



**OREGON
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Oregon Investment Council

December 12, 2018

Rukaiyah Adams
Chair

John Skjervem
Chief Investment Officer

Tobias Read
State Treasurer



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OREGON INVESTMENT COUNCIL

Agenda

December 12, 2018
9:00 AM

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

<u>Time</u>	<u>A. Action Items</u>	<u>Presenter</u>	<u>Tab</u>
9:00-9:05	1. Review & Approval of Minutes October 31, 2018	Rukaiyah Adams <i>OIC Chair</i>	1
9:05-9:10	2. Committee Reports and CIO Remarks	John Skjervem <i>Chief Investment Officer</i>	2
9:10-10:00	3. Global Infrastructure Partners IV, L.P. <i>OPERF Alternatives Portfolio</i>	Ben Mahon <i>Senior Investment Officer, Alternatives</i> Tom Martin <i>Managing Director, TorreyCove Capital Partners</i> Bayo Ogunlesi <i>Chairman & Managing Partner, Global Infrastructure Partners</i>	3
10:00-10:30	4. Global Low Volatility Mandate <i>OPERF Public Equity Portfolio</i>	Michael Viteri <i>Senior Investment Officer, Public Equity</i> Janet Becker-Wold <i>Senior Vice President, Callan LLC</i> Gerard O'Reilly <i>Co-Chief Executive Officer, Chief Investment Officer, Dimensional Fund Advisors</i>	4
10:30-10:45	----- BREAK -----		
10:45-11:00	5. Capital Markets Policy Updates <i>OPERF</i>	Jennifer Peet <i>Corporate Governance Director</i> Michael Viteri	5

Rukaiyah Adams
Chair

John Russell
Vice Chair

Rex Kim
Member

Tobias Read
State Treasurer

Kevin Olineck
PERS Director

TAB 1 – REVIEW & APPROVAL OF MINUTES

October 31, 2018 Regular Meeting



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State of Oregon Office of the State Treasurer

162 SW Upper Boones Ferry Road

Tigard, Oregon 97224

OREGON INVESTMENT COUNCIL

OCTOBER 31, 2018

Meeting Minutes

Members Present: Rukaiyah Adams, John Russell, Tobias Read, Rex Kim and Kevin Olineck

Staff Present: John Skjervem, Darren Bond, Perrin Lim, David Randall, John Hershey, Deena Bothello, Karl Cheng, Tony Breault, Roy Jackson, Austin Carmichael, David Elott, May Fanning, Steve Kruth, Jen Plett, Steve Kruth, Debra Day, Dana Millican, Ben Mahon, Paul Koch, Jo Recht, Tom Lofton, Geoff Nolan, Garrett Cudahey, Angela Schaffers, Aliese Jacobsen, Eric Messer, Amanda Kingsbury, Mark Selfridge, Michael Langdon, Joe Hutchinson, Michael Viteri, Jennifer Peet, Ricardo Lopez, William Hiles, Michael Mueller, Kristel Flores, Tiffany Zhuge, Andy Coutu, Tim Baumert, James Sinks, Jenny Dalto, Dmitri Palmateer, Amy Wojcicki, Michael Kaplan, Robin Kaukonen, Ryan Mann, Kim Olson, Chris Ebersole and Faith Sedberry

Consultants Present: Tom Martin (TorreyCove); Allan Emkin and Brandon Ross (PCA); Janet Becker-Wold and Jim Callahan (Callan)

Legal Counsel Present: Steven Marlowe, Department of Justice

The October 31st, 2018 OIC meeting was called to order at 9:00 am by Rukaiyah Adams, OIC Chair.

I. **9:01 am Review and Approval of Minutes**

MOTION: After soliciting edits, Chair Adams asked for a motion to approve the September 19th, 2018 OIC regular meeting minutes. Member Russell moved the motion which received a second from Treasurer Read and then passed by a 4/0 vote.

II. **9:05 am Committee Reports and CIO Update**

Committee Reports: Mr. Skjervem gave an update on the following committee actions taken since the September 19th, 2018 OIC meeting:

Private Equity Committee

September 24, 2018

A&M Capital Europe

\$150M

Vista Capital Partners Fund VII

Pursuant to policy INV 905, a \$15 million commitment to Vista Equity Partners Fund VII was approved by



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the Chief Investment Officer for inclusion in the Common School Fund private equity portfolio.

Alternatives Portfolio Committee

October 22, 2018

Westbourne Infrastructure Debt
Separately Managed Account

\$230M

Opportunity Portfolio Committee

None

Real Estate Committee

None

Mr. Skjervem then provided opening remarks during which he highlighted the two consultant recommendations (general and portfolio-specific), proposed updates to and the overall rationalization of public equity policies, and an initial review of the OPERF Currency Overlay Program. He also mentioned the annual review for the OPERF public equity portfolio and two important recommendations associated therewith, and introduced newly-hired OST employee, Faith Sedberry, Alternatives Investment Officer.

III. 9:08 am General Consultant Recommendation – OPERF

Karl Cheng, Senior Investment Officer, Portfolio Risk & Research presented the Council with a recommendation to extend for another two years the OIC's general consulting contracts with Callan LLC (Callan) and Pension Consulting Alliance LLC (PCA), both of which are currently set to expire on December 31, 2018.

In recognition of the positive contributions made by Callan and PCA, respectively, Staff proposed that the OIC extend its current contracts with both firms, subject to existing terms and conditions, for a final two-year period beginning January 1, 2019 and ending December 31, 2020.

MOTION: Treasurer Read moved approval, and Mr. Kim seconded the motion which then passed by a 4/0 vote.

IV. 9:14 am Portfolio Consultant Recommendation – OPERF Alternatives & Opportunity Portfolios

Ben Mahon, Senior Investment Officer, Alternatives, recommended that the Council approve a non-discretionary, full retainer consulting contract with TorreyCove Capital Partners, LLC ("TorreyCove") beginning January 1, 2019 for the OPERF Alternatives Portfolio. Mr. Mahon also recommended that an existing agreement with TorreyCove providing similar consulting services in support of the OPERF Opportunity Portfolio be renewed.

MOTION: Treasurer Read moved approval, and Mr. Kim seconded the motion which then passed by a 4/0 vote.

V. 9:17 am Public Equity Policy Updates – OPERF and other OST-managed Funds

Jen Peet, Corporate Governance Director, recommended approval of three public equity policy modifications:



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1. Synchronize the expected return of the U.S. Risk Premia and International Risk Premia strategies relative to their cap-weighted benchmarks (specifically, 150 bps excess return annualized over a market cycle);
2. Clarify the return and tracking error objectives for these same two strategies (specifically, 10 bps excess return with tracking error of 50 bps or less relative to the risk premia benchmark); and
3. Establish a deadline of 6 months for liquidating securities from all internally-managed equity portfolios, when those securities are no longer included in the portfolios' corresponding benchmark.

Second, Ms. Peet reported that staff recommended reducing the number of public equity policies from seven to three, so that the surviving policies comprised one covering externally-managed mandates, one covering internally-managed mandates, and one covering proxy voting (the OIC reviewed and approved the proxy voting policy at the March 2018 meeting). Specifically, she said staff recommended the following:

INV 601	Public Equity Investments - Strategic Role of Public Equity Securities within OPERF	Retain
INV 602	Equity Investments - Selecting and Terminating Investment Management Firms	Retire and fold into INV 601
INV 603	Internal Equity Portfolio Objectives and Strategies	Retain
INV 604	Internal Equity Approved Broker List	Retire and fold into INV 603
INV 605	Proxy voting	Retain (approved in March of 2018)
INV 606	Equity Investments - Commission Recapture	Retire and fold into INV 601
INV 607	Equity Investments - Manager Monitoring	Retire and fold into INV 601

MOTION: Treasurer Read moved approval of the staff recommendation, and Mr. Russell seconded the motion which then passed by a 4/0 vote.

VI. 9:53 am OSTF Portfolio Rules Recommendation – Oregon Short Term Fund

Garrett Cudahey, Investment Officer, Fixed Income, recommended a revision to the Oregon Short Term Fund policy to increase the maximum allowable percentage of fund assets invested in asset-backed securities (ABS) from 15% to 25% for the following reasons:

- Alignment with Policy Objectives – Highly-rated ABS securities have a strong history of providing principal protection. ABS securities are also highly-liquid with deep new issuance and secondary trading markets;
- Attractive Relative Yields in Collateralized Form – ABS securities offer attractive relative yields when compared to other asset classes in the U.S. short-duration fixed income markets; and
- Improved Diversification – ABS securities offer diversification from corporate credit exposures, thus allowing staff to build a more resilient portfolio.

MOTION: Treasurer Read moved approval, and Mr. Russell seconded the motion which then passed by a 4/0 vote.

VII. 10:13 am Currency Overlay Program – OPERF

Jen Plett, Senior Investment Analyst and Karl Cheng presented a review of the OPERF Currency Overlay Program, which was approved by the Council on August 9, 2017 and implemented by staff on January 2, 2018.



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VIII. 11:29 am Public Equity Review – OPERF

Michael Viteri, Senior Investment Officer, Public Equity, Robin Kaukonen, Investment Officer, Public Equity, Tim Baumert, Investment Officer, Public Equity and Janet Becker-Wold, Senior Vice President, Callan LLC delivered an annual review of the OPERF public equity portfolio. Their presentation included the following recommendations:

1. Insource management of the OPERF private equity stock distribution portfolio; and
2. Change the internally-managed small cap portfolio benchmark from the Russell 2000 index to the S&P SmallCap 600 index.

MOTION: Treasurer Read moved approval of insourcing the management of the OPERF private equity stock distribution portfolio. Mr. Russell seconded the motion which then passed by a 4/0 vote.

MOTION: Treasurer Read moved approval of staff's recommendation to change the internally-managed small cap portfolio benchmark from the Russell 2000 index to the S&P SmallCap 600 index. Mr. Kim seconded the motion which then passed by a 4/0 vote.

IX. 11:31 am Asset Allocation & NAV Updates

Mr. Skjervem reviewed asset allocations and NAVs across OST-managed accounts for the period ended September 30, 2018.

X. 11:31 am Calendar – Future Agenda Items

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

XI. 11:32 am Open Discussion

Member Russell said he is looking forward to having a fifth member join the Council. Treasurer Read said his understanding was that the Governor's office intended to put forward a nominee for Senate consideration after the election and prior to the December legislative session.

11:33 am Public Comments

Ms. Elizabeth Merin, Toys "R" Us, and Mr. Jim Baker, Private Equity Stakeholder Project addressed the Council concerning Oaktree Capital. Mr. Baker gave an update related to Toys "R" Us, and reported that since that company was shut down earlier this year, 33,000 employees have lost their jobs and were never paid \$75 million in promised severance. According to Mr. Baker, KKR and Bain Capital agreed to contribute \$20 million to a hardship fund for Toys "R" Us employees. Ms. Merin and Mr. Baker then urged the Council to ask that Oaktree Capital 1) join KKR and Bain Capital by making a contribution to the hardship fund and 2) ensure that employees who built the Toys "R" Us brand have a role in any efforts to revive that brand.

Ms. Adams adjourned the meeting at 11:45 am.

Respectfully submitted,

A handwritten signature in cursive script that reads "May Fanning".

May Fanning
Executive Support Specialist

TAB 2 – Committee Reports and CIO Remarks

December 12, 2018

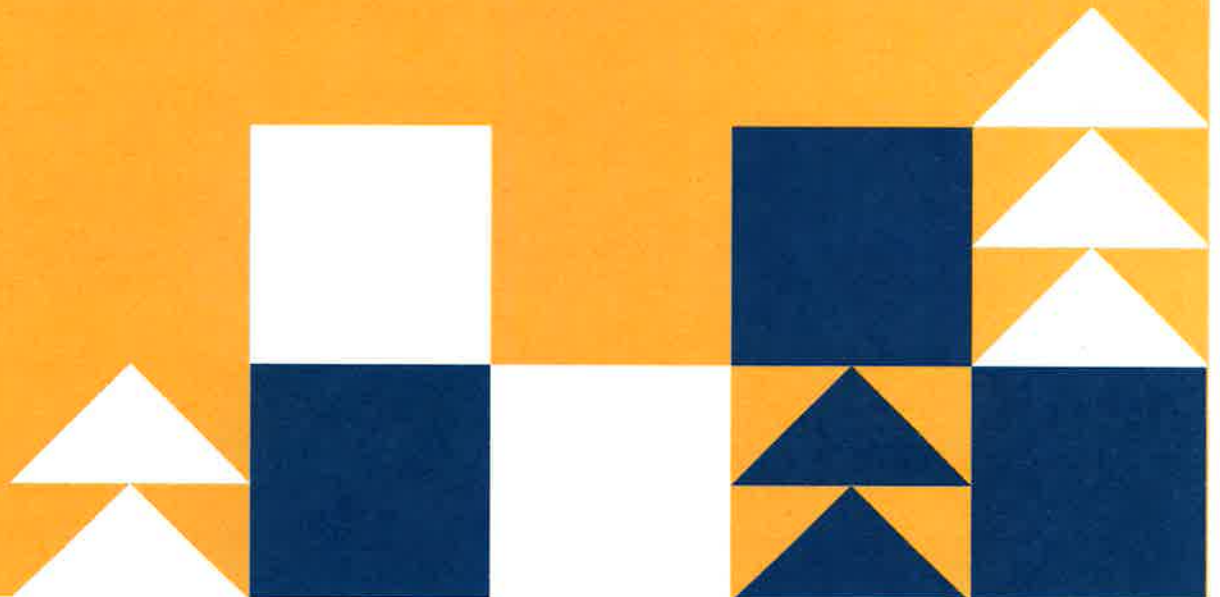
Oregon Investment Council

Opening Remarks

John D. Skjervem, Chief Investment Officer



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Alternatives Portfolio

Global Infrastructure Partners

Public Equity Portfolio

Dimensional Fund Advisors

Policy Updates

Public Equity and Fixed Income

Q3 2018 Performance & Risk Report

Good Q3

Fixed Income Annual Review

No changes, but lots to talk about!



December 12, 2018

Oregon Investment Council

TAB 3 – Global Infrastructure Partners IV, L.P.

OPERF Alternatives Portfolio

Global Infrastructure Partners Fund IV, L.P.

Purpose

Staff and TorreyCove recommend a \$400 million commitment to Global Infrastructure Partners Fund IV, L.P. (“GIP IV” or the “Fund”) for 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 the continuation of a relationship on behalf of the OPERF Alternatives Portfolio.

Background

Global Infrastructure Partners (“GIP” or the “Firm”) is an independent fund manager focused on investing in infrastructure assets in the energy, transportation, and water/waste industries. GIP was founded in 2006 by a team of former Credit Suisse (“CS”) and General Electric (“GE”) professionals with the goal of creating an investment approach based on combining industry expertise with industrial best practice operational management. GIP currently manages \$46 billion across its platforms.

Oregon's relationship with GIP dates back to 2011, and consists of three mandates across two strategies:

- Infrastructure equity – \$150 million to Global Infrastructure Partners Fund II in 2011;
- Infrastructure debt – \$200 million to Global Infrastructure Partners Capital Solutions Fund in 2014; and
- Infrastructure equity – \$400 million to Global Infrastructure Partners Fund III in 2015.

GIP is seeking \$17.5 billion in aggregate L.P. capital commitments for the Fund with a \$20.0 billion hard cap. The Firm plans to hold a first close on or about December 14, 2018. Well in excess of the Alternatives Portfolio's target return, the Fund is targeting a gross internal rate of return of 15% to 20%.

Discussion/Investment Considerations

With this Fund, GIP will continue its traditional focus on investing in infrastructure assets on a global basis, primarily in the energy, transportation, and water/waste sectors. Fundamental to its investment strategy, the Firm intends to focus on driving operational improvements, deploying its operating team to implement industrial best practices, with the goal of generating incremental returns for the Fund. An important feature of GIP IV strategy is the Firm's focus on large-scale, complex transactions, which should provide less competition and more opportunities for operational value creation. Of note, this scale and expertise has allowed for strategic partnerships with industrial partners, positioning GIP to enter into joint venture relationships with industry leaders (to date, approximately half of GIP's equity investments have been through industrial JVs). The Firm expects to make between 10 to 15 equity investments and generally aims to secure a controlling stake.

Attributes:

- *Experienced team.* GIP has a deep and experienced team, with a balance of financial and operational backgrounds. The GIP team has been very stable, with many of its senior members joining from the original sponsoring partners Credit Suisse (including the former head of global investment banking) and GE (including the former CEO of GE Infrastructure). This breadth of experience provides GIP with the capabilities to evaluate the widest possible set of opportunities on behalf of the Fund.
- *Strong operational orientation.* GIP has built out a 28-member operations team, including a number of former GE executives who apply GE concepts to GIP assets. This operational focus seeks measurable gains in areas such as customer service, pricing, operating efficiency, process improvements, capital spending, working capital management and cost control. These operational improvements drive incremental EBITDA growth post-investment, which in turn drives returns without requiring multiple expansion to achieve acceptable returns.

- *Global and large cap focus.* The Firm's focus with GIP IV will be on large, global infrastructure investments, a strategy that complements OPERF's existing infrastructure portfolio. Moreover, GIP is differentiated by their focus on JV transactions with large industrial partners (which have encompassed a broad spectrum of partners, including Kinder Morgan, MSC, ACS, and Ørsted)
- *Market opportunity.* The historical underinvestment in infrastructure, along with macroeconomic trends of growing populations and urbanization, has resulted in substantial and often imperative investment requirements in both Europe and North America. At the same time, traditional suppliers of infrastructure capital, such as governments and utilities, continue to face capital constraints. GIP expects **continued** high corporate asset disposal activity among relevant companies, which will be driven by an enhanced focus on core operations, financing restrictions, and a need to reduce balance sheets. Thus, Staff believes the target opportunity set for GIP's strategy is very attractive.
- *Strong interim results.* To date, GIP I and II have distributed approximately \$14.0 billion to investors, primarily as a result of 13 exits. On an aggregate level, these exits have yielded a gross multiple of invested capital of 2.6x and a gross IRR of 25.1%.

Concerns:

- *Competitive market for investment opportunities.* Interest from institutional investors in real assets, including infrastructure strategies, remains high. As more capital enters the market for private infrastructure, expected returns may decline. [Mitigant: Staff has confidence in GIP's financial discipline and expertise in originating, structuring, and executing infrastructure transactions. Moreover, GIP focuses on large-scale transactions, which tend to be more complex and less competitive than other market segments.]
- *Fund IV increase.* Fund IV represents a substantial increase in capital commitments relative to Fund III. Such increases in assets under management may result in a deviation from stated objectives, i.e., "style drift," as well as create strains on organizational infrastructure. [Mitigant: GIP's approach is to focus on large-scale, complex transactions and the capital base allows for deployment of a significant amount of commitments. Furthermore, the Fund is subject to restrictions on the size and type of investments, limiting the potential impacts on investment approach.]
- *Significant unrealized value.* As of June 30, 2018, the existing GIP Funds have an unrealized carrying value of \$22.5 billion across 16 investments. Managing the unrealized portfolio will require significant time and attention from the investment and operating teams. [Mitigant: With an investment team of 78 professionals (an increase of 21 since the launch of Fund III), GIP feels that it is adequately staffed to manage the existing Funds and deploy Fund IV. GIP has demonstrated through the deployment and management of Fund III its ability to navigate these challenges successfully.]
- *Political/regulatory risks.* The political and regulatory environment for infrastructure is evolving and changes therein may have an adverse effect on the Firm's ability to pursue its investment strategy. [Mitigant: All investments in the infrastructure sector are subject to the aforementioned risks. Staff finds the risk/reward tradeoff to be reasonable and supported by: a) the team's experience and technical expertise; b) the Fund's proposed asset diversification; and, c) the Fund's likely geographic focus on OECD countries.]

Terms

Fund terms include a management fee on committed capital with a standard carry and preferred return. The Fund will have a five-year investment period, and a 10-year duration with up to two, one-year extensions at the General Partner's discretion plus two additional one-year extensions with Limited Partner consent. During fundraising efforts, no placement agent had contact with Treasury staff.

Conclusion

The Alternatives Portfolio target allocation to infrastructure investments is 25%, with a range of 20% to 30%, or approximately \$2.3 billion at current OPERF NAV. To complement this allocation's current \$1.8 billion NAV, Staff considers GIP IV an anchor commitment within the OPERF infrastructure portfolio.

Staff also believes GIP IV represents an opportunity to invest with an experienced manager in an attractive sector. Since its formation in 2006, GIP has established a leading reputation in the global infrastructure space, with an investment team whose breadth and depth of resources are nearly unrivaled. Moreover, GIP is differentiated by their operational value-add strategy and industrial JV focus. At a macro level, requirements for infrastructure investment are massive, underpinning positive demand dynamics for capital, and Staff believes GIP is well positioned to capitalize on the Fund's target opportunity set.



