OREGON STATE TREASURY

Oregon Investment Council

October 30, 2019

Rukaiyah Adams
Chair

John Skjervem
Chief Investment Officer

Tobias Read
State Treasurer

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OREGON INVESTMENT COUNCIL

Agenda

October 30, 2019
9:00 AM

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

<u>**Time**</u>	<u>**A. Action Items**</u>	<u>**Presenter**</u>	<u>**Tab**</u>
9:00-9:05	**1. Review & Approval of Minutes** September 18, 2019	**Rukaiyah Adams** *OIC Chair*	**1**
9:05-9:10	**2. Committee Reports and CIO Remarks**	**John Skjervem** *Chief Investment Officer*	**2**
9:10-10:00	**3. Currency Overlay Review and Manager Recommendations** *OPERF*	**Jiangning (Jen) Plett** *Investment Officer, Portfolio Risk & Research* **Karl Cheng** *Senior Investment Officer, Portfolio Risk & Research* **Dr. Anoosh Lachin** *Co-Portfolio Manager, Aspect Capital* **Warren Naphtal** *Co-Founder & Chief Investment Officer, P/E Global* **David Souza Jr.** *Co-Portfolio Manager, P/E Global* **Janet Becker-Wold** *Senior Vice President, Callan LLC*	**3**
10:00-10:45	**4. Public Equity Review** *OPERF*	**Michael Viteri** *Senior Investment Officer, Public Equity* **Robin Kaukonen** *Investment Officer, Public Equity* **Wil Hiles** *Investment Officer, Public Equity* **Janet Becker-Wold**	**4**
10:45-11:00	**-------------------- BREAK --------------------**		

B. Information Items

11:00-11:35	**5.**	**Opportunity Portfolio Review** *OPERF*	**Michael Mueller** *Investment Officer, Alternatives*	**5**
11:35-12:10	**6.**	**ESG Update** *OPERF*	**Anna Totdahl** *Investment Officer, Portfolio Risk & Research*	**6**
12:10-12:15	**7.**	**Asset Allocations & NAV Updates** a. Oregon Public Employees Retirement Fund b. SAIF Corporation c. Common School Fund d. Southern Oregon University Endowment Fund	**John Skjervem**	**7**
	8.	**Calendar — Future Agenda Items**	**John Skjervem**	**8**
12:15	**9.**	**Open Discussion**	**Council Members** **Staff** **Consultants**	

C. Public Comment Invited

10 Minutes

TAB 1 – REVIEW & APPROVAL OF MINUTES

September 18, 2019 Regular Meeting

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State of Oregon

Office of the State Treasurer

16290 SW Upper Boones Ferry Road

Tigard, Oregon 97224

OREGON INVESTMENT COUNCIL

September 18, 2019

Meeting Minutes

Members Present:	Rukaiyah Adams, John Russell, Tobias Read, Rex Kim, Patricia Moss and Kevin Olineck
Staff Present:	John Skjervem, Michael Kaplan, Perrin Lim, David Randall, Deena Bothello, Karl Cheng, David Elott, Steve Kruth, May Fanning, Michael Langdon, Wil Hiles, Angela Schaffers, Tony Breault, Jen Plett, Debra Day, Faith Sedberry, Sam Spencer, Paul Koch, Krystal Mclean, Tom Lofton, Lisa Pettinati, Geoff Nolan, Garrett Cudahey, Amanda Kingsbury, Michael Mueller, Aliese Jacobsen, Dana Millican, Eric Messer, Kristel Flores, Michael Viteri, Tyler Bernstein, Ricardo Lopez, Tiffany ZhuGe, Andy Coutu, Jeremy Knowles, Dmitri Palmateer, Amy Wojcicki, Rachel Wray, Robin Kaukonen, Sommer May, Andrey Voloshinov, Chris Ebersole, Scott Robertson, and Ian Huculak
Consultants Present:	Tom Martin (TorreyCove); Allan Emkin, David Glickman and Brandon Ross (Meketa Investment Group, Inc.); Janet Becker-Wold and Uvan Tseng (Callan LLC)
Legal Counsel Present:	Steven Marlowe, Department of Justice

The September 18th, 2019 OIC meeting was called to order at 9:00 am by Rukaiyah Adams, OIC Chair.

I. 9:00 am Review and Approval of Minutes

MOTION: Chair Adams asked for approval of the June 5, 2019 OIC regular meeting minutes. Treasurer Read moved the motion at 9:00 am, and Mr. Kim seconded the motion which then passed by a 5/0 vote.

II. 9:01 am Committee Reports and CIO Remarks

Committee Reports: John Skjervem, Chief Investment Officer, gave an update on the following committee actions taken since the June 5th, 2019 OIC meeting:

Private Equity Committee

June 10, 2019	Advent Global Technology L.P.	$50M
July 24, 2019	CVC Capital Partners Asia V, L.P.	$150M
	Veritas Capital Fund VII, L.P.	$250M
September 9, 2019	Advent Latin American Private Equity Fund VII	$100M
	Pathway Private Equity Fund C-III 2019 Follow-On	$250M

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Alternatives Portfolio Committee

June 20, 2019	QL Capital Partners, L.P.	$200M
July 31, 2019	Appian Natural Resources Fund II, L.P.	$100M

Real Estate Committee

July 29, 2019	LBA Logistics Joint Venture	$250M
	Walton Street Real Estate Core-Plus Fund, L.P.	$250M

Opportunity Portfolio Committee

None

Mr. Skjervem provided opening remarks which included brief comments on the Q2 2019 Performance & Risk Report, the Annual Cost & Implementation Analysis and the annual OSGP Review & Update. He then introduced several new staff members including Aaron Schaffer, Jeremy Knowles and Mohammed Quraishi, and announced the promotions of Eric Messer, Wil Hiles, Krystal Mclean, Jen Plett, Sommer May and Amanda Kingsbury. Finally, Mr. Skjervem recognized the fine contributions of the investment division's summer interns, Maryam Azeemi (Girls Who Invest) and Vivek Sharma (University of Oregon), and welcomed Treasury's new Straub Fellow 2019-20 intern, Boliver Cardenas.

III. 9:07 am Financial Markets and Macro Economic Update

Brian Smedley, Head of Macroeconomic and Investment Research, Guggenheim Partners, LLC, gave a presentation on the global macroeconomic environment with particular emphasis on negative bond yields, and described for the Council both possible financial market implications and potential policy responses.

IV. 10:14 am Q2 2019 Performance & Risk Report – *OPERF*

Karl Cheng, Senior Investment Officer, Portfolio Risk & Research and Janet Becker-Wold, Senior Vice President, Callan LLC, presented the quarterly OPERF investment performance and risk report for the calendar year and cumulative period ended June 30, 2019.

V. 10:48 am Annual Cost & Implementation Analysis – *OPERF*

David Randall, Director of Investment Operations, provided a quick introduction of Mr. Mike Heale, Principal, CEM Benchmarking who then presented the Council with the Annual Cost & Implementation Analysis for OPERF. In this analysis, OPERF's return and cost metrics are compared to 289 funds in CEM's pension database. Mr. Heale's report included the following key takeaways:

Return:
- OPERF's 5-year net total annualized return was 6.3%, well above both the 5.4% U.S. public fund median and 5.6% CEM peer fund median; and
- OPERF's 5-year annualized policy return was 6.3%, also above the 5.3% U.S. public fund median and 5.7% CEM peer fund median.

Cost:
- OPERF's 2018 annual investment cost of 76.4 bps was slightly below its 77.6 bp benchmark cost.
- While the asset allocation and implementation strategy for OPERF are high cost in absolute terms, as in years past, OPERF incurred total costs slightly less than peer funds would for a similar asset allocation and implementation strategy.

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VI. 11:12 am Oregon Savings Growth Plan – *Annual Review and Update*

Wil Hiles, Investment Officer, Public Equity and Uvan Tseng, Senior Vice President, Callan LLC, provided an update on the Oregon Savings Growth Plan (OSGP).

At staff's request, Callan, the Plan's retained investment consultant, performed an evaluation of the Plan's Small Company Stock Option which is currently comprised of the following three underlying funds: DFA U.S. Small Cap Equity; Callan Small Cap Equity; and BlackRock Russell 2000 Index. In an attempt to more closely align the Plan's investment strategies with OPERF, staff recommended adding the BlackRock S&P 600 Index Fund, as a replacement for the BlackRock Russell 2000 Index Fund. Staff expects this change will improve the Small Company Stock Option's risk/return profile while maintaining an identical expense ratio. The Plan's Real Return Option is now comprised of a single, underlying investment strategy, the SSgA Real Assets Fund. The SSgA Real Assets Fund seeks an investment return that approximates, as closely as practicable, before fees, the performance of a custom benchmark by diversifying across several inflation-sensitive asset classes such as commodities, REITs, TIPS, and global infrastructure. Currently, the benchmark for the Real Return Option is the Consumer Price Index (CPI) + 3%, which was appropriate give the previous, multi-fund structure of the Real Return Option. However, given that the SSgA Real Assets Fund is now the single, underlying investment strategy within the Real Return Option, staff and Callan recommended converting the Real Return Option's primary benchmark to the SSgA Real Assets Custom Blended Index, as a more appropriate reflection of the Real Return Option's underlying investments. The SSgA Real Assets Fund's secondary objective is to seek a positive real return with a specific CPI + 4% target over a full market cycle. Accordingly, staff and Callan also recommended utilizing CPI + 4% as a secondary benchmark for the Real Return Option.

MOTION: Treasurer Read moved approval of the Real Return Option Benchmark Change – Utilize SSgA Real Assets Custom Blended Index and Consumer Price Index + 4% at 11:50 am and Mr. Kim seconded the motion which then passed by a 5/0 vote.

Mr. Russell moved approval of Small Company Stock Option – Replace Russell 2000 Index Fund with S&P 600 Index Fund at 11:51 am and Treasurer Read seconded the motion which then passed by a 5/0 vote.

VII. 11:52 am Asset Allocation & NAV Updates

Mr. Skjervem reviewed asset allocations and NAVs across OST-managed accounts for the period ended July 31, 2019.

VIII. 11:52 am Calendar – Future Agenda Items

A calendar listing of future OIC meetings and scheduled agenda topics was included in the Council's meeting material.

IX. 11:53 am OIC Discussion

Chair Adams said that during this time of uncertainty it feels particularly important that the OIC work closely with Mr. Olineck and the PERS Board to establish a productive working relationship and maintain open lines of communication. Mr. Olineck reported that the PERS Board met on July 26 Board and voted to maintain 7.2% as its assumed OPERF earnings rate. Mr. Olineck noted that the July 26 vote was not unanimous, a first, as some Board members felt 7.2% was too high.

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11:56 am Public Comments

Douglas Berg, from Eugene, expressed concerns similar to those he shared at the August 2018 OIC meeting, namely his belief that OPERF returns over the last decade were both poor and insufficient relative to the unfunded liability facing PERS. Mr. Berg called on the Council to change its policy so that the OPERF public equity portfolio was predominantly comprised of U.S. stocks, which he indicated had performed much better than foreign equities and would, in his opinion, continue to do so in the future.

Ms. Adams adjourned the meeting at 12:00 pm.

Respectfully submitted,
May Fanning
May Fanning
Executive Support Specialist

TAB 2 – Committee Reports and CIO Remarks

October 30, 2019 **Oregon Investment Council**

Opening Remarks

John D. Skjervem, Chief Investment Officer

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Annual Currency Overlay Review

- Accretive so far!
- New manager recommendations

Annual Public Equity Review

- Short-term factor challenges, long-term outperformance
- New internally-managed mandate recommendation

Annual Opportunity Portfolio Review

- New sheriff in Opportunityville
- Waiting for Godot

ESG Update

- What has Anna been up to?
- What's next?

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TAB 3 – Currency Overlay Review and Manager Recommendations

OPERF

OPERF Currency Overlay Program
Annual Review

Purpose

Provide the Oregon Investment Council (OIC) with a review of and update on the Oregon Public Employees Retirement Fund (OPERF or the "Fund") Currency Overlay Program, which was launched on January 2, 2018.

Background

The Public Employees Retirement System pays benefits from OPERF in U.S. dollars, yet a sizable portion of the Fund's assets are invested outside the U.S. and denominated in foreign currencies. OPERF's foreign currency (FX) exposure is a by-product of its international investments and represents an explicit source of OPERF asset volatility. For U.S.-based investors, currency risk manifests during strong (i.e., appreciating) dollar periods. Without some form of FX hedging, the value in U.S. dollar terms of OPERF's foreign assets *declines* when the dollar *appreciates*.

To evaluate FX risks and propose potential risk-mitigating FX management solutions, staff has surveyed extensive empirical research and conducted discussions with peer funds, consultants, an index provider, and currency managers since the summer of 2016. Staff reported the following primary findings during two OIC education sessions held in December 2016 and March 2017:

- Unmanaged currency exposure is a source of uncompensated risk; and
- Currency fluctuations contribute meaningfully to OPERF's total risk.

After deliberation, the OIC adopted Policy INV 217: OPERF Foreign Currency Risk Policy on August 9, 2017 to establish a Currency Overlay Program (the "Program") to manage FX risk. The goal of the Program is to strategically manage foreign currency exposures to reduce volatility in U.S. dollar-denominated value while preserving the diversification benefits of OPERF's foreign-denominated investments.

On November 1, 2017, OIC approved hiring Adrian Lee & Partners, a London-based currency management specialist, to manage a $2 billion notional currency management mandate to help launch the Program.

Program Results

Through September 30, 2019, the Program has been active for 21 months, and during that time has met staff's expectations and achieved the Program's goal of reducing currency-related portfolio volatility. From inception through September 30, 2019, the Program has reduced OPERF's International Public Equity portfolio risk by 18 bps and increased its return by 46 bps (relative to the Portfolio's risk/return performance on a non-hedged basis). The Program's YTD results as of September 30, 2019 are similarly accretive with 16 bps of risk reduction and 43 bps of return enhancement.

In addition, the Program has realized $60.7 million and $14.1 million of cash inflows as a result of U.S. dollar appreciation for the since inception and year-to-date periods as of September 30, 2019, respectively.

Discussion
During last year's annual review session, staff discussed expanding the Program. Specifically, Staff outlined the following criteria as important in evaluating and selecting a new currency manager for the Program: 1) complementarity with Program's existing currency manager and approach; 2) expected improvements for the Program's risk-adjusted active currency returns; and 3) expected reductions in overall currency-related portfolio volatility. Subject to the OIC's approval, in a separate memo, staff now recommends expanding the Program by adding two additional currency overlay managers, Aspect Capital Limited ("Aspect") and P/E Global LLC ("P/E").

As of September 30, 2019, OPERF's Public Equity portfolio has approximately $8 billion in non-U.S. developed foreign currency exposure. To balance the Program's currency risk reduction objective and take into consideration negative cash flow impacts during periods of U.S. dollar weakness, in a separate action item and memo, staff recommends gradually scaling the Program from its current $2 billion notional exposure up to $6 billion, as reflected in the table below.

Program Profile Update

Considerations	Program Parameters
Objective	To hedge currency risk in OPERF's ~~International~~ **Public** Equity portfolio
Inception date	January 2nd, 2018
Notional amount	~~$2 billion~~ **$6 billion**
Target portfolio	Currency mix comprised by the MSCI World ex-U.S. Index
FX overlay managers	Adrian Lee & Partners, **Aspect Capital and P/E Global**
Base currency	U.S. dollar
Benchmark	The currency return component of a 50% hedged MSCI World ex-U.S. Index
Range of hedge ratios	0% to 100%
Active volatility target	2%

Staff Recommendation
None, information only.

October 30, 2019 Oregon Investment Council

OPERF Currency Overlay Program Review

Jiangning (Jen) Plett

Karl Cheng

Portfolio Risk and Research

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Agenda

- Executive Summary
- Program Background
- Program Goal
- Program Profile Update
- Results

Appendix:

1) Public Equity Currency Exposure
2) International Equity Currency Exposure
3) Recent Currency Market Performance

Executive Summary

- Empirical research shows unmanaged currency exposure is a source of uncompensated risk.
- The OIC adopted INV 217: OPERF Foreign Currency Risk Policy on 8/9/2017.
- The OPERF's Currency Overlay Program (the "Program"), currently managed by Adrian Lee & Partners, was initiated on 1/2/2018.
- Since inception and YTD through 09/30/19, the Program has met staff's expectation and provided a compelling proof statement for reducing currency-related portfolio volatility.
- Subject to the OIC's approval, staff recommends hiring two new currency overlay managers and scaling up the Program from its current $2 billion notional exposure to $6 billion, at which point the Program would comprise about 75% of the OPERF Public Equity Portfolio's non-U.S. developed market currency exposure.

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Program Background

- Rationale
  - OPERF has a U.S. dollar (USD) liability in the form of its benefit payment obligations.
  - OPERF has sizable foreign currency (FX) exposure due to its investments in non-U.S. assets.
  - Currency fluctuations contribute meaningfully to OPERF's total risk.
  - Empirical research shows unmanaged currency exposure is a source of uncompensated risk.
- After two education sessions on currency risk, the OIC adopted INV 217: OPERF Foreign Currency Risk Policy on 8/9/2017.
- The OIC approved hiring Adrian Lee & Partners ("ALP") to manage a $2 billion notional currency management mandate in connection with OPERF's Currency Overlay Program (the "Program") in 11/2017.
- The Program was initiated on 1/2/2018 and has been running for the last 21 months as of 9/30/2019.
- Since inception, the Program has met staff's expectation and reduced currency-related portfolio volatility. Staff recommends scaling up the Program from its current $2 billion notional exposure to $6 billion.
- As of 9/30/2019, OPERF's Public Equity Portfolio has approximately $8 billion in non-U.S. developed market currency exposure.

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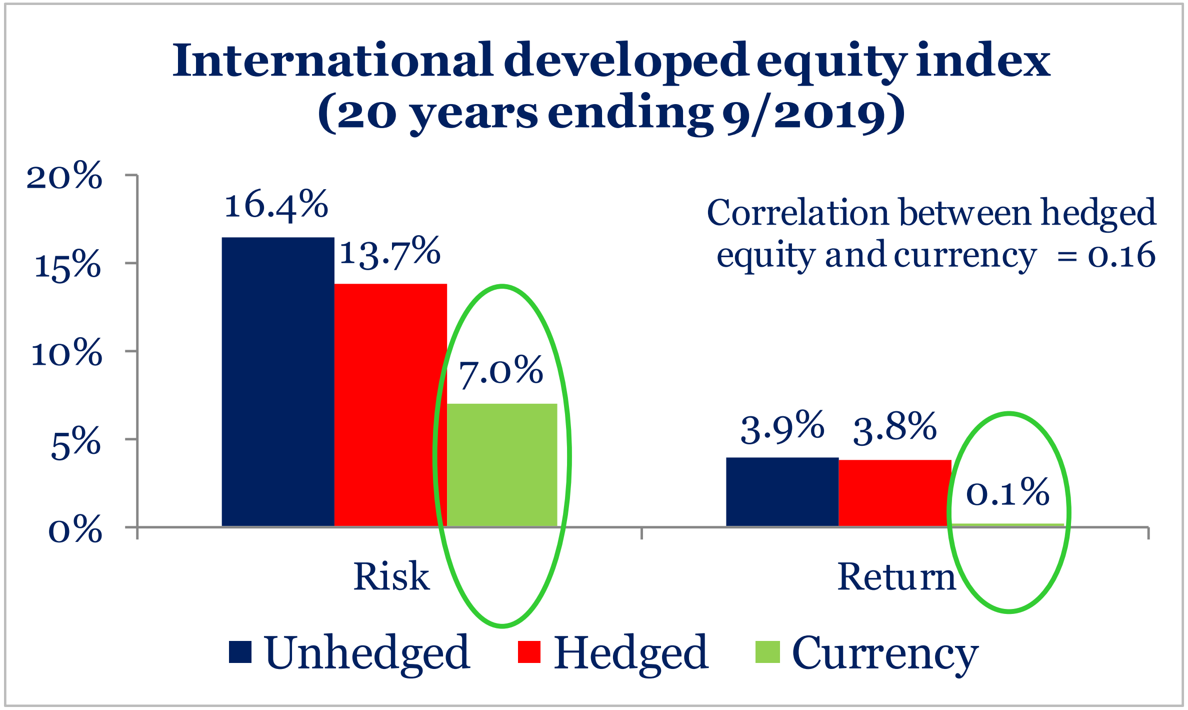
Program Background - Uncompensated Currency Risk



Source: OST staff calculation, MSCI

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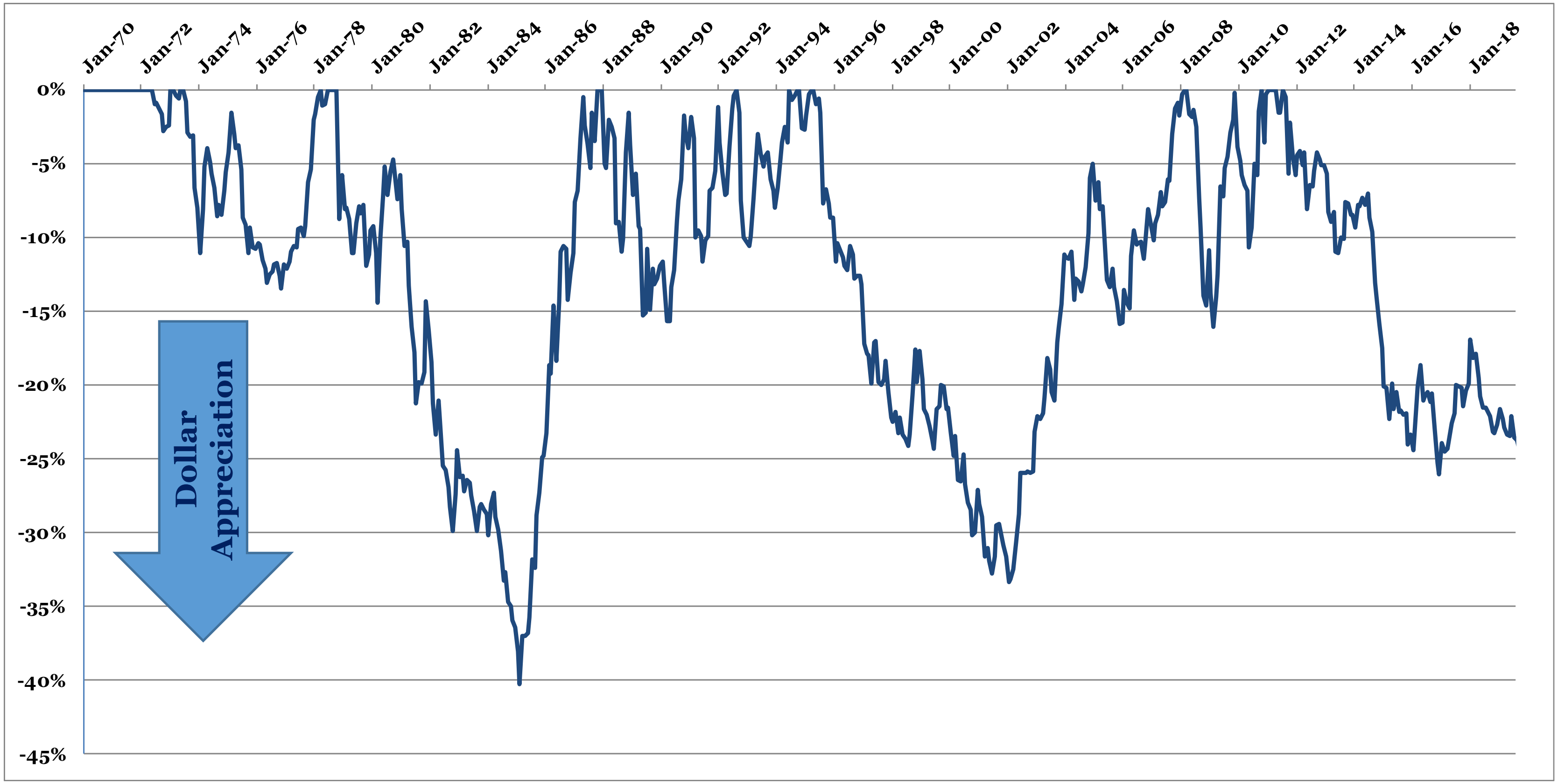
Program Background - Drawdown

- Currency component returns associated with the MSCI World ex-U.S. Index have historically been pro-cyclical, particularly during stressed environments (e.g., 1998, 2001, 2008, 2014-2015).
- Currency's historical maximum loss from peak to trough is -40%, which occurred in February 1985.



Source: MSCI, OST staff calculation

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Program Goal

INV 217: OPERF Foreign Currency Risk Policy

- "The goal of the Currency Overlay Program is to strategically manage foreign currency risk to reduce volatility in U.S. dollar-denominated value as a result of movements in foreign exchange rates while preserving the diversification benefits of OPERF's foreign-denominated investments."

Program Profile Update

Considerations	Program Parameters
Objective	To hedge currency risk in OPERF's ~~international~~ public equity portfolio
Inception date	January 2nd, 2018
Notional amount	~~$2 billion~~ $6 billion
Target portfolio	Currency mix comprised by the MSCI World ex-U.S. Index
FX overlay managers	Adrian Lee & Partners, Aspect Capital and P/E Global
Base currency	U.S. dollar
Benchmark	The currency return component of a 50%-hedged MSCI World ex-U.S. Index
Range of hedge ratios	0% to 100%
Active volatility target	2%

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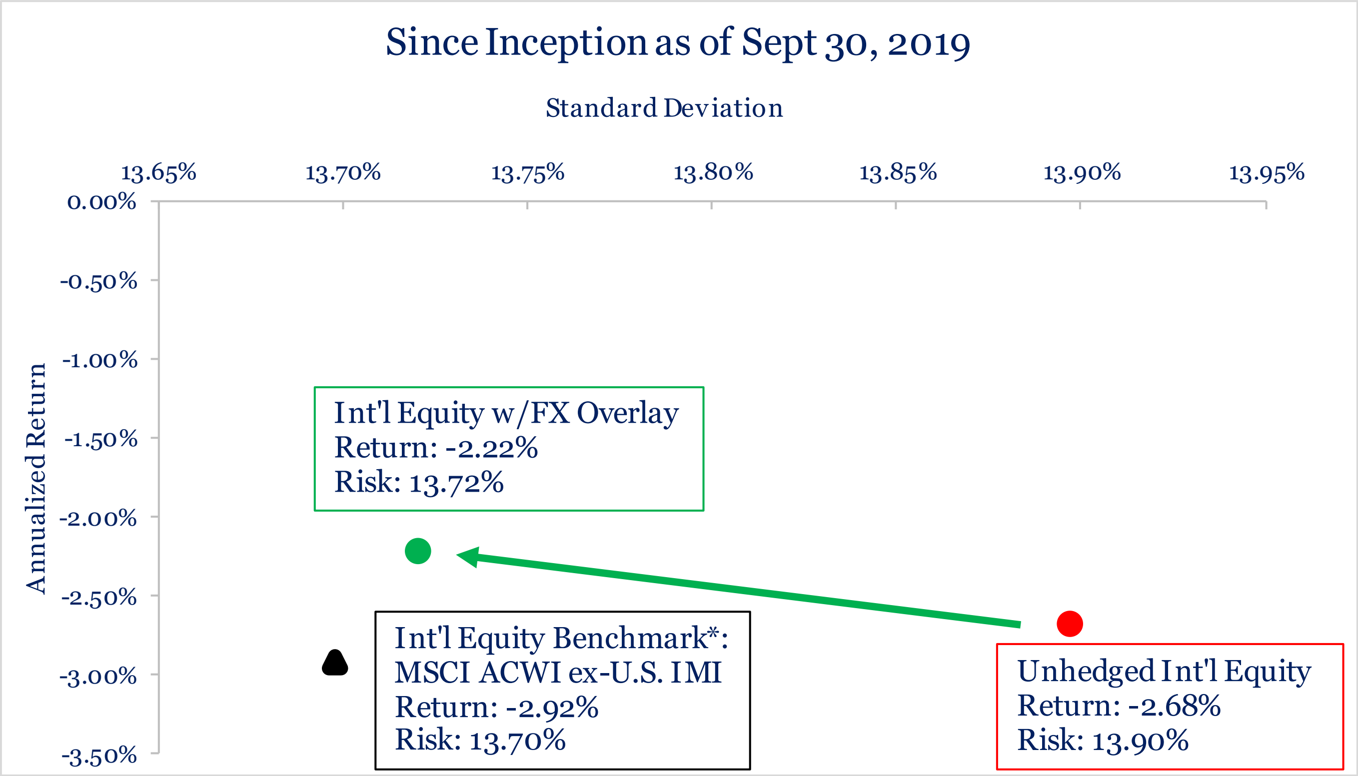
Since Inception Results: Return vs. Risk

Compared to unhedged results, OPERF's international public equity portfolio risk has been reduced by 18 bps since the currency overlay program's Jan. 2018 introduction, while portfolio return improved by 46 bps.



Source: State Street

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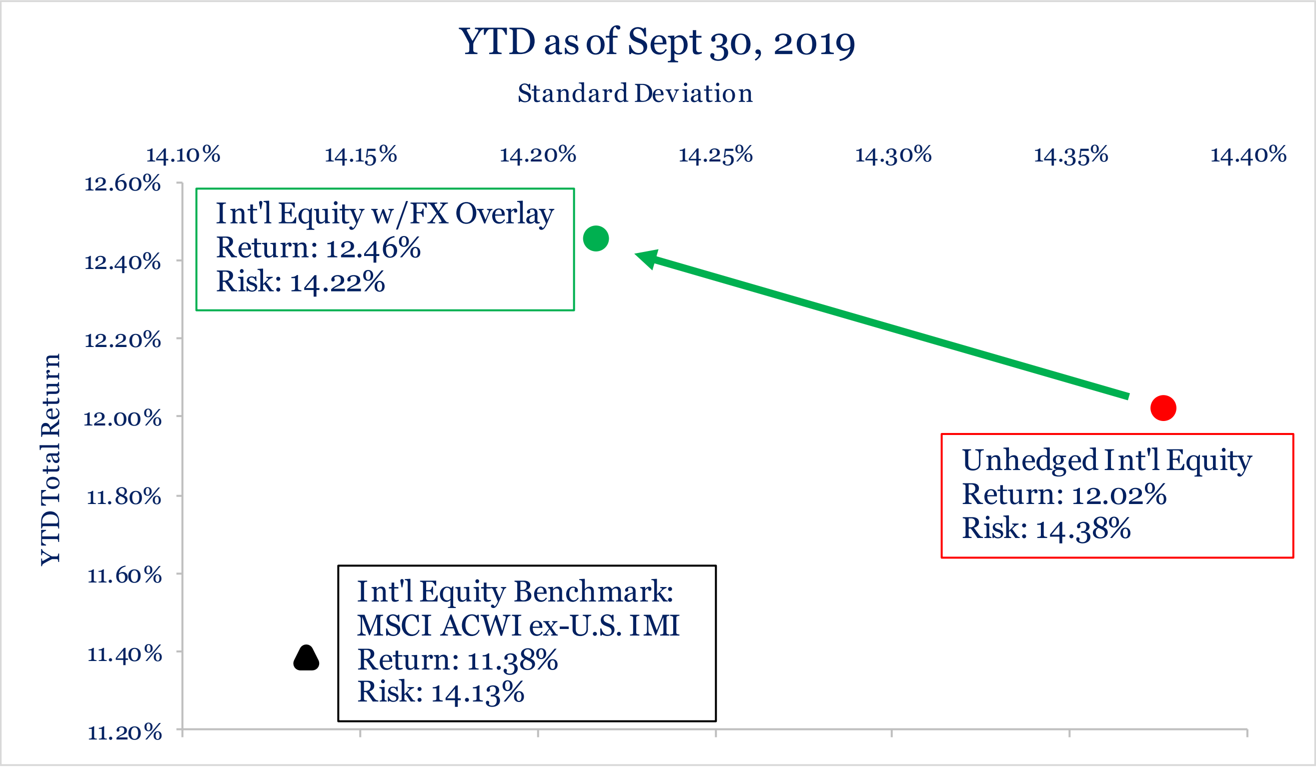
YTD Results - Return vs. Risk

Compared to unhedged results, risk in OPERF's international public equity portfolio has been reduced by 16 bps YTD 2019, while portfolio return improved by 43 bps.



