Oregon Investment Council

May 31, 2023

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Chair

Tobias Read
State Treasurer

Rex Kim
Chief Investment Officer

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Agenda
May 31, 2023
9:00 AM

Time	**Tab**		**Presenter**
9:00	1	**Review & Approval of Minutes** April 19, 2023	Cara Samples OIC Chair
	2	**Committee Reports**	Rex Kim Chief Investment Officer
9:05 – 9:10	3	**OIC Elections** (Action Item: Vice Chair)	Cara Samples OIC Chair
9:10 – 9:40	4	**OPERF Q1 Performance Review**	Allan Emkin Managing Principal, Meketa Mika Malone Managing Principal, Meketa
9:40 – 10:30	5	**OIC-PERS Joint Session**	Colin Bebee Managing Principal, Meketa Matt Larrabee Principle, Milliman Sadhana Shenoy, Chair, PERS Jardon Jaramillo, PERS

Suzanne Linneen, PERS
Stephen Buckley, PERS
John Scanlan, PERS

—— BREAK ——

10:40 – 11:00	6	**OPERF Public Equity** (Action Item: Fund Recommendations)	Louise Howard Senior Investment Officer, Public Equity Mika Malone Managing Principal, Meketa
11:00 – 11:20	7	**OSGP** (Action Item: Fund Recommendations)	Claire Illo Investment Officer, Public Equity Uvan Tseng Senior Vice President, Callan, LLC Anne Heaphy Senior Vice President, Callan, LLC
11:30	8	**Consultant Contract Renewal** (Action Item: Real Estate Consultant)	Michael Langdon Director of Private Markets

—— BREAK ——

11:45	9	**Statement of Funds Governance**	Allan Emkin Managing Principal, Meketa Mika Malone Managing Principal, Meketa Raneen Jalajel Associate Partner, Aon Julie Becker Partner, Aon

12:30	10	**Asset Allocation & NAV Updates**	Rex Kim
12:35	11	**Calendar – Future Agenda Items**	Rex Kim
12:40	12	**Open Discussion**	OIC Members, Staff, Consultants
12:45	13	**Public Comments**	

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

April 19, 2023

Meeting Minutes

Members Present:	Cara Samples, Lorraine Arvin, Tobias Read, Kevin Olineck
Staff Present:	Rex Kim, Michael Langdon, David Randall, Karl Cheng, Austin Carmichael, Ben Mahon, Jen Plett, Alli Gordon, Jennifer Kersgaard, Louise Howard, Claire Illo, Amanda Kingsbury, Kenny Bao, Sara Bayes, Chuck Christopher, Bryson Pate, Angela Schaffers, Dmitri Palmateer
Staff Participating Virtually:	Ryan Auclair, Amy Bates, Tyler Bernstein, Taylor Bowman, Tan Cao, Andrew Coutu, Bradley Curran, Ashley Daigle, Debra Day, Ahman Dirks, Eric Engelson, Annie Gregori, Roy Jackson, Aliese Jacobsen, Kristi Jenkins, Krystal Korthals, Ericka Langone, Perrin Lim, Sommer May, Tim Miller, Dana Millican, Bryson Pate, Tim Powers, Andrew Robertson, Scott Robertson, Faith Sedberry, Sam Spencer, Stacey Spencer, Andrey Voloshinov, Tiffany Zahas
Consultants Present:	Tom Martin, Ann Heaphy, Uvan Tseng, Chris Nikolich, Elena Wang, Paola Nealon, Steve Cummings, Ashley Woeste
PERS Present:	Kevin Olineck, Michiru Farney, Matthew Graves
Legal Counsel Present:	Steve Marlowe (Department of Justice)

The April 19, 2023, OIC meeting was called to order at 9:00 am by Cara Samples, Chair.

I. 9:00 am Review and Approval of Minutes

MOTION: Chair Samples asked for approval of the March 8, 2023, OIC regular meeting minutes. Tobias Read moved approval at 9:01 am, Lorraine Arvin seconded the motion which then passed by a 3/0 vote.

II. 9:02 am Committee Reports

Private Equity Committee:

March 23	Genstar Capital Partners XI	$250 M
March 23	TA Associates XV	$200 M
March 9	Parthenon Investors VII	$150 M

Real Estate Committee:

None

OREGON STATE TREASURY

Opportunity Committee:
None

Alternatives Portfolio Committee:

March 22	Appian Natural Resources Fund III	$125 M
March 22	LS Power V	$200 M

Staff Discretion
Common School Fund

March 9	Parthenon Investors VII	$15 M
March 22	Appian Natural Resources Fund III	$5 M
March 22	LS Power V	$10 M
March 23	TA Associates XV	$15 M

III. 9:02 am OPERF Real Assets Portfolio Review

Ben Mahon, Senior Investment Officer, Alternatives, presented and introduced the guest speaker from Aksia.

Tom Martin, Partner, Global Head of Private Equity and Real Assets, Aksia, presented the real assets portfolio update.

The OIC has exceeded the Real Asset Performance objective of CPI +4% by 1.3% YTD, and .8% in Q3 2022. A second consecutive year of strong performance in 2022 was led by natural resources and infrastructure energy funds; the portfolio is above target allocation.

IV. 10:05 am Oregon Savings Growth Plan Annual Review

Claire Illo, Investment Officer, Public Equity, presented the OSGP review and introduced the presenting Consultants.

Anne Heaphy, Senior Vice President, Callan, LLC and Uvan Tseng, Senior Vice President, Callan, LLC.

OSGP Participants have increased to 37,457 with 31.3% of total participants enrolled in BlackRock LifePath Funds.

V. 10.37am Individual Account Program (IAP) Review (Action Item: Glide Path Recommendation)

Karl Cheng, Senior Investment Officer, Portfolio Risk and Research, presented a recommendation to adopt a new glide path.

Staff recommendation: Change IAP's allocation to an Alternative Glide Path, that would set maximum OPERF allocation to 75% per target-date fund, reduce the amount of OPERF transactions, and have low impact on median performances.

MOTION: Treasurer Read moved approval to adopt the recommended Glide Path at 11:10 am, the motion was seconded by Member Lorraine Arvin and passed by a vote of 3/0.

VI. 11:15 am Calendar – Future Agenda Items

Rex Kim discussed highlights of the forward calendar. Next meeting will be a joint meeting with PERS. Future featured agenda items: guest speakers relating to ESG and Climate.

VII. 11:17 am Open Discussion

None

VIII. 11:17 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.

Chair Samples adjourned the meeting at 11:39 am.

Respectfully submitted,
Jennifer Kersgaard
Executive Support Specialist

OIC

OREGON STATE TREASURY

TAB 2

COMMITTEE REPORTS

OIC

OREGON STATE TREASURY

TAB 3

OIC ELECTIONS

OIC

OREGON STATE TREASURY

TAB 4

OPERF Q1

PERFORMANCE REVIEW

MEKETA | 45 YEARS
CELEBRATING A MILESTONE

Oregon Investment Council

May 31, 2023

Q1 Performance Update
As of March 31, 2023

Table of Contents

Introduction

OPERF Executive Summary – Notable Items

- → The transition to the new long-term policy allocation (approved in December 2022) is ongoing. Policy targets were shifted on 4/1/23 and certain transitions have already taken place. Further details regarding the strategic allocation of OPERF and its actuarial assumed rate of return will be discussed at the May joint session.
- → OIC approved a new benchmark for the Opportunity Portfolio. This will also be updated as of April 1 in reporting.
- → Investment Policy work is underway for the OPERF portfolio- a discussion on Roles and Responsibilities will take place at this meeting.
- → The public equity program continues to evolve. Additional manager recommendations are before the Council at this meeting.
- → The Asset Liability process, completed one year ago, is being implemented within the OPERF portfolio. We will discuss this implementation today. It comes with discussion around the actuarial assumed rate of return, which is approved by the PERS board and is presented at the May Joint Session for the Council's information.

Economic and Market Update

Data as of March 31, 2023

Commentary

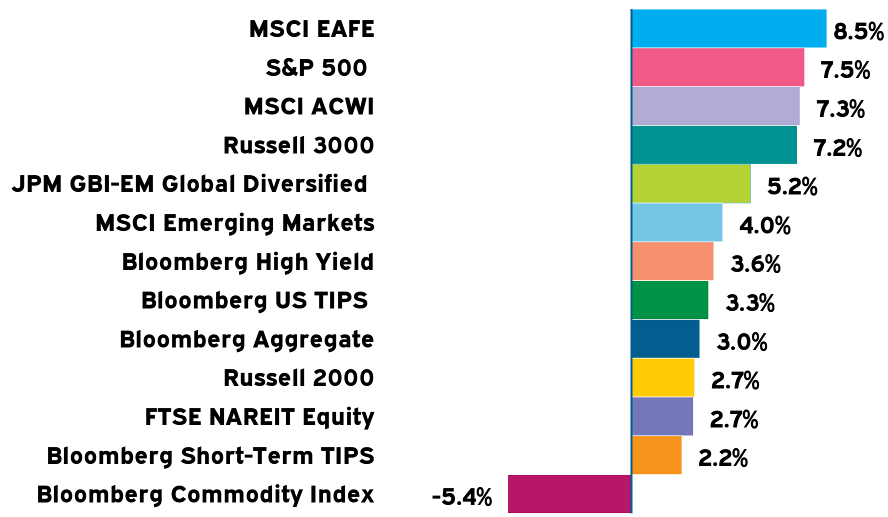
→ It was a volatile quarter for most asset classes driven by evolving monetary policy expectations and high-profile bank failures. Ultimately, investors remained focused on slowing inflation and potentially peaking rate hikes leading to positive results across most asset classes for the quarter.

- The Fed's, and others', quick responses to pressures in the banking sector brought confidence back to the markets in March with the crisis driving the terminal policy rate expectations lower.
- US equity markets (Russell 3000) rallied in March (+2.7%) finishing the first quarter in strongly positive territory (+7.2%). Growth significantly outperformed value for the quarter, driven by the technology sector.
- Non-US developed equity markets (MSCI EAFE +2.5%) also posted positive returns in March. They returned 8.5% for the quarter, finishing ahead of US equities.
- Emerging market equities had positive returns for the month (+3.0%) supported by Chinese equities (+4.5%) and a weaker US dollar. They trailed developed market equities for the quarter partly due to higher US-China tensions.
- On expectations for lower inflation and concerns over the banking sector, bonds rallied in March, with the broad US bond market (Bloomberg Aggregate) rising 2.5%. For the quarter, the broad US bond market was up 3.0%.

→ This year, the path of inflation and monetary policy, slowing global growth, and the war in Ukraine, as well as recent pressures in small- and medium-sized regional banks in the US, will all be key.

Index Returns[1]

Q1 2023



→ Despite volatility during the quarter, public markets, except commodities, finished the first quarter of 2023 in positive territory adding to the strong gains from the fourth quarter of last year.

[1] Source: Bloomberg and FactSet. Data is as of March 31, 2023.

Domestic Equity Returns[1]

Domestic Equity	March (%)	Q1 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
S&P 500	3.7	7.5	-7.7	18.6	11.2	12.2
Russell 3000	2.7	7.2	-8.6	18.5	10.4	11.7
Russell 1000	3.2	7.5	-8.4	18.6	10.9	12.0
Russell 1000 Growth	6.8	14.4	-10.9	18.6	13.6	14.6
Russell 1000 Value	-0.5	1.0	-5.9	17.9	7.5	9.1
Russell MidCap	-1.5	4.1	-8.8	19.2	8.0	10.0
Russell MidCap Growth	1.4	9.1	-8.5	15.2	9.1	11.2
Russell MidCap Value	-3.1	1.3	-9.2	20.7	6.5	8.8
Russell 2000	-4.8	2.7	-11.6	17.5	4.7	8.0
Russell 2000 Growth	-2.5	6.1	-10.6	13.4	4.3	8.5
Russell 2000 Value	-7.2	-0.7	-13.0	21.0	4.5	7.2

US Equities: Russell 3000 Index rose 2.7% in March and 7.2% in Q1.

→ US stocks rose in aggregate for the month and quarter as investors were optimistic that the Federal Reserve may end its policy tightening earlier than expected. However, turmoil in the regional banking industry weighed on segments of the market.

→ The small cap and value indices were more exposed to the banking turmoil and underperformed their broad market indices by significant margins.

→ Large cap stocks were driven higher by the continued strength of the technology and communication services sectors. This same dynamic contributed to the continued outperformance of growth stocks against their value counterparts across the capitalization spectrum.

[1] Source: Bloomberg. Data is as of March 31, 2023.

Foreign Equity Returns[1]

Foreign Equity	March (%)	Q1 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
MSCI ACWI ex. US	2.4	6.9	-5.1	11.8	2.5	4.2
MSCI EAFE	2.5	8.5	-1.4	13.0	3.6	5.0
MSCI EAFE (Local Currency)	0.5	7.5	3.8	14.6	6.3	7.3
MSCI EAFE Small Cap	-0.2	4.9	-9.8	12.1	0.9	5.8
MSCI Emerging Markets	3.0	4.0	-10.7	7.8	-0.9	2.0
MSCI Emerging Markets (Local Currency)	2.2	3.8	-6.6	8.8	1.9	5.0
MSCI China	4.5	4.7	-4.7	-2.6	-4.0	3.4

Foreign Equity: Developed international equities (MSCI EAFE) rose 2.5% in March and 8.5% for the quarter. Emerging market equities (MSCI EM) rose 3.0%. for the month and 4.0% in the first quarter.

→ Non-US equities also recovered in March with developed markets (MSCI EAFE) outpacing US equities (8.5% versus 7.2%) for the quarter and emerging markets (MSCI Emerging Markets) trailing (4.0% versus 7.2%).

→ Developed market equities also benefited from expectations that monetary policy may be peaking on declining inflation. The continued weakness in the US dollar also added to the quarterly results (+1%) for US investors.

→ Emerging market equities started the year with optimism over the reopening of China's economy, but the escalation of US-China tensions and the broader banking crisis led to weaker relative results compared to developed markets.

[1] Source: Bloomberg. Data is as of March 31, 2023.

Fixed Income Returns[1]

Fixed Income	March (%)	Q1 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	Current Yield (%)	Duration (Years)
Bloomberg Barclays Universal	2.3	2.9	-4.6	-2.0	1.0	1.6	4.8	6.3
Bloomberg Barclays Aggregate	2.5	3.0	-4.8	-2.8	0.9	1.4	4.4	6.5
Bloomberg Barclays US TIPS	2.9	3.3	-6.1	1.8	2.9	1.5	4.1	7.0
Bloomberg Short-term TIPS	1.9	2.2	-0.3	3.5	3.0	1.5	4.6	2.5
Bloomberg Barclays High Yield	1.1	3.6	-3.3	5.9	3.2	4.1	8.5	4.2
JPM GBI-EM Global Diversified (USD)	4.1	5.2	-0.7	0.9	-2.4	-1.5	7.1	5.1

Fixed Income: The Bloomberg Universal rose 2.3% in March and 2.9% in Q1 as global sovereign debt yields fell on monetary policy expectations.

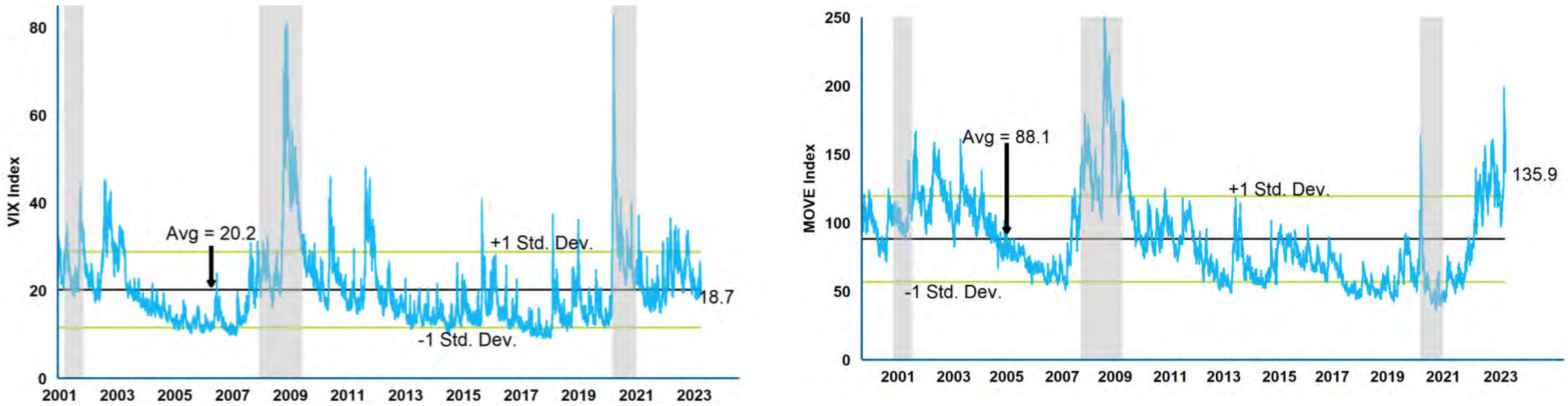
→ Anecdotal reports suggest bouts of flight-to-quality flows during the peak of interest rate volatility connected to the banking sector pushed sovereign debt yields lower. These concerns largely outweighed continued inflation concerns and caused investors to adjust their policy expectations.

→ The broad TIPS index outperformed the broad US bond market (Bloomberg Aggregate) in March and for the quarter.

→ High yield bonds had the weakest results in March driven by banking sector weakness but outperformed the broad US bond market for the quarter.

[1] Source: Bloomberg. JPM GBI-EM data is from InvestorForce. Data is as of March 31, 2023. The yield and duration data from Bloomberg is defined as the index's yield to worst and modified duration respectively.

Equity and Fixed Income Volatility[1]

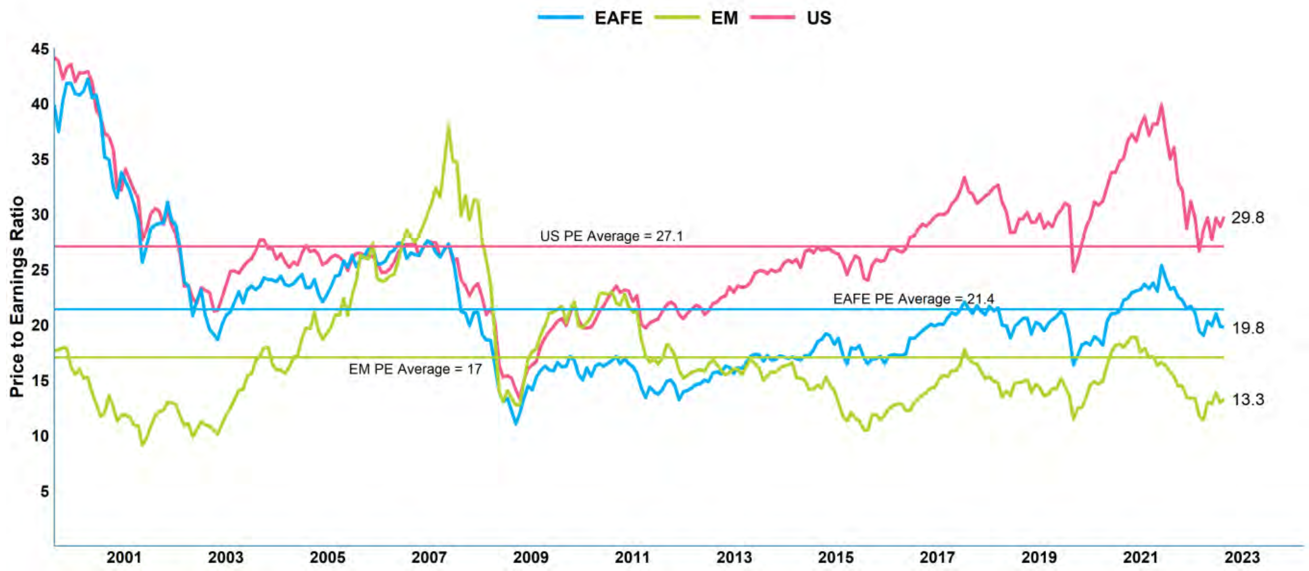


→ Volatility in equities (VIX) remained subdued through the end of March as investors continued to anticipate the end of the Fed's policy tightening.

→ In comparison, the bond market remains on edge with the more policy sensitive MOVE (fixed income volatility) remaining well above its long-run average. During the quarter it hit the highest level since the Global Financial Crisis as the banking sector issues created uncertainty over how the Fed would balance fighting inflation and maintaining financial stability.

[1] Equity and Fixed Income Volatility – Source: Bloomberg. Implied volatility as measured using VIX Index for equity markets and the MOVE Index to measure interest rate volatility for fixed income markets. Data is as of March 2023. The average line indicated is the average of the VIX and MOVE values between January 2000 and March 2023.

Equity Cyclically Adjusted P/E Ratios[1]

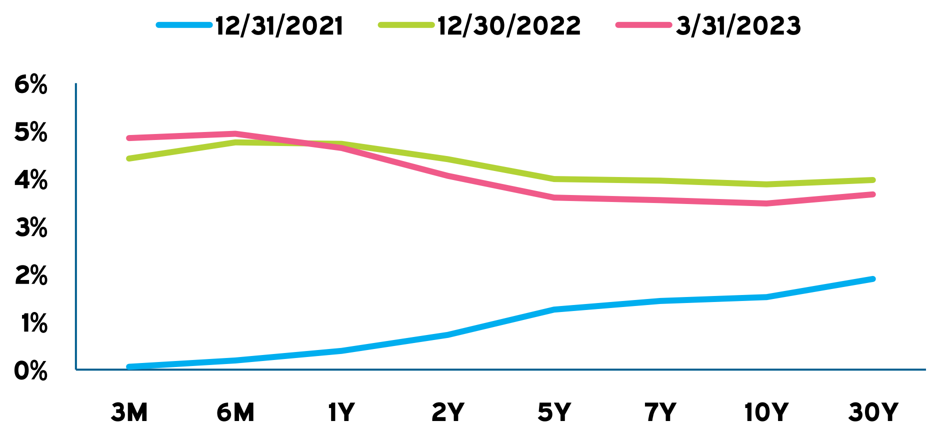


→ After its dramatic decline last year the US equity price-to-earnings ratio remains above its long-run (21st century) average.

→ International developed market valuations are slightly below their own long-term average, with those for emerging markets the lowest and well under the long-term average.

[1] US Equity Cyclically Adjusted P/E on S&P 500 Index. Source: Robert Shiller, Yale University, and Meketa Investment Group. Developed and Emerging Market Equity (MSCI EAFE and EM Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years. Data is as of March 2023. The average line is the long-term average of the US, EM, and EAFE PE values from December 1999 to the recent month-end respectively.

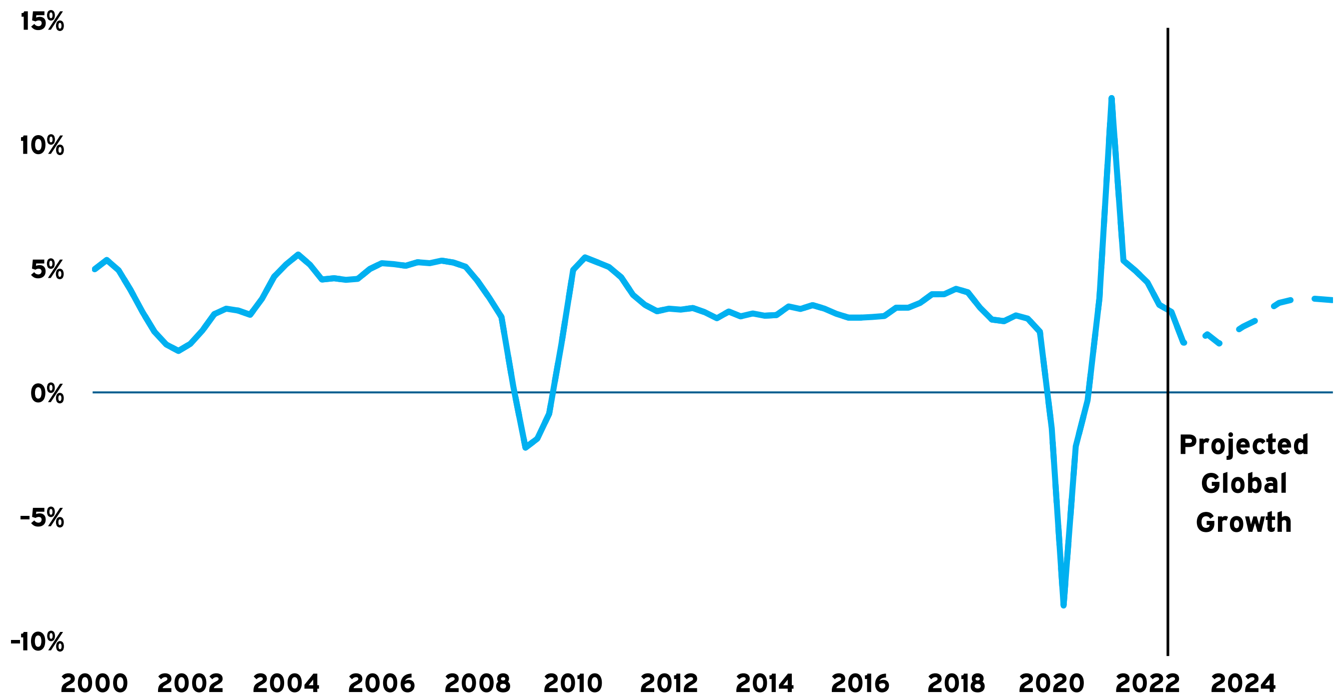
US Yield Curve[1]



- → It was a volatile quarter for interest rates, particularly shorter-dated maturities. Except for the shortest maturities, rates largely declined across the yield curve in the first quarter on expectations of peaking policy.
- → After hitting -1.07% in early March, the yield spread between two-year and ten-year Treasuries finished the quarter at -0.55% as policy-sensitive rates at the front-end of the curve declined faster than longer maturities. The more closely watched measure by the Fed of three-month and ten-year Treasuries also remained inverted. Inversions in the yield curve have often preceded recessions.
- → The Fed remained committed to fighting inflation, despite pressures in the banking sector, raising rates another 25 basis points to a range of 4.75% to 5.0% at its March meeting.

[1] Source: Bloomberg. Data is as of March 31, 2023.

Global Real Gross Domestic Product (GDP) Growth[1]

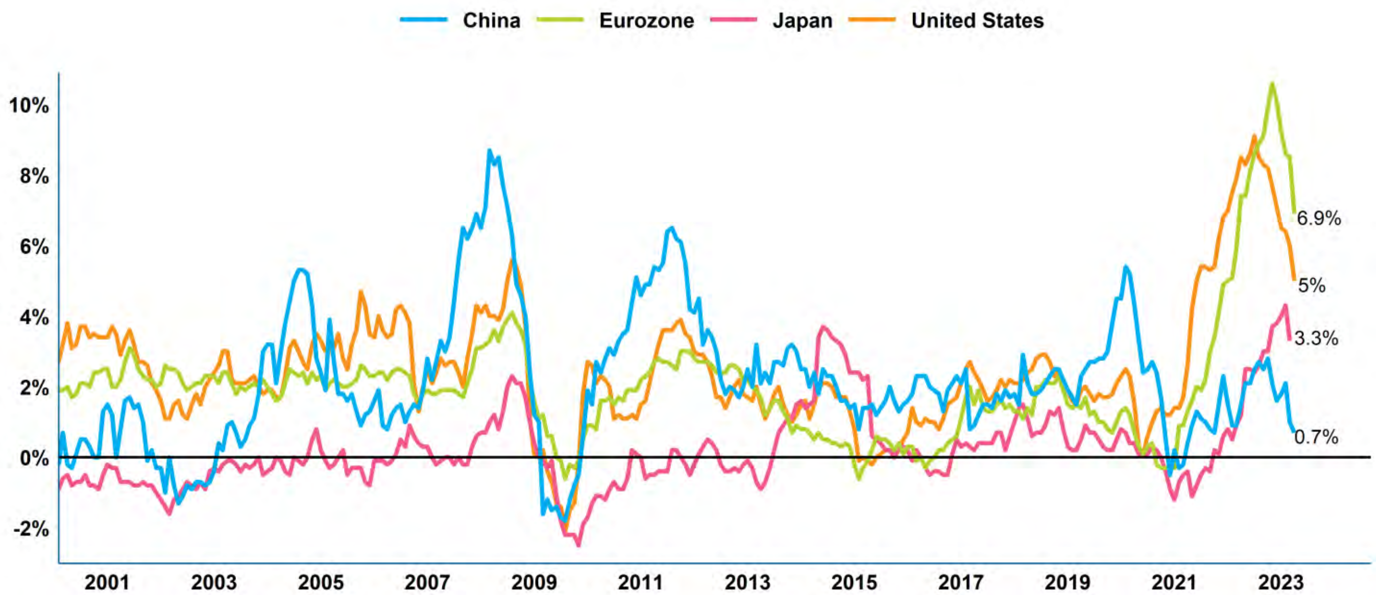


→ Global economies are expected to slow in 2023 compared to 2022, with risks of recession increasing given persistently high inflation and related tighter monetary policy.

→ The delicate balancing act of central banks trying to reduce inflation without dramatically impacting growth will remain key.

[1] Source: Oxford Economics (World GDP, US$ prices & PPP exchange rate, real, % change YoY). Updated March 2023.

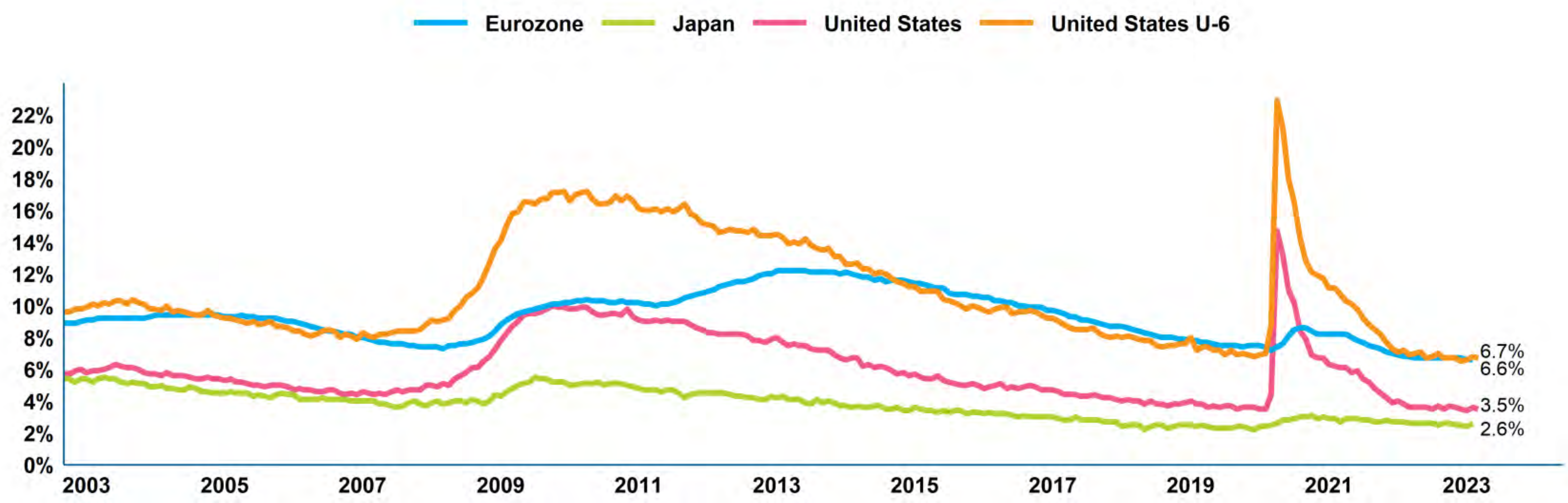
Inflation (CPI Trailing Twelve Months)[1]



- → Inflation increased dramatically from the lows of the pandemic, particularly in the US and Eurozone where it reached levels not seen in many decades.
- → Inflation pressures are slowly declining in the US as supply issues ease, but they remain elevated, while in Europe they have also started to fall as energy prices have eased.
- → Lingering supply issues related to the pandemic, record monetary and fiscal stimulus, strict COVID-19 restrictions in China, and higher commodity prices driven by the war in Ukraine have been key global drivers of inflation.

[1] Source: Bloomberg. Data is as March 31, 2023. The most recent Japanese inflation data is as of February 2023.

Unemployment[1]



- → Labor markets have significantly improved from the pandemic as economies have largely reopened.
- → Despite slowing growth and high inflation, the US labor market remains a particular bright spot. Unemployment in the US, which experienced the steepest rise, recently has returned to pre-pandemic levels. Broader measures of unemployment (U-6) remain higher at 6.7% but have also declined dramatically from their peak.
- → The strong labor market and higher wages, although beneficial for workers, motivates the Fed's efforts to fight inflation, likely leading to higher unemployment.

[1] Source: Bloomberg. Data is as March 31, 2023, for the US. The most recent data for Eurozone and Japanese unemployment is as of February 2023.

US Dollar versus Broad Currencies[1]

→ The dollar finished 2022 much higher than it started, due to the increased pace of policy tightening, stronger relative growth, and safe-haven flows. Late last year and into early this year, the dollar experienced some weakness though as investors anticipated the end of Fed tightening.

→ Overall, the US dollar depreciated in March and finished the quarter slightly lower than where it started as weaker economic data and bank turmoil drove interest rates lower in the US.

→ This year, the track of inflation across economies and the corresponding monetary policies will likely be key drivers of currency moves.

[1] Source: Bloomberg. Data as of March 31, 2023.

Summary

Key Trends:

→ The impacts of record high inflation will remain key, with market volatility likely to stay high.

→ Recent issues related to the banking sector have created a delicate balance for central banks to continue to fight inflation but also try to maintain financial stability.

→ Global monetary policies could diverge in 2023 with the Fed pausing and others continuing to tighten. The risk of policy errors remains elevated given persistent inflation pressures and a strong US labor market.

→ Growth is expected to slow globally this year, with many economies forecast to tip into recession. Inflation, monetary policy, and the war will all be key.

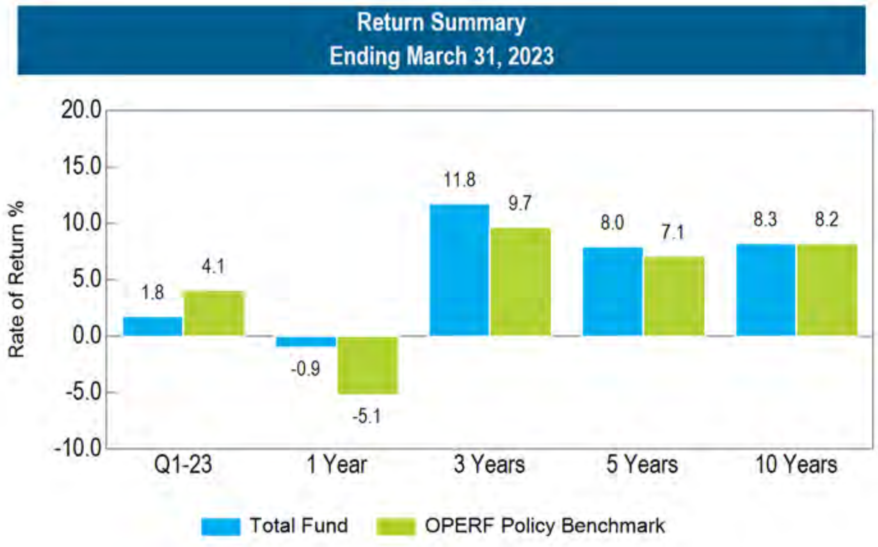
→ In the US, the end of many fiscal programs is expected to put the burden of continued growth on consumers. Costs for shelter, medical care, and education could continue to rise, keeping 'sticky price' inflation at elevated levels.

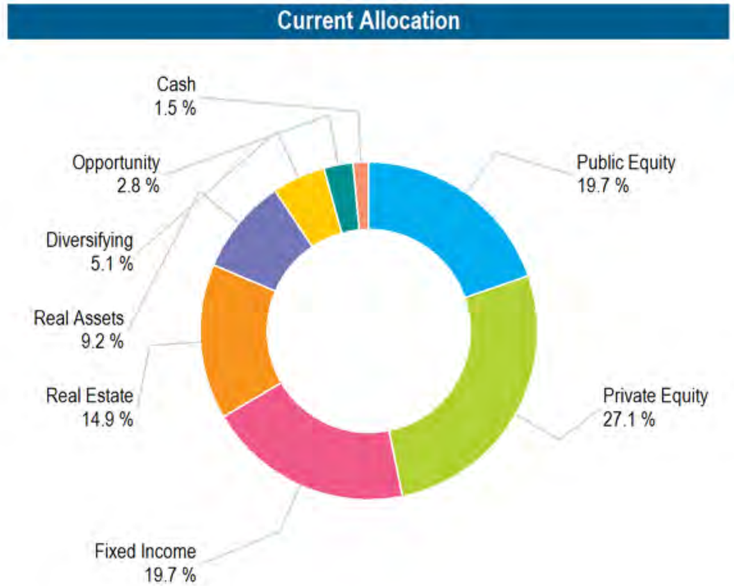
→ The key for US equities going forward will be whether earnings can remain resilient if growth continues to slow.

→ Outside the US, equity valuations remain lower in both emerging and developed markets, but risks remain, including potential continued strength in the US dollar, higher inflation particularly weighing on Europe, and China's rushed exit from COVID-19 restrictions and on-going weakness in the real estate sector.

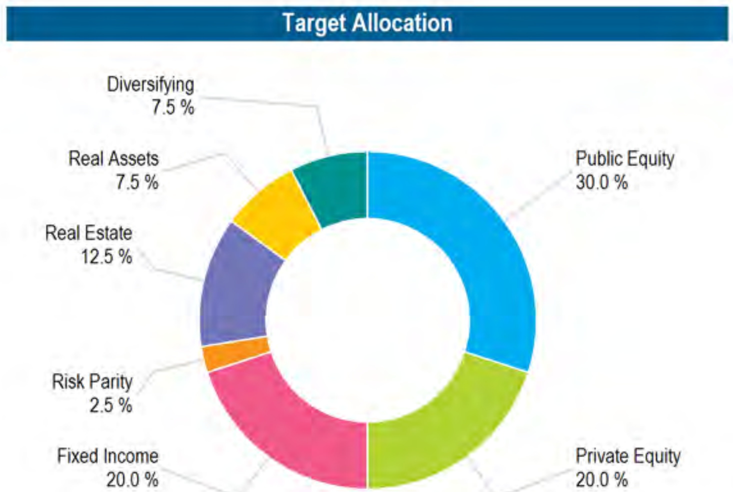
Executive Summary

Q1 2023



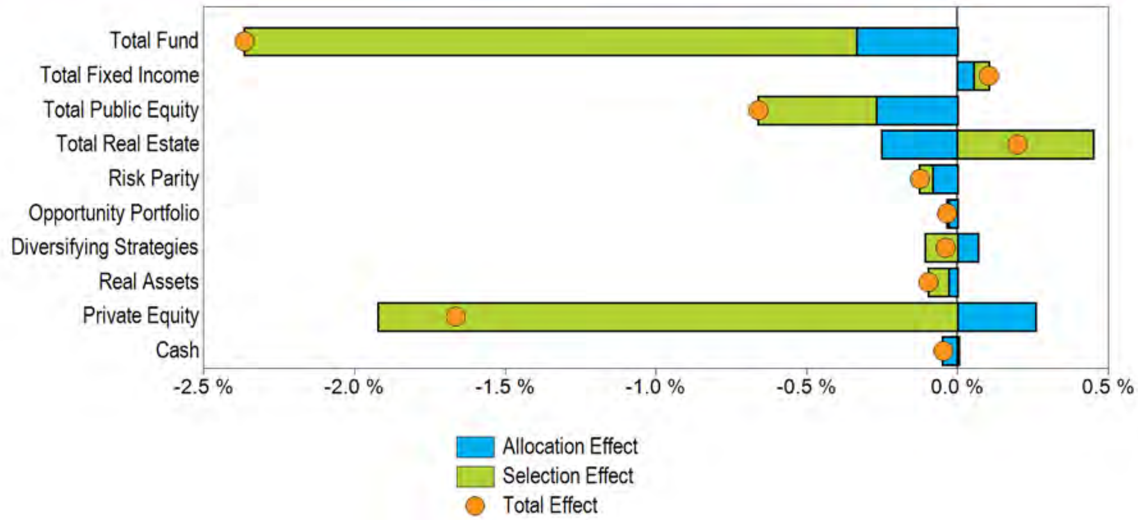


	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Fund	**1.8**	**-0.9**	**11.8**	**8.0**	**8.3**
OPERF Policy Benchmark	*4.1*	*-5.1*	*9.7*	*7.1*	*8.2*
Excess Return	-2.3	4.2	2.1	0.9	0.1
InvMetrics All DB > $10B Net Rank	*99*	*6*	*26*	*4*	*4*
Median	*3.7*	*-3.9*	*11.0*	*6.6*	*7.4*



Quarterly Commentary

Attribution Effects
3 Months Ending March 31, 2023



→ The Total Fund returned 1.8% for the fourth quarter, underperforming the OPERF Policy Benchmark (+4.1%) by 230 basis points.

→ Compared to peers the Total Fund underperformed the peer median return of 3.7%

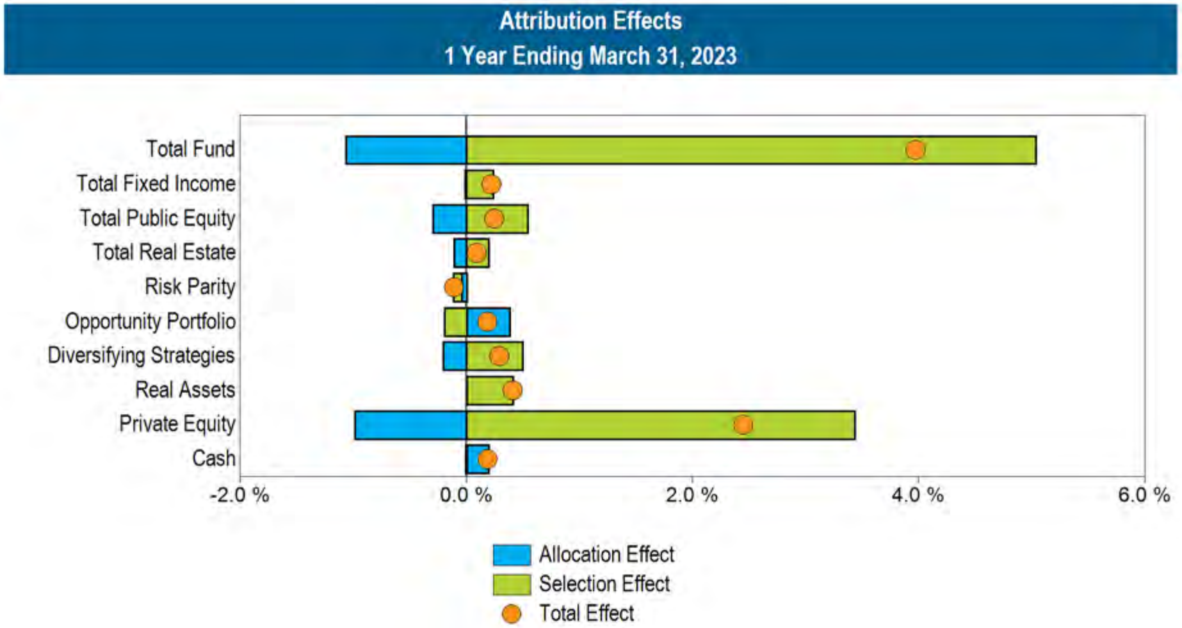
→ Public Equities returned 5.1% for the quarter driven by US Equity which returned 4.5% for the quarter and accounts for over 50% of the Public Equities exposure.

- A majority of US Equities are held within the Market Oriented (Core) portfolio (+4.7%) which underperformed the Russell 1000 Index (+7.5%) by 280 basis points. All underlying funds underperformed the broad Russell 3000 index (+7.2%) aside from the S&P 500 – OST managed account (+7.5%).
- The underweight to and selection (performance) within Public Equities was a detractor on a relative basis.

→ Private Equity returned 0.7% for the quarter underperforming the Russell 3000 +300 basis points QTR Lag benchmark (+8.0%) by 730 basis points.

- Private Equity's underperformance of the benchmark was the largest detractor of relative returns in the first quarter.

One Year Commentary



→ The Total Fund returned -0.9% for the trailing 12-month period ending March 31, 2023. The Fund outperformed the OPERF Policy Benchmark (-5.1%) by 420 basis points and outperformed the peer median return of -3.9% by 300 basis points. This return ranks in the top decile of peer universe returns.

→ Private Equity continues to drive returns on a relative basis. The trailing 1-Year return of the Private Equity portfolio was -5.2% compared to the Russell 3000 +300 basis points QTR Lag which returned -16.7% over the same period.

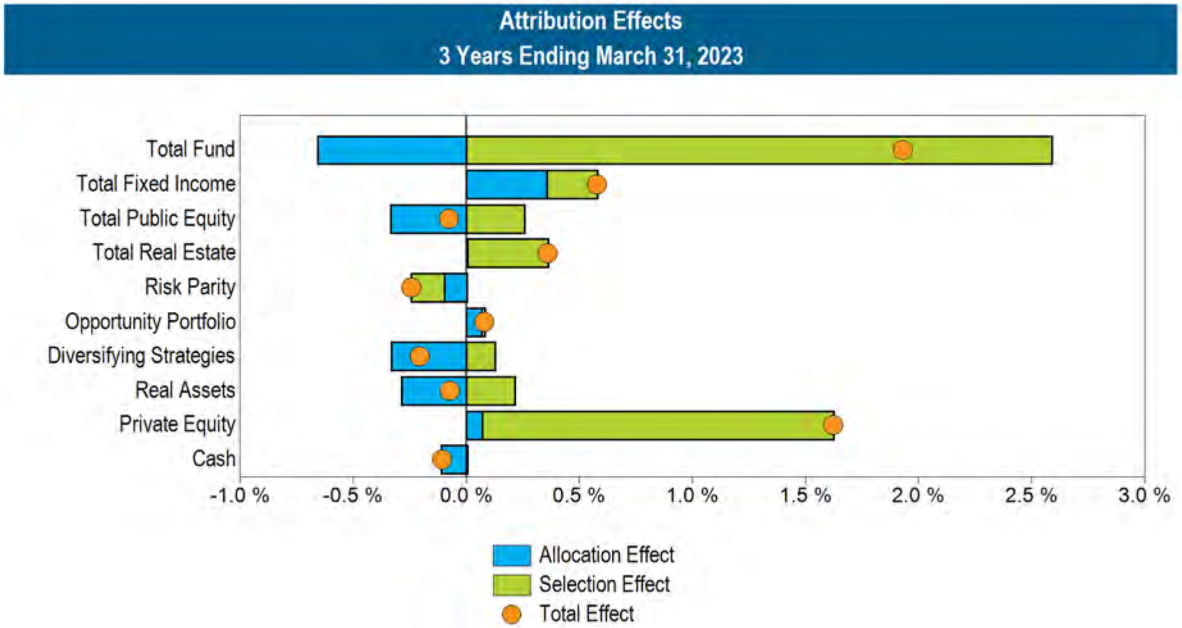
→ Total Fixed Income returned -3.3% versus a -4.8% return for the Oregon Custom FI Benchmark.

- Core Fixed Income (-4.5%) and U.S. Government (-4.6%) portfolios, which account for over half of the Fixed Income portfolio, drove negative returns within Total Fixed Income on an absolute basis. Though all managers performed roughly in line with their respective benchmarks.

→ Total Public Equities were down -5.5% for the 1-year period though still outperformed the MSCI ACWI IMI benchmark return of -7.7%.