MEMORANDUM

TO: Oregon Public Employees Retirement Fund ("OPERF")
FROM: TorreyCove Capital Partners ("TorreyCove")
DATE: December 3, 2018
RE: Global Infrastructure Partners IV, L.P.

Strategy:

GIP IV will be a continuation of the strategy deployed in the prior three funds, targeting core and core plus infrastructure assets in the energy, transport, and water/waste sectors in OECD markets. Fund IV does not have targeted allocation ranges by sector or geography but will have restrictions pertaining to investments made in non-OECD countries and single portfolio company concentration limits. The Firm believes that in pursuing larger transactions there will be less competition and greater opportunity to utilize their in-house operational expertise to drive growth within more complex businesses. Moreover, GIP will continue to pursue long-lived assets that provide essential services to an industry or economy that have strong and secure market positions with high barriers to entry, stable and predictable cash flows from regulated or contracted revenues, inflation protection, and downside protection with room for operational growth.

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

Conclusion:

The Fund offers OPERF an opportunity to participate in a differentiated portfolio of private 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 \$400.0 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.

TAB 4 – Global Low Volatility Mandate

OPERF Public Equity Portfolio

Oregon Investment Council
OPERF Public Equity Portfolio – Global Low Volatility
December 12, 2018

Purpose

Staff recommends funding Dimensional Fund Advisors with an \$800MM global low volatility portfolio.

Background

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 defensive, Low Volatility strategies alongside existing systematic equity strategies that pursue excess returns through deliberate factor tilts has proven to be complementary and served to reduce total equity risk.

Regarding the decades-long persistence of the low volatility anomaly, several explanations exist. The first is that investors prefer a high-return portfolio, but are reluctant to utilize leverage (or are prohibited from using leverage). In the absence of leverage, high return seeking investors prefer high beta stocks, which increases demand for risky (i.e., high beta) stocks relative to lower beta stocks. This increased demand pushes valuations on high beta stocks up, and subsequently pushes future expected returns on those same stocks down.

The second explanation is an agency-based theory predicated on the observation that long-only retail mutual fund managers prefer high beta stocks due to those stocks' positive effect on mutual fund inflows during bull markets. The majority of net, new mutual fund inflows occur during bull markets; moreover, most of these inflows go to funds with the best, recent absolute performance. Assets in retail mutual funds are also very sticky so that poor performance does not result in proportionately large outflows as retail investors typically make withdrawals based on their own personal liquidity needs, not relative mutual fund performance. This retail fund flow dynamic incents mutual fund managers to invest in stocks that do well in bull markets (i.e., high beta stocks) in order to gather more assets, which increases those fund managers' compensation.

The third explanation is based on the use of equity benchmarks for institutional active managers. Low volatility stocks often have low betas, and overweighting low beta stocks in a portfolio leads to higher tracking error relative to cap-weighted benchmarks. Active managers prefer using their active risk budget (i.e., tracking error) for stocks they believe contain excess return potential (i.e., alpha). By focusing on alpha-seeking opportunities, active managers attempt to outperform their assigned benchmark. Although low beta stocks often produce better risk-adjusted return portfolios, active managers don't get compensated for risk reduction and instead often get penalized or terminated for relative performance lags during bull markets.

OPERF Global Low Volatility Implementation

Staff has funded four externally-managed global low volatility managers (Los Angeles Capital, Acadian, AQR, and Arrowstreet) and an internally-managed Developed ex-U.S. multifactor strategy that tilts towards low volatility. Total exposure to global low volatility relative to the OPERF Public Equity portfolio stands at approximately 17 percent. As of October 31, 2018, the OPERF Public Global Low Vol portfolio has outperformed the MSCI ACWI IMI Net over both the trailing 1- year and since inception (January 1, 2018) periods (Exhibit 1).

Exhibit 1

Period Ending 10/30/18	Market Value	1 year	Incep
Global Equity Low Vol	\$ 3,670,259,067.73	1.83%	10.82%
MSCI ACWI IMI Net		-0.95%	9.69%
Excess		2.78%	1.13%

1-yr Beta
0.78
1.00

Source: State Street

Over the long term, staff expects the global low volatility portfolio to provide returns commensurate with the portfolio’s MSCI ACWI IMI Net benchmark (i.e., no excess returns), but with lower volatility. The defensive nature of the portfolio allows for outperformance in declining or volatile stock markets such as those exhibited in February and October 2018 (Exhibit 2 & Exhibit 3) and highlighted below. In fact, only in the last two months has the cumulative excess return associated with this strategy exceeded the public equity benchmark.

**Exhibit 2 - OPERF Global Low Volatility Monthly & Cumulative Excess Returns
January 1, 2017 – October 31, 2018**

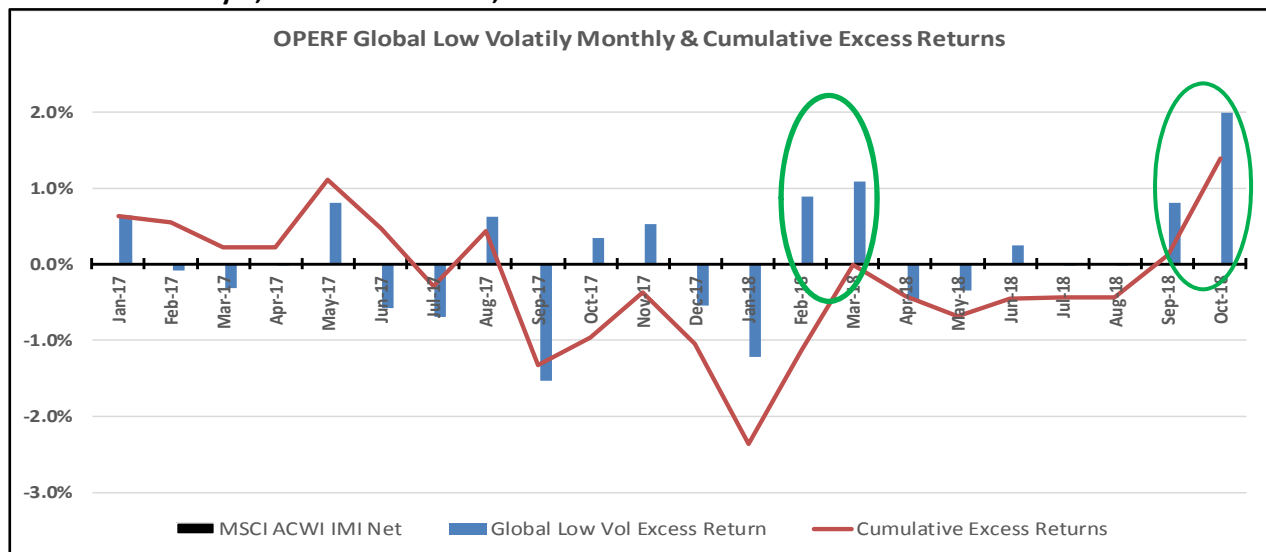
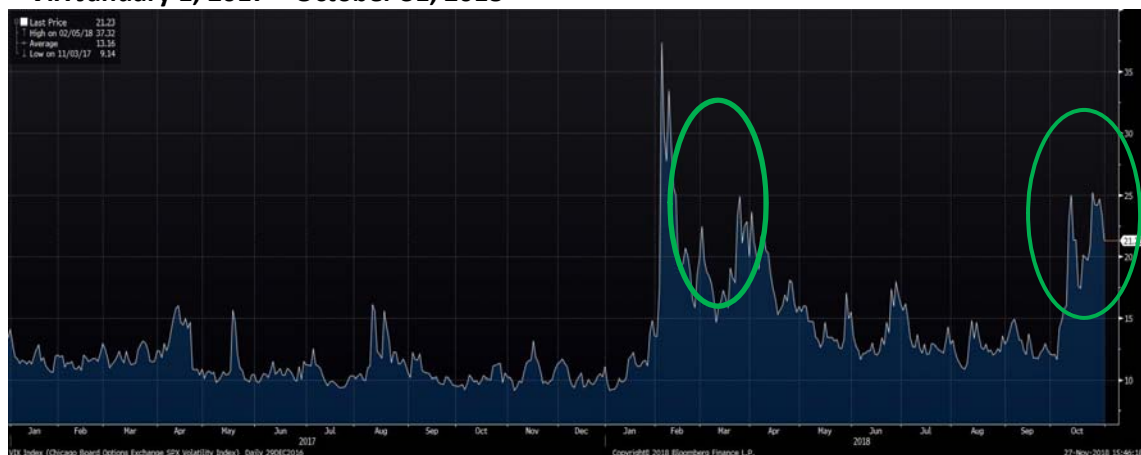


Exhibit 3 – VIX January 1, 2017 – October 31, 2018



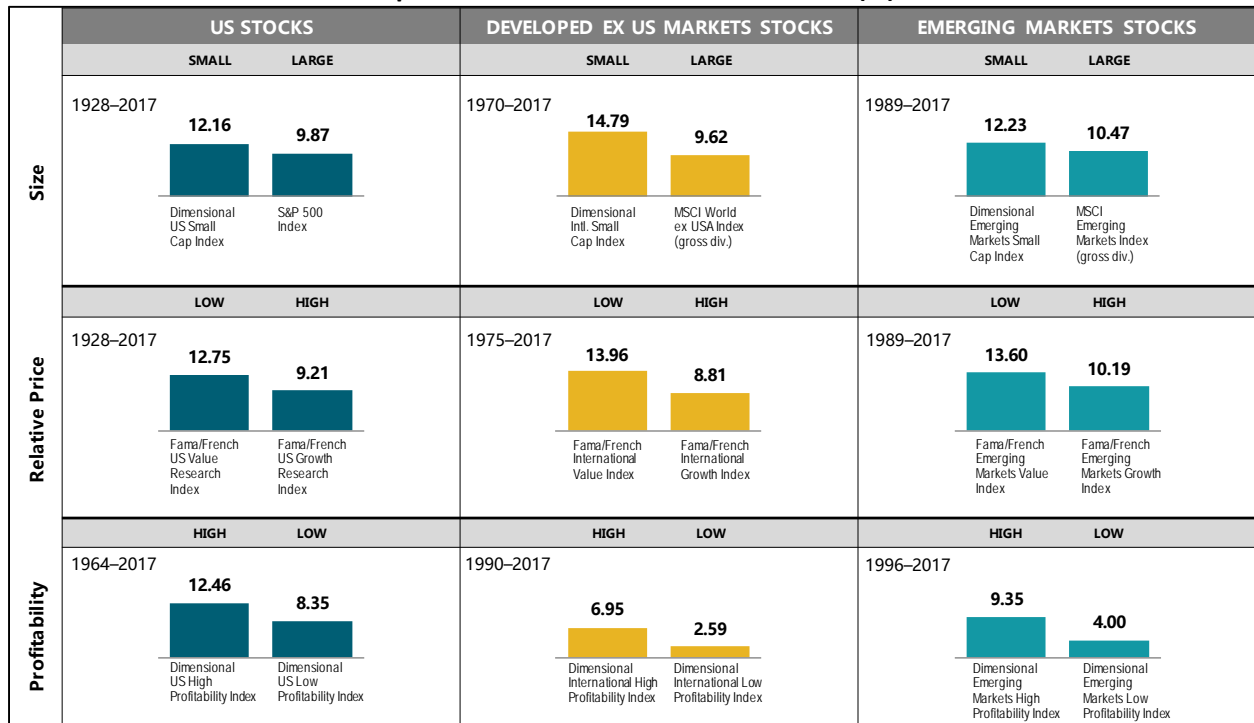
Source: Bloomberg

Firm & Strategy

Founded in 1981, DFA is a private limited partnership owned primarily by its founders, employees and company directors. The firm is headquartered in Austin, Texas, employs over 1,300 people firm-wide and maintains regional and investment offices around the world with trading and portfolio management activities based around the globe. As of September 30, 2018, DFA reported \$596 billion in assets under management (“AUM”) in a variety of equity and fixed income products.

DFA’s investment philosophy is based on academic research which shows that small companies (as measured by market capitalization), value stocks (measured by book/market price ratios) and highly profitable companies, provide greater expected returns relative to large companies, growth stocks, and low profitability companies respectively. Contemporary academic research now supports the premise that all three of these common factors (namely, size, value, and profitability) command persistent and statistically significant return premia over time (see Exhibit 1).

Exhibit 1 Annualized Compound Returns of DFA Risk Premiums (%) in US dollars



Source: Dimensional Fund Advisors

DFA maintains strong ties to the academic community. For example, University of Chicago Nobel Laureate Eugene Fama, Dartmouth’s Kenneth French and Wharton’s Donald Keim all serve as consultants and provide on-going research in support of current and proposed DFA investment strategies. Investment researcher Roger Ibbotson and Nobel Laureates Robert Merton and Myron Scholes also serve as directors of the firm’s mutual funds board.

Discussion/Investment Considerations

Staff has been in discussions with DFA since late 2016 on the formulation of a global low volatility strategy that would capitalize on DFA’s well-established record of investing in return premia. Staff has met with

DFA on multiple occasions over the last two years and has received several updated performance statistics on DFA's low volatility strategy. DFA feels that structured appropriately, a low volatility portfolio with systematic focus on size, relative price, and profitability dimensions, investors should expect to achieve returns similar to the market place with less volatility.

The OIC is familiar with DFA as it has previously approved seven systematic DFA mandates which are managed with the same tilts towards return premia as the proposed low vol strategy: World ex-U.S. Small Cap Value (January 2009); Emerging Markets Small Cap (May 2010); U.S. Micro Cap Value (January 2013); International Micro Cap Value (March 2014); U.S. Large Cap Core (October 2014); for the Oregon Savings Growth Plan, Emerging Markets Core (February 2011); and, for the Common School Fund, U.S. Large Cap Core (November 2017). Given the long relationship Oregon has enjoyed with DFA and the multiple mandates that the OIC has funded with the firm, staff negotiated a management fee that is significantly less than the average active management fee that OPERF pays its existing global managers.

Attributes:

- Staff has very high regard for DFA as a firm. Current DFA/OPERF mandates have performed in line with expectations and have exceeded investment return and risk objectives since inception.
- Given the existing investment relationships, staff was successful in negotiating a considerable fee discount.
- This strategy is consistent with OIC's Statement of Investment and Management Beliefs {*Section 5.A. Inefficiencies that can be exploited by active management may exist in certain segments of the capital markets. The nature (i.e., perceived magnitude and likely duration) of such inefficiencies should inform the proposed active management strategy (e.g., discretionary or systematic)*} and {*Section 6.A. All fees, expenses, commissions and transaction costs should be diligently monitored and managed in order to maximize net investment returns*}.
- This approach will provide direct exposures to common factors that enjoy robust empirical support as persistent sources of excess returns.
- The proposed strategy is aimed at the most liquid segment of the global public equity market (Global large & Mid Cap) and should have little or no market impact in the reallocation of existing mandates.

Concerns:

- This is a new strategy with no investment track record. {Mitigant: The firm has successfully introduced new systematic products in this space several times over the course of its 37 year history.}
- Due to its deeper value bias, this product may under-perform during certain market environments.
- Return premia associated with common factors such as those targeted by this strategy have historically produced **long-term outperformance**, but have also experienced significant, multi-year periods of underperformance. [Mitigant: Strong empirical evidence supports both the efficacy of these factor premia (i.e., these factors produce a higher mean return relative to market averages) as well as reversions to this higher mean following periods of underperformance. Additionally, the tracking error relative to the MSCI ACWI IMI Net for the proposed strategy is in-line with that of current, traditional active management strategies.]
- Due to a Low Vol strategy's emphasis on downside protection, these mandates will likely under-perform during strong bull market episodes. [Mitigant: the multi-manager structure of OPERF's

Public Equity Portfolio offsets this impact by way of higher beta mandates in other parts of the portfolio].

Recommendation

- 1) Staff recommends funding Dimensional Fund Advisors with an \$800mm global low volatility mandate.
- 2) Amend OIC policy INV 601 and INV 603 accordingly.

Oregon Investment Council

Global Low Volatility Strategy

December 12, 2018

Gerard O'Reilly, PhD, Co-Chief Executive Officer, Chief Investment Officer, and Dimensional Director

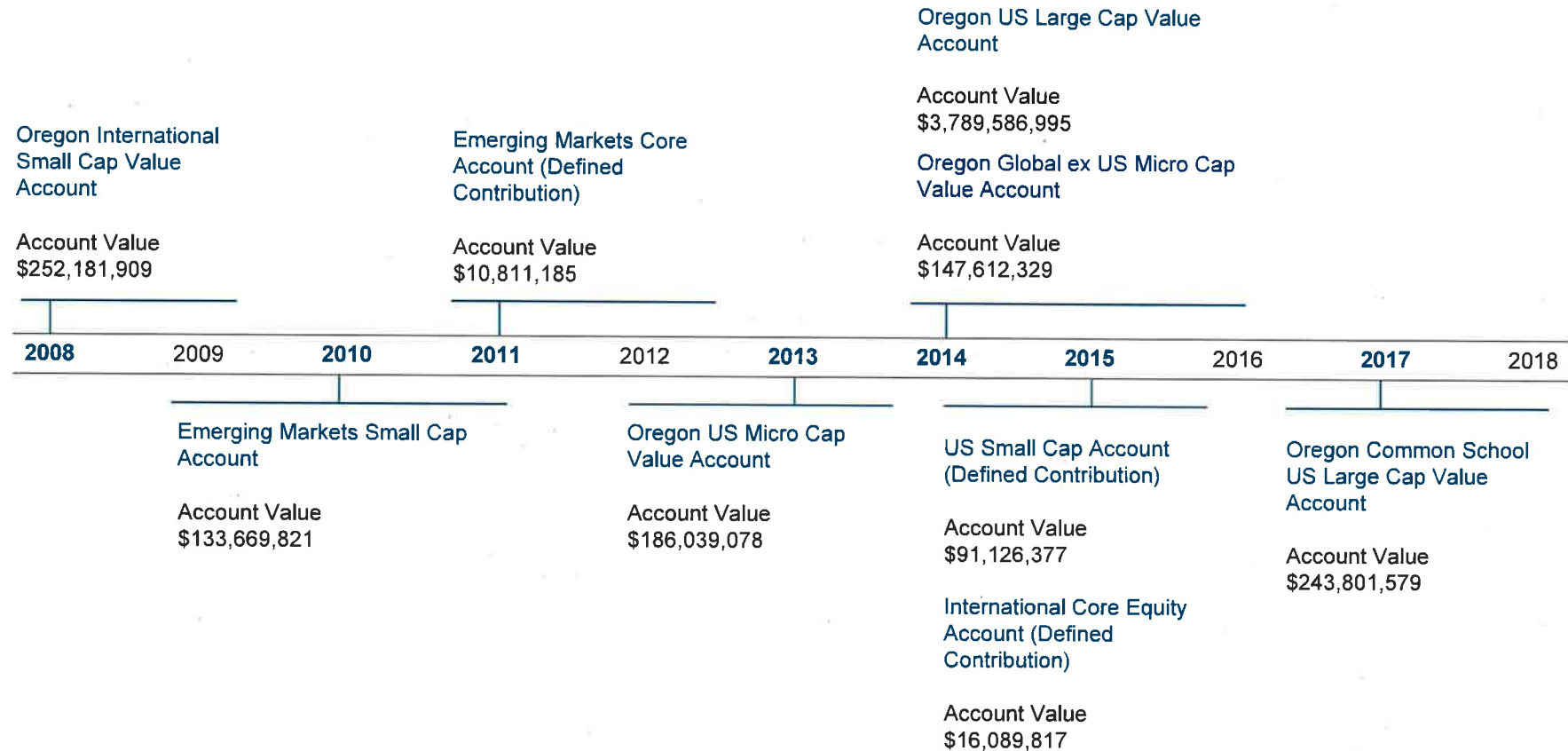
Joseph Young, CFA, Vice President and Regional Director

This information is provided for Oregon State Treasury, an institutional investor, and is not intended for public use. Dimensional Fund Advisors LP is an investment advisor registered with the Securities and Exchange Commission.

*"Dimensional Director" refers to a member of the Board of Directors of the general partner of Dimensional Fund Advisors LP.

Relationship Summary

As of October 31, 2018



- Oregon has entrusted Dimensional with over \$4.7 billion state assets.
- Dimensional has grown Oregon's assets by \$1.8 billion since 2008.