Source: State Street

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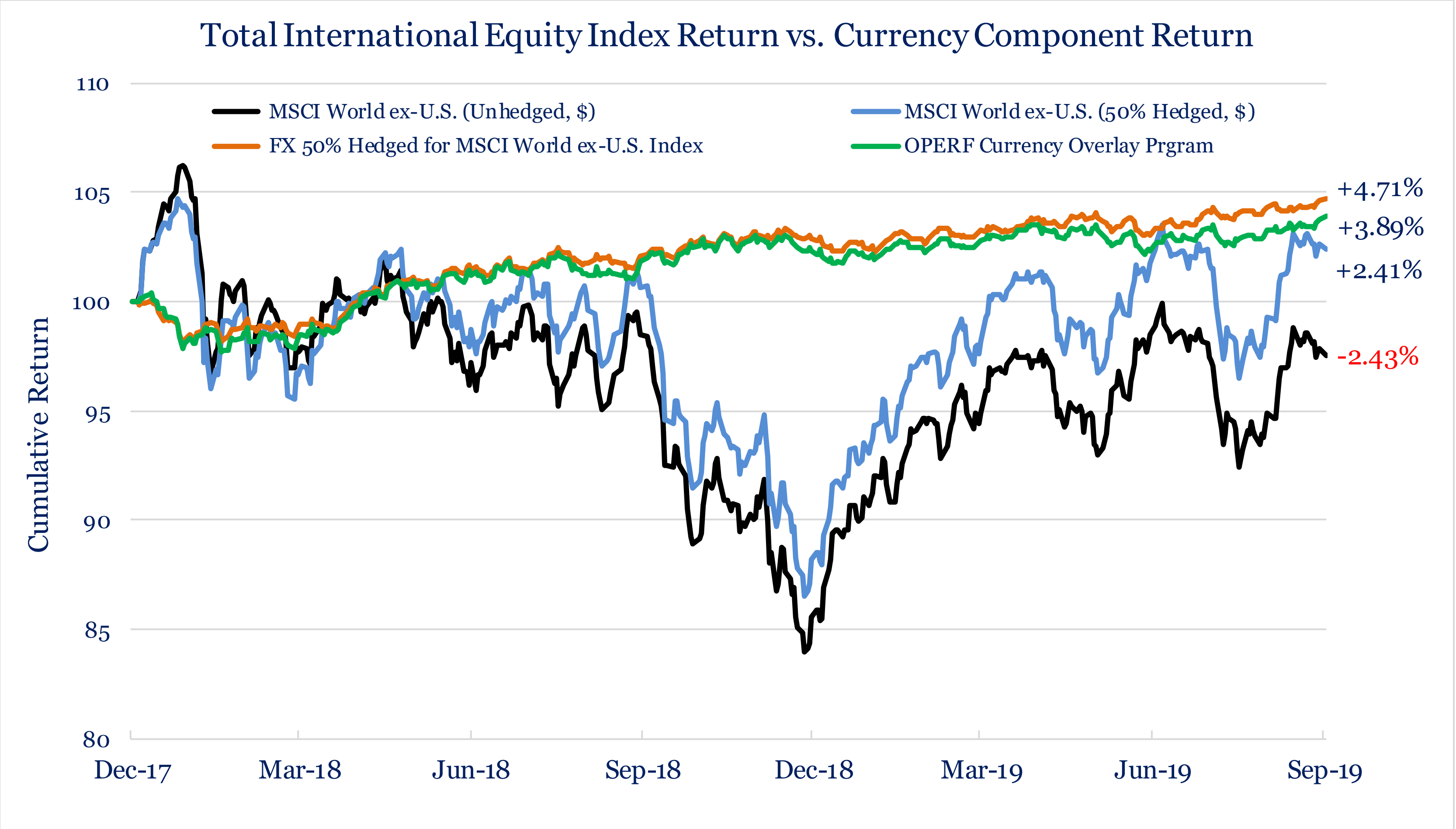
Since Inception Results – 50% Hedged Performance



Source: Bloomberg, MSCI, State Street

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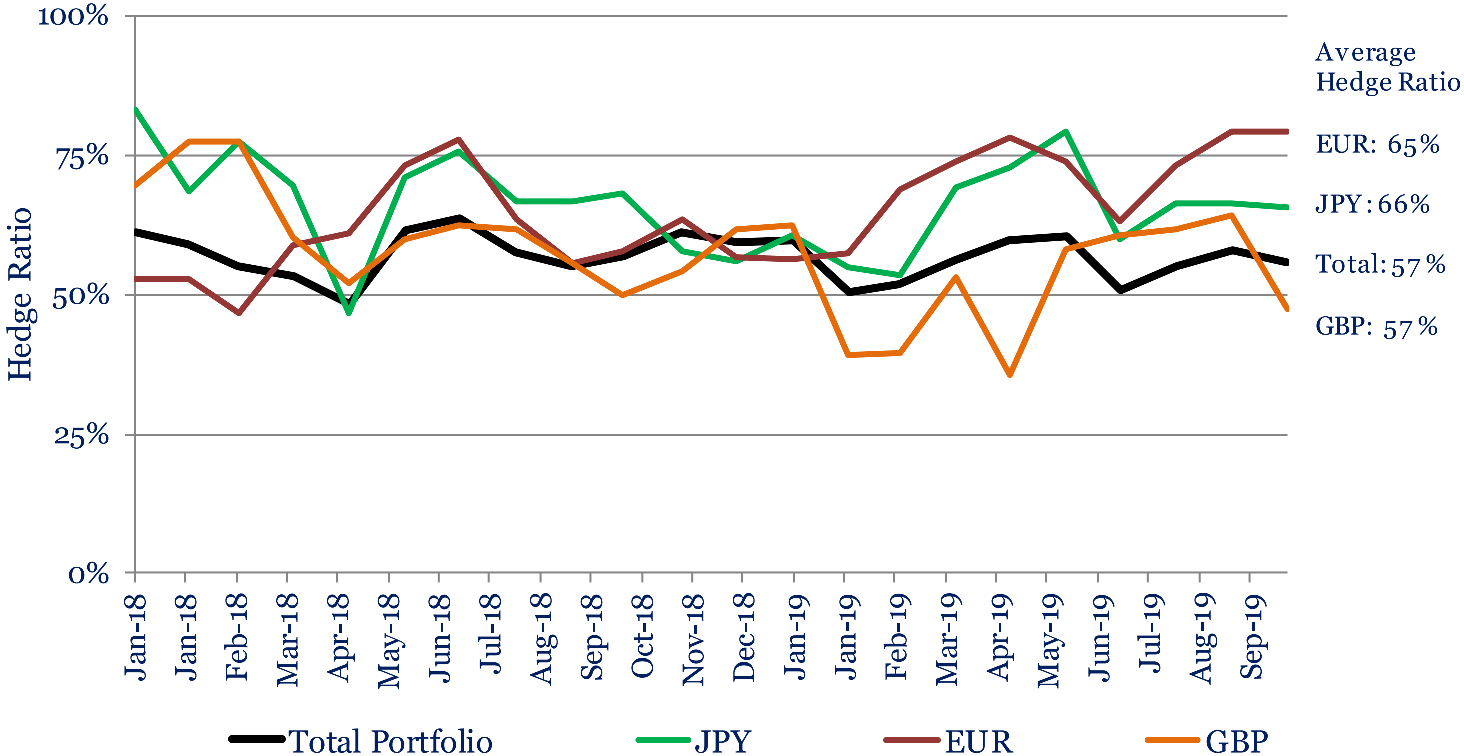
Since Inception – Program Hedge Ratio Trends



Source: Adrian Lee & Partners

Appendix 1 – Currency Exposure Profile of OPERF’s Public Equity Portfolio

	As of Sept 30, 2019	MSCI ACWI IMI	EQ without Currency Hedge	EQ with Currency Hedge	FX Overlay Hedge Impact on EQ
1	US Dollar (USD)	56.5%	61.0%	65.3%	4.3%
2	Euro (EUR)	9.2%	7.0%	5.2%	-1.7%
3	Japanese Yen (JPY)	7.7%	6.8%	5.7%	-1.1%
4	British Pound (GBP)	5.0%	4.7%	4.2%	-0.6%
5	Hong Kong Dollar (HKD)	3.2%	3.1%	2.9%	-0.1%
6	Canadian Dollar (CAD)	3.1%	2.2%	2.2%	-0.1%
7	Swiss Franc (CHF)	2.6%	2.1%	1.2%	-0.9%
8	Australian Dollar (AUD)	2.2%	1.9%	2.0%	0.1%
9	South Korean Won (KRW)	1.4%	1.7%	1.7%	0.0%
10	Taiwan Dollar (TWD)	1.4%	1.3%	1.3%	0.0%
11	Indian Rupee (INR)	1.1%	0.8%	0.8%	0.0%
	Other Currencies	6.5%	7.4%	7.6%	0.2%
		100.0%	100.0%	100.0%	0.0%

Source: BlackRock Aladdin

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Appendix 2 – Currency Exposure Within OPERF's International Public Equity Portfolio

	As of Sept 30, 2019	MSCI World ex-U.S.	MSCI ACWI ex-U.S. IMI	Int'l EQ without Currency Hedge	Int'l EQ with Currency Hedge	FX Overlay Hedge Impact on Int'l EQ
1	Euro (EUR)	28.7%	20.6%	16.7%	11.7%	-5.0%
2	Japanese Yen (JPY)	22.2%	17.3%	13.7%	10.6%	-3.2%
3	British Pound (GBP)	14.8%	11.2%	11.7%	10.1%	-1.6%
4	Canadian Dollar (CAD)	9.4%	7.0%	4.9%	4.7%	-0.2%
5	Swiss Franc (CHF)	8.5%	5.9%	4.4%	1.7%	-2.6%
6	Australian Dollar (AUD)	6.4%	4.8%	4.5%	4.6%	0.1%
7	Hong Kong Dollar (HKD)	3.0%	7.2%	6.6%	6.2%	-0.4%
8	Swedish Krona (SEK)	2.3%	2.0%	1.2%	0.5%	-0.7%
9	Danish Krone (DKK)	1.6%	1.2%	1.7%	1.5%	-0.2%
10	Singapore Dollar (SGD)	1.1%	0.9%	0.7%	1.4%	0.7%
11	US Dollar (USD)	0.8%	2.7%	11.5%	23.7%	12.2%
12	Norwegian Krone (NOK)	0.6%	0.6%	0.2%	1.0%	0.8%
13	Israeli Shekel (ILS)	0.3%	0.4%	0.8%	0.6%	-0.2%
14	New Zealand Dollar (NZD)	0.2%	0.2%	0.6%	0.8%	0.2%
	South Korean Won (KRW)	0.0%	3.2%	4.9%	4.9%	0.0%
	Taiwan Dollar (TWD)	0.0%	3.1%	2.8%	2.8%	0.0%
	Indian Rupee (INR)	0.0%	2.4%	2.0%	2.0%	0.0%
	Brazilian Real (BRL)	0.0%	1.9%	2.8%	2.8%	0.0%
	South African Rand (ZAR)	0.0%	1.2%	1.0%	1.0%	0.0%
	Other EM Currencies	0.0%	6.2%	7.3%	7.2%	0.0%
		100.0%	100.0%	100.0%	100.0%	0.0%

- The MSCI World ex-U.S. index is a non-U.S. developed market equity index containing 14 currencies.
- The currency return component of a 50%-hedged MSCI World ex-U.S. index is the benchmark for the OPERF Currency Overlay Program.
- The MSCI All Country World Index ex-U.S. Investable Market index (MSCI ACWI ex-U.S. IMI) is a global equity index covering both non-U.S. developed markets and emerging markets countries. It comprises 37 currencies, and also serves as the benchmark for OPERF's International Public Equity portfolio.

Source: BlackRock Aladdin, MSCI

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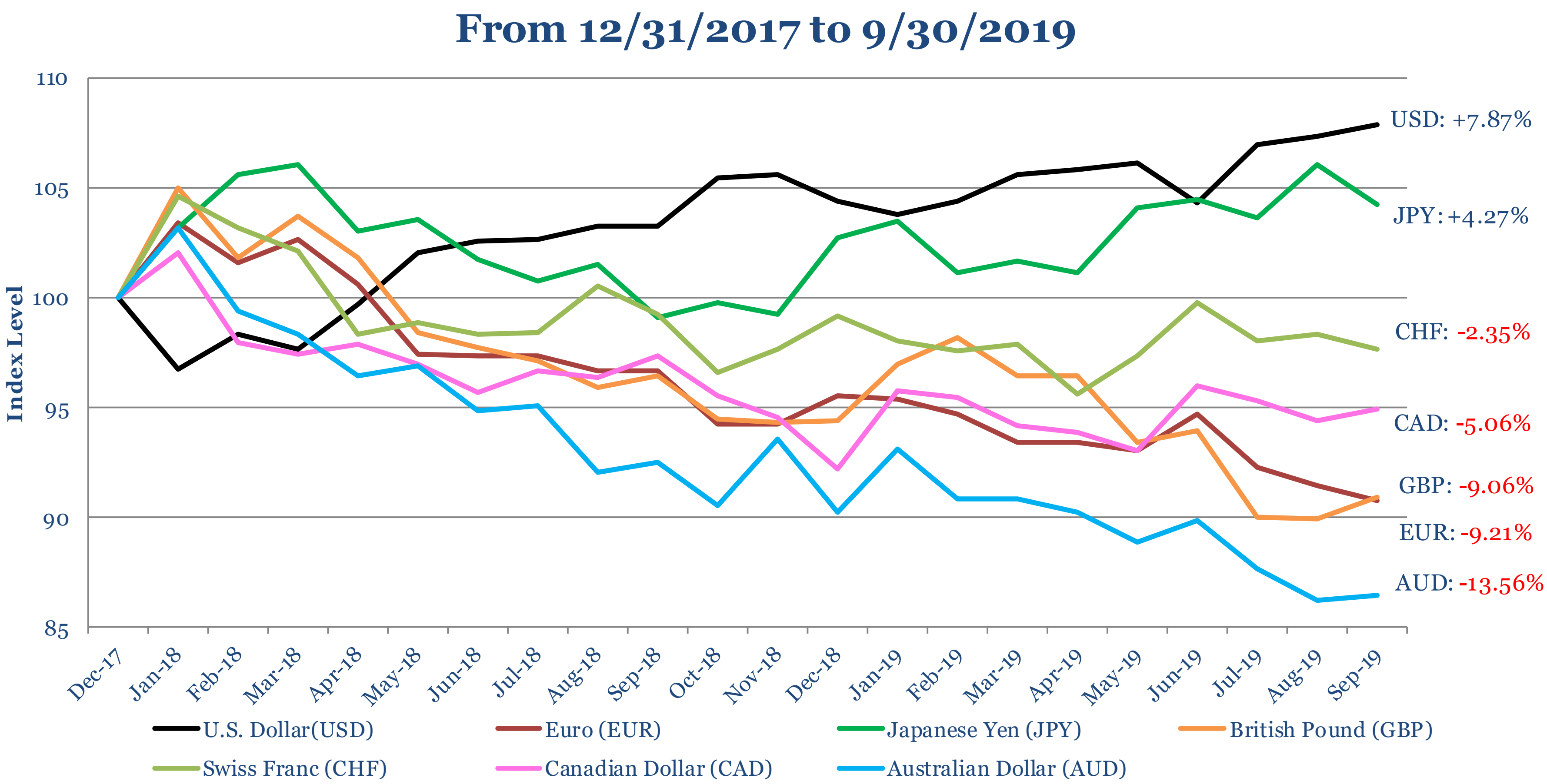
Appendix 3 – Recent Currency Market Performance



Source: Bloomberg

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Tobias Read
Oregon State Treasurer

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OPERF Currency Overlay Manager Recommendation

Aspect Capital Limited

P/E Global LLC

Purpose

Staff and Callan recommend adding Aspect Capital Limited and P/E Global LLC to the OPERF Currency Overlay Program. Staff recommends allocating $2 billion notional exposure to each manager (an initial investment of $1 billion with another $1 billion exposure subsequently added at Staff discretion), subject to a) Oregon Investment Council approval and b) satisfactory legal negotiation of all related terms and conditions.

Background

In August 2017, the OIC approved Policy INV 217: OPERF Foreign Currency Risk Policy (the "Policy"), which 1) recognizes that unmanaged foreign currency exposure is a source of uncompensated risk and 2) establishes a Currency Overlay Program ("the Program") to reduce currency risks associated with OPERF's foreign-denominated investments while preserving their diversification benefits. In November 2017, the OIC launched the Program by approving Adrian Lee & Partners ("ALP") for a $2 billion notional currency management mandate. Since inception on January 2, 2018, the Program has met staff's expectations and achieved the Program's goal of reducing currency-related portfolio volatility. In addition, the Program realized $60.7 million in cash inflows as a result of its net, long U.S. dollar/short foreign currencies position. At the Program's annual review session on October 31, 2018, staff discussed expanding the Program. Staff's criteria for selecting a new currency overlay manager are 1) complementarity with ALP's currency management approach and 2) improve the Program's risk-adjusted, active currency returns, while reducing overall currency-related portfolio volatility.

As of September 30, 2019, OPERF's Public Equity Portfolio has approximately $8 billion in non-U.S. developed foreign currency exposure. To further the Program's currency risk reduction objective and limit the impacts of negative cash flows, staff recommends gradually scaling the Program from its current $2 billion notional exposure up to $6 billion.

Founded in 1997, Aspect Capital Limited ("Aspect") managed $7.5 billion across systematic alternative investment strategies as of June 30, 2019, including managed futures ($4.4 billion, or 58% of firm assets), alternative risk premia ($1.8 billion, or 24% of firm assets), and currency solutions ($1.3 billion, or 17% of firm assets). The firm's dedicated currency solutions are managed by two portfolio managers, Dr. Anoosh Lachin and Mr. Asif Noor, who are in turn supported by four research analysts. Prior to its acquisition by Aspect in February 2016, this currency team worked at Auriel Capital Management ("Auriel"), which was founded by Dr. Lachin and Mr. Noor in 2004. In addition to managing dedicated currency portfolios, the team also manages $477 million in Aspect's Systematic Global Macro Programme, which shares common investment model characteristics with the firm's currency approach. Within OPERF's Alternatives Portfolio, the Diversifying Strategies sleeve has approximately $500 million invested in Aspect's Core Diversified Programme. Accordingly, the OPERF currency manager recommendation represents an extension of an existing relationship with Aspect.

Founded in 1995 by Warren Naphtal, Mary Naphtal, and J. Richard Zecher, P/E Global LLC ("P/E") managed $7.7 billion as of June 30, 2019 across currency ($6.9 billion, or 90% of firm assets), diversified global macro ($0.5 billion, or 6% of firm assets), and other strategies ($0.3 billion, or 4% of firm assets). Based in Boston, the firm has 45 employees, including 16 investment professionals with an average 11 years' experience in institutional currency management.

Discussion/Investment Considerations
Staff recommends that Aspect and P/E both manage a $2 billion notional exposure[1], respectively or roughly one third of the total Program's $6 billion target exposure. The proposed mandate may be notionally long $1 billion of U.S. dollar and short an equivalent amount of foreign currencies (since currencies are typically traded in pairs), but the market value of that position is effectively zero at the onset. As the currency pairs move, the profit-and-loss of the net position is scaled by the notional exposure. For example, assume a $1 billion long U.S. dollar/short euro position was entered at 1.0517 (the price of 1 euro in U.S. dollar terms) at the end of 2016. The U.S. dollar then depreciated versus the euro to 1.1814 by September 2017 for a loss of 11.0%. In this scenario, a $1 billion notional position would have resulted in a cash outflow of approximately $110 million.

Aspect's Attributes:

- *Complementary to existing currency manager*. Over Aspect's track record from an inception date of December 2010 to June 2019, the *ex post* correlation of excess returns between ALP and Aspect is close to zero at +0.05. This negligible correlation reflects Aspect's differentiated approach, namely a dynamic quantitative currency model which has a shorter model investment horizon than ALP.
- *Multi-layered risk management process.* One of the crucial elements of Aspect's investment process is that its currency team uses a proprietary, multi-layered risk management process to help measure and control risk within its currency hedging portfolios. To enhance factor timing, the investment process applies three different risk filters: risk conditioning; risk overlay; and thematic stop-loss. These risk filters are designed to limit portfolio drawdowns by identifying unfavorable, "risk off" regimes or extended thematic drawdowns and dynamically exclude/reduce portfolio positions. Staff appreciates Aspect's risk management emphasis in its currency management process and believes it would help achieve the Policy's guideline of limiting negative cash flows and portfolio drawdowns.
- *Negative correlation with equity portfolio and indices.* Aspect's currency portfolio has historically exhibited negative correlation with OPERF's Public Equity Portfolio, International Public Equity sleeve, and broad equity indices. Adding Aspect to the Currency Overlay Program would further improve risk reduction.

Concerns on Aspect:

- *Concentrated client risk.* Aspect has only one institutional client in its Dynamic Currency Hedging Programme. [Mitigant: Aspect's key client provided very positive feedback and confirmation. Dr. Lachin and Mr. Noor have continuously managed this key client's currency overlay portfolio since December 2010 when they were at Auriel. Now the currency team is with Aspect, a much bigger firm with greater research and operational resources as well as a firm commitment to sustaining the team.]
- *Key person risk.* Dr. Lachin and Mr. Noor initiated the currency strategy and are the sole, responsible portfolio managers. [Mitigant: Dr. Lachin and Mr. Noor co-founded Auriel in 2004. When the Auriel currency team joined Aspect in 2016, alignment of incentives was important to both parties. Accordingly, a number of mechanisms were built into the acquisition agreement to help achieve long-term partnership success. One of the key reasons motivating Dr. Lachin and Mr. Noor to partner with a larger and more established firm was the enormous effort required to manage a boutique investment firm, from handling trading, middle- and back-office functions to meeting regulatory requirements and investors' operational due diligence demands. Both portfolio managers expressed their strong desire to stay at Aspect to focus on their core competency -- continuous research to enhance the firm's systematic investment strategies. In the unlikely event that either or both of Dr. Lachin and Mr. Noor leave Aspect, the firm would retain the intellectual property associated with Dr. Lachin and Mr. Noor's investment strategies.]

[1] *Notional exposure* is the magnitude of economic sensitivity, not the market value of the investment.

<u>P/E's Attributes</u>:

- *Dedicated currency management specialist.* Currency management for institutional investors is almost the entirety of P/E's business, representing 90% of the firm's assets under management.
- *Unique investment approach.* P/E's currency models are driven by three main macroeconomic and financial factors -- yield, risk and capital flows -- which are also commonplace among other currency managers' models. However, P/E's approach is unique in its application of Bayesian statistical analysis into model construction and reiteration processes. Though infrequently applied in investment management, Bayesian statistical methods have been widely used in the fields of robotics and voice recognition. These methods incorporate new data and information into the statistical modeling to reduce forecasting parameter errors and improve forecast accuracy.
- *Complementary to existing currency manager*. Over P/E's track record from an inception date of October 2003 to June 2019, the *ex post* correlation of returns between ALP and P/E is low at approximately +0.20. Over the common track record period from December 2010 to June 2019, the *ex post* correlation of excess returns between P/E and Aspect is also low at approximately +0.12. In addition, Staff analyzed P/E's rolling 3-year return-to-risk ratios. Staff noticed that P/E's currency portfolio exhibits high return-to-risk ratios (greater than 0.5) about 62% of the time during the rolling periods from the furthest available 3-year track record data in September 2006 to June 2019. Staff believes adding P/E to the program is accretive and enhances the risk-adjusted excess return above the Program's 50%-hedged passive currency benchmark.
- *Negative correlation with equity portfolio and indices.* P/E's currency portfolio has exhibited negative correlation with OPERF's Public Equity Portfolio, International Public Equity sleeve, and broad equity indices. Adding P/E to the Currency Overlay Program would further improve risk reduction.

<u>Concerns on P/E</u>:

- *Higher beta to passive currency benchmark.* P/E's currency portfolio exhibits a high beta to the passive currency index. This type of sensitivity usually represents an undesired attribute for an active currency manager. [Mitigant: Staff studied the rolling 12-month beta for P/E's strategy and found it did not always exhibit a high beta. From 2008 to mid-2011, P/E's beta was negative while from mid-2012, its beta was high. As the passive currency benchmark has performed well since 2012 (i.e., long U.S. dollar and short foreign currencies), P/E's strategy benefited from its bullish exposure to the U.S. dollar.]
- *Key person risk.* A co-founder, Mr. Naphtal also serves as the firm's Chief Investment Officer. He has 34 years of institutional currency management experience, and is the key person for the firm's business and strategy success. [Mitigant: Nearly 100% of P/E's currency investment process is systematic and driven by Bayesian quantitative factor models. The only discretionary part of the investment process is portfolio manager intervention to reduce risk in the event of a shock event, which has occurred only five times in the past 16 years. In addition, David Souza Jr., Head of Research and Trading, also serves as the assistant portfolio manager and has worked with Mr. Naphtal for the last 19 years at P/E. In the event Mr. Naphtal can no longer serve his function, Mr. Souza has authority to take over currency portfolio management.]

Conclusion

Aspect's currency portfolio managers collectively have more than four decades of institutional currency management experience while P/E has specialized in institutional currency management for more than 15 years. Staff believes both firms are good complements to OPERF's existing currency manager in terms of their respective approach to currency management and expected, resultant diversification benefits. Scaled gradually, staff recommends allocating $2 billion notional exposure to both Aspect and P/E, respectively.

Callan

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Memorandum

To: Oregon Investment Council

From: Callan LLC ("Callan")

Date: September 18, 2019

Subject: OPERF Currency Overlay Manager Evaluation – Aspect Capital Inc.

Callan conducted an evaluation of the Aspect Dynamic Currency Hedging Programme (ADCH) and a simulated G10 solution, managed by Aspect Capital Inc. (Aspect) for Oregon State Treasury. Callan is supportive of the firm and either strategy for a risk-reducing currency hedging program. ADCH can be selected if developed and emerging currency exposures are to be hedged, while the G10 version is appropriate if only developed currency hedging, and/or if alpha maximization is desired

The currency program is led by Dr. Anoosh Lachin and Asif Noor, supported by four dedicated researchers. Both Lachin and Noor were founding partners of Auriel Capital Management where this currency platform was developed in 2000. Auriel was acquired by Aspect in February 2016, bringing Auriel's quantitative investment approach to Aspect, where all existing strategies were quantitatively managed. Aspect was an early adopter in applying quantitative techniques to investment management since 1987. Aspect's currency program is offered as a standalone solution, while versions of their platform have been integrated into Aspect's broader product line, including the Aspect Core Diversified Programme and Global Macro strategies. With the addition of Auriel personnel, Aspect reorganized in 2019 to leverage new expertise and remove legacy redundancies. As of June 2019, the firm totaled 121 employees, with 51 investment professionals involved in the management of currency strategies. Firm wide assets totaled $7.5 billion with active currency mandates making up $1.3 billion. The ADCH strategy has been in continual existence since December 2010. The G10 solution is a simulation with targeted risk of 2% volatility.

ADCH, the G10 solution, and all strategies at Aspect are quantitatively driven. The investible universe for ADCH includes G10 developed countries and seven liquid emerging market currencies. A composite is managed at 1% volatility, while scalable risk makes it appropriate for higher risk solutions. For instance, the currency component of Aspect Global Macro is managed at 6-8% volatility.

G10 exposure is managed utilizing seven broad themes/models of (1) Factor Premium Timing/carry, (2) Risk Aversion, (3) Commodity Effects, (4) Momentum, (5) Economic Activity, (6) Option Market Sentiment, and (7) News Sentiment. Emerging market exposure utilizes two models/themes of (1) Factor Premium Timing, and (2) Option Market Sentiment. Construction of the G10 model allows for directional bets, while EM exposure is constructed to be USD neutral overall. G10, therefore, offers higher alpha potential. The investible universe of currencies and targeted risk levels are highly customizable. Exposures to the various themes/models are dynamic. Factor timing is applied using three different risk filters: (1) Regime Conditioning – fundamental insights triggered by well tested quantitative signals; (2) Risk Overlay – threshold concept used to determine risk-off scenarios; and (3) Thematic Stop-Loss – calibrates the probability of common factor unwinds, immunizing the portfolio to extended theme drawdowns. These risk filters can result in certain factors being turned on/off, or re-weighted.

Although the investment process has remained largely unchanged since its inception, on-going research is conducted as markets, data sources and techniques change. Recent model enhancements include an enhanced news sentiment model based on Natural Language Processing on financial websites and blogs, and option market sentiment models looking at differential call/put pricing, to name a few. Additional research is being conduct to incorporate new unstructured data sources.

While ADCH results highlight broader currency hedging capabilities, a review of a G10 simulation showed that the developed country model brings higher efficacy in returns. This is due to EM exposure being constructed USD neutral, removing opportunity for directional bets, while the G10 model showed efficacy maintaining directional bets. Therefore, ADCH is appropriate for risk mitigation of an ACWI exUS universe, while the G10 simulation is appropriate for a World exUS universe.

In summary, Aspect Capital is a sound choice to manage an active currency program for the Oregon State Treasury and Callan supports their selection. Callan has known the firm, and the team's predecessor firm, for many years. Further:

- The team is well established with a long history of consistent application of their investment process across multiple firms.
- Aspect's adaptive/dynamic approach to factor exposures allows for adjustments through changing market environments.
- Aspect's broader offerings afford this team access to well established trading, back and middle offices, legal/compliance, quantitative infrastructure, and other support.
- Evaluation of the ADCH composite and custom G10 2% simulation for OST suggests that the G10 model is strongest for alpha generation through risk mitigation, while the EM model offers risk mitigation but diluted alpha potential. Either are sound options for OST's active hedging program.

Please refer to the full report for further information.

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Memorandum

To: Oregon Investment Council

From: Callan LLC ("Callan")

Date: September 18, 2019

Subject: OPERF Currency Overlay Manager Evaluation – P/E Global

Callan conducted an evaluation of P/E Global's FX Strategy, specifically a version simulated by P/E Global for Oregon State Treasury. Callan is supportive of the firm and the proposed strategy for a risk-reducing currency hedging program. The FX Strategy proposed considers a 50% hedge ratio and 2% volatility and has no live assets at this time. While P/E Global can customize allocations for clients, their live composite FX Strategies only include 3% volatility (FX Low Volatility) and 12% volatility (FX Standard) with no hedge ratios associated.

The currency program is led by CIO Warren Naphtal and Head of Research/Trading David Souza. These two are supported by 14 professionals within research, trading, and systems. Naphtal founded the firm with wife Mary Naphtal and Richard Zecher. Zecher currently serves as Chairman of the firm's Advisory Board. In 2003 P/E launched their flagship FX strategy. In 2011 P/E became employee owned by repurchasing ownership from a previous partnership established in 1999. The firm is currently 70% owned by both Naphtal and his wife Mary (35% each) who serves as COO. This stake is being diluted 3% per year as ownership is being redistributed to a broader group within P/E. In total the firm is diverse with 43% owned by women and 43% owned by minorities. P/E offers two versions of the currency strategy, low volatility (3%) and standard (12%) as well as tailored managed accounts. Firm wide assets totaled $7.7 billion with currency mandates making up $6.9 billion.

All strategies at P/E are quantitatively driven using a Bayesian approach. The investible universe includes G15, both developed countries and emerging market currencies. The strategy is managed using seven macroeconomic and fundamental factors including relative short term rates, relative long term rates, relative short end yield curve (1mo. – 1yr.), relative long end yield curve (1yr. – 10yr.), inflation index, capital flows, and economic surprise. The model attempts to forecast which factors and time horizons predict the actual returns of the currencies best. The Bayesian approach makes this process dynamic by comparing forecasted model returns to actual returns for each currency over time. Factors are more heavily weighted if forecasting errors are lower. Also, shorter look-back time horizons are used if forecasting errors are higher. Portfolio construction utilizes an optimizer that incorporates the model's ability to forecast returns for the currencies; emphasizing the factors and time horizons with the highest predictive power.

The strategy's ability to outperform is centered on the efficacy of its factors. As a result, P/E spends a lot of time researching new factors, as well as sources of data. In 2013 the firm moved to intraday data from daily data. In 2015 and 2018 P/E added the capital flows and economic surprise factors, respectively. While the performance for the proposed strategy is not live, the simulated returns are using the same model and process as the live returns for the FX Low Volatility and FX Standard strategies. The proposed strategy over the time period provided show broad positive contributions from currencies resulting in mostly positive cash flows.

In summary, P/E Global is a good choice to manage an active currency program for the Oregon State Treasury and Callan supports their selection. Further:

- The team is well established with a long history of consistent application of their investment process.
- P/E's Bayesian (dynamic) approach to factor weightings allows for adjustments through changing market environments.
- P/E is an established organization with sufficient professionals and systems related to trading, back office, legal/compliance, and other support.

Please refer to the full report for further information.

INV 217: OPERF Foreign Currency Risk Policy

INTRODUCTION & OVERVIEW

Purpose and Goals

The purpose of this policy is to a) summarize the philosophy of the *Oregon Investment Council* (the "OIC" or the "Council") relative to the foreign currency exposures of the Oregon Public Employees Retirement Fund (OPERF) and b) establish a Currency Overlay Program to manage the risk of such exposures. The goal of the Currency Overlay Program is to strategically manage foreign currency risk to reduce volatility in U.S. dollar-denominated value as a result of movements in foreign exchange rates while preserving the diversification benefits of OPERF's foreign-denominated investments.

POLICY PROVISIONS

Definitions

Currency Exposure: The direct or indirect exposure to a foreign currency due to an investment. For example, OPERF may hold shares of Toyota Motor Corporation listed on the Tokyo Stock Exchange and denominated in Japanese yen. This particular investment would have a currency exposure to the movement of the Japanese yen versus the U.S. dollar *distinct and separate* from the equity performance of the shares on the Tokyo Stock Exchange. There are several forms of currency exposure:

a. *Direct*. Currency exposure from a foreign currency-denominated investment. These include investments such as publicly-traded stocks listed on foreign exchanges. Measuring this type of direct currency exposure is relatively simple and straight forward.

b. *Indirect*. Currency exposure from a U.S. dollar-denominated investment that holds or comprises other foreign currency-denominated investments. For example, a U.S.-listed Exchange Traded Fund (ETF) that tracks a foreign index is denominated in U.S. dollars but is comprised of foreign stocks. The investor's investment in this ETF would be measured in U.S. dollars, but the investor would have non-U.S. dollar currency exposure associated with the ETF's underlying foreign stock holdings. If this ETF's underlying holdings are transparent, measuring this type of indirect currency exposure is also relatively simple and straightforward.

c. *Implicit*. Currency exposure from an investment that has economic sensitivity to foreign currencies. For example, a publicly-traded stock of a multi-national corporation may be denominated in U.S. dollars, but a shareholder would have currency exposure to the non-U.S. component of that corporation's revenue. This type of implicit foreign currency exposure is often difficult to measure due to opaque or insufficient accounting detail and/or corporate- or partnership-level currency hedging activities.

Policy Statements

As a U.S. sovereign entity, OPERF must pay benefits in U.S dollars, yet a sizable portion of OPERF's assets are invested outside the U.S. and denominated in foreign currencies. Essentially, OPERF's foreign currency exposure is a by-product of its international investments.

INV 1201 Statement of OIC Investment and Management Beliefs reaffirms the Council's authority to set and monitor portfolio risks. The Council acknowledges that such risks include those that arise from currency movements, that is, the incremental volatility of return due to the translation of investments denominated in foreign currencies back to the U.S. dollar. Furthermore, the OIC recognizes that a) there is little economic basis or empirical evidence to support a positive, long-term return expectation in connection with OPERF's foreign currency exposure, and b) OPERF's foreign currency exposure is the source of meaningful, stand-alone volatility that contributes to OPERF's total, overall risk. **In other words, the OIC recognizes that unmanaged foreign currency exposure is a source of uncompensated risk.**

Although foreign currency exposure results in uncompensated risk, the Council maintains unhedged policy benchmarks at both the total fund (i.e., OPERF) and individual asset class levels, but simultaneously directs staff to moderate the impact of foreign currency exposure on both OPERF and individual asset class performance as and when economically feasible.

1) Staff will initiate and manage a Currency Overlay Program (the "Program") to strategically manage foreign currency risk to reduce volatility in U.S. dollar-denominated value as a result of movements in foreign exchange rates. However, the Council recognizes that the implementation of the Program and related strategies or tactics could generate additional risks for OPERF, such as operational risk – significant cash inflows and outflows generated exclusively from currency hedging activities – and counterparty risk. To that end, staff will consider and incorporate these additional risks in Program design, implementation and management efforts.

2) The Program will be managed to meet the following guidelines:

   a. Performance and risk objectives evaluated over a full currency market cycle:

      - The Program is expected to achieve a zero or negligible annualized rate of return, net of fees;

- The Program, in isolation, shall target a moderate level of risk while reducing OPERF-level volatility due to foreign currency exposures; and

- The Program aims to minimize negative cash flows and limit portfolio drawdowns.

b. The Program is permitted to transact in foreign currencies that constitute the MSCI World ex-U.S. Index, a developed countries equity index; and

c. Staff will provide the Council an annual review of the Program.

3) On a regular basis, staff will report to the Council a summary of OPERF's direct and indirect currency exposures. Implicit exposures, particularly those from OPERF's private market investments, are more difficult to measure. Staff will endeavor to include implicit exposures in its summary report, but will balance such efforts against related time, cost and accuracy considerations.

Exceptions

None.

Failure to Comply

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

ADMINISTRATION

Feedback

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

TAB 4 – Public Equity Review

OPERF

Oregon Investment Council
OPERF Public Equity Portfolio – Annual Review
October 30, 2019

Purpose

Provide an annual review of the Oregon Public Employees Retirement Fund (OPERF) Public Equity portfolio.

Background

The strategic role of OPERF public equity investments is outlined in OIC Policy INV 1201 – *Statement of OIC Investment and Management Beliefs* and OIC Policy INV 601 – *Strategic Role of Public Equity Securities within OPERF*. As outlined in those policy documents, the strategic role of public equity is to generate a return premium relative to risk-free investments, while providing diversification benefits and liquidity in support of OPERF's cash flow requirements. Return and risk objectives for the Public Equity portfolio (outlined in OIC Policy INV 601 – *Strategic Role of Public Equity Securities within OPERF*) are as follows:

1) To achieve an excess portfolio return of 0.50 percent or more above the MSCI All Country World Investable Market Index (ACWI IMI) (net) over a market cycle of three to five years on a net-of-fee basis; and
2) To manage the active risk to a targeted annualized tracking error of 0.75 to 2.0 percent, relative to the MSCI ACWI IMI (net).