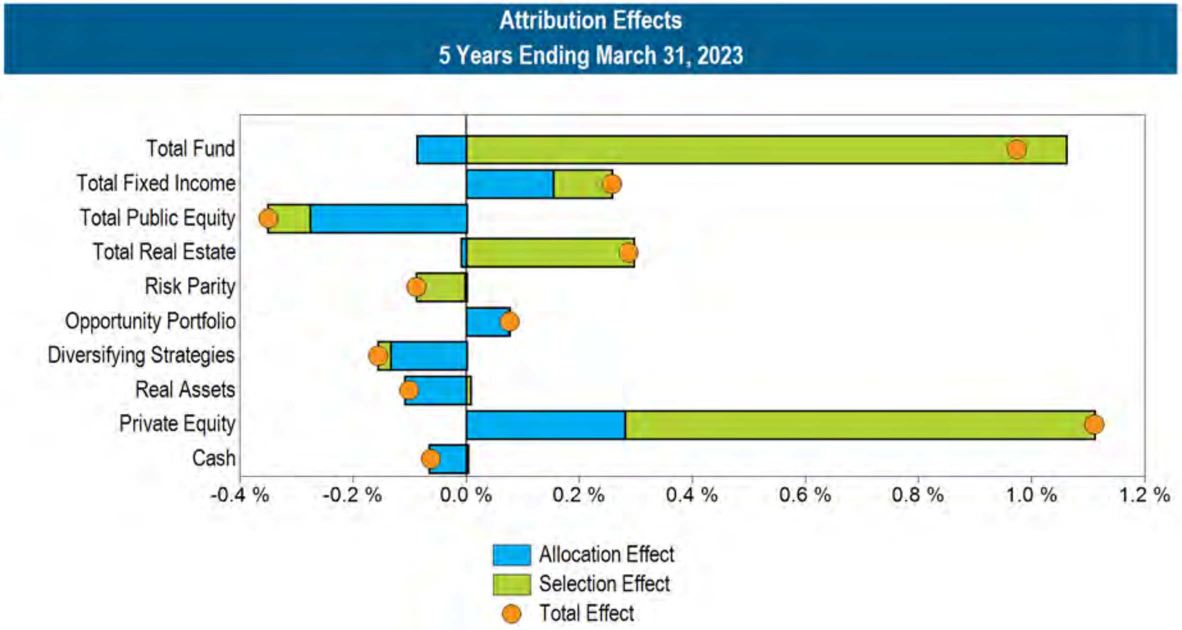
- Non-US Equity (-2.8%) driven primarily by International Market Oriented (Core) (-2.4%) and Global Equity Low Volatility (-4.2%) were key drivers of relative performance within the Total Public Equities portfolio.

Three Year Commentary



- → The Total Fund returned 11.8% annualized over the trailing 3-year period and has outperformed the OPERF Policy Benchmark (+9.7%) and the peer median return of 11.0% by 210 basis points and 80 basis points respectively.
- → Drivers of outperformance over the 3-year period are Total Fixed Income (-1.1%), Total Real Estate (+11.9%), and Private Equity (+16.3%) portfolios.
- → A slight underweight to and selection within Fixed Income have both been positive contributors to Total Fund performance versus the policy benchmark even though performance of the portfolio has been a headwind on an absolute basis of the 3-year period.
  - Over the same period Non-Core Fixed Income has returned 9.8% versus the Custom Non-Core Fixed Income Index return 7.9%.
- → Total Real Estate has contributed positively to 3-year returns on an absolute and relative basis.
  - The Real Estate excluding REITS (+11.9%) and Total REITS (+10.4%) portfolios have outperformed the NCREIF ODCE (Custom) (Adj.) return of 9.0% over the same period.
- → The overweight to Private Equity was a slight contributor to Total Fund outperformance while selection within the asset class was the primary contributor to relative returns.

Five Year Commentary



→ The Total Fund returned 8.0% annualized over the trailing 5-year period and has outperformed the OPERF Policy Benchmark (+7.1%) and the peer median return of 6.6% by 90basis points and 140 basis points respectively.

→ Selection within Real Estate (+10.2%) and Private Equity (+15.5%), in addition to the Private Equity overweight have been the primary drivers of outperformance.

→ Benchmark relative outperformance within Total Fixed Income (+1.5%) has also been a contributor to trailing 5-year outperformance.

- Both Core (+1.3%) and Non-Core (+4.6%) Fixed Income portfolios have outperformed their respective benchmarks over this period.

→ Total Public Equity (+6.6%) has been the largest detractor over the period on a relative basis due primarily to being underweight versus the Policy.

- The Market Oriented (Core) (+9.3%) portfolio has also been a strong contributor to absolute returns even though it has trailed the Russell 1000 benchmark (+10.9%) by 160 basis points.

Statistics Summary

1 Year Ending March 31, 2023

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Fund	-0.94%	6.09%	1.06	0.62	-0.56	3.95%
OPERF Policy Benchmark	-5.14%	9.62%	--	1.00	-0.79	0.00%

Statistics Summary

3 Years Ending March 31, 2023

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Fund	11.76%	6.18%	0.63	0.75	1.76	3.26%
OPERF Policy Benchmark	9.69%	7.47%	--	1.00	1.18	0.00%

Statistics Summary

5 Years Ending March 31, 2023

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Fund	7.98%	6.25%	0.32	0.82	1.07	2.74%
OPERF Policy Benchmark	7.10%	7.01%	--	1.00	0.82	0.00%

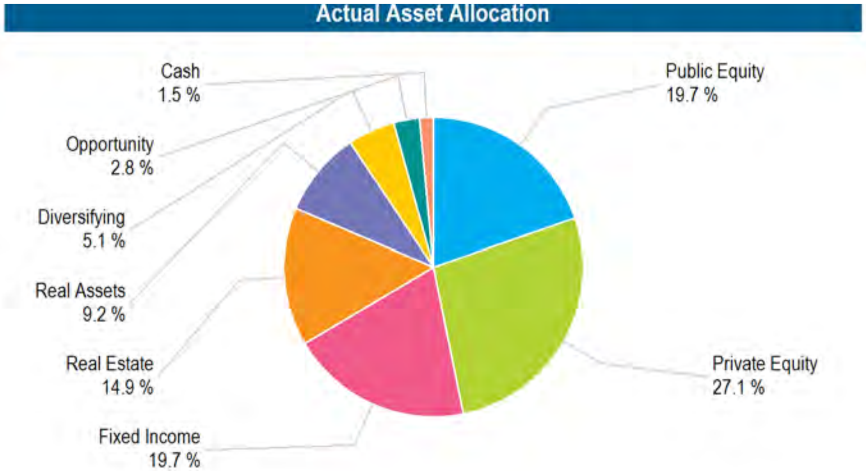
Statistics Summary

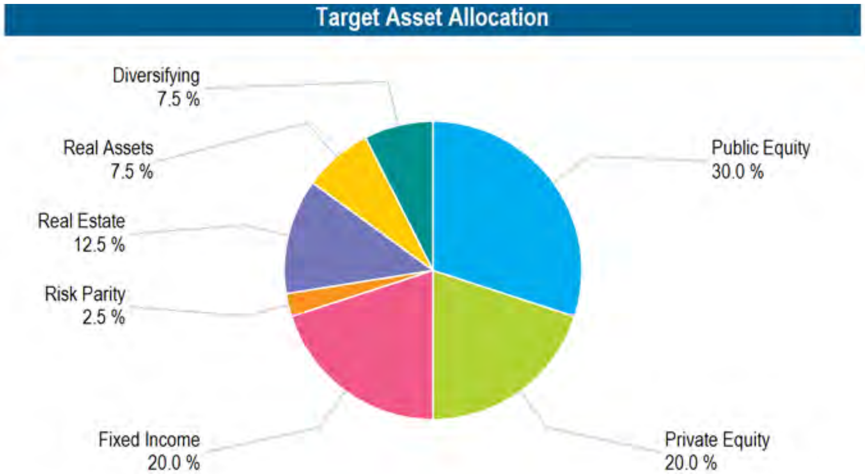
10 Years Ending March 31, 2023

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Fund	8.26%	5.45%	0.01	0.84	1.36	2.14%
OPERF Policy Benchmark	8.23%	6.06%	--	1.00	1.22	0.00%

Performance Update

As of March 31, 2023





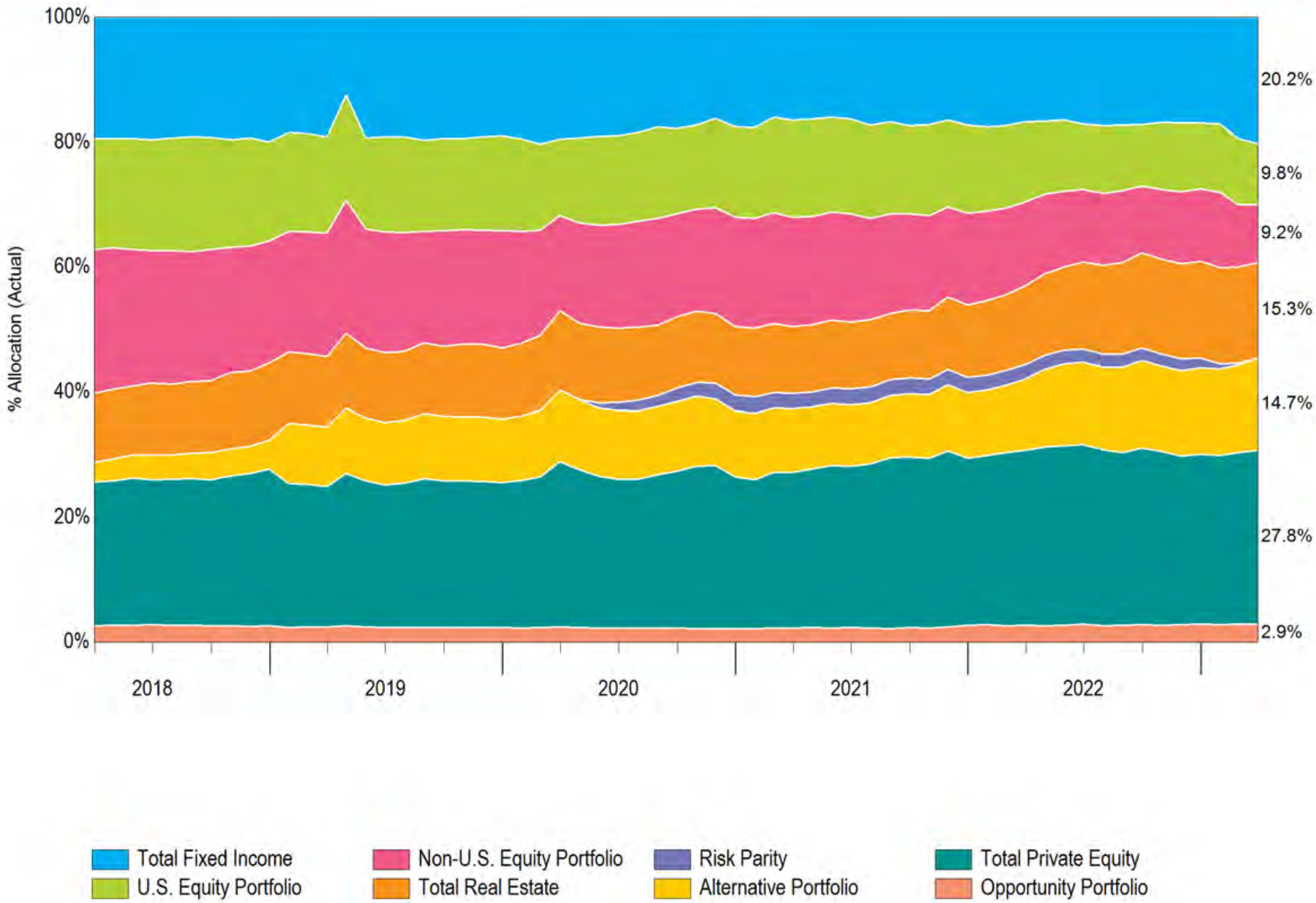
Asset Allocation vs. Target

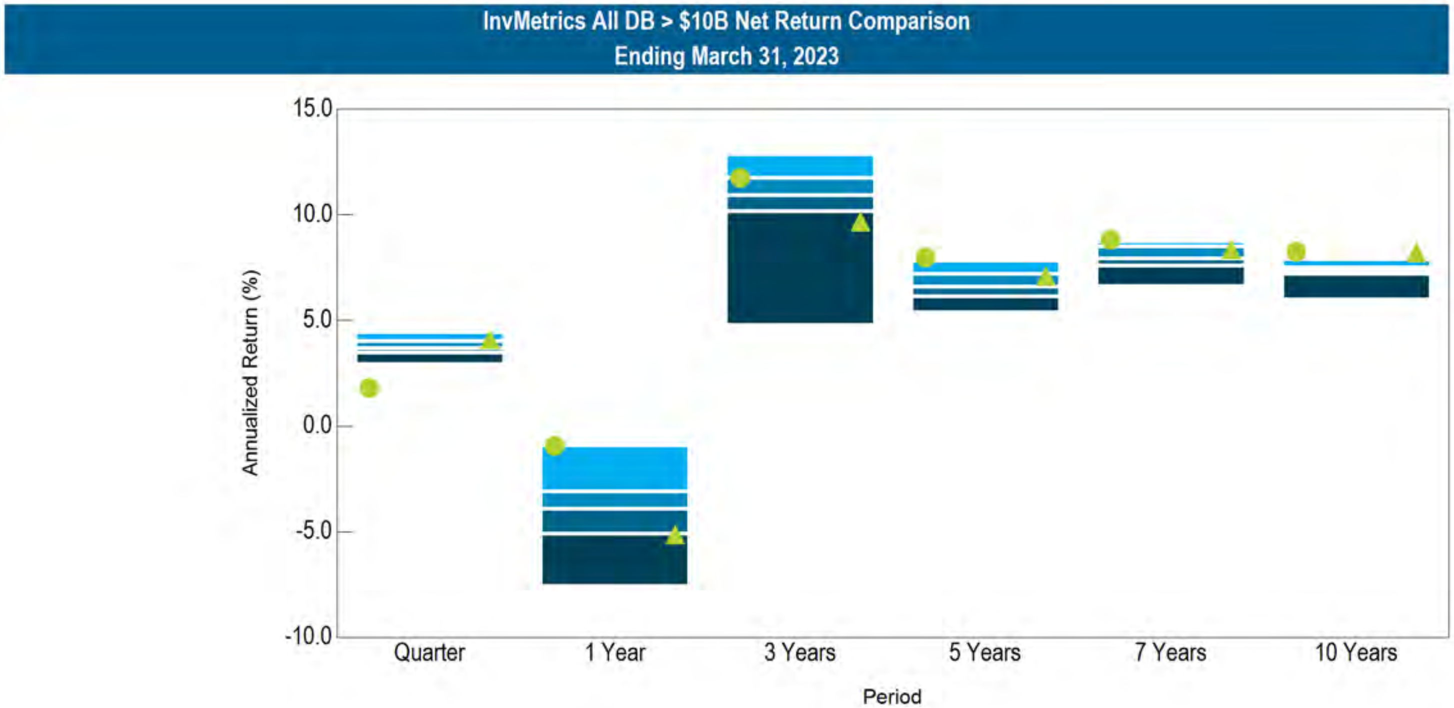
As Of March 31, 2023

	Current	Current	Policy	Difference	Policy Range	Within Range
Public Equity[1]	$18,188,396,544	19.7%	30.0%	-10.3%	25.0% - 35.0%	No
Private Equity	$25,002,069,282	27.1%	20.0%	7.1%	15.0% - 27.5%	Yes
Fixed Income	$18,217,073,159	19.7%	20.0%	-0.3%	15.0% - 25.0%	Yes
Risk Parity	$16,717,371	0.0%	2.5%	-2.5%	0.0% - 3.5%	Yes
Real Estate	$13,782,486,357	14.9%	12.5%	2.4%	7.5% - 17.5%	Yes
Real Assets	$8,534,263,118	9.2%	7.5%	1.7%	2.5% - 10.0%	Yes
Diversifying	$4,696,313,779	5.1%	7.5%	-2.4%	2.5% - 10.0%	Yes
Opportunity	$2,630,831,313	2.8%	0.0%	2.8%	0.0% - 5.0%	Yes
Cash[2]	$1,355,937,140	1.5%				Yes
Total	**$92,424,088,064**	**100.0%**	**100.0%**			

[1] Public Equity includes Other Equity for allocation purposes.
[2] Cash includes the Russell Overlay Cash balance for allocation purposes.

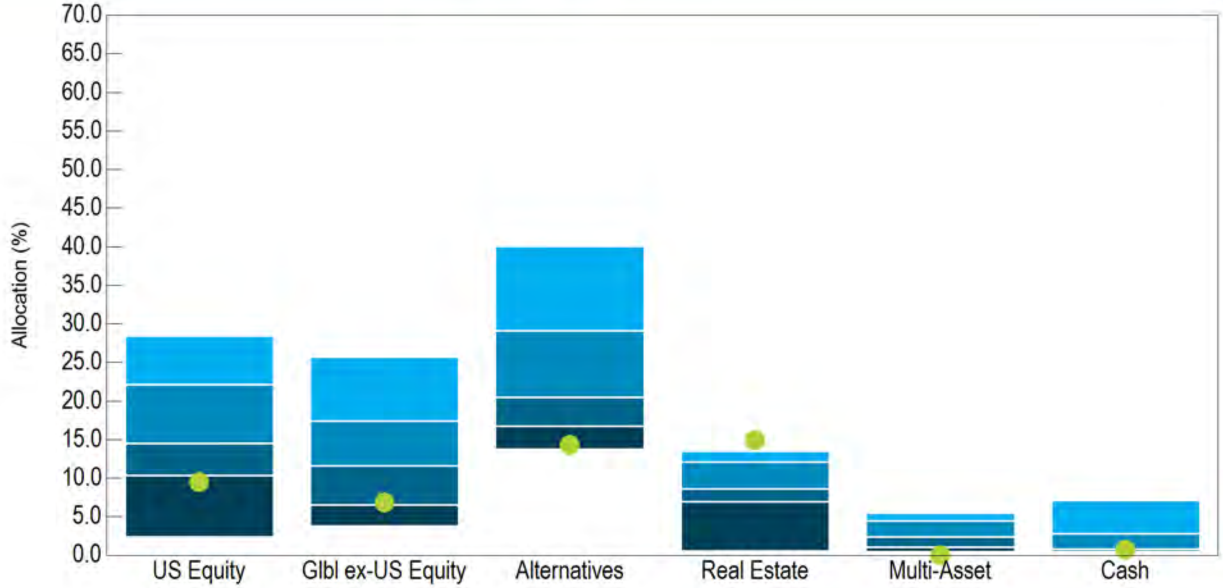
Asset Allocation History
5 Years Ending March 31, 2023





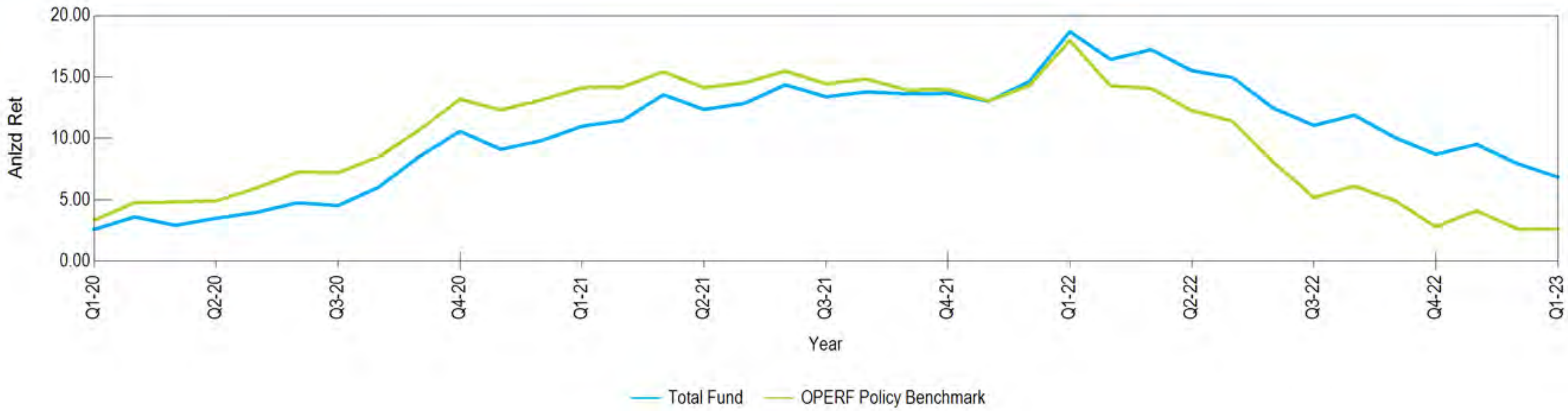
	Return (Rank)											
5th Percentile	4.5		-0.9		12.9		7.8		8.7		7.9	
25th Percentile	4.0		-3.1		11.8		7.2		8.5		7.5	
Median	3.7		-3.9		11.0		6.6		8.0		7.4	
75th Percentile	3.5		-5.1		10.2		6.2		7.6		7.2	
95th Percentile	2.9		-7.5		4.8		5.4		6.7		6.0	
# of Portfolios	22		22		22		21		20		19	
Total Fund	1.8	(99)	-0.9	(6)	11.8	(26)	8.0	(4)	8.8	(5)	8.3	(4)
OPERF Policy Benchmark	4.1	(24)	-5.1	(76)	9.7	(83)	7.1	(31)	8.4	(30)	8.2	(4)

Total Plan Allocation vs. InvMetrics All DB > $10B Net
As of March 31, 2023

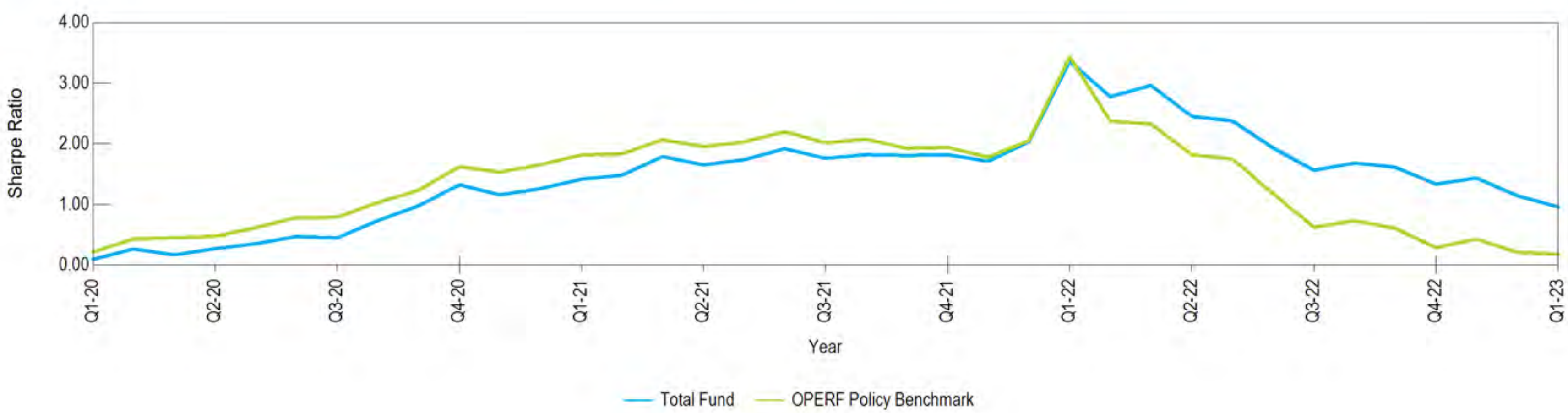


	Allocation (Rank)											
5th Percentile	28.5		25.7		40.1		13.5		5.5		7.1	
25th Percentile	22.2		17.5		29.2		12.2		4.5		2.9	
Median	14.6		11.7		20.6		8.7		2.5		0.9	
75th Percentile	10.4		6.6		16.8		7.1		1.1		0.5	
95th Percentile	2.5		3.8		13.8		0.6		0.6		0.3	
# of Portfolios	18		19		19		19		9		17	
Total Fund	9.5	(84)	6.8	(73)	14.3	(89)	14.9	(1)	0.0	(99)	0.7	(60)

Rolling 3 Year Annualized Return (%)
Total Fund vs. OPERF Policy Benchmark



Rolling 3 Year Sharpe Ratio
Total Fund vs. OPERF Policy Benchmark



Asset Class Trailing Net Performance

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Fund	**92,424,088,064**	**100.0**	--	1.8	-0.9	11.8	8.0	8.3
OPERF Policy Benchmark				*4.1*	*-5.1*	*9.7*	*7.1*	*8.2*
InvMetrics All DB > $10B Net Median				*3.7*	*-3.9*	*11.0*	*6.6*	*7.4*
InvMetrics All DB > $10B Net Rank				*99*	*6*	*26*	*4*	*4*
Total Fixed Income	**18,217,073,159**	**19.7**	**19.7**	3.3	-3.3	-1.1	1.5	1.7
Oregon Custom FI Benchmark				*3.0*	*-4.8*	*-2.3*	*0.9*	*1.2*
Core Fixed Income	**3,821,116,399**	**4.1**	**21.0**	3.5	-4.5	-1.7	1.3	1.8
Oregon Custom External FI BM				*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
U.S. Government	**8,988,527,242**	**9.7**	**49.3**	3.2	-4.6	-4.2	0.8	--
Government Blended Index				*3.0*	*-4.5*	*-4.2*	*0.7*	*0.5*
Non-Core Fixed Income	**1,861,447,121**	**2.0**	**10.2**	3.7	5.1	9.8	4.6	4.7
Custom Non-Core Fixed Income Index				*3.4*	*1.2*	*7.9*	*3.5*	*3.9*
Global Sovereign	**1,091,579,785**	**1.2**	**6.0**	3.2	-3.1	--	--	--
BbgBarc Global Treasury Ex-U.S.				*3.2*	*-3.5*	*-2.3*	*0.8*	*2.2*
Emerging Markets Debt	**321,455,192**	**0.3**	**1.8**	1.8	-8.2	--	--	--
JP Morgan EMBI Global Diversified				*1.9*	*-6.9*	*0.0*	*-0.6*	*2.0*
Structured Credit Products	**1,628,549,456**	**1.8**	**8.9**	2.6	-2.8	--	--	--
Oregon Structured Credit Products FI BM				*3.0*	*-2.0*	*--*	*--*	*--*
Total Public Equity	**17,123,338,676**	**18.5**	**18.5**	5.1	-5.5	16.8	6.6	8.4
MSCI ACWI IMI Net (Daily)				*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
U.S. Equity	**8,786,294,883**	**9.5**	**51.3**	4.5	-7.8	18.9	8.8	10.7
Russell 3000 TR				*7.2*	*-8.6*	*18.5*	*10.4*	*11.7*
Small Cap Growth	**227,480,230**	**0.2**	**2.6**	-0.1	-14.7	22.4	9.8	10.7
Russell 2000 Growth TR				*6.1*	*-10.6*	*13.4*	*4.3*	*8.5*
Small Cap Value	**212,016,752**	**0.2**	**2.4**	0.5	-6.4	26.5	6.3	8.5
Russell 2000 Value TR				*-0.7*	*-13.0*	*21.0*	*4.6*	*7.2*
Market Oriented (CORE)	**8,346,797,901**	**9.0**	**95.0**	4.7	-7.8	18.4	9.3	11.0
Russell 1000 TR				*7.5*	*-8.4*	*18.6*	*10.9*	*12.0*

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Non-U.S. Equity	6,328,859,551	6.8	37.0	7.2	-2.8	15.9	4.1	6.0
Oregon MSCI ACWI Ex US IMI (Net)				*6.6*	*-5.8*	*12.2*	*2.3*	*4.3*
Total International Overlay Accounts	-13,986,677	0.0	-0.2					
International Market Oriented (Core)	3,254,251,489	3.5	51.4	6.8	-2.4	15.5	4.5	6.4
MSCI World ex USA IMI Net Return				*7.6*	*-3.9*	*13.5*	*3.5*	*5.0*
International Value	1,236,100,836	1.3	19.5	7.6	-2.0	18.2	3.9	6.2
Oregon MSCI ACWI Ex US Value IMI (Net)				*5.0*	*-4.6*	*14.1*	*1.3*	*3.3*
International Growth	816,272,984	0.9	12.9	12.3	0.1	11.4	7.7	7.3
Oregon MSCI WORLD Ex US (Net)				*8.0*	*-2.7*	*13.5*	*3.8*	*4.9*
International Small Cap	319,985,221	0.3	5.1	6.4	-4.1	20.7	2.3	5.9
MSCI World Ex US Small Cap Value (Net)				*4.6*	*-7.4*	*15.2*	*1.3*	*5.0*
Emerging Markets	702,249,022	0.8	11.1	5.0	-7.7	14.1	2.1	3.8
ORE MSCI Emerging Markets IMI (Net)				*3.9*	*-10.7*	*9.2*	*-0.6*	*2.1*
Global Equity	2,008,183,122	2.2	11.7	3.3	-4.4	12.7	5.4	8.3
MSCI ACWI IMI Net (Daily)				*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
Global Equity Low Volatility	1,507,361,067	1.6	75.1	3.0	-4.2	12.5	6.0	--
MSCI AC World (Daily Const)				*7.3*	*-7.4*	*15.4*	*6.9*	*8.1*
Other Equity[1]	1,079,045,665	1.2	6.3					
Total Real Estate	13,782,486,357	14.9	14.9	-2.3	7.9	11.9	10.2	10.3
NCREIF ODCE (Custom) (Adj.)				*-5.2*	*6.5*	*9.0*	*7.7*	*8.9*
Real Estate excluding REITS	13,404,186,740	14.5	97.3	-2.5	8.5	11.9	10.5	11.1
NCREIF ODCE (Custom) (Adj.)				*-5.2*	*6.5*	*9.0*	*7.7*	*8.9*
Total REITS	378,299,617	0.4	2.7	3.9	-9.2	10.4	4.5	4.7

[1] Other Equity represents Transitional and Closed Accounts and is not included in the Total Public Equity aggregate market value.

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Risk Parity	16,717,371	0.0	0.0	-0.4	-19.4	--	--	--
S&P Risk Parity - 12% Target Volatility				8.6	-12.1	11.8	7.7	6.5
Opportunity Portfolio	2,630,831,313	2.8	2.8	2.8	2.3	11.8	9.5	8.6
CPI + 5%				2.9	10.2	10.6	9.1	7.7
Alternative Portfolio	13,230,576,897	14.3	14.3	1.4	14.3	10.2	4.2	4.0
CPI +4%				2.7	8.9	9.5	8.0	6.7
Diversifying Strategies	4,696,313,779	5.1	35.5	-1.3	12.2	6.8	0.2	2.8
HFRI FOF Conservative Index				0.8	0.8	7.6	3.9	3.4
Real Assets	8,534,263,118	9.2	64.5	3.0	15.8	12.6	7.3	5.4
CPI +4%				2.7	8.9	9.5	8.0	6.7
Private Equity	25,002,069,282	27.1	27.1	0.7	-5.2	16.3	15.5	14.1
Russell 3000 + 300 BPS QTR LAG (Adj.)				8.0	-16.7	10.3	12.0	15.5
Cash	687,810,355	0.7	0.7	1.2	2.4	1.2	1.7	1.3
ICE BofA US 3-Month Treasury Bill				1.1	2.5	0.9	1.4	0.9

Trailing Net Performance

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Fund	**92,424,088,064**	**100.0**	**1.8**	**-0.9**	**11.8**	**8.0**	**8.3**
OPERF Policy Benchmark			*4.1*	*-5.1*	*9.7*	*7.1*	*8.2*
60% MSCI ACWI / 40% Bloomberg Aggregate			*5.6*	*-6.1*	*8.0*	*4.8*	*5.6*
70% MSCI ACWI/30% Barclays Agg			*6.0*	*-6.4*	*9.8*	*5.4*	*6.2*
InvMetrics All DB > $10B Net Median			*3.7*	*-3.9*	*11.0*	*6.6*	*7.4*
InvMetrics All DB > $10B Net Rank			*99*	*6*	*26*	*4*	*4*
Total Fixed Income	**18,217,073,159**	**19.7**	**3.3**	**-3.3**	**-1.1**	**1.5**	**1.7**
Oregon Custom FI Benchmark			*3.0*	*-4.8*	*-2.3*	*0.9*	*1.2*
Bloomberg US Aggregate TR			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
Fixed Income Weighted BM			*3.0*	*-4.0*	*-2.3*	*1.1*	*1.5*
Core Fixed Income	**3,821,116,399**	**4.1**	**3.5**	**-4.5**	**-1.7**	**1.3**	**1.8**
Oregon Custom External FI BM			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
Blackrock	1,250,510,812	1.4	3.3	-4.7	-2.0	1.3	1.7
Oregon Custom External FI BM			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
Wellington	1,277,158,871	1.4	3.6	-4.7	-1.8	1.4	1.9
Oregon Custom External FI BM			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
Western Asset	1,293,426,213	1.4	3.7	-4.8	-0.9	1.4	2.1
Oregon Custom External FI BM			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
Fidelity	504,398,295	0.5	3.4	--	--	--	--
Oregon Custom External FI BM			*3.0*	*-4.8*	*-2.8*	*0.9*	*1.4*
U.S. Government	**8,988,527,242**	**9.7**	**3.2**	**-4.6**	**-4.2**	**0.8**	**--**
Government Blended Index			*3.0*	*-4.5*	*-4.2*	*0.7*	*0.5*
Government Portfolio	8,988,527,242	9.7	3.2	-4.6	-4.2	0.8	--
Government Blended Index			*3.0*	*-4.5*	*-4.2*	*0.7*	*0.5*

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Non-Core Fixed Income	**1,861,447,121**	**2.0**	**3.7**	**5.1**	**9.8**	**4.6**	**4.7**
Custom Non-Core Fixed Income Index			*3.4*	*1.2*	*7.9*	*3.5*	*3.9*
KKR Asset Management	29,132,626	0.0	16.5	-2.4	3.0	0.1	2.2
KKR Custom Leveraged Loans & Bond Index			*3.4*	*0.6*	*7.7*	*3.5*	*3.9*
Oak Hill	1,579,997,975	1.7	3.6	5.3	9.5	5.1	5.1
Oak Hill Custom Lev Loan & Bond Index			*3.3*	*1.8*	*8.2*	*3.6*	*3.8*
Beach Point[1]	252,316,520	0.3					
Global Sovereign	**1,091,579,785**	**1.2**	**3.2**	**-3.1**	**--**	**--**	**--**
BbgBarc Global Treasury Ex-U.S.			*3.2*	*-3.5*	*-2.3*	*0.8*	*2.2*
MSIM Global Sovereign	544,522,915	0.6	3.2	-3.2	--	--	--
BbgBarc Global Treasury Ex-U.S.			*3.2*	*-3.5*	*-2.3*	*0.8*	*2.2*
PIMCO Global Sovereign	547,056,870	0.6	3.2	-3.0	--	--	--
BbgBarc Global Treasury Ex-U.S.			*3.2*	*-3.5*	*-2.3*	*0.8*	*2.2*
Emerging Markets Debt	**321,455,192**	**0.3**	**1.8**	**-8.2**	**--**	**--**	**--**
JP Morgan EMBI Global Diversified			*1.9*	*-6.9*	*0.0*	*-0.6*	*2.0*
Ashmore EMD	101,004,244	0.1	1.5	-11.2	--	--	--
JP Morgan EMBI Global Diversified			*1.9*	*-6.9*	*0.0*	*-0.6*	*2.0*
Global Evolution EMD	111,013,383	0.1	2.2	-7.0	--	--	--
JP Morgan EMBI Global Diversified			*1.9*	*-6.9*	*0.0*	*-0.6*	*2.0*
PGIM EMD	109,437,566	0.1	1.7	-6.6	--	--	--
JP Morgan EMBI Global Diversified			*1.9*	*-6.9*	*0.0*	*-0.6*	*2.0*

[1]Beach Point was fully funded in March and performance will begin April 1st, 2023.

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Structured Credit Products	**1,628,549,456**	**1.8**	**2.6**	**-2.8**	**--**	**--**	**--**
Oregon Structured Credit Products FI BM			*3.0*	*-2.0*	*--*	*--*	*--*
Schroders SCP	560,357,792	0.6	3.1	-0.2	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx			*3.3*	*-0.6*	*3.0*	*1.8*	*2.3*
Putnam SCP	503,409,583	0.5	1.8	-6.9	--	--	--
Bloomberg US MBS TR USD			*2.5*	*-4.9*	*-3.3*	*0.2*	*1.0*
Guggenheim SCP	564,782,081	0.6	2.9	-1.4	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx			*3.3*	*-0.6*	*3.0*	*1.8*	*2.3*
Total Public Equity	**17,123,338,676**	**18.5**	**5.1**	**-5.5**	**16.8**	**6.6**	**8.4**
MSCI ACWI IMI Net (Daily)			*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
U.S. Equity	**8,786,294,883**	**9.5**	**4.5**	**-7.8**	**18.9**	**8.8**	**10.7**
Russell 3000 TR			*7.2*	*-8.6*	*18.5*	*10.4*	*11.7*
Small Cap Growth	**227,480,230**	**0.2**	**-0.1**	**-14.7**	**22.4**	**9.8**	**10.7**
Russell 2000 Growth TR			*6.1*	*-10.6*	*13.4*	*4.3*	*8.5*
EAM MicroCap Growth	227,480,230	0.2	-0.1	-14.7	22.4	9.8	11.0
Russell Microcap Growth Index (Daily)			*0.8*	*-18.0*	*10.9*	*1.0*	*5.8*
Small Cap Value	**212,016,752**	**0.2**	**0.5**	**-6.4**	**26.5**	**6.3**	**8.5**
Russell 2000 Value TR			*-0.7*	*-13.0*	*21.0*	*4.6*	*7.2*
AQR Capital Management	60,940,950	0.1	-6.0	-9.1	26.2	4.3	6.9
Russell 2000 Value TR			*-0.7*	*-13.0*	*21.0*	*4.6*	*7.2*
Mellon Asset Management	151,035,379	0.2	1.7	-9.4	22.3	6.8	8.5
Russell 2000 Value TR			*-0.7*	*-13.0*	*21.0*	*4.6*	*7.2*
DFA MicroCap Value	40,423	0.0					

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Market Oriented (CORE)	**8,346,797,901**	**9.0**	**4.7**	**-7.8**	**18.4**	**9.3**	**11.0**
Russell 1000 TR			*7.5*	*-8.4*	*18.6*	*10.9*	*12.0*
DFA Large Cap Core	1,589,039,597	1.7	4.6	-5.7	21.0	9.4	--
Russell 1000 TR			*7.5*	*-8.4*	*18.6*	*10.9*	*12.0*
Russell 2000 Synthetic - OST managed	298,732,220	0.3	2.6	-8.8	21.8	6.0	9.1
S&P 600 Custom			*2.6*	*-8.8*	*21.7*	*5.8*	*8.6*
S&P 500 - OST managed	2,671,131,942	2.9	7.5	-7.8	18.6	11.2	12.3
S&P 500 Index (Daily)			*7.5*	*-7.7*	*18.6*	*11.2*	*12.3*
S&P 400 - OST managed	634,625,832	0.7	3.8	-5.1	22.0	7.7	10.0
S&P 400 Midcap Index (Daily)			*3.8*	*-5.1*	*22.1*	*7.7*	*9.8*
OST Risk Premia Strategy	3,153,268,282	3.4	2.9	-9.5	15.4	8.5	--
Risk Premia Custom Index			*2.8*	*-9.5*	*15.4*	*8.4*	--

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Non-U.S. Equity	**6,328,859,551**	**6.8**	**7.2**	**-2.8**	**15.9**	**4.1**	**6.0**
Oregon MSCI ACWI Ex US IMI (Net)			*6.6*	*-5.8*	*12.2*	*2.3*	*4.3*
Total International Overlay Accounts	**-13,986,677**	**0.0**					
PERS-Adrian Lee Active Currency	25,240,655	0.0					
PERS-P/E Global Active Currency	-35,045,592	0.0					
PERS-Aspect Cap Active Currency	-4,182,835	0.0					
International Market Oriented (Core)	**3,254,251,489**	**3.5**	**6.8**	**-2.4**	**15.5**	**4.5**	**6.4**
MSCI World ex USA IMI Net Return			*7.6*	*-3.9*	*13.5*	*3.5*	*5.0*
Arrowstreet Capital	1,079,757,508	1.2	7.6	3.4	23.0	8.4	10.1
Oregon MSCI ACWI Ex US IMI (Net)			*6.6*	*-5.8*	*12.2*	*2.3*	*4.3*
Lazard Asset Management	1,751,922	0.0					
Lazard International CEF	901,914,211	1.0	5.1	-7.5	12.6	2.8	--
Oregon MSCI ACWI Ex US (Net)			*6.9*	*-5.1*	*11.8*	*2.5*	*4.2*
AQR Capital Management	8,128,971	0.0					
OST Int'l Risk Premia	1,262,698,877	1.4	7.7	-3.9	13.5	5.5	--
MSCI World x US Custom Div Multiple-Factor			*7.5*	*-4.2*	*13.1*	*5.1*	*--*
MSCI World ex USA Net Index			*8.0*	*-2.7*	*13.5*	*3.8*	*4.9*
International Value	**1,236,100,836**	**1.3**	**7.6**	**-2.0**	**18.2**	**3.9**	**6.2**
Oregon MSCI ACWI Ex US Value IMI (Net)			*5.0*	*-4.6*	*14.1*	*1.3*	*3.3*
Acadian Asset Management	757,604,567	0.8	3.9	-8.7	18.1	4.1	6.5
Oregon MSCI ACWI Ex US Value IMI (Net)			*5.0*	*-4.6*	*14.1*	*1.3*	*3.3*
Brandes Investment Partners	478,496,269	0.5	11.7	5.9	18.5	3.8	5.8
Oregon MSCI ACWI Ex US Value (Net)			*5.2*	*-4.0*	*13.8*	*1.3*	*3.1*

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
International Growth	**816,272,984**	**0.9**	**12.3**	**0.1**	**11.4**	**7.7**	**7.3**
Oregon MSCI WORLD Ex US (Net)			*8.0*	*-2.7*	*13.5*	*3.8*	*4.9*
Walter Scott Management	816,272,984	0.9	12.3	0.1	11.4	7.7	7.4
Oregon MSCI WORLD Ex US (Net)			*8.0*	*-2.7*	*13.5*	*3.8*	*4.9*
International Small Cap	**319,985,221**	**0.3**	**6.4**	**-4.1**	**20.7**	**2.3**	**5.9**
MSCI World Ex US Small Cap Value (Net)			*4.6*	*-7.4*	*15.2*	*1.3*	*5.0*
DFA International Small Cap	1,293,621	0.0					
Harris Associates	179,914,235	0.2	7.3	3.1	23.7	4.2	6.3
MSCI ACWI ex USA Small Cap Value (Net)			*3.8*	*-8.0*	*16.4*	*1.4*	*4.7*
EAM International Micro Cap	137,846,741	0.1	4.3	-16.2	19.4	0.3	--
Oregon FTSE Global Ex US Micro Cap			*3.5*	*-15.3*	*20.5*	*3.0*	*--*
DFA International Micro Cap	930,624	0.0	7.3	-2.0	20.8	2.5	--
Oregon FTSE Global Ex US Micro Cap			*3.5*	*-15.3*	*20.5*	*3.0*	*--*
Emerging Markets	**702,249,022**	**0.8**	**5.0**	**-7.7**	**14.1**	**2.1**	**3.8**
ORE MSCI Emerging Markets IMI (Net)			*3.9*	*-10.7*	*9.2*	*-0.6*	*2.1*
Genesis Emerging Markets	20,089,934	0.0	0.1	-13.2	4.6	-1.8	1.6
ORE MSCI Emerging Markets IMI (Net)			*3.9*	*-10.7*	*9.2*	*-0.6*	*2.1*
Arrowstreet Emerging Markets	405,180,079	0.4	6.2	-1.7	21.4	6.1	5.5
ORE MSCI Emerging Markets IMI (Net)			*3.9*	*-10.7*	*9.2*	*-0.6*	*2.1*
Westwood Global Investment	125,857,808	0.1	3.4	-6.4	15.1	1.1	4.1
MSCI Emerging Markets IMI Net			*3.9*	*-10.7*	*9.2*	*-0.6*	*2.1*

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
William Blair and Company	93,318,086	0.1	3.6	-21.2	8.7	0.7	3.6
MSCI Emerging Markets Growth Net			*4.0*	*-11.9*	*5.7*	*-0.8*	*2.0*
William Blair Emerging Mkt Small Cap	57,679,242	0.1	5.1	-16.7	13.8	1.8	--
MSCI Emerging Markets Small Cap Gr Net			*6.1*	*-12.5*	*20.2*	*1.8*	*3.3*
OST EM Risk Premia ESG	123,874	0.0					
Global Equity	**2,008,183,122**	**2.2**	**3.3**	**-4.4**	**12.7**	**5.4**	**8.3**
MSCI ACWI IMI Net (Daily)			*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
Alliance Bernstein Global Value	822,055	0.0					
Global Equity Low Volatility	**1,507,361,067**	**1.6**	**3.0**	**-4.2**	**12.5**	**6.0**	**--**
MSCI AC World (Daily Const)			*7.3*	*-7.4*	*15.4*	*6.9*	*8.1*
MSCI ACWI Minimum Volatility Index (Net)			*1.5*	*-6.1*	*8.3*	*5.0*	*6.7*
LACM Global Equity Low Volatility	753,862,583	0.8	4.5	-8.2	12.6	6.3	--
MSCI AC World (Daily Const)			*7.3*	*-7.4*	*15.4*	*6.9*	*8.1*
MSCI ACWI Minimum Volatility Index (Net)			*1.5*	*-6.1*	*8.3*	*5.0*	*6.7*
Arrowstreet Global Low Volatility	747,072,612	0.8	2.8	0.1	16.2	8.8	--
MSCI ACWI IMI Net (Daily)			*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
AQR Global Low Volatility	3,522,086	0.0					
Acadian Global Low Volatility	1,504,947	0.0	2.2	-4.2	10.7	4.2	--
MSCI ACWI IMI Net (Daily)			*6.9*	*-7.7*	*15.6*	*6.6*	*8.0*
DFA Global Low Volatility	1,398,840	0.0					
Cantillion	500,000,000	0.5					

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Other Equity[1]	**1,079,045,665**	**1.2**					
Transitional & Closed Accounts	1,079,045,642	1.2					
PERS- Equity Distribution	24	0.0					
Total Real Estate	**13,782,486,357**	**14.9**	**-2.3**	**7.9**	**11.9**	**10.2**	**10.3**
NCREIF ODCE (Custom) (Adj.)			*-5.2*	*6.5*	*9.0*	*7.7*	*8.9*
Real Estate excluding REITS	**13,404,186,740**	**14.5**	**-2.5**	**8.5**	**11.9**	**10.5**	**11.1**
NCREIF ODCE (Custom) (Adj.)			*-5.2*	*6.5*	*9.0*	*7.7*	*8.9*
Total REITS	**378,299,617**	**0.4**	**3.9**	**-9.2**	**10.4**	**4.5**	**4.7**
ABKB - LaSalle Advisors	269,365,108	0.3	4.6	-11.3	14.6	11.1	9.1
Nareit Equity Share Price Index			*1.7*	*-19.4*	*10.1*	*6.3*	*6.5*
Woodbourne Investment Management	108,934,509	0.1	2.1	-3.2	1.5	3.5	5.1
Nareit Equity Share Price Index			*1.7*	*-19.4*	*10.1*	*6.3*	*6.5*
Risk Parity	**16,717,371**	**0.0**	**-0.4**	**-19.4**	**--**	**--**	**--**
S&P Risk Parity - 12% Target Volatility			*8.6*	*-12.1*	*11.8*	*7.7*	*6.5*
Man AHL Target Risk	16,654,925	0.0					
PanAgora Risk Parity	40,213	0.0					
Bridgewater All Weather	22,233	0.0					

[1] Other Equity represents Transitional and Closed Accounts and is not included in the Total Public Equity aggregate market value.