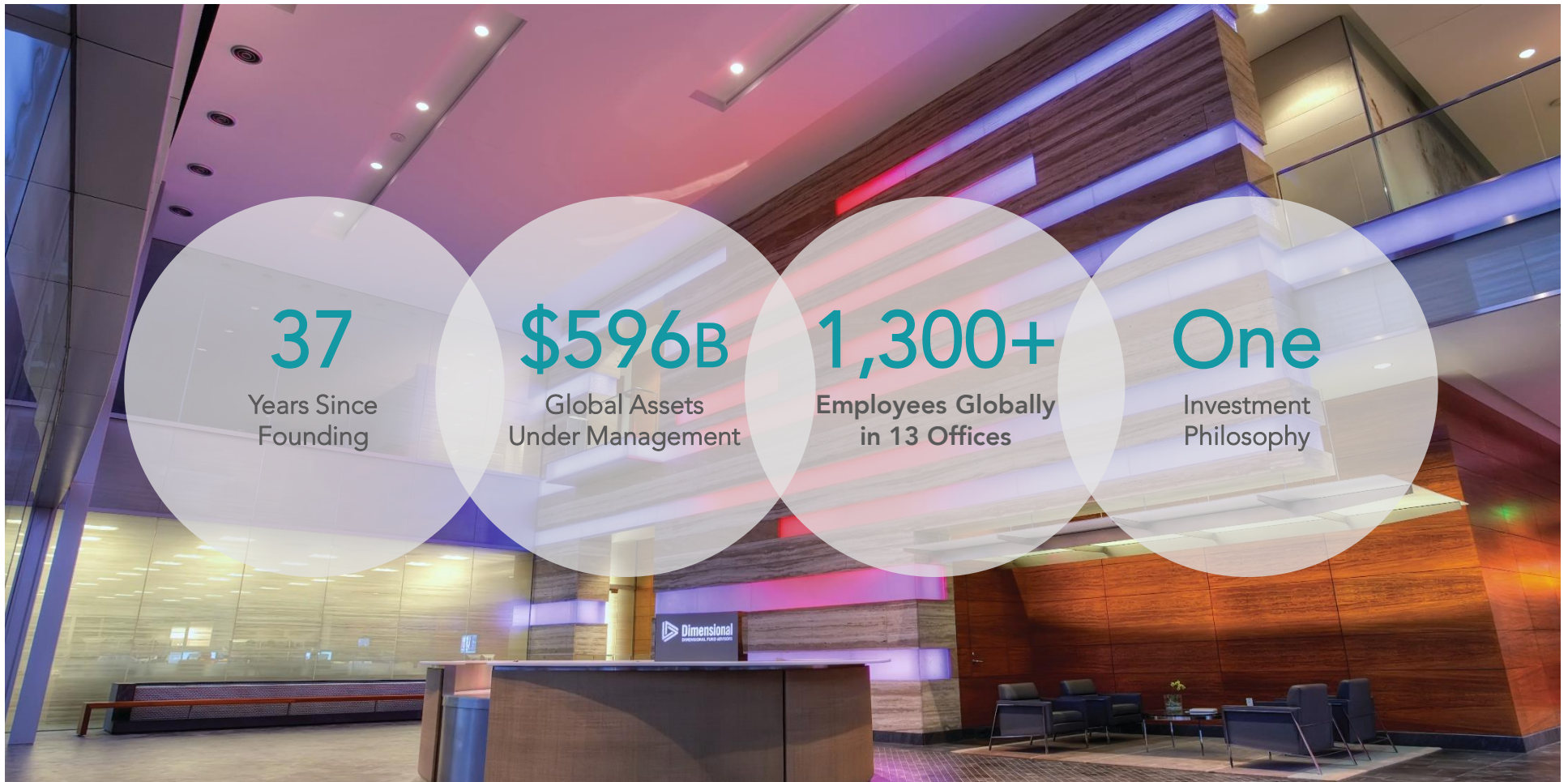
Agenda

- Dimensional
- Investment Philosophy
- Oregon Global Low Volatility Strategy
- Appendix

Dimensional

Dimensional at a Glance

As of September 30, 2018



Assets in US dollars.

"Dimensional" refers to the Dimensional separate but affiliated entities generally, rather than to one particular entity. These entities are Dimensional Fund Advisors LP, Dimensional Fund Advisors Ltd., DFA Australia Limited, Dimensional Fund Advisors Canada ULC, Dimensional Fund Advisors Pte. Ltd., Dimensional Japan Ltd., and Dimensional Hong Kong Limited. Dimensional Hong Kong Limited is licensed by the Securities and Futures Commission to conduct Type 1 (dealing in securities) regulated activities only and does not provide asset management services.

A Heritage of Leading Research

The bar for research at Dimensional has been set by the best in the field



Eugene Fama



Kenneth French

Robert Merton



Robert Novy-Marx

Merton Miller



Myron Scholes



University of Chicago

Director and Consultant, Dimensional, 1981–present

Dartmouth College

Consultant, 1986–present
Head of Investment Research Committee, Dimensional, 2006–present
Director, 2006–present

MIT

Director, Dimensional Mutual Funds, 2003–2009

Resident Scientist, Dimensional, 2010–present

University of Rochester

Consultant, Dimensional, 2014–present

University of Chicago

Independent Director, Dimensional Mutual Funds, 1981–2000

Stanford University

Independent Director, Dimensional Mutual Funds, 1981–present

“At Dimensional, we don’t jump on every new idea that comes along. We’re looking for what will stand up over a long period of time.”

Eugene Fama

Implementation Requires Expertise

Taking knowledge and information and implementing it in a real test, not in a backtest, is what counts



DAVID BOOTH
Executive Chairman
and Founder



GERARD K. O'REILLY, PhD
Co-Chief Executive Officer
and Chief Investment Officer



DAVE BUTLER
Co-Chief Executive Officer

Global Research Team



MARLENA LEE, PhD
Co-Head of Research



SAVINA RIZOVA, PhD
Co-Head of Research



PETE DILLARD
Chief Data Officer and Head of
Investment Analytics and Data

Global Portfolio Management Team



JOSEPH CHI
Co-Head of Global
Portfolio Management



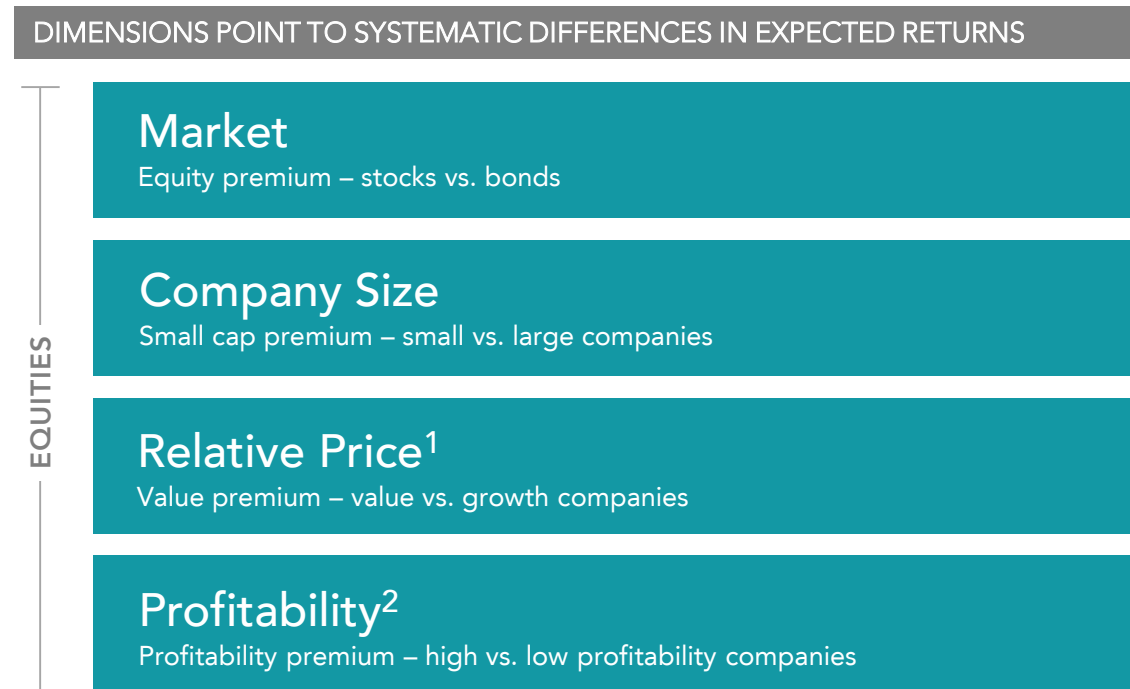
JED FOGDALL
Co-Head of Global
Portfolio Management



Investment Philosophy

Dimensions of Expected Returns

Expected returns are driven by prices investors pay and cash flows they expect to receive



To be considered a dimension of expected return, a premium must be:

- Sensible
- Persistent
- Pervasive
- Robust
- Cost-effective

Diversification does not eliminate the risk of market loss.

1. Relative price as measured by the price-to-book ratio; value stocks are those with lower price-to-book ratios.

2. Profitability is a measure of current profitability, based on information from individual companies' income statements.

A Deeper Look at Value and Profitability

Average Monthly Returns

US: 1963–2017

		PROFITABILITY			PROFITABILITY PREMIUM
		LOW		HIGH	
PRICE/BOOK	GROWTH	0.63	0.83	0.95	0.32
		0.77	0.86	0.93	0.17
	VALUE	0.94	1.19	1.44	0.50
VALUE PREMIUM		0.31	0.36	0.50	0.81

Non-US Developed: 1990–2017

		PROFITABILITY			PROFITABILITY PREMIUM
		LOW		HIGH	
PRICE/BOOK	GROWTH	0.13	0.54	0.54	0.40
		0.34	0.49	0.70	0.36
	VALUE	0.60	0.78	0.82	0.23
VALUE PREMIUM		0.46	0.25	0.29	0.69

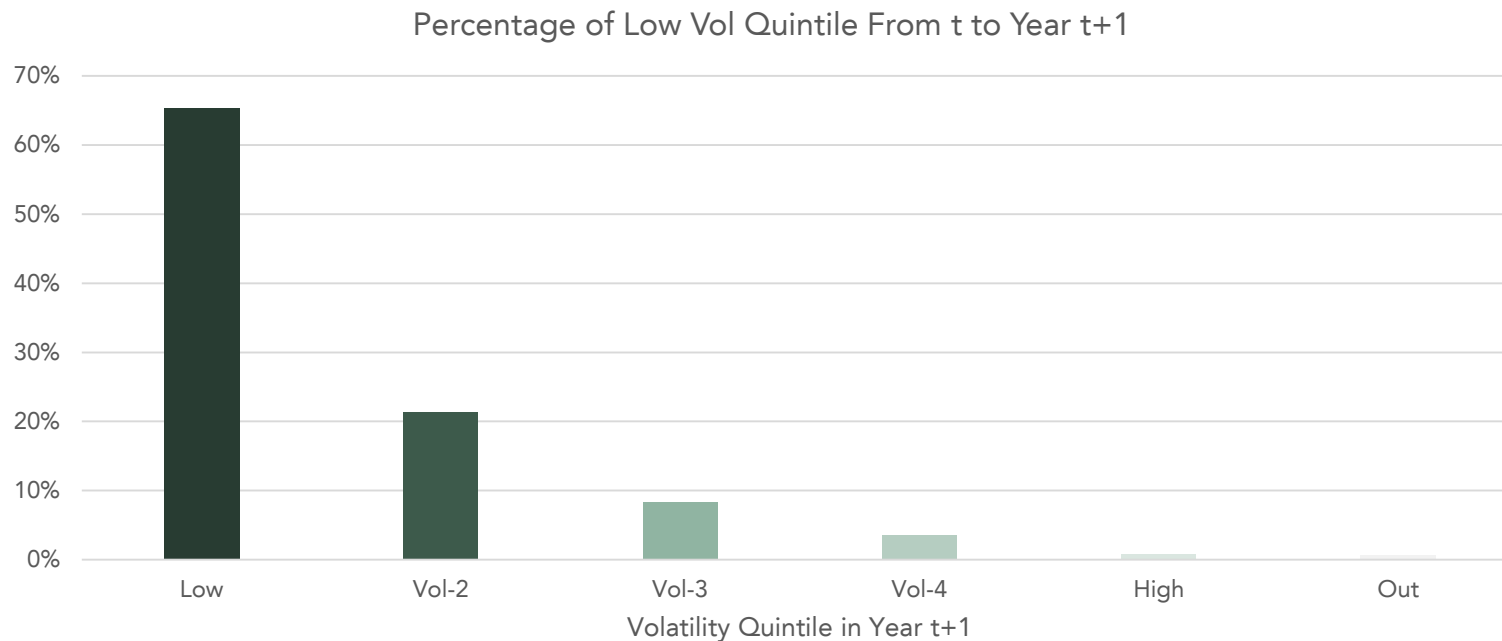
Emerging Markets: 1995–2017

		PROFITABILITY			PROFITABILITY PREMIUM
		LOW		HIGH	
PRICE/BOOK	GROWTH	0.47	0.58	0.82	0.35
		0.34	0.81	0.73	0.39
	VALUE	0.83	1.05	1.28	0.46
VALUE PREMIUM		0.36	0.47	0.46	0.81

Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Filters were applied to data retroactively and with the benefit of hindsight. Groups of stocks are hypothetical, are not representative of indices, actual investments or actual strategies managed by Dimensional, and do not reflect costs and fees associated with an actual investment. Actual investment returns may be lower. Past performance, including hypothetical performance, is no guarantee of future results. See Appendix "Using the Valuation Equation: Descriptions and Important Information."

Persistence of Volatility Ranks

Sample Period: 1928 - 2017



From Year t to Year t+1

Low	Vol-2	Vol-3	Vol-4	High	Out
65.30%	21.40%	8.30%	3.50%	0.80%	0.70%

Data source: CRSP

The chart reports the average proportion (by market cap) from the low volatility quintile in year t that falls within each quintile in year t+1. The first bar for the low vol quintile in year t+1 can be interpreted as approximately 65% stays in low volatility in consecutive years, on average.

The analysis is based on ranking stocks into quintiles (% mcap breaks) each December on standard deviation of daily returns for the prior 12 months. The sample period is 1928-2015 and includes all listed US stocks. The information presented was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. This information is hypothetical and is provided for informational purposes only.

Oregon Global Low Volatility Strategy

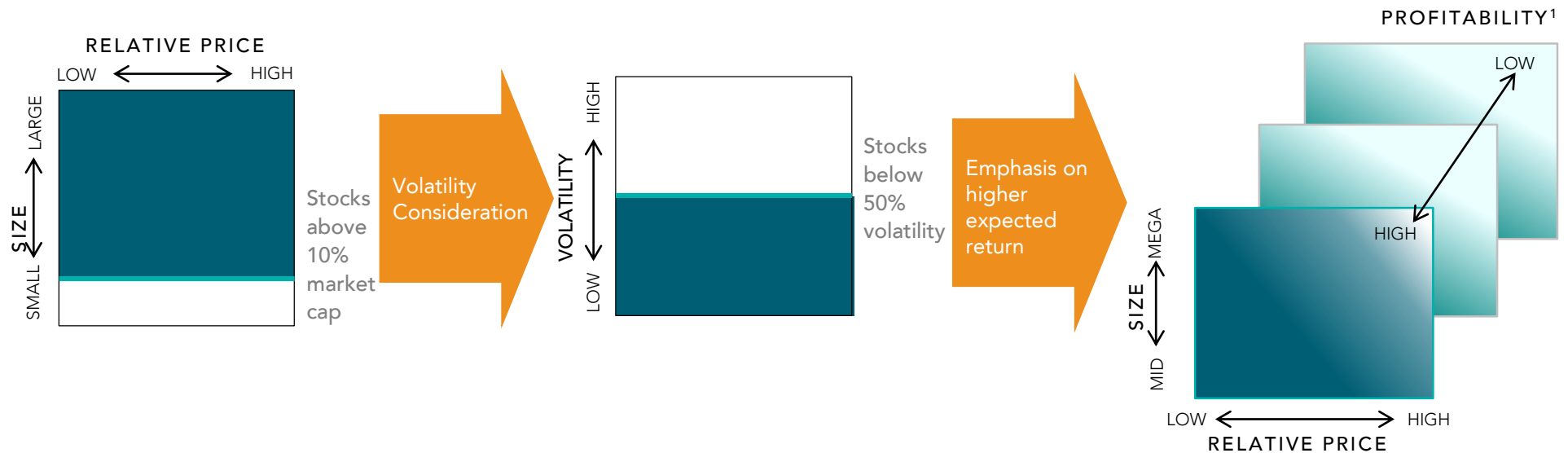
Oregon Global Low Vol Simulated Strategy

Using an integrated approach to add value across all aspects of the investment process

- Targets securities with the lowest 50% of volatility in the large and mid cap universe.
- Strategy emphasizes systematic sources of higher expected returns:
 - Company size
 - Relative price (value)
 - Profitability
- Offers broad country, sector and security diversification
- Balances competing premiums and controls implementation costs by using a disciplined and patient trading strategy

Portfolio Construction: Security Selection and Weighting

Oregon Global Low Volatility Simulated Strategy



As of 10/31/2018	Number of Issuers	Weighted Average Market Cap (millions)	Aggregate Price-to-Book	Weighted Average Profitability
Oregon Global Low Volatility Simulated Strategy	986	\$133,404	2.22	0.40
MSCI All Country World Index (gross div.)	2,704	\$149,407	2.21	0.37

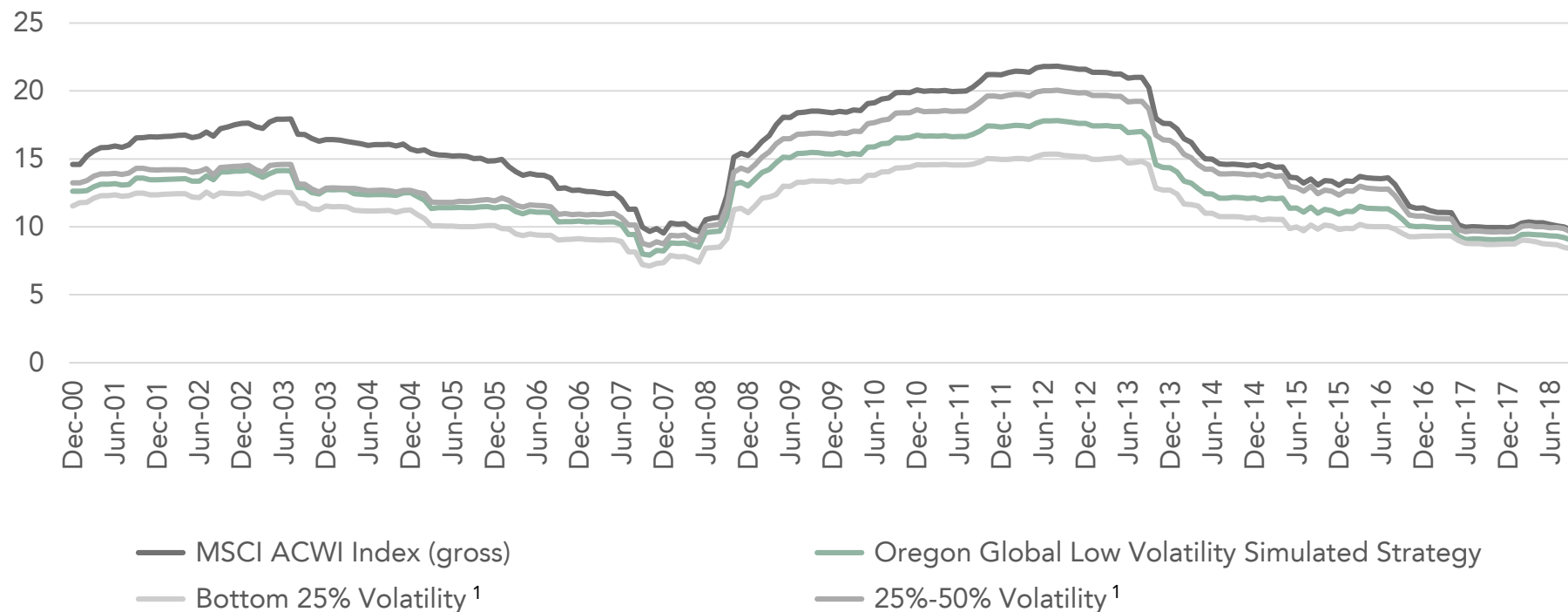
SIMULATED DATA. Not a live strategy managed by Dimensional Fund Advisors LP or its affiliates.

1. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book.

Holdings are subject to change. MSCI data © MSCI 2018, all rights reserved.

Targeting Lower Volatility than Overall Market

Rolling 5-Year Volatility Analysis: January 1996 – October 2018



Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

1. Free-float market capitalization weighted quartiles sorted on average of two rankings on volatility (one ranking is based on 5 year of monthly returns and the other is based on 1 year of weekly returns).

Source: Bloomberg.

Index performance data shown (MSCI World Index) represents past performance and is no guarantee of future results. Assumes reinvestment of interest and dividends. An index is not available for direct investment. MSCI data © MSCI 2018, all rights reserved.