As of September 30, 2019, the capitalization-based MSCI All-Country World Investable Market Index was comprised 55.3 percent U.S. equities, 33.4 percent international developed-market equities and 11.3 percent emerging market equities. To achieve a similar allocation to the benchmark within the OPERF Public Equity portfolio, staff uses a mix of 36 differentiated investment strategies, managed by 18 distinct managers (including staff), organized across style (core/growth/value), capitalization range (large/mid/small/micro), and geography (country/region/global). The 36 investment strategies are broadly categorized as follows:

- **12 U.S. equity strategies,** comprised of 3 indexed strategies (which are internally-managed, and 8 active or systematic strategies (two of which are internally-managed); and
- **24 global/international equity strategies,** comprised of 12 international developed-market strategies (one of which is internally-managed), 6 dedicated emerging-market strategies, and 6 global strategies.

Public Equity Management Highlights

Although results for the period ending June 30, 2019 are detailed in a report from OIC general consultant Callan, staff wishes to highlight the following key points, which have been updated for the period ending September 30, 2019:

- Policy Objective – The OIC's public equity policy objective of 50 basis points (bps) of excess return has not been achieved over the three-year and five-year periods (Exhibit 1). Although the public equity portfolio did not achieve its return objectives, the portfolio did provide meaningful excess returns. Moreover, this excess performance has been achieved by utilizing less than half the policy's 200 bps tracking error (active risk) allowance.

Exhibit 1

Period Ending 9/30/19	Market Value	3 Months	1 Year	3 Years	5 Years	10 Years
OPERF Public Equity Returns	$ 25,661,929,602	0.02%	-0.07%	9.57%	7.01%	9.00%
MSCI ACWI IMI Net		-0.18%	0.48%	9.36%	6.61%	8.45%
Excess Return (0.50% Target)		**0.20%**	**-0.55%**	**0.21%**	**0.40%**	**0.55%**

OPERF Public Equity Tracking Error (2.0% Maximum)		**N/A**	**0.93%**	**0.87%**	**0.90%**	**0.90%**
Information Ratio (Excess Return/Tracking Error)		**N/A**	**-0.59**	**0.25**	**0.45**	**0.61**

Source: State Street, as of September 30, 2019.

- Internally-Managed Equity Portfolios – Since inception, all internally-managed public equity portfolios (current and terminated mandates) have outperformed their corresponding capitalization-weighted benchmarks, net-of-fees (Appendix A).

- Staff started managing the Private Equity stock distribution portfolio beginning November 1, 2018. Previously, fees paid to an external asset manager overseeing the portfolio included a 30 basis point asset management fee and a 10% carry on any appreciation relative to the date stock was distributed from the Private Equity general partner. Since Nov. 1, 2018, the staff-managed portfolio has received approximately $123 million (and sold approximately $73 million) in public stock distributions, and has posted a time-weighted and money-weighted return of 15.87% year to date (January 1, 2019 – September 30, 2019).

- Staff started managing the Foreign Exchange (FX) facilitation program effective May 1, 2019. Previously, fees associated with the program were 3 bps of notional value of the FX trade, and all trades were executed through one external counterparty. Since May 1, 2019, staff has executed over $296 million in FX trades through an electronic platform that allows eight counterparties to actively compete through a real-time auction process, ensuring best execution.

- Manager Meetings – Staff continually scans the marketplace for promising investment managers. Meeting prospective managers in OST offices is the most efficient venue for staff's initial consideration. For the one-year period ending September 30 2019, staff conducted 154 in-person meetings in the Tigard office, 69 quarterly conference calls, and 13 annual on-site diligence meetings with existing OPERF equity managers. Staff maintains files on all manager meetings, and uses a broad range of third-party databases and analytical tools to assist in the tracking and evaluation of current and prospective managers.

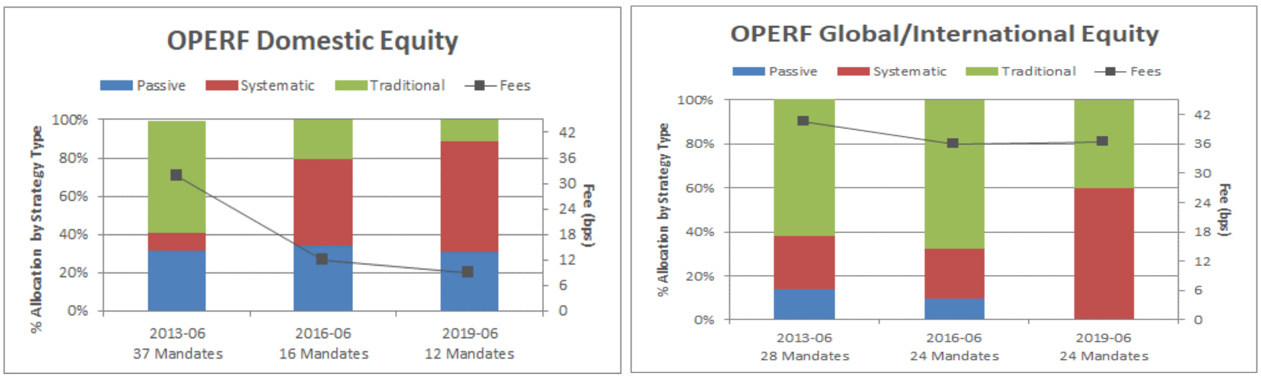
- Portfolio Rebalances – OIC Policy INV 601 and INV 602 give staff authority, with CIO approval, to terminate and rebalance among existing public equity mandates. For the 12 months ending September 30, 2019, staff raised $3.6 billion for PERS pension payments, private market capital calls, a new externally-managed $800mm low volatility portfolio, and an additional $400mm for an internally-managed International Risk Premia mandate. (Appendix B).

<u>OPERF Public Equity Restructuring</u>

Staff continues to opportunistically restructure OPERF's public equity portfolio away from traditional active mandates and reallocate proceeds in favor of low-cost, systematic or "engineered" factor strategies (both internally- and externally-managed). Staff believes this approach has a higher probably of long-term success for the OPERF public equity portfolio than traditional, higher-cost active management implementations.

This restructuring has reduced the number of traditional active managers employed by the OEPRF domestic equity portfolio (Exhibit 2) and lowered the portfolio's investment management costs from 32 bps to 9 bps per annum Similar actions in the OPERF global/international portfolio have reduced the number of traditional active managers employed and lowered the portfolio's management costs from 43 to 36 bps per annum. The cost saving associated with the OPERF public equity restructuring for fiscal year 2019 was approximately $34 million.

Exhibit 2



This restructuring has also complemented the portfolio's long-standing overweight to small cap stocks (the "Size" factor) with systematic tilts toward other factors (Value, Momentum, Profitability/Quality, and, most recently, low volatility or "Low Vol"). Supported by robust empirical evidence, these various factors generate excess return premiums that are both persistent over time and pervasive across markets and geographies.

To date, staff has funded five externally-managed global Low Vol managers (Los Angeles Capital, Acadian, AQR, Arrowstreet, and Dimensional) and an internally-managed Developed ex-U.S. multifactor strategy that tilts towards low volatility. As of September 30, 2019, total exposure to global Low Vol within the OPERF Public Equity portfolio stands at approximately 22 percent (policy target = 25 percent), and this exposure has outperformed the MSCI ACWI IMI Net over all trailing time periods since its implementation inception on January 1, 2017 (Exhibit 3).

Exhibit 3

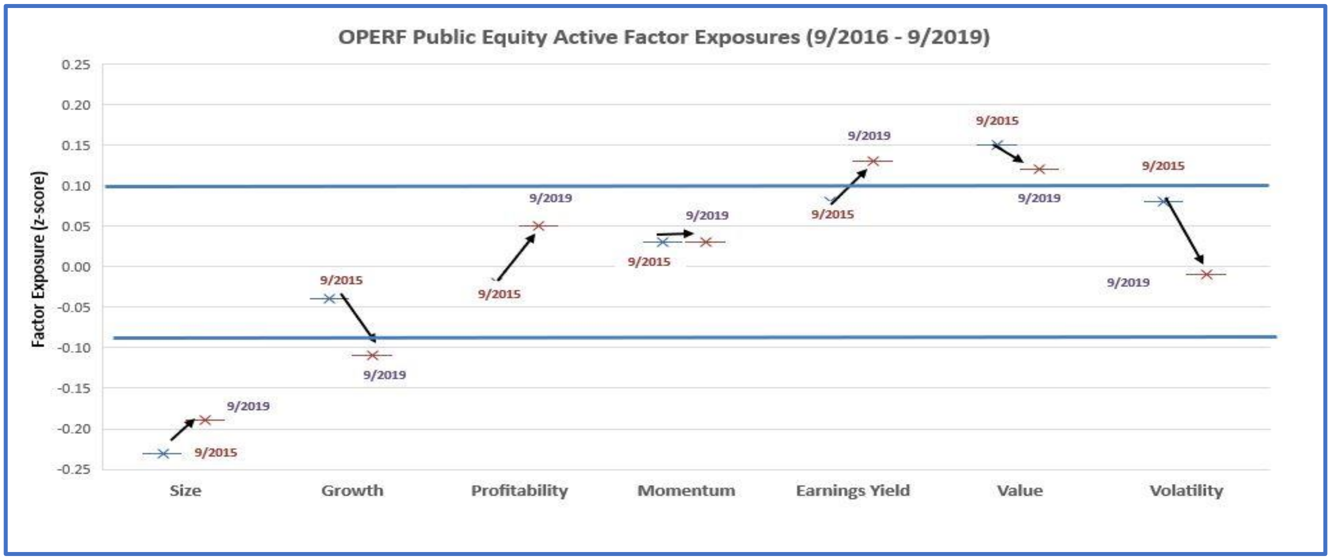
Period Ending 9/30/19	Market Value	3 Months	1 Year	2 years	Incep	2-yr Beta
Global Equity Low Vol	$ 4,430,119,268	0.86%	4.22%	7.42%	11.13%	**0.73**
MSCI ACWI IMI Net		-0.18%	0.48%	4.95%	9.75%	**1.00**
Excess Return		**1.04%**	**3.74%**	**2.46%**	**1.37%**	

Source: State Street, as of September 30, 2019.

Over the long-term, staff expects the global low volatility portfolio to provide returns commensurate with the portfolio's MSCI ACWI IMI Net benchmark (i.e. no excess returns) but with lower volatility. The defensive nature of the portfolio allows for outperformance in declining or volatile stock markets such as those exhibited in October 2018 and May 2019.

Staff has intentionally built factor exposures within the OPERF public equity portfolio that exhibit better diversification over time (Exhibit 4). For example, the portfolio's exposure to the Size factor has been reduced, allowing for expanded tilts towards Value, Profitability/Quality, Momentum, and Low Vol.

Exhibit 4



Appendix A

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 400 Portfolio	$ 702,779,412	18.05%	-2.28%	5.78%	9.69%	11.16%	9.17%	12.87%	12.87%
S&P 400 Index		17.87%	-2.49%	5.53%	9.38%	10.84%	8.88%	12.56%	12.56%
Excess (net)		**0.18%**	**0.22%**	**0.25%**	**0.31%**	**0.32%**	**0.29%**	**0.31%**	**0.31%**
Inception Date of Oct. 1, 2009	**Tracking Error = 30 bps**	**Target Excess Return: 10 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 500 Portfolio	$ 2,558,808,869	20.68%	4.38%	10.95%	13.46%	13.96%	10.90%	13.30%	13.30%
S&P 500 Index		20.55%	4.25%	10.87%	13.39%	13.90%	10.84%	13.26%	13.26%
Excess (net)		**0.12%**	**0.13%**	**0.07%**	**0.07%**	**0.06%**	**0.06%**	**0.04%**	**0.04%**
Inception Date of Oct 1, 2009	**Tracking Error = 10 bps**	**Target Excess Return: 5 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RU2000/ S&P 600	$ 295,175,064	13.99%	-9.35%	2.12%	8.14%	10.31%	8.61%	*N/A*	11.03%
Russell 2000/S&P 600 Index		13.46%	-9.46%	2.15%	8.00%	9.83%	8.05%	N/A	10.31%
Excess (net)		**0.53%**	**0.11%**	**-0.03%**	**0.14%**	**0.48%**	**0.56%**	**N/A**	**0.72%**
Inception Date of April 1, 2010	**Tracking Error = 50 bps**	**Target Excess Return: 30 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
US Risk Premia Portfolio	**$ 3,207,141,012**	**20.17%**	**1.45%**	**10.93%**	**14.35%**	**14.43%**	**11.88%**	**N/A**	**11.72%**
MSCI Risk Premia Index		*20.06%*	*1.41%*	*10.84%*	*14.36%*	*14.46%*	*11.92%*	*N/A*	*11.74%*
MSCI USA Index		**20.63%**	**4.14%**	**10.79%**	**13.29%**	**13.75%**	**10.73%**	**N/A**	**10.76%**
Excess (net)		**-0.46%**	**-2.69%**	**0.14%**	**1.06%**	**0.68%**	**1.15%**	**N/A**	**0.96%**
Inception Date of Jan 1, 2014	**Tracking Error = 300 bps**	**Target Excess Return: 150 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
Int'l Risk Premia Portfolio	**$ 1,209,673,061**	**15.24%**	**1.16%**	**2.32%**	**N/A**	**N/A**	**N/A**	**N/A**	**3.69%**
MSCI Int'l Risk Premia Index		*14.94%*	*0.79%*	**2.04%**	*N/A*	*N/A*	*N/A*	*N/A*	*3.46%*
MSCI World X-US Index		**13.57%**	**-0.95%**	**0.84%**	**N/A**	**N/A**	**N/A**	**N/A**	**3.11%**
Excess (net)		**1.674%**	**2.113%**	**1.476%**	**N/A**	**N/A**	**N/A**	**N/A**	**0.58%**
Inception Date of Jun 1, 2017	**Tracking Error = 300 bps**	**Target Excess Return: 150 bps**							

Period Ending 9/30/15	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
TEMS Portfolio	**$ 180,449,700**	**-16.55%**	**-22.43%**	**-9.25%**	**-6.42%**	**-0.92%**	**-4.08%**	*N/A*	**9.01%**
MSCI EM Index		**-15.48%**	**-19.28%**	**-8.25%**	**-5.27%**	**-0.15%**	**-3.24%**	**N/A**	**8.87%**
Excess (net)		**-1.07%**	**-3.15%**	**-1.01%**	**-1.15%**	**-0.77%**	**-0.85%**	**N/A**	**0.14%**
Inception Date of Feb 1, 2009	**Tracking Error = 400 bps**	**Target Excess Return: 200 bps**		**TERMINATED SEPTEMBER 30, 2015**					

Period Ending 8/31/16	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RUSSELL RAFI LC Portfolio	**$ 1,371,571,346**	**10.27%**	**13.81%**	**4.97%**	**11.23%**	**14.23%**	**N/A**	**N/A**	**14.65%**
RAFI LC Index		*10.06%*	*13.54%*	*4.90%*	*11.21%*	*14.21%*	*N/A*	*N/A*	*14.62%*
RUSSELL 1000 Index		**7.83%**	**11.69%**	**5.89%**	**12.02%**	**13.93%**	**N/A**	**N/A**	**14.46%**
Excess (net)		**2.43%**	**2.11%**	**-0.93%**	**-0.79%**	**0.31%**	**N/A**	**N/A**	**0.19%**
Inception Date of Nov 1, 2011	**Tracking Error = 300 bps**	**Target Excess Return: 150 bps**			**TERMINATED AUGUST 31, 2016**				

Source: State Street, as of September 30, 2019, unless otherwise noted.

Appendix B

Date(s)	Manager	Sub-Asset Class	Market Value	Purpose
Nov-18	Acadian Int'l Value	Int'l Developed & Emerging Value	15,000,000	Cash Raise/Rebalance
Nov-18	Acadian Global Low Vol	Global Low Vol	18,000,000	Cash Raise/Rebalance
Nov-18	AllianceBernstein Global Value	Global Value	14,000,000	Cash Raise/Rebalance
Nov-18	AJO Large Cap Value	US Large Cap Value	15,000,000	Cash Raise/Rebalance
Nov-18	AQR Int'l Large Cap Core	World Developed X-US	15,000,000	Cash Raise/Rebalance
Nov-18	AQR US Small Cap 130/30	Small Cap Value	5,000,000	Cash Raise/Rebalance
Nov-18	AQR Global Low Vol	Global Low Vol	17,000,000	Cash Raise/Rebalance
Nov-18	Arrowstreet EM	Emerging Markets	8,000,000	Cash Raise/Rebalance
Nov-18	Arrowstreet Int'l Core 130/30	Int'l Developed & Emerging	30,000,000	Cash Raise/Rebalance
Nov-18	Arrowstreet Global Low Vol	Global Low Vol	18,000,000	Cash Raise/Rebalance
Nov-18	Brandes Int'l Value	Int'l Developed & Emerging	16,000,000	Cash Raise/Rebalance
Nov-18	Callan Micro Cap Value	US Micro Cap	4,000,000	Cash Raise/Rebalance
Nov-18	DFA Int'l Small Cap Value	Int'l Developed Small Cap	5,000,000	Cash Raise/Rebalance
Nov-18	DFA US Large Cap Core	US Large Cap	75,000,000	Cash Raise/Rebalance
Nov-18	DFA US Micro Cap Value	US Micro Cap	4,000,000	Cash Raise/Rebalance
Nov-18	DFA Int'l Micro Cap Value	International Developed Micro Cap	3,000,000	Cash Raise/Rebalance
Nov-18	DFA EM Small Cap	Emerging Markets Small	3,000,000	Cash Raise/Rebalance
Nov-18	EAM US Micro Cap Growth	US Micro Cap Growth	3,000,000	Cash Raise/Rebalance
Nov-18	EAM Int'l Micro Cap	Global X-US Micro Cap	2,000,000	Cash Raise/Rebalance
Nov-18	Genesis EM	Emerging Marekts	8,000,000	Cash Raise/Rebalance
Nov-18	Harris Int'l Value	Int'l Developed Small Cap Value	5,000,000	Cash Raise/Rebalance
Nov-18	Lazard Int'l Core	Int'l Developed & Emerging	17,000,000	Cash Raise/Rebalance
Nov-18	Lazard Int'l Core CEF	Int'l Developed & Emerging	23,000,000	Cash Raise/Rebalance
Nov-18	LACM Global Low Vol	Global Low Vol	19,000,000	Cash Raise/Rebalance
Nov-18	OST S&P 500 Index	US Large Cap	50,000,000	Cash Raise/Rebalance
Nov-18	The Boston Co Small Cap Value	US Small Cap Value	5,000,000	Cash Raise/Rebalance
Nov-18	Walter Scott Int'l Growth	Int'l Developed	15,000,000	Cash Raise/Rebalance
Nov-18	Westwood Global EM	Emerging Markets	6,000,000	Cash Raise/Rebalance
Nov-18	William Blair EM Growth	Emerging	4,000,000	Cash Raise/Rebalance
Nov-18	William Blair EMSC	Emerging Small	3,000,000	Cash Raise/Rebalance
Jan-19	OST 59GY	International Developed	$ (50,000,000)	Cash Raise/Rebalance
Feb-19	AQR CAPITAL MANAGEMENT, LLC	World Developed	$ (15,000,000.00)	Cash Raise/Rebalance
Feb-19	ARROWSTREET CAPITAL, LP	Int'l Developed & Emerging	$ (31,000,000.00)	Cash Raise/Rebalance
Feb-19	LAZARD CEF	Int'l Developed & Emerging	$ (24,000,000.00)	Cash Raise/Rebalance
Feb-19	LAZARD	Int'l Developed & Emerging	$ (18,000,000.00)	Cash Raise/Rebalance
Feb-19	WALTER SCOTT MGMT	Int'l Developed	$ (16,000,000.00)	Cash Raise/Rebalance
Feb-19	ACADIAN ASSET MGMT	Int'l Developed & Emerging Value	$ (16,000,000.00)	Cash Raise/Rebalance
Feb-19	BRANDES INVESTMENT PARTNERS LP	Int'l Developed & Emerging Value	$ (17,000,000.00)	Cash Raise/Rebalance
Feb-19	DIMENSIONAL FUND ADVISORS	Int'l Developed Small Cap Value	$ (5,000,000.00)	Cash Raise/Rebalance
Feb-19	HARRIS ASSOCIATES	Int'l Developed Small Cap Value	$ (5,000,000.00)	Cash Raise/Rebalance
Feb-19	EAM INVESTORS, LLC	Global X -US Micro Cap Growth	$ (3,000,000.00)	Cash Raise/Rebalance
Feb-19	DIMENSIONAL FUND ADVISORS LTD.	Global X -US Micro Cap Value	$ (3,000,000.00)	Cash Raise/Rebalance
Feb-19	GENESIS ASSET MANAGERS	Emerging	$ (9,000,000.00)	Cash Raise/Rebalance
Feb-19	WILLIAM BLAIR AND COMPANY	Emerging Growth	$ (5,000,000.00)	Cash Raise/Rebalance
Feb-19	ARROWSTREET CAPITAL, L.P.	Emerging	$ (10,000,000.00)	Cash Raise/Rebalance
Feb-19	WILLIAM BLAIR & CO.	Emerging Small Growth	$ (3,000,000.00)	Cash Raise/Rebalance
Feb-19	WESTWOOD GLOBAL INVESTMENTS	Emerging	$ (7,000,000.00)	Cash Raise/Rebalance
Feb-19	DIMENSIONAL FUND ADVISORS	Emerging Small	$ (3,000,000.00)	Cash Raise/Rebalance
Feb-19	ALLIANCE BERNSTEIN	Global Value	$ (14,000,000.00)	Cash Raise/Rebalance
Feb-19	DIMENSIONAL FUND ADVISORS	U.S. Large Cap Core	$ (400,000,000.00)	Cash Raise/Rebalance
Feb-19	DIMENSIONAL FUND ADVISORS	Global Low Volatility	$ 800,000,000.00	Initial Funding
Mar-19	DIMENSIONAL FUND ADVISORS LTD.	World Developed	$ (206,000,000.00)	Cash Raise/Rebalance
Mar-19	S & P 500 INDEX OST MANAGED	U.S. Large Cap Core	$ (130,000,000.00)	Cash Raise/Rebalance
Mar-19	ARONSON,JOHNSON,ORTIZ	U.S. Large Cap Value	$ (48,000,000.00)	Cash Raise/Rebalance
Mar-19	AQR CAPITAL MANAGEMENT, LLC	U.S. Small Cp Value	$ (14,000,000.00)	Cash Raise/Rebalance
Mar-19	MELLON	U.S. Small Cap Value	$ (16,000,000.00)	Cash Raise/Rebalance
Mar-19	AQR CAPITAL MANAGEMENT, LLC	International Developed	$ (43,000,000.00)	Cash Raise/Rebalance
Mar-19	ARROWSTREET CAPITAL, LP	International Developed & Emerging	$ (91,000,000.00)	Cash Raise/Rebalance
Mar-19	LAZARD ASSET MANAGEMENT	International Developed & Emerging	$ (72,000,000.00)	Cash Raise/Rebalance
Mar-19	LAZARD FRERES ASSET MANAGEMENT	International Developed & Emerging	$ (52,000,000.00)	Cash Raise/Rebalance
Mar-19	WALTER SCOTT MGMT	International Developed	$ (46,000,000.00)	Cash Raise/Rebalance
Mar-19	ACADIAN ASSET MGMT	International Developed & Emerging	$ (45,000,000.00)	Cash Raise/Rebalance
Mar-19	BRANDES INVESTMENT PARTNERS LP	International Developed & Emerging	$ (49,000,000.00)	Cash Raise/Rebalance
Mar-19	DIMENSIONAL FUND ADVISORS	Developed Small Cap Value	$ (15,000,000.00)	Cash Raise/Rebalance
Mar-19	HARRIS ASSOCIATES	Int'l Developed Small Cap Value	$ (15,000,000.00)	Cash Raise/Rebalance
Mar-19	EAM INVESTORS, LLC	Global X-US Micro Cap	$ (7,000,000.00)	Cash Raise/Rebalance
Mar-19	DIMENSIONAL FUND ADVISORS LTD.	Global X-US Micro Cap	$ (9,000,000.00)	Cash Raise/Rebalance
Mar-19	GENESIS ASSET MANAGERS	Emerging	$ (26,000,000.00)	Cash Raise/Rebalance
Mar-19	WILLIAM BLAIR AND COMPANY	Emerging Growth	$ (13,000,000.00)	Cash Raise/Rebalance
Mar-19	ARROWSTREET CAPITAL, L.P.	Emerging	$ (27,000,000.00)	Cash Raise/Rebalance
Mar-19	WILLIAM BLAIR & CO.	Emerging Small Growth	$ (8,000,000.00)	Cash Raise/Rebalance
Mar-19	WESTWOOD GLOBAL INVESTMENTS	Emerging	$ (19,000,000.00)	Cash Raise/Rebalance
Mar-19	DIMENSIONAL FUND ADVISORS	Emerging Small	$ (9,000,000.00)	Cash Raise/Rebalance
Mar-19	ALLIANCE BERNSTEIN	Global X-US Value	$ (41,000,000.00)	Cash Raise/Rebalance

Appendix B (Continued)

Date(s)	Manager	Sub-Asset Class	Market Value	Purpose
Jun-19	Acadian Int'l Value	International Developed & Emerging	$ (17,000,000)	Cash Raise/Rebalance
Jun-19	AJO US Large Value	U.S. Large Cap Value	$ (18,000,000)	Cash Raise/Rebalance
Jun-19	AllianceBernstein Global Value	Global X-US Value	$ (16,000,000)	Cash Raise/Rebalance
Jun-19	AQR Int'l Large Cap Core	International Developed	$ (21,000,000)	Cash Raise/Rebalance
Jun-19	Arrowstreet EM	Emerging Markets	$ (10,000,000)	Cash Raise/Rebalance
Jun-19	Arrowstreet Int'l Core 130/30	International Developed & Emerging	$ (40,000,000)	Cash Raise/Rebalance
Jun-19	Brandes Int'l Value	International Developed & Emerging	$ (18,000,000)	Cash Raise/Rebalance
Jun-19	DFA US Large Cap	U.S. Large Cap Core	$ (80,000,000)	Cash Raise/Rebalance
Jun-19	DFA Int'l Small Cap Value	Int'l Developed Small Cap Value	$ (6,000,000)	Cash Raise/Rebalance
Jun-19	Genesis EM	Emerging	$ (11,000,000)	Cash Raise/Rebalance
Jun-19	Harris Int'l Value	Int'l Developed Small Cap Value	$ (6,000,000)	Cash Raise/Rebalance
Jun-19	Lazard Int'l Core	International Developed & Emerging	$ (20,000,000)	Cash Raise/Rebalance
Jun-19	Lazard Int'l Core CEF	International Developed & Emerging	$ (25,000,000)	Cash Raise/Rebalance
Jun-19	Mellon US Small Value	U.S. Small Cap Value	$ (8,000,000)	Cash Raise/Rebalance
Jun-19	Walter Scott Int'l	International Developed	$ (18,000,000)	Cash Raise/Rebalance
Jun-19	Westwood Global EM	Emerging	$ (8,000,000)	Cash Raise/Rebalance
Jun-19	William Blair EM Growth	Emerging Growth	$ (5,000,000)	Cash Raise/Rebalance
Jun-19	William Blair EMSC	Emerging Small Cap Growth	$ (3,000,000)	Cash Raise/Rebalance
Jun-19	Los Angeles Capital Management	Global Low Vol	$ (25,000,000)	Cash Raise/Rebalance
Jun-19	Acadian Low Vol	Global Low Vol	$ (23,000,000)	Cash Raise/Rebalance
Jun-19	AQR Low Vol	Global Low Vol	$ (23,000,000)	Cash Raise/Rebalance
Jun-19	Arrowstreet Low Vol	Global Low Vol	$ (20,000,000)	Cash Raise/Rebalance
Jun-19	DFA Low Vol	Global Low Vol	$ (20,000,000)	Cash Raise/Rebalance
Aug-19	Acadian Int'l Value	International Developed & Emerging	$ (42,000,000)	Cash Raise/Rebalance
Aug-19	AJO US Large Value	U.S. Large Cap Value	$ (45,000,000)	Cash Raise/Rebalance
Aug-19	AllianceBernstein Global Value	Global X-US Value	$ (37,000,000)	Cash Raise/Rebalance
Aug-19	AQR Int'l Large Cap Core	International Developed	$ (40,000,000)	Cash Raise/Rebalance
Aug-19	Arrowstreet EM	Emerging Markets	$ (25,000,000)	Cash Raise/Rebalance
Aug-19	Arrowstreet Int'l Core 130/30	International Developed & Emerging	$ (85,000,000)	Cash Raise/Rebalance
Aug-19	Brandes Int'l Value	International Developed & Emerging	$ (44,000,000)	Cash Raise/Rebalance
Aug-19	DFA US Large Cap	U.S. Large Cap Core	$ (197,000,000)	Cash Raise/Rebalance
Aug-19	Genesis EM	Emerging	$ (24,000,000)	Cash Raise/Rebalance
Aug-19	Lazard Int'l Core	International Developed & Emerging	$ (50,000,000)	Cash Raise/Rebalance
Aug-19	Lazard Int'l Core CEF	International Developed & Emerging	$ (60,000,000)	Cash Raise/Rebalance
Aug-19	Walter Scott Int'l	International Developed	$ (45,000,000)	Cash Raise/Rebalance
Aug-19	OST S&P 500 Index	U.S. Large Cap Core	$ (150,000,000)	Cash Raise/Rebalance
Aug-19	William Blair EM Growth	Emerging Growth	$ (13,000,000)	Cash Raise/Rebalance
Aug-19	Westwood Global EM	Emerging	$ (16,000,000)	Cash Raise/Rebalance
Aug-19	Los Angeles Capital Management	Global Low Vol	$ (61,000,000)	Cash Raise/Rebalance
Aug-19	Acadian Low Vol	Global Low Vol	$ (56,000,000)	Cash Raise/Rebalance
Aug-19	AQR Low Vol	Global Low Vol	$ (55,000,000)	Cash Raise/Rebalance
Aug-19	Arrowstreet Low Vol	Global Low Vol	$ (58,000,000)	Cash Raise/Rebalance
Aug-19	DFA Low Vol	Global Low Vol	$ (50,000,000)	Cash Raise/Rebalance
Sep-19	OST International Risk Premia	Global Low Vol	$ 400,000,000	Cash Raise/Rebalance

Oregon Investment Council
OPERF Public Equity Portfolio – Emerging Markets Risk Premia ESG Strategy
STAFF RECOMMENDATION
October 30, 2019

Purpose

Recommend funding a $500 million internally-managed Emerging Markets Risk Premia ESG strategy within the OPERF Public Equity Portfolio.

Executive Summary

Staff proposes to systematically tilt the portfolio (at very low cost) towards the factor exposures of value, momentum, quality, and low volatility. Historically, these factor exposures have been persistently compensated and explain much of the outperformance of most active managers over time. This strategy will also tilt the portfolio towards favorable Environmental, Social and Governance (ESG) exposures. A small but growing body of research shows these ESG exposures can add value over time. Staff believes this method of active risk taking (factor exposures and ESG tilts) has a high probability of long-term success.

Background - Internal Management

Staff has successfully managed select public equity strategies since 2009. As of September 30, 2019, internally-managed public equity AUM totaled approximately $8 billion, representing 31 percent of OPERF's $25.6 billion global public equity portfolio. Since inception, all internally-managed public equity mandates have outperformed their assigned benchmarks (Exhibit 1). In staff's opinion, given the systems, personnel, and processes already in place, the addition of an internally-managed Emerging Markets Risk Premia portfolio would require little incremental resources. Additionally, the BlackRock team that services OST has been directly involved in back office fulfillment of similar emerging market mandates at other public pension plans.

Exhibit 1

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 400 Portfolio	$ 702,779,412	18.05%	-2.28%	5.78%	9.69%	11.16%	9.17%	12.87%	12.87%
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Excess (net)		**0.18%**	**0.22%**	**0.25%**	**0.31%**	**0.32%**	**0.29%**	**0.31%**	**0.31%**
Inception Date of Oct. 1, 2009	**Tracking Error = 30 bps**	**Target Excess Return: 10 bps**							

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S&P 500 Index		20.55%	4.25%	10.87%	13.39%	13.90%	10.84%	13.26%	13.26%
Excess (net)		**0.12%**	**0.13%**	**0.07%**	**0.07%**	**0.06%**	**0.06%**	**0.04%**	**0.04%**
Inception Date of Oct 1, 2009	**Tracking Error = 10 bps**	**Target Excess Return: 5 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RU2000/ S&P 600	$ 295,175,064	13.99%	-9.35%	2.12%	8.14%	10.31%	8.61%	*N/A*	11.03%
Russell 2000/S&P 600 Index		13.46%	-9.46%	2.15%	8.00%	9.83%	8.05%	N/A	10.31%
Excess (net)		**0.53%**	**0.11%**	**-0.03%**	**0.14%**	**0.48%**	**0.56%**	**N/A**	**0.72%**
Inception Date of April 1, 2010	**Tracking Error = 50 bps**	**Target Excess Return: 30 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
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MSCI Risk Premia Index		*20.06%*	*1.41%*	*10.84%*	*14.36%*	*14.46%*	*11.92%*	*N/A*	*11.74%*
MSCI USA Index		**20.63%**	**4.14%**	**10.79%**	**13.29%**	**13.75%**	**10.73%**	**N/A**	**10.76%**
Excess (net)		**-0.46%**	**-2.69%**	**0.14%**	**1.06%**	**0.68%**	**1.15%**	**N/A**	**0.96%**
Inception Date of Jan 1, 2014	**Tracking Error = 300 bps**	**Target Excess Return: 150 bps**							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
Int'l Risk Premia Portfolio	**$ 1,209,673,061**	**15.24%**	**1.16%**	**2.32%**	**N/A**	**N/A**	**N/A**	**N/A**	**3.69%**
MSCI Int'l Risk Premia Index		*14.94%*	*0.79%*	**2.04%**	*N/A*	*N/A*	*N/A*	*N/A*	*3.46%*
MSCI World X-US Index		**13.57%**	**-0.95%**	**0.84%**	**N/A**	**N/A**	**N/A**	**N/A**	**3.11%**
Excess (net)		**1.674%**	**2.113%**	**1.476%**	**N/A**	**N/A**	**N/A**	**N/A**	**0.58%**

Source: State Street, as of September, 30, 2019

MSCI ESG Indices

Staff continually reviews and compares various providers of commercially available factor indexes/strategies. Although there are small nuances between different index providers (e.g., types of fundamental data, constituent weightings, etc.), these indexes generally deliver similar risk factor exposures. Staff finds MSCI's focus on the balance between factor efficacy and practical "investability" particularly attractive. In addition, the depth of MSCI's research resources, the integration between its index and ESG research platform (with over 200 dedicated ESG analysts), and the fact that MSCI currently provides benchmarks for a number of existing OPERF strategies makes MSCI staff's preferred choice.

In 2010, MSCI acquired RiskMetrics Group, Inc., a leading provider of risk management and corporate governance services. RiskMetrics embodied a materiality view which serves as the framework for MSCI's ESG ratings methodology.

