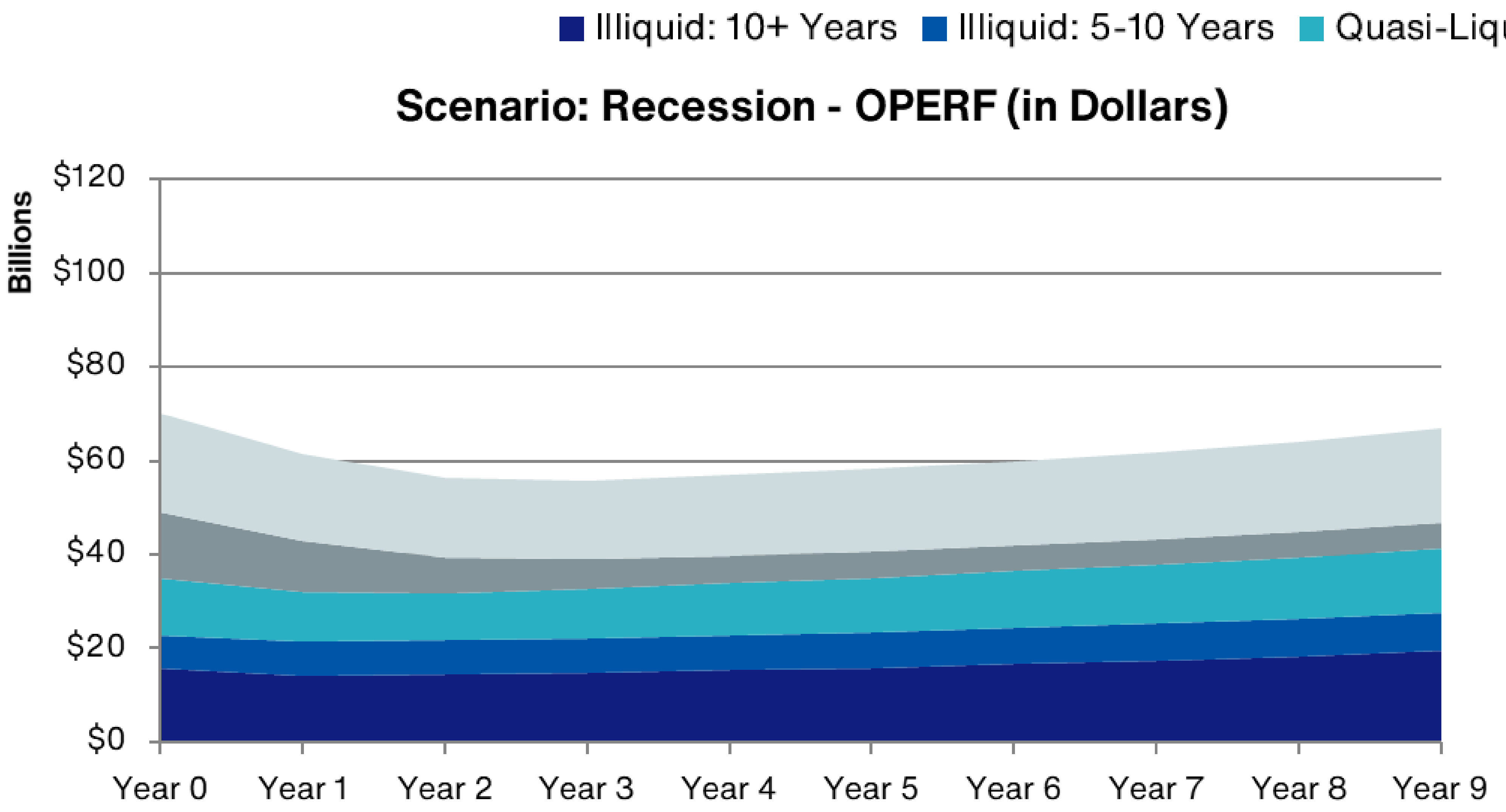
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	72%	73%	75%	76%	78%	80%	82%	84%	87%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.1	$3.3	$3.8	$4.3	$4.5	$4.6	$4.7

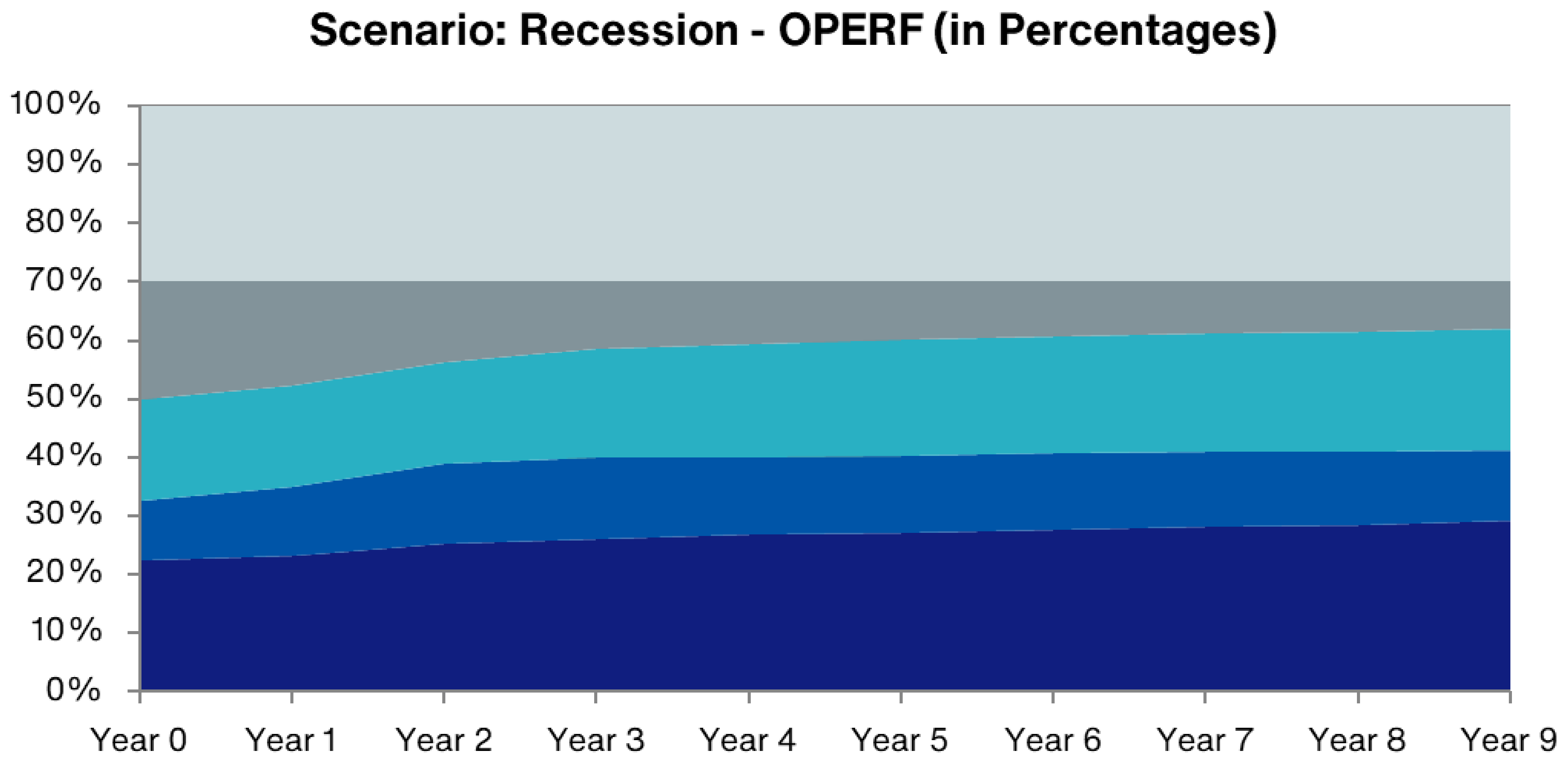
Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Recession economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Recession economic scenario, assuming commitments are continued as expected





Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but recessionary markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 62% of the Plan due to the shrinking market value of the total Plan in this scenario
- There would not be a concern with the ability to pay benefits
- The OIC may need to redeem some quasi-liquid assets to stay close to its target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Recession economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Recession economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Liquid Return-Seeking	20	18	14	11	11	10	9	9	9	8
Total Liquid	**50%**	**48%**	**44%**	**41%**	**41%**	**40%**	**39%**	**39%**	**39%**	**38%**
Quasi-Liquid	18%	17%	17%	19%	19%	20%	20%	20%	21%	21%
Illiquid: 5-10 Year Lock-up	10	12	14	14	13	13	13	13	13	12
Illiquid: 10+ Year Lock-up	23	23	25	26	27	27	28	28	28	29
Total Quasi + Illiquid	**50%**	**52%**	**56%**	**59%**	**59%**	**60%**	**61%**	**61%**	**61%**	**62%**

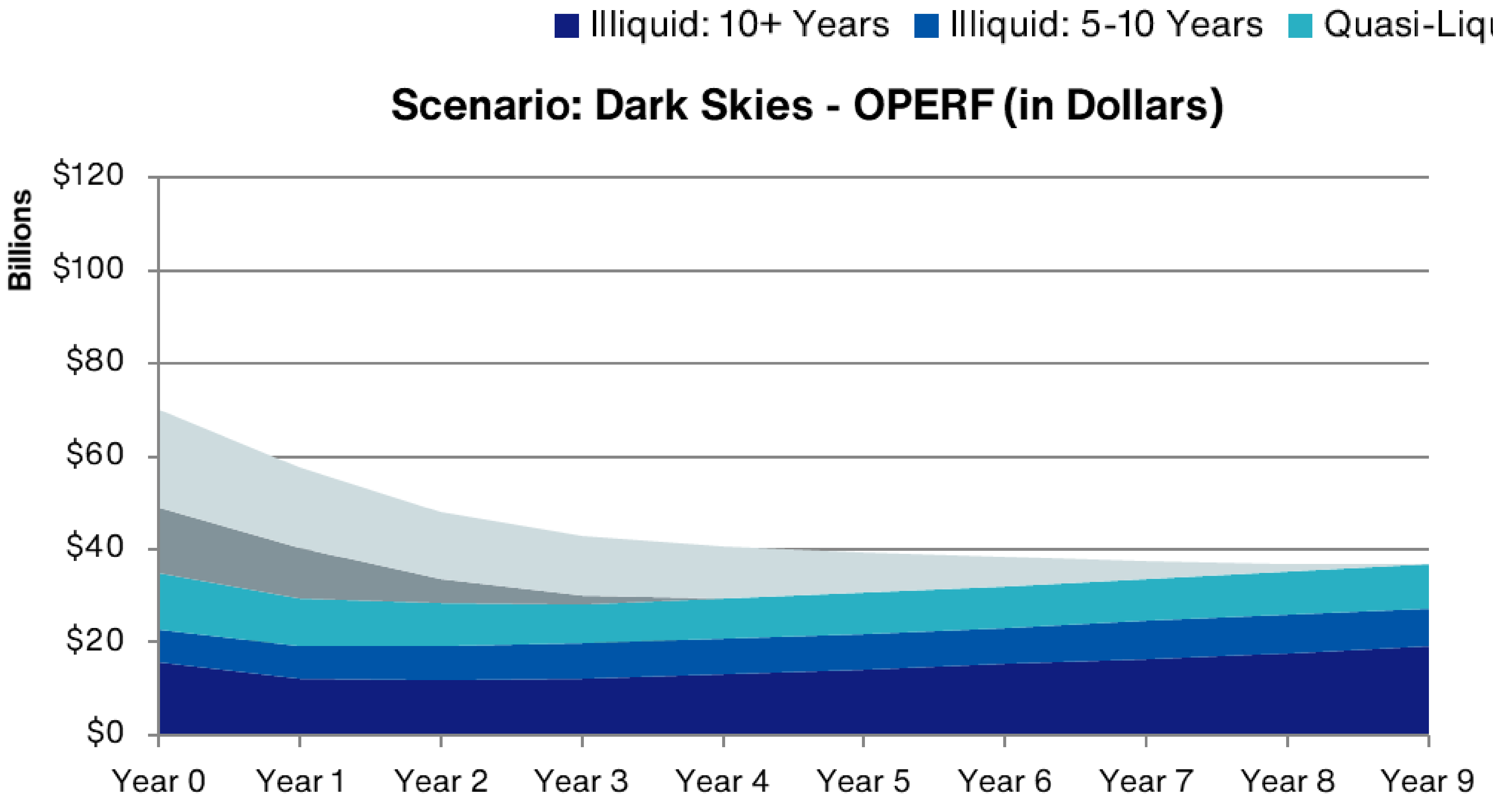
Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	60%	54%	53%	53%	53%	54%	55%	56%	58%
Total Contribution Amt (in $B)	$2.5	$2.7	$3.0	$3.5	$4.1	$4.7	$5.2	$5.8	$6.3	$6.7

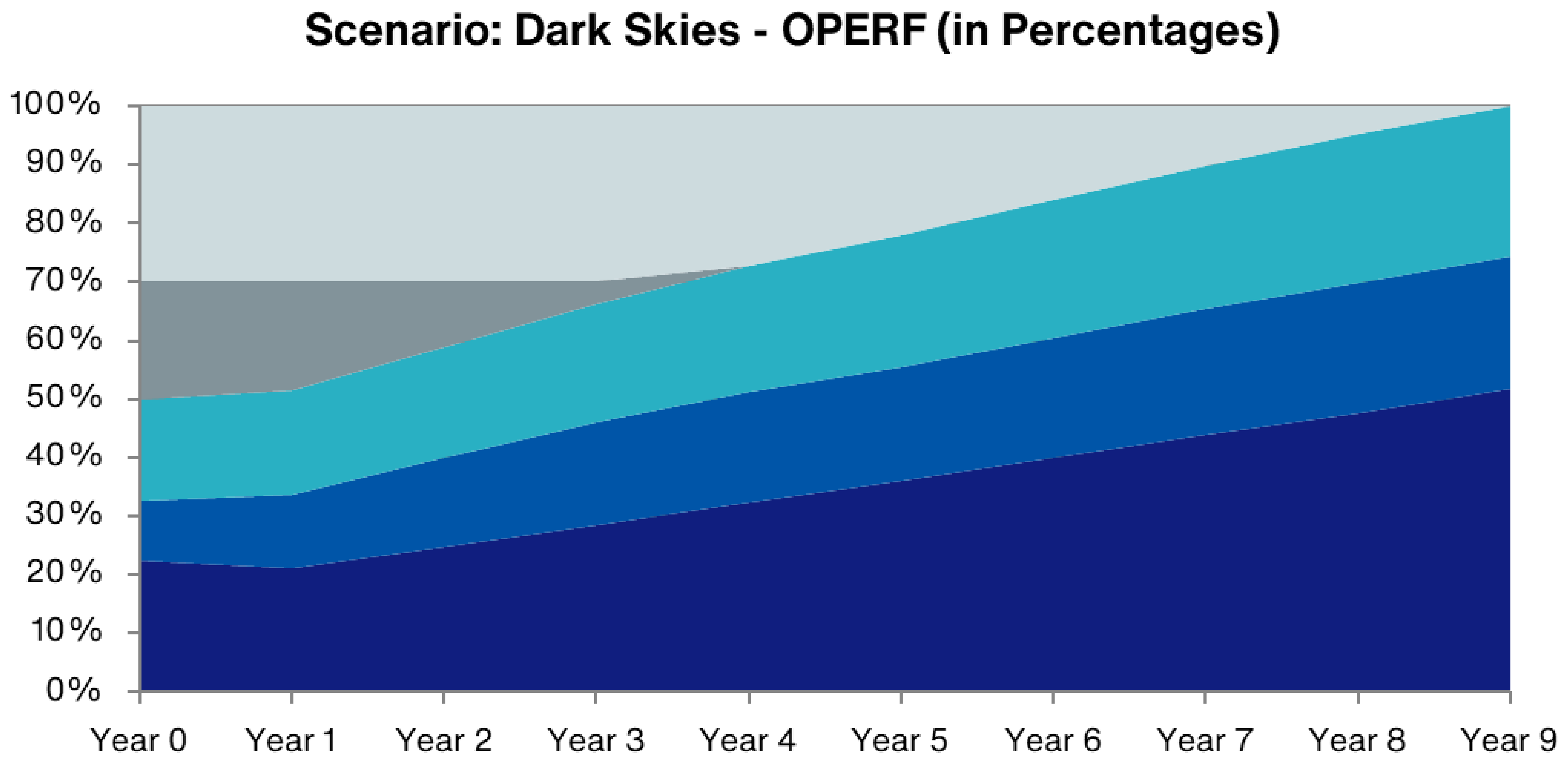
Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Liquidity Analysis

Dark Skies economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected





Key Takeaways:

- Commitments to illiquid alternatives are maintained at the steady state level, but subpar markets cause the total portfolio to shrink
- Total illiquid and quasi-liquid assets are projected to reach as high as 100% of the Plan due to the shrinking market value of the total Plan in this scenario
- In this scenario, the OIC may want to pare back future commitments to stay closer to the target allocations; however, the allocation would still be significantly different from the target allocation (50% illiquid assets)

Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

Dark Skies economic scenario – Option 3 (70% R-S)

The exhibit below shows the projected liquidity lock-up of the Option 3 allocation in the Dark Skies economic scenario, assuming commitments are continued as expected

Asset Allocation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Risk-Reducing Assets	30%	30%	30%	30%	27%	22%	16%	10%	5%	0%
Liquid Return-Seeking	20	19	11	4	0	0	0	0	0	0
Total Liquid	**50%**	**49%**	**41%**	**34%**	**27%**	**22%**	**16%**	**10%**	**5%**	**0%**
Quasi-Liquid	18%	18%	19%	20%	22%	23%	24%	25%	25%	26%
Illiquid: 5-10 Year Lock-up	10	12	15	17	19	20	21	21	22	23
Illiquid: 10+ Year Lock-up	23	21	25	29	32	36	40	44	48	52
Total Quasi + Illiquid	**50%**	**51%**	**59%**	**66%**	**73%**	**78%**	**84%**	**90%**	**95%**	**100%**

Other Metrics	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Funded Ratio (MVA / AL)	70%	56%	46%	41%	38%	37%	35%	34%	33%	33%
Total Contribution Amt (in $B)	$2.5	$2.7	$2.9	$3.4	$4.0	$4.6	$5.1	$5.5	$5.9	$6.4

Note: Year 0 represents a starting point of June 30, 2022; Percentages may not sum to 100% due to rounding

Assumptions and Methods

Section: Appendix

Liquidity Analysis
Assumptions

We started with the target asset allocations, then see how the actual allocations would change in different economic scenarios, continuing new commitments to private assets, as expected.

Actuarial projections provided by the plan actuary (Milliman) based on the unique economic scenario assumptions

- Milliman's projections are based on the same information used for results provided to Meketa and Oregon State Treasury (OST) on August 22, 2022. This reflects the same model used for our financial modeling presentation to the PERS Board at their December 2021 meeting, and that presentation should be referenced for information on the data, assumptions, methods, reliance, and disclaimers regarding the model. Known 2021 full-year OPERF returns and inflation were incorporated for all purposes and the deterministic scenarios Aon provided was used for calendar years 2022 through 2031.
- Please note that throughout Milliman's projection the valuation interest is assumed to remain at the current Board-adopted 6.90% for all scenarios and allocations.

Asset experience through June 30, 2022 (assumed to be a -8% year-to-date return) included in this analysis

Assets modeled in this analysis do not include side accounts

Assumes the portfolio starts at the target asset allocation levels for illiquid assets, maintaining close to the portfolio targets over the next 10 years

Our Capital Market Assumptions

As of June 30, 2022 (30 Years)

		Expected Real Return[1]	Expected Nominal Return[1]	Expected Nominal Volatility
	Equity			
1	Global Equity IMI	5.3%	7.8%	18.5%
	Fixed Income			
2	Core Fixed Income	1.3%	3.7%	4.5%
	Alternatives			
3	Hedge Funds - CTAs	3.5%	6.0%	15.5%
4	Hedge Funds - Global Macro	3.0%	5.5%	12.5%
5	Alternative Risk Premia	5.0%	7.5%	9.5%
6	Risk Parity	3.9%	6.4%	10.5%
7	Core Real Estate	2.6%	5.1%	15.5%
8	Non-Core Real Estate	4.2%	6.7%	25.5%
9	Private Equity	7.6%	10.2%	25.5%
10	Infrastructure	5.2%	7.7%	15.0%
	Inflation			
11	Inflation	0.0%	2.4%	2.0%

[1] Expected returns are using Aon Investments Q3 2022 30-Year Capital Market Assumptions. Assumptions do not include fees/expenses. All expected returns are geometric (long-term compounded; rounded to the nearest decimal) and net of investment fees. Expected returns presented are models and do not represent the returns of an actual client account. Not a guarantee of future results.

Our Capital Market Assumptions

As of June 30, 2022

	Nominal Correlations	1	2	3	4	5	6	7	8	9	10	11
1	Global Equity IMI	**1.00**	0.02	0.16	0.23	0.32	0.75	0.36	0.47	0.63	0.35	0.08
2	Core Fixed Income	0.02	**1.00**	-0.03	0.14	0.08	0.42	0.05	0.04	0.03	0.05	-0.02
3	Hedge Funds - CTAs	0.16	-0.03	**1.00**	0.70	0.06	0.10	0.03	0.05	0.07	0.03	-0.02
4	Hedge Funds - Global Macro	0.23	0.14	0.70	**1.00**	0.09	0.28	0.06	0.09	0.11	0.06	0.01
5	Alternative Risk Premia	0.32	0.08	0.06	0.09	**1.00**	0.26	0.13	0.17	0.21	0.13	0.07
6	Risk Parity	0.75	0.42	0.10	0.28	0.26	**1.00**	0.23	0.32	0.37	0.23	0.18
7	Core Real Estate	0.36	0.05	0.03	0.06	0.13	0.23	**1.00**	0.97	0.32	0.18	0.06
8	Non-Core Real Estate	0.47	0.04	0.05	0.09	0.17	0.32	0.97	**1.00**	0.37	0.22	0.07
9	Private Equity	0.63	0.03	0.07	0.11	0.21	0.37	0.32	0.37	**1.00**	0.32	0.06
10	Infrastructure	0.35	0.05	0.03	0.06	0.13	0.23	0.18	0.22	0.32	**1.00**	0.06
11	Inflation	0.08	-0.02	-0.02	0.01	0.07	0.18	0.06	0.07	0.06	0.06	**1.00**

Aon's Capital Market Assumptions
Background

Long-term (10- and 30-year forecasts) forward-looking assumptions (asset class geometric return, volatility, and correlations)

Building Block approach, primarily based on consensus expectations and market-based inputs

Best estimates of annualized returns (50/50 better or worse)

Market returns: no active management value added (except for certain assets classes, such as hedge funds)

Net of investment fees

Updated quarterly

We show Aon's long-term (i.e., 30-year) capital market assumptions throughout this material

Aon's Capital Market Assumption Framework

Building Block Approach

Expected return estimates for equity and fixed income are developed using a building block approach

Expected returns based on observable information in the equity and fixed income markets and consensus estimates for major economic and capital market inputs, such as earnings and inflation

Where necessary, judgment-based modifications are made to these inputs

Return assumptions for other asset classes are based on historical results, current market characteristics, and professional judgment from our specialist research teams

Example: Public Equities

INCOME (Earnings Yield x Sustainable Payout Ratio)	+	**GROWTH** (Real EPS Growth)	+	**INFLATION**	=	**TOTAL** (Equity Return)
Earnings yield moves directly with market; Sustainable payout ratio is a constant and based on Aon's assumptions		Based on Aon's in-house trend analysis, I/B/E/S estimates and Consensus Economics		Based on consensus forecasts; Primary source is Consensus Economics		FORWARD LOOKING ASSUMPTION

Explanation of Capital Market Assumptions
As of June 30, 2022 (30 Years)

The following capital market assumptions were developed by Aon's Global Asset Allocation Team and represent the long-term capital market outlook (i.e., 30 years) based on data at the end of the second quarter of 2022. The assumptions were developed using a building block approach, reflecting observable inflation and interest rate information available in the fixed income markets as well as Consensus Economics forecasts. Our long-term assumptions for other asset classes are based on historical results, current market characteristics, and our professional judgment.

Inflation – Expected Level (2.4%)

Based on Consensus Economics long-term estimates and our near-term economic outlook, we expect U.S. consumer price inflation to be approximately 2.4% during the next 30 years.

Real Returns for Asset Classes

Fixed Income

- **Cash (0.5%)** – Over the long run, we expect the real yield on cash and money market instruments to produce a real return of 0.5% in a moderate to low-inflationary environment.
- **TIPS (1.0%)** – We expect intermediate duration Treasury Inflation-Protected Securities to produce a real return of about 0.0%.
- **Core Fixed Income (i.e., Market Duration)** (1.3%) – We expect intermediate duration Treasuries to produce a real return of about 0.5%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.8%, resulting in a long-term real return of 1.3%.
- **Core Plus Bonds (1.7%)** – Modeled as 20% 5 duration gov't with real return of 0.5% and 80% 5 duration corporate bonds with real return of 2.0%.
- **Long Duration Bonds – Government and Credit (1.9%)** – We expect Treasuries with a duration comparable to the Long Government Credit Index to produce a real return of 1.1%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 0.8%, resulting in an expected real return of 1.9%.