Annualized Performance (Simulated)

As of October 31, 2018

Annualized Returns ¹ (%)	Year to Date	1 Year	3 Years	5 Years	10 Years	Since 01/96	Standard Deviation (01/96 - 10/18)
OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	-3.63	0.79	7.71	6.33	10.11	8.43	12.59
MSCI All Country World Index (gross div.)	-3.53	0.00	8.33	6.72	10.34	6.79	15.17

Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

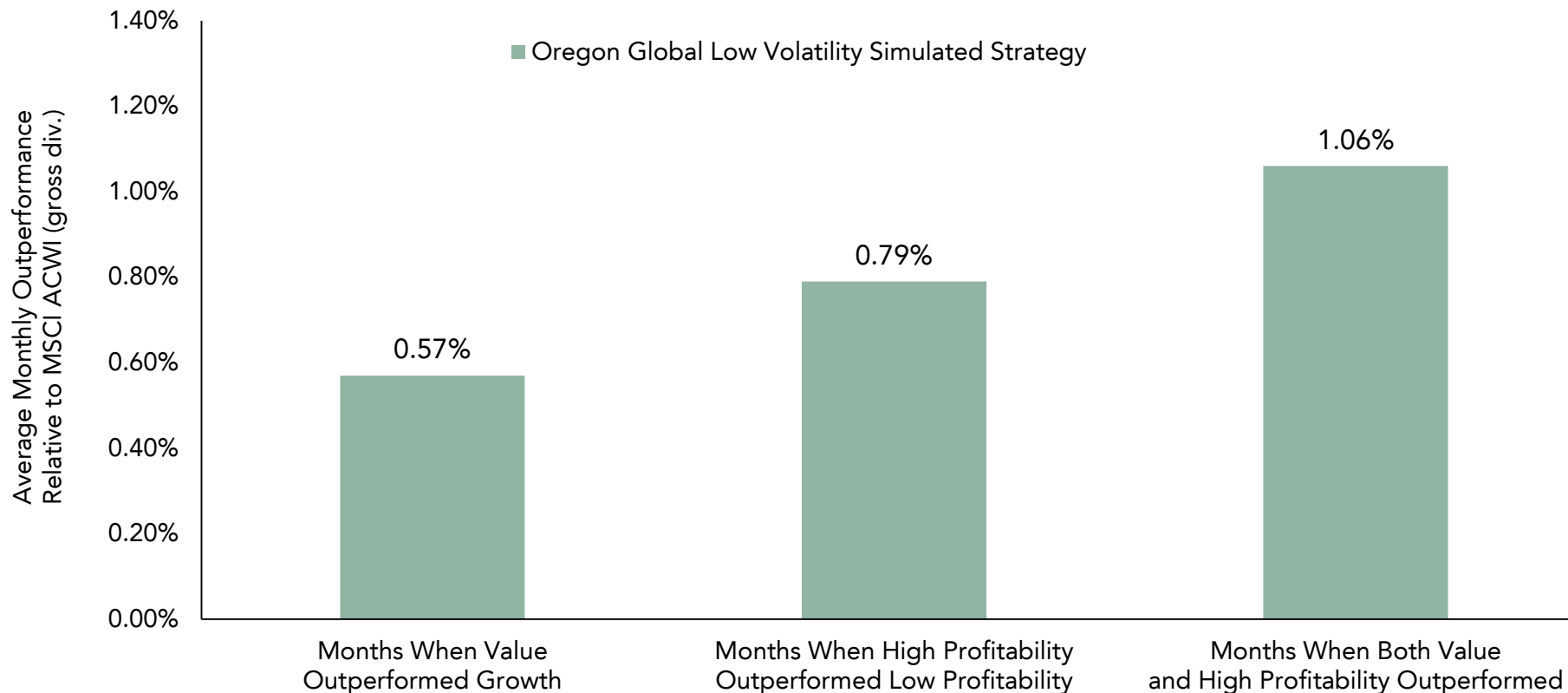
1. Returns for periods shorter than one year are not annualized.

Index performance data shown (MSCI World Index) represents past performance and is no guarantee of future results. Assumes reinvestment of interest and dividends. An index is not available for direct investment. MSCI data © MSCI 2018, all rights reserved.

Capturing the Sources of Higher Expected Returns

Monthly Excess Returns Analysis, January 1, 1996 – October 31, 2018

January 1, 1996 – October 31, 2018



Simulated strategy returns based on a model/back-tested simulation. **These are not live strategies managed by Dimensional.** The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

Total market: MSCI All Country World Index (gross dividends); Value: MSCI All Country Value Index (gross dividends); Growth: MSCI All Country World Growth Index (gross dividends). High Profitability: Combining Dimensional High Prof for US, Dev ex US, and EM. Low Profitability: Dimensional Low Prof indices for US, Dev ex US, and EM. Indices are calculated as a combination of regional high and low profitability returns, weighted by regional market capitalization. Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Assumes reinvestment of interest and dividends. Past performance is not a guarantee of future results. Frank Russell Company is the source and owner of the trademarks, service marks, and copyrights related to the Russell Indexes.

Diversified Country Allocations

As of October 31, 2018

	OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)		OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)
PORTFOLIO WEIGHTS (%)			PORTFOLIO WEIGHTS (%)		
US	54.6	55.6	Brazil	0.8	0.9
Australia	2.1	2.1	Chile	0.1	0.1
Austria	0.1	0.1	China	3.1	3.3
Belgium	0.3	0.3	Colombia	0.1	0.1
Canada	3.1	3.0	Czech	0.0	0.0
Denmark	0.5	0.5	Egypt	0.0	0.0
Finland	0.3	0.3	Greece	0.0	0.0
France	3.3	3.4	Hungary	0.0	0.0
Germany	2.8	2.8	India	1.2	1.0
Hong Kong	1.0	1.1	Indonesia	0.2	0.2
Ireland	0.2	0.2	Korea	1.5	1.5
Israel	0.2	0.2	Malaysia	0.3	0.3
Italy	0.7	0.7	Mexico	0.3	0.3
Japan	8.2	7.5	Pakistan	—	0.0
Netherlands	1.0	1.0	Peru	0.0	0.1
Zealand	0.1	0.1	Philippines	0.1	0.1
Norway	0.3	0.2	Poland	0.1	0.1
Portugal	0.0	0.1	Qatar	—	0.1
Singapore	0.4	0.4	Russia	0.4	0.4
Spain	0.9	0.9	South Africa	0.6	0.7
Sweden	0.9	0.8	Taiwan	1.4	1.3
Switzerland	2.7	2.6	Thailand	0.3	0.3
UK	5.4	5.4	Turkey	0.1	0.1
			UAE	—	0.1

Diversified Sector Allocations

As of October 31, 2018

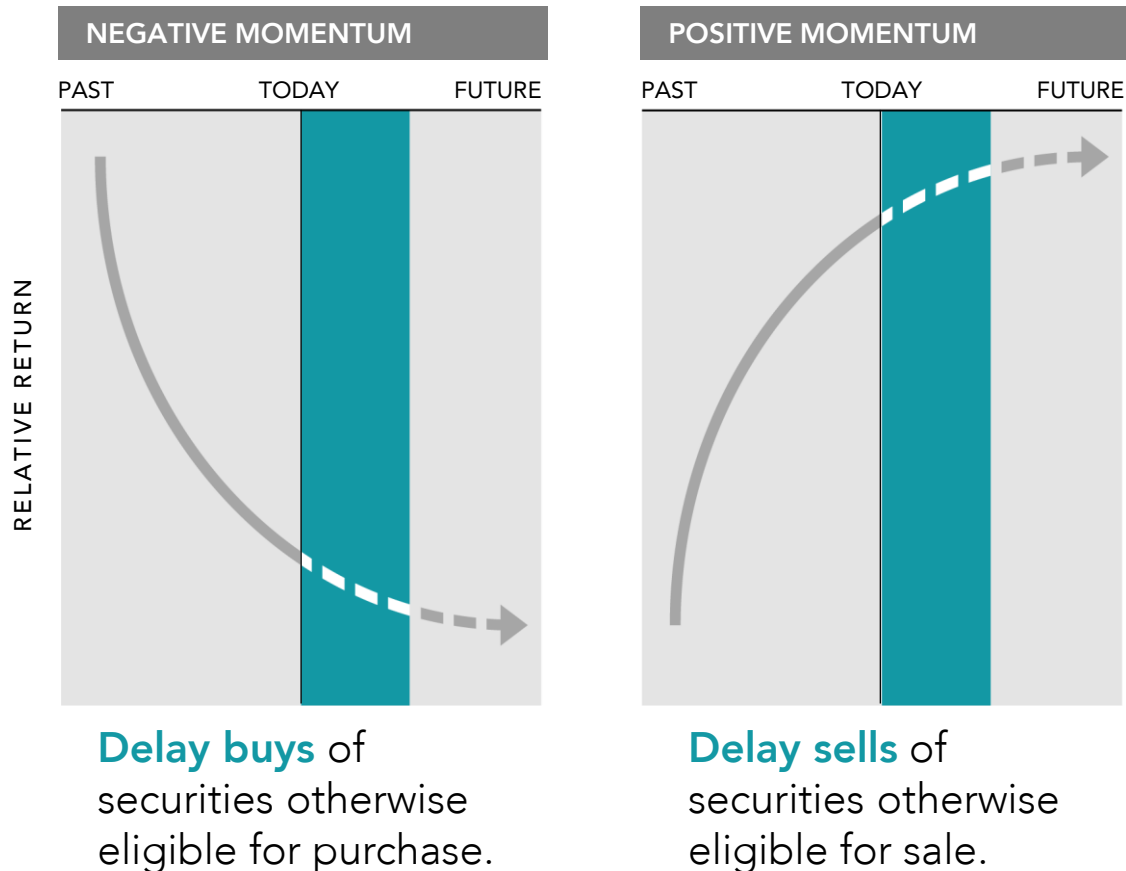
	OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)
PORTFOLIO WEIGHTS (%)		
Consumer Discretionary	7.0	10.2
Consumer Staples	11.7	8.4
Energy	6.7	6.6
Financials	21.0	17.3
Health Care	9.6	12.0
Industrials	11.8	10.4
Information Technology	12.3	15.5
Materials	4.7	4.9
Real Estate ex REITs	0.7	0.9
REITs	—	2.1
Communication Services	12.0	8.8
Utilities	2.5	3.1

SIMULATED DATA. Not live strategies managed by Dimensional Fund Advisors LP or any of its affiliates.

Numbers may not total 100% due to rounding. Sectors defined by MSCI. MSCI data © MSCI 2018, all rights reserved. Real Estate Investment Trusts (REITs) are shown as a separate category to illustrate their exclusion from certain funds. REITs are classified according to GICS Industry code. GICS was developed by and is the exclusive property of MSCI and S&P Dow Jones Indices.

Managing Momentum

We incorporate momentum when making buy and sell decisions

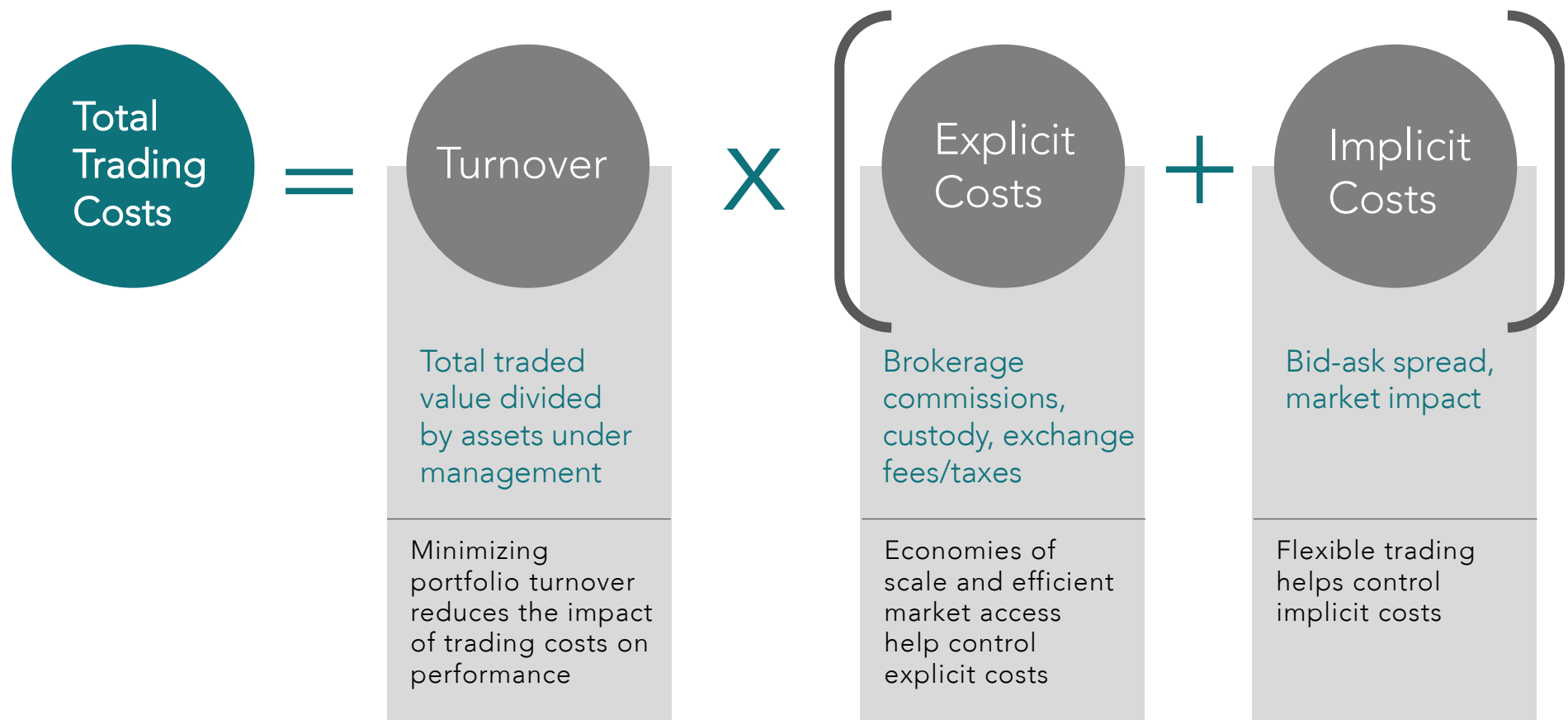


Stock returns may exhibit momentum:

- Stocks with large relative underperformance tend to have negative excess returns in the next period.
- Stocks with large relative outperformance tend to have positive excess returns in the next period.

Trading Costs Matter

Dimensional's flexible approach helps reduce the total costs of trading



Appendix

Presenters' Biographies

Gerard O'Reilly

Co-Chief Executive Officer, Chief Investment Officer, and Dimensional Director

Gerard O'Reilly serves as Co-Chief Executive Officer and Chief Investment Officer and is a Dimensional Director.* He has been with Dimensional since 2004 and was named Co-CIO in 2014. He oversees the design, development, and delivery of research that guides Dimensional's scientific approach to investing. He has been instrumental in the creation and implementation of investment solutions that meet the needs of Dimensional's global clients.

Gerard works closely with clients and leads a team of researchers, portfolio managers, and traders in designing and managing reliable and cost-effective investment strategies based on sound academic research. Gerard is the Co-Chair of the firm's Investment Research Committee and a member of the Investment Committee, which consists of senior executives and investment team leadership that oversee management of the portfolios and accounts managed by the company. Prior to joining Dimensional in 2004, Gerard obtained his PhD in aeronautics from the California Institute of Technology. He holds a master of science degree in high performance computing from Trinity College Dublin in his native country of Ireland, where he also received a first class honors degree in theoretical physics and was a recipient of the Foundation Scholarship.

* "Dimensional Director" refers to a member of the Board of Directors of the general partner of Dimensional Fund Advisors LP.

Joseph L. Young

Vice President

Joseph Young is a Vice President responsible for developing and maintaining relationships with public pension funds, foundations, endowments, Taft-Hartley plan sponsors, and corporate pension and defined contribution plans.

Joe began his career with Dimensional in February 2002, focusing on consultant relations. Prior to joining Dimensional, he worked as a project management analyst at Global Crossing. He is an active member of the CFA Society of Austin, National Society of Institutional Investment Professionals and the Texas Association of Public Employee Retirement Systems (TEXPERS). He has been a guest lecturer for the College of Business at Colorado State University and University of Idaho. Joe received a BS in finance from the University of Idaho and is a CFA® charterholder.

Experienced Teams Help Ensure Consistency

High degree of practitioners' knowledge and experience across market cycles

Investment Committee¹

Average 22 Years of Industry Experience

David Booth, Founder and Executive Chairman

David Butler, Co-Chief Executive Officer, Head of Global Financial Advisor Services, and Dimensional Director

Gerard O'Reilly, Co-Chief Executive Officer, Chief Investment Officer, and Dimensional Director

Joseph Chi, Investment Committee Chairman and Co-Head of Portfolio Management

Robert Deere, Senior Investment Director

Jed Fogdall, Co-Head of Portfolio Management

Joseph Kolerich, Senior Portfolio Manager

Mary Phillips, Senior Portfolio Manager

David Plecha, Global Head of Fixed Income

Savina Rizova, Co-Head of Research

Karen Umland, Senior Portfolio Manager

Ryan Wiley, Co-Head of Global Equity Trading

Portfolio Management

Average 13 Years of Industry Experience

Austin

Jed Fogdall, Co-Head of Portfolio Management

Senior Portfolio Managers:
Arun Keswani, Joseph Kolerich, Joel Schneider, Lukas Smart

Portfolio Managers:
Ashish Bhagwanjee, William Collins-Dean, Gavin Crabb, Damian Dormer, Joseph Hohn, Alan Hutchison, Marc Corona Leblond, Brendan McAndrews, John Morrison, Pamela Noble, Andres Torres, Ethan Wren, Matthew Zenz

Charlotte

Senior Portfolio Managers:
Marcus Axthelm, Mary Phillips

Portfolio Managers:
Horacio Carias, Travis Meldau

Santa Monica

Joseph Chi, Co-Head of Portfolio Management

Robert Deere, Senior Investment Director

David Plecha, Global Head of Fixed Income

Senior Portfolio Managers:
Daniel Ong, Allen Pu, Grady Smith, Karen Umland

Portfolio Managers:
Patrick Brown, Mitchell Firestein, John Hertzler, David Shao, Brian Walsh

London

Nathan Lacaze, Co-CEO, Dimensional Fund Advisors Ltd. and Head of EMEA Portfolio Management

Senior Portfolio Managers:
Paul Foley, Joel Kim

Portfolio Managers:
Kipp Cummins, Alexander Fridman, Krati Gupta, Althea Trevor, Adam Ward, Jim Whittington

Sydney

Bhanu Singh, Head of Asia Pacific Portfolio Management and Director

Robert Ness, Senior Portfolio Manager

Portfolio Managers:
Murray Cockerell, Stephen Garth, Slava Platkov, Gillian Wilson, Craig Wright

Tokyo

Kotaro Hama, Portfolio Manager

Singapore

Emily Cornell, Portfolio Manager

Trading

Average 13 Years of Industry Experience

Austin

Senior Traders: Christian Gunther, David LaRusso, Christopher Rink, Scott Van Pelt

Traders: Joel Mitter, Robert Richardson, Elizabeth Van Pelt

Charlotte

Polly Weiss, Senior Trader

Santa Monica

Ryan Wiley, Co-Head of Global Equity Trading

Le Tran, Senior Trader

Traders: Claudette Higdon, Erhan Oktay

London

John Romiza, Co-CEO, Dimensional Fund Advisors Ltd. and Co-Head of Global Equity Trading

Senior Traders: Mark Butterworth, William Letheren

Traders: Frances Ritter, Mathieu Roland, James Simpson, Archit Soni

Sydney

Jason Lapping, Head of International Equity Trading

Senior Traders: David Vrolyk, Sam Willis
Jian Du, Trader

Singapore

Traders: Jonathan Smith, Hayato Yonemori

As of October 9, 2018.

1. Dimensional Fund Advisors LP Investment Committee.

Locations with offices operated by Dimensional. "Dimensional" refers to the Dimensional entities generally, rather than to one particular entity. These entities are Dimensional Fund Advisors LP, Dimensional Fund Advisors Ltd., DFA Australia Limited, Dimensional Fund Advisors Canada ULC, Dimensional Fund Advisors Pte. Ltd., Dimensional Japan Ltd., and Dimensional Hong Kong Limited. Dimensional Hong Kong Limited is licensed by the Securities and Futures Commission to conduct Type 1 (dealing in securities) regulated activities only and does not provide asset management services.