ESG is shorthand for Environmental, Social, and Governance and is a very broad umbrella term that encompasses a wide variety of non-traditional risk factors and performance indicators. Current day ESG practices evolved from Socially Responsible Investment (SRI) strategies which predominantly used exclusionary screens to align investors' values and investment objectives. These exclusionary screens resulted in divestment campaigns that included securities holdings in tobacco, alcohol, gaming, adult entertainment, birth control, South African securities during apartheid, Sudan and Iran.

In contrast, MSCI's ESG methodology uses a systematic inclusion of financially material environmental, social and governance metrics into an investment factor framework. Examples of environmental factors considered in MSCI's methodology include climate change, greenhouse gas and carbon emissions, resource scarcity (e.g., water), pollution, waste and deforestation. Examples of social factors considered in MSCI's methodology include working conditions, supply chain labor standards, nutrition, health and safety, diversity and inclusion practices. Examples of Governance factors considered in MSCI's methodology include executive pay, bribery and corruption, business ethics and fraud, anti-competitive practices, political lobbying and donations, board independence, board diversity and shareholder rights.

MSCI ESG scores are created on a market cap weighted basis at the individual stock level and range from 0 to 10, with 0 representing the worst-in-class and 10 representing the best-in-class. Higher scores imply that companies rank better in terms of managing risks and opportunities relative to the ESG factors defined by MSCI. These ESG scores can be utilized on either an absolute score basis or an industry-adjusted basis which serves to make scores more comparable across industries.

MSCI ESG Return Premia

In 2017, MSCI conducted ESG custom factor attribution research on Lipper-sourced, asset-level holdings data for over 22,000 mutual funds. Approximately 250 funds were selected at random across U.S. Equity, Global Equity, and Emerging Markets Equity subject to the constraint that sufficient time-series data existed. The inserted ESG factors were made orthogonal to existing common factors (i.e., ESG is not measuring parts of Quality, Value, Size, etc.).

Exhibit 2 shows the results of the ESG factor risk premia attribution. The study showed that within U.S. Equity, the MSCI Governance factor had a statistically significant positive excess return, and negative excess returns associated with Environmental and Social scores. However, the opposite is true in

Emerging Markets, where the Environmental and Social factors contained statistically significant positive excess returns, and the Governance factor contained a statistically negative excess return.

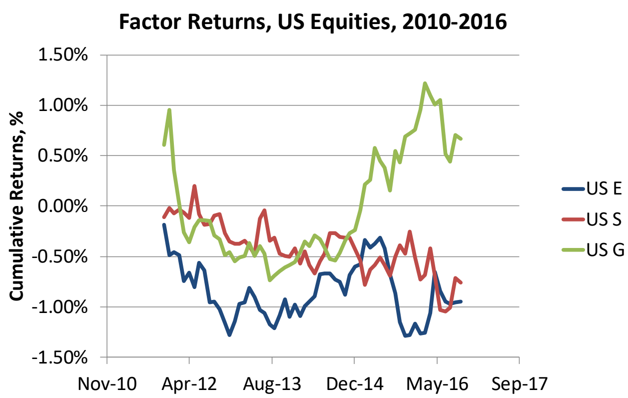
Exhibit 2

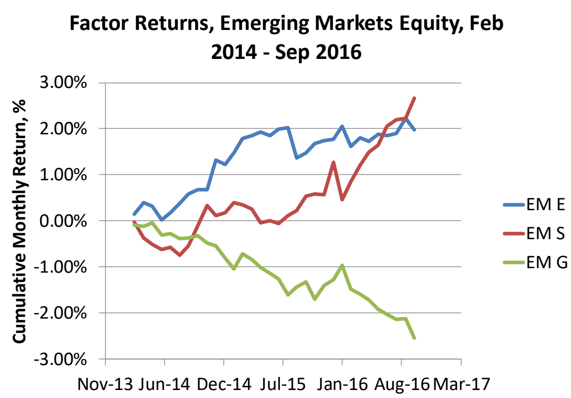
	E	S	G
US: Feb 2011 - Sep 2016			
Return	-0.9%	-0.8%	0.7%
Std. Dev.	0.1%	0.2%	0.2%
Global Equity: Feb 2014 - Sep 2016			
Return	1.0%	-0.1%	0.9%
Std. Dev.	0.1%	0.1%	0.1%
Emerging Markets: Feb 2014 - Sep 2016			
Return	2.0%	2.7%	-2.6%
Std. Dev.	0.2%	0.1%	0.2%

Source: Callan ESG Education Presentation 2019

Exhibit 3 show the cumulative returns associated with MSCI ESG factor in U.S. Equity (2010 – 2016) and Emerging Markets (2014 – 2016). Environmental, Social, and Governance signals are significant, persistent and notably different amongst U.S. Equity, Global Equity and EM regions.

Exhibit 3





Source: MSCI

Staff proposes to construct an Emerging Markets Risk Premia ESG strategy which will have an optimized blending of four risk premia factor exposures (specifically, Momentum, Enhanced Value, MSCI Quality and Low Volatility) as well as an ESG risk premia factor exposure. Although the governance exposure within Emerging Markets has most recently shown persistent negative excess returns, staff feels that judging governance as a risk premium by looking backward might ignore the potential future excess returns resulting from expected improvements in Emerging Markets reporting transparency and governance practices.

Issues to Consider

Pros:

- This approach will provide direct exposures to risk factor premia that enjoy abundant and robust empirical support as persistent sources of excess return.
- This approach will provide a direct exposure to an integrated MSCI ESG methodology that has been commercially available since 2007.
- The proposed strategy is aimed at a very liquid segment of the Emerging Markets universe (specifically, large and mid cap securities), and should have little or no market impact in the reallocation and funding from of existing OPERF emerging market mandates.
- This strategy's portfolio management costs will lower OPERF's overall management fee burden as the new mandate will be funded from other, higher cost externally-managed EM mandates.
- Staff has been managing MSCI Risk Premia portfolios (U.S. Risk Premia and a Developed ex-U.S. Risk Premia) on BlackRock Aladdin since January 2014 and is very familiar with the operational aspects of MSCI Risk Premia strategies.

Cons:

- Risk factor premia have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance. [**Mitigant**: Strong empirical evidence supports both the efficacy of these risk factor premia (i.e., these factors produce a higher mean return relative to market averages) as well as reversions to this higher mean following periods of underperformance.]
- Tilting toward risk premia implies that the OST Public Equity Portfolio may no longer be neutral relative to Value and Growth dimensions. [**Mitigant**: Portfolio exposures in the OPERF Public Equity continue to be managed relative to the MSCI ACWI IMI benchmark and consistent with the OIC's 200 basis point annual tracking error allowance.]
- This strategy may not deliver the desired levels of exposure to the underlying risk factors. [**Mitigant**: MSCI will provide a customizable index and staff will regularly evaluate index construction to ensure it delivers the appropriate blend of both risk factor exposure and investability.]
- Managing Non-U.S. portfolios might be more operationally complex than managing U.S.-based equity portfolios. [**Mitigant**: Staff has visited various public, corporate, and asset management firms that use Aladdin for their Non-U.S. portfolio management mandates and has high confidence in BlackRock Aladdin and OST Operations staff.]
- MSCI is one of over 125 organizations providing ESG ratings and research[1]. [**Mitigant**: MSCI ESG has a dedicated staff of 200 ESG analysts, a ratings database that covers more than 12 years of live historical data, and a 29-year ESG research track record of fundamental ESG research data, making it one of the most tenured providers of ESG research in the industry.]

The recommendation of the MSCI Emerging Market Risk Premia & ESG strategy is consistent with **OIC INV 1201** - *Statement of OIC Investment and Management Beliefs:*

> *Section 6.A. - All fees, expenses, commissions and transaction costs should be diligently monitored and managed in order to maximize net investment returns*.

[1] Bender, Bridges, He, Lester, Sun. (2018). "A Blueprint For Integrating ESG Into Equity Portfolios," Journal of Investment Management, Vol. 16. No. 1, pp 44-58.

1. *Active management should therefore be a deliberate choice and applied only to those public market strategies/managers in which the OIC enjoys a high degree of confidence that such strategies/managers will be sufficiently rewarded on a risk-adjusted basis and net of all fees and related transactions costs.*

Recommendation

1. Staff recommends funding an internally-managed, Emerging Markets Risk Premia ESG public equity strategy in the amount of $500 million.
2. Amend Policy INV 603 (Internal Equity – Portfolio Objectives & Strategies) accordingly.

Callan

October 30, 2019

Oregon Investment Council

OPERF Public Equity Review

Public Equity Portfolio

Summary Observations

- The Total Public Equity portfolio underperformed the MSCI ACWI IMI (Net) Index over the 1-year period, but continued to outperform over longer term periods as of June 30, 2019.
  - The majority of the underperformance over the near term was attributed to the U.S. Equity portfolio, which returned 5.3% versus the 9.0% return of the Russell 3000. The Non-U.S. Equity portfolio just edged out its benchmark, returning 0.4% versus 0.3% for the MSCI ACWI ex-US IMI (net) Index.
- As of June 30, 2019, the Total Public Equity portfolio employed 35 strategies and accounted for ~34% of OPERF
  - The U.S. Equity portfolio had 6 traditional active strategies (~6.5% of the total public equity portfolio), 3 traditional passive strategies (~13.7%), and 2 factor-oriented strategies (~24.4%).
    - During the last 12 months, one traditional active strategy, Wellington Domestic Equity, was terminated.
  - The Non-U.S. Equity portfolio had 17 traditional active strategies (~32.2% of the total public equity portfolio) and one factor-oriented strategy (~3.1%)
  - The Total Public Equity portfolio also had 1 traditional active global equity strategy (~2.3% of the Total Public Equity portfolio) and 5 global low-volatility strategies (~17.7%).
    - During the last 12 months, one global low-volatility strategy, DFA Global Low Volatility, was added.
- The portfolio is diversified across regions, countries, styles, capitalizations and sectors.
- Total tracking error for the Total Public Equity portfolio is 0.86% for the 10 years ended June 30, 2019, which remains on the lower end of the 0.75% - 2.00% policy range.
- While the majority of the Total Public Equity portfolio is invested in actively-managed strategies, many of which have higher tracking error targets, the active share of the total public equity portfolio remains around 36% (meaning only about 36% of the total portfolio is different from the benchmark); this is essentially unchanged from last year but represents a mild increase from the 33% it was in 2016.

Strategic Role and Policy Objectives of Public Equities

Strategic Role

- Provide enhanced returns, diversification, and liquidity to meet cash flow needs.
- Target allocation is 32.5% of the Total Fund.
- The investable universe can be categorized as U.S., Non-U.S. developed and emerging market countries.

Policy Objectives

- Provide one of the highest expected returns of the OPERF major asset classes.
- Achieve a portfolio return of 0.50% or more above the MSCI All Country World Index Investable Market Index (ACWI IMI) (net) over a market cycle of 3 to 5 years on a net-of-fee basis.

As of June 30, 2019	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Total Public Equity*	3.63%	11.70%	6.28%	10.88%
MSCI ACWI IMI Net	4.56%	11.42%	6.03%	10.32%
Excess Return	**(0.93%)**	**0.28%**	**0.25%**	**0.56%**

- Active risk will be managed to a targeted annualized tracking error of 0.75% to 2.00% relative to the MSCI ACWI IMI (net).
  - Portfolio tracking error for trailing 5 years ended June 30, 2018 was 0.91%, near the low end of the range.

*Public equity benchmark transitioned to the MSCI ACWI IMI in 2008

Public Equity Managers

	June 30, 2019 Market Value	% of Total Fund
Total Public Equity	**$26,388,047,025**	**33.20%**
U.S. Equity	**$11,799,734,778**	**14.84%**
Large Cap Value	**$752,264,563**	**0.95%**
Aronson, Johnson & Ortiz	752,264,563	0.95%
Small Cap Growth	**$183,063,482**	**0.23%**
EAM MicroCap Growth	183,063,482	0.23%
Small Cap Value	**$789,453,448**	**0.99%**
AQR Capital Management	207,996,214	0.26%
Boston Company Asset Management	228,861,861	0.29%
Callan US Microcap Value	178,190,968	0.22%
DFA MicroCap Value	174,404,404	0.22%
Market Oriented	**$10,052,064,337**	**12.65%**
DFA Large Cap Core	3,284,730,073	4.13%
Russell 2000 Synthetic - OST managed	295,527,457	0.37%
S&P 500 - OST managed	2,617,566,157	3.29%
S&P 400 - OST managed	703,126,433	0.88%
OST Risk Premia Strategy	3,151,114,180	3.96%
Other Equity		
Shott Capital Management	21,616,820	0.03%
Shott Annex	0	0.00%
Transitional & Closed Accounts	1,272,164	0.00%

	June 30, 2019 Market Value	% of Total Fund
Non-U.S. Equity	**$9,300,119,983**	**11.70%**
International Market Oriented (Core)	**$4,883,751,658**	**6.14%**
Arrowstreet Capital	1,456,617,470	1.83%
Lazard Asset Management	825,032,548	1.04%
Lazard International CEF	1,134,762,340	1.43%
AQR Capital Management	652,328,587	0.82%
OST Int'l Risk Premia	815,010,711	1.03%
International Value	**$1,418,756,711**	**1.78%**
Acadian Asset Management	693,726,822	0.87%
Brandes Investment Partners	725,029,889	0.91%
International Growth	**$756,718,449**	**0.95%**
Walter Scott Mgmt	756,718,450	0.95%
International Small Cap	**$687,601,816**	**0.86%**
DFA International Small Cap	219,143,929	0.28%
Harris Associates	222,286,646	0.28%
EAM International Micro Cap	110,671,012	0.14%
DFA International Micro Cap	135,500,228	0.17%
Emerging Markets	**$1,553,291,349**	**1.95%**
Genesis Emerging Markets	403,069,540	0.51%
Arrowstreet Emerging Markets	416,665,218	0.52%
Westwood Global Investment	271,607,712	0.34%
William Blair and Company	204,405,221	0.26%
DFA Emerging Market Small Cap	137,370,201	0.17%
William Blair Emerging Mkt Small Cap	120,173,426	0.15%
Global Equity	**$5,288,192,264**	**6.65%**
Alliance Bernstein Global Value	614,812,126	0.77%
Global Equity Low Volatility	**$4,673,380,139**	**5.88%**
LACM	1,018,522,635	1.28%
Arrowstreet	975,549,642	1.23%
AQR	918,300,532	1.16%
Acadian	934,065,897	1.18%
DFA Global Low Volatility	826,941,432	1.04%

Total Public Equity Exposures

Holdings-Based Analysis as of June 30, 2019

By Size*

Style Exposure Matrix
Holdings as of June 30, 2019

	Value	Core	Growth	Total
Large	21.5% (263) 22.3% (288)	18.8% (263) 20.6% (286)	22.5% (295) 27.9% (304)	**62.8% (821)** **70.8% (878)**
Mid	8.8% (421) 5.7% (533)	7.4% (471) 5.9% (572)	5.9% (416) 6.8% (653)	**22.2% (1308)** **18.4% (1758)**
Small	3.9% (888) 2.8% (1070)	4.5% (1007) 3.5% (1307)	2.6% (666) 2.9% (1137)	**11.1% (2561)** **9.2% (3514)**
Micro	1.7% (2690) 0.6% (980)	1.3% (1862) 0.6% (880)	0.9% (1113) 0.5% (777)	**3.9% (5665)** **1.7% (2637)**
Total	**36.0% (4262)** **31.5% (2871)**	**32.1% (3603)** **30.5% (3045)**	**32.0% (2490)** **38.0% (2871)**	**100.0% (10355)** **100.0% (8787)**

-8.0%

+5.7%

+4.5%

-6.0%

By Region

Style Exposure Matrix
Holdings as of June 30, 2019

	Value	Core	Growth	Total
Europe/ Mid East	5.8% (494) 5.9% (483)	6.0% (447) 5.1% (511)	7.0% (308) 7.9% (505)	**18.7% (1249)** **19.0% (1499)**
N. America	23.0% (978) 18.8% (847)	19.1% (1042) 17.7% (1028)	17.7% (651) 21.7% (870)	**59.8% (2671)** **58.2% (2745)**
Pacific	2.9% (974) 3.3% (606)	3.5% (577) 4.2% (579)	3.1% (326) 3.9% (572)	**9.5% (1877)** **11.4% (1757)**
Emerging/ FM	4.4% (1816) 3.3% (935)	3.5% (1537) 3.6% (927)	4.1% (1205) 4.5% (924)	**12.0% (4558)** **11.4% (2786)**
Total	**36.0% (4262)** **31.5% (2871)**	**32.1% (3603)** **30.5% (3045)**	**32.0% (2490)** **38.0% (2871)**	**100.0% (10355)** **100.0% (8787)**

- **OPERF Public Equity**
- **MSCI ACWI IMI**

- Total public equity portfolio is underweight large cap (62.8% vs. 70.8%) but overweight mid, small, and micro cap (37.2% vs. 29.2%) and exhibits a slight value bias relative to the MSCI ACWI IMI.
- Regional allocations have shifted over the last year to be overweight to North America and underweight the Pacific region. Allocations to Europe/Mid East were approximately inline; Emerging/Frontier markets exhibited a slight overweight.

*The capitalization segments in the matrices above are dictated by capitalization decile breakpoints. The style segments are determined using the Combined Z Score, based on the eight fundamental factors used in the MSCI stock scoring system.

U.S. Equity Style Exposures

Exposures as of June 30, 2019

Style Exposure Matrix
Holdings as of June 30, 2019

	Value	Core	Growth	Total
Large	25.8% (106) 25.0% (107)	16.8% (93) 20.1% (92)	21.2% (99) 30.6% (99)	**63.8% (298)** **75.7% (298)**
Mid	8.4% (183) 4.9% (180)	7.7% (204) 6.1% (210)	5.5% (181) 5.8% (207)	**21.6% (568)** **16.8% (597)**
Small	3.7% (299) 1.8% (324)	5.3% (413) 2.7% (486)	2.7% (246) 2.1% (384)	**11.7% (958)** **6.7% (1194)**
Micro	1.3% (280) 0.3% (297)	0.9% (257) 0.3% (382)	0.8% (113) 0.2% (217)	**3.0% (650)** **0.8% (896)**
Total	**39.1% (868)** **32.1% (908)**	**30.7% (967)** **29.2% (1170)**	**30.2% (639)** **38.7% (907)**	**100.0% (2474)** **100.0% (2985)**

-11.9%

+9.8%

+7.0%

-8.5%

- **OPERF U.S. Equity**
- **Russell 3000**

- The U.S. equity portfolio is underweight large cap (63.8% vs.75.7%) but overweight mid, small, and micro cap equity (36.2% vs. 24.3%) and exhibits a value tilt relative to the Russell 3000.

Non-U.S. & Global Equity

Exposures as of June 30, 2019

Style Exposure Matrix
Holdings as of June 30, 2019

	Value	Core	Growth	Total
Large	16.5% (127) 18.7% (205)	18.8% (123) 20.2% (200)	25.6% (158) 25.6% (229)	**60.9% (408)** **64.6% (634)**
Mid	8.4% (170) 6.2% (364)	6.9% (183) 6.7% (408)	6.6% (162) 8.6% (497)	**21.8% (515)** **21.5% (1269)**
Small	5.2% (591) 3.8% (807)	4.2% (549) 4.2% (909)	3.2% (408) 3.6% (820)	**12.6% (1548)** **11.6% (2536)**
Micro	2.0% (2183) 0.9% (718)	1.6% (1482) 0.8% (636)	1.0% (896) 0.7% (549)	**4.7% (4561)** **2.3% (1903)**
Total	**32.1% (3071)** **29.6% (2094)**	**31.6% (2337)** **31.9% (2153)**	**36.4% (1624)** **38.5% (2095)**	**100.0%** (7032) **100.0%** (6342)

Style Exposure Matrix
Holdings as of June 30, 2019

	Value	Core	Growth	Total
Europe/ Mid East	13.1% (427) 12.8% (474)	14.2% (377) 11.9% (521)	15.8% (235) 17.6% (504)	**43.2% (1039)** **42.3% (1499)**
N. America	1.8% (67) 2.1% (102)	1.5% (48) 2.7% (100)	2.0% (26) 2.1% (98)	**5.3% (141)** **6.9% (300)**
Pacific	6.6% (876) 7.4% (598)	7.5% (464) 9.3% (588)	7.1% (224) 8.7% (571)	**21.2% (1564)** **25.4% (1757)**
Emerging/ FM	10.6% (1701) 7.3% (920)	8.4% (1448) 8.1% (944)	11.4% (1139) 10.1% (922)	**30.4% (4288)** **25.4% (2786)**
Total	**32.1% (3071)** **29.6% (2094)**	**31.6% (2337)** **31.9% (2153)**	**36.4% (1624)** **38.5% (2095)**	**100.0%** (7032) **100.0%** (6342)

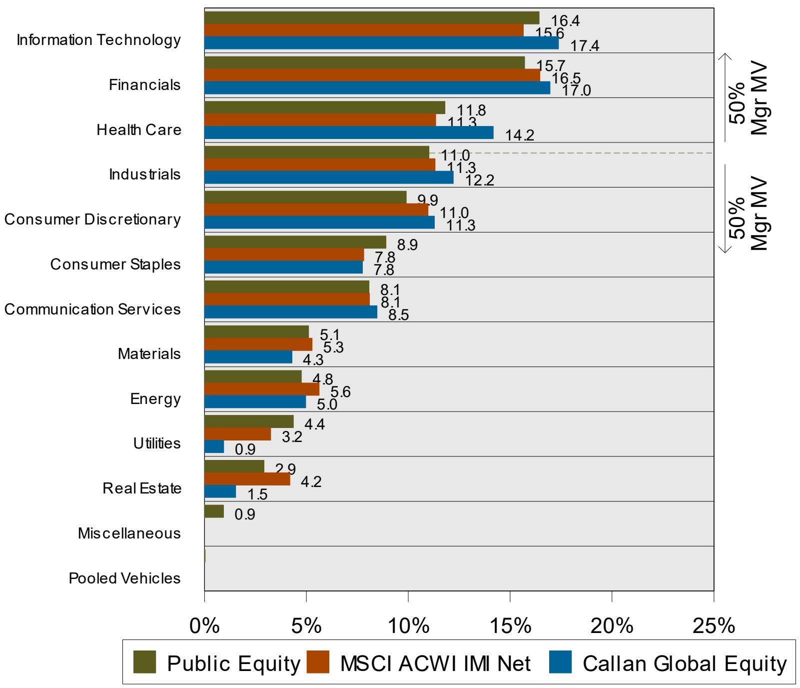
- **OPERF Non-U.S. Equity**
- **MSCI ACWI ex-U.S. IMI**

- The non-U.S. equity portfolio is underweight large cap (60.9% vs. 64.6%) and overweight mid, small, and micro cap (39.1% vs. 35.4%) relative to the MSCI ACWI ex-U.S. IMI Index.
- Regional allocations were significantly overweight Emerging and Frontier Markets, and underweight the Pacific region. The portfolio had a smaller overweight to Europe/Mid East and a smaller underweight to North America.

Public Equity

Portfolio Characteristics

Sector Allocation
June 30, 2019



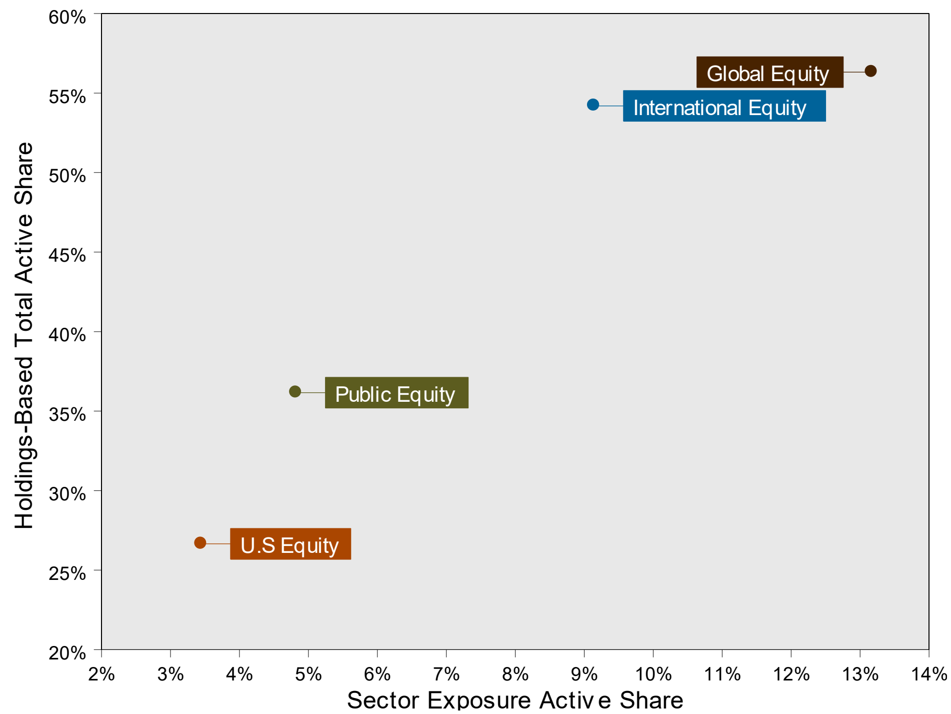
Portfolio Characteristics
As of June 30, 2019

	Weighted Median Market Cap	Price/ Forecasted Earnings	Price/ Book	Forecasted Earnings Growth	Dividend Yield	MSCI Combined Z-Score
Public Equity	27.58	14.15	1.99	10.96	2.45	(0.21)
MSCI ACWI IMI Net	42.63	15.41	2.11	12.64	2.43	(0.02)

- Sector exposures are approximately in-line with the benchmark. The most significant differences are in Utilities and Real Estate, where the Public Equity Portfolio is overweight and underweight, respectively.
- Weighted median market cap shows a smaller cap bias compared to the benchmark but other characteristics are approximately in-line.

Active Share Analysis

As of June 30, 2019



	Weight %	Index	Total Act Share	Non-Idx Act Share	Sector Act Share	Number Securities	Security Diverse
Public Equity	**100.00%**	**MSCI ACWI IMI**	**36.16%**	**3.59%**	**4.83%**	**11120**	**304.47**
U.S Equity	**44.63%**	**Russell 3000**	**26.65%**	**0.42%**	**3.45%**	**2572**	**114.53**
International Equity	**35.25%**	**MSCI ACWI ex US IMI**	**54.19%**	**7.21%**	**9.15%**	**7577**	**159.94**
Global Equity	**20.04%**	**MSCI ACWI**	**56.32%**	**8.74%**	**13.18%**	**2592**	**194.27**

- Total active share for the public equity portfolio, which measures how different a portfolio is from its index on a holdings basis, remained around 36% as of June 30, 2019.
  - Active share has increased from three years ago when it was at 33%. This is due to the move away from traditional passive strategies and increased allocations to factor-based strategies and the funding of the low-volatility mandates

Total Public Equity Portfolio Risk Analysis

Rolling 12 Quarter Tracking Error vs MSCI ACWI IMI Net

5 Years Ended June 30, 2019

	Sharpe Ratio	Excess Return Ratio	Standard Deviation	Tracking Error
Total Public Equity	0.52	0.58	11.18	0.91
MSCI ACWI World IMI	0.46	0.00	11.17	0.00

U.S. Equity	0.71	-0.62	11.77	1.56
Russell 3000	0.82	0.00	11.41	0.00

Non-U.S. Equity	0.24	1.46	12.21	1.04
MSCI ACWI ex-U.S. IMI	0.11	0.00	11.98	0.00

Asset Class Performance – U.S. Equity

Net of Fee Returns as of June 30, 2019

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
U.S. Equity	5.30%	13.19%	9.09%	14.12%
Russell 3000 Index	8.98%	14.02%	10.19%	14.67%
Excess Return	**(3.68%)**	**(0.83%)**	**(1.10%)**	**(0.55%)**
Lg Public >10 B DE	7.98%	13.95%	9.89%	14.69%
Market Oriented	6.95%	13.86%	9.61%	-
Russell 3000 Index	8.98%	14.02%	10.19%	14.67%
Excess Return	**(2.03%)**	**(0.16%)**	**(0.58%)**	-
CAI All Cap: Broad DB	7.51%	14.48%	8.89%	13.62%
Large Cap Value	2.35%	9.89%	5.78%	-
Russell 1000 Value Index	8.46%	10.19%	7.46%	13.19%
Excess Return	**(6.11%)**	**(0.30%)**	**(1.68%)**	-
CAI Large Cap Value Style	6.22%	11.28%	7.65%	13.13%
Small Cap Growth	-2.39%	19.30%	9.24%	-
Russell 2000 Growth Index	-0.49%	14.69%	8.63%	14.41%
Excess Return	**(1.90%)**	**4.61%**	**0.61%**	-
CAI Sm Cap Growth Style	6.84%	19.26%	10.96%	16.00%
Small Cap Value	-8.77%	8.92%	5.00%	-
Russell 2000 Value Index	-6.24%	9.81%	5.39%	12.40%
Excess Return	**(2.53%)**	**(0.89%)**	**(0.39%)**	**(12.40%)**
CAI Small Cap Value Style	-5.19%	9.77%	6.04%	13.86%

- The U.S. equity portfolio lagged the Russell 3000 Index over all standard reporting periods. Large cap value was the largest detractor over the one year period ended June 30, 2019.

Asset Class Performance – Non-U.S. & Global Equity

Net of Fee Returns as of June 30, 2019

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Non-U.S. Equity	0.39%	9.79%	3.34%	7.98%
MSCI ACWI ex-US IMI Index (Net)	0.26%	9.17%	2.25%	6.78%
Excess Return	**0.13%**	**0.62%**	**1.09%**	**1.20%**
Lg Public >10 B IE	1.07%	10.07%	3.37%	7.69%
International Market Oriented (Core)	2.17%	10.71%	3.86%	-
MSCI World ex-US IMI Net	0.16%	8.92%	2.22%	7.04%
Excess Return	**2.01%**	**1.79%**	**1.64%**	-
CAI Core Int'l Equity	-0.19%	9.19%	2.77%	7.86%
International Value	-3.47%	9.55%	2.28%	-
MSCI ACWI ex-US IMI Value	-0.84%	8.79%	0.52%	5.77%
Excess Return	**(2.63%)**	**0.76%**	**1.76%**	-
CAI Core Value Int'l Equity Style	-2.84%	7.80%	1.40%	6.91%
International Growth	9.75%	11.96%	5.91%	-
MSCI World ex US Growth	4.36%	9.42%	4.02%	7.81%
Excess Return	**5.39%**	**2.54%**	**1.89%**	-
CAI Core Growth Int'l Equity Style	2.13%	10.65%	4.58%	8.94%
International Small Cap	-10.67%	5.79%	1.73%	-
ACWI Sm Cap ex US	-5.94%	7.76%	2.77%	8.48%
Excess Return	**(4.73%)**	**(1.97%)**	**(1.04%)**	-
CAI Int'l Small Cap Style	-6.81%	8.77%	4.44%	11.07%
Emerging Markets	0.01%	8.77%	2.09%	-
EM IMI Index	0.48%	10.02%	2.26%	5.83%
Excess Return	**(0.47%)**	**(1.25%)**	**(0.17%)**	-
CAI Emerging Markets Equity DB	2.00%	10.78%	3.58%	7.43%
Global Equity	5.81%	12.46%	6.03%	10.17%
MSCI ACWI Value Net Index	4.34%	9.38%	3.77%	8.65%
Excess Return	**1.47%**	**3.08%**	**2.26%**	**1.52%**
CAI Global Eq Broad Style	5.41%	12.55%	7.11%	11.41%

- The non-U.S. equity portfolio continues to outperform the ACWI ex-U.S. IMI net over all periods measured above.

Focus on Global Low Volatility Strategies*

7 Year Period Ended June 2019

	Returns	Standard Deviation	Beta	Maximum Drawdown	Down Market Capture
Acadian Global Low Volatility (extended)	10.1	8.0	0.7	(9.6)	69.3
AQR Global Low Vol (extended)	8.8	8.6	0.7	(8.1)	78.3
LACM Global Equity Low Vol (extended)	10.6	9.3	0.9	(10.8)	86.2
Arrowstreet Global Low Vol (extended)	12.0	9.5	0.8	(9.4)	61.6
MSCI:ACWI	9.9	10.1	1.0	(12.8)	100.0

- Low volatility strategies have, for the most part, exceeded the MSCI ACWI index at a lower standard deviation and beta
- Maximum drawdown (4th quarter 2018) is lower than the index as is the Down Market Capture

*All strategies linked to composites with longer history beginning July 2012. Actual Oregon returns begin on February 2017 for Acadian, March 2017 for AQR, May 2017 for Arrowstreet and December 2016 for LACM. DFA Global Low Volatility not included due to one quarter of track record.

OST Managed Strategies

As of June 30, 2019

Portfolio Benchmark	**S&P 500** S&P 500 Index	**S&P 400** S&P 400 Index	**R2000 Synthetic** Russell 2000 Index	**Risk Premia** MSCI USA Index	**Int'l Risk Premia** MSCI World X-US Index
Portfolio Return (1 yr)	10.55%	1.58%	-5.95%	7.71%	4.10%
Benchmark Return (1 yr)	10.42%	1.36%	-6.03%	10.24%	1.29%
Excess Return	**0.13%**	**0.22%**	**0.08%**	**(2.52%)**	**2.81%**
Portfolio Return (Inception)	13.46%	13.22%	11.40%	11.92%	5.65%
Benchmark Return (Inception)	13.41%	12.91%	10.62%	10.97%	4.13%
Excess Return	**0.05%**	**0.31%**	**0.78%**	**0.95%**	**1.52%**
Tracking Error*	0.05	0.09	0.44	1.82	N/A
Excess Return Ratio*	1.00	3.26	1.41	0.73	N/A
AUM	$ 2,617,566,157	$ 703,126,433	$ 295,527,457	$ 3,151,114,180	$ 815,010,711
Inception Date	10/01/2009	10/01/2009	04/01/2010	01/01/2014	06/01/2017

- On a since inception basis, the internally managed strategies have all performed well versus their respective benchmarks.

*Risk statistics are calculated using 5 years worth of quarterly data unless the track record is less than 5 years, in which case it is calculated on a since inception basis (provided that there is at least 3 years worth of data).

October 30, 2019

OPERF Public Equity Portfolio 2019 Annual Review

Michael Viteri
Senior Investment Officer, Public Equity

Robin Kaukonen
Investment Officer, Public Equity

Wil Hiles
Investment Officer, Public Equity

OREGON STATE TREASURY

Agenda

Section	Pages	1A	1B	1C	1D	1E	2A	2B	3A	4A	4B	5A	5B	6A	6B	7A	7B	8A
		OIC Investment and Management Beliefs Mapping																
Agenda	2																	
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OPERF EM Risk Premia ESG Strategy Recommendation	12																	

LEGEND: OIC INVESTMENT AND MANAGEMENT BELIEFS

1 **THE OIC SETS POLICY AND IS ULTIMATELY RESPONSIBLE FOR THE INVESTMENT PROGRAM**

A. The OIC is a policy-setting council that largely delegates investment management activities to the OST and qualified external fiduciaries.
B. The OIC has authority to set and monitor portfolio risk. Both short-term and long-term risks are critical.
C. To exploit market inefficiencies, the OIC must be contrarian, innovative and opportunistic in its investment approach.
D. Internal incentive structures should be carefully evaluated to ensure proper alignment with specific investment objectives.
E. Adequate resources are required to successfully compete in global capital markets.

