
Oregon Investment Council

November 1, 2017
9:00 AM

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

Rukaiyah Adams
Chair

John Skjervem
Chief Investment Officer

Tobias Read
State Treasurer



OREGON INVESTMENT COUNCIL



Agenda

November 1, 2017
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>
9:00-9:02	1. Review & Approval of Minutes September 20, 2017	Rukaiyah Adams <i>OIC Chair</i>	1
9:02-9:10	2. Committee Reports and CIO Remarks	John Skjervem <i>Chief Investment Officer</i>	2
9:10-9:50	3. Novalpina Capital Partners I SCSp <i>OPERF Private Equity Portfolio</i>	Michael Langdon <i>Senior Investment Officer, Private Equity</i> Stephen Peel <i>Founding Partner, Novalpina</i> Tom Martin <i>Managing Director, TorreyCove Capital Partners</i>	3
9:50-10:30	4. BlackRock Style Advantage <i>OPERF Alternatives Portfolio</i>	Mike Mueller <i>Investment Officer, Alternatives</i> Ked Hogan, PhD <i>Managing Director, Chief Investment Officer, BlackRock, Inc.</i> Jim Callahan <i>Executive Vice President, Callan Associates</i>	4
10:30-10:40	----- BREAK -----		
10:40-11:20	5. Adrian Lee & Partners <i>OPERF Currency</i> <i>Overlay Program</i>	Karl Cheng <i>Senior Investment Officer, Portfolio Risk & Research</i> Jiangning (Jen) Plett <i>Senior Investment Analyst</i> Adrian Lee <i>President & CIO, Adrian Lee & Partners</i> Philip Lawson <i>Head of Portfolio Management, Adrian Lee & Partners</i> Janet Becker-Wold <i>Senior Vice President, Callan Associates</i> Andy Iseri <i>Senior Vice President, Callan Associates</i>	5

Rukaiyah Adams
Chair

John Russell
Vice Chair

Rex Kim
Member

Rick Miller, Jr.
Member

Tobias Read
State Treasurer

Steve Rodeman
PERS Director

TAB 1 – REVIEW & APPROVAL OF MINUTES

September 20, 2017 Regular Meeting



STATE OF OREGON
OFFICE OF THE STATE TREASURER
16290 SW UPPER BOONES FERRY ROAD
TIGARD, OREGON 97224

OREGON INVESTMENT COUNCIL
SEPTEMBER 20, 2017
MEETING MINUTES

Members Present: Rukaiyah Adams, Tobias Read, John Russell, Rex Kim, Rick Miller and Steve Rodeman

Staff Present: John Skjervem, Perrin Lim, David Randall, Deena Bothello, Karl Cheng, May Fanning, Michael Langdon, Jen Plett, Jen Peet, James Sinks, Michael Viteri, Tony Breault, Amanda Kingsbury, Austin Carmichael, Dana Millican, Ricardo Lopez, Jo Recht, Ben Mahon, Debra Day, Tom Lofton, Angela Schaffers, Priyanka Shukla, Roy Jackson, Garrett Cudahey, Mike Mueller, Steven Chang, Andy Coutu, Cassie Lallack, Dmitri Palamateer, Kim Olson, Aliese Jacobsen, William Hiles, Cassie Lallak, Amy Wojcicki

Consultants Present: Tom Martin, Nic DiLoretta, David Fan, (TorreyCove); Allan Emkin, Christy Fields (PCA); Jim Callahan, Uvan Tseng, Janet Becker-Wold (Callan)

Legal Counsel Present: Dee Carlson, Oregon Department of Justice

The September 20th, 2017 OIC meeting was called to order at 8:59 am by Rukaiyah Adams, OIC Chair.

I. 9: 01am Review and Approval of Minutes

MOTION: Treasurer Read moved approval of the August 9th, 2017 OIC meeting minutes, and Mr. Kim seconded the motion which then passed by a 5/0 vote.

II. 9:06 am Committee Reports and CIO Update

Committee Reports: John Skjervem, OST Chief Investment Officer gave an update on the following committee actions taken since the August 9, 2017 OIC meeting:

Private Equity Committee

September 5, 2017	GTCR XII	\$150 million
September 5, 2017	Francisco Partners V	\$250 million

Alternatives Portfolio Committee

August 17, 2017	NGP Natural Resources XII	\$250 million
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Opportunity Portfolio Committee

None

Real Estate Committee

None

Mr. Skjervem then gave opening remarks which included comments on the Alternatives Manager Presentations as well as the Individual Account Program (IAP). He also mentioned that staff would present follow-up policy recommendations for the Common School Fund, Real Estate and Fixed Income portfolios, and high-lighted the importance of the annual CEM Benchmarking report.

- III. **09:54 am Stonepeak Infrastructure Partners III, L.P. – OPERF Alternatives Portfolio**
Ben Mahon, Senior Investment Officer, Alternatives recommended approval of a \$400 million commitment to Stonepeak Infrastructure Fund III, L.P. (“Stonepeak III”) for the OPERF Alternatives Portfolio, subject to the satisfactory negotiation of all terms and conditions with Staff working in concert with legal counsel. Mr. Mahon then introduced Mr. Michael Dorrell and Trent Vichie, Senior Managing Directors & Co-Founders who provided the Council with a presentation on the Fund, their firm and their firm’s strategy.

Stonepeak Infrastructure Partners is an independently-owned investment firm formed in 2011 by Mike Dorrell and Trent Vichie, formerly of The Blackstone Group and Macquarie. Oregon’s relationship with Stonepeak dates back to 2012, when the OIC committed \$100 million to Stonepeak Infrastructure Fund I, L.P. (“Stonepeak I”). A subsequent \$400 million commitment was made to Stonepeak Infrastructure Fund II, L.P. (“Stonepeak II”) in 2015. Thus, this proposed investment would represent the OIC’s third Stonepeak fund commitment. The Firm’s focus with Stonepeak III will be on middle-market, value-add infrastructure investments, a strategy that complements OPERF’s existing infrastructure portfolio, which is currently tilted toward larger infrastructure assets or more opportunistic strategies.

MOTION: Mr. Russell moved approval of staff’s recommendation, and Mr. Miller seconded the motion which then passed by a 5/0 vote.

- IV. **10:32 am J.P. Morgan Systematic Alpha – OPERF Alternatives Portfolio**
Mike Mueller, Investment Officer, Alternatives recommended approval of a \$500 million commitment (comprised of an initial investment of \$250 million with additional funding at Staff discretion) to the JP Morgan Asset Management (“JPMAM”) Systematic Alpha (“SA”) strategy for the Diversifying Strategies sleeve of the OPERF Alternatives Portfolio, subject to the satisfactory negotiation of terms and conditions with Staff working in concert with legal counsel. This proposed commitment represents a new investment manager relationship on behalf of the OPERF Alternatives Portfolio.

Mr. Mueller then introduced Mr. Yazann “Yaz” Romahi, CIO, Quantitative Strategies and Mr. Darren Smith, Managing Director who provided the Council with a presentation on their firm and its SA strategy. JPMAM, with \$1.5 trillion in assets under management, has managed dedicated alternative risk premia strategies since 2009, with nearly \$4 billion of AUM in those strategies today. JPMAM’s SA strategy will provide OPERF with complementary manager diversification in the risk premia space, and increase OPERF’s exposure closer to the OIC’s Diversifying Strategies target allocation.

MOTION: Treasurer Read moved approval of staff’s recommendation, and Mr. Kim seconded the motion which then passed by a 5/0 vote.

- V. **11:53 am AB Individual Account Program (IAP) Presentation – OPERF**
Dave Randall, Director of Investment Operations and Karl Cheng, Senior Investment Officer, Portfolio Risk & Research submitted to The Council the following recommendations for the Individual Account Program:

1. Retain AB for glide path design and management;
2. Approve AB’s proposed glide path and corresponding creation of ten specific Target Date Funds;
3. Retain State Street Global Advisors to manage certain index strategies for inclusion in the proposed Target Date Fund series;

4. Create a new Individual Account Program fund that invests solely in the Oregon Short Term Fund; and
5. Update the recently-approved Individual Account Program policy.

The Individual Account Program (“IAP” or the “Program”) is a member-funded Defined Contribution Retirement Plan created by the Oregon Legislature in 2003. Since inception, IAP assets have been invested alongside of defined benefit pension assets and represent a growing fraction of the Oregon Public Employees Retirement Fund (OPERF). As of June 2017, IAP comprised \$8.2 billion or 11.3% of total OPERF net asset value.

Oregon State Treasury (OST) and the Public Employees Retirement System (PERS) staff have collaborated for the past two years to improve IAP so its investments would better match the risk-return profile of the Program’s approximately 250,000 individual participants. To that end, the Council approved at its August 2017 meeting a policy directing staff to establish a set of Target-Date Funds (TDFs) available for PERS to assign to each Program participant.

MOTION: Treasurer Read moved approval of staff’s recommendation, and Mr. Russell seconded the motion which then passed by a 5/0 vote.

VI. 12:05 pm Common School Fund – Asset Allocation Recommendation

Mike Viteri, Senior Investment Officer, Public Equity, and Janet Becker-Wold, Callan Associates recommended approval of the following asset allocation targets and ranges for the Common School Fund (CSF):

Common School Fund	Current Target	Current Ranges	Proposed Target	Proposed Ranges
Global Equity	60%	50% - 70%	45%	40% - 50%
Private Equity	10%	0% - 12%	10%	8% - 12%
Fixed Income	30%	25% - 35%	25%	20% - 30%
Real Assets	0%	N/A	10%	8% - 12%
Diversifying Strategies	0%	N/A	10%	8% - 12%
Cash	0%	0% - 3%	0%	0% - 3%

10 Yr Expected Return (Geo Mean)	6.5%
Projected Standard Deviation	14.5%

6.6%
13.2%

Source: Callan 2017 Capital Market Assumptions.

This recommendation is consistent with existing policy and practice in OPERF as well as the following excerpts from INV 1201: Statement of OIC Investment Management and Beliefs:

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

MOTION: Treasurer Read moved approval of staff’s recommendation, and Mr. Kim seconded the motion which then passed by a 5/0 vote.

VII. 12:11 pm LaSalle REIT Mandate Revision – OPERF Real Estate Portfolio

Austin Carmichael, Investment Officer, Real Estate and Amanda Kingsbury, Senior Investment Analyst, recommended amending OPERF’s investment mandate with LaSalle Investment Management to a more narrowly defined universe of niche, publicly-traded real estate securities (“REITs”) in order to meet the revised role of REITs within the OPERF real estate portfolio. A customized benchmark consisting of diversifying real estate asset types was also proposed for this sub-portfolio.

MOTION: Mr. Russell moved approval of staff's recommendation, and Treasurer Read seconded the motion which then passed by a 5/0 vote.

VIII. 12:20 pm Fixed Income Policy Update – OITP

Tom Lofton, Investment Officer, Fixed Income recommended guideline changes for the Oregon Intermediate Term Pool (OITP) to enable more efficient and effective portfolio management. OITP's market value was \$114.09 million as of July 31, 2017, and its benchmark is the Bloomberg Barclays 3-5 year U.S. Aggregate index. As described in his remarks, Mr. Lofton said Staff now seeks guideline changes to better manage OITP's risk and return profile relative to its benchmark.

MOTION: Treasurer Read moved approval of staff's recommendation, and Mr. Russell seconded the motion which then passed by a 5/0 vote.

IX. 12:35 pm CEM Benchmarking Annual Report – OPERF

Karl Cheng introduced Mr. Mike Heale, Principal, who presented the OPERF investment cost analysis performed by CEM Benchmarking Inc. ("CEM") for both the calendar and five-year period ended December 31, 2016.

X. 12:54 pm Q2 2017 Performance & Risk Report – OPERF

Karl Cheng and Uvan Tseng, Callan Associates presented an OPERF performance and risk report for the period ending June 30, 2017.

XI. 12:55 pm Asset Allocation & NAV Updates

Mr. Skjervem reviewed asset allocations and NAVs across OST-managed accounts for the period ended July 31, 2017.

XII. 12:55 pm Calendar — Future Agenda Items

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

XIII. 12:58 pm Open Discussion

Ms. Adams, OIC Chair, had proposed earlier in the year to discuss investment complexity and whether or not the OIC has been rewarded for OPERF's increased complexity. She suggested complexity as the focus for the strategic issues discussion planned for the November 1 OIC meeting. Ms. Adams also wanted to hear from other Council member's and get their thoughts on this and any other topics that should be considered for the November discussion.

Treasurer Read noted that Ms. Adams is the only current member who participated in the development of the Council's current investment beliefs and that re-examining those beliefs would be a worthwhile discussion topic.

Mr. Kim said he would like to see the OIC and Treasury investment staff aspire to become "best in class" but that such aspirations most likely require an approach different from peers. He then asked rhetorically, "how are we different" and/or "how should we be different" in the future? Mr. Kim added that he doesn't know the pension landscape as well as others, but does wonder how much OPERF is starting resemble its peer funds, and noted that peer funds "are certainly starting to look more like" OPERF. "So what are we doing," he asked, to stay ahead of the curve?

11:39 am Public Comments

1. Michael Pineschi, Researcher with Unite Here, along with workers from two different Brookfield-owned properties urged the Council to ask Brookfield to engage constructively with its workforce at the Hard Rock Hotel and Casino in Las Vegas and ensure a fair process in deciding whether or not those workers should unionize.
2. Diane Freaney of Rooted Investing shared some thoughts and emphasized her desire for more transparency into OIC-directed investments.

Ms. Adams adjourned the meeting at 1:13 pm.

Respectfully submitted,

May Fanning

May Fanning
Executive Support Specialist

DRAFT

TAB 2 – Committee Reports and CIO Remarks

Opening Remarks

John D. Skjervem, Chief Investment Officer

November 1, 2017



Oregon State Treasury

November 1, 2017 OIC Meeting

Private Equity Manager Recommendation

- An example of OR brand power and program differentiation

Alternatives Manager Recommendation

- Diversifying Strategies build-out progressing per plan
- Timely juxtaposition with equity market highs
- By year-end, 85% implemented

Currency Manager Recommendation

- Unhedged foreign currency exposure = a material and uncompensated risk
- Hedging foreign currency exposure invokes other costs and trade-offs
- Pursuing “path of least regret”

Public Equity Review

- Structural evolution complete
- Recalibrate performance expectations
- Benchmark changes for four mandates

Strategic Issues Discussion

- Complexity as proxy for diversification
- 3-part series!

TAB 3 – Novalpina Capital Partners I SCSp
OPERF Private Equity Portfolio

Novalpina Capital Partners I, SCSp

Purpose

Subject to satisfactory negotiation of all terms and conditions with Staff working in concert with legal counsel, Staff recommends approval of an up to €200 million capital commitment to Novalpina Capital Partners I, SCSp (“Novalpina I”, “Fund I” or the “Fund”) as part of the OPERF private equity portfolio. Approval of the proposed commitment would create a new relationship with Novalpina Capital LLP (“Novalpina”, the “Firm” or the “GP”).

Background

Stephen Peel, Stefan Kowski, and Bastian Lueken are forming Novalpina with the vision of creating a best-in-class, European private equity firm focused on value investing in complex situations. The new partnership will build on a shared experience and heritage among the Founders of nearly two decades during which they built and led Europe- and Asia-based private equity platforms for some of the world’s leading private equity franchises. Most notably, the Founders shared long tenures at TPG where they helped establish, develop, and manage that firm’s non-U.S. private equity investment practice at the most senior level. Based on that shared experience, Novalpina will be built on a culture of focus, alignment, collaboration, and innovation. The Founders are thoughtfully building an investment team of 20 professionals, initially all based in London. That team is being formed in an extremely deliberate manner based on a highly developed view of culture and strategy. Novalpina is targeting €1 billion for its debut fund, and the GP anticipates making a material commitment of €75 million to the partnership.

Strategy

In Fund I, Novalpina will target control investments in quality, middle market business at attractive valuations by capitalizing on transactional and operational complexity. The Fund will target a concentrated portfolio of 7-9 investments of €75-200 million in companies with enterprise values of €200-500 million. The Firm will target opportunities across Western Europe with a focus on the DACH, UK, and French markets. The Founders’ collective background and experience informs a strategy focusing on industries and markets in transition where value can be accessed via process and/or capital structure complexity. The GP will seek to unlock such opportunities based on thematic sector research building on deep networks and complemented by a small but impressive roster of Senior Advisors. Novalpina’s approach to performing deep and detailed due diligence as well as driving impactful value creation initiatives early in the ownership period partially relies on accessing cutting edge data science techniques. The heavy use of such analytics is relatively novel in the private equity industry.

Issues to Consider

Attributes:

- *Experienced Founder Group* – As noted above, the three Founding Partners bring nearly 20 years of shared experience and half a century of aggregate experience as private equity investors. In the late 1980s, Stephen Peel was among a small group of early pioneers pursuing cross-border buyouts in Europe while part of Goldman Sachs’ Private Investment Area. In 1997, Mr. Peel joined TPG as a founding member of TPG’s first international office in London, and over the next decade plus he built out that firm’s international platform first in Western Europe and then in Turkey and Russia. Finally, in 2008 he moved to Hong Kong to oversee TPG’s expansive Asia platform until his departure in 2014. While at TPG, Mr. Peel was a senior partner participating on both the global management and investment committees. Also at TPG, Stefan Kowski worked closely with Stephen Peel from 2006 to 2014 in both Europe and Asia before moving to the European arm of Centerbridge in 2014. Likewise, Bastian Lueken also worked closely with Messrs. Peel and Kowski during his tenure on TPG’s London based investment team from 1999 to 2009. After leaving TPG, Mr. Lueken joined Platinum Equity as a Managing Director overseeing that firm’s European investment activities.

- *Solid Pre-Novalpina Track Record* – Since the late 1980s, Novalpina’s Founders have developed deep track records leading private equity investments across multiple economic cycles, industry sectors, business geographies, and deal types. This experience includes \$3.3 billion invested in 14 European transactions across seven countries. Those investments which cross Novalpina’s target geographies have generated solid results. Further information on Novalpina’s pre-fund track record can be found in the TorreyCove materials.
- *Portfolio Fit* – In recent years, the OIC with the support of Staff and TorreyCove has deliberately targeted opportunities to replenish OPERF’s GP roster and reshape its exposure in Europe. Several of the program’s legacy relationships have moved up in target deal size and increasingly pursue global mandates thus reducing the strict emphasis on Western Europe. Further, Staff finds it challenging to access quality European middle market exposure given the OPERF private equity program’s target commitment size. Finally, the vast majority of OPERF’s exposure in Europe targets a core or growth orientation. On this basis, Novalpina presents an attractive and complementary proposition. The Firm’s core focus on complex value opportunities across the European middle market addresses a portfolio construction need for OPERF. The opportunity to step in early as an anchor investor in Novalpina’s initial partnership also positions the Oregon program to create exposure at scale today as well as in subsequent funds.

