OREGON STATE TREASURY

Oregon Investment Council

September 7, 2022

Cara Samples
Chair

Tobias Read
State Treasurer

Rex Kim
Chief Investment Officer

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OREGON INVESTMENT COUNCIL

Agenda

September 7, 2022
9:00 AM

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

Time	A. Action Items	Presenter	Tab
9:00-9:05	1. **Review & Approval of Minutes** July 20, 2022	**Cara Samples** *OIC Chair*	1
	2. **Committee Reports**	**Rex Kim** *Chief Investment Officer*	2
9:05-10:00	3. **Cryptocurrency and Blockchain**	**Maxwell Stein** *Associate, DLT & Digital Assets, BlackRock*	3
10:00-10:30	4. **Common School Fund Investment Policy Statement**	**John Hershey** *Director of Investments* **Raneen Jalajel** *Associate Partner, Aon*	4

B. Information Items

10:30-11:30	5. **OPERF Preliminary Asset/Liability Analysis**	**Karl Cheng** *Senior Investment Officer, Portfolio Risk & Research* **Colin Bebee** *Managing Principal, Meketa* **Matthew Larrabee** *Principal, Milliman* **Scott Preppernau** *Principal, Milliman*	5

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

11:30-12:00	**6.**	**OPERF Q2 Performance**	**Allan Emkin** *Managing Principal, Meketa* **Mika Malone** *Managing Principal, Meketa* **Paola Nealon** *Managing Principal, Meketa*	**6**
12:00	**7.**	**Asset Allocation & NAV Updates** a. Oregon Public Employees Retirement Fund b. SAIF Corporation c. Common School Fund	**Rex Kim**	**7**
	8.	**Calendar — Future Agenda Items**	**Rex Kim**	**8**
12:00	**9.**	**Open Discussion**	**OIC Members** **Staff** **Consultants**	
12:00	**10.**	**Public Comments**		

OIC

OREGON STATE TREASURY

TAB 1

REVIEW & APPROVAL OF MINUTES

State of Oregon
Office of the State Treasurer

16290 SW Upper Boones Ferry Road

Tigard, Oregon 97224

OREGON INVESTMENT COUNCIL

July 20, 2022

Meeting Minutes

Members Present:	Cara Sample, John Russell, Lorraine Arvin, Tobias Read, Kevin Olineck
Staff Present:	Rex Kim, John Hershey, Michael Langdon, David Randall, Karl Cheng, Ben Mahon, Caleb Aldridge, Dmitri Palmeteer, Amy Bates, Austin Carmichael, Chris Ebersole, Wil Hiles, Claire Illo, Louise Howard, Michael Mueller, Aadrial Phillips, Caleb Aldridge
Staff Participating Virtually:	Kenny Bao, Tyler Bernstein, Taylor Bowman, Tan Cao, Uanne Chang, Andrew Coutu, Bradley Curran, Debra Day, Alli Gordon, Will Hampson, Ian Huculak, Emadul Islam, Roy Jackson, Aliese Jacobsen, Kristi Jenkins, Donald Johnson, Josh Jones, Amanda Kingsbury, Jeremy Knowles, Paul Koch, Mary Krehbiel, Steve Kruth, Michael Makale, Sommer May, Eric Messer, Tim Miller, Dana Millican, Mike Mueller, Dmitri Palmateer, Lisa Pettinati, Mohammed Quraishi, Andrew Robertson, Scott Robertson, Angela Schaffers, Mark Selfridge, Aleshia Slaughter, Stacey Spencer, Anna Totdahl, Andrey Voloshinov, Isabel Walter, Perrin Lim
Consultants Present:	Allan Emkin, Mika Malone, Christy Fields, Paola Nealon, David Glickman (Meketa Investment Group, Inc.); Ashely Woeste, Zoltan Karacsony (Aon Investments); Thomas Martin (Aksia/TorreyCove Capital Partners LLC); Ryan Fitzgerald (Albourne); Mike Acton, Candida Hoeberichts (AEW)
PERS Present:	Michiru Farney, Heather Case, Jake Winship
Legal Counsel Present:	Steven Marlowe (Department of Justice)

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

The July 20, 2022 OIC meeting was called to order at 9:00 am by Cara Samples, Chair.

I. 9:00 am Chair's Note

Chair Samples extended a welcome to new OIC Member Lorraine Arvin.

Before moving into the first agenda item, Chair Samples explained that one of the scheduled presenters had to cancel and will not be part of today's meeting.

II. **9:02 am Review and Approval of Minutes**

MOTION: Chair Samples asked for approval of the June 1, 2022 OIC regular meeting minutes. Vice-Chair Russell moved approval at 9:02 am, and Treasurer Read seconded the motion which then passed by a 4/0 vote.

III. **9:01 am Committee Reports**

Private Equity Committee:

June 28	TDR Capital Fund V, L.P.	€225M
June 28	Cinven Fund VIII, L.P.	€225M
July 19	USV 2022 Climate	<$20M

Real Estate Committee:

June 15	Windsor Columbia Realty Fund, LLC	$200M
June 15	Blackstone Real Estate Partners X, L.P.	$300M
	plus a separate approval for the CSF	$10M
June 15	Harrison Street Real Estate Partners Fund IX, L.P.	$150M
	plus a separate approval for the CSF	$10M
June 15	Harrison Street U.S. Separate Account V, L.P.	$200M
July 19	Columbia Office Properties	$150M

Opportunity Committee:

None

Alternatives Portfolio Committee:

June 27	Stonepeak Core Fund	$250M
June 27	Blackstone Energy Partners IV	$200M
	with a sidecar	$50M

IV. **9:03 am Oregon Savings Growth Plan: Consultant Renewal**

Louise Howard, Senior Investment Office, Public Equity, and Claire Illo, Investment Officer, Public Equity introduced a recommendation to renew a contract with Callan, LLC for general consulting for the Oregon Savings Growth Plan.

MOTION: Vice Chair Russell moved to approve the proposal at 9:06. The motion was seconded by Member Arvin, and passed by a 4/0 vote.

V. **9:06 am Common School Fund: Strategic Asset Allocation and Annual Review**

John Hershey, Director of Investments, and Raneen Jalajel, Associate Partner, Aon presented the Common School Fund Strategic Asset Allocation. Raneen Jalajel presented three different proposals and compared them to the current allocations and those of a reference peer group. Both Aon and Staff recommended adoption of Proposed Portfolio A.

MOTION: Chair Samples moved approval of the recommended asset allocation proposal at 9:48 am. The motion as seconded by Treasurer Read and passed by a vote of 4/0.

John Hershey and Wil Hiles, Investment Officer, Public Equity then presented the Common School Fund Annual Review. Topics included investment objectives, 2021 priorities, asset allocation, fund performance, performance of each asset type, and 2022 priorities.

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VI. **10:20 am Real Estate Market Review**

Michael Langdon, Director of Private Markets, introduced the topic speaker, Michael Acton, Managing Director, AEW.

Michael Acton presented a review of the real estate market.

VII. **11:25 am Asset Allocation & NAV Updates**

Rex Kim, Chief Investment Officer presented the asset allocation and NAV updates.

VIII. **11.27: am Calendar – Future Agenda Items**

Rex Kim presented the forward calendar.

IX. **11:28 am Open Discussion**

Kevin Olineck announced the next meeting of the PERS Board.

X. **11:29 am Public Comments**

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

Ms. Samples adjourned the meeting at 12:02 pm.

Respectfully submitted,
Aadrial Phillips
Executive Support Specialist

OIC

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TAB 2

COMMITTEE REPORTS

OIC

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TREASURY

TAB 3

CRYTOCURRENCY AND CLOCKCHAIN

TAB 4

COMMON SCHOOL FUND INVESTMENT POLICY STATEMENT

Oregon Investment Council

Common School Fund (CSF) Policy Review

Aon
Empower Results®

Executive Summary

- Aon and the Oregon State Treasury Investments Division have conducted a comprehensive review of the Common School Fund investment policy statement (IPS) and have proposed changes to the IPS to reflect best practices
- A well-written, comprehensive IPS is the best form of documentation as it clearly articulates who is responsible for which roles, including forms of delegation, defines the purpose and objective of the asset pool, and provides clear guidelines for ongoing monitoring and execution
    - IPS is one of the critical elements of the "Documentation of Process", an important component of demonstrating that you acted prudently
    - An IPS also ensures continuity by providing a framework for decision-making which is particularly important when personnel changes occur
- The following slides summarize the key components of an effective IPS and the enhancements made to the CSF IPS

Key Components of an Effective Investment Policy Statement (IPS) for Common School Fund

Key Components	Description	Covered by Existing CSF IPS?	Updates Made to CSF IPS
Introduction, Scope and Purpose	Provides an introduction to the organization, the scope of the IPS, appropriate fiduciary standards and the purpose and intent of the IPS	Key elements that are **not i**ncluded in the IPS • Description of the role or fundamental purpose of the CSF • Scope and purpose of the IPS • Fiduciary language	**Added** – See section I. *Introduction and Purpose*
Roles and Responsibilities	The Department of State Lands has ultimate fiduciary responsibility, however many ongoing responsibilities delegated to others need to be clearly articulated.	The four roles that are **not** included in the IPS • OIC • Investment Consultants • Custodian • Investment Managers The following role **is** described in the document • OST Staff	**Added** – See section II. *Roles and Responsibilities*
Investment Objectives	Clearly stated investment objectives will help establish appropriate asset allocation guidelines and other polices. Investment objectives are also important when reviewing the investment results.	Investment Objective is **not** fully outlined Example: The CSF should preserve and enhance the real (inflation-adjusted) market value of CSF's assets over the long-term, net of annual spending and expenses.	**Added** – See section III. *Investment Objectives*

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Key Components of an Effective Investment Policy Statement (IPS) for Common School Fund

Key Components	Description	Covered by Existing CSF IPS?	Updates Made to CSF IPS
Time Horizon	It is important to reference the applicable time horizon in order to set the right perspective when evaluating outcomes.	Time Horizon is **not** defined in IPS	**Added** – See section III. *Investment Objectives*
Risk Tolerance	Appropriate risk language and parameters for the investment program, particularly the willingness to accept downside risk in the near term, can help when assessing portfolio choices.	Risk Tolerance is **not** explained in IPS	**Added** – See section III. *Investment Objectives*
Spending Policy	CSF is relied upon to support both current and future spending needs for Oregon School Districts. Stating the CSF's target spending policy helps set expectations for the variability in spend.	Spending Policy is **not** outlined in IPS	**Added** – See section III. *Investment Objectives*
Asset Allocation Guidelines	Asset allocation may be the most important determinant of long-term success for the organization's investment program and should be described in the IPS. Rebalancing guidelines help guide the actions of staff without requiring additional committee approval.	IPS **Includes**: - Long-term allocation targets - Policy ranges - Description of each asset class and their primary portfolio purpose - Rebalancing methodology and frequency	**Maintained & Enhanced** – See section IV. *Asset Allocation Guidelines* & Section V. *Strategic Role Guidelines* *Note: Asset class targets and ranges were moved to Appendix A.

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Key Components of an Effective Investment Policy Statement (IPS) for Common School Fund

Key Components	Description	Covered by Existing CSF IPS?	Updates Made to CSF IPS
Performance Measurement & Evaluation	A regular review of performance helps the organization monitor the portfolio's progress toward the stated investment objectives. Identifying benchmarks to help measure and evaluate the portfolio's performance provides tangible metrics to guide this process.	Asset class benchmarks **are** included in the IPS Total Fund Benchmark is **not** directly stated in the current IPS	**Added** – See section VI. *Performance Measurement and Evaluation* *Note: *Interim Policy Benchmark* is now defined and Reference Portfolio is added as a secondary benchmark.
Additional Considerations	• **Liquidity Considerations—** Defining liquidity risk and outlining how its managed helps the organization monitor the liquidity profile of the portfolio • **Frequency of IPS Review—**It is prudent to review the IPS on a periodic basis.	It is **not** described in IPS It is **not** described in IPS	**Added** – See section III. *Investment Objectives* under Risk section **Added** – See section I. *Introduction and Purpose* under Purpose section

Investment Policy Statement

for

the Common School Fund

Adopted – September 7, 2022

Table of Contents

I. INTRODUCTION AND PURPOSE

Introduction:

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

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

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

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

Authority:

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

Purpose:

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

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

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

II. ROLES AND RESPONSIBILITIES

<u>Oregon Investment Council</u>

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

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

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

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

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

Oregon State Treasury Staff

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

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

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

Investment Consultants

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

Investment Professionals

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

Custodian

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

III. INVESTMENT OBJECTIVES

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

Spending Policy

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

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

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

Time Horizon

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

Diversification

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

Risk

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

A. Risk Standards and Metrics

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

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

B. Liquidity

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

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

C. Foreign-Exchange Risk Management

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

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

IV. ASSET ALLOCATION GUIDELINES

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

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

Rebalancing Guidelines

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

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

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

V. STRATEGIC ROLE GUIDELINES

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

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

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

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

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

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

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

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

VI. PERFORMANCE MEASUREMENT AND EVALUATION

Total Portfolio Performance:

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

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

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

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

Strategy Performance:

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

Review and Reporting:

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

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

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

By:____________________________________
(Title)

Appendix A

Asset Allocation Strategy Targets & Range

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

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

INTRODUCTION & OVERVIEW

Summary Policy Statement

The Oregon Investment Council ("OIC") formulates policies for the investment and reinvestment of funds under the control and administration of the Department of State Lands ("DSL"), known as the Common School Fund (the "Fund"). This policy provides guidance to Oregon State Treasury ("OST") staff and advisors regarding approved asset classes, asset allocation, and reporting requirements for the Fund.

Purpose and Goals

The investment objective for the Fund is to maximize risk-adjusted return, while remaining consistent with Fund goals as established by DSL's board (the "State Land Board"). The OIC has approved the following asset classes to meet the Fund's investment objective: 1) Global Equity; 2) Private Equity; 3) Fixed Income; 4) Real Estate; 5) Alternatives; and 6) Cash (each as defined below). This policy will outline the strategic role of each asset class and provide further guidance to OST staff on the investment program.

Applicability

Classified represented, management service, and unclassified executive service staff.

POLICY PROVISIONS

Policy Statements

A. **Asset Allocation**
   Recognizing the general objectives and operating philosophy of the Fund, the OIC has approved the following asset classes and target ranges:
   1. **Global Equity.** Domestic and international investments that represent a direct ownership of, or interest in, a corporation, and the shares of which are traded in public securities markets.
   2. **Fixed Income.** Investments in loans and other debt. This asset class may include mortgage-backed, asset-backed and structured securities.
   3. **Private Equity.** Investments in privately-held companies or corporations including buyouts and venture capital. Fund of funds investing and purchases of secondary interests may also be included in this category.
   4. **Alternatives.** Investments will be diversified through exposure to a variety of alternative investment assets and strategies, including infrastructure, natural resources, and other diversifying strategies.
   5. **Real Estate.** Investments will be diversified through exposure to a variety of real estate investment strategies, including core, value add, and opportunistic.
   6. **Cash.** Cash and cash equivalents are defined as cash held in OST's Oregon Short Term Fund.

Asset Class	Benchmark	Target Allocation	Range
Global Equity	MSCI ACWI IMI Net	45%	40% - 50%•
Private Equity	Russell 3000 + 300 bps	10%	8% - 12%
Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	25%	20% - 30%

Real Estate	NCREIF-ODCE	10%	0% - 12%
Alternatives	CPI+ 4%,	10%	0% - 12%
Cash	Cash	0%	0% - 3%

7. OST staff shall monitor the Fund's actual asset allocations relative to OIC-established targets on a monthly basis. A sustained and material deviation outside of the approved ranges shall trigger a rebalancing back towards established targets with due consideration given to any liquidity constraints and/or potential transactions costs. Whenever possible, the Fund's cash flows will be used to rebalance between asset classes. Alternative investments will receive special consideration and staff will receive additional flexibility in building out this asset class given its still-nascent status.
8. OST will work with the State Land Board and DSL staff to ensure the Fund's asset allocation policy comports with the State Land Board's goals for the Fund. Moreover, the OIC shall not make asset allocation changes without considering input from the State Land Board or DSL staff.
9. Formal asset allocation reviews will be performed at least every 3 years to ensure that the Fund is positioned properly. These reviews will be performed by OST staff in conjunction with the OIC's general consultant.

B. **Global Equity Investments**

The strategic role of publicly-traded equity securities is to provide one of the highest expected returns among approved asset classes for the Fund. The Fund's Global Equity portfolio also provides liquidity necessary to meet its cash distribution obligations.

1. The Fund's Global Equity portfolio is structured on a global basis, seeking to loosely replicate the country and market capitalization characteristics of the MSCI ACWI lnvestable Market Index (MSCI ACWI IMI Net).
2. OST staff will seek to enhance returns through selective active management, provided such actively managed strategies demonstrate empirical efficacy relative to factor exposures and net of all fees and transactions costs.
3. Benchmarks assigned to all non-U.S. strategies should be unhedged. Managers may be permitted to hedge currency exposures, and in cases where currency represents an explicit element of a manager's stated investment approach, may take active currency positions.
4. Proxies associated with separately managed accounts will be voted by OST's third-party proxy voting agent.

C. **Fixed Income Investments**

The strategic role of fixed income securities is to diversify the Fund in general and its allocation to equity securities in particular. The Fixed Income portfolio provides liquidity necessary to meet its cash distribution obligations.

1. The Fund's Fixed Income portfolio is structured as a well-diversified bond portfolio.
2. The benchmark is the Bloomberg Barclays U.S. Aggregate Bond Index (the "Benchmark").
3. Actively-managed strategies are expected to outperform stated benchmarks on an after-fee and risk adjusted basis, over a 3-5 year market cycle while remaining within reasonable risk parameters.

D. **Private Equity Investments**

The strategic role of private equity investments is to enhance return and diversification opportunities for the Fund. While potentially more volatile than public equity, private equity provides a diversification benefit and the opportunity to achieve higher returns.

1. The Fund's Private Equity portfolio will include investments with a select group of large, established and historically successful private equity partners and will generally be accessed through limited partnership interests.
2. Diversification in the Fund's Private Equity portfolio may be accomplished through any of the following: investment style or strategy; geographic focus; sector allocation; and capitalization.
3. Partnership agreements shall conform to current industry standards and shall be subject to legal sufficiency approval by and through OST legal counsel.

4. The Fund's Private Equity portfolio is expected to achieve total returns greater than the Russell 3000 + 300 basis points, net of fees, over a three- to five-year investment cycle.

E. **Real Estate Investments**
The strategic role of real estate investments is to enhance return and diversification opportunities for the Fund.
1. Diversification in real estate may be accomplished through exposure to a variety of real estate debt and equity investment strategies, property types (i.e., office, industrial, retail, multifamily, hospitality, etc.), geographic location, and various stages of a property life-cycle from development to stabilized.
2. The Fund's Real Estate portfolio is expected to achieve total returns greater than the NCREIF Fund Index - Open-End Diversified Core Equity (NFI-ODCE), net of fees.

F. **Alternative Investments**
The strategic role of alternative investments is to enhance long-term return and diversification opportunities for the Fund. A lower correlation between the returns of alternative investments and other Fund assets is expected, and alternative investments are therefore expected to provide an added measure of diversification to overall Fund returns.
1. Diversification in alternative investments may be achieved through exposure to a variety of possible alternative investment assets and strategies, including, but not limited to, infrastructure, natural resources, and other diversifying strategies.
2. The Fund's Alternatives portfolio is expected to achieve total returns greater than the Consumer Price Index for All Urban Consumers ("CPI") plus 400 basis points, net of fees.

G. **OST Staff Authority**
With approval from the Chief Investment Officer ("CIO") and quarterly notification to the OIC, OST staff may:
1. Terminate "at will" any public equity or fixed income manager or mandate according to the terms of its contract with, and on behalf of, the OIC;
2. Rebalance between and among managers within the Fund's Global Equity or Fixed Income portfolios. The aggregate, structural characteristics of the portfolio will be considered during such rebalancings;
3. Rebalance between and among open-end core real estate funds within the Real Estate Portfolio. The aggregate, structural characteristics of the portfolio will be considered during such rebalancings;
4. Convert any public equity long-only implementation to a 130/30 strategy, provided such implementation does not change the mandate's role within the Fund's Global Equity Portfolio; and
5. Retain an external manager in any of the five asset classes that has been approved by the OIC on behalf of the Oregon Public Employees Retirement Fund ("OPERF").

H. **Compliance**. The OST Compliance program will a) monitor and evaluate portfolios and asset classes and determine compliance with OST policies and contractual obligations; b) identify instances of non-compliance and develop and execute appropriate resolution strategies; c) provide relevant compliance information and reports to OST management and the Fund, as appropriate; and d) when applicable, verify resolution by the appropriate individual or manager within the appropriate time frame.

I. **Review and Reporting**
1. **OST/OIC Reviews.** OST staff will continuously review asset allocations and investment performance, and present their review and conclusions to the OIC on no less than an annual basis. These reviews will focus on the continued appropriateness of existing policy, compliance with guidelines and performance relative to Fund objectives. A formal process shall be established allowing DSL staff to meet with OIC's general consultant on an annual basis to discuss investment management and asset allocation issues. In addition, DSL staff will have the opportunity to address the OIC annually to discuss the State Land Board's particular views regarding Fund performance and related management issues.
2. **Presentation to State Land Board.** OST staff will arrange for and lead a formal review of the Fund at a meeting of the State Land Board on at least an annual basis. OST and DSL staff will coordinate in advance of each meeting to develop an agenda.

Exceptions

None.

Failure to Comply

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

OIC

OREGON
STATE
TREASURY

TAB 5

OPERF PRELIMINARY ASSET/LIABILITY ANALYSIS

MEKETA

INVESTMENT GROUP

Oregon Investment Council

September 7, 2022

2022
Preliminary Asset-Liability Study Results

Table of Contents

Introduction and Goals of Today

Introduction

→ This presentation seeks to spark dialogue and discussion among the OIC, Staff, and consultants.

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

- Current Policy
- Actual Allocation
- Multiple illustrative portfolios (e.g., less risk, more risk, etc.)

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

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

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

Goals of Today

→ One of the primary goals is to solicit feedback from the OIC pertaining to other potential portfolios to examine, additional metrics to show, etc.

- A key element of this process is to identify and quantify major tradeoffs.

→ **Primary takeaways:**

- OPERF is currently well-positioned to maintain consistent funding progress.
- Potential allocation changes that would impact asset-liability metrics:
  - Increase private markets
    - More "optimal" portfolio but increase to an already illiquid portfolio.
  - Decrease private markets
    - Less "optimal" portfolio but improves liquidity and optionality.
  - Increase Diversifying Strategies
    - More "optimal" portfolio but results in increased manager selection risk (i.e., implementation matching expectations is critical).

Review of Prior Discussions

Review of Prior Discussions

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

- April | Risk and Implementation Survey Results
- June | Capital Market Assumptions

→ These items represent material inputs and guidance for the modeling process.

→ The major takeaways from these discussions are provided on the subsequent pages.

Risk and Implementation Survey

→ Survey results served as a foundation for the asset-liability modeling process. They helped frame the inputs (e.g., classes and constraints) and output goals (e.g., key metrics and characteristics).

→ For the vast majority of topics, there was a high level of consensus within each of the respective groups (i.e., within the OIC and within Staff).

→ The results supported the current trajectory of the OIC/OPERF. There was nothing in the results that suggested a material deviation was desired.

→ **Primary takeaways**:

- Overall goal: maintain consistent progress on funded ratio.
- Critical considerations to achieve goal: avoid major drawdowns and focus on corresponding implications of negative net cash-flow.
- Widespread support for illiquid strategies, Risk Parity, and Diversifying Strategies.
- Willingness to explore the incorporation of equity hedging strategies (e.g., tail risk).
- Separate from the asset-liability study, further clarification of certain classes (e.g., Diversifying Strategies) will be prudent.

Investment Beliefs

→ In addition to the survey results, the *Statement of OIC Investment and Management Beliefs* served as a foundational document for analyzing the current portfolio and any modifications thereof.

→ The primary investment beliefs that relate to this asset-liability study are:

- Investment management is dichotomous – part art and part science.
- The OIC is vested with the authority to set and monitor portfolio risk. Both short-term and long-term risks are critical.
- Asset allocation drives risk and return.
- The equity risk premium will be rewarded.
- Private market investments can add significant value and represent a core OIC/OST competency.
- Capital markets have inefficiencies that can be exploited.

→ These beliefs were directly incorporated into the asset-liability study.

Capital Market Assumptions ("CMAs")

→ The June discussion was a deep dive into the CMA development process.

→ CMAs are the inputs needed to calculate a portfolio's expected return, volatility, and relationships (i.e., correlations) to the broader markets.

- CMAs are also used in mean-variance optimization, simulation-based optimization, asset-liability modeling, and every other technique for finding "optimal" portfolios.

→ Consultants (including Meketa) generally set them once per year.

- Our results are published in January based on December 31 data.
- During periods of heightened market volatility (such as 2022), we may make mid-year adjustments.

→ This involves setting long-term expectations for a variety of asset class/strategy attributes:

- Returns (note: all returns discussed in this presentation are geometric/compound returns)
- Standard Deviations
- Correlations
- Higher Moments of Distributions (e.g., skewness, kurtosis, etc.)

Capital Market Assumptions and Market Dynamics

Mid-2022 Summary

→ 2022 has proven to be a volatile year.

- Global equity markets have steadily declined throughout the year, but valuations remain elevated.
- Sovereign bond yields have continued to rise.
- Credit spreads have widened to near or above their long-term historical averages.
- Private market valuations have yet to reflect the current capital market environment.

→ The month of July was a partial reversal from the first six months of the year, but the general trends remain intact.

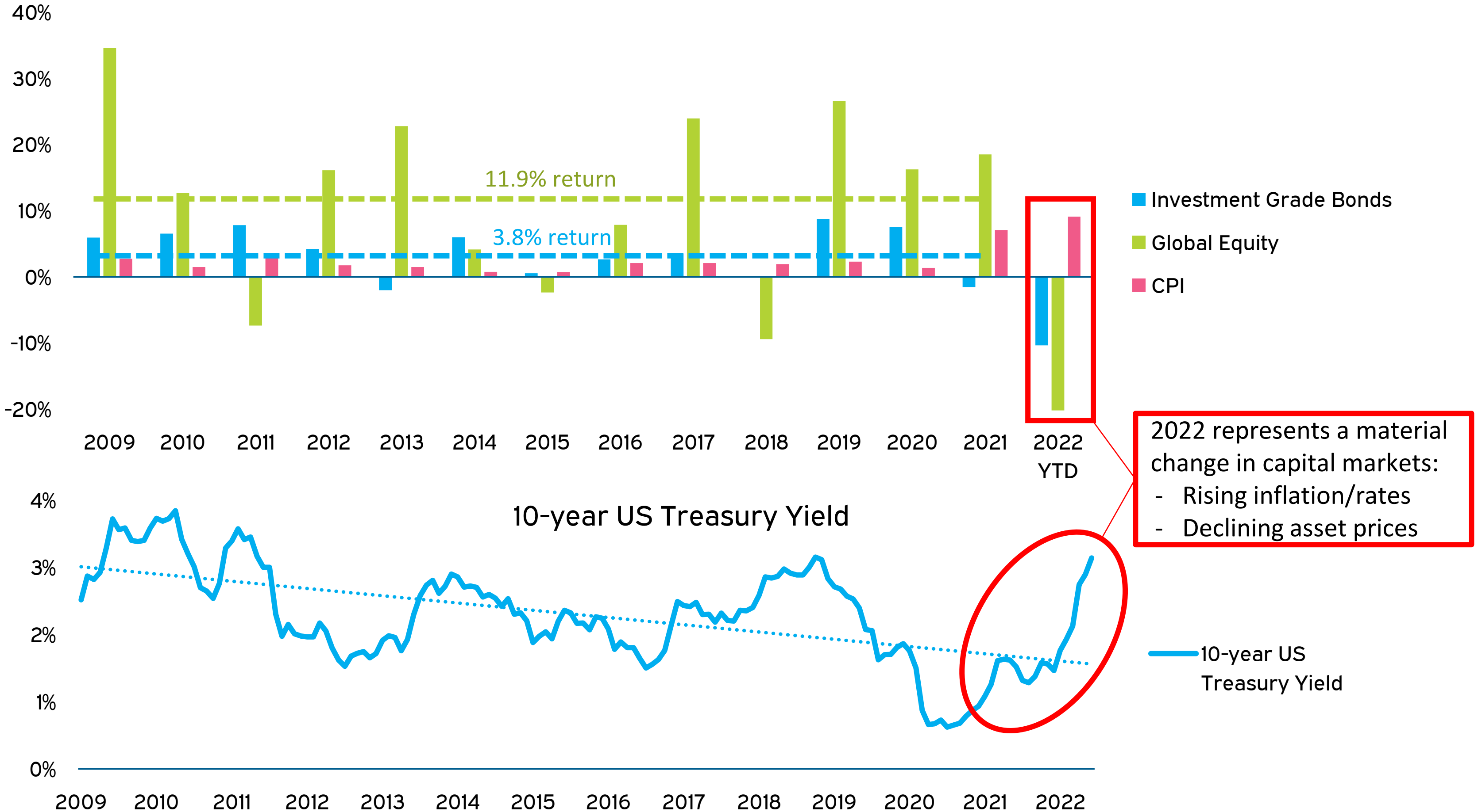
→ Both Meketa and Aon updated CMAs as of 6/30/22.

→ For investors who are revisiting their asset allocations (e.g., asset-liability studies), it is important to spend time examining the capital market assumptions.

- Meketa, Aon, and OST Staff held meaningful discussions on the topic.
- The final expected returns that were utilized in the process represented a simple average of Meketa and Aon recommendations.

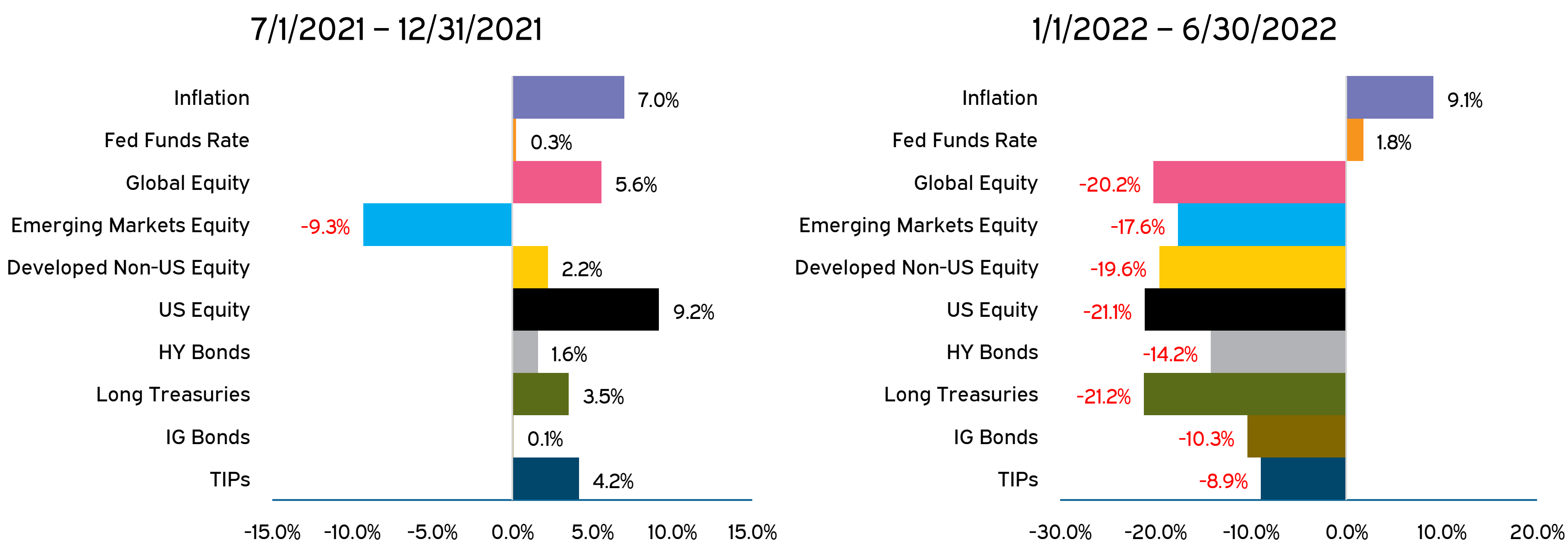
Looking Back - A Decade+ of Tailwinds

Equities, Bonds, and Inflation | 2009-2022 YTD (as of 6/30/22)



Source: Bloomberg, MPI Stylus

Trailing One Year (as of 6/30/22) – Two Different Stories



→ Q3 2021 through Q4 2021 was a fairly benign market (excluding emerging markets equity).