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Opportunity Portfolio	**2,630,831,313**	**2.8**	**2.8**	**2.3**	**11.8**	**9.5**	**8.6**
CPI + 5%			*2.9*	*10.2*	*10.6*	*9.1*	*7.7*
Portfolio Holdings - Opportunity	169,416,398	0.2	10.0	-6.0	30.2	-21.6	-18.6
Alternative Portfolio	**13,230,576,897**	**14.3**	**1.4**	**14.3**	**10.2**	**4.2**	**4.0**
CPI +4%			*2.7*	*8.9*	*9.5*	*8.0*	*6.7*
Diversifying Strategies	**4,696,313,779**	**5.1**	**-1.3**	**12.2**	**6.8**	**0.2**	**2.8**
HFRI FOF Conservative Index			*0.8*	*0.8*	*7.6*	*3.9*	*3.4*
Diversifiying Strategies	4,696,313,779	5.1	-1.3	12.2	6.8	0.2	--
HFRI FOF Conservative Index			*0.8*	*0.8*	*7.6*	*3.9*	*3.4*
Real Assets	**8,534,263,118**	**9.2**	**3.0**	**15.8**	**12.6**	**7.3**	**5.4**
CPI +4%			*2.7*	*8.9*	*9.5*	*8.0*	*6.7*
Infrastructure	5,956,311,385	6.4	3.5	11.6	12.6	--	--
CPI +4%			*2.7*	*8.9*	*9.5*	*8.0*	*6.7*
Natural Resources	2,577,951,733	2.8	1.7	25.1	12.4	--	--
CPI +4%			*2.7*	*8.9*	*9.5*	*8.0*	*6.7*
Private Equity	**25,002,069,282**	**27.1**	**0.7**	**-5.2**	**16.3**	**15.5**	**14.1**
Russell 3000 + 300 BPS QTR LAG (Adj.)			*8.0*	*-16.7*	*10.3*	*12.0*	*15.5*
MSCI ACWI+3% (1 quarter lagged)			*10.6*	*-15.9*	*7.1*	*8.4*	*11.2*
Cash	**687,810,355**	**0.7**	**1.2**	**2.4**	**1.2**	**1.7**	**1.3**
ICE BofA US 3-Month Treasury Bill			*1.1*	*2.5*	*0.9*	*1.4*	*0.9*
PERS-Russell Overlay Cash Balance	668,126,786	0.7					

Calendar Year Performance

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Total Fund	**-1.5**	**20.0**	**7.7**	**13.6**	**0.5**	**15.4**	**7.1**	**2.0**	**7.3**	**15.6**
OPERF Policy Benchmark	*-8.6*	*15.6*	*12.4*	*14.0*	*1.2*	*15.6*	*9.0*	*1.6*	*8.2*	*15.6*
InvMetrics All DB > $10B Net Median	*-10.0*	*16.7*	*10.7*	*17.9*	*-2.6*	*15.4*	*8.2*	*0.3*	*6.6*	*14.0*
InvMetrics All DB > $10B Net Rank	*1*	*14*	*94*	*92*	*8*	*51*	*82*	*3*	*34*	*29*
Total Fixed Income	**-11.3**	**-0.9**	**7.7**	**8.8**	**0.3**	**3.7**	**2.8**	**0.6**	**3.5**	**1.0**
Oregon Custom FI Benchmark	*-13.0*	*-0.9*	*7.3*	*8.3*	*0.3*	*3.3*	*2.5*	*0.1*	*3.0*	*0.3*
Core Fixed Income	**-13.9**	**-1.1**	**8.7**	**9.8**	**-0.2**	**4.6**	**3.4**	**0.6**	**6.9**	**-1.4**
Oregon Custom External FI BM	*-13.0*	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*
Blackrock	-13.2	-1.4	9.1	8.9	0.1	3.8	2.8	0.9	6.7	-1.7
Oregon Custom External FI BM	*-13.0*	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*
Wellington	-14.3	-0.9	9.6	9.8	-0.4	4.6	4.0	0.8	6.5	-1.2
Oregon Custom External FI BM	*-13.0*	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*
Western Asset	-14.9	-1.2	9.4	11.6	-0.7	5.6	3.7	0.4	7.0	-1.0
Oregon Custom External FI BM	*-13.0*	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*
Fidelity	--	--	--	--	--	--	--	--	--	--
Oregon Custom External FI BM	--	--	--	--	--	--	--	--	--	--
U.S. Government	**-12.5**	**-2.3**	**8.1**	**6.9**	**0.9**	**2.3**	**-1.6**	**0.9**	**1.0**	--
Government Blended Index	*-12.5*	*-2.3*	*8.0*	*6.9*	*0.9*	*2.3*	*-1.3*	*0.8*	*0.8*	--
Government Portfolio	-12.5	-2.3	8.1	6.9	0.9	--	--	--	--	--
Government Blended Index	*-12.5*	*-2.3*	*8.0*	*6.9*	*0.9*	--	--	--	--	--

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Non-Core Fixed Income	**0.3**	**6.4**	**3.7**	**10.5**	**0.1**	**4.9**	**10.1**	**0.2**	**2.4**	**8.1**
Custom Non-Core Fixed Income Index	*-3.3*	*5.3*	*3.9*	*10.1*	*-0.2*	*5.0*	*12.0*	*-1.7*	*1.8*	*5.8*
KKR Asset Management	-31.9	13.8	2.6	10.5	-0.4	3.4	9.3	-0.2	2.5	9.0
KKR Custom Leveraged Loans & Bond Index	*-4.4*	*5.2*	*4.3*	*10.6*	*-0.5*	*5.3*	*12.7*	*-2.1*	*1.9*	*6.0*
Oak Hill	1.3	5.7	4.9	10.5	0.5	6.3	11.2	0.9	2.2	6.5
Oak Hill Custom Lev Loan & Bond Index	*-2.2*	*5.2*	*3.6*	*9.5*	*0.0*	*4.6*	*11.2*	*-1.3*	*1.7*	*5.6*
Beach Point										
Global Sovereign	**-9.3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
BbgBarc Global Treasury Ex-U.S.	*-10.1*	--	--	--	--	--	--	--	--	--
MSIM Global Sovereign	-9.3	--	--	--	--	--	--	--	--	--
BbgBarc Global Treasury Ex-U.S.	*-10.1*	--	--	--	--	--	--	--	--	--
PIMCO Global Sovereign	-9.3	--	--	--	--	--	--	--	--	--
BbgBarc Global Treasury Ex-U.S.	*-10.1*	--	--	--	--	--	--	--	--	--
Emerging Markets Debt	**-18.4**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
JP Morgan EMBI Global Diversified	*-17.8*	--	--	--	--	--	--	--	--	--
Ashmore EMD	-21.1	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	*-17.8*	--	--	--	--	--	--	--	--	--
Global Evolution EMD	-16.6	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	*-17.8*	--	--	--	--	--	--	--	--	--
PGIM EMD	-17.6	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	*-17.8*	--	--	--	--	--	--	--	--	--

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Structured Credit Products	**-9.3**	--	--	--	--	--	--	--	--	--
Oregon Structured Credit Products FI BM	*-9.0*	--	--	--	--	--	--	--	--	--
Schroders SCP	-6.5	--	--	--	--	--	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx	*-7.6*	--	--	--	--	--	--	--	--	--
Putnam SCP	-14.9	--	--	--	--	--	--	--	--	--
Bloomberg US MBS TR USD	*-11.8*	--	--	--	--	--	--	--	--	--
Guggenheim SCP	-5.9	--	--	--	--	--	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx	*-7.6*	--	--	--	--	--	--	--	--	--
Total Public Equity	**-14.3**	**20.0**	**12.7**	**25.3**	**-10.5**	**24.5**	**9.8**	**-1.7**	**3.3**	**26.7**
MSCI ACWI IMI Net (Daily)	*-18.4*	*18.2*	*16.3*	*26.4*	*-10.1*	*24.0*	*8.3*	*-2.1*	*3.8*	*23.5*
U.S. Equity	**-16.0**	**27.2**	**13.6**	**29.0**	**-7.9**	**20.3**	**14.9**	**-0.8**	**9.8**	**35.4**
Russell 3000 TR	*-19.2*	*25.7*	*20.9*	*31.0*	*-5.3*	*21.1*	*12.8*	*0.5*	*12.6*	*33.6*
Small Cap Growth	**-23.9**	**19.6**	**38.9**	**33.9**	**-4.7**	**26.8**	**6.3**	**-5.0**	**-3.6**	**57.9**
Russell 2000 Growth TR	*-26.4*	*2.8*	*34.6*	*28.5*	*-9.3*	*22.2*	*11.3*	*-1.4*	*5.6*	*43.3*
EAM MicroCap Growth	-23.9	19.6	38.9	33.9	-4.7	26.8	6.3	-5.7	1.8	57.5
Russell Microcap Growth Index (Daily)	*-29.8*	*0.9*	*40.1*	*23.3*	*-14.2*	*16.7*	*6.9*	*-3.9*	*4.3*	*52.8*

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Small Cap Value	**-7.2**	**35.6**	**0.3**	**21.3**	**-14.1**	**7.5**	**31.4**	**-5.2**	**3.0**	**36.8**
Russell 2000 Value TR	*-14.5*	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*
AQR Capital Management	-1.8	46.3	-7.1	15.2	-18.1	-1.2	31.7	-2.5	4.7	36.9
Russell 2000 Value TR	*-14.5*	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*
Mellon Asset Management	-11.2	25.8	5.2	24.2	-8.0	10.8	26.8	-5.8	2.6	36.7
Russell 2000 Value TR	*-14.5*	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*
DFA MicroCap Value										
Market Oriented (CORE)	**-16.3**	**26.6**	**15.2**	**30.1**	**-7.1**	**22.0**	**14.8**	**-1.7**	**11.1**	**33.1**
Russell 1000 TR	*-19.1*	*26.5*	*21.0*	*31.4*	*-4.8*	*21.7*	*12.1*	*0.9*	*13.2*	*33.1*
DFA Large Cap Core	-12.9	27.8	12.7	29.1	-9.0	21.1	15.6	-4.6	--	--
Russell 1000 TR	*-19.1*	*26.5*	*21.0*	*31.4*	*-4.8*	*21.7*	*12.1*	*0.9*	*--*	*--*
Russell 2000 Synthetic - OST managed	-16.2	27.1	11.8	23.4	-11.3	14.5	23.4	-3.6	5.8	39.9
S&P 600 Custom	*-16.1*	*26.8*	*11.3*	*22.8*	*-11.0*	*14.7*	*21.3*	*-4.4*	*4.9*	*38.8*
S&P 500 - OST managed	-18.2	28.7	18.4	31.7	-4.4	21.8	12.0	1.5	13.7	32.5
S&P 500 Index (Daily)	*-18.1*	*28.7*	*18.4*	*31.5*	*-4.4*	*21.8*	*12.0*	*1.4*	*13.7*	*32.4*
S&P 400 - OST managed	-13.0	24.6	13.5	26.6	-10.9	16.7	21.1	-2.0	10.0	33.9
S&P 400 Midcap Index (Daily)	*-13.1*	*24.8*	*13.7*	*26.2*	*-11.1*	*16.3*	*20.7*	*-2.2*	*9.8*	*33.5*
OST Risk Premia Strategy	-17.6	24.3	15.8	31.3	-5.5	27.1	10.8	4.5	13.0	--

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Non-U.S. Equity	**-14.3**	**12.7**	**13.5**	**22.6**	**-14.9**	**30.4**	**4.6**	**-2.6**	**-2.9**	**18.6**
Oregon MSCI ACWI Ex US IMI (Net)	*-16.6*	*8.5*	*11.1*	*21.6*	*-14.8*	*27.8*	*4.4*	*-4.6*	*-3.9*	*15.8*
Total International Overlay Accounts										
PERS-Adrian Lee Active Currency										
PERS-P/E Global Active Currency										
PERS-Aspect Cap Active Currency										
International Market Oriented (Core)	**-13.5**	**13.1**	**12.5**	**23.2**	**-14.3**	**31.0**	**2.5**	**-1.2**	**-2.6**	**21.3**
MSCI World ex USA IMI Net Return	*-15.3*	*12.4*	*8.3*	*22.9*	*-14.7*	*25.2*	*2.9*	*-1.9*	*-4.5*	*21.6*
Arrowstreet Capital	-5.5	24.5	9.1	23.2	-10.3	35.4	4.7	0.4	0.8	26.2
Oregon MSCI ACWI Ex US IMI (Net)	*-16.6*	*8.5*	*11.1*	*21.6*	*-14.8*	*27.8*	*4.4*	*-4.6*	*-3.9*	*15.8*
Lazard Asset Management										
Lazard International CEF	-25.7	4.5	30.2	29.0	-17.2	39.8	0.1	-0.2	0.6	--
Oregon MSCI ACWI Ex US (Net)	*-16.0*	*7.8*	*10.7*	*21.5*	*-14.2*	*27.2*	*4.5*	*-5.5*	*-3.9*	--
AQR Capital Management										
OST Int'l Risk Premia	-11.5	15.6	7.7	22.8	-12.0	--	--	--	--	--
MSCI World x US Custom Div Multiple-Factor	*-11.8*	*15.0*	*7.3*	*22.4*	*-12.3*	--	--	--	--	--
International Value	**-10.9**	**18.0**	**4.9**	**17.8**	**-12.4**	**25.7**	**9.8**	**-4.5**	**-4.3**	**25.0**
Oregon MSCI ACWI Ex US Value IMI (Net)	*-9.3*	*11.0*	*-0.1*	*16.3*	*-14.6*	*23.6*	*8.8*	*-8.9*	*-5.0*	*15.7*
Acadian Asset Management	-13.9	21.7	11.5	19.4	-15.4	35.1	11.8	-7.2	-3.7	21.9
Oregon MSCI ACWI Ex US Value IMI (Net)	*-9.3*	*11.0*	*-0.1*	*16.3*	*-14.6*	*23.6*	*8.8*	*-8.9*	*-5.0*	*15.7*
Brandes Investment Partners	-7.4	14.1	-1.3	16.4	-9.4	16.3	7.9	-1.6	-5.0	28.3
Oregon MSCI ACWI Ex US Value (Net)	*-8.6*	*10.5*	*-0.8*	*15.7*	*-14.0*	*22.7*	*8.9*	*-10.1*	*-5.1*	*15.0*

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
International Growth	**-21.0**	**12.4**	**19.9**	**28.1**	**-6.4**	**27.5**	**1.3**	**1.9**	**-4.3**	**18.8**
Oregon MSCI WORLD Ex US (Net)	*-14.3*	*12.6*	*7.6*	*22.5*	*-14.1*	*24.2*	*2.8*	*-3.0*	*-4.3*	*21.0*
Walter Scott Management	-21.0	12.4	19.9	28.0	-6.3	27.5	6.4	1.2	-3.1	13.1
Oregon MSCI WORLD Ex US (Net)	*-14.3*	*12.6*	*7.6*	*22.5*	*-14.1*	*24.2*	*2.8*	*-3.0*	*-4.3*	*21.0*
International Small Cap	**-15.0**	**18.1**	**9.3**	**24.1**	**-24.3**	**30.2**	**4.9**	**6.1**	**-6.5**	**29.1**
MSCI World Ex US Small Cap Value (Net)	*-14.0*	*13.3*	*2.6*	*22.8*	*-18.4*	*27.9*	*7.9*	*1.1*	*-5.9*	*27.7*
DFA International Small Cap										
Harris Associates	-13.8	20.1	5.0	33.4	-24.1	27.2	7.1	1.0	-6.7	30.9
MSCI ACWI ex USA Small Cap Value (Net)	*-13.6*	*14.1*	*4.7*	*20.3*	*-18.2*	*29.9*	*8.2*	*-1.2*	*-4.5*	*20.9*
EAM International Micro Cap	-25.2	17.8	38.4	20.3	-33.6	45.3	2.2	23.5	--	--
Oregon FTSE Global Ex US Micro Cap	*-21.1*	*18.0*	*27.9*	*16.6*	*-20.0*	*31.4*	*6.0*	*2.9*	--	--
DFA International Micro Cap	-10.3	17.1	5.7	18.5	-22.0	30.9	11.9	-1.8	--	--
Oregon FTSE Global Ex US Micro Cap	*-21.1*	*18.0*	*27.9*	*16.6*	*-20.0*	*31.4*	*6.0*	*2.9*	--	--
Emerging Markets	**-16.9**	**4.3**	**23.5**	**22.1**	**-17.4**	**35.7**	**10.3**	**-14.5**	**1.2**	**-0.1**
ORE MSCI Emerging Markets IMI (Net)	*-19.8*	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*
Genesis Emerging Markets	-22.8	-6.6	17.5	29.3	-15.9	33.6	12.0	-14.9	-1.0	0.7
ORE MSCI Emerging Markets IMI (Net)	*-19.8*	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*
Arrowstreet Emerging Markets	-10.5	9.6	32.1	23.7	-19.5	35.4	11.2	-15.8	1.1	-1.0
ORE MSCI Emerging Markets IMI (Net)	*-19.8*	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*
Westwood Global Investment	-4.1	3.6	10.1	9.8	-9.3	29.5	19.0	-16.1	0.2	0.6
MSCI Emerging Markets IMI Net	*-19.8*	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.3*	*11.2*	*-14.9*	*-2.2*	*-2.6*

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
William Blair and Company	-33.3	4.4	41.4	29.1	-21.6	50.2	1.9	-14.1	5.7	0.9
MSCI Emerging Markets Growth Net	*-24.0*	*-8.4*	*31.3*	*25.1*	*-18.3*	*37.3*	*11.2*	*-14.9*	*-2.2*	*-2.6*
William Blair Emerging Mkt Small Cap	-28.6	17.9	33.0	21.7	-24.4	38.5	-4.3	-5.9	14.9	--
MSCI Emerging Markets Small Cap Gr Net	*-23.3*	*20.4*	*25.6*	*12.0*	*-20.0*	*33.8*	*2.3*	*-6.8*	*1.0*	--
OST EM Risk Premia ESG										
Global Equity	**-9.8**	**15.5**	**7.4**	**21.6**	**-7.9**	**22.3**	**9.4**	**-3.3**	**6.9**	**35.6**
MSCI ACWI IMI Net (Daily)	*-18.4*	*18.2*	*16.3*	*26.4*	*-10.1*	*24.0*	*8.3*	*-2.1*	*3.8*	*23.5*
Alliance Bernstein Global Value										
Global Equity Low Volatility	**-9.2**	**15.2**	**7.9**	**21.7**	**-5.5**	**22.5**	--	--	--	--
MSCI AC World (Daily Const)	*-18.4*	*18.5*	*16.3*	*26.6*	*-9.4*	*24.0*	--	--	--	--
LACM Global Equity Low Volatility	-14.9	15.4	15.0	23.1	-6.6	22.7	--	--	--	--
MSCI AC World (Daily Const)	*-18.4*	*18.5*	*16.3*	*26.6*	*-9.4*	*24.0*	--	--	--	--
Arrowstreet Global Low Volatility	-2.7	15.1	12.6	22.3	-2.7	--	--	--	--	--
MSCI ACWI IMI Net (Daily)	*-18.4*	*18.2*	*16.3*	*26.4*	*-10.1*	--	--	--	--	--
AQR Global Low Volatility										
Acadian Global Low Volatility	-7.7	17.5	-1.9	20.2	-7.0	--	--	--	--	--
MSCI ACWI IMI Net (Daily)	*-18.4*	*18.2*	*16.3*	*26.4*	*-10.1*	--	--	--	--	--
DFA Global Low Volatility										
Cantillion										
Other Equity										
Transitional & Closed Accounts										
PERS- Equity Distribution										

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Total Real Estate	**20.0**	**19.0**	**2.7**	**7.2**	**8.0**	**10.0**	**7.9**	**9.9**	**14.2**	**12.8**
NCREIF ODCE (Custom) (Adj.)	*21.0*	*13.6*	*0.6*	*4.7*	*7.7*	*6.7*	*8.9*	*13.5*	*11.3*	*11.0*
Real Estate excluding REITS	**21.6**	**18.6**	**3.0**	**7.3**	**8.9**	**11.2**	**10.0**	**12.7**	**12.0**	**15.8**
NCREIF ODCE (Custom) (Adj.)	*21.0*	*13.6*	*0.6*	*4.7*	*7.7*	*6.7*	*8.9*	*13.5*	*11.3*	*11.0*
Total REITS	**-16.4**	**28.2**	**-0.9**	**7.2**	**-2.0**	**9.8**	**1.1**	**2.0**	**22.2**	**2.2**
ABKB - LaSalle Advisors	-18.6	36.2	3.0	29.9	3.2	7.4	5.4	2.9	32.1	1.6
Nareit Equity Share Price Index	*-24.9*	*41.3*	*-5.2*	*28.7*	*-4.0*	*8.7*	*8.6*	*2.8*	*28.0*	*2.8*
Woodbourne Investment Management	-10.3	9.9	0.6	18.5	-4.8	10.6	4.3	8.6	19.5	-1.8
Nareit Equity Share Price Index	*-24.9*	*41.3*	*-5.2*	*28.7*	*-4.0*	*8.7*	*8.6*	*2.8*	*28.0*	*2.8*
Risk Parity	**-22.6**	**13.7**	--	--	--	--	--	--	--	--
S&P Risk Parity - 12% Target Volatility	*-19.7*	*18.2*	--	--	--	--	--	--	--	--
Man AHL Target Risk										
PanAgora Risk Parity										
Bridgewater All Weather										
Opportunity Portfolio	**1.3**	**22.7**	**10.2**	**6.2**	**5.8**	**10.5**	**6.1**	**2.1**	**8.8**	**15.0**
CPI + 5%	*11.7*	*12.4*	*6.4*	*7.4*	*7.0*	*7.2*	*7.2*	*5.8*	*5.8*	*6.6*
Portfolio Holdings - Opportunity	-15.5	2.7	-5.5	-44.4	-46.6	-28.9	45.1	-48.9	-12.0	17.1

	2022 (%)	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)
Alternative Portfolio	**19.1**	**14.8**	**-6.6**	**-1.3**	**-2.4**	**8.3**	**6.6**	**-4.3**	**4.4**	**6.0**
CPI +4%	*10.4*	*11.3*	*5.4*	*6.4*	*6.0*	*6.2*	*6.2*	*4.8*	*4.8*	*5.6*
Diversifying Strategies	**21.4**	**8.7**	**-12.1**	**-1.0**	**-11.5**	**8.0**	**0.5**	**6.4**	**9.0**	**6.8**
HFRI FOF Conservative Index	*0.1*	*7.6*	*6.5*	*6.3*	*-0.9*	*4.1*	*1.9*	*0.4*	*3.1*	*7.7*
Diversifiying Strategies	21.4	8.7	-12.1	-1.0	-11.5	8.0	--	--	--	--
HFRI FOF Conservative Index	*0.1*	*7.6*	*6.5*	*6.3*	*-0.9*	*4.1*	--	--	--	--
Real Assets	**18.2**	**19.0**	**-2.0**	**-1.6**	**4.9**	**8.4**	**9.0**	**-7.9**	**3.1**	**5.4**
CPI +4%	*10.4*	*11.3*	*5.4*	*6.4*	*6.0*	*6.2*	*6.2*	*4.8*	*4.8*	*5.6*
Infrastructure	13.9	16.6	5.6	8.9	--	--	--	--	--	--
CPI +4%	*10.4*	*11.3*	*5.4*	*6.4*	--	--	--	--	--	--
Natural Resources	27.7	23.9	-12.8	-12.5	--	--	--	--	--	--
CPI +4%	*10.4*	*11.3*	*5.4*	*6.4*	--	--	--	--	--	--
Private Equity	**1.2**	**41.8**	**12.7**	**11.1**	**18.1**	**17.3**	**6.3**	**7.3**	**15.9**	**16.2**
Russell 3000 + 300 BPS QTR LAG (Adj.)	*-15.1*	*35.7*	*18.4*	*6.0*	*21.1*	*22.2*	*18.4*	*2.5*	*21.2*	*25.2*
Cash	**0.5**	**0.1**	**1.6**	**3.3**	**2.0**	**1.3**	**1.2**	**0.5**	**0.5**	**0.7**
ICE BofA US 3-Month Treasury Bill	*1.5*	*0.1*	*0.7*	*2.3*	*1.9*	*0.9*	*0.3*	*0.0*	*0.0*	*0.1*
PERS-Russell Overlay Cash Balance										

Disclaimer, Glossary, and Notes

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PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

Credit Risk: Refers to the risk that the issuer of a fixed income security may default (i.e., the issuer will be unable to make timely principal and/or interest payments on the security).

Duration: Measure of the sensitivity of the price of a bond to a change in its yield to maturity. Duration summarizes, in a single number, the characteristics that cause bond prices to change in response to a change in interest rates. For example, the price of a bond with a duration of three years will rise by approximately 3% for each 1% decrease in its yield to maturity. Conversely, the price will decrease 3% for each 1% increase in the bond's yield. Price changes for two different bonds can be compared using duration. A bond with a duration of six years will exhibit twice the percentage price change of a bond with a three-year duration. The actual calculation of a bond's duration is somewhat complicated, but the idea behind the calculation is straightforward. The first step is to measure the time interval until receipt for each cash flow (coupon and principal payments) from a bond. The second step is to compute a weighted average of these time intervals. Each time interval is measured by the present value of that cash flow. This weighted average is the duration of the bond measured in years.

Information Ratio: This statistic is a measure of the consistency of a portfolio's performance relative to a benchmark. It is calculated by subtracting the benchmark return from the portfolio return (excess return), and dividing the resulting excess return by the standard deviation (volatility) of this excess return. A positive information ratio indicates outperformance versus the benchmark, and the higher the information ratio, the more consistent the outperformance.

Jensen's Alpha: A measure of the average return of a portfolio or investment in excess of what is predicted by its beta or "market" risk. Portfolio Return- [Risk Free Rate+Beta*(market return-Risk Free Rate)].

Market Capitalization: For a firm, market capitalization is the total market value of outstanding common stock. For a portfolio, market capitalization is the sum of the capitalization of each company weighted by the ratio of holdings in that company to total portfolio holdings; thus it is a weighted-average capitalization. Meketa Investment Group considers the largest 65% of the broad domestic equity market as large capitalization, the next 25% of the market as medium capitalization, and the smallest 10% of stocks as small capitalization.

Market Weighted: Stocks in many indices are weighted based on the total market capitalization of the issue. Thus, the individual returns of higher market-capitalization issues will more heavily influence an index's return than the returns of the smaller market-capitalization issues in the index.

Maturity: The date on which a loan, bond, mortgage, or other debt/security becomes due and is to be paid off.

Prepayment Risk: The risk that prepayments will increase (homeowners will prepay all or part of their mortgage) when mortgage interest rates decline; hence, investors' monies will be returned to them in a lower interest rate environment. Also, the risk that prepayments will slow down when mortgage interest rates rise; hence, investors will not have as much money as previously anticipated in a higher interest rate environment. A prepayment is any payment in excess of the scheduled mortgage payment.

Price-Book Value (P/B) Ratio: The current market price of a stock divided by its book value per share. Meketa Investment Group calculates P/B as the current price divided by Compustat's quarterly common equity. Common equity includes common stock, capital surplus, retained earnings, and treasury stock adjusted for both common and nonredeemable preferred stock. Similar to high P/E stocks, stocks with high P/B's tend to be riskier investments.

Price-Earnings (P/E) Ratio: A stock's market price divided by its current or estimated future earnings. Lower P/E ratios often characterize stocks in low growth or mature industries, stocks in groups that have fallen out of favor, or stocks of established blue chip companies with long records of stable earnings and regular dividends. Sometimes a company that has good fundamentals may be viewed unfavorably by the market if it is an industry that is temporarily out of favor. Or a business may have experienced financial problems causing investors to be skeptical about is future. Either of these situations would result in lower relative P/E ratios. Some stocks exhibit above-average sales and earnings growth or expectations for above average growth. Consequently, investors are willing to pay more for these companies' earnings, which results in elevated P/E ratios. In other words, investors will pay more for shares of companies whose profits, in their opinion, are expected to increase faster than average. Because future events are in no way assured, high P/E stocks tend to be riskier and more volatile investments. Meketa Investment Group calculates P/E as the current price divided by the I/B/E/S consensus of twelve-month forecast earnings per share.

Quality Rating: The rank assigned a security by such rating services as Fitch, Moody's, and Standard & Poor's. The rating may be determined by such factors as (1) the likelihood of fulfillment of dividend, income, and principal payment of obligations; (2) the nature and provisions of the issue; and (3) the security's relative position in the event of liquidation of the company. Bonds assigned the top four grades (AAA, AA, A, BBB) are considered investment grade because they are eligible bank investments as determined by the controller of the currency.

Sharpe Ratio: A commonly used measure of risk-adjusted return. It is calculated by subtracting the risk free return (usually three-month Treasury bill) from the portfolio return and dividing the resulting excess return by the portfolio's total risk level (standard deviation). The result is a measure of return per unit of total risk taken. The higher the Sharpe ratio, the better the fund's historical risk adjusted performance.

STIF Account: Short-term investment fund at a custodian bank that invests in cash-equivalent instruments. It is generally used to safely invest the excess cash held by portfolio managers.

Standard Deviation: A measure of the total risk of an asset or a portfolio. Standard deviation measures the dispersion of a set of numbers around a central point (e.g., the average return). If the standard deviation is small, the distribution is concentrated within a narrow range of values. For a normal distribution, about two thirds of the observations will fall within one standard deviation of the mean, and 95% of the observations will fall within two standard deviations of the mean.

Style: The description of the type of approach and strategy utilized by an investment manager to manage funds. For example, the style for equities is determined by portfolio characteristics such as price-to-book value, price-to-earnings ratio, and dividend yield. Equity styles include growth, value, and core.

Tracking Error: A divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark, as defined by the difference in standard deviation.

Yield to Maturity: The yield, or return, provided by a bond to its maturity date; determined by a mathematical process, usually requiring the use of a "basis book." For example, a 5% bond pays $5 a year interest on each $100 par value. To figure its current yield, divide $5 by $95—the market price of the bond—and you get 5.26%. Assume that the same bond is due to mature in five years. On the maturity date, the issuer is pledged to pay $100 for the bond that can be bought now for $95. In other words, the bond is selling at a discount of 5% below par value. To figure yield to maturity, a simple and approximate method is to divide 5% by the five years to maturity, which equals 1% pro rata yearly. Add that 1% to the 5.26% current yield, and the yield to maturity is roughly 6.26%.

$$\frac{5\%\ \text{(discount)}}{5\ \text{(yrs. to maturity)}} = \begin{matrix}1\%\ \text{pro rata, plus}\\ 5.26\%\ \text{(current yield)}\end{matrix} = 6.26\%\ \text{(yield to maturity)}$$

Yield to Worst: The lowest potential yield that can be received on a bond without the issuer actually defaulting. The yield to worst is calculated by making worst-case scenario assumptions on the issue by calculating the returns that would be received if provisions, including prepayment, call, or sinking fund, are used by the issuer.

NCREIF Property Index (NPI): Measures unleveraged investment performance of a very large pool of individual commercial real estate properties acquired in the private market by tax-exempt institutional investors for investment purposes only. The NPI index is capitalization-weighted for a quarterly time series composite total rate of return.

NCREIF Fund Index - Open End Diversified Core Equity (NFI-ODCE): Measures the investment performance of 28 open-end commingled funds pursuing a core investment strategy that reflects funds' leverage and cash positions. The NFI-ODCE index is equal-weighted and is reported gross and net of fees for a quarterly time series composite total rate of return.

Sources: Investment Terminology, International Foundation of Employee Benefit Plans, 1999.
The Handbook of Fixed Income Securities, Fabozzi, Frank J., 1991

Throughout this report, numbers may not sum due to rounding.

Returns for periods greater than one year are annualized throughout this report.

Values shown are in millions of dollars, unless noted otherwise.

OREGON STATE TREASURY

Tobias Read
Oregon State Treasurer

Michael Kaplan
Deputy State Treasurer

To: **The Oregon Investment Council**

From: **Karl Cheng, Senior Investment Officer, Portfolio Risk & Research**

Re: **First Quarter 2023 Risk Report for the Oregon Public Employees Retirement Fund**

Executive Summary

This memo summarizes OPERF's predicted volatility, as estimated by Aladdin, Treasury's end-to-end investment analytics platform built by BlackRock. As of March 31, 2023, OPERF has an estimated return volatility of 15.4%, higher than that for the latest OIC-approved target allocation presented by Meketa Investment Group ("Meketa") at the December 2022 meeting.

The realized tracking errors for the liquid portion of the Fund, mainly the Public Equity and Fixed Income Portfolios, are at their upper limits of the OIC guidelines. Additionally, the predicted active risks for both Portfolios exceed their respective policy limits. The Public Equity Portfolio's active risk rose steadily through 2022 due to the increasing correlations of the performances of the active factor tilts, which has contributed to the Portfolio's outperformance versus its benchmark. As for the Fixed Income Portfolio, relative to its benchmark, the Bloomberg U.S. Aggregate, it has a short duration of -0.57. The volatilities of U.S. interest rates rose throughout 2022 and spiked in early March when Silicon Valley Bank failed. The short duration exposure has been a tailwind to the Portfolio's relative performance but likely warrants further consideration at the next Fixed Income Annual Review.

OPERF Asset Allocation

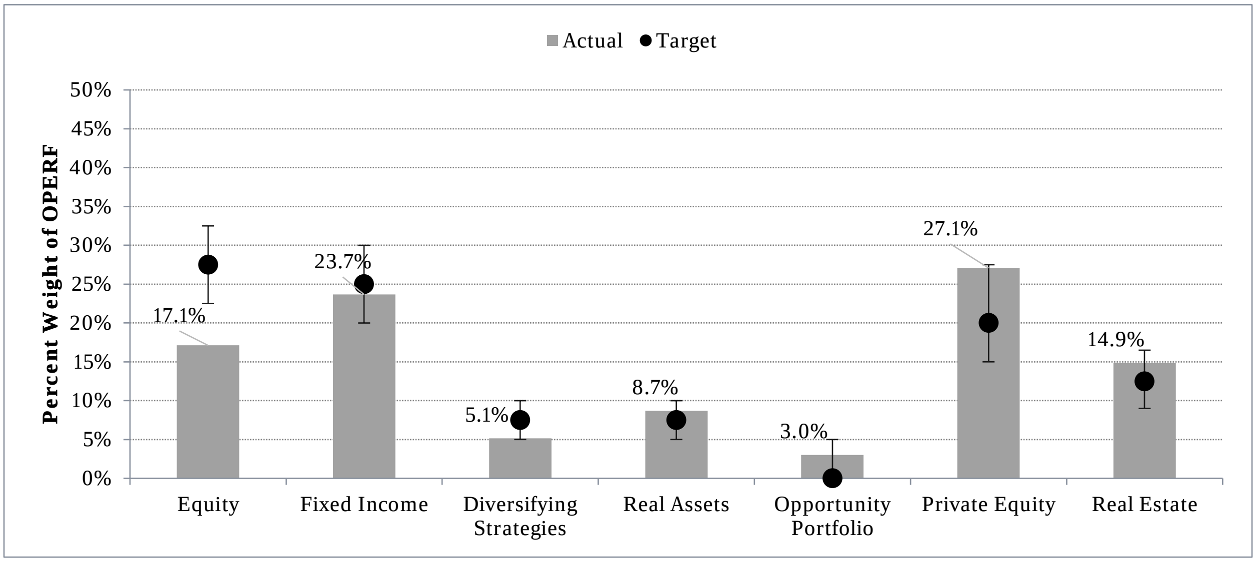
Investment Belief #2 in [INV 1201: Statement of OIC Investment and Management Beliefs] states: "*Asset Allocation Drives Risk and Return*". Shown in the table below are OPERF's target allocations approved by the Council at the December 2022 meeting.

Table 1. OPERF Target Asset Allocation

Asset Class	Target Allocation (%)	Rebalancing Range (%)
Public Equity	27.5	22.5 – 32.5
Private Equity	20.0	15.0 – 27.5
Fixed Income	25.0	20.0 – 30.0
Real Estate	12.5	9.0 – 16.5
Real Assets	7.5	5.0 – 10.0
Diversifying Strategies	7.5	5.0 – 10.0
Total Fund	**100.0**	

Including the synthetic overlays exposures managed by Russell Investments, Figure 1 below shows OPERF's allocation.

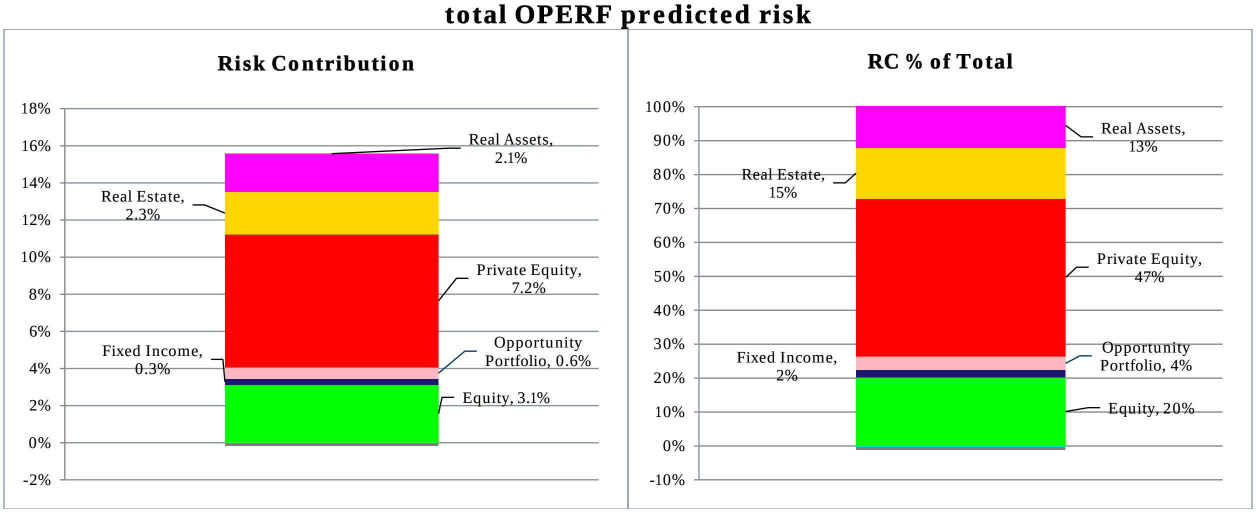
Figure 1. OPERF Actual Allocation versus Target



OPERF Predicted Risk

The risk estimates are shown in the charts below.

Figure 2. OPERF Risk Contribution by Asset Class and Risk Contribution as a percent of total OPERF predicted risk

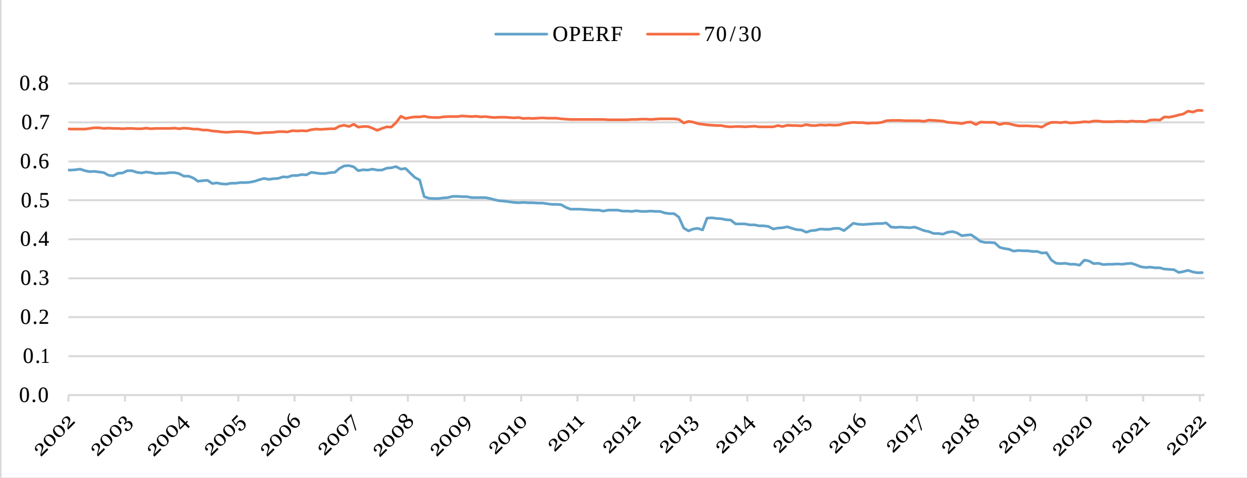


The total predicted **standard deviation**, or **volatility**, for OPERF is 15.4% as of March 31, 2023. To put that in context, Meketa, the OIC's investment consultant, estimates OPERF's long-term volatility to be 11.4% using their 2022 Capital Market Assumptions, which are a blend of assumptions from staff, Meketa, and Aon Investments, the Council's secondary investment consultant. Aladdin's model uses a medium-term, five-year lookback period so there will almost always be some difference between the two estimates.

Another item of note from Figure 2 is that "equity" risk, that is the predicted risk contributions from the Public Equity and Private Equity Portfolios, is estimated to be 67% of OPERF's predicted risk. This is down from 81% of then predicted risk a year ago. Equity risk has always been the largest risk contributor to OPERF. OIC Investment Belief #3 summarizes the Council's objective for investing in equity: "*Over the long-term, equity-oriented investments provide reliable return premiums relative to risk-free investments.*"

Over the years, the OIC-approved changes to asset allocation, mainly lowering the allocation to Public Equity and raising those of Real Assets and Diversifying Strategies, have reduced OPERF's volatility. Figure 3 below plots OPERF's rolling 20-quarter realized beta to MSCI ACWI IMI as well as that of the 70% MSCI ACWI IMI & 30% Bloomberg U.S. Aggregate Index blend, or the "Reference Portfolio". OPERF's realized beta hovered around +0.60 in the earlier portion of the analysis period before starting a steady decline. A significant contributor to that decline is the increasing allocation to illiquid investments, which have performance smoothing, but also provide diversification.

Figure 3. OPERF's Beta to MSCI ACWI IMI



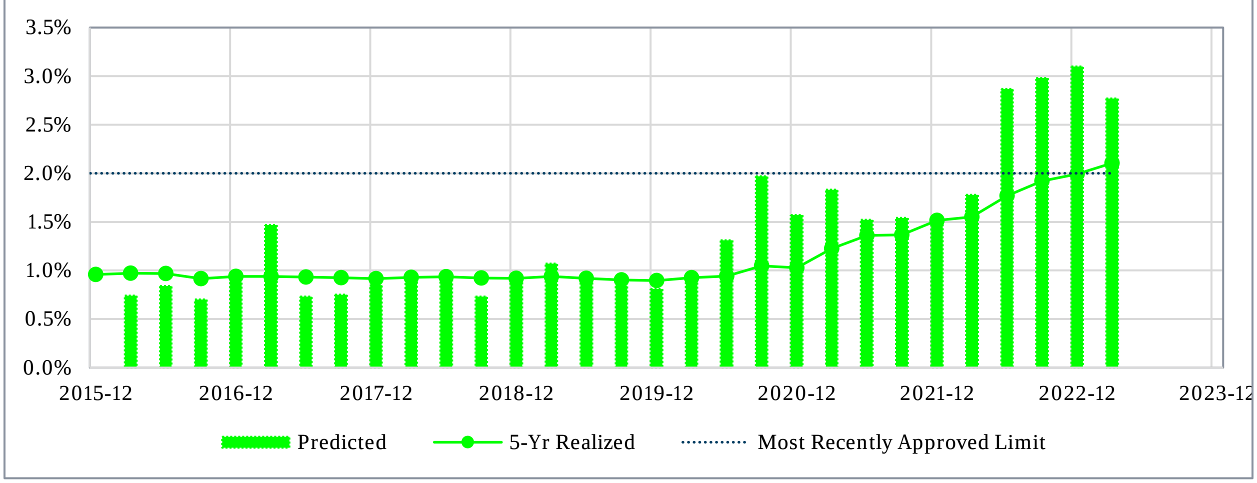
Capital Markets

Public Equity

The Public Equity Portfolio has an OIC-approved **tracking error** range of 0.75% to 2.00%. Using monthly performance data from State Street, the five-year *ex post* tracking error through March 31, 2023 for the Portfolio is 2.1%, slightly above the upper end of the approved range. However, Aladdin estimates an *ex ante* active risk of 2.8%. Equity market volatility ramped up since the beginning of 2022 due to geopolitical, inflation, and recession concerns. While the global low volatility strategies contributed positive relative performances to the Public Equity Portfolio year to date, the active risk due to the low volatility tilt also became more meaningful, consistent with staff's expectation of how this portion of the Portfolio would behave in a "risk off" market. Furthermore, the sector rotation that occurred in 2022 – significant sell-off of large growth firms – was specifically reflected in the active factor exposures in the Portfolio. The returns to value, low volatility, and size became more correlated – all of which the Portfolio is tilted to – resulting in a higher estimated active risk.

At the December 2022 meeting, the Public Equity team presented a strategic rebalancing of the Portfolio that would reduce the active factor exposures. That, in conjunction with the moderation of factor correlations, should lower the predicted active risk of the Portfolio.

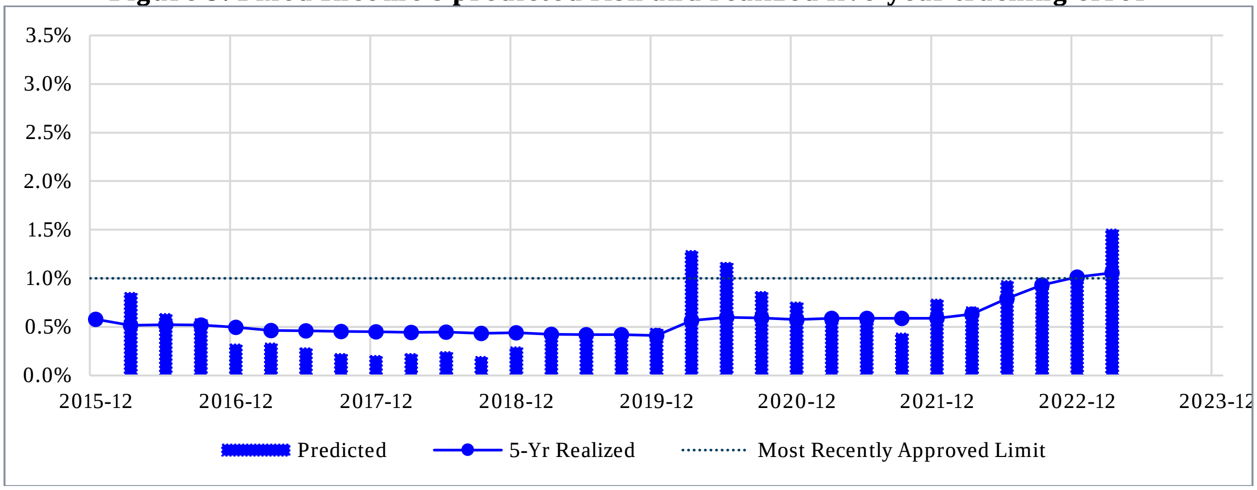
Figure 4. Public Equity's predicted risk and realized five-year tracking error



Fixed Income

The Fixed Income Portfolio has an OIC-approved **tracking error** of up to 1.0%. Using monthly performance data from State Street, the five-year tracking error through March 31, 2023 for the Portfolio is 1.1%, slightly above the upper end of the approved range. The predicted active risk rose from 1.1% in the previous quarter to 1.5%. This increase in predicted active risk is mainly due to the Portfolio's short duration exposure relative to its benchmark, the Bloomberg U.S. Aggregate, exacerbated by the pickup in interest rate volatility. The U.S. 10-Year interest rate was at 1.51% the end of 2021 and rose to 3.77% at the end of 2022. Given the circumstances around several U.S. bank failures, in March 2023 alone, there were ten days where the U.S. 10-Year interest rate moved by over 10 basis points, including two days where it dropped by over 20 basis points. While there is no recommendation for immediate action by the OIC, the short duration warrants further consideration at the next Fixed Income Annual Review.

Figure 5. Fixed Income's predicted risk and realized five-year tracking error



OPERF Cash Flow

Table 2 below summarizes approximate net investment cash flow and pension cash flow for Year-to-Date 2023 and for the past five years.

Table 2. OPERF Net Cash Flow by Portfolio by Time Period

	Net Cash Flow ($M)					
Asset Class	YTD (2023)	2022	2021	2020	2019	2018
Public Equity	2,588	3,285	4,220	3,062	2,752	3,432
Private Equity	-424	506	2,730	494	347	1,216
Fixed Income	-2,490	-1,544	-3,053	3,154	327	61
Real Estate	-227	-883	-396	15	-48	-28
Real Assets	-243	-706	-572	-564	-578	-524
Diversifying Strategies	-254	-11	381	-621	-490	-1,349
Opportunity	-25	-165	-248	71	26	156
Other	962	663	-227	-2,249	283	-15
Total Fund	**-114**	**1,144**	**2,836**	**3,362**	**2,617**	**2,948**
Net Pension	*-1,045*	*-2,605*	*-1,743*	*-3,041*	*-2,659*	*-2,774*

The estimated uncalled commitments from the private market portfolios are tabulated below.

Table 3. OPERF Uncalled Commitments

Asset Class Portfolio	**Uncalled Commitment ($B)**
Private Equity	$7.7
Real Assets	$3.2
Real Estate	$3.6
Opportunity	$1.3
Total	**$15.8**

OREGON STATE TREASURY

Tobias Read
Oregon State Treasurer

Michael Kaplan
Deputy State Treasurer

To: The Oregon Investment Council

From: Jen Plett, Investment Officer, Portfolio Risk & Research

Re: First Quarter 2023 Risk Report for the Common School Fund (CSF)

Executive Summary

This memo summarizes CSF's predicted volatility, as estimated by Aladdin, Treasury's end-to-end investment analytics platform built by BlackRock. As of March 31, 2023, Aladdin estimated a return volatility of 12.9% for CSF, in-line with staff's expectation. Therefore, staff recommends no additional action at this point.

CSF Asset Allocation

Investment Belief #2 in INV 1201: Statement of OIC Investment and Management Beliefs states: "*Asset Allocation Drives Risk and Return*". CSF's current Strategic Asset Allocation (SAA) was approved at the OIC meeting on July 20, 2022.