Concerns:

- *First Time Fund Risk* – While the profile of the founding team at Novalpina is impressive, this is a new manager, and Fund I will represent the Founders’ inaugural effort running their own firm. [Mitigant: First time fund risk is unavoidable when backing emerging managers, but very few emerging managers are led by a founding team as experienced and accomplished as Novalpina’s. This investment proposal is a unique opportunity to back a team of professionals with an impressive pedigree and an extensive history of having collaborated closely. The Founding Partners reference very strongly in the industry, and their clear vision for the GP they want to build and how it will create returns is far more developed than one would generally expect from a new manager. For those reasons, Staff has higher conviction in the attractiveness of this opportunity than we would generally expect to develop in a first time GP.]
- *Scale Commitment to an Emerging Manager* – The proposed commitment of €200 million is nearly consistent with the average commitment of \$250 million that OIC makes with more established managers, and, as such, is a seemingly large commitment for a first time fund. [Mitigant: On a standalone basis, this recommendation represents a significant exposure to a new manager, but in the context of the broader private equity program represents a very controlled risk. In an effort to focus and balance the OPERF private equity portfolio, Staff has made great efforts to concentrate all commitments around an average commitment size of \$250 million whenever possible. This focus allows for a more concentrated GP roster and reduced reliance on any single relationship. It further positions each GP relationship for controlled growth down the road to support the program’s scale in years to come. With that as a foundation, the OIC has been committing to OPERF private equity investments at a pace of \$2.5-3.5 billion per annum with projected commitments across a three-year cycle of roughly \$10 billion. On that basis, a commitment of €200 million to Novalpina becomes highly palatable. Further, stepping up at this size with a highly complementary portfolio fit enables access to a privileged, anchor allocation in Fund I and positions OPERF for similar, preferred allocations in the future.]

Terms

Legal negotiations are not yet final, but Staff considers Fund I terms attractive. Additional detail on proposed terms can be found in the TorreyCove materials, and Staff has interfaced with Park Hill, the placement agent Novalpina engaged for the Fund I capital raising process.

Conclusion

Staff recommends a capital commitment of up to €200 million to Novalpina Capital Partners I, SCSp, which represents, in Staff's opinion, an attractive European investment opportunity for the OPERF private equity program.



MEMORANDUM

TO: Oregon Public Employees Retirement Fund (“OPERF”)
FROM: TorreyCove Capital Partners (“TorreyCove”)
DATE: October 25, 2017
RE: Novalpina Capital Partners I, SCSp (“Fund I”, or the “Fund”)

Strategy:

Fund I is being formed to continue the value-based, control oriented buyout strategy pursued by the Founding Partners in their prior roles at TPG, Centerbridge, and Platinum. The primary difference with Novalpina’s strategy is that it will be applied to the less competitive, more fragmented mid-market segment in Europe. Novalpina’s value-based investment strategy is predicated on acquiring good businesses at attractive prices by capitalizing on both transactional and operational complexity. When the Founding Partners refer to transactional complexity, they mean businesses where: (i) there are multiple stakeholders with divergent interests; (ii) innovative financing and/or structuring are required; and (iii) negotiations are expected to be challenging and protracted. Given the Firm’s focus on operational complexity, transactions will typically take the form of buyouts of founder-owned companies or corporate carve-outs; however, the Firm will also opportunistically pursue buyouts of sponsor-owned companies. Novalpina may also invest in businesses requiring growth, replacement, or acquisition capital. Further, the Fund may make investments in credit instruments higher up in the capital structure either alongside or prior to an equity-related investment with a view toward exercising influence or control.

With regard to sectors of focus, Novalpina will not have any specific allocation targets. Instead, the Firm will apply a thematic approach to identify certain sectors or sub-sectors that are undergoing rapid and disruptive change. Themes currently seen as disruptive to the market that are being considered include: (i) the transition from thermal to renewable energy; (ii) outsourcing of health services; (iii) the fallout from the drop in commodity prices; (iv) the digitalization of commerce and the disruption of manufacturing due to robotics and artificial intelligence; (v) the roll out of industry-specific EU regulations; and (vi) the recap of the European banking sector. Alongside industry executives and selected consultants, the Firm will work to develop a detailed market map of a particular sector or sub-sector being affected by these underlying themes. With regard to geography, Novalpina will pursue a pan-European strategy with a particular focus on the core markets of the U.K., Germany, and France.

The Firm will pursue a relatively concentrated portfolio of between seven and nine platform investments that will require between €75.0 million and €200.0 million of equity per transaction. These companies will generally have enterprise values between €200.0 million and €500.0 million. Novalpina believes that companies operating in this segment of the market are typically below the minimum investment size for larger funds in the space but still exhibit the required scale to be competitive in pan-European or global markets. Novalpina is targeting a 20% to 30% gross IRR and a 2.5x gross MOIC on its investments.

Please see attached investment memorandum for further detail on the investment opportunity.



Allocation:

A new commitment to the Fund would be allocated 100% to the Corporate Finance investment sub-sector and will further be categorized as an International investment. As of the June 30, 2017 report, OPERF's allocation to Corporate Finance is listed in the table below. It is important to note that since allocation is based on fair market value, a commitment to the Fund would not have an immediate impact on OPERF's current portfolio allocation. Commitments to the Fund are complementary to OPERF's existing fund commitments and provide the overall portfolio with a further degree of diversification.

As of June 30, 2017	Target	FMV	FMV + Unfunded
Corporate Finance	60-85%	76.4%	77.2%

Conclusion:

The Fund offers OPERF an opportunity to participate in a differentiated portfolio of private equity investments with relatively attractive overall terms. TorreyCove's review of the General Partner and the proposed Fund indicates that the potential returns available justify the risks associated with an investment in the Fund. TorreyCove recommends that OPERF consider a commitment of €200¹ million to the Fund. TorreyCove's recommendation is contingent upon the following:

- (1) Satisfactory negotiation or clarification of certain terms of the investment;
- (2) Satisfactory completion of legal documents;
- (3) Satisfactory continuation and finalization of due diligence;
- (4) No material changes to the investment opportunity as presented; and
- (5) Confidentiality maintained regarding the commitment of OPERF to the Partnership until such time as all the preceding conditions are met.

¹ Equates to approximately \$235.2 million based on the 10/24/17 closing exchange rate of 1.1761 EUR/USD.

TAB 4 – BlackRock Style Advantage
OPERF Alternatives Portfolio

BlackRock Style Advantage Fund

Purpose

Staff and Callan recommend a \$500 million commitment (an initial investment of \$250 million with additional funding at Staff discretion) to the BlackRock Style Advantage Fund (“SA” or “the Fund”) for the Diversifying Strategies sleeve of the OPERF Alternatives Portfolio, subject to the satisfactory negotiation of terms and conditions with Staff working in concert with legal counsel. This proposed commitment represents a new investment manager relationship on behalf of the OPERF Alternatives Portfolio.

Background

In January 2011, the OIC approved the creation of the Alternatives Portfolio, with a target allocation of 5% of total OPERF assets and a portfolio mix of approximately 75% Real Assets¹ and 25% Diversifying Strategies². Consistent with the expansion potential outlined in the original proposal, the target allocation for the Alternatives Portfolio has increased twice since its inception: first, in June 2013, when the overall target allocation was doubled to 10% of total OPERF assets, and second, in June 2015, when the Diversifying Strategies sleeve was increased to 5% of total OPERF assets (resulting in an overall 12.5% target allocation for the Alternatives Portfolio and a 60% Real Assets/40% Diversifying Strategies mix).

As referenced during the Alternatives Portfolio “2017 Plan and Review,” Staff is in the second year of a three-year plan to build out the Diversifying Strategies allocation. That plan included funding two additional alternative risk premia mandates and one additional managed futures mandate, prior to year-end 2017. In the alternative risk premia category, Blackrock is the second manager staff is recommending following the OIC’s recent approval of JP Morgan for a similar mandate.

Discussion/Investment Considerations

BlackRock is the global leader in investment assets under management (AUM), with nearly \$6 trillion under management across institutional and retail clients, as of September 30, 2017. Blackrock is a publically traded corporation (Ticker: BLK) with approximately 13,000 employees. Style Advantage is nearing its two-year anniversary, and has grown to \$3.6 billion under management, as of September 30, 2017.

SA is managed by BlackRock’s Factor-Based Strategies Group (FBSG) and is the firm’s “flagship,” market-neutral, multi-asset style factor strategy. SA is neither a carve-out of a broader strategy nor an expansion of a single-asset class strategy, even though the Fund is only two years old. Rather, in managing SA, FBSG capitalizes and builds upon research BlackRock’s systematic investment teams in equities, fixed income and multi-asset divisions have conducted over the last three-plus decades. With SA, FBSG targets an ex-ante volatility of 10 percent and strives to achieve an attractive risk-adjusted return over time that is uncorrelated with traditional markets. Through its Fund investments, FBSG attempts to capture a premium from well-researched style factors (value, carry, momentum, quality, and low volatility), which are implemented by taking long and short positions in liquid asset classes including, but not limited to the

¹ Using current OIC/OST nomenclature, *Real Assets* is synonymous with the illiquid elements of the Alternatives Portfolio (e.g., infrastructure, natural resources, etc.).

² Using current OIC/OST nomenclature, *Diversifying Strategies* is synonymous with the liquid elements of the Alternatives Portfolio.

following: equities; bonds; currencies; and commodities. In addition, BlackRock's FBSG seeks to limit the Fund's downside risk by dynamically managing its overall beta exposure during market extremes.

Consistent with the discussion regarding the recently-approved JP Morgan Systematic Alpha strategy, the BlackRock SA portfolio is largely uncorrelated to public stock and bond markets. The result is a composite portfolio with a higher, risk-adjusted return (as measured by and reflected in a favorable Sharpe ratio) which makes SA a valuable diversifier to a portfolio such as OPERF's with otherwise large, long-only public market allocations.

Attributes:

- *Experienced portfolio management team.* While the Fund's live track record is relatively short, SA portfolio management is led by two investment veterans with a combined 30 years at BlackRock (including their time at BGI³). Ked Hogan, PhD, serves as CIO and Head of Investments and is ultimately responsible for the Fund's portfolio management and performance. Hogan's prior roles at BlackRock included leadership positions on the firm's quantitative equity teams. Phil Hodges, PhD, serves as Head of Research for BlackRock's FBSG. The balance of the team is comprised of 12 individuals responsible for portfolio management and ongoing research, and a group of 14 investment strategy specialists who serve in client and consultant interface roles.
- *Uncorrelated returns.* A commitment to the SA strategy is intended to improve, on the margin, the risk-adjusted return of the total OPERF portfolio while adding diversification and incremental improvements to downside risk. For example, the expected correlation of SA to OPERF and its equity market beta are both approximately -0.20 (measured over the past three years). Moreover, based on staff analysis, the historical correlation of SA to both the existing AQR strategies and JP Morgan's Systematic Alpha is approximately 0.50, thus adding a complementary strategy to the Alternatives Portfolio's Diversifying Strategies sleeve.
- *Excellent transparency, liquidity and cost effectiveness.* BlackRock can provide OPERF complete position-level transparency into the SA portfolio, as well as integration with OST's use of Aladdin. In addition, the SA strategy provides excellent liquidity as OPERF can redeem its investment monthly, upon 3 business days' notice. BlackRock has a decided advantage in managing and controlling trading costs, given the vast depth and breadth of its market footprint (more than \$63 trillion traded annually), thereby significantly reducing transaction costs. Finally, staff was able to negotiate a unique fee structure, to better align interests.
- *Risk management and compliance processes.* Providing an independent risk oversight function, a member of BlackRock's Risk & Quantitative Analysis Group (comprised of over 200 individuals firm-wide) meets monthly with the portfolio management team. Additionally, a risk manager is assigned to the Fund to monitor risk on a day-to-day basis. Pre-established "dashboards" provide information on leverage, volatility, style valuations and other measures. In 2005, BlackRock established a Counterparty & Concentration Risk Group, a dedicated team of professionals that leads the global process for managing counterparty risk. The group is responsible for managing credit risk in all trading relationships with counterparties, and produces a report showing aggregate risk exposures by counterparty and by portfolio.

³ Barclays Global Investors, or "BGI," is a pioneer in index investment strategies and creator of the popular exchange-traded fund (ETF) family iShares®. BGI developed the investment industry's first index strategy in 1971 followed in 1977 by the market's first quantitative active strategy. In June 2009, Barclays entered into an agreement to be acquired by Blackrock.

Concerns:

- *Continued efficacy of style/factor premia.* The academic merit behind factor investing has been well established, going back over a quarter century. However, the practical implementation of these concepts to portfolio management, beyond public equities, is just now gaining significant attention. Popularity of investment approaches increases the chances of “crowded trades” (e.g., the “Quant Meltdown” in August 2007). [Mitigant: A recent study completed by Societe Generale on alternative risk premia strategies (September 2017) showed that the universe of such strategies is quite limited, with only 23 live strategies, as of June 2017. Additionally, it is estimated that multi-asset, multi-risk premia strategies comprise just \$35 billion in AUM currently. More importantly, the SocGen study concluded: “We observe that pairwise correlations between programs are very low—averaging just 0.23 in the analysis period—with more than two-thirds of those pairwise correlations measuring at less than 0.40.”]
- *Significant use of leverage and shorting.* To achieve the strategy’s target volatility (10%) and factor exposures, BlackRock applies meaningful leverage and shorting. Without the use of leverage, due to the breadth (~2,800 individual stocks) and diversifying nature of the underlying strategies, the volatility of the portfolio would be insufficient to meet its return objectives. [Mitigant: BlackRock invests only in highly liquid instruments and markets, and maintains meaningful levels of cash. For example, unencumbered cash levels within SA have averaged approximately 30 percent, since inception.]
- *Global banking institution.* All else equal, staff has demonstrated a preference for non-bank, “boutique” firms within the Alternatives Portfolio. The short-term, quarterly earnings pressure of large, publicly-traded financial institutions can sometimes be at odds with institutional investors’ longer term investment horizon. This, in turn, can lead to a lack of focus and product proliferation, driven by a desire to grow assets under management. Staff made a similar comment regarding JP Morgan. [Mitigant: BlackRock has established AUM limits for the SA strategy, reducing the likelihood that the fund will be allowed to grow to the point of diminishing returns. Importantly, senior BlackRock leadership is supporting the FBSG as evidenced by the hiring of Andrew Ang in 2015 to lead the effort. Dr. Ang is a former professor at Columbia Business School and the author of, “Asset Management: a Systematic Approach to Factor Investing,” 2014.]
- *Short, live track record.* The SA strategy has a two-year track record. [Mitigant: The previously cited SocGen report noted that the median track record length of strategies, in the alternative risk premia universe, is only 27 months with over a quarter of the 23 live strategies having fewer than 12 months of performance. As such, Staff finds comfort in recommending a firm with a demonstrated history of at least implementing the components of an alternative risk premia strategy.]

Conclusion

The Alternatives Portfolio target allocation to Diversifying Strategies is 40%, or approximately \$3.7 billion at current OPERF NAV. To date, OPERF has a total of \$1.4 billion invested in this category with AQR, and an addition \$500 million commitment to JP Morgan’s Systematic Alpha strategy, which has yet to be funded, pending legal negotiations. As recently discussed with members of the OIC, risk premia strategies can offer an excellent source of diversification to OPERF’s otherwise heavily-weighted, long-only equity and bond portfolio. A commitment to BlackRock’s Style Advantage will complete, for now, the build-out of the alternative risk premia component of the Diversifying Strategies sleeve within the Alternatives Portfolio.



Memorandum

To: Oregon Public Employees Retirement Fund ("OPERF")
From: Callan LLC ("Callan")
Date: October 20, 2017
Subject: BlackRock Style Advantage, Ltd. ("the Fund" or "Style Advantage")

Strategy:

The Fund invests in single-name equities, equity indices, currency, fixed-income and commodity-linked instruments, both long and short, in a manner that is, over the long term, targeted to be uncorrelated to the equity markets or a 60/40 equity/fixed income portfolio relative to other investment alternatives. Using a systematic, quantitative investment process, the Fund seeks to capture sources of return typically associated with well-researched and documented style factors, while maintaining a high degree of diversification.

Please see attached research note for further detail on the investment opportunity.

Conclusion:

Style Advantage is an attractive investment opportunity and is a compelling fit for OPERF's proposed style premia mandate as it is focused exclusively on sources of return associated with well-researched and well-documented style factors. The Fund would also be a good complement to the other strategies that have been funded for this sleeve of the Diversifying Strategies allocation. Callan recommends that OPERF consider an investment of \$500 million in the Fund. Callan's recommendation is contingent upon the following:

- (1) A satisfactory review and approval of the Fund's offering materials by OPERF's legal counsel
- (2) No significant changes to the team or process as presented
- (3) Satisfactory fee negotiations

TAB 5 – Adrian Lee & Partners
OPERF Currency Overlay Program

Adrian Lee & Partners

Purpose

Staff recommends the approval of Adrian Lee & Partners for a \$2 billion notional currency management mandate in connection with OPERF's Currency Overlay Program, subject to satisfactory negotiation of terms and conditions with Staff working in concert with legal counsel.

Background

In August 2017, the Oregon Investment Council (OIC) approved Policy INV 217: OPERF Foreign Currency Risk Policy to accomplish the following objectives: 1) recognize that unmanaged foreign currency exposure is a source of uncompensated risk; and 2) establish a Currency Overlay Program ("the Program"), the goal of which is to reduce currency risk in U.S. dollar-denominated value while preserving the diversification benefits of OPERF's foreign-denominated investments.

Adrian Lee & Partners ("ALP" or the "Firm") was established in 1999 by Mr. Adrian Lee and several other members of J.P. Morgan Investment Management to focus exclusively on currency management. Prior to founding ALP, Mr. Lee was Managing Director of J.P. Morgan Investment Management's Currency Overlay group and developed J.P. Morgan's tactical currency models. ALP manages \$12.6 billion across active currency hedging (\$8.2 billion, 65%), currency absolute return (\$3.4 billion, 27%), and passive currency hedging (\$1 billion, 8%) strategies. Based in London and Dublin, the Firm has a team of 27 individuals with an average of 15 years of experience in institutional currency management for clients located in the U.S., Europe and Australia.

Discussion/Investment Considerations

Staff recommends that ALP manage a \$2 billion notional exposure or roughly 17% of the total currency exposure in the OPERF International Public Equity sleeve (approximately \$12 billion). Including the non-U.S. portion of the OPERF Global Public Equity sleeve, the \$2 billion notional represents 14% of the OPERF's total non-U.S. Public Equity investments (approximately \$14 billion). *Notional exposure* is the magnitude of economic sensitivity and not the market value of the investment. The proposed mandate may be notionally long \$2 billion of U.S. dollar and short an equivalent amount of foreign currencies (since currencies are typically traded in pairs), but the 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 \$2 billion U.S. dollar/euro position was entered at 1.0517 (price of 1 euro in U.S. dollar) at the end of 2016. Then assume the U.S. dollar depreciates versus the euro to 1.1814 by September 2017 for a loss of 11.0%. In this scenario, a \$2 billion notional position would have resulted in a cash outflow of approximately \$220 million.

To minimize the Program's operational complexity, target currency exposures will be equivalent to the MSCI World ex-U.S. Index, two-thirds of which is comprised by the euro, Japanese yen, and British pound. ALP will target a 50% hedge ratio with an active risk budget to provide flexibility on a currency-by-currency basis. The hedge ratio target is designed to mitigate the impact of currency fluctuation on OPERF's performance while the active risk budget provides ALP the opportunity to moderate potential cash outflows.

Attributes:

- *Dedicated currency management specialist.* ALP is a 100% employee-owned independent asset manager. Currency management for institutional investors is the "bread-and-butter" business for ALP, with no distraction from other products or business initiatives. In addition, 73% of ALP's total currency business focuses on currency hedging risk management solutions, including 65% in active

hedging and 8% in passive hedging strategies. OPERF will benefit from ALP's nearly two decades of experience in active currency hedging management.