→ Over the most recent two quarters, there has been nowhere to hide in traditional markets.

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

Final CMAs

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

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

Expected Returns (%)

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

Annual Volatility (%)

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

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

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

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

Overview of Process

Strategic Allocation: The foundation for long-term portfolio structure

Key aspect:
Define risk & determine Council's tolerance for that risk (e.g., contribution levels, portfolio drawdowns, illiquidity, funding levels, etc.)

Tolerance for risk:
Heavily influences policy selection

Plan Assets

Heavily influence overall plan risk

90%

% of portfolio volatility explained by asset allocation policy*

Strategic Asset Allocation was last updated in 2021

*_Does Asset Allocation Policy Explain 40, 90, or 100 Percent of Performance?_ Roger G. Ibbotson and Paul D. Kaplan (2000, Financial Analysts Journal)

Priorities for the 2022 A/L Study

→Clarify sensitivities to various types of plan risks

→Examine relevant capital market assumptions and asset class constraints (i.e., forward-looking expectations and implementable changes)

→Optimize the investment portfolio as part of a total system*

*While the liability structure is separate from the OIC's responsibility, being aware of total system dynamics is best practices.

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

1.
Develop an understanding of **how the financial condition of OPERS/OPERF might vary** based on outcomes of the investment portfolio.

2.
Set a consensus definition and view of the risk(s) the OIC is willing to bear.

3.
Once a view/tolerance for risk has been established, **select an appropriate long-term investment strategy** (i.e., a policy portfolio / strategic allocation).

Pension Plan Dynamics

→ There are three primary levers that determine a pension system's current and future health:

1. Contributions
2. Investment Returns
3. Benefits

Input

Output

→ OIC can only impact #2 (Investment Returns).

- Due to variability and risks within the capital markets, this impact is imperfect.
- Costs (i.e., net returns) are key to consider.

→ Constructing an investment portfolio that is cognizant of the other levers is best-practices.

→ OPERS's liability structure (i.e., contributions and benefits) is highly complex.

Primary OPERF Considerations

1. Negative net cash-flow
   - Potential to magnify negative capital market events.
2. Challenging global capital market environment
   - Material uncertainties further complicate the CMA development process.
3. Complex liability structure
   - Asset-liability study may produce interesting results and is best conducted with the PERS actuary.
4. Significant private markets exposures
   - Presents implications for incorporating material policy target changes in a single study.

→ While #1 and #2 are common amongst peers, #3 and #4 are more OPERF-specific.

Approach to Asset-Liability Studies

→ An asset-liability study is a dimension reducing exercise.

- Take the immense complexities of a defined benefit system and the global capital markets and reduce them to a digestible form.

→ We are continually improving our methodologies and models to better reflect the real world and the full dynamics of retirement systems.

- Be humble, but rigorous, about the models.
  - There is "error" at every level of the modeling process (inputs, outputs, etc.).
- "As simple as possible but as complex as necessary."

Asset-Liability Modeling Principles

→ Council members' perspectives regarding risks and implementations are paramount.

→ The financial position (i.e., liabilities) of a system should be explicitly considered.

→ The "efficient frontier" is not a thin line.

- It is important to analyze and understand portfolios that are "near optimal."

→ Even for long-term investors, the journey matters.

- Examining short-term, intermediate-term, and long-term outcomes provides better balance to the decision-making process.

Simulation-Based Optimization

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

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

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

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

→ Differs from traditional mean-variance optimization.

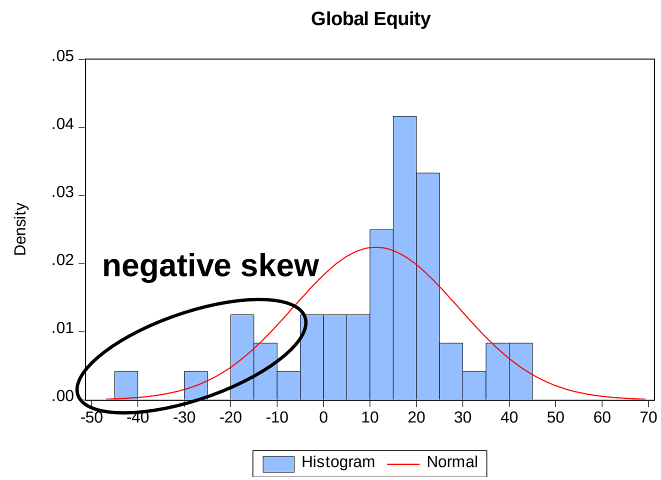
- Mean-Variance Optimization ("MVO"):
  - Workhorse for asset allocation analysis since the 1950s
  - Single-period model
  - Assumes normal distributions and linear relationships
  - Only examines risk under standard deviation lens
  - Doesn't incorporate crisis situations (i.e., correlations moving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

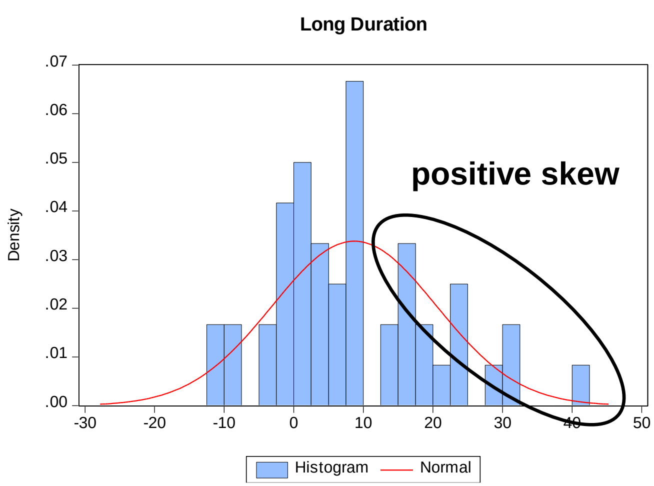
Examples of Non-Normality:
(distributions of annual returns)

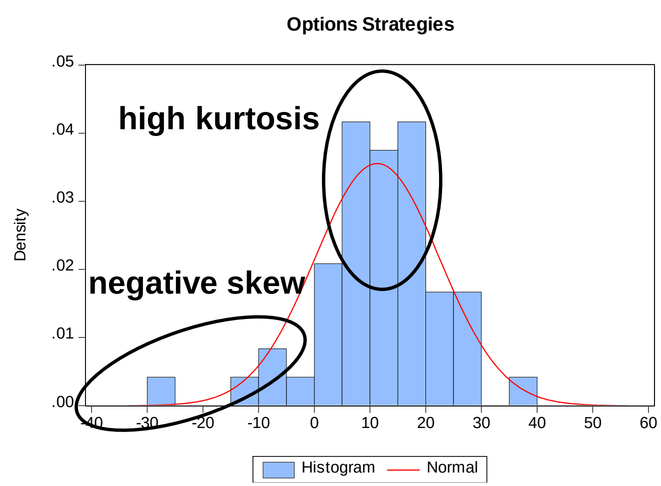
→ Simulation approach directly incorporates.

→ An issue in the near-to-intermediate term; long-term much less so.

→ Asset asymmetry may lead to different portfolio solutions compared to MVO.







Liability Structure

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

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

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

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

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

→ In addition to simulations for different total portfolios, Meketa provided Milliman with corresponding simulations for public equity and inflation.

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

Modeling Process

80%	20%
- Development of risk/return assumptions - Development of constraints - Model engineering, testing, and refinement - Optimization runs	- Examining reasonableness - Initial transition planning - Smoothing out any over-engineering

→ "All models are wrong, but some are useful."
  – George Box, English Statistician

→ "Prediction is very difficult, especially if it's about the future."

- Nils Bohr, Nobel Laureate in Physics

→ Ultimately, portfolio selection should represent the combination of mathematical rigor, economic intuition, implementation reasonableness, and a heavy dose of humility.

Constraints and Model Output

Examining the Efficient Frontier

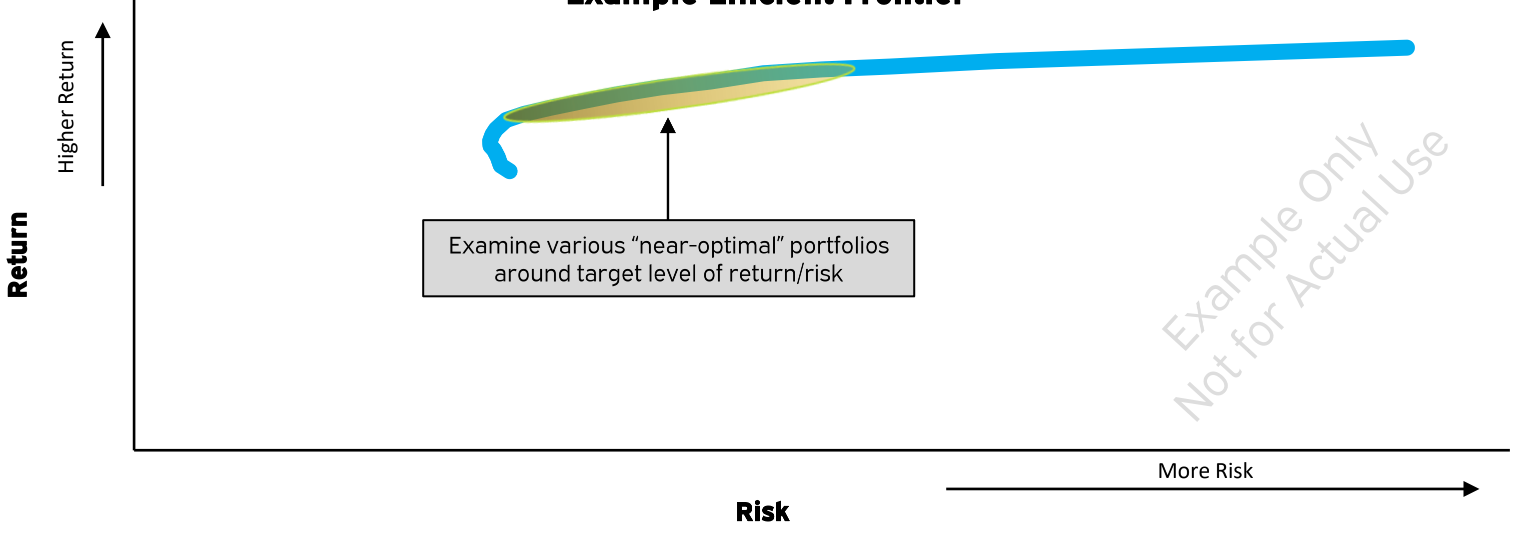
→ Strategic allocation optimizations produce an "efficient frontier," which is a series of portfolios with the highest expected return for a given level of risk.

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

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

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

Example Efficient Frontier



Modeling Process

→ The first step involves running optimizations with a set of relaxed weight constraints (i.e., unconstrained).

→ Multiple iterations are run with modifications to the constraints as the output is analyzed.

- Constraints are meant to guide the model, not force it.

→ Optimization models are notorious for finding "corner solutions."

- i.e., "optimal" portfolios that are concentrated in certain assets.

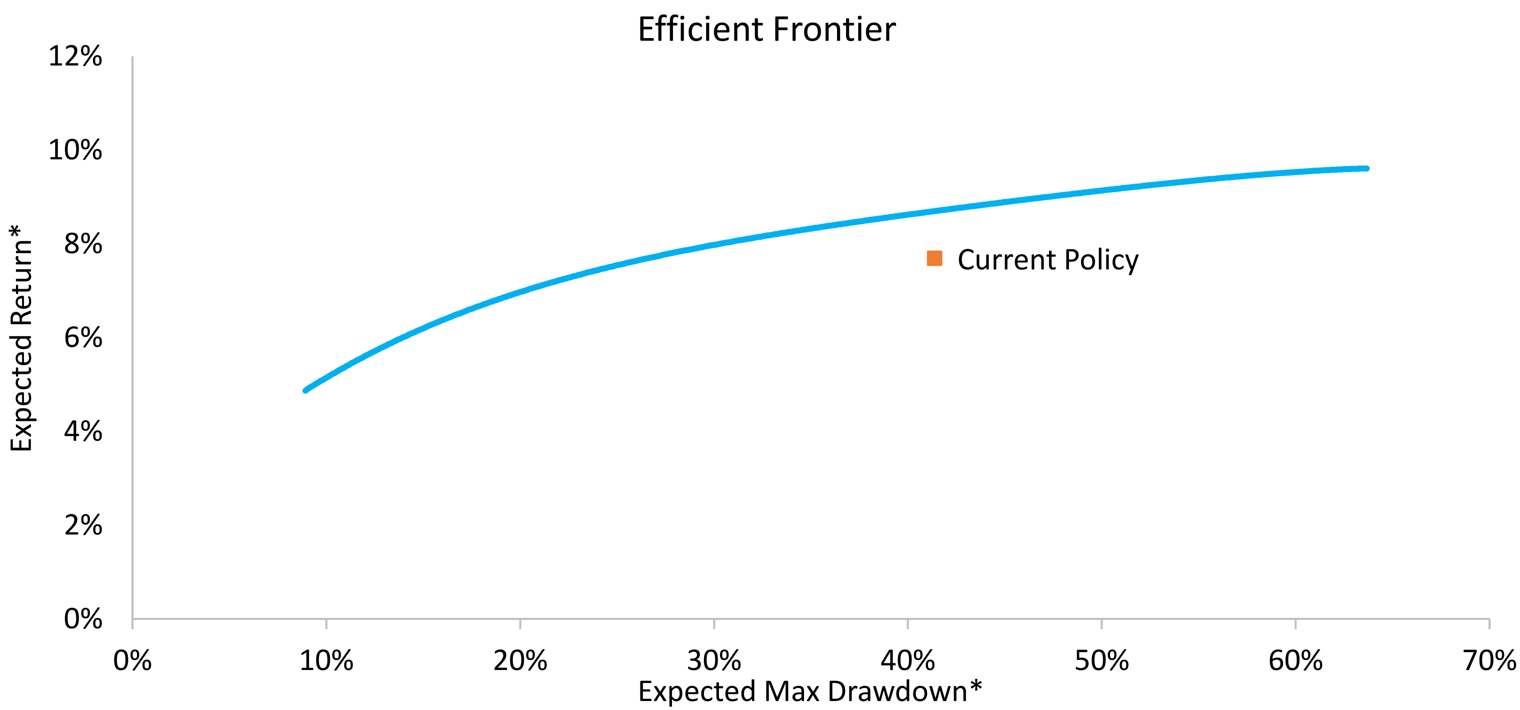
→ The constraints assist in guiding the model towards logical and implementable weights.

→ The modeling process focuses first on asset-only optimizations, with potential portfolios analyzed in concert with the liability structure via simulations.

Initial "Unconstrained" Model

Asset Class/Strategy	Minimum Weight	Maximum Weight
Public Equity	0.0	100.0
Fixed Income	0.0	100.0
Risk Parity	0.0	100.0
Private Equity	0.0	100.0
Real Estate	0.0	100.0
Real Assets	0.0	100.0
Diversifying Strategies	0.0	100.0

Initial "Unconstrained" Model

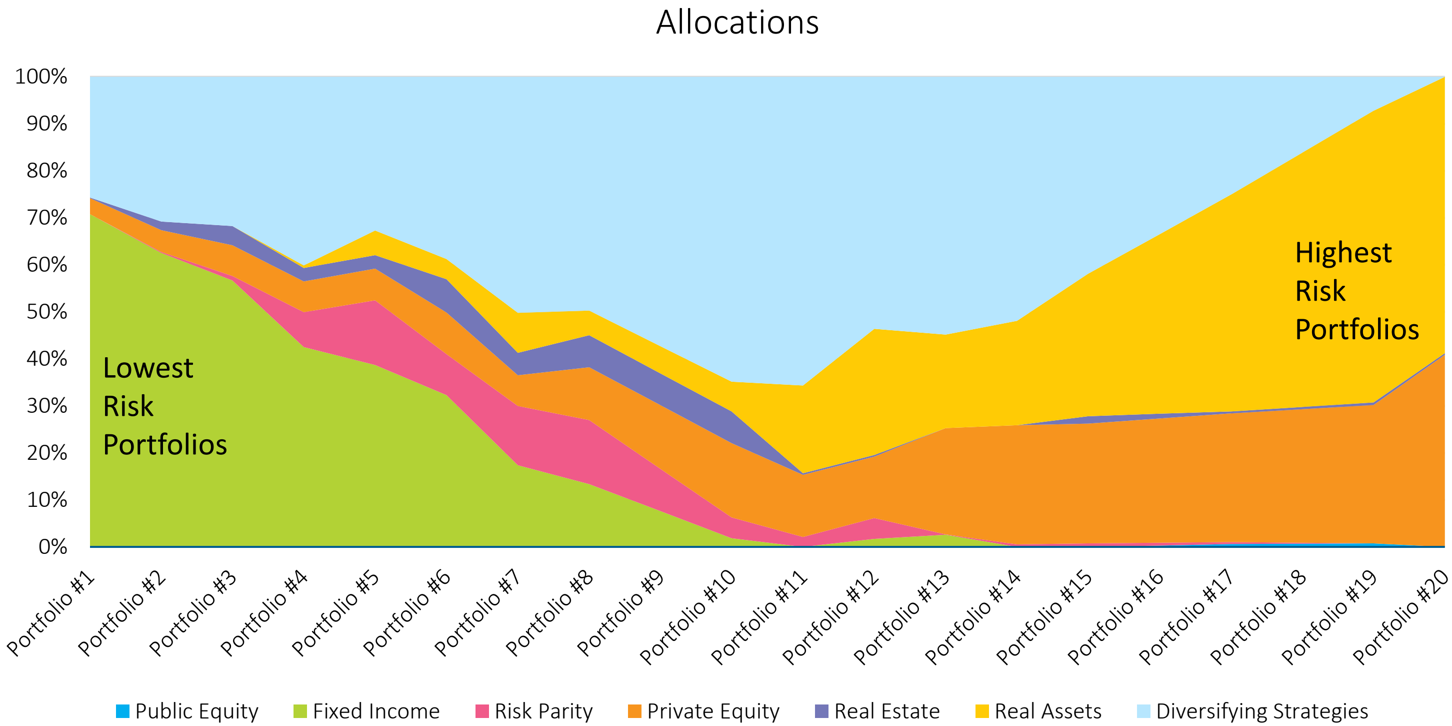


→ For systems with negative net cash-flow situations, focusing on "drawdown" as the risk metric is more productive than "standard deviation."

→ While *Current Policy* is not on the "unconstrained" efficient frontier, it is near the efficient frontier and most allocations on the frontier could not be implemented.

*See Appendix for methodology/calculation details

Initial "Unconstrained" Model



- → On the lower end of the risk spectrum, model favors Fixed Income and Diversifying Strategies.
- → Middle portion of the risk spectrum utilizes several asset classes roughly equally but materially allocates to Diversifying Strategies.
- → High risk allocations are biased towards Real Assets and Private Equity.

Final "Constrained" Model

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

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

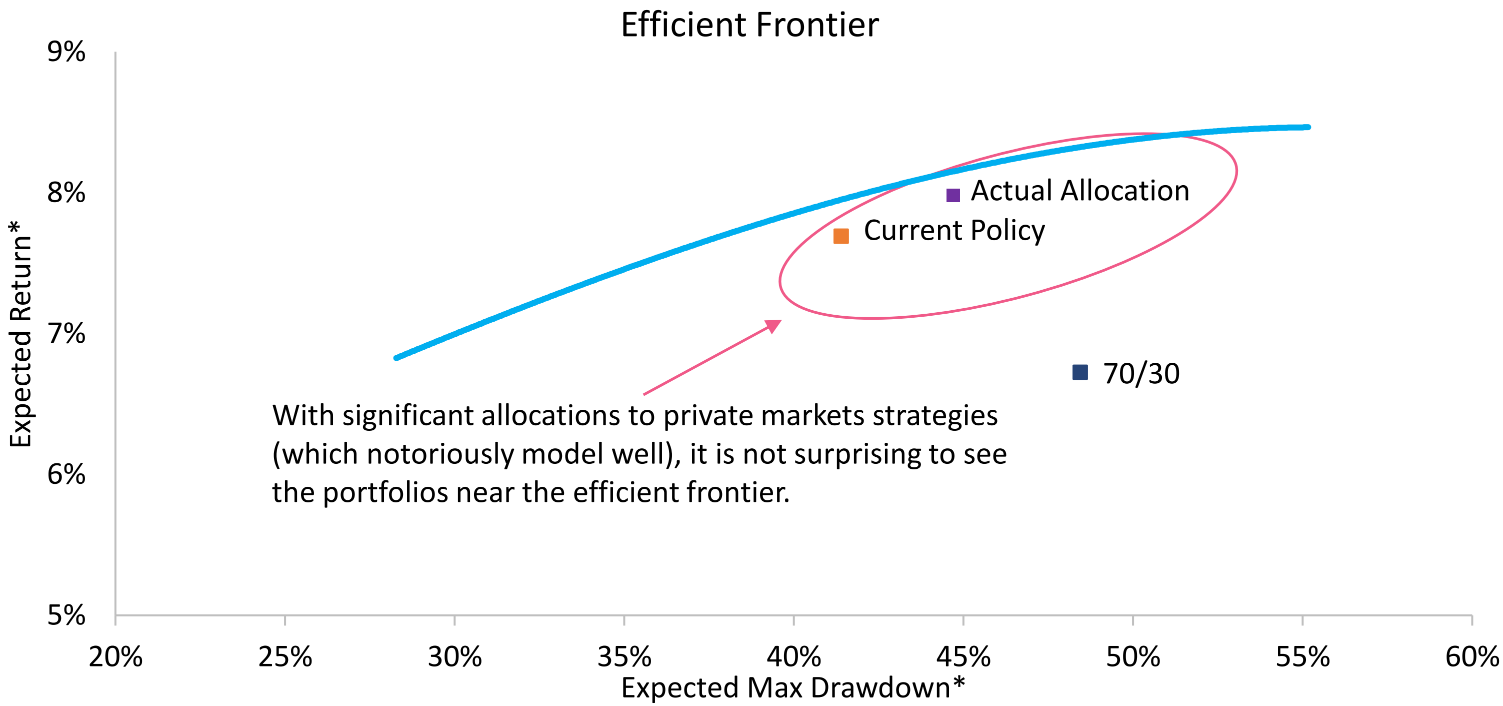
→ The minimums are primarily focused on addressing allocations that cannot be easily shifted away from in the near-term (i.e., within 3-5 years).

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

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

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

Final "Constrained" Model



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

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

*See Appendix for methodology/calculation details

Asset-Liability Integration

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

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

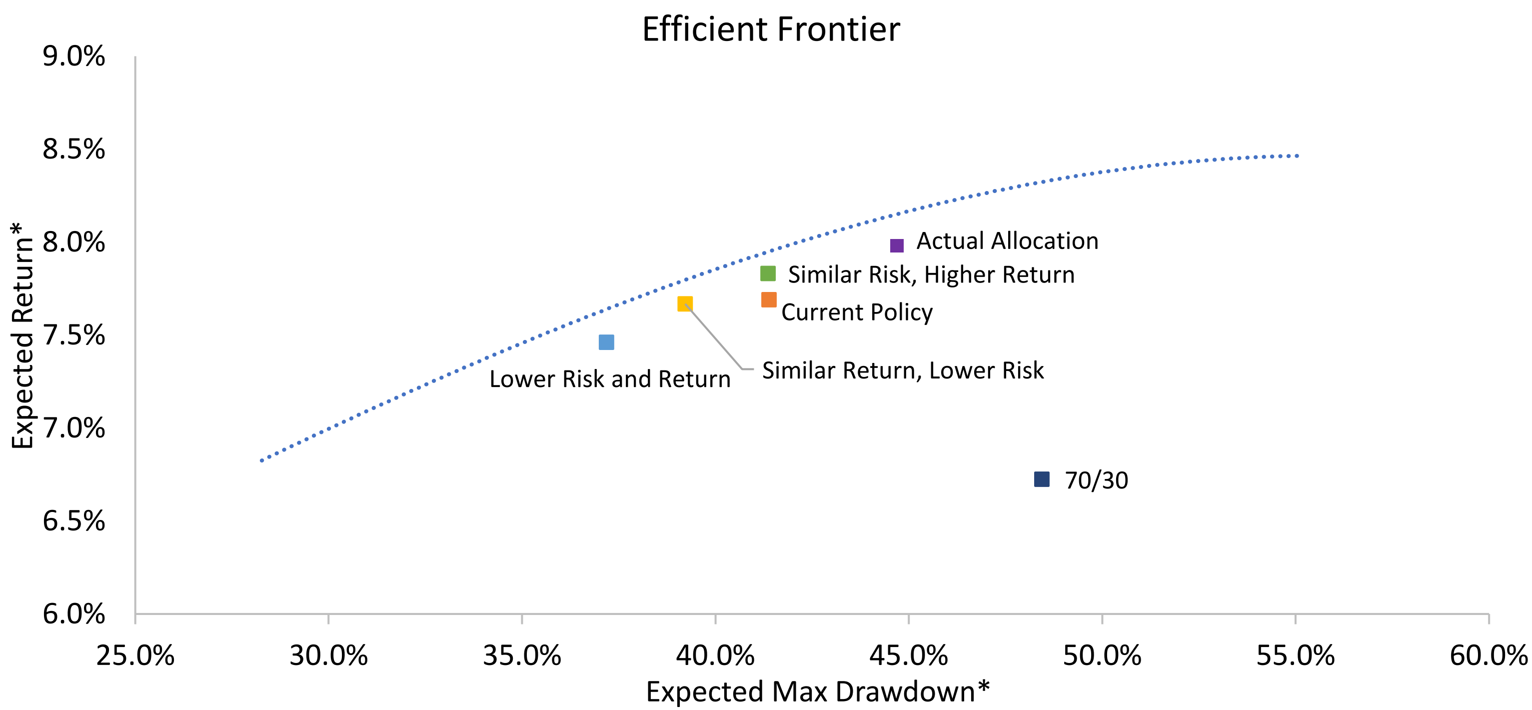
- While a final selection by the OIC may look similar to one of these portfolios, they are not intended to be recommendations.

→ Examined Portfolios

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

Illustrative Portfolios

Efficient Frontier and Examined Portfolios



→ The three illustrative portfolios generally shift the *Current Policy* closer to the efficient frontier and would be considered "near-optimal" from an asset-only perspective.

→ Examining the illustrative portfolios (along with *Current Policy* and *Actual Allocation*) under an asset-liability lens will assist in the final selection of a new policy portfolio by the OIC.

*See Appendix for methodology/calculation details

Examined Portfolios | Asset-only Metrics

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

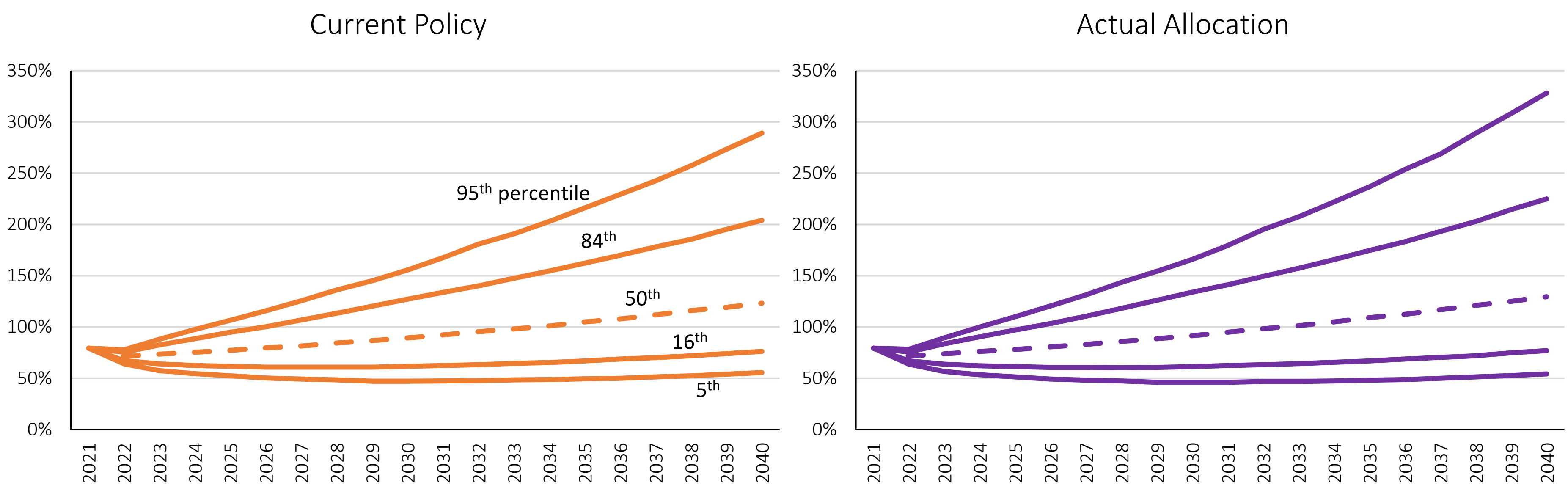
→ Despite what may appear to be different allocations, there is a high degree of commonality among the examined portfolios.