2 **ASSET ALLOCATION DRIVES RISK AND RETURN**

A. Asset allocation is the OIC's primary policy tool for managing the investment program's long-term risk/return profile.
B. Portfolio construction, including diversification and correlation considerations, is essential to maximizing risk-adjusted returns.

3 **THE EQUITY RISK PREMIUM WILL BE REWARDED**

A. Over the long-term, equity-oriented investments provide reliable return premiums relative to risk-free investments.

4 **PRIVATE MARKET INVESTMENTS CAN ADD SIGNIFICANT VALUE AND REPRESENT A CORE OIC/OST COMPETENCY**

A. The OIC can capitalize on its status as a true, long-term investor by making meaningful allocations to illiquid, private market investments.
B. Dispersion in private market investment returns is wide; accordingly, top-quartile manager selection and vintage year diversification are paramount.

5 **CAPITAL MARKETS HAVE INEFFICIENCIES THAT CAN BE EXPLOITED**

A. Inefficiencies that can be exploited by active management may exist in certain segments of the capital markets.
B. Passive investment management in public markets will outperform the median active manager in those markets over time.

6 **COSTS DIRECTLY IMPACT INVESTMENT RETURNS AND SHOULD BE MONITORED AND MANAGED CAREFULLY**

A. All fees, expenses, commissions, and transaction costs should be diligently monitored and managed in order to maximize net investment returns.
B. External incentive structures should be carefully evaluated to ensure proper alignment with investment program objectives.

7 **FAIR AND EFFICIENT CAPITAL MARKETS ARE ESSENTIAL FOR THE LONG-TERM SUCCESS OF OIC/OST INVESTMENT ACTIVITIES**

A. The OIC recognizes that the quality of regulation and corporate governance can affect the long-term value of its investments.
B. The OIC also recognizes that voting rights have economic value and therefore must be treated as a fund or beneficiary asset.

8 **DIVERSITY, IN ALL ASPECTS, IS ACCRETIVE TO MEETING OIC OBJECTIVES**

A. By embracing and enhancing diversity and inclusion efforts, the OIC ensures that the investment program will be exposed to and informed by a wide range of perspectives, ideas and opinions.

OREGON STATE TREASURY

Public Equity Performance

Strategic Role

The strategic role of OPERF public equity investments is outlined in OIC INV 1201 – Statement of OIC Investment and Management Beliefs and OIC Policy INV 601 – Strategic Role of Public Equity Securities within OPERF. As outlined in those policy documents, the strategic role of public equity is to generate a return premium relative to risk-free investments, while providing diversification benefits and liquidity in support of OPERF's cash flow requirements. Return and risk objectives for the Public Equity Portfolio (outlined in OIC Policy INV 601 – Strategic Role of Public Equity Securities within OPERF) are as follows:

1) To achieve an excess portfolio return of 0.50 percent or more above the MSCI All Country World Investable Market Index (net) over a market cycle of three to five years on a net-of-fee basis; and

2) To manage active risk to a target annualized tracking error of 0.75 to 2.0 percent, relative to the MSCI ACWI IMI (net).

Trailing Performance

	Market Value	3 Months	YTD	1 Year	3 Years	5 Years	10 Years
OPERF Public Equity Portfolio	**$25,661,929,602**	**0.02%**	**15.41%**	**-0.07%**	**9.57%**	**7.01%**	**9.00%**
MSCI ACWI IMI (net)		-0.18%	15.87%	0.48%	9.36%	6.61%	8.45%
Excess Return		**0.20%**	**-0.46%**	**-0.55%**	**0.21%**	**0.40%**	**0.55%**

Risk Statistics

		3 Months	YTD	1 Year	3 Years	5 Years	10 Years
OPERF Public Equity Tracking Error		**N/A**	**N/A**	**0.93%**	**0.87%**	**0.90%**	**0.90%**
OPERF Public Equity Information Ratio		**N/A**	**N/A**	**-0.59**	**0.25**	**0.45**	**0.61**

Source: State Street, as of September 30, 2019.

Public Equity Benchmark

MSCI All Country World Investable Market Index (MSCI ACWI IMI)

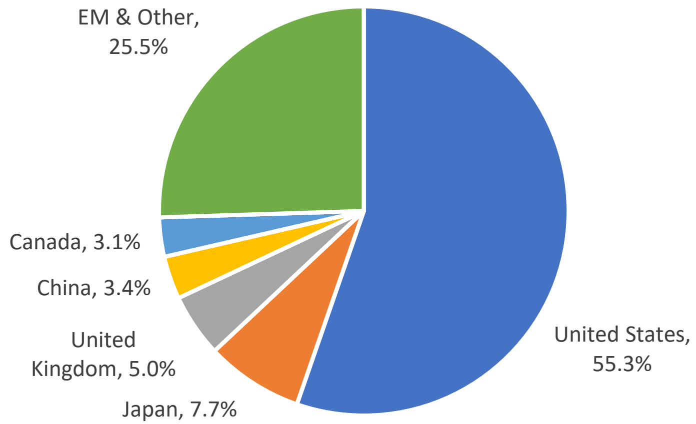
Market Coverage

Holdings: 8,820
Countries: 49
- U.S Equities: 55.3%
- International Developed Equities: 33.4% across 22 countries
- Emerging Markets Equities: 11.3% across 26 countries

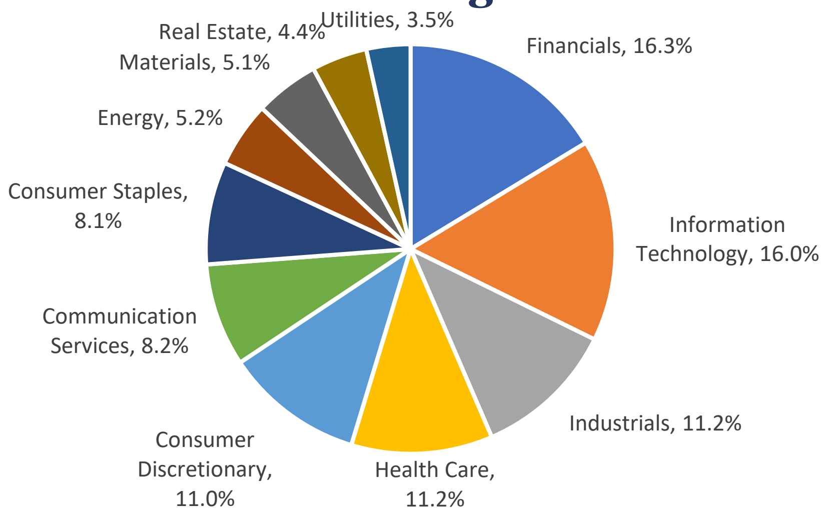
Top 10 Constituents

Issuer	Country	Mkt Cap (USD BB)	Index Wt. (%)	Sector
APPLE	US	1,030.50	1.94	Info Tech
MICROSOFT CORP	US	1,012.09	1.90	Info Tech
AMAZON.COM	US	726.45	1.37	Cons Disc
FACEBOOK A	US	427.84	0.81	Comm Srvcs
ALPHABET C	US	382.08	0.72	Comm Srvcs
JPMORGANCHASE & CO	US	381.78	0.72	Financials
ALPHABET A	US	365.65	0.69	Comm Srvcs
JOHNSON & JOHNSON	US	343.51	0.65	Health Care
NESTLE	CH	332.61	0.63	Cons Staples
PROCTER & GAMBLE CO	US	311.99	0.59	Cons Staples

Country Weights



Sector Weights



Public Equity Portfolio

Programs

- **Internal Management** – All internally-managed strategies have outperformed since inception.
- **Private Equity Stock Distribution Program** – Since its November 1, 2019 inception, this program has received $123mm in distributions and sold approximately $73mm in GP-distributed stock. Year to date IRR = 15.8%. (**Portfolio Manager: Wil Hiles**)
- **Foreign Exchange (FX) facilitation Program** – Since its May 1, 2019 inception, this program has executed $296mm in FX trades through an electronic platform that allows for multiple counterparties to compete through a real-time auction process. (**Portfolio Manager: Robin Kaukonen**)
- **Manager meetings** – YTD 2019**,** held 154 "open door" meetings with prospective managers in Tigard offices, conducted 69 existing manager quarterly conference calls, and made 13 on-site diligence visits.
- **Portfolio Cash Raise** – For the 12-month period ending September 30, 2019, staff raised $3.6bb for the following: PERS benefit payments; Private Market capital calls; a new, $800mm externally-managed low volatility strategy; and an additional $400 additional for an internally-managed International Risk Premia mandate.

OST Internally Managed Portfolios

Primary PM | Backup PM

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 400 Portfolio	$ 702,779,412	18.05%	-2.28%	5.78%	9.69%	11.16%	9.17%	12.87%	12.87%
S&P 400 Index		17.87%	-2.49%	5.53%	9.38%	10.84%	8.88%	12.56%	12.56%
Excess (net)		0.18%	0.22%	0.25%	0.31%	0.32%	0.29%	0.31%	0.31%
Inception Date of Oct. 1, 2009	Tracking Error = 30 bps	Target Excess Return: 10 bps							


Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 500 Portfolio	$ 2,558,808,869	20.68%	4.38%	10.95%	13.46%	13.96%	10.90%	13.30%	13.30%
S&P 500 Index		20.55%	4.25%	10.87%	13.39%	13.90%	10.84%	13.24%	13.24%
Excess (net)		0.12%	0.13%	0.07%	0.07%	0.06%	0.06%	0.06%	0.06%
Inception Date of Oct 1, 2009	Tracking Error = 10 bps	Target Excess Return: 5 bps							


Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RU2000/ S&P 600	$ 295,175,064	13.99%	-9.35%	2.11%	8.14%	10.30%	8.61%	*N/A*	11.03%
Russell 2000/S&P 600 Index		13.46%	-9.46%	2.15%	8.00%	9.82%	8.05%	N/A	10.31%
Excess (net)		0.53%	0.11%	-0.04%	0.14%	0.48%	0.56%	N/A	0.72%
Inception Date of April 1, 2010	Tracking Error = 50 bps	Target Excess Return: 30 bps							


Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RISK PREMIA	$ 3,207,141,012	20.17%	1.45%	10.93%	14.35%	14.43%	11.88%	N/A	11.72%
MSCI Risk Premia Index		*20.06%*	*1.41%*	*10.84%*	*14.36%*	*14.46%*	*11.92%*	*N/A*	*11.74%*
MSCI USA		20.63%	4.14%	10.79%	13.29%	13.75%	10.73%	N/A	10.76%
Excess (net)		-0.46%	-2.69%	0.14%	1.06%	0.68%	1.15%	N/A	0.95%
Inception Date of Jan 1, 2014	Tracking Error = 300 bps	Target Excess Return: 150 bps							

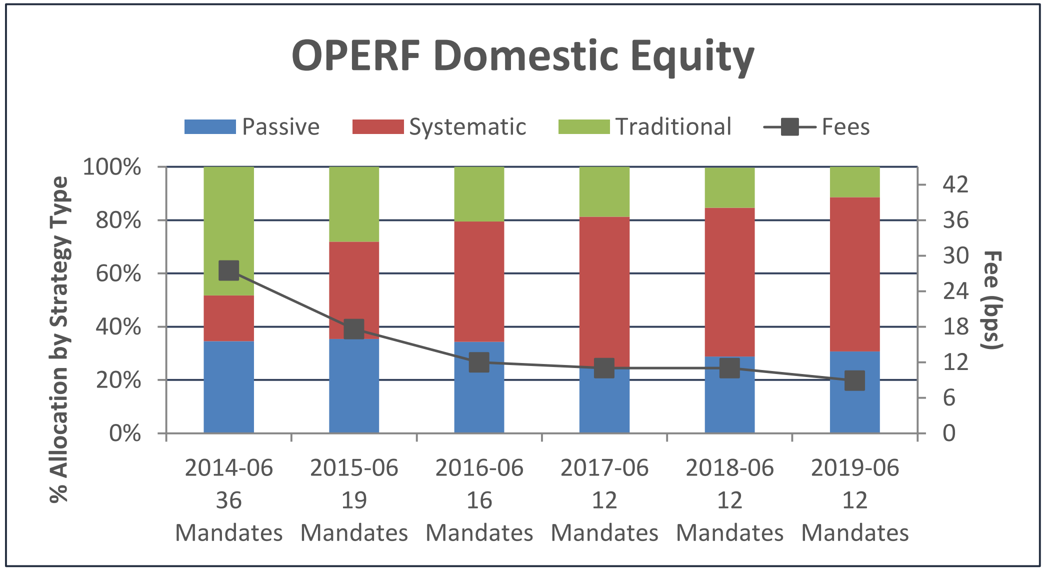

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
INT'L RISK PREMIA	$ 1,209,673,061	15.24%	1.16%	2.32%	N/A	N/A	N/A	N/A	3.69%
MSCI INT'L Risk Premia Index		*14.94%*	*0.79%*	2.04%	*N/A*	*N/A*	*N/A*	*N/A*	*3.46%*
MSCI WORLD X-US		13.57%	-0.95%	0.84%	N/A	N/A	N/A	N/A	3.11%
Excess (net)		1.674%	2.113%	1.476%	N/A	N/A	N/A	N/A	0.58%
Inception Date of Jun 1, 2017	Tracking Error = 300 bps	Target Excess Return: 150 bps							


OREGON STATE TREASURY

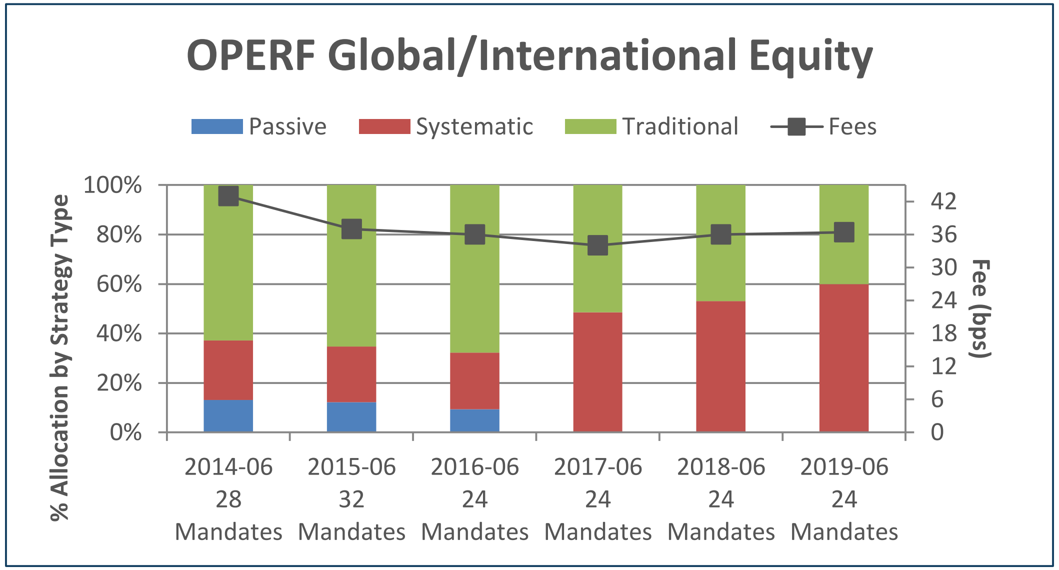
Public Equity Portfolio

Fees

- Pursuant to a 2014 OIC approval, staff continues to opportunistically move away from traditional active mandates and reallocate proceeds in favor of low-cost systematic or “engineered” strategies (either internally- or externally-managed).
- Diversify exposures in the U.S. Equity portfolio away from Size (small cap) to other well known return premia which are supported by abundant and robust empirical evidence as persistent and pervasive sources of excess relative return (e.g., Value, Momentum, Low Vol, etc.).
- Reduce exposure to passive management within International Equity and increase exposure to internal low cost systematic strategies.



Portfolio Management costs in the Domestic Equity portfolio decreased by more than 60 percent (from 32 bps to 9 bps/annum), number of individual mandates decreased from 37 to 12.

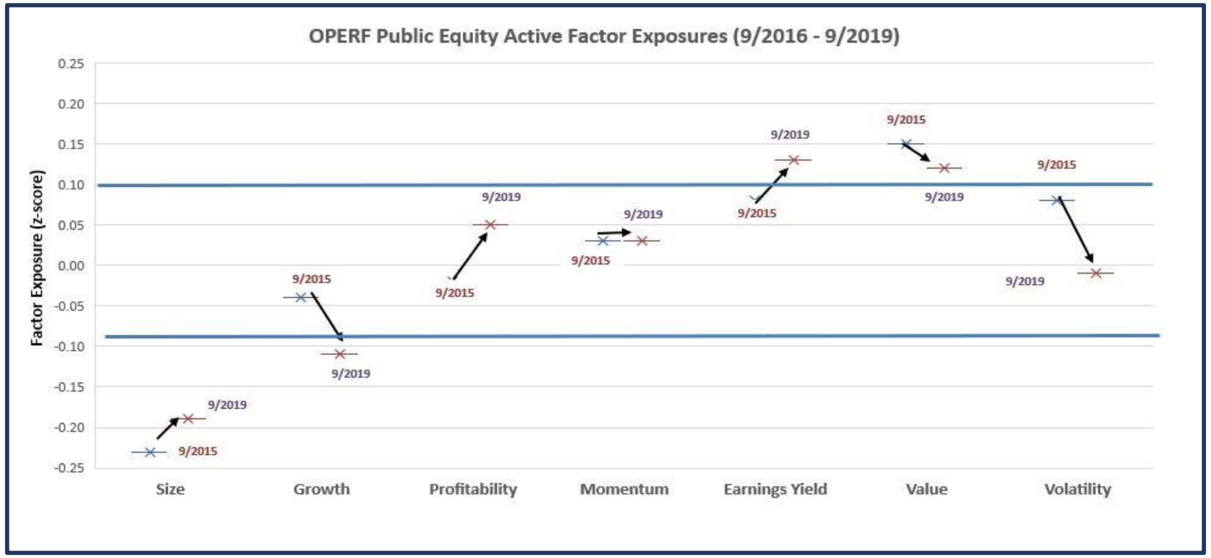


Portfolio Management costs in the International/Global Equity portfolio reduced from 43bps to 36 bps. The number of individual mandates reduced from 32 to 24.

Public Equity Portfolio

Factor Exposures

- Diversify exposures in the U.S. Equity portfolio away from Size (small cap) to other well known return premia such as Value, Momentum, Profitability (a.k.a. Quality), and Low Volatility which are supported by abundant and robust empirical evidence as persistent and pervasive sources of excess relative return.



Staff has intentionally built factor exposures within the OPERF public equity portfolio that provide improved diversification over time (Exhibit 4). The portfolio's exposure to the Size factor has been reduced, allowing for expanded tilts towards Value, Profitability/Quality, Momentum, and Low Volatility.

Period Ending 9/30/19	Market Value	3 Months	1 Year	2 years	Incep	2-yr Beta
Global Equity Low Vol	$ 4,430,119,268	0.86%	4.22%	7.42%	11.13%	**0.73**
MSCI ACWI IMI Net		-0.18%	0.48%	4.95%	9.75%	**1.00**
Excess Return		**1.04%**	**3.74%**	**2.46%**	**1.37%**	

Over the long-term, staff expects the global low volatility portfolio to provide returns commensurate with the portfolio's MSCI ACWI IMI Net benchmark (i.e., no excess returns), but with lower volatility. The defensive nature of the portfolio allows for outperformance in declining or volatile stock markets such as those exhibited in October 2018 and May 2019.

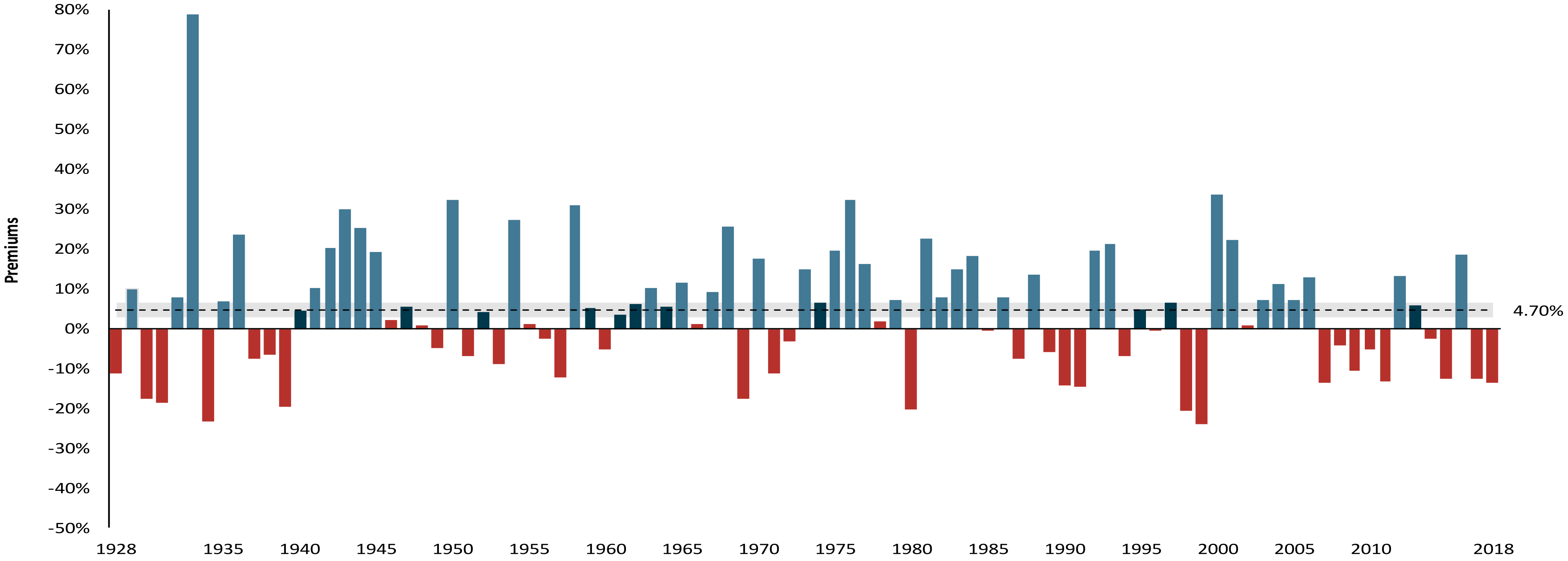
OREGON STATE TREASURY

Public Equity Portfolio

Factor Exposures – Value minus Growth

- Risk factor premia have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance.

Yearly Observations Value Premium (1928-2018)



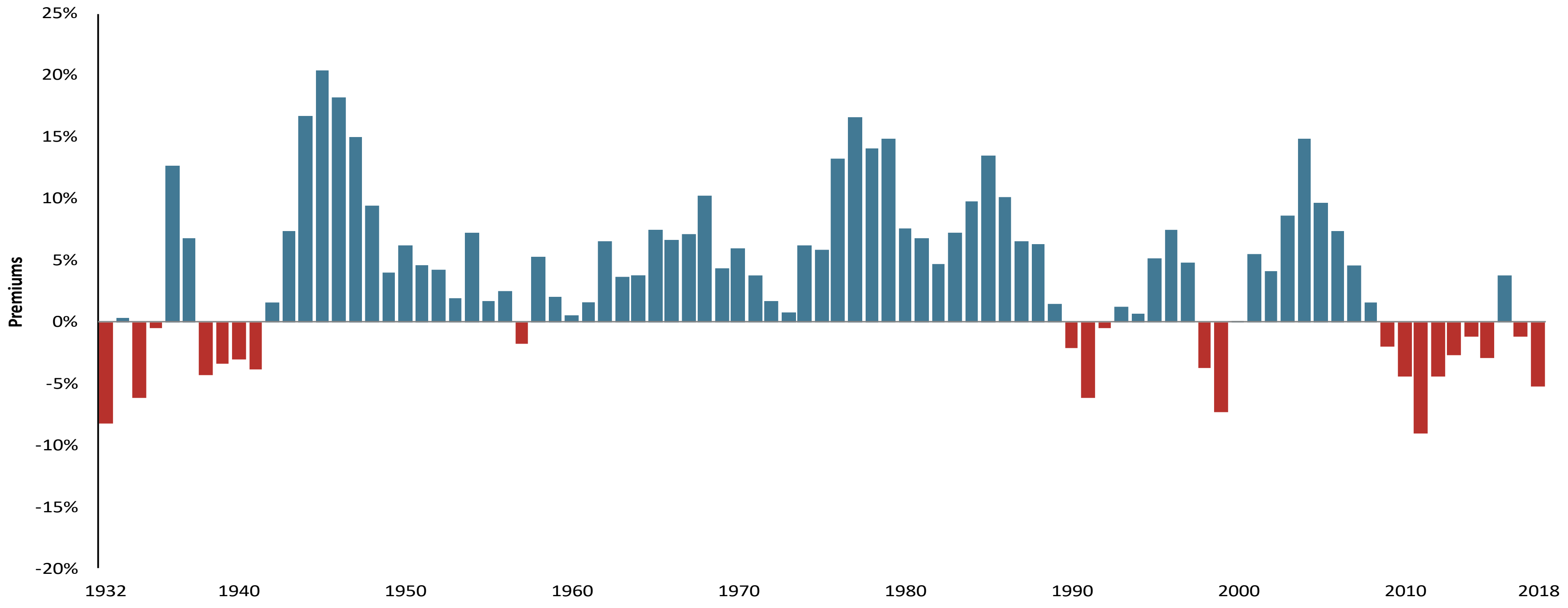
Source: Dimensional Fund Advisors.

Public Equity Portfolio

Factor Exposures – Value minus Growth

- Risk factor premia have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance.

Rolling Five-Year Observations Value Premium (1932-2018)



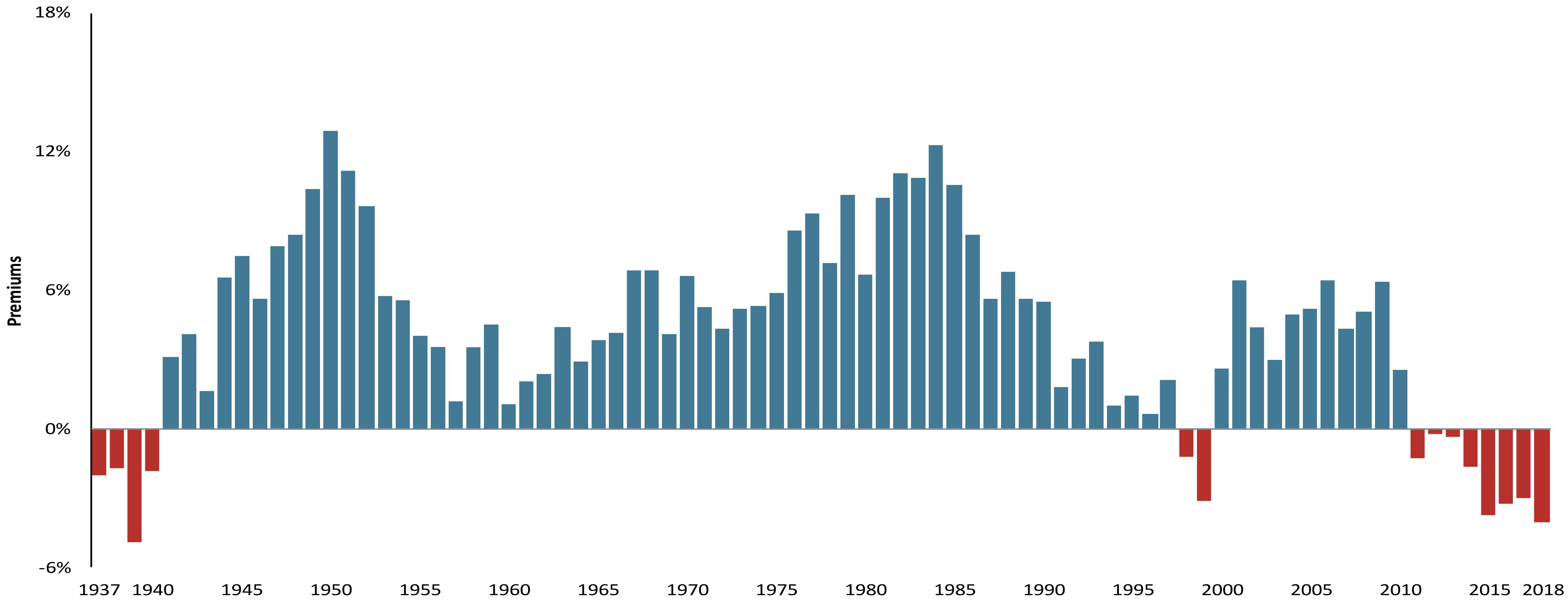
Source: Dimensional Fund Advisors.

Public Equity Portfolio

Factor Exposures – Value minus Growth

- Risk factor premia have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance.

Rolling Ten-Year Observations Value Premium (1937-2018)



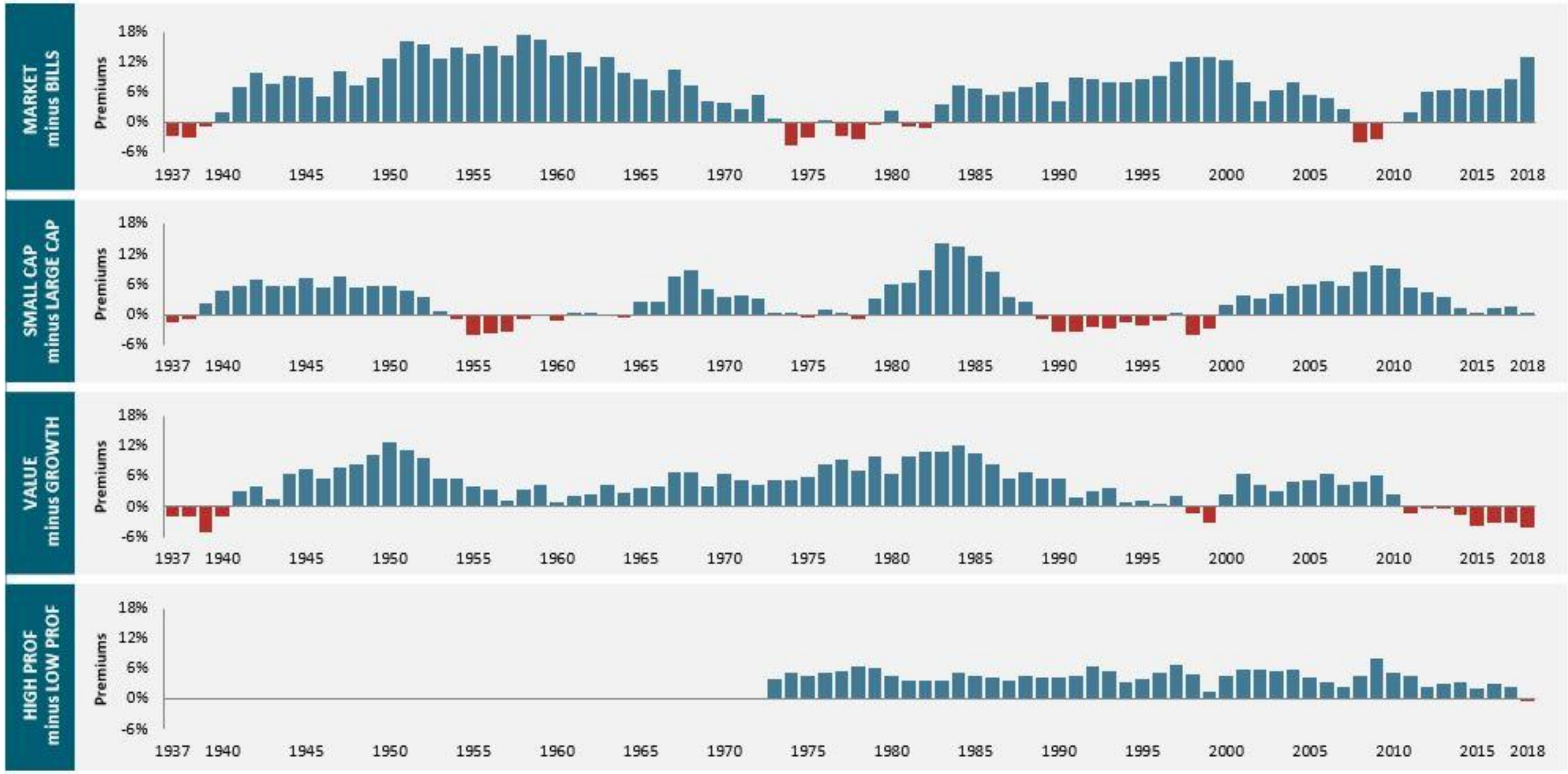
Source: Dimensional Fund Advisors.

Public Equity Portfolio

Factor Premiums – US Market, Size, Value, Profitability

- Risk factor premia have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance.

Rolling Ten-Year Observations Market, Size, Value, Profitability (1937-2018)



Source: Dimensional Fund Advisors.

OREGON STATE TREASURY

Staff Recommendation

Emerging Markets Risk Premia ESG Strategy

- Staff has successfully managed equity portfolios for over 10 years.
- All internally-managed strategies have out-performed their respective benchmarks since inception.
- Bespoke Risk Premia Strategies (U.S. and non-U.S.) tilting towards Value, Momentum, Quality, and Low Volatility have performed in-line with expectations, providing robust returns relative to capitalization weighted benchmarks.
- The proposed EM Risk Premia strategy will also tilt towards MSCI Environmental, Social, and Governance factors which have more than 12 years of live historical data and a dedicated staff of 200 ESG analysts.