- *Appropriate alignment of business and client interests.* About 50% of ALP employees are equity owners of the Firm. This high percentage of employee ownership stood out in staff's manager search. In addition, and compared to the other prospective currency firms staff evaluated, ALP has a more concentrated clientele. Specifically, the Firm has only 11 separately-managed institutional client accounts with an average account size of \$900 million, and interactions with ALP employees reflect client service as a top priority. Impressed with how responsive and engaging ALP has been throughout the 15-month due diligence process, staff believes ALP's business model does not focus on purely growing the number of clients, but rather on maintaining high client satisfaction, which creates additional business from existing clients.
- *Balanced quantitative fundamental modeling with active forecasting of future fundamentals.* ALP's investment process consists of both systematic modeling, such as investment factors based on technical signals and international trade flows, and a judgement-based forecasting approach implemented through their Investment Strategy Committee. In its investment process, ALP will develop a currency-by-currency outlook to optimize its active risk budget, while managing to a 50% hedge ratio.

Concerns:

- *Key person risk.* Mr. Lee, with 37 years of institutional currency management experience, serves as the Firm's President and Chief Investment Officer, and is critical to ALP's business and strategy success. [*Mitigant:* 80% of ALP's investment process is systematic and driven by well-established quantitative fundamental models. Currently, Mr. Lee holds one-fifth of the Investment Strategy Committee votes. The other four committee members collectively represent 76 years of currency management/trading experience. In addition, one of the other key committee members, Mr. Phillip Lawson, Head of Portfolio Management, has worked with Mr. Lee for the last 17 years. In the event Mr. Lee can no longer serve in his management and committee capacities, Mr. Lawson is set to succeed Mr. Lee in a leadership role.]
- *Correlation with equity indices.* One-third of ALP's investment process is exposed to the currency carry factor. This factor generates excess return by investing in higher interest rate currencies versus lower interest rate currencies. As a risk premium, this factor is somewhat correlated with all risky asset market returns as faster growing economies tend to offer a carry premium in order to attract global capital. Moreover, this factor (i.e., currency carry) has been an important source of excess return for the Firm over time. [*Mitigant:* The correlation between ALP's active strategy and the currency component in the MSCI World ex-U.S. Index is approximately zero. Additionally, the combination of both ALP's active component and a 50% currency hedge is *negatively* correlated with OPERF returns historically. Therefore, we believe ALP's process is well positioned to achieve the OPERF Currency Overlay Program's risk reduction objective.]

Conclusion

ALP has specialized in institutional currency management for nearly two decades, and the Firm has a proven track record manifest in nearly a dozen bespoke currency mandates. Staff believes ALP is the best manager to help launch OPERF's Currency Overlay Program.



Memorandum

To: Oregon Investment Council
From: Callan LLC ("Callan")
Date: October 23, 2017
Subject: OPERF Currency Overlay Manager Evaluation – Adrian Lee & Partners

Callan conducted an evaluation of Adrian Lee & Partners Active Currency Management services for Oregon State Treasury. Callan is supportive of the firm and strategy for a risk-reducing currency hedging program.

The firm's founder, Adrian Lee, was an early pioneer in institutional currency hedging management having launched the approach at J.P. Morgan in 1989 before starting Adrian Lee & Partners 10-years later. The firm is 100% employee owned. Over half of its employees are equity holders. The firm boasts a small number of long-standing clients. As of June 30, 2017, the firm overlaid \$12.6 billion in assets with an average active risk level of 2.5%. \$11.6 billion is managed in active strategies and \$1 billion in passively hedge accounts. There are a total of 11 separately managed accounts at the firm; nine active and two passive.

Adrian Lee & Partners employs 12 investment professionals and 14 support staff. The investment team is led by Adrian Lee, Chief Investment Officer; Philip Lawson, Head of Portfolio Management; Nigel Rogers, Head of Trading; and Daire McNally, Director of Research. Callan recognizes that Adrian Lee represents key-person risk given his history developing and leading the firm and investment process. There are no formal succession plans as no shareholders expect to retire over the next five years. A contingency plan is in place designating how Lee's investment duties are to be assigned. His ownership stake will be inherited by family members.

The firm's investment philosophy rests on three tenants: (1) fundamental economic factors determine currency equilibrium over time; (2) research-driven valuation analysis identifies departures from this equilibrium; and (3) experienced investment management can exploit these deviations to add return over time. The investment process combines quantitative, fundamental, technical, and discretionary fundamental forecasting processes, represented in three models known as "Alpha Centers". Alpha Center 1 (AC1) – Fundamental Tactical Model (65% of model) - Considers relative fundamentals across currencies in a quantitative framework. Factor observations are based on interest and inflation rates, trade data, and commodity prices. Alpha Center 2 (AC2) – Current Market Trends Model (15% of model) – Considers trends in currency prices and risk. Alpha Center 3 (AC3) – Fundamental Market Dynamics (20% of model) – Discretionary component relying on the views and experience of senior team members

(Lee, Lawson, Rogers, Rakesh Odedra, and Tim Hewson). AC3 is a key differentiator relative to other currency managers. Team members use in-house and external macro-economic research to forecast future relative growth, inflation, current account, monetary policy, and risk appetites for currencies forming long/short portfolios that reflect their individual views. Long/short positions from each Alpha Center are combined at model weights to determine the positioning of the portfolio. There are over 400 factors utilized across models to ensure diversification. Individual and regional constraints are applied in construction. Positions are reduced as implied volatility increases. Stop losses are supplied by technical signals and strategy member judgement. Counterparty risk management is conducted through multiple lenses: legal protections, credit risk analysis, and diversification limits are managed.

At the inception of every new account, client specific risk targets are identified. Exposures to Alpha Centers are then scaled appropriately. As active exposures are established within constraints stipulated by the client in the form of investment guidelines, relevant “aggressiveness parameters” and tracking error limits are monitored.

Adrian Lee’s Active Currency strategy has performed well over the long-term adding 1% annualized (gross of fees) since its 2001 inception. Approximately 17% has been added on a cumulative basis. Over the long-term, expected excess return is 1% to 1.5% at 2% risk. It should be noted that within currency hedging programs, positive returns imply there was less exposure to currencies which fell relative to the U.S. Dollar and higher exposure to currencies which appreciated. Although this is expressed in the form of return, it is also the result of lower downside volatility (risk reduction). The goal of currency hedging is to minimize exposure to falling currencies while maximizing the exposure to appreciating currencies while contributing to volatility reduction at the asset class level.

In summary, Adrian Lee & Partners 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 for many years and maintains an existing common client relationship in a similarly-managed mandate. Further:

- The firm is well established with a long history of consistent application of their investment process.
- Adrian Lee, while a source of key-person risk, is also the architect of the process and key decision maker in both model development and enhancement, as well as the discretionary judgement component of the process. He is a consistent and stabilizing force within the firm.
- The firm has a deep, experienced, and stable team.
- Adrian Lee is also an effective educator and can participate in board and staff development.

Please refer to the full report for further information.

TAB 6 – Public Equity Review

OPERF

Oregon Investment Council
OPERF Public Equity Portfolio -- Annual Review
November 1, 2017

Purpose

Provide an annual review of the Oregon Public Employees Retirement Fund (OPERF) Public Equity portfolio, approve benchmark changes for four public equity mandates and decrease the public equity excess return objective contained in INV 601.

Policy Objectives

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 0.75 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 targeted, annualized tracking error of 0.75 to 2.0 percent, relative to the MSCI ACWI IMI (net).

Public Equity Management Highlights

Although results of the Public Equity review are detailed in a report from OIC general consultant Callan Associates (for the period ending June 30, 2017), staff wishes to highlight the following key points which have been updated for the period ending September 30, 2017:

- **Public Equity Policy Objective** – The OIC’s public equity policy objective of 75 basis points [bps] of excess return has been achieved over the three-year and five-year periods (Exhibit 1). Moreover, this excess performance has been achieved by utilizing only half the policy’s 200 bps tracking error (active risk) allowance.

Exhibit 1

Period Ending 9/30/2017	Market Value	3 Months	1 Year	3 Years	5 Years
OPERF Public Equity Returns	\$ 30,654,941,354	5.65%	20.02%	8.58%	11.40%
MSCI ACWI IMI Net		5.32%	18.73%	7.72%	10.42%
Excess Return (0.75% Target)		0.33%	1.29%	0.85%	0.98%
OPERF Public Equity Tracking Error (2.0% Maximum)		N/A	0.86%	0.92%	0.93%
Information Ratio (Excess Return/Tracking Error)		N/A	1.51	0.94	1.05

Source: State Street

- **Internally-Managed Equity Portfolios** – Six of the seven internally-managed public equity portfolios (current and terminated mandates) have out-performed their corresponding capitalization weighted benchmarks since inception and net of fees (Appendix A).
- **Manager Meetings** – Staff continually scans the marketplace for promising investment managers. The most efficient venue is through visits with prospective managers in OST offices. For the one-year period ending September 2017, staff conducted approximately 80 in-person meetings in the Tigard offices, 70 quarterly conference calls and 20 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 manager strategies.

- **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 15 months ending September 30, 2017, staff reallocated \$7.7 billion in public equity assets, \$5.8 billion of which was reallocated to new low volatility strategies, existing managers or internally-managed assets, while the residual \$1.9 billion was raised for OPERF pension payments and private market capital calls (Appendix B). These actions include nine terminations (five international mandates and four domestic mandates, including one internally-managed strategy), funding four global low volatility mandates and funding an internally-managed, international mandate.

Background

As of September 30, 2017, the capitalization-based MSCI All Country World Index - IMI was comprised of 52 percent U.S. equities, 36.5 percent international developed-market equities, and 11.5 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 20 distinct managers, 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 9 active and/or systematic strategies (one of which is internally-managed); and
- **24 Global/International Equity strategies**, comprised of 13 international developed-market strategies (one of which is managed internally), 6 dedicated emerging-market strategies and 5 global-equity strategies (4 of which are low volatility).

At the November 2014 OIC meeting, staff proposed gradually restructuring OPERF's U.S. equity portfolio toward low-cost, systematic or "engineered" strategies that tilt to size, value and perhaps other, discreet risk-factor exposures (e.g., momentum, profitability, etc.). The rationale behind the recommended restructure was that consistent long-term excess returns from traditional, discretionary active management in the OPERF domestic equity portfolio have become increasingly difficult to achieve. Although the total Public Equity portfolio continued to meet the OIC's 75 basis points of excess return policy objective while utilizing only half the policy's 200 bps tracking error allowance, the objective had been achieved mainly through the success of the international mandates.

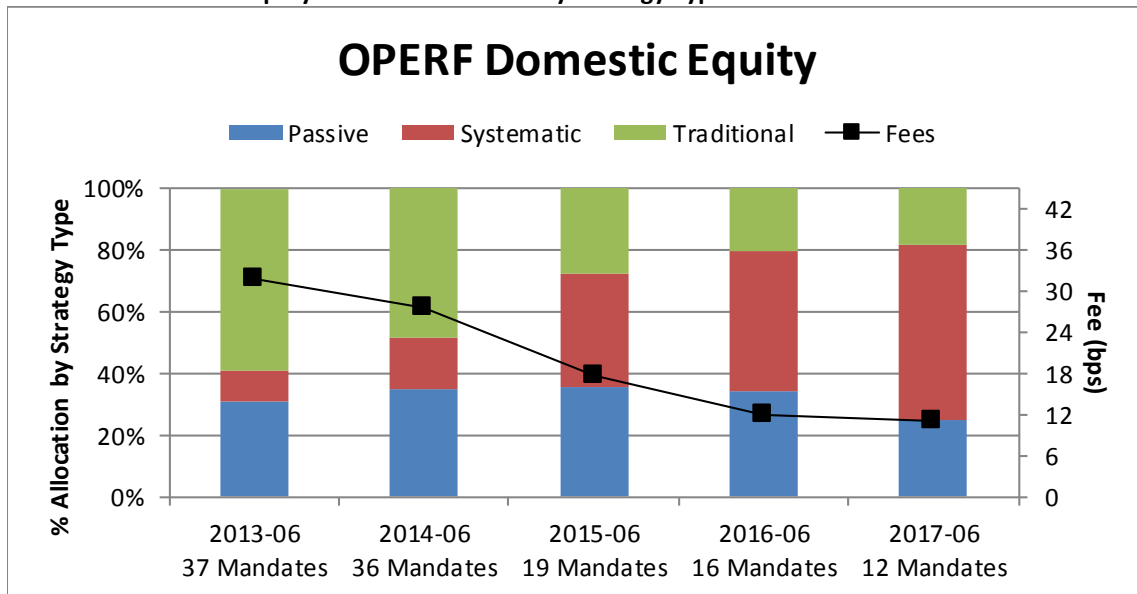
Historically, OPERF achieved exposure to domestic public equity markets by assigning specific mandates (e.g., large cap, small cap, micro cap, growth, value, etc.) to active managers who attempted to outperform their respective benchmarks. This traditional implementation resulted in a large roster of active managers, often with high associated costs. The positive excess returns (if any) produced by these managers were labelled "alpha" and were commonly believed to be evidence of manager skill. However, empirical studies have demonstrated that a large portion of "alpha" is not manager skill but rather is attributable to certain factor exposures¹ such as size, value and momentum. In other words, well-known common factor exposures – rather than stock picking abilities – are often the main driver of active management "alpha" among U.S. public equity managers. The implication of these academic

¹ These exposures or "tilts" can be deliberate in a discretionary active management process, but instead are usually just a residual consequence of traditional security selection algorithms.

studies is that pension funds have been paying substantive fees for common factor exposures that can otherwise be captured through more cost-effective systematic strategies.

Pursuant to the 2014 recommendation approved by the OIC, staff continues to opportunistically restructure OPERF’s equity portfolio away from traditional active mandates and reallocate proceeds in favor of low-cost systematic or “engineered” strategies (both internally- and externally-managed). This restructuring has complemented the portfolio’s long-standing overweight to small cap stocks with systematic tilts toward other factors that are supported by robust empirical evidence as persistent and pervasive sources of excess return. Staff continues to believe that this approach has a higher probability of long-term success for the OPERF U.S. equity portfolio than traditional, higher cost active management implementations. These actions (Exhibit 2) have a) reduced the number of traditional active managers employed in the OPERF U.S. public equity portfolio, b) increased that portfolio’s allocation to systematic strategies that tilt towards factors associated with persistent return premia, and c) lowered the portfolio’s management costs from 31.6 bps to 11 bps per annum.

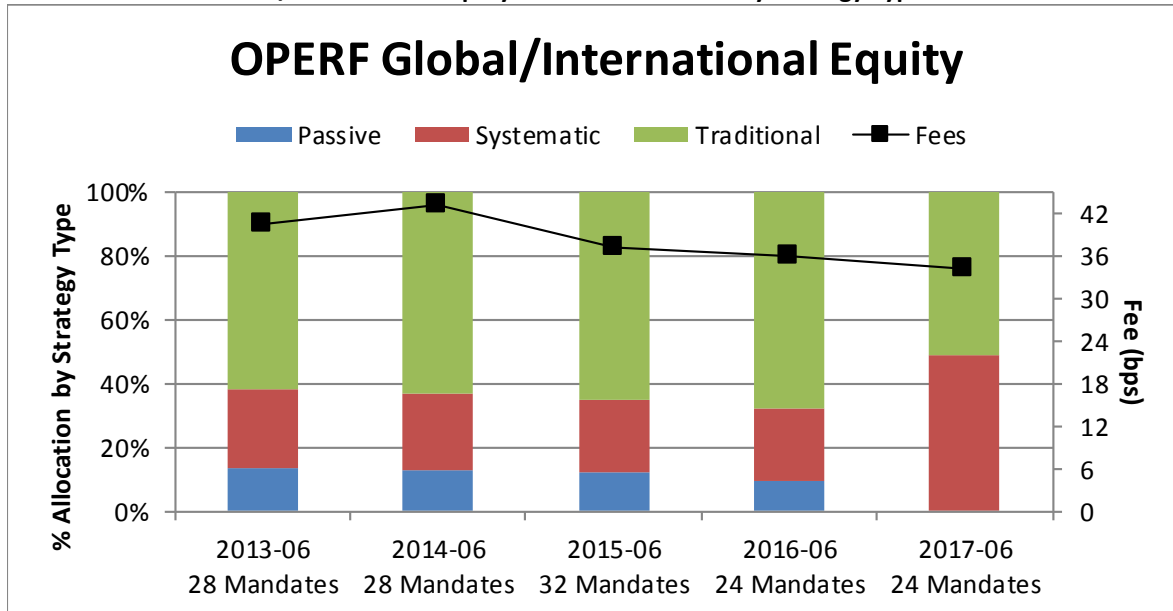
Exhibit 2 – OPERF US Equity Allocation and Fees by Strategy Type



Source: OST Public Equity

Similar actions (Exhibit 3) in the OPERF Global/International portfolio have a) reduced the number of traditional active managers employed in the Global/International component of OPERF’s public equity portfolio, b) increased that portfolio’s allocation to systematic strategies that tilt towards factors associated with persistent return premia, and c) lowered the portfolio’s management costs from 43 bps to 34 bps per annum.

Exhibit 3 – OPERF Global/International Equity Allocation and Fees by Strategy Type



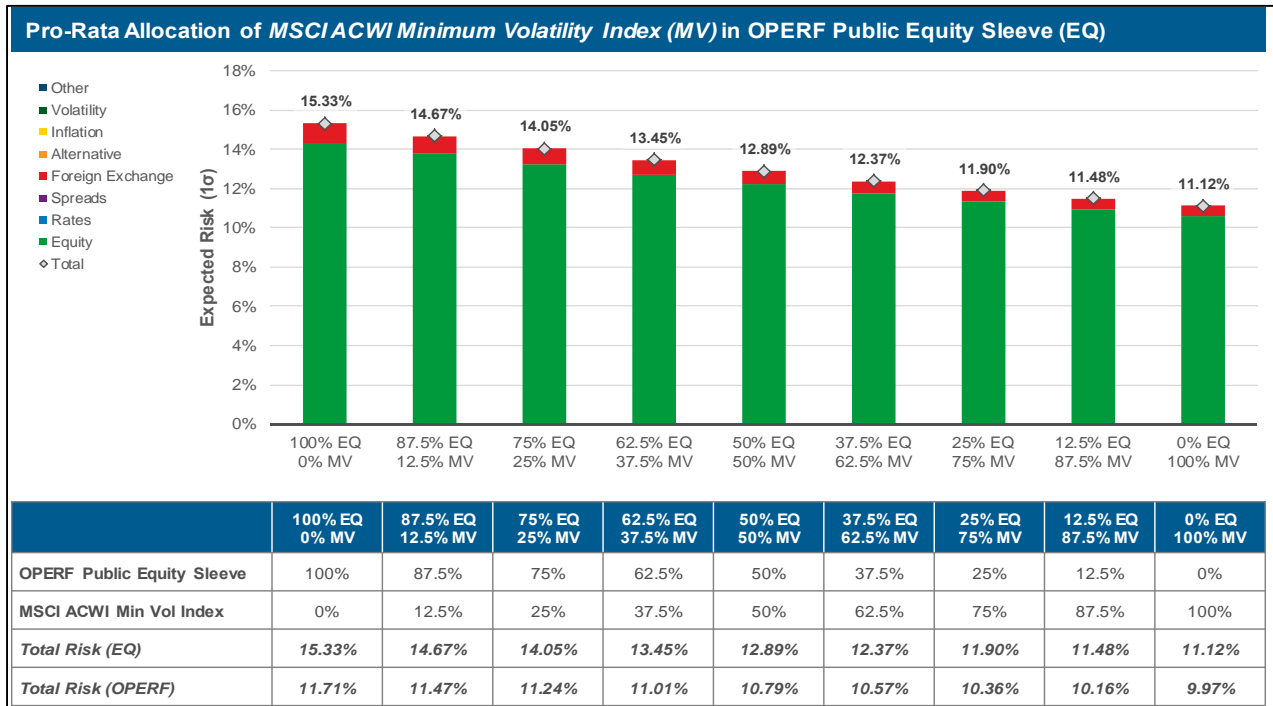
Source: OST Public Equity

Global Low Volatility Implementation Update

A factor (such as low volatility) can be thought of as any attribute that helps explain the return and risk characteristics of one or more securities. Certain factors generate excess return premiums that have historically proved a) persistent (though not uniform) through time and b) pervasive across markets and geographies. Investment strategies that seek return premiums on a systematic basis (i.e., not as a function of stock-picking or other traditional active management techniques) can generally be classified into two broad categories: 1) strategies that pursue excess returns through deliberate factor tilts (e.g., size, value or momentum); or 2) strategies that pursue market returns at lower levels of volatility.