Applying AON's 10-Year Capital Market Assumptions to CSF's current target allocations produces an estimated return volatility of 12.5%. A "Reference Portfolio" can be constructed with 70% in the MSCI ACWI IMI and 30% in the Bloomberg U.S. Aggregate Bond Index that would reach a similar level of estimated volatility. Prior to current allocations, CSF's Reference Portfolio was approximated to be a 65/35 split between public equity and fixed income indices.

Shown in the table below are CSF'S target allocations as of 3/31/2023.

Table 1. CSF Target Asset Allocation as of 3/31/2023

Asset Class	Target Allocation (%)	Interim Target (%)	Rebalancing Range (%)
Global Equity	45	47.5	40 - 50
Private Equity	15	12.5	10 - 20
Fixed Income	20	22.5	15 - 25
Real Estate	10	10.0	5 - 15
Real Assets	5	2.5	0 - 10
Diversifying Strategies	5	5.0	0 - 10
Cash	0	0	0 - 3
Total Fund	**100**	**100.0**	

Figure 1 below shows CSF's actual allocation as of 3/31/2023.

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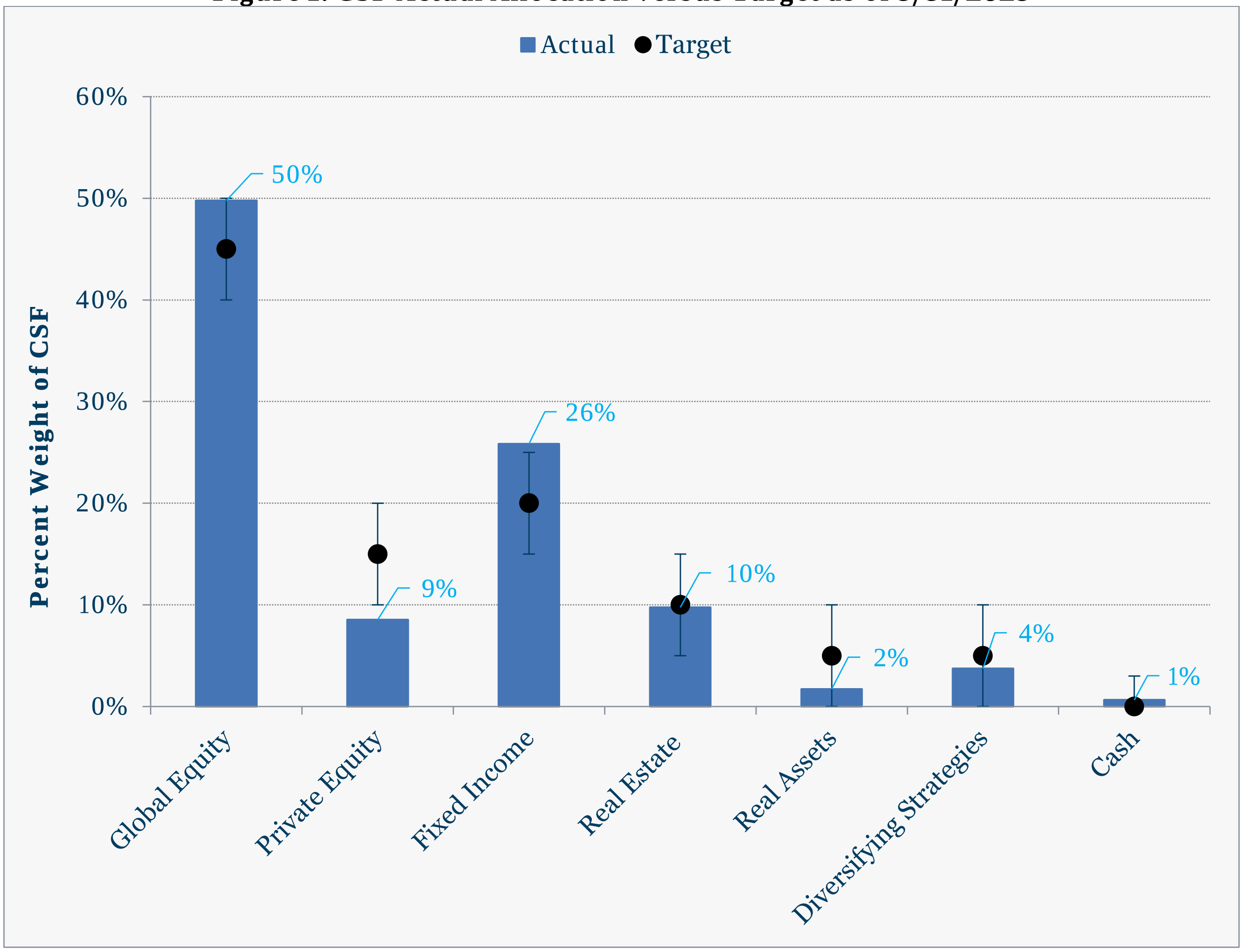
503.378.4000

oregon.gov/treasury
oregon.treasurer@state.or.us

Figure 1. CSF Actual Allocation versus Target as of 3/31/2023

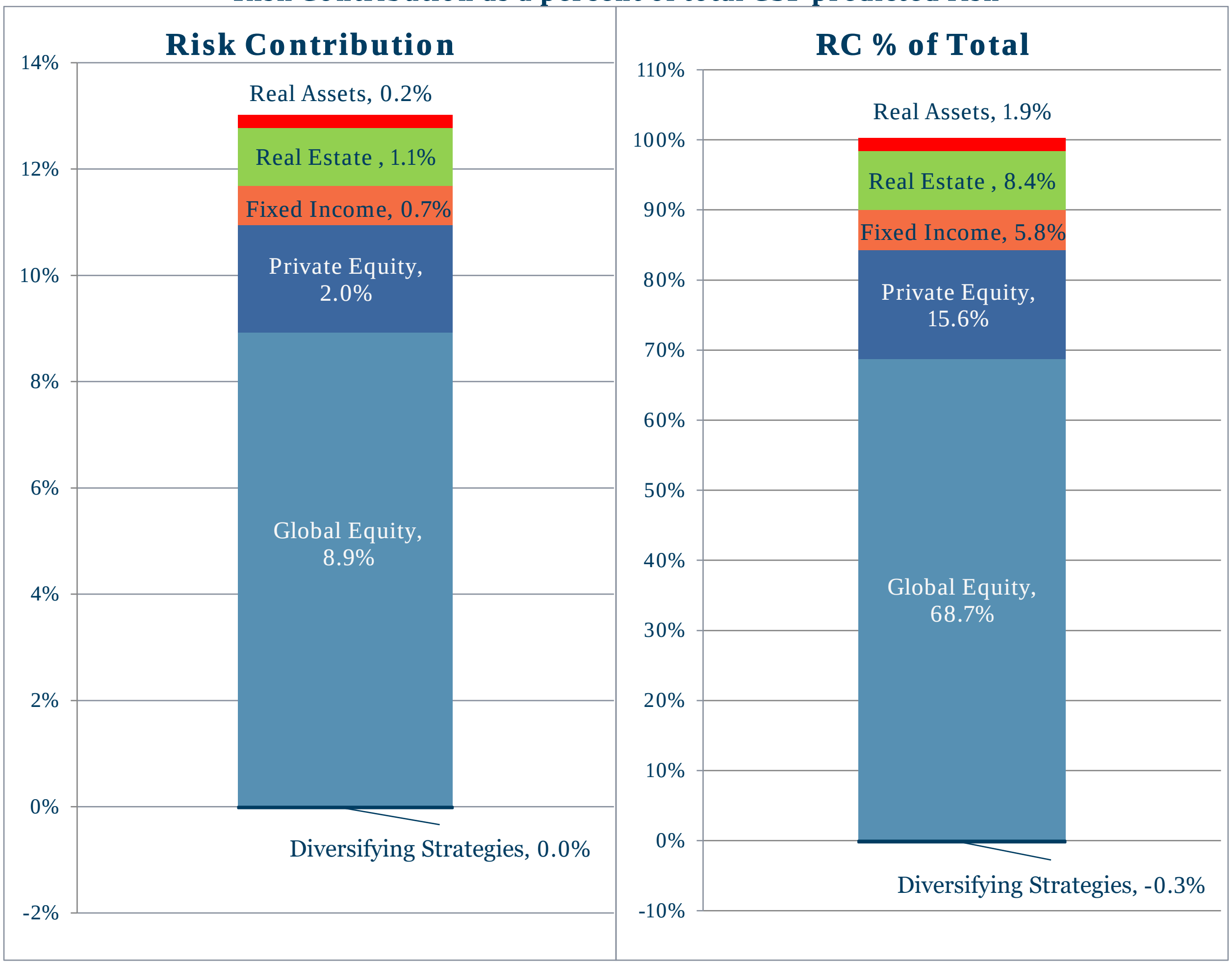


As of March 31, 2023, actual CSF asset allocations were within the policy tolerances relative to the established targets, except for Fixed Income and Private Equity, which the OIC recently approved lowering Fixed Income's allocation from 25% to 20% and increasing Private Equity's allocation from 10% to 15%.

CSF Predicted Risk

The risk estimates are shown in the charts below.

Figure 2. CSF Risk Contribution by Asset Class and Risk Contribution as a percent of total CSF predicted risk



The total predicted **standard deviation**, or **volatility**, for CSF is 12.9% as of March 31, 2023. Aladdin's risk model uses a medium-term, five-year lookback.

Another item of note from Figure 2 is that "equity" risk, that is the predicted risk contributions from Global Equity and Private Equity, is estimated to be 84% of CSF's predicted risk. Equity risk has always been the largest risk contributor to CSF. OIC Investment Belief #3 summarizes the Council's objective for investing in equity: "*Over the long-term, equity-oriented investments provide reliable return premiums relative to risk-free investments.*" However, equity investments are much more volatile than investment grade fixed income and U.S. Treasuries.

Overtime the OIC-approved asset allocation changes have reduced CSF's volatility over time. Figure 3 below plots CSF's rolling 20-quarter realized beta to MSCI ACWI IMI as well as that of the Reference Portfolio of 70% MSCI ACWI IMI and 30% Bloomberg U.S. Aggregate Bond Index. CSF's realized beta was elevated during the Great Financial Crisis from 2007 to 2009 before steadily trending down. Part of that decline is due to an increasing allocation to illiquid investments, which have smoothed performances, but the other cause is the improved diversification.

Figure 3. CSF's Beta to MSCI ACWI IMI

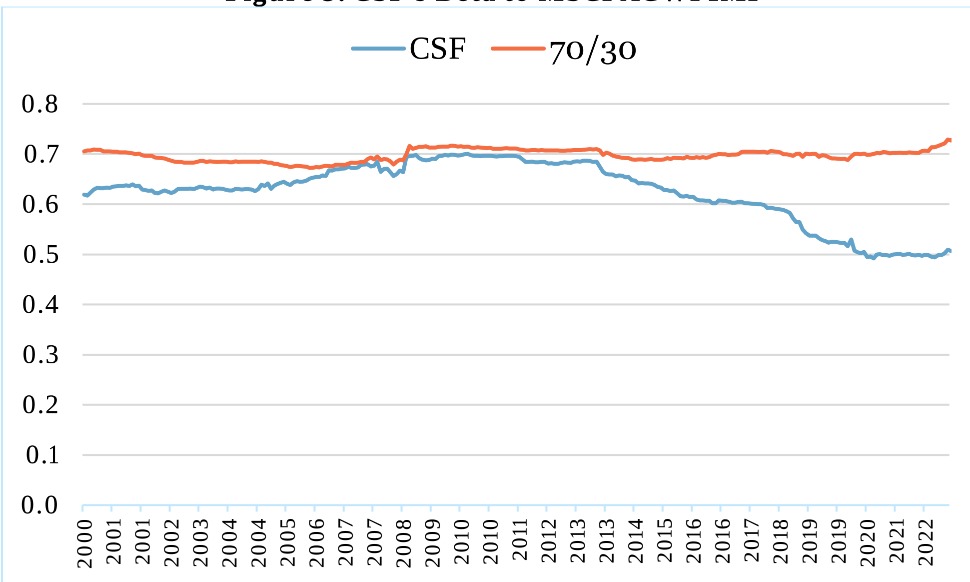
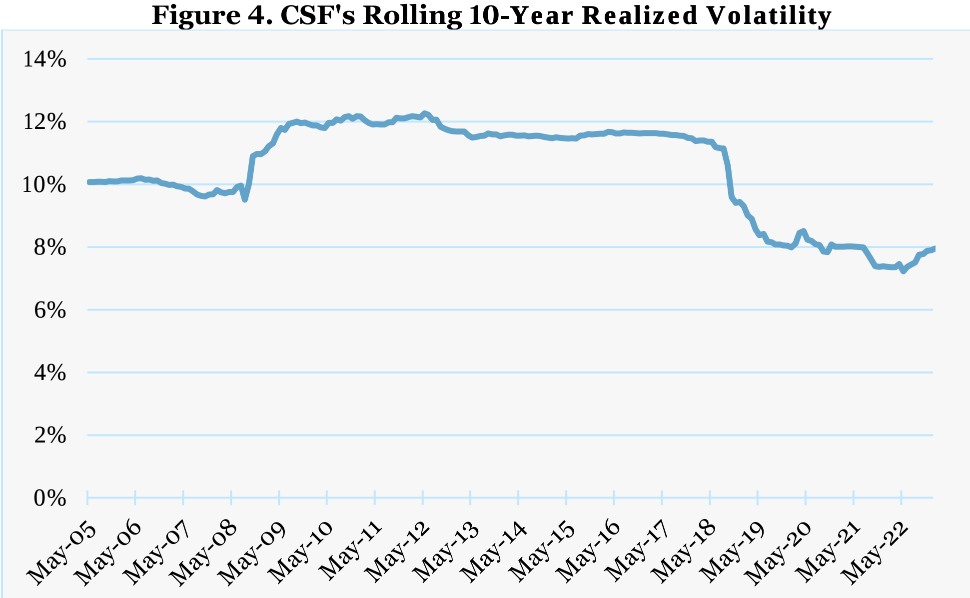


Figure 4. CSF's Rolling 10-Year Realized Volatility



OIC

OREGON STATE TREASURY

TAB 5

OIC-PERS

JOINT SESSION

MEKETA
INVESTMENT GROUP

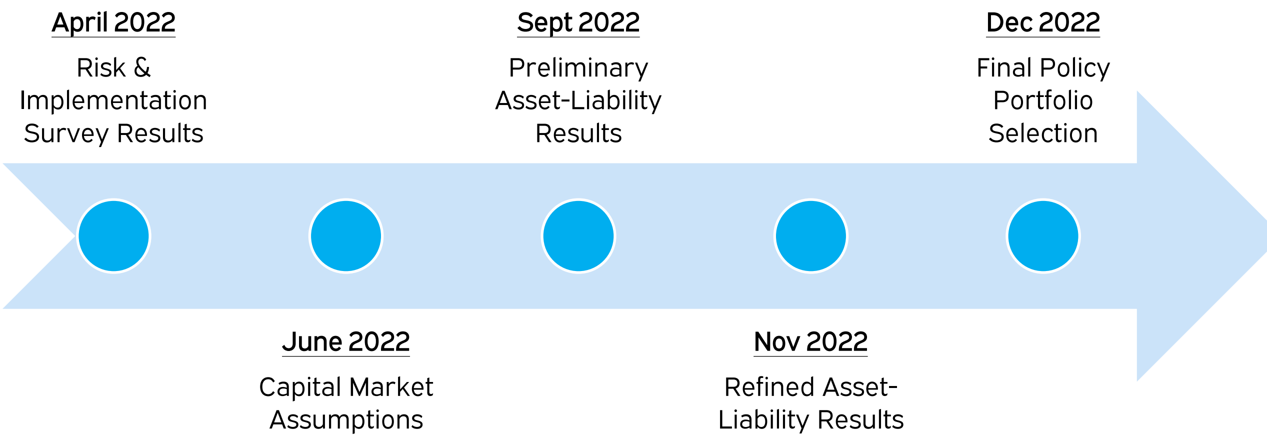
Oregon Investment Council

May 31, 2023

2023
Asset Allocation Update

2022 Asset-Liability Study

→ The 2022 OPERF Asset-Liability Study was a major project for the OIC, OST Staff, and OPERF consultants/actuaries.



→ Based on the asset-liability modeling process, OPERF was already well-situated to achieve its long-term objectives.

→ The policy portfolio that was ultimately selected by the OIC represented modest enhancements that reflected the prevailing capital market environment while also streamlining the portfolio.

→ Importantly, while long term expected returns increased in 2022/23 (largely due to the rapid increase in rates during 2022), Meketa does not typically advise clients to make changes based on one-year adjustments.

Capital Market Assumptions

→ Capital market assumptions ("CMAs") are critical inputs into the modeling process.

→ Due to the volatile environment of 2022 and the time required to complete an asset-liability study, the utilized CMAs were updated mid-project.

- These changes generally reflected higher interest rates and lower equity prices, both of which increased expected returns for most asset classes.

OPERF-Specific CMAs

Strategic Class	Expected Return	Expected Volatility
Public Equity	7.5	18.8
Fixed Income	3.8	4.3
Risk Parity	5.4	10.0
Private Equity	10.1	26.5
Real Estate	6.2	15.0
Real Assets	9.2	17.2
Diversifying Strategies	5.7	8.2

→ CMAs were updated in August 2022.

→ Despite significant market volatility since then, both equity prices and long-term interest rates are roughly the same in May 2023 compared to August 2022.

→ This implies the detailed portfolio expected return/risk figures remain appropriate.

→ Every year, CMAs are updated based on prevailing and historical market conditions.

Asset Allocations

	Policy Target Allocation at time of A/L Study	Actual Allocation at time of A/L Study[1]	Approved Long-term Policy Target Allocation
Public Equity	30%	23%	27.5%
Fixed Income	20%	20%	25%
Risk Parity	2.5%	2%	---
Private Equity	20%	28%	20%
Real Estate	12.5%	14%	12.5%
Real Assets	7.5%	8%	7.5%
Diversifying Strategies	7.5%	5%	7.5%
Expected Max Drawdown	41.4%	44.7%	39.4%
Expected Volatility	11.9%	12.7%	11.4%
Expected Return	7.7%	8.0%	7.6%
Illiquids	40%	50%	40%

→ Approved Long-term Policy:

- Eliminated allocation to Risk Parity.
- Increased Fixed Income target by 5%.
- Set Public Equity target in between actual allocation and policy target.
- Maintained targets to Private Equity, Real Estate, Real Assets, and Diversifying Strategies, acknowledging that current exposures will differ from targets for an extended period.

[1]Based on 8/12/22 allocations. Opportunities assets are allocated pro-rata across other classes. Figures incorporate rounding.

Progress Towards New Policy targets

	Actual Allocation at time of A/L Study[1]	Current Actual Allocation[2]	Approved Long-term Policy Target Allocation
Public Equity	23%	18%	27.5%
Fixed Income	20%	24%	25%
Risk Parity	2%	---	---
Private Equity	28%	28%	20%
Real Estate	14%	15%	12.5%
Real Assets	8%	10%	7.5%
Diversifying Strategies	5%	5%	7.5%
Illiquids	50%	52%	40%

→ Policy targets/benchmarks shifted on 4/1/23.

→ Risk Parity has been eliminated and the assets transitioned to elsewhere in the portfolio.

→ Remaining transitions will generally depend on contributions/distributions of private markets portfolios.

[1]Based on 8/12/22 allocations. Opportunities assets are allocated pro-rata across other classes. Figures incorporate rounding.
[2]Based on 4/28/23 allocations. Opportunities assets are allocated pro-rata across other classes. Figures incorporate rounding.

Disclaimers

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AON

Liquidity Analysis

Oregon Investment Council

November 2022

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 2	Option 2A	Option 2B
Liquid (Risk-Reducing Assets)					
Core Fixed Income	20.0%	20.0%	25.0%	25.0%	27.5%
Subtotal	*20.0%*	*20.0%*	*25.0%*	*25.0%*	*27.5%*
Liquid (Return-Seeking Assets)					
Public Equity	30.0%	23.0%	25.0%	27.5%	25.0%
Risk Parity	2.5%	2.0%	--	--	--
Subtotal	*32.5%*	*25.0%*	*25.0%*	*27.5%*	*25.0%*
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%	20.0%	20.0%
Subtotal	*20.0%*	*28.0%*	*22.5%*	*20.0%*	*20.0%*
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total Quasi + Illiquid Assets	**47.5%**	**55.0%**	**50.0%**	**47.5%**	**47.5%**

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

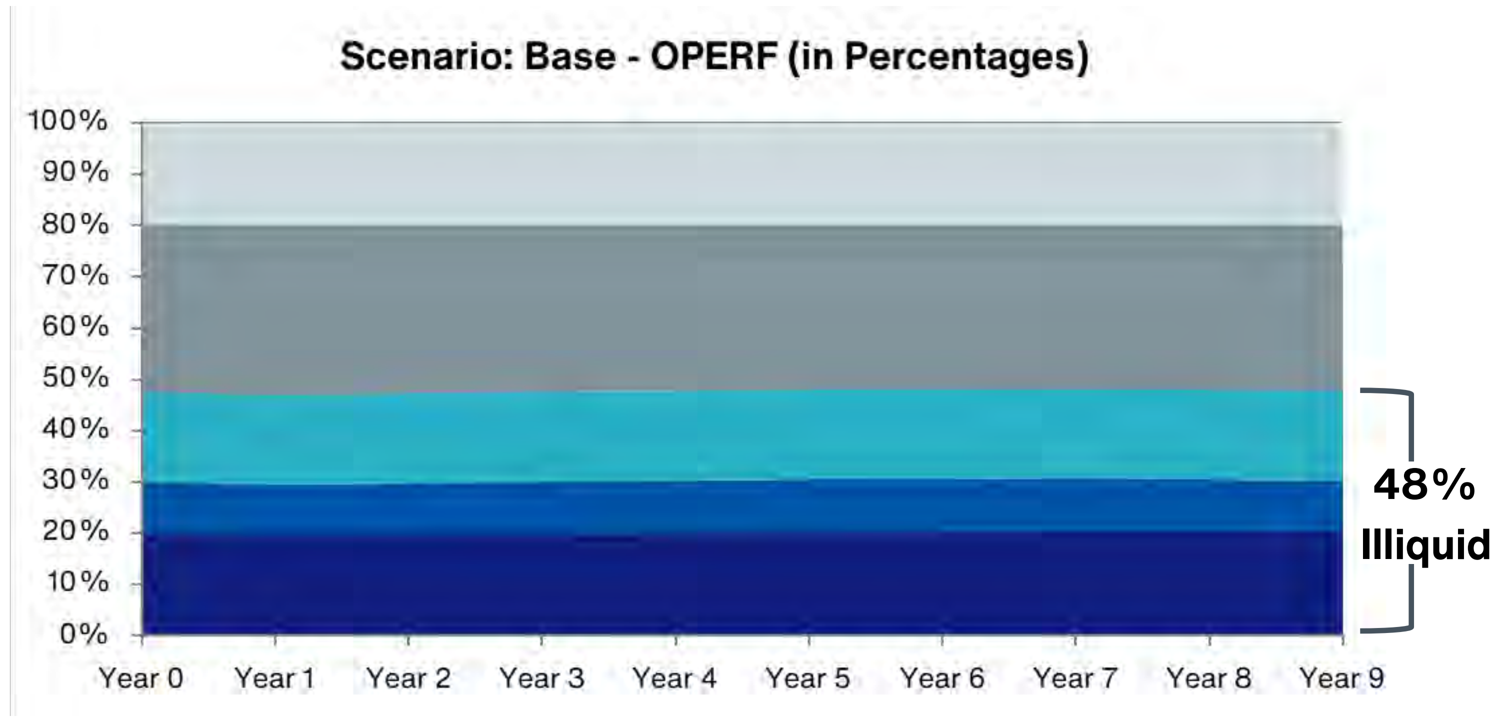
Return-seeking assets decline significantly

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

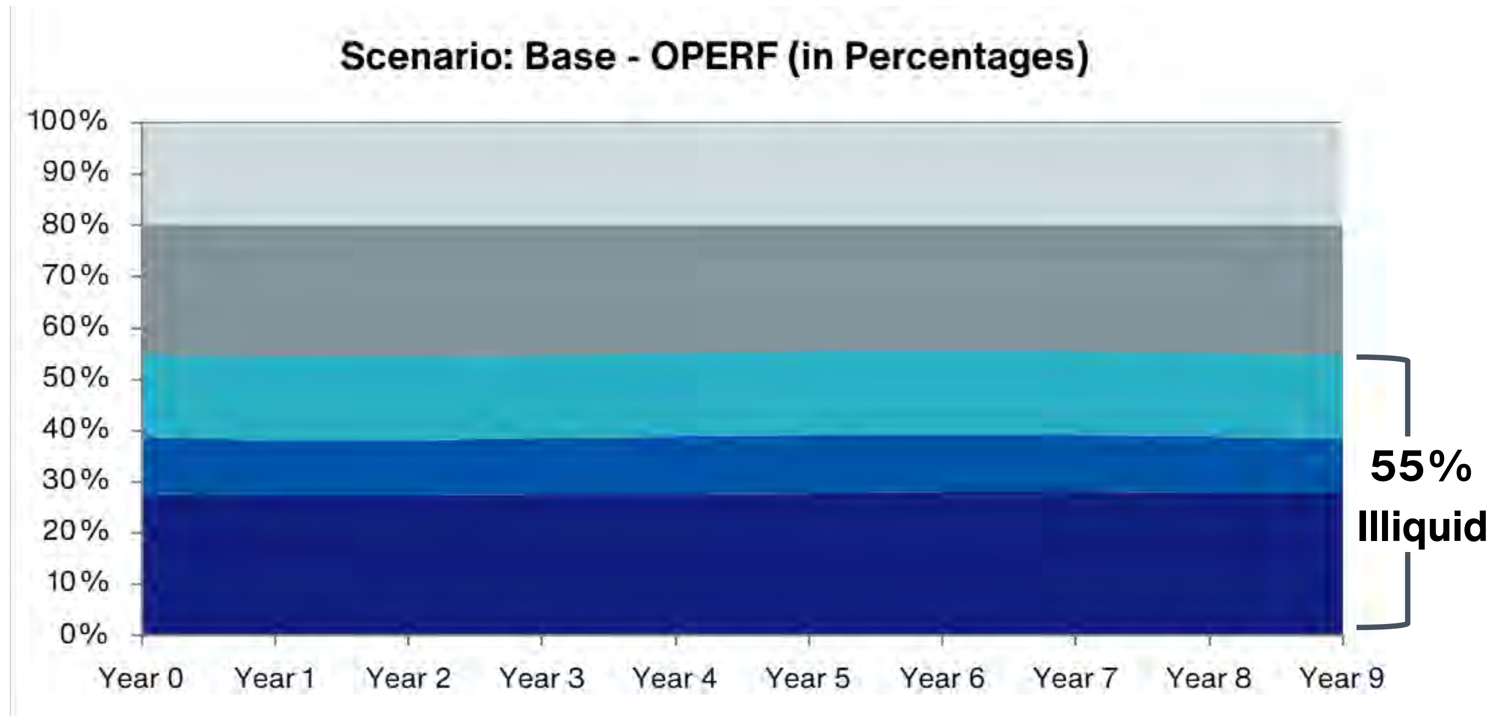
Liquidity Analysis
Base Case

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

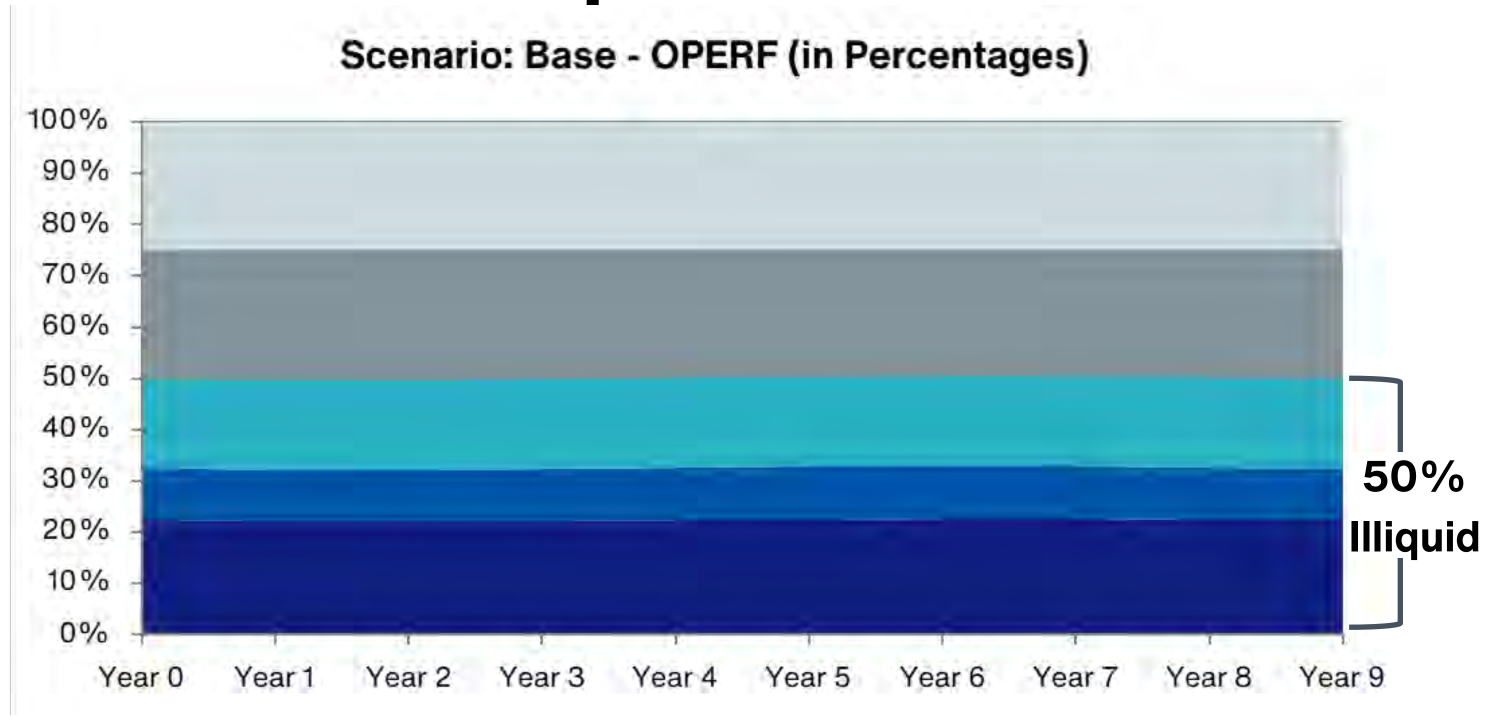
Current Policy



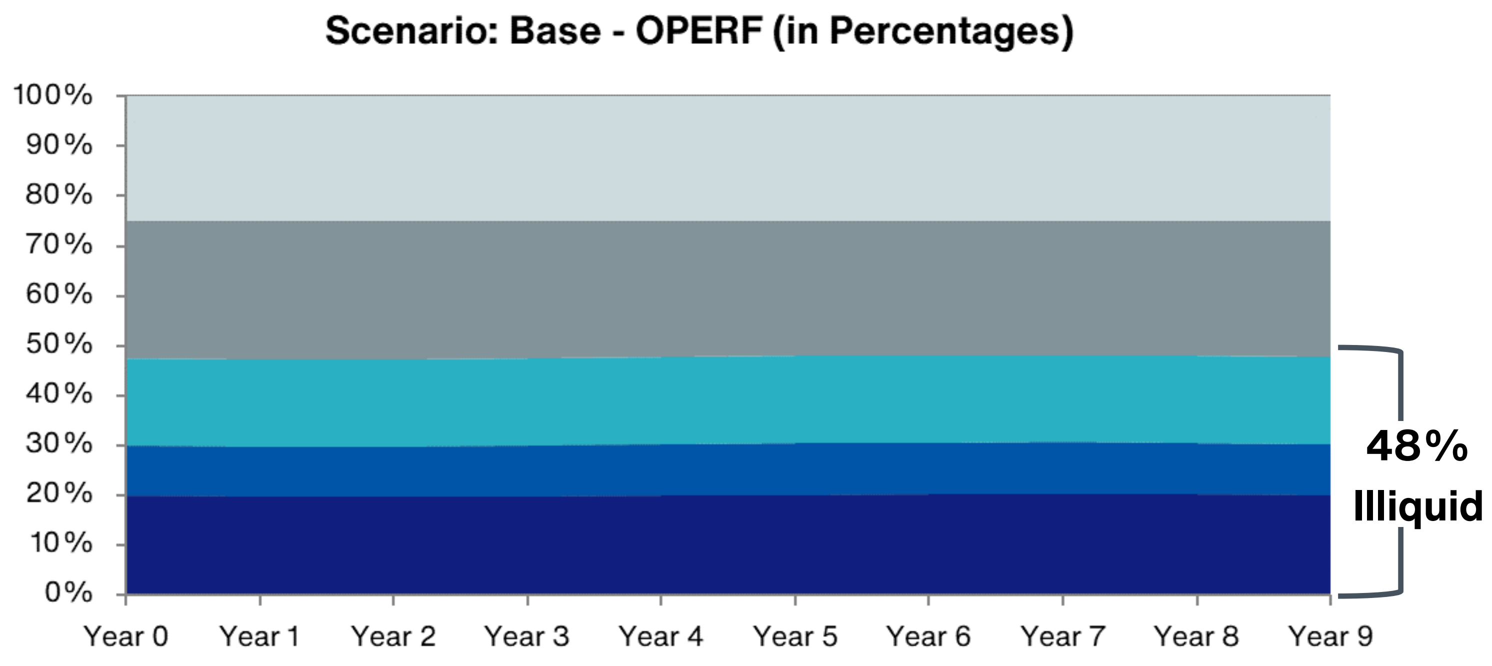
Actual



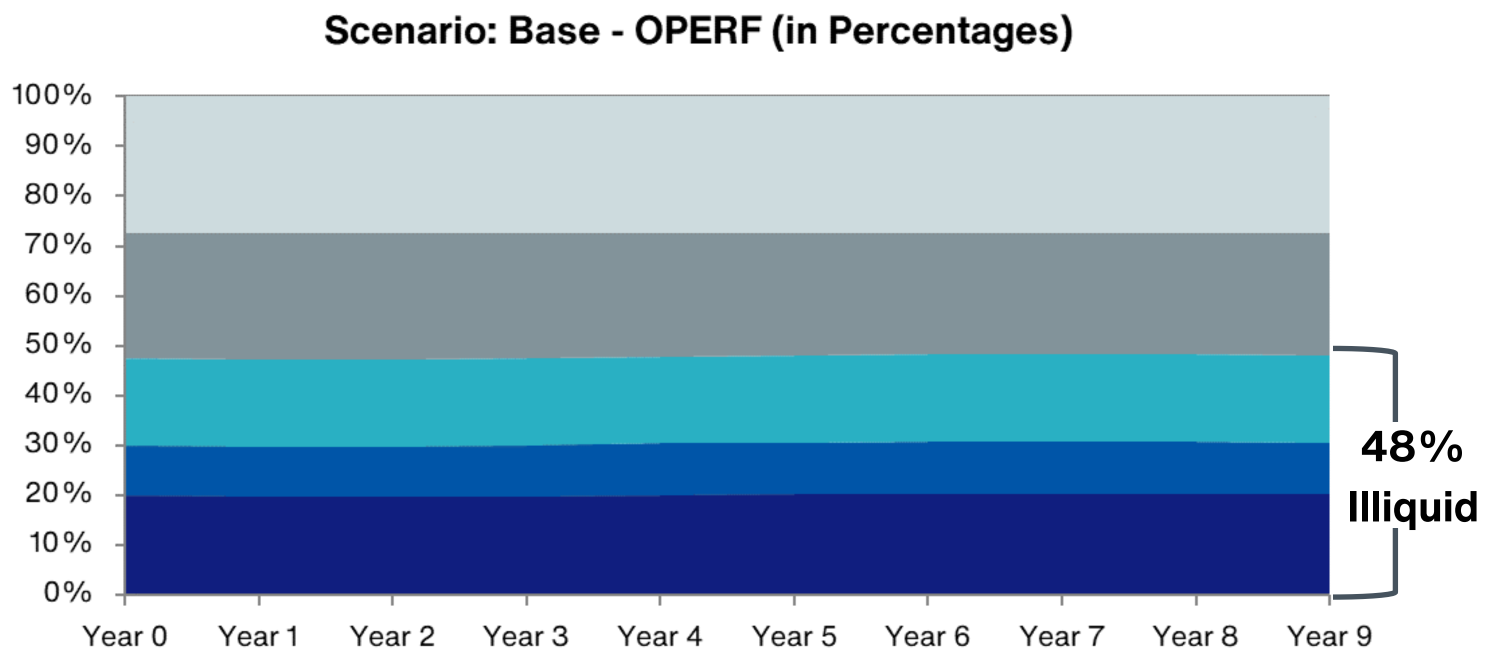
Option 2



Option 2A



Option 2B



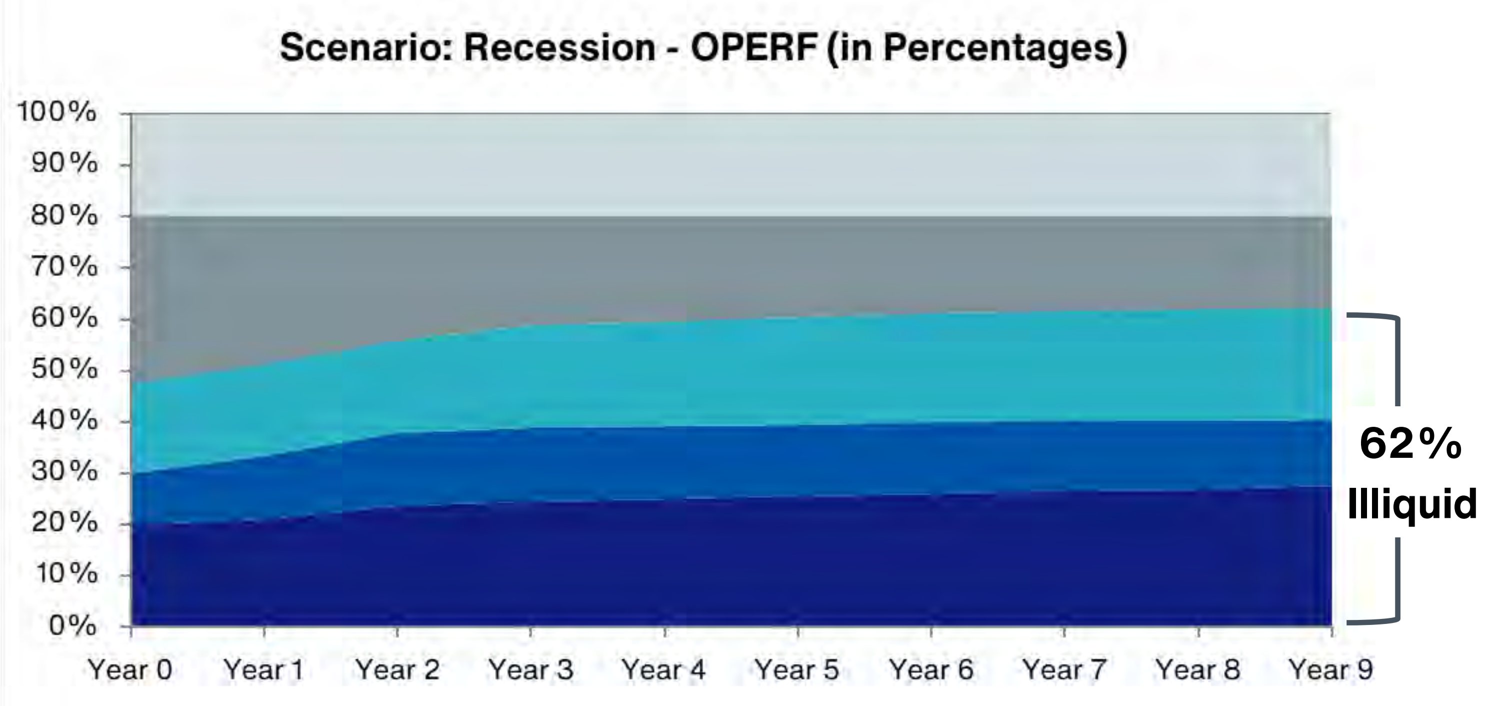
Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

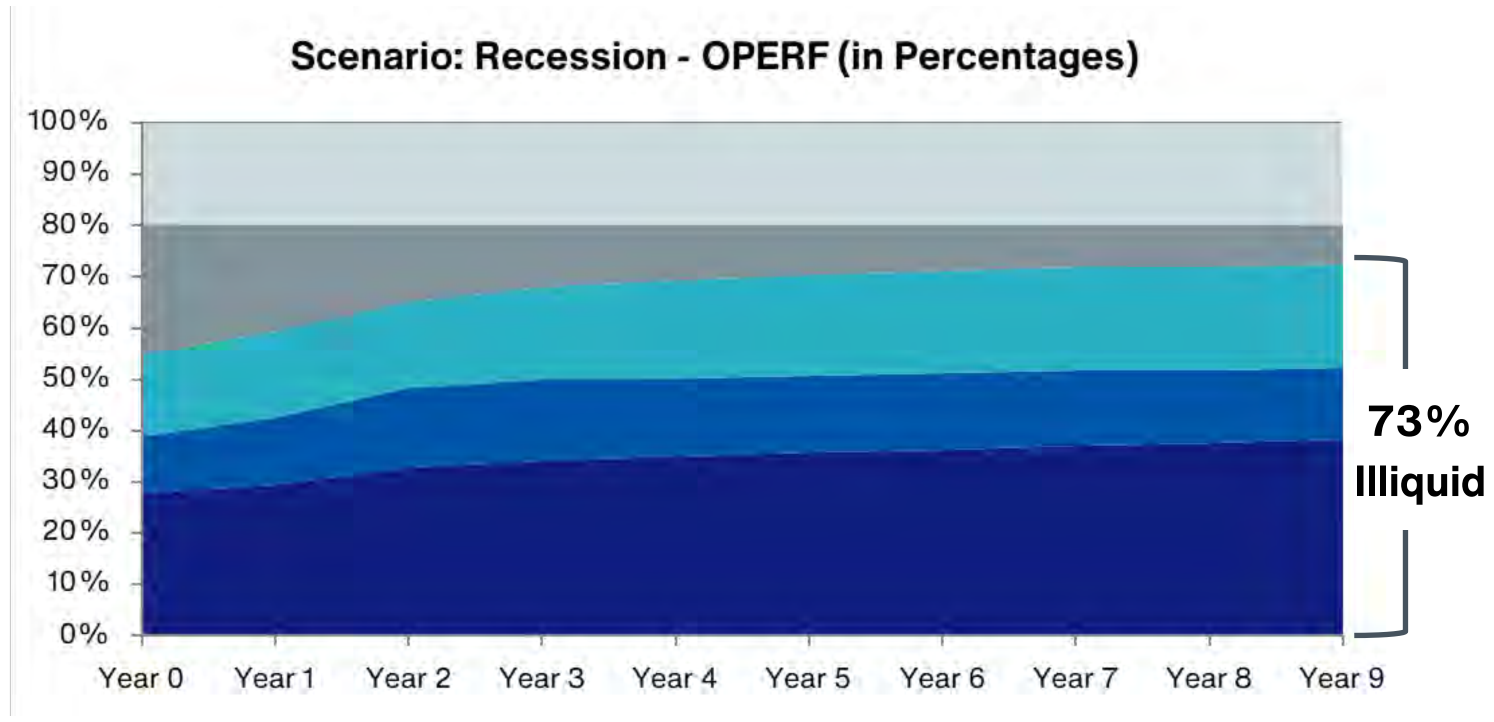
Recession

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

Current Policy



Actual



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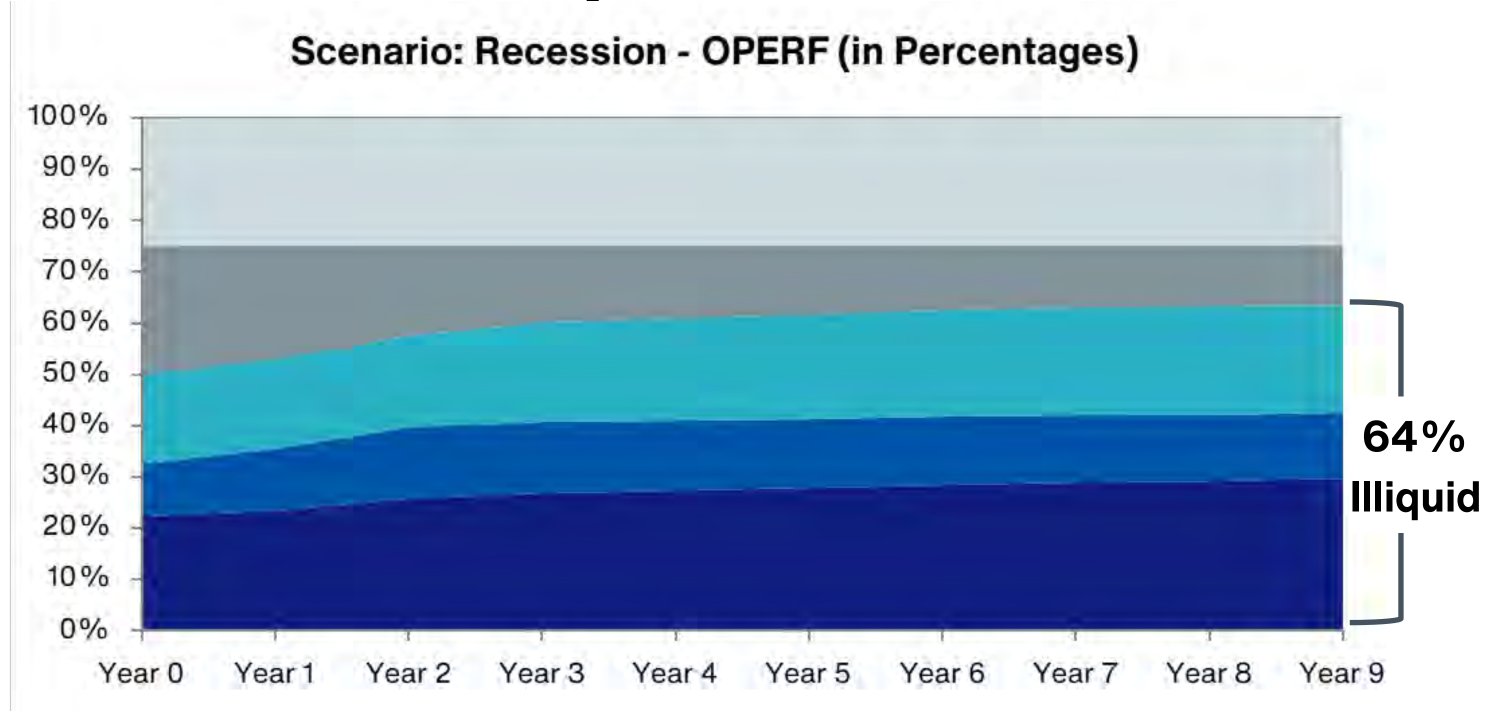
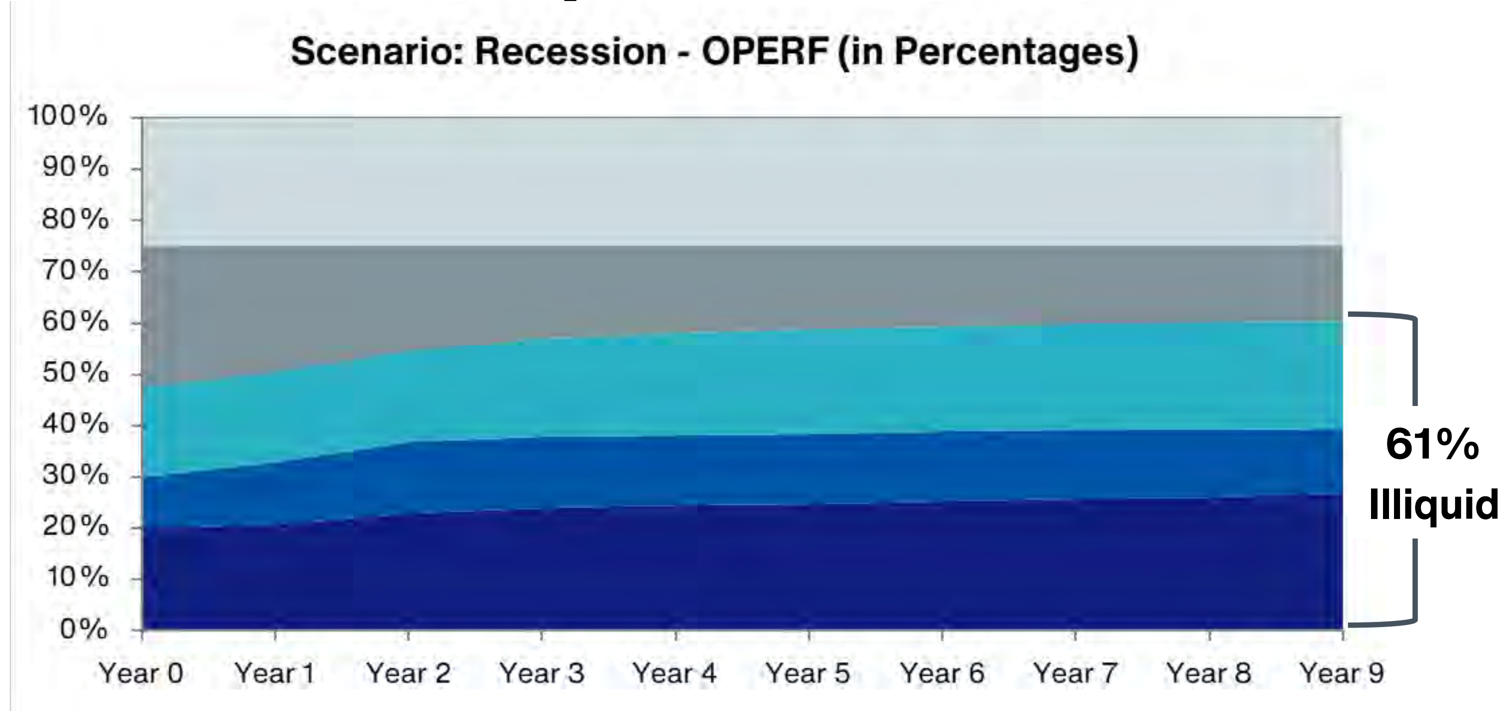
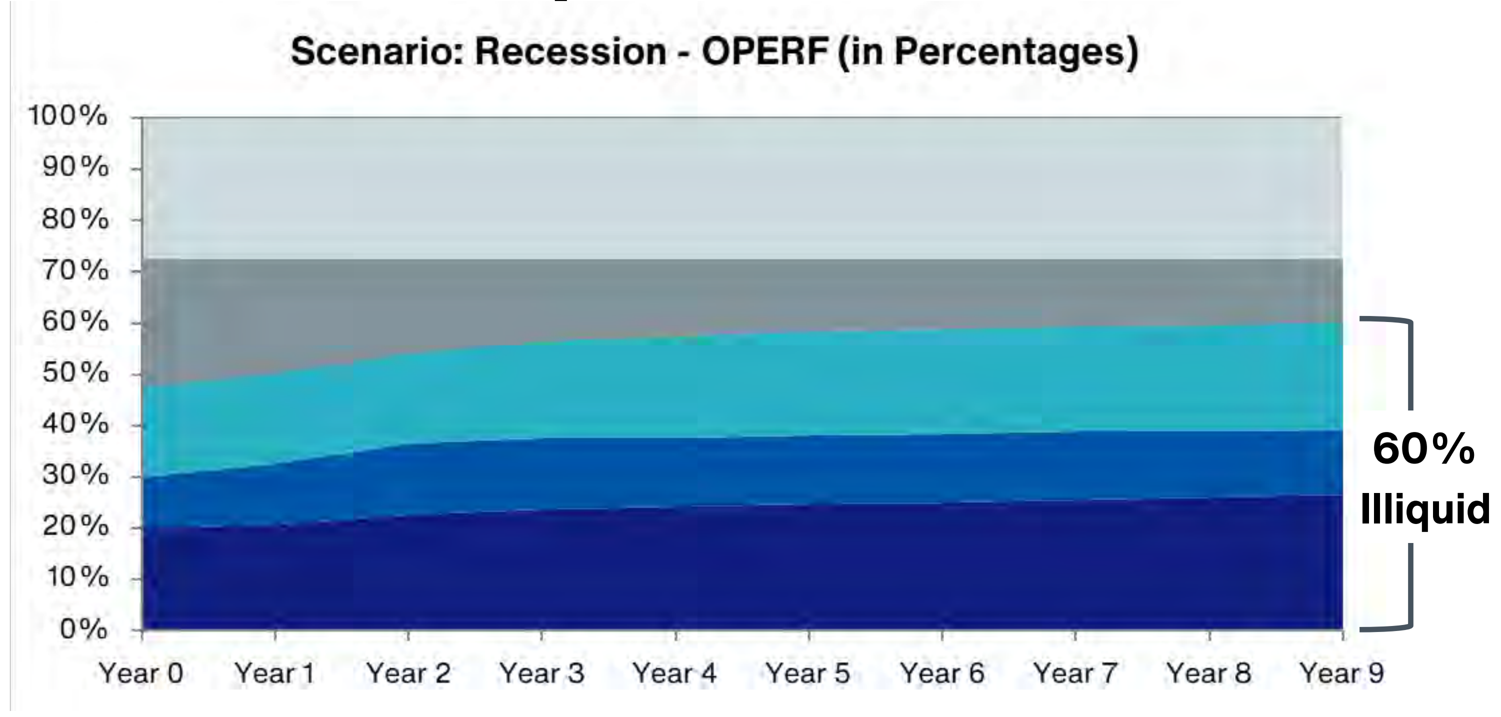