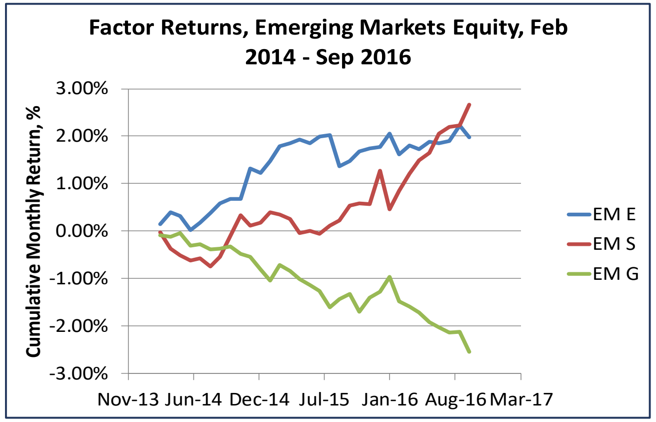
Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 400 Portfolio	$ 702,779,412	18.05%	-2.28%	5.78%	9.69%	11.16%	9.17%	12.87%	12.87%
S&P 400 Index		17.87%	-2.49%	5.53%	9.38%	10.84%	8.88%	12.56%	12.56%
Excess (net)		0.18%	0.22%	0.25%	0.31%	0.32%	0.29%	0.31%	0.31%
Inception Date of Oct. 1, 2009	Tracking Error = 30 bps	Target Excess Return: 10 bps							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
OST 500 Portfolio	$ 2,558,808,869	20.68%	4.38%	10.95%	13.46%	13.96%	10.90%	13.30%	13.30%
S&P 500 Index		20.55%	4.25%	10.87%	13.39%	13.90%	10.84%	13.24%	13.24%
Excess (net)		0.12%	0.13%	0.07%	0.07%	0.06%	0.06%	0.06%	0.06%
Inception Date of Oct 1, 2009	Tracking Error = 10 bps	Target Excess Return: 5 bps							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RU2000/ S&P 600	$ 295,175,064	13.99%	-9.35%	2.11%	8.14%	10.30%	8.61%	*N/A*	11.03%
Russell 2000/S&P 600 Index		13.46%	-9.46%	2.15%	8.00%	9.82%	8.05%	N/A	10.31%
Excess (net)		0.53%	0.11%	-0.04%	0.14%	0.48%	0.56%	N/A	0.72%
Inception Date of April 1, 2010	Tracking Error = 50 bps	Target Excess Return: 30 bps							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
RISK PREMIA	$ 3,207,141,012	20.17%	1.45%	10.93%	14.35%	14.43%	11.88%	N/A	11.72%
MSCI Risk Premia Index		*20.06%*	*1.41%*	*10.84%*	*14.36%*	*14.46%*	*11.92%*	*N/A*	*11.74%*
MSCI USA		20.63%	4.14%	10.79%	13.29%	13.75%	10.73%	N/A	10.76%
Excess (net)		-0.46%	-2.69%	0.14%	1.06%	0.68%	1.15%	N/A	0.95%
Inception Date of Jan 1, 2014	Tracking Error = 300 bps	Target Excess Return: 150 bps							

Period Ending 9/30/19	Market Value	YTD	1 year	2 years	3 years	4 years	5 years	10 Years	Inception
INT'L RISK PREMIA	$ 1,209,673,061	15.24%	1.16%	2.32%	N/A	N/A	N/A	N/A	3.69%
MSCI INT'L Risk Premia Index		*14.94%*	*0.79%*	2.04%	*N/A*	*N/A*	*N/A*	*N/A*	*3.46%*
MSCI WORLD X-US		13.57%	-0.95%	0.84%	N/A	N/A	N/A	N/A	3.11%
Excess (net)		1.674%	2.113%	1.476%	N/A	N/A	N/A	N/A	0.58%
Inception Date of Jun 1, 2017	Tracking Error = 300 bps	Target Excess Return: 150 bps							



RECOMMENDATION

– Staff recommends funding an internally-managed Emerging Markets Risk Premia ESG Equity strategy in the amount of $500mm.

– Amend Policy INV 603 (Internal Equity – Portfolio Objectives & Strategies) accordingly.

OREGON
STATE
TREASURY

Tobias Read
Oregon State Treasurer

16290 SW Upper Boones Ferry Road
Tigard, OR 97224

oregon.gov/treasury

TAB 5 – Opportunity Portfolio Review

OPERF

October 30, 2019

OPERF Opportunity Portfolio

2018 / 2019 Annual Review

OREGON
STATE
TREASURY

Topics

Opportunity Portfolio Overview

- Primary Role of the Opportunity Portfolio
  - Provide enhanced, risk-adjusted returns and diversification to OPERF
  - Investments are expected to comprise both shorter-term (1-3 years) and longer-term holdings
  - Per OIC policy, may comprise no more than 3% of total Fund assets
  - No strategic target allocation

- Objectives
  - Policy benchmark of CPI + 5.0%
  - Often uncorrelated with other OPERF holdings
  - Less risk than OPERF public equity component
  - Opportunistic / dislocation oriented
  - Innovation / incubation oriented
  - May be non-diversified – concentration up to 25% at time of investment

- Strategies of Interest
  - Dislocation oriented (historical examples: bank loans, convertible bonds)
  - Diversification oriented (royalties, reinsurance, intellectual property)
  - Private credit (direct lending, distressed)

- Additional Resources
  - August 2019: Mike Mueller named dedicated Opportunity Portfolio Investment Officer

History

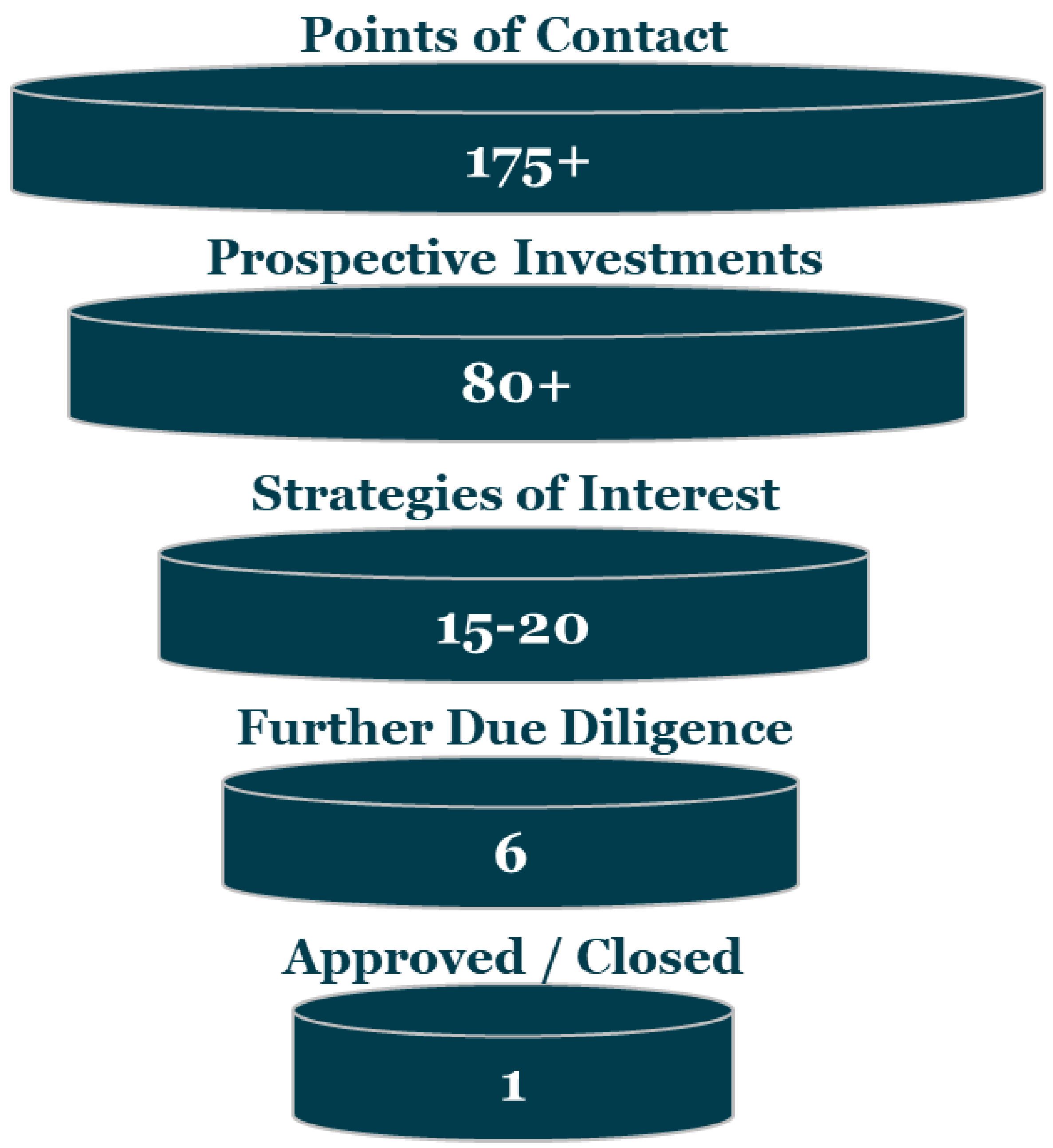
2005	❖ Opportunity Portfolio inception
2006	❖ Opportunity Portfolio first investment
2007	❖ Early market fissures appear • OPERF early to levered loans dislocation
2008	❖ Global Financial Crisis (GFC) • Full-time Opportunity Portfolio Investment Officer hired • High-water mark in new commitments (number & dollars) • Heavy investment in private credit (bank loans)
2009-2010	❖ Relatively light deployment following significant investment post-GFC
2011	❖ Three funds moved to seed new Alternatives Portfolio
2012-2014	❖ Commitments to multi-strategy opportunistic mandates in response to limited staff resources
2014	❖ Senior Opportunity Portfolio Investment Officer promoted to Director of Alternatives Program
2015-2018	❖ Relatively stable to light deployment
2019	❖ Appointment of Investment Officer dedicated to Opportunity Portfolio

2018 – 2019 Years in Review

- The Opportunity Portfolio's $1.7 billion market value remained at approximately 2.3% of OPERF over the past 18 months, within the 3.0% OIC policy (see Appendix) limit.
- The Portfolio is concentrated among its seven largest investments which currently comprise 90% of Portfolio value.
- In 2018, the OIC made a $200 million commitment to the TSSP Adjacent Opportunities ("TAO") Contingent Fund, which is the continuation of an existing relationship with TSSP, to provide additional "flex" capital in the event of a market dislocation over the next 32 months.
- Following the Portfolio review in 2018, Staff trimmed a total of $150 million from two existing managers to rebalance and create additional headroom for future investments.
- Over the past decade, Staff has been focused on niche strategies, but the Portfolio is poised for a shift to a market dislocation focus if / when the opportunity arises.
- Historically, Staff has executed about three deals a year in the Portfolio, but over the past five years, that number has declined to approximately one per year. This reduced investment pace is primarily a reflection of Staff patience during a "beta trade" bull market as well as limited internal resources dedicated to the Portfolio during the 2014-2019 period.

2018 – 2019 Years in Review (cont.)

- 2018-2019 Opportunity Portfolio Deal Flow
  - Scale, brand, existing relationships and open door policy leveraged to foster solid deal flow.
  - Broad opportunity set has helped meeting count remain consistent over time.
  - Points of contact (in-person or calls) covering 80+ distinct, prospective investment products.
  - Sizable uptick in the number of private credit / direct lending opportunities as part of the flow (55+).
  - Deep dives / further due diligence on six opportunities: insurance; business development company (BDC); entertainment royalties; residential mortgages; special situations; and credit opportunities.
  - $200 million commitment to TSSP Adjacent Opportunities Contingent Fund which closed in January 2019.



OREGON STATE TREASURY

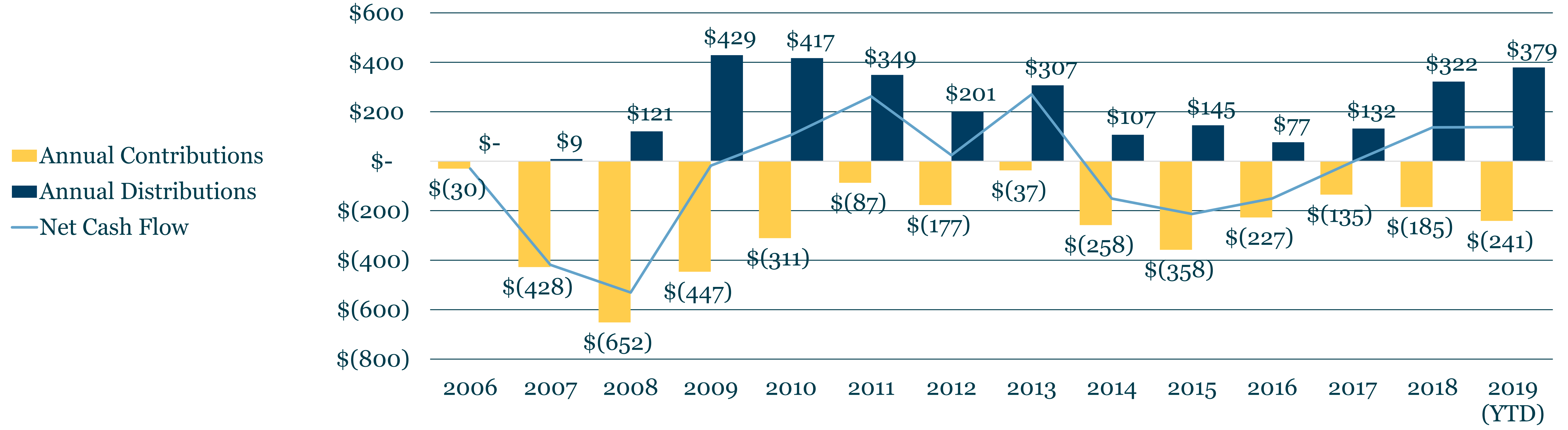
Investments as of 6/30/19

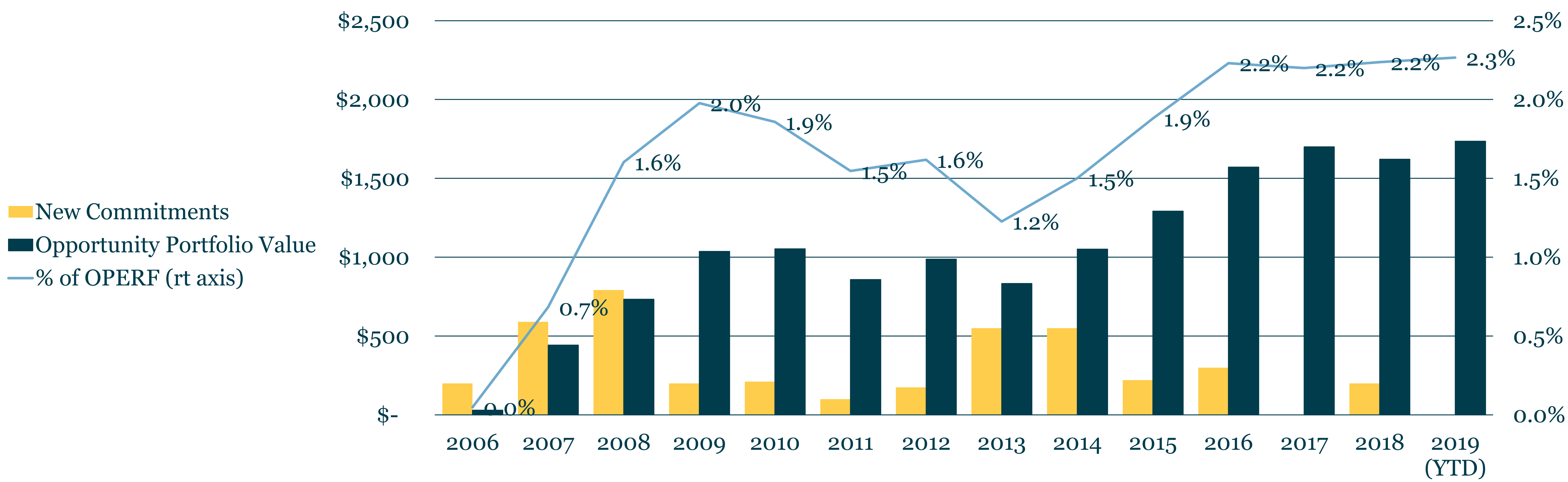
Fund	Strategy	6/30/19 FMV ($M)	%	Commitment ($M)	Vintage Year(s)	Status
Fidelity Real Estate Opportunistic Income Fund	Debt / Private Credit	$ 175.8	10%	$ 100.0	2007	Evergreen
Apollo Credit Opportunity Fund II	Debt / Private Credit	$ 1.2	0%	$ 250.0	2008	Liquidation
Providence TMT Special Situations Fund	Debt / Private Credit	$ 0.7	0%	$ 100.0	2008	Liquidation
Sanders Capital All Asset Value Fund	Diversified	$ 353.4	20%	$ 200.0	2010	Evergreen
Nephila Advisors Juniper & Palmetto Funds	Reinsurance	$ 121.1	7%	$ 100.0	2012	Evergreen
SailingStone Natural Gas Portfolio	Equity	$ 18.2	1%	$ 75.0	2012	Evergreen
Blackstone Tactical Opportunities	Diversified	$ 306.3	18%	$ 500.0	2013, 2014	Harvesting
TSSP Adjacent Opportunities Partners	Debt / Private Credit	$ 352.1	20%	$ 700.0	2014, 2015, 2018	Evergreen
Galton Onshore Mortgage Recovery Fund III	Debt / Private Credit	$ 10.3	1%	$ 50.0	2013	Harvesting
Content Partners Fund III	Royalties	$ 35.2	2%	$ 50.0	2014	Harvesting
Lone Star Residential Mortgage Fund I	Debt / Private Credit	$ 12.1	1%	$ 86.4	2014	Harvesting
OrbiMed Royalty Opportunities Fund II	Royalties	$ 18.5	1%	$ 35.0	2015	Investment
TPG Specialty Lending Europe I	Debt / Private Credit	$ 60.2	3%	$ 100.0	2015	Harvesting
Lone Star Fund X	Debt / Private Credit	$ 106.9	6%	$ 150.0	2016	Investment
Owl Rock Capital Corporation	Debt / Private Credit	$ 164.0	9%	$ 150.0	2016	Evergreen
Total Opportunity Portfolio		**$ 1,736.0**				
Allocation within OPERF		**2.3%**				

90% of the Opportunity Portfolio is invested in seven funds

Source: TorreyCove. Data as of 6/30/19.

Historical Cash Flows and New Commitments



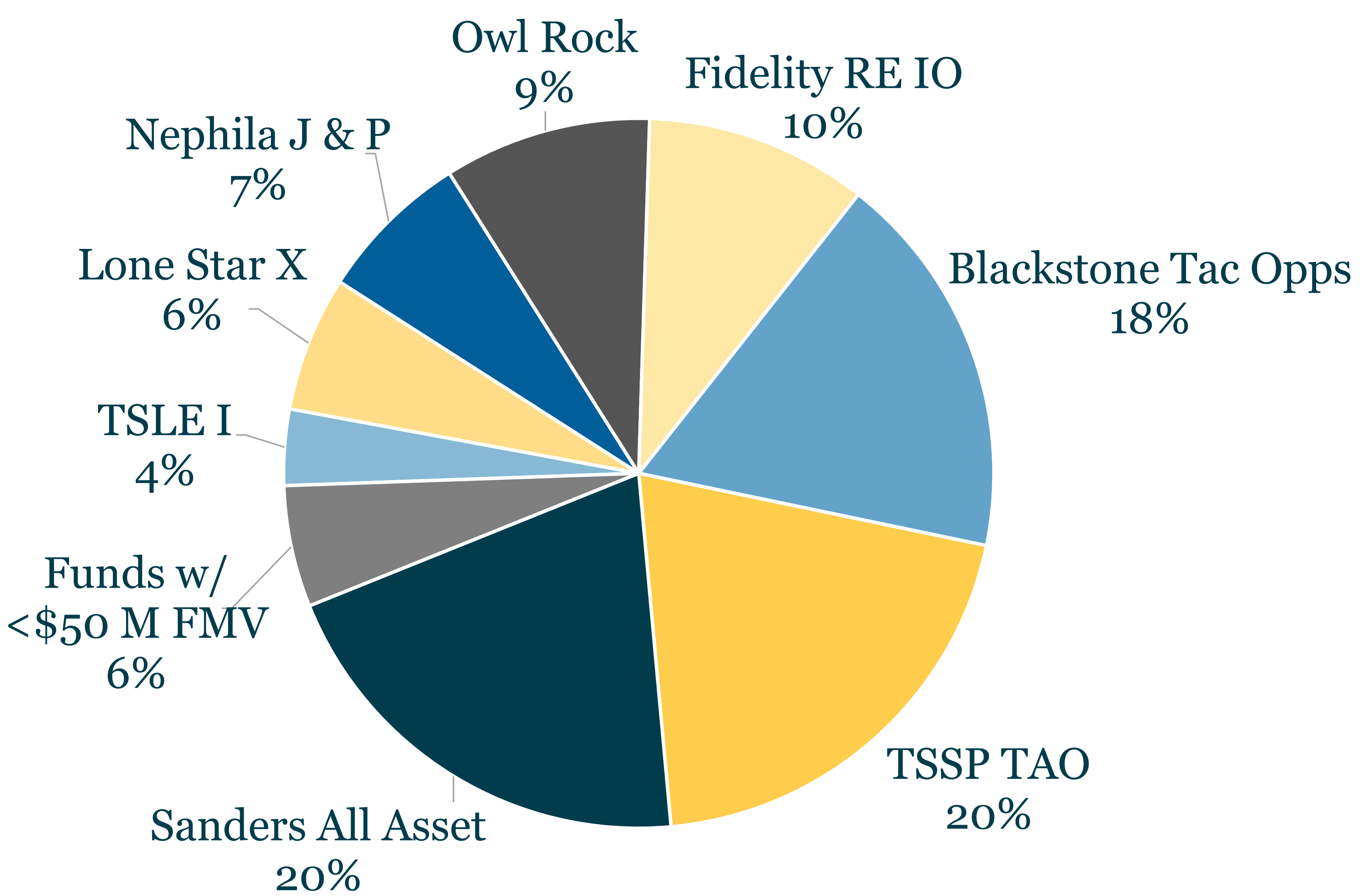


Source: TorreyCove and State Street. Data as of 6/30/19.

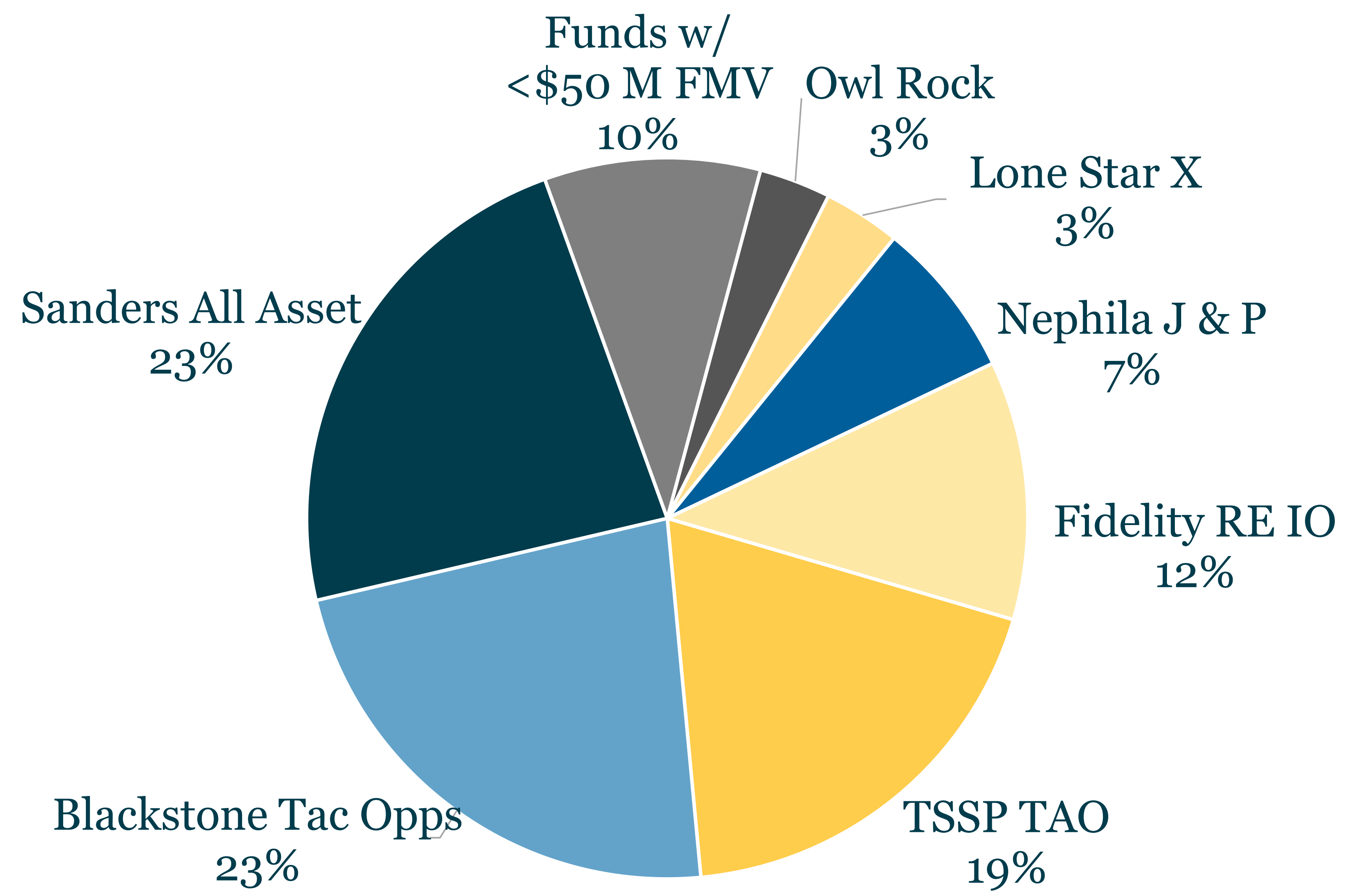
OREGON STATE TREASURY

Portfolio Manager Snapshot

6/30/19
FMV $1.7 B



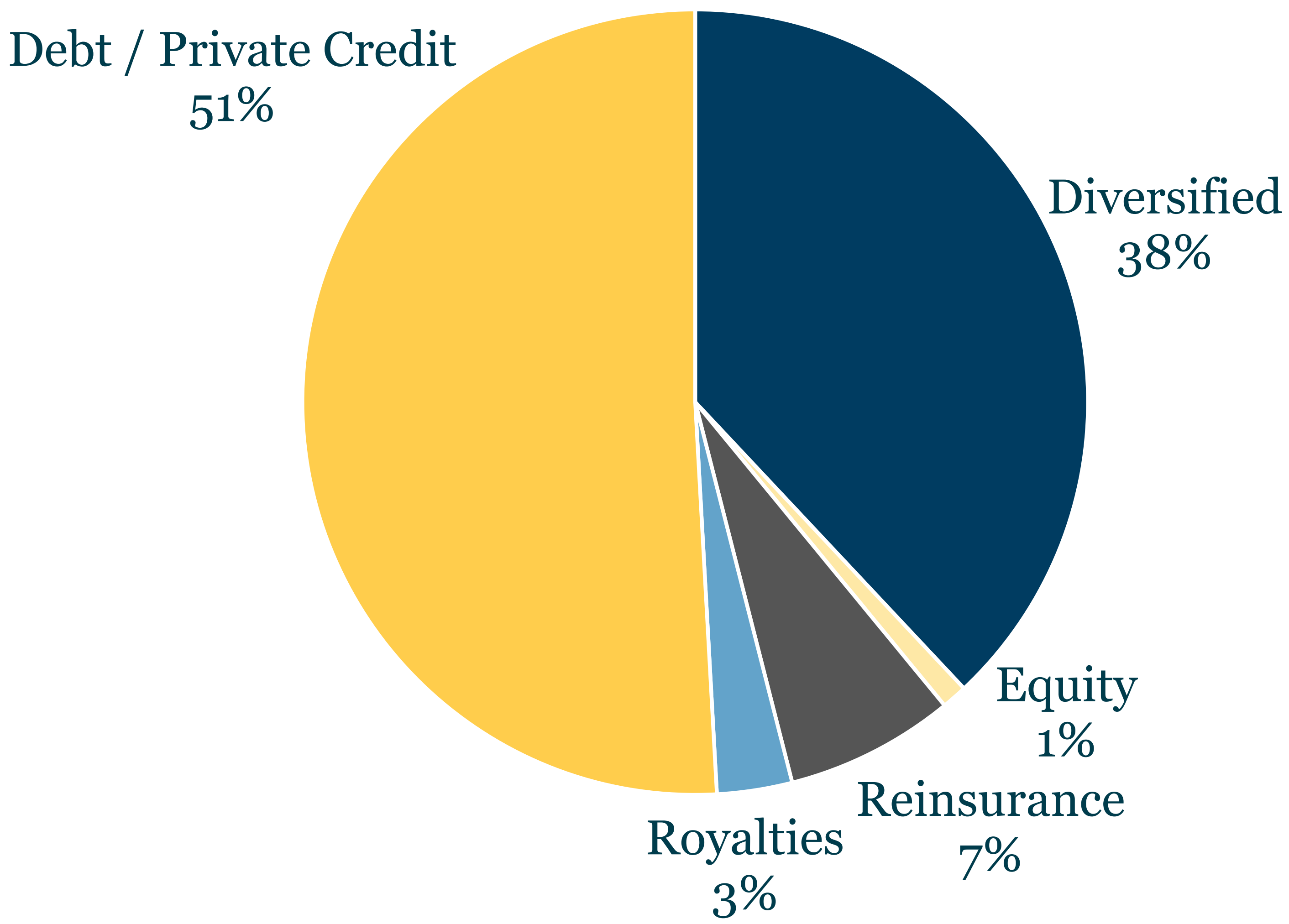
6/30/18
FMV $1.8 B



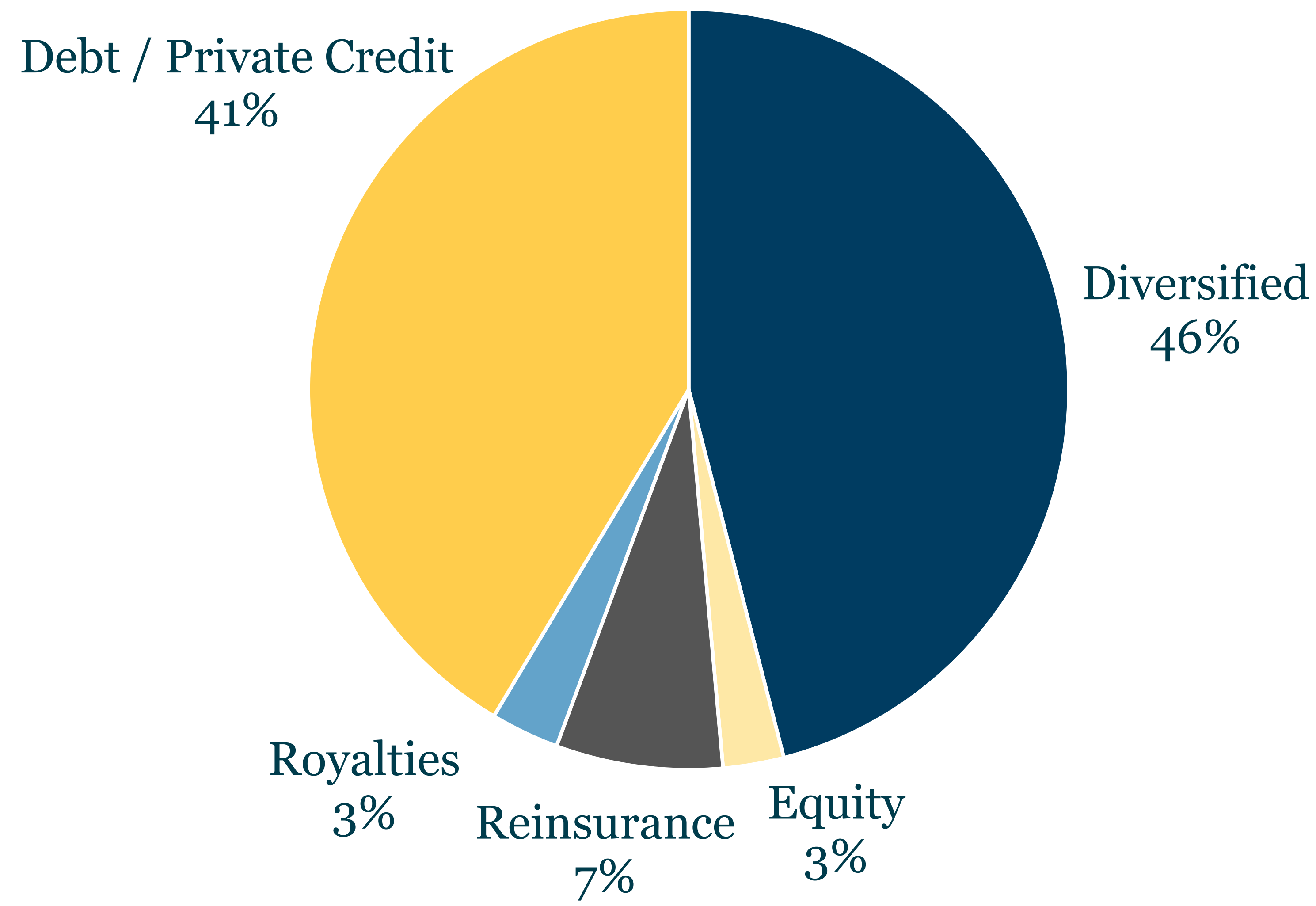
Source: TorreyCove. Data as of 6/30/19.

Portfolio Strategy Snapshot

6/30/19
FMV $1.7 B



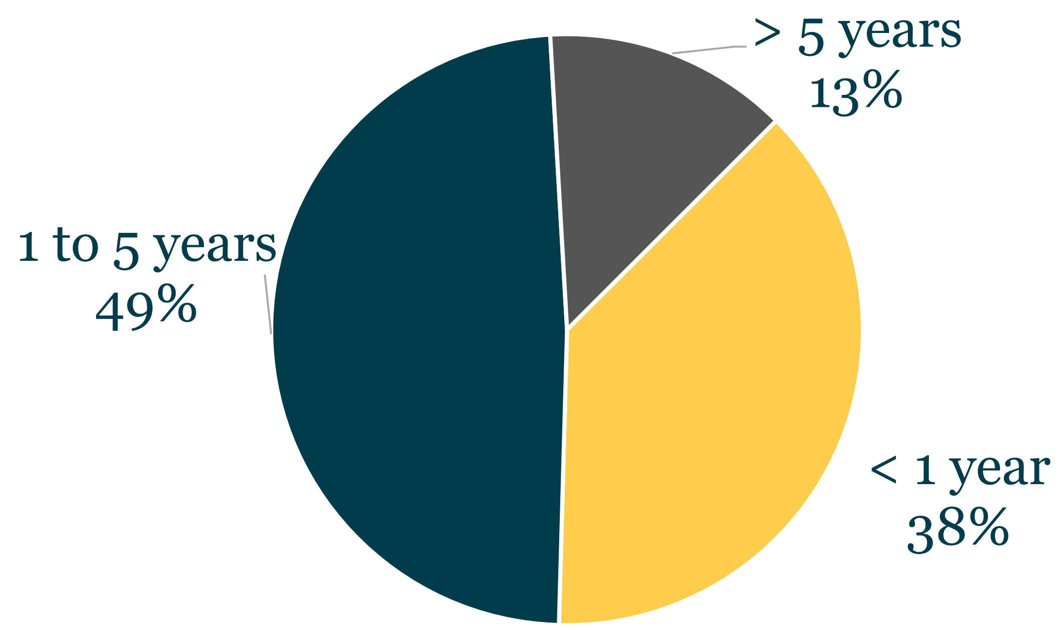
6/30/18
FMV $1.8 B



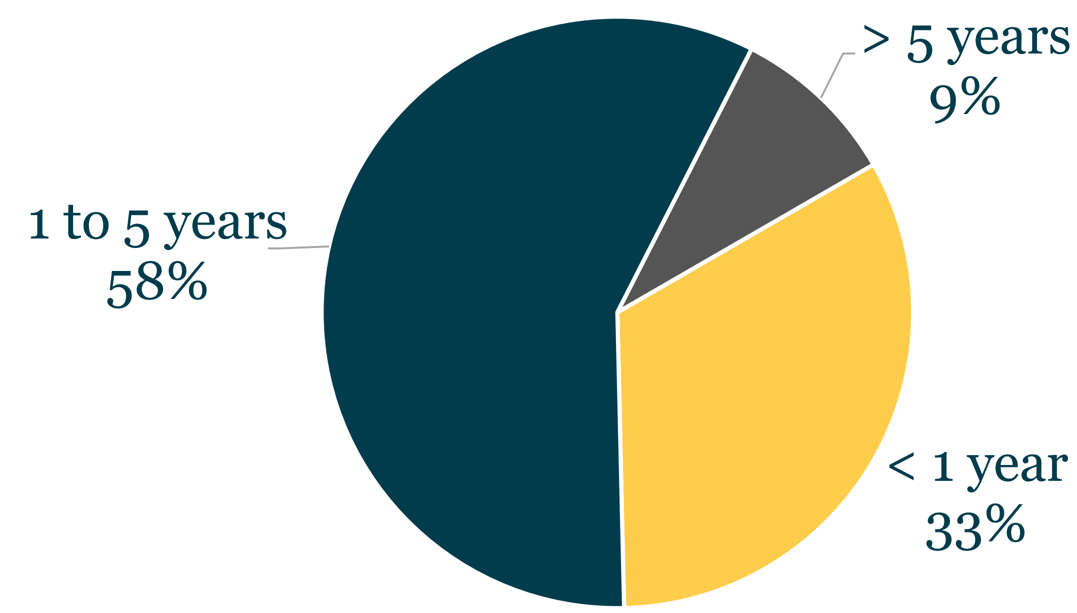
Source: TorreyCove. Data as of 6/30/19.