At the October 26, 2016 OIC meeting, Public Equity staff recommended (and the OIC approved) a 25 percent allocation to Low Volatility strategies within the OPERF Public Equity portfolio. The incorporation of a 25 percent exposure to Global Low Volatility strategies alongside the existing systematic equity strategies that pursue excess returns through deliberate factor tilts will prove complementary and serve to reduce both total equity as well as overall OPERF risk (Exhibit 4).

Exhibit 4



Source: BlackRock Aladdin, as of 9/30/2016

At the October 26, 2016 OIC meeting, staff indicated that implementation would be divided into two tranches of 12.5 percent each. By the end of the second quarter 2017, staff completed the first tranche (Exhibit 5) by funding four global low volatility managers (Los Angeles Capital Management in December 2016, Acadian in February 2017, AQR in March 2017, and Arrowstreet in May 2017).

Exhibit 5

OPERF Public Equity Portfolio Allocation to Low Volatility Strategies



Source: BlackRock Aladdin, as of 9/30/2017

Staff believes that although portfolio risk will be reduced by implementation of low volatility strategies, portfolio returns should be commensurate with the portfolio's MSCI ACWI IMI Net benchmark. In other words, low volatility strategies should achieve index returns with lower volatility over the long term. The opportunity cost to investing in low volatility strategies is that there is no excess return expectation for this portion of the OPERF equity portfolio. This trade-off implies that we should only expect to meet or exceed the 0.75 percent excess return target on 75% of the OPERF portfolio (i.e., the portion not allocated to low volatility strategies). In order to better manage future excess return expectations, staff recommends lowering the excess return objective codified in INV 601 from 0.75 percent to 0.50 percent 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.

The continued restructuring of the OPERF equity portfolio is consistent with **OIC INV 1201 - Statement of OIC Investment and Management Beliefs**:

Section 5.A. - Inefficiencies that can be exploited by active management may exist in certain segments of the capital markets.

- *While largely efficient, select segments of the capital markets can sometimes be exploited by skilled active management.*
- *The nature (i.e., perceived magnitude and likely duration) of such inefficiencies should inform the proposed active management strategy (e.g., discretionary or systematic).*

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

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.*

OPERF Public Equity Benchmark Study

In early 2017, Callan was engaged by OST to perform a benchmark study on all of OPERF's public equity mandates. Of the forty mandates reviewed, Callan recommended making benchmark changes to the following four mandates:

- 1) **Wellington Small Cap Mandate:** Callan recommends changing the benchmark from the Russell 2000 index to the Russell Micro Cap index.
{Staff comments: When Wellington was hired for this mandate in 1997, the Russell Micro Cap index did not exist. Russell created the Micro Cap benchmark in 2007. Staff agrees with Callan's assessment and recommends changing this mandate's benchmark to the Russell Micro Cap Index};
- 2) **Westwood Emerging Markets Mandate:** Callan recommends changing the benchmark from the MSCI EM Standard Index to the MSCI EM Investable Market Index (IMI).
{Staff comments: When Westwood was hired for this mandate in April 2010, the MSCI EM index was an appropriate benchmark as Westwood was investing in emerging market large cap and mid cap securities. Three years later, in 2012, Westwood introduced smaller emerging markets exposure within the mandate. Staff agrees with Callan's assessment and recommends changing this mandate's benchmark to the MSCI EM IMI Index};
- 3) **William Blair Emerging Markets Mandate:** Callan recommends changing the benchmark from the MSCI EM Index to the MSCI EM Growth Index.

{Staff comments: When William Blair was hired in 2011, this mandate's growth tilt was documented by staff in its initial OIC recommendation. However, none of William Blair's clients were using the growth index as a benchmark at that time. Furthermore, consultant databases also categorized this mandate as a core mandate. Staff agrees with Callan's assessment and recommends changing this mandate's benchmark to the MSCI EM Growth Index}; and

- 4) **William Blair Emerging Markets Small Cap Mandate:** Callan recommends changing the benchmark from the MSCI EM Small Cap Index to the MSCI EM Small Cap Growth Index.
{Staff comments: When William Blair was hired for this mandate in 2013, this mandate's growth tilt was documented by staff in its initial OIC recommendation. However, none of William Blair's clients were using the growth index as a benchmark at that time. Furthermore, consultant databases also categorized this mandate as a core mandate. Staff agrees with Callan's assessment and recommends changing this mandate's benchmark to the MSCI EM Small Cap Growth Index};

Recommendation

- 1) Approve the following manager benchmark changes:
 - a) Wellington Small Cap - from Russell 2000 Index to Russell Micro Cap Index;
 - b) Westwood EM - from MSCI EM Net to MSCI EM IMI Net;
 - c) William Blair EM - from MSCI EM Net to MSCI EM Growth Net; and
 - d) William Blair SC EM - from MSCI EM Small Cap Net to MSCI EM Small Cap Growth Net.

- 2) Modify excess return objective contained in INV 601 from 0.75 percent to 0.50 percent 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.

Appendix A

Internally Managed Equity Performance (Period Ending 9/30/17, unless otherwise noted)

Period Ending 9/30/17	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
OST 400 Portfolio	\$ 628,107,149.57	3.917%	3.30%	9.74%	17.95%	11.50%	11.65%	14.74%	14.72%
S&P 400 Index		3.915%	3.22%	9.40%	17.52%	11.18%	11.34%	14.42%	14.40%
Excess		0.00%	0.08%	0.34%	0.43%	0.32%	0.31%	0.33%	0.32%
Inception Date of Oct. 1, 2009	Tracking Error = 30 bps	Target Excess Return: 10 bps							
Period Ending 9/30/17	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
OST 500 Portfolio	\$ 2,312,550,017.27	2.082%	4.49%	14.26%	18.67%	10.87%	13.03%	14.27%	13.90%
S&P 500 Index		2.063%	4.48%	14.24%	18.61%	10.81%	12.98%	14.22%	13.84%
Excess		0.02%	0.01%	0.02%	0.06%	0.06%	0.05%	0.05%	0.06%
Inception Date of Oct 1, 2009	Tracking Error = 10 bps	Target Excess Return: 5 bps							
Period Ending 9/30/17	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
Russell 2000 Synthetic	\$ 473,278,936.29	6.465%	5.99%	11.27%	21.29%	13.17%	10.97%	14.71%	13.54%
Russell 2000 Index		6.241%	5.67%	10.94%	20.74%	12.18%	10.06%	13.79%	12.59%
Excess		0.22%	0.32%	0.32%	0.55%	0.99%	0.91%	0.91%	0.94%
Inception Date of April 1, 2010	Tracking Error = 50 bps	Target Excess Return: 30 bps							
Period Ending 9/30/17	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
RISK PREMIA	\$ 2,606,486,207.10	2.897%	6.05%	17.38%	21.53%	12.52%	N/A	N/A	12.14%
MSCI Risk Premia Index		2.900%	6.15%	17.86%	21.75%	12.65%	N/A	N/A	12.21%
MSCI USA		2.040%	4.47%	14.41%	18.48%	10.65%	N/A	N/A	10.73%
Excess		0.857%	1.585%	2.963%	3.053%	1.87%	N/A	N/A	1.41%
Inception Date of Jan 1, 2014	Tracking Error = 300 bps	Target Excess Return: 150 bps							
Period Ending 9/30/17	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
INT'L RISK PREMIA	\$ 644,570,238.68	0.998%	4.292%						3.94%
MSCI INT'L Risk Premia Index		0.947%	4.211%						3.98%
MSCI WORLD X-US		2.590%	5.626%						5.73%
Excess		-1.592%	-1.334%						-1.782%
Inception Date of Jun 1, 2017	Tracking Error = 300 bps	Target Excess Return: 150 bps							
Period Ending 9/30/15	Market Value	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
TEMS	\$ 180,449,700	-8.202%	-14.74%	-16.55%	-22.43%	-6.42%	-0.92%	-4.08%	9.01%
MSCI EM Index		-9.040%	-17.54%	-15.48%	-19.28%	-5.27%	-0.15%	-3.24%	8.87%
Excess		0.84%	2.81%	-1.07%	-3.15%	-1.15%	-0.77%	-0.85%	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	Month	3 Months	YTD	1 year	3 years	4 years	5 years	Inception
RUSSELL RAFI LC	\$ 1,371,571,346	-0.045%	4.04%	10.27%	13.81%	11.23%	14.23%	N/A	14.65%
RAFI LC Index		-0.040%	3.97%	10.06%	13.54%	11.21%	14.21%	N/A	14.62%
RUSSELL 1000		0.133%	4.18%	7.83%	11.69%	12.02%	13.93%	N/A	14.46%
Excess		-0.18%	-0.14%	2.43%	2.11%	-0.79%	0.31%	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

Appendix B
OPERF Public Equity Portfolio Rebalancing
(June 30, 2016 – September 30, 2017)

Date(s)	Manager	Sub-Asset Class	Market Value	Purpose
July-16	Columbia Wanger	US SMID Cap Core	\$ (741,000,000)	Termination
July-16	Genesis	Emerging Markets	\$ (50,000,000)	Cash Raise/Rebalance
July-16	Lazard	Developed & Emerging Markets	\$ (100,000,000)	Cash Raise/Rebalance
July-16	Pyramis	Developed & Emerging Markets	\$ (250,000,000)	Cash Raise/Rebalance
July-16	Walter Scott	International Developed	\$ (100,000,000)	Cash Raise/Rebalance
July-16	Dimensional Fund Advisors	Large Cap US	\$ 240,000,000	Rebalance - Additional Funding
October-16	OST - Russell Fundamental Strategy	Large Cap US	\$ (1,371,571,000)	Termination
October-16	OST - MSCI Risk Premia Strategy	Large Cap US	\$ 1,371,571,000	Rebalance - Additional Funding
November-16	Blackrock R1000G Index Fund	U.S. Large Cap	\$ (75,000,000)	Cash Raise/Rebalance
November-16	Blackrock R1000V Index Fund	U.S. Large Cap	\$ (75,000,000)	Cash Raise/Rebalance
November-16	State Street Global Advisors	Int'l Developed	\$ (125,000,000)	Cash Raise/Rebalance
November-16	Genesis	Emerging Markets	\$ (25,000,000)	Cash Raise/Rebalance
December-16	Blackrock R1000G Index Fund	U.S. Large Cap	\$ (300,000,000)	Cash Raise/Rebalance
December-16	Blackrock R1000V Index Fund	U.S. Large Cap	\$ (300,000,000)	Cash Raise/Rebalance
December-16	OST S&P 500	U.S. Large Cap	\$ (5,000,000)	Cash Raise/Rebalance
December-16	OST Russell 2000	U.S. Small Cap	\$ 5,000,000	Cash Raise/Rebalance
December-16	State Street Global Advisors	Int'l Developed	\$ (600,000,000)	Cash Raise/Rebalance
December-16	Los Angeles Capital Management	Global Low Volatility	\$ 800,000,000	Rebalance - Initial Funding
January-17	Wells Capital Closed End Fund	Developed & Emerging	\$ (425,000,000)	Termination
January-17	Lazard Closed End Fund	Developed & Emerging	\$ 425,000,000	Rebalance - Additional Funding
February-17	Blackrock R1000V Index Fund	U.S. Large Cap	\$ (89,000,000)	Cash Raise/Rebalance
February-17	Blackrock R1000G Index Fund	U.S. Large Cap	\$ (618,000,000)	Termination
February-17	TT International	Int'l Developed	\$ (674,000,000)	Termination
February-17	Victory Capital	Int'l Developed Small Cap	\$ (241,000,000)	Termination
February-17	Acadian	Global Low Volatility	\$ 800,000,000	Rebalance - Initial Funding
March-17	AQR	Global Low Volatility	\$ 800,000,000	Rebalance - Initial Funding
April-17	Fidelity	Developed & Emerging	\$ (603,000,000)	Termination
April-17	Blackrock R1000V Index Fund	Developed & Emerging	\$ (323,000,000)	Termination
April-17	Arrowstreet	Global Low Volatility	\$ 800,000,000	Rebalance - Initial Funding
May-17	State Street Global Advisors	Int'l Developed	\$ (600,000,000)	Termination
June-17	OST International Risk Premia	Int'l Developed	\$ 600,000,000	Rebalance - Initial Funding

October 31, 2017



Oregon Investment Council

OPERF Public Equity Review

Public Equity Portfolio

Summary Observations

- The Total Public Equity portfolio has performed well and has exceeded the MSCI ACWI IMI (Net) Index over both near term and longer term periods as of June 30, 2017.
 - The majority of the outperformance continues to come from the non-U.S. equity portfolio, although the U.S. equity portfolio had a strong trailing 12 month period.
- The public equity portfolio currently employs 36 strategies and accounts for 38.2% of OPERF
 - The U.S. equity portfolio has 7 traditional active strategies (~12.0% of the total public equity portfolio), 3 traditional passive strategies (~11.0%), and 2 factor-oriented fundamental strategies (~23.5%).
 - The non-U.S. equity portfolio has 19 traditional active strategies (~38.7% of the total public equity portfolio).
 - The public equity portfolio also has 1 traditional active global equity strategy (~3.3% of the total public equity portfolio) and 4 global low-volatility strategies (~11.5%).
- The portfolio is diversified across regions, countries, styles, capitalizations and sectors.
- Total tracking error for the public equity portfolio is 1.05% for the 10 years ended June 30, 2017, which remains on the lower end of the 0.75%-2.00% policy range.
- While the majority of the portfolio is invested in actively-managed strategies, many of which have higher tracking error targets, the active share of the total public equity portfolio is only around 37% (meaning only about 37% of the total portfolio is different from the benchmark). This is an increase from 33% last year.
- Last November, Staff embarked on a path to gradually shift 25% of total public equities to a low-volatility approach. Currently, more than 12.5% of the public equity portfolio has transitioned. The second half is expected to transition in 2018.

Public Equity Portfolio, cont.

Summary Observations

- In January of this year, Callan presented the findings of the public equity managers benchmark review and recommended the following benchmark changes:
 - **Wellington U.S. Small Cap:** From Russell 2000 Index to Russell Micro Cap Index
 - **Westwood EM:** From MSCI Emerging Markets Net to MSCI Emerging Markets IMI Net
 - **William Blair EM:** From MSCI Emerging Markets Net to MSCI Emerging Markets Growth Net
 - **William Blair EM Small Cap:** From MSCI Emerging Markets Small Cap Net to MSCI Emerging Markets Small Cap Growth Net

Strategic Role and Policy Objectives of Public Equities

Strategic Role

- Provide enhanced returns, diversification, and liquidity to meet cash flow needs.
- Target allocation is 37.5% 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.
- Over the long term, the return should exceed inflation by 6.0%.
 - Portfolio return of 4.4% over trailing 10 years ended June 30, 2017 exceeds inflation by approximately 2.8% annualized.
- Achieve a portfolio return of 0.75% 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.

	Last Year	Last 3 Years	Last 5 Years
Total Public Equity	20.39%	5.41%	11.64%
- MSCI ACWI IMI Net*	19.01%	4.87%	10.74%
Excess Return	1.38%	0.54%	0.90%

- 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, 2017 was 0.96%, near the low end of the range.

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

Public Equity Managers

	June 30, 2017			June 30, 2017	
	Market Value	% of Total Fund		Market Value	% of Total Fund
Total Public Equity	\$28,164,391,940	38.24%	Non-U.S. Equity	\$11,462,897,661	15.57%
U.S. Equity	\$13,770,095,587	18.70%	International Market Oriented (Core)	\$5,321,739,110	7.23%
Large Cap Value	\$1,341,431,762	1.82%	Arrowstreet Capital	1,448,385,531	1.97%
Aronson, Johnson & Ortiz	1,341,436,681	1.82%	Lazard Asset Management	930,092,035	1.26%
Small Cap Growth	\$151,395,707	0.21%	Lazard International CEF	1,245,590,945	1.69%
EAM MicroCap Growth	151,395,707	0.21%	AQR Capital Management	1,085,946,221	1.47%
Small Cap Value	\$948,590,136	1.29%	OST Int'l Risk Premia	611,724,378	0.83%
AQR Capital Management	249,974,710	0.34%	International Value	\$2,026,828,313	2.75%
Boston Company Asset Management	292,950,748	0.40%	Acadian Asset Management	1,068,717,261	1.45%
DFA MicroCap Value	238,463,436	0.32%	Brandes Investment Partners	958,111,052	1.30%
Callan US Microcap Value	167,201,244	0.23%	International Growth	\$774,955,751	1.05%
Market Oriented	\$10,715,070,844	14.55%	Walter Scott Mgmt	774,955,751	1.05%
DFA Large Cap Core	4,484,373,642	6.09%	International Small Cap	\$1,347,718,664	1.83%
Wellington Mgmt - Domestic Equity	505,177,685	0.69%	DFA International Small Cap	339,734,083	0.46%
Russell 2000 Synthetic - OST managed	446,540,279	0.61%	Harris Associates	339,097,365	0.46%
S&P 500 - OST managed	2,213,145,863	3.01%	Fidelity Select Small Cap	358,115,717	0.49%
S&P 400 - OST managed	608,054,346	0.83%	EAM International Micro Cap	143,051,832	0.19%
OST Risk Premia Strategy	2,457,779,029	3.34%	DFA International Micro Cap	167,719,667	0.23%
Other Equity			Emerging Markets	\$1,991,655,824	2.70%
Shott Capital Management	30,635,787	0.04%	Genesis Emerging Markets	623,393,415	0.85%
Shott Annex	0	0.00%	Arrowstreet Emerging Markets	508,988,616	0.69%
Transitional & Closed Accounts	582,966,432	0.79%	Westwood Global Investment	327,997,846	0.45%
			William Blair and Company	232,598,534	0.32%
			DFA Emerging Market Small Cap	146,667,059	0.20%
			William Blair Emerging Mkt Small Cap	152,010,353	0.21%
			Global Equity	\$4,360,774,350	5.92%
			Alliance Bernstein Global Value	962,707,517	1.31%
			Global Equity Low Volatility	\$3,398,066,833	4.61%
			LACM	889,564,763	1.21%
			Arrowstreet	817,651,282	1.11%
			AQR	832,326,972	1.13%
			Acadian	858,523,816	1.17%

Total Public Equity Exposures

Holdings-Based Analysis as of June 30, 2017

By Size*

Style Exposure Matrix
Holdings as of June 30, 2017

Large	22.3% (292)	18.5% (258)	18.4% (284)	59.2% (834)
	25.1% (296)	21.0% (261)	23.8% (307)	69.8% (864)
Mid	7.7% (394)	9.1% (509)	7.5% (478)	24.3% (1381)
	5.4% (481)	6.9% (611)	7.0% (636)	19.2% (1728)
Small	4.2% (955)	4.7% (971)	2.7% (662)	11.6% (2588)
	2.9% (1073)	3.4% (1264)	2.8% (1120)	9.2% (3457)
Micro	2.0% (2492)	1.7% (1880)	1.1% (941)	4.9% (5313)
	0.7% (971)	0.6% (866)	0.5% (755)	1.8% (2592)
Total	36.2% (4133)	34.0% (3618)	29.8% (2365)	100.0% (10116)
	34.1% (2821)	31.9% (3002)	34.0% (2818)	100.0% (8641)
	Value	Core	Growth	Total

By Region

Style Exposure Matrix
Holdings as of June 30, 2017

Europe/ Mid East	6.2% (522)	5.0% (471)	7.3% (410)	18.6% (1403)
	6.8% (472)	6.1% (486)	7.8% (532)	20.7% (1490)
N. America	21.9% (879)	21.3% (1108)	14.6% (596)	57.8% (2583)
	18.9% (790)	18.5% (1137)	17.8% (861)	55.2% (2788)
Pacific	3.5% (951)	3.7% (599)	4.2% (383)	11.4% (1933)
	4.4% (592)	3.9% (561)	4.2% (537)	12.5% (1690)
Emerging/ FM	4.6% (1781)	4.0% (1440)	3.6% (976)	12.2% (4197)
	3.9% (967)	3.4% (818)	4.2% (888)	11.5% (2673)
Total	36.2% (4133)	34.0% (3618)	29.8% (2365)	100.0% (10116)
	34.1% (2821)	31.9% (3002)	34.0% (2818)	100.0% (8641)
	Value	Core	Growth	Total

- OPERF Public Equity
- MSCI ACWI IMI

- Total public equity portfolio is underweight large cap (59.2% vs. 69.8%) but overweight mid, small, and micro cap (40.8% vs. 30.2%) and exhibits a small value bias relative to the MSCI ACWI IMI.
- Regional allocations remain approximately in-line with the benchmark.