Option 2A



Option 2B



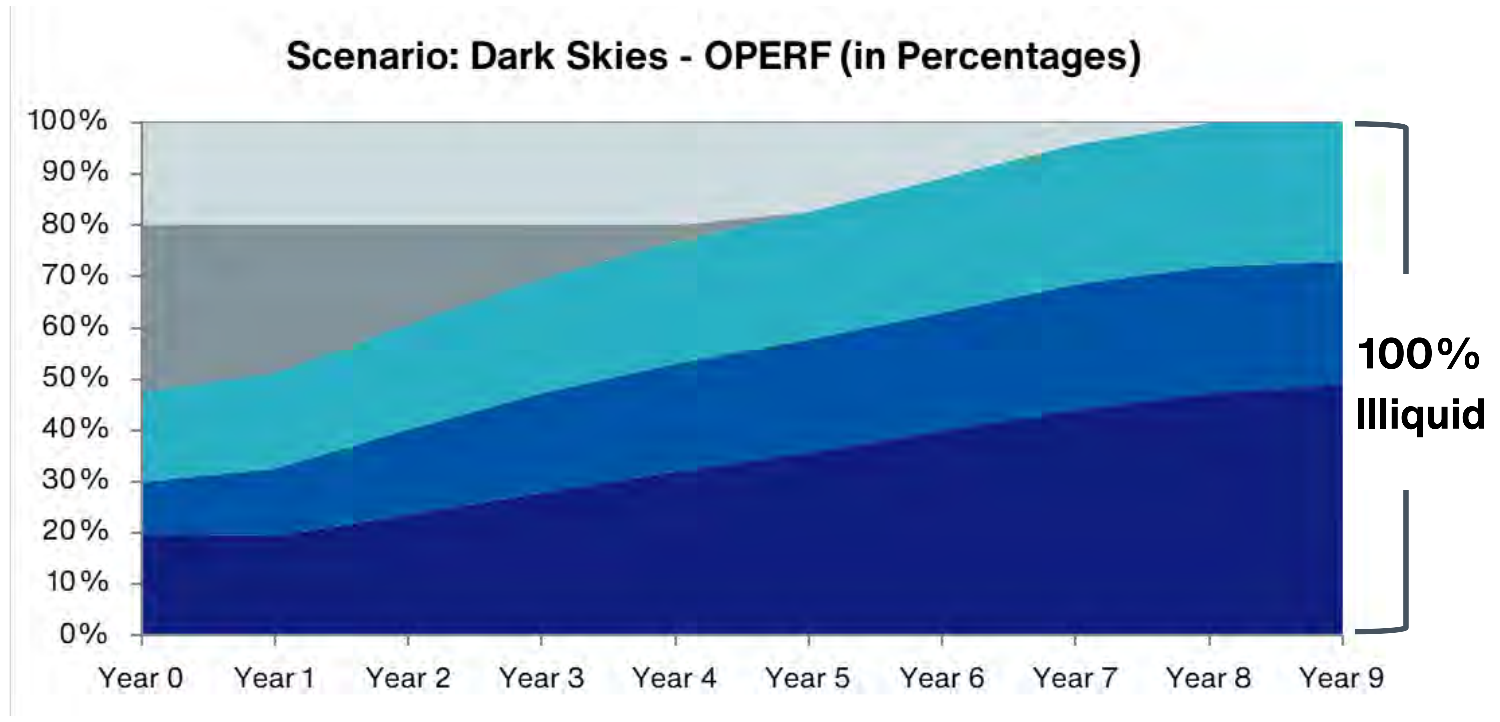
Note: Year 0 represents a starting point of June 30, 2022

Liquidity Analysis

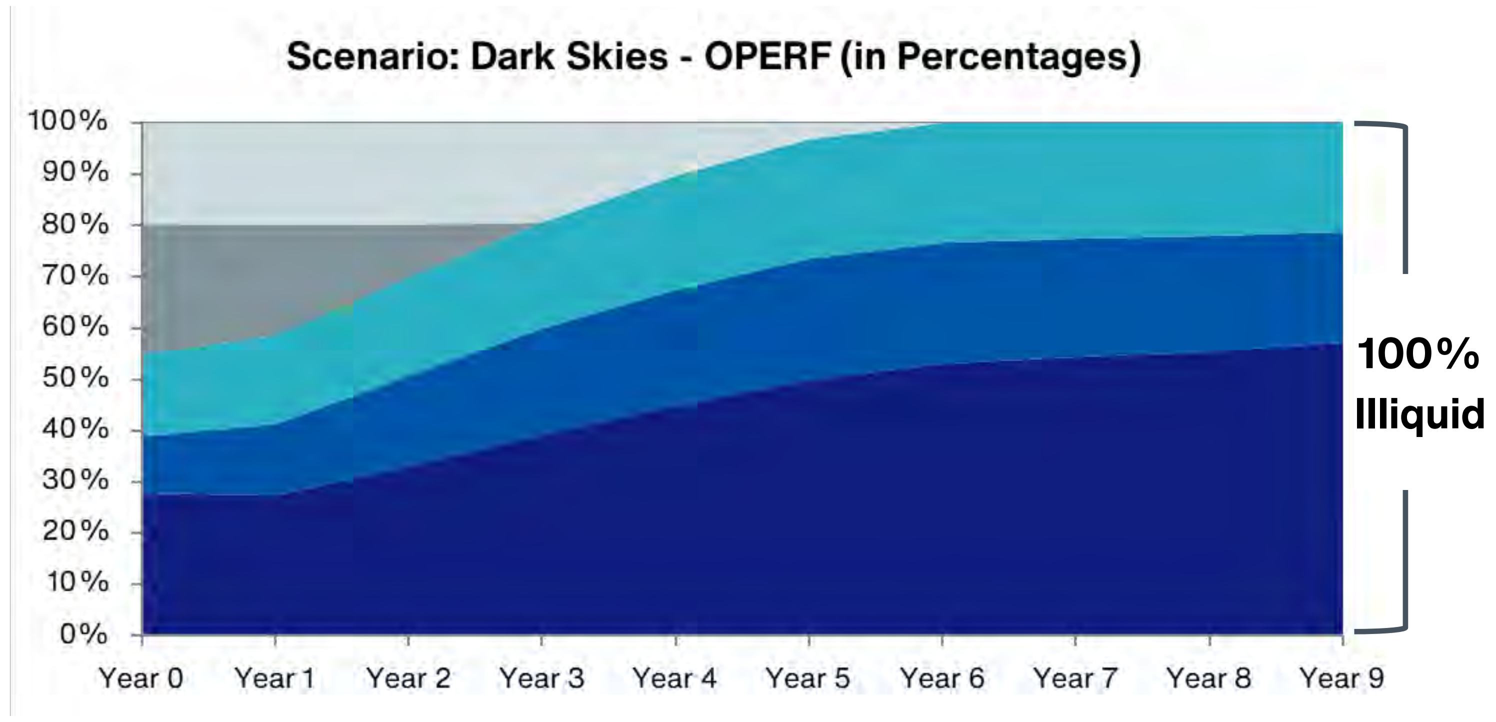
Dark Skies

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

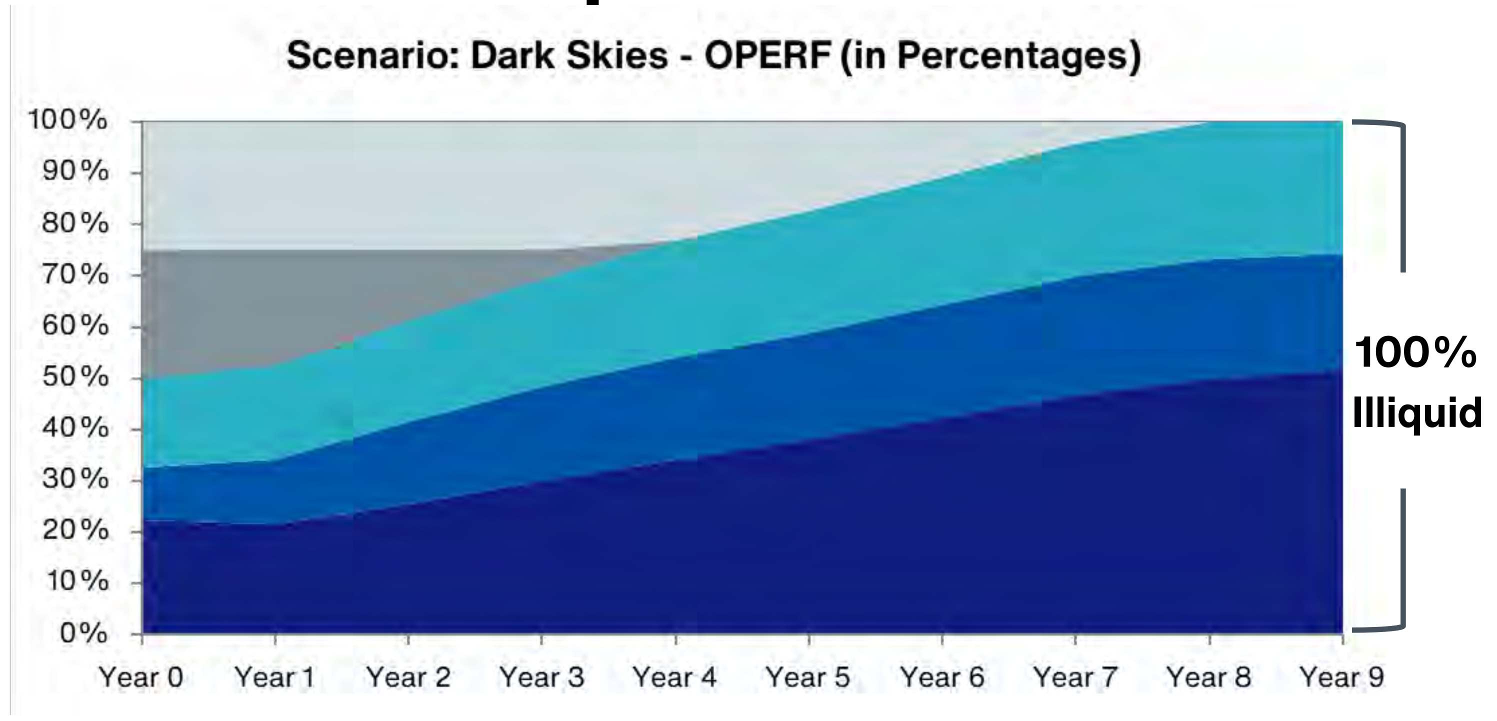
Current Policy



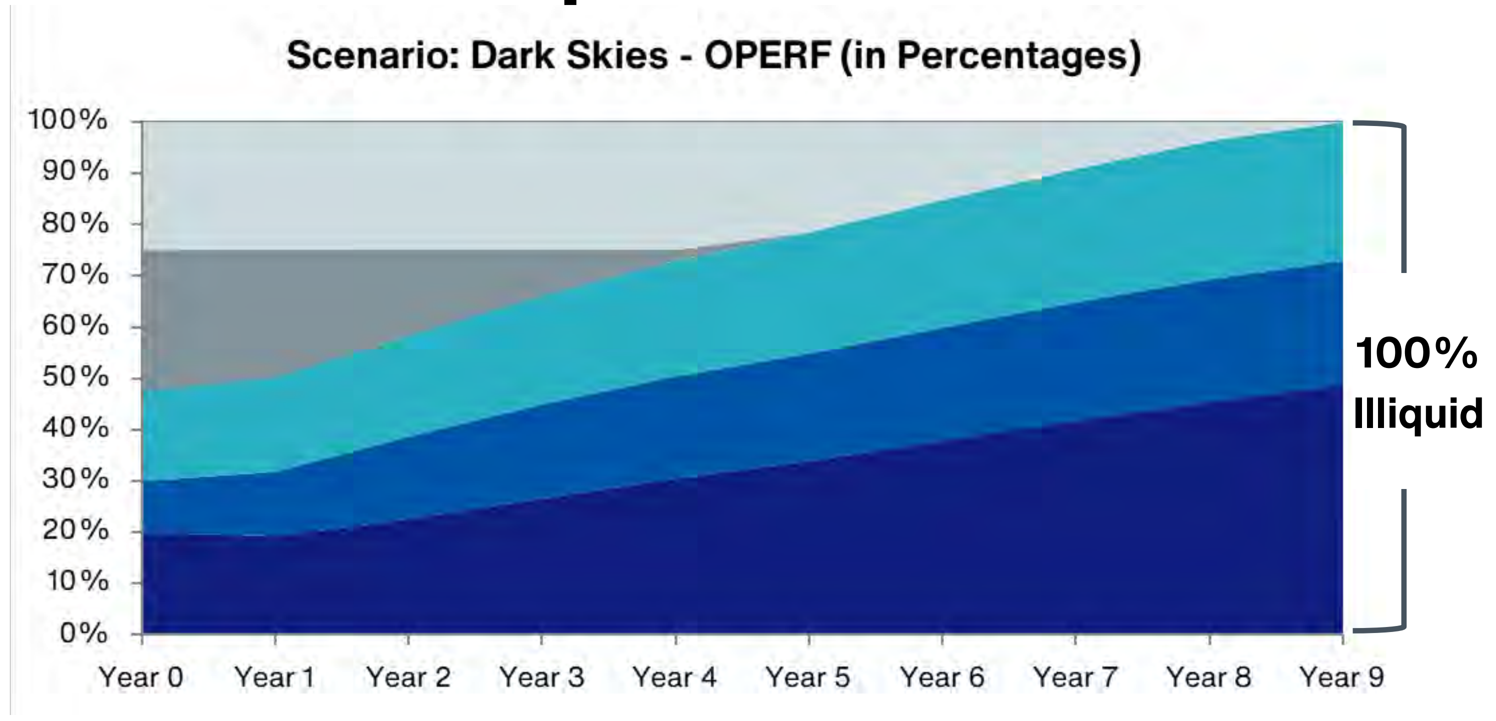
Actual



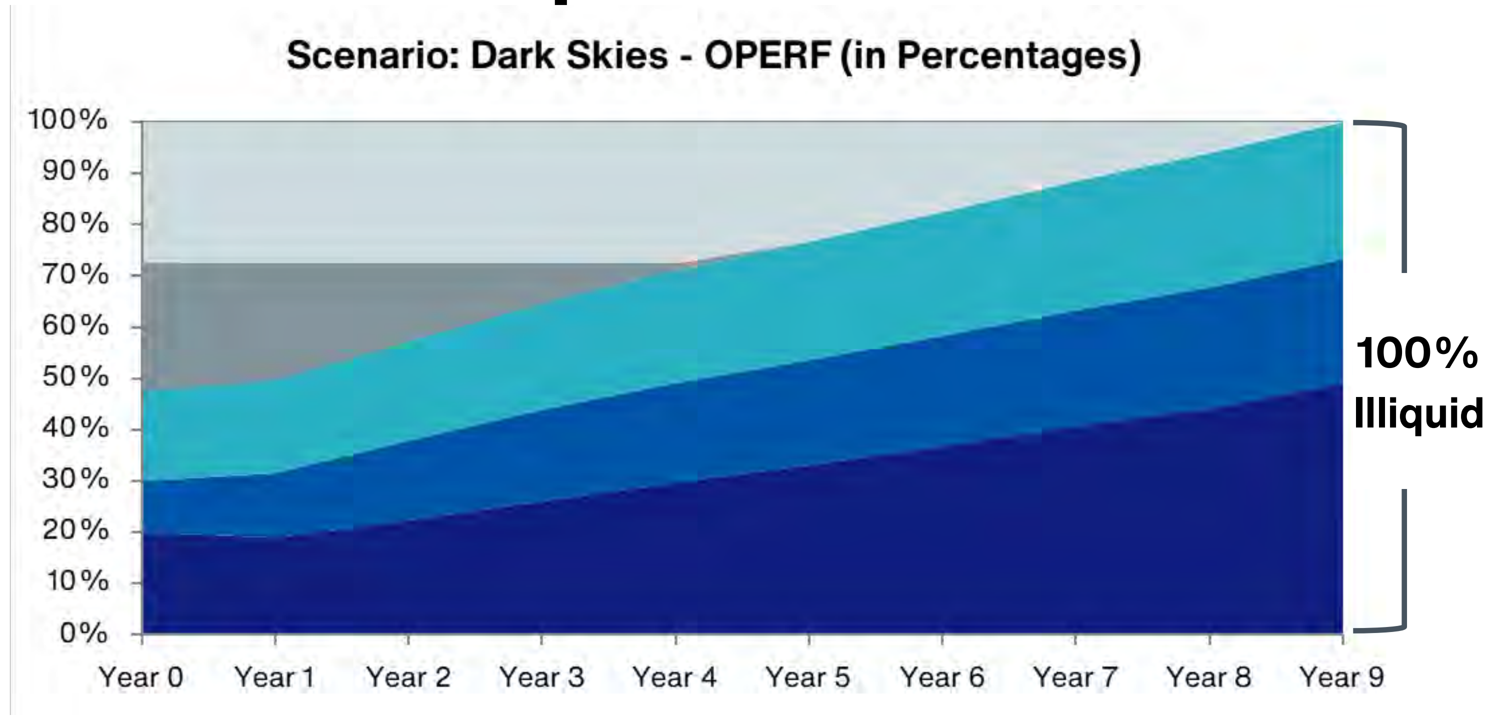
Option 2



Option 2A



Option 2B



AON

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 2	Option 2A	Option 2B
Projected # of Years to be 100% Illiquid	8 yrs.	6 yrs.	8 yrs.	9 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 in portfolio options 2, 2A, and 2B, the lower risk profile and additional liquidity delays the number of years projected 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

- Assumptions and Methods
- About This Material

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.

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

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

Milliman

Joint Meeting of OIC and PERS Board

OREGON PUBLIC EMPLOYEES RETIREMENT SYSTEM

Presented by:

Matt Larrabee, FSA, EA
Scott Preppernau, FSA, EA

May 31, 2023

Background Regarding Today's Slides

- The following slides have either been presented at prior PERS Board meetings or will be presented at the June 2, 2023 PERS Board meeting
- Information on the data, assumptions, methods, and provisions used in developing the slides from prior presentations, including the limitations of use of the material, is incorporated into this material by reference

System-Average Weighted Total* Pension-Only Rates

2009-2011 rates set **prior to 2008 economic downturn**

2011-2013 rates first to reflect **-27%** return in 2008 and **+19%** return in 2009

2013-2015 rates shown before (dotted line) and after (solid line) **legislated changes**

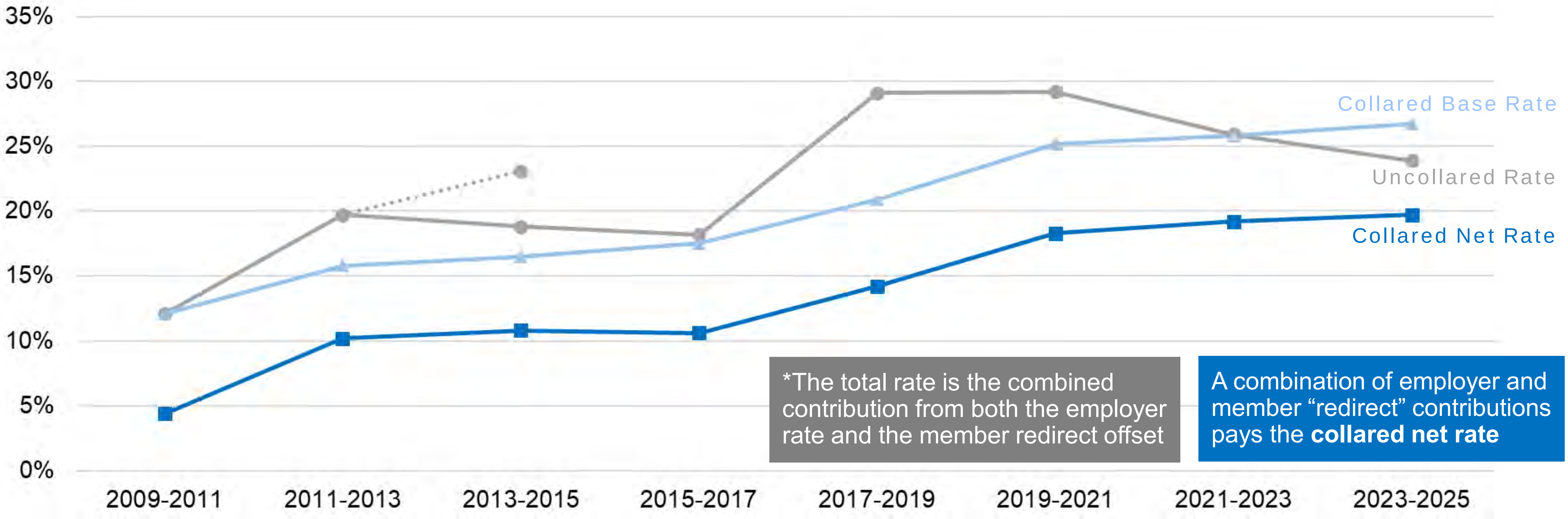
2015-2017 rates set **pre-*Moro*** reflecting 2012 (**+14.3%**) & 2013 (**+15.6%**) returns, **first decrease in assumed return**

2017-2019 rates set **post-*Moro***, reflecting 2015 return (**+2.1%**) and second **decrease in assumed return**

2019-2021 rates reflect **+15.4%** return in 2017 and third **decrease in assumed return**

2021-2023 rates reflect **mandated reamortization of Tier One/Tier Two UAL**, biennial returns near assumption

2023-2025 rates reflect 2021 actual return of **+20.05%,** a fourth **decrease in assumed return** and an **update to rate collaring policy**



*The total rate is the combined contribution from both the employer rate and the member redirect offset

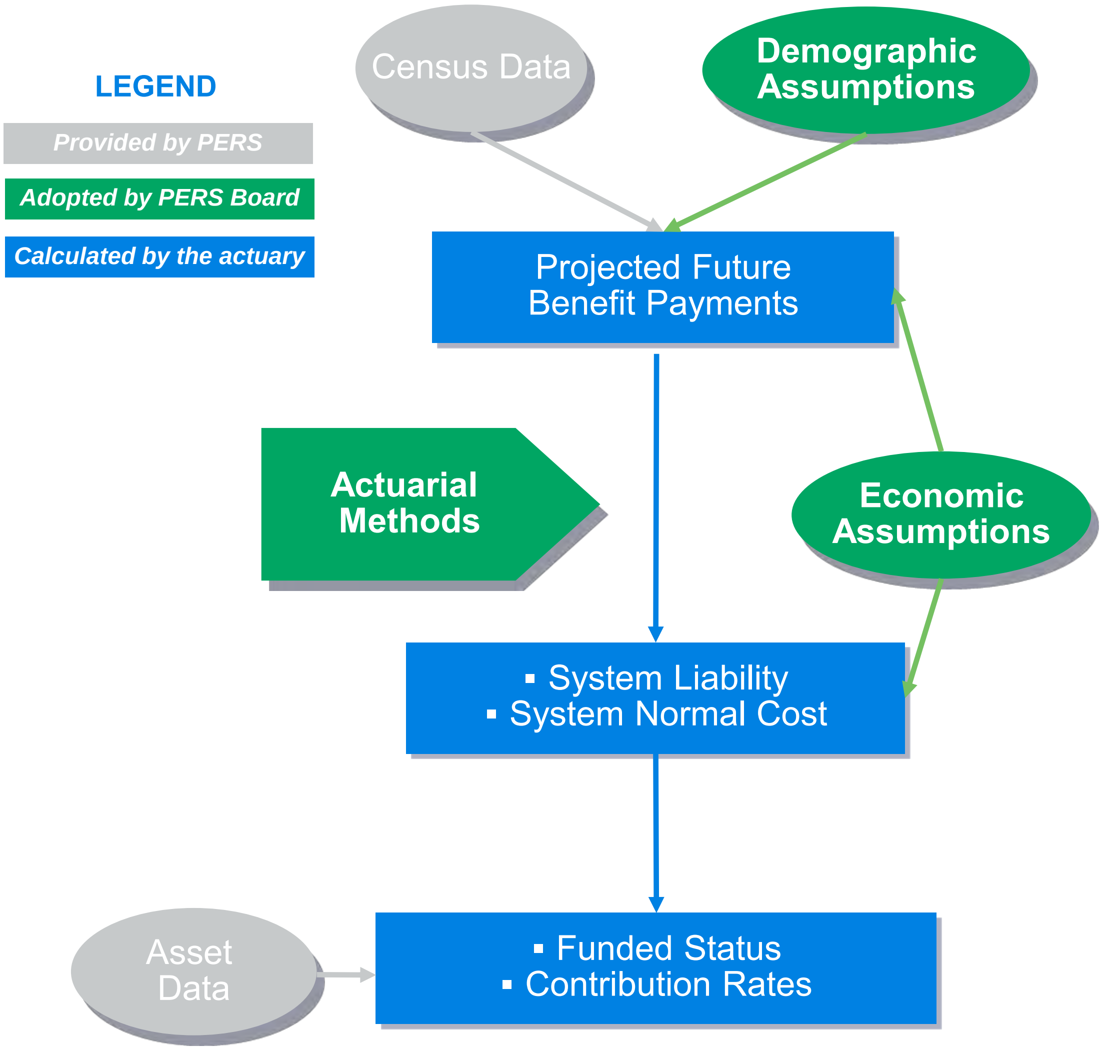
A combination of employer and member "redirect" contributions pays the **collared net rate**

Assumed Return:	8.00%	8.00%	8.00%	7.75%	7.50%	7.20%	7.20%	6.90%

Milliman

Two-Year Rate-Setting Cycle

- **July 2023: Assumptions & methods adopted by Board in consultation with the actuary**
- September 2023: System-wide 12/31/22 actuarial valuation results
- December 2023: Advisory 2025-2027 employer-specific contribution rates
- July 2024: System-wide 12/31/23 actuarial valuation results
- September 2024: Disclosure & adoption of employer-specific **2025-2027 contribution rates**



Milliman

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Valuation Process and Timeline

- Actuarial valuations are conducted annually
  - Alternate between “rate-setting” and “advisory” valuations
  - This valuation as of 12/31/2022 is <u>advisory</u>
- Board adopts contribution rates developed in rate-setting valuations, and those rates go into effect 18 months after the valuation date

Valuation Date	Employer Contribution Rates
12/31/2019 →	July 2021 – June 2023
12/31/2021 →	July 2023 – June 2025
12/31/2023 →	July 2025 – June 2027

Board Objectives - Methods & Assumptions

- Transparent
- Predictable and stable rates
- Protect funded status
- Equitable across generations
- Actuarially sound
- GASB compliant

Some of the objectives can conflict, particularly in periods with significant volatility in investment return or projected benefit levels. Overall system funding policies should seek an appropriate balance between conflicting objectives.

The Fundamental Cost Equation

- Long-term program costs are the contributions, which are governed by the "fundamental cost equation":

BENEFITS =

CONTRIBUTIONS +

EARNINGS

Governance Structure

- Benefits:
  - Plan design set by Oregon Legislature
  - Subject to judicial review
- Earnings:
  - Asset allocation set by OIC
  - Actual returns determined by market
- Contributions:
  - Funding, including methods & assumptions, set by PERS Board
  - Since contributions are the balancing item in the fundamental cost equation, PERS Board policies primarily affect the **timing** of contributions
  - Different actuarial methods and assumptions produce different projected future contribution patterns

Assumptions to Be Reviewed (Other than Investment Return)

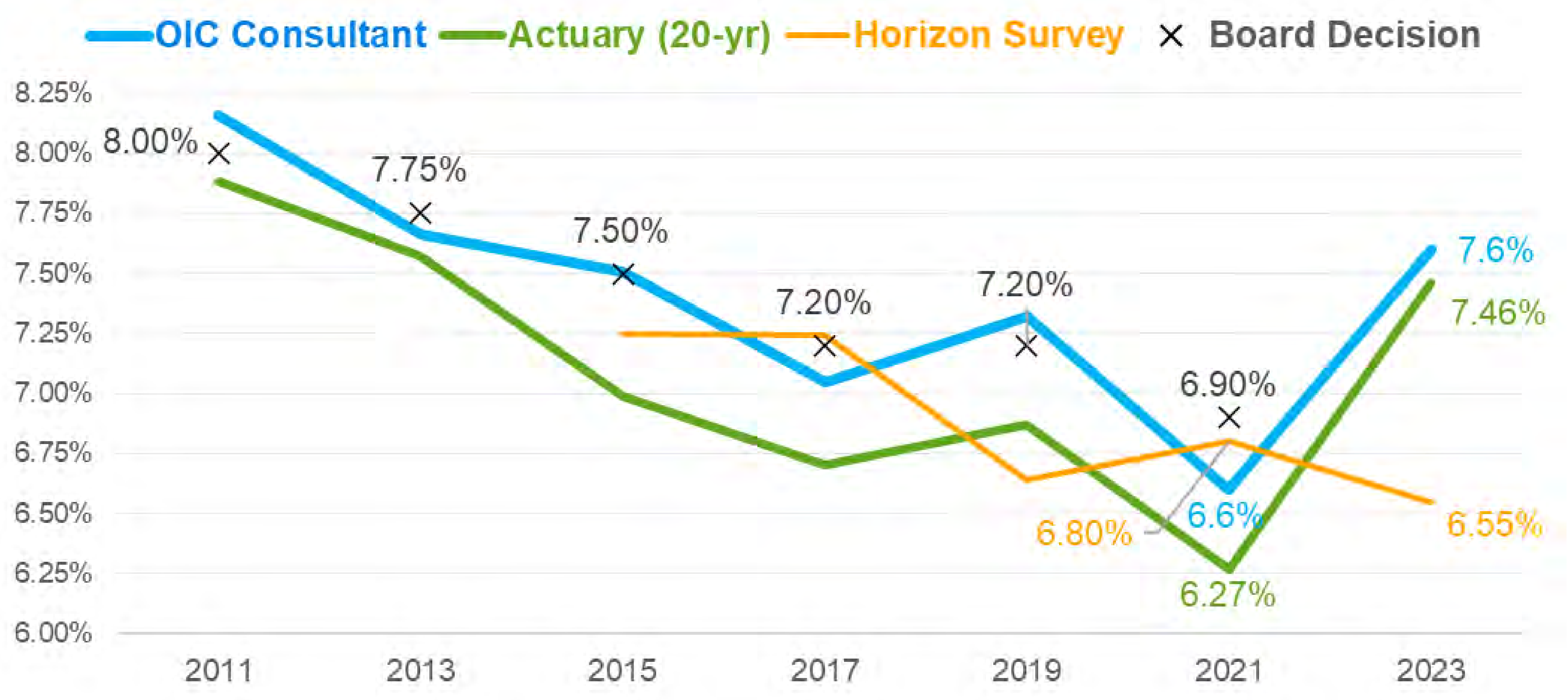
	12/31/2021 Valuation Assumptions	12/31/2022 Valuation Proposed* Assumptions
Inflation	2.4%	2.4%
Real Wage Growth	1.0%	1.0% or lower
System Payroll Growth	3.4%	3.4% or lower

No explicit assumption is made for investment-related expenses, which are accounted for implicitly in the analysis of the long-term investment return assumption.

*All assumptions and methods will be adopted at the July 2023 Board meeting

Investment Return 50th Percentile Outlooks

Geometric Returns from Outlook Models in Current and Prior Six Reviews



Investment Return 50th Percentile Outlooks

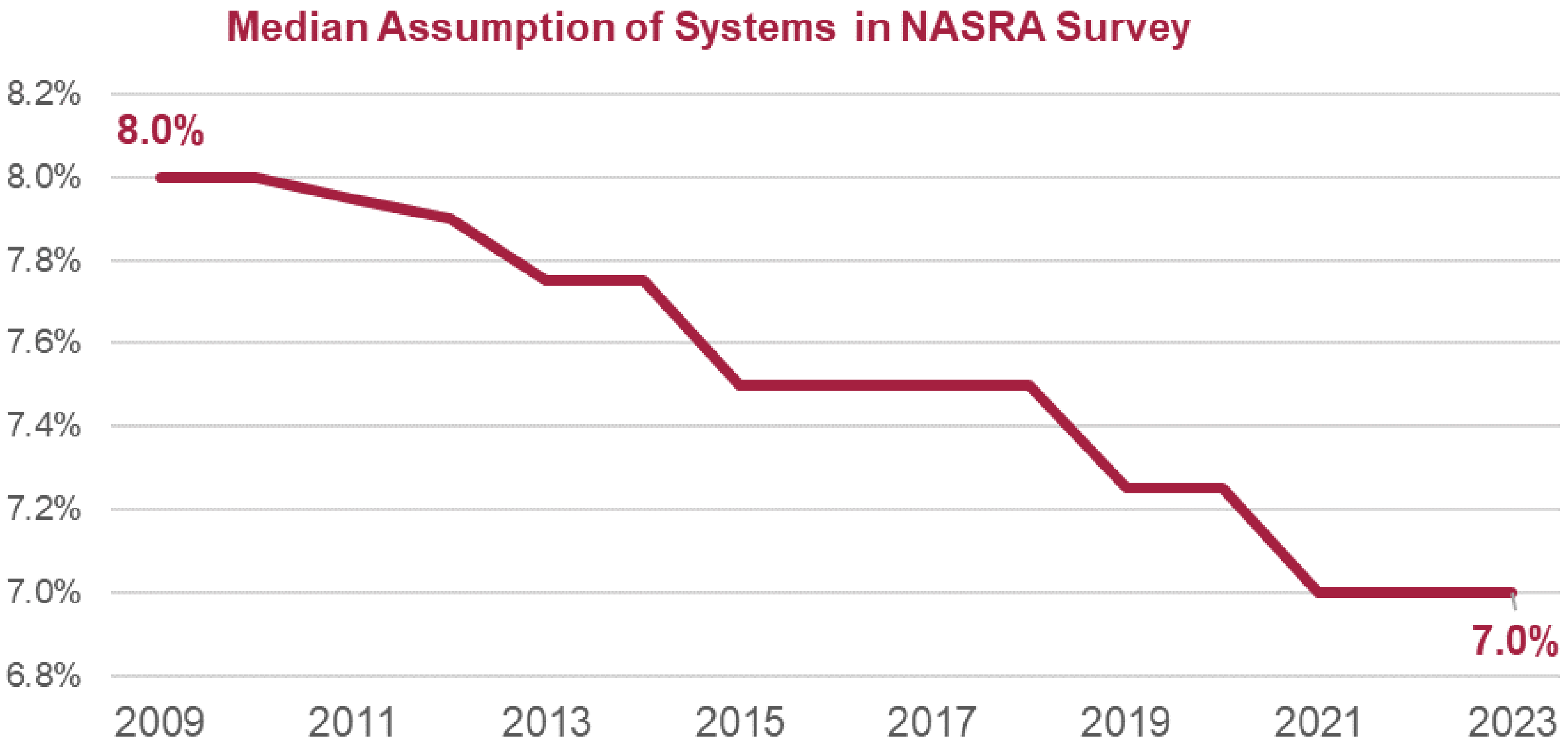
- Estimates are shown based on the OIC's long-term asset allocation

	OIC Consultant	Milliman 10-Year	Milliman 20-Year	Horizon Survey
Median Annualized Return	**7.6%**	**7.11%**	**7.46%**	**6.55%**
Assumed Inflation	2.5%	2.40%	2.35%	2.46%
Timeframe Modeled	20 years	10 years	20 years	10 years

The median returns shown above are geometric annualized average returns over the timeframes indicated above for each provided set of capital market assumptions

Comparison to Peer Systems

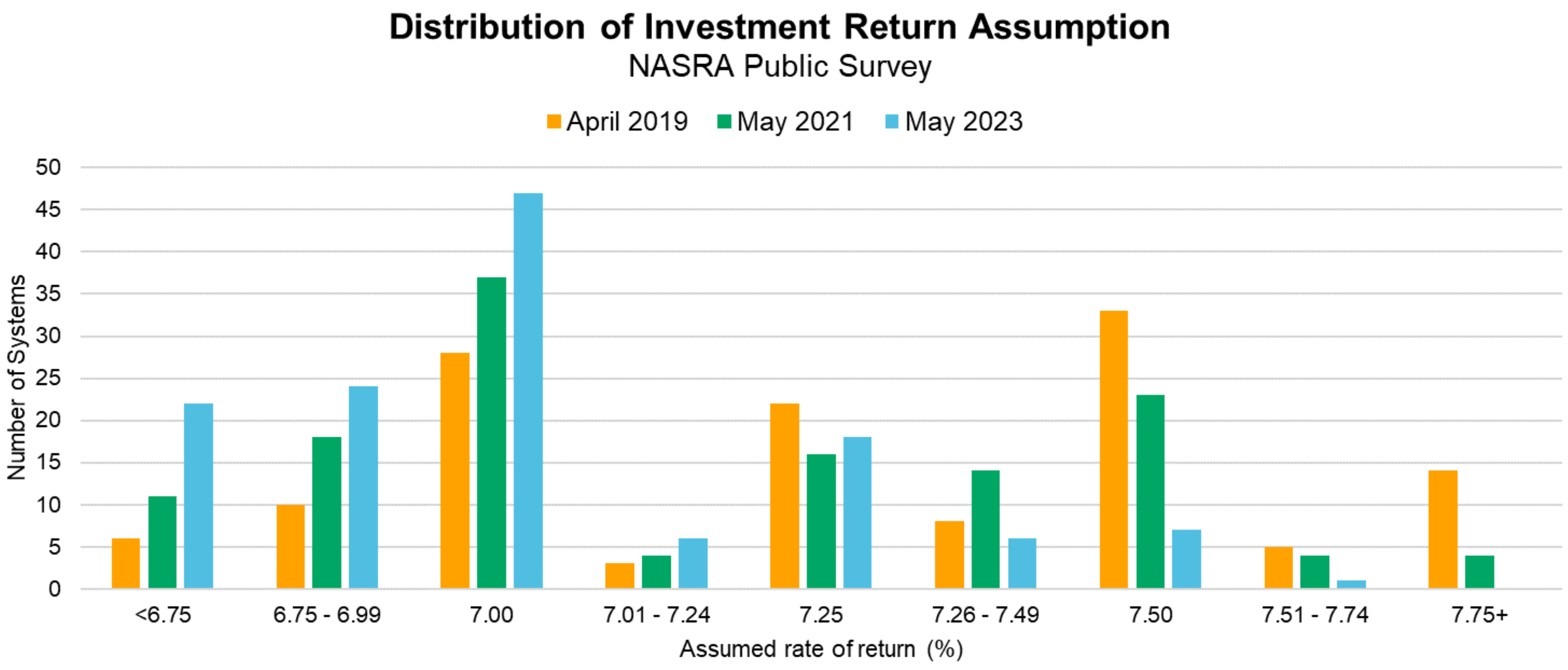
- There has been a downward trend in public plan return assumptions, with a current median assumption for large public systems of 7.00%
  - While capital market expectations have increased recently, so far large systems have not responded with increased return assumptions



Source: NASRA (May 2023)

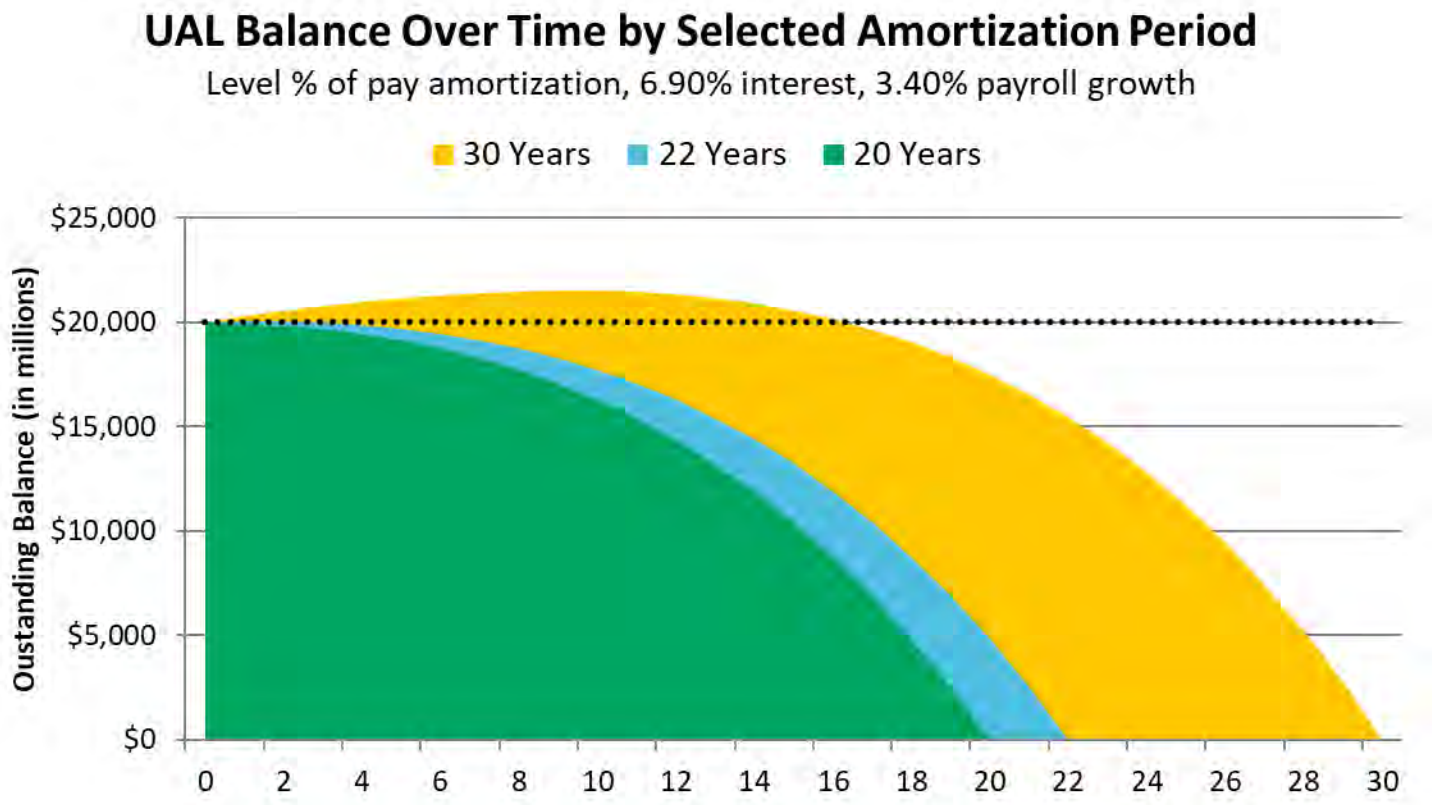
Comparison to Peer Systems

- The distribution of about 130 systems tracked by the NASRA Public Fund Survey is shown below
- Four years ago, the most common assumption was 7.50%; now the most common assumption is 7.00% and over 70% of all plans have an assumption of 7.00% or lower



Source: NASRA (May 2023)