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

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

*See Appendix for methodology/calculation details

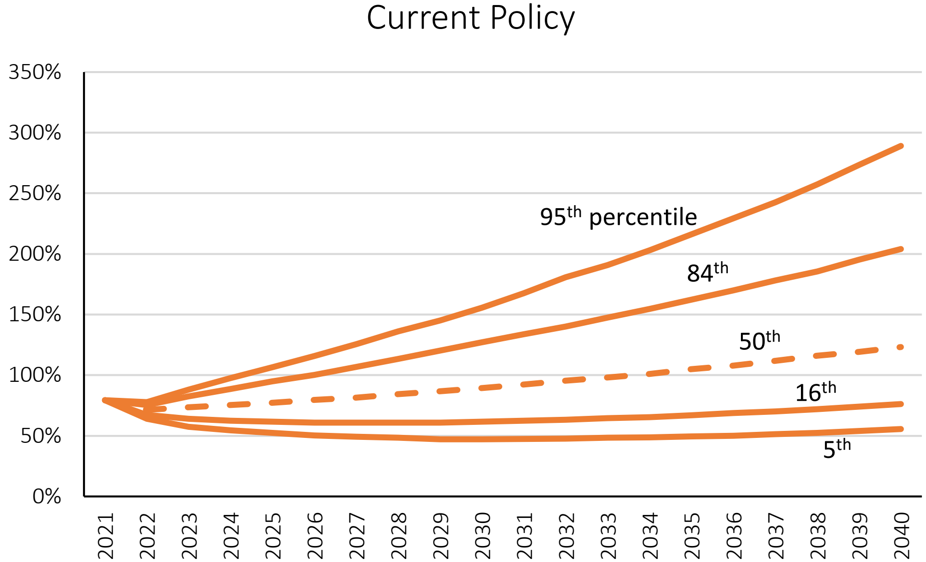
Funded Status (excluding Side Accounts)

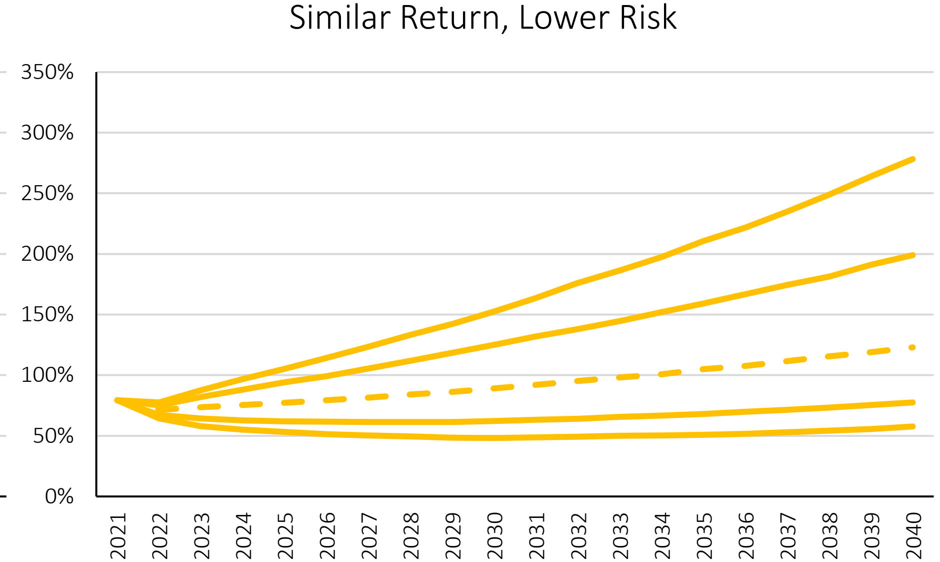


→ Compared to the *Current Policy*, the *Actual Allocation* exhibits slightly higher funded status projections at the median and higher percentiles.

→ Downside percentile projections are similar between the two.

Funded Status (excluding Side Accounts)

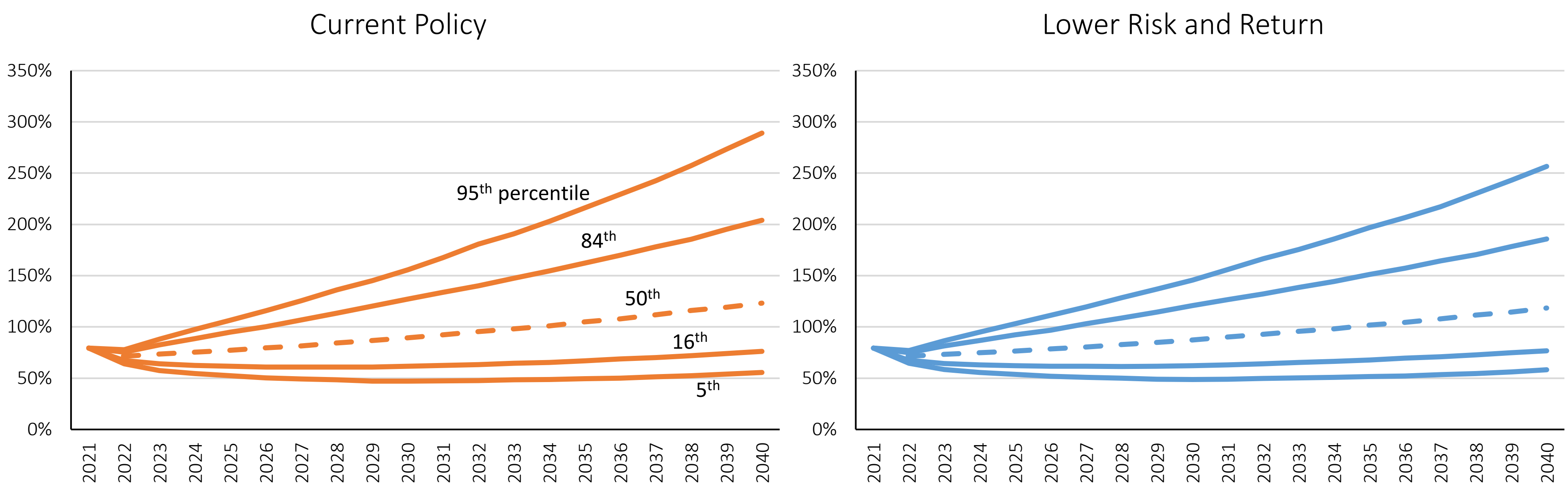




→ Compared to the *Current Policy*, the *Similar Return, Lower Risk* allocation exhibits slightly lower funded status projections at the median and higher percentiles.

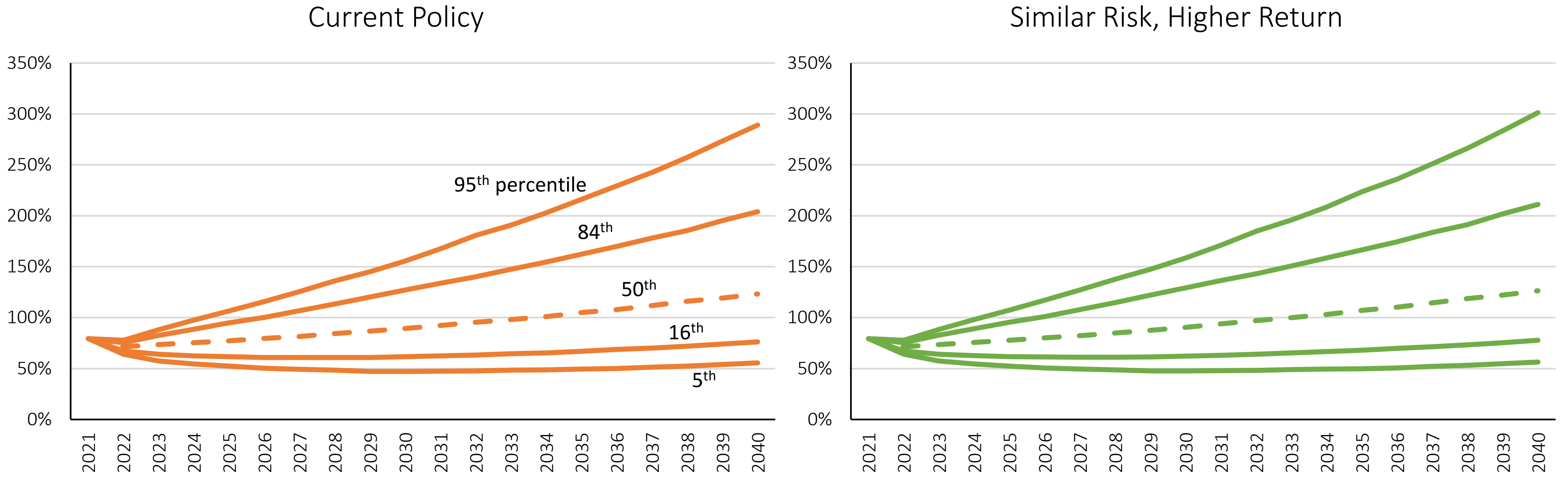
→ Downside percentile projections are marginally better with the *Similar Return, Lower Risk* allocation.

Funded Status (excluding Side Accounts)



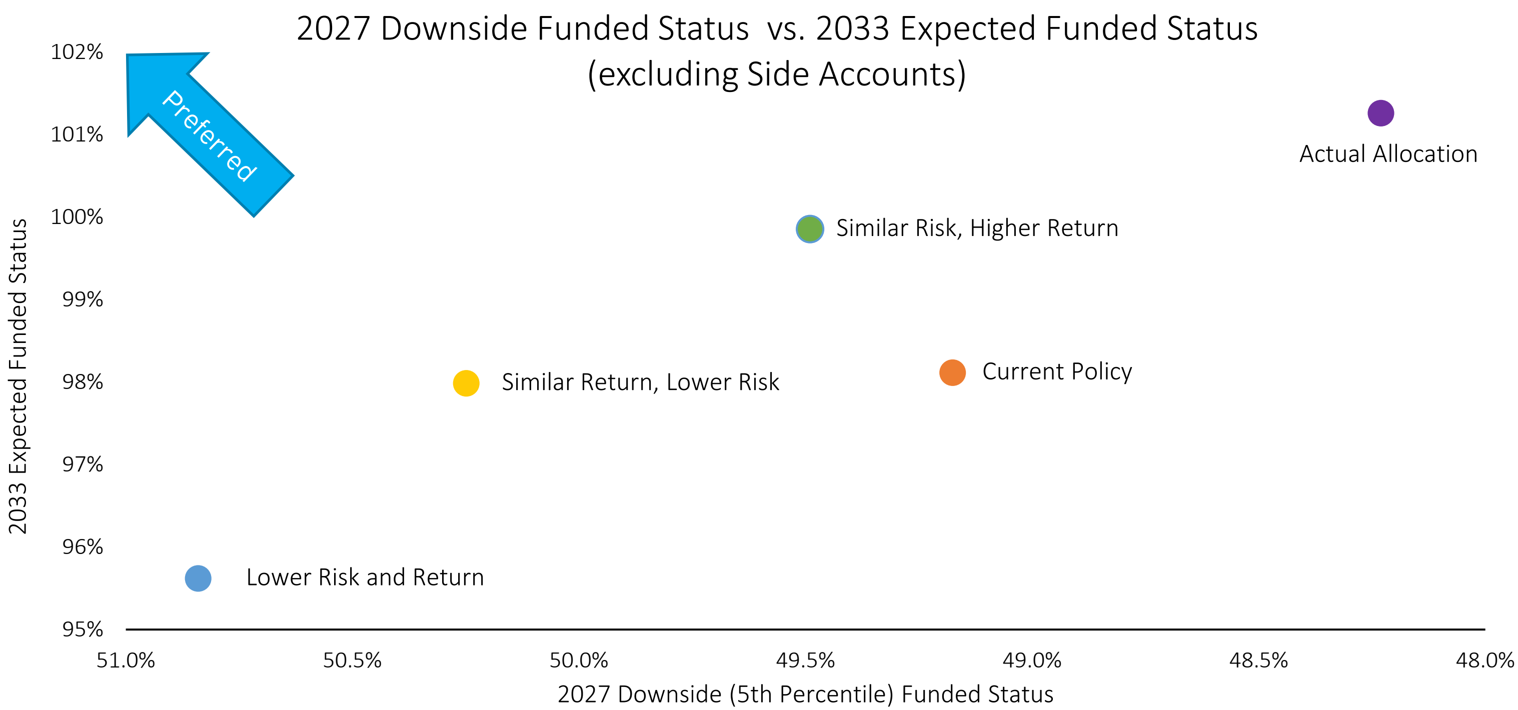
→ Compared to the *Current Policy*, the *Lower Risk and Return* allocation exhibits slightly higher funded status projections during downside percentiles but lower funded status projections for most scenarios.

Funded Status (excluding Side Accounts)



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

Funded Status Efficient Frontier – Short and Medium-term Scenarios

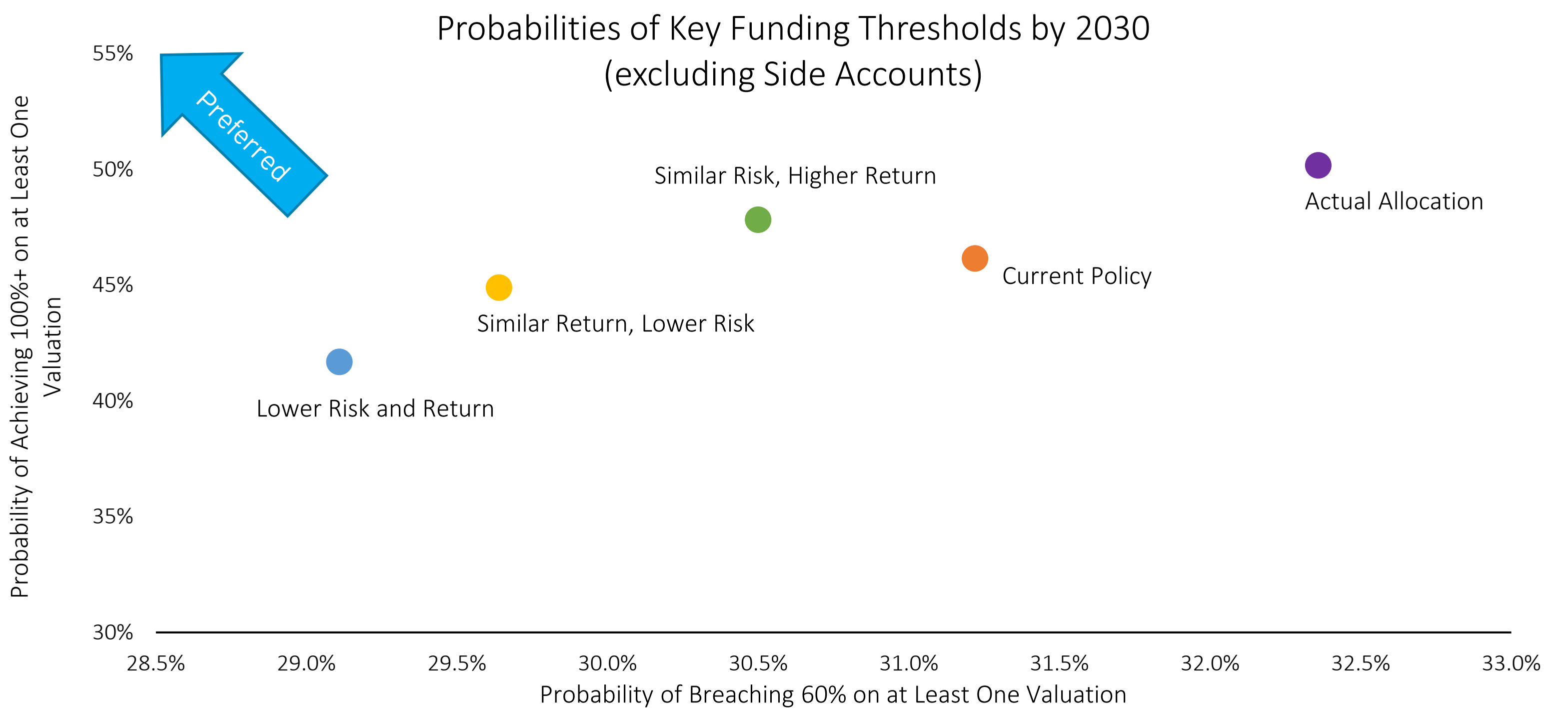


→ Reframing the efficient frontier:

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

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

Funded Status Efficient Frontier – Key Thresholds



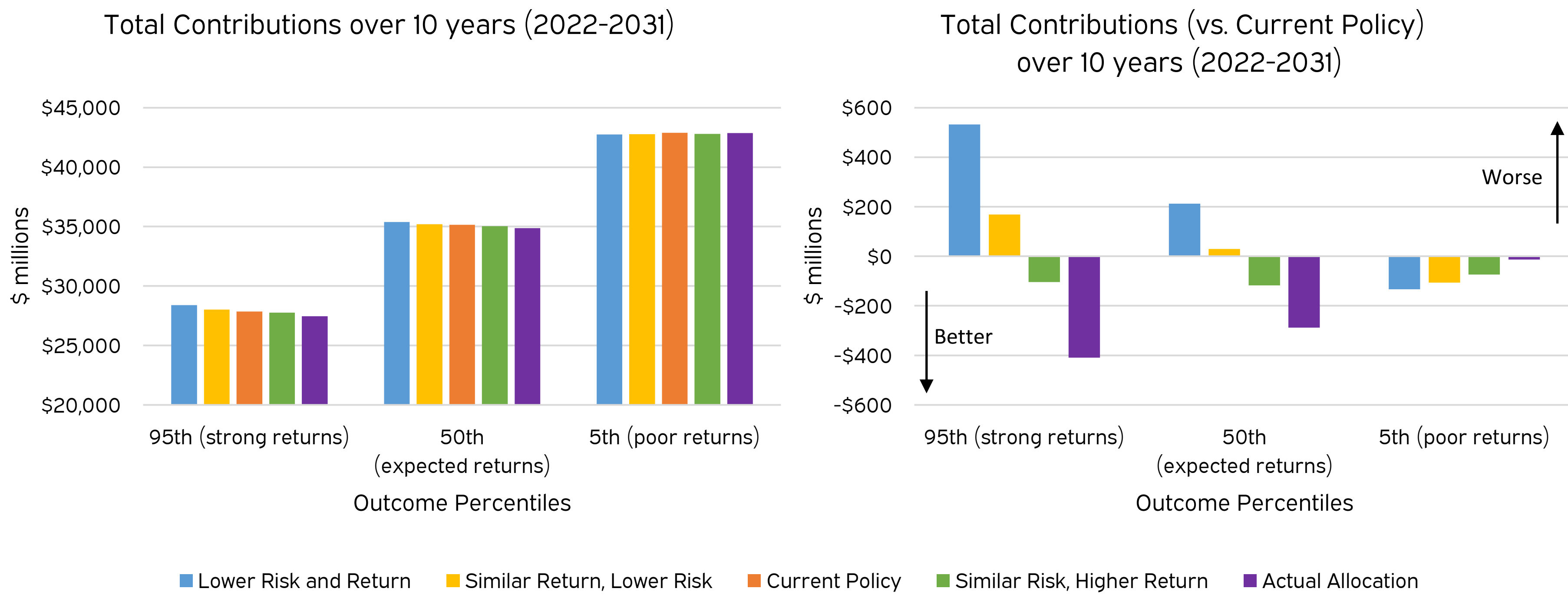
→ Reframing the efficient frontier:

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

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

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

Total Contributions over 10 Years*



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

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

*Excluding Side Account transfers

Findings and Next Steps

Findings

→ With the currently utilized constraints, improvements in the asset-liability posture are difficult.

→ More "efficient" portfolios would generally rely on even higher allocations to private markets and/or higher allocations to Diversifying Strategies.

→ Examining materially different portfolios (e.g., less private markets) could shift the asset-liability posture, but the shift would likely be to a less efficient portfolio.

→ Based on the asset-liability modeling process, OPERF appears well situated.

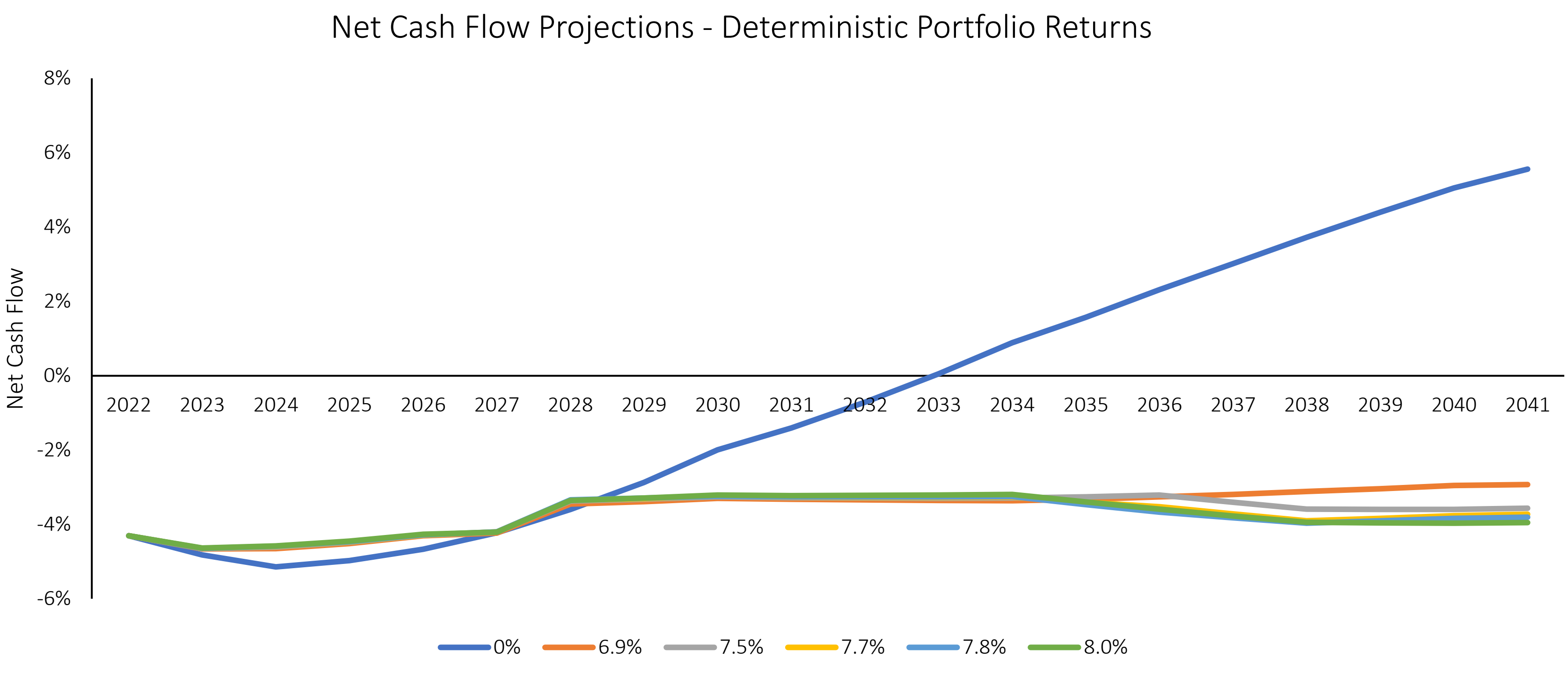
→ Any alterations, whether small or large, would be more of a preference of the OIC rather than a conclusion from the asset-liability modeling process.

Next Steps

→ Based on OIC feedback, Meketa, Aon, Milliman, and Staff will explore additional portfolios of varying degrees and bring forth a final recommendation in October.

Appendix

Net Cash Flow Projections



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

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

Definitions

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

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

Disclaimers

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OIC

OREGON STATE TREASURY

TAB 6

OPERF Q2 PERFORMANCE

MEKETA

INVESTMENT GROUP

Oregon Investment Council

September 7, 2022

Q2 Performance Update
As of June 30, 2022

Table of Contents

Economic and Market Update

Data as of June 30, 2022

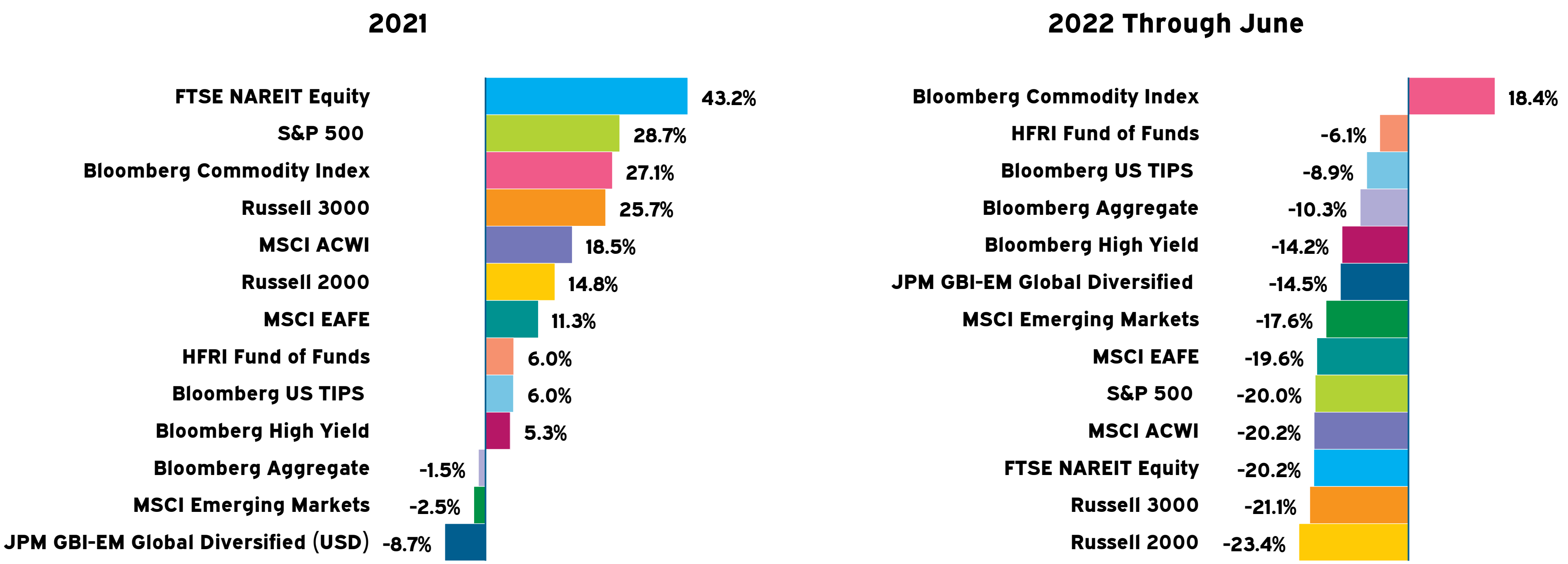
Commentary

→ Global markets resumed their sell-off in June as inflation surged in the US and Europe.

- In response, the US Federal Reserve increased interest rates 75 basis points (above prior expectations). Markets also repriced the growth outlook downward.
- All major equity indices suffered steep declines in June. Emerging markets proved slightly more resilient than developed markets on a partial re-opening in China from pandemic related lockdowns.
- In a reversal of the prior trend growth stocks outperformed value stocks in June.
- The global bond selloff resumed, as inflation fears, and policy expectations weighed on all major bond markets.

→ Persistently high inflation and the expected policy response, the war in Ukraine, lingering COVID-19 issues, and lockdowns in China will all have considerable economic and financial consequences for the global economy.

Index Returns[1]



→ Outside of emerging markets and the broad US investment grade bond market (Bloomberg Aggregate), most asset classes appreciated in 2021.

→ In June all major asset classes posted negative returns on renewed inflation and economic growth fears, with equities experiencing the largest declines.

[1] Source: Bloomberg and FactSet. Data is as of June 30, 2022.

Domestic Equity Returns[1]

Domestic Equity	June (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
S&P 500	-8.3	-16.1	-20.0	-10.6	10.6	11.3	12.9
Russell 3000	-8.4	-16.7	-21.1	-13.9	9.8	10.6	12.6
Russell 1000	-8.4	-16.7	-20.9	-13.0	10.2	11.0	12.8
Russell 1000 Growth	-7.9	-20.9	-28.1	-18.8	12.6	14.3	14.8
Russell 1000 Value	-8.7	-12.2	-12.9	-6.8	6.9	7.2	10.5
Russell MidCap	-10.0	-16.8	-21.6	-17.3	6.6	8.0	11.3
Russell MidCap Growth	-7.5	-21.1	-31.0	-29.6	4.3	8.9	11.5
Russell MidCap Value	-11.0	-14.7	-16.2	-10.0	6.7	6.3	10.6
Russell 2000	-8.2	-17.2	-23.4	-25.2	4.2	5.2	9.4
Russell 2000 Growth	-6.2	-19.3	-29.5	-33.4	1.4	4.8	9.3
Russell 2000 Value	-9.9	-15.3	-17.3	-16.3	6.2	4.9	9.0

US Equities: Russell 3000 Index declined 8.3%, and growth indices outperformed value in June.

→ US stocks experienced steep losses for the month, led by the energy and materials sectors.

→ Growth indices outperformed their value counterparts for the month but remain well behind for the year-to-date period.

→ Small company stocks slightly outperformed large company stocks in June but remain behind their larger peers year-to-date.

[1] Source: Bloomberg. Data is as of June 30, 2022.

Foreign Equity Returns[1]

Foreign Equity	June (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
MSCI ACWI ex. US	-8.6	-13.7	-18.4	-19.4	1.3	2.5	4.8
MSCI EAFE	-9.3	-14.5	-19.6	-17.8	1.1	2.2	5.4
MSCI EAFE (Local Currency)	-6.3	-7.8	-11.3	-6.6	4.4	4.3	8.3
MSCI EAFE Small Cap	-11.0	-17.7	-24.7	-24.0	1.1	1.7	7.2
MSCI Emerging Markets	-6.6	-11.5	-17.6	-25.3	0.6	2.2	3.1
MSCI Emerging Markets (Local Currency)	-4.6	-8.1	-13.7	-20.2	3.3	4.4	6.0
MSCI China	6.6	3.4	-11.3	-31.8	-0.6	2.1	5.5

International Equities (MSCI EAFE) declined 9.3% and Emerging Markets (MSCI EM) declined 6.6% in June.

→ Non-US developed market stocks slightly trailed the US for the month, while emerging markets stocks had better results due to China gaining 6.6%. Both remain notably negative for the year-to-date period, but ahead of the US.

→ The war in Ukraine, high inflation and the likely monetary policy response, and slowing growth continue to weigh on sentiment.

→ As in the US, growth stocks outperformed value stocks across developed and emerging markets.

[1] Source: Bloomberg. Data is as of June 30, 2022.

Fixed Income Returns[1]

Fixed Income	June (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	Current Yield (%)	Duration (Years)
Bloomberg Universal	-2.0	-5.1	-10.9	-10.9	-0.9	0.9	1.8	4.2	6.4
Bloomberg Aggregate	-1.6	-4.7	-10.3	-10.3	-0.9	0.9	1.5	3.7	6.6
Bloomberg US TIPS	-3.2	-6.1	-8.9	-5.1	3.0	3.2	1.7	3.4	7.0
Bloomberg High Yield	-6.7	-9.8	-14.2	-12.8	0.2	2.1	4.5	8.9	4.8
JPM GBI-EM Global Diversified (USD)	-4.5	-8.6	-14.5	-19.3	-5.8	-2.3	-1.5	7.4	4.9

Fixed Income: The Bloomberg Universal declined 2.0% in June.

→ The above expectations CPI print led to renewed inflation fears driving interest rates higher and weighing on the broad US investment grade bond market (Bloomberg Aggregate).

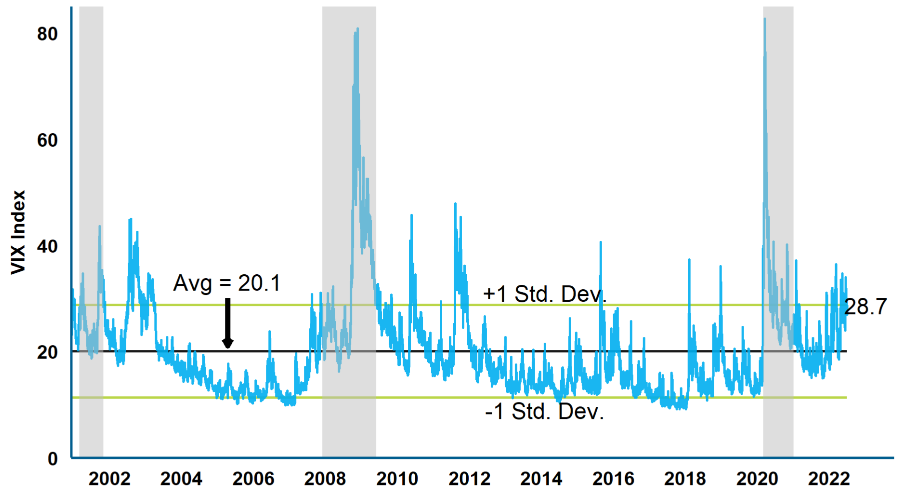
→ Despite the above expectation CPI prints, breakeven inflation rates have continued to move down driven by the decline in nominal rates. The nominal 10-year Treasury yield peaked at 3.47% before declining to 3.01% by month-end, while the 2-year Treasury yield declined from 3.43% to 2.95%.