*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, 2017

**Style Exposure Matrix
Holdings as of June 30, 2017**

Large	26.0% (107)	17.8% (99)	17.9% (104)	61.7% (310)
	27.6% (104)	21.9% (98)	25.4% (104)	74.8% (306)
Mid	7.9% (174)	9.6% (231)	5.0% (187)	22.4% (592)
	4.9% (175)	6.7% (237)	5.5% (206)	17.2% (618)
Small	3.9% (291)	5.6% (364)	2.4% (192)	11.9% (847)
	2.1% (344)	2.9% (490)	2.2% (398)	7.2% (1232)
Micro	1.7% (250)	1.3% (271)	0.9% (105)	3.9% (626)
	0.3% (281)	0.3% (347)	0.2% (199)	0.9% (827)
Total	39.5% (822)	34.2% (965)	26.2% (588)	100.0% (2375)
	34.9% (904)	31.8% (1172)	33.3% (907)	100.0% (2983)
	Value	Core	Growth	Total

- OPERF U.S. Equity
- Russell 3000

- The U.S. equity portfolio is underweight large cap (61.7% vs.74.8%) but overweight mid, small, and micro cap equity (38.3% vs. 25.2%) and exhibits a value tilt relative to the Russell 3000.

Non-U.S. & Global Equity

Exposures as of June 30, 2017

**Style Exposure Matrix
Holdings as of June 30, 2017**

Large	18.0% (153)	17.0% (132)	21.3% (170)	56.3% (455)
	22.0% (197)	20.7% (181)	22.9% (238)	65.6% (616)
Mid	7.9% (197)	8.4% (223)	9.5% (237)	25.8% (657)
	6.1% (355)	7.0% (410)	8.4% (469)	21.5% (1234)
Small	5.1% (639)	4.5% (626)	3.8% (474)	13.4% (1739)
	3.4% (765)	3.8% (889)	3.3% (814)	10.5% (2468)
Micro	2.0% (2003)	1.6% (1459)	1.0% (700)	4.6% (4162)
	0.9% (715)	0.8% (626)	0.6% (510)	2.3% (1851)
Total	33.0% (2992)	31.4% (2440)	35.6% (1581)	100.0% (7013)
	32.4% (2032)	32.4% (2106)	35.2% (2031)	100.0% (6169)
	Value	Core	Growth	Total

**Style Exposure Matrix
Holdings as of June 30, 2017**

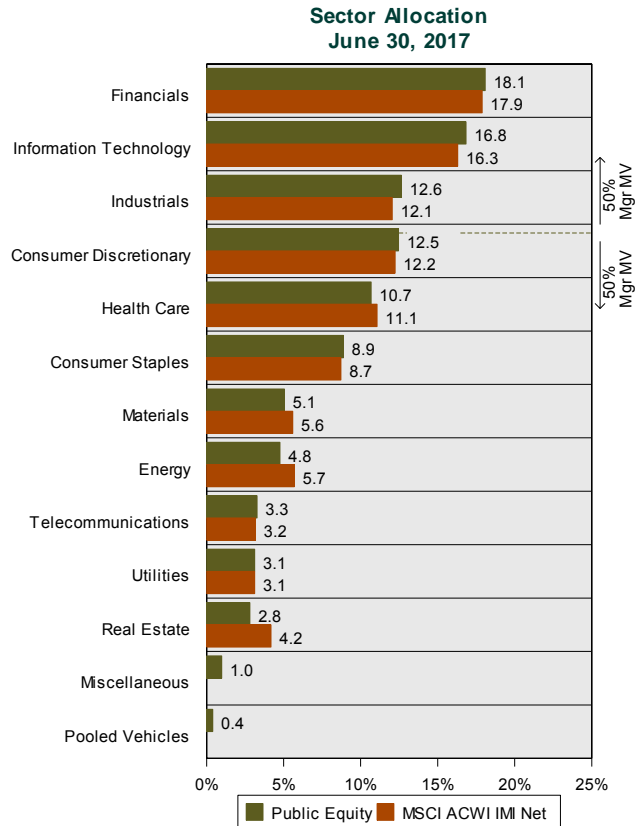
Europe/ Mid East	13.8% (428)	12.0% (420)	16.1% (323)	41.8% (1171)
	13.8% (446)	13.6% (518)	15.7% (526)	43.1% (1490)
N. America	1.7% (71)	2.0% (75)	1.4% (44)	5.1% (190)
	1.7% (91)	3.2% (133)	1.9% (92)	6.8% (316)
Pacific	7.6% (852)	7.7% (538)	8.9% (299)	24.2% (1689)
	8.9% (567)	8.4% (589)	8.8% (534)	26.1% (1690)
Emerging/ FM	10.0% (1641)	9.7% (1407)	9.2% (915)	28.9% (3963)
	8.0% (928)	7.1% (866)	8.8% (879)	23.9% (2673)
Total	33.0% (2992)	31.4% (2440)	35.6% (1581)	100.0% (7013)
	32.4% (2032)	32.4% (2106)	35.2% (2031)	100.0% (6169)
	Value	Core	Growth	Total

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

- The non-U.S. equity portfolio is underweight large cap (56.3% vs. 65.6%) and overweight mid, small, and micro cap (43.7% vs. 34.4%) relative to the MSCI ACWI ex-U.S. IMI Index.
- Regional allocations are approximately in-line with benchmark, with a modest overweight to emerging markets.

Public Equity

Portfolio Characteristics



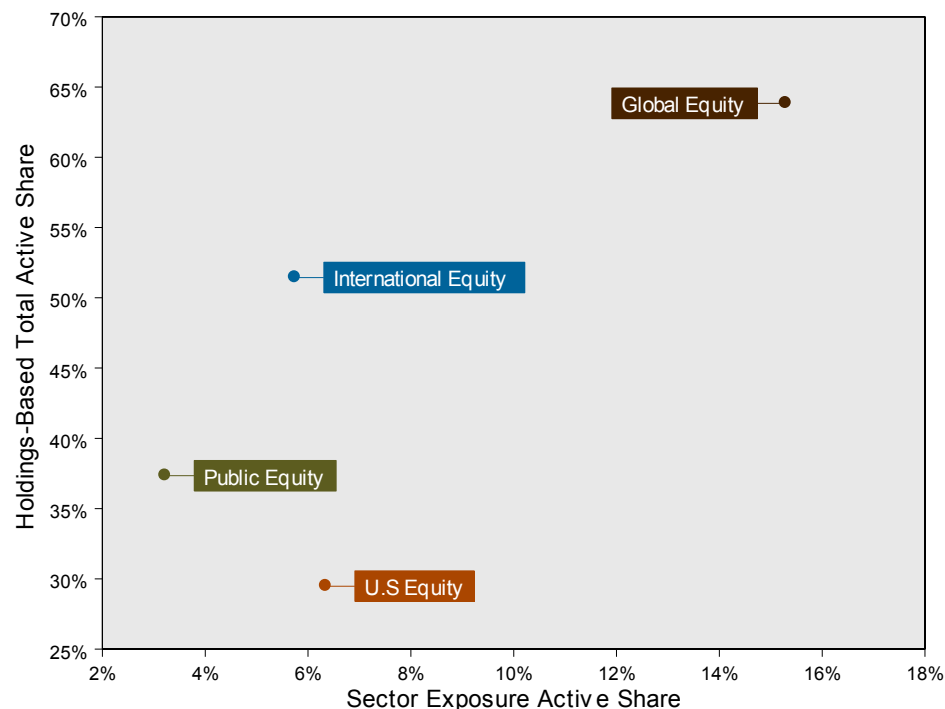
Portfolio Characteristics Relative to MSCI ACWI IMI Net as of June 30, 2017

	Weighted Median Market Cap	Price/Forecasted Earnings	Price/Book	Forecasted Earnings Growth	Dividend Yield	MSCI Combined Z-Score
Public Equity	20.12	14.90	1.95	12.15	2.20	(0.16)
MSCI ACWI IMI Net	36.08	16.15	2.10	12.85	2.34	(0.02)

- Sector exposures are approximately in-line with the benchmark. The most significant differences are in Energy and Real Estate (which has only recently been broken out as its own sector), where the Public Equity Portfolio is underweight both sectors.
- 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, 2017



	Weight %	Index	Total Act Share	Non-Idx Act Share	Sector Act Share	Number Securities	Security Diverse
Public Equity	100.00%	MSCI ACWI IMI	37.34%	3.00%	3.23%	10742	356.25
U.S. Equity	45.35%	Russell 3000	29.48%	0.92%	6.35%	2400	124.33
International Equity	45.43%	MSCI ACWI ex US IMI	51.44%	5.09%	5.75%	7506	223.16
Global Equity	15.03%	MSCI ACWI	63.84%	8.28%	15.30%	2162	157.39

- Total active share for the public equity portfolio, which measures how different a portfolio is from its index on a holdings basis, increased to 37% as of June 30, 2017 (from 33% as of a year ago).
 - 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, 2017

	Sharpe Ratio	Excess Return Ratio	Standard Deviation	Tracking Error
Total Public Equity	1.37	1.26	8.61	0.96
MSCI ACWI IMI	1.26	0.00	8.42	0.00
U.S. Equity	1.70	-0.13	8.35	1.60
Russell 3000	1.82	0.00	7.92	0.00
Non-U.S./Global Equity	0.88	2.32	10.61	0.83
MSCI ACWI ex-U.S. IMI	0.69	0.00	10.78	0.00

Asset Class Performance – U.S. Equity

Net of Fee Returns as of June 30, 2017

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Domestic Equity	19.76%	8.46%	14.17%	6.92%
- Russell 3000 Index	18.51%	9.10%	14.58%	7.26%
Excess Return	1.25%	(0.64%)	(0.41%)	(0.34%)
- Lg Public >10 B DE	19.48%	8.98%	14.56%	7.24%
Market Oriented	19.96%	8.73%	14.12%	-
- Russell 3000 Index	18.51%	9.10%	14.58%	7.26%
Excess Return	1.45%	(0.37%)	(0.46%)	-
- CAI All Cap: Broad DB	20.02%	6.97%	13.60%	6.55%
- Russell 1000 Growth Index	20.42%	11.11%	15.30%	8.91%
Excess Return	(0.41%)	(4.14%)	(1.70%)	(2.36%)
- CAI Lrg Cap Growth Style	20.96%	10.57%	15.17%	8.59%
Large Cap Value	16.53%	5.17%	12.68%	-
- Russell 1000 Value Index	15.53%	7.36%	13.94%	5.57%
Excess Return	1.00%	(2.19%)	(1.25%)	-
- CAI Large Cap Value Style	18.32%	7.46%	14.24%	5.75%
Small Cap Growth	27.03%	5.18%	11.37%	-
- Russell 2000 Growth Index	24.40%	7.64%	13.98%	7.82%
Excess Return	2.63%	(2.46%)	(2.61%)	-
- CAI Sm Cap Growth Style	24.23%	7.19%	13.59%	7.62%
Small Cap Value	24.06%	7.01%	13.32%	-
- Russell 2000 Value Index	24.86%	7.02%	13.39%	5.92%
Excess Return	(0.79%)	(0.01%)	(0.06%)	-
- CAI Small Cap Value Style	23.64%	7.81%	14.99%	7.43%

- The U.S. equity portfolio has added value net of fees over the Russell 3000 Index on a trailing year basis but lags over longer periods measured above.

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

Net of Fee Returns as of June 30, 2017

	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
International Equity	21.07%	2.54%	9.10%	2.75%
MSCI ACWI ex-US IMI Index (Net)	20.43%	1.14%	7.58%	1.52%
Excess Return	0.64%	1.40%	1.52%	1.24%
Lg Public >10 B IE	21.29%	2.35%	8.42%	2.17%
International Market Oriented (Core)	20.90%	2.50%	9.66%	-
MSCI World ex-US IMI Net	19.74%	1.12%	8.57%	1.29%
Excess Return	1.16%	1.38%	1.09%	-
CAI Core Int'l Equity	21.41%	2.24%	9.83%	2.22%
International Value	23.37%	1.65%	9.79%	-
MSCI ACWI ex-US IMI Value	23.61%	(0.49%)	6.86%	0.69%
Excess Return	(0.24%)	2.14%	2.94%	-
CAI Core Value Int'l Equity Style	22.33%	1.54%	9.46%	1.71%
International Growth	15.66%	3.17%	8.53%	-
MSCI World ex US Growth	14.90%	2.22%	8.54%	1.84%
Excess Return	0.77%	0.94%	(0.00%)	-
CAI Core Growth Int'l Equity Style	19.88%	3.44%	9.71%	3.12%
International Small Cap	24.29%	4.59%	12.19%	-
ACWI Sm Cap ex US	20.32%	3.31%	10.02%	2.91%
Excess Return	3.98%	1.28%	2.17%	-
CAI Int'l Small Cap Style	22.93%	5.89%	13.76%	4.78%
Emerging Markets	21.49%	1.54%	5.20%	-
EM IMI Index	22.82%	1.03%	4.09%	2.02%
Excess Return	(1.32%)	0.51%	1.11%	-
CAI Emerging Markets Equity DB	22.68%	2.59%	6.38%	3.36%
Global Equity	23.52%	5.19%	13.81%	2.24%
MSCI ACWI Value Net Index	18.99%	3.05%	9.62%	2.94%
Excess Return	4.53%	2.14%	4.19%	(0.70%)
CAI Global Eq Broad Style	20.63%	6.04%	12.17%	5.15%

- The non-U.S. equity portfolio continues to outperform the custom non-U.S. benchmark (ACWI ex-U.S. Gross through May 31, 2008, and the ACWI ex-U.S. IMI net thereafter) over all periods measured above.

OST Managed Strategies

As of June 30, 2017

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)	17.96%	19.06%	25.68%	19.48%	N/A
Benchmark Return (1 yr)	17.90%	18.57%	24.60%	18.02%	N/A
Excess Return	0.06%	0.49%	1.08%	1.46%	N/A
Portfolio Return (Inception)	13.73%	14.74%	13.18%	11.17%	N/A
Benchmark Return (Inception)	13.67%	14.42%	12.20%	10.18%	N/A
Excess Return	0.06%	0.32%	0.98%	0.99%	N/A
Tracking Error*	0.05	0.11	0.31	1.38	N/A
Excess Return Ratio*	0.73	2.61	3.15	0.72	N/A
AUM	\$ 2,213,145,863	\$ 608,054,346	\$ 446,540,279	\$ 2,457,779,029	\$ 611,724,378
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.
- The Russell Fundamental Large Cap portfolio was terminated August 31, 2016

*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).

TAB 7 – Strategic Issues Discussion: Complexity

OPERF

Strategic Issues Discussion

Complexity

November 1, 2017



Oregon State Treasury

Strategic Issues Discussion: Complexity

Q: Why Talk About Complexity?

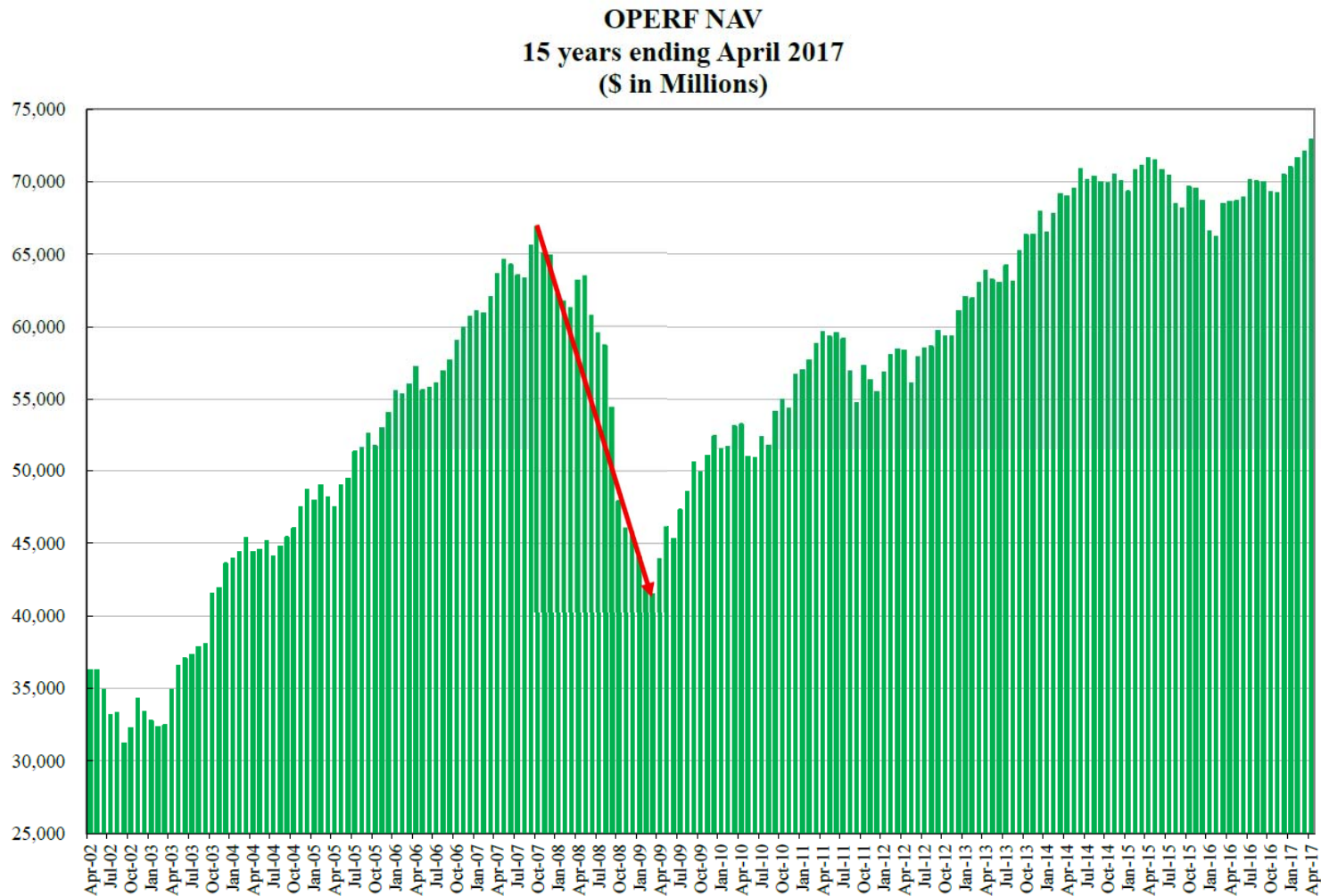
A: Complexity ~ Diversification

Strategic Issues Discussion: Complexity

Q: Why is Complexity/
Diversification Important?