Remaining Balances for 20-, 22-, & 30-Year Amortizations



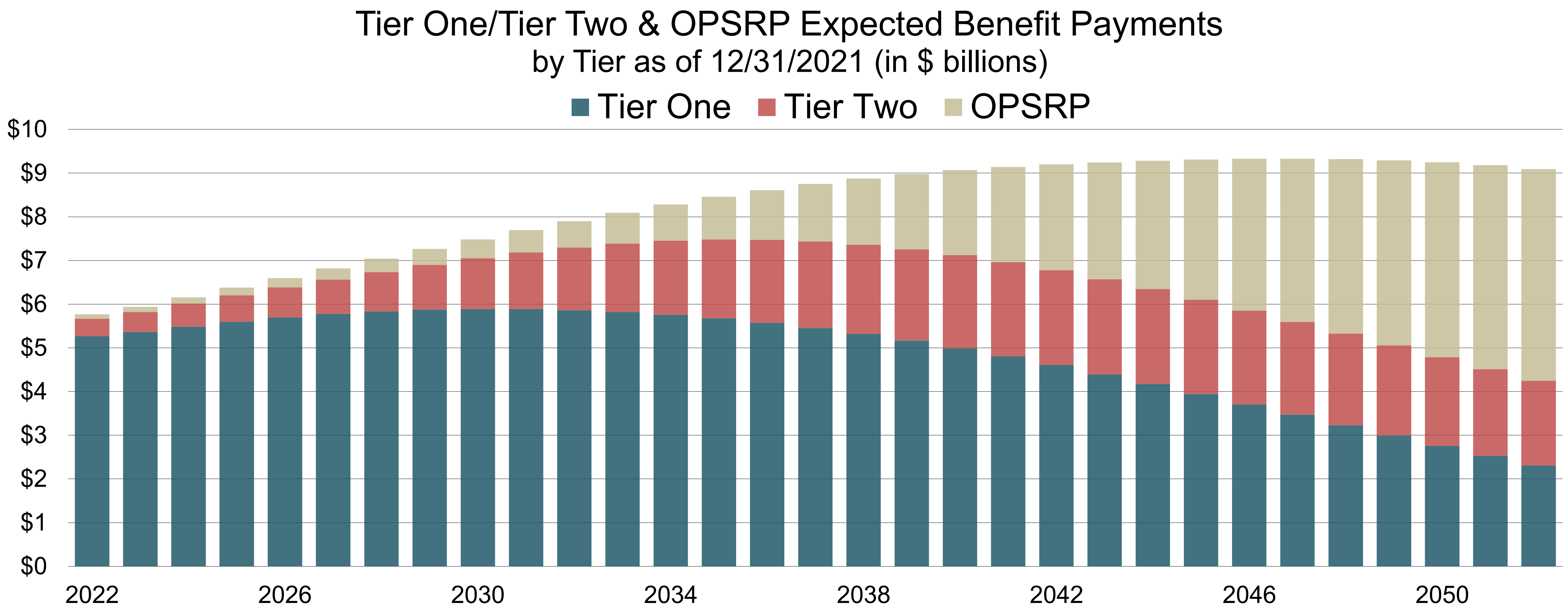
Current ongoing policy

- Tier One / Tier Two: **20 years**
- OPSRP: **16 years**

- **Why is 20 years or less a best practice?** If actual experience matches the assumption…
  - with 20 years progress is made decreasing the UAL from year 1
  - with 22 years zero progress is made in decreasing the initial UAL until year 3
  - with 30 years the UAL will increase by 8% over the first decade, and zero progress is made in decreasing the initial UAL until year 17

Projected Benefit Payments by Tier for Members as of 12/31/2021

Does Not Include Projected Benefit Payments for Anyone Joining OPSRP After 12/31/2021



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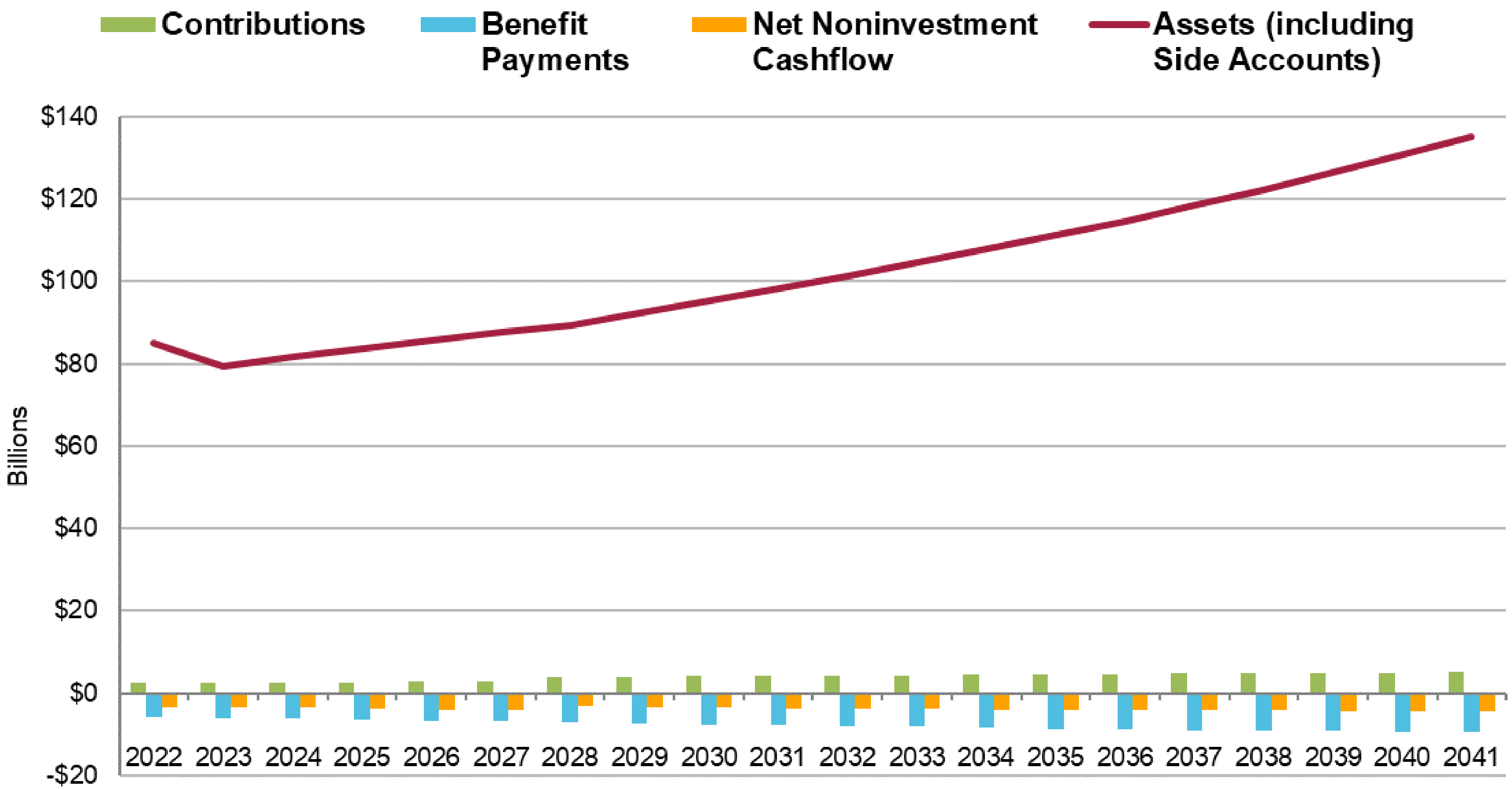
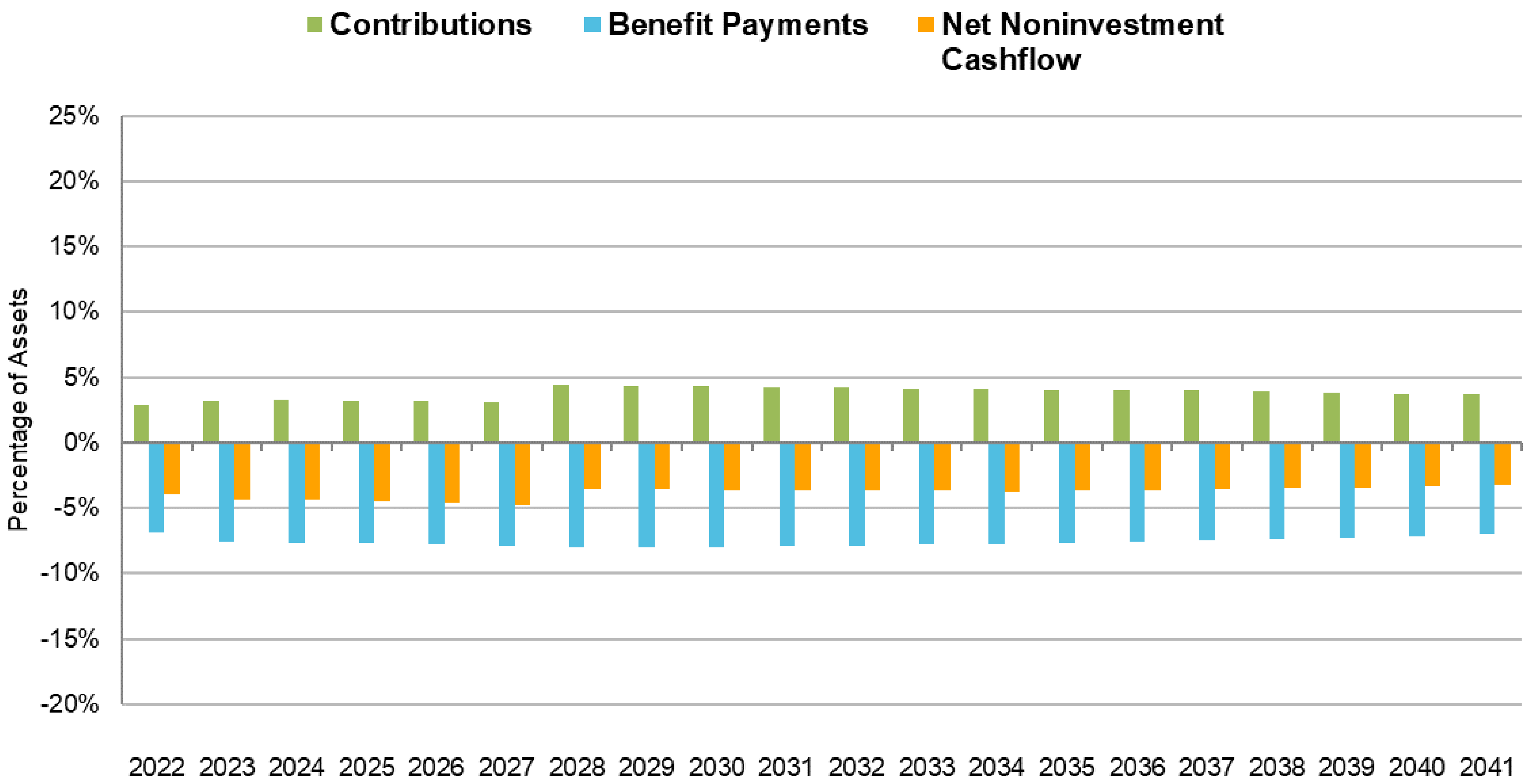
Cash Flow and Asset Balance at +6.90% Actual Future Return



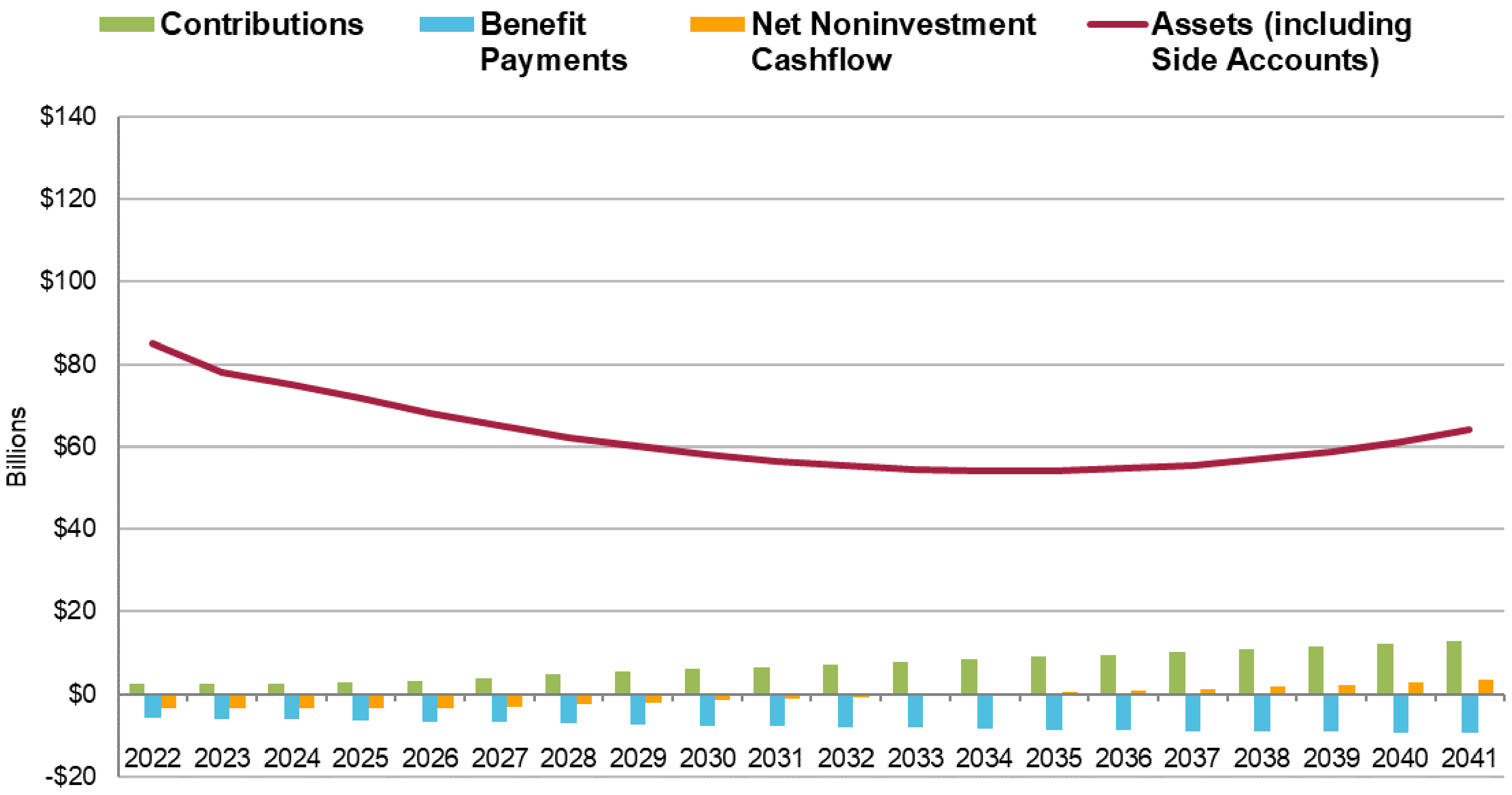
Net Noninvestment Cashflow = Contributions – Benefit Payments

Cash Flows as a % of Assets at +6.90% Actual Future Return

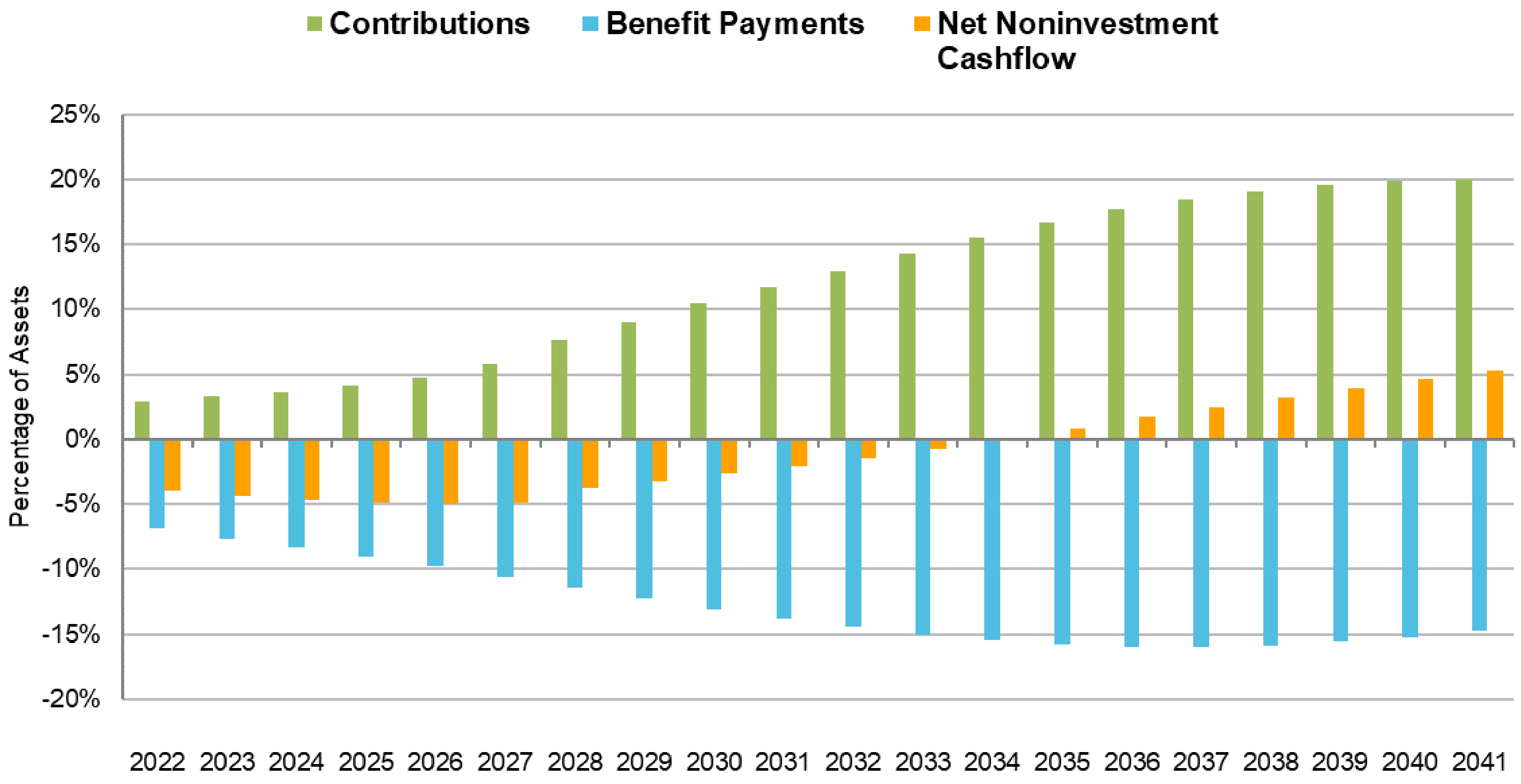


Net Noninvestment Cashflow = Contributions – Benefit Payments

Cash Flow and Asset Balance at +0.00% Actual Future Return



Cash Flows as a % of Assets at +0.00% Actual Future Return



Net Noninvestment Cashflow = Contributions – Benefit Payments

Appendix

Certification

This presentation discusses actuarial methods and assumptions for use in the valuation of the Oregon Public Employees Retirement System (“PERS” or “the System”). For the most recent complete actuarial valuation results, including cautions regarding the limitations of use of valuation calculations, please refer to our formal Actuarial Valuation Report as of December 31, 2021 (“the Valuation Report”) published on September 19, 2022. The Valuation Report, including all supporting information regarding data, assumptions, methods, and provisions, is incorporated by reference into this presentation. The statements of reliance and limitations on the use of this material is reflected in the actuarial report and still apply to this presentation. The Valuation Report, along with prior presentations to the PERS Board including our December 2022 and April 2023 presentations, should be referenced for additional detail on the data, assumptions, methods, and plan provisions underlying this presentation.

In preparing this presentation, we relied, without audit, on information (some oral and some in writing) supplied by the System’s staff as well as OIC capital market expectations as provided to us by Meketa, capital market outlook information published in 2022 by Horizon Actuarial Services, and information presented to the Oregon Investment Council. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

In assessing the Milliman capital market expectations presented in this report, per Actuarial Standards of Practice we disclose reliance upon a model developed by Milliman colleagues who are credentialed investment professionals with expertise in capital outlook modeling.

All costs, liabilities, rates of interest, and other factors for the System have been determined on the basis of actuarial assumptions and methods which in our professional opinion are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer a reasonable estimate of anticipated experience affecting the System. The valuation results were developed using models intended for valuations that use standard actuarial techniques. We have reviewed the models, including their inputs, calculations, and outputs for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice. We have incorporated other sources of economic data in assessing the reasonableness of the assumptions. Reliance on other experts is reflected in Milliman’s capital market assumptions and in Milliman’s expected return model, both of which are developed by credentialed investment consultants. We have also considered the System’s investment policy, capital market assumptions, and the expected return analysis provided by the System’s investment consultant in our assessment of the investment return assumption.

Certification

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. Our annual financially modeling presentation to the PERS Board should be referenced for additional analysis of the potential variation in future measurements.The PERS Board has the final decision regarding the appropriateness of the assumptions.

The calculations in this report have been made on a basis consistent with our understanding of the plan provisions described in the appendix of the Valuation Report. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use of the Oregon Public Employees Retirement System. Milliman does not intend to benefit or create a legal duty to any third-party recipient of its work product.

No third-party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are retirement actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the System. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board and the *Code of Professional Conduct* and *Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States* published by the American Academy of Actuaries. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Appendix
Actuarial Basis

Capital Market Assumptions - Milliman

For this purpose, we considered the Oregon PERS Fund to be allocated among the model's asset classes as shown below. This allocation is based on input provided by Meketa (OIC's primary consultant) and reflects proposed changes to the OIC's target allocation for the Oregon PERS fund adopted at the January 25, 2023 OIC meeting.

Reflects Milliman's capital market assumptions as of December 31, 2022.

	Annual Arithmetic Mean	20-Year Annualized Geometric Mean	Annual Standard Deviation	Policy Allocation
Global Equity	8.57%	7.07%	17.99%	27.500%
Private Equity	12.89%	8.83%	30.00%	25.500%
Real Estate	6.90%	5.83%	15.13%	12.250%
US Core Fixed Income	4.59%	4.50%	4.22%	25.000%
Hedge Fund – Macro	5.44%	4.83%	7.49%	5.625%
Hedge Fund – Equity Hedge	7.39%	6.48%	12.04%	0.625%
Hedge Fund – Multistrategy	6.81%	6.27%	9.04%	1.250%
Infrastructure	7.88%	6.51%	17.11%	1.500%
Master Limited Partnerships	9.41%	6.02%	27.04%	0.750%
US Inflation (CPI-U)	2.35%	2.35%	1.41%	**N/A**
Fund Total (reflecting asset class correlations)	**8.26%**	**7.50%***	**13.30%**	**100.00%**

* The model's 20-year annualized geometric median is **7.46%**.

Appendix
Actuarial Basis

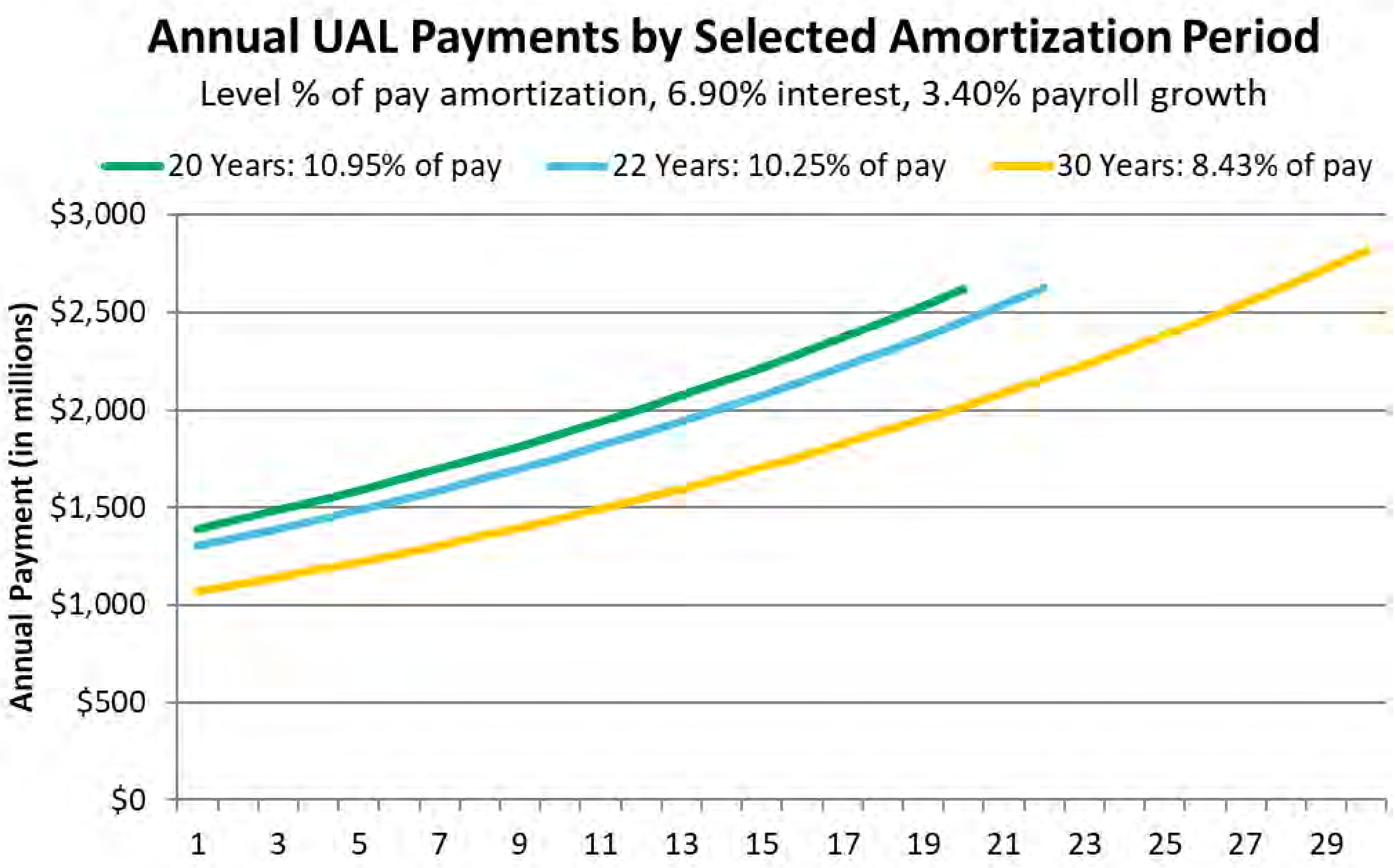
Capital Market Assumptions – Horizon Survey

For assessing the expected portfolio return under an additional set of capital market assumptions, we applied the assumptions from the 2022 Survey of Capital Market Assumptions published by Horizon Actuarial Services, LLC. According to the survey report, the 10-year return assumptions shown below represent an average of the expectations for 40 investment advisors responding to the survey.

	10-Year Annualized Geometric Mean	Annual Standard Deviation	Policy Allocation
US Equity – Large Cap	5.91%	16.33%	**12.375%**
Non-US Equity – Developed	6.54%	18.09%	**12.375%**
Non-US Equity – Emerging	7.30%	23.92%	**2.75%**
US Corporate Bonds – Core	2.63%	5.36%	**25.00%**
Real Estate	5.37%	17.00%	**12.25%**
Hedge Funds	4.81%	7.99%	**7.50%**
Infrastructure	6.39%	16.63%	**2.25%**
Private Equity	9.22%	22.13%	**25.50%**
Inflation	2.46%		**N/A**
Fund Total (reflecting asset class correlations)	**6.62%***	**11.96%**	**100.00%**

* 10-year annualized geometric median is **6.55%**.

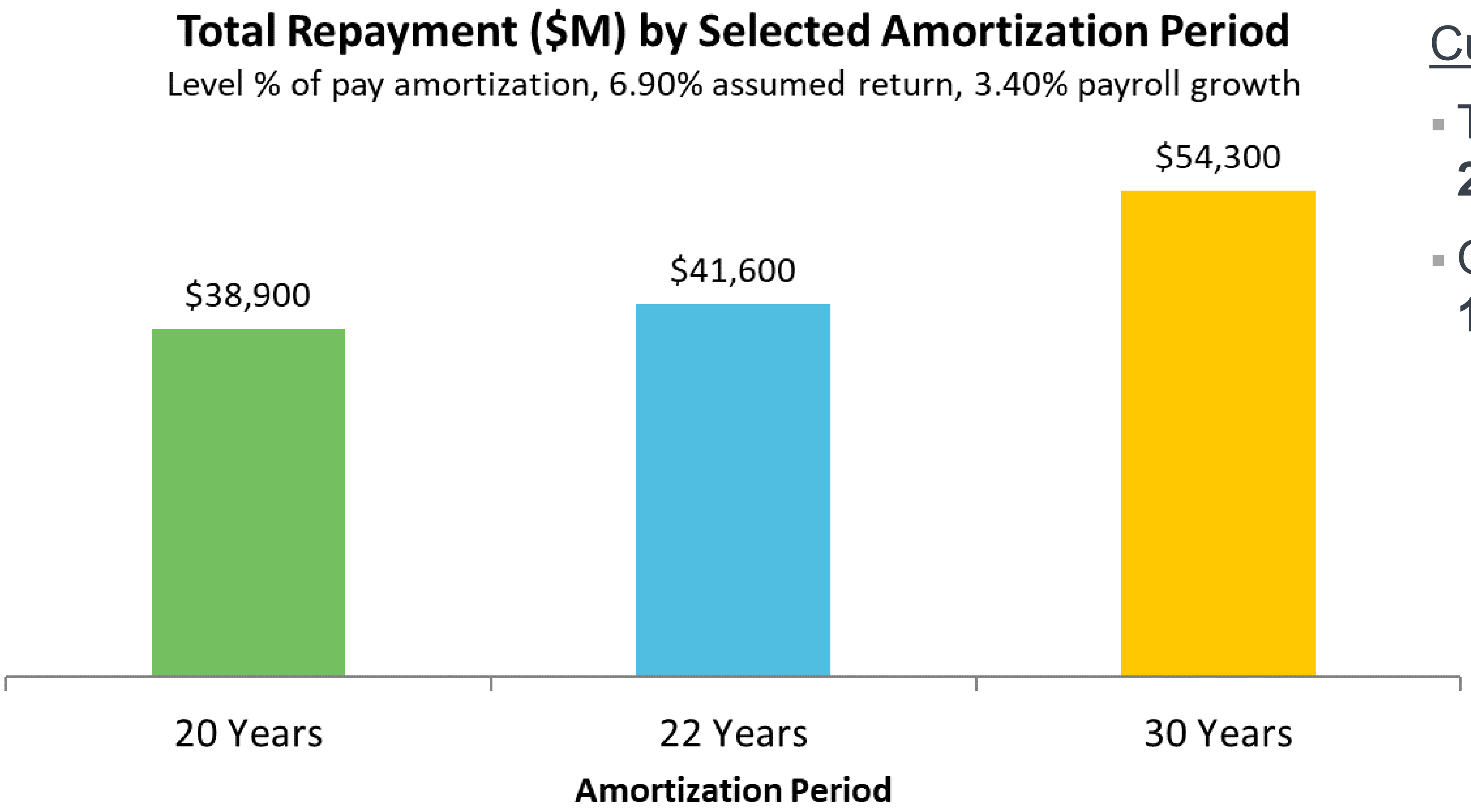
Illustration of UAL Amortization Periods



Current ongoing policy

- Tier One / Tier Two: **20 years**
- OPSRP: **16 years**

Illustration of UAL Amortization Periods



Current ongoing policy

- Tier One / Tier Two: **20 years**
- OPSRP: **16 years**

This illustrates total amortization payments for a $20.0 billion shortfall over periods of 20, 22 or 30 years

TAB 6

OPERF

PUBLIC EQUITY

May 31, 2023

OPERF Public Equity Portfolio

Manager Strategy Change & Manager Recommendation:
DFA – US All Cap Core Equity Market
BlackRock, Inc – Russell 3000 Index Fund

Louise Howard
Senior Investment Officer, Public Equity

Claire Illo
Investment Officer, Public Equity

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DFA – US All Cap Core Equity Market

Current OPERF domestic equity investment manager – proposed change to switch current mandate to the US All Cap Core Equity Market strategy – which has less tilt towards value, small size, and lower active risk.

Investment Highlights	Investment Considerations
Independent, majority employee-owned firm with significant resources and research.	Ownership is concentrated with founder.
Large investment team, with responsibilities broadly dispersed; little to no key person risk.	Low tracking error, which can limit both upside and downside. potential.
Simple, consistent quantitative investment philosophy and process.	Short track record; incepted in December 2020.
Less value-tilt; help alleviate OPERF's value bias.	Oregon would be the first client in a separately managed. account (SMA); only ETF clients currently.
Low investment management fees.	Weak and relatively opaque succession plan in place.
Long history with the Oregon; the OIC has previously approved multiple DFA mandates for OPERF and other Oregon plans.	

BlackRock Inc – Russell 3000 Index Fund

Leading index fund manager, with a long, successful track record.

Investment Highlights	Investment Considerations
Strong passive performance in the US space.	Given the large team, there has been some level of team turnover.
Long & successful track record.	Client servicing as a large organization.
Low investment management fees, especially when compared to peers.	Reliance on Aladdin; operational risk there.
Long history with Oregon & the OIC; included in other Oregon plans.	

OREGON
STATE
TREASURY

Tobias Read
Oregon State Treasurer

16290 SW Upper Boones Ferry Road
Tigard, OR 97224

oregon.gov/treasury

Dimensional Fund Advisers

Purpose

Staff and Meketa recommend transitioning the current DFA US Large Cap mandate, which is tilted towards the value style factor and is benchmarked to the Russell 1000 Index, into the DFA US All Cap Core Equity Market mandate. The new mandate would be benchmarked to the Russell 3000 Index, which is also the benchmark for the US Equity Sleeve, subject to the satisfactory negotiation of the investment management agreement and guidelines with Staff working in concert with legal counsel. This proposed investment change represents another step in achieving Staff's intended style exposure targets and reducing the active risk (tracking error) within the Domestic Equity and total Public Equity portfolio.

Background

In December 2022, Staff proposed a path forward for the Public Equity Portfolio, which was supported by both Aon and Meketa. The goal was to reduce the portfolio's style factor exposure – namely value, small size, and low volatility relative to the policy benchmark and emphasize high conviction, active managers. Active risk decomposition demonstrated that OPERF's style factors were the primary drivers of active risk, while the contribution from stock selection was a much smaller contribution. Staff demonstrated that implementing the proposed transition would materially impact the portfolio's active risk decomposition with the main drivers of active risk shifting to stock selection and while reducing the outsized contribution attributed to style factors. Moreover, balancing the contributions of stock selection and style factors would reduce the portfolio's ex-ante active risk on a proforma basis.

Founded in 1981, DFA is a private limited partnership owned primarily by its founders, employees, and company directors. The firm is headquartered in Austin, Texas, employs over 1,500 people firm-wide and maintains regional investment offices around the world. As of December 31, 2022, DFA reported $584 billion in assets under management (AUM) in a variety of equity, fixed income, and target date fund products. DFA launched its first public equity strategies in the early 1980s with US Micro-Cap and then US Small Cap. They expanded into fixed income later in the decade before opening their first international (World ex-US) portfolio in 1991. Following that release, DFA launched their first value-oriented strategies in both US and International markets, as well as a dedicated Real Estate (REIT) portfolio. It was then in 2002 when they launched their All-Cap Core product, which has since become their largest strategy at over $77B in AUM. DFA also maintains strong ties to the academic community. For example, University of Chicago Nobel Laureate Eugene Fama, Dartmouth's Kenneth French, and Wharton's Donald Keim all serve as consultants and provide on-going research in support of current and proposed DFA investment strategies.

Discussion/Investment Considerations

DFA, a pioneer in smart beta investing, built its business creating equity investment products for clients that emphasize size, value, and profitability as common factors. OPERF's current DFA US Large Cap strategy, a core mandate augmented to significantly increase the value factor exposure, emphasizes higher expected return securities with lower relative prices, higher profitability, and lower market capitalizations, as compared to the market (Russell 1000 benchmark). The proposed DFA US All Cap Core Equity Market strategy also seeks to overweight factors such as value, profitability, and size. DFA offers several off the shelf US All Cap Core strategies with different tracking error ranges since 2002. Given Staff's desire to track more closely to the US equity sleeve benchmark (Russell 3000 Index), the strategy suggestion from DFA was to seed a newer strategy as a separate account vehicle, currently managed in ETF form.

The DFA US All Cap Core Equity Market strategy invests in companies across all US market caps and offers broader diversification across sectors and securities. With this diversification comes the potential spread of higher expected returns across the broad US equity market, rather than US Large Cap under the current construct. The proposed portfolio's increased exposure to smaller capitalization, lower relative price, and higher profitability companies would be achieved by decreasing the allocation of the proposed portfolio's assets to larger capitalization companies relative to their weight in the U.S. universe.

DFA's investment philosophy is based on academic research, which suggests that small companies (measured by market cap), value stocks (measured by book/market price ratios) and highly profitable companies, provide greater expected returns relative to large companies, growth stocks, and low profitability companies, respectively. Contemporary academic research now supports the premise that all three of these common factors (namely size, value, and profitability) command persistent and statistically significant return premia over time.

Attributes:

- *Significant resources & research.* DFA is a large, independent, majority employee-owned firm with significant resources and research and close ties to the academic community. The firm had close to $600 billion in assets at the end of 2022. They have a long history in value investing, which they started in the 1980s with some of the first micro and small cap US public equity products. Staff views the size and independency of the firm as a positive, especially for a quant firm. When it comes to quantitative firms, it's generally a good idea to be a larger firm, thus, more resources dedicated to research and process improvement.
- *Large, experienced investment team.* DFA does not follow the classic PM and analyst type structure. The key decision-makers instead sit on either the Investment Research Committee (which focus on long-term strategy enhancements) or the Investment Committee (which focuses on strategy implementation and daily oversight). The responsibilities are spread out between teams, and because of this, there is minimal key person risk.
- *Consistent and simple investment process.* DFA follows the same process and philosophy across their public equity products. The dimensions of size, relative price, and profitability is backed by sound academic research and have shown to add value to their client portfolios over time.
- *Less Value tilt.* This portfolio will have less value-tilt than the legacy portfolio, which will help alleviate OPERF's value bias. This product tracks closer to the index, so there are less value names in general.
- *Low investment management fees.* Staff negotiated to retain the same fee as the legacy Large Cap portfolio, which ranks in the top quartile for the eVestment US All Cap peer universe.

Concerns:

- *Ownership concentration.* DFA has over 70% employee ownership, but it should be noted that a good majority of that is held by the founder, David Booth. DFA does not disclose the exact percentage of his ownership, but is suspected to be a large amount, so in reality, employee ownership could be rather limited. Transparency around ownership in general is limited.
- *Short track record.* Another concern is the short track record of only 2 years. However, this is slightly mitigated since this product is another flavor of DFA's flagship US All Cap product, which has been around for over 20 years and is arguably one of their most successful products to date. With the short track record, it would also mean that Oregon would be the first client in its separately managed account, as there are only ETF clients currently.

Terms

Legal negotiations are not final, but Staff views the proposed Investment Management Agreement terms and guidelines for DFA to be reasonable.

Conclusion

The recommendation to transition the current DFA US Large mandate into the DFA US All Cap Core Equity Market mandate has been reviewed and approved by the Capital Markets Leadership (CML) Committee prior to this memorandum. Staff believes that this updated DFA mandate will serve as an active anchor manager in the domestic equity sleeve of the Public Equity portfolio, as the Portfolio is shifted to a more neutral positioning versus the policy benchmark.

BlackRock, Inc.

Purpose

Staff and Meketa recommend an initial investment up to $1 billion in the BlackRock Russell 3000 Index Fund for the Oregon Public Employees Retirement Fund (OPERF) Public Equity Portfolio, subject to the satisfactory negotiation of the investment management agreement and guidelines with Staff working in concert with legal counsel. This proposed investment would provide the Public Equity portfolio with broad US market exposure, low investment management fees, a reduction in the portfolio's ex-ante tracking error, and serve as an additional liquidity lever.

Background

In December 2022, Staff proposed a path forward for the Public Equity Portfolio, which was supported by both Aon and Meketa. The goal was to reduce the portfolio's style factor exposure – namely value, small size, and low volatility, and reduce the ex-ante tracking error of the portfolio, which had risen above its budget of 200 basis points. Staff demonstrated that implementing the proposed transition would materially impact the portfolio's active risk decomposition with the main drivers of active risk shifting to stock selection and while reducing the outsized contribution attributed to style factors. Moreover, balancing the contributions of stock selection and style factors would reduce the portfolio's ex-ante active risk on a proforma basis.

BlackRock was founded in 1988 and is a publicly traded financial services firm. With $9.1 trillion in assets under management (AUM) as of March 31, 2023, making it the largest investment management provider by AUM in the world. Other BlackRock businesses include brokerage services and analytic/risk management services, such as Aladdin (which Oregon State Treasury uses). Much of BlackRock's AUM is comprised of its passive strategies, which includes multiple asset classes and many different vehicles, such as separately managed accounts, mutual funds, pooled funds, and ETFs.

Discussion/Investment Considerations

The BlackRock Russell 3000 Index Fund is an index fund that invests in the 3,000 largest capitalized public companies within the U.S. market. BlackRock's indexing philosophy is focused on tracking error. The ETF and Equity Indexing Team ("EII Team"), the team responsible for this strategy, aims to deliver a market return while minimizing tracking error subject to transaction costs.

This specific strategy employs an optimization approach to replicating the index. The optimization process is based on a risk model, with the goal of creating a portfolio that has risk characteristics similar to that of the benchmark (the Russell 3000 Index). By assessing a security's risk characteristics – including volatility, size, and industry membership – the optimization process allows the team to systematically trade off the risk of any potential mis weights relative to the cost of acquiring that position. The EII Team uses BlackRock Fundamental Risk for Equity (BFRE) models, which are used for risk estimation, as well as portfolio construction and optimization. These models use company fundamentals, technical factors as well as historical market data, to describe the risk profile of equity assets and portfolios. Lastly, the Russell 3000 Equity Index Fund is monitored monthly by an Investment Review Committee ("IRC"). This committee formally reviews the portfolio performance and its attribution.

The team that oversees this strategy - the EII Team – is comprised of 70 portfolio engineers, with support from 15 research staff and 39 more generalized research officers. In addition to these investment resources, the team is supported by several platform engineers who focus on implementation issues. The EII Team also works closely with the independent Risk & Quantitative Analysis Group (RQA) to ensure portfolio risks are consistent across mandates and client's risk guidelines.

Attributes:

- *Passive vs. Active.* The addition of a passive all-cap equity mandate is potentially additive to the total Domestic Equity portfolio performance. Given the efficiency of US markets, passive management within US markets has outperformed active management over the long-term.
- *Liquidity.* The public equity team is responsible for regular cash raises (for pension payments, capital calls, and private/alternative asset class fundings) and periodic rebalances. This passive mandate would provide an ideal source of liquidity for these events.
- *Track record.* BlackRock is one of the largest index fund providers in the world, with a proven, long-term track record. The Russell 3000 Equity Index Fund has slightly outperformed its respective index over all trailing time periods, as of December 31, 2022. Additionally, tracking error against the index remains consistently low at 2 basis points over rolling 5-year periods.
- *Low fees.* The Russell 3000 Equity Index Fund will cost OPERF 1.25 basis points, ranking the strategy in the first percentile when compared to its eVestment peer universe of similar mandate sizes.
- *Team and Resources*. The index investment organization within BlackRock—understandably, given the amount of assets it manages—is one of the largest in the index investment business. Furthermore, the index organization receives ample firm resources.
- *Current Relationship.* The Oregon Investment Council (OIC) is quite familiar with BlackRock, as they have previously approved multiple BlackRock mandates within OPERF and other plans, such as the Common School Fund and Oregon Savings Growth Plan. Additionally, OST uses Aladdin, BlackRock's portfolio management software, for internal trading and risk analytics.

Concerns:

- *Team turnover.* Given the large team, there has been some level of turnover of portfolio managers and researchers, more so than boutique investment firms that the Public Equity team is familiar with, but not necessarily more than other large competing firms. The turnover has not been material to date, but just something to be mindful of.

Conclusion

The recommendation to initially invest up to $1 billion in BlackRock's Russell 3000 Index strategy have been reviewed and approved by the Capital Markets Leadership (CML) Committee prior to this memorandum. BlackRock will serve as an additional implementation of passive core exposure in the Domestic Equity sleeve of the Public Equity portfolio in addition to OPERFs internally managed passive portfolios. In addition to providing market exposure, Staff may draw upon the portfolio as a liquidity source as needed.

OIC

OREGON STATE TREASURY

TAB 7

OSGP

May 31, 2023

Oregon Savings Growth Plan

International Stock Option Recommendation

Claire Illo
Investment Officer, Public Equity
Louise Howard
Senior Investment Officer, Public Equity
Kenny Bao
Investment Analyst, Public Equity

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International Stock Option Recommendations

Staff and Callan recommend approval of two investment option changes:

1) Add Walter Scott EAFE Strategy and Acadian ACWI ex US Value Strategy to and remove AQR International, Lazard International, and DFA International Core from the International Stock Option.
    - Further alignment with OPERF Public Equity Portfolio and the MSCI ACWI ex-US Index
    - Reduces tracking error
    - Comparable fees

1) Add BlackRock ACWI ex US Index Fund as a standalone "Passive International Stock Option" within the plan.

OREGON STATE TREASURY

Acadian ACWI ex. US Value Strategy

Acadian Overview	
Firm Name	Acadian Asset Management
Product Name	ACWI ex. US Value Equity
Product Benchmark	MSCI ACWI ex-US Value Index
Investment Approach	Quantitative
Strategy Inception Date	July 1, 2003
CIT Inception Date	Feb 8, 2021
Equity Capitalization	All-Cap
Style Emphasis	Value
Assets Under Management (AUM)	Firm: $97.5B ACWI ex US Value: $1.3B
Product Status	Open to new investors
Team (PMs/Analysts)	Team Approach; 103 team members
Headquarters	Boston, MA
Firm Headcount	387
Stated Fee	0.55%

Performance	QTD	1 Year	2022	2021	Since Inception
Acadian ACWI ex US Value CIT	3.3	-7.4	-9.6	14.1	3.0
MSCI ACWI ex US Value Index	5.2	-4.0	-10.1	13.6	1.2
Difference	-1.9	-3.4	0.5	0.5	1.8

OREGON STATE TREASURY

Source: eVestment & Acadian. Overview data and CIT performance data as March 31, 2023.

Walter Scott EAFE Strategy

Walter Scott Overview	
Firm Name	Walter Scott & Partners
Product Name	Walter Scott EAFE Strategy
Product Benchmark	MSCI EAFE
Investment Approach	Fundamental
Strategy Inception Date	June 30, 1985
CIT Inception Date	May 5, 2019
Equity Capitalization	All-Cap
Style Emphasis	Growth at a Reasonable Price (GARP)
Assets Under Management (AUM)	Firm: $79.3B EAFE Strategy: $29.4B
Product Status	Open to new investors
Team (PMs/Analysts)	Team Approach; 21 team members
Headquarters	Edinburgh, Scotland
Firm Headcount	173
Stated Fee	0.48%

Performance	QTD	1 Year	3 Years	2022	2021	2020	Since Inception
Walter Scott EAFE CIT	12.1	-0.1	11.3	-21.1	12.2	20.5	8.9
MSCI EAFE Index	8.5	-1.4	13.0	-14.5	11.3	7.8	6.3
Difference	3.6	1.2	-1.7	-6.7	0.9	12.6	2.6

Source: eVestment & Walter Scott. Overview data and CIT performance data as March 31, 2023.

BlackRock ACWI ex. US Index Fund

BlackRock Overview	
Firm Name	BlackRock Inc.
Product Name	BlackRock MSCI ACWI Ex-US Index Fund
Product Benchmark	MSCI ACWI Ex-US Index
Investment Approach	Passive
Strategy Inception Date	December 15, 2003
Equity Capitalization	Large-Cap
Style Emphasis	Core
Assets Under Management (AUM)	Firm: $9,090B ACWI ex US Index Fund: $14.2B
Product Status	Open to new investors
Team (PMs/Analysts)	EII Team Approach
Headquarters	New York, NY
Firm Headcount	19,451
Stated Fee	0.06%

Performance	QTD	1 Year	3 Years	5 Years	10 Years	Since Inception
BlackRock MSCI ACWI ex US Index Fund	7.1	-3.7	12.2	2.7	4.5	6.0
MSCI ACWI ex US	6.9	-5.1	11.8	2.5	4.2	5.7
Difference	0.2	1.4	0.4	0.2	0.3	0.3

OREGON STATE TREASURY

Source: eVestment & BlackRock. Overview data and performance data as March 31, 2023.

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Oregon State Treasurer

Michael Kaplan
Deputy State Treasurer

Purpose

Staff and Callan recommend adding the Acadian ACWI ex US Value Strategy and Walter Scott EAFE Strategy to the OSGP International Stock Option and remove AQR International, Lazard International, and DFA International Core from the Plan. Staff and Callan also recommend adding an "International Passive Stock Option" to the plan and utilize BlackRock ACWI ex US Index Fund as the investment manager within the option.