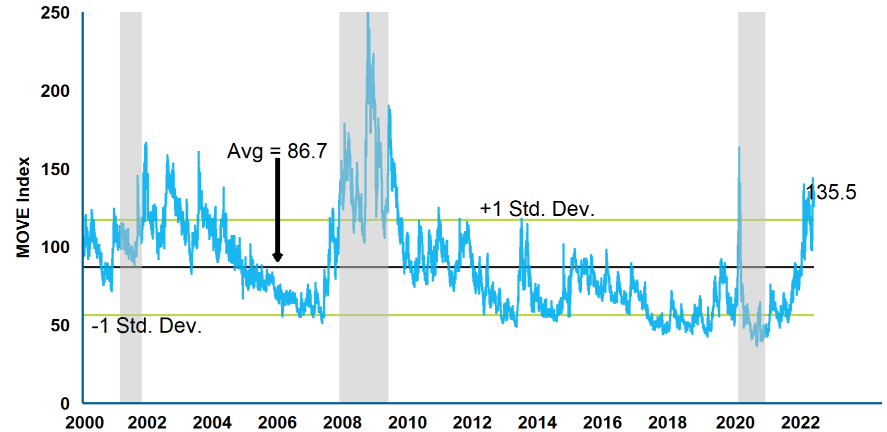
→ US credit spreads widened, particularly for high yield debt, leading to it having the worst results among bonds for the month.

→ Emerging market debt also declined for the month.

[1] Source: Bloomberg. JPM GBI-EM is from InvestorForce. Data is as of June 30, 2022.

Equity and Fixed Income Volatility[1]



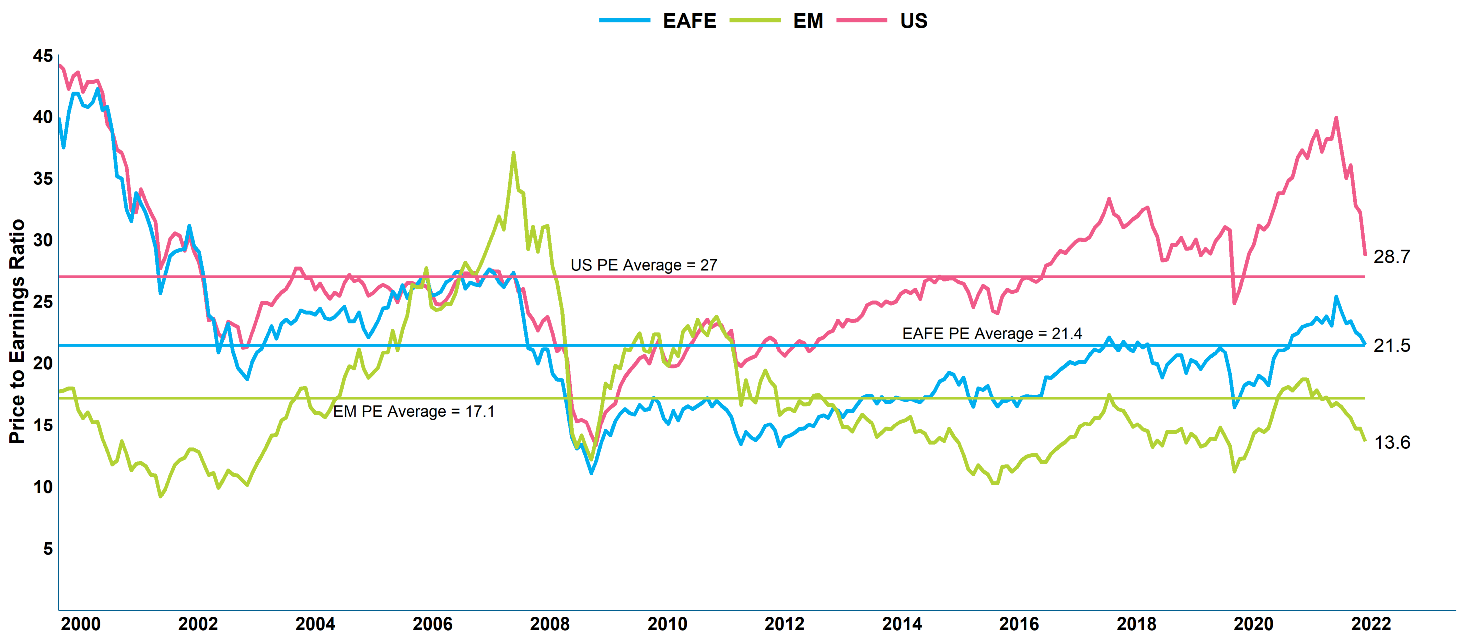


→ Volatility in equities (VIX) and fixed income (MOVE) rose in June on renewed inflation fears and on building signs of weakness in economic growth.

→ Fixed income volatility remains particularly high due to the uncertain path of short-term interest rates.

[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 June 2022. The average line indicated is the average of the VIX and MOVE values between January 2000 and the recent month-end respectively.

Equity Cyclically Adjusted P/E Ratios[1]

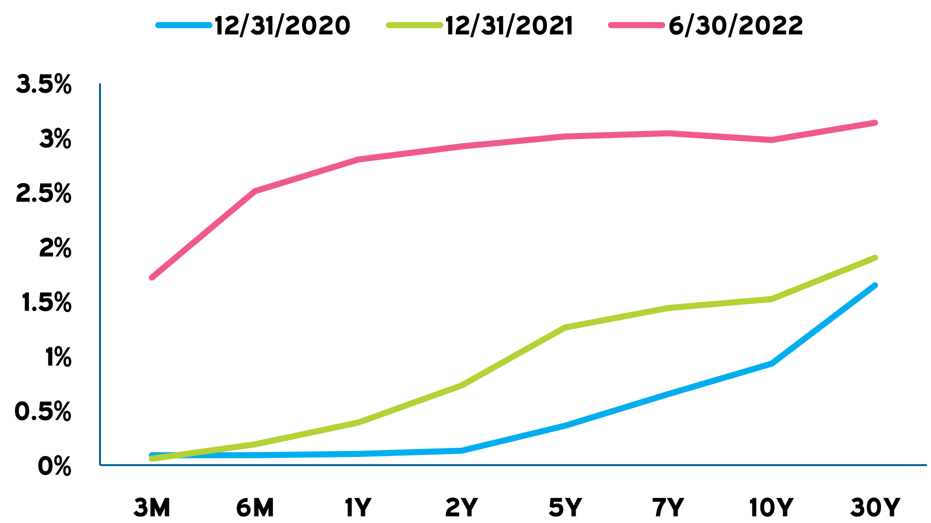


→ The steep decline in June in US equities pushed valuations lower, approaching the level of the long-term (post-2000) average.

→ International developed market valuations remain below the US and are slightly above their own long-term average, with those for emerging markets the lowest and 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 June 30, 2022. 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]



→ Rates across the yield curve remain much higher than at the start of the year.

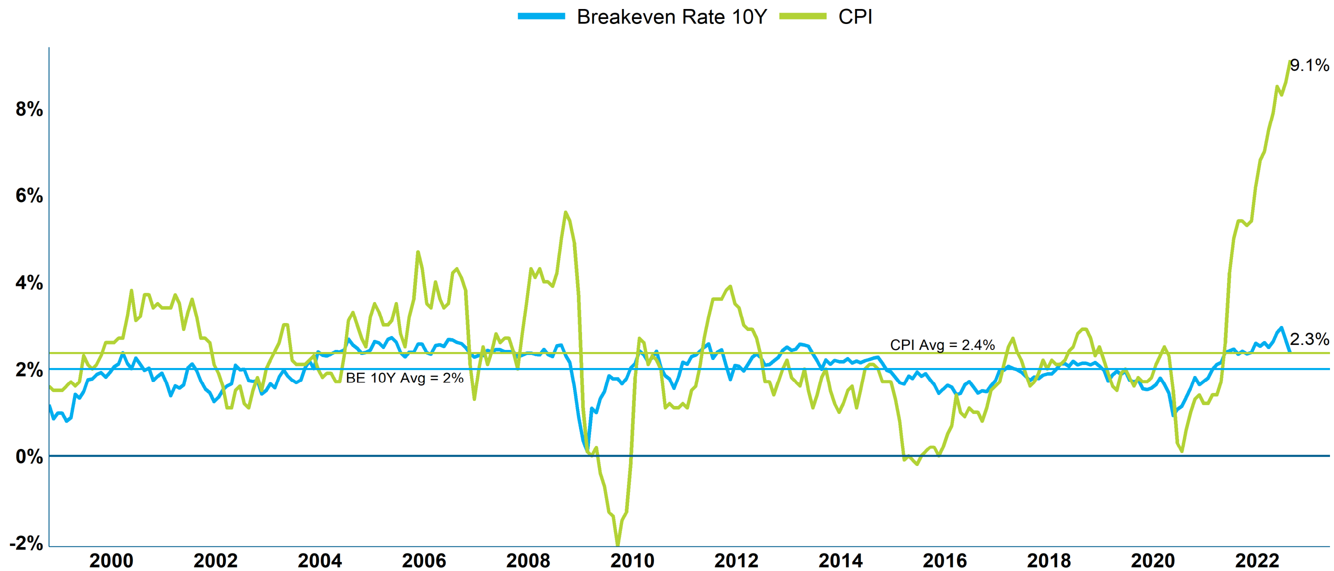
→ In June, rates rose across maturities (particularly short-dated), as markets continue to reflect elevated inflation and rate expectations.

→ The curve continued to flatten in June with the spread between two-year and ten-year Treasuries falling from 30 basis points at the end of May to just 5 basis points by the end of June.

→ Since month-end, the spread between two-year and ten-year Treasuries became negative which historically has often signaled a coming recession.

[1] Source: Bloomberg. Data is as of June 30, 2022.

Ten-Year Breakeven Inflation and CPI[1]



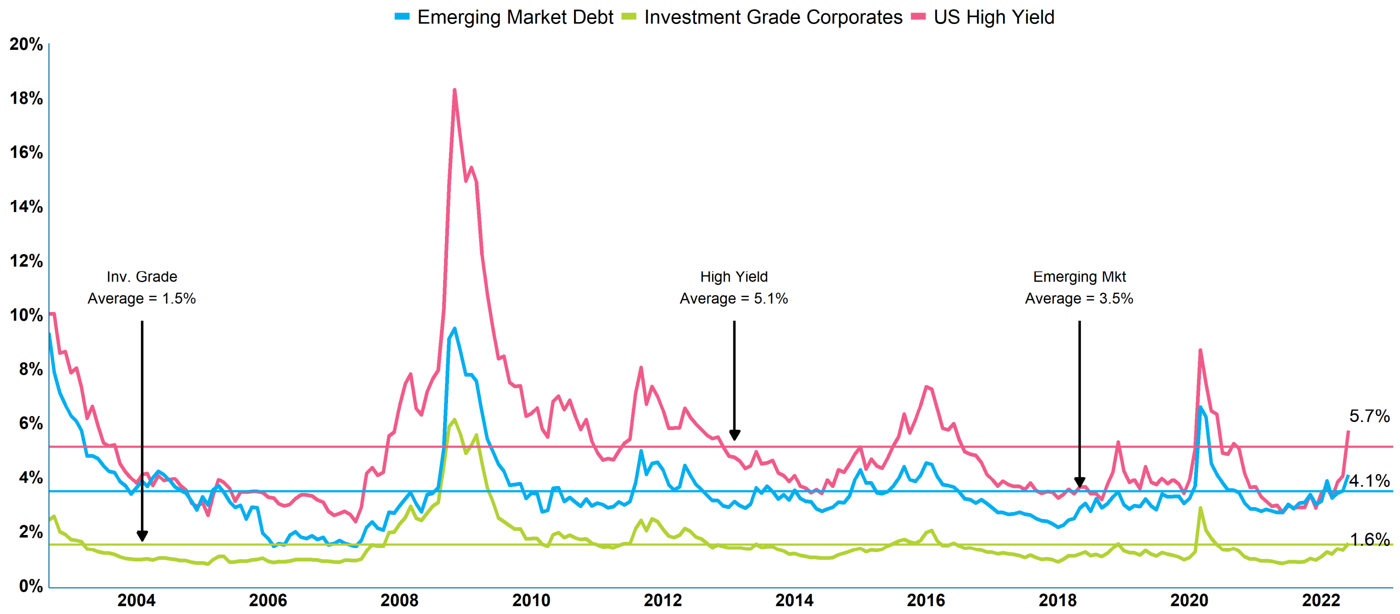
→ Inflation expectations (breakevens) fell further in June on declining growth expectations and anticipated tighter monetary policy.

→ Trailing twelve-month CPI rose in June (9.1% versus 8.6%) and notably came in above expectations. Inflation levels in the US remain well above the long-term average of 2.4%.

→ Rising prices for energy (particularly oil), food, housing, and for new and used cars, remain key drivers of higher inflation.

[1] Source: Bloomberg. Data is as of June 30, 2022. The CPI and 10 Year Breakeven average lines denote the average values from August 1998 to the present month-end respectively. Breakeven values represent month-end values for comparative purposes.

Credit Spreads vs. US Treasury Bonds[1]



→ Credit spreads (the spread above a comparable maturity Treasury) rose in June with high yield and investment grade corporate bonds breaking above their long-run averages.

→ In the US, spreads for high yield significantly increased from 4.0% to 5.7% in the risk-off environment, while investment grade spreads experienced a more modest increase (1.3% to 1.6%). Emerging market spreads also rose (3.5% to 4.1% during the month) but finished much lower than US high yield spreads.

[1] Sources: Bloomberg. Data is as of June 30, 2022. Average lines denote the average of the investment grade, high yield, and emerging market spread values from August 2000 to the recent month-end respectively.

Global Economic Outlook

The IMF significantly lowered global growth forecasts in their latest projections, driven by the economic impacts of the war in Ukraine.

→ The IMF forecasts final global GDP growth to come in at 6.1% in 2021 and 3.6% in 2022 (0.8% below the prior 2022 estimate), both still above the past ten-year 3.0% average.

→ In advanced economies, GDP is projected to increase 3.3% in 2022 and 2.4% in 2023. The US has limited economic ties with Russia but saw another downgrade in the 2022 growth forecast (3.7% versus 4.0%) largely due to policy tightening happening faster than previously expected. The euro area saw a significant downgrade in expected growth (2.8% versus 3.9%) in 2022 as rising energy prices particularly weigh on the region that is a net importer of energy. The Japanese economy is expected to grow 2.4% this year.

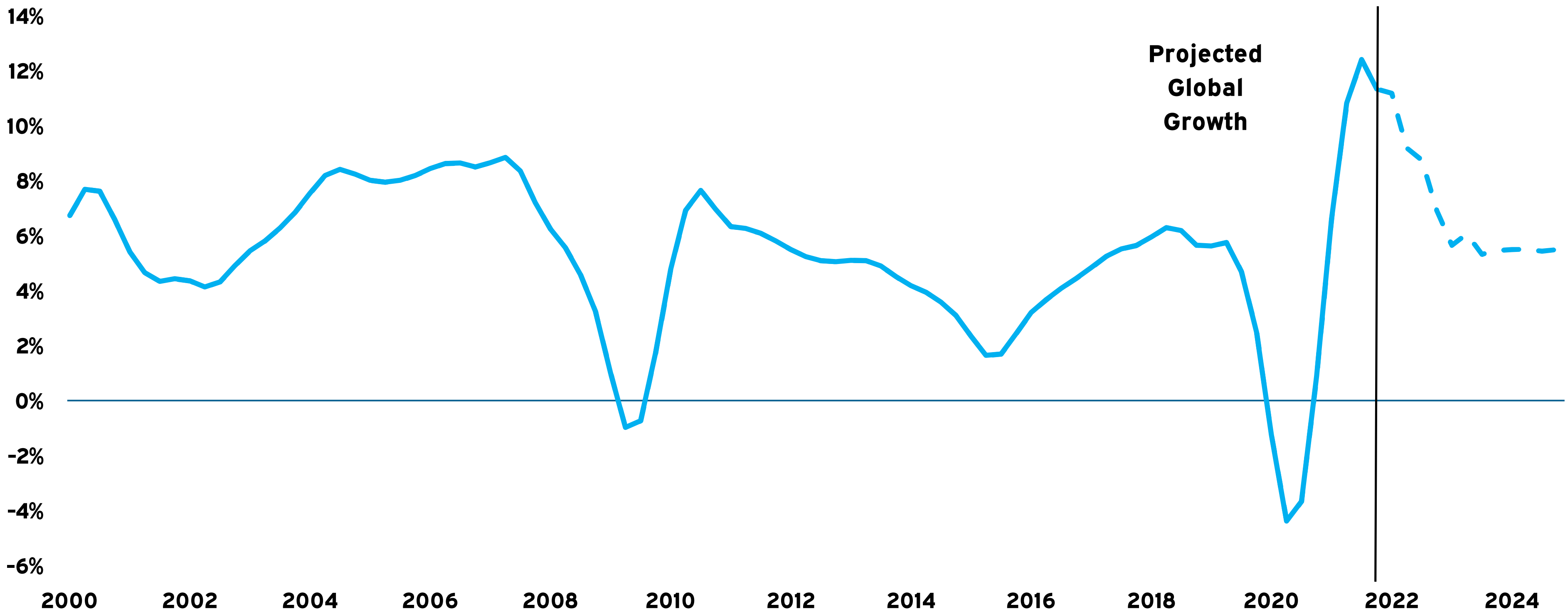
→ Growth projections for emerging markets are higher than developed markets, at 3.8% in 2022 and 4.4% in 2023. China's growth was downgraded (4.4% versus 4.8%) for 2022 given tight COVID-19 restrictions and continued property sector problems.

→ The global inflation forecast was significantly increased for 2022 (7.4% versus 3.8%).

	Real GDP (%)[1]			Inflation (%)[1]		
	IMF 2022 Forecast	IMF 2023 Forecast	Actual 10 Year Average	IMF 2022 Forecast	IMF 2023 Forecast	Actual 10 Year Average
World	3.6	3.6	3.0	7.4	4.8	3.5
Advanced Economies	3.3	2.4	1.6	5.7	2.5	1.5
US	3.7	2.3	2.1	7.7	2.9	1.9
Euro Area	2.8	2.3	0.9	5.3	2.3	1.2
Japan	2.4	2.3	0.5	1.0	0.8	0.5
Emerging Economies	3.8	4.4	4.2	8.7	6.5	5.1
China	4.4	5.1	6.7	2.1	1.8	2.1

[1] Source: IMF World Economic Outlook. Real GDP forecasts from April WEO Update. Inflation forecasts are as of the April 2022 Update." Actual 10 Year Average" represents data from 2012 to 2021.

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

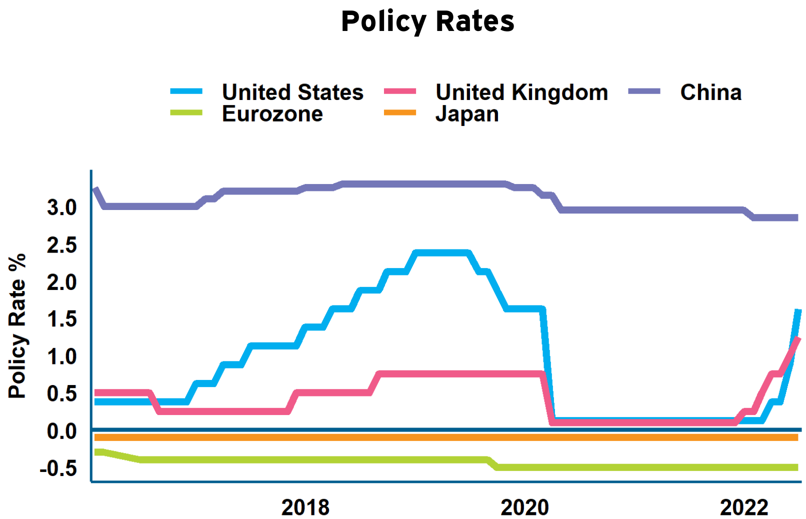


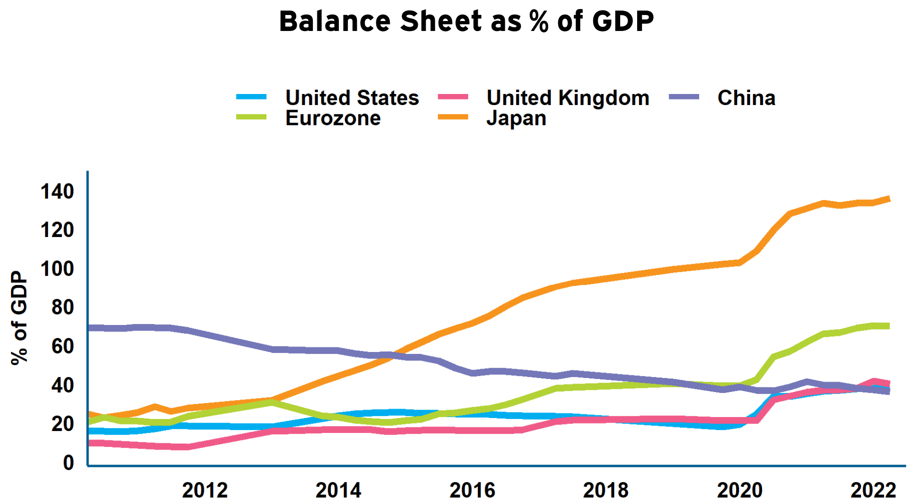
→ Global economies are expected to slow in 2022 compared to 2021 with fears of potential recessions in areas increasing recently given persistently high inflation and related tighter monetary policy.

→ Looking forward, 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, nominal, % change YoY). Updated June 2022.

Central Bank Response[1]





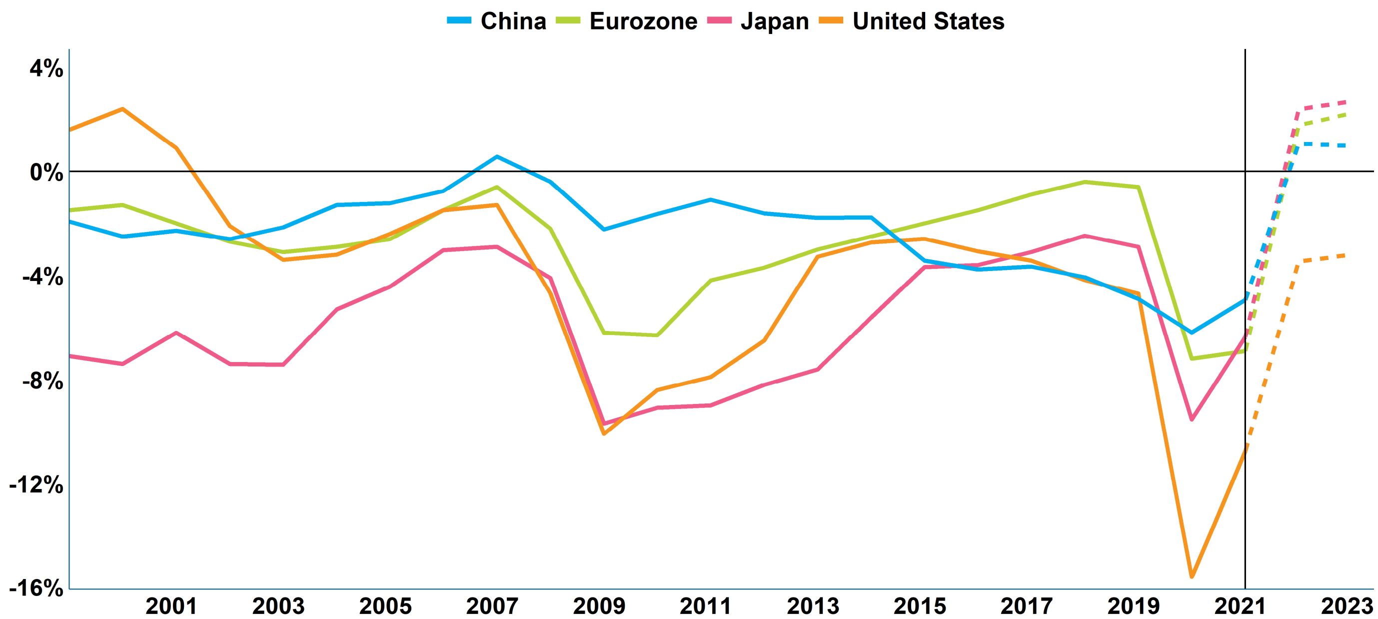
→ After global central banks took extraordinary action to support economies during the pandemic, including policy rate cuts and emergency stimulus through quantitative easing (QE), many are reducing or considering reducing support, in the face of high inflation.

→ The pace of withdrawing support will likely vary across central banks with the US expected to take a more aggressive approach. The risk remains for a policy error, particularly overtightening, as record inflation, the war in Ukraine, and a tough COVID-19 policy in China could suppress global growth.

→ The one notable central bank outlier is China, where the central bank recently lowered rates and reserve requirements in response to slowing growth.

[1] Source: Bloomberg. Policy rate data is as of June 30, 2022. China policy rate is defined as the medium-term lending facility 1 year interest rate. Balance sheet as % of GDP is based on quarterly data and is as of June 30, 2022.

Budget Surplus / Deficit as a Percentage of GDP[1]

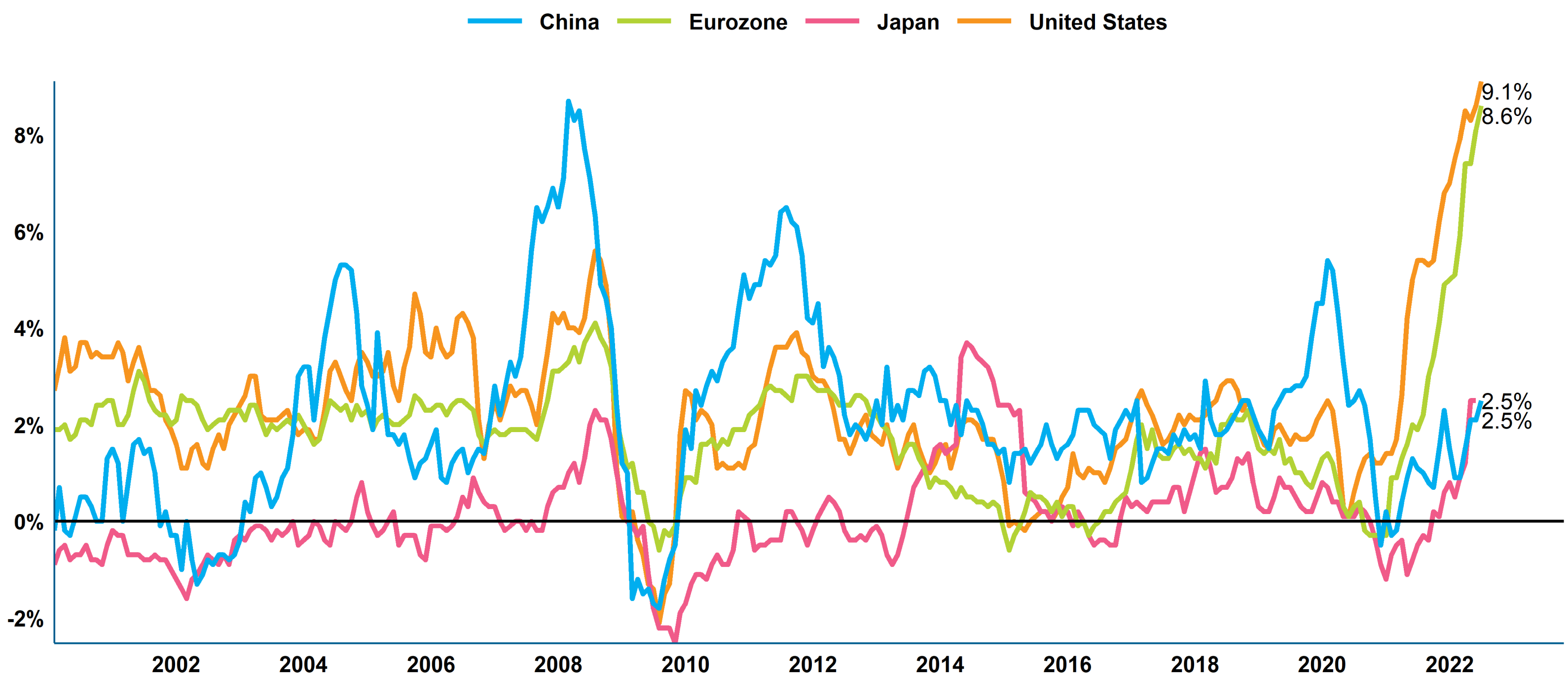


→ Budget deficits as a percentage of GDP drastically increased for major world economies, particularly the US, due to massive fiscal support and the severe economic contraction's effect on tax revenue in 2020 and 2021.

→ As fiscal stimulus programs end, and economic recoveries continue, deficits should improve in the coming years.

[1] Source: Bloomberg. Data is as of June 30, 2022. Projections via IMF Forecasts from April 2022 Report. Dotted lines represent 2022 and 2023 forecasts.

Inflation (CPI Trailing Twelve Months)[1]

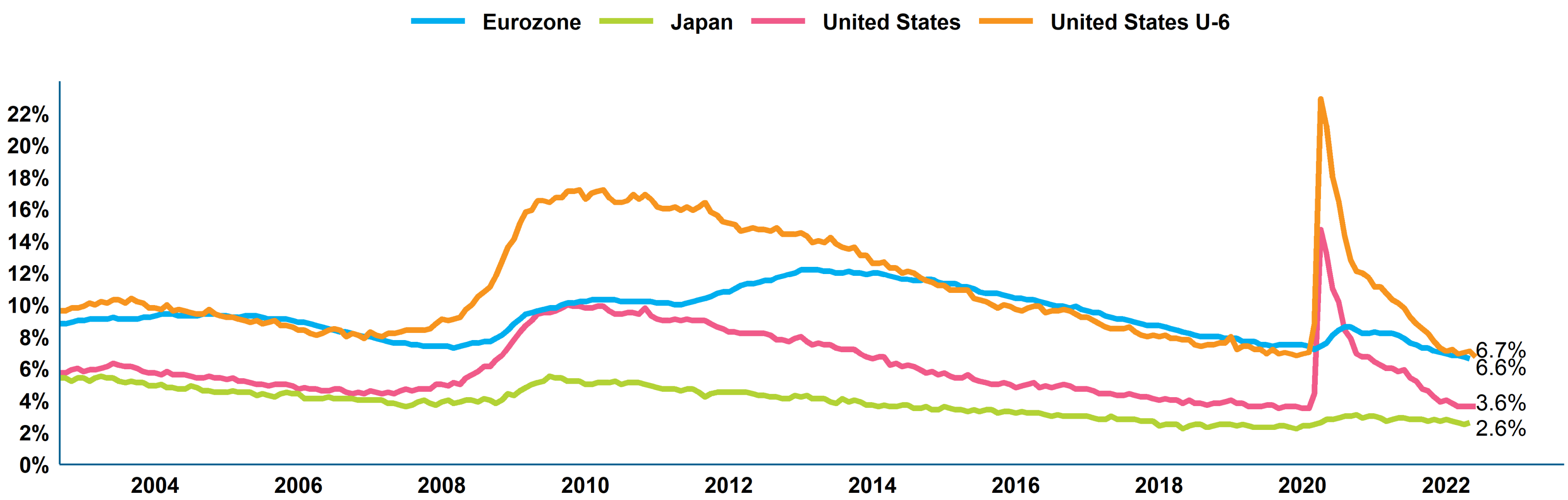


→ Inflation increased dramatically from the lows of the pandemic, particularly in the US and Eurozone where it has reached levels not seen in many decades.

→ Supply issues related to the pandemic, record monetary and fiscal stimulus, strict COVID-19 restrictions in China, and higher prices in many commodities driven by the war in Ukraine have been key drivers of inflation globally.