Strategic Issues Discussion: Complexity

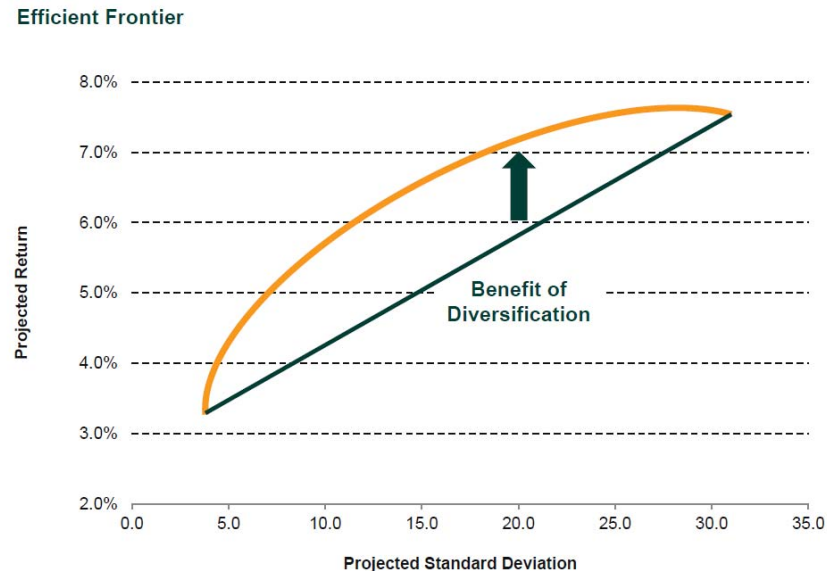
- Diversification Goal: Reduce the magnitude of future drawdowns.



A. Portfolio Construction & Investment Performance

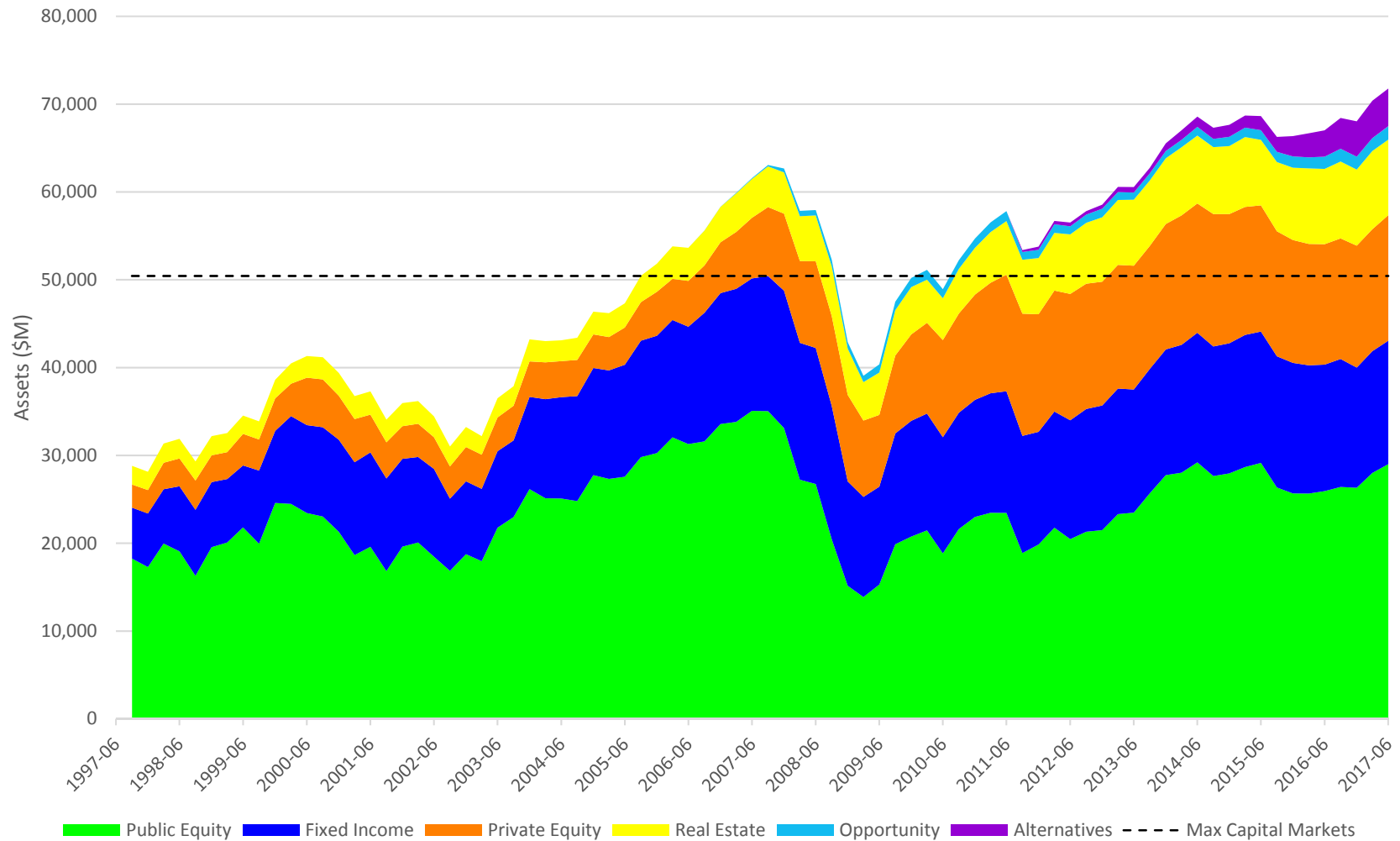
Diversification Discussion

- A fundamental tenet of Modern Portfolio Theory is that diversification can improve portfolio outcome.

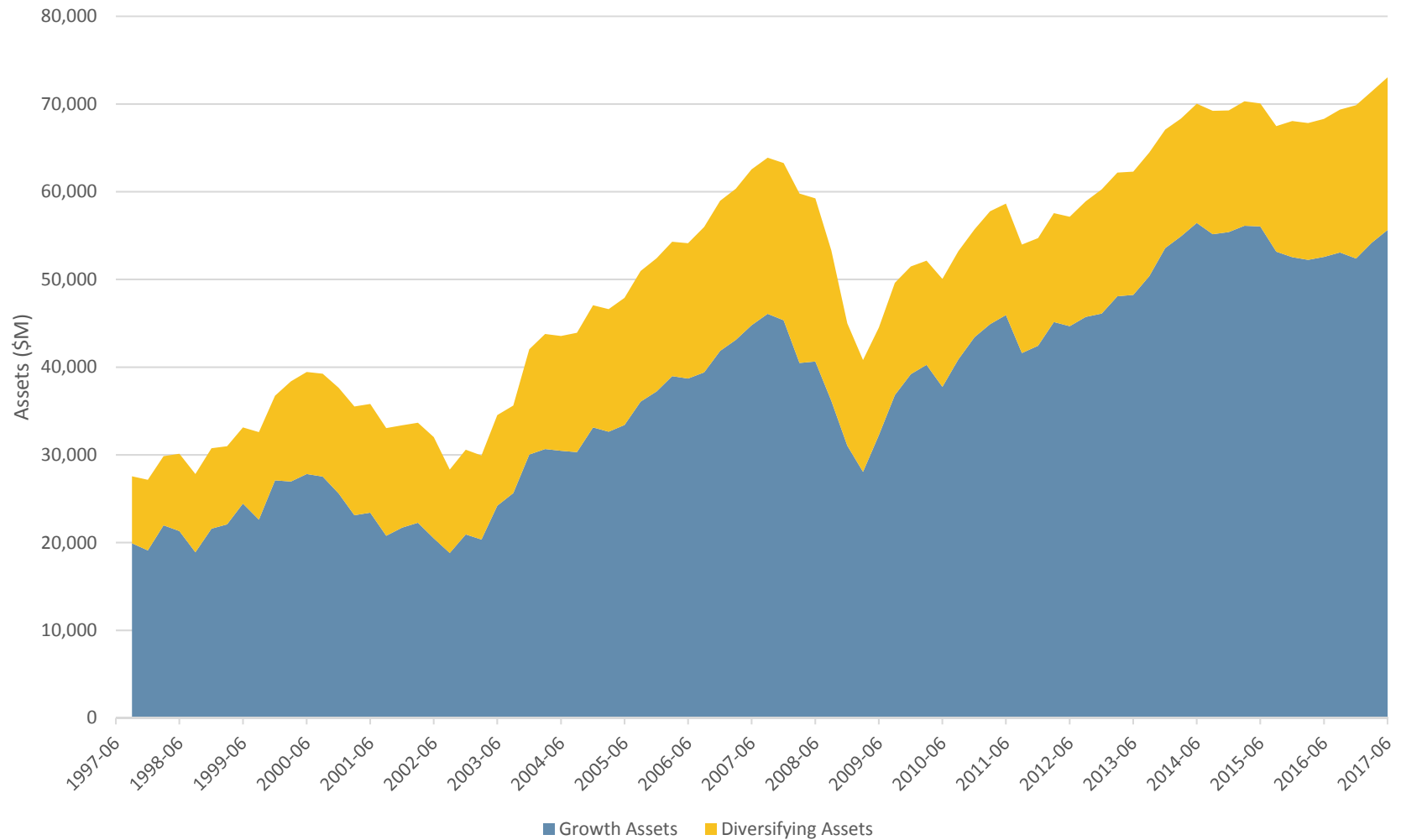


- Diversification can be measured by correlations between asset classes or other things, such as, “factor” exposures.
- The ultimate goal is not simply “performance”, but the best *risk-adjusted* performance. Specifically, ORS 293.721 (“the primary directive”) states that OIC’s goal is to make OPERF “moneys as productive as possible” (i.e., maximize returns) *subject to* ORS 293.726 which includes, among other manifestations of prudence, the duty of diversification.

OPERF: Portfolio Construction by Asset Class



OPERF: Portfolio Construction by Asset Type

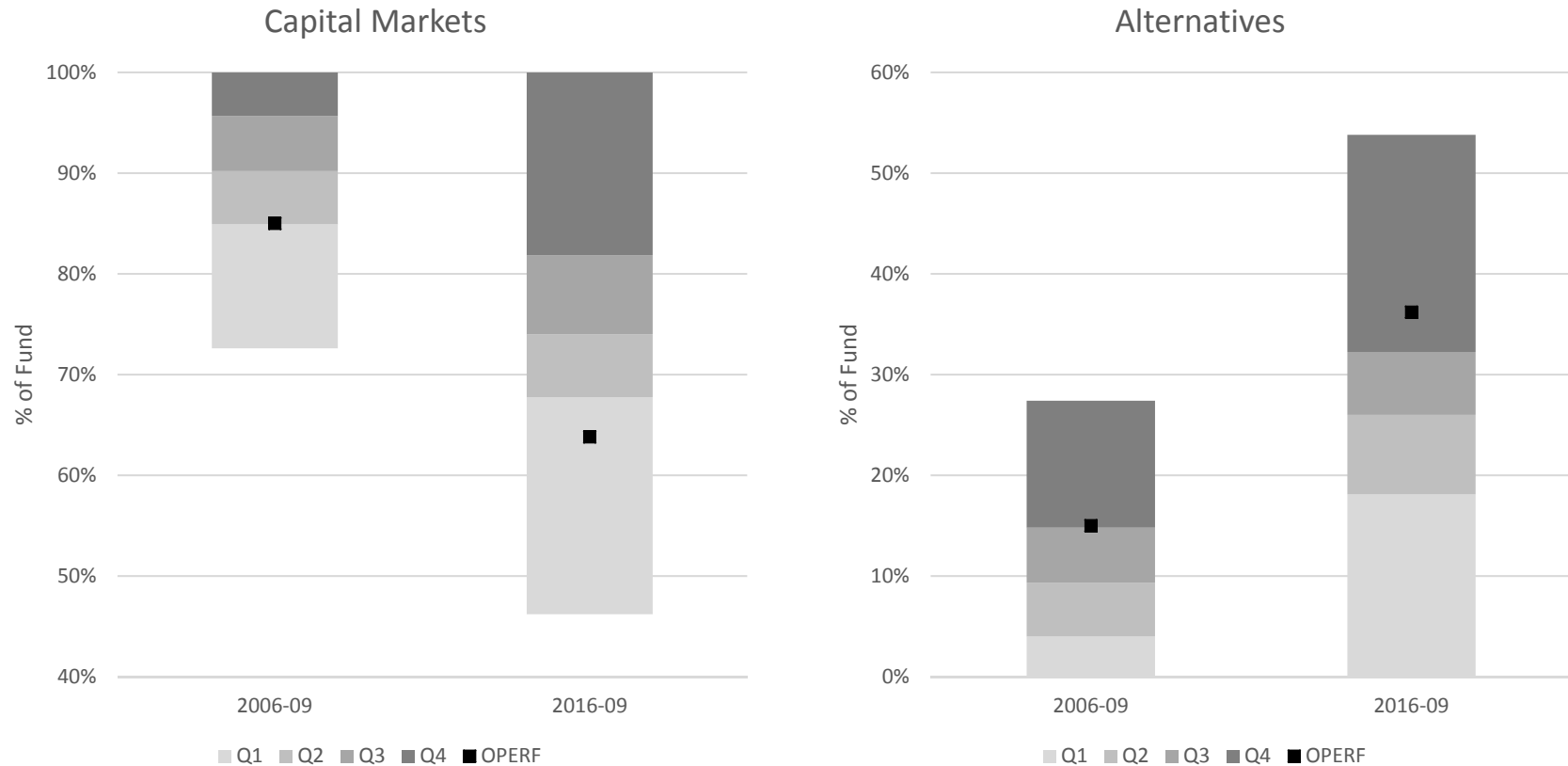


June 2007 versus June 2017

Asset Class	June 2007 (\$M)	June 2017 (\$M)	Change (\$M)	Change (%)
Public Equity	35,066	29,011	-6,055	-17%
Fixed Income	15,084	14,038	-1,046	-7%
Cash, Overlay, & Transition	974	1,278	305	+31%
Capital Markets Program	51,124	44,327	-6,797	-13%
Private Equity	6,890	14,306	7,416	+108%
Real Estate	4,425	8,599	4,173	+94%
Opportunity	97	1,529	1,433	n.m.
Alternatives	0	4,289	4,289	
Alternatives Program	11,412	28,722	17,311	+152%
OPERF	62,535	73,049	10,514	+17%

- June 2007 a “natural” starting point since it was near OPERF’s peak (September 2007) NAV allocation to the Capital Markets Program.
- Total OPERF NAV increased from \$62.5B to \$73.0B over the ten-year period.
- As a percentage of OPERF NAV, the Capital Markets Program declined from 82% in June 2007 to 61% in June 2017.
- The Alternatives Program correspondingly increased from 18% to 39% of OPERF NAV.

OPERF Is Not Unique



Source: Pensions & Investments. Peer group is U.S. public pension plans with assets > \$10 billion (observations = 54 and 63 for 2006 and 2016, respectively).

- OPERF's declining allocation to Capital Markets and commensurately increasing allocation to Alternatives is consistent with broader peer group trends.
- Within that peer group, OPERF's Capital Markets allocation is bottom quartile while its Alternatives allocation is top quartile.