Background

The Oregon Savings Growth Plan (the "Plan" or "OSGP") is the State of Oregon's 457 Deferred Compensation plan. OSGP is a voluntary, supplemental retirement plan that provides eligible state and local government employees the opportunity to defer a portion of their current salary on a pre-tax or after-tax (Roth) basis. These deferrals are invested in various investment options until participants draw funds at retirement. The Plan offers an array of equity and fixed income investment options, a suite of target-date retirement funds, which in aggregate, constitute a single investment option, and a self-directed brokerage option. As of March 31, 2023, plan assets totaled $3.07 billion from over 37,774 participants.

With support and assistance from the Oregon State Treasury (OST) Investment Division, the Oregon Investment Council (OIC) is responsible for oversight of the Plan's investment program. Oversight of Plan administration is the responsibility of the Oregon Public Employees Retirement System Board ("PERS Board"), with support from OSGP staff. Additional oversight is provided by a seven-member Deferred Compensation Advisory Committee (the "Advisory Committee") established under ORS 243.505.

Discussion/Investment Considerations

Staff is currently implementing a strategic restructuring of the Oregon Public Employees Retirement Fund (OPERF) Public Equity portfolio, as the prescriptive language previously requiring strategic overweight allocations to both the value factor and small size factor have been removed from Public Equity investment policy. Due to this prior policy reference, the OPERF Public Equity portfolio has had long-term, intentional overweights to these factors. Additionally, Staff is implementing this restructuring to reduce the active risk (tracking error) of the portfolio and reduce the outsized exposures of certain investment managers. This process includes rebalancing assets, terminations, and new manager funding.

As a result of this restructuring, in the first quarter of 2023, Staff terminated Lazard International Equity, AQR International Equity, DFA International Small Cap and International Micro-Cap mandates from the

OPERF Public Equity Portfolio, due to their desire to further lower the value and small size tilt in the portfolio. As part of the repositioning, Staff also intend to add passive components (index funds) to each of the Public Equity portfolio composites (US, International, Global, and Emerging Markets), which will serve as liquidity sources during periodic cash raises (for pension payments) and help reduce portfolio active risk even further.

The Oregon Savings Growth Plan is comprised of high conviction managers that are typically also included within OPERF. When Staff recommend changes in OPERF, any changes should also be reflected in the OSGP, wherever appropriate. OSGP's International Stock Option is currently comprised of five underlying funds: AQR International Equity (25% of option), Arrowstreet ACWI ex-US Equity (25%), DFA Emerging Markets Core Equity (10%), DFA International Core Equity (15%), and Lazard International Equity (25%). In an effort to more closely align the managers with those in OPERF, Staff recommends removing AQR International Equity (25% of option), DFA International Core Equity (15%), and Lazard International Equity (25%), and include Walter Scott EAFE Strategy and Acadian ACWI ex-US Value Equity instead.

Walter Scott is a fundamental investment manager based out of Edinburgh, Scotland. The firm wide philosophy is centered on the belief that companies with sustainable wealth generation, as defined by 1) cash return on capital employed, 2) return on equity, and 3) growth in earnings per share, will outperform over the long-term. The 21-person investment team of regional experts identifies these opportunities through in-house, bottom-up research. Walter Scott seeks high-quality and competitively positioned companies that generate strong cash flows and are led by prudent management teams. The International Equity portfolio typically holds 40 to 60 stocks with opportunistic exposure to emerging markets and has a strong growth bias. The consistently applied process is reflected in the strategy's strong longer-term investment performance. Since inception (May 2019), the CIT strategy has added 259 basis points of outperformance as of March 31, 2023.

Acadian is a quantitative investment manager based out of Boston, Massachusetts. The firm is a pioneer in systematic investment strategies, specializing in the active management of global and international equity strategies. It operates with a fundamental belief that there are market inefficiencies and a systematic process is best suited to benefit from these inefficiencies. Acadian's investment strategy employs a systematic, multi-factor approach to establish alpha return forecasts for a global universe of public equity securities. The multi-factor approach combines stock-specific fundamental factors (value, growth, quality), top-down macro forecasts (country and regional), and peer-relative forecasts. The goal is to identify stocks that exhibit favorable characteristics and have greater upside potential. Acadian employs a team-based approach to portfolio management. The equity portfolio management and implementation teams include 58 investment professionals. These teams are responsible for the application of the investment strategies, portfolio optimization, trading, and risk management. Since inception (February 2021), the CIT strategy has added 180 basis points of outperformance as of March 31, 2023.

Staff recommends adding BlackRock ACWI ex US Index Fund as a standalone "Passive International Stock Option" within the plan. BlackRock is the current Investment Manager for the other passive options in the plan – BlackRock US Debt Index, BlackRock Russell 1000 Value Index, BlackRock Russell 1000 Growth Index, BlackRock Russell 3000 Index, BlackRock S&P 600 Index, as well as the BlackRock LifePath Funds.

Issues to Consider

<u>Attributes:</u>

- *Alignment with OPERF Public Equity Portfolio and MSCI ACWI ex US Index.* The removal of AQR, Lazard, and DFA International, which are all considered to be value-tilted managers within the International Stock Option, would better align OSGP's manager lineup with OPERF's current lineup. The addition of Walter Scott and Acadian, a growth and value manager, respectively, would bring down OSGP's value exposure and allow the plan to align with OPERF's style-neutral goals more closely. The revised composition of this option would also bring the total style exposures, regional exposures, and characteristics to resemble more closely that of the option's benchmark, the MSCI ACWI ex US index, as shown in Callan's analysis.
- *Reduction in tracking error.* Given that the option will look more similar to the benchmark, the predicted tracking error of the active International Equity Stock Option will decrease as well. This aligns with OPERF's goals of reducing tracking error. The 3-year tracking error as of December 31, 2022, for the current option was 2.7%, while the 3-year tracking error for the proposed option was 1.4%.
- *Comparable Fees.* As of March 31, 2023, the total weighted average fee for the International Stock option was 51.5 basis points. Walter Scott's proposed fee of 45 basis points and Acadian's proposed fee of 55 basis points would bring the total weighted average fee to 55.5 basis points, a marginal increase.
- *Passive International Stock Option.* Adding a passive non-U.S. equity fund would provide participants additional choice and allow them to select between low-cost, passive non-U.S. exposure or the potential for alpha via the active multi-manager implementation. The addition of a passive non-U.S. equity fund would also lead to a more balanced set of U.S. equity and non-U.S. equity options (currently 5 U.S. equity options compared to 1 non-U.S. equity option). Moreover, the multi-manager non-U.S. equity fund is the Plan's only multi-manager option that does not have an underlying passive component. BlackRock would charge 6 basis points for the ACWI ex US index fund.

Concerns:

- *Adding one more option.* Pending OIC approval, the creation of the Passive International Stock Option would increase the total number of options to 11 (excluding the BlackRock LifePath funds). The addition of another international equity option could potentially confuse participants, especially those who are not familiar with active versus passive management. However, one mitigant of this is the fact that the number of options that OSGP offers to participants is still below the average of the DC Plan Index (14).

Conclusion

Staff and Callan recommend adding the Acadian ACWI ex US Value Strategy and Walter Scott EAFE Strategy to the OSGP International Stock Option and remove AQR International, Lazard International, and DFA International Core from the Plan. Staff and Callan also recommend adding an "International Passive Stock Option" to the plan and utilize BlackRock ACWI ex US Index Fund as the investment manager within the option.

Callan

May 31, 2023

OSGP International Stock Option Structure Review

Anne Heaphy
Plan Sponsor Consulting

Uvan Tseng, CFA
Plan Sponsor Consulting

International Stock Option Structure Review

Summary

Oregon State Treasury Staff requested that Callan review the structure of the Oregon Savings Growth Plan (OSGP) International Stock Option, given the manager changes being made to the Public Equity portfolio in the Oregon Public Employees' Retirement Fund (OPERF).

In line with the changes being made in OPERF, Callan was asked to look at structure alternatives that would remove allocations to AQR and Lazard, replacing those allocations with ones to Acadian and Walter Scott, both of which are currently in the OPERF Public Equity portfolio; as well as reducing the overall exposure to DFA.

Callan modeled various structure alternatives, and in discussions with Staff, came up with the following recommendation that achieves the desired goals of making the manager changes as well as reducing the style, cap, and regional weighting biases of the existing structure.

Current Structure		Recommended Structure	
25.0%	AQR International Equity	31.5%	Acadian ACWI ex-US Value
25.0%	Arrowstreet ACWI ex-US	31.5%	Walter Scott International Stock (EAFE)
25.0%	Lazard ACWI ex-US	25.0%	Arrowstreet ACWI ex-US
15.0%	DFA International Core	12.0%	DFA Emerging Markets Core
10.0%	DFA Emerging Markets Core		

Additionally, it is recommended to add a passive international option given the fact that the International Stock Option has no passive component (which is different from the other active options). A passively managed fund benchmarked to the MSCI ACWI ex-US (which covers approximately 85% of the international market) would align the passive and active options.

International Stock Option Structure Alternatives

Annualized Returns as of March 31, 2023

Net of Fee Returns for Periods Ended March 31, 2023

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
International Stock Option	7.20	(2.91)	14.99	3.08	6.27	5.05	3.31
Structure 1 - All Active (1/3 - Acad/Arrow/WS)	7.19	(4.17)	15.44	5.65	8.90	6.85	5.29
Structure 2 - Add Passive (1/4 - Acad/Arrow/BR/WS)	6.39	(5.85)	13.42	3.94	7.86	5.60	4.37
Structure 3 - Add DFA-12% (29%- Acad/Arrow/WS)	7.01	(4.67)	15.26	5.05	8.57	6.39	5.05
Structure 3a-DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%	7.06	(4.81)	15.00	4.99	8.52	6.32	4.98
MSCI ACWI ex-US Index	6.87	(5.07)	11.80	2.47	5.86	4.17	2.62

The following structures were evaluated:

- Structure 1 (All Active): 33.3% Acadian, 33.4% Arrowstreet, and 33.3% Walter Scott
- Structure 2 (Active/Passive): 25% Acadian, 25% Arrowstreet, 25% Walter Scott and 25% BlackRock Emerging Markets Index
- Structure 3 (All Active – add DFA): 29% Acadian, 29% Arrowstreet, 29% Walter Scott and 12% DFA
- Structure 3a (All Active – add DFA): 31.5% Acadian, 31.5% Walter Scott, 25% Arrowstreet, and 12% DFA

Structure 3a:

- Arrowstreet recently notified clients that capacity for its ACWI ex-US strategy is temporarily closed. As a result, the allocation to their strategy could not be increased from the current target of 25% to the proposed target of 29% in Structure 3.
- Arrowstreet's target allocation will remain at 25%. Acadian and Walter Scott's allocations are increased by 2% each. When the strategy re-opens, we will re-evaluate the weightings of the managers.

Structure 1 = Acadian composite, Arrowstreet composite, WalterScott composite
Structure 2 = Acadian composite, Arrowstreet composite, WalterScott composite, BlackRock Emerging Markets Index CIT Fund B Non-Lending (used 0.10% expense ratio to calculate net of fee returns)
Structure 3/3a = Acadian composite, Arrowstreet composite, WalterScott composite, DFA Emerging Markets Core Equity Fund

International Stock Option Structure Alternatives

Return Based Statistics for 10 Years Ended March 31, 2023

Statistics for 10 Years Ended March 31, 2023

	Alpha	Beta	Down Market Capture	Up Market Capture	Information Ratio	Sharpe Ratio	Standard Deviation	Tracking Error
International Stock Option	0.80	1.04	98.79	108.24	0.41	0.25	17.03	2.01
Structure 1 - All Active (1/3 - Acad/Arrow/WS)	2.63	0.99	92.63	117.23	1.66	0.37	16.20	1.57
Structure 2 - Add Passive (1/4 - Acad/Arrow/BR/WS)	1.39	1.00	96.56	109.93	0.77	0.29	16.42	1.77
Structure 3 - Add DFA-12% (29%- Acad/Arrow/WS)	2.16	1.00	94.33	115.09	1.38	0.34	16.38	1.54
Structure 3a-DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%	2.10	0.99	94.35	114.20	1.32	0.33	16.31	1.58
MSCI ACWI ex-US Index							16.33	

Structure 1 = Acadian composite, Arrowstreet composite, WalterScott composite
Structure 2 = Acadian composite, Arrowstreet composite, WalterScott composite, BlackRock Emerging Markets Index CIT Fund B Non-Lending (used 0.10% expense ratio to calculate net of fee returns)
Structure 3/3a = Acadian composite, Arrowstreet composite, WalterScott composite, DFA Emerging Markets Core Equity Fund

Active International Stock Option Style and Regional Exposure

Style Exposure Matrix
Holdings as of March 31, 2023

	Value	Core	Growth	Total
Europe	16.9% (722) 12.4% (157)	11.3% (654) 11.0% (127)	12.8% (547) 17.4% (153)	41.0% (1923) 40.8% (437)
N. America	2.1% (133) 2.5% (28)	1.7% (139) 2.7% (24)	1.0% (96) 2.5% (35)	4.7% (368) 7.7% (87)
Pacific	9.9% (1263) 8.6% (137)	5.5% (828) 6.3% (99)	5.7% (755) 8.1% (120)	21.2% (2846) 23.0% (356)
Emerging	16.2% (2480) 7.5% (419)	8.9% (2271) 9.6% (410)	8.0% (1510) 11.4% (472)	33.1% (6261) 28.5% (1301)
Total	45.1% (4598) 31.0% (741)	27.4% (3892) 29.6% (660)	27.5% (2908) 39.4% (780)	100.0% (11398 100.0% (2181)

-- OSGP Current International Option
-- MSCI ACWI ex-US Index

Style Exposure Matrix
Holdings as of March 31, 2023

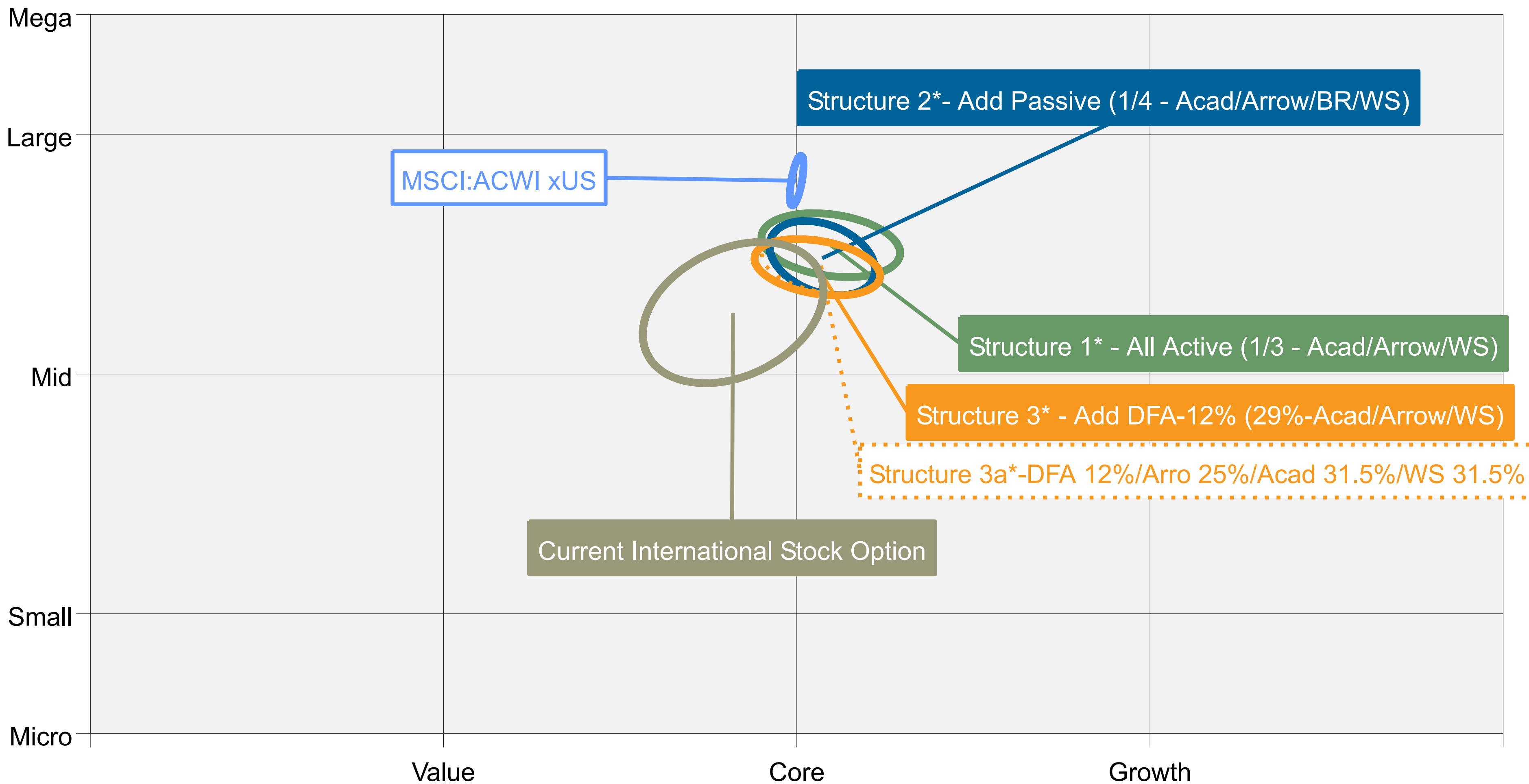
	Value	Core	Growth	Total
Europe	11.0% 12.4% (157)	9.8% 11.0% (127)	21.0% 17.4% (153)	41.8% 40.8% (437)
N. America	1.7% 2.5% (28)	1.8% 2.7% (24)	3.1% 2.5% (35)	6.5% 7.7% (87)
Pacific	9.7% 8.6% (137)	5.1% 6.3% (99)	9.0% 8.1% (120)	23.8% 23.0% (356)
Emerging	15.2% 7.5% (419)	7.0% 9.6% (410)	5.7% 11.4% (472)	28.0% 28.5% (1301)
Total	37.5% 31.0% (741)	23.6% 29.6% (660)	38.9% 39.4% (780)	100.0% 100.0% (2181)

-- Structure 3a – DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%
-- MSCI ACWI ex-US Index

Structure 3a reduces the value and emerging markets overweights.

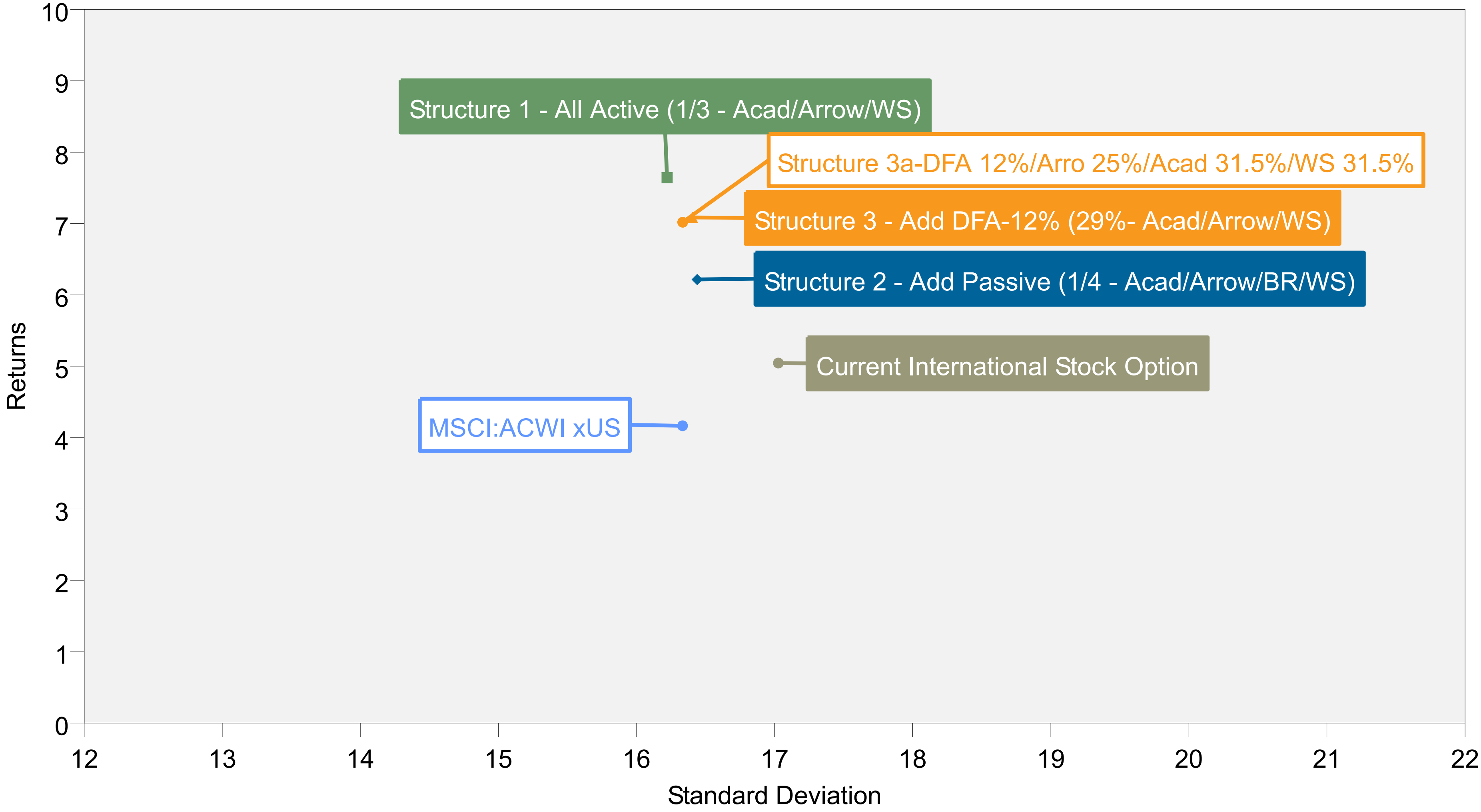
International Stock Option Structure Alternatives

International Equity Style Map
for 10 Years Ended March 31, 2023



International Stock Option Structure Alternatives

Risk/Reward Chart for 10 Years Ended March 31, 2023



International Stock Option Structure Alternatives

Fees

Current Structure		Fees (bps)	Weighted Average Fee (bps)
25.0%	AQR International Equity	59.0	14.75
25.0%	Arrowstreet ACWI ex-US	77.0	19.25
25.0%	Lazard ACWI ex-US	40.0	10.00
15.0%	DFA International Core	24.0	3.60
10.0%	DFA Emerging Markets Core	39.0	3.90
Total			**51.50**

Recommended Structure (#3a)		Fees (bps)	Weighted Average Fee (bps)
31.5%	Acadian ACWI ex-US Value	55.0	17.33
31.5%	Walter Scott International Stock (EAFE)	45.0	14.18
25.0%	Arrowstreet ACWI ex-US	77.0	19.25
12.0%	DFA Emerging Markets Core	39.0	4.68
Total			**55.43**

Fees for the new international structure are modestly more expensive than the current structure. However, based on historical analysis and manager styles, it is believed the new structure should provide stronger overall net of fee returns for participants.

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Callan

May 31, 2023

OSGP International Stock Option Structure Review

Anne Heaphy
Plan Sponsor Consulting

Uvan Tseng, CFA
Plan Sponsor Consulting

International Stock Option Structure Review

Summary

Oregon State Treasury Staff requested that Callan review the structure of the Oregon Savings Growth Plan (OSGP) International Stock Option, given the manager changes being made to the Public Equity portfolio in the Oregon Public Employees' Retirement Fund (OPERF).

In line with the changes being made in OPERF, Callan was asked to look at structure alternatives that would remove allocations to AQR and Lazard, replacing those allocations with ones to Acadian and Walter Scott, both of which are currently in the OPERF Public Equity portfolio; as well as reducing the overall exposure to DFA.

Callan modeled various structure alternatives, and in discussions with Staff, came up with the following recommendation that achieves the desired goals of making the manager changes as well as reducing the style, cap, and regional weighting biases of the existing structure.

Current Structure		Recommended Structure	
25.0%	AQR International Equity	31.5%	Acadian ACWI ex-US Value
25.0%	Arrowstreet ACWI ex-US	31.5%	Walter Scott International Stock (EAFE)
25.0%	Lazard ACWI ex-US	25.0%	Arrowstreet ACWI ex-US
15.0%	DFA International Core	12.0%	DFA Emerging Markets Core
10.0%	DFA Emerging Markets Core		

Additionally, it is recommended to add a passive international option given the fact that the International Stock Option has no passive component (which is different from the other active options). A passively managed fund benchmarked to the MSCI ACWI ex-US (which covers approximately 85% of the international market) would align the passive and active options.

International Stock Option Structure Alternatives

Annualized Returns as of March 31, 2023

Net of Fee Returns for Periods Ended March 31, 2023

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
International Stock Option	7.20	(2.91)	14.99	3.08	6.27	5.05	3.31
Structure 1 - All Active (1/3 - Acad/Arrow/WS)	7.19	(4.17)	15.44	5.65	8.90	6.85	5.29
Structure 2 - Add Passive (1/4 - Acad/Arrow/BR/WS)	6.39	(5.85)	13.42	3.94	7.86	5.60	4.37
Structure 3 - Add DFA-12% (29%- Acad/Arrow/WS)	7.01	(4.67)	15.26	5.05	8.57	6.39	5.05
Structure 3a-DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%	7.06	(4.81)	15.00	4.99	8.52	6.32	4.98
MSCI ACWI ex-US Index	6.87	(5.07)	11.80	2.47	5.86	4.17	2.62

The following structures were evaluated:

- Structure 1 (All Active): 33.3% Acadian, 33.4% Arrowstreet, and 33.3% Walter Scott
- Structure 2 (Active/Passive): 25% Acadian, 25% Arrowstreet, 25% Walter Scott and 25% BlackRock Emerging Markets Index
- Structure 3 (All Active – add DFA): 29% Acadian, 29% Arrowstreet, 29% Walter Scott and 12% DFA
- Structure 3a (All Active – add DFA): 31.5% Acadian, 31.5% Walter Scott, 25% Arrowstreet, and 12% DFA

Structure 3a:

- Arrowstreet recently notified clients that capacity for its ACWI ex-US strategy is temporarily closed. As a result, the allocation to their strategy could not be increased from the current target of 25% to the proposed target of 29% in Structure 3.
- Arrowstreet's target allocation will remain at 25%. Acadian and Walter Scott's allocations are increased by 2% each. When the strategy re-opens, we will re-evaluate the weightings of the managers.

Structure 1 = Acadian composite, Arrowstreet composite, WalterScott composite
Structure 2 = Acadian composite, Arrowstreet composite, WalterScott composite, BlackRock Emerging Markets Index CIT Fund B Non-Lending (used 0.10% expense ratio to calculate net of fee returns)
Structure 3/3a = Acadian composite, Arrowstreet composite, WalterScott composite, DFA Emerging Markets Core Equity Fund

International Stock Option Structure Alternatives

Return Based Statistics for 10 Years Ended March 31, 2023

Statistics for 10 Years Ended March 31, 2023

	Alpha	Beta	Down Market Capture	Up Market Capture	Information Ratio	Sharpe Ratio	Standard Deviation	Tracking Error
International Stock Option	0.80	1.04	98.79	108.24	0.41	0.25	17.03	2.01
Structure 1 - All Active (1/3 - Acad/Arrow/WS)	2.63	0.99	92.63	117.23	1.66	0.37	16.20	1.57
Structure 2 - Add Passive (1/4 - Acad/Arrow/BR/WS)	1.39	1.00	96.56	109.93	0.77	0.29	16.42	1.77
Structure 3 - Add DFA-12% (29%- Acad/Arrow/WS)	2.16	1.00	94.33	115.09	1.38	0.34	16.38	1.54
Structure 3a-DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%	2.10	0.99	94.35	114.20	1.32	0.33	16.31	1.58
MSCI ACWI ex-US Index							16.33	

Structure 1 = Acadian composite, Arrowstreet composite, WalterScott composite
Structure 2 = Acadian composite, Arrowstreet composite, WalterScott composite, BlackRock Emerging Markets Index CIT Fund B Non-Lending (used 0.10% expense ratio to calculate net of fee returns)
Structure 3/3a = Acadian composite, Arrowstreet composite, WalterScott composite, DFA Emerging Markets Core Equity Fund

Active International Stock Option Style and Regional Exposure

Style Exposure Matrix
Holdings as of March 31, 2023

	Value	Core	Growth	Total
Europe	16.9% (722) 12.4% (157)	11.3% (654) 11.0% (127)	12.8% (547) 17.4% (153)	41.0% (1923) 40.8% (437)
N. America	2.1% (133) 2.5% (28)	1.7% (139) 2.7% (24)	1.0% (96) 2.5% (35)	4.7% (368) 7.7% (87)
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Emerging	16.2% (2480) 7.5% (419)	8.9% (2271) 9.6% (410)	8.0% (1510) 11.4% (472)	33.1% (6261) 28.5% (1301)
Total	45.1% (4598) 31.0% (741)	27.4% (3892) 29.6% (660)	27.5% (2908) 39.4% (780)	100.0% (11398) 100.0% (2181)

-- OSGP Current International Option
-- MSCI ACWI ex-US Index

Style Exposure Matrix
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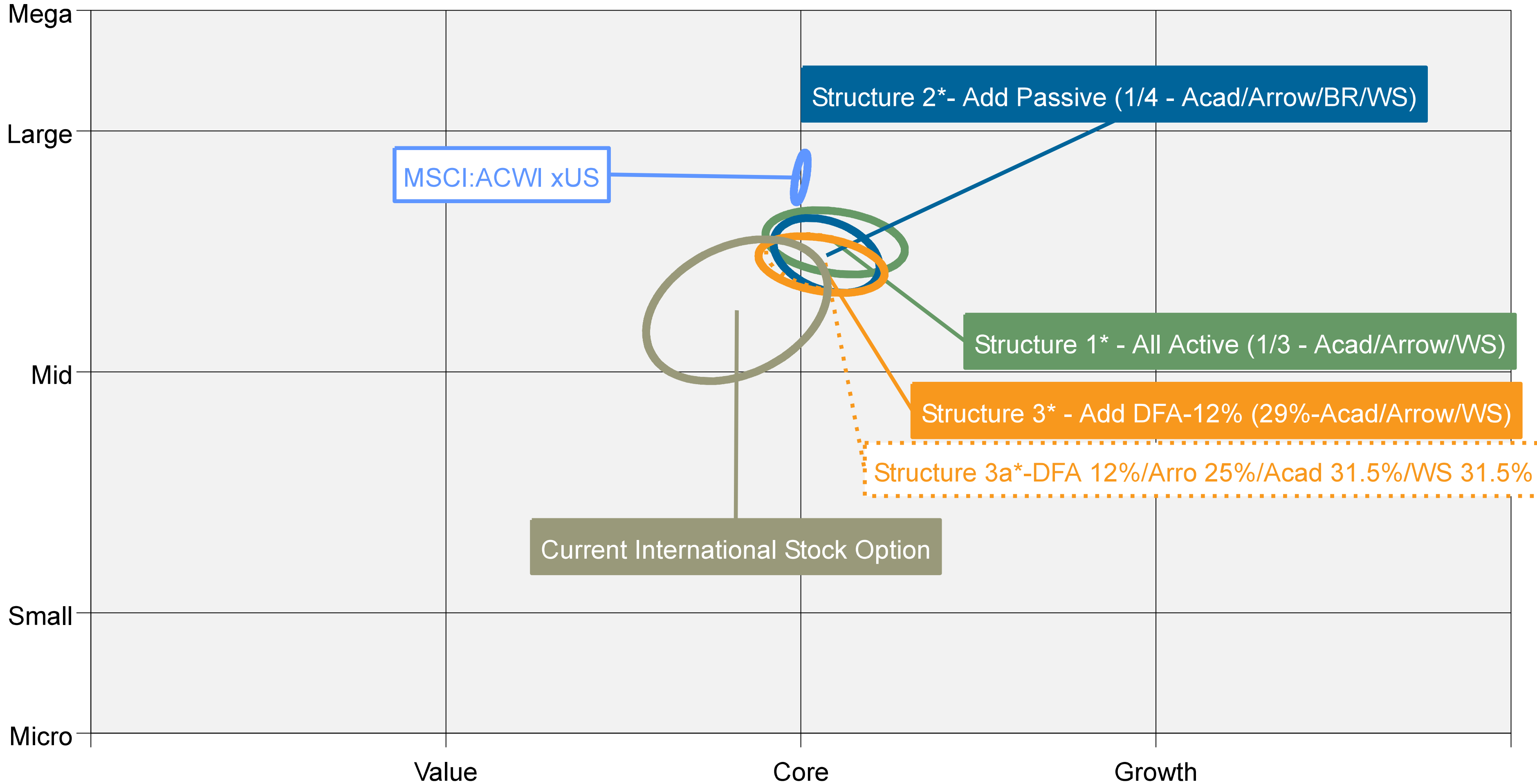
Total	37.5% 31.0% (741)	23.6% 29.6% (660)	38.9% 39.4% (780)	100.0% 100.0% (2181)

-- Structure 3a – DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%
-- MSCI ACWI ex-US Index

Structure 3a reduces the value and emerging markets overweights.

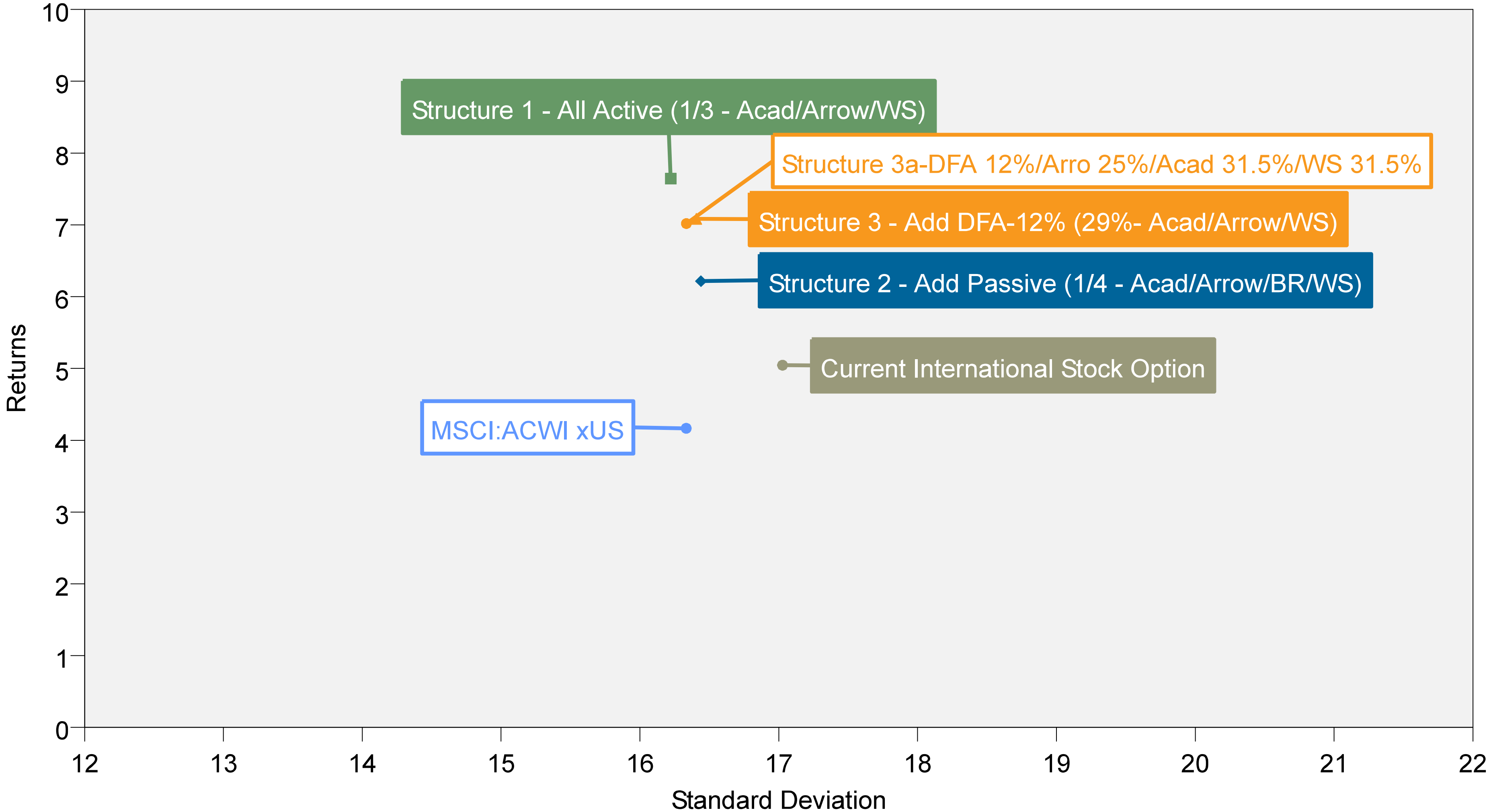
International Stock Option Structure Alternatives

International Equity Style Map
for 10 Years Ended March 31, 2023



International Stock Option Structure Alternatives

Risk/Reward Chart for 10 Years Ended March 31, 2023



International Stock Option Structure Alternatives

Fees

Current Structure		Fees (bps)	Weighted Average Fee (bps)
25.0%	AQR International Equity	59.0	14.75
25.0%	Arrowstreet ACWI ex-US	77.0	19.25
25.0%	Lazard ACWI ex-US	40.0	10.00
15.0%	DFA International Core	24.0	3.60
10.0%	DFA Emerging Markets Core	39.0	3.90
Total			**51.50**

Recommended Structure (#3a)		Fees (bps)	Weighted Average Fee (bps)
31.5%	Acadian ACWI ex-US Value	55.0	17.33
31.5%	Walter Scott International Stock (EAFE)	45.0	14.18
25.0%	Arrowstreet ACWI ex-US	77.0	19.25
12.0%	DFA Emerging Markets Core	39.0	4.68
Total			**55.43**

Fees for the new international structure are modestly more expensive than the current structure. However, based on historical analysis and manager styles, it is believed the new structure should provide stronger overall net of fee returns for participants.

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Callan

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www.callan.com

Memorandum

To: **Claire Illo, Kenny Bao, Louise Howard, and Oregon State Treasury**
From: Anne Heaphy and Uvan Tseng, Callan
Date: May 31, 2023
Subject: International Stock Option Structure Changes

Oregon State Treasury Staff requested that Callan review the structure of the Oregon Savings Growth Plan (OSGP) International Stock Option, given the manager changes being made to the Public Equity portfolio in the Oregon Public Employees' Retirement Fund (OPERF).

In line with the changes being made in OPERF, Callan was asked to look at structure alternatives that would remove allocations to AQR and Lazard, replacing those allocations with ones to Acadian and Walter Scott, both of which are currently in the OPERF Public Equity portfolio; as well as reducing the overall exposure to DFA.

Callan modeled various structure alternatives, and in discussions with Staff, came up with the following recommendation that achieves the desired goals of making the manager changes as well as reducing the style, cap, and regional weighting biases of the existing structure.

Current Structure		Recommended Structure	
25.0%	AQR International Equity	31.5%	Acadian ACWI ex-US Value
25.0%	Arrowstreet ACWI ex-US	31.5%	Walter Scott International Stock (EAFE)
25.0%	Lazard ACWI ex-US	25.0%	Arrowstreet ACWI ex-US
15.0%	DFA International Core	12.0%	DFA Emerging Markets Core
10.0%	DFA Emerging Markets		

The recommended structure would increase the weighted average expense ratio of the OSGP International Stock Option to 0.555% from the current 0.516% (an increase of 0.04%). An analysis of alternative structures considered is provided on the second page of the memo.

Additionally, during the Investment Structure Evaluation conducted for OSGP in 2022, Callan noted that while the current structure was sound, the Plan could opt to add a passive international option given the fact that the International Stock Option has no passive component (which is different from the other active options).

For a passive international equity option, a fund benchmarked to the MSCI ACWI ex-US (which covers approximately 85% of the international market) would align the passive and active options. An index fund benchmarked to the MSCI ACWI ex-US IMI (which covers approximately 99% of the international market) would also be an option, though a passive option tracking the MSCI ACWI ex-US is what we most commonly see in participant directed plans. As such, Callan recommends adding an MSCI ACWI ex-US passive option.

Callan

Alternative Structures

Callan reviewed multiple structures using the following managers and discussed them with Staff:

- Structure 1 (All Active): 33.3% Acadian, 33.4% Arrowstreet, and 33.3% Walter Scott
- Structure 2 (Active/Passive): 25% Acadian, 25% Arrowstreet, 25% Walter Scott and 25% BlackRock Emerging Markets Index
- Structure 3 (All Active - add DFA): 25% Acadian, 25% Arrowstreet, 25% DFA and 25% Walter Scott

Staff gravitated towards Structure 3 but asked Callan to adjust the weightings so that the overall fund would be more in line with the MSCI ACWI ex-US benchmark on a style, size, and regional allocation perspective, which resulted in a revised Structure 3.

- Structure 3 (All Active – add DFA): 29% Acadian, 29% Arrowstreet, 29% Walter Scott and 12% DFA

Staff and Callan agreed that the revised Structure 3 was the one that made the most sense for OSGP and prepared to bring it forward as a recommendation for approval. However, we were informed by Arrowstreet shortly afterwards that they were temporarily closing the ACWI ex-US strategy to manage capacity. Staff and Callan then met to discuss other alternatives that would approximately achieve the same goals in the interim (until Arrowstreet reopens) and landed on Structure 3a.

- Structure 3a (All Active – add DFA): 31.5% Acadian, 31.5% Walter Scott, 25% Arrowstreet, and 12% DFA

Style Exposure Matrix
Holdings as of March 31, 2023

	Value	Core	Growth	Total
Europe	16.9% (722) 12.4% (157)	11.3% (654) 11.0% (127)	12.8% (547) 17.4% (153)	41.0% (1923) 40.8% (437)
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-- OSGP Current International Option
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-- Structure 3a – DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%
-- MSCI ACWI ex-US Index

Callan is in favor of Structure 3a as the recommended structure to bring forward for approval.

Callan

Fee Comparison

Fee Comparison	% of Fund	Net Fee	Wtd Ave Fee
AQR International Equity	25.0%	0.59%	0.148%
Arrowstreet ACWI ex-US	25.0%	0.77%	0.194%
DFA Emerging Markets Core I	10.0%	0.39%	0.039%
DFA International Core Equity	15.0%	0.24%	0.036%
Lazard ACWI ex-US	25.0%	0.40%	0.100%
	100.0%		0.516%

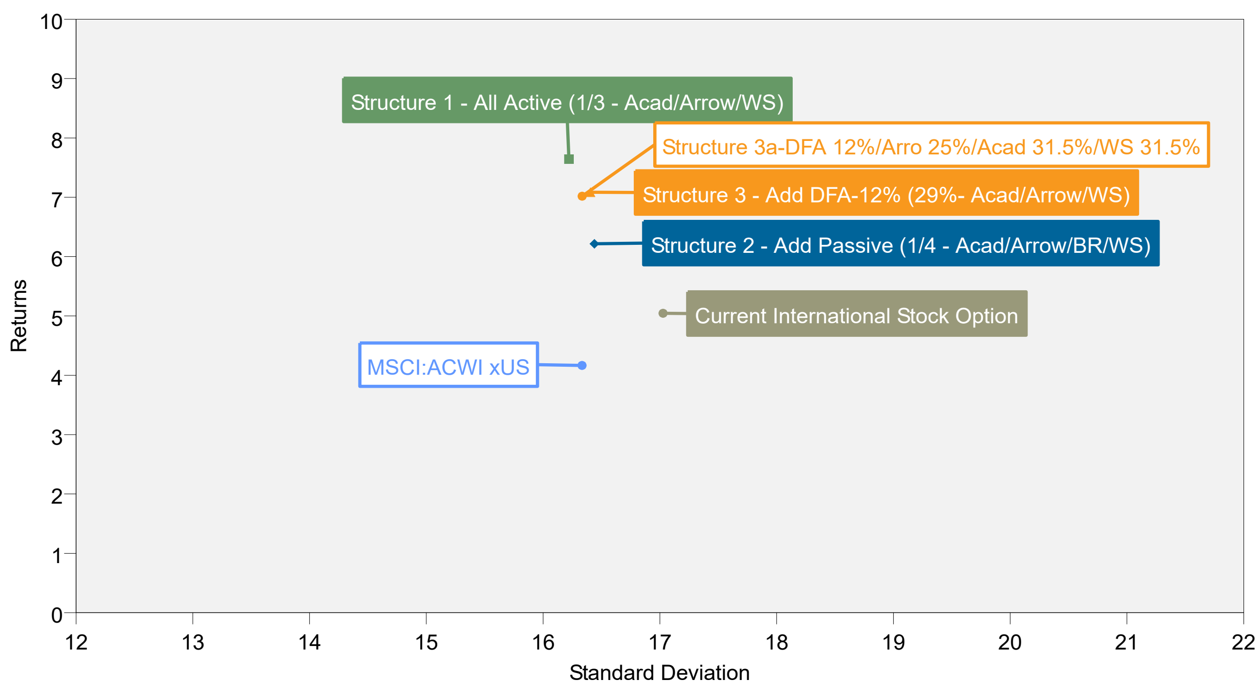
	% of Fund	Net Fee	Wtd Ave Fee
Acadian ACWI ex-US Value	31.5%	0.55%	0.173%
Arrowstreet ACWI ex-US	25.0%	0.77%	0.194%
DFA Emerging Markets Core I	12.0%	0.39%	0.047%
Walter Scott International Stock	31.5%	0.45%	0.142%
	100.0%		0.555%

Risk/Reward Metrics and Characteristics

Statistics for 10 Years Ended March 31, 2023

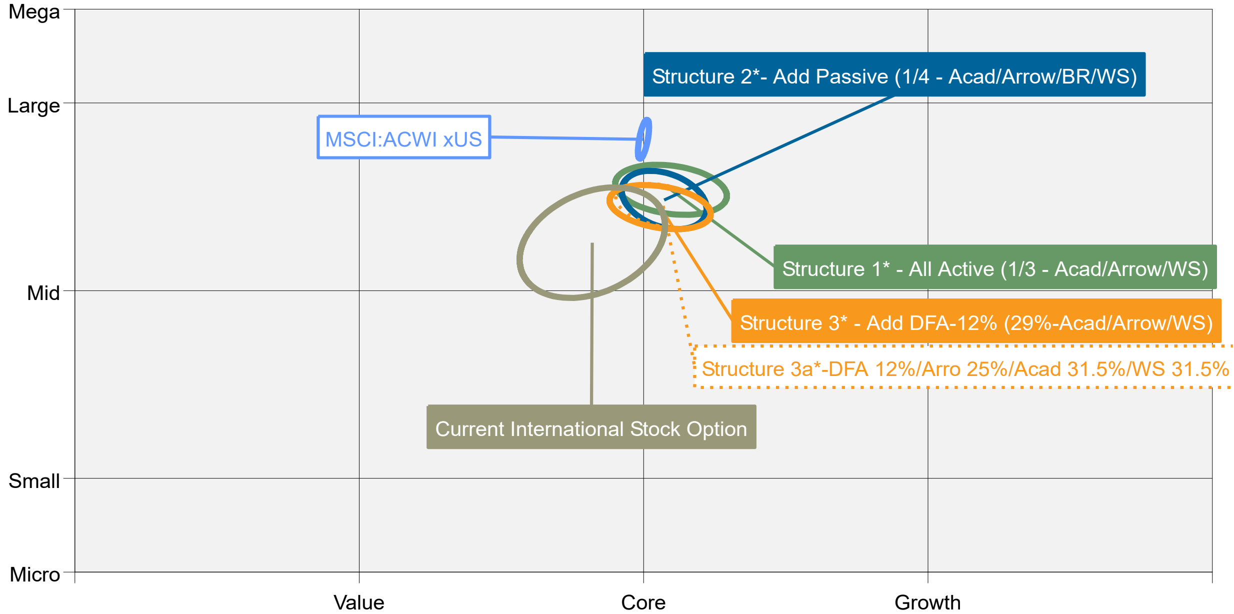
	Alpha	Beta	Down Market Capture	Up Market Capture	Information Ratio	Sharpe Ratio	Standard Deviation	Tracking Error
International Stock Option	0.80	1.04	98.79	108.24	0.41	0.25	17.03	2.01
Structure 1 - All Active (1/3 - Acad/Arrow/WS)	2.63	0.99	92.63	117.23	1.66	0.37	16.20	1.57
Structure 2 - Add Passive (1/4 - Acad/Arrow/BR/WS)	1.39	1.00	96.56	109.93	0.77	0.29	16.42	1.77
Structure 3 - Add DFA-12% (29%- Acad/Arrow/WS)	2.16	1.00	94.33	115.09	1.38	0.34	16.38	1.54
Structure 3a-DFA 12%/Arro 25%/Acad 31.5%/WS 31.5%	2.10	0.99	94.35	114.20	1.32	0.33	16.31	1.58
MSCI ACWI ex-US Index							16.33	

Risk/Reward Chart for 10 Years Ended March 31, 2023



Callan

International Equity Style Map
for 10 Years Ended March 31, 2023



OIC

OREGON STATE TREASURY

TAB 8

CONSULTANT

CONTRACT RENEWAL

OIC Consultant Contract Extension Recommendation
OPERF Real Estate Portfolio

Policy
Under INV 210 (attached), consultant contracts are generally awarded for a three-year period, can be renewed no more than twice, and are limited to a final expiration date not more than four years beyond the original expiration date. At the end of seven years, contracts must be re-bid and a new seven-year cycle can begin. Additionally, the OIC retains the contractual right to terminate such contracts, at any time, upon written notice.