[1] Source: Bloomberg. Data is as of June 2022, except for Japan, where the most recent data available is as of May 31, 2022.

Unemployment[1]

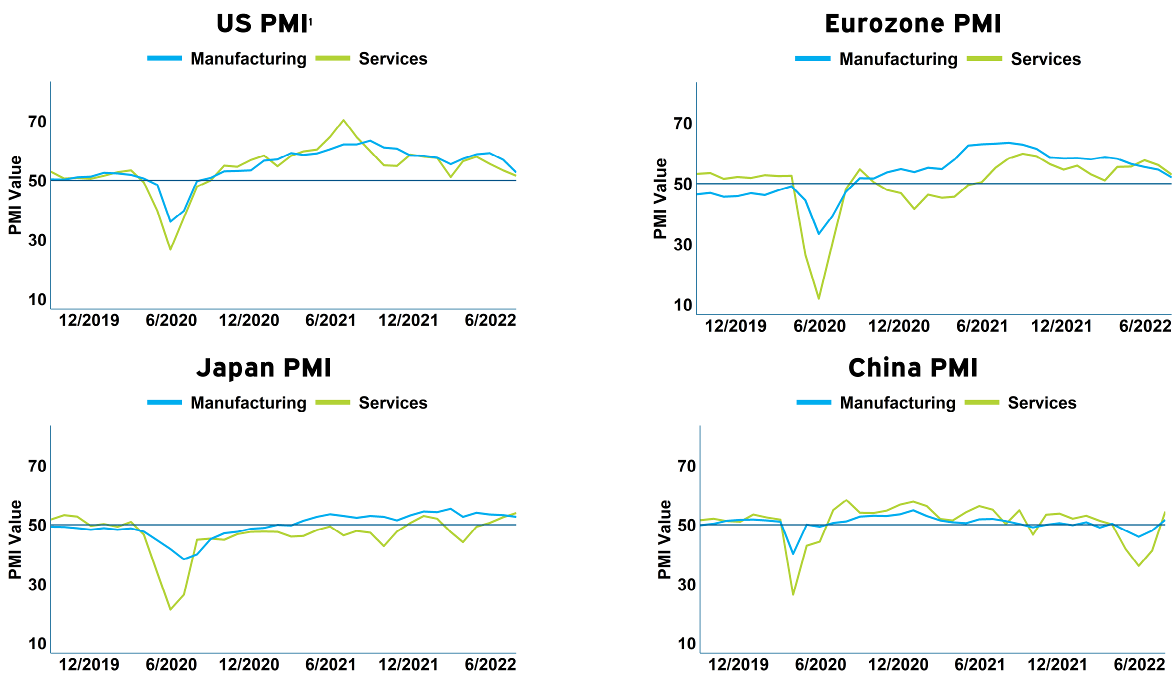


→ As economies have largely reopened, helped by vaccines for the virus, improvements have been seen in the labor market.

→ US unemployment, which experienced the steepest rise from the pandemic, declined back to pre-pandemic levels. The broader measure (U-6) that includes discouraged and underemployed workers declined but is much higher at 6.7%.

[1] Source: Bloomberg. Data is as of June 2022, for the US. The most recent data for Eurozone and Japanese unemployment is as of May 31, 2022.

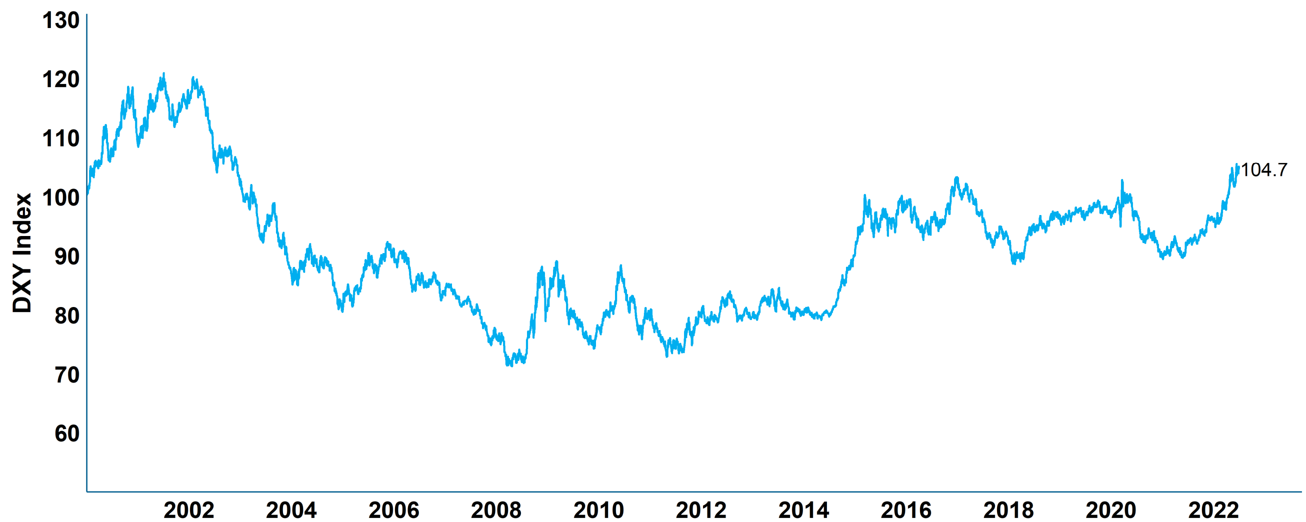
Global PMIs



- → After improvements from the lows of the pandemic, Purchasing Managers Indices (PMI), based on surveys of private sector companies, have experienced some pressures recently.
- → Service sector PMIs in the US and Europe have recently declined due to higher prices and supply issues, while they continue to improve in Japan as pandemic restrictions ease. In China the services PMI surged to expansion territory on an easing in lockdown measures.
- → Manufacturing PMIs are in expansion territory as pandemic-related production issues ease and orders increase. China also moved to expansion levels here on partial reopening.

[1] Source: Bloomberg. US Markit Services and Manufacturing PMI, Caixin Services and Manufacturing PMI, Eurozone Markit Services and Manufacturing PMI, Jibun Bank Services and Manufacturing PMI. Data is as of June 2022. Readings below 50 represent economic contractions.

US Dollar versus Broad Currencies[1]



→ The US dollar continued higher in June on safe-haven flows, relatively strong growth, and higher interest rates.

→ The euro, yen, and yuan have all experienced significant declines versus the dollar, adding to inflation and slowing growth concerns.

[1] Source: Bloomberg. Data as of June 30, 2022.

Summary

Key Trends in 2022:

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

→ The war in Ukraine has created significant uncertainty, with a wide range of potential outcomes.

→ Expect growth to slow globally in 2022 to the long-term trend or below. Inflation, monetary policy, and the war will all be key.

→ The end of many fiscal programs is expected to put the burden of continued growth on consumers. Higher energy and food prices will depress consumers' spending in other areas.

→ Monetary policy will likely tighten globally but will remain relatively accommodative. The risk of overtightening policy remains.

→ Valuations have significantly declined in the US, approaching long-term averages.

→ Outside the US, equity valuations remain lower in both emerging and developed markets, but risks remain, including continued strength in the US dollar, higher inflation particularly weighing on Europe, and China maintaining its restrictive COVID-19 policies

Executive Summary

Q2 2022

OPERF Performance Summary – Commentary

→ OPERF posted a return of -2.5% for the second quarter, relative to a benchmark return of -6.0% and peer median return of -7.6%. Performance for the quarter ranks in the top percentile of the InvestMetrics public plan peer universe of all DB plans over $10 billion, with longer-term performance over all time periods shown ranking in the top decile.

→ Key performance drivers for the quarter were an underweight to and benchmark relative outperformance within Public Equity, overweight to and relative outperformance within Private Equity, and positive absolute performance from alternatives such as Diversifying Strategies and Real Assets.

→ Public Equities (-13.2%) outperformed the broad MSCI ACWI IMI Net (Daily) index (-15.8%). Outperformance was driven by value managers, both domestically and abroad, and the Global Low Vol portfolio. Of particular note within the Global Low Vol managers, has been Arrowstreet's strong benchmark-relative performance both in the quarter (+10.8%) and since inception. Value continues to outperform as investors weigh the possibility of a prolonged recession on the back of record inflation and the resulting hawkish Fed stance.

→ OPERF's Fixed Income portfolio (-4.3%) outperformed the Oregon Custom Core FI Benchmark (-4.7%). Core Fixed Income continues to face challenges with the interest rates rise. Outperformance in the second quarter was driven by higher yielding Non-Core Fixed Income and the US Government portfolio.

OPERF Performance Summary – Commentary (continued)

→ Real Estate, while lagging its NCREIF ODCE benchmark for the quarter, delivered positive absolute returns (+5.9%) and was one of the few positive asset classes for the quarter. OPERF's 13.6% allocation served as an additional tailwind. Longer-term results have contributed positively to OPERF with the asset class returning low double digit returns over a 3, 5, and 10 year period.

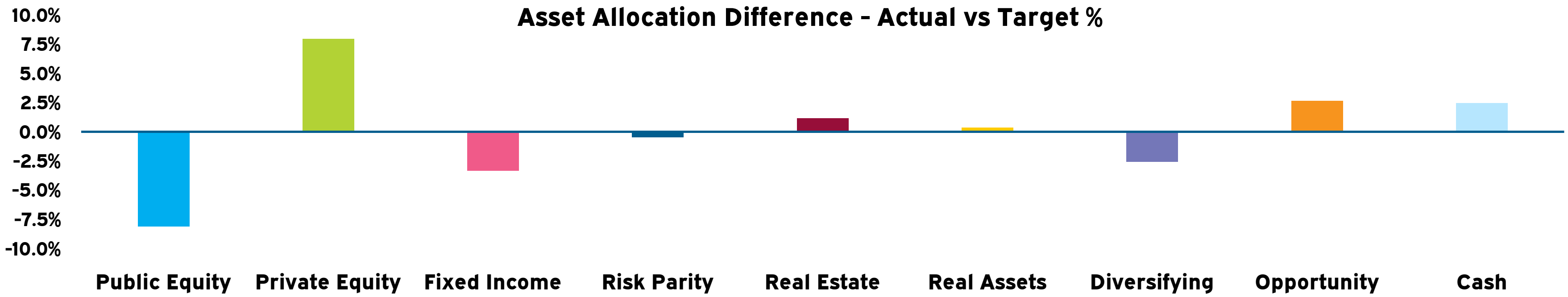
→ Within the Alternative portfolio, Diversifying Strategies- at 4.9% of the Total Fund- returned 7.7% for the quarter and was another driver of relative outperformance for the fund.

→ Real Assets, driven by persistent inflation pressures and lingering supply chain issues, experienced a strong first half of the year. The Fund's Real Assets portfolio returned 8.1% for the quarter versus the CPI +4% benchmark of 4.1%. Real Assets are up 23.0% over the trailing one-year period, with Natural Resources delivering particularly strong results.

→ The Private Equity overweight continues to bolster benchmark relative performance as the illiquid asset class is sheltered from the price volatility found in more liquid markets. The OPERF Portfolio maintains a significant overweight relative to the target - actual allocation of 27.1% versus a target allocation of 20%. OPERF is actively looking to reduce private equity exposure, though it will take some time given the illiquid nature of the asset class.

OPERF Asset Allocation as of June 30, 2022

Asset Class	Actual ($ 000)	Actual Weight (%)	Target Weight (%)	Difference (%)	Difference ($ 000)
Public Equity	20,413,788	21.9	30.0	-8.1	-7,590,783
Private Equity	26,112,932	28.0	20.0	8.0	7,443,219
Fixed Income	15,534,749	16.6	20.0	-3.4	-3,134,964
Risk Parity	1,886,411	2.0	2.5	-0.5	-447,303
Real Estate	12,731,034	13.6	12.5	1.1	1,062,463
Real Assets	7,338,907	7.9	7.5	0.4	337,764
Diversifying	4,568,797	4.9	7.5	-2.6	-2,432,346
Opportunity	2,465,522	2.6	0.0	2.6	2,465,522
Cash	2,296,428	2.5	0.0	2.5	2,296,428
Total	93,348,567	100.0	100.0		
YTD Net Cash Flow	-1,884,133				
Gain/Loss	-1,304,142				



→ A significant majority of OPERF's assets are allocated to risk-oriented assets in the public and private equity markets.

→ Efforts are underway/ liquidity programs in place to reduce the overweight to Private Equity. It is important to note that reducing exposure to PE is challenging given the nature of the asset class, and a work in progress.

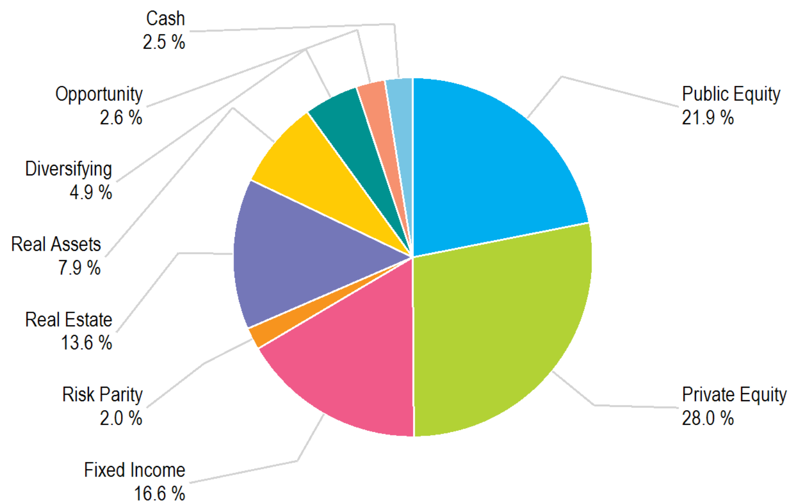
OPERF Q2 2022 Performance Attribution

	QTD	1 Yr	3 Yr	5 Yr	10 Yr	Target	Overweight / Underweight	Contributors / Detractors
Total Fund	-2.5	6.3	10.3	9.3	9.3			
Total Fund ex Overlay	-2.9	6.0	10.4	9.4	9.3			
OPERF Policy Benchmark	-6.0	-0.7	8.9	8.6	9.2			
Over/Under	3.5	7.0	1.4	0.7	0.1			
InvMetrics All DB > $10B Net Median	-7.6	-5.3	7.7	7.5	8.4			
InvMetrics All DB > $10B Net Rank	1	1	1	3	5	Policy	As of 6/30/22	QTD
Total Fixed Income	-4.3	-9.1	-0.3	1.3	2.2	20.0%	-3.4%	Contributor
Oregon Custom FI Benchmark	-4.7	-10.1	-0.9	0.9	1.7			
Over/Under	0.4	1.0	0.6	0.4	0.5			
Total Public Equity	-13.2	-13.3	6.7	7.1	9.3	30.0%	-8.1%	Contributor
MSCI ACWI IMI Net (Daily)	-15.8	-16.5	6.0	6.7	8.7			
Over/Under	2.6	3.2	0.7	0.4	0.6			
Total Real Estate	5.9	29.6	13.6	11.0	11.3	12.5%	1.1%	Neutral
NCREIF ODCE (Custom) (Adj.)	7.1	27.2	10.3	8.9	9.8			
Over/Under	-1.2	2.4	3.3	2.1	1.5			
Risk Parity	-13.3	-13.0	--	--	--	2.5%	-0.5%	Neutral
S&P Risk Parity - 12% Target Volatility	-11.5	-6.7	7.9	9.1	8.1			
Over/Under	-1.8	-6.3						
Opportunity Portfolio	0.2	10.0	13.0	9.9	9.7	0.0%	2.6%	Detractor
CPI + 5%	4.3	14.5	10.2	9.0	7.7			
Over/Under	-4.1	-4.5	2.8	0.9	2.0			
Diversifiying Strategies	7.7	17.1	3.0	0.7	3.2	7.5%	-2.6%	Contributor
HFRI FOF Conservative Index	-1.7	0.1	4.7	4.0	3.8			
Over/Under	9.4	17.0	-1.7	-3.3	-0.6			
Real Assets	8.1	23.0	10.0	8.0	--	7.5%	0.4%	Contributor
CPI +4%	3.8	13.1	9.1	8.0	6.7			
Over/Under	4.3	9.9	0.9	0.0				
Private Equity	-0.7	24.0	21.8	19.6	15.4	20.0%	8.0%	Contributor
Russell 3000 + 300 BPS QTR LAG (Adj.)	-4.6	15.2	21.7	18.8	17.7			
Over/Under	3.9	8.8	0.1	0.8	-2.3			
Cash	-0.1	-0.8	0.7	1.4	1.1	0.0%	2.5%	Neutral
ICE BofA US 3-Month Treasury Bill	0.1	0.2	0.6	1.1	0.6			
Over/Under	-0.2	-1.0	0.1	0.3	0.5			

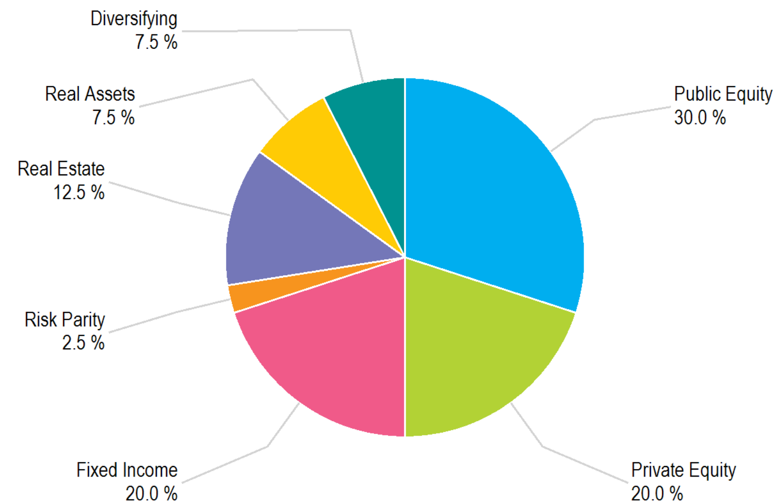
Performance Update

as of June 30, 2022

Actual Asset Allocation



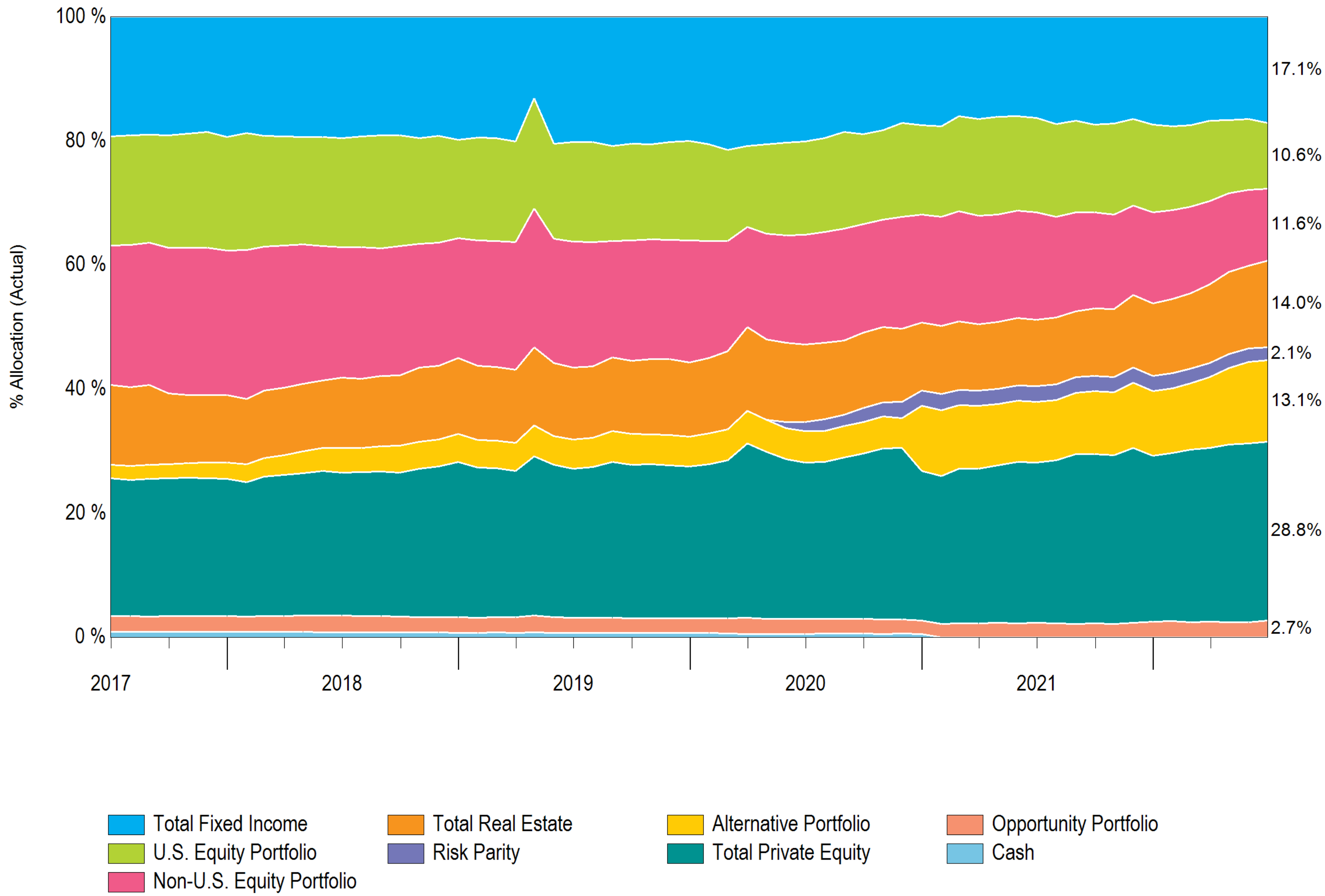
Target Asset Allocation

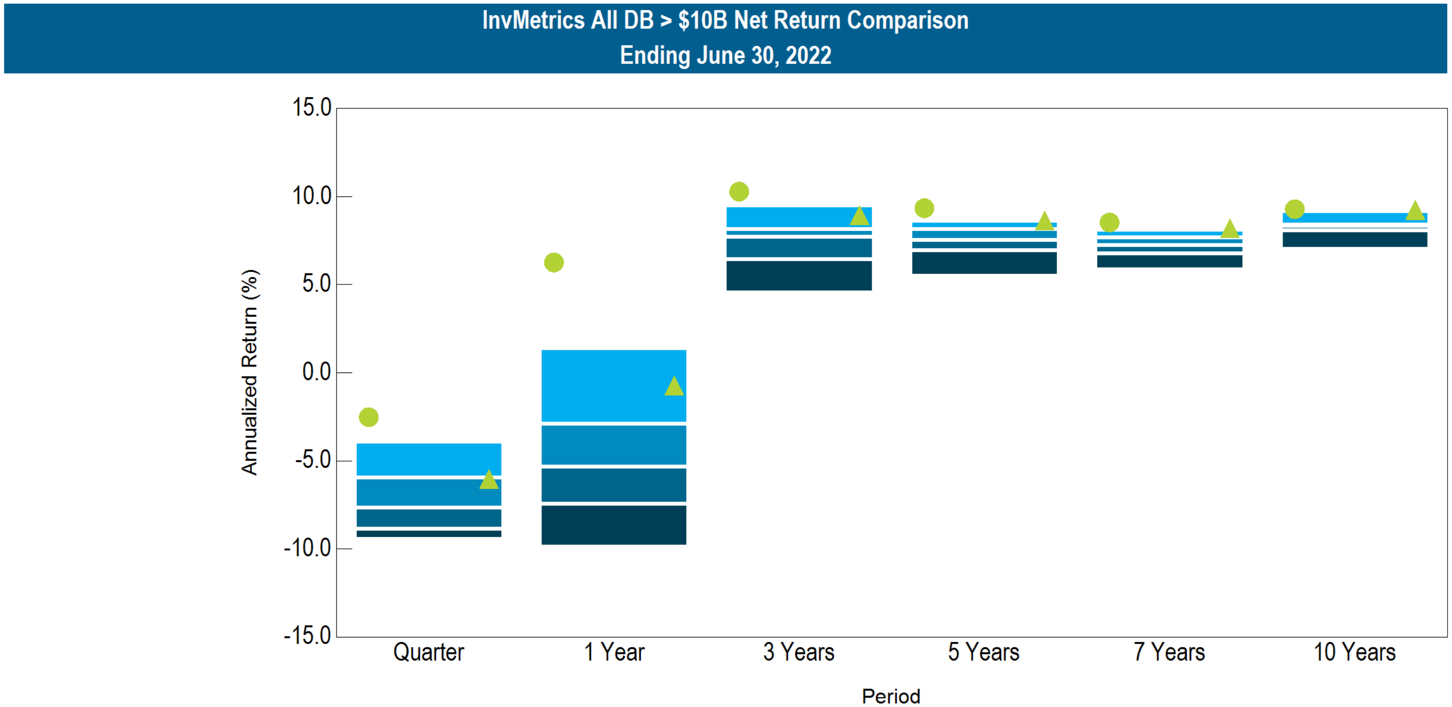


Asset Allocation vs. Target
As Of June 30, 2022

	Current	Current	Policy	Difference	Difference
Public Equity	$20,413,787,547	21.9%	30.0%	-8.1%	-$7,590,782,565
Private Equity	$26,112,931,937	28.0%	20.0%	8.0%	$7,443,218,529
Fixed Income	$15,534,749,043	16.6%	20.0%	-3.4%	-$3,134,964,365
Risk Parity	$1,886,410,933	2.0%	2.5%	-0.5%	-$447,303,243
Real Estate	$12,731,033,840	13.6%	12.5%	1.1%	$1,062,462,960
Real Assets	$7,338,906,773	7.9%	7.5%	0.4%	$337,764,245
Diversifying	$4,568,796,706	4.9%	7.5%	-2.6%	-$2,432,345,822
Opportunity	$2,465,521,842	2.6%	0.0%	2.6%	$2,465,521,842
Cash	$2,296,428,419	2.5%	0.0%	2.5%	$2,296,428,419
Total	**$93,348,567,041**	**100.0%**	**100.0%**		

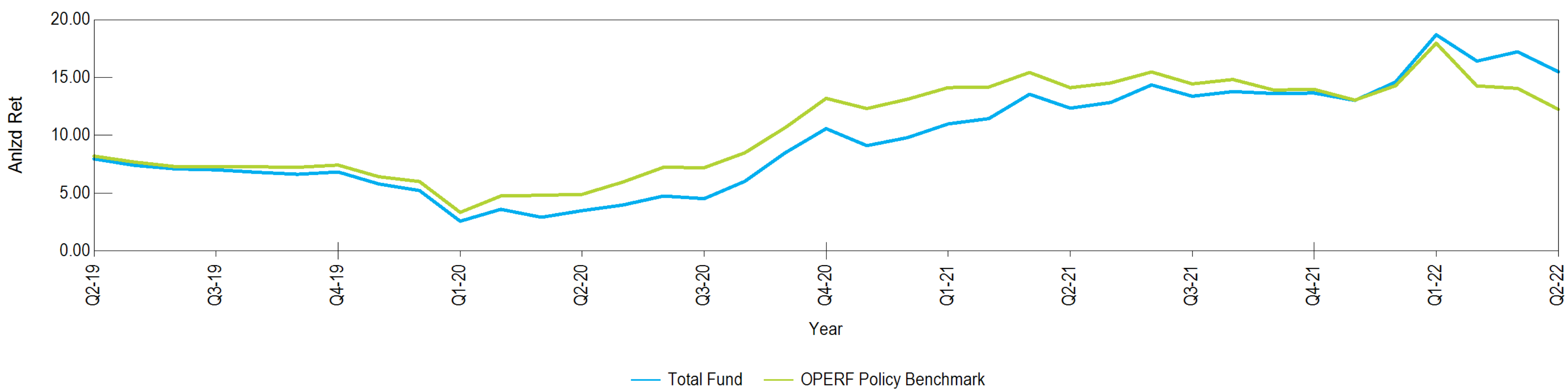
Asset Allocation History
5 Years Ending June 30, 2022



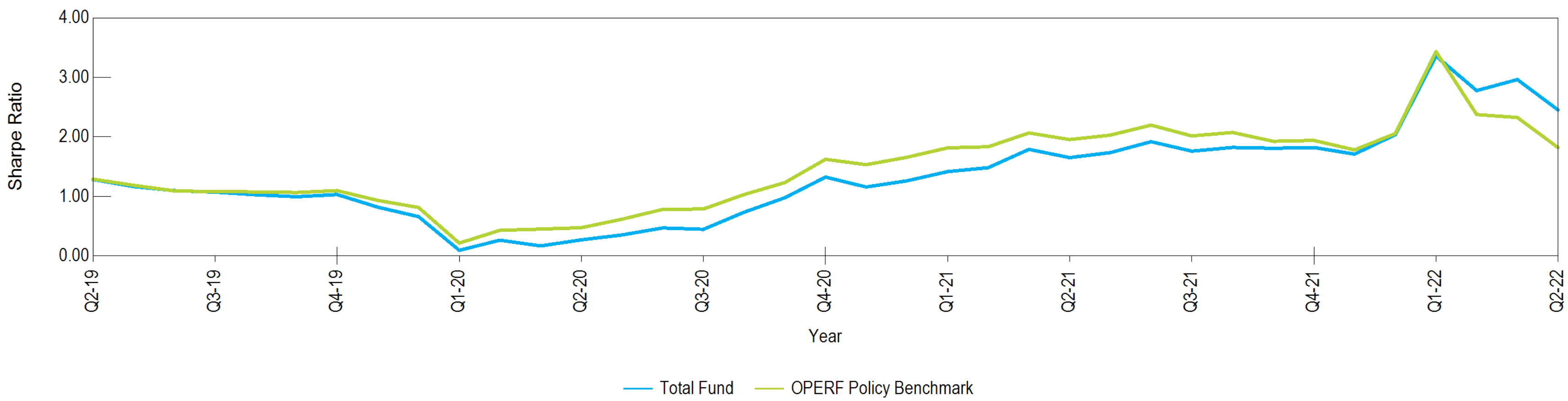


	Return (Rank)											
5th Percentile	-3.9		1.4		9.5		8.6		8.1		9.2	
25th Percentile	-5.9		-2.9		8.2		8.2		7.7		8.4	
Median	-7.6		-5.3		7.7		7.5		7.3		8.4	
75th Percentile	-8.8		-7.4		6.5		7.0		6.8		8.1	
95th Percentile	-9.4		-9.8		4.6		5.5		5.9		7.1	
# of Portfolios	22		21		20		19		18		17	
Total Fund	-2.5	(1)	6.3	(1)	10.3	(1)	9.3	(3)	8.5	(3)	9.3	(5)
OPERF Policy Benchmark	-6.0	(27)	-0.7	(14)	8.9	(13)	8.6	(5)	8.2	(5)	9.2	(5)