Explanation of Capital Market Assumptions

As of June 30, 2022 (30 Years)

- **Long Duration Bonds – Credit (2.4%)** – We expect Treasuries with a duration comparable to the Long Credit Index to produce a real return of 1.1%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 1.3%, resulting in an expected real return of 2.4%.
- **Long Duration Bonds – Government (1.1%)** – We expect Treasuries with a duration of ~12 years to produce a real return of 1.1% during the next 30 years.
- **High Yield Bonds (3.3%)** – We expect intermediate duration Treasuries to produce a real return of about 0.5%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults and downgrades) to be 2.8%, resulting in an expected real return of 3.3%.
- **Bank Loans (3.7%)** – We expect LIBOR to produce a real return of about 1.1%. We estimate the fair value credit spread (credit risk premium - expected losses from defaults) to be 2.6%, resulting in an expected real return of 3.7%.
- **Non-US Developed Bonds: 50% Hedged (0.9%)** – We forecast real returns for non-US developed market bonds to be 0.9% over a 30-year period after adjusting for a 50% currency hedge. We assume a blend of one-third investment grade corporate bonds and two-thirds government bonds. We also produce assumptions for 0% hedged and 100% hedged non-US developed bonds.
- **Emerging Market Bonds (Sovereign; USD) (3.3%)** – We forecast real returns for emerging market sovereign bonds denominated in US dollars to be 3.3% over a 30-year period.
- **Emerging Market Bonds (Corporate; USD) (2.7%)** – We forecast real returns for emerging market corporate bonds denominated in US dollars to be 2.7% over a 30-year period.
- **Emerging Market Bonds (Sovereign; Local) (3.9%)** – We forecast real returns for emerging market sovereign bonds denominated in local currency to be 3.9% over a 30-year period.
- **Multi Asset Credit (MAC) (4.4%)** – We assume real returns from beta exposure to high yield, bank loans and emerging market debt to add 3.6% plus 0.8% from alpha (net of fees) over a 30-year period.

Explanation of Capital Market Assumptions

As of June 30, 2022 (30 Years)

- **Private Debt-Direct Lending (4.6%) –** The base building block is bank loans 3.7% + spread 0.9% (net of management fees and performance incentives). There is 100% leverage included in the assumption with the nominal cost of financing at LIBOR + 2.5%.

Equities

- **Large Cap U.S. Equity (4.8%)** – This assumption is based on our 30-year outlook for large cap U.S. company dividends and real earnings growth. Adjustments are made for valuations as needed.
- **Small Cap U.S. Equity (5.3%)** – Adding a 0.5% return premium for small cap U.S. equity over large cap U.S. equity results in an expected real return of 5.3%. This return premium is theoretically justified by the higher risk inherent in small cap U.S. equity versus large cap U.S. equity, and is also justified by historical data. In recent years, higher small cap valuations relative large cap equity has reduced the small cap premium.
- **Global Equity (Developed & Emerging Markets) (5.3%)** – We employ a building block process similar to the U.S. equity model using the developed and emerging markets that comprise the MSCI All-Country World Index. Our roll-up model produces an expected real return of 5.3% for global equity.
- **International (Non-U.S.) Equity, Developed Markets (5.1%)** – We employ a building block process similar to the U.S. equity model using the non-U.S. developed equity markets that comprise the MSCI EAFE Index.
- **Emerging Market Stocks (5.7%)** - We employ a building block process similar to the U.S. equity model using the non-U.S. emerging equity markets that comprise the MSCI Emerging Markets Index.
- **Equity Risk Insurance Premium Strategies-High Beta (3.8%) –** We expect real returns from 50% equity + 50% cash beta of 3.0% plus 0.8% insurance risk premium over the next 30 years.

Explanation of Capital Market Assumptions

As of June 30, 2022 (30 Years)

Alternative Asset Classes

- **Hedge Fund-of-Funds Universe (2.1%)** – The generic category "hedge funds" encompasses a wide range of strategies accessed through "fund-of-funds" vehicles. We also assume the *median* manager is selected and also allow for the additional costs associated with Fund-of-Funds management. A top-tier portfolio of funds (hedge fund-of-funds buy-list) could add an additional 1.1% in return at similar volatility based on alpha, lower fees and better risk management.
- **Hedge Fund-of-Funds Buy List (3.2%)** – The generic category of top-tier "hedge funds" encompasses a wide range of strategies accessed through "fund-of-funds" vehicles. We assume additional costs associated with Funds-of-Funds management. To use this category the funds must be buy rated or we advise on manager selection.
- **Broad Hedge Funds Universe (3.5%)** – Represents a diversified portfolio of direct hedge fund investments. This investment will tend to be less diversified than a typical "fund-of-funds" strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure.
- **Broad Hedge Funds Buy List (4.8%)** – Represents a diversified portfolio of top-tier direct hedge fund investments. This investment will tend to be less diversified than a typical "fund-of-funds" strategy as there will be fewer underlying managers and will not include the extra layer of fees found in a Fund-of-Funds structure. To use this category the funds must be buy rated or we advise on manager selection.
- **Core Real Estate (2.6%)** -- Our real return assumption for core real estate is based a gross income of about 2.6%, management fees of roughly 1%, 25% leverage and future capital appreciation near the rate of inflation during the next 30 years. We assume a portfolio of equity real estate holdings that is diversified by property and by geographic region.
- **Non-Core Real Estate (4.2%)** -- Core real estate is levered approximately 100% as the base building block for this assumption. We subtract financing costs for the leverage and 2% management costs. We also assume nominal alpha of 3% over core real estate. We assume a 50/50 mix of value-add and opportunistic investments.

Explanation of Capital Market Assumptions

As of June 30, 2022 (30 Years)

- **U.S. REITs (3.9%)** – Our real return assumption for U.S. REITs is based on income of about 3.9% and future capital appreciation near the rate of inflation during the next 30 years. REITs are a sub-set of U.S. small/mid cap equity universe.
- **Commodities (3.5%)** – Our commodity assumption is for a diversified portfolio of commodity futures contracts. Commodity futures returns are composed of three parts: spot price appreciation, collateral return, and roll return (positive or negative change implied by the shape of the future curve). We believe that spot prices will converge with CPI over the long run (i.e., 2.4%). Collateral is assumed to be LIBOR cash (1.1%). Also, we believe the roll effect will be near zero, resulting in a real return of about 3.5% for commodities.
- **Private Equity (7.6%)** – Our private equity assumption reflects a diversified fund of funds with exposure to buyouts, venture capital, distressed debt, and mezzanine debt.
- **Infrastructure (5.2%)** – Our infrastructure assumption is formulated using a cash flow based approach that projects cash flows (on a diversified portfolio of assets) over a 30-year period. Income and capital growth as well as gearing levels, debt costs and terms, relevant tax and management expenses are all taken into consideration. Our approach produces an expected real return of 5.2% for infrastructure.
- **Equity Risk Insurance Premium Strategies-Low Beta (2.9%) –** We assume real returns from cash of 0.5% + 2.4% from alpha.
- **Alternative Risk Premia (ARP) (5.0%) –** Real return target LIBOR 1.1% plus 3.9% alpha (net of fees)
- **eLDI (2.8%) –** Combination of various long credit strategies (1/6 real estate debt, 1/3 securitized debt, 1/6 CMOs, 1/3 private placements)
- **Closed-End Real Assets (5.5%) –** Modeled as 50% Non-Core Real Estate and 50% Infrastructure

Explanation of Capital Market Assumptions

As of June 30, 2022 (30 Years)

Volatility / Correlation Assumptions

Assumed volatilities are formulated with reference to implied volatilities priced into option contracts of various terms, as well as with regard to historical volatility levels. For asset classes which are not marked to market (for example real estate), we “de-smooth” historical returns before calculating volatilities. Importantly, we consider expected volatility trends in the future – in recent years we assumed the re-emergence of an economic cycle and a loss of confidence in central bankers would lead to an increase in volatility. Correlation assumptions are generally similar to actual historical results; however, we do make adjustments to reflect our forward-looking views as well as current market fundamentals.

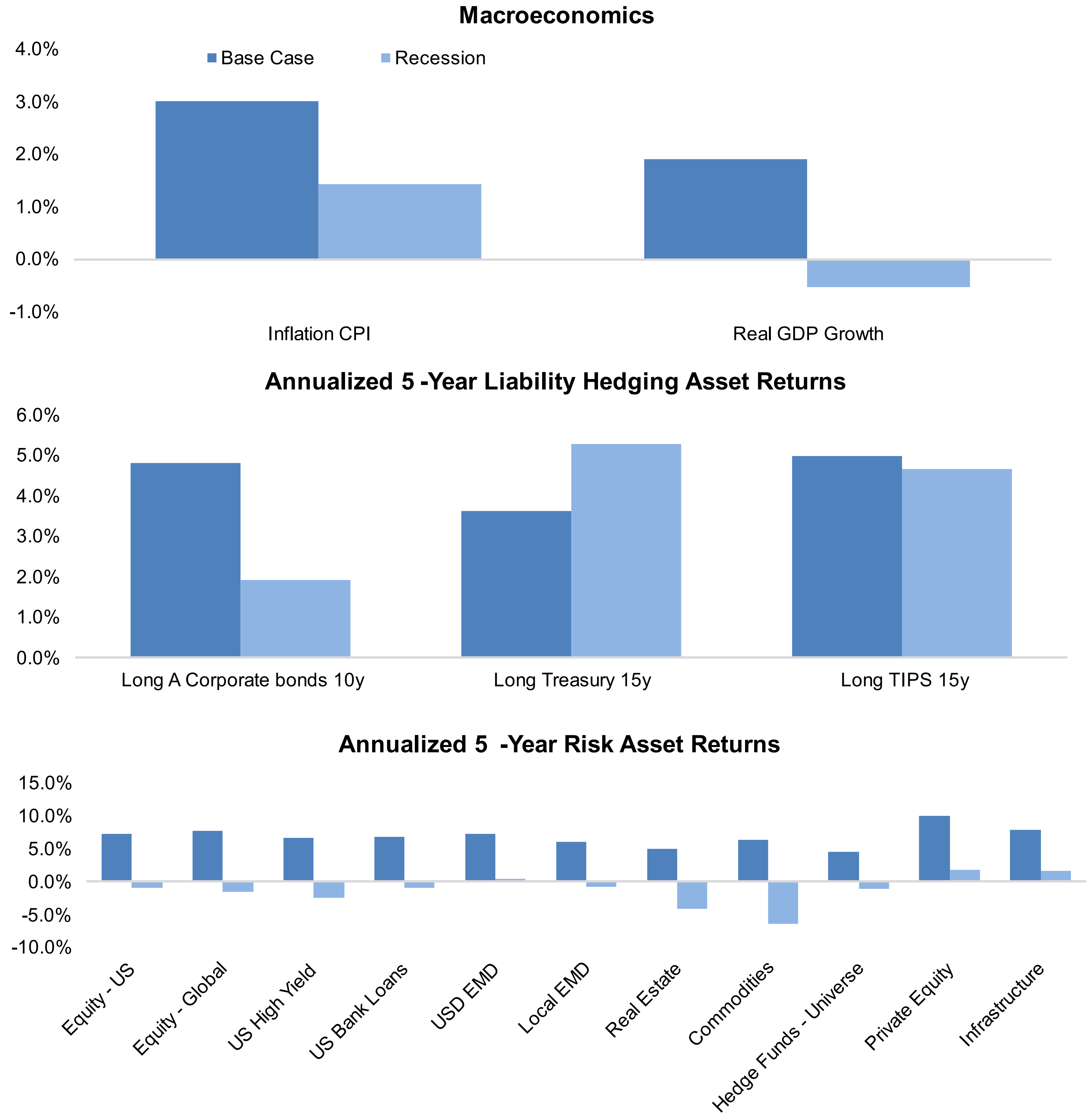
Economic Scenarios

Section: Appendix

Recession Scenario
Description

The US economy slips back into recession in 2022/2023

- Global growth is much weaker than the base case. Concerns that inflation will remain high for longer lead to central banks rapidly tightening monetary policies.
- Tightening financial conditions, combined with spillover effects from geopolitical volatility and reduced consumer and business spending, as real incomes are squeezed by high inflation, lead to a deep recession in the US in 2022/23.
- The economic slowdown leads to developed economies implementing modest fiscal stimulus measures and monetary policy becomes more accommodative. Policy actions are only partially effective as they are tackling the demand side of the equation.
- Inflation is lower than the base case. However, inflation starts to rise in later years as the post-recession recovery gets underway.
- Treasury yields fall while TIPS yields remain at low levels as the US enters recession. Yields rise in later years as a recovery gets underway. Corporate spreads rise significantly due to the poor economic situation and increased risks of downgrades or defaults.
- Most risk assets make losses in the first two years but rebound in later years as the economy recovers.



Returns from 30 June 2022
Source: Aon
The opinions referenced are as of the date of publication and are subject to change due to changes in the market or economic conditions and may not necessarily come to pass. Information contained herein is for informational purposes only and should not be considered investment advice.

Recession Scenario
Data

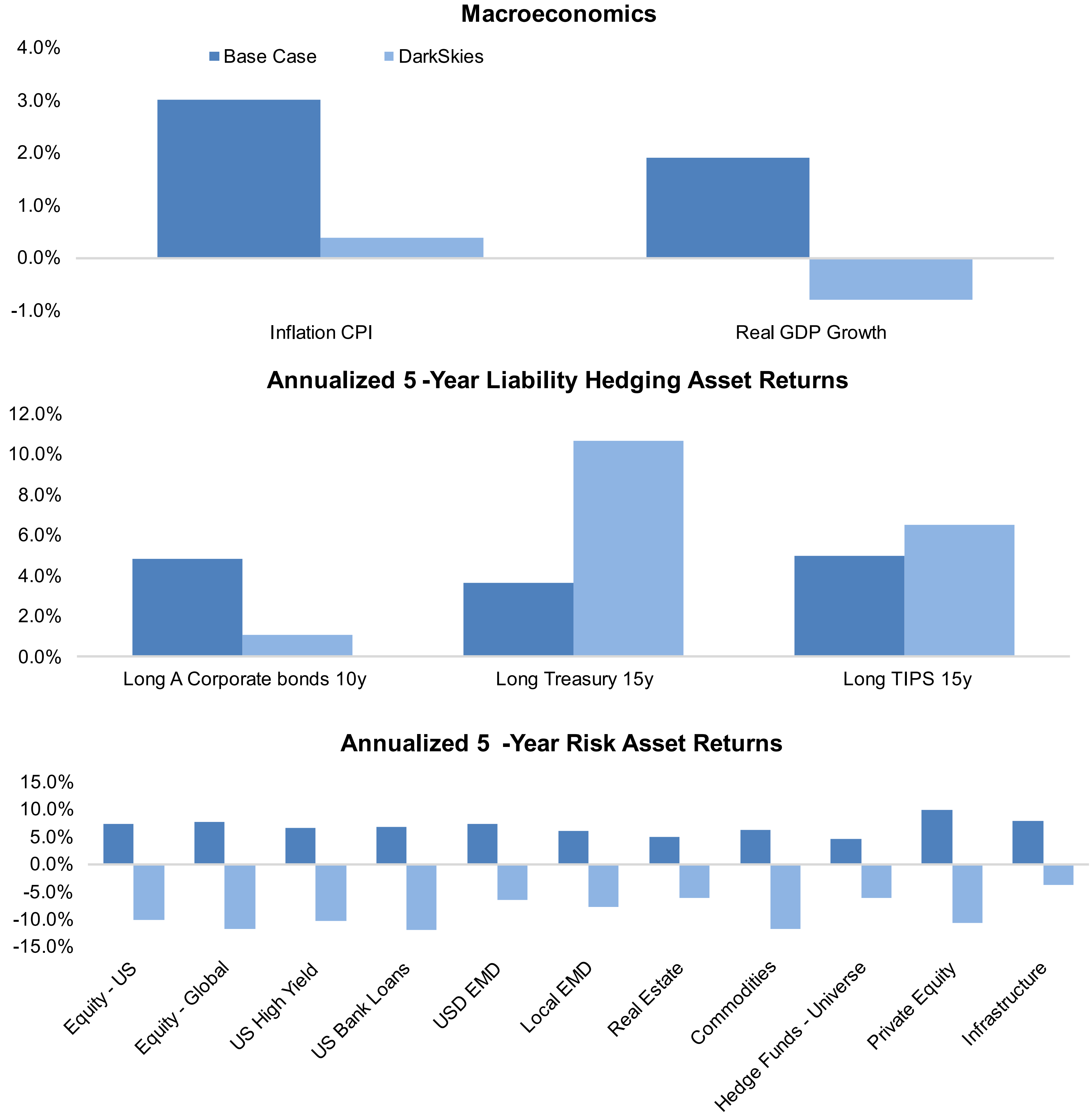
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yields (BOY)											
Treasury yield 5y	3.0%	0.8%	0.6%	1.3%	1.6%	1.9%	1.9%	2.0%	2.1%	2.2%	2.4%
Long Treasury yield 15y	3.2%	1.0%	0.9%	1.8%	2.1%	2.4%	2.5%	2.6%	2.7%	2.8%	2.8%
TIPS yield 5y	0.6%	-1.0%	-1.1%	-0.6%	-0.5%	-0.3%	-0.3%	-0.2%	0.0%	0.2%	0.5%
Long TIPS yield 15y	1.0%	-0.7%	-0.8%	-0.2%	0.0%	0.1%	0.3%	0.4%	0.5%	0.7%	0.8%
Breakeven price inflation 15y	2.2%	1.7%	1.7%	2.0%	2.1%	2.2%	2.2%	2.2%	2.2%	2.1%	2.0%
A Corporate bond yield 5y	4.5%	5.0%	5.5%	5.5%	5.1%	5.1%	4.9%	4.7%	4.5%	4.4%	4.4%
Long A Corporate bond yield 10y	4.6%	4.5%	4.8%	5.2%	5.0%	4.9%	4.9%	5.0%	5.0%	5.1%	5.1%
A Corporate spread 5y	1.5%	4.3%	4.9%	4.2%	3.6%	3.2%	3.0%	2.7%	2.5%	2.2%	2.0%
Long A Corporate spread 10y	1.4%	3.6%	4.1%	3.7%	3.2%	3.0%	2.8%	2.6%	2.4%	2.3%	2.1%
Expected nominal return on assets											
Equity – US		-17.2%	-9.1%	11.5%	6.6%	6.6%	6.7%	6.7%	6.8%	6.9%	6.9%
Equity – Global		-19.6%	-10.5%	12.5%	7.0%	7.0%	7.0%	7.1%	7.2%	7.2%	7.3%
A Corporate bonds 5y		2.1%	1.4%	3.3%	5.4%	4.2%	4.8%	4.7%	4.5%	4.3%	4.2%
Long A Corporate bonds 10y		3.7%	-1.1%	-1.7%	5.6%	3.2%	3.5%	3.9%	4.1%	4.6%	4.8%
Treasury 5y		13.1%	1.7%	-1.6%	0.5%	0.9%	2.1%	2.1%	2.0%	2.0%	1.9%
Long Treasury 15y		40.3%	3.9%	-10.5%	-0.3%	-0.5%	1.8%	2.0%	2.2%	2.3%	2.1%
TIPS 5y		9.9%	1.0%	-1.7%	0.1%	0.4%	1.0%	1.1%	1.1%	1.2%	1.4%
Long TIPS 15y		32.4%	2.6%	-7.6%	0.0%	0.0%	0.8%	0.9%	1.0%	0.9%	1.1%
US High Yield		-15.3%	-11.8%	7.2%	5.4%	4.0%	5.4%	5.4%	5.3%	5.4%	5.3%
Bank Loans		-10.2%	-7.1%	6.3%	3.7%	3.6%	3.9%	4.2%	4.5%	4.7%	4.9%
USD Emerging Market Debt		-11.2%	-6.9%	9.2%	6.4%	6.2%	6.7%	6.7%	6.7%	6.7%	6.7%
Local Emerging Market Debt		-12.4%	-8.1%	8.0%	5.3%	5.0%	5.5%	5.5%	5.5%	5.5%	5.5%
Real Estate		-13.2%	-8.1%	-3.0%	0.5%	4.4%	4.4%	4.5%	4.6%	4.6%	4.7%
Commodities		-26.0%	-20.1%	8.9%	5.5%	5.5%	5.6%	5.6%	5.7%	5.8%	5.9%
Hedge Funds - FoHF – Universe		-13.4%	-8.2%	7.4%	6.2%	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%
Private Equity		-19.8%	-9.9%	14.7%	9.2%	9.2%	9.2%	9.3%	9.4%	9.5%	9.5%
Infrastructure - US		-4.9%	-0.6%	2.9%	3.7%	7.3%	7.4%	7.4%	7.5%	7.5%	7.5%
Cash		2.8%	0.3%	0.4%	0.8%	1.1%	1.2%	1.4%	1.6%	1.7%	1.8%
CPI		2.4%	1.5%	0.8%	1.1%	1.4%	1.5%	1.6%	1.7%	1.8%	1.9%

Scenario information as of June 30, 2022

Dark Skies Scenario
Description

A deep recession followed by a longer period of stagnant growth

- A worsening Russia-Ukraine war, which expands beyond Ukraine's borders, and a renewed flare up of the pandemic, disrupts to the global economy, as additional restrictions are required over the next few years. China experiences a sharp deterioration in economic growth, due to stricter Covid restrictions and structural issues.
- Worsening geopolitical instability and central banks' aggressive monetary tightening has a severe impact on world economic growth. Economic weakness in developed and emerging market economies and severe levels of financial distress (due to high debt levels and political crisis) lead to a global recession followed by stagnation.
- Inflation falls sharply in 2022 and sluggish growth over the following years means that inflation stays low.
- Treasury yields fall and remain at low levels as the US enters recession. Corporate spreads rise significantly due to the poor economic situation and increased risks of downgrades or defaults.
- Risk assets make losses in the first few years. There is no pronounced bounce in growth and the economic situation remains poor for a long time, which weighs on returns in later years.



Returns from 30 June 2022
Source: Aon
The opinions referenced are as of the date of publication and are subject to change due to changes in the market or economic conditions and may not necessarily come to pass. Information contained herein is for informational purposes only and should not be considered investment advice.

Dark Skies Scenario

Data

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yields (BOY)											
Treasury yield 5y	3.0%	0.2%	-0.6%	-0.7%	-0.7%	-0.5%	-0.2%	0.0%	0.3%	0.6%	0.9%
Long Treasury yield 15y	3.2%	0.4%	-0.1%	-0.2%	-0.1%	0.0%	0.3%	0.6%	0.9%	1.2%	1.4%
TIPS yield 5y	0.6%	-1.1%	-1.7%	-1.9%	-1.8%	-1.7%	-1.5%	-1.3%	-1.1%	-0.8%	-0.4%
Long TIPS yield 15y	1.0%	-1.1%	-1.5%	-1.6%	-1.5%	-1.4%	-1.2%	-0.9%	-0.7%	-0.4%	-0.2%
Breakeven price inflation 15y	2.2%	1.5%	1.4%	1.4%	1.4%	1.4%	1.5%	1.6%	1.6%	1.6%	1.6%
A Corporate bond yield 5y	4.5%	5.8%	5.6%	5.2%	4.6%	4.3%	4.2%	4.1%	4.1%	4.0%	4.0%
Long A Corporate bond yield 10y	4.6%	4.9%	4.8%	4.5%	4.1%	3.9%	4.0%	4.1%	4.2%	4.3%	4.4%
A Corporate spread 5y	1.5%	5.6%	6.2%	5.9%	5.2%	4.8%	4.4%	4.1%	3.8%	3.4%	3.1%
Long A Corporate spread 10y	1.4%	4.6%	5.0%	4.8%	4.4%	4.0%	3.8%	3.6%	3.3%	3.1%	2.9%
Expected nominal return on assets											
Equity – US		-26.2%	-18.6%	-9.8%	3.7%	3.7%	4.0%	4.4%	4.7%	5.1%	5.5%
Equity – Global		-29.5%	-21.0%	-11.1%	3.7%	3.7%	4.1%	4.5%	4.9%	5.3%	5.7%
A Corporate bonds 5y		-1.9%	1.7%	1.5%	2.2%	0.9%	0.3%	0.8%	1.2%	1.6%	1.9%
Long A Corporate bonds 10y		-1.0%	0.4%	1.8%	3.1%	1.1%	-0.4%	0.2%	0.7%	1.3%	1.8%
Treasury 5y		15.5%	3.6%	-0.4%	-1.0%	-1.4%	-1.8%	-1.5%	-1.2%	-1.0%	-0.7%
Long Treasury 15y		52.5%	8.9%	1.7%	-0.3%	-1.5%	-3.2%	-2.8%	-2.5%	-2.1%	-2.0%
TIPS 5y		8.8%	1.2%	-1.3%	-2.0%	-2.1%	-2.0%	-1.7%	-1.4%	-1.1%	-0.7%
Long TIPS 15y		37.0%	4.8%	-0.1%	-2.1%	-2.4%	-3.6%	-3.2%	-3.0%	-2.7%	-2.4%
US High Yield		-19.6%	-15.2%	-11.2%	-1.6%	-2.9%	-3.1%	-2.1%	-1.1%	-0.2%	0.6%
Bank Loans		-23.3%	-19.9%	-12.5%	-0.8%	-1.1%	-0.5%	0.2%	0.9%	1.6%	2.2%
USD Emerging Market Debt		-17.2%	-12.4%	-6.9%	2.9%	2.4%	2.4%	2.9%	3.4%	3.8%	4.3%
Local Emerging Market Debt		-18.4%	-13.6%	-8.0%	1.8%	1.2%	1.2%	1.7%	2.2%	2.7%	3.1%
Real Estate		-14.9%	-10.5%	-4.9%	-0.6%	1.5%	1.9%	2.2%	2.6%	2.9%	3.2%
Commodities		-33.1%	-25.1%	-1.6%	4.1%	4.1%	4.3%	4.5%	4.7%	5.0%	5.2%
Hedge Funds - FoHF – Universe		-16.3%	-11.1%	-5.5%	1.5%	1.5%	1.8%	2.1%	2.4%	2.7%	3.0%
Private Equity		-30.6%	-21.4%	-10.5%	5.6%	5.6%	6.0%	6.5%	6.9%	7.3%	7.8%
Infrastructure - US		-11.8%	-7.5%	-3.7%	1.3%	3.9%	4.3%	4.7%	5.0%	5.4%	5.8%
Cash		2.8%	-0.1%	-0.5%	-0.6%	-0.5%	-0.3%	-0.1%	0.2%	0.4%	0.7%
CPI		1.0%	-0.2%	0.2%	0.4%	0.6%	0.8%	0.9%	1.1%	1.3%	1.5%

Scenario information as of June 30, 2022

About This Material

Section: Appendix

About This Material

This material includes a summary of calculations and consulting related to the finances of the Oregon Public Employees Retirement Fund (OPERF). The following variables have been addressed:

- Contributions, Liquidity, Net Outflow

This analysis is intended to assist the Investment Committee with a review of the associated issues and options, and its use may not be appropriate for other purposes. This analysis has been prepared solely for the benefit of the Investment Committee. Any further dissemination of this report is not allowed without the written consent of Aon Investments USA Inc.