Portfolio Liquidity Snapshot

6/30/19



6/30/18



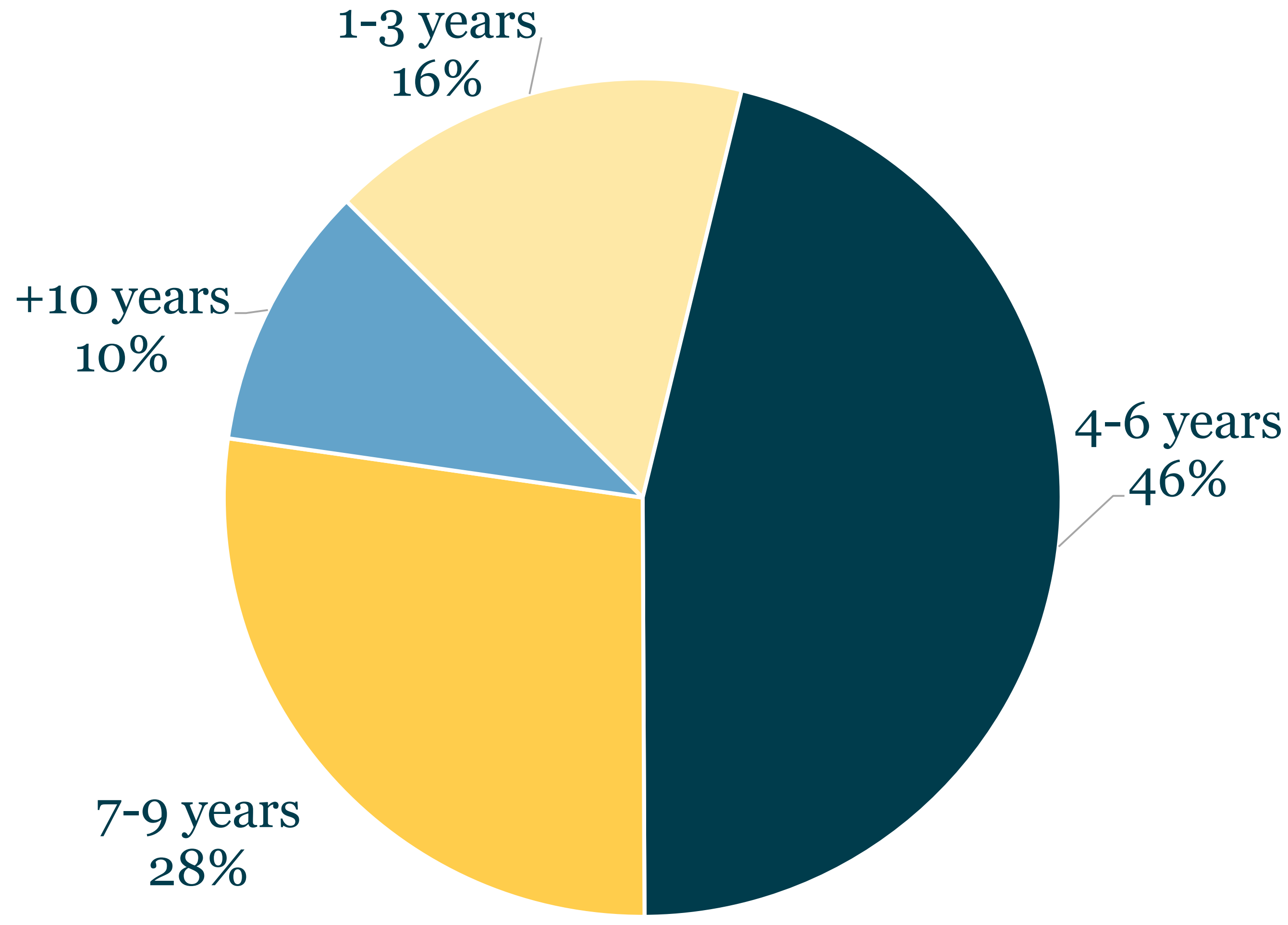
	6/30/19	Allocation
< 1 year	**$ 658,589,721**	**38%**
Apollo Credit Opportunity Fund II	1,171,759	0%
Nephila Advisors Juniper & Palmetto Funds	121,070,810	7%
Owl Rock Capital Corporation	164,014,740	9%
Providence TMT Special Situations Fund	722,600	0%
SailingStone Natural Gas Portfolio	18,189,883	1%
Sanders Capital All Asset Value Fund	353,419,929	20%
1 to 5 years	**844,593,162**	**49%**
Blackstone Tactical Opportunities	306,331,084	18%
Fidelity Real Estate Opportunistic Income Fund	175,848,852	10%
Galton Onshore Mortgage Recovery Fund III	10,296,287	1%
TSSP Adjacent Opportunities Partners	352,116,939	20%
> 5 years	**232,810,742**	**13%**
Content Partners Fund III	35,162,435	2%
Lone Star Fund X	106,899,531	6%
Lone Star Residential Mortgage Fund I	12,056,252	1%
OrbiMed Royalty Opportunities Fund II	18,533,995	1%
TPG Specialty Lending Europe I	60,158,529	3%
Total	**$ 1,735,993,625**	**100%**

	6/30/18	Allocation
< 1 year	**$ 597,758,325**	**33%**
Apollo Credit Opportunity Fund II	1,488,990	0%
Nephila Advisors Juniper & Palmetto Funds	128,619,267	7%
Providence TMT Special Situations Fund	1,258,748	0%
SailingStone Natural Gas Portfolio	46,859,178	3%
Sanders Capital All Asset Value Fund	419,532,142	23%
1 to 5 years	**1,049,023,630**	**58%**
Blackstone Tactical Opportunities	413,931,782	23%
Fidelity Real Estate Opportunistic Income Fund	210,457,077	12%
Galton Onshore Mortgage Recovery Fund III	22,335,351	1%
Owl Rock Capital Corporation	58,305,125	3%
TSSP Adjacent Opportunities Partners	343,994,295	19%
> 5 years	**166,164,265**	**9%**
Content Partners Fund III	30,746,298	2%
Lone Star Fund X	62,551,064	3%
Lone Star Residential Mortgage Fund I	10,184,036	1%
OrbiMed Royalty Opportunities Fund II	21,986,761	1%
TPG Specialty Lending Europe I	40,696,106	2%
Total	**$ 1,812,946,220**	**100%**

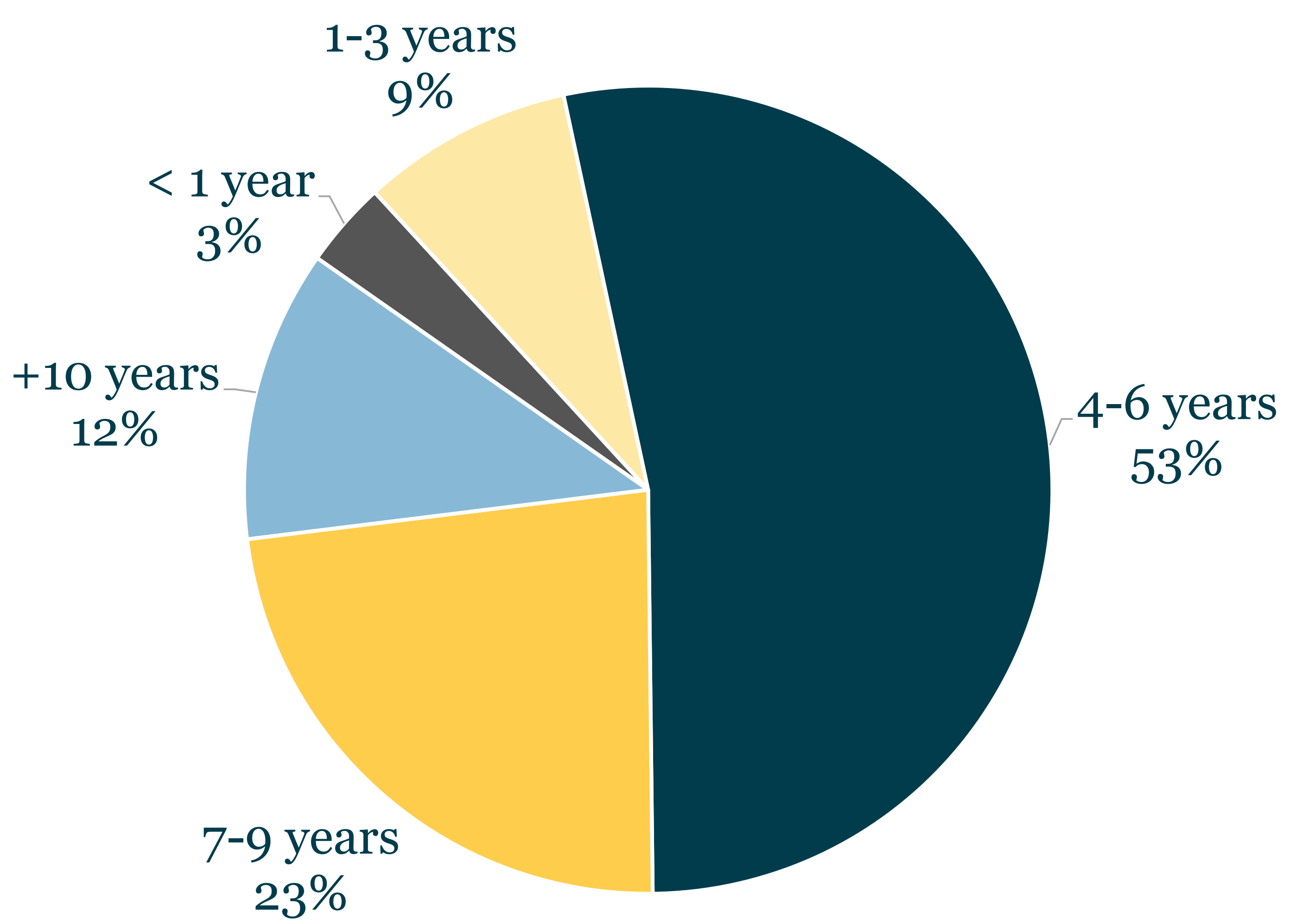
Source: TorreyCove. Data as of 6/30/19.

Portfolio Age Snapshot

6/30/19
FMV $1.7 B



6/30/18
FMV $1.8 B



Source: TorreyCove. Data as of 6/30/19. Contribution-weighted age.

OREGON STATE TREASURY

Performance

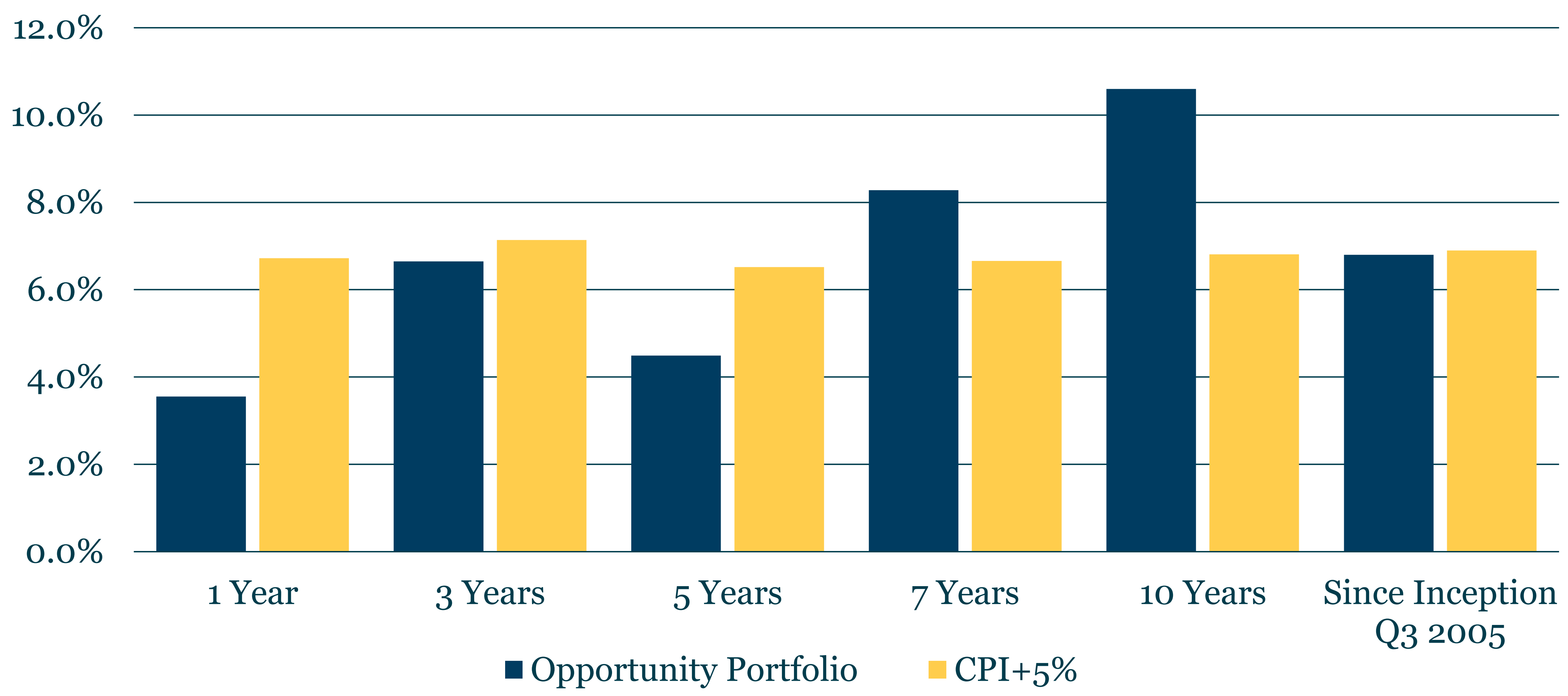
Measure	6/30/19	6/30/18
FMV + Distributions	$4,449 M	$4,147 M
FMV	$1,736 M	$1,813 M
FMV % of OPERF	2.3%	2.4%
FMV + Unfunded Commitments % of OPERF	3.2%	3.4%

Multiple [(FMV + Distributions)/Drawn]	1.3x	1.3x
IRR Since Inception Q3 2005	7.5%	7.9%

Source: Torrey Cove. Data as of 6/30/2019.

Time-Weighted Returns	Performance 6/30/19	CPI+5 %	Performance 6/30/18	CPI+5 %
1 Year	3.6%	6.7%	7.3%	8.0%
3 Years	6.7%	7.1%	6.6%	6.9%
5 Years	4.5%	6.5%	7.5%	6.6%
7 Years	8.3%	6.7%	7.7%	6.7%
10 Years	10.6%	6.8%	8.1%	6.5%
Since Inception Q3 2005	6.8%	6.9%	7.0%	6.9%

Source: State Street. Data as of 6/30/19.



Looking Forward

- The Opportunity Portfolio is well-positioned to continue to deploy capital as attractive, niche strategies arise.
- Based on current marks, OPERF would have to suffer a near 25% drawdown (under the conservative assumption that the Opportunity Portfolio remains unimpaired) before the 3% policy limit would be exceeded.
- Bond spreads are low, and equity multiples are relatively high; as such, Staff view the current environment as less conducive to tactical opportunities.
- Strategies currently in the pipeline include royalty strategies, reinsurance, and various credit strategies.
- Allocation to TAO Contingent Fund makes capital immediately available at the onset of a market turn.
- In the event of a market dislocation, Staff may pivot to shorter-term trading opportunities that could emerge.

Appendix: Investment Process

Evaluation framework

- Very high-level framework summary illustrated below.
- In practice, a non-linear process with many more variables and numerous feedback channels.

Fit

-Low expected overlap and correlation with other strategies
-Sources of risk/return
-Scope of mandate
-Pacing
-Relationship target
***Additive to the Portfolio**

Skill Assessment

-Firm, team, strategy evaluation
-Investment performance evaluation
-Differentiated
-Culture
-Financial discipline
-Effective implementation
***Confidence manager will achieve their objectives**

Timing/Opportunity Set

-Valuations
-Fundraising activity
-Contrarian approach
-Asymmetric return profile
-Manager assessment of opportunity set
***Awareness of cycles**

Governance

-Ownership
-Economics
-Protections/remedies
-Transparency
-GP commitment
***GP/LP alignment and spirit of partnership**

Internal Review
ATL > CIO > Consultant

Underwriting Package
Scorecard > Reference Calls > Track Record > Memo

Terms and Conditions

Portfolio

OREGON STATE TREASURY

Appendix: Fund Snapshots

Blackstone Tactical Opportunities	
Strategy	Ability to invest outside of Blackstone's traditional fund mandates to pursue a broad range of equity and debt investments in an unconstrained manner. A truly opportunistic mandate that is global, multi-disciplinary, and multi-asset class leveraging resources and deal flow from across Blackstone's businesses.
FMV	$306.3 M
Vintage(s)	2013 - $250 M 2014 - $250 M
Performance	7.5% net IRR since inception 9/13 1.32x net TVPI
Highlights	• OPERF's investment period completed; significant $32 M distribution 9/19 • Since inception, the Tac Opps team invested capital across 68 opportunities • Remaining portfolio value concentrated in real estate and financials assets • Strategy geared for more volatile environments; investment period has been fairly benign

Appendix: Fund Snapshots (cont.)

Fidelity Real Estate Opportunistic Income Fund	
Strategy	Investments in a wide range of structured real estate debt.
FMV	$175.8 M
Vintage(s)	2007 - $100 M
Performance	7.2% net IRR since inception 4/07 10-year 12.5% net annualized time-weighted rate of return 2.26x net TVPI
Highlights	• Strategy launched before the onset of the GFC in 2007 creating significant early headwinds • Evergreen structure with quarterly liquidity and semi-annual income distributions • Primary investment types today include direct private debt, CMBS, and term loans • Modest leverage at 7% of gross value (limited to 50%); average cash yield of 6.5%

Appendix: Fund Snapshots (cont.)

Lone Star Fund X	
Strategy	Non-commercial real estate loans and securities and investments in financial and other operating companies. Lone Star is an opportunistic investor focusing mainly on financial market dislocations caused by asset value depreciation with distressed, counter cyclical investing being its core business.
FMV	$106.9 M
Vintage(s)	2016 - $150 M
Performance	12.9% net IRR since inception 9/16 1.11x net TVPI
Highlights	• 25% gross target IRR at individual asset level • Fund is about 90% invested with certain assets positioned for exit • European focus within the materials sector (e.g., building products), additional investments in financials and energy sectors

Appendix: Fund Snapshots (cont.)

Nephila Advisors Juniper & Palmetto Funds	
Strategy	Nephila is the oldest dedicated manager in the insurance linked securities (ILS) sector. Juniper focuses on natural hazard catastrophe risk reinsurance diversified among and within geographic regions; Palmetto has strategy similar to Juniper, but is more diversified with lower expected risk and return.
FMV	$121.1 M
Vintage(s)	2012 - $100 M (split 50/50)
Performance	Juniper: 2.1% net annualized time-weighted rate of return since inception 1/12 1.17x net TVPI Palmetto: 3.0% net annualized time-weighted rate of return since inception 1/12 1.25x net TVPI
Highlights	• Nephila was acquired by Markel 12/18, with Nephila remaining operationally independent • Median return estimates (post loss) for 2019 were 8% and 12%, respectively, for Palmetto and Juniper (highest since initial OST investment in 2012) • Impact of Hurricane Dorian still being assessed (estimated to be down 1%-4%, gross)

Appendix: Fund Snapshots (cont.)

Owl Rock Capital Corporation	
Strategy	Direct middle-market private credit platform seeking investment opportunities in US-based companies with $10 to $250 M EBITDA and annual review of $50 M to $2.5 B.
FMV	$164.0 M
Vintage(s)	2016 - $150 M
Performance	8.2% net IRR since inception 2016 1.09x net TVPI
Highlights	• Successful IPO in July 2019 listed on the NYSE under the ticker symbol "ORCC" • With a market cap of over $6 B, ORCC is the second-largest publicly traded BDC • OPERF holds publicly traded shares subject to rolling lock-up

Appendix: Fund Snapshots (cont.)

Sanders Capital All Asset Value Fund	
Strategy	Sanders Capital combines fundamental research analysis with both qualitative and quantitative tools to identify value investment opportunities in liquid equities, fixed income, commodities, and currencies.
FMV	$353.4 M
Vintage(s)	2010 - $200 M
Performance	9.3% net annualized time-weighted rate of return since inception 3/10 2.26x net TVPI
Highlights	• Targeting a 10% rate of return for each underlying investment • Based on current market conditions, only finding opportunity in select public equity sectors • Portfolio is defensively positioned with significant cash position awaiting opportunities • Trimmed fund by $100 M in late 2018 as the investment approached 25% of Opportunity Portfolio

Appendix: Fund Snapshots (cont.)

TSSP Adjacent Opportunities Partners	
Strategy	Within TPG, TSSP is a dedicated credit and credit-related investment platform. TSSP has a long-term and highly flexible capital base, investing across industries, geographies, capital structures, and asset classes in transactions that are typically complex.
FMV	$352.1 M
Vintage(s)	2014 - $250 M 2015 - $250 M 2018 - $200 M
Performance	9.3% net IRR since inception 6/14 1.31x net TVPI
Highlights	• Portfolio of over 90 active positions and 40 exited; highly diversified • Firmwide focus on “covering the downside” during underwriting, particularly this late in the cycle • Current yields are 8-11% • Raised $3.2 B in TAO Contingent Fund vehicle, includes $200 M from OPERF

Appendix: OIC Policy

Current Status: *Active* **PolicyStat ID:** *4922902*

OREGON STATE TREASURY

Origination:	*03/2015*
Last Approved:	*06/2018*
Last Revised:	*06/2018*
Next Review:	*06/2019*
Owner:	*John Hershey: Director of Alternative Investments*
Policy Area:	*Investments*
References:	*OST Policy 4.06.03*

INV 703: OPERF Opportunity Portfolio Standards & Procedures

INTRODUCTION & OVERVIEW

Summary Policy Statement

The Oregon State Treasury ("OST"), to accomplish the prudent and efficient implementation of investment policies established by the Oregon Investment Council ("OIC" or "Council"), has created the Opportunity Portfolio (the "Portfolio") as an investment strategy within the Oregon Public Employees Retirement Fund ("OPERF" or the "Fund"). The Portfolio may be populated with investment approaches across a wide range of investment opportunities with no limitation on asset classes or strategies employed. The Opportunity Portfolio investment Portfolio seeks to achieve its investment objective by making investments and partnership commitments that, for any one or more various reasons, do not conform to the guidelines and objectives of the OIC's previously identified asset classes (i.e., public equities, fixed income, real estate, private equity, alternative investments and cash).

Purpose and Goals

The purpose of this policy is to define the strategic role of the Portfolio within the OIC's general investment policies for OPERF, to set forth specific policy objectives, and to outline strategies and guidelines for Portfolio implementation.

The goal of this policy is to provide guidance to OST staff ("Staff") and advisors regarding the Portfolio and its investment objectives.

Applicability

Classified represented, management service, unclassified executive service

Authority

293.726 Standard of judgment and care in investments; investment in corporate stock.

1. The investment funds shall be invested and the investments of those funds managed as a prudent investor would do, under the circumstances then prevailing and in light of the purposes, terms, distribution requirements and laws governing each investment fund.

2. The standard stated in subsection (1) of this section requires the exercise of reasonable care, skill and caution, and is to be applied to investments not in isolation but in the context of each investment fund's investment portfolio and as a part of an overall investment strategy, which should incorporate risk and return objectives reasonably suitable to the particular investment fund.
3. In making and implementing investment decisions, the Oregon Investment Council and the investment officer have a duty to diversify the investments of the investment funds unless, under the circumstances, it is not prudent to do so.
4. In addition to the duties stated in subsection (3) of this section, the council and the investment officer must:
    a. Conform to the fundamental fiduciary duties of loyalty and impartiality;
    b. Act with prudence in deciding whether and how to delegate authority and in the selection and supervision of agents; and
    c. Incur only costs that are reasonable in amount and appropriate to the investment responsibilities imposed by law.
5. The duties of the council and the investment officer under this section are subject to contrary provisions of privately created public trusts the assets of which by law are made investment funds. Within the limitations of the standard stated in subsection (1) of this section and subject to subsection (6) of this section, there may be acquired, retained, managed and disposed of as investments of the investment funds every kind of investment which persons of prudence, discretion and intelligence acquire, retain, manage and dispose of for their own account.
6. Notwithstanding subsection (1) of this section, not more than 50 percent of the moneys contributed to the Public Employees Retirement Fund or the Industrial Accident Fund may be invested in common stock, and not more than 65 percent of the moneys contributed to the other trust and endowment funds managed by the Oregon Investment Council or the State Treasurer may be invested in common stock.
7. Subject to the standards set forth in this section, moneys held in the Deferred Compensation Fund may be invested in the stock of any company, association or corporation, including but not limited to shares of a mutual fund. Investment of moneys in the Deferred Compensation Fund is not subject to the limitation imposed by subsection (6) of this section. [1967 c.335 §7; 1971 c.53 §1; 1973 c.385 §1; 1981 c.880 §12; 1983 c.456 §1; 1983 c.466 §1; 1987 c.759 §1; 1993 c.18 §59; 1993 c.75 §1; 1997 c.129 §2; 1997 c.179 §22; 1997 c.804 §5; 2005 c.294 §1]

293.731 Council to formulate and review investment policies; exception. Subject to the objective set forth in ORS 293.721 and the standards set forth in ORS 293.726, the Oregon Investment Council shall formulate policies for the investment and reinvestment of moneys in the investment funds and the acquisition, retention, management and disposition of investments of the investment funds. The council, from time to time, shall review those policies and make changes therein as it considers necessary or desirable. The council may formulate separate policies for any fund included in the investment funds. This section does not apply to the Oregon Growth Account, the Oregon Growth Fund, the Oregon Growth Board, the Oregon Commercialized Research Fund, the Oregon Innovation Fund or the Oregon Innovation Council. [1967 c.335 §8; 1993 c.210 §20; 1999 c.42 §1; 1999 c.274 §18; 2001 c.835 §9; 2001 c.922 §§15a,15b; 2005 c.748 §§15,16; 2012 c.90 §§22,32; 2013 c.732 §8]

293.736 Duties of investment officer.

1. Except as provided in ORS 293.741, in amounts available for investment purposes and subject to the policies formulated by the Oregon Investment Council, the investment officer shall invest and reinvest

moneys in the investment funds and acquire, retain, manage, including exercise of any voting rights, and dispose of investments of the investment funds.

2. Subject to the direction of the council, the investment officer shall perform the functions described in subsection (1) of this section with respect to the investment in mutual funds of moneys in the Deferred Compensation Fund. The council must approve all mutual funds in which Deferred Compensation Fund moneys are invested. [1967 c.335 §9; 1997 c.179 §23; 2005 c.295 §1]

POLICY PROVISIONS

Definitions

Advisor: One or more independent third party (consultant) firms retained by the OIC and working in concert with Staff to provide expert investment counsel, due diligence, and ongoing portfolio monitoring.

Policy Statements

I. GENERAL POLICY

Portfolio investments provide an appropriate complement to OPERF's other investments, and are consistent with OPERF's general objectives, including:

A. Providing a means to pay benefits to OPERF participants and their beneficiaries;

B. Investing to produce a return based on prudent and reasonable levels of liquidity and investment risk;

C. Attaining an adequate real return over the expected rate of inflation; and

D. Complying with all applicable laws and regulations concerning the investment of pension assets.

Portfolio investments should exhibit differentiated (i.e., less correlated) returns relative to other Fund assets and therefore the Portfolio is expected to provide diversification benefits to the Fund.

Staff and the Advisor will provide the OST and OIC with an annual Portfolio investment review and strategy plan.

II. OBJECTIVES

A. **Strategic Role**

The Portfolio should provide enhanced, risk-adjusted returns and diversification to OPERF, and Portfolio investments are expected to comprise both shorter-term (1-3 years) and longer-term holdings, which may include inflation-oriented and real return-oriented strategies.

The Portfolio has no strategic target, and it may comprise no more than 3.0% of total Fund assets; moreover, any allocation to the Portfolio will not result in a range violation for or among the Fund's other, previously established strategic asset allocations.

B. **Investment Performance Objective**

The Portfolio's investment performance objective is long-term net returns to OPERF (i.e., after management fees and general partners' carried interest) above a benchmark comprised of the Consumer Price Index ("CPI") plus an appropriate premium to compensate for illiquidity, principal risk and related investment costs and expenses. Specifically, the Portfolio's performance objective is a return equivalent to CPI plus 500 basis points. OST Staff will periodically evaluate the Portfolio's performance objective and assigned benchmark.

C. **Diversification**

1. The Portfolio may be non-diversified, meaning that Staff may concentrate its investments. However, with the exception of cash, the Portfolio's allocation to a particular investment or partnership commitment cannot exceed, at the time of investment, 25% of the Portfolio's maximum allowable 3% total Fund allocation ceiling (i.e., 0.75% of OPERF).

2. Certain investments may be allocated to the Portfolio for incubation purposes and, if successful, may be recommended for transfer into one of the other, primary OPERF asset classes.

3. Investments will be diversified among a range of commitment sizes, generally with a minimum commitment of $75 million and a maximum commitment equal to 25% of any particular co-mingled partnership. Staff will document and report to the OIC any deviations from these guidelines.

4. Given the truly opportunistic nature and objective of the Portfolio, Staff expects its investments and partnership commitments will be highly episodic and inconsistent over time.

5. A low correlation between OPERF and Portfolio returns is expected over time.

III. OPPORTUNITY COMMITTEE

A. The Opportunity Committee or "Committee" acts on behalf of, and subject to the review of, OST. The Committee is comprised of the following individuals: the Deputy State Treasurer; the Chief Investment Officer (CIO); and an OIC member invited by the OST to participate as a voting member on the Committee. OST will consider input from the OIC in extending such invitations.

B. OST, through the Committee, may invest OPERF amounts up to and including $250 million per investment for new general partner, fund sponsor or manager relationships, and an amount up to and including $350 million for existing relationships, consistent with OIC policies (see Appendix B). If consideration of a particular investment opportunity is deemed urgent or otherwise less suited for presentation to the OIC, the CIO may seek OIC approval for Committee consideration of that particular investment opportunity.

C. The Committee will only exercise its investment authority by unanimous vote and acting upon a favorable due diligence determination by the Advisor. The Committee may only consider proposed investments if agreement exists between the Advisor and Staff that the proposed investment is consistent with Portfolio standards. Proposed investments or partnership commitments presented to the Committee are subject to review by OST, which may choose to cancel or refer such proposed investments or partnership commitments to the OIC for broader review and consideration.

D. In connection with a proposed investment or partnership commitment, Staff shall furnish any favorable due diligence determination, including the underlying rationale, market conditions and portfolio impact, to the OIC as soon as practical and at least two weeks prior to a Committee meeting called for purposes of considering the proposed investment or partnership commitment. If OST objects to the proposed investment or partnership commitment or is advised by any OIC member that he or she objects to the proposed investment or partnership commitment, OST will cancel the proposed investment or partnership commitment and determine whether or not Staff will bring same as a separate agenda item at a subsequent OIC meeting.

E. Staff shall report any investment or partnership commitment made by the Committee at the next, most feasible OIC meeting.

IV. OST STAFF AUTHORITY

The CIO, upon a favorable recommendation from both the Director of Alternative Investments and the Advisor, has authority to accomplish the following:

A. Approve OST administrative activities and guideline exceptions if a plan is established to conform the [project/investment/partnership] exception(s) to applicable guidelines within a reasonable period of time;

B. Acquire, retain, manage and dispose of investment or partnership interests consistent with the authority granted to the Office of the State Treasurer pursuant to ORS 293.736. Review and approve other activities as necessary to further the interests of the Portfolio consistent with its standards; and

C. Approve up to an additional $50 million to an existing investment or partnership commitment for the following purposes: (1) recapitalize the investment or partnership with additional equity; (2) acquire all or part of another manager's or limited partner's interest in an investment or partnership; (3) re-balance between or among investments or partnership commitments; or (4) co-invest alongside a partnership in an individual investment.

D. Any such additional investments or partnership commitments shall be on terms equal to or better than the existing terms.

Staff shall report any of the foregoing activities at the next, most feasible OIC meeting.

V. ADVISOR AND OST REQUIREMENTS

OST manages the Portfolio using a hybrid Staff/Advisor model. Specifically, and subject to budget limitations, OST will assign an appropriate number of Staff to manage Portfolio design and construction, the Portfolio's investment decision-making schedule and process, and the Advisor's contract. The OIC will retain a qualified, independent Advisor and will delegate to that Advisor substantial duties such as performing due diligence on investment opportunities, monitoring Portfolio investments, performing Portfolio analytics and valuation analyses and preparing current historical performance reports.

Staff retains the primary responsibility to ensure that Portfolio investments and prospective investments receive appropriate due diligence, monitoring, and valuation analyses. While some of these duties may be delegated to the Advisor, Staff will conduct and document sufficient reviews and tests of the Advisor's work as necessary to conclude that such delegated duties are performed consistently and appropriately by the Advisor.

VI. LEGAL COUNSEL

Staff will obtain relevant legal services from internal legal staff and/or Oregon Department of Justice (DOJ) personnel. However, due to the complex nature of Portfolio investments, OIC, OST and/or Staff will recommend internal legal or DOJ collaboration with expert, external legal counsel when deemed necessary or appropriate.

VII. MONITORING

A. **Reports**. The Advisor will furnish Portfolio activity and performance reports to Staff on both a quarterly and annual basis.

B. **Adherence to Strategy**. Staff and the Advisor will evaluate the actual strategy employed by investment managers or general partners relative to stated Portfolio objectives, strategies or other industry standards. The Advisor will interact with investment managers and general partners periodically and as necessary to verify adherence to such objectives, strategies and standards.