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



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



Trailing Net Performance	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Fund	**93,348,567,041**	**100.0**	**-2.5**	**-1.4**	**6.3**	**10.3**	**9.3**	**9.3**
OPERF Policy Benchmark			*-6.0*	*-5.7*	*-0.7*	*8.9*	*8.6*	*9.2*
60% MSCI ACWI / 40% Bloomberg Aggregate			*-11.4*	*-16.3*	*-13.4*	*3.7*	*4.8*	*6.0*
70% MSCI ACWI/30% Barclays Agg			*-12.4*	*-17.3*	*-14.0*	*4.3*	*5.4*	*6.7*
InvMetrics All DB > $10B Net Median			*-7.6*	*-10.3*	*-5.3*	*7.7*	*7.5*	*8.4*
InvMetrics All DB > $10B Net Rank			*1*	*1*	*1*	*1*	*3*	*5*
Total Fixed Income	**15,534,749,043**	**16.6**	**-4.3**	**-9.2**	**-9.1**	**-0.3**	**1.3**	**2.2**
Oregon Custom FI Benchmark			*-4.7*	*-10.3*	*-10.1*	*-0.9*	*0.9*	*1.7*
Bloomberg US Aggregate TR			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.5*
Fixed Income Weighted BM			*-4.5*	*-9.6*	*-9.3*	*-0.8*	*1.0*	*1.7*
Core Fixed Income	**4,291,627,776**	**4.6**	**-5.3**	**-11.6**	**-11.4**	**-0.8**	**1.1**	**2.2**
Oregon Custom External FI BM			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.7*
Alliance Bernstein	19,236	0.0	1.1	3.1	10.9	6.2	5.2	4.2
Oregon Custom External FI BM			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.7*
Blackrock	1,245,829,525	1.3	-5.0	-10.7	-10.7	-0.5	1.2	2.0
Oregon Custom External FI BM			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.7*
Wellington	1,267,511,551	1.4	-5.4	-11.9	-11.4	-0.5	1.3	2.4
Oregon Custom External FI BM			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.7*
Western Asset	1,281,481,713	1.4	-5.7	-12.6	-12.3	-0.7	1.4	2.5
Oregon Custom External FI BM			*-4.7*	*-10.3*	*-10.3*	*-0.9*	*0.9*	*1.7*
Fidelity	496,785,751	0.5						

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
U.S. Government	**6,751,576,491**	**7.2**	**-3.8**	**-9.0**	**-8.9**	**-0.8**	**0.8**	**--**
Government Blended Index			*-3.8*	*-9.1*	*-8.9*	*-0.9*	*0.7*	*0.7*
Government Portfolio	6,751,576,491	7.2	-3.8	-9.0	-8.9	-0.8	0.8	--
Government Blended Index			*-3.8*	*-9.1*	*-8.9*	*-0.9*	*0.7*	*0.7*
Non-Core Fixed Income	**1,494,234,016**	**1.6**	**-2.3**	**-3.3**	**-2.2**	**3.3**	**3.6**	**4.8**
Custom Non-Core Fixed Income Index			*-5.8*	*-7.0*	*-5.3*	*1.6*	*2.7*	*3.9*
KKR Asset Management	24,664,478	0.0	-17.4	-32.9	-33.7	-6.8	-2.9	1.4
KKR Custom Leveraged Loans & Bond Index			*-6.4*	*-7.9*	*-6.3*	*1.4*	*2.6*	*4.0*
Oak Hill	1,469,569,538	1.6	-2.0	-2.4	-1.2	3.9	4.3	5.2
Oakhill Custom Lev Loan & Bond Index			*-5.3*	*-6.0*	*-4.3*	*1.8*	*2.8*	*3.9*
Global Sovereign	**1,078,122,299**	**1.2**	**-4.3**	**-7.6**	**-7.6**	**--**	**--**	**--**
BbgBarc Global Treasury Ex-U.S.			*-3.9*	*-7.7*	*-7.5*	*-1.5*	*1.3*	*2.6*
MSIM Global Sovereign	538,484,558	0.6	-4.3	-7.5	-7.5	--	--	--
BbgBarc Global Treasury Ex-U.S.			*-3.9*	*-7.7*	*-7.5*	*-1.5*	*1.3*	*2.6*
PIMCO Global Sovereign	539,637,741	0.6	-4.3	-7.7	-7.7	--	--	--
BbgBarc Global Treasury Ex-U.S.			*-3.9*	*-7.7*	*-7.5*	*-1.5*	*1.3*	*2.6*
Emerging Markets Debt	**302,574,207**	**0.3**	**-13.6**	**-21.8**	**-23.9**	**--**	**--**	**--**
JP Morgan EMBI Global Diversified			*-11.4*	*-20.3*	*-21.2*	*-5.2*	*-1.2*	*2.2*
Ashmore EMD	96,794,383	0.1	-14.9	-23.3	-27.2	--	--	--
JP Morgan EMBI Global Diversified			*-11.4*	*-20.3*	*-21.2*	*-5.2*	*-1.2*	*2.2*
Global Evolution EMD	102,888,205	0.1	-13.8	-21.0	-22.2	--	--	--
JP Morgan EMBI Global Diversified			*-11.4*	*-20.3*	*-21.2*	*-5.2*	*-1.2*	*2.2*
PGIM EMD	102,891,619	0.1	-12.2	-21.2	-22.3	--	--	--
JP Morgan EMBI Global Diversified			*-11.4*	*-20.3*	*-21.2*	*-5.2*	*-1.2*	*2.2*

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Structured Credit Products	**1,616,614,255**	**1.7**	**-3.5**	**-7.6**	--	--	--	--
Oregon Structured Credit Products FI BM			*-2.8*	*-7.0*	--	--	--	--
Schroders SCP	546,381,097	0.6	-2.7	-5.9	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx			*-2.2*	*-6.1*	*-6.2*	*0.3*	*1.8*	*2.7*
Putnam SCP	510,917,425	0.5	-5.5	-12.1	--	--	--	--
Bloomberg US MBS TR USD			*-4.0*	*-8.8*	*-9.0*	*-1.4*	*0.4*	*1.2*
Guggenheim SCP	559,315,732	0.6	-2.4	-4.1	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx			*-2.2*	*-6.1*	*-6.2*	*0.3*	*1.8*	*2.7*
Total Public Equity	**20,266,437,570**	**21.7**	**-13.2**	**-17.2**	**-13.3**	**6.7**	**7.1**	**9.3**
MSCI ACWI IMI Net (Daily)			*-15.8*	*-20.4*	*-16.5*	*6.0*	*6.7*	*8.7*
U.S. Equity	**9,573,146,122**	**10.3**	**-15.3**	**-19.4**	**-12.9**	**8.6**	**9.2**	**11.6**
Russell 3000 TR			*-16.7*	*-21.1*	*-13.9*	*9.8*	*10.6*	*12.6*
Small Cap Growth	**215,886,948**	**0.2**	**-19.1**	**-27.8**	**-26.6**	**9.5**	**11.9**	**11.7**
Russell 2000 Growth TR			*-19.3*	*-29.5*	*-33.4*	*1.4*	*4.8*	*9.3*
EAM MicroCap Growth	215,886,948	0.2	-19.1	-27.8	-26.6	9.5	11.9	12.8
Russell Microcap Growth Index (Daily)			*-22.4*	*-33.0*	*-44.0*	*0.1*	*1.6*	*7.0*
Small Cap Value	**463,753,671**	**0.5**	**-13.1**	**-13.3**	**-9.3**	**8.6**	**5.9**	**9.6**
Russell 2000 Value TR			*-15.3*	*-17.3*	*-16.3*	*6.2*	*4.9*	*9.1*
AQR Capital Management	60,547,492	0.1	-9.7	-8.3	-0.7	10.0	4.5	8.4
Russell 2000 Value TR			*-15.3*	*-17.3*	*-16.3*	*6.2*	*4.9*	*9.1*
Mellon Asset Management	142,008,111	0.2	-14.8	-15.1	-12.2	7.0	6.9	10.1
Russell 2000 Value TR			*-15.3*	*-17.3*	*-16.3*	*6.2*	*4.9*	*9.1*

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
DFA MicroCap Value	133,532,103	0.1	-12.3	-12.1	-8.6	10.6	6.4	--
Russell Microcap Value (Daily)			*-16.8*	*-19.7*	*-20.2*	*7.6*	*6.0*	*10.1*
Callan US Microcap Value	127,665,965	0.1	-13.3	-16.0	-14.0	7.7	6.4	--
Russell Microcap Value (Daily)			*-16.8*	*-19.7*	*-20.2*	*7.6*	*6.0*	*10.1*
Market Oriented (CORE)	**8,893,505,491**	**9.5**	**-15.4**	**-19.6**	**-12.7**	**9.0**	**9.8**	**11.9**
Russell 1000 TR			*-16.7*	*-20.9*	*-13.0*	*10.2*	*11.0*	*12.8*
DFA Large Cap Core	2,280,619,086	2.4	-14.5	-17.4	-10.4	9.3	9.5	--
Russell 1000 TR			*-16.7*	*-20.9*	*-13.0*	*10.2*	*11.0*	*12.8*
Russell 2000 Synthetic - OST managed	281,141,643	0.3	-14.2	-19.1	-16.9	7.5	6.5	10.5
S&P 600 Custom			*-14.1*	*-18.9*	*-16.8*	*7.3*	*6.4*	*10.0*
S&P 500 - OST managed	2,502,292,325	2.7	-16.1	-20.0	-10.6	10.6	11.4	13.0
S&P 500 Index (Daily)			*-16.1*	*-20.0*	*-10.6*	*10.6*	*11.3*	*13.0*
S&P 400 - OST managed	565,525,996	0.6	-15.4	-19.5	-14.7	6.8	7.1	11.1
S&P 400 Midcap Index (Daily)			*-15.4*	*-19.5*	*-14.6*	*6.9*	*7.0*	*10.9*
OST Risk Premia Strategy	3,263,926,439	3.5	-15.5	-20.7	-14.9	8.3	10.2	--
Risk Premia Custom Index			*-15.4*	*-20.6*	*-14.8*	*8.3*	*10.2*	*--*
Non-U.S. Equity	**6,682,694,827**	**7.2**	**-12.1**	**-16.9**	**-16.4**	**4.6**	**4.6**	**6.8**
Oregon MSCI ACWI Ex US IMI (Net)			*-14.3*	*-19.1*	*-19.9*	*1.6*	*2.5*	*5.0*
Total International Overlay Accounts	**147,073,512**	**0.2**						
PERS-Adrian Lee Active Currency	92,389,708	0.1						
PERS-P/E Global Active Currency	16,756,388	0.0						
PERS-Aspect Cap Active Currency	37,903,386	0.0						

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
International Market Oriented (Core)	**4,026,882,452**	**4.3**	**-11.0**	**-15.8**	**-14.2**	**4.6**	**5.1**	**7.4**
MSCI World ex USA IMI Net Return			*-15.2*	*-19.5*	*-17.7*	*1.7*	*2.6*	*5.5*
Arrowstreet Capital	1,230,323,460	1.3	-7.6	-9.2	-3.0	9.7	9.9	11.0
Oregon MSCI ACWI Ex US IMI (Net)			*-14.3*	*-19.1*	*-19.9*	*1.6*	*2.5*	*5.0*
Lazard Asset Management	411,368,736	0.4	-12.5	-17.4	-17.4	0.0	2.0	5.0
Oregon MSCI ACWI Ex US (Net)			*-13.7*	*-18.4*	*-19.4*	*1.3*	*2.5*	*4.9*
Lazard International CEF	839,083,449	0.9	-13.9	-27.3	-28.5	2.9	4.0	--
Oregon MSCI ACWI Ex US (Net)			*-13.7*	*-18.4*	*-19.4*	*1.3*	*2.5*	*4.9*
AQR Capital Management	281,150,674	0.3	-11.8	-16.2	-18.5	-0.2	0.1	5.2
Oregon MSCI WORLD Ex US (Net)			*-14.7*	*-18.8*	*-16.8*	*1.7*	*2.7*	*5.4*
OST Int'l Risk Premia	1,264,956,134	1.4	-11.4	-12.1	-10.0	5.0	4.9	--
MSCI World x US Custom Div Multiple-Factor			*-11.5*	*-12.3*	*-10.3*	*4.6*	*4.6*	*--*
MSCI World ex USA Net Index			*-14.7*	*-18.8*	*-16.8*	*1.7*	*2.7*	*5.4*
International Value	**839,342,791**	**0.9**	**-12.9**	**-14.8**	**-14.1**	**4.3**	**3.9**	**6.8**
Oregon MSCI ACWI Ex US Value IMI (Net)			*-12.4*	*-12.6*	*-13.5*	*0.8*	*1.3*	*4.0*
Acadian Asset Management	438,226,371	0.5	-15.3	-17.0	-14.7	6.2	5.4	7.9
Oregon MSCI ACWI Ex US Value IMI (Net)			*-12.4*	*-12.6*	*-13.5*	*0.8*	*1.3*	*4.0*
Brandes Investment Partners	401,116,420	0.4	-10.1	-12.1	-13.3	2.5	2.3	5.6
Oregon MSCI ACWI Ex US Value (Net)			*-11.9*	*-11.8*	*-12.8*	*0.6*	*1.2*	*3.8*
International Growth	**498,033,943**	**0.5**	**-14.6**	**-24.3**	**-20.6**	**3.7**	**6.3**	**7.5**
Oregon MSCI WORLD Ex US (Net)			*-14.7*	*-18.8*	*-16.8*	*1.7*	*2.7*	*5.4*
Walter Scott Management	498,033,943	0.5	-14.6	-24.3	-20.6	3.7	6.3	7.5
Oregon MSCI WORLD Ex US (Net)			*-14.7*	*-18.8*	*-16.8*	*1.7*	*2.7*	*5.4*

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
International Small Cap	**515,842,537**	**0.6**	**-15.9**	**-20.6**	**-19.7**	**4.1**	**1.5**	**6.7**
MSCI World Ex US Small Cap Value (Net)			*-15.6*	*-18.1*	*-17.4*	*2.0*	*1.4*	*6.3*
DFA International Small Cap	128,141,205	0.1	-13.9	-15.1	-12.7	3.7	0.8	6.8
MSCI World Ex US Small Cap Value (Net)			*-15.6*	*-18.1*	*-17.4*	*2.0*	*1.4*	*6.3*
Harris Associates	147,982,717	0.2	-15.2	-24.0	-24.4	2.3	0.6	6.2
MSCI ACWI ex USA Small Cap Value (Net)			*-15.4*	*-17.6*	*-17.5*	*2.6*	*1.9*	*6.0*
EAM International Micro Cap	131,379,530	0.1	-19.9	-25.4	-23.6	9.1	3.6	--
Oregon FTSE Global Ex US Micro Cap			*-18.9*	*-21.8*	*-21.7*	*8.0*	*4.7*	*--*
DFA International Micro Cap	108,339,085	0.1	-13.9	-15.4	-15.3	4.7	1.7	--
Oregon FTSE Global Ex US Micro Cap			*-18.9*	*-21.8*	*-21.7*	*8.0*	*4.7*	*--*
Emerging Markets	**802,593,104**	**0.9**	**-12.6**	**-17.4**	**-23.1**	**5.1**	**4.2**	**4.7**
ORE MSCI Emerging Markets IMI (Net)			*-12.1*	*-17.9*	*-24.7*	*1.1*	*2.3*	*3.2*
Genesis Emerging Markets	162,470,387	0.2	-11.2	-21.0	-30.5	-1.8	1.6	3.2
ORE MSCI Emerging Markets IMI (Net)			*-12.1*	*-17.9*	*-24.7*	*1.1*	*2.3*	*3.2*
Arrowstreet Emerging Markets	367,530,847	0.4	-10.8	-13.8	-19.8	11.3	7.1	6.2
ORE MSCI Emerging Markets IMI (Net)			*-12.1*	*-17.9*	*-24.7*	*1.1*	*2.3*	*3.2*
Westwood Global Investment	120,356,264	0.1	-10.5	-5.1	-10.1	5.2	3.7	4.8
MSCI Emerging Markets IMI Net			*-12.1*	*-17.9*	*-24.7*	*1.1*	*2.3*	*3.1*
William Blair and Company	96,758,807	0.1	-18.3	-28.4	-32.5	5.5	5.2	5.3
MSCI Emerging Markets Growth Net			*-12.0*	*-21.1*	*-31.2*	*1.9*	*2.4*	*3.2*
William Blair Emerging Mkt Small Cap	55,382,152	0.1	-20.0	-28.0	-26.5	7.9	3.9	--
MSCI Emerging Markets Small Cap Gr Net			*-18.2*	*-23.8*	*-23.6*	*6.8*	*3.6*	*4.3*
OST EM Risk Premia ESG	94,647	0.0						

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Global Equity	**4,005,475,761**	**4.3**	**-9.7**	**-12.0**	**-8.2**	**5.3**	**6.1**	**9.9**
MSCI ACWI IMI Net (Daily)			*-15.8*	*-20.4*	*-16.5*	*6.0*	*6.7*	*8.7*
Alliance Bernstein Global Value	332,234,343	0.4	-13.6	-18.1	-17.1	3.2	1.5	7.4
Oregon MSCI ACWI Value (Net)			*-11.5*	*-12.3*	*-8.1*	*3.9*	*4.3*	*6.9*
Global Equity Low Volatility	**3,673,241,418**	**3.9**	**-9.3**	**-11.4**	**-7.2**	**5.5**	**6.8**	**--**
MSCI AC World (Daily Const)			*-15.7*	*-20.2*	*-15.8*	*6.2*	*7.0*	*8.8*
MSCI ACWI Minimum Volatility Index (Net)			*-9.3*	*-12.0*	*-6.4*	*2.9*	*5.7*	*8.0*
LACM Global Equity Low Volatility	854,913,783	0.9	-13.3	-16.0	-11.6	5.8	7.2	--
MSCI AC World (Daily Const)			*-15.7*	*-20.2*	*-15.8*	*6.2*	*7.0*	*8.8*
MSCI ACWI Minimum Volatility Index (Net)			*-9.3*	*-12.0*	*-6.4*	*2.9*	*5.7*	*8.0*
Arrowstreet Global Low Volatility	914,211,492	1.0	-5.0	-5.1	-4.3	9.8	10.4	--
MSCI ACWI IMI Net (Daily)			*-15.8*	*-20.4*	*-16.5*	*6.0*	*6.7*	*8.7*
AQR Global Low Volatility	641,456,742	0.7	-9.8	-13.9	-9.7	2.9	4.7	--
MSCI AC World (Daily Const)			*-15.7*	*-20.2*	*-15.8*	*6.2*	*7.0*	*8.8*
MSCI ACWI Minimum Volatility Index (Net)			*-9.3*	*-12.0*	*-6.4*	*2.9*	*5.7*	*8.0*
Acadian Global Low Volatility	673,454,466	0.7	-8.7	-10.1	-3.2	3.1	4.5	--
MSCI ACWI IMI Net (Daily)			*-15.8*	*-20.4*	*-16.5*	*6.0*	*6.7*	*8.7*
DFA Global Low Volatility	589,204,935	0.6	-9.8	-12.0	-6.3	5.3	--	--
MSCI AC World (Daily Const)			*-15.7*	*-20.2*	*-15.8*	*6.2*	*7.0*	*8.8*
Other Equity	**5,397,327**	**0.0**						
Transitional & Closed Accounts	300,497	0.0						
PERS- Equity Distribution	5,096,830	0.0						

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Real Estate	**12,731,033,840**	**13.6**	**5.9**	**15.1**	**29.6**	**13.6**	**11.0**	**11.3**
NCREIF ODCE (Custom) (Adj.)			*7.1*	*15.3*	*27.2*	*10.3*	*8.9*	*9.8*
Real Estate excluding REITS	**12,342,181,821**	**13.2**	**6.5**	**16.3**	**31.0**	**14.1**	**11.4**	**12.2**
NCREIF ODCE (Custom) (Adj.)			*7.1*	*15.3*	*27.2*	*10.3*	*8.9*	*9.8*
Total REITS	**388,852,019**	**0.4**	**-8.9**	**-12.9**	**-3.3**	**3.6**	**4.4**	**6.0**
ABKB - LaSalle Advisors	278,665,739	0.3	-11.3	-14.9	-3.0	8.4	10.9	9.9
Nareit Equity Share Price Index			*-14.7*	*-19.2*	*-5.9*	*5.3*	*6.8*	*8.3*
Woodbourne Investment Management	110,186,279	0.1	-2.1	-7.4	-4.1	3.1	4.0	6.1
Nareit Equity Share Price Index			*-14.7*	*-19.2*	*-5.9*	*5.3*	*6.8*	*8.3*
Risk Parity	**1,886,410,933**	**2.0**	**-13.3**	**-17.1**	**-13.0**	**--**	**--**	**--**
S&P Risk Parity - 12% Target Volatility			*-11.5*	*-12.3*	*-6.7*	*7.9*	*9.1*	*8.1*
Man AHL Target Risk	632,354,689	0.7	-12.2	-17.3	-10.5	--	--	--
S&P Risk Parity - 12% Target Volatility			*-11.5*	*-12.3*	*-6.7*	*7.9*	*9.1*	*8.1*
PanAgora Risk Parity	585,173,245	0.6	-16.7	-22.6	-20.7	--	--	--
S&P Risk Parity - 12% Target Volatility			*-11.5*	*-12.3*	*-6.7*	*7.9*	*9.1*	*8.1*
Bridgewater All Weather	668,883,000	0.7	-11.1	-11.5	-7.4	--	--	--
S&P Risk Parity - 12% Target Volatility			*-11.5*	*-12.3*	*-6.7*	*7.9*	*9.1*	*8.1*
Opportunity Portfolio	**2,465,521,842**	**2.6**	**0.2**	**2.0**	**10.0**	**13.0**	**9.9**	**9.7**
CPI + 5%			*4.3*	*8.9*	*14.5*	*10.2*	*9.0*	*7.7*
Alternative Portfolio	**11,907,703,479**	**12.8**	**7.9**	**14.0**	**20.6**	**6.6**	**4.3**	**3.4**
CPI +4%			*3.8*	*8.1*	*13.1*	*9.1*	*8.0*	*6.7*
Diversifiying Strategies	4,568,796,706	4.9	7.7	15.0	17.1	3.0	0.7	3.2

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Real Assets	**7,338,906,773**	**7.9**	**8.1**	**13.5**	**23.0**	**10.0**	**8.0**	**--**
CPI +4%			*3.8*	*8.1*	*13.1*	*9.1*	*8.0*	*6.7*
Infrastructure	4,929,127,396	5.3	5.8	11.6	17.0	13.9	--	--
CPI +4%			*3.8*	*8.1*	*13.1*	*9.1*	*8.0*	*6.7*
Natural Resources	2,409,779,376	2.6	13.1	17.4	36.0	5.8	--	--
CPI +4%			*3.8*	*8.1*	*13.1*	*9.1*	*8.0*	*6.7*
Private Equity	**26,112,931,937**	**28.0**	**-0.7**	**6.6**	**24.0**	**21.8**	**19.6**	**15.4**
Russell 3000 + 300 BPS QTR LAG (Adj.)			*-4.6*	*5.0*	*15.2*	*21.7*	*18.8*	*17.7*
MSCI ACWI+3% (1 quarter lagged)			*-4.6*	*2.5*	*10.5*	*17.1*	*15.0*	*13.3*
Cash	**1,667,536,276**	**1.8**	**-0.1**	**-0.7**	**-0.8**	**0.7**	**1.4**	**1.1**
ICE BofA US 3-Month Treasury Bill			*0.1*	*0.1*	*0.2*	*0.6*	*1.1*	*0.6*
PERS-Russell Overlay Cash Balance	628,892,143	0.7						

Calendar Year Performance

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Total Fund	**20.0**	**7.7**	**13.6**	**0.5**	**15.4**	**7.1**	**2.0**	**7.3**	**15.6**	**14.3**
OPERF Policy Benchmark	*15.6*	*12.4*	*14.0*	*1.2*	*15.6*	*9.0*	*1.6*	*8.2*	*15.6*	*16.6*
InvMetrics All DB > $10B Net Median	*16.7*	*10.7*	*17.9*	*-2.6*	*15.4*	*8.2*	*0.3*	*6.6*	*14.0*	*12.8*
InvMetrics All DB > $10B Net Rank	*14*	*94*	*92*	*8*	*51*	*82*	*3*	*34*	*29*	*2*
Total Fixed Income	**-0.9**	**7.7**	**8.8**	**0.3**	**3.7**	**2.8**	**0.6**	**3.5**	**1.0**	**10.4**
Oregon Custom FI Benchmark	*-0.9*	*7.3*	*8.3*	*0.3*	*3.3*	*2.5*	*0.1*	*3.0*	*0.3*	*8.6*
Core Fixed Income	**-1.1**	**8.7**	**9.8**	**-0.2**	**4.6**	**3.4**	**0.6**	**6.9**	**-1.4**	**9.1**
Oregon Custom External FI BM	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*	*6.8*
Alliance Bernstein	6.3	6.8	8.8	0.2	3.7	3.3	0.4	7.3	-1.8	7.6
Oregon Custom External FI BM	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*	*6.8*
Blackrock	-1.4	9.1	8.9	0.1	3.8	2.8	0.9	6.7	-1.7	7.9
Oregon Custom External FI BM	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*	*6.8*
Wellington	-0.9	9.6	9.8	-0.4	4.6	4.0	0.8	6.5	-1.2	10.0
Oregon Custom External FI BM	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*	*6.8*
Western Asset	-1.2	9.4	11.6	-0.7	5.6	3.7	0.4	7.0	-1.0	11.0
Oregon Custom External FI BM	*-1.5*	*7.5*	*8.7*	*0.0*	*3.5*	*2.7*	*0.6*	*6.0*	*-1.9*	*6.8*
Fidelity										
U.S. Government	**-2.3**	**8.1**	**6.9**	**0.9**	**2.3**	**-1.6**	**0.9**	**1.0**	**--**	**--**
Government Blended Index	*-2.3*	*8.0*	*6.9*	*0.9*	*2.3*	*-1.3*	*0.8*	*0.8*	*--*	*--*
Government Portfolio	-2.3	8.1	6.9	0.9	--	--	--	--	--	--
Government Blended Index	*-2.3*	*8.0*	*6.9*	*0.9*	*--*	*--*	*--*	*--*	*--*	*--*

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Non-Core Fixed Income	**6.4**	**3.7**	**10.5**	**0.1**	**4.9**	**10.1**	**0.2**	**2.4**	**8.1**	**13.2**
Custom Non-Core Fixed Income Index	*5.3*	*3.9*	*10.1*	*-0.2*	*5.0*	*12.0*	*-1.7*	*1.8*	*5.8*	*11.1*
KKR Asset Management	13.8	2.6	10.5	-0.4	3.4	9.3	-0.2	2.5	9.0	13.8
KKR Custom Leveraged Loans & Bond Index	*5.2*	*4.3*	*10.6*	*-0.5*	*5.3*	*12.7*	*-2.1*	*1.9*	*6.0*	*11.7*
Oak Hill	5.7	4.9	10.5	0.5	6.3	11.2	0.9	2.2	6.5	12.0
Oakhill Custom Lev Loan & Bond Index	*5.2*	*3.6*	*9.5*	*0.0*	*4.6*	*11.2*	*-1.3*	*1.7*	*5.6*	*10.5*
Global Sovereign	--	--	--	--	--	--	--	--	--	--
BbgBarc Global Treasury Ex-U.S.	--	--	--	--	--	--	--	--	--	--
MSIM Global Sovereign	--	--	--	--	--	--	--	--	--	--
BbgBarc Global Treasury Ex-U.S.	--	--	--	--	--	--	--	--	--	--
PIMCO Global Sovereign	--	--	--	--	--	--	--	--	--	--
BbgBarc Global Treasury Ex-U.S.	--	--	--	--	--	--	--	--	--	--
Emerging Markets Debt	--	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	--	--	--	--	--	--	--	--	--	--
Ashmore EMD	--	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	--	--	--	--	--	--	--	--	--	--
Global Evolution EMD	--	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	--	--	--	--	--	--	--	--	--	--
PGIM EMD	--	--	--	--	--	--	--	--	--	--
JP Morgan EMBI Global Diversified	--	--	--	--	--	--	--	--	--	--

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Structured Credit Products	--	--	--	--	--	--	--	--	--	--
Oregon Structured Credit Products FI BM	--	--	--	--	--	--	--	--	--	--
Schroders SCP	--	--	--	--	--	--	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx	--	--	--	--	--	--	--	--	--	--
Putnam SCP	--	--	--	--	--	--	--	--	--	--
Bloomberg US MBS TR USD	--	--	--	--	--	--	--	--	--	--
Guggenheim SCP	--	--	--	--	--	--	--	--	--	--
ICE BofA AA-BBB US Asset Backed Sec Idx	--	--	--	--	--	--	--	--	--	--
Total Public Equity	**20.0**	**12.7**	**25.3**	**-10.5**	**24.5**	**9.8**	**-1.7**	**3.3**	**26.7**	**17.5**
MSCI ACWI IMI Net (Daily)	*18.2*	*16.3*	*26.4*	*-10.1*	*24.0*	*8.3*	*-2.1*	*3.8*	*23.5*	*16.4*
U.S. Equity	**27.2**	**13.6**	**29.0**	**-7.9**	**20.3**	**14.9**	**-0.8**	**9.8**	**35.4**	**16.3**
Russell 3000 TR	*25.7*	*20.9*	*31.0*	*-5.3*	*21.1*	*12.8*	*0.5*	*12.6*	*33.6*	*16.4*
Small Cap Growth	**19.6**	**38.9**	**33.9**	**-4.7**	**26.8**	**6.3**	**-5.0**	**-3.6**	**57.9**	**11.3**
Russell 2000 Growth TR	*2.8*	*34.6*	*28.5*	*-9.3*	*22.2*	*11.3*	*-1.4*	*5.6*	*43.3*	*14.6*
EAM MicroCap Growth	19.6	38.9	33.9	-4.7	26.8	6.3	-5.7	1.8	57.5	17.6
Russell Microcap Growth Index (Daily)	*0.9*	*40.1*	*23.3*	*-14.2*	*16.7*	*6.9*	*-3.9*	*4.3*	*52.8*	*15.2*
Small Cap Value	**35.6**	**0.3**	**21.3**	**-14.1**	**7.5**	**31.4**	**-5.2**	**3.0**	**36.8**	**15.5**
Russell 2000 Value TR	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*	*18.1*
AQR Capital Management	46.3	-7.1	15.2	-18.1	-1.2	31.7	-2.5	4.7	36.9	11.8
Russell 2000 Value TR	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*	*18.1*

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Mellon Asset Management	25.8	5.2	24.2	-8.0	10.8	26.8	-5.8	2.6	36.7	19.0
Russell 2000 Value TR	*28.3*	*4.7*	*22.4*	*-12.9*	*7.8*	*31.7*	*-7.5*	*4.3*	*34.5*	*18.1*
DFA MicroCap Value	41.6	1.1	18.5	-15.7	7.3	33.3	-6.3	0.2	--	--
Russell Microcap Value (Daily)	*34.9*	*6.3*	*21.3*	*-12.0*	*11.1*	*30.6*	*-6.5*	*3.1*	--	--
Callan US Microcap Value	31.7	2.0	28.3	-15.8	16.4	37.2	-7.0	5.2	--	--
Russell Microcap Value (Daily)	*34.9*	*6.3*	*21.3*	*-12.0*	*11.1*	*30.6*	*-6.5*	*3.1*	--	--
Market Oriented (CORE)	**26.6**	**15.2**	**30.1**	**-7.1**	**22.0**	**14.8**	**-1.7**	**11.1**	**33.1**	**16.6**
Russell 1000 TR	*26.5*	*21.0*	*31.4*	*-4.8*	*21.7*	*12.1*	*0.9*	*13.2*	*33.1*	*16.4*
DFA Large Cap Core	27.8	12.7	29.1	-9.0	21.1	15.6	-4.6	--	--	--
Russell 1000 TR	*26.5*	*21.0*	*31.4*	*-4.8*	*21.7*	*12.1*	*0.9*	--	--	--
Russell 2000 Synthetic - OST managed	27.1	11.8	23.4	-11.3	14.5	23.4	-3.6	5.8	39.9	17.3
S&P 600 Custom	*26.8*	*11.3*	*22.8*	*-11.0*	*14.7*	*21.3*	*-4.4*	*4.9*	*38.8*	*16.3*
S&P 500 - OST managed	28.7	18.4	31.7	-4.4	21.8	12.0	1.5	13.7	32.5	16.0
S&P 500 Index (Daily)	*28.7*	*18.4*	*31.5*	*-4.4*	*21.8*	*12.0*	*1.4*	*13.7*	*32.4*	*16.0*
S&P 400 - OST managed	24.6	13.5	26.6	-10.9	16.7	21.1	-2.0	10.0	33.9	18.0
S&P 400 Midcap Index (Daily)	*24.8*	*13.7*	*26.2*	*-11.1*	*16.3*	*20.7*	*-2.2*	*9.8*	*33.5*	*17.9*
OST Risk Premia Strategy	24.3	15.8	31.3	-5.5	27.1	10.8	4.5	13.0	--	--
Non-U.S. Equity	**12.7**	**13.5**	**22.6**	**-14.9**	**30.4**	**4.6**	**-2.6**	**-2.9**	**18.6**	**18.9**
Oregon MSCI ACWI Ex US IMI (Net)	*8.5*	*11.1*	*21.6*	*-14.8*	*27.8*	*4.4*	*-4.6*	*-3.9*	*15.8*	*17.0*