Our calculations were generally based on the methodologies identified in the actuary's valuation report for OPERF. We believe the methodology used in these calculations conforms to the applicable standards identified in the report.

Models are used to develop alternative scenarios based on the underlying valuation model and project financial results under those scenarios. The models were developed by experts outside and within Aon. Where outside models were used, the models were reviewed by experts within Aon. The models were selected as appropriate for these projections by the undersigned.

Experience different than anticipated could have a material impact on the ultimate costs of the benefits. In addition, changes in plan provisions or applicable laws could have a significant impact on cost. Actual experience may differ from our modeling assumptions.

Our calculations were based on data provided by the plan actuary. The actuarial assumptions and methods and plan provisions reflected in these projections are the same as those used for the 2021 actuarial valuation for OPERF as noted in the actuarial reports, except where noted in this report. Unless specifically noted, our calculations do not reflect any other changes or events after December 31, 2021. Reflecting events after December 31, 2021 would impact the results of the projection.

In conducting these projections, we have relied on plan design, demographic and financial information provided by other parties, including the plan's actuary and plan sponsor. While we cannot verify the accuracy of all of the information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy or completeness of the information and believe that it has produced appropriate results.

These projections have been conducted in accordance with generally accepted actuarial principles and practices, including applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board. The undersigned actuary is familiar with the near-term and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no colleague of Aon Investments USA Inc. providing services to OPERF has any direct financial interest or indirect material interest in OPERF. Thus, we believe there is no relationship existing that might affect our capacity to prepare and certify this report for OPERF.

Aon Investments USA Inc.

Phil Kivarkis, FSA, CFA

Legal Disclosures and Disclaimers

Investment advice and consulting services provided by Aon Investments USA Inc. ("Aon Investments"). The information contained herein is given as of the date hereof and does not purport to give information as of any other date. The delivery at any time shall not, under any circumstances, create any implication that there has been a change in the information set forth herein since the date hereof or any obligation to update or provide amendments hereto.

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Aon Investments USA Inc. is a federally registered investment advisor with the U.S. Securities and Exchange Commission. Aon Investments is also registered with the Commodity Futures Trading Commission as a commodity pool operator and a commodity trading advisor and is a member of the National Futures Association. The Aon Investments ADV Form Part 2A disclosure statement is available upon written request to:

Aon Investments USA Inc.
200 E. Randolph Street
Suite 700
Chicago, IL 60601
ATTN: Aon Investments Compliance Officer

TAB 4

COMMON SCHOOL FUND

INVESTMENT POLICY STATEMENT

Investment Policy Statement

for

the Common School Fund

Adopted – November 2, 2022

Table of Contents

I. INTRODUCTION AND PURPOSE

Introduction:

The purpose of the Investment Policy Statement (IPS) is to assist the Oregon Investment Council ("OIC" or the "Council") in effectively supervising, monitoring, and evaluating the investments of the Common School Fund ("CSF" or the "Fund"). The OIC formulates policies for the investment and reinvestment of funds under the control and administration of the Department of State Land's Board ("the "State Land Board" or "SLB""). It is the intention of the SLB and the OIC that the CSF's investments be managed in accordance with this Investment Policy Statement.

The SLB has determined that the CSF should be viewed as a perpetual fund managed to benefit both present and future beneficiaries of Oregon's Department of Education.

The investment portfolio should preserve and enhance the real or inflation-adjusted market value of the Fund's assets over the long-term, net of annual spending and expenses. To achieve this objective, the SLB has adopted a long-term investment horizon such that short-term spending needs and market volatility will be monitored and balanced with the long-term real return objective. The investment of assets must be made in accordance with the standards provided in ORS 293.726.

This IPS applies to all investable assets of the CSF. All assets available for investment will be invested through an investment policy approved by the OIC. Separate account, mutual fund and/or commingled investment vehicles that may include, but are not limited to equities, fixed income, private equity, private credit, real assets, and alternative investments.

Authority:

ORS Chapters 273, 293 and 327. Article VIII of the Oregon Constitution.

Purpose:

The purpose of this IPS is to define the investment objectives, policies and procedures established by the OIC to support the Fund's mission. This IPS will serve as a framework, with sufficient flexibility to be practical, for the management and review of the Fund and intended to:

- Identify roles and responsibilities;
- Establish investment objectives;
- Outline the annual spending policy approved by the SLB;
- Establish long-term asset allocation targets; and
- Establish guidelines to monitor the performance in comparison to stated objectives.

Additionally, this IPS serves as a guide and general framework within which the Fund's assets are managed in achieving the near-term and long-term objectives of those assets. The OIC also recognizes that from time to time, short-term market fluctuations and dynamics could make it impossible to precisely reflect all aspects of this policy at all times. This IPS is established to accommodate these short-term fluctuations, which should not necessitate IPS adjustments. It is expected that this IPS be reviewed annually to ensure alignment with forward-looking market expectations and industry best thinking and best practices.

II. ROLES AND RESPONSIBILITIES

<u>Oregon Investment Council</u>

Pursuant to the applicable provisions of ORS 293, the OIC has the authority to set investment policies for the Fund.

The Oregon Investment Council has the responsibility to ensure that all investments are managed in a manner that is consistent with the policies and objectives of the Fund.

The Oregon Investment Council's responsibilities may include but are not limited to:

- Establish the IPS for the management of the Fund;
- Develop investment goals that are consistent with the financial needs of the CSF and the appropriate asset allocation consistent with meeting those objectives;
  - Total fund investment objectives and asset class benchmarks
  - Investment policies, including target asset allocation and rebalancing policies
- Receipt and review of periodic reports from OST staff, consultants, investment managers and other experts

The OIC may, at its discretion, delegate the execution of above responsibilities, in full or in part, to external parties with appropriate expertise to assist the OIC in discharging its obligations. Other specialists may be employed by the OIC from time to time, on an as-needed basis, to ensure its responsibilities in providing oversight of Fund assets are prudently executed.

<u>Oregon State Treasury Staff</u>

Oregon State Treasury ("OST" or "Treasury") staff manage the Fund in accordance with the applicable provisions of ORS 293, including maintaining their fiduciary obligations under ORS 293.726.

The following investment management and implementation decisions with the approval from the Chief Investment Officer ("CIO") and quarterly notification to the OIC:

- Manage day-to-day investment activities of the Fund;
- Work with the Council-retained investment consultants to compile information on the investment return and performance for the OIC review;
- Re-balancing of total fund to ensure assets are within the asset allocation ranges, properly notifying the OIC when breaches occur and providing recommendations;
- Recommending the hiring of investment managers within each asset class. Before recommending a manager change, Treasury staff will satisfy the Council that the manager recommendation is supported by a satisfactory level of analysis and due diligence;
- Retain an external manager that has been approved by the OIC on behalf of the Oregon Public Employees Retirement Fund ("OPERF")
- Terminating investment managers;
- Preparing, negotiating and executing investment manager mandates, guidelines and fee agreements;
- Overseeing individual investment managers to ensure their portfolios comply with their respective portfolio mandates and guidelines;
- Providing oversight of the master custodian to ensure that the Fund's rights to pursue securities class action litigation are appropriately protected; and
- In making the above decisions, Treasury staff shall seek as needed the advice, guidance and recommendations from Council-retained investment consultants, investment managers and other experts and sources as considered prudent by Treasury staff.

<u>Investment Consultants</u>

- The Investment Consultants support the responsibilities of Treasury staff, as needed and pursuant to the contractual obligations agreed to by the parties.

<u>Investment Professionals</u>

- Investment decisions may be delegated to investment professionals and monitored by Treasury staff in accordance with the applicable provisions of ORS 293.

Custodian

- Custodian has the duties and obligations pursuant to the contract agreed to with Treasury staff.

III. INVESTMENT OBJECTIVES

The primary objective of the CSF is to generate a real rate of return, above an appropriate inflation rate (i.e. the Consumer Price Index or CPI) and over time, that is sufficient to support, in perpetuity, the mission of the CSF and its spending needs. It is particularly important to preserve the value of the assets in real terms (i.e. inflation adjusted) to maintain its purchasing power without eroding the principal corpus of the Fund over long-term periods. Thus, the long-term return objective will account for inflation, administrative expenses, other planned withdrawals, and annual spend as appropriate.

Spending Policy

The State Land Board generally seeks advice, guidance and recommendations from the OIC, OST staff, and Council-retained investment consultants on the spending policy for CSF. The OIC recognizes the dual funding role of the Fund in supporting both current and future spending needs (i.e. provide a stable and predictable stream of funds versus maintain purchasing power of the Fund over time). It is the desire of the SLB and OIC to maintain this intergenerational equity and balance needs between current and future beneficiaries.

Unless otherwise directed and/or approved by the State Land Board, the annual target spending rate is **3.5%** of the Fund's trailing three-year average market value.

Proposed or actual spending in any given fiscal year that would lead the Fund's market value to dip below its corpus shall be monitored by OST staff and reported to the OIC in a timely manner.

Time Horizon

The OIC acknowledges that fluctuating rates of return characterize the securities markets, particularly during short-term time periods. Accordingly, the OIC views interim fluctuations with an appropriate perspective, given the long-term perpetual objectives. Long-term investment objectives are to be evaluated over a minimum long-term horizon, defined as rolling ten-year periods.

Diversification

The OIC believes that the likelihood of realization of the investment objectives is enhanced through diversification. The OIC through setting of the Strategic Asset Allocation will aim to diversify assets among portfolio roles and strategies to maintain acceptable risk levels and enhance long-term investment return opportunities.

Risk

Risk refers to the uncertainty and the prospective loss due to an activity or an exposure. With respect to the CSF, that is expressed principally as investment risk, i.e., a permanent impairment to the Fund's value that could reduce its ability to meet and sustain spending requirements, but it could also be exhibited in operations and liquidity management. At the same time, given the relationship between risk and return, taking too little risk could lead to the Fund underperforming its return objective. Given the need to take an appropriate amount, risk is considered throughout the investment process, from asset allocation to manager selection to performance evaluation.

A. Risk Standards and Metrics

Staff will monitor investment risk of the Fund on ex ante and ex post bases to evaluate whether appropriate amount of risk is being taken efficiently, i.e., to be properly compensated and commensurately to the return objectives of the Fund. Risk evolves over time, dictated by changing macroeconomic environments and shifting mix of investments in the portfolio. Staff will therefore apply various tools and approaches over different time horizons to analyze the Fund's investment risk. Staff will also consider total risk, i.e., the variation of total returns, at various levels of the Fund and active risk, i.e., the variation of relative returns versus a benchmark, at the manager and asset class levels for the public market investments.

Staff will use realized returns to evaluate ex post tracking error but will typically rely on a risk model to estimate ex ante risk. Most commercial risk models make simplifying assumptions to improve reliability and sensibility, but they are ultimately assumptions that will never fully capture all outcomes, such as extreme losses in a drawdown. Nevertheless, the output of such models can be useful, particularly in the context of other analyses undertaken by staff.

B. Liquidity

Liquidity risk is defined as that element of total risk comes from the unpredictability of the cost and time duration necessary to convert existing investment positions to cash.

In combination with the illiquidity of private market investments and rebalancing requirements (see "Rebalancing Guidelines"), staff will consider the liquidity of the assets and cash flow requirements when recommending an asset allocation to the OIC and managing the Fund investments.

C. Foreign-Exchange Risk Management

The CSF makes distributions to Oregon's Department of Education in U.S. dollars, yet, for diversification purpose, a portion of the Fund's assets is invested outside the U.S. and denominated in foreign currencies. The translation of foreign-denominated investments back to the U.S. dollar provides incremental volatility of return to CSF's total, overall risk. Furthermore, there is little economic basis or empirical evidence to support a positive, long-term return expectation in connection with these foreign currency exposures. In other words, unmanaged foreign currency exposure is a source of uncompensated risk.

Staff will manage this risk by taking into consideration the magnitude of exposures, operational requirements, and portfolio construction.

IV. ASSET ALLOCATION GUIDELINES

Given the perpetual nature of the CSF, asset allocation will be the most important determinant of long-term success. The target allocation balances the need to satisfy the long-term return objective and to minimize total investment risk. The target allocation is based on long-term capital market assumptions (expected returns, risk, and correlations) of asset classes and over time should provide an expected return equal to or greater than the primary objective of the Fund, while avoiding undue risk concentrations in any single role or strategy; thus, reducing risk at the total portfolio level. To achieve these goals, the asset allocation will be set with the target percentages and within the ranges provided in Appendix A.

Formal asset allocation reviews will be performed at least every three years to ensure that the Fund is positioned properly. These reviews will be performed by OST staff in conjunction with the OIC's general consultant.

Rebalancing Guidelines

The OIC recognizes that rapid unanticipated market shifts or changes in economic conditions may lead to wide deviations from the target allocation and approved ranges. Generally, these divergences are of a short-term or tactical nature in response to fluctuating market environments. There may be short-term deviations from the target due to illiquidity of private market investments.

A breach of any of the established asset allocation ranges triggers a review and possible rebalancing back to established targets with due consideration given to the liquidity of the affected investments, all anticipated transaction costs and the current portfolio structure within each asset class. Given the nature of private assets, the amount and timing of the cash flows cannot be precisely known, and it will take time to build out the portfolio to the long-term policy target levels. Accordingly, at any particular time, the actual allocation to Private Equity, Real Estate, Real Assets, and Diversifying Strategies may be above or below the long-term target allocation.

OST staff will review the asset allocation on a monthly basis and rebalance to within the target asset allocation range at least quarterly if necessary.

V. STRATEGIC ROLE GUIDELINES

This section outlines the strategic investment guidelines for each portfolio role, which shall serve as a framework for evaluating asset allocation choices across asset classes and investment strategies to achieve the Fund's objectives. While certain strategies and investment securities may demonstrate risk and return characteristics at different time periods that could fulfill more than one portfolio role, it is the strategic nature of those investments that shall dictate the primary purpose they serve in the Portfolio.

Global Equity Investments
The strategic role of publicly traded equity securities is to serve as the Fund's primary return-seeking investments to generate long-term asset growth. Return over time is primarily driven by equity risk beta. The Fund's Global Equity portfolio also provides liquidity necessary to meet its cash distribution obligations.

Fixed Income Investments
The strategic role of fixed income securities is to diversify the Fund in general and its allocation to equity securities in particular. The Fixed Income portfolio provides liquidity necessary to meet its cash distribution obligations. The fixed income allocation shall consist primarily of U.S. investment grade fixed income securities represented within the benchmark index. It may also allow for non-benchmark sectors, including, but not limited to, developed and emerging markets international securities, inflation-linked bonds, as well as below investment grade securities.

Private Equity Investments
The strategic role of private equity investments is to enhance return and diversification opportunities for the Fund. While potentially more volatile than public equity, private equity provides a diversification benefit and the opportunity to achieve higher returns. Diversification in the Fund's Private Equity portfolio may be accomplished by investing across different fund types and strategies including venture capital, leverage buyout, mezzanine debt, distressed debt, sector funds, secondaries, and fund-of-funds.

Real Estate Investments
The strategic role of real estate investments is to enhance return and diversification opportunities for the Fund while providing some inflation protection. Diversification in real estate may be accomplished through exposure to a variety of real estate debt and equity investment strategies, property types (i.e., office, industrial, retail, multifamily, hospitality, etc.), geographic location, and various stages of a property life-cycle.

Real Asset Investments
The strategic role of real asset investments is to enhance long-term return and diversification

opportunities for the Fund. A lower correlation between the returns of real asset investments and other Fund assets is expected, and real asset investments are therefore expected to provide an added measure of diversification to overall Fund returns. Diversification in real asset investments may be achieved through exposure to a variety of possible alternative investment assets and strategies, including, but not limited to, infrastructure and natural resources.

Diversifying Strategies Investments
The strategic role of diversifying strategies investments is to enhance long-term return and diversification opportunities for the Fund. A lower correlation between the returns of diversifying strategies investments and other Fund assets is expected, and diversifying strategies investments are therefore expected to provide an added measure of diversification to overall Fund returns. Diversification in diversifying strategies investments may be achieved through exposure to a variety of possible alternative investment assets and strategies, including, but not limited to, long-short, relative value, directional, event driven, and other diversifying strategies.

VI. PERFORMANCE MEASUREMENT AND EVALUATION

Total Portfolio Performance:

The principal goal of the Fund is to maximize the likelihood of achieving and/or exceeding the Investment Objectives stated in this IPS over the long-term.

The primary benchmark for evaluating performance of the Fund will be a weighted benchmark consisting of broad market indices for the underlying strategies combined according to the strategy allocation targets as described in Appendix A. Total Portfolio performance will be evaluated on a net-of-fee basis relative to the representative weighted benchmark over various trailing time periods, as applicable.

A portion of the Fund's assets will be committed to private assets. Given the nature of these investments, the amount and timing of the cash flows cannot be precisely known, and it will take time to build out the portfolio to the long-term policy target levels. Accordingly, at any particular time, the actual allocation to Private Equity, Real Estate, Real Assets, and Diversifying Strategies may be below the long-term target allocation. Accordingly, the composition of the Interim Policy Benchmark will be reviewed annually and adjusted to gradually converge to the Policy Benchmark.

The secondary benchmark for evaluating the efficacy of the Policy Portfolio's complexity and diversification will be a simplified reference portfolio.

Strategy Performance:

Performance for the underlying asset classes will be compared with the risk and return of an appropriate market index (as described in Appendix A), on a net-of-fee basis over various trailing time periods.

Review and Reporting:

OST/OIC Reviews. OST staff will continuously review asset allocations and investment performance, and present their review and conclusions to the OIC on no less than an annual basis. These reviews will focus on the continued appropriateness of existing policy, compliance with guidelines and performance relative to Fund objectives.

Presentation to State Land Board. OST staff will arrange for and lead a formal review of the Fund at a meeting of the State Land Board on at least an annual basis. OST and DSL staff will coordinate in advance of each meeting to develop an agenda.

The foregoing IPS was adopted by the Council to be effective as of September 7, 2022

By:___________________________________
(Title)

Appendix A

Asset Allocation Strategy Targets & Range

Fund Role	Benchmark	Min	Interim Target	Long-Term Target	Max
Global Equity	MSCI ACWI IMI Net	40.0%	47.5%	45.0%	50.0%
Private Equity	Russell 3000 + 300 bps	10.0%	12.5%	15.0%	20.0%
Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	15.0%	22.5%	20.0%	25.0%
Real Estate	NCREIF-ODCE	5.0%	10.0%	10.0%	15.0%
Real Assets	CPI+ 4%	0.0%	2.5%	5.0%	10.0%
Diversifying Strategies	HFRI FOF Conservative Index	0.0%	5.0%	5.0%	10.0%
Cash	Cash	0.0%	0.0%	0.0%	3.0%

* Total Portfolio Index will be a weighted benchmark consisting of market indices for each strategy combined according to the strategy allocation targets as described above
** The sum of Strategy “Min” and “Max” within each Portfolio Role (Global Equity, Private Equity, Fixed Income, Real Estate, Real Assets, Diversifying Strategies, and Cash) will not equal “Min” and “Max” for each Role.
***Based on the risk profile of the approved asset allocation using standard deviation as the risk metric, the reference portfolio equates to 70% global equity and 30% core fixed income.

Investment Policy Statement

for

the Common School Fund

Adopted – November 2, 2022

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Table of Contents

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Purpose:

The purpose of this IPS is to define the investment objectives, policies and procedures established by the OIC to support the Fund's mission. This IPS will serve as a framework, with sufficient flexibility to be practical, for the management and review of the Fund and intended to:

- Identify roles and responsibilities;
- Establish investment objectives;
- Outline the annual spending policy approved by the SLB;
- Establish long-term asset allocation targets; and
- Establish guidelines to monitor the performance in comparison to stated objectives.

Additionally, this IPS serves as a guide and general framework within which the Fund's assets are managed in achieving the near-term and long-term objectives of those assets. The OIC also recognizes that from time to time, short-term market fluctuations and dynamics could make it impossible to precisely reflect all aspects of this policy at all times. This IPS is established to accommodate these short-term fluctuations, which should not necessitate IPS adjustments. It is expected that this IPS be reviewed annually to ensure alignment with forward-looking market expectations and industry best thinking and best practices.

II. ROLES AND RESPONSIBILITIES

<u>Oregon Investment Council</u>

Pursuant to the applicable provisions of ORS 293, the OIC has the authority to set investment policies for the Fund.

The Oregon Investment Council has the responsibility to ensure that all investments are managed in a manner that is consistent with the policies and objectives of the Fund.

The Oregon Investment Council's responsibilities may include but are not limited to:

- Establish the IPS for the management of the Fund;
- Develop investment goals that are consistent with the financial needs of the CSF and the appropriate asset allocation consistent with meeting those objectives;
  - Total fund investment objectives and asset class benchmarks
  - Investment policies, including target asset allocation and rebalancing policies
- Receipt and review of periodic reports from OST staff, consultants, investment managers and other experts

The OIC may, at its discretion, delegate the execution of above responsibilities, in full or in part, to external parties with appropriate expertise to assist the OIC in discharging its obligations. Other specialists may be employed by the OIC from time to time, on an as-needed basis, to ensure its responsibilities in providing oversight of Fund assets are prudently executed.

Oregon State Treasury Staff

Oregon State Treasury ("OST" or "Treasury") staff manage the Fund in accordance with the applicable provisions of ORS 293, including maintaining their fiduciary obligations under ORS 293.726.

The following investment management and implementation decisions with the approval from the Chief Investment Officer ("CIO") and quarterly notification to the OIC:

- Manage day-to-day investment activities of the Fund;
- Work with the Council-retained investment consultants to compile information on the investment return and performance for the OIC review;
- Re-balancing of total fund to ensure assets are within the asset allocation ranges, properly notifying the OIC when breaches occur and providing recommendations;
- Recommending the hiring of investment managers within each asset class. Before recommending a manager change, Treasury staff will satisfy the Council that the manager recommendation is supported by a satisfactory level of analysis and due diligence;
- Retain an external manager that has been approved by the OIC on behalf of the Oregon Public Employees Retirement Fund ("OPERF")
- Terminating investment managers;
- Preparing, negotiating and executing investment manager mandates, guidelines and fee agreements;
- Overseeing individual investment managers to ensure their portfolios comply with their respective portfolio mandates and guidelines;
- Providing oversight of the master custodian to ensure that the Fund's rights to pursue securities class action litigation are appropriately protected; and
- In making the above decisions, Treasury staff shall seek as needed the advice, guidance and recommendations from Council-retained investment consultants, investment managers and other experts and sources as considered prudent by Treasury staff.

Investment Consultants

- The Investment Consultants support the responsibilities of Treasury staff, as needed and pursuant to the contractual obligations agreed to by the parties.

Investment Professionals

- Investment decisions may be delegated to investment professionals and monitored by Treasury staff in accordance with the applicable provisions of ORS 293.

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Custodian

- Custodian has the duties and obligations pursuant to the contract agreed to with Treasury staff.

III. INVESTMENT OBJECTIVES

The primary objective of the CSF is to generate a real rate of return, above an appropriate inflation rate (i.e. the Consumer Price Index or CPI) and over time, that is sufficient to support, in perpetuity, the mission of the CSF and its spending needs. It is particularly important to preserve the value of the assets in real terms (i.e. inflation adjusted) to maintain its purchasing power without eroding the principal corpus of the Fund over long-term periods. Thus, the long-term return objective will account for inflation, administrative expenses, other planned withdrawals, and annual spend as appropriate.

Spending Policy

The State Land Board generally seeks advice, guidance and recommendations from the OIC, OST staff, and Council-retained investment consultants on the spending policy for CSF. The OIC recognizes the dual funding role of the Fund in supporting both current and future spending needs (i.e. provide a stable and predictable stream of funds versus maintain purchasing power of the Fund over time). It is the desire of the SLB and OIC to maintain this intergenerational equity and balance needs between current and future beneficiaries.

Unless otherwise directed and/or approved by the State Land Board, the annual target spending rate is **3.5%** of the Fund's trailing three-year average market value.

Proposed or actual spending in any given fiscal year that would lead the Fund's market value to dip below its corpus shall be monitored by OST staff and reported to the OIC in a timely manner.

Time Horizon

The OIC acknowledges that fluctuating rates of return characterize the securities markets, particularly during short-term time periods. Accordingly, the OIC views interim fluctuations with an appropriate perspective, given the long-term perpetual objectives. Long-term investment objectives are to be evaluated over a minimum long-term horizon, defined as rolling ten-year periods.

Diversification

The OIC believes that the likelihood of realization of the investment objectives is enhanced through diversification. The OIC through setting of the Strategic Asset Allocation will aim to diversify assets among portfolio roles and strategies to maintain acceptable risk levels and enhance long-term investment return opportunities.

Risk

Risk refers to the uncertainty and the prospective loss due to an activity or an exposure. With respect to the CSF, that is expressed principally as investment risk, i.e., a permanent impairment to the Fund's value that could reduce its ability to meet and sustain spending requirements, but it could also be exhibited in operations and liquidity management. At the same time, given the relationship between risk and return, taking too little risk could lead to the Fund underperforming its return objective. Given the need to take an appropriate amount, risk is considered throughout the investment process, from asset allocation to manager selection to performance evaluation.

A. Risk Standards and Metrics

Staff will monitor investment risk of the Fund on ex ante and ex post bases to evaluate whether appropriate amount of risk is being taken efficiently, i.e., to be properly compensated and commensurately to the return objectives of the Fund. Risk evolves over time, dictated by changing macroeconomic environments and shifting mix of investments in the portfolio. Staff will therefore apply various tools and approaches over different time horizons to analyze the Fund's investment risk. Staff will also consider total risk, i.e., the variation of total returns, at various levels of the Fund and active risk, i.e., the variation of relative returns versus a benchmark, at the manager and asset class levels for the public market investments.