Purpose
To address the OIC's consultant contract for the Real Estate Portfolio which is set to expire on June 30, 2023.

Background
The current Real Estate Portfolio consultant contract with Meketa was approved by the OIC on April 22, 2020, and began on July 1, 2020. In addition to the initial three-year contract term, two pre-negotiated two-year extensions are available at the Council's discretion.

Recommendation
Staff proposes that the OIC extend its current contract, subject to the existing terms and conditions, for an additional two-year period beginning July 1, 2023, and ending June 30, 2025, on behalf of the Real Estate Portfolio.

Status Active PolicyStat ID 1755247

Origination	12/2010	Owner	Rex Kim: Chief Investment Officer
Last Approved	09/2015	Policy Area	Investments
Last Revised	09/2015		
Next Review	09/2016		

INV 210: Consulting Contracts

OREGON INVESTMENT COUNCIL POLICY

–

INTRODUCTION & OVERVIEW

–

Summary Policy Statement

This policy outlines the requirements and limitations of written contracts between the Oregon Investment Council (OIC) and external consultants.

Purpose and Goals

The goal of this policy is to establish the parameters within which the OIC may engage and enter into contractual agreements with external consultants.

Applicability

Classified represented, management service, unclassified executive service

POLICY PROVISIONS

Definitions

Placement Agent: includes any third party, affiliated or unaffiliated with an investment manager, investment advisory firm, or a general partnership, that is a party to an agreement or arrangement (whether oral or written) with an investment manager, investment advisory firm, or a general partnership for the direct or indirect payment of a Placement Fee in connection with an OIC investment.

Placement Fee: includes any compensation or payment, directly or indirectly, of a commission, finder's fee, or any other consideration or benefit paid to Placement Agent.

Policy Statements

1. The OIC shall engage consultants using written contracts. Consultants include, but are not limited to, full-service consultants and specific asset class advisors (e.g., real estate, private equity, etc.).
2. Consulting contracts shall have specified expiration dates, termination clauses and renewal/ extension terms. Staff shall undertake a formal "request for proposal" (RFP) process before the end of the contract term (including any renewals or extensions) for the purpose of identifying new candidates, upgrading services, ensuring competitive pricing and acquiring any other information or benefits considered relevant to staff and the Council.
3. Consulting contracts shall be negotiated and executed in compliance with Council policy INV 208: Negotiation and Execution of Contracts.
4. Consulting contracts shall expire on a date not to exceed three years from the effective date of the contract.
5. Consulting contracts shall include a "no-cause" termination clause with a maximum 90-day notice period.
6. The Council directs staff to regularly review and evaluate the work of all contractors on an annual basis.
7. Consulting contracts are limited to a) two renewals or extensions beyond the original expiration date, and b) a final expiration date no more than four years beyond the original expiration date.
8. Upon final expiration of the original contract, or whenever directed by the Council, staff shall undertake and complete an RFP process to include the following:
    a. Identification of potential consulting candidates qualified to provide the required services;
    b. Creation of an RFP which shall include, but not be limited to:
        1. Description of services requested;
        2. Description of the potential or preliminary standards required of the candidates; and
        3. Request for pricing or fee schedule information.
9. Consultants under contract with the Council shall disclose, in written recommendations delivered to the Council, any Placement Agent contact Consultants may have had in connection with such Council recommendations.

Exceptions

None.

Failure to Comply

Failure to comply with this policy may be cause for disciplinary action up to and including dismissal.

PROCEDURES and FORMS

–

ADMINISTRATION

Feedback

Your comments are extremely important to improving the effectiveness of this policy. If you would like to comment on the provisions of this policy, you may do so by e-mailing the Policy Analyst. To ensure your comments are received without delay, *please list the policy number and name in your e-mail's subject*. Your comments will be reviewed during the policy revisions process and may result in changes to the policy.

Approval Signatures

Step Description	Approver	Date
Oregon Investment Council	John Skjervem: Chief Investment Officer	09/2015
	Kim Olson: Policy Analyst	08/2015
	Mike Mueller	08/2015

OIC

OREGON STATE TREASURY

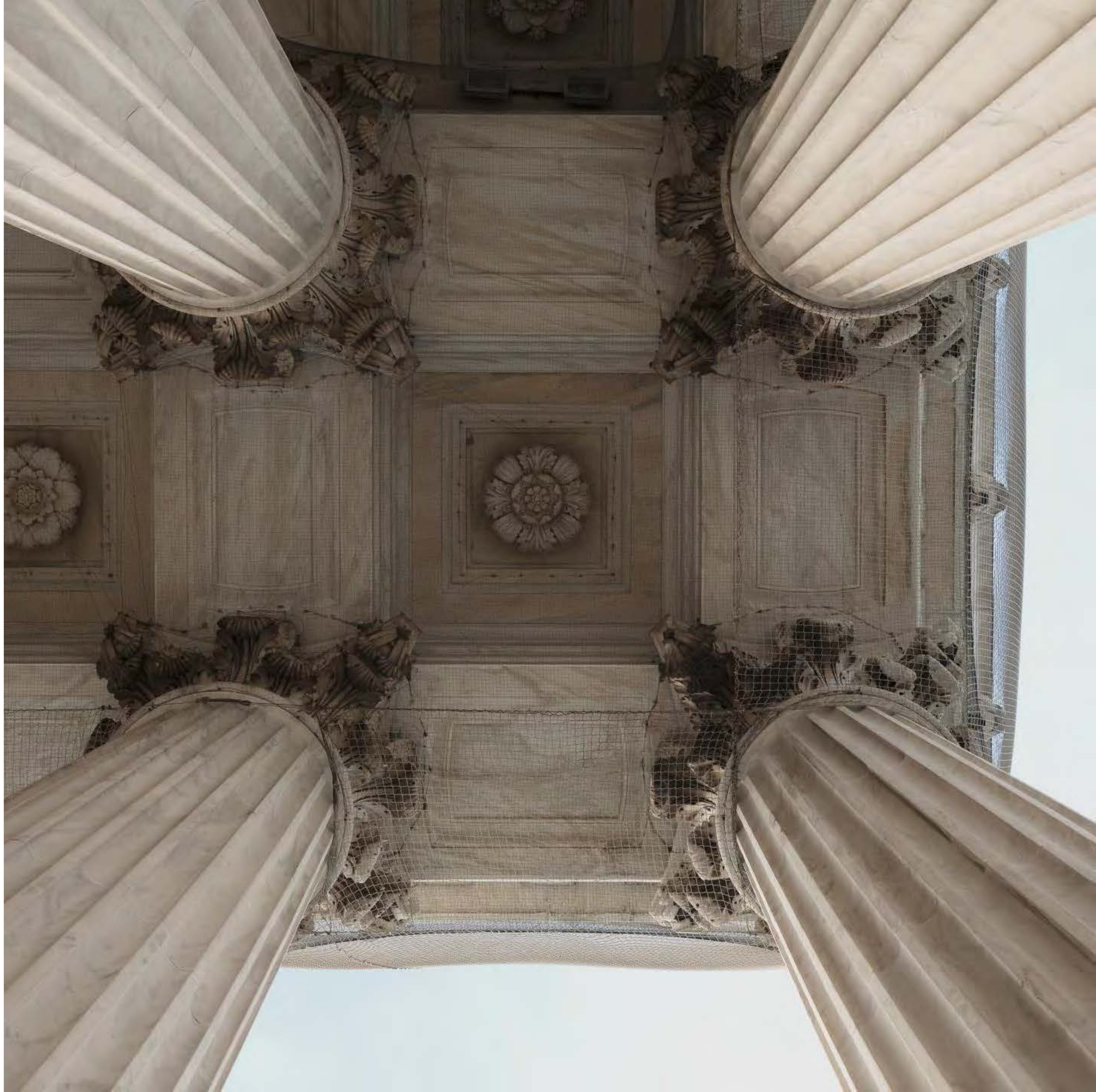
TAB 9

STATEMENT OF FUNDS GOVERNANCE

Oregon Investment Council

Roles and Responsibilities — Governance Discussion

May 31, 2023



Executive Summary

The purpose of this presentation is to facilitate a discussion around Policy making at the Council level. The Council sets policy around various components of the oversight of the OPERF portfolio, including around responsibilities for manager selection. Based partially on today's conversation, Aon and Meketa will work with Staff to develop a refined Investment Policy Statement for the Council's review later this year.

Topics for discussion today include:

- Review of current roles and responsibilities.
- Discussion of how those roles relate specifically to manager selection for the OIC and OST Staff.
- Overview of current and alternative manager selection oversight models.
- Education on the prudence of monitoring when assigning implementation duties.
- Outline of current and potential future state monitoring structure.
- Examples of peer public funds manager selection processes and reporting structures.

1

Roles and Responsibilities

OIC — Roles and Responsibilities

- The OIC is a **policy-setting council** that largely **oversees and assigns investment management activities** of the OST and qualified external fiduciaries.
  - The OIC is responsible for setting asset allocation, investment policies, and guidelines which guide staff in their work, and provide Council the ability to oversee the program as fiduciaries
  - The OIC tasks OST staff, external managers, consultants and other service providers with policy implementation
- As part of that policy setting and implementation, the OIC outlined roles and responsibilities for selection of investment managers in its Statement of Fund Governance as shown on the following slide.
  - [Among other responsibilities], the **OIC retains direct approval of retaining investment managers within each asset class, including alternative investment commitments over the specified threshold amounts**

Source: Statements of OIC Investment & Management Beliefs INV 1201 and Statement of Fund Governance — INV 1202

Key Takeaway:

The OIC retains direct approval for most manager hirings today. Focusing more of the manager selection process at OST staff level would allow the OIC more time to spend on policy level decisions. Furthermore, OIC is already practiced in its monitoring and oversight role.

OST Staff — Roles & Responsibilities

- The Council has created policy language which delegates to qualified Treasury staff the following investment management and implementation decisions:
  - **Recommending retaining investment managers** within each asset class. Before recommending a manager change, Treasury staff will satisfy the Council that the manager change is supported by a satisfactory level of analysis and due diligence
  - **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

Source: Excerpts from Statement of Fund Governance —INV 1202

Key Takeaway:

The OIC has already created policy which assigns many of the key investment implementation responsibilities to OST staff. As part of its oversight role, the OIC requires timely reports to ensure assigned responsibilities are being carried out in accordance with fiduciary duties and in compliance with relevant policies, guidelines and approvals.

2

Manager Selection Oversight Models

Manager Selection Oversight Models for Consideration

Models	Allocation of Responsibility			Private Markets & Alternatives Thresholds	Public Markets Thresholds
	Asset Allocation Decisions	Investment Policy Setting	Manager Selection		
Current Hybrid Approach[1]	OIC	OIC	• OST through the Treasurer's Asset Class Committees approve investments below thresholds • OIC approve investments above threshold	Up to **$250 million** for new commitments & **$350 million** for existing relationships	None – all new manager mandates require OIC approval
Apply Thresholds to all Asset Classes	OIC	OIC	• OST to approve investments **below** thresholds • Treasurer's asset class committees or the OIC approve investments **above** threshold	Up to **$250 million** for new commitments & **$350 million** for existing relationships	Illustrative Up to **$750 million** for new manager mandates
No Thresholds	OIC	OIC	OST to approve all investments. No council approval necessary. Possible consultant concurrence/additional reporting added.	--	--

[1]OST is also allowed to approve investments below $50 million.

AON

A. Current Hybrid Approach

Benefits	Considerations
• Greater OIC control • Enhanced transparency	• Requires more time commitment on the part of the members of the OIC • Brings the OIC below policy adoption and oversight • Requires expertise and knowledge on the part of the OIC • Decision-making process can be protracted • Misalignment of Private and Public Market decision making

B. Apply Thresholds to all Asset Classes

Benefits	Considerations
• OIC members have more time to focus on broader investment strategies and policy development • More investment decisions can be implemented expeditiously • Increased comfort level by assigning selection of all asset class managers to a deep and experienced team of OST professionals	• Reduced control • Governing fiduciaries can become complacent in oversight and monitoring. • OIC still below policy adoption and oversight without full implementation of selection process • Need to determine appropriate threshold level for each asset class and periodically revisit

C. Full Implementation — No Thresholds

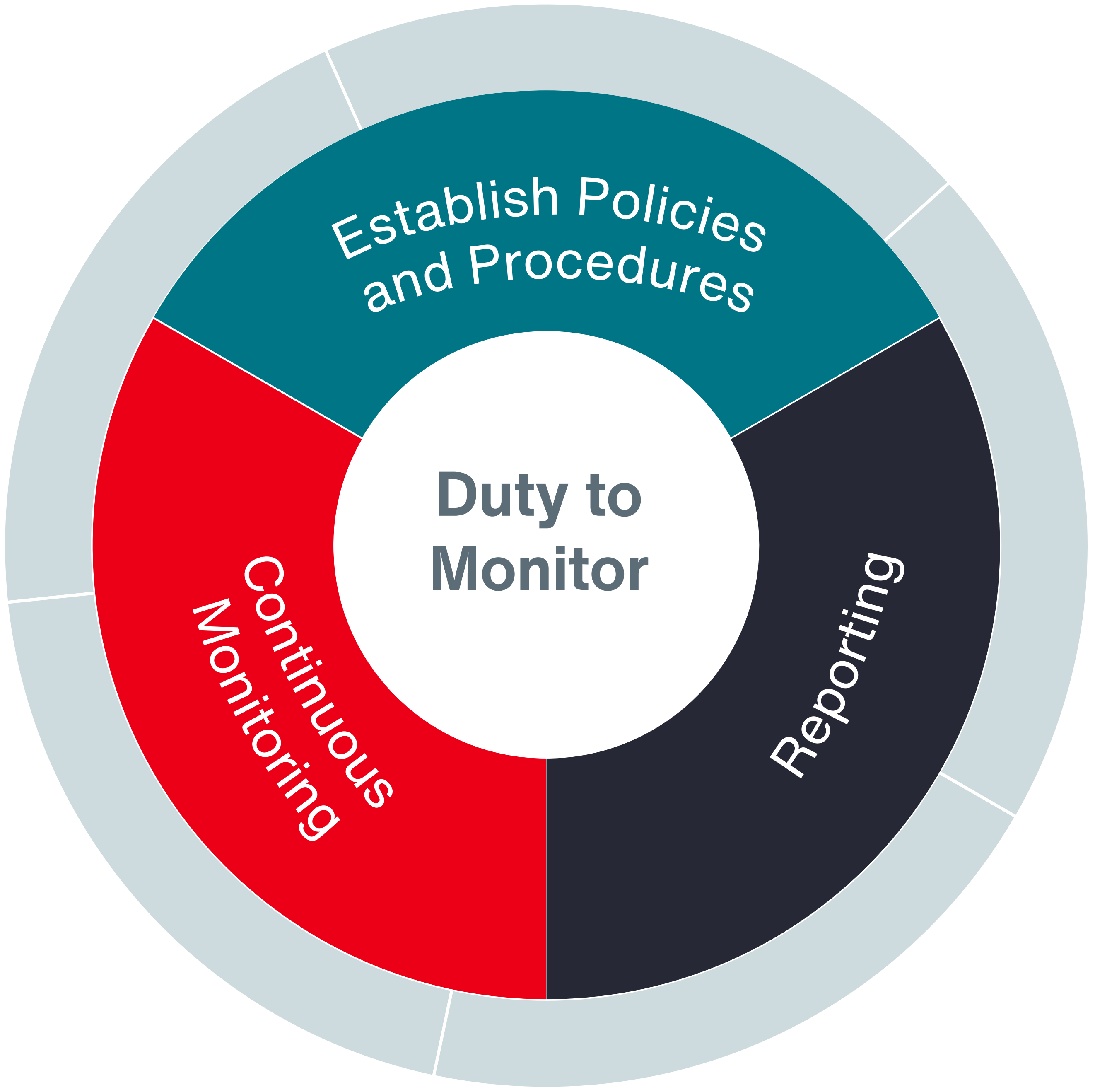
Benefits	Considerations
• OIC members have more time to focus on broader investment strategies and policy development • Investment decisions can be implemented more expeditiously • Increased comfort level by assigning selection of all asset class managers to a deep and experienced team of OST professionals • Enhancement of fiduciary oversight and risk management	• Reduced control on part of OIC members • Governing fiduciaries can become complacent in oversight and monitoring • Additional monitoring, reporting, and policy language needed

3

Duty to Monitor

Duty to Monitor

U.S. Supreme court opinion held fiduciaries have a continuing duty – separate and apart from the duty to exercise prudence in selecting investments at the outset – to monitor and remove imprudent investment options. Tibble v. Edison International, 135 S.Ct. 1823 (2015), Hughes v. Northwestern Univ., 595 U.S.__2022.



Staff implements policies and procedures and ensures compliance controls are in place to protect the funds and ensures the highest level of services from external advisors.

Adequate reporting is necessary for prudent monitoring.

Oversight

- Any assignment of implementation must be accompanied by diligent oversight.
  - Trustees must periodically review the agent's performance and compliance with the terms of the delegation.
  - The duty to monitor requires proactive monitoring, trustees must actively seek out knowledge and information about the actions of those to whom they have delegated responsibilities.
  - Trustees are obligated to act with appropriate prudence and reasonableness to determine whether those who have delegated duties are performing their fiduciary obligations.
  - The duty to monitor is a lasting duty-trustees cannot simply delegate and walk away.

Key Takeaway:

The OIC must have a sound process in place for ongoing monitoring of OST staff. This includes ensuring the reporting processes in place are adequate.

Prudent Monitoring

To be prudent, when monitoring:

Ensure the delegated duty is carried out consistent with specified parameters.	Evaluate compliance with scope of authority.	Evaluate performance against relevant standards/benchmarks.
Require regular reporting and notification of any material changes.	Ensure the delegation matches current roles and responsibilities and continues to be prudent.	Make changes, if necessary, by refining or rescinding delegations where appropriate.
Require sufficient reporting to the Board to fulfill its oversight responsibility.	Utilize independent verifications or reviews needed to assist the Board.	Hold professionals/service providers appropriately accountable.

4

Current and Future State Monitoring Structure for Discussion

Committee Structure for External Manager Due Diligence — Current State

Broad Overview

Oregon Investment Council

Treasurer's Asset Class Committees

- **Private Equity**
- **Real Estate**
- **Alternatives**
  - Real Assets
  - Diversifying Strategies
- **Opportunity Portfolio**

OST Investment Division Committees

- **Alternative Team Leads**
- **Capital Market Leads**

Committee Structure for External Manager Due Diligence — Current State

Treasurer's Asset Class Committees

Private Equity

Real Estate

Alternatives
- Real Assets
- Diversifying Strategies

Opportunity Portfolio

Each Committee is Comprised of:

1. Deputy State Treasurer
2. CIO
3. One OIC Member invited by the OST as a voting member

Primary Duty:

- Manager Selection for OPERF capital up to:
  - $250m for new GP/Manager
  - $350m for existing relationship

Committee Structure for External Manager Due Diligence — Current State

OST Investment Division Committees

ATL Committee is Comprised of:

1. Director of Private Markets
2. SIOs for each Private Markets Portfolio
3. Investment Officers of Private Markets Portfolio (participate on rotating basis)

Alternative Team Leads

Primary Duties:

- Policy/Guidelines Review
- Manager Due Diligence
- Portfolio Construction
- Performance Monitoring

Private Markets Portfolios:

- Private Equity
- Real Estate
- Real Assets
- Opportunity Portfolio

Capital Market Leads

Primary Duties:

- Policy/Guidelines Review
- Manager Due Diligence
- Portfolio Construction
- Performance Monitoring

Public Markets Portfolios:

- Public Equity
- Fixed Income
- Diversifying Strategies
- Currency Overlay Program

CML Committee is Comprised of:

1. CIO
2. SIOs for Public Market Portfolios
3. SIO for Portfolio Risk and Research
4. Director of Investments

Manager Selection Process Overview — Current State

Private Markets

1. Proposed investment agreed upon by **OST asset class team and Consultant**

2. Proposed investment reviewed and approved by **Alternatives Team Leads Committee**

3.A Proposed investment is **below** policy threshold amount

Approved by the **Treasurer's Asset Class Committee**

3.B Proposed investment is **above** policy threshold amount

Approved by the **OIC**

Public Markets

1. Proposed investment agreed upon by **OST asset class team and Consultant**

2. Proposed investment reviewed and approved by **Capital Markets Leads Committee**

3. Reviewed and Approved by **OIC**

Note: The manager selection process for Diversifying Strategies aligns with the process for Private Markets with an exception to step 2, the committee responsible for reviewing and approving the strategy is the Capital Markets Leads Committee instead of the Alternative Team Leads Committee.

Illustrative Example

Manager Selection Process Overview — Future State

Private Markets

1. Proposed investment agreed upon by **OST asset class team and Consultant**

2. Proposed investment reviewed and approved by **Alternatives Team Leads Committee**

3.A Proposed investment is **below** policy threshold amount

Approved by the **OST**

3.B Proposed investment is **above** policy threshold amount

Approved by the **Treasurer's Asset Class Committee** or the **OIC**

Public Markets

1. Proposed investment agreed upon by **OST asset class team and Consultant**

2. Proposed investment reviewed and approved by **Capital Markets Leads Committee**

3.A Proposed investment is **below** policy threshold amount

Approved by the **OST**

3.B Proposed investment is **above** policy threshold amount

Approved by the **Treasurer's Asset Class Committee** or the **OIC**

Note: The manager selection process for Diversifying Strategies aligns with the process for Private Markets with an exception to step 2, the committee responsible for reviewing and approving the strategy is the Capital Markets Leads Committee instead of the Alternative Team Leads Committee.

Illustrative Example

Committee Structure for External Manager Due Diligence — Future State

Treasurer's Asset Class Committees

Asset Class Role:	Growth	Real Assets	Risk Mitigation	Opportunistic
Private Markets:	Private Equity	Real Estate	Fixed Income	Opportunity Portfolio
Public Markets:	Public Equity	Real Assets	Diversifying Strategies	

Each Committee would be Comprised of:

1. Deputy State Treasurer
2. CIO
3. One OIC Member invited by the OST as a voting member

Primary Duties:

- Annual Strategic Plan & Pacing Review
- Quarterly Meetings:
  - Portfolio Construction
  - Performance and Risk Review
  - Market Outlook
  - Review of Strategic Relationships
- Ad Hoc Meetings:
  - Manager Selection for OPERF capital above policy approved threshold amounts

Illustrative Example

Monitoring/Reporting Options for Consideration at the OIC Level

	Reporting	Currently In Place?		Presentations	Currently In Place?
1.	Quarterly Manager Update Report - Manager Additions - Termination - Rebalancing		1.	CIO reports outcome of executed decisions related to investment managers at next regularly scheduled OIC meeting	Yes
2.	Access to a portal with full Due Diligence Reports		2.	Annual Asset Class Review - Annual Strategic Plan - Portfolio Construction - Performance Review	Yes
3.	Total Fund Quarterly Performance Report	Yes	3.	5–10-minute updates on asset classes semi-annually at OIC meeting to serve as check in on progress towards annual plan	
			4.	OIC periodically reviews appropriateness of manager selection oversight model and threshold amounts	

5

Public Fund Peer Examples

Peer Public Pension Funds Models — Manager Selection

The following table outlines examples of public pension funds that delegate manager selection to staff with a brief description of their approval process and associated reporting

Peer Plan	Threshold	Internal Staff / Committee Monitoring & Approval Process	Full Committee / Board Reporting
Fund A >$300 B	Board approves if investments exceed: • 2% of PE NAV for new PE; 4% follow on • 3% RE NAV • $500 mil for Infrastructure	• Manager selection fully delegated to Staff. Consultant/advisor concurrence utilized. Consultants utilized for sourcing as needed at Staff level. Board retains its own Consultants for oversight and monitoring. • Asset class policies contain detailed guidance on delegation.	• Report on delegation provided annually to Board • Semi-Annual Reporting on manager ratings in public and private markets
Fund B $157 B	Board approves when investment exceeds: - 0.5% of plan assets (approx. $1B) for initial investments - 1% of all plan assets for follow-on investments	• Internal Investment Committee (IIC) meetings composed of CIO, CRO, & Investment Division SMDs to review & approve managers threshold • Board members & the IC Chair may sit in on these meetings • IIC may delegate investment discretion to asset class investment committees	• No reporting on manager selection/ termination • Prudence letter required for recommendations above threshold • The Board has access to full due diligence & other details through an online confidential reporting link
Fund C $150 B	None	• Staff prepares due diligence memo • Executive Director (ED)/ CIO has ultimate approval	• 5–10-minute updates on asset classes at each quarterly Board meeting • No reporting on manager selection/ termination • Annual deep dive

[1]Source: 2022 Delegation of Authority Review

Peer Public Pension Funds Models — Manager Selection (cont'd.)

Peer Plan	Threshold	Internal Staff / Committee Monitoring & Approval Process	Full Committee / Board Reporting
Fund D $122 B	Board approves when investment exceeds: - $1B for initial investment in public markets - $300M for private assets	• Internal Investment Committee prepares due diligence memo (Staff only, no Board members) • ED/CIO has ultimate approval	• ED/CIO circulates manager hiring plan to Board/Committee with option to have it brought to Board for approval • Board responsible for manager terminations • ED/CIO provides quarterly Investment Discretion Exercised Report
Fund J $60 B	Board approves when investment exceeds: - 1% of plan assets (applies to all asset class investments except US Equity) - 1.5% of plan assets for US Equity	• Manager selection delegated to Bureau of Investments (BOI) with CIO serving as senior executive administrator • Investment divisions of BOI for each asset class consist of internal staff members	• 10–15-minute updates on asset classes at Board meetings • No reporting on manager selection/ termination (strategy level only)

Appendix – Public Fund Peer Summary

Public Pension Fund Survey Results

Survey Public Pension Funds	Delegation of Search, Selection & Termination of Investment Managers	Delegation Thresholds	Delegation of Selection of Private Equity Funds	Delegation of Selection of Real Estate Funds	Internal Asset Management	Fund Size
Fund A	Yes	Yes	Yes	Yes	Yes	>$300 B
Fund B	Yes	Yes	Yes	Yes	Yes	$157 B
Fund C	Yes	No	Yes	Yes	Yes	$150 B
Fund D	Yes	Yes	Yes	Yes	Yes	$122 B
Fund E	Yes	No	Yes	Yes	Yes	$117 B
Fund F	No	No	No	No	No	$136 B
Fund G	Yes	Yes	Yes	Yes	Yes	$82 B
Fund H	Yes	No	Yes	Yes	Yes	$80 B
Fund I	Yes	No	No	No	Yes	$80 B
Fund J	Yes	No	Yes	Yes	Yes	$60 B
Fund K	Yes	Yes	Yes	Yes	Yes	$52 B
Fund L	No	No	No	No	No	$28 B
Fund M	Yes	Yes	Yes	Yes	Yes	$27 B
Fund N	No	No	No	No	No	$21 B
Fund O	No	No	No	No	No	$17 B
Fund P	No	No	No	No	No	$16 B

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OIC

OREGON STATE TREASURY

TAB 10

ASSET ALLOCATION

& NAV UPDATES

Asset Allocations at April 30, 2023

OPERF	Policy	Target[1]	Regular Account $ Thousands	Regular Account Pre-Overlay	Regular Account Overlay	Regular Account Net Position	Regular Account Actual	Target Date Funds $ Thousands	Variable Fund $ Thousands	Total Fund $ Thousands
Public Equity	22.5-32.5%	27.5%	18,195,017	19.6%	(1,685,767)	16,509,250	17.8%	1,224,207	247,197	17,980,654
Private Equity	17.5-27.5%	20.0%	24,973,791	26.9%		24,973,791	26.9%			24,973,791
Total Equity	**45.0-55.0%**	**47.5%**	**43,168,808**	**46.5%**	**(1,685,767)**	**41,483,041**	**44.6%**			**42,954,445**
Opportunity Portfolio	**0-5%**	**0.0%**	**2,628,741**	**2.8%**		**2,628,741**	2.8%			**2,628,741**
Fixed Income	**20-30%**	**25.0%**	**18,330,510**	**19.7%**	**3,489,073**	**21,819,582**	23.5%	2,191,291		**24,010,874**
Risk Parity	**0.0%**	**0.0%**	**4,681**	**0.0%**		**4,681**	0.0%			**4,681**
Real Estate	**9.0-16.5%**	**12.5%**	**13,693,385**	**14.7%**	**(1,200)**	**13,692,185**	14.7%			**13,692,185**
Real Assets	**2.5-10.0%**	**7.5%**	**8,566,809**	**9.2%**		**8,566,809**	9.2%			**8,566,809**
Diversifying Strategies	**2.5-10.0%**	**7.5%**	**4,699,911**	**5.1%**		**4,699,911**	5.1%			**4,699,911**
Cash[2]	**0-3%**	**0.0%**	**1,822,659**	**2.0%**	**(1,802,106)**	**20,553**	0.0%		6,332	**26,885**
TOTAL OPERF		**100%**	**$ 92,915,503**	**100.0%**	**$ -**	**$ 92,915,503**	**100.0%**	**$ 3,415,498**	**$ 253,529**	**$ 96,584,531**

[1]Targets established in April 2023. Policy benchmark effective April 1, 2023, consists of: 27.5% MSCI ACWI IMI Net, 25% 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]Includes cash held in the policy implementation overlay program.

SAIF	Policy	Target	$ Thousands	Actual
Total Equity	**7-13%**	**10.0%**	**464,207**	**10.6%**
Fixed Income	**80-90%**	**85.0%**	**3,608,040**	**82.2%**
Real Estate	**0-7%**	**5.0%**	**285,193**	**6.5%**
Cash	**0-3%**	**0.0%**	**30,955**	**0.7%**
TOTAL SAIF			**$ 4,388,395**	**100.0%**

CSF	Policy	Target	$ Thousands	Actual
Global Equities	40-50%	45.0%	1,080,018	50.1%
Private Equity	8-12%	10.0%	182,109	8.5%
Total Equity	**58-62%**	**55.0%**	**1,262,127**	**58.6%**
Fixed Income	**20-30%**	**25.0%**	**557,003**	**25.9%**
Real Estate	**0-12%**	**10.0%**	**202,906**	**9.4%**
Alternative Investments	**0-12%**	**10.0%**	**116,706**	**5.4%**
Cash	**0-3%**	**0.0%**	**15,794**	**0.7%**
TOTAL CSF			**$ 2,154,536**	**100.0%**

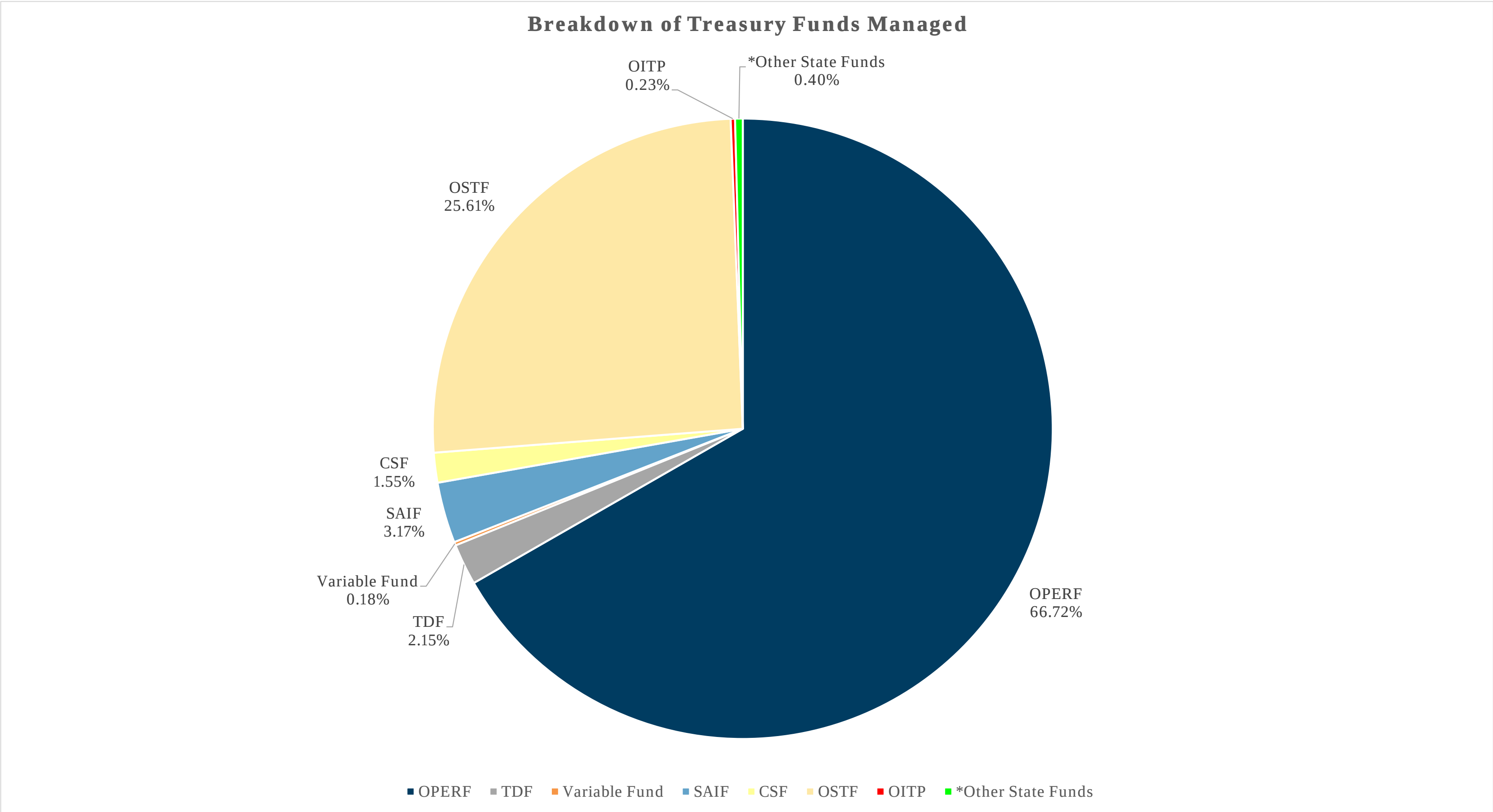
SOUE	Policy	Target	$ Thousands	Actual
Global Equities	**0-65%**	**N/A**	2,035	**75.6%**
Fixed Income	**35-100%**	**N/A**	656	**24.4%**
Cash	**0-3%**	**N/A**	0	**0.0%**
TOTAL SOUE			**$ 2,691**	**100.0%**

WOUE	Policy	Target	$ Thousands	Actual
Global Equities	**30-65%**	**55.0%**	1,621	**56.8%**
Fixed Income	**35-60%**	**40.0%**	1,098	**38.5%**
Cash	**0-25%**	**5.0%**	135	**4.7%**
TOTAL WOUE			**$ 2,854**	**100.0%**

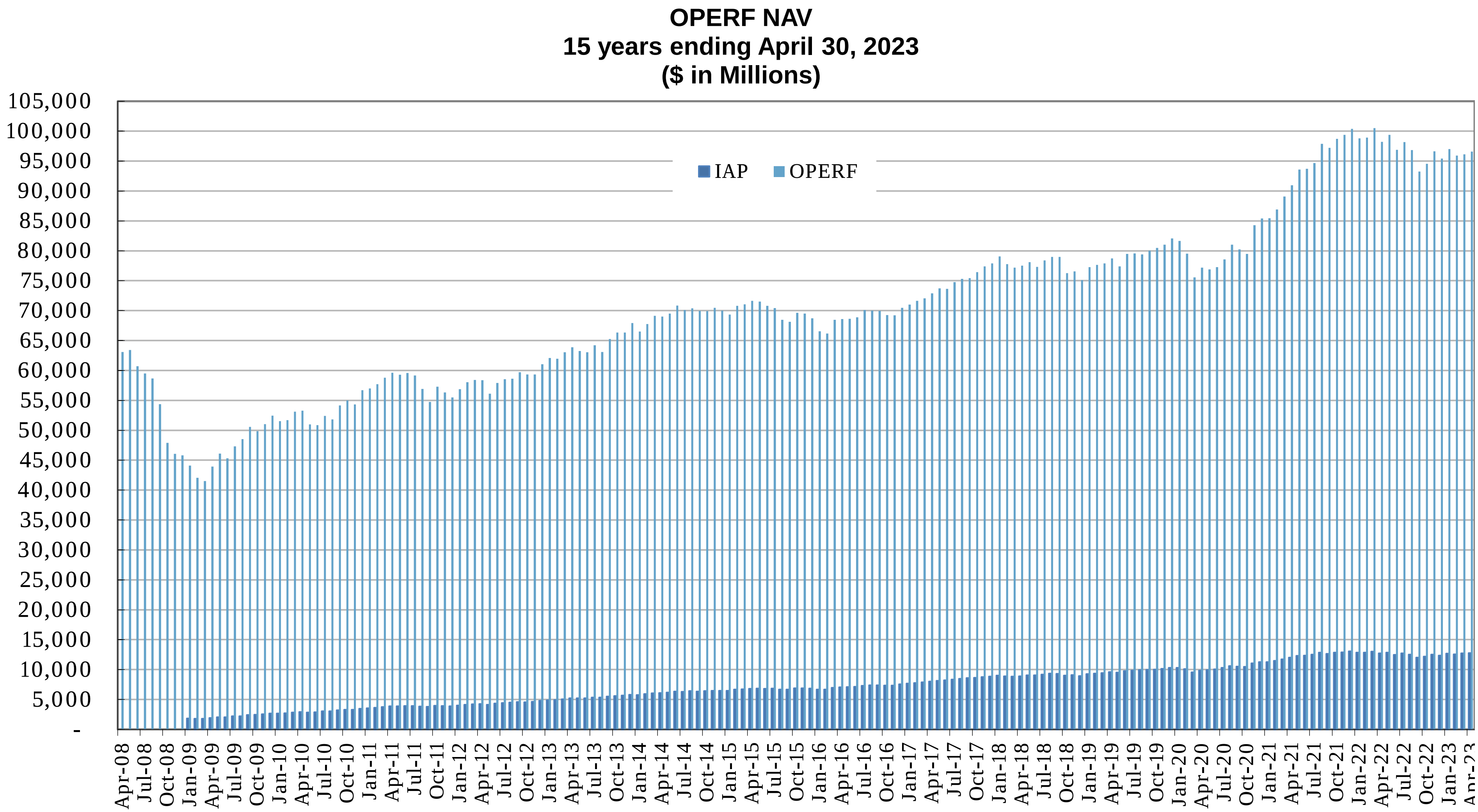
Oregon State Treasury Funds Managed as of April 30, 2023

OSTF, OITP & Other State Funds*	$ Thousands	Actual
OSTF	35,217,896	94.6%
OITP	315,859	0.8%
DAS Insurance Fund	75,682	0.2%
DCBS Operating Fund	207,319	0.6%
DCBS Workers Benefit Fund	143,516	0.4%
DCHS - Elderly Housing Bond Sinking Fund	1,336	0.0%
DCHS - Other Fund	13,910	0.0%
Oregon Lottery Fund	104,875	0.3%
DVA Bond Sinking Fund	95,417	0.3%
ODOT Fund	426,091	1.1%
OLGIF	238,050	0.6%
OPUF	389,728	1.0%
Total OSTF & Other State Funds	$ 37,229,677	100.0%

Total of All Treasury Funds**	$ 137,542,635



*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 April 30, 2023
($ in Millions)
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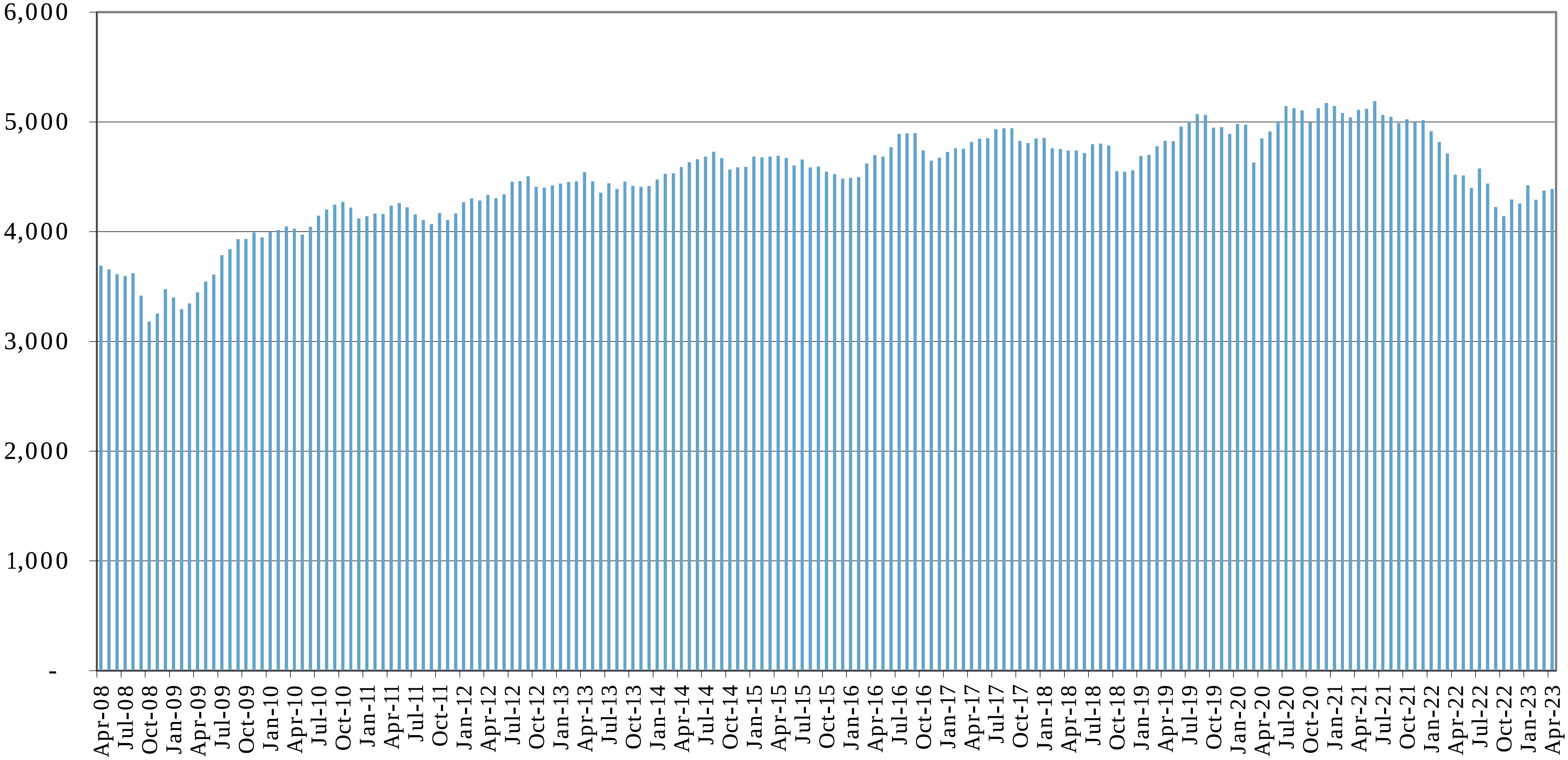
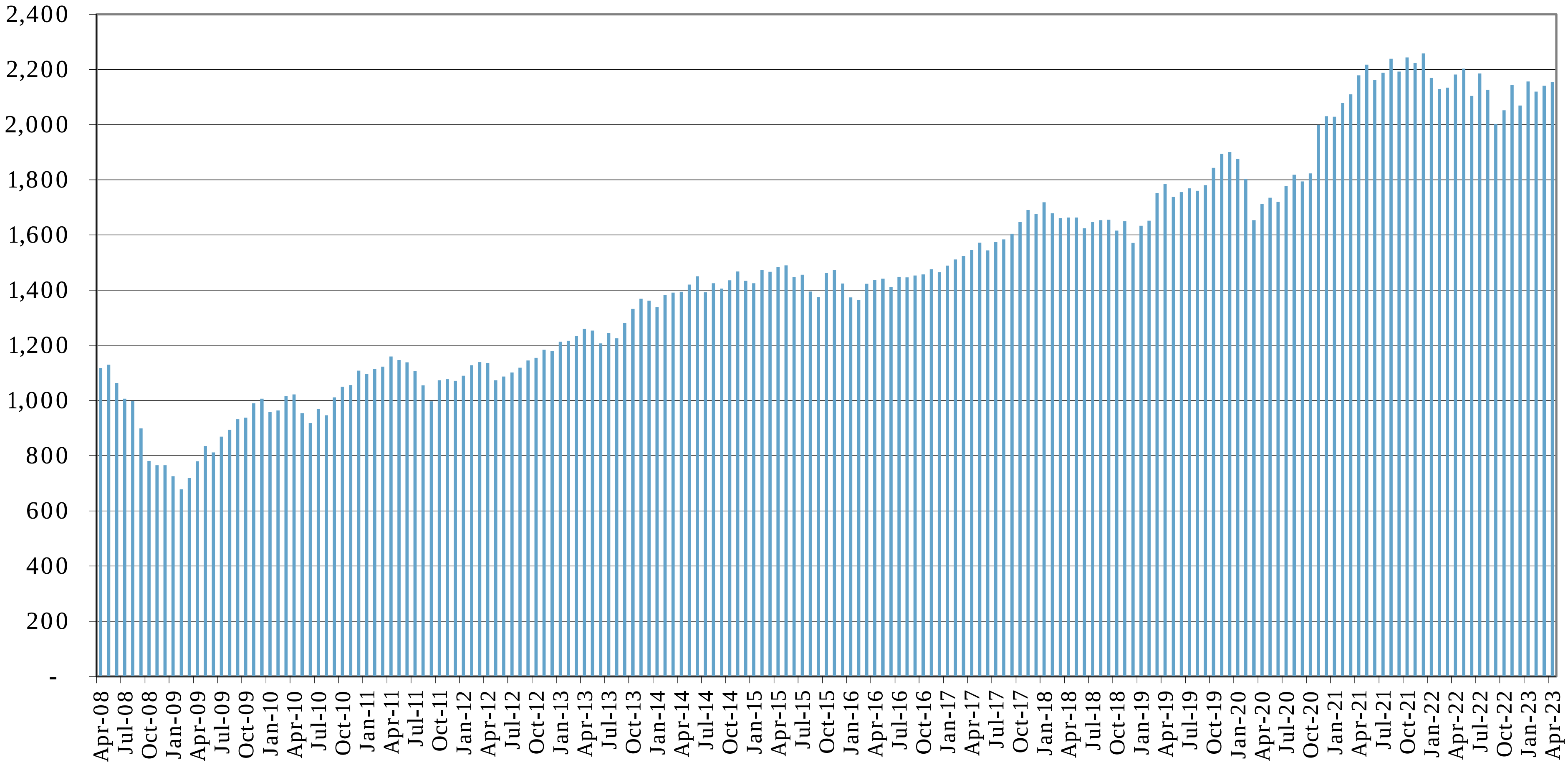
SAIF NAV
15 years ending April 30, 2023
($ in Millions)



CSF NAV
15 years ending April 30, 2023
($ in Millions)



TAB 11

CALENDAR – FUTURE

AGENDA ITEMS

2023-24 OIC Forward Calendar and Planned Agenda Topics

July 19, 2023	Diversifying Strategies Portfolio Review
September 6, 2023	Q2 Performance Review: OPERF, CSF, SAIF
October 25, 2023	Operations Annual Review CEM Benchmarking
December 6, 2023	Q3 OPERF Performance Public Equity Portfolio Review Fixed Income Portfolio Review: OPERF, OSTF
January 24, 2024	Private Equity Portfolio Review Opportunity Portfolio Review 2025 OIC Calendar Approval
March 6, 2024	2023 Performance Review: OPERF, CSF, SAIF Fixed Income Portfolio Review Real Estate Portfolio Review
April 17, 2024	Real Assets Portfolio Review Individual Account Program (IAP) Review OSGP Annual Review
May 29, 2024	Q1 Performance Review: OPERF

TAB 12

OPEN

DISCUSSION

OIC

OREGON
STATE
TREASURY

TAB 13

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