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Total International Overlay Accounts										
PERS-Adrian Lee Active Currency										
PERS-P/E Global Active Currency										
PERS-Aspect Cap Active Currency										
International Market Oriented (Core)	**13.1**	**12.5**	**23.2**	**-14.3**	**31.0**	**2.5**	**-1.2**	**-2.6**	**21.3**	**19.3**
MSCI World ex USA IMI Net Return	*12.4*	*8.3*	*22.9*	*-14.7*	*25.2*	*2.9*	*-1.9*	*-4.5*	*21.6*	*16.6*
Arrowstreet Capital	24.5	9.1	23.2	-10.3	35.4	4.7	0.4	0.8	26.2	20.1
Oregon MSCI ACWI Ex US IMI (Net)	*8.5*	*11.1*	*21.6*	*-14.8*	*27.8*	*4.4*	*-4.6*	*-3.9*	*15.8*	*17.0*
Lazard Asset Management	7.1	6.9	21.0	-13.4	24.8	0.9	-1.1	-2.8	19.1	21.4
Oregon MSCI ACWI Ex US (Net)	*7.8*	*10.7*	*21.5*	*-14.2*	*27.2*	*4.5*	*-5.5*	*-3.9*	*15.3*	*16.8*
Lazard International CEF	4.5	30.2	29.0	-17.2	39.8	0.1	-0.2	0.6	--	--
Oregon MSCI ACWI Ex US (Net)	*7.8*	*10.7*	*21.5*	*-14.2*	*27.2*	*4.5*	*-5.5*	*-3.9*	*--*	*--*
AQR Capital Management	6.1	5.9	19.6	-20.3	26.8	2.1	2.4	-4.9	23.1	22.6
Oregon MSCI WORLD Ex US (Net)	*12.6*	*7.6*	*22.5*	*-14.1*	*24.2*	*2.8*	*-3.0*	*-4.3*	*21.0*	*16.4*
OST Int'l Risk Premia	15.6	7.7	22.8	-12.0	--	--	--	--	--	--
MSCI World x US Custom Div Multiple-Factor	*15.0*	*7.3*	*22.4*	*-12.3*	*--*	*--*	*--*	*--*	*--*	*--*
International Value	**18.0**	**4.9**	**17.8**	**-12.4**	**25.7**	**9.8**	**-4.5**	**-4.3**	**25.0**	**15.1**
Oregon MSCI ACWI Ex US Value IMI (Net)	*11.0*	*-0.1*	*16.3*	*-14.6*	*23.6*	*8.8*	*-8.9*	*-5.0*	*15.7*	*17.4*
Acadian Asset Management	21.7	11.5	19.4	-15.4	35.1	11.8	-7.2	-3.7	21.9	19.7
Oregon MSCI ACWI Ex US Value IMI (Net)	*11.0*	*-0.1*	*16.3*	*-14.6*	*23.6*	*8.8*	*-8.9*	*-5.0*	*15.7*	*17.4*
Brandes Investment Partners	14.1	-1.3	16.4	-9.4	16.3	7.9	-1.6	-5.0	28.3	10.5
Oregon MSCI ACWI Ex US Value (Net)	*10.5*	*-0.8*	*15.7*	*-14.0*	*22.7*	*8.9*	*-10.1*	*-5.1*	*15.0*	*17.0*

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
International Growth	**12.4**	**19.9**	**28.1**	**-6.4**	**27.5**	**1.3**	**1.9**	**-4.3**	**18.8**	**18.3**
Oregon MSCI WORLD Ex US (Net)	*12.6*	*7.6*	*22.5*	*-14.1*	*24.2*	*2.8*	*-3.0*	*-4.3*	*21.0*	*16.4*
Walter Scott Management	12.4	19.9	28.0	-6.3	27.5	6.4	1.2	-3.1	13.1	20.3
Oregon MSCI WORLD Ex US (Net)	*12.6*	*7.6*	*22.5*	*-14.1*	*24.2*	*2.8*	*-3.0*	*-4.3*	*21.0*	*16.4*
International Small Cap	**18.1**	**9.3**	**24.1**	**-24.3**	**30.2**	**4.9**	**6.1**	**-6.5**	**29.1**	**18.7**
MSCI World Ex US Small Cap Value (Net)	*13.3*	*2.6*	*22.8*	*-18.4*	*27.9*	*7.9*	*1.1*	*-5.9*	*27.7*	*19.5*
DFA International Small Cap	16.9	1.1	20.9	-23.3	27.4	9.6	2.5	-6.6	32.9	20.5
MSCI World Ex US Small Cap Value (Net)	*13.3*	*2.6*	*22.8*	*-18.4*	*27.9*	*7.9*	*1.1*	*-5.9*	*27.7*	*19.5*
Harris Associates	20.1	5.0	33.4	-24.1	27.2	7.1	1.0	-6.7	30.9	17.9
MSCI ACWI ex USA Small Cap Value (Net)	*14.1*	*4.7*	*20.3*	*-18.2*	*29.9*	*8.2*	*-1.2*	*-4.5*	*20.9*	*20.2*
EAM International Micro Cap	17.8	38.4	20.3	-33.6	45.3	2.2	23.5	--	--	--
Oregon FTSE Global Ex US Micro Cap	*18.0*	*27.9*	*16.6*	*-20.0*	*31.4*	*6.0*	*2.9*	--	--	--
DFA International Micro Cap	17.1	5.7	18.5	-22.0	30.9	11.9	-1.8	--	--	--
Oregon FTSE Global Ex US Micro Cap	*18.0*	*27.9*	*16.6*	*-20.0*	*31.4*	*6.0*	*2.9*	--	--	--
Emerging Markets	**4.3**	**23.5**	**22.1**	**-17.4**	**35.7**	**10.3**	**-14.5**	**1.2**	**-0.1**	**21.7**
ORE MSCI Emerging Markets IMI (Net)	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*	*18.7*
Genesis Emerging Markets	-6.6	17.5	29.3	-15.9	33.6	12.0	-14.9	-1.0	0.7	21.6
ORE MSCI Emerging Markets IMI (Net)	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*	*18.7*
Arrowstreet Emerging Markets	9.6	32.1	23.7	-19.5	35.4	11.2	-15.8	1.1	-1.0	22.8
ORE MSCI Emerging Markets IMI (Net)	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.0*	*9.9*	*-13.9*	*-1.8*	*-2.2*	*18.7*
Westwood Global Investment	3.6	10.1	9.8	-9.3	29.5	19.0	-16.1	0.2	0.6	18.4
MSCI Emerging Markets IMI Net	*-0.3*	*18.4*	*17.6*	*-15.0*	*37.3*	*11.2*	*-14.9*	*-2.2*	*-2.6*	*18.2*

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
William Blair and Company	4.4	41.4	29.1	-21.6	50.2	1.9	-14.1	5.7	0.9	21.5
MSCI Emerging Markets Growth Net	*-8.4*	*31.3*	*25.1*	*-18.3*	*37.3*	*11.2*	*-14.9*	*-2.2*	*-2.6*	*18.2*
William Blair Emerging Mkt Small Cap	17.9	33.0	21.7	-24.4	38.5	-4.3	-5.9	14.9	--	--
MSCI Emerging Markets Small Cap Gr Net	*20.4*	*25.6*	*12.0*	*-20.0*	*33.8*	*2.3*	*-6.8*	*1.0*	--	--
OST EM Risk Premia ESG										
Global Equity	**15.5**	**7.4**	**21.6**	**-7.9**	**22.3**	**9.4**	**-3.3**	**6.9**	**35.6**	**12.6**
MSCI ACWI IMI Net (Daily)	*18.2*	*16.3*	*26.4*	*-10.1*	*24.0*	*8.3*	*-2.1*	*3.8*	*23.5*	*16.4*
Alliance Bernstein Global Value	18.1	4.2	20.1	-19.1	21.8	9.3	-3.3	6.9	35.6	12.6
Oregon MSCI ACWI Value (Net)	*19.6*	*-0.3*	*20.6*	*-10.8*	*18.3*	*12.6*	*-6.3*	*2.9*	*22.4*	*15.5*
Global Equity Low Volatility	**15.2**	**7.9**	**21.7**	**-5.5**	**22.5**	--	--	--	--	--
MSCI AC World (Daily Const)	*18.5*	*16.3*	*26.6*	*-9.4*	*24.0*	--	--	--	--	--
LACM Global Equity Low Volatility	15.4	15.0	23.1	-6.6	22.7	--	--	--	--	--
MSCI AC World (Daily Const)	*18.5*	*16.3*	*26.6*	*-9.4*	*24.0*	--	--	--	--	--
Arrowstreet Global Low Volatility	15.1	12.6	22.3	-2.7	--	--	--	--	--	--
MSCI ACWI IMI Net (Daily)	*18.2*	*16.3*	*26.4*	*-10.1*	--	--	--	--	--	--
AQR Global Low Volatility	11.4	6.8	19.6	-5.7	--	--	--	--	--	--
MSCI AC World (Daily Const)	*18.5*	*16.3*	*26.6*	*-9.4*	--	--	--	--	--	--
Acadian Global Low Volatility	17.5	-1.9	20.2	-7.0	--	--	--	--	--	--
MSCI ACWI IMI Net (Daily)	*18.2*	*16.3*	*26.4*	*-10.1*	--	--	--	--	--	--
DFA Global Low Volatility	17.2	5.5	--	--	--	--	--	--	--	--
MSCI AC World (Daily Const)	*18.5*	*16.3*	--	--	--	--	--	--	--	--

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Other Equity										
Transitional & Closed Accounts										
PERS- Equity Distribution										
Total Real Estate	**19.0**	**2.7**	**7.2**	**8.0**	**10.0**	**7.9**	**9.9**	**14.2**	**12.8**	**13.6**
NCREIF ODCE (Custom) (Adj.)	*13.6*	*0.6*	*4.7*	*7.7*	*6.7*	*8.9*	*13.5*	*11.3*	*11.0*	*11.0*
Real Estate excluding REITS	**18.6**	**3.0**	**7.3**	**8.9**	**11.2**	**10.0**	**12.7**	**12.0**	**15.8**	**10.8**
NCREIF ODCE (Custom) (Adj.)	*13.6*	*0.6*	*4.7*	*7.7*	*6.7*	*8.9*	*13.5*	*11.3*	*11.0*	*11.0*
Total REITS	**28.2**	**-0.9**	**7.2**	**-2.0**	**9.8**	**1.1**	**2.0**	**22.2**	**2.2**	**26.1**
ABKB - LaSalle Advisors	36.2	3.0	29.9	3.2	7.4	5.4	2.9	32.1	1.6	17.7
Nareit Equity Share Price Index	*41.3*	*-5.2*	*28.7*	*-4.0*	*8.7*	*8.6*	*2.8*	*28.0*	*2.8*	*19.7*
Woodbourne Investment Management	9.9	0.6	18.5	-4.8	10.6	4.3	8.6	19.5	-1.8	15.8
Nareit Equity Share Price Index	*41.3*	*-5.2*	*28.7*	*-4.0*	*8.7*	*8.6*	*2.8*	*28.0*	*2.8*	*19.7*
Risk Parity	**13.7**	--	--	--	--	--	--	--	--	--
S&P Risk Parity - 12% Target Volatility	*18.2*	--	--	--	--	--	--	--	--	--
Man AHL Target Risk	17.0	--	--	--	--	--	--	--	--	--
S&P Risk Parity - 12% Target Volatility	*18.2*	--	--	--	--	--	--	--	--	--
PanAgora Risk Parity	9.0	--	--	--	--	--	--	--	--	--
S&P Risk Parity - 12% Target Volatility	*18.2*	--	--	--	--	--	--	--	--	--
Bridgewater All Weather	15.5	--	--	--	--	--	--	--	--	--
S&P Risk Parity - 12% Target Volatility	*18.2*	--	--	--	--	--	--	--	--	--

	2021 (%)	2020 (%)	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)
Opportunity Portfolio	**22.7**	**10.2**	**6.2**	**5.8**	**10.5**	**6.1**	**2.1**	**8.8**	**15.0**	**18.4**
CPI + 5%	*12.4*	*6.4*	*7.4*	*7.0*	*7.2*	*7.2*	*5.8*	*5.8*	*6.6*	*6.8*
Alternative Portfolio	**14.8**	**-6.6**	**-1.3**	**-2.4**	**8.3**	**6.6**	**-4.3**	**4.4**	**6.0**	**-0.8**
CPI +4%	*11.3*	*5.4*	*6.4*	*6.0*	*6.2*	*6.2*	*4.8*	*4.8*	*5.6*	*5.8*
Diversifiying Strategies	8.7	-11.6	-1.0	-13.1	8.8	0.8	8.1	9.4	7.9	3.7
Real Assets	**19.0**	**-2.0**	**0.0**	**6.5**	**10.5**	**--**	**--**	**--**	**--**	**--**
CPI +4%	*11.3*	*5.4*	*6.4*	*6.0*	*6.2*	--	--	--	--	--
Infrastructure	16.7	7.4	11.1	--	--	--	--	--	--	--
CPI +4%	*11.3*	*5.4*	*6.4*	--	--	--	--	--	--	--
Natural Resources	23.8	-13.0	-12.2	--	--	--	--	--	--	--
CPI +4%	*11.3*	*5.4*	*6.4*	--	--	--	--	--	--	--
Private Equity	**41.6**	**12.7**	**11.1**	**18.2**	**17.3**	**6.3**	**7.3**	**15.9**	**16.2**	**14.4**
Russell 3000 + 300 BPS QTR LAG (Adj.)	*35.7*	*18.4*	*6.0*	*21.1*	*22.2*	*18.4*	*2.5*	*21.2*	*25.2*	*34.0*
Cash	**0.1**	**1.6**	**3.3**	**2.0**	**1.3**	**1.2**	**0.5**	**0.5**	**0.7**	**1.7**
ICE BofA US 3-Month Treasury Bill	*0.1*	*0.7*	*2.3*	*1.9*	*0.9*	*0.3*	*0.0*	*0.0*	*0.1*	*0.1*
PERS-Russell Overlay Cash Balance										

Disclaimer, Glossary, and Notes

WE HAVE PREPARED THIS REPORT (THIS “REPORT”) FOR THE SOLE BENEFIT OF THE INTENDED RECIPIENT (THE “RECIPIENT”).

SIGNIFICANT EVENTS MAY OCCUR (OR HAVE OCCURRED) AFTER THE DATE OF THIS REPORT AND THAT IT IS NOT OUR FUNCTION OR RESPONSIBILITY TO UPDATE THIS REPORT. ANY OPINIONS OR RECOMMENDATIONS PRESENTED HEREIN REPRESENT OUR GOOD FAITH VIEWS AS OF THE DATE OF THIS REPORT AND ARE SUBJECT TO CHANGE AT ANY TIME. ALL INVESTMENTS INVOLVE RISK. THERE CAN BE NO GUARANTEE THAT THE STRATEGIES, TACTICS, AND METHODS DISCUSSED HERE WILL BE SUCCESSFUL.

INFORMATION USED TO PREPARE THIS REPORT WAS OBTAINED FROM INVESTMENT MANAGERS, CUSTODIANS, AND OTHER EXTERNAL SOURCES. WHILE WE HAVE EXERCISED REASONABLE CARE IN PREPARING THIS REPORT, WE CANNOT GUARANTEE THE ACCURACY OF ALL SOURCE INFORMATION CONTAINED HEREIN.

CERTAIN INFORMATION CONTAINED IN THIS REPORT MAY CONSTITUTE “FORWARD - LOOKING STATEMENTS,” WHICH CAN BE IDENTIFIED BY THE USE OF TERMINOLOGY SUCH AS “MAY,” “WILL,” “SHOULD,” “EXPECT,” “AIM”, “ANTICIPATE,” “TARGET,” “PROJECT,” “ESTIMATE,” “INTEND,” “CONTINUE” OR “BELIEVE,” OR THE NEGATIVES THEREOF OR OTHER VARIATIONS THEREON OR COMPARABLE TERMINOLOGY. ANY FORWARD-LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION ARE BASED UPON CURRENT ASSUMPTIONS. CHANGES TO ANY ASSUMPTIONS MAY HAVE A MATERIAL IMPACT ON FORWARD - LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS. ACTUAL RESULTS MAY THEREFORE BE MATERIALLY DIFFERENT FROM ANY FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION.

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%.

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

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

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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: **Second Quarter 2022 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 June 30, 2022, Aladdin estimated a return volatility of 13.2% for OPERF, approximately in-line with the estimate presented by Meketa Investment Group ("Meketa") at the June 2021 meeting.

The realized tracking errors for the liquid portion of the Fund, mainly the Public Equity and Fixed Income Portfolios, are within OIC guidelines. While the predicted active risk for the Fixed Income Portfolio is relatively low, that for the Public Equity Portfolio is elevated. Since that is driven by the Portfolio's low volatility tilt in this market environment and not due to a substantive change, **Staff recommends no action at this point.**

OPERF Asset Allocation

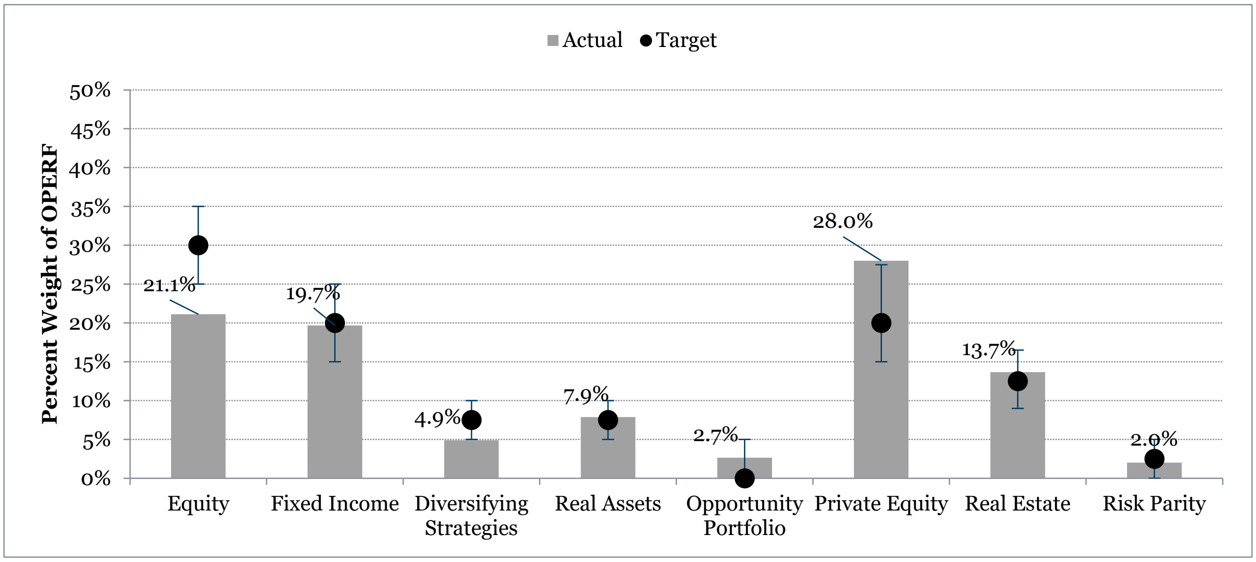
Investment Belief #2 in INV 1201: Statement of OIC Investment and Management Beliefs states: "*Asset Allocation Drives Risk and Return*". Shown in the table below are OPERF's target allocations approved by the Council at the June 2021 meeting.

Table 1. OPERF Target Asset Allocation

Asset Class	Target Allocation (%)	Rebalancing Range (%)
Public Equity	30.0	25.0 – 35.0
Private Equity	20.0	15.0 – 27.5
Fixed Income	20.0	15.0 – 25.0
Real Estate	12.5	9.0 – 16.5
Real Assets	7.5	5.0 – 10.0
Diversifying Strategies	7.5	5.0 – 10.0
Risk Parity	2.5	0.0 – 5.0
Total Fund	**100.0**	

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

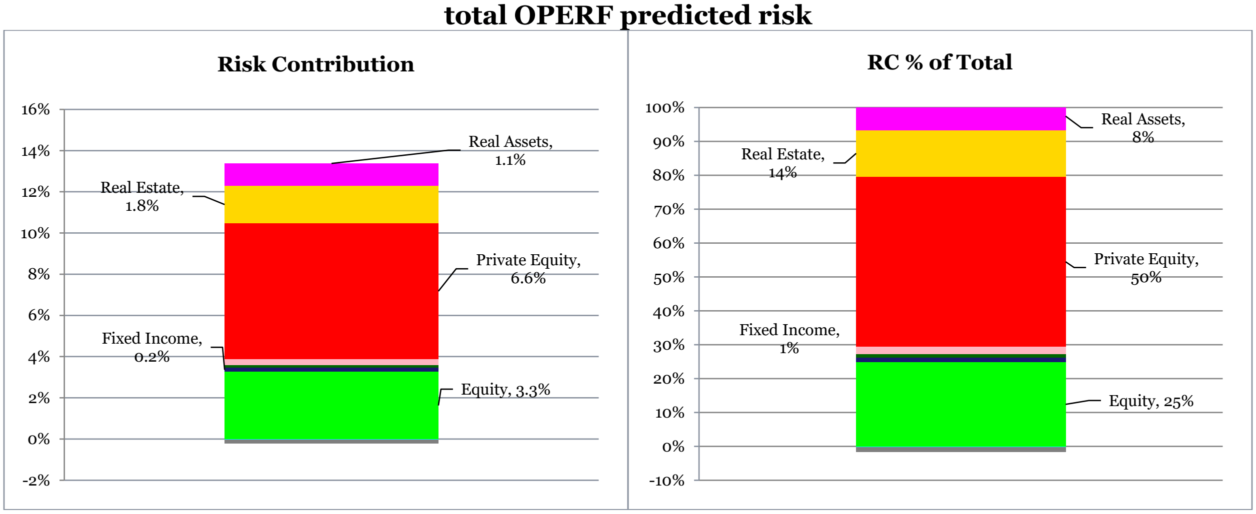
Figure 1. OPERF Actual Allocation versus Target



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 13.2% as of June 30, 2022. To put that in context, Meketa, the OIC's investment consultant, estimates OPERF's long-term volatility to be

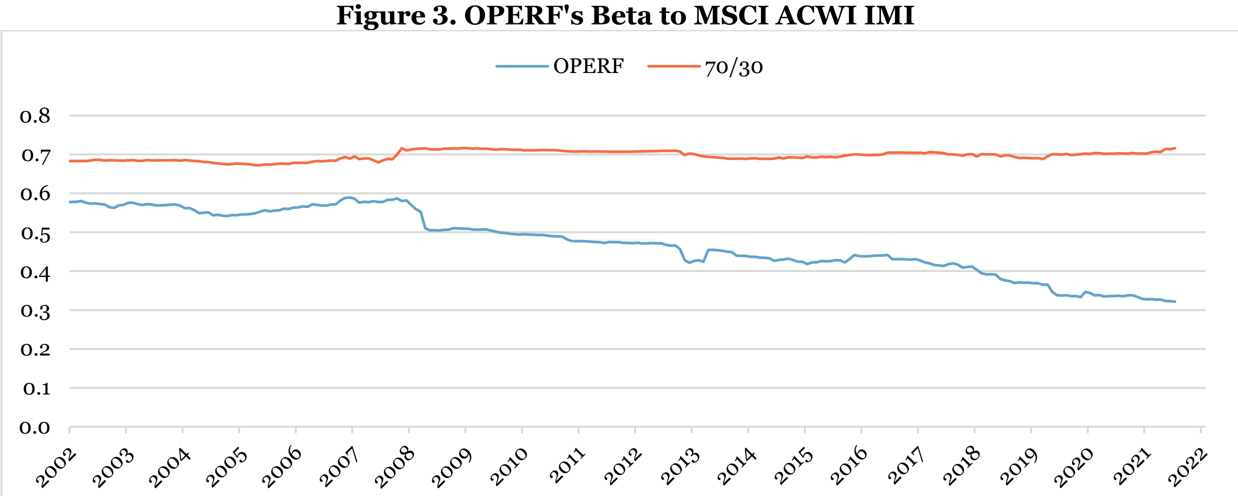
12.8% using their 2021 Capital Market Assumptions, which were a blend of forward 10- and 20-year assumptions from staff, Meketa, and Aon Investments, the Council's secondary investment consultant. Aladdin's model uses a medium-term, five-year lookback period so there will almost always be some difference 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 75% of OPERF's predicted risk. 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*." However, equity investments are much more volatile than investment grade fixed income and U.S. Treasuries. Over the past several years, the OIC has approved changes to asset allocations and portfolio construction to diversify the Fund from equity risk, including:

- Increasing Diversifying Strategies allocation,
- Rebalancing the Fixed Income and Real Estate Portfolios,
- Allocating to defensive equity within the Public Equity Portfolio, and
- Adding Risk Parity.

The OIC-approved changes have reduced OPERF's volatility over time. **Error! Reference source not found.** 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. Part of that decline is due to an increasing allocation to illiquid investments, which tend to have performance smoothing, but the other cause is the aforementioned diversification.

Figure 3. OPERF's Beta to MSCI ACWI IMI

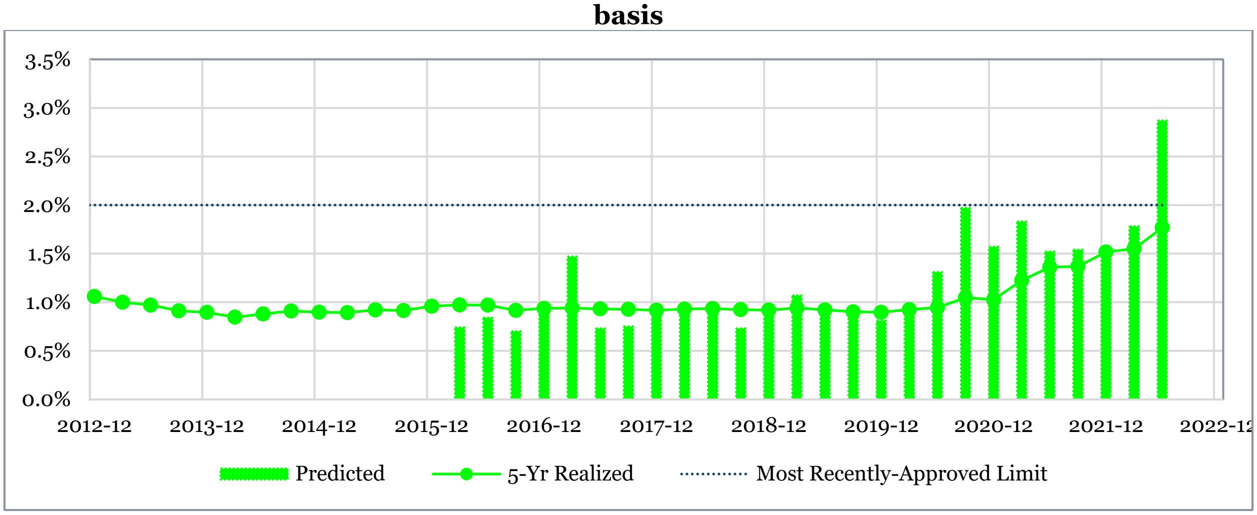


Capital Markets

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 June 30, 2022 for the Portfolio is 1.8%, within the approved range. However, Aladdin estimates an *ex ante* active risk of 2.9%. Equity market volatility started ramping 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, which is consistent with staff's expectation of how this portion of the Portfolio would behave in a "risk off" market. As such, staff recommends no action at this point.

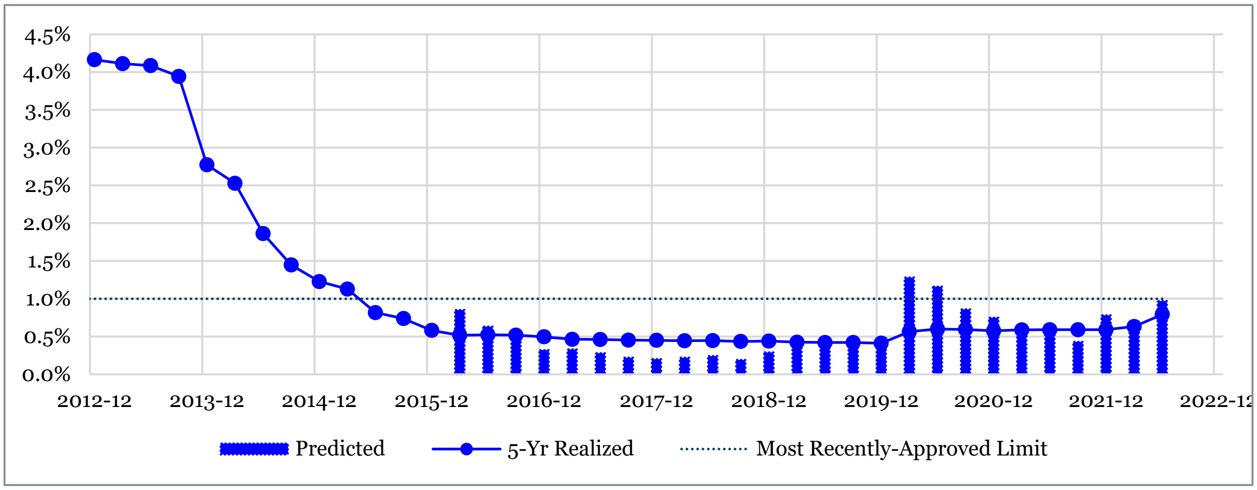
Figure 4. Public Equity's predicted risk and realized five-year tracking error on a quarterly basis



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 June 30, 2022 for the Portfolio is 0.8%, within the approved range. Similar to what occurred for Public Equity, predicted active risk increased in 2022 due to market environment.

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



OPERF Cash Flow

Table 2 below summarizes approximate net investment cash flow and pension cash flow for Year-to-Date 2022 and for the past five years.

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

	Net Cash Flow ($M)					
Asset Class	**YTD 2022**	**2021**	**2020**	**2019**	**2018**	**2017**
Public Equity	3,281	4,220	3,062	2,752	3,432	1,451
Private Equity	408	2,730	494	347	1,216	1,434
Fixed Income	-1,614	-3,053	3,154	327	61	21
Real Estate	-313	-396	15	-48	-28	508
Real Assets	-689	-572	-564	-578	-524	-306
Diversifying Strategies	-449	381	-621	-490	-1,349	-395
Opportunity	-60	-248	71	26	156	-2
Risk Parity	0	0	-1,800	0	0	0
Other	228	-227	-449	283	-15	0
Total Fund	**793**	**2,836**	**3,362**	**2,617**	**2,948**	**2,711**
Net Pension	*-1,529*	*-1,743*	*-3,041*	*-2,659*	*-2,774*	*-3,195*

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	$9.7
Real Assets	$3.3
Real Estate	$3.4
Opportunity	$1.3
Total	**$18.2**

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: Second Quarter 2022 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 June 30, 2022, Aladdin estimated a return volatility of 12% 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*". On July 20, 2022, OIC approved CSF's new Strategic Asset Allocation (SAA) recommendations presented by staff and the consultant AON:

- Increasing Private Equity from current 10% to 15%;
- Reducing Fixed Income from 25% to 20%;
- Splitting Alternative Investments evenly to Real Assets and Diversifying Strategies; and
- Splitting Real Estate evenly to Core and Non-Core Real Estate sub-asset classes.