Staff will use realized returns to evaluate ex post tracking error but will typically rely on a risk model to estimate ex ante risk. Most commercial risk models make simplifying assumptions to improve reliability and sensibility, but they are ultimately assumptions that will never fully capture all outcomes, such as extreme losses in a drawdown. Nevertheless, the output of such models can be useful, particularly in the context of other analyses undertaken by staff.

B. Liquidity

Liquidity risk is defined as that element of total risk comes from the unpredictability of the cost and time duration necessary to convert existing investment positions to cash.

In combination with the illiquidity of private market investments and rebalancing requirements (see "Rebalancing Guidelines"), staff will consider the liquidity of the assets and cash flow requirements when recommending an asset allocation to the OIC and managing the Fund investments.

C. Foreign-Exchange Risk Management

The CSF makes distributions to Oregon's Department of Education in U.S. dollars, yet, for diversification purpose, a portion of the Fund's assets is invested outside the U.S. and denominated in foreign currencies. The translation of foreign-denominated investments back to the U.S. dollar provides incremental volatility of return to CSF's total, overall risk. Furthermore, there is little economic basis or empirical evidence to support a positive, long-term return expectation in connection with these foreign currency exposures. In other words, unmanaged foreign currency exposure is a source of uncompensated risk.

Staff will manage this risk by taking into consideration the magnitude of exposures, operational requirements, and portfolio construction.

IV. ASSET ALLOCATION GUIDELINES

Given the perpetual nature of the CSF, asset allocation will be the most important determinant of long-term success. The target allocation balances the need to satisfy the long-term return objective and to minimize total investment risk. The target allocation is based on long-term capital market assumptions (expected returns, risk, and correlations) of asset classes and over time should provide an expected return equal to or greater than the primary objective of the Fund, while avoiding undue risk concentrations in any single role or strategy; thus, reducing risk at the total portfolio level. To achieve these goals, the asset allocation will be set with the target percentages and within the ranges provided in Appendix A.

Formal asset allocation reviews will be performed at least every three years to ensure that the Fund is positioned properly. These reviews will be performed by OST staff in conjunction with the OIC's general consultant.

Rebalancing Guidelines

The OIC recognizes that rapid unanticipated market shifts or changes in economic conditions may lead to wide deviations from the target allocation and approved ranges. Generally, these divergences are of a short-term or tactical nature in response to fluctuating market environments. There may be short-term deviations from the target due to illiquidity of private market investments.

A breach of any of the established asset allocation ranges triggers a review and possible rebalancing back to established targets with due consideration given to the liquidity of the affected investments, all anticipated transaction costs and the current portfolio structure within each asset class. Given the nature of private assets, the amount and timing of the cash flows cannot be precisely known, and it will take time to build out the portfolio to the long-term policy target levels. Accordingly, at any particular time, the actual allocation to Private Equity, Real Estate, Real Assets, and Diversifying Strategies may be above or below the long-term target allocation.

OST staff will review the asset allocation on a monthly basis and rebalance to within the target asset allocation range at least quarterly if necessary.

V. STRATEGIC ROLE GUIDELINES

This section outlines the strategic investment guidelines for each portfolio role, which shall serve as a framework for evaluating asset allocation choices across asset classes and investment strategies to achieve the Fund's objectives. While certain strategies and investment securities may demonstrate risk and return characteristics at different time periods that could fulfill more than one portfolio role, it is the strategic nature of those investments that shall dictate the primary purpose they serve in the Portfolio.

Global Equity Investments
The strategic role of publicly traded equity securities is to serve as the Fund's primary return-seeking investments to generate long-term asset growth. Return over time is primarily driven by equity risk beta. The Fund's Global Equity portfolio also provides liquidity necessary to meet its cash distribution obligations.

Fixed Income Investments
The strategic role of fixed income securities is to diversify the Fund in general and its allocation to equity securities in particular. The Fixed Income portfolio provides liquidity necessary to meet its cash distribution obligations. The fixed income allocation shall consist primarily of U.S. investment grade fixed income securities represented within the benchmark index. It may also allow for non-benchmark sectors, including, but not limited to, developed and emerging markets international securities, inflation-linked bonds, as well as below investment grade securities.

Private Equity Investments
The strategic role of private equity investments is to enhance return and diversification opportunities for the Fund. While potentially more volatile than public equity, private equity provides a diversification benefit and the opportunity to achieve higher returns. Diversification in the Fund's Private Equity portfolio may be accomplished by investing across different fund types and strategies including venture capital, leverage buyout, mezzanine debt, distressed debt, sector funds, secondaries, and fund-of-funds.

Real Estate Investments
The strategic role of real estate investments is to enhance return and diversification opportunities for the Fund while providing some inflation protection. Diversification in real estate may be accomplished through exposure to a variety of real estate debt and equity investment strategies, property types (i.e., office, industrial, retail, multifamily, hospitality, etc.), geographic location, and various stages of a property life-cycle.

Real Asset Investments
The strategic role of real asset investments is to enhance long-term return and diversification

opportunities for the Fund. A lower correlation between the returns of real asset investments and other Fund assets is expected, and real asset investments are therefore expected to provide an added measure of diversification to overall Fund returns. Diversification in real asset investments may be achieved through exposure to a variety of possible alternative investment assets and strategies, including, but not limited to, infrastructure and natural resources.

Diversifying Strategies Investments
The strategic role of diversifying strategies investments is to enhance long-term return and diversification opportunities for the Fund. A lower correlation between the returns of diversifying strategies investments and other Fund assets is expected, and diversifying strategies investments are therefore expected to provide an added measure of diversification to overall Fund returns. Diversification in diversifying strategies investments may be achieved through exposure to a variety of possible alternative investment assets and strategies, including, but not limited to, long-short, relative value, directional, event driven, and other diversifying strategies.

VI. PERFORMANCE MEASUREMENT AND EVALUATION

Total Portfolio Performance:

The principal goal of the Fund is to maximize the likelihood of achieving and/or exceeding the Investment Objectives stated in this IPS over the long-term.

The primary benchmark for evaluating performance of the Fund will be a weighted benchmark consisting of broad market indices for the underlying strategies combined according to the strategy allocation targets as described in Appendix A. Total Portfolio performance will be evaluated on a net-of-fee basis relative to the representative weighted benchmark over various trailing time periods, as applicable.

A portion of the Fund's assets will be committed to private assets. Given the nature of these investments, the amount and timing of the cash flows cannot be precisely known, and it will take time to build out the portfolio to the long-term policy target levels. Accordingly, at any particular time, the actual allocation to Private Equity, Real Estate, Real Assets, and Diversifying Strategies may be below the long-term target allocation. Accordingly, the composition of the Interim Policy Benchmark will be reviewed annually and adjusted to gradually converge to the Policy Benchmark.

The secondary benchmark for evaluating the efficacy of the Policy Portfolio's complexity and diversification will be a simplified reference portfolio.

Strategy Performance:

Performance for the underlying asset classes will be compared with the risk and return of an appropriate market index (as described in Appendix A), on a net-of-fee basis over various trailing time periods.

Review and Reporting:

OST/OIC Reviews. OST staff will continuously review asset allocations and investment performance, and present their review and conclusions to the OIC on no less than an annual basis. These reviews will focus on the continued appropriateness of existing policy, compliance with guidelines and performance relative to Fund objectives.

Presentation to State Land Board. OST staff will arrange for and lead a formal review of the Fund at a meeting of the State Land Board on at least an annual basis. OST and DSL staff will coordinate in advance of each meeting to develop an agenda.

The foregoing IPS was adopted by the Council to be effective as of September 7, 2022

By:___________________________________
(Title)

Appendix A

Asset Allocation Strategy Targets & Range

Fund Role	Benchmark	Min	Interim Target	Long-Term Target	Max
Global Equity	MSCI ACWI IMI Net	40.0%	47.5%	45.0%	50.0%
Private Equity	Russell 3000 + 300 bps	10.0%	12.5%	15.0%	20.0%
Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	15.0%	22.5%	20.0%	25.0%
Real Estate	NCREIF-ODCE	5.0%	10.0%	10.0%	15.0%
Real Assets	CPI+ 4%	0.0%	2.5%	5.0%	10.0%
Diversifying Strategies	HFRI FOF Conservative Index	0.0%	5.0%	5.0%	10.0%
Cash	Cash	0.0%	0.0%	0.0%	3.0%

*   Total Portfolio Index will be a weighted benchmark consisting of market indices for each strategy combined according to the strategy allocation targets as described above
** The sum of Strategy "Min" and "Max" within each Portfolio Role (Global Equity, Private Equity, Fixed Income, Real Estate, Real Assets, Diversifying Strategies, and Cash) will not equal "Min" and "Max" for each Role.
***Based on the risk profile of the approved asset allocation using standard deviation as the risk metric, the reference portfolio equates to 70% global equity and 30% core fixed income.

OIC

OREGON STATE TREASURY

TAB 5

STATE ACCIDENTAL INSURANCE FUND

ANNUAL REVIEW

November 2, 2022 Oregon Investment Council

SAIF Fixed Income Portfolio Annual Review

Perrin Lim, Investment Officer

OREGON STATE TREASURY

Agenda

1. SAIF Fixed Income Portfolio Overview

State Accident Insurance Fund (SAIF)

Performance as of August 31, 2022

	Ending Market Value	% Portfolio	1 Mth	3 Mth	YTD	1 Year	Annualized 2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
State Accident Insurance Fund	**$4,439,158,955**	**100.0%**	**-2.51%**	**-2.01%**	**-10.66%**	**-10.89%**	**-3.06%**	**0.44%**	**2.73%**	**2.37%**	**3.48%**	**3.50%**
*Oregon SAIF Policy Index**	-	-	*-2.71%*	*-2.22%*	*-11.31%*	*-11.52%*	*-3.95%*	*-0.24%*	*2.18%*	*1.84%*	*2.81%*	*2.83%*
Total Global Equity - SAIF	**$430,897,725**	**9.7%**	**-3.55%**	**-5.53%**	**-17.62%**	**-16.03%**	**4.60%**	**8.17%**	**5.77%**	**7.01%**	**8.55%**	**9.01%**
Blackrock	$430,897,725	9.7%	-3.55%	-5.53%	-17.62%	-16.03%	4.60%	8.17%	5.77%	7.01%	8.55%	9.01%
MSCI ACWI IMI Net	-	-	*-3.55%*	*-5.58%*	*-17.78%*	*-16.24%*	*4.39%*	*7.95%*	*5.53%*	*6.75%*	*8.26%*	*8.69%*
Total Fixed Income - SAIF	**$3,599,466,244**	**81.1%**	**-2.63%**	**-2.08%**	**-11.81%**	**-12.54%**	**-5.31%**	**-1.32%**	**1.79%**	**1.34%**	**2.55%**	**2.63%**
Wellington	$1,795,605,115	40.4%	-2.65%	-2.16%	-12.11%	-12.80%	-5.54%	-1.51%	1.61%	1.21%	2.43%	2.54%
Western Asset	$1,803,861,129	40.6%	-2.62%	-2.01%	-11.51%	-12.28%	-5.08%	-1.14%	1.98%	1.47%	2.68%	2.71%
*Oregon SAIF FI Index***	-	-	*-2.86%*	*-2.29%*	*-11.84%*	*-12.51%*	*-5.76%*	*-1.74%*	*1.30%*	*0.88%*	*1.91%*	*1.97%*
Total Real Estate - SAIF	**$305,201,549**	**6.9%**	**0.00%**	**4.39%**	**21.59%**	**28.51%**	**17.04%**	**-**	**-**	**-**	**-**	**-**
Morgan Stanley	$162,283,543	3.7%	0.00%	3.04%	20.85%	27.89%	17.21%	-	-	-	-	-
REEFF America	$142,918,006	3.2%	0.00%	5.97%	22.40%	29.22%	16.23%	-	-	-	-	-
NCREIF ODCE (Custom) (Adj.)	-	-	*1.49%*	*5.40%*	*18.81%*	*27.96%*	*16.01%*	*11.21%*	*9.84%*	*9.33%*	*9.52%*	*10.10%*
SAIF - Cash Invested in OSTF	**$51,782,513**	**1.2%**	**0.02%**	**0.12%**	**-0.44%**	**-0.57%**	**-0.10%**	**0.65%**	**1.30%**	**1.37%**	**1.31%**	**1.10%**
SAIF - Pledged Securities	**$51,810,925**	**1.2%**	**-2.04%**	**-1.44%**	**-6.65%**	**-6.89%**	**-3.43%**	**-1.33%**	**0.25%**	**-0.06%**	**0.23%**	**0.40%**

Source: State Street.
* SAIF Policy Index: 10% MSCI ACWI IMI Net Daily; 85% SAIF FI Index (** 50% BBG US Corporate Index, 20% BBG MBS Fixed Rate Index, 15% BBG US Government Index, 10% BBG US Corporate Intermediate Index, 5% BBG US High Yield Ba/B 2% Issuer Cap Index); 5% NCREIF ODCE Index.

OREGON STATE TREASURY

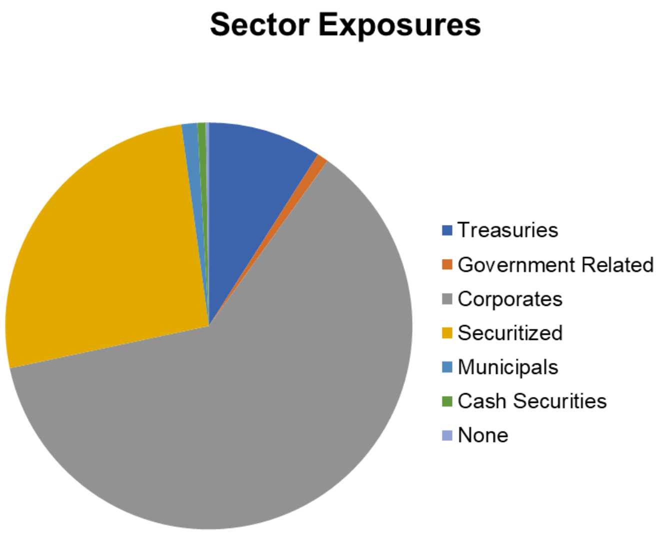
State Accident Insurance Fund (SAIF) – Fixed Income Characteristics

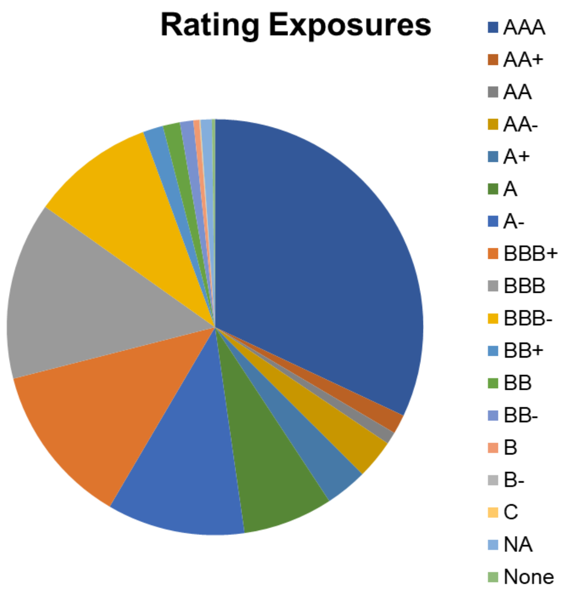
Data as of August 31, 2022

Objective – The SAIF portfolio is largely designed to be comprised of fixed income holdings that provide positive cash flow, dampen overall portfolio volatility, provide a real rate of return, and are positively linked to the entity's insurance liabilities. Maintaining the flexibility to seek out total return and a focus on realized loss minimization are additional, important criteria.

Strategy – SAIF funds are invested to maintain an overall portfolio quality of single A or higher with an average duration of +/-20% of the custom fixed income benchmark. In addition, maturities are structured to provide reinvestment opportunities that consider SAIF's operating cash flow projections. SAIF hires independent consultants to develop an appropriate strategy and benchmark. OST staff assists in this process and helps select firms that can best achieve the desired objective given all relevant constraints.

		Yield to Maturity		Duration		Effective Rating	
Portfolio	**NAV ($Ms)**	**Portfolio**	**Benchmark**	**Portfolio**	**Benchmark**	**Portfolio**	**Benchmark**
SAIF FI	3,651,277	4.83	4.55	6.46	6.43	A	A+
Wellington	1,795,605	4.88	4.55	6.54	6.43	A+	A+
Western Asset	1,803,861	4.82	4.55	6.47	6.43	A	A+
Pledged Securities	51,811	3.41	-	3.52	-	AAA	-





Source: State Street and Aladdin.

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Updated Jan 2016

SAIF Fixed Income Portfolio 2022 Annual Review

OREGON
STATE
TREASURY

Tobias Read
Oregon State Treasurer

350 Winter St NE, Suite 100
Salem, OR 97301-3896

oregon.gov/treasury

SAIF Oregon Investment Council

November 2, 2022

Chip Terhune, President & CEO
Gina Manley, CFO

Bridging the financial gap

SAIF's charter, as defined in ORS 656.752 (2)(b), is "To make insurance available to as many Oregon employers as inexpensively as may be consistent with the overall integrity of the Industrial Accident Fund, in accordance with ORS 656.634 and sound principles of insurance."

Mission

SAIF's mission is to serve Oregon's workers and employers by making workers' compensation coverage widely available, affordable, and accessible, and by providing extraordinary service.

Who we are

- Largest workers' comp provider in Oregon
- Market share by premium is 55.5%, more than 55,000 policyholders
- Independent, not-for-profit, public corporation
- Governed by a board of directors, appointed by the governor
- We don't receive taxpayer money or state funding

How we fulfill our mission

- Get injured workers back to work as soon as they are able
- Our vision is to make Oregon the safest and healthiest place to work
- 67 safety and health experts—the largest network of workplace safety professionals of any insurance carrier in Oregon
- Affordable coverage, dividends
- SAIF specializes in insuring high-hazard industries

Initial areas of focus

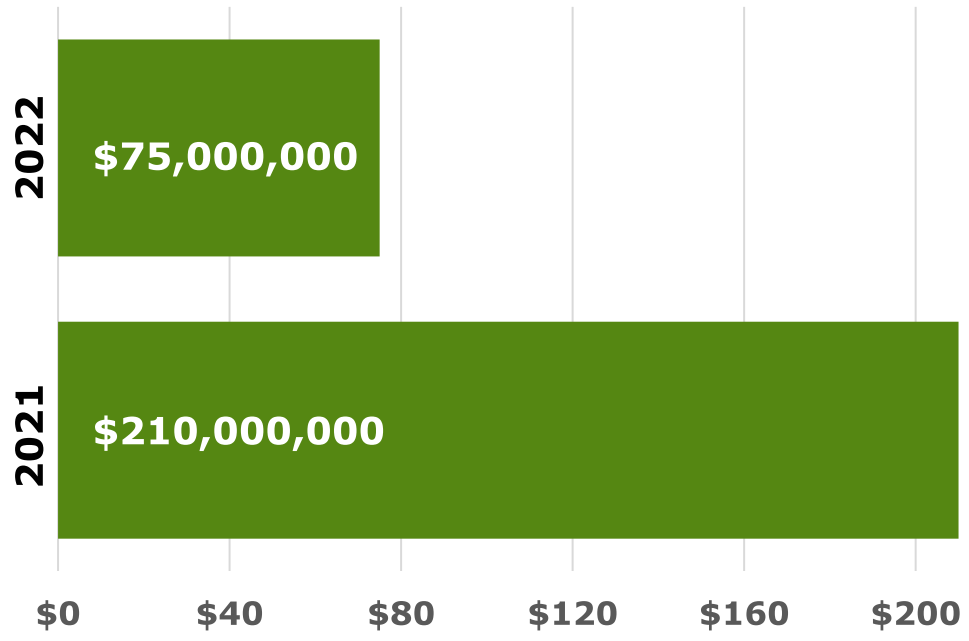
- Longer Term Planning
- Succession Planning
- Diversity, Equity & Inclusion
- Technology Improvements
- Project/Change Management
- Flexible Workforce

The state of SAIF is strong

- Market share is 55.5%
- Pricing is competitive
- Very strong safety program
- Market-leading service levels

The state of SAIF (continued)

DIVIDENDS

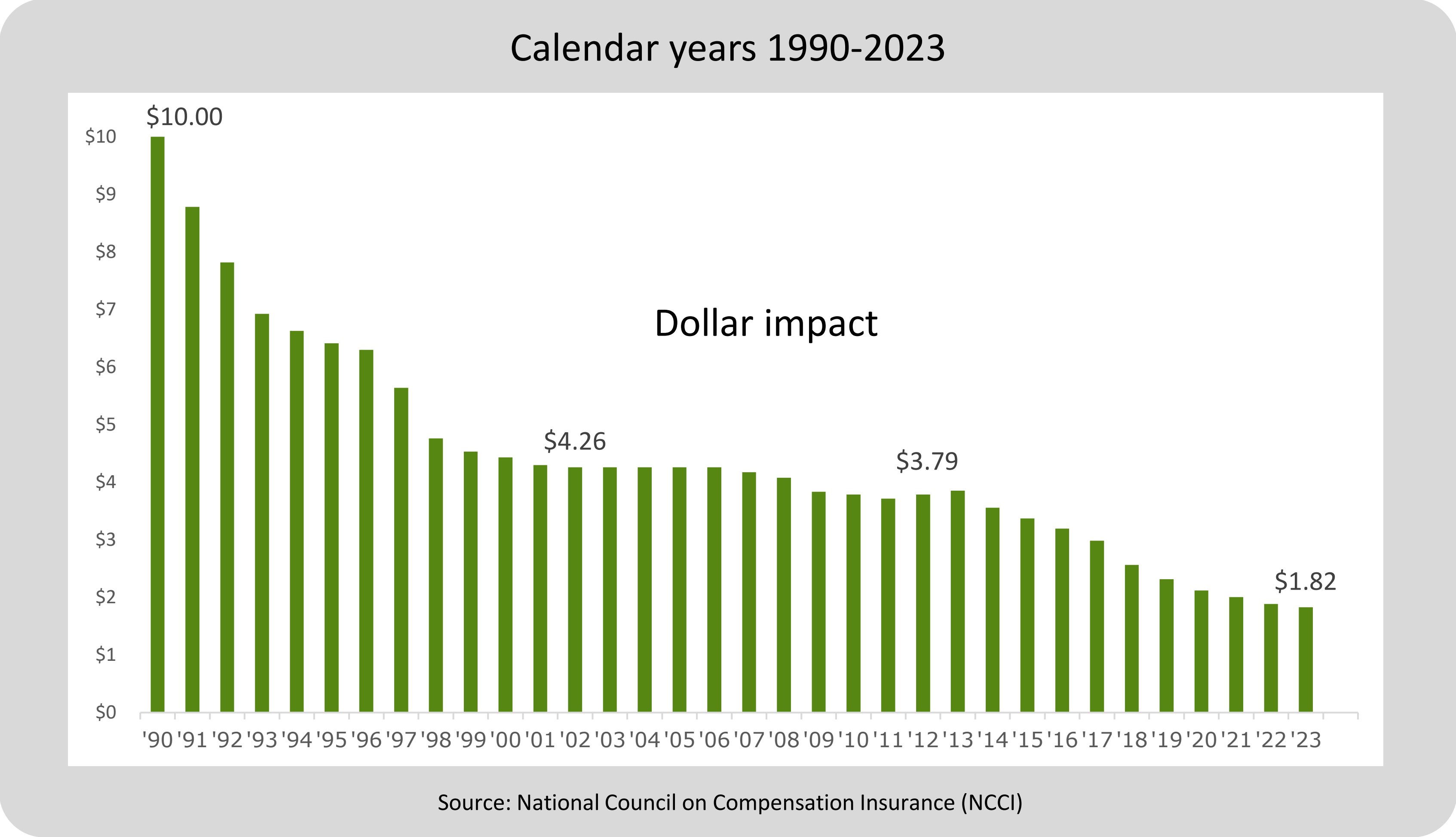


- Customer retention rate over 97% for the last ten years
- The workers' comp system is stable and balanced

  2023 pure premium reduction of 3.2%

  2022 pure premium reduction of 5.8%

Impact of Oregon workers’ comp premium rate changes



SAIF's financial model

- Policies are priced below actual cost
- Investment returns subsidize pricing
- Changes to our $2.5B claims reserve have a big impact
- Goals:
  - Maintain stable, predictable pricing
  - Pay a dividend when appropriate