Dimensional Fund Advisors and Affiliates

Global Organizational Leadership

EXECUTIVE

David G. Booth,¹ Founder and Executive Chairman

David P. Butler,¹ Co-Chief Executive Officer, Head of Global Financial Advisor Services, and Dimensional Director

Gerard K. O'Reilly,¹ Co-Chief Executive Officer, Chief Investment Officer, and Dimensional Director

INVESTMENT PROFESSIONALS

RESEARCH

Gerard K. O'Reilly¹
Co-Chief Executive Officer, Chief Investment Officer, and Dimensional Director

Peter Dillard
Chief Data Officer
and Head of Investment Analytics and Data

Marlena Lee
Co-Head of Research

Savina Rizova¹
Co-Head of Research

PORTFOLIO MANAGEMENT AND TRADING

Joseph H. Chi¹
Co-Head of Portfolio Management

Robert T. Deere¹
Senior Investment Director

Jed S. Fogdall¹
Co-Head of Portfolio Management

Jason Lapping
Head of International Equity Trading

David A. Plecha¹
Global Head of Fixed Income

John Romiza
Co-CEO, Dimensional Fund Advisors Ltd. and Co-Head of Global Equity Trading

Bhanu Singh
Head of Asia Pacific Portfolio Management and Director

Ryan Wiley¹
Co-Head of Global Equity Trading

DIMENSIONAL DIRECTORS

David G. Booth,¹ Executive Chairman

David P. Butler¹

Eugene F. Fama, Nobel laureate and Consultant

Kenneth R. French, Consultant

John A. McQuown

Gerard K. O'Reilly¹

SALES AND CLIENT SERVICE

David P. Butler¹
Co-Chief Executive Officer, Head of Global Financial Advisor Services, and Dimensional Director

Stephen A. Clark
Head of Global Institutional Services

Mark Gochnour
Head of Financial Advisor Services International and Advisor Services

Craig Horvath
Global Head of Consultant Relations

David R. Jones
Head of Financial Advisor Services, EMEA

Kevin Kandasamy
Head of Institutional, Australia

Nathan Krieger
Head of Financial Advisor Services, Australia

Bryce Skaff
Head of US Financial Advisor Services and Strategic Relationship

Bradley G. Steiman
Director and Head of Canadian Financial Advisor Services

Joel Teasdel
Head of Financial Advisor Services, Asia ex Japan

Erik van Houwelingen
Head of European Sales, Dimensional Fund Advisors Ltd. (DFAL)

Carlo Venes
Head of Institutional, Asia ex Japan

CORPORATE

COMPLIANCE AND RISK MANAGEMENT

Christopher S. Crossan
Global Chief Compliance Officer

FINANCIAL/ACCOUNTING SERVICES

Gregory K. Hinkle
Chief Financial Officer and Treasurer

HUMAN RESOURCES

Aaron Marcus
Head of Global Human Resources

INVESTMENT OPERATIONS

Richard A. Eustice
Head of Global Investment Operations

LEGAL

Catherine L. Newell
General Counsel and Secretary

MARKETING

Karen Dolan
Head of Marketing

RISK MANAGEMENT

Jeffrey Vernor
Head of Risk Management

TECHNOLOGY

Michael Holmes
Chief Technology Officer

AFFILIATES

DIMENSIONAL FUND ADVISORS LTD. (LONDON)

Nathan Lacaze, CFA
Co-CEO and Head of EMEA Portfolio Management

John S. Romiza
Co-CEO and Co-Head of Global Equity Trading

DFA AUSTRALIA LIMITED (SYDNEY)

J. Glenn Crane
Chairman and Chief Executive Officer

DIMENSIONAL JAPAN LTD. (TOKYO)

John R. Alkire
Chief Executive Officer

DIMENSIONAL FUND ADVISORS PTE. LTD. (SINGAPORE)

Peng Chen
Director, Chief Executive Officer, Asia ex Japan

DIMENSIONAL FUND ADVISORS CANADA ULC (VANCOUVER)

Bradley G. Steiman
Director and Head of Canadian Financial Advisor Services

As of October 9, 2018.

1. Member of the Investment Committee of Dimensional Fund Advisors LP.

All listed individuals are employees of Dimensional Investment LLC, a subsidiary of Dimensional Fund Advisors LP.

"Dimensional Directors" refers to the Board of Directors of the general partner of Dimensional Fund Advisors LP.

Calendar Year Performance (Simulated)

Calendar Year Return As of December 31, 2017

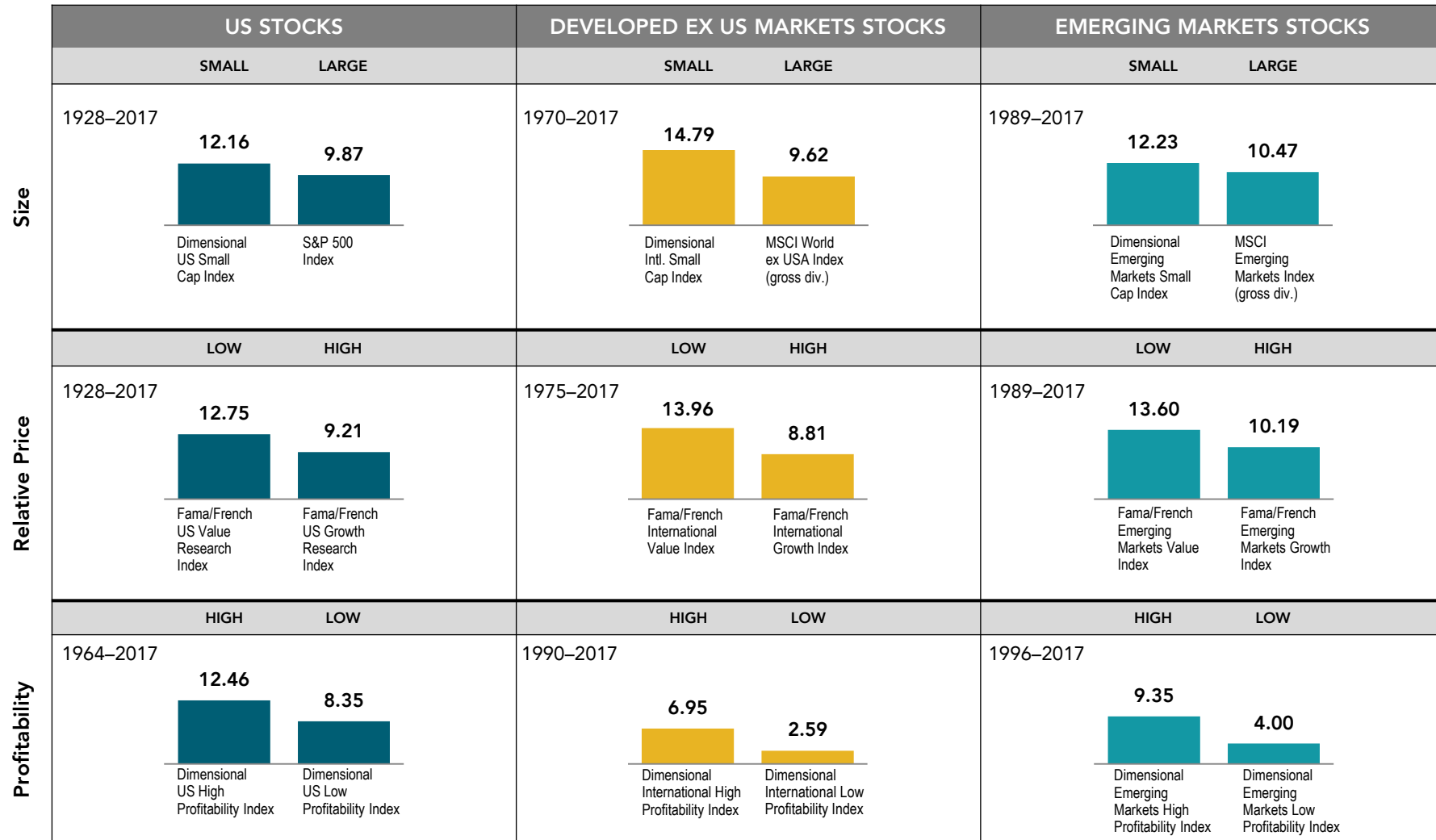
Calendar Year Returns (%)	OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)	Calendar Year Returns (%)	OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)
1996	14.18	13.20	2007	10.35	12.19
1997	16.10	15.00	2008	-34.50	-41.84
1998	16.17	21.97	2009	26.99	35.41
1999	10.21	26.82	2010	11.25	13.21
2000	2.91	-13.93	2011	2.06	-6.86
2001	-6.62	-15.91	2012	13.78	16.80
2002	-8.89	-18.98	2013	22.07	23.44
2003	30.96	34.63	2014	5.18	4.71
2004	21.51	15.76	2015	-1.53	-1.84
2005	11.43	11.37	2016	8.28	8.49
2006	26.09	21.53	2017	22.11	24.63

Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

Index performance data shown (MSCI World Index) represents past performance and is no guarantee of future results. Assumes reinvestment of interest and dividends. An index is not available for direct investment. MSCI data © MSCI 2018, all rights reserved.

Dimensions of Expected Returns

Illustrative index performance: Annualized compound returns (%) in US dollars

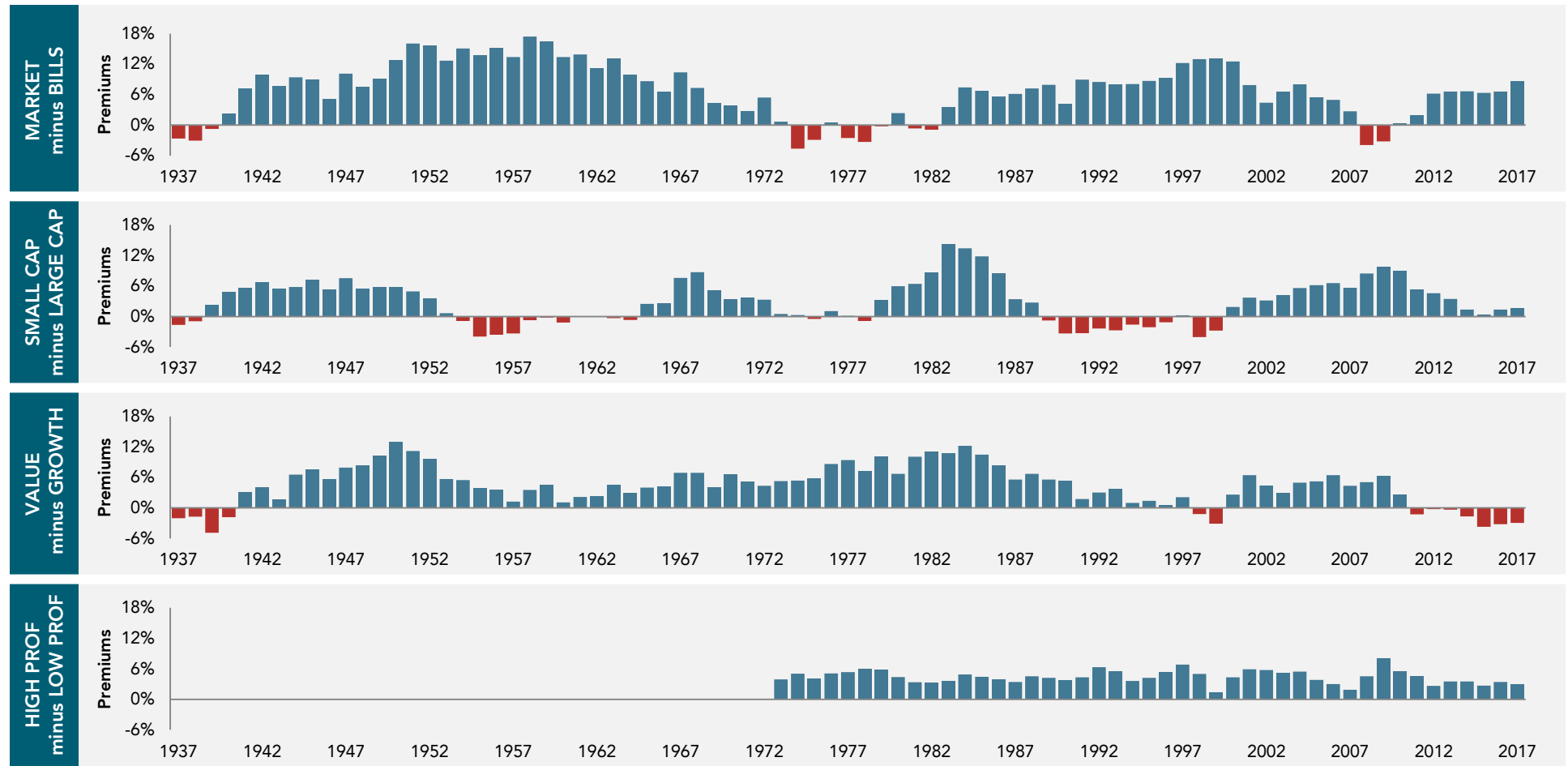


Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book.

Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Past performance is not a guarantee of future results. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment. Actual returns may be lower. See "Index Descriptions" in the appendix for descriptions of Dimensional and Fama/French index data. Eugene Fama and Ken French are members of the Board of Directors of the general partner of, and provide consulting services to, Dimensional Fund Advisors LP. S&P data copyright 2018 S&P Dow Jones Indices LLC, a division of S&P Global. All rights reserved. MSCI data © MSCI 2018, all rights reserved.

Historical Observations of 10-Year Premiums

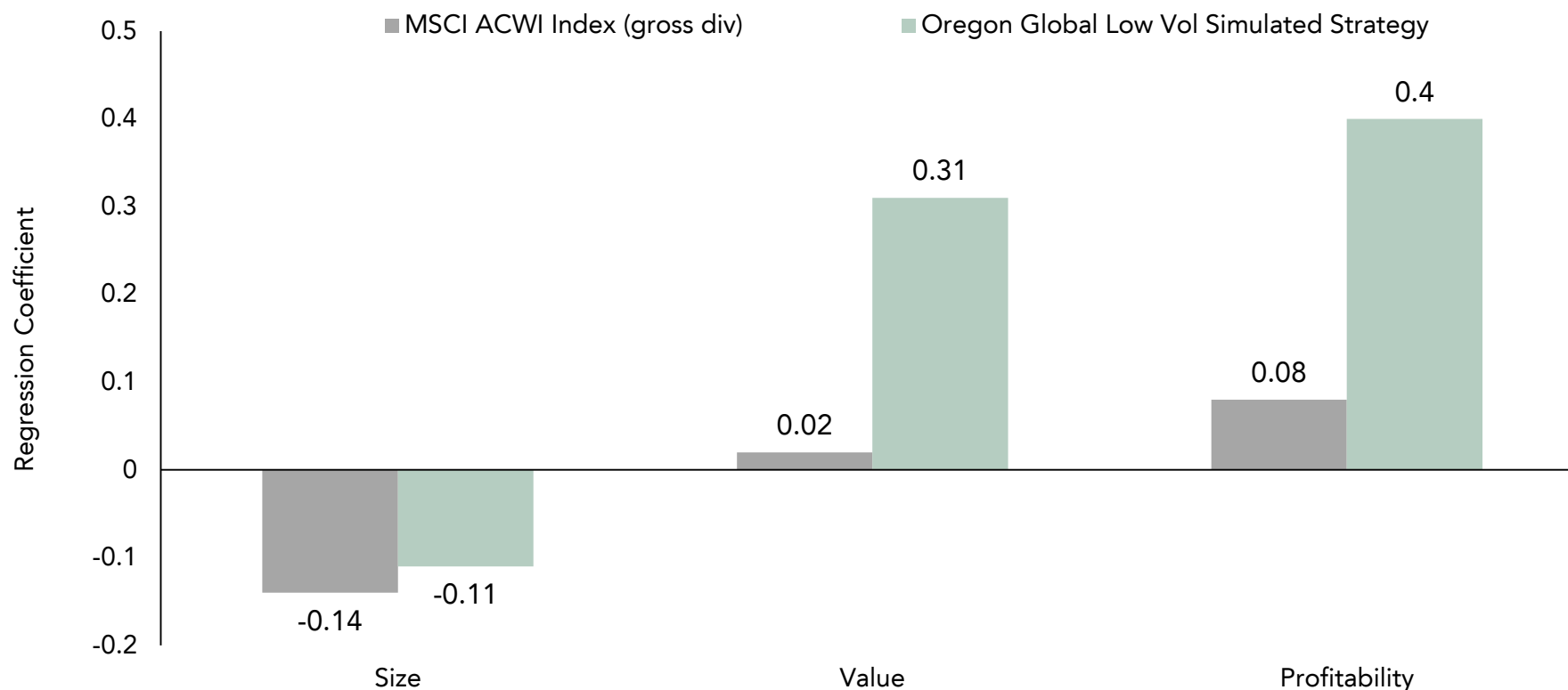
Equity, size, relative price, and profitability: US Markets



10-year rolling equity premium is computed as the 10-year annualized compound return on the Fama/French Total US Market Index minus the 10-year annualized compound return of the one-month US Treasury Bill. 10-year rolling size premium is computed as the 10-year annualized compound return on the Dimensional US Small Cap Index minus the 10-year annualized compound return on the S&P 500 Index. 10-year rolling relative price premium is computed as the 10-year annualized compound return on the Fama/French US Value Index minus the 10-year annualized compound return on the Fama/French US Growth Index. The 10-year rolling profitability premium is computed as the 10-year annualized compound return on the Dimensional US High Profitability Index minus the 10-year annualized compound return on the Dimensional US Low Profitability Index. Profitability is measured as operating income before depreciation and amortization minus interest expense, scaled by book. One-Month Treasury Bills is the IA SBBI US 30 Day TBill TR USD, provided by Ibbotson Associates via Morningstar Direct. Fama/French indices provided by Ken French. S&P data copyright 2018 S&P Dow Jones Indices LLC, a division of S&P Global. All rights reserved. Dimensional indices use CRSP and Compustat data. Index descriptions available upon request. Eugene Fama and Ken French are members of the Board of Directors of the general partner of, and provide consulting services to, Dimensional Fund Advisors LP. **Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Past performance is no guarantee of future results.**

Emphasizing the Sources of Higher Expected Return

Multifactor Regression Analysis, January 1, 1996 – October 31, 2018



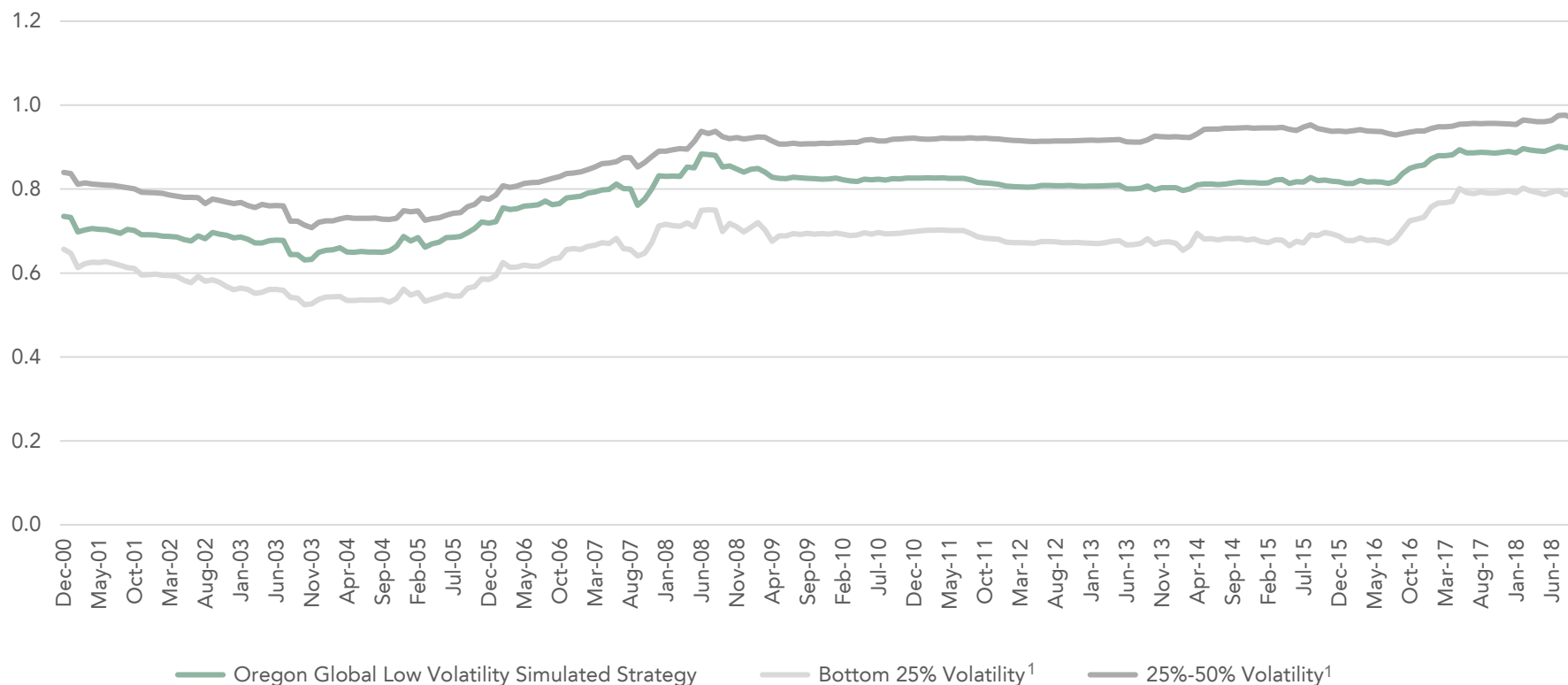
Simulated strategy returns based on a model/back-tested simulation. **These are not live strategies managed by Dimensional.** The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Assumes reinvestment of interest and dividends. Past performance is not a guarantee of future results.