Applying AON's 10-Year Capital Market Assumptions to CSF's new approved 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 Barclays U.S. Aggregate Bond that would reach a similar level of estimated volatility. Prior to the recent change in 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 6/30/2022 and the new approval one as of 7/20/2022.

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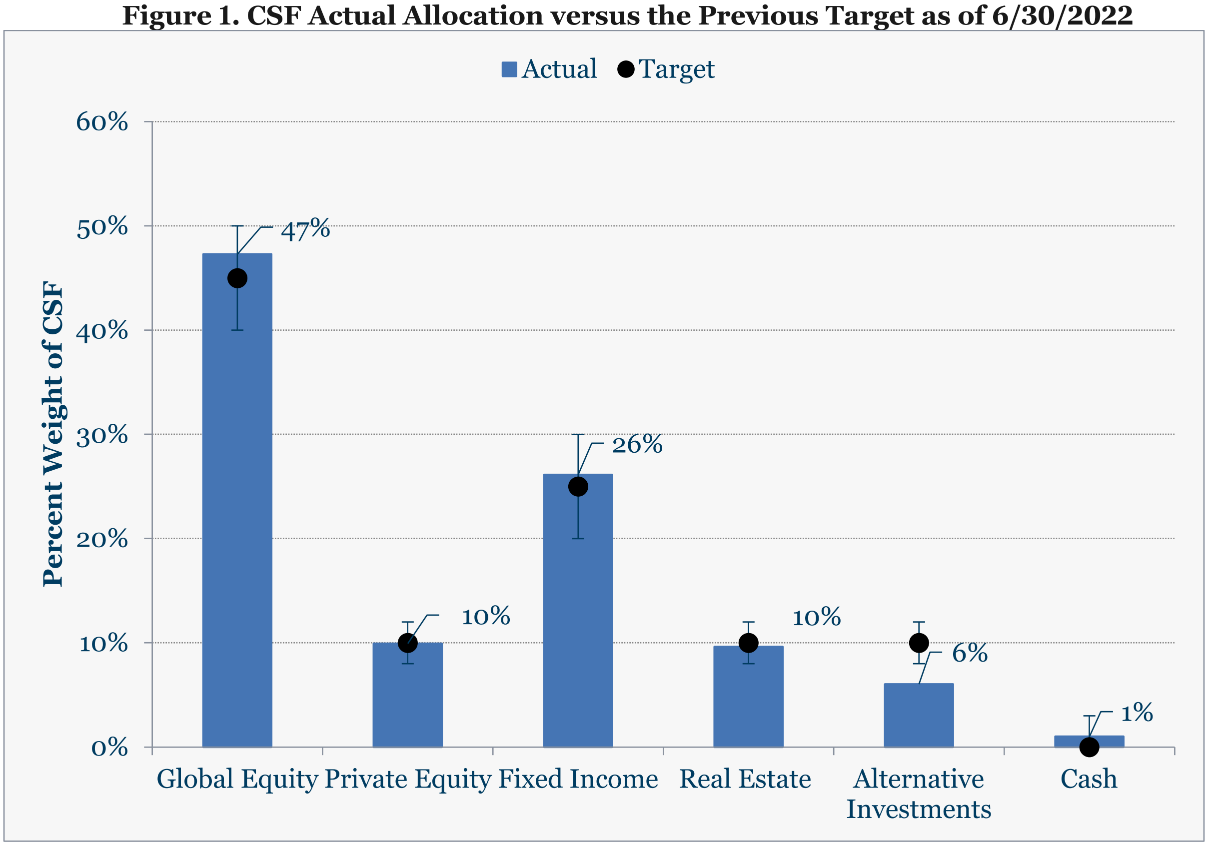
	Table 1. CSF Target Asset Allocation as of 6/30/2022		OIC Approval on 7/20/2022
Asset Class	**Target Allocation (%)**	**Rebalancing Range (%)**	**Target Allocation (%)**
Global Equity	45	40 - 50	45
Private Equity	10	8 - 12	15
Fixed Income	25	20 -30	20
Real Estate (Core)	10	8 - 12	5
Real Estate (Non-Core)			5
Alternative Investments	10	8 - 12	
Real Assets			5
Diversifying Strategies			5
Cash	0	0 - 3	0
Total Fund	**100**		**100**

Figure 1 below shows CSF's actual allocation as of 6/30/2022.

Figure 1. CSF Actual Allocation versus the Previous Target as of 6/30/2022

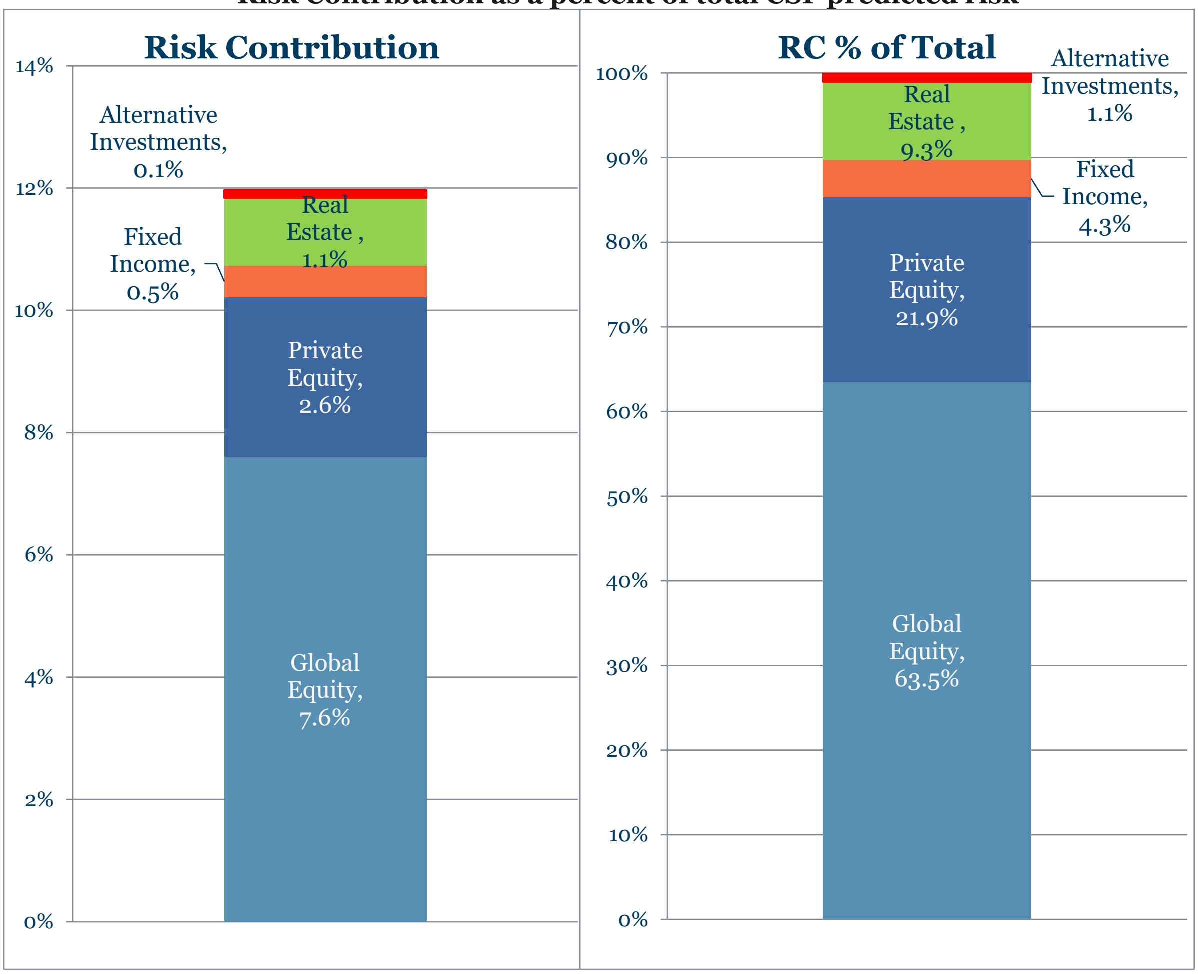


As of June 30, 2022, actual CSF asset allocations were within the policy tolerances relative to the established targets, except for Alterative Investments as it continues to ramp up to its allocation.

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% as of June 30, 2022. 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 85% 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.

Until the approval of SAA on July 20, 2022, the OIC-approved 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 Barclays U.S. Aggregate Bond indices. 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 tend to have performance smoothing, but the other cause is the improved diversification.

Figure 3. CSF's Beta to MSCI ACWI IMI

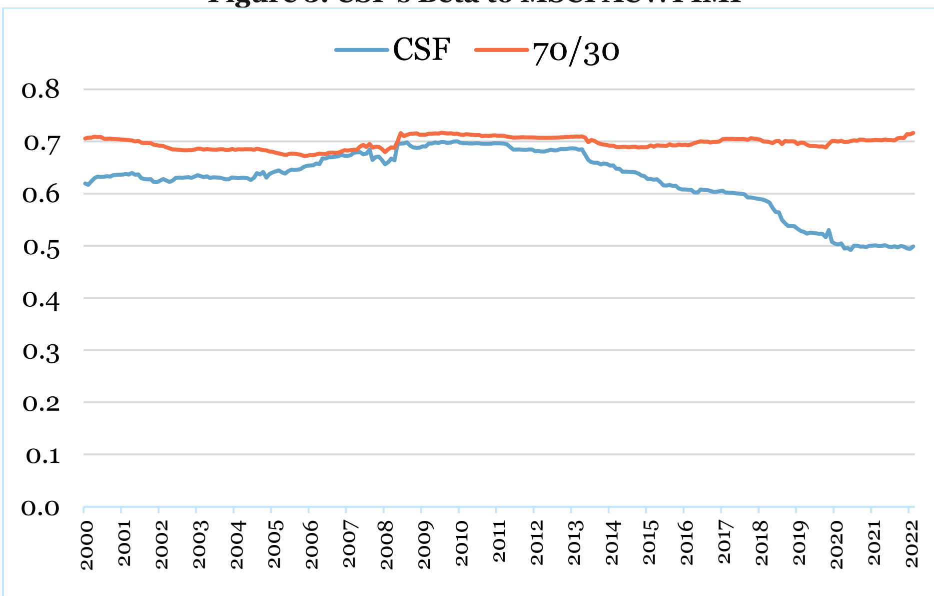
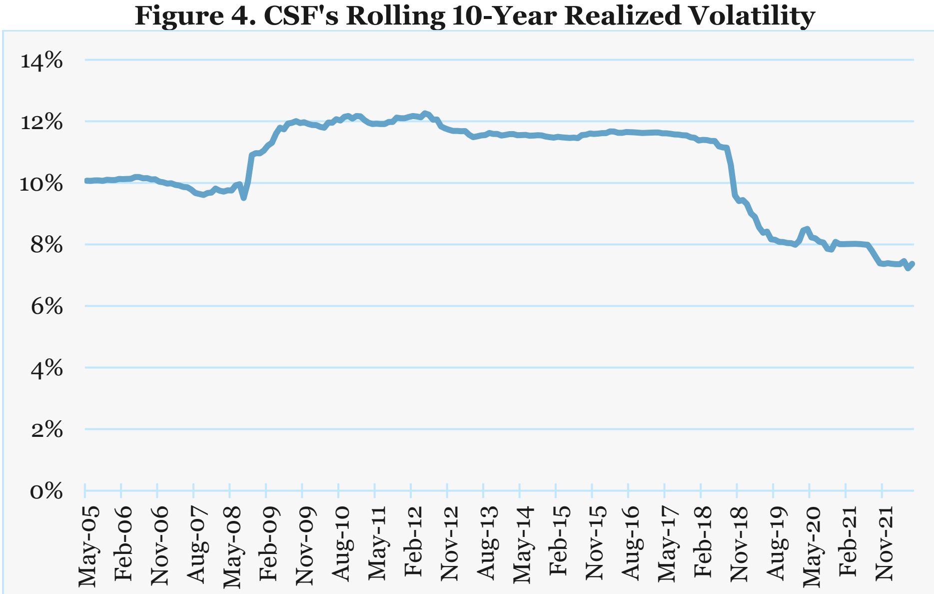


Figure 4. CSF's Rolling 10-Year Realized Volatility



TAB 7

ASSET ALLOCATION & NAV UPDATES

Asset Allocations at July 31, 2022

OPERF	Policy	Target[1]	Regular Account $ Thousands	Pre-Overlay	Overlay	Net Position	Actual	Target Date Funds $ Thousands	Variable Fund $ Thousands	Total Fund $ Thousands
Public Equity	25.0-35.0%	30.0%	20,734,986	22.0%	34,374	20,769,360	22.0%	1,199,203	306,789	22,275,353
Private Equity	15.0-27.5%	20.0%	25,727,625	27.3%		25,727,625	27.3%			25,727,625
Total Equity	**45.0-55.0%**	**50.0%**	**46,462,611**	**49.2%**	**34,374**	**46,496,986**	**49.3%**			**48,002,978**
Opportunity Portfolio	**0-5%**	**0.0%**	**2,424,868**	**2.6%**		**2,424,868**	2.6%			**2,424,868**
Fixed Income	**15-25%**	**20.0%**	**15,861,040**	**16.8%**	**2,665,756**	**18,526,796**	19.6%	2,267,925		**20,794,721**
Risk Parity	**0.0-3.5%**	**2.5%**	**1,916,620**	**2.0%**		**1,916,620**	2.0%			**1,916,620**
Real Estate	**7.5-17.5%**	**12.5%**	**12,986,431**	**13.8%**	**(1,400)**	**12,985,031**	13.8%			**12,985,031**
Real Assets	**2.5-10.0%**	**7.5%**	**7,465,358**	**7.9%**		**7,465,358**	7.9%			**7,465,358**
Diversifying Strategies	**2.5-10.0%**	**7.5%**	**4,580,576**	**4.9%**		**4,580,576**	4.9%			**4,580,576**
Cash[2]	**0-3%**	**0.0%**	**2,709,514**	**2.9%**	**(2,698,730)**	**10,784**	0.0%		8,936	**19,720**
TOTAL OPERF		**100%**	**$ 94,407,017**	**100.0%**	**$ -**	**$ 94,407,017**	**100.0%**	**$ 3,467,128**	**$ 315,725**	**$ 98,189,870**

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

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

SAIF	Policy	Target	$ Thousands	Actual
Total Equity	**7-13%**	**10.0%**	**446,761**	**9.8%**
Fixed Income	**80-90%**	**85.0%**	**3,759,707**	**82.1%**
Real Estate	**0-7%**	**5.0%**	**305,202**	**6.7%**
Cash	**0-3%**	**0.0%**	**65,361**	**1.4%**
TOTAL SAIF			**$ 4,577,030**	**100.0%**

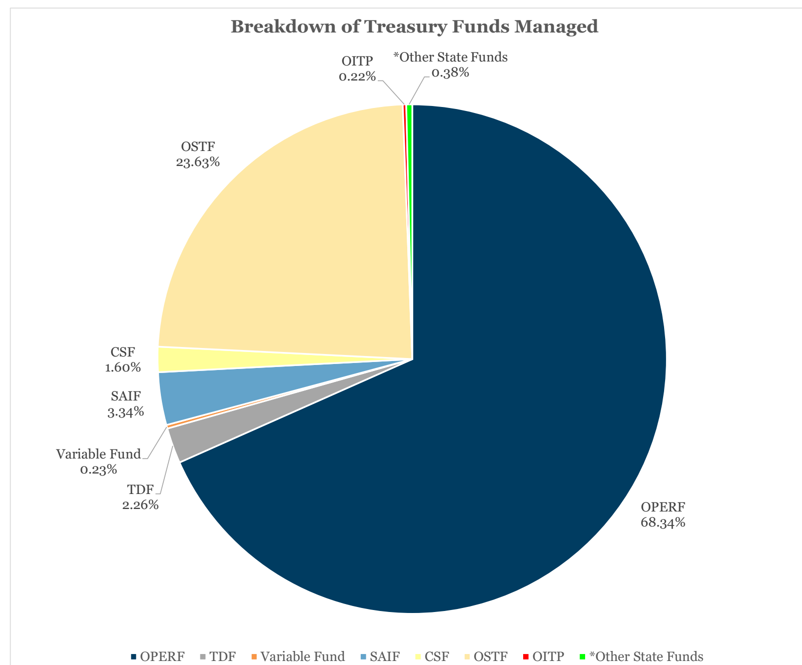
CSF	Policy	Target	$ Thousands	Actual
Global Equities	40-50%	45.0%	1,054,569	48.3%
Private Equity	8-12%	10.0%	201,557	9.2%
Total Equity	**58-62%**	**55.0%**	**1,256,126**	**57.5%**
Fixed Income	**20-30%**	**25.0%**	**565,100**	**25.9%**
Real Estate	**0-12%**	**10.0%**	**212,676**	**9.7%**
Alternative Investments	**0-12%**	**10.0%**	**126,789**	**5.8%**
Cash	**0-3%**	**0.0%**	**24,469**	**1.1%**
TOTAL CSF			**$ 2,185,160**	**100.0%**

SOUE	Policy	Target	$ Thousands	Actual
Global Equities	**0-65%**	**N/A**	2,064	**75.3%**
Fixed Income	**35-100%**	**N/A**	676	**24.7%**
Cash	**0-3%**	**N/A**	2	**0.1%**
TOTAL SOUE			**$ 2,742**	**100.0%**

WOUE	Policy	Target	$ Thousands	Actual
Global Equities	**30-65%**	**55.0%**	1,300	**46.6%**
Fixed Income	**35-60%**	**40.0%**	942	**33.8%**
Cash	**0-25%**	**5.0%**	547	**19.6%**
TOTAL WOUE			**$ 2,790**	**100.0%**

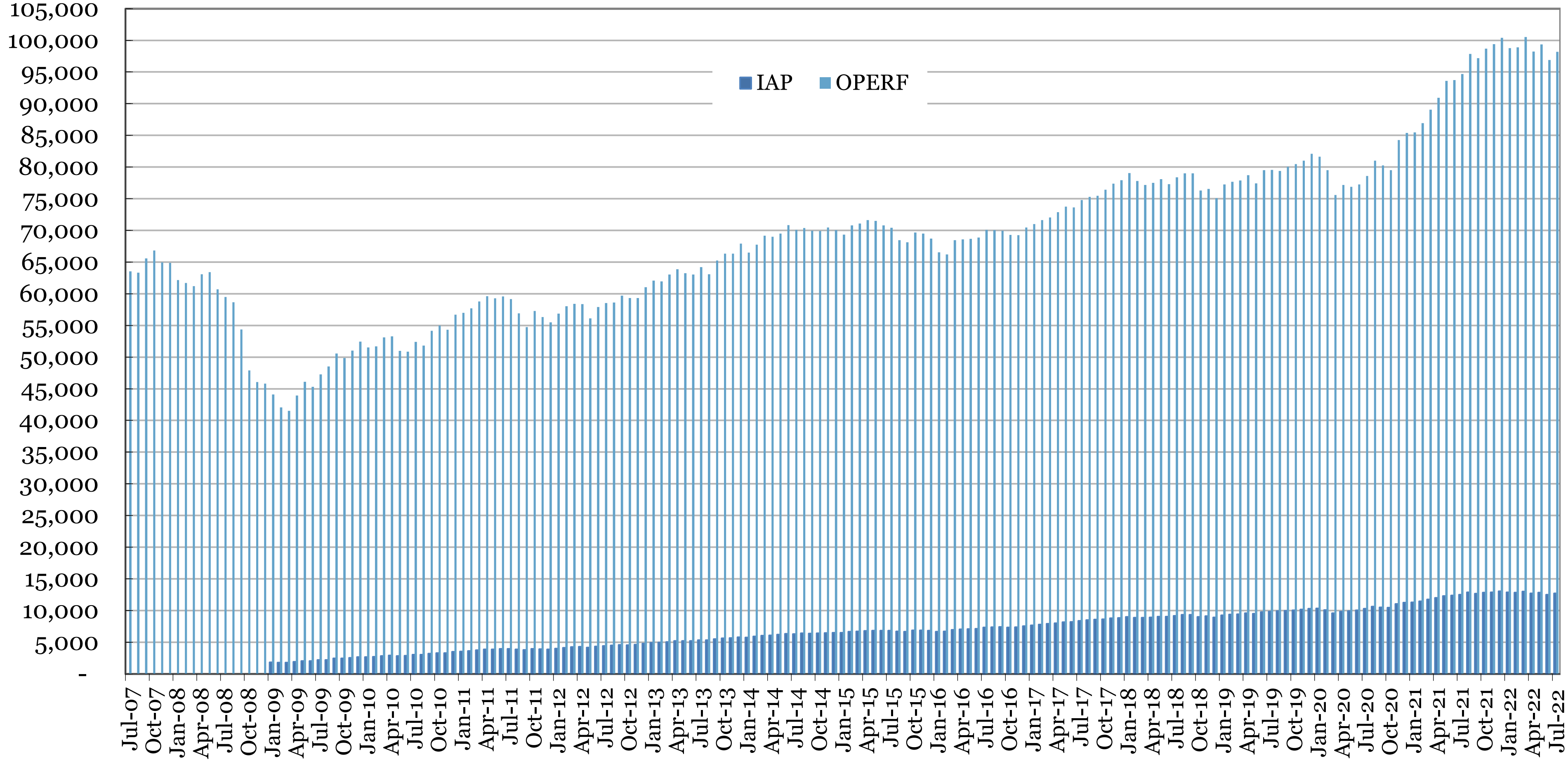
OSTF, OITP & Other State Funds*	$ Thousands	Actual
OSTF	31,900,511	**94.3%**
OITP	314,688	**0.9%**
DAS Insurance Fund	149,657	**0.4%**
DCBS Operating Fund	182,135	**0.5%**
DCBS Workers Benefit Fund	136,793	**0.4%**
DCHS - Elderly Housing Bond Sinking Fund	1,452	**0.0%**
DCHS - Other Fund	14,384	**0.0%**
Oregon Lottery Fund	114,789	**0.3%**
DVA Bond Sinking Fund	83,714	**0.2%**
ODOT Fund	367,857	**1.1%**
OLGIF	236,671	**0.7%**
OPUF	336,946	**1.0%**
Total OSTF & Other State Funds	**$ 33,839,596**	**100.0%**
Total of All Treasury Funds**	**$ 134,993,631**	

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

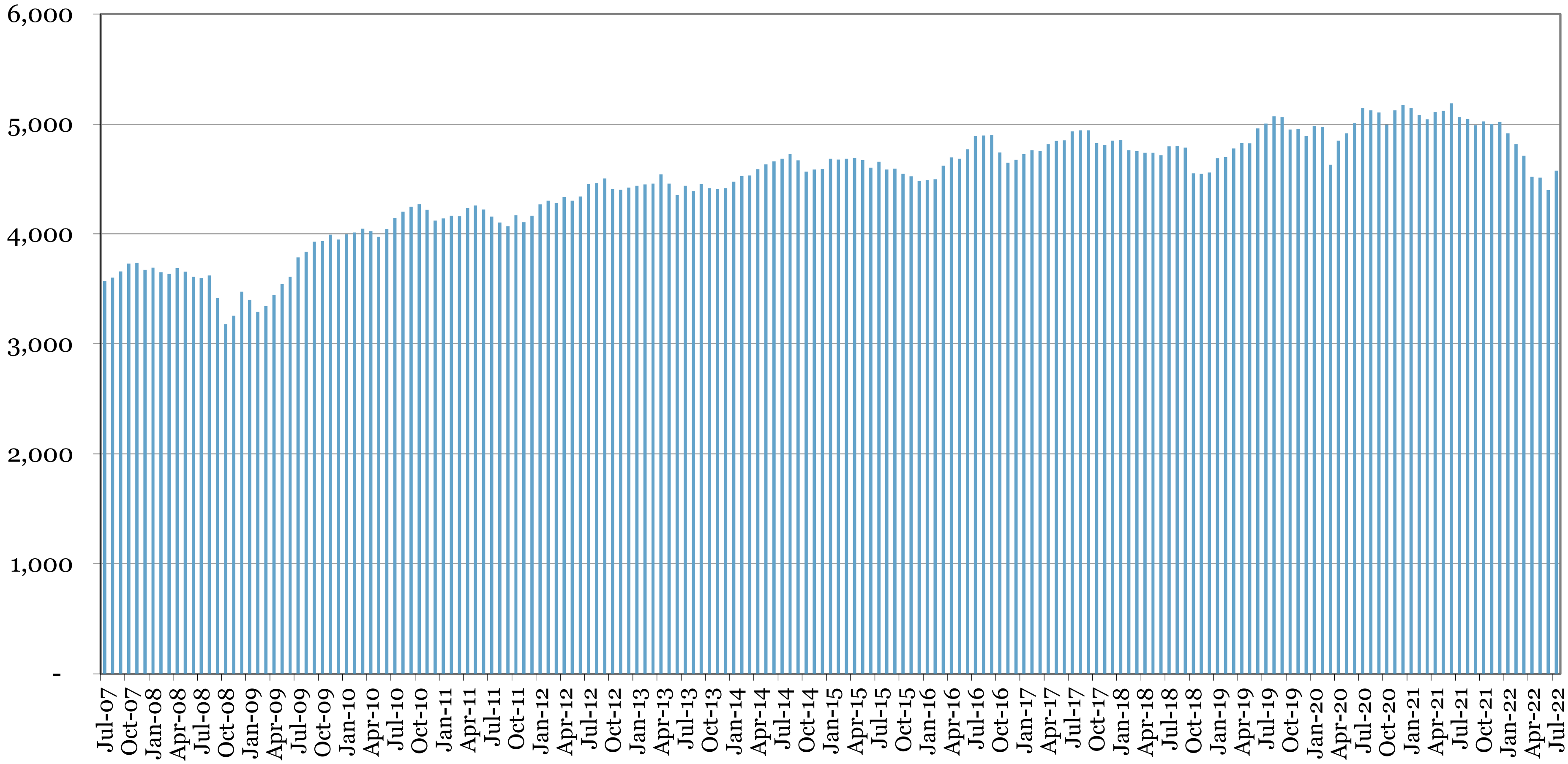


*Other State Funds include DAS Insurance Fund, DCBS Operating Fund, DCBS Workers Benefit Fund, DCHS - Elderly Housing Bond Sinking Fund, DCHS - Other Fund, Oregon Lottery Fund, DVA Bond Sinking Fund, ODOT Fund, OLGIF, & OPUF.

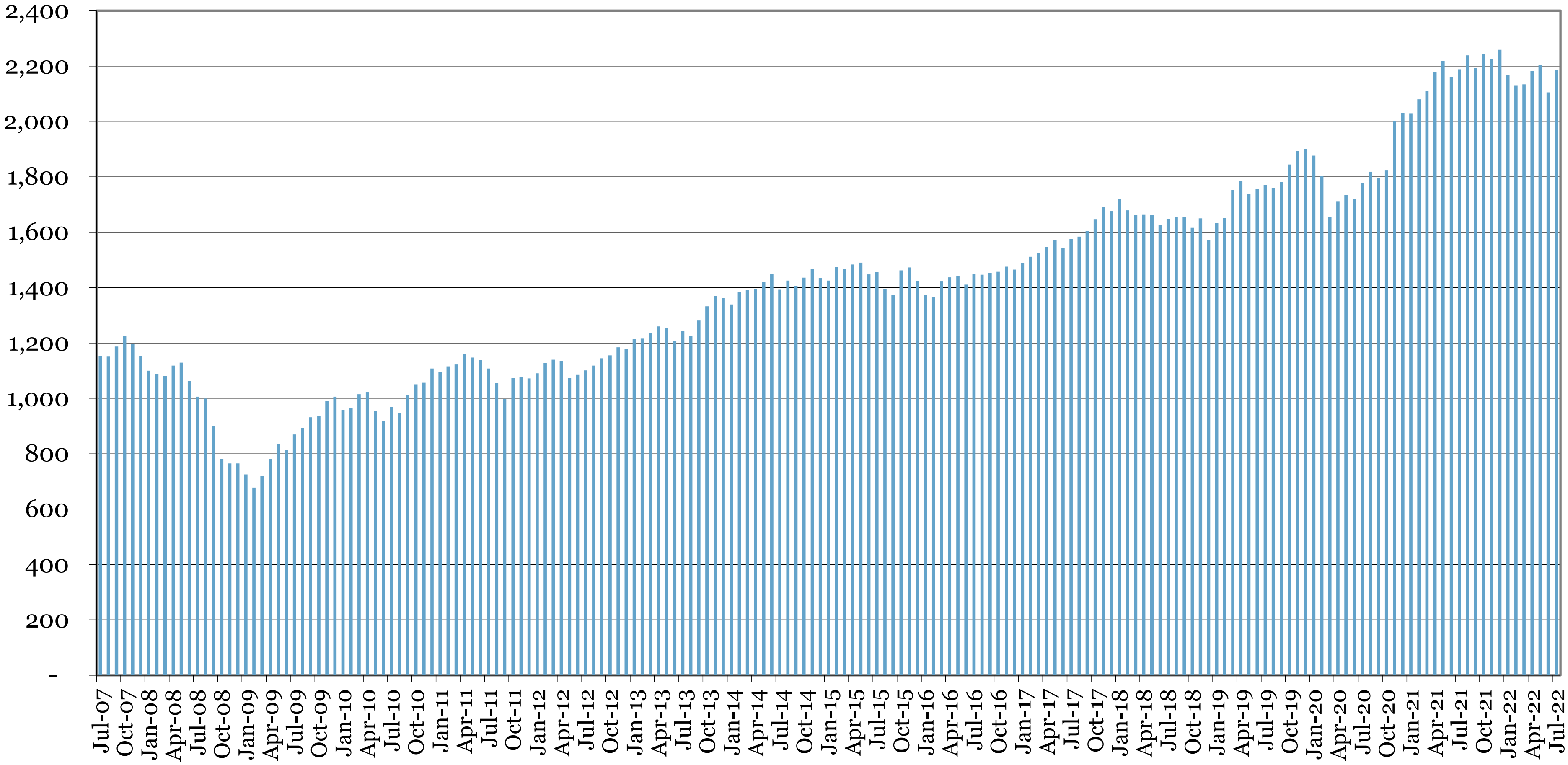
OPERF NAV
15 years ending July 31, 2022
($ in Millions)



SAIF NAV
15 years ending July 31, 2022
($ in Millions)



CSF NAV
15 years ending July 31, 2022
($ in Millions)



OIC

OREGON STATE TREASURY

TAB 8

CALENDAR – FUTURE AGENDA ITEMS

2022/23 OIC Forward Calendar and Planned Agenda Topics

October 26, 2022	OPERF Asset/Liability Study SAIF Annual Review OSGP Annual Review
December 7, 2022	Q3 OPERF Performance Public Equity Portfolio Review Fixed Income Portfolio Review Opportunity Portfolio Consultant
January 25, 2023	Private Equity Portfolio Review Opportunity Portfolio Review 2024 OIC Calendar Approval
March 8, 2023	Q4 OPERF Performance Individual Account Program (IAP) Review Real Estate Portfolio Review Real Assets Portfolio Review
April 20, 2023	Diversifying Strategies Portfolio Review
May 31, 2023	Q1 OPERF Performance
July 19, 2023	Common School Fund Annual Review
September 6, 2022	Q2 OPERF Performance

TAB 9

OPEN DISCUSSION

TAB 10

PUBLIC COMMENTS

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

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