Exceptions

None

Failure to Comply

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

PROCEDURES and FORMS

Appendix A: Alternative Investments Valuation Policy

Appendix B: OIC/OST Alternative Investments Authority

Appendix C: OST Procedures for INV 703

Appendix D: OST Procedures: Contract Execution and Partnership Funding

ADMINISTRATION

Feedback

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

Attachments:

Appendix A: Alternative Investments Valuation Policy
Appendix B: OIC/OST Alternative Investments Authority
Appendix C: OST Procedures for INV 703
Appendix D: Contract Execution and Partnership Funding

Approval Signatures

Step Description	Approver	Date
	John Skjervem: Chief Investment Officer	06/2018
	Carmen Leiva: Operations Analyst	06/2018
	John Hershey: Director of Alternative Investments	05/2018

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Tobias Read
Oregon State Treasurer

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

TAB 6 – ESG Update

OPERF

ESG at OST

Presentation to Oregon Investment Council

October 30, 2019

Anna Totdahl
Investment Officer, ESG & Sustainability

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The Metamorphosis of ESG

1950s: Rise of institutional investment management; divestment from "sin" stocks

1960s: Socially Responsible Investing (SRI), aligning investments with morals/values (exclusionary screens)

1980s: First Socially Responsible mutual funds created

1970s-1990s: South Africa divestment campaign to protest Apartheid

2000s: Rise of corporate governance & proxy voting activism

- 2006 UN Principles for Responsible Investment (UNPRI) created
- Professionalism of engagement/shareholder advocacy efforts

2010s: Proliferation of ESG indices & data providers

- 2011 Sustainability Accounting Standards Board (SASB) formed

Integration: identification of ESG risks & opportunities

Terminology, an evolution

- Negative Screening
- Exclusionary Screening
- Responsible Investing
- Socially Responsible Investing
- Values-based Investing
- Ethical Investing
- Socially Conscious Investing
- Impact Investing
- Sustainable Investing
- ESG Investing

Scope of the ESG Role at OST

Peers
- How are they incorporating ESG?
- Best practices/lessons learned

Industry Organizations
- Who's doing good work?
- Who do we want to align ourselves with?

Data Providers
- Who are the providers?
- What are the best sources of data?
- What do we need/how will we use it?

Asset Class Incorporation
- How do we want to integrate ESG in each asset class?
- How does this differ between public/private markets?

Asset Managers
- What are they doing to incorporate ESG?

Risk Factors
- Identify potential ESG risk factors
- Evaluate existing portfolio for ESG risks

Research
- Current Research: Academic/Journal Articles
- Thought pieces/conferences/Interviews & Discussions

How we think about ESG

Investment Beliefs [1]

2. Asset Allocation Drives Risk and Return
   b. Portfolio construction, including diversification and correlation considerations, is essential to maximizing risk-adjusted returns.
      - Empirical rigor, coupled with sound judgment, is required in the portfolio construction process to effect true diversification, while discipline is required to maintain diversification through and across successive market cycles.
      - Risk is multi-faceted and may include, but is not limited to, the following types of specific risks: principal loss; opportunity cost; concentration risk; leverage and illiquidity risk; volatility and valuation risk; interest rate and inflation risk; and environmental, social and governance (ESG) risks.
8. Diversity, in All Aspects, is Accretive to Meeting OIC Objectives.
   a. By embracing and enhancing diversity and inclusion efforts, the OIC ensures that the investment program will be exposed to and informed by a wide range of perspectives, ideas and opinions.

Fiduciary Duty [2]

- The OIC and the Treasurer may consider statutory social factors in making an investment decision, but the OIC and Treasurer may select or reject an investment based on such factors only if the investment is equal to or superior to alternative investments when judged solely on the basis of its potential economic value.

Embedded Risks

- Utilizing appropriate empirical rigor, it is possible to identify and integrate ESG factors to improve the long-term risk adjusted return of a portfolio

Examples [3]:

- As a fiduciary to fund beneficiaries, Treasury applies industry best practices to its investment and asset allocation decisions. When and wherever possible, these decisions must be anchored by empirical data, such as institutional quality metrics developed by the Sustainable Accounting Standards Board (SASB). Treasury is a founding member of SASB's Institutional Advisory Group.
- Through its Council of Institutional Investors (CII) affiliation, Treasury amplifies its corporate governance agenda on behalf of Oregon's fund beneficiaries. The organization advocates for effective corporate governance, shareowner rights, and transparent and fair capital markets.

Progress to date – by Asset Class

All Treasury

Hosted a summer intern from *Girls Who Invest*

Public Equity

Manager meetings w/time dedicated to ESG
Evaluation of "menu" of ESG options
ESG Alignment in Proxy Voting (Jennifer Peet)

Fixed Income

Manager meetings w/time dedicated to ESG
Evaluation of ESG STIF options (Geoff Nolan)

Private Equity

Diversity-focused conversations with European GPs
30 Percent Coalition LP/GP roundtable
Manager ESG survey
ILPA Diversity & Inclusion Advisory Council (John Hershey)
Hosted NAIC workshop (Hershey/Skjervem/Zhuge) [4]

Real Estate

Physical Property Risk Exposure
Manager ESG survey
Responsible Contractor Policy (Jennifer Peet)

Alternatives

Manager ESG survey
Responsible Contractor Policy (Jennifer Peet)

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Physical Property Risk Assessment

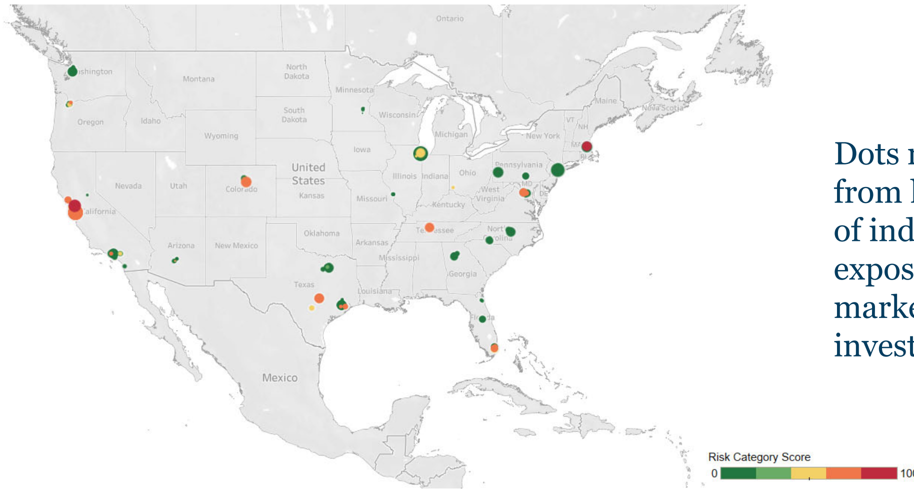
Risk of extreme climate events within the Real Estate Portfolio

- Assessed vs. five climate risk scenarios: Heat stress; Water Stress; Floods; Hurricanes/Typhoons; and Sea Level Rise
- Models assess projected exposure to climate hazards from 2030 to 2040 for each facility
- We can use results to evaluate long-term risk exposure of the portfolio holdings and engage with managers to improve asset resilience and risk mitigation

Climate Hazard	Description	Potential Business Impacts
Heat Stress	Increase in temperature	• Increased energy costs • Heightened risk of brownouts/power outages • Stress on human health/labor force
Water Stress	Change in water supply and demand	• Reduced water supply • Increased water costs • Social license to operate/reputation
Floods	Intense rainfall events and riverine floods	• Property and building damage • Compromised infrastructure • Business interruptions
Cyclones, Hurricanes, Typhoons	Exposure to past cyclones	• Severe property damage • Permanent loss of property value • Relocation costs
Sea level rise	Heightened storm surge, augmented by sea level rise	• Nuisance floods, property damage • Permanent loss of property value • Relocation costs

Physical Property Risk Assessment

Portfolio representation:



Dots represent results from highest risk scenario of individual property exposures, sized by market value of investment

Individual property-level results

By risk scenario:

Floods	Heat Stress	Hurricanes & Typhoons	Sea Level Rise	Water Stress
74	32	0	0	16

For floods, 50 is the threshold score at which sites are likely to experience flooding at a return interval of at least 1-in-500 years. Scores above this threshold generally indicate greater frequency and/or extent of flooding.

Subcategories provide a more granular breakdown of risk potential.

Subcategory breakdown of flood results:

Risk Subcategory	Measure Value	Units	Score
Absolute wet days	-1.5	difference in days	60
Historical flood frequency	1-in-75 year	return period of inundation	85
Historical flood severity	0.05 - 0.25 meter	inundation (m), 1-in-100-year event	75
Rainfall intensity	35.9	percent change in mm	59
Very wet days	9.3	count of days	40

Coming Soon

Support for PREA Foundation

To promote diversity within the institutional real estate investment community via collaboration with Sponsors for Educational Opportunity (SEO)

Manager Heatmaps by Asset Class

Qualitative assessment of managers' ESG efforts

Results will inform further dialogue with managers

Climate Change oriented Public Equity Strategy

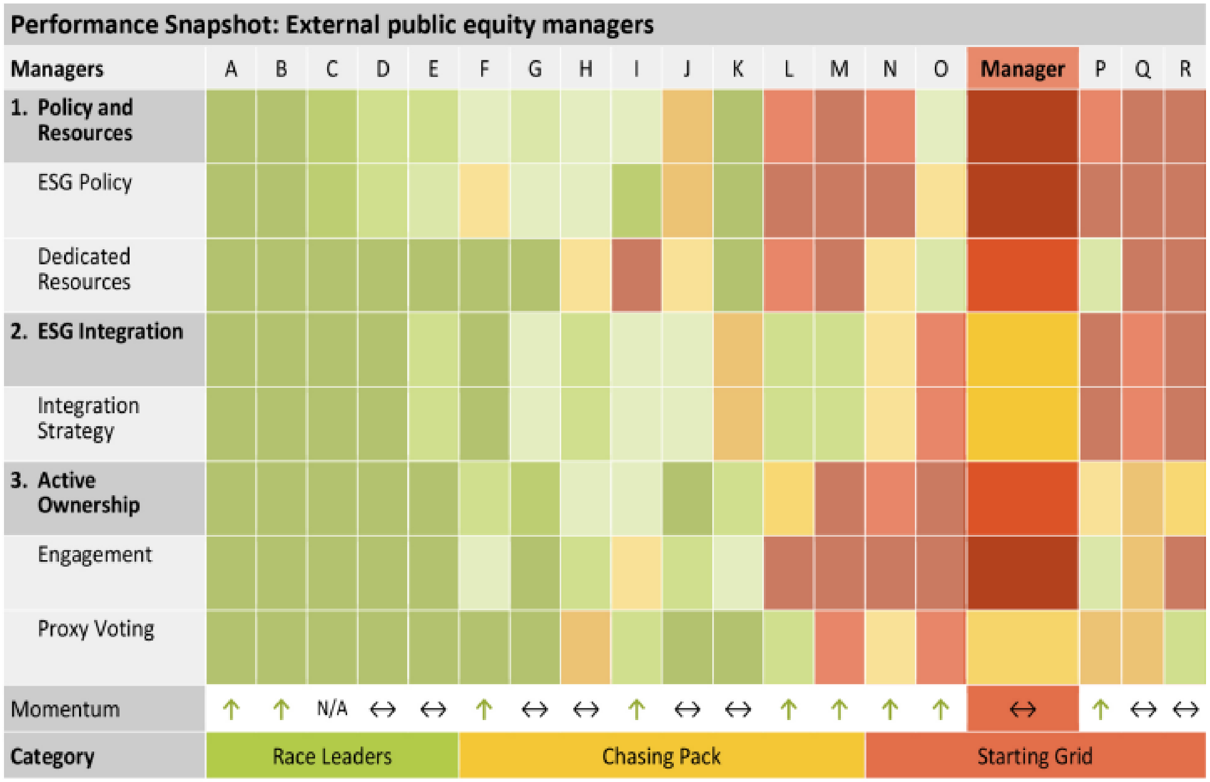
Evaluate public equity strategies that account for risks and opportunities related to the climate transition

Comprehensive Climate Change Strategy

Assess feasibility of implementing a cross-asset class climate change strategy

Sample Asset class ESG Appraisal heatmap

Source: Wespath Benefits and Investments *For illustrative purposes only*



Each category weighted to reflect views on relative importance (e.g., Policy & Resources - 25%; ESG Integration - 50%; Active Ownership - 25%)

Citations:

[1] Oregon Investment Council, Statement of OIC Investment and Management Beliefs; Revised @ 1/31/19 OIC meeting to include Diversity
https://www.oregon.gov/treasury/invested-for-oregon/Documents/Invested-for-OR-OIC-INV/Invested-for-OR-OIC-INV-1201--Statement-of-OIC-Invest-and-Mgmt-Beliefs.pdf

[2] State of Oregon, Department of Justice,
https://www.doj.state.or.us/wp-content/uploads/2017/06/op2010-3.pdf

[3] 2017 Oregon Sustainable Investing Stewardship Report,
https://www.oregon.gov/treasury/invested-for-oregon/Documents/Invested-for-OR-Sustainable-Investing-Stewardship/Invested-for-Oregon-Sustainable-Investing-Stewardship-2017.pdf

[4] The **National Association of Investment Companies** (NAIC) is a Washington DC-based trade **association** that serves as the largest network of diverse-owned and emerging private equity **firms** and hedge funds.

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Tobias Read
Oregon State Treasurer

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Salem, OR 97301-3896

oregon.gov/treasury

TAB 7 – Asset Allocations & NAV Updates

Asset Allocations at September 30, 2019

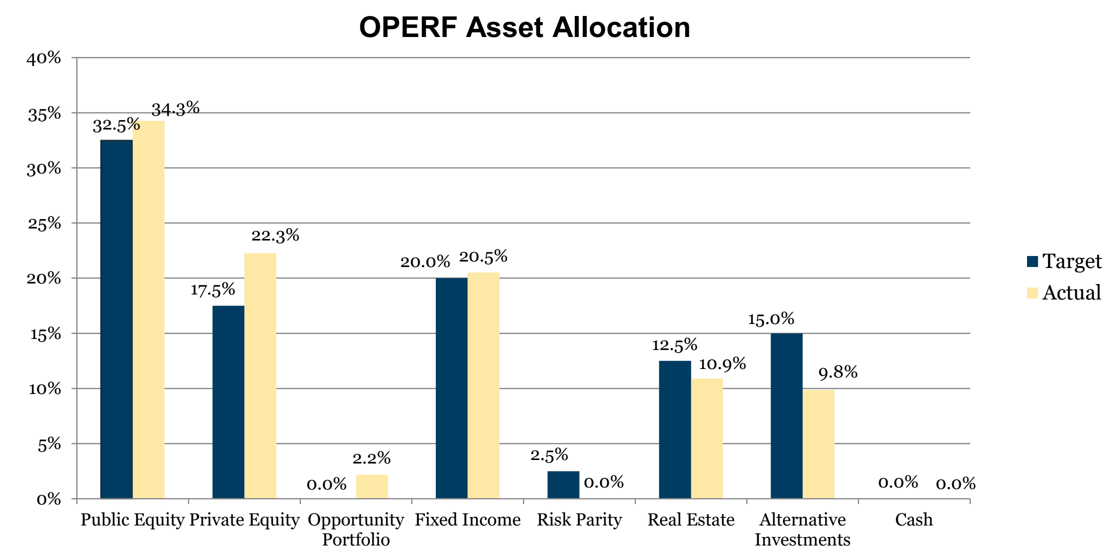
OPERF	Policy	Target[1]	Regular Account: $ Thousands	Regular Account: Pre-Overlay	Regular Account: Overlay	Regular Account: Net Position	Regular Account: Actual	Target Date Funds: $ Thousands	Variable Fund: $ Thousands	Total Fund: $ Thousands
Public Equity	27.5-37.5%	32.5%	25,662,890	33.3%	779,335	26,442,226	34.3%	1,031,549	460,717	27,934,492
Private Equity	13.5-21.5%	17.5%	17,188,196	22.3%		17,188,196	22.3%			17,188,196
Total Equity	**45.0-55.0%**	**50.0%**	**42,851,087**	**55.5%**	**779,335**	**43,630,422**	**56.5%**			**45,122,688**
Opportunity Portfolio	**0-3%**	**0.0%**	**1,678,094**	**2.2%**		**1,678,094**	2.2%			**1,678,094**
Fixed Income	**15-25%**	**20.0%**	**15,437,500**	**20.0%**	**389,808**	**15,827,308**	20.5%	1,385,636		**17,212,944**
Risk Parity	**0.0-2.5%**	**2.5%**	**-**	**0.0%**		**-**	0.0%			**-**
Real Estate	**9.5-15.5%**	**12.5%**	**8,412,353**	**10.9%**	**(6,500)**	**8,405,853**	10.9%			**8,405,853**
Alternative Investments	**7.5-17.5%**	**15.0%**	**7,598,481**	**9.8%**		**7,598,481**	9.8%			**7,598,481**
Cash[2]	**0-3%**	**0.0%**	**1,179,580**	**1.5%**	**(1,162,643)**	**16,937**	0.0%		9,019	**25,956**
TOTAL OPERF		**100%**	**$ 77,157,095**	**100.0%**	**$ -**	**$ 77,157,095**	**100.0%**	**$ 2,417,185**	**$ 469,736**	**$ 80,044,016**

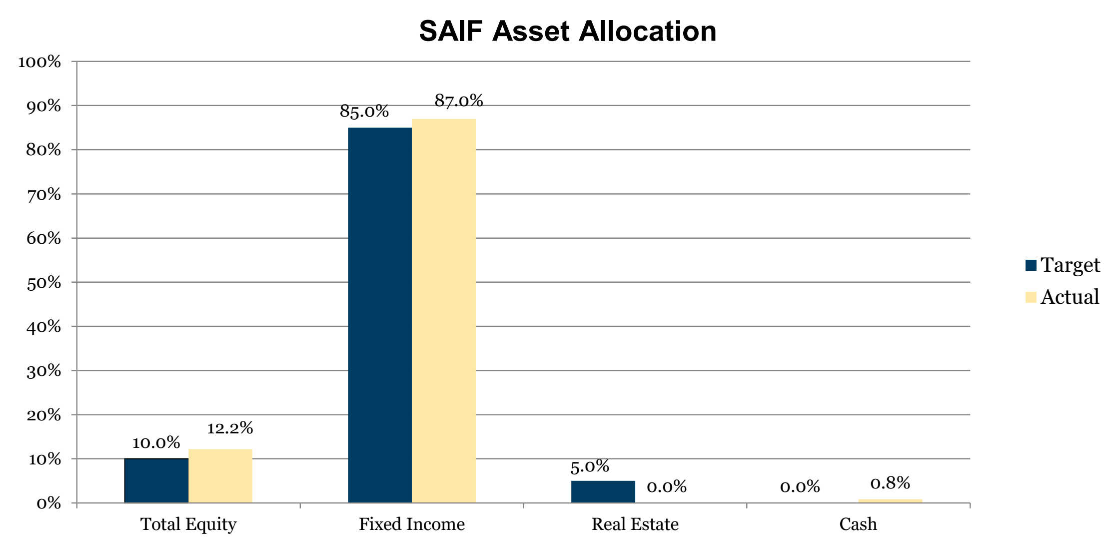
[1]Targets established in April 2019. Interim policy benchmark effective January 1, 2019, consists of: 37.5% MSCI ACWI IMI Net, 21% Custom FI Benchmark, 19% Russell 3000+300bps (1 quarter lagged), 12.5% NCREIF ODCE net (1 quarter lagged), & 10% CPI+400bps.

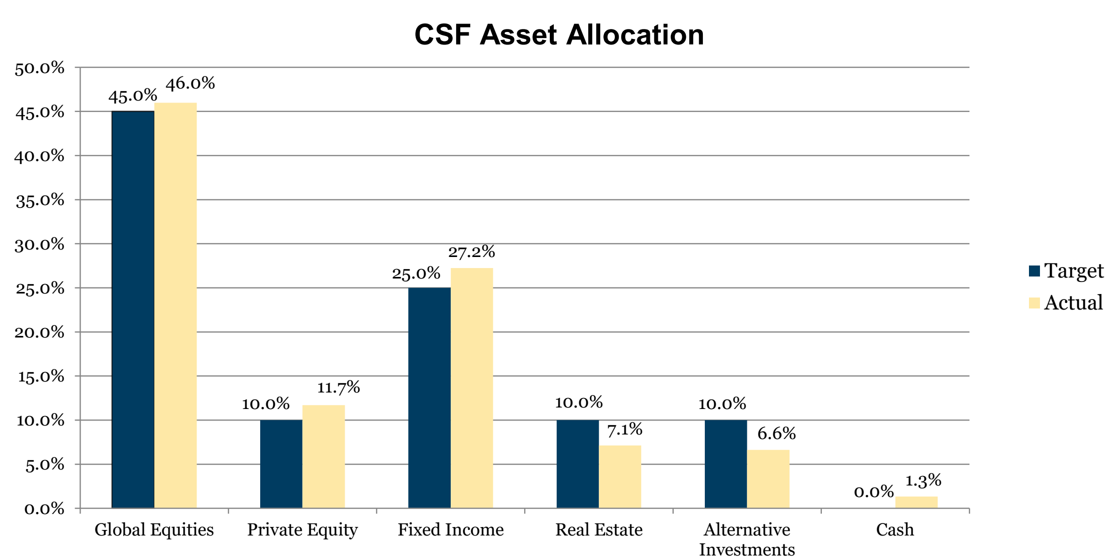
[2] Includes cash held in the policy implementation overlay program.

SAIF	Policy	Target	$ Thousands	Actual
Total Equity	**7-13%**	**10.0%**	**617,183**	**12.2%**
Fixed Income	**80-90%**	**85.0%**	**4,404,476**	**87.0%**
Real Estate	**0-7%**	**5.0%**	**-**	**0.0%**
Cash	**0-3%**	**0.0%**	**42,032**	**0.8%**
TOTAL SAIF			**$ 5,063,691**	**100.0%**

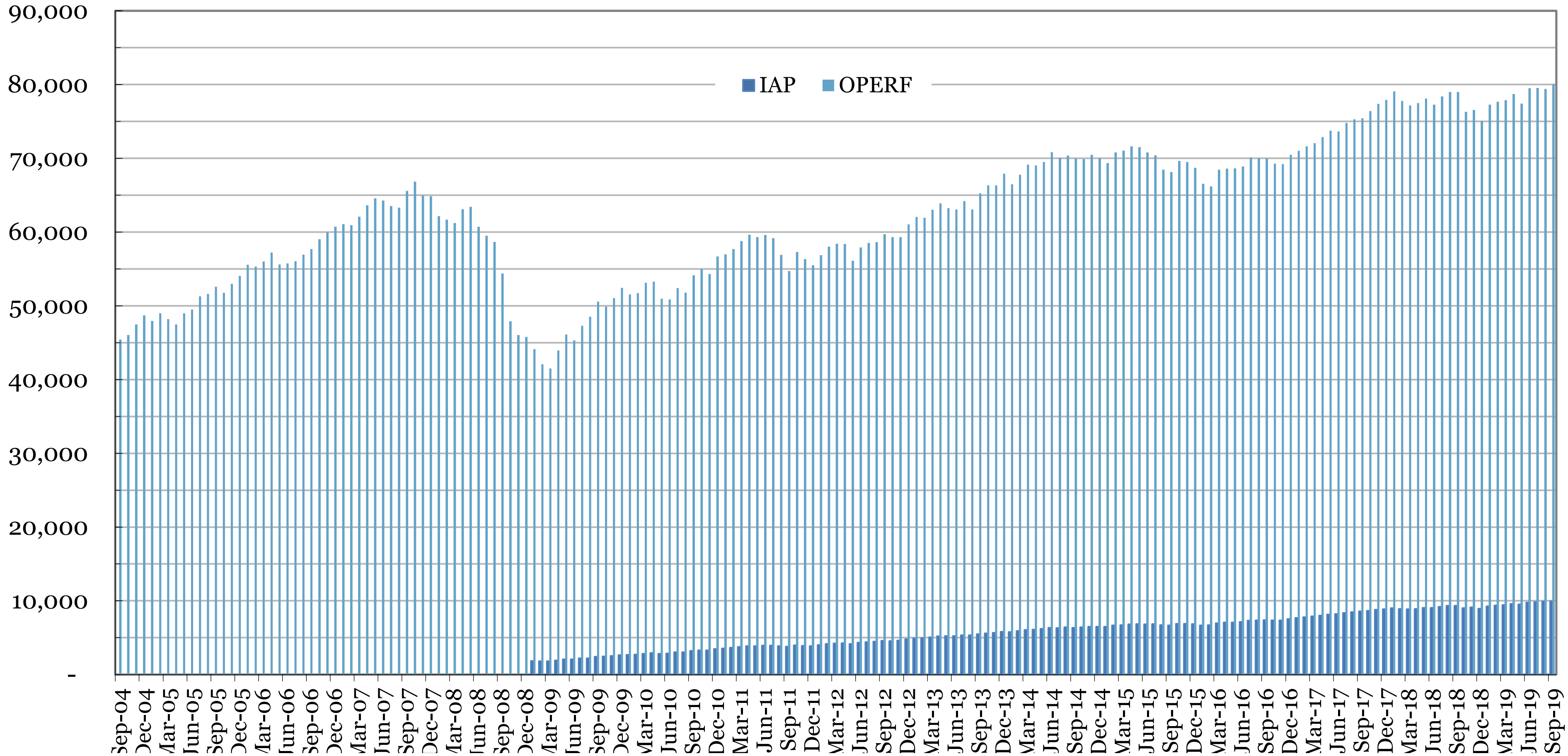
CSF	Policy	Target	$ Thousands	Actual
Global Equities	40-50%	45.0%	818,927	46.0%
Private Equity	8-12%	10.0%	208,198	11.7%
Total Equity	**58-62%**	**55.0%**	**1,027,125**	**57.7%**
Fixed Income	**25-35%**	**25.0%**	**484,943**	**27.2%**
Real Estate	**8-12%**	**10.0%**	**126,924**	**7.1%**
Alternative Investments	**8-12%**	**10.0%**	**117,988**	**6.6%**
Cash	**0-3%**	**0.0%**	**23,679**	**1.3%**
TOTAL CSF			**$ 1,780,658**	**100.0%**


OPERF Asset Allocation
40%
35%
30%
25%
20%
15%
10%
5%
0%
32.5%
34.3%
17.5%
22.3%
0.0%
2.2%
20.0%
20.5%
2.5%
0.0%
12.5%
10.9%
15.0%
9.8%
0.0%
0.0%
Public Equity
Private Equity
Opportunity Portfolio
Fixed Income
Risk Parity
Real Estate
Alternative Investments
Cash
Target
Actual

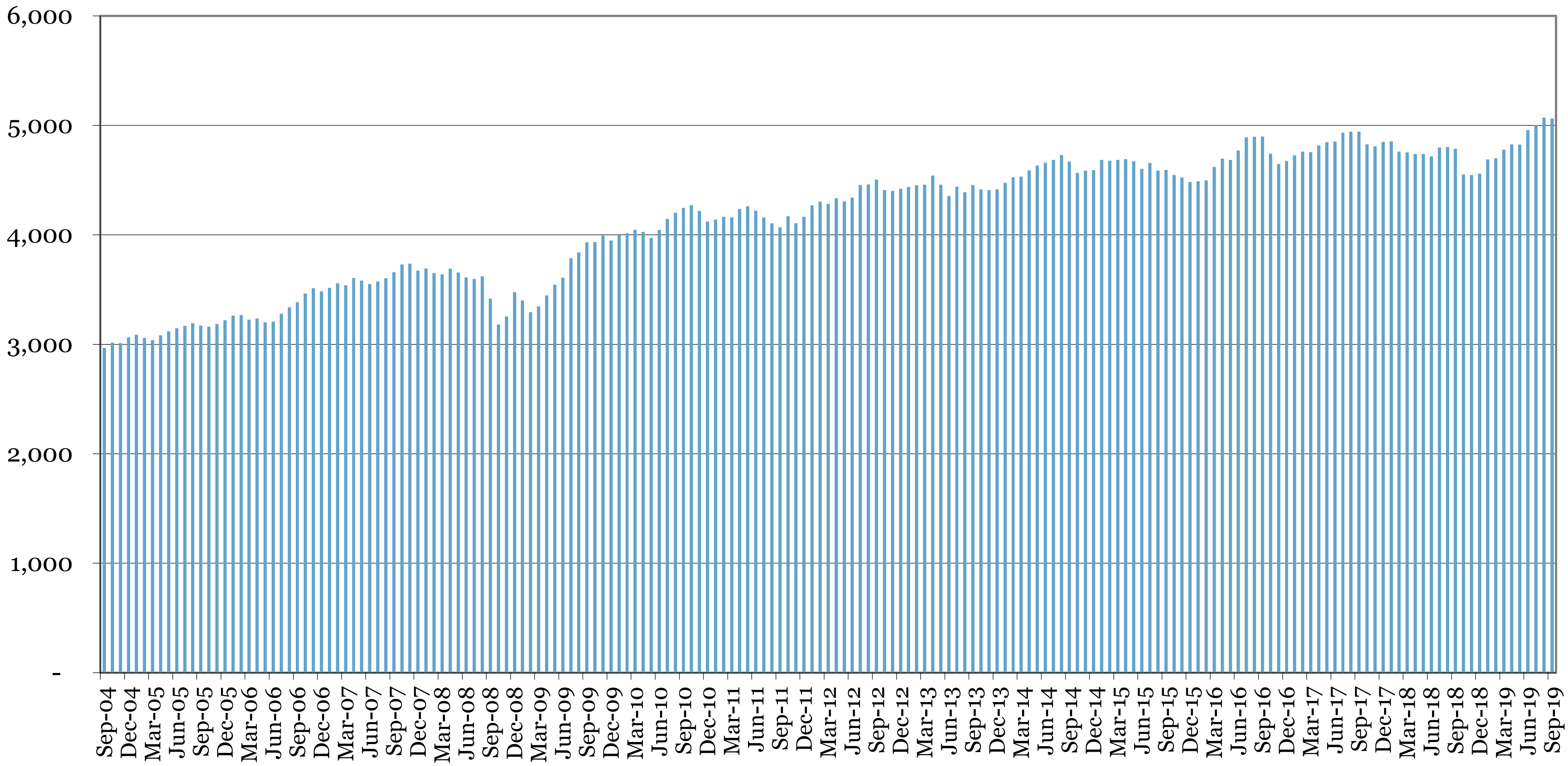

SAIF Asset Allocation
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10.0%
12.2%
85.0%
87.0%
5.0%
0.0%
0.0%
0.8%
Total Equity
Fixed Income
Real Estate
Cash
Target
Actual


CSF Asset Allocation
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
45.0%
46.0%
10.0%
11.7%
25.0%
27.2%
10.0%
7.1%
10.0%
6.6%
0.0%
1.3%
Global Equities
Private Equity
Fixed Income
Real Estate
Alternative Investments
Cash
Target
Actual

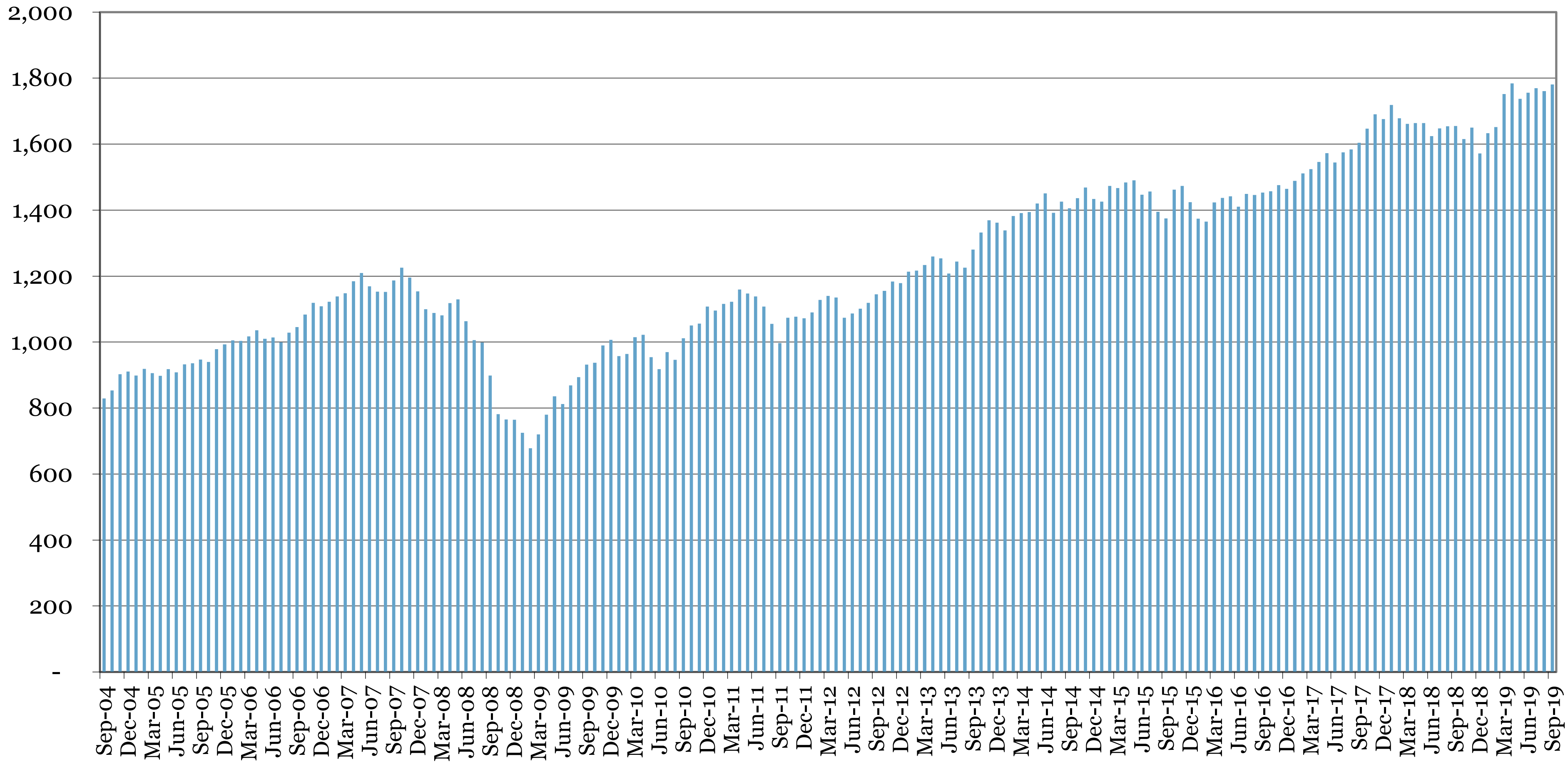
OPERF NAV
15 years ending September 30, 2019
($ in Millions)



SAIF NAV
15 years ending September 30, 2019
($ in Millions)



CSF NAV
15 years ending September 30, 2019
($ in Millions)



TAB 8 – Calendar — Future Agenda Items

2019/20 OIC Forward Calendar and Planned Agenda Topics

December 11, 2019	Fixed Income Program Review Risk Parity Manager Recommendation Q3 Performance & Risk Report Policy Updates OIC Governance Discussion
January 30, 2020:	2021 OIC Calendar Approval Private Equity Program Review Public University Fund Update Placement Agent Report IAP Update
March 11, 2020:	Liquidity Update & Analysis CSF Annual Review Real Estate Portfolio Review Q4 2019 Performance & Risk Report
April 22, 2020:	Asset Allocation & Capital Market Assumptions Update SAIF Annual Review Real Estate Consultant Recommendation Overlay Review
June 3, 2020	Alternatives Portfolio Review Securities Lending Update Q1 Performance & Risk Report Operations Update
September 9, 2020	Opportunity Portfolio Review OSGP Annual Review Corporate Governance Update Q2 Performance & Risk Report
October 28, 2020	Currency Overlay Review ESG Update Public Equity Program Review