Historical Betas vs MSCI ACWI

Sample Period: January 1996 – October 2018

Rolling 5-Year Beta vs MSCI ACWI



Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

1. Free-float market capitalization weighted quartiles sorted on average of two rankings on volatility (one ranking is based on 5 year of monthly returns and the other is based on 1 year of weekly returns).

Source: Bloomberg.

Index performance data shown (MSCI World Index) represents past performance and is no guarantee of future results. Assumes reinvestment of interest and dividends. An index is not available for direct investment. MSCI data © MSCI 2018, all rights reserved.

Historical Performance

Sample Period: January 1996 – October 2018

	Oregon Global Low Volatility Simulated Strategy	Global Large Cap Bottom 50% Volatility ¹	MSCI ACWI Index (gross)	Bottom 25% Volatility ¹	25%-50% Volatility ¹	50-75% Volatility ¹	Top 25% Volatility ¹
Annualized Compound Return	8.43	7.81	6.79	8.06	7.74	6.40	4.24
Annualized Standard Deviation	12.59	12.24	15.17	11.22	13.71	17.10	22.82
Premium versus MSCI	1.64	1.02	—	1.27	0.95	-0.39	-2.55
Annualized TE versus MSCI	5.22	5.03	—	6.98	3.65	3.62	10.22

Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of these types of simulated strategies may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results. The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV. See slide "Simulated Performance Disclosures and Descriptions" for important information regarding simulated performance.

1. Free-float market capitalization weighted quartiles sorted on average of two rankings on volatility (one ranking is based on 5 year of monthly returns and the other is based on 1 year of weekly returns).

Source: Bloomberg. Global Large Cap bottom 50% volatility is represented by the least volatile 50% of the large cap market in each eligible country based on the average of two rankings on volatility (one ranking is based on 5 years of monthly returns and the other is based on 1 year of weekly returns).

Index performance data shown (MSCI World Index) represents past performance and is no guarantee of future results. Assumes reinvestment of interest and dividends. An index is not available for direct investment. MSCI data © MSCI 2018, all rights reserved.

Characteristics (Simulated)

As of October 31, 2018

	OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY	MSCI All Country World Index (gross div.)
MARKET CHARACTERISTICS		
Number of Issuers	986	2,787
SIZE CHARACTERISTICS		
Wtd. Average Market Cap (millions)	\$133,404	\$149,407
VALUATION CHARACTERISTICS		
Aggregate Price-to-Book	2.22	2.21
PROFITABILITY CHARACTERISTICS		
Wtd. Average Profitability ¹	0.40	0.37

SIMULATED DATA. Not live strategies managed by Dimensional Fund Advisors LP or any of its affiliates.

1. Operating income before depreciation and amortization minus interest expense scaled by book.

Holdings are subject to change. MSCI data © MSCI 2018, all rights reserved.

Dimensional Implicit Costs Relative to Peers

ITG Post-Trade Analytics™ – Peer Trade Cost Analysis



- Trading costs negatively impact returns
- Lower implicit costs contribute to lower total trading costs
- Dimensional uses both third party and internally developed benchmarks to evaluate the implicit costs of trading.

Past performance is not a guarantee of future results. Date range reflects most recent data available.

1. MSCI Developed ex US.

2. MSCI Emerging.

3. Ranking provided by ITG. Ranking from 1-100% where 1 is lowest implicit cost and 100 is highest implicit cost.

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Simulated Performance Disclosures and Descriptions

Simulated strategy returns based on a model/back-tested simulation. These are not live strategies managed by Dimensional. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Back-tested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The securities held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision making if the advisor were actually managing client money. These strategies were not available for investment in the time periods depicted. Actual management of this type of simulated strategy may result in lower returns than the back-tested results achieved with the benefit of hindsight. Past performance (including hypothetical past performance) does not guarantee future or actual results.

The simulated performance shown is "gross performance," which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. A client's investment returns will be reduced by the advisory fees and other expenses that may be incurred in the management of the advisory account. For example, if a 1% annual advisory fee were deducted quarterly and a client's annual return were 10% (based on quarterly returns of approximately 2.41% each) before deduction of advisory fees, the deduction of advisory fees would result in an annual return of approximately 8.91% due, in part, to the compound effect of such fees. To account for trading costs, however, the simulated performance does reflect the deduction of an assumed brokerage fee of 2.5 basis points using an estimated turnover number. A client's investment returns will be reduced by the advisory fees and other expenses it may incur in the management of its advisory account. Dimensional's advisory fees are described in Part 2A of Dimensional's Form ADV.

Simulated Strategy Descriptions

OREGON GLOBAL LOW VOLATILITY SIMULATED STRATEGY

Simulation excludes the most volatile 50% of the large cap market in each eligible country based on the average of two rankings on volatility (one ranking is based on 5 years of *monthly returns* and the other is based on 1 year of *weekly returns*). Within the remaining eligible stocks, we emphasize the securities with higher expected returns (companies with lower market capitalization, lower relative price and higher profitability) in a balanced manner. Country weights are based on the aggregate free float market cap of each eligible country. The simulated strategy is rebalanced semi-annually at December and June.

Using the Valuation Equation: Descriptions and Important Information

US: 1963-2017

Source: CRSP and Compustat. At the end of each June from 1963 to 2017 stocks are sorted on price-to-book into three portfolios, each representing one-third of the market. Similarly, stocks are sorted on profitability into three portfolios, each representing one-third of the market. The monthly returns reported above are for the intersections of the three portfolios formed on price-to-book and the three portfolios formed on profitability.

Non-US Developed: 1990-2016 and Emerging Markets: 1995-2017

Source: Bloomberg. Eligible stocks in each non-US developed market country are sorted on price-to-book into three portfolios, each representing one-third of the aggregate market capitalization of that country. Similarly, stocks are sorted on profitability into three portfolios, each representing one-third of the aggregate market capitalization of that country. From the intersections of the three portfolios formed on price-to-book and the three portfolios formed on profitability we form nine profitability/price-to-book portfolios within each country. The returns on the portfolios are constructed by averaging the returns on the respective country portfolios. Developed ex US portfolios are rebalanced semi-annually from December-end 1989 to June-end 2017. Emerging Markets portfolios are rebalanced semi-annually from June-end 1995 to June-end 2017.

US: Pre-1963

Source: Wahal, Sunil, The Profitability and Investment Premium: Pre-1963 Evidence (December 29, 2016). Available at SSRN: <https://ssrn.com/abstract=2891491> or <http://dx.doi.org/10.2139/ssrn.2891491>. Sunil Wahal provides consulting services to Dimensional Fund Advisors LP. Using CRSP and Compustat data as well as hand-collected financials from the Moody's Industrial, Bank & Finance, and Utilities Manuals, at the end of June each year from 1940 to 1962 US stocks are sorted independently on book-to-market equity (B/M) and operating profitability (OP/B), defined as operating income before amortization and depreciation minus interest expense scaled by book equity. Stocks are sorted into three groups, each with one third of the number of stocks, based B/M. Similarly, stocks are sorted into three groups, each with one third of the number of stocks, based OP/B. From the intersection of the two independent sorts, six B/M-OP/B portfolios are formed. The exhibit reports average monthly value-weighted returns on those portfolios for July 1940 to June 1963.

Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity.

Index Descriptions

Dimensional US Small Cap Index was created by Dimensional in March 2007 and is compiled by Dimensional. It represents a market-capitalization-weighted index of securities of the smallest US companies whose market capitalization falls in the lowest 8% of the total market capitalization of the Eligible Market. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and investment companies. From January 1975 to the present, the index also excludes companies with the lowest profitability and highest relative price within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat. The index monthly returns are computed as the simple average of the monthly returns of 12 sub-indices, each one reconstituted once a year at the end of a different month of the year. The calculation methodology for the Dimensional US Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Dimensional US High Profitability Index was created by Dimensional in January 2014 and represents an index consisting of US companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three high-profitability subgroups. It is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat.

Dimensional US Low Profitability Index was created by Dimensional in January 2014 and represents an index consisting of US companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three low-profitability subgroups. It is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat.

Dimensional International Small Cap Index was created by Dimensional in April 2008 and is compiled by Dimensional. July 1981–December 1993: It Includes non-US developed securities in the bottom 10% of market capitalization in each eligible country. All securities are market capitalization weighted. Each country is capped at 50%. Rebalanced semiannually. January 1994–Present: Market-capitalization-weighted index of small company securities in the eligible markets excluding those with the lowest profitability and highest relative price within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of a different quarter of the year. Prior to July 1981, the index is 50% UK and 50% Japan. The calculation methodology for the Dimensional International Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Index Descriptions

Dimensional International Low Profitability Index was created by Dimensional in January 2013 and represents an index consisting of non-US developed companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization of each eligible country. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three low-profitability subgroups. The index is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: Bloomberg.

Dimensional International High Profitability Index was created by Dimensional in January 2013 and represents an index consisting of non-US developed companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization of each eligible country. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three high-profitability subgroups. The index is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: Bloomberg.

Dimensional Emerging Markets Low Profitability Index was created by Dimensional in April 2013 and represents an index consisting of emerging markets companies and is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization of each eligible country. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three low-profitability subgroups. The index is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: Bloomberg.

Dimensional Emerging Markets High Profitability Index was created by Dimensional in April 2013 and represents an index consisting of emerging markets companies and is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization of each eligible country. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three high-profitability subgroups. The index is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: Bloomberg.

Dimensional Emerging Markets Small Cap Index was created by Dimensional in April 2008 and is compiled by Dimensional. January 1989–December 1993: Fama/French Emerging Markets Small Cap Index. January 1994–Present: Dimensional Emerging Markets Small Index Composition: Market-capitalization-weighted index of small company securities in the eligible markets excluding those with the lowest profitability and highest relative price within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of a different quarter of the year. Source: Bloomberg. The calculation methodology for the Dimensional Emerging Markets Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

The Dimensional Indices have been retrospectively calculated by Dimensional Fund Advisors LP and did not exist prior to their index inception dates. Accordingly, results shown during the periods prior to each Index's index inception date do not represent actual returns of the Index. Other periods selected may have different results, including losses. Backtested index performance is hypothetical and is provided for informational purposes only to indicate historical performance had the index been calculated over the relevant time periods. Backtested performance results assume the reinvestment of dividends and capital gains. Eugene Fama and Ken French are members of the Board of Directors of the general partner of, and provide consulting services to, Dimensional Fund Advisors LP.

Index Descriptions

Fama/French US Value Research Index: Provided by Fama/French from CRSP securities data. Includes the lower 30% in price-to-book of NYSE securities (plus NYSE Amex equivalents since July 1962 and Nasdaq equivalents since 1973).

Fama/French US Growth Research Index: Provided by Fama/French from CRSP securities data. Includes the higher 30% in price-to-book of NYSE securities (plus NYSE Amex equivalents since July 1962 and Nasdaq equivalents since 1973).

Fama/French Total US Market Index: Provided by Fama/French from CRSP securities data. Includes all US operating companies trading on the NYSE, AMEX or Nasdaq NMS. Excludes ADRs, Investment Companies, Tracking Stocks, non-US incorporated companies, Closed-end funds, Certificates, Shares of Beneficial Interests and Berkshire Hathaway Inc (Permco 540).

Fama/French International Value Index: 2008–present: Provided by Fama/French from Bloomberg securities data. Simulated strategy of MSCI EAFE + Canada countries in the lower 30% price-to-book range. 1975–2007: Provided by Fama/French from MSCI securities data.

Fama/French International Growth Index: 2008–present: Provided by Fama/French from Bloomberg securities data. Simulated strategy of MSCI EAFE + Canada countries in the higher 30% price-to-book range. 1975–2007: Provided by Fama/French from MSCI securities data.

Fama/French Emerging Markets Value Index: 2009–present: Provided by Fama/French from Bloomberg securities data. Simulated strategy using IFC investable universe countries. Companies in the lower 30% price-to-book range; companies weighted by float-adjusted market cap; countries weighted by country float-adjusted market cap; rebalanced monthly. 1989–2008: Provided by Fama/French from IFC securities data. IFC data provided by International Finance Corporation.

Fama/French Emerging Markets Growth Index: 2009–present: Provided by Fama/French from Bloomberg securities data. Simulated strategy using IFC investable universe countries. Companies in the higher 30% price-to-book range; companies weighted by float-adjusted market cap; countries weighted by country float-adjusted market cap; rebalanced monthly. 1989–2008: Provided by Fama/French from IFC securities data. IFC data provided by International Finance Corporation.

TAB 5 – Capital Markets Policy Updates

OPERF

**Oregon Investment Council
OPERF Capital Markets Policy Updates**

**1. Fixed Income Portfolio – Policy Revisions
2. Public Equity Portfolio – Manager Benchmark Changes**

December 12, 2018

Purpose: 1) To update two policies in the OPERF Fixed Income Portfolio; and 2) to provide a recommendation to change benchmarks for two mandates within the OPERF Public Equity Portfolio.

1. **Fixed Income.** Staff recommends revisions to the fixed income policies to mirror the changes in the public equity portfolio from the October meeting. Specifically, staff recommends reducing the number of policies in the fixed income portfolio from three to two, as follows:
 - a. **INV 401: Strategic role of Fixed Income for OPERF;**
 - b. **INV 402: Internal Fixed Income Portfolio Investments;** and
 - c. **INV 403: Fixed Income Investments: Investment Manager Selection, Monitoring, and Termination (*RETIRE and fold portions into INV 401*).**

2. **Public Equity.** Staff recommends two benchmark changes, as described below.

Background

In mid-2014, the London Stock Exchange Group (LSEG) entered into an agreement to purchase the U.S.-based, indexing and asset management firm, Russell Investments. Approximately one year later, LSEG merged its existing FTSE Group with the Russell Index brand, creating FTSE Russell, a single, global index business.

Since then, the joint entity has conducted a comprehensive review of all index offerings and has decided to decommission a number of indices. FTSE Russell provides that an index may be decommissioned for a number of reasons, including inadequate supply of data, poor quality of data supply, insufficient number of clients using the index, insufficient revenue linked to the index or insufficient number of eligible constituents available for inclusion in the index.

As a result, the Russell Global ex-U.S. Microcap Index is scheduled to be decommissioned, effective December 31, 2018. This index serves as a benchmark for two mandates within the OPERF Public Equity portfolio (DFA Global ex-U.S. Micro Cap and EAM Global ex-U.S. Micro Cap). Although the Russell Global ex-U.S. Microcap Index is scheduled to be decommissioned, the FTSE Russell group does offer a suitable replacement benchmark in the FTSE Global ex-U.S. Micro Cap Index.

Although similarities exist between the Russell Global ex-U.S. Microcap Index and the FTSE Global ex-U.S. Micro Cap Index, there are also some notable differences (Exhibit 1). Staff and the impacted investment managers agree that the FTSE Global ex-U.S. Micro Cap Index is the most suitable benchmark moving forward.

Exhibit 1 – Benchmark Comparison

	Russell Global ex-U.S. Microcap Index	FTSE Global ex-U.S. Micro Cap Index
Number of Constituents	2,491	6,640
Top 10 Holdings	3.53%	1.97%
Market Cap Construction	Bottom 2% of Russell Global Index	Below top 98% of FTSE All Cap Index
Median Market Cap	\$276 Million	\$65 Million
Dividend Yield	2.28%	2.13%
Number of Countries	43	45
Liquidity	Median ADTV	Median Velocity Rule
Rebalance Methodology	Annually	Semi-annually

Source: FTSE Russell, as of June 30, 2018.

Recommendation

1. **Fixed Income:** Staff recommends revisions to policies INV 401 and 402 as reflected in the attached documents, and also recommends retiring INV 403.
2. **Public Equity:** Due to FTSE Russell decommissioning the current benchmarks, staff recommends making benchmark changes for the following two mandates:
 - a) DFA Global ex-U.S. Micro Cap Value – from the Russell Global ex-U.S. Microcap Index to the FTSE Global ex-U.S. Micro Cap Index; and
 - b) EAM International Micro Cap – from the Russell Global ex-U.S. Microcap Index to the FTSE Global ex-U.S. Micro Cap Index.



Origination: 03/2014
Last Approved: N/A
Last Revised: 11/2018
Next Review: 1 year after approval
Owner: Perrin Lim: Director of Capital Markets
Policy Area: Investments
References: INV 216: Securities Lending

INV 401: Strategic Role of Fixed Income for OPERF

OREGON INVESTMENT COUNCIL POLICY INTRODUCTION & OVERVIEW

Summary Policy Statement

The strategic role of fixed income investments is delineated in the Oregon Investment Council ("OIC") Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund ("OPERF" or the "Fund"). ~~The OPERF Fixed Income Portfolio (the "Portfolio") is expected to provide diversification to the Oregon Public Employees Retirement Fund (OPERF) portfolio in general and its allocation to equity securities in particular. Fixed income investments also provide opportunities, as well as liquidity to help meet OPERF's cash flow requirements.~~ Oregon State Treasury staff ("OST" and "Staff"), with approval from the Chief Investment Officer ("CIO") and notification to the OIC, will have the discretion to rebalance between and among managers within the Fixed Income Portfolio. Fixed income investments are subject to specific, strategic asset allocation targets ~~established by the Oregon Investment Council and described in INV 215: OPERF Asset Allocation and Rebalancing Policy~~ herein.

Purpose and Goals

The purpose of these Fixed Income Investment Policies & Strategies is to a) define the objectives of fixed income as an asset class within the general investment policies established by the ~~Oregon Investment Council (OIC) as part of its governance of the OPERF portfolio~~, and b) outline appropriate strategies for implementing the OIC's fixed income investment policies.

Applicability

Classified represented, management service, unclassified executive service

Authority

ORS Chapter 293

POLICY PROVISIONS

Policy Statements

A. BENCHMARK AND GUIDELINE MANAGEMENT

Assigned benchmarks may not be changed without OIC approval; however, the following guidelines may be modified as considered necessary by the Chief Investment Officer (CIO):

1. The investment mandate to which a manager is assigned;
2. A manager's investment objectives;
3. A manager's performance objective(s), expressed on a relative basis in comparison to a defined benchmark, as that manager's required excess return; and
4. Permissible fixed income investments in which a manager may invest, subject to permitted holdings as listed in Section D.

B. POLICY OBJECTIVES

1. Over a market cycle of three to five years and on a net-of-fee basis, achieve a fixed income portfolio return of at least 25 basis points above the custom policy benchmark which is currently comprised as follows: 37% Barclays U.S. Treasury Index; 46% Barclays Capital U.S. Aggregate Bond Index; 13% S&P/LSTA Leveraged Loan Index; and 4% Bank of America Merrill Lynch High Yield Master II Index. The fixed income portfolio is also expected to achieve top quartile performance in a peer group comprised of other public and corporate pension funds with total assets greater than \$1 billion.
2. Limit fixed income portfolio risk, as measured by the standard deviation of returns, to a level not to exceed that of the custom benchmark.

C. STRATEGIES

1. Build and maintain a well diversified fixed income portfolio that reflects the general characteristics of the custom benchmark and is managed to maximize total return subject to the risk limitations described directly above.
2. Maintain portfolio duration within parameters as defined by staff, with OIC approval, for each specific fixed income mandate.
3. Staff will have discretion, with CIO approval and quarterly OIC reporting, to rebalance between and among managers should specific mandates exceed the OIC's approved allocation percentage of total OPERF fixed income. The total fixed income portfolio's structural characteristics will be considered at the time of any rebalancing.
4. Invest opportunistically using innovative investment approaches within a controlled and defined portfolio allocation.
5. Over a market cycle of three to five years, active managers are expected to outperform stated benchmarks on an after-fee, risk-adjusted basis.
6. The OIC's selection of active managers will be based upon demonstrated expertise as reflected by an ability to add value over a passive management alternative and within reasonable risk parameters.