SAIF’s financial profile

Balance sheet

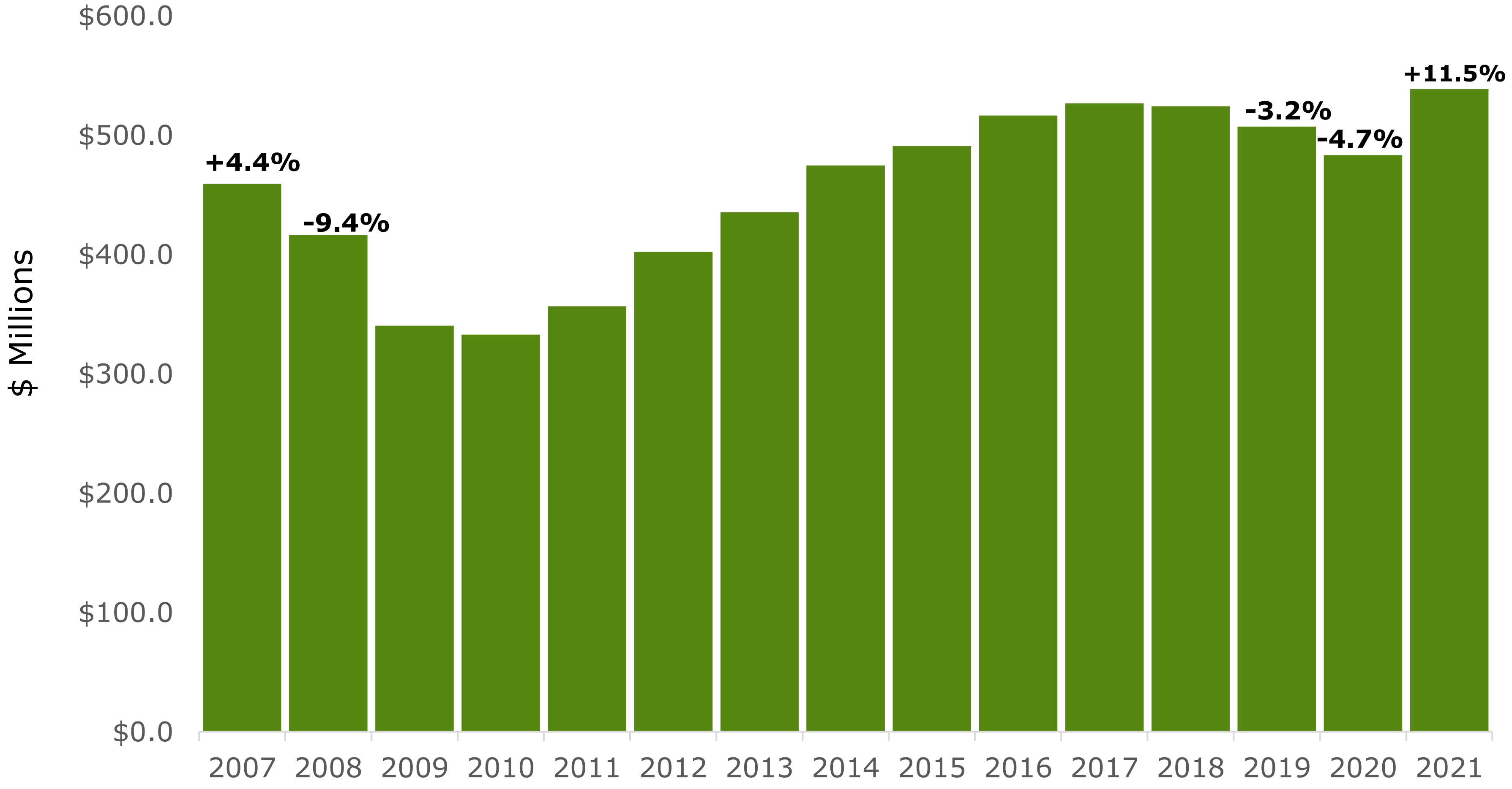
As of December 31

	2021
Invested assets	$4.9 billion
Other assets	$0.3 billion
Total assets	**$5.2 billion**
Claims reserves	$2.6 billion
Insurance payables and other	$0.4 billion
Total liabilities	**$3.0 billion**
Total surplus/capital	**$2.2 billion**
Total liabilities & surplus/capital	**$5.2 billion**

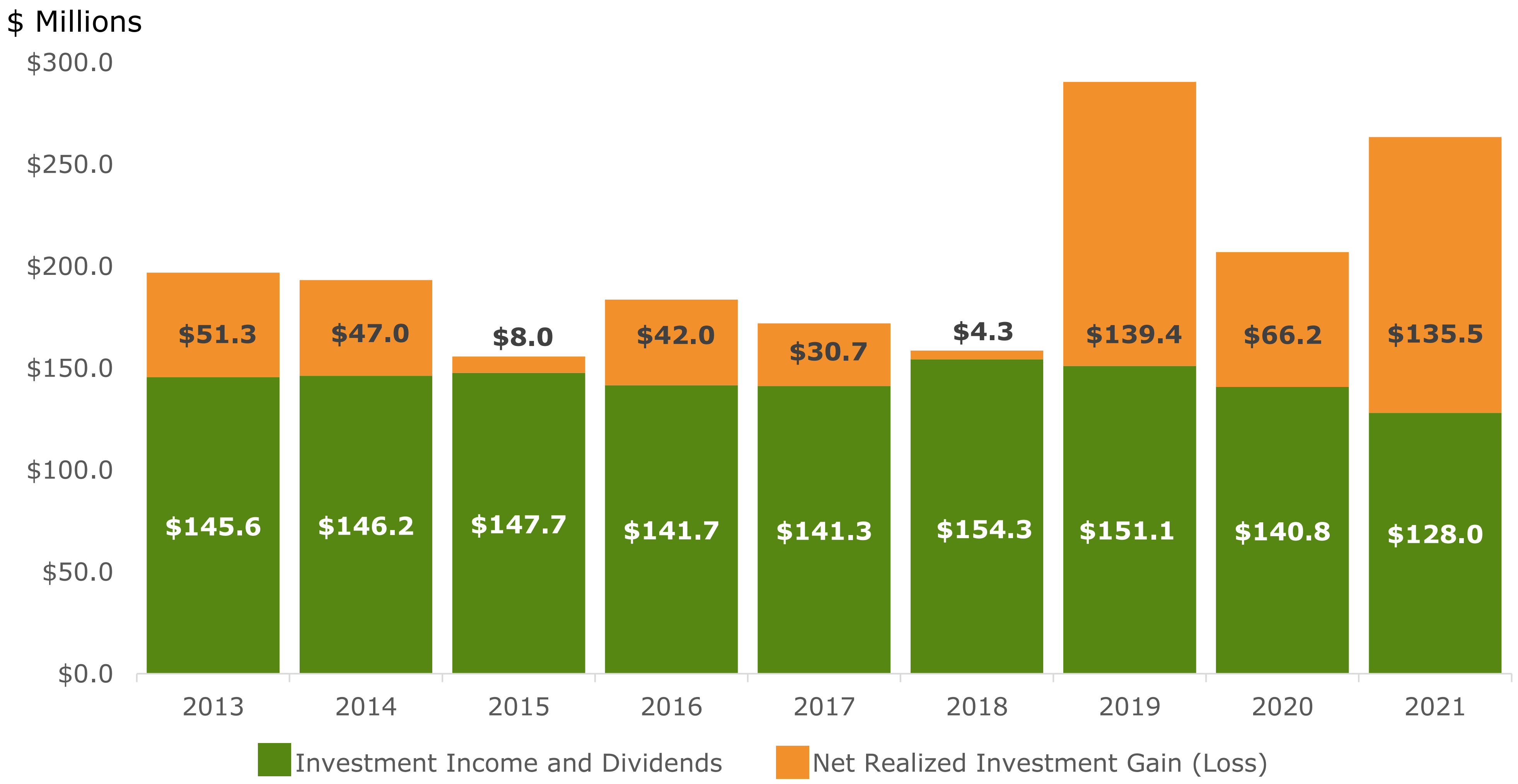
Income statement

$ in millions	**2021**
Premiums	$ 538.9
Claims	436.5
Loss adjustment, underwriting & other expense	202.8
Underwriting gain (loss)	**(100.4)**
Investment income & realized gains	263.5
Miscellaneous income	(0.9)
Net income before dividends	162.2
Policyholder dividends	210.0
Net income after dividends	**$ (47.8)**

Net earned premium



Total investment income



SAIF’s investment priorities

- Preservation of capital
- Stable, predictable investment returns
- Matching liquidity to SAIF cash needs
  - Availability of capital in a crisis
  - Availability of capital for project work

Investment allocation

Investment allocation approved at April 2019 OIC meeting:

	Previous Allocation	Aug. 2022 Allocation	Current Target Allocation
Fixed income	90%	83%	77%
Real estate funds	0%	7%	5%
Equities	10%	10%	10%
Bank loans & private credit	-	-	8%

SAIF will begin an asset allocation study in 2023 in partnership with Treasury. The results will be presented to the SAIF board of directors and the OIC for approval.

Capital levels help determine:

- Pricing
  - Investment income offsets underwriting losses
- Dividends
  - Based on a snapshot in time and future outlook
- SAIF’s mission is to serve Oregon’s workers and employers by making workers’ compensation coverage widely available and affordable, and by providing extraordinary service.
  - Underwriting
  - Service levels

Capital levels help determine:

Our risk tolerance

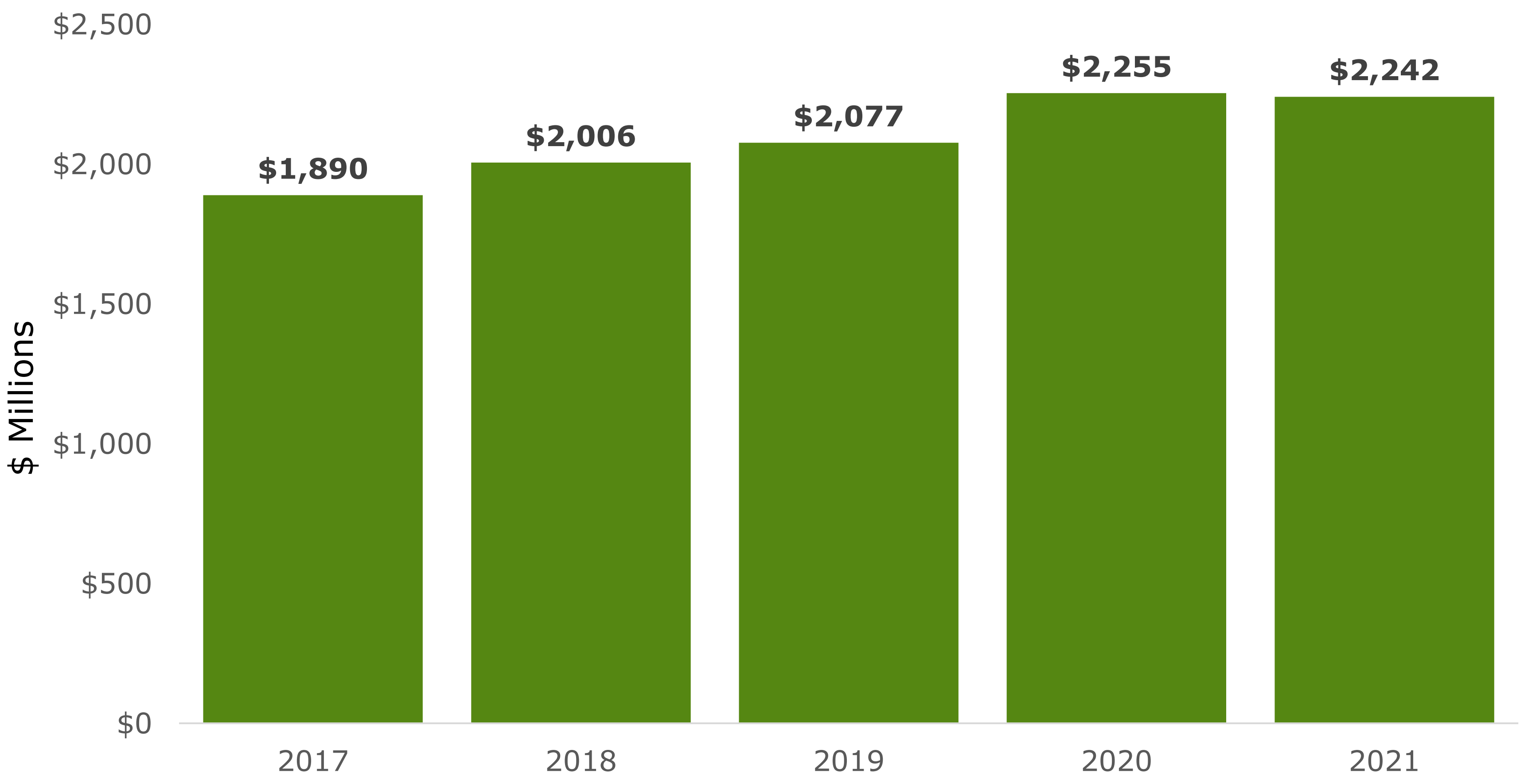
- Recession
- Earthquake
- Medical Cost Escalation
- Pandemics
- Legislative/Regulatory/ Judicial changes
- Changes in loss patterns

Our board adopts a risk tolerance statement

Maintain a minimum surplus of 5.0 times CAL-RBC; risk models show the likelihood of capital falling below CAL-RBC over next three years is less than .5%

Surplus/capital

as of December 31



SAIF’s capital need is affected by:

- Lack of diversification
- No other sources of capital
- WC is a “long tail” line of insurance
- Necessary long-term investments

COVID-19

COVID-19 claims

Paid & incurred COVID-19 claim costs by year:

$ in millions	2Q22	2021	2020	Total
Paid	$7.5	$7.6	$2.5	$17.6
Incurred	$15.0	$20.7	$3.7	$39.4
Reported claim count	2,166	2,142	2,295	6,603

- Significantly more COVID claims reported in first half of 2022 vs. first half of 2021 or 2020
- Booked reserves consider potential for COVID claims that have occurred but have not yet been reported to SAIF

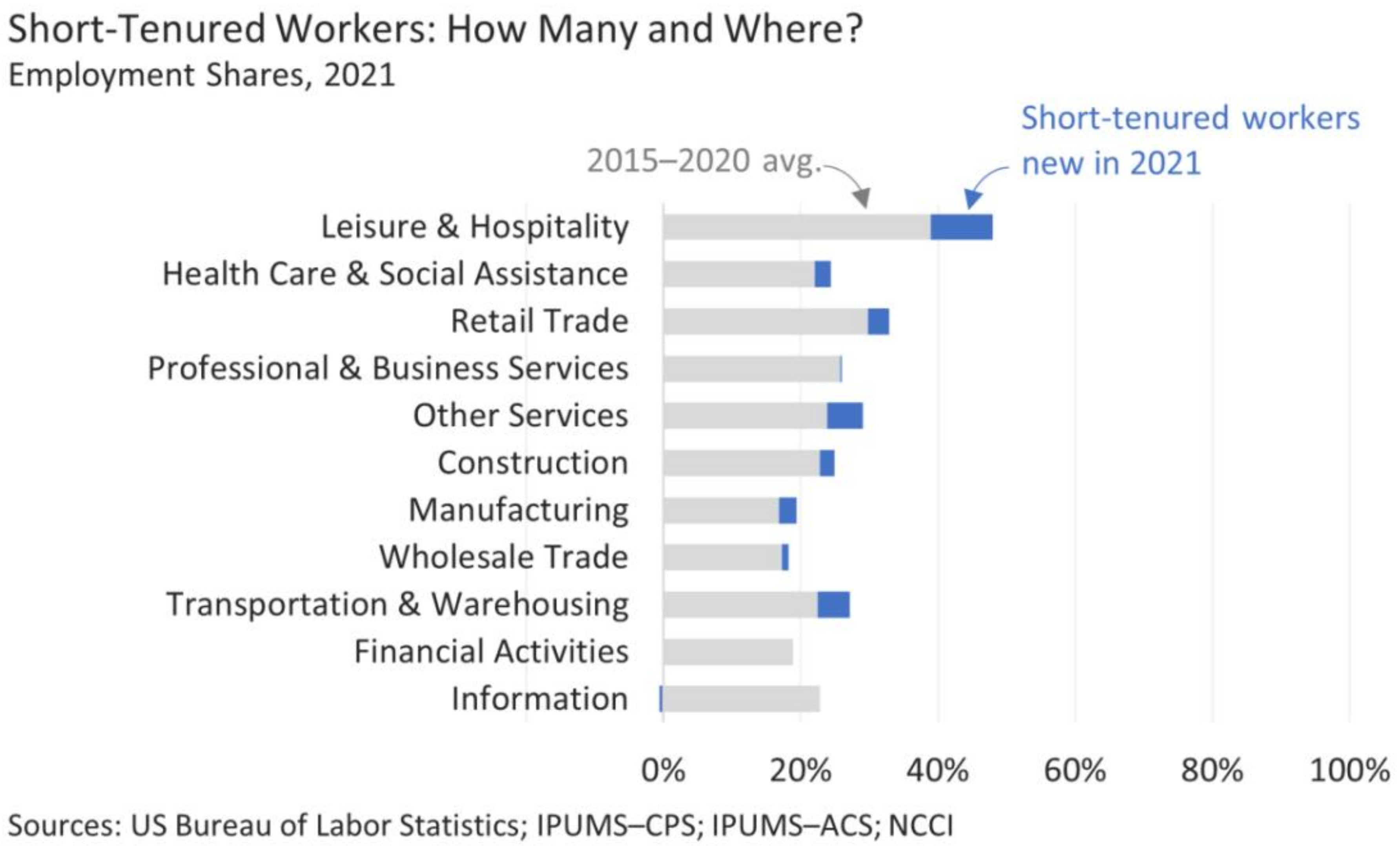
SAIF’s response to COVID-19

- Remained open for business; staff working remotely since March 13, 2020
- $21.3M Coronavirus worker safety fund
- Increased flexibility
  - Moratorium on cancellations
  - Flexible payment terms
  - No premium charged for employees on paid furlough
  - Relaxed claim filing requirements
- Outbound calls to policyholders
- Dissemination of COVID-safety information

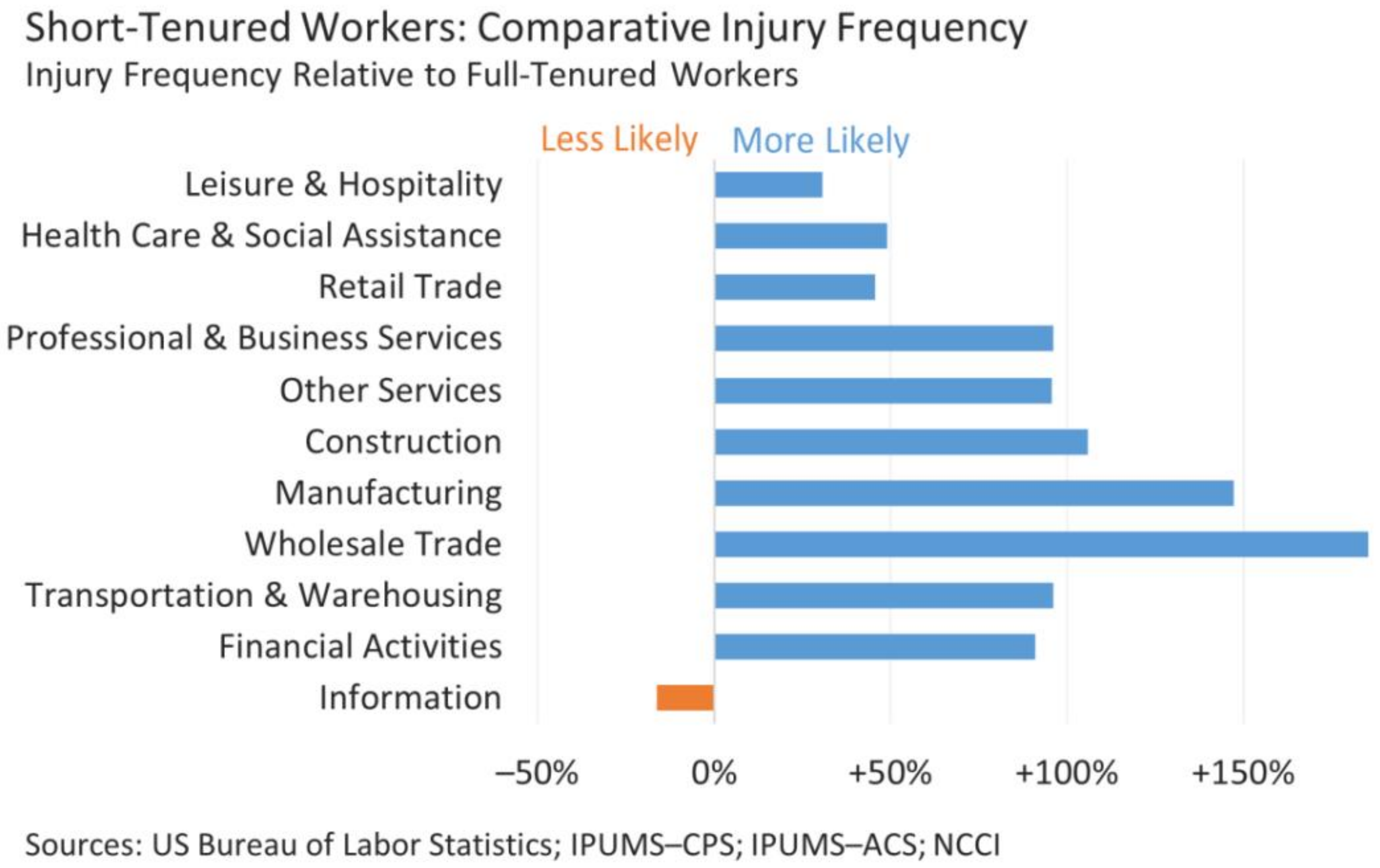
Remote work and a shifting labor market

National trends

- Increases in short-tenured workers
  - Short tenured workers are more than twice as likely to be injured at work
- Increase in remote work has decreased frequency of injuries for office-based sectors
  - Approximately 22.7% of Oregon workers work from home in 2021
    - Up from 7.3% in 2019
  - Unknown how work-from-home will impact ergonomic and other related injuries in the long-term



National Council on Compensation Insurance, Inc. The Great Reshuffle and Workers Compensation Frequency



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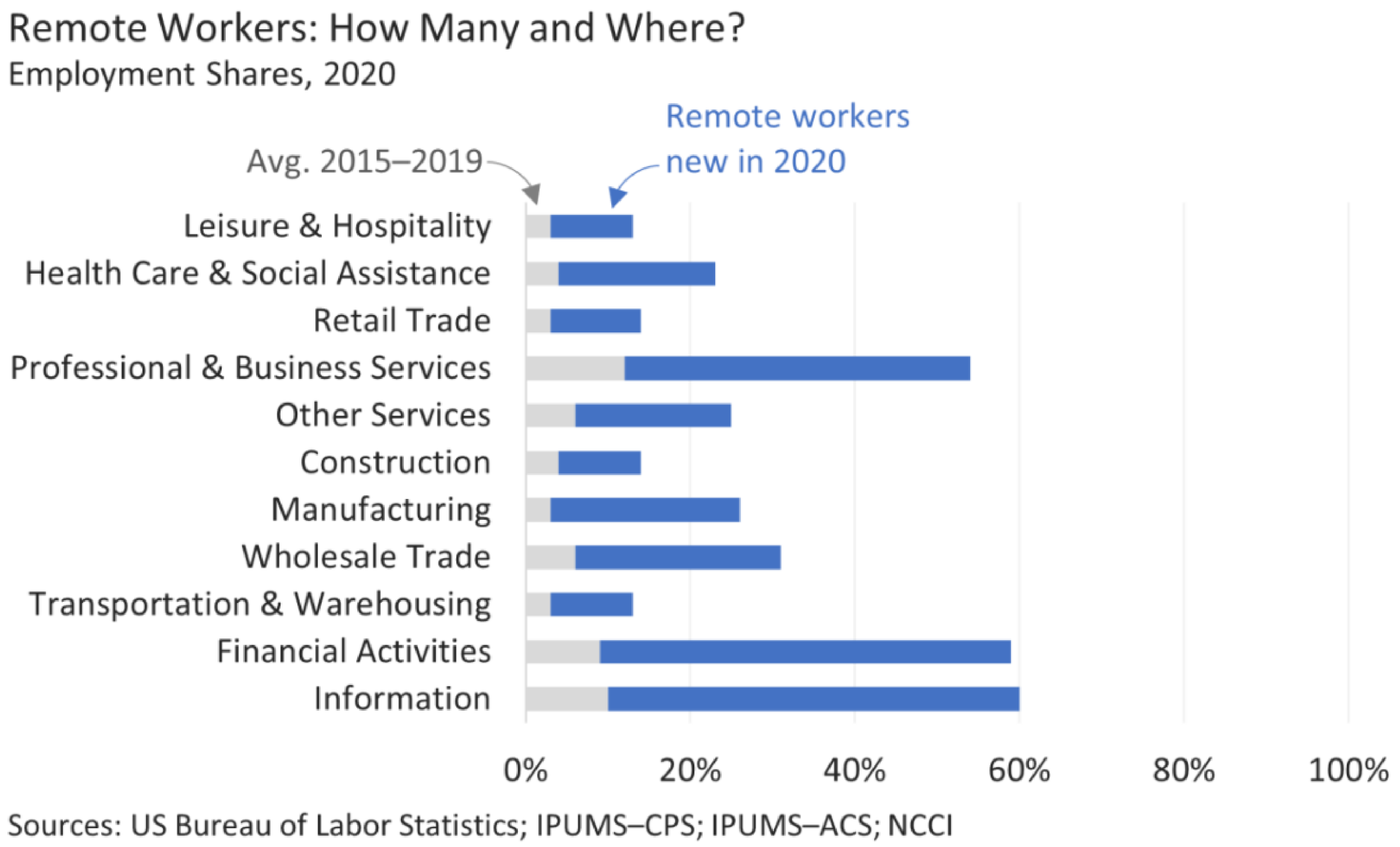

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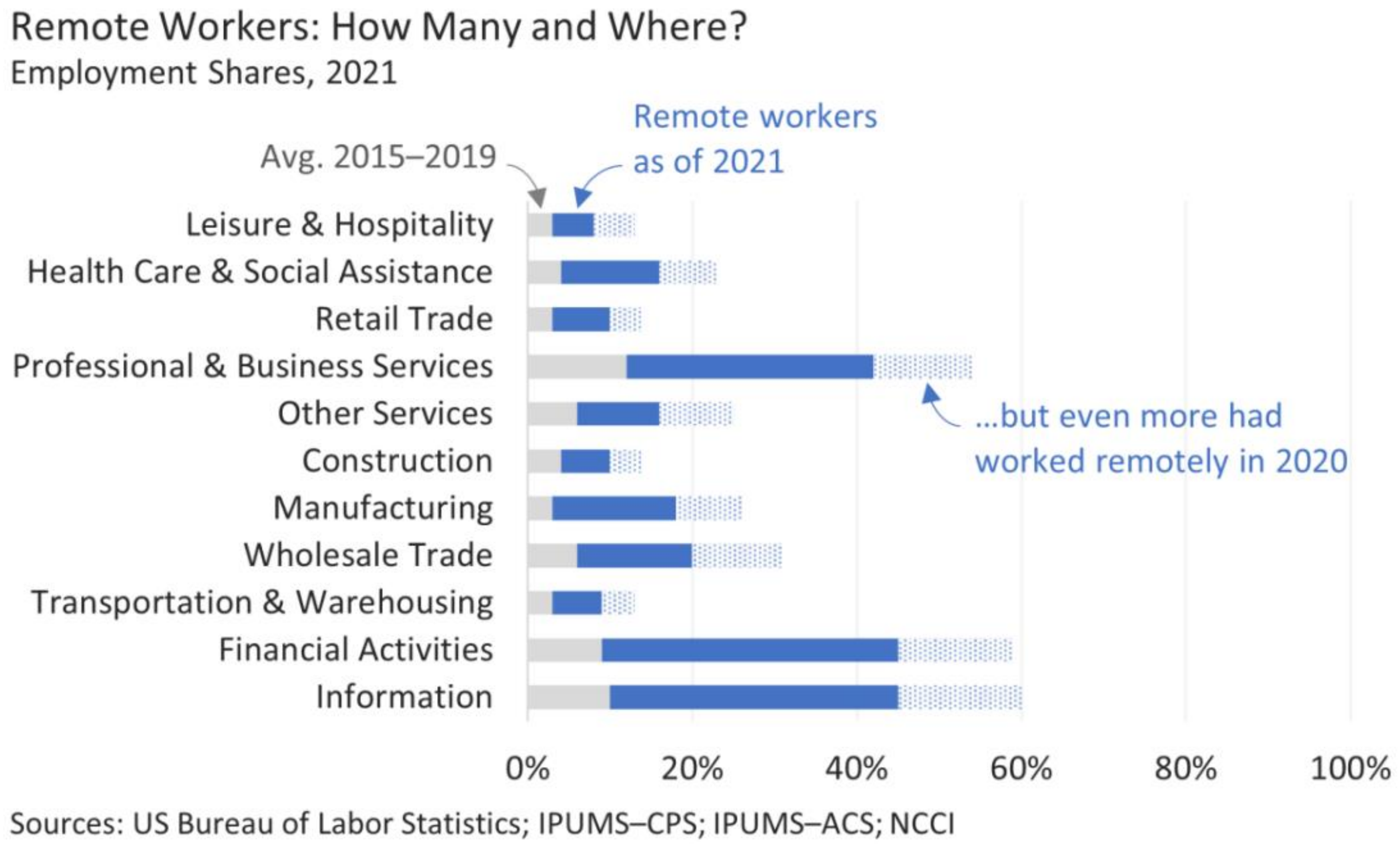


National Council on Compensation Insurance, Inc. The Great Reshuffle and Workers Compensation Frequency

Economic volatility

Key risks

On-going and future pandemic impacts

Changes in medical cost escalation

Fluctuations in policyholder payroll

Investment market volatility

Total investment revenue*

As of June 30, 2022

	2Q22	2Q21	Change
Bond interest income	$66.4 million	$66.5 million	-0.2%
Realized gains (losses)	(15.3) million	14.3 million	-207.0%
Total investment revenue	$51.1 million	$80.8 million	-36.8%

- As interest rates rise, investment income will slowly increase.
- Rising interest rates will also cause our current bond holdings to decrease in value driving realized losses.