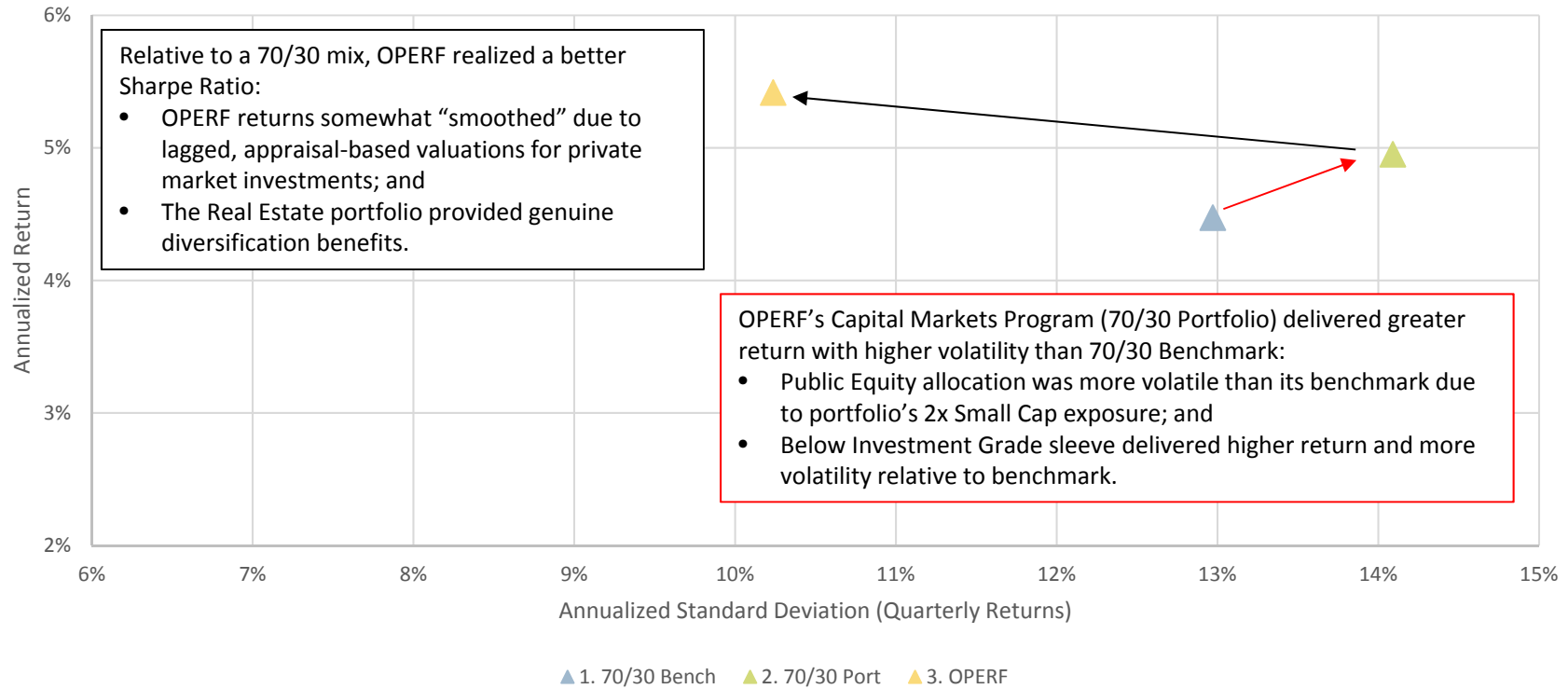
Impact of Strategic Asset Allocation Choices

10-Year Annualized Performance from June 2007 to June 2017

- Manager Selection & SAA
- Manager Selection
1. +4.47% – 70/30 mix of Public Equity and Fixed Income benchmarks, respectively*
 2. +4.95% – 70/30 mix of Public Equity and Fixed Income portfolios, respectively
 - ▶ OPERF's Public Equity and Fixed Income allocations generated excess returns of +0.41% and +0.94% versus their respective benchmarks
 3. +5.42% – Actual OPERF performance
 - ▶ Private Equity delivered a net return of +8.64% (4.28% > OPERF's Public Equity allocation)
 - ▶ Real Estate generated Public Equity-like return of +4.95%
 - ▶ Opportunity Portfolio (too small) and Alternatives Portfolio (initiated mid-period) had *de minimis* impact on overall OPERF results

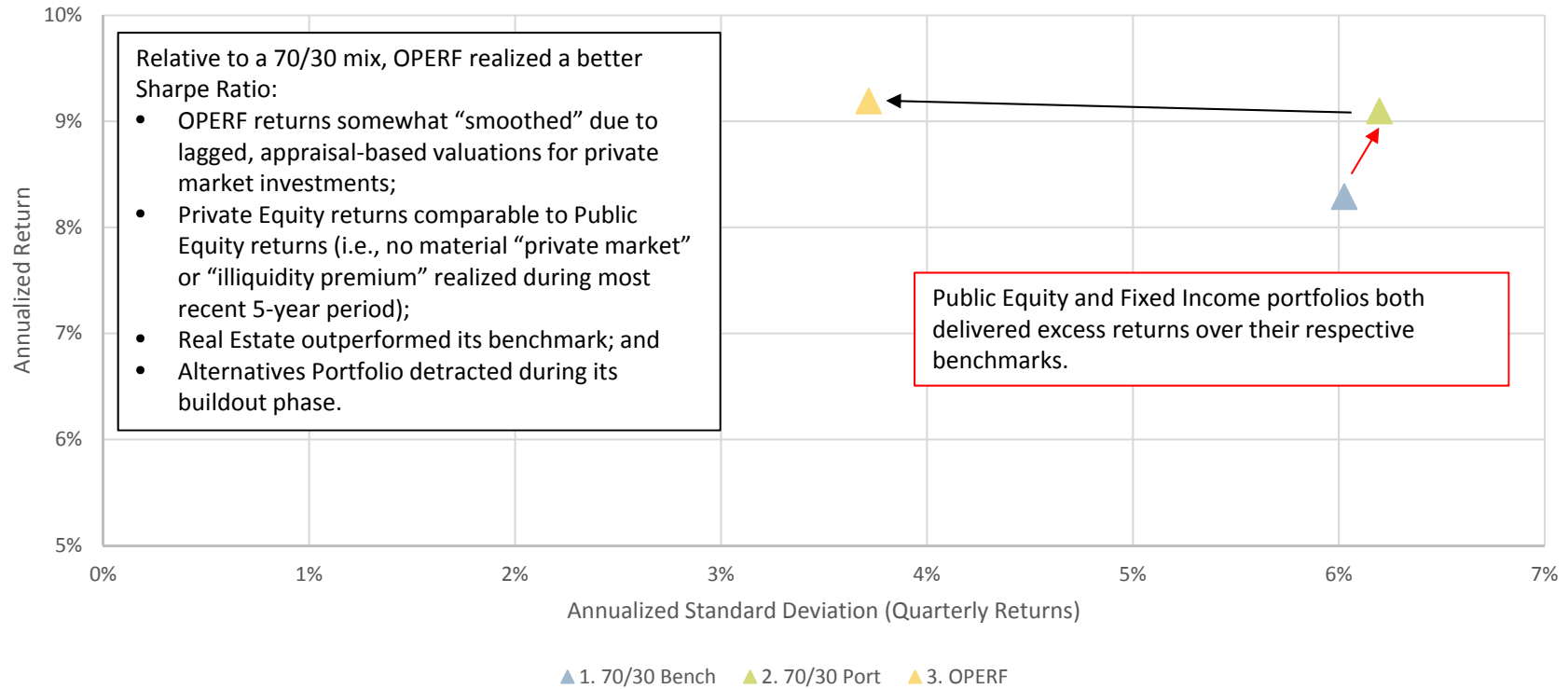
*For almost the entire period, OPERF's Public Equity benchmark has been the MSCI ACWI IMI while its Fixed Income benchmark changed three times.

10-Year Annualized Risk/Return Plot



10-Year Annualized Performance						
	OPERF	Public Equity	Fixed Income	Private Equity	Real Estate	Opportunity
Portfolio	5.42%	4.36%	5.42%	8.64%	4.95%	6.20%
Benchmark	6.04%	3.95%	4.47%	11.18%	6.70%	6.69%
Excess Return	-0.62%	+0.41%	+0.94%	-2.54%	-1.75%	-0.49%

5-Year Annualized Risk/Return Plot



5-Year Annualized Performance							
	OPERF	Public Equity	Fixed Income	Private Equity	Real Estate	Opportunity	Alternatives
Portfolio	9.19%	11.63%	3.13%	11.54%	11.36%	8.18%	2.50%
Benchmark	9.85%	10.74%	2.50%	16.54%	10.65%	6.37%	5.36%
Excess Return	-0.66%	+0.88%	+0.64%	-5.01%	+0.70%	+1.81%	-2.86%

Was OPERF Rewarded for Increased Complexity?

Yes

- ▶ OPERF has delivered a better risk-adjusted return than a “generic” 70/30 Public Equity/Fixed Income portfolio.
- ▶ Combined “Equity” allocation (i.e., Public Equity + Private Equity) declined from 76% in 2007 to 59% in 2017, partially reducing OPERF’s overall equity beta; however, Real Estate and Alternatives contributed some equity beta during the period. Recent repositioning of the Real Estate allocation and the ultimate maturation of the Alternatives Portfolio should improve these allocations’ respective diversifying properties.
- ▶ OPERF now has two diversifiers, the Fixed Income portfolio and the Diversifying Strategies sleeve of the Alternatives portfolio.

Strategic Issues Discussion: Complexity

- ▶ Looking Back: Yes, OPERF was rewarded for its complexity.
- ▶ Looking Ahead: To the extent complexity is coincident with diversification, the answer for the forthcoming decade should also be yes.



Oregon State Treasury

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OREGON INVESTMENT COUNCIL

November 2017

PCA

PENSION
CONSULTING
ALLIANCE



Table of Contents

- Volatility Penalty
- Capital Market Assumptions
- Risk Metrics
- Current Volatility

Volatility Penalty

	Arithmetic Return	Standard Deviation	Volatility Penalty	Compound Return
Portfolio A	8.0	9.0	0.4	7.6
Portfolio B	8.0	13.0	0.8	7.2

2017 10-Year Capital Market Assumptions

2017 PCA Generic Capital Market Assumptions	Expected Arithmetic Average Nominal Annual Return	Expected Geometric Compound Nominal Annual Return	Expected Risk of Nominal Returns (Annl. SD)	Cash	TIPS	TSY	CoreFxd	Credit	RealEst	USEq	IntlEq	GlblEq	HIntlEq	PrivEq
Cash	2.25	2.25	1.50											
Treasury Infl. Protected Securities	3.00	2.75	7.00	0.20										
US Treasuries Only Fixed Income	2.35	2.10	7.00	0.30	0.50									
US Core Fixed Income	3.05	2.90	5.50	0.25	0.60	0.40								
US Credit Fixed Income	3.75	3.50	7.00	0.00	0.65	0.00	0.75							
Core Real Estate	5.50	5.00	10.00	0.30	0.00	0.00	0.00	0.00						
Domestic Equity	8.00	6.25	19.50	0.00	0.00	-0.25	0.20	0.40	0.40					
International Equity	9.50	7.25	22.00	0.00	0.00	-0.35	0.10	0.20	0.30	0.80				
Global Equity	9.00	7.15	20.00	0.00	0.00	-0.30	0.15	0.30	0.35	0.90	0.90			
Hedged International Equity	9.35	7.40	20.50	0.00	0.00	-0.30	0.10	0.30	0.35	0.85	0.90	0.90		
Private Equity/Venture Capital	11.75	8.50	27.00	0.00	0.00	-0.30	0.00	0.30	0.30	0.85	0.80	0.80	0.80	
Inflation	2.25	2.25	1.50	0.50	0.45	-0.10	0.00	0.10	0.35	0.20	0.20	0.20	0.20	0.10

Significant Changes from Last Year's January's Ten-Year Assumptions

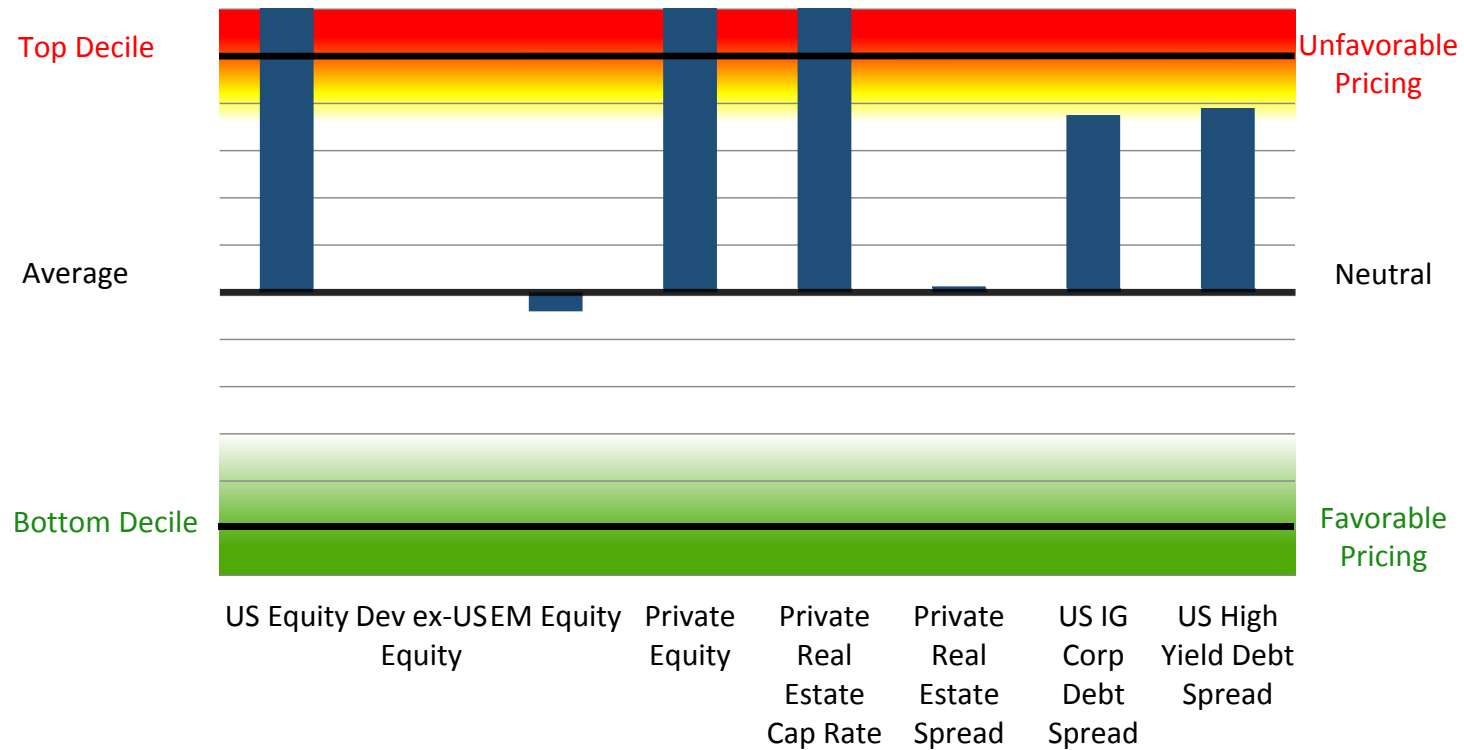
- Inflation expectations remained the same as last year at 2.25%. While the observed level of breakeven inflation rose to 2% by year end, realized inflation came in below this level in 2016, and consensus projections remain in line with PCA's estimate.
- PCA increased our volatility expectations across all classes, indicating increased uncertainty in inflation, interest rates and growth expectations globally.
- Core fixed income expectations remain similar to last year. While interest rates increased slightly from last year, credit spreads tightened.
- U.S. equity expectations declined, following another year of above average appreciation leading to higher valuation levels.
- Non-U.S. equity expectations remained similar to last year, but with increased volatility.

Indices Used in Modeling Asset Class Assumptions

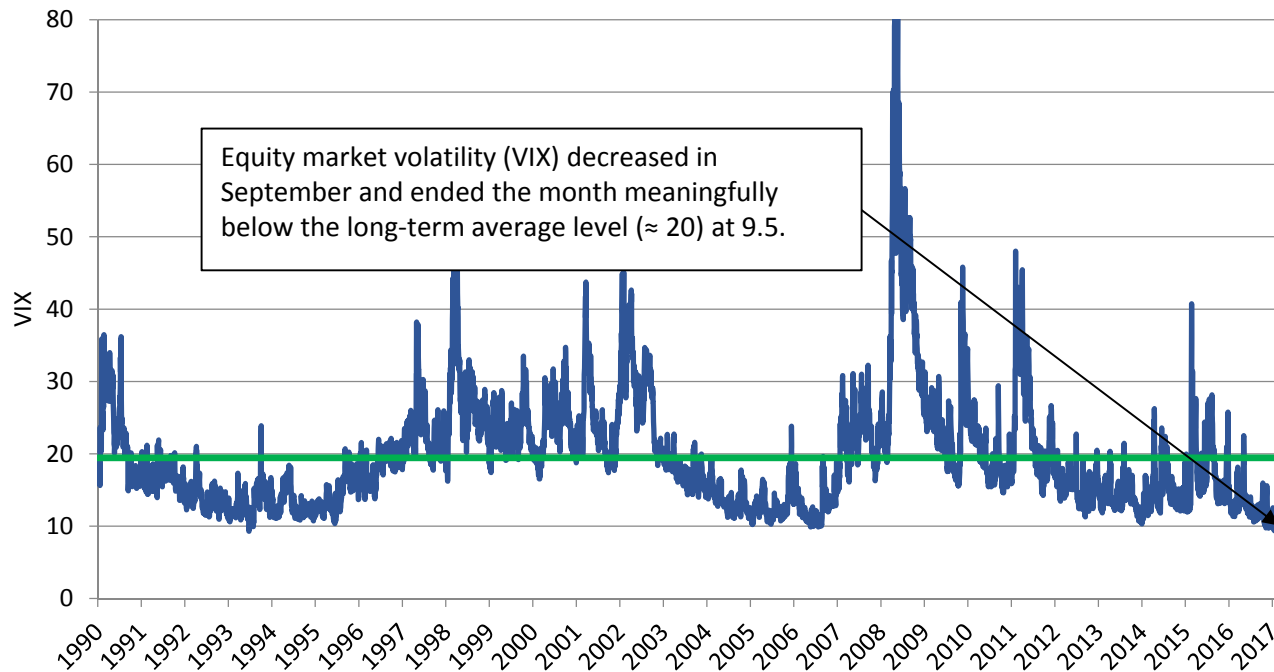
Asset Class	Index
Cash	Citigroup 3 month US Treasury Bill Index
TIPS	Barclays Capital TIPS, simulated TIPS series per Bridgewater
US Treasuries Only Fixed Income	Barclays Capital US Treasuries Index
US Core Fixed Income	Barclays Capital Universal, Barclays Capital Aggregate Index, Barclays Capital G/C Index, Barclays Capital Intermediate Govt. Index, Barclays Capital Corp/Credit Index
US Credit Fixed Income	Barclays Capital US Universal Spread 1-10 Index, Barclays Capital Corp/Credit Index
Core Real Estate	NCREIF NPI Index, Prior Indices
Domestic Equity	Russell 3000 Index, S&P 500 Index
International Equity	MSCI/Barra ACWI ex-US Index, MSCI/Barra EAFE Index
Global Equity	MSCI/Barra ACWI Index
Hedged Intl. Equity	Hedged MSCI/Barra EAFE Index, MSCI/Barra ACWI ex-US Index, MSCI/Barra EMF Index
Private Equity	Prior Brinson Venture Capital Index, VCJ Post Venture Capital Index

PCA Risk Metrics Valuations as of 9/30/2017

**Valuation Metrics versus Historical Range
A Measure of Risk**



VIX - a measure of equity market fear / uncertainty



Source: <http://www.cboe.com/micro/vix/historical.aspx>

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TAB 8 – Asset Allocation & NAV Updates

Asset Allocations at September 30, 2017

			Regular Account					Variable Fund	Total Fund
OPERF	Policy	Target ¹	\$ Thousands	Pre-Overlay	Overlay	Net Position	Actual	\$ Thousands	\$ Thousands
Public Equity	32.5-42.5%	37.5%	31,203,460	41.7%	(620,703)	30,582,758	40.9%	593,178	31,175,935
Private Equity	13.5-21.5%	17.5%	14,564,610	19.5%		14,564,610	19.5%		14,564,610
Total Equity	50.0-60.0%	55.0%	45,768,070	61.1%	(620,703)	45,147,367	60.3%		45,740,545
Opportunity Portfolio	0-3%	0.0%	1,538,835	2.1%		1,538,835	2.1%		1,538,835
Fixed Income	15-25%	20.0%	14,135,392	18.9%	2,449,350	16,584,741	22.2%		16,584,741
Real Estate	9.5-15.5%	12.5%	7,709,580	10.3%	(480,000)	7,229,580	9.7%		7,229,580
Alternative Investments	0-12.5%	12.5%	4,334,575	5.8%		4,334,575	5.8%		4,334,575
Cash²	0-3%	0.0%	1,364,001	1.8%	(1,348,647)	15,354	0.0%		25,774
TOTAL OPERF		100%	\$ 74,850,454	100.0%	\$ -	\$ 74,850,454	100.0%		\$ 603,597

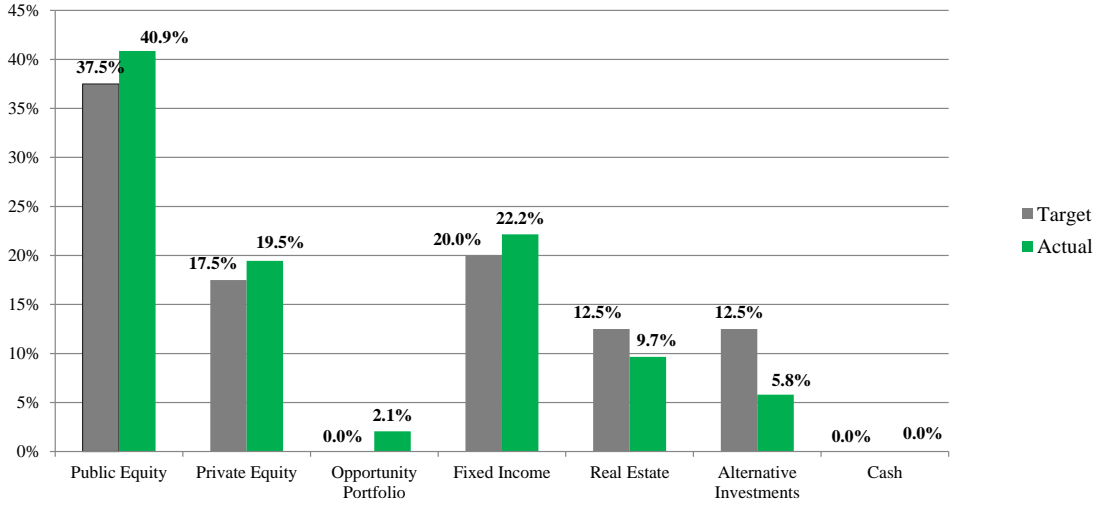
¹Targets established in June 2015. Interim policy benchmark consists of: 40% MSCI ACWI IMI Net, 22.5% Custom FI Benchmark, 20% Russell 3000+300bps (1 quarter lagged), 12.5% NCREIF ODCE net (1 quarter lagged), & 5% CPI+400bps.