D. PERMITTED HOLDINGS

The following fixed income securities, individually or in commingled vehicles, may be held outright and

under resale agreement:

1. Obligations issued or guaranteed by the U.S. Federal Government, U.S. Federal agencies or U.S. government-sponsored corporations and agencies;
2. Obligations of U.S. and non-U.S. corporations such as convertible and non-convertible notes and debentures, preferred stocks, commercial paper, certificates of deposit and bankers acceptances issued by industrial, utility, finance, commercial banking or bank holding company organizations, bank loans, common stock received in connection with the restructuring of corporate debt;
3. Mortgage-backed, asset-backed and structured securities;
4. Obligations, including the securities of emerging market issuers, denominated in U.S. dollars or foreign currencies of international agencies, supranational entities and foreign governments (or their subdivisions or agencies), as well as foreign currency exchange-related securities, warrants and forward contracts;
5. Obligations issued or guaranteed by U.S. local, city and state governments and agencies;
6. Securities defined under Rule 144A and Commercial Paper defined under Section 4(2) of the Securities Act of 1933;
7. Yankee Bonds (dollar denominated sovereign and corporate debt);
8. Derivatives including futures, swaps and options contracts; and
9. Securities eligible for the Short-Term Investment Fund (OSTF).

E. DIVERSIFICATION

The portfolio should be adequately diversified to minimize various risks. The following specific limitations reflect, in part, the OIC's current investment philosophy regarding diversification.

1. Obligations issued or guaranteed by the U.S. government, U.S. agencies or government sponsored enterprises are eligible, without limit.
2. Obligations of other national governments are limited to 10% per issuer.
3. Private mortgage-backed and asset-backed securities are limited to 10% per issuer, unless the collateral is credit-independent of the issuer and the security's credit enhancement is generated internally, in which case the limit is 25% per issuer.
4. Obligations of other issuers are subject to a 3% per issuer limit excluding investments in commingled vehicles.
5. Not more than 25% of the portfolio may be invested in non-dollar denominated securities.
6. Not more than 30% of the portfolio will be below investment grade (below Baa3/BBB-).
7. No more than 5% of the externally-managed portfolio will be invested in futures or swaps margin and option premiums, exclusive of any in-the-money portion of the premiums. Short (sold) options positions will generally be hedged with cash, cash equivalents, current portfolio security holdings or other options or futures positions.
8. No more than 10% of internally-managed funds may be invested in U.S. Treasury Futures measured in gross notional value.

F. ABSOLUTE RESTRICTIONS

Investments in the following are prohibited:

1. Short sales of securities;

- ~~2. Margin purchases or other use of lending or borrowing money or leverage to create positions greater than 100% of the market value of assets under management;~~
- ~~3. Commodities or common stocks, unless common stock shares are received due to a restructuring, then shares will be liquidated at the manager's discretion; and~~
- ~~4. Securities of the existing investment manager, its parents, custodians or subsidiaries.~~

A. POLICY STATEMENTS

The Portfolio is expected to achieve return of at least 25 basis points above the custom policy benchmark, which is currently comprised as follows: 37% Bloomberg Barclays U.S. Treasury Index; 46% Bloomberg Barclays U.S. Aggregate Bond Index; 13% S&P/LSTA Leveraged Loan Index; and 4% Bank of America Merrill Lynch High Yield Master II Index. Any changes to the policy benchmark will be approved by the OIC.

B. OBJECTIVES

1. Limit portfolio risk, as measured by tracking error, to an annualized target of .5 to 1.0 percent.
2. Build and maintain a well-diversified portfolio managed to maximize total return subject to the risk limitations described herein.
3. Maintain portfolio duration within parameters as defined by staff, with CIO approval, for each specific fixed income mandate.
4. Invest opportunistically using innovative investment approaches within a controlled and defined portfolio allocation.
5. Outperform stated benchmarks on an after-fee, risk-adjusted basis over a market cycle of three to five years.
6. Select active managers based upon demonstrated expertise and ability to add value over a passive management alternative and within reasonable risk parameters.

C. OST STAFF AUTHORITY & REPORTING

1. Staff will have discretion, with advance approval of the Director of Capital Markets and the CIO and subsequent notice to the OIC, to rebalance between and among managers. The total fixed income portfolio's structural characteristics will be considered at the time of any rebalancing.
2. Re-allocations between asset classes shall adhere to Policy INV 1203: Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund.
3. The following guidelines may be modified as considered necessary by the Director of Capital Markets, with notification to the CIO:
 - a. The investment mandate to which a manager is assigned;
 - b. A manager's investment objectives;
 - c. A manager's benchmark;
 - d. A manager's performance objective(s), expressed on a relative basis in comparison to a defined benchmark, as that manager's required excess return; and
 - e. Permissible fixed income investments in which a manager may invest, as listed in the "Permitted Holdings" section below.
4. OST Staff, with approval from the CIO and notification to the OIC, may terminate "at will" any manager according to the terms of its contract with and on behalf of the OIC.

5. OST Staff, with approval from the CIO and notification to the OIC, is authorized to engage and fund any mandate considered necessary to allocate assets from terminated or defunded managers or to fill gaps identified in, or reduce risk in, the Portfolio.

D. PERMITTED HOLDINGS

The following fixed income securities, individually or in commingled vehicles, may be held outright and under resale agreement:

1. Obligations issued or guaranteed by the U.S. Federal Government, U.S. Federal agencies or U.S. government-sponsored corporations and agencies;
2. Obligations of U.S. and non-U.S. corporations;
3. Obligations of international agencies, supranational entities and foreign governments (or their subdivisions or agencies), as well as foreign currency exchange-related securities, warrants and forward contracts;
4. Obligations issued or guaranteed by U.S. local, city and state governments and agencies;
5. Securities defined under Rule 144A and Commercial Paper defined under Section 4(2) of the Securities Act of 1933;
6. Yankee Bonds (dollar denominated sovereign and corporate debt);
7. Derivatives of fixed income and currency market instruments; and
8. Securities eligible for the Short-Term Investment Fund (OSTF).

Exceptions

None.

Failure to Comply

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

PROCEDURES and FORMS ADMINISTRATION

Review

Annually

Feedback

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

Attachments:

No Attachments

Approval Signatures

Step Description	Approver	Date
PolicyStat Admin	Carmen Leiva: Operations Analyst	pending
	Geoff Nolan: Senior Investment Officer	11/2018

Applicability

Oregon State Treasury

COPY



Origination: 03/2014
Last Approved: N/A
Last Revised: 11/2018
Next Review: 1 year after approval
Owner: Perrin Lim: Director of Capital Markets
Policy Area: Investments
References: INV 216: Securities Lending

INV 401: Strategic Role of Fixed Income for OPERF

OREGON INVESTMENT COUNCIL POLICY

INTRODUCTION & OVERVIEW

Summary Policy Statement

The strategic role of fixed income investments is delineated in the Oregon Investment Council (“OIC”) Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund (“OPERF” or the “Fund”). The OPERF Fixed Income Portfolio (the “Portfolio”) is expected to provide diversification opportunities, as well as liquidity to help meet OPERF’s cash flow requirements. Oregon State Treasury staff (“OST” and “Staff”), with approval from the Chief Investment Officer (“CIO”) and notification to the OIC, will have the discretion to rebalance between and among managers within the Fixed Income Portfolio. Fixed income investments are subject to specific, strategic asset allocation targets described herein.

Purpose and Goals

The purpose of these Fixed Income Investment Policies & Strategies is to a) define the objectives of fixed income as an asset class within the general investment policies established by the OIC, and b) outline appropriate strategies for implementing the OIC’s fixed income investment policies.

Applicability

Classified represented, management service, unclassified executive service

Authority

ORS Chapter 293

POLICY PROVISIONS

A. POLICY STATEMENTS

The Portfolio is expected to achieve return of at least 25 basis points above the custom policy benchmark,

which is currently comprised as follows: 37% Bloomberg Barclays U.S. Treasury Index; 46% Bloomberg Barclays U.S. Aggregate Bond Index; 13% S&P/LSTA Leveraged Loan Index; and 4% Bank of America Merrill Lynch High Yield Master II Index. Any changes to the policy benchmark will be approved by the OIC.

B. OBJECTIVES

1. Limit portfolio risk, as measured by tracking error, to an annualized target of .5 to 1.0 percent.
2. Build and maintain a well-diversified portfolio managed to maximize total return subject to the risk limitations described herein.
3. Maintain portfolio duration within parameters as defined by staff, with CIO approval, for each specific fixed income mandate.
4. Invest opportunistically using innovative investment approaches within a controlled and defined portfolio allocation.
5. Outperform stated benchmarks on an after-fee, risk-adjusted basis over a market cycle of three to five years.
6. Select active managers based upon demonstrated expertise and ability to add value over a passive management alternative and within reasonable risk parameters.

C. OST STAFF AUTHORITY & REPORTING

1. Staff will have discretion, with advance approval of the Director of Capital Markets and the CIO and subsequent notice to the OIC, to rebalance between and among managers. The total fixed income portfolio's structural characteristics will be considered at the time of any rebalancing.
2. Re-allocations between asset classes shall adhere to Policy INV 1203: Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund.
3. The following guidelines may be modified as considered necessary by the Director of Capital Markets, with notification to the CIO:
 - a. The investment mandate to which a manager is assigned;
 - b. A manager's investment objectives;
 - c. A manager's benchmark;
 - d. A manager's performance objective(s), expressed on a relative basis in comparison to a defined benchmark, as that manager's required excess return; and
 - e. Permissible fixed income investments in which a manager may invest, as listed in the "Permitted Holdings" section below.
4. OST Staff, with approval from the CIO and notification to the OIC, may terminate "at will" any manager according to the terms of its contract with and on behalf of the OIC.
5. OST Staff, with approval from the CIO and notification to the OIC, is authorized to engage and fund any mandate considered necessary to allocate assets from terminated or defunded managers or to fill gaps identified in, or reduce risk in, the Portfolio.

D. PERMITTED HOLDINGS

The following fixed income securities, individually or in commingled vehicles, may be held outright and under resale agreement:

1. Obligations issued or guaranteed by the U.S. Federal Government, U.S. Federal agencies or U.S.

- government-sponsored corporations and agencies;
2. Obligations of U.S. and non-U.S. corporations;
 3. Obligations of international agencies, supranational entities and foreign governments (or their subdivisions or agencies), as well as foreign currency exchange-related securities, warrants and forward contracts;
 4. Obligations issued or guaranteed by U.S. local, city and state governments and agencies;
 5. Securities defined under Rule 144A and Commercial Paper defined under Section 4(2) of the Securities Act of 1933;
 6. Yankee Bonds (dollar denominated sovereign and corporate debt);
 7. Derivatives of fixed income and currency market instruments; and
 8. Securities eligible for the Short-Term Investment Fund (OSTF).

Exceptions

None.

Failure to Comply

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

PROCEDURES and FORMS

ADMINISTRATION

Review

Annually

Feedback

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

Attachments:

No Attachments

Approval Signatures

Step Description	Approver	Date
PolicyStat Admin	Carmen Leiva: Operations Analyst	pending
	Geoff Nolan: Senior Investment Officer	11/2018

Applicability

Oregon State Treasury

COPY



Origination: 09/2014
Last Approved: N/A
Last Revised: 11/2018
Next Review: 6 months after approval
Owner: Tom Lofton: Fixed Income
 Investment Officer
Policy Area: Investments
References: INV 216: Securities Lending

INV 402: Internal Fixed Income Portfolio Investments

INTRODUCTION & OVERVIEW

Summary Policy Statement

~~Only State Agency funds meeting certain minimum requirements will be considered eligible for discreet (i.e., separate account) investment management. All internal fixed income investments shall be authorized by a fixed income investment officer, and this authorization shall be documented in accordance with portfolio guidelines established by the Oregon Investment Council (OIC).~~

Internally-managed, publicly-traded investments in debt securities are permitted in the Oregon Investment Council ("OIC") Statement of Fund Governance, and the strategic role of those investments is delineated in the OIC Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund ("OPERF").

Purpose and Goals

The purpose of this Fixed Income Investment Policy ~~comprises the following objectives is to:~~ (1) ~~determine what define the requirements for funds that~~ are eligible for discreet investment management; (and, 2) define the role of fixed income within the OIC's general investment policies for internally-managed funds; ~~3) establish specific short- and long-term policy objectives for these funds; and 4) outline strategies for implementing the OIC's fixed income investment policies.~~

Applicability

Classified represented, management service, unclassified executive service

POLICY PROVISIONS

Definitions

None.

Policy Statements

A. ELIGIBILITY

1. Funds eligible for discreet investment management must meet the following requirements:
 - a. Funds' enabling statutes must evidence legislative contemplation of discreet investment activity. Language containing the word "invest" in some form will suffice as evidence; and
 - b. The minimum projected balance for candidate funds must be at least \$50 million for investment in U.S. Treasury and Government-Sponsored Enterprise securities and at least \$100 million for inclusion of corporate bonds.
2. A participating agency ("Agency") must meet the following requirements:
 - a. Agency Head makes a written request for discreet investment management which includes an affirmative statement of the agency's ability to comply with the requirements of the Interagency Agreement for Fixed Income Investments; and
 - b. Agency will enter into an Interagency Investment Agreement with Oregon State Treasury (OST).
3. Final determination on the eligibility of any funds for discreet investing will be made solely by OST.
4. Exceptions to eligibility must be approved by the Deputy State Treasurer.

B. OVERALL POLICY OBJECTIVES & STRATEGIES

1. Achieve a stable and predictable yield with principal preservation while providing sufficient liquidity to meet agency-related cash flow requirements.
2. ~~Maintain a well-diversified portfolio, managed to maximize yield or total return as mandated in the respective agency investment policy.~~
Investment objectives, constraints, compliance and reporting requirements for individual Agency participants are presented in the form of an Investment Policy Statement and attached to this policy. Oregon State Treasury fixed income investment staff will maintain a well-diversified portfolio, managed to maximize yield or total return as mandated in each Agency's Investment Policy Statement.
3. Conduct periodic meetings with agencies to review and document each ~~agency~~Agency's specific portfolio objectives and liquidity needs.
 - a. ~~The investment objectives, constraints, compliance and reporting requirements for individual agencies are attached to this policy.~~
4. Invest opportunistically, using innovative investment approaches within a controlled and defined portfolio allocation.
5. Maintain average credit quality ~~of at least single A~~pursuant to each Agency's Investment Policy Statement.
6. Maintain communication with ~~agencies~~Agencies during periods of unique market environments (e.g., volatile credit cycles, low interest rate scenarios, etc.), and discuss possible impacts/constraints relative to portfolio objectives and liquidity needs.

PERMITTED HOLDINGS

1. ~~Obligations issued or guaranteed by the U.S. government, U.S. government agencies or U.S. government-sponsored corporations and agencies.~~

2. ~~Obligations of U.S. and non-U.S. corporations, commercial paper, certificates of deposit and bankers acceptances issued by industrial, utility, finance, commercial banking or bank holding company organizations.~~
3. ~~Mortgage-backed, asset-backed and structured securities.~~
 - a. ~~U.S. agency mortgage-backed securities (MBS) including collateralized mortgage obligations (CMOs).~~
 - b. ~~Senior tranches of commercial mortgage-backed securities (CMBS).~~
 - c. ~~Senior tranches of asset-backed securities (ABS) collateralized by:~~
 - i. ~~Autos;~~
 - ii. ~~Equipment;~~
 - iii. ~~Credit card debt; or~~
 - iv. ~~Student loans.~~
 - d. ~~Senior tranches of enhanced equipment trust certificates (EETCs).~~
4. ~~Obligations issued or guaranteed by U.S. local, city and state governments and agencies.~~
5. ~~Yankee Bonds (U.S. dollar denominated sovereign and corporate debt).~~
6. ~~The Oregon Short Term Fund (OSTF) and securities eligible for OSTF.~~
7. ~~The Oregon Intermediate Term Pool (OITP) and securities eligible for OITP.~~

DIVERSIFICATION

The portfolio should be adequately diversified to minimize various risks. The following specific limitations reflect, in part, the OIC's current investment philosophy regarding diversification:

1. ~~Obligations issued or guaranteed by the U.S. government, U.S. agencies or government-sponsored enterprises are eligible, without limit;~~
2. ~~Private mortgage-backed and asset-backed securities are limited to 10% per issuer, unless the collateral is credit independent of the issuer and the security's credit enhancement is generated internally, in which case the limit is 25% per issuer; and~~
3. ~~Obligations of other issuers are subject to a 3% per issuer limit.~~

ABSOLUTE RESTRICTIONS

For internally-managed mandates, Investment Staff may not purchase the following investments or types of investments without the specific, advance approval of both the CIO and OIC:

1. ~~Short sales of securities;~~
2. ~~Margin purchases or other use of lending or borrowing money or leverage to create positions greater than 100% of the market value of assets under management;~~
3. ~~Commodities or common stocks;~~
4. ~~Non-U.S. dollar denominated fixed income securities issued by entities incorporated or chartered outside of the United States;~~
5. ~~Fixed income securities which may be converted into equity securities;~~
6. ~~Investments categorized as equity real estate or within the equity asset class (investments categorized within the short-term asset class are specifically permitted, however);~~

~~7. Other securities which may not be categorized as fixed income securities; and~~

~~8. Other securities as stipulated in specific agency documents.~~

~~The OIC may add or remove investments from this list.~~

Exceptions

None.

Failure to Comply

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

PROCEDURES and FORMS

- A. OIC Policy: Department of Consumer and Business Services Consumer and Business Services Fund Investment Policy Statement
- B. OIC Policy: Department of Consumer and Business Services Workers' Benefit Fund Investment Policy Statement
- C. OIC Policy: Department of Administrative Services Fund Investment Policy Statement
- D. OIC Policy: Oregon Department of Transportation Fund Investment Policy Statement
- E. OIC Policy: Department of Veterans Affairs Fund Investment Policy Statement

ADMINISTRATION

Feedback

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

Attachments:

- A. DCBS Fund IPS
- B. DCBS Workers Benefit Fund IPS
- C. DAS Insurance Fund IPS
- D. ODOT Fund IPS
- E: Department of Veterans Affairs Fund IPS

Approval Signatures

Step Description	Approver	Date
	Geoff Nolan: Senior Investment Officer	pending

Applicability

Oregon State Treasury

COPY



Origination: 09/2014
Last Approved: N/A
Last Revised: 11/2018
Next Review: 6 months after approval
Owner: Tom Lofton: Fixed Income
 Investment Officer
Policy Area: Investments
References: INV 216: Securities Lending

INV 402: Internal Fixed Income Portfolio Investments

INTRODUCTION & OVERVIEW

Summary Policy Statement

Internally-managed, publicly-traded investments in debt securities are permitted in the Oregon Investment Council ("OIC") Statement of Fund Governance, and the strategic role of those investments is delineated in the OIC Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund ("OPERF").

Purpose and Goals

The purpose of this Fixed Income Investment Policy is to: 1) define the requirements for funds that are eligible for discreet investment management; and, 2) define the role of fixed income within the OIC's general investment policies for internally-managed funds.

Applicability

Classified represented, management service, unclassified executive service

POLICY PROVISIONS

Definitions

None.

Policy Statements

A. ELIGIBILITY

1. Funds eligible for discreet investment management must meet the following requirements:
 - a. Funds' enabling statutes must evidence legislative contemplation of discreet investment activity. Language containing the word "invest" in some form will suffice as evidence; and
 - b. The minimum projected balance for candidate funds must be at least \$50 million for investment

in U.S. Treasury and Government-Sponsored Enterprise securities and at least \$100 million for inclusion of corporate bonds.

2. A participating agency ("Agency") must meet the following requirements:
 - a. Agency Head makes a written request for discreet investment management which includes an affirmative statement of the agency's ability to comply with the requirements of the Interagency Agreement for Fixed Income Investments; and
 - b. Agency will enter into an Interagency Investment Agreement with Oregon State Treasury (OST).
3. Final determination on the eligibility of any funds for discreet investing will be made solely by OST.
4. Exceptions to eligibility must be approved by the Deputy State Treasurer.

B. OVERALL POLICY OBJECTIVES & STRATEGIES

1. Achieve a stable and predictable yield with principal preservation while providing sufficient liquidity to meet agency-related cash flow requirements.
2. Investment objectives, constraints, compliance and reporting requirements for individual Agency participants are presented in the form of an Investment Policy Statement and attached to this policy. Oregon State Treasury fixed income investment staff will maintain a well-diversified portfolio, managed to maximize yield or total return as mandated in each Agency's Investment Policy Statement.
3. Conduct periodic meetings with agencies to review and document each Agency's specific portfolio objectives and liquidity needs.
4. Invest opportunistically, using innovative investment approaches within a controlled and defined portfolio allocation.
5. Maintain average credit quality pursuant to each Agency's Investment Policy Statement.
6. Maintain communication with Agencies during periods of unique market environments (e.g., volatile credit cycles, low interest rate scenarios, etc.), and discuss possible impacts/constraints relative to portfolio objectives and liquidity needs.

Exceptions

None.