*Results are reported using Statutory insurance accounting rules which do not reflect the full mark-to-market adjustments for bond holdings.

Investment returns: Market value

As of June 30, 2022

- Portfolio down 11.32% for the first half of 2022
  - Bonds down 11.96%
  - Stocks down 20.29%
  - Real estate funds up 16.47%
- Portfolio performed better than the benchmark by 0.49 percentage points
- In compliance with approved policy

Investment Returns*

As of August 31, 2022

	YTD June 2022	July 2022	August 2022	Total YTD August 2022
Realized gains (losses)	$(15.3) million	$(1.5) million	$(0.0) million	$(16.8) million
Unrealized gains (losses)	(104.5) million	42.0 million	(18.6) million	(81.1) million
Total	$(119.8) million	$40.5 million	$(18.6) million	$(97.9) million

*Results are reported using Statutory insurance accounting rules which do not reflect the full mark-to-market adjustments for bond holdings.

Recession impact and planning

- Continue to take a long-term view
- Understand levers that we can pull in various scenarios (playbook exercises)
- Financial modeling & stress testing
    - Rising interest rates & inflation
    - Rising claims costs
    - Stress testing investment market declines

Other issues to watch

- Legislative/regulatory changes that threaten balance in WC system
- Economic and claim impacts from increased wildfire activity, drought, and record high temperatures.
- A “taking” of SAIF capital

saif

Work.
Life.
Oregon.

OIC

OREGON STATE TREASURY

TAB 6

OREGON SAVINGS GROWTH PLAN

ANNUAL REVIEW

OREGON PERS

PUBLIC EMPLOYEES RETIREMENT SYSTEM

Oregon Savings Growth Plan (OSGP)

November 2, 2022

Governance

Advisory Committee

Christine Valentine – State of Oregon

Jeff Gibbs – Local Government

Colin Benson – State of Oregon

Kyle Niemeyer – State of Oregon

Zachariah Heck – State of Oregon

Gene Bentley – Retired

Frank Goulard – Local Government

Treasury

Wil Hiles – Public Equity Investment Officer

Claire Illo – Public Equity Investment Officer

Callan Investment Consultant

Anne Heaphy – Senior Vice President

Uvan Tseng – Senior Vice President

Department of Justice

Steven Marlowe – Assistant Attorney General

Administrative Support

OSGP Staff

Debby Larsen – Program Manager

Dee Monday – Operations Coordinator

Jack Schafroth – Outreach Coordinator

John Bennett – Administrative Assistant

Dean Marshall – Retirement Counselor

Tamie Brahin – Retirement Counselor

Helen Wilson – Retirement Counselor

Recordkeeper: Voya Financial

Deirdre Jones – Relationship Manager

Carol Cann – Operations Manager

Jennifer Moran – Communication Consultant

Gladys Salguero – Education Team Manager

Plan Summary

Assets and Cash Flow (as of June 30, 2022)

Total plan assets	$2.8 billion
Net cash flow	$23 million
Pre-tax contributions	$32 million+
Rollover-in contributions	$25 million+
Roth contributions	$5.5 million+
Participants with Roth elections	6,700

Investment Composition

1.	LifePath Options	31% of plan assets
2.	Large Company Growth Stock Option	12% of plan assets
3.	Stock Index Option	12% of plan assets
4.	Schwab Brokerage account	497 participants with an average balance of $89,339

Investment Options and Performance

Investment options	Ending balance as of 6/30/22	Annual performance	Contribution by fund option
Large Company Growth Stock Option	$349,424,325.88	-12.05%	$6,606,836
Stock Index Option	$335,447,538.90	-7.45%	$5,914,551
Socially Responsible Investment Option	$37,434,335.75	-8.16%	$1,393,390
Small Company Stock Option	$241,355,194.37	-7.14%	$3,190,492
International Stock Option	$147,658,728.47	-14.56%	$3,291,093
Active Fixed Income Option	$183,137,010.03	-9.23%	$3,068,878
Real Return Option	$37,235,244.58	11.16%	$818,609
Large Company Value Stock Option	$223,913,668.96	-1.57%	$4,561,370
Stable Value Option	$358,210,530.69	1.43%	$4,321,933

Investment Options and Performance

Investment options	Ending balance as of 12/31/21	Annual performance	Contribution by fund option
LifePath® Retirement	$313,313,364.55	-8.82%	$5,751,894.71
LifePath® 2025	$156,439,174.38	-8.89%	$4,811,120.74
LifePath® 2030	$130,676,875.27	-9.11%	$5,504,447.25
LifePath® 2035	$100,159,177.29	-9.43%	$3,809,812.11
LifePath® 2040	$79,505,408.00	-9.77%	$3,661,408.93
LifePath® 2045	$54,132,944.34	-10.11%	$2,774,180.92
LifePath® 2050	$39,243,676.43	-10.40%	$1,731,402.24
LifePath® 2055	$18,460,411.07	-10.48%	$1,178,372.14
LifePath® 2060	$11,645,193.12	-10.49%	$652,547.93
LifePath® 2065	$2,140,793.18	-10.25%	$251,016.85

OSGP Fees

Administrative fees	Percentage of assets
State of Oregon Administrative Fee	0.07%
Recordkeeping/Custody/Trust/Communications	0.05%
Total Administrative Fees	**0.12%**

By investment option	Weighted average (%)
LifePath® Portfolios	0.07%
Stable Value	0.33%
Active Fixed Income Option	0.16%
Real Return Fund	0.22%
Large Company Value Stock	0.02%
Stock Index	0.02%
Socially Responsible Investment Option	0.17%
Large Company Growth Stock	0.02%
International Stock	0.52%
Small Company Stock	0.37%

Rollovers

OSGP Rollovers Out Qtr. 2 2022

Institution	# of Rollovers	% of Total	$ Rolled
OREGON PERS	95	33%	$474,261
EDWARD JONES	27	9%	$2,851,408
CHARLES SCHWAB	14	5%	$902,859
VANGUARD	10	3%	$2,388,410
TD	10	3%	$971,688
All Others	136	47%	$13,624,041

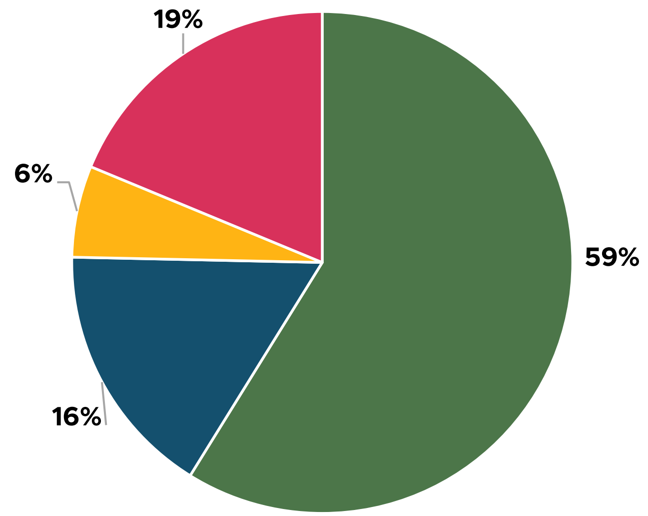
OSGP Rollovers-In Qtr. 2 2022

Institution	# of Rollovers	% of Total	$ Rolled
IAP	162	64%	$20,194,402
All Others	123	36%	$4,752,424

Participant Status Summary

As of June 30, 2022

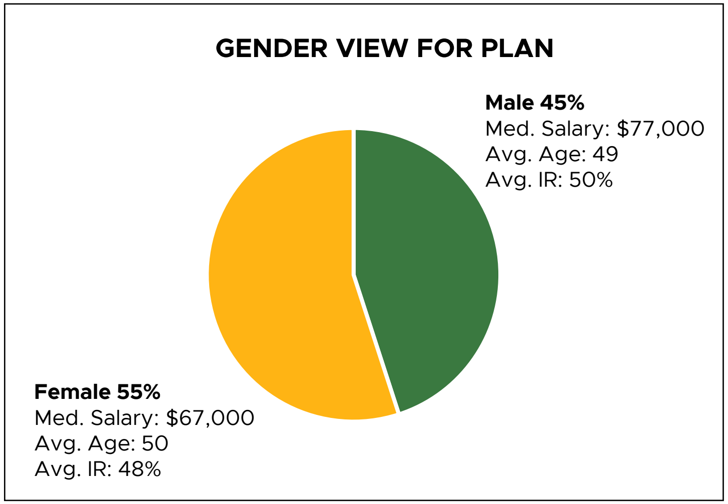
Participant Status	Number of Participants
Active, Contributing	22,629
Active Not Contributing	6,343
Terminated Receiving Installments	2,269
Terminated with a Balance	7,216
Total	**38,457***

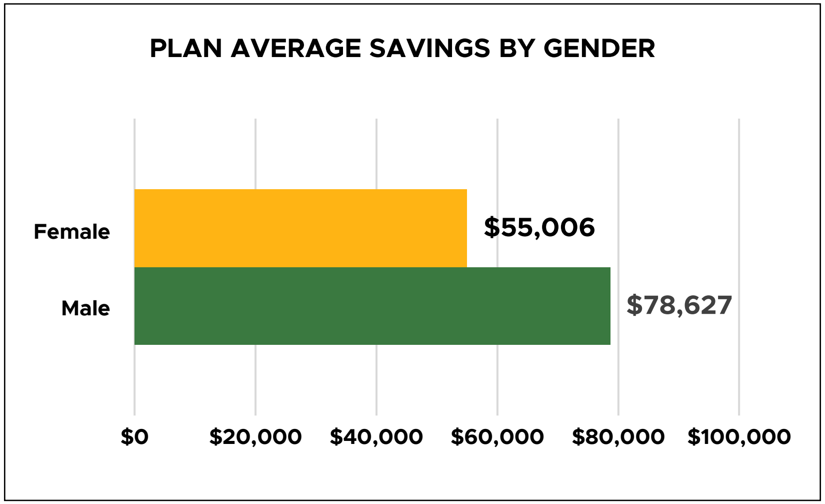


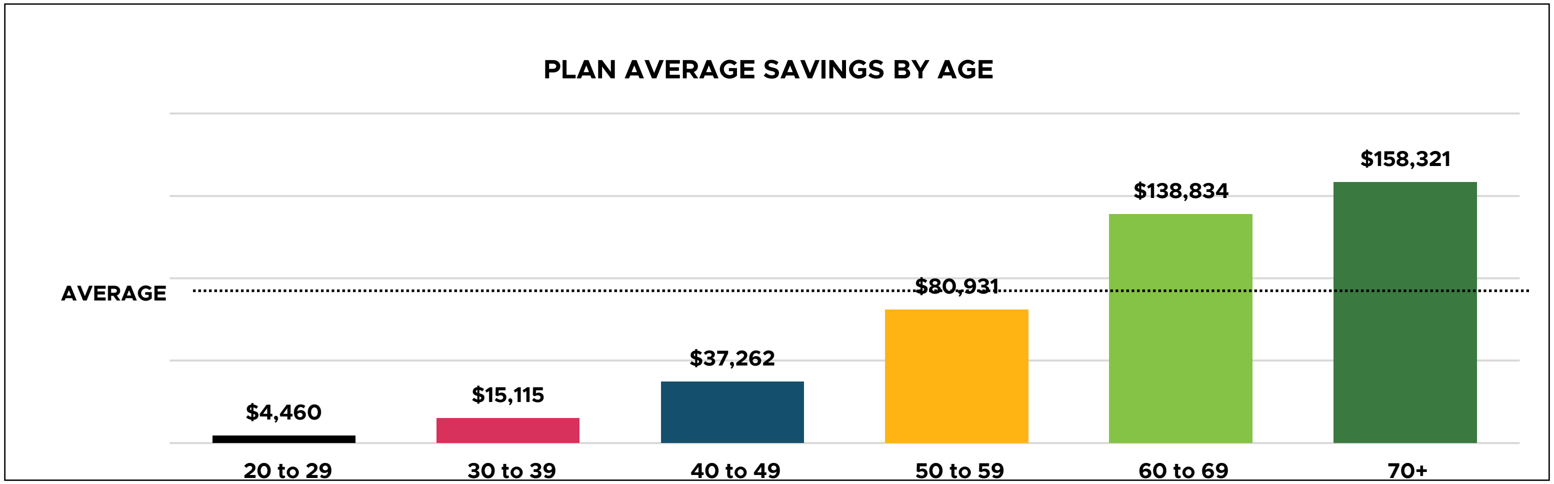
*Total includes 37 suspended accounts not included in chart.

Participant Status Summary

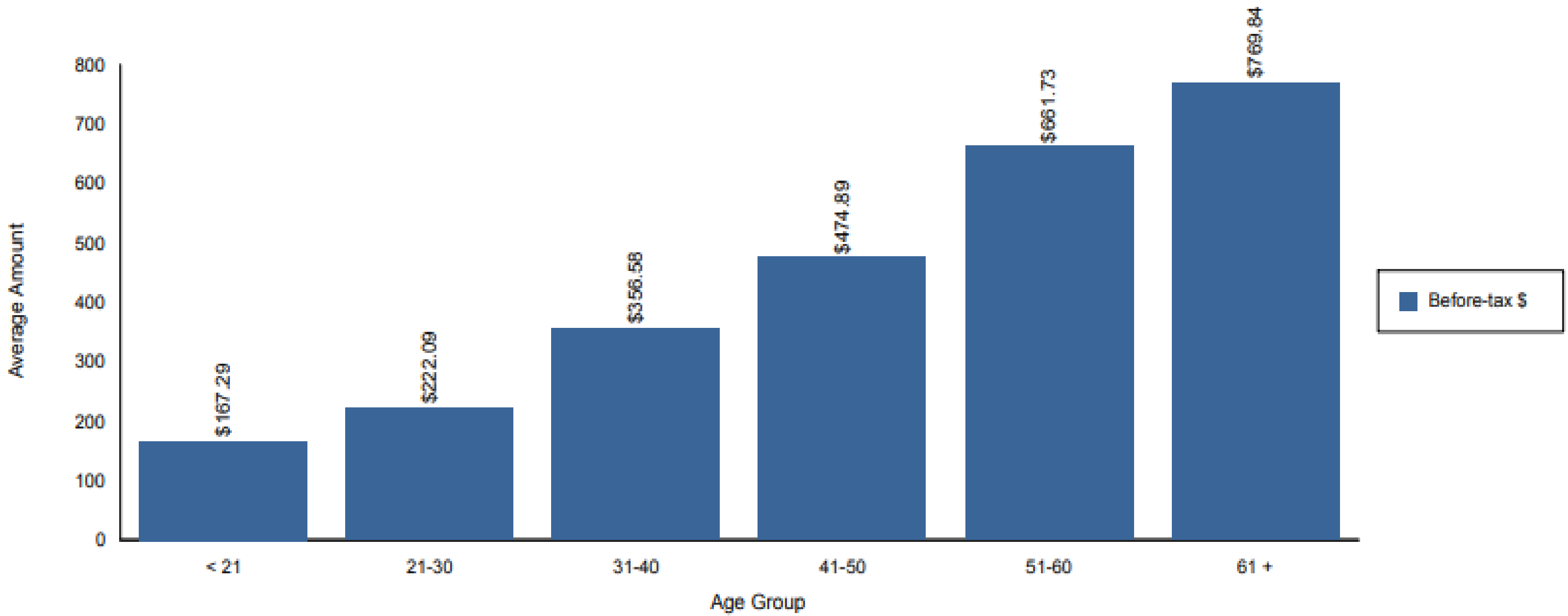
As of June 30, 2022





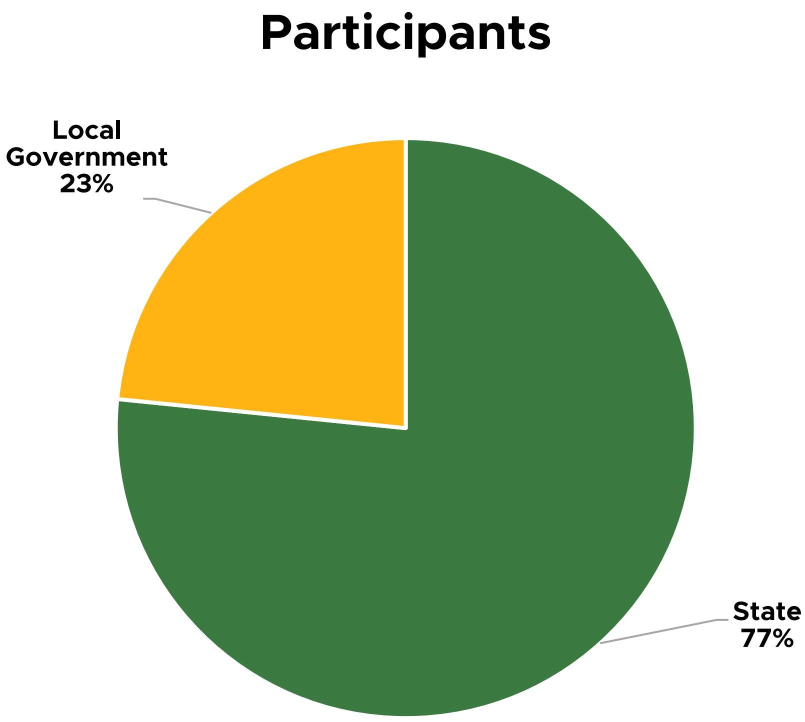


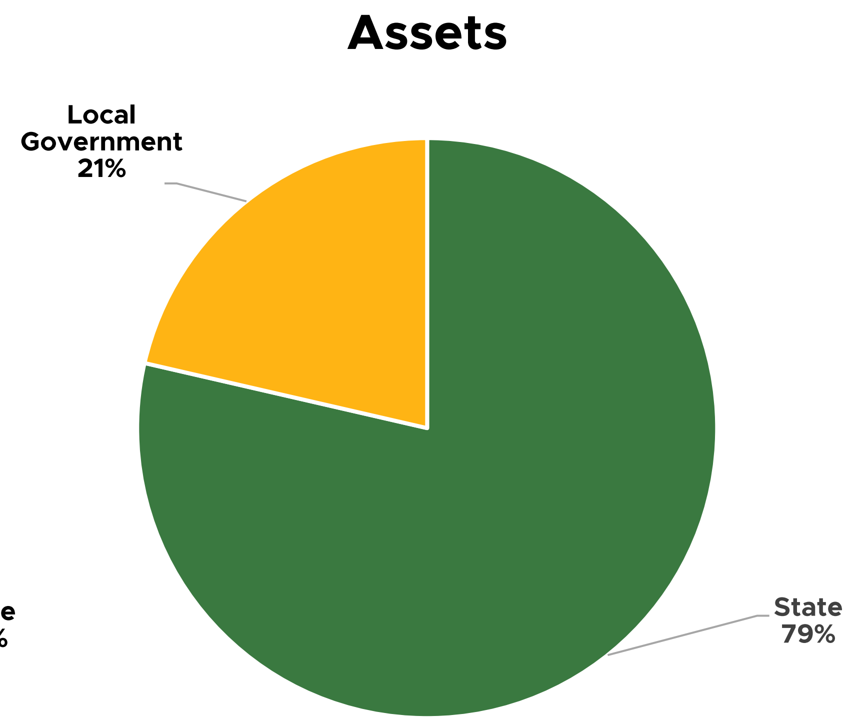
Average Monthly Contributions



< 21	$167.29
21-30	$222.09
31-40	$356.58
41-50	$474.89
51-60	$661.73
61 +	$769.84
Average	**$534.73**

State and Local Government Breakdown



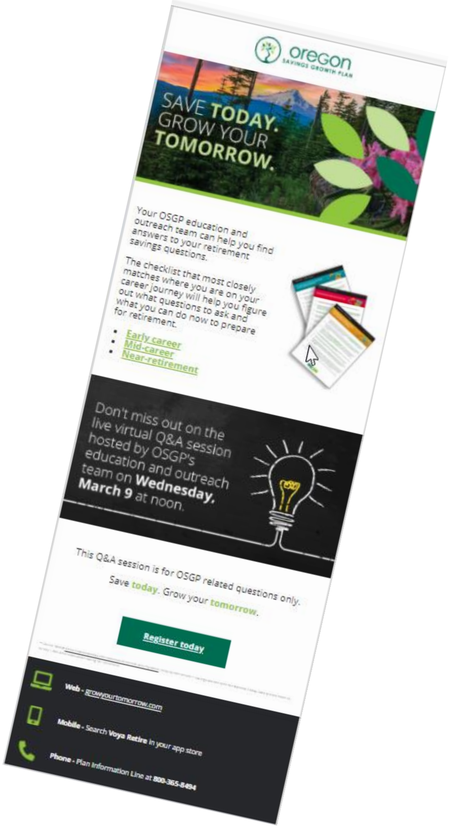


Communications

Communications assists with OSGP goals through a variety of campaigns while providing a cohesive, professional, and friendly overall look and feel to all OSGP materials.

2021 Accomplishments:

- Created five educational videos (used at the PERS Expo).
  - Roth vs. Pre-tax, Diversification, Plan Fees, Time Value of Money, Advisory Services.
- Developed new Advisory Services workshop presentation.
- Conducted annual Advisory Services email campaign.
- Sent quarterly newsletter email campaigns, updated newsletter format.
- Established brand guidelines.
- Deployed Stay in the Plan and new-hire campaigns.
- Awarded second place for financial wellness by Plan Sponsor Council of America (PSCA).
- Updated and redesigned flyers, marketing pieces, and forms.

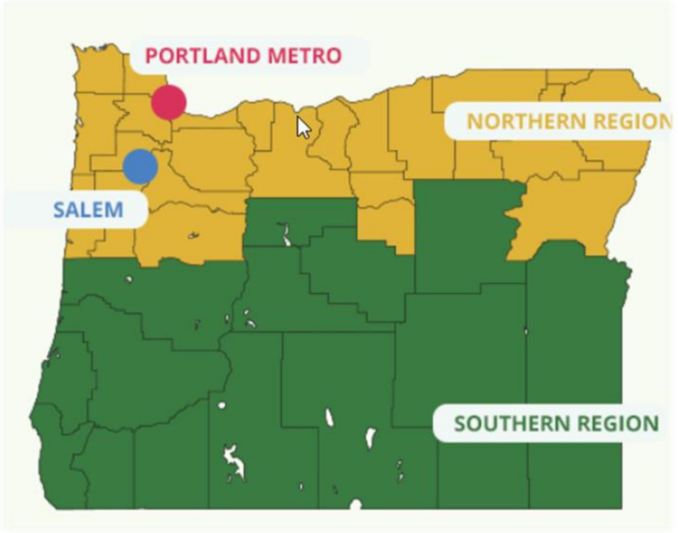


Workday Data Feed and Efforts

PERS, OSGP, Voya, and DAS worked together to develop a weekly Workday-based demographic data feed for all state employees.