²Includes cash held in the policy implementation overlay program.

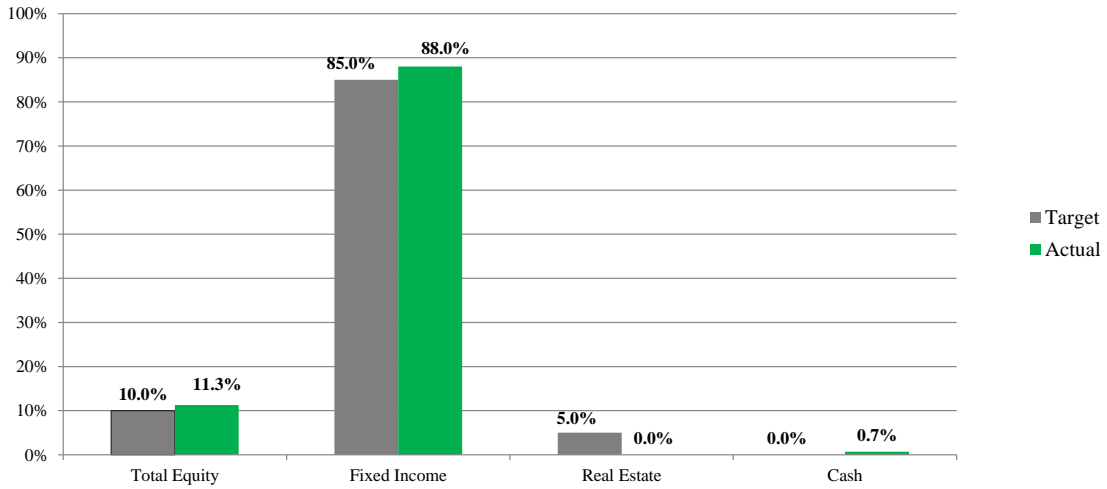
SAIF	Policy	Target	\$ Thousands	Actual
Total Equity	7-13%	10.0%	557,005	11.3%
Fixed Income	80-90%	85.0%	4,351,959	88.0%
Real Estate	0-7%	5.0%	0	0.0%
Cash	0-3%	0%	34,637	0.7%
TOTAL SAIF			\$ 4,943,601	100.0%

CSF	Policy	Target	\$ Thousands	Actual
Domestic Equities	25-35%	30%	477,598	29.8%
International Equities	25-35%	30%	472,686	29.5%
Private Equity	0-12%	10%	196,753	12.3%
Total Equity	65-75%	70%	1,147,037	71.5%
Fixed Income	25-35%	30%	445,981	27.8%
Cash	0-3%	0%	10,949	0.7%
TOTAL CSF			\$ 1,603,967	100.0%

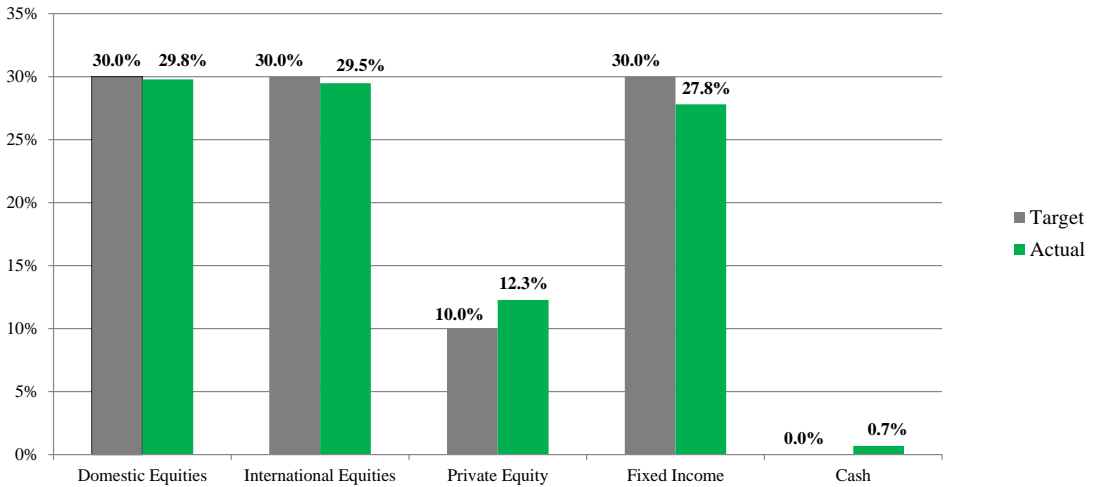
OPERF Asset Allocation



SAIF Asset Allocation



CSF Asset Allocation

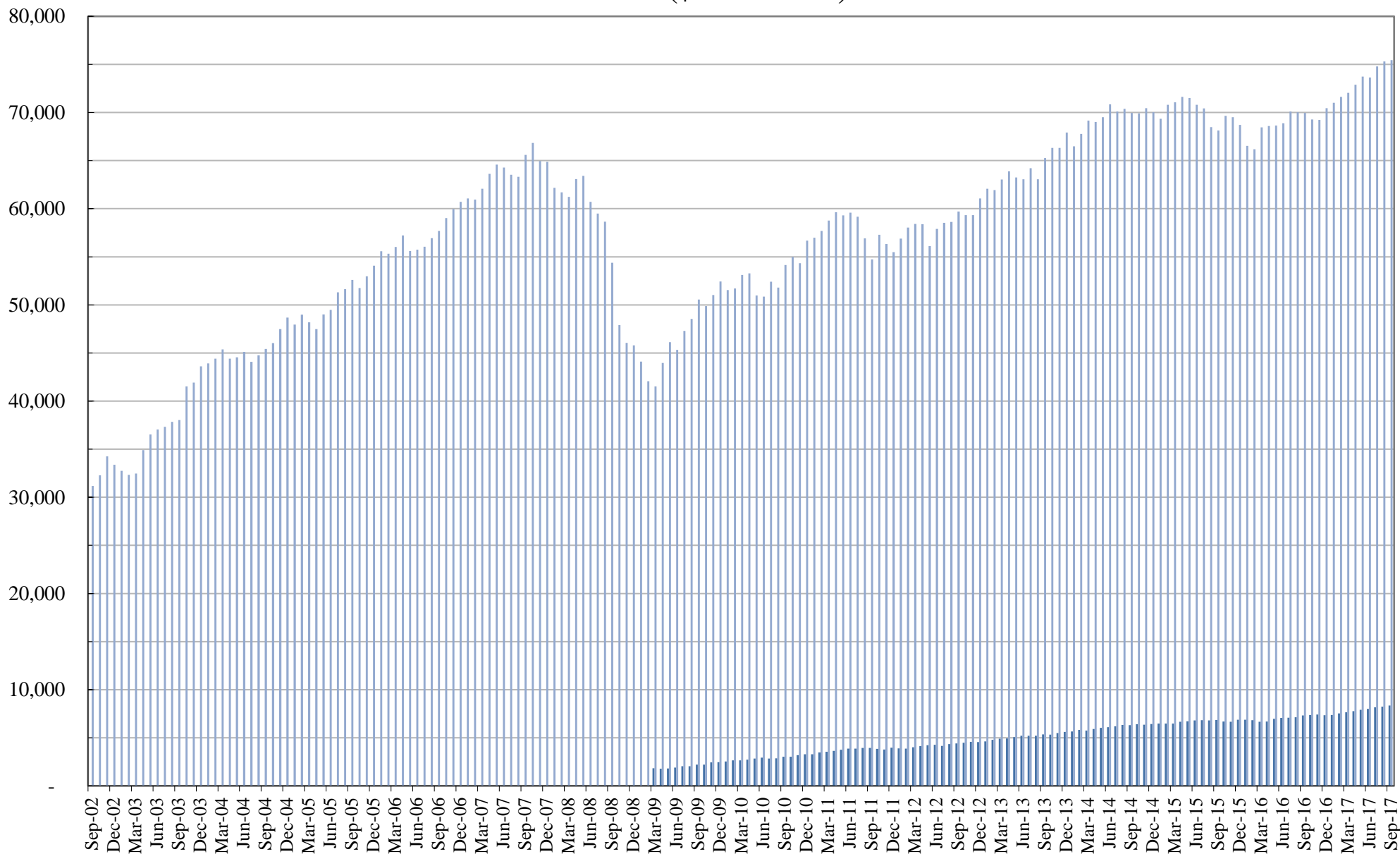


OPERF NAV

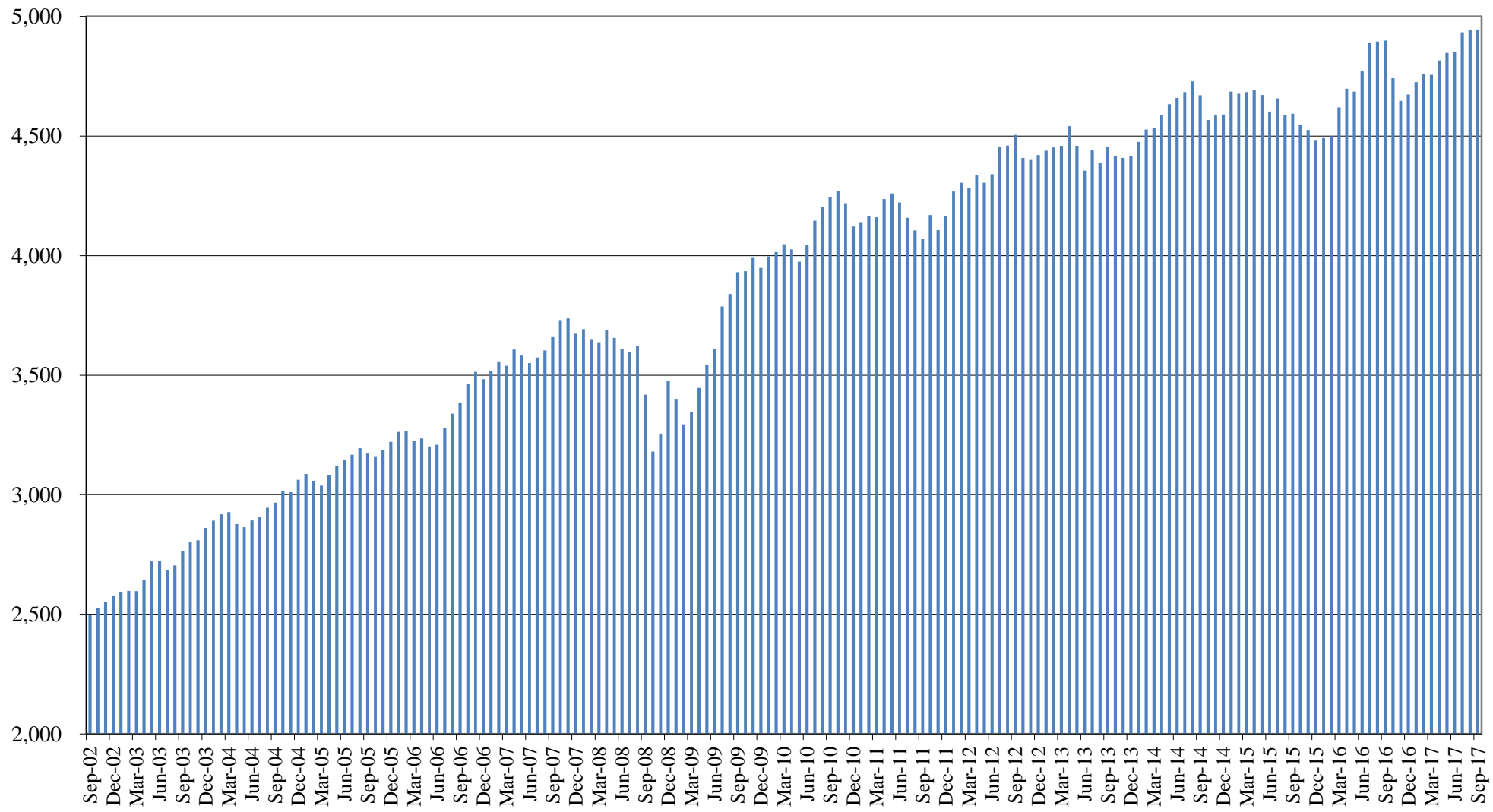
15 years ending September 2017

(\$ in Millions)

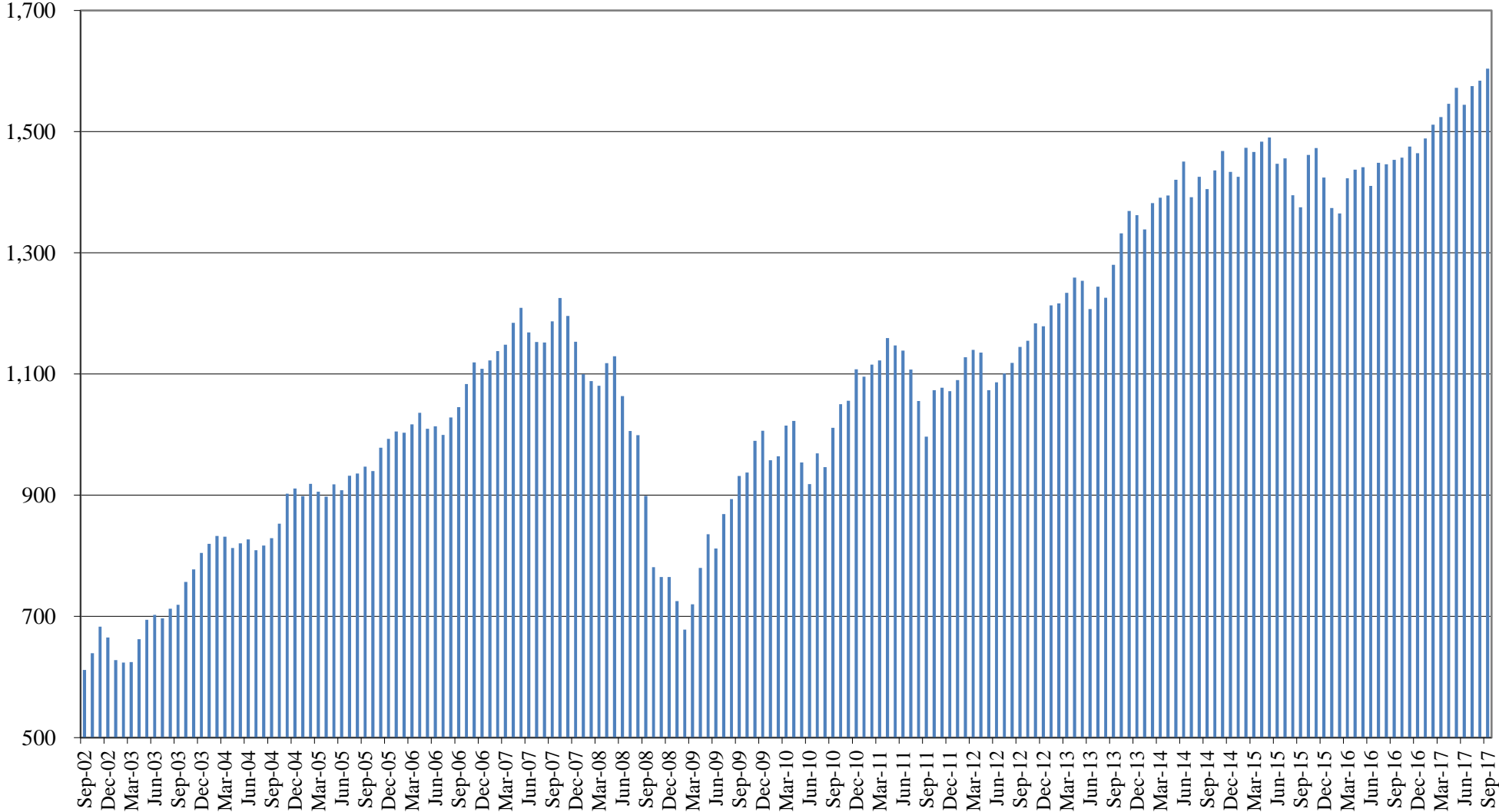
■ IAP ■ OPERF



SAIF NAV
15 years ending September 2017
(\$ in Millions)



CSF NAV
15 years ending September 2017
(\$ in Millions)



TAB 9 – Calendar — Future Agenda Items

2017/18 OIC Forward Calendar and Planned Agenda Topics

- December 13, 2017:** OIC Officer Election
Alternatives Portfolio Manager Recommendation
Q3 OPERF Performance & Risk Report
Fixed Income Program Review (OPERF, OSTF & OITP)
Strategic Issues Discussion: Part II
- February 1, 2018:** Private Equity Manager Recommendation
Private Equity Program Review
Placement Agent Report
2019 OIC Calendar Approval
Guest Speaker Presentation
Strategic Issues Discussion: Part III
- March 14, 2018:** OPERF Overlay Review
Securities Lending Update
Real Estate Program Review
Q4 2017 OPERF Performance & Risk Report
- April 25, 2018:** OPERF Asset Allocation & Capital Market Assumptions Update
Alternatives Portfolio Review
OIC Policy Updates
SAIF Annual Review
- June 6, 2018** Opportunity Portfolio Review
Q1 OPERF Performance & Risk Report
Operations Update
CSF Annual Review
- August 8, 2018:** Corporate Governance Update
OIC Policy Updates
- September 19, 2018:** Q2 OPERF Performance & Risk Report
CEM Benchmarking Report
- October 31, 2018:** Currency Program Review
Public Equity Program Review
Strategic Issues Discussion