- In October 2020, data was used to segment audience by years of service for PERS Expo emails.
- 23,419 letters were mailed to state employees not currently enrolled in the plan.
- Average of 142 new-hire letters go out each month.
- Data will be used in future marketing campaigns to promote enrollment, increase current deferrals, and further educate employees on the importance of saving more for retirement.
- PERS' Outcome-Based Management System (POBMS) and key performance measure (KPM) goal: to increase state employee participation from current 43% to over 50% within the next 18 months.

Education and Outreach (E&O)

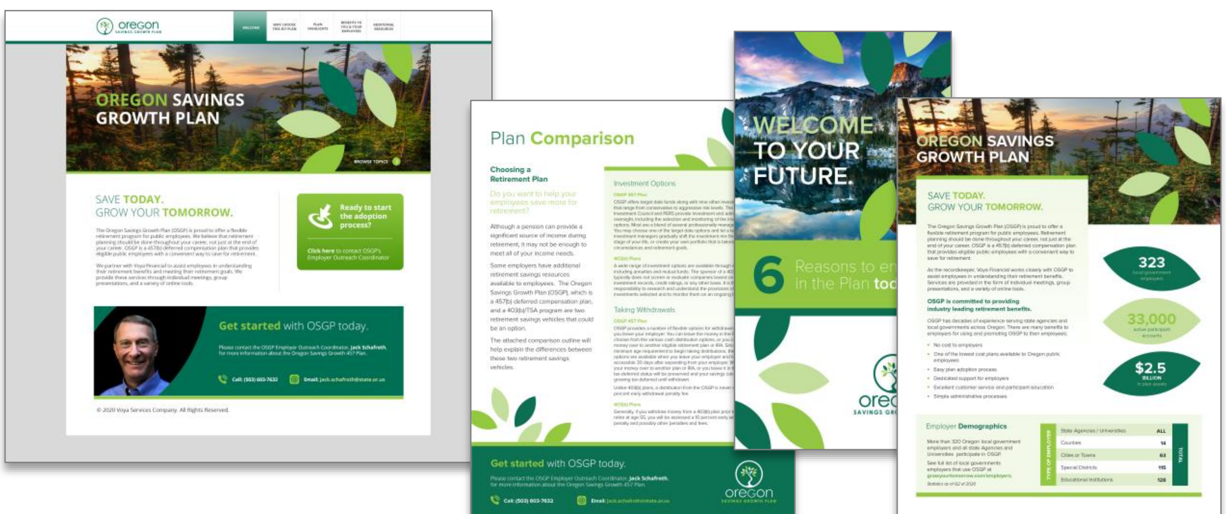


- E&O team includes manager and four local reps.
- Four different workshops offered all year.
- In 2021, new workshop created called Advisory Services.
- All workshops recorded and available on OSGP website.
- Workshops offered in-person (when allowed), virtual, and recorded.
- Marketing materials encourage participants to engage with reps and register for workshops and individual meetings.
- In 2021, 99% satisfaction rate for workshop content.
- In 2021, 66% of attendees took action after attending a workshop.

OREGON PERS
PUBLIC EMPLOYEES RETIREMENT SYSTEM

Employer Outreach

Employer category	Number
Total employers who have adopted OSGP	339
Total employers who are new in 2021	9
Total local-government employers who stopped using OSGP in 2021	0



Looking Ahead

- Continue to remove barriers to enrolling in OSGP.
- Educate participants, as well as public employees who are not yet participants.
- Leverage demographic data to customize education and marketing.
- Reach new employees who haven't taken any action.
- Continue and expand existing automated campaigns.
- Create new campaigns that encourage enrollment, deferral increases, rollovers, and financial wellness.
- Incorporate recognition of various diversity celebrations.
- Continuously improve and update website to make it informative, easy to navigate, and a true resource for participants and employers.

OREGON PERS

PUBLIC EMPLOYEES RETIREMENT SYSTEM

THANK YOU

Callan

November 2, 2022

Oregon Investment Council
OSGP Annual Review 2022

Anne Heaphy
Plan Sponsor Consulting

Uvan Tseng, CFA
Plan Sponsor Consulting

OSGP Annual Review

OSGP Investment Structure

OSGP Investment Structure

Risk Spectrum	Tier I. Asset Allocation Options	Tier II. Core Options	Tier III. Specialty Options
Conservative	**Target Date Funds** LifePath Portfolios	**Capital Preservation** Stable Value Option	
		Fixed Income Active Fixed Income Option	
		Broad U.S. Equity Stock Index Option	**Specialty Equity** Socially Responsible Investment Option
		Large Cap U.S. Equity Large Company Value Stock Option Large Company Growth Stock Option	
		Small Cap U.S. Equity Small Company Stock Option	
		International Equity International Stock Option	**Inflation Sensitive** Real Return Option
Aggressive			**Brokerage Window** Schwab PCRA

Asset Distribution

	June 30, 2022 Market Value	June 30, 2022 Weight	Net New Inv.	Inv. Return	March 31, 2022 Market Value	March 31, 2022 Weight
Tier I - Asset Allocation Options						
Target Date Funds	**$904,997,427**	**31.62%**	**$6,518,695**	**$(112,830,605)**	**$1,011,309,338**	**31.28%**
LifePath Index Retirement Fund O	312,441,242	10.92%	(5,169,028)	(31,985,169)	349,595,439	10.81%
LifePath Index 2025 Fund O	156,519,062	5.47%	(1,721,474)	(17,377,711)	175,618,247	5.43%
LifePath Index 2030 Fund O	130,734,314	4.57%	3,606,257	(15,700,343)	142,828,400	4.42%
LifePath Index 2035 Fund O	100,167,197	3.50%	2,179,314	(13,876,647)	111,864,530	3.46%
LifePath Index 2040 Fund O	79,475,907	2.78%	2,753,660	(12,179,760)	88,902,007	2.75%
LifePath Index 2045 Fund O	54,178,004	1.89%	2,261,692	(9,008,932)	60,925,244	1.88%
LifePath Index 2050 Fund O	39,275,787	1.37%	1,181,358	(6,947,458)	45,041,888	1.39%
LifePath Index 2055 Fund O	18,441,205	0.64%	988,635	(3,275,100)	20,727,670	0.64%
LifePath Index 2060 Fund O	11,634,451	0.41%	227,152	(2,084,723)	13,492,023	0.42%
LifePath Index 2065 Fund O	2,130,258	0.07%	211,128	(394,761)	2,313,890	0.07%
Tier II - Core Investment Options	**$1,838,484,158**	**64.24%**	**$3,093,002**	**$(263,169,221)**	**$2,098,560,376**	**64.90%**
Stable Value Option						
Galliard	357,571,941	12.49%	15,556,097	959,944	341,055,900	10.55%
Active Fixed Income Option						
BlackRock / DoubleLine / Wellington	183,665,733	6.42%	(5,980,381)	(8,904,311)	198,550,425	6.14%
Stock Index Option						
BlackRock	335,226,627	11.71%	41,739	(67,478,896)	402,663,784	12.45%
Large Company Value Stock Option						
BlackRock	223,938,907	7.82%	1,715,852	(31,281,783)	253,504,838	7.84%
Large Company Growth Stock Option						
BlackRock	348,966,156	12.19%	(6,198,501)	(93,431,891)	448,596,549	13.87%
Small Company Stock Option						
BlackRock / Callan / DFA	241,405,993	8.43%	(3,030,229)	(42,409,084)	286,845,305	8.87%
International Stock Option						
AQR / Arrowstreet / DFA / Lazard	147,708,801	5.16%	988,425	(20,623,199)	167,343,576	5.18%
Tier III - Specialty Options	**$118,485,989**	**4.14%**	**$13,671,694**	**$(18,687,225)**	**$123,501,520**	**3.82%**
Socially Responsible Investment Option						
TIAA-CREF	37,421,859	1.31%	92,768	(6,919,865)	44,248,957	1.37%
Real Return Option						
State Street	36,973,647	1.29%	13,848,039	(3,684,581)	26,810,189	0.83%
Brokerage Window	44,090,484	1.54%	(269,113)	(8,082,779)	52,442,375	1.62%
Total Fund	**$2,861,978,568**	**100.0%**	**$23,283,391**	**$(394,687,040)**	**$3,233,382,218**	**100.0%**

Summary Returns

Periods Ended June 30, 2022

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Tier I - Asset Allocation Options				
LifePath Index Retirement Fund	(11.69)	2.77	3.93	4.55
LifePath Index Retirement Benchmark	(11.68)	2.72	3.90	4.53
LifePath Index 2025 Fund	(12.11)	3.47	4.73	5.98
LifePath Index 2025 Benchmark	(12.11)	3.42	4.69	5.94
LifePath Index 2030 Fund	(12.89)	4.21	5.40	6.67
LifePath Index 2030 Benchmark	(12.92)	4.14	5.33	6.61
LifePath Index 2035 Fund	(13.63)	4.91	6.03	7.34
LifePath Index 2035 Benchmark	(13.71)	4.82	5.93	7.24
LifePath Index 2040 Fund	(14.42)	5.46	6.53	7.88
LifePath Index 2040 Benchmark	(14.51)	5.36	6.43	7.78
LifePath Index 2045 Fund	(15.11)	5.93	6.91	8.32
LifePath Index 2045 Benchmark	(15.25)	5.79	6.77	8.20
LifePath Index 2050 Fund	(15.56)	6.13	7.07	8.60
LifePath Index 2050 Benchmark	(15.72)	6.00	6.93	8.46
LifePath Index 2055 Fund	(15.68)	6.15	7.08	8.74
LifePath Index 2055 Benchmark	(15.86)	6.03	6.95	8.62
LifePath Index 2060 Fund	(15.69)	6.14	7.06	--
LifePath Index 2060 Benchmark	(15.86)	6.03	6.95	--
LifePath Index 2065 Fund	(15.72)	--	--	--
LifePath Index 2065 Benchmark	(15.88)	--	--	--

Summary Returns

Periods Ended June 30, 2022

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years	Last 15 Years
Tier II - Core Investment Options					
Stable Value Option	1.65	2.07	2.14	1.90	2.21
3 Year Constant Maturity Treasury	1.44	0.94	1.48	1.18	1.29
3 Month T-Bill	0.17	0.63	1.11	0.64	0.75
Active Fixed Income Option	(10.44)	(0.80)	1.10	1.98	3.71
Bloomberg Aggregate Index	(10.29)	(0.93)	0.88	1.54	3.26
Stock Index Option	(13.87)	9.83	10.65	12.64	8.41
Russell 3000 Index	(13.87)	9.77	10.60	12.57	8.36
Large Company Value Stock Option	(6.89)	6.94	7.26	10.92	6.22
Russell 1000 Value Index	(6.82)	6.87	7.17	10.50	6.10
Large Company Growth Stock Option	(18.85)	12.54	14.24	14.75	10.27
Russell 1000 Growth Index	(18.77)	12.58	14.29	14.80	10.67
Small Company Stock Option	(17.26)	7.40	7.13	10.29	7.30
Russell 2000 Index	(25.20)	4.21	5.17	9.35	6.33
International Stock Option	(17.32)	3.15	3.20	5.86	2.01
MSCI ACWI ex US Index	(19.42)	1.35	2.50	4.83	1.58
Tier III - Specialty Options					
Socially Responsible Investment Option	(14.57)	9.71	10.29	--	--
Russell 3000 Index	(13.87)	9.77	10.60	12.57	8.36
Real Return Option	7.15	8.32	6.08	--	--
Real Return Option Blended Benchmark	8.81	9.22	7.60	3.51	2.69
Consumer Price Index + 4%	13.81	9.42	8.15	6.62	6.44

Investment Options Fee Summary

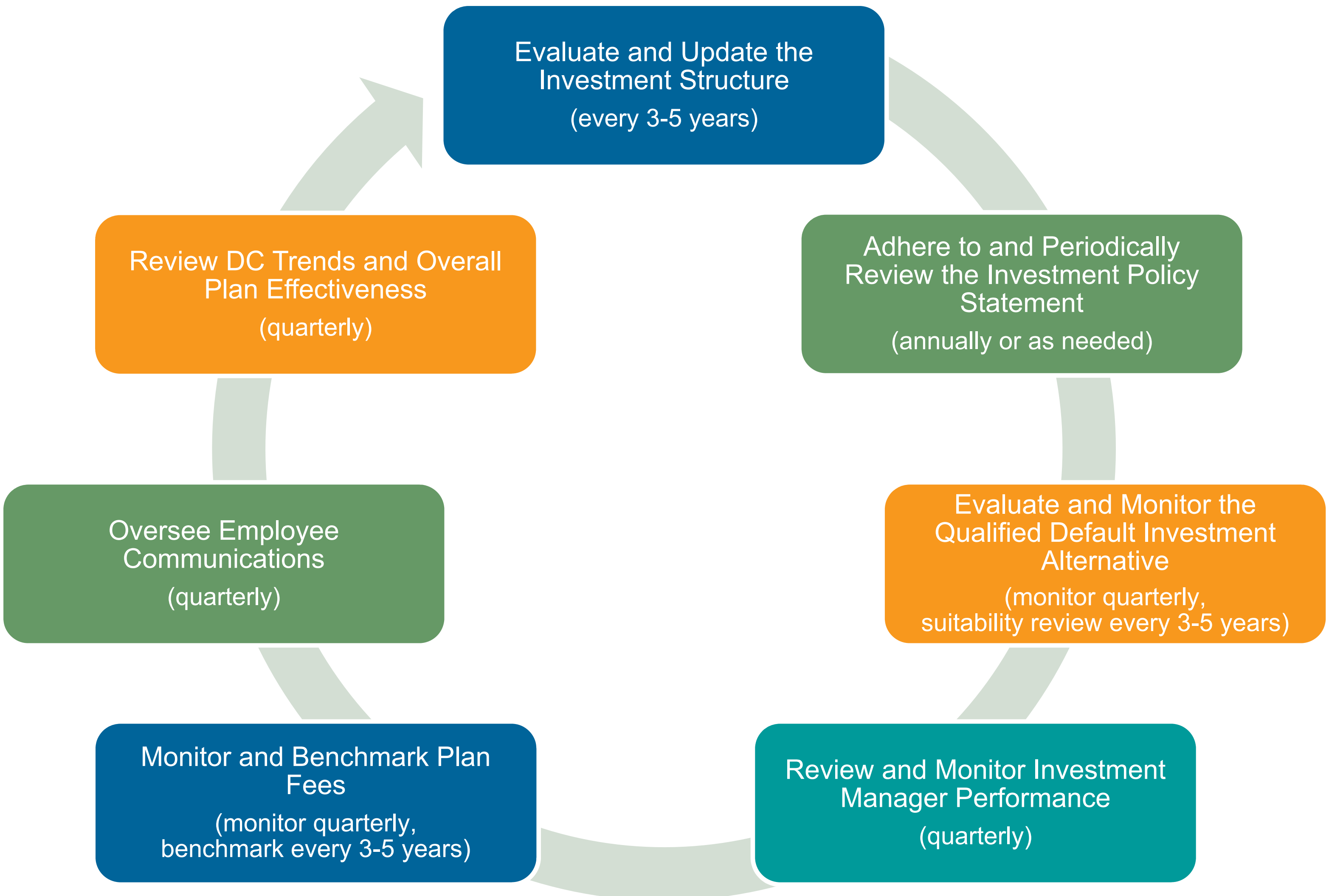
Asset Class and Strategy	Investment Management Fees*	Institutional Peer Group Median
Asset Allocation Options		
LifePath Index Retirement, 2020 – 2060 Funds	0.080%	0.10% - 0.11%
Capital Preservation		
Stable Value Option	0.302%	0.29%
Fixed Income		
Active Fixed Income Option	0.168%	0.25%
U.S. Large Cap Equity		
Stock Index Option	0.023%	0.04%
Large Company Value Stock Option	0.024%	0.04%
Large Company Growth Stock Option	0.023%	0.04%
U.S. Small Cap Equity		
Small Company Stock Option	0.320%	0.72%
International Equity		
International Stock Option	0.514%	0.57%
Specialty Options		
Socially Responsible Investment Option	0.170%	0.51%
Real Return Option	0.220%	1.03%

*Fee data provided by OST.

OSGP Work Plan

Key Functions of a DC Plan Fiduciary

In managing DC Plan investments, fiduciaries should consider seven key areas



OSGP Work Plan

OSGP Action Items	Review Date	Status
Review Existing Investment Managers	Quarterly	Continuous
Monitor Investment Fees	Quarterly	Continuous
DC Regulatory, Legal, and Industry Trends Review	Quarterly	Continuous
Plan Utilization and Administration Review (Voya)	Quarterly	Continuous
Plan Communications Review (Voya)	Quarterly	Continuous
Evaluate Administration Services and Fees (PERS & Cammack)	August 2019	Concluded
Investment Policy Statement Review	November 2017	Concluded
Callan DC Trends Survey	February 2018	Concluded
Investment Structure Evaluation	May 2018	Concluded
Capital Preservation Structure Evaluation	August 2018	Concluded
Large Cap Equity Structure Evaluation	August 2018	Concluded
International Equity Structure Evaluation	August 2018	Concluded
Real Assets Structure Evaluation	August 2018	Concluded
Target Date Fund Suitability Review	January 2019	Concluded
Small Cap Equity Structure Evaluation	August 2019	Concluded
Brokerage Window Review (Schwab)	May 2020	Concluded
ESG Education	August 2020	Concluded
Investment Policy Statement Review	October 2020	Concluded
Callan DC Trends Survey	May 2021	Concluded
ESG/Socially Responsible Investment Option Overview (TIAA-CREF)	May 2022	Concluded
Investment Structure Evaluation	July 2022	Concluded
Investment Policy Statement Review	TBD	

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Investment Structure Evaluation Summary

Optimizing the Investment Structure

Building the optimal three-tier investment structure

- Callan uses a three-tiered framework to organize the options in a DC plan's investment structure.
- This approach seeks to address the needs of the various constituencies within an employee population.
- No two plans are exactly the same, and therefore the ideal structure will vary based on plan-specific circumstances.

Tier I: Asset Allocation	Tier II: Core Options	Tier III: Specialty Options
Target Date Funds	Capital Preservation U.S. Fixed Income U.S. Large-Cap Equity Non-U.S. Equity U.S. Small Cap Equity	Diversified Real Assets ESG Brokerage
Simple (and smart) choice for participants who prefer a single-fund solution and the delegation of the asset allocation decision to a professional manager	Provide primary building blocks to create diversified portfolios For participants who wish to build and manage their own portfolios Often useful to offer both active and passive options within Tier II	Includes non-core asset classes geared toward sophisticated participants who desire more flexibility Callan recommends offering a limited set of specialty options given their relatively complex nature and the potential confusion they may bring to participants

OSGP Summary[1]

About 3 in 4 participants are flagged as active in the OSGP. The Plan's investment lineup features 11 total options—including 6 equity funds, 2 fixed income funds, a target date fund (TDF) suite, a diversified real assets fund, and a self-directed brokerage window.

- The OSGP has about $3.3 billion in total plan assets and 36,000 total participants.
  - About 3 in 4 participants are flagged as active in the Plan.
- The average participant balance is $90,000, compared to a median participant balance of $27,000.
- The Plan's investment lineup features 11 total investment options.
  - In addition to 6 equity funds and 2 fixed income funds, the Plan offers a TDF suite managed by BlackRock, a diversified real assets fund managed by SSgA, and a self-directed brokerage window.

Summary Information	
Total Assets	$3,250,144,862
Total Participants	36,232
Active Participants	26,772 (74%)
Average Balance	$89,704
Median Balance	$27,379
Number of Participant-Facing Investment Options	11[2]
Equity Options to Fixed Income Options	6 to 2
U.S. Equity Options to Non-U.S. Equity Options	5 to 1

[1] Information on this page as of March 31, 2022; [2] TDF suite counted as one

OSGP Current Investment Structure[1]

The diagram below depicts the menu of investment options, by asset category, currently offered to the OSGP participants.

Tier I: Asset Allocation

Target Date Funds

BlackRock LifePath Funds (31%):

- BlackRock LifePath Retirement
- BlackRock LifePath 2025
- BlackRock LifePath 2030
- BlackRock LifePath 2035
- BlackRock LifePath 2040
- BlackRock LifePath 2045
- BlackRock LifePath 2050
- BlackRock LifePath 2055
- BlackRock LifePath 2060
- BlackRock LifePath 2065

Tier II: Passive Core

U.S. Large-Cap Equity

- BlackRock Russell 1000 Value Index (8%)
- BlackRock Russell 1000 Growth Index (14%)

U.S. All-Cap Equity

- BlackRock Russell 3000 Index (12%)

Tier II: Active Core

Capital Preservation

- Galliard Stable Value (11%)

Core/Core Plus Fixed Income

- Active Fixed Income Option (6%)[2]

Non-U.S. Equity

- International Stock Option (5%)[2]

U.S. Small-Cap Equity

- Small Company Stock Option (9%)[2]

Tier III: Specialty

Real Return

- SSgA Real Assets (1%)

Socially Responsible

- TIAA-CREF Social Choice Equity (1%)

Self-Directed Brokerage (2%)

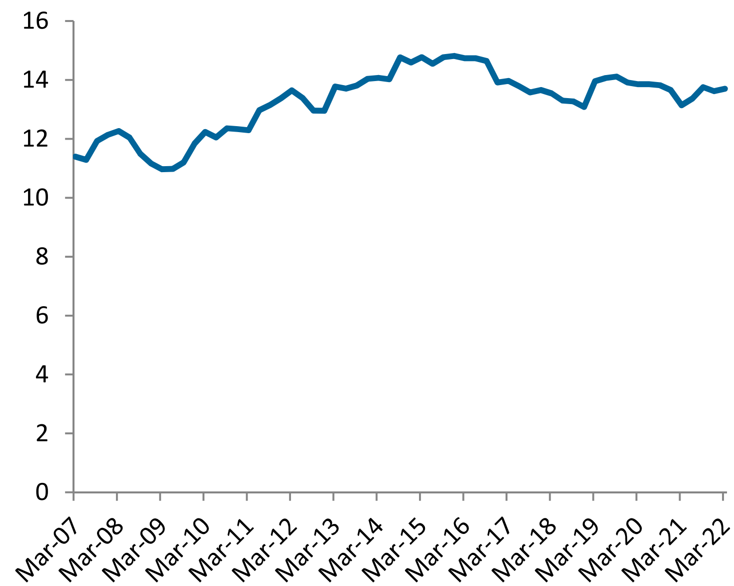
[1] Allocations as of March 31, 2022; [2] have multiple underlying managers; source: Voya

Number of Options & Asset Class Prevalence

DC Index Data as of March 31, 2022

The Plan’s number of options is similar to the average number offered by a DC Index plan. In addition, the Plan’s investment menu does not differ from those of Index plans in any major ways.

Number of Options (Excluding TDFs)



- The Plan’s number of options (10)* is comparable to the average number offered by a DC Index plan (14)*.
- With respect to the asset classes offered, the Plan’s investment lineup does not differ from those of Index plans in any significant ways.

Asset Class Prevalence

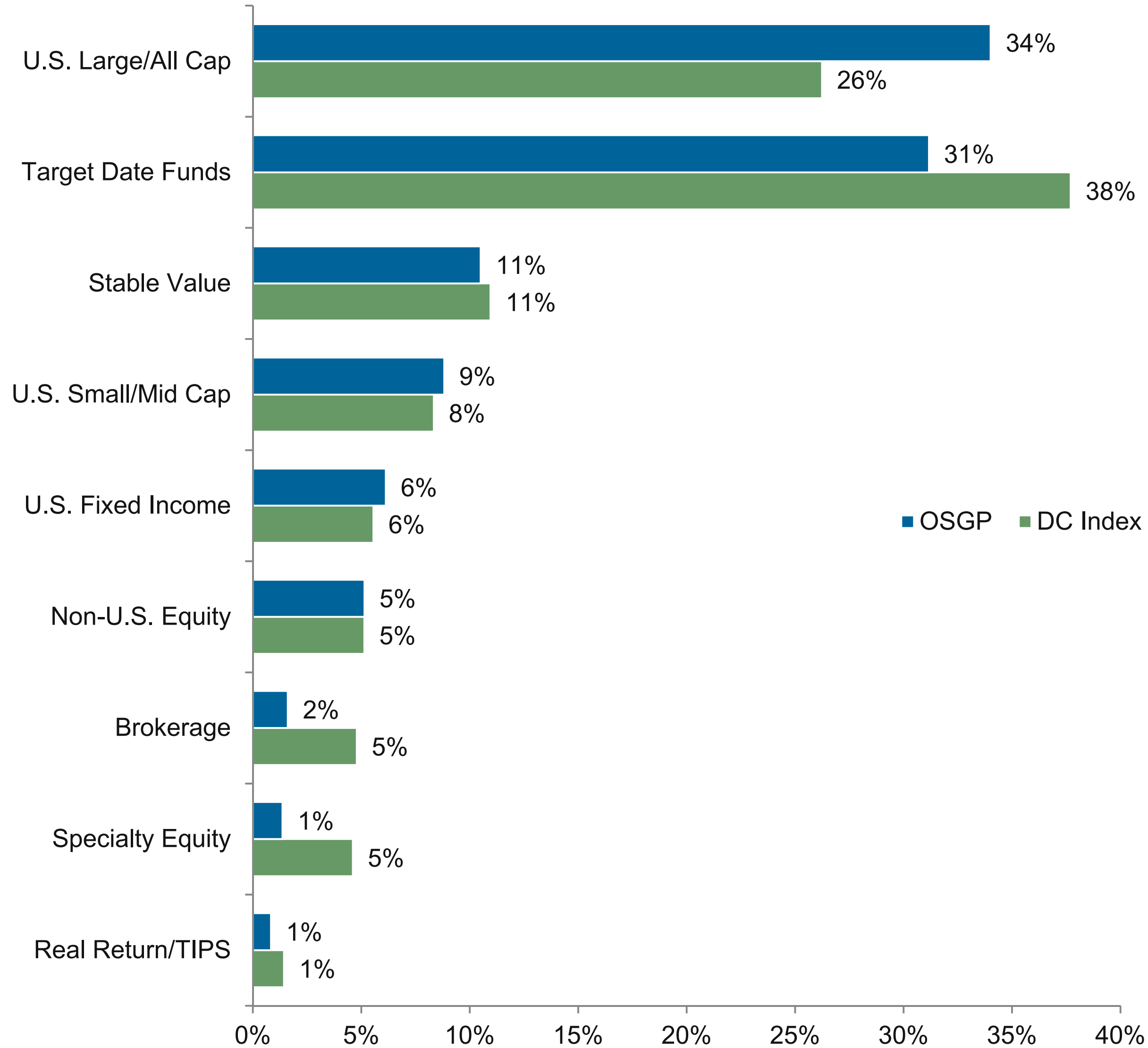
Asset Class	Prevalence	Does OSGP Offer?
U.S. Fixed	100%	Yes
U.S. Large Cap	100%	Yes
Non-U.S. Equity	100%	Yes
U.S. Small/Mid Cap	97%	Yes
Target Date Funds	89%	Yes
Stable Value	74%	Yes
Money Market	49%	No
Balanced	44%	No
Brokerage Window	43%	Yes
Real Return/TIPS	34%	Yes
Real Estate	23%	No
Company Stock	20%	No
Global Equity	16%	No
Emerging Equity	16%	No
ESG	16%	Yes
High Yield Fixed	8%	No
Int'l/Global Fixed	7%	No
Alternatives/Other	7%	No
Specialty Equity/Sector	1%	No

*Both figures exclude TDFs, source: Callan DC Index

Asset Allocation

- The chart compares asset class allocations for the OSGP to average allocation figures from the DC Index.
- Relative to the Index, the OSGP has larger allocations to U.S. large/all cap (34% vs. 26%) and U.S. small/mid cap (9% vs. 8%).
- On the other hand, the OSGP has smaller-than-Index allocations to target date funds (31% vs. 38%) and self-directed brokerage (2% vs. 5%).
- Importantly, the DC Index presents average allocation figures. These do not represent optimal allocations but rather demonstrate how the Plan's aggregate allocations differ from those of a large sample of other DC plans. Plans within the Index may be different in size and/or have different objectives than the OSGP.

Asset Class Allocations (as of March 31, 2022)[1]



[1] DC Index figures represent average asset class allocations, when offered; sources: Voya and Callan DC Index

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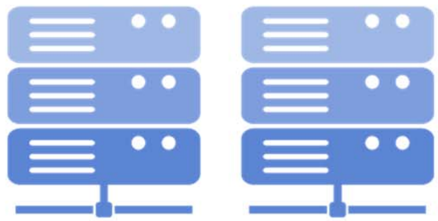
Appendix

Published Research Highlights from 2Q22

Research Café: ESG Interview Series

Investing in Data Centers: The Real Assets of the Digital Age



Webinar: Pension Risk Transfer

Do Active Fixed Income Managers Add Value With Sector Rotation?

Recent Blog Posts

Best Practices to Make Sure Investors and Their Managers Are in Sync

Jan Mende

Rising Interest Rates Spur Look at Structured Credit

Nathan Wong

SEC Proposes Rule to Enhance ESG Disclosures for Investments

Kristin Bradbury

Additional Reading

Alternatives Focus quarterly newsletter

Active vs. Passive quarterly charts

Capital Markets Review quarterly newsletter

Monthly Updates to the Periodic Table

Market Pulse Flipbook quarterly markets update

Real Estate Indicators market outlook

Callan Institute Events

Upcoming conferences, workshops, and webinars

Callan College

Intro to Alternatives

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with alternative investments like private equity, hedge funds, and real estate and how they can play a key role in any portfolio. In our "Callan College" on Alternatives, you will learn about the importance of allocations to alternatives, and how to consider integrating, evaluating, and monitoring them.

Join our next VIRTUAL session via Zoom (2 sessions, 3 hours each):
August 24-25, 2022

Intro to Investments—Learn the Fundamentals

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with basic investment theory, terminology, and practices.

Join our next VIRTUAL session via Zoom (3 sessions, 2–3 hours each):
September 20–22, 2022

Mark Your Calendar

2022 October Regional Workshops

October 18, 2022
Denver

October 20, 2022
San Francisco

Callan Institute's 2023 National Conference

April 2-4, 2023
Scottsdale, Arizona

Watch your email for further details and an invitation.

Webinars & Research Café Sessions

Market Intelligence

October 14, 2022 – 9:30am (PT)

Content Calendar—Callan Institute

4Q22 Webinar Topics:

- Market Intelligence
- Regional Workshop Recap
- ESG Survey
- Research Café (TBD)

1Q22 Webinar Topics:

- Capital Markets Assumptions
- Market Intelligence
- DC Trends Survey

3Q22 Webinar Topics:

- Market Intelligence
- Corporate DB Webinar
- Research Café (ESG)

2Q22 Webinar Topics:

- Market Intelligence
- Regional Workshop Recap
- Research Café: ESG Interview Series
- Pension Risk Transfer

Callan College | Conference / Workshop | Publication | Webinar | Research Café

Callan Updates

Firm updates by the numbers, as of June 30, 2022

Total Associates: ~200

Ownership
- 100% employees
- 67% of employees are equity owners
- 55% of shareholders identify as women or minority

Key Hires
- Craig Chaikin, CFA, SVP, Denver Consulting
- Emily Hylton, SVP, Atlanta Consulting
- Christina Mays, VP, Real Assets Consulting
- Nicole Wubbena, SVP, Global Manager Research

Total General and Investment Consultants: more than 55

Total Specialty and Research Consultants: more than 80

Total CFA/CAIA/FRMs: more than 55

Total Institutional Investor Clients: more than 475

Assets Under Advisement: more than $4 trillion

"Callan has been offering alternatives investment consulting services for more than 30 years. The demand for our services is greater than ever as institutional investors increase their allocations to alternative investments. As a result, we've been expanding our already robust research resources and capabilities to support them." — Pete Keliuotis, EVP, Callan's Alternatives Consulting Group

Disclosure

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OREGON STATE TREASURY

TAB 7

ASSET ALLOCATION & NAV UPDATES

Asset Allocations at September 30, 2022

OPERF	Policy	Target[1]	Regular Account $ Thousands	Pre-Overlay	Overlay	Net Position	Actual	Target Date Funds $ Thousands	Variable Fund $ Thousands	Total Fund $ Thousands
Public Equity	25.0-35.0%	30.0%	18,083,453	20.1%	235,995	18,319,448	20.4%	1,076,276	247,814	19,643,537
Private Equity	15.0-27.5%	20.0%	24,603,467	27.4%		24,603,467	27.4%			24,603,467
Total Equity	**45.0-55.0%**	**50.0%**	**42,686,920**	**47.6%**	**235,995**	**42,922,915**	**47.8%**			**44,247,005**
Opportunity Portfolio	**0-5%**	**0.0%**	**2,449,510**	**2.7%**		**2,449,510**	2.7%			**2,449,510**
Fixed Income	**15-25%**	**20.0%**	**14,958,454**	**16.7%**	**2,232,969**	**17,191,423**	19.2%	2,131,199		**19,322,622**
Risk Parity	**0.0-3.5%**	**2.5%**	**1,734,364**	**1.9%**		**1,734,364**	1.9%			**1,734,364**
Real Estate	**7.5-17.5%**	**12.5%**	**13,225,303**	**14.7%**	**(1,600)**	**13,223,703**	14.7%			**13,223,703**
Real Assets	**2.5-10.0%**	**7.5%**	**7,878,995**	**8.8%**		**7,878,995**	8.8%			**7,878,995**
Diversifying Strategies	**2.5-10.0%**	**7.5%**	**4,331,700**	**4.8%**		**4,331,700**	4.8%			**4,331,700**
Cash[2]	**0-3%**	**0.0%**	**2,502,226**	**2.8%**	**(2,467,364)**	**34,863**	0.0%		12,434	**47,297**
TOTAL OPERF		**100%**	**$ 89,767,472**	**100.0%**	**$ -**	**$ 89,767,472**	**100.0%**	**$ 3,207,474**	**$ 260,248**	**$ 93,235,195**

[1]Targets established in October 2021. Interim policy benchmark effective October 1, 2021, consists of: 30% MSCI ACWI IMI Net, 20% Bloomberg U.S. Aggregate, 20% Russell 3000+300bps (1 quarter lagged), 12.5% NCREIF ODCE net (1 quarter lagged), 7.5% CPI+400bps, 7.5% HFRI FOF Conservative & 2.5% S&P Risk Parity - 12% Target Volatility.

[2] Includes cash held in the policy implementation overlay program.

SAIF	Policy	Target	$ Thousands	Actual
Total Equity	**7-13%**	**10.0%**	**389,553**	**9.2%**
Fixed Income	**80-90%**	**85.0%**	**3,478,020**	**82.3%**
Real Estate	**0-7%**	**5.0%**	**305,202**	**7.2%**
Cash	**0-3%**	**0.0%**	**51,067**	**1.2%**
TOTAL SAIF			**$ 4,223,842**	**100.0%**

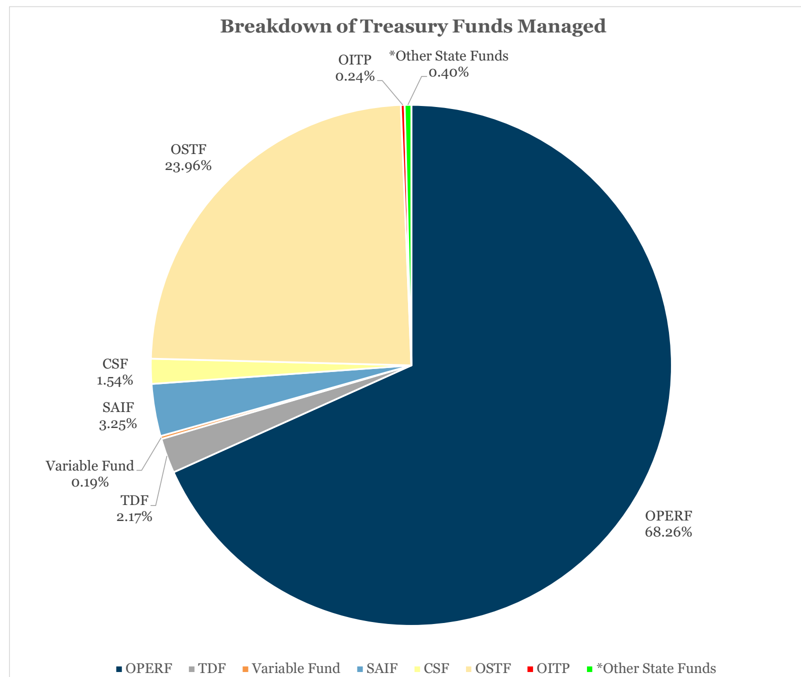
CSF	Policy	Target	$ Thousands	Actual
Global Equities	40-50%	45.0%	921,135	46.0%
Private Equity	8-12%	10.0%	190,550	9.5%
Total Equity	**58-62%**	**55.0%**	**1,111,685**	**55.5%**
Fixed Income	**20-30%**	**25.0%**	**523,673**	**26.2%**
Real Estate	**0-12%**	**10.0%**	**213,074**	**10.6%**
Alternative Investments	**0-12%**	**10.0%**	**130,952**	**6.5%**
Cash	**0-3%**	**0.0%**	**22,986**	**1.1%**
TOTAL CSF			**$ 2,002,369**	**100.0%**

SOUE	Policy	Target	$ Thousands	Actual
Global Equities	**0-65%**	**N/A**	1,708	**73.6%**
Fixed Income	**35-100%**	**N/A**	610	**26.3%**
Cash	**0-3%**	**N/A**	1	**0.0%**
TOTAL SOUE			**$ 2,319**	**100.0%**

WOUE	Policy	Target	$ Thousands	Actual
Global Equities	**30-65%**	**55.0%**	1,360	**54.1%**
Fixed Income	**35-60%**	**40.0%**	1,022	**40.6%**
Cash	**0-25%**	**5.0%**	134	**5.3%**
TOTAL WOUE			**$ 2,516**	**100.0%**

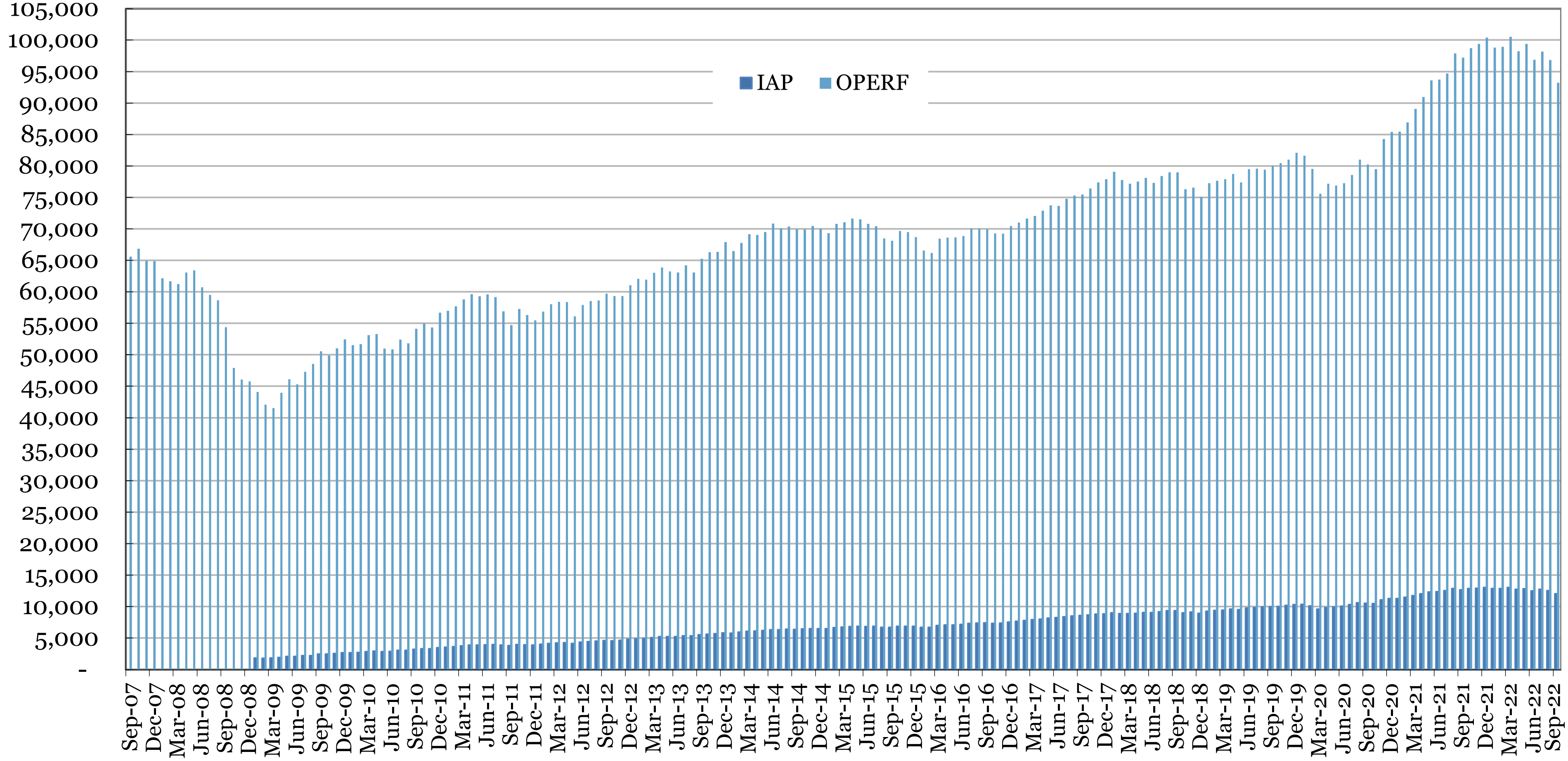
OSTF, OITP & Other State Funds*	$ Thousands	Actual
OSTF	30,805,977	**94.3%**
OITP	305,709	**0.9%**
DAS Insurance Fund	135,621	**0.4%**
DCBS Operating Fund	186,046	**0.6%**
DCBS Workers Benefit Fund	135,479	**0.4%**
DCHS - Elderly Housing Bond Sinking Fund	1,287	**0.0%**
DCHS - Other Fund	13,594	**0.0%**
Oregon Lottery Fund	104,032	**0.3%**
DVA Bond Sinking Fund	106,455	**0.3%**
ODOT Fund	289,442	**0.9%**
OLGIF	228,922	**0.7%**
OPUF	342,721	**1.0%**
Total OSTF & Other State Funds	**$ 32,655,286**	**100.0%**
Total of All Treasury Funds**	**$ 128,550,781**	

**Balances of the funds include OSTF or OITP investments, which is why total does not foot.

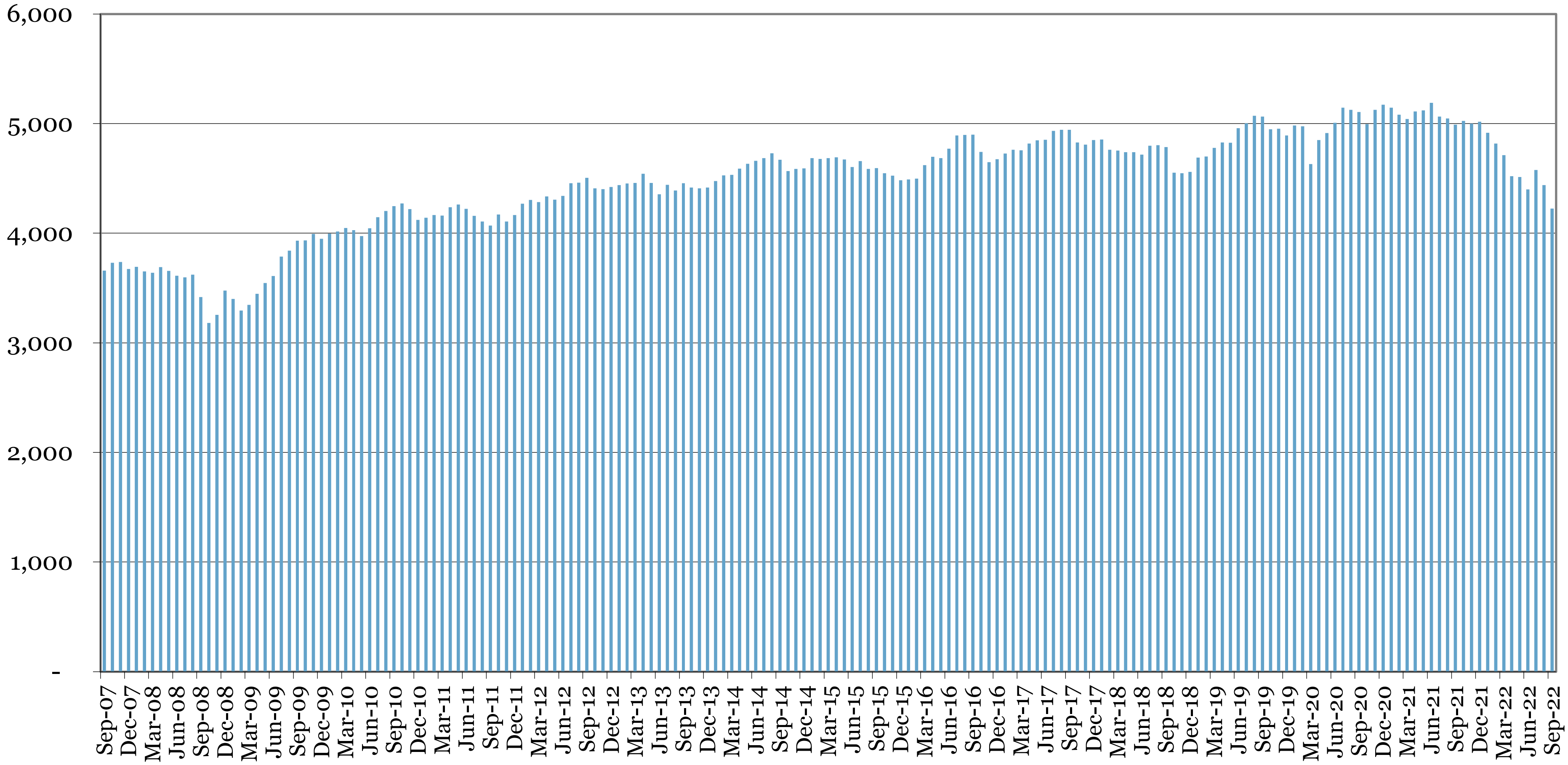


*Other State Funds include DAS Insurance Fund, DCBS Operating Fund, DCBS Workers Benefit Fund, DCHS - Elderly Housing Bond Sinking Fund, DCHS - Other Fund, Oregon Lottery Fund, DVA Bond Sinking Fund, ODOT Fund, OLGIF, & OPUF.

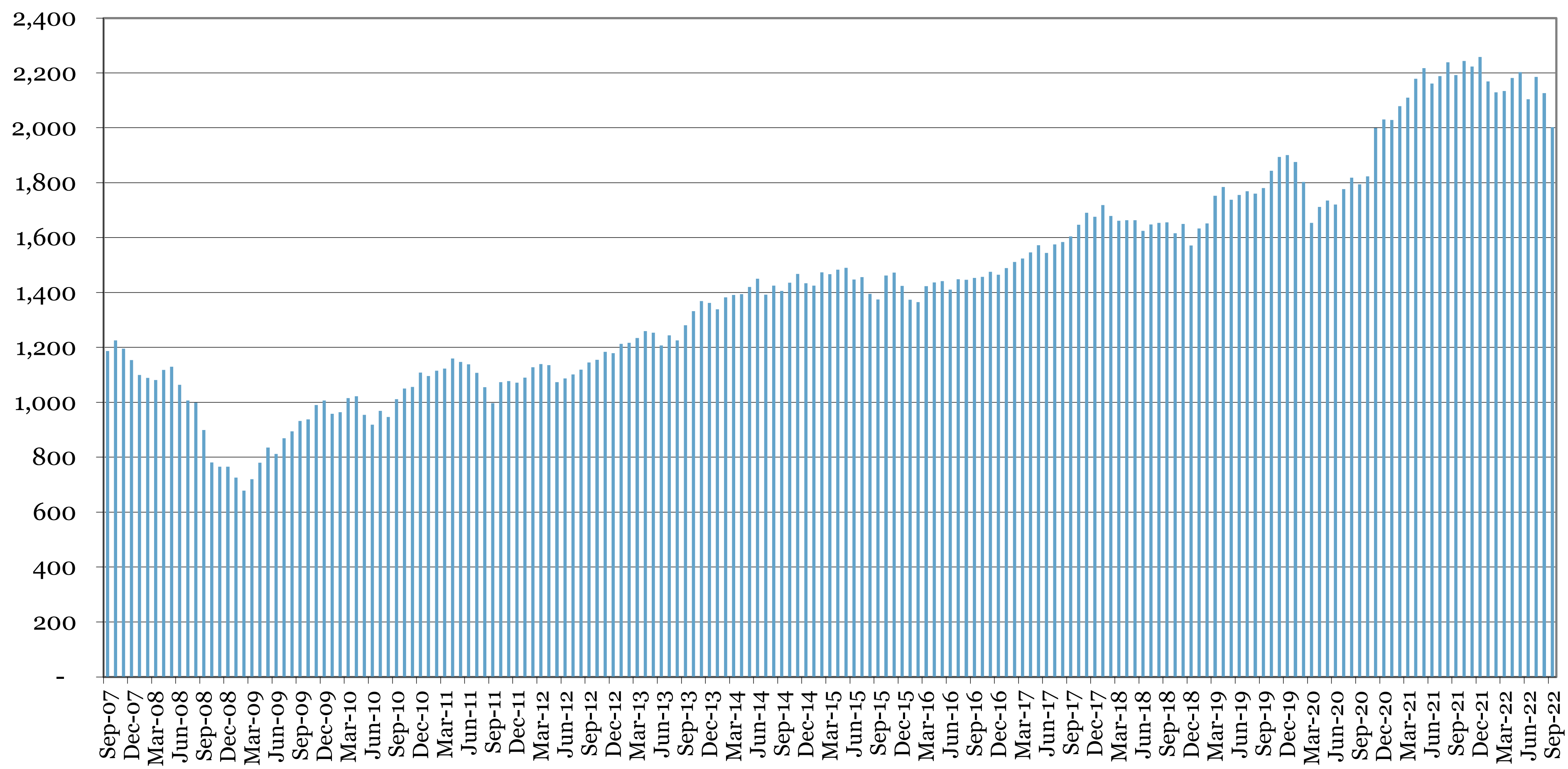
OPERF NAV
15 years ending September 30, 2022
($ in Millions)



SAIF NAV
15 years ending September 30, 2022
($ in Millions)



CSF NAV
15 years ending September 30, 2022
($ in Millions)



OIC

OREGON STATE TREASURY

TAB 8

CALENDAR – FUTURE AGENDA ITEMS

2022/23 OIC Forward Calendar and Planned Agenda Topics

December 7, 2022	Q3 OPERF Performance Public Equity Portfolio Review Fixed Income Portfolio Review Opportunity Portfolio Consultant
January 25, 2023	Private Equity Portfolio Review Opportunity Portfolio Review 2024 OIC Calendar Approval
March 8, 2023	Q4 OPERF Performance Individual Account Program (IAP) Review Real Estate Portfolio Review Real Assets Portfolio Review
April 20, 2023	Diversifying Strategies Portfolio Review
May 31, 2023	Q1 OPERF Performance
July 19, 2023	Common School Fund Annual Review
September 6, 2022	Q2 OPERF Performance
October 25, 2022	SAIF Annual Review OSGP Annual Review

OIC

OREGON
STATE
TREASURY

TAB 9

OPEN DISCUSSION

OIC

OREGON STATE TREASURY

TAB 10

PUBLIC COMMENTS

Public comments can now be found at the OIC website at:

https://www.oregon.gov/treasury/invested-for-oregon/pages/oregon-investment-council.aspx