Failure to Comply

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

PROCEDURES and FORMS

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- B. OIC Policy: Department of Consumer and Business Services Workers' Benefit Fund Investment Policy Statement
- C. OIC Policy: Department of Administrative Services Fund Investment Policy Statement
- D. OIC Policy: Oregon Department of Transportation Fund Investment Policy Statement
- E. OIC Policy: Department of Veterans Affairs Fund Investment Policy Statement

ADMINISTRATION

Feedback

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- D. ODOT Fund IPS
- E: Department of Veterans Affairs Fund IPS

Approval Signatures

Step Description	Approver	Date
	Geoff Nolan: Senior Investment Officer	pending

Applicability

Oregon State Treasury

TAB 6 – Q3 2018 Performance & Risk Report

OPERF

December 12, 2018

Oregon Investment Council Meeting

OPERF Risk Dashboard

2018 Q3

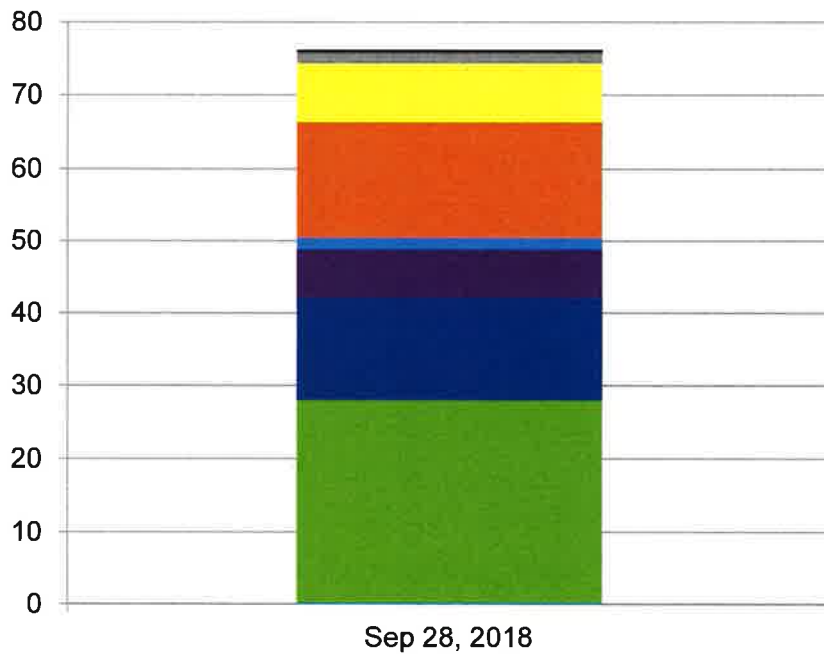


**OREGON
STATE
TREASURY**

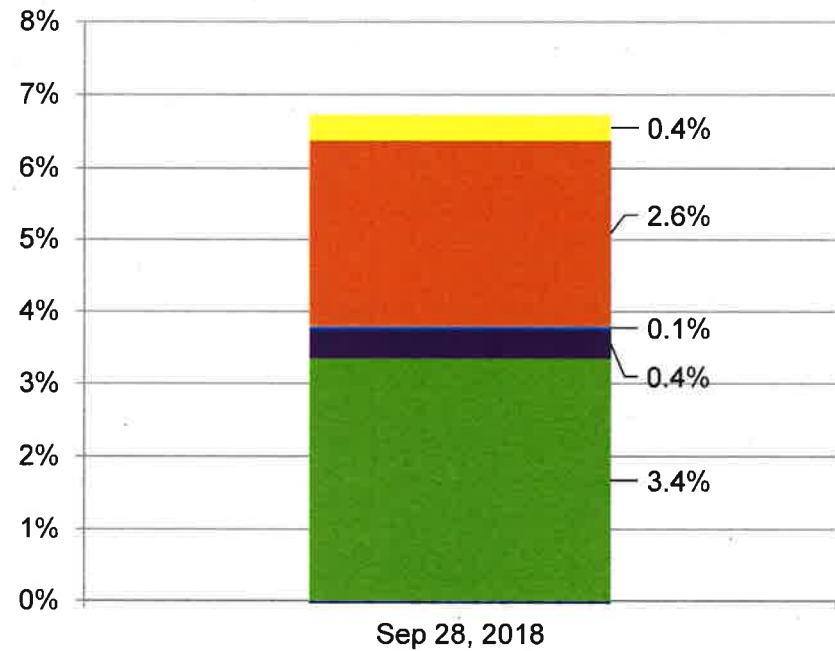


Allocation & Risk Contribution by Asset Class

Allocation in \$B



Risk Contribution

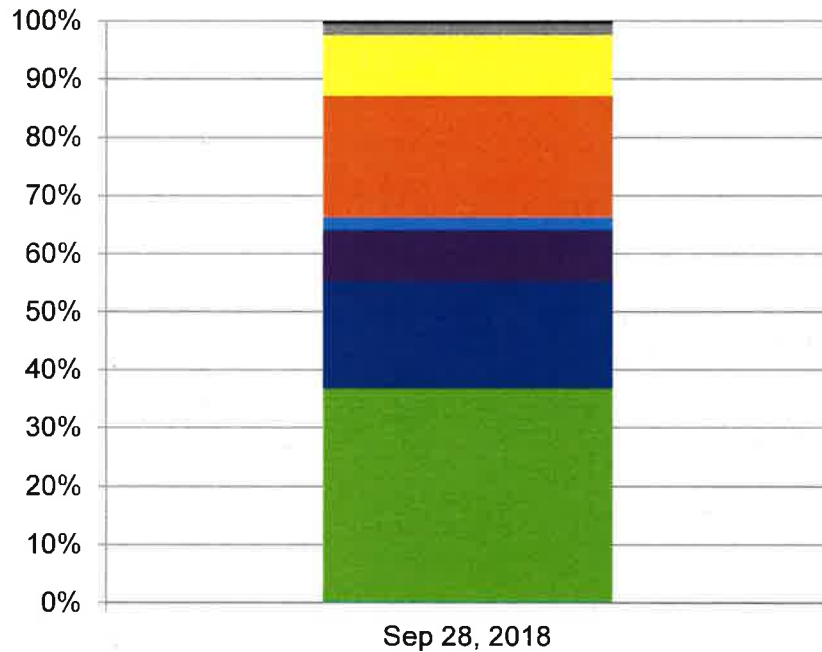


- Equity
- Fixed Income
- Alternatives Portfolio
- Opportunity Portfolio
- Private Equity
- Real Estate
- Cash
- Overlay

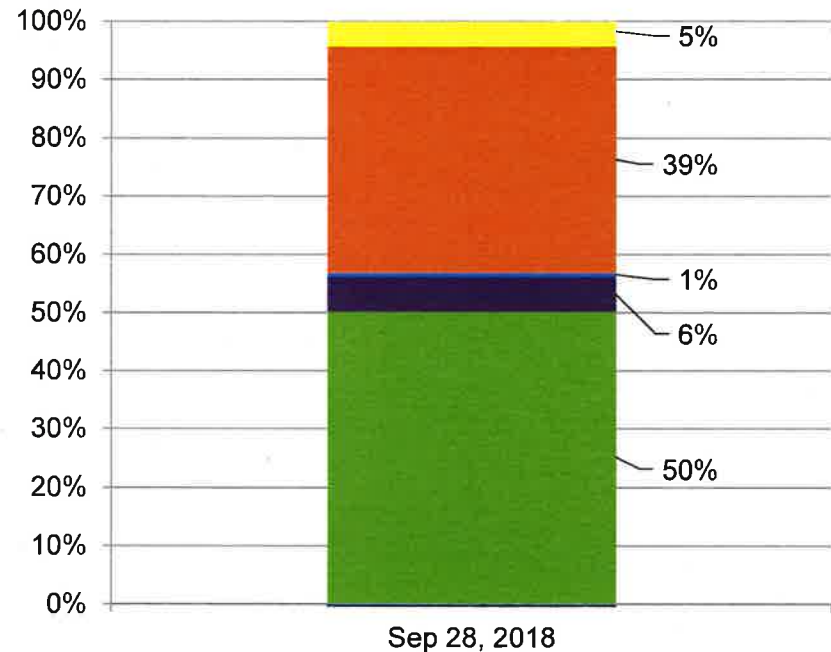
- Equity
- Fixed Income
- Alternatives Portfolio
- Opportunity Portfolio
- Private Equity
- Real Estate
- Cash
- Overlay

Allocation & Risk Contribution by Asset Class

Allocation % of Total



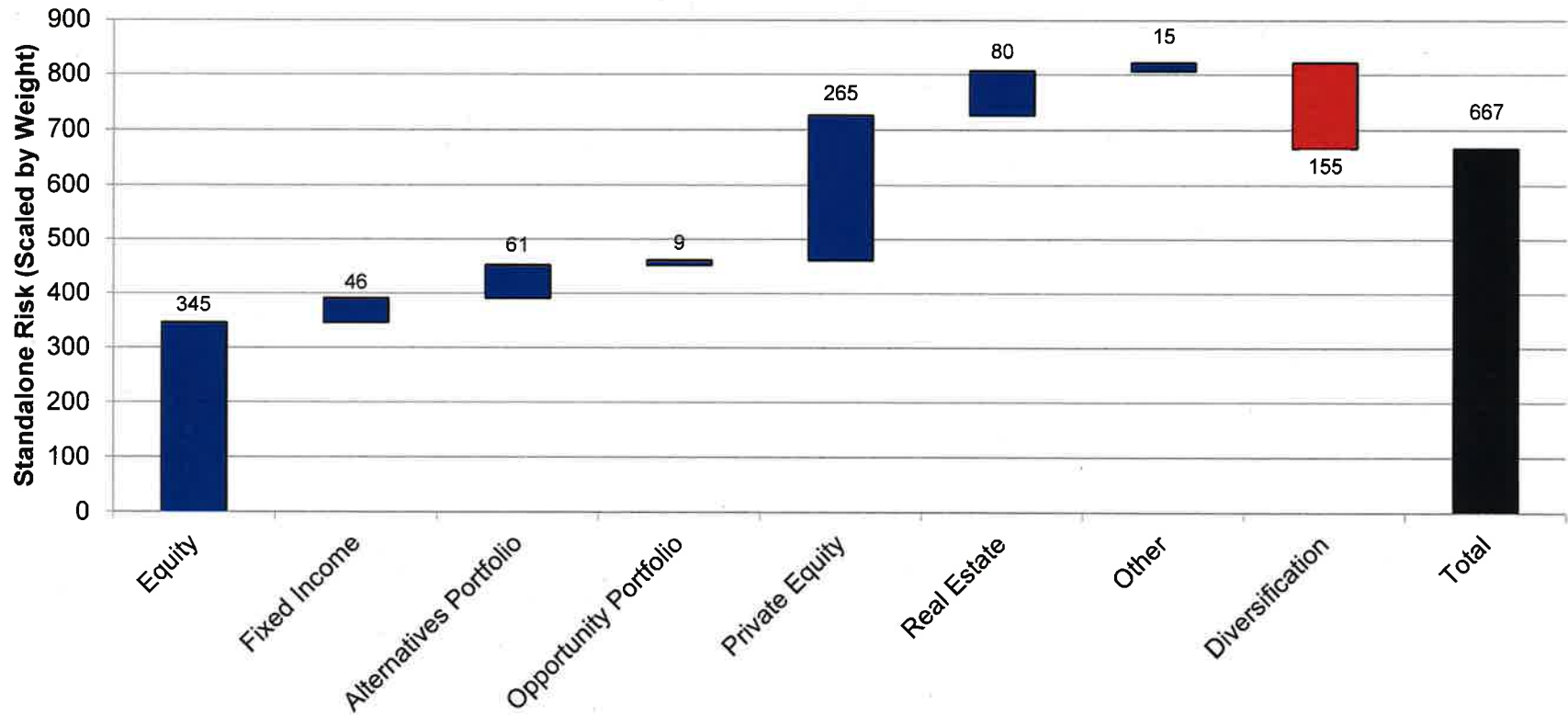
Risk Contrib % of Total



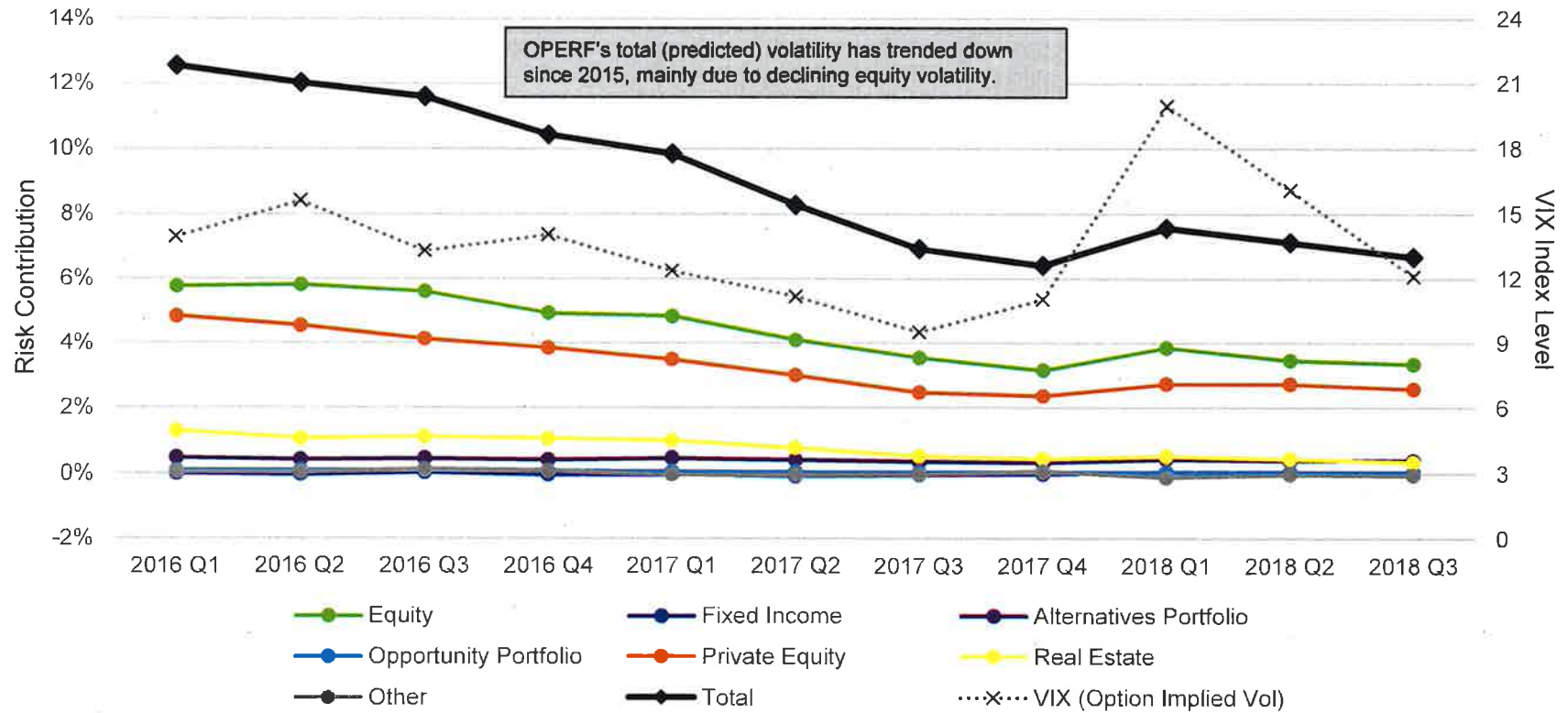
- Equity
- Fixed Income
- Alternatives Portfolio
- Opportunity Portfolio
- Private Equity
- Real Estate
- Cash
- Overlay

- Equity
- Fixed Income
- Alternatives Portfolio
- Opportunity Portfolio
- Private Equity
- Real Estate
- Cash
- Overlay

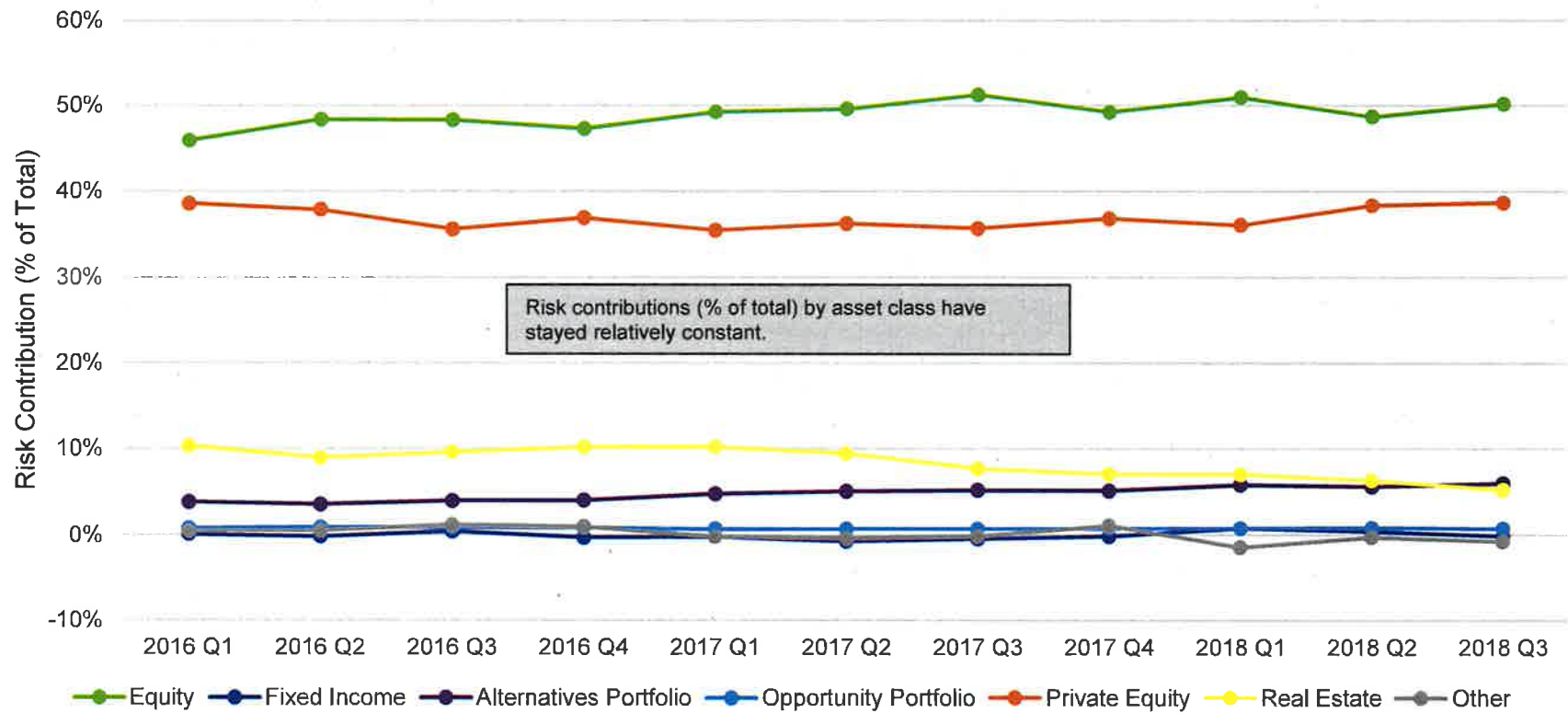
Stand-alone Risk by Asset Class



11-Quarter Risk Contribution Time Series



11-Quarter Risk Contribution Time Series

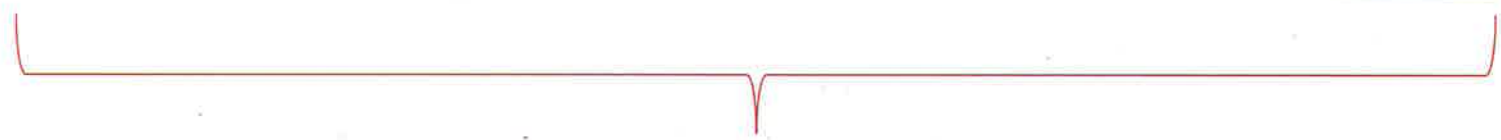


Correlation Matrix by Asset Class

Expected Return	Expected Risk	Predicted Risk ¹	Sep 28, 2018	Equity	Fixed Income	Alternatives Portfolio	Opportunity Portfolio	Private Equity	Real Estate	OPERF
7.1%	19.5%	9.5%	Equity	1.00	-0.17	0.56	0.56	0.91	0.26	0.96
3.0%	3.8%	2.4%	Fixed Income		1.00	0.08	-0.13	-0.15	0.33	-0.02
6.8%	10.6%	5.5%	Alternatives Portfolio			1.00	0.45	0.56	0.29	0.65
		4.1%	Opportunity Portfolio				1.00	0.52	0.06	0.55
9.5%	26.3%	12.9%	Private Equity					1.00	0.30	0.96
6.6%	15.0%	7.7%	Real Estate						1.00	0.43
7.1%	14.1%	6.7%	OPERF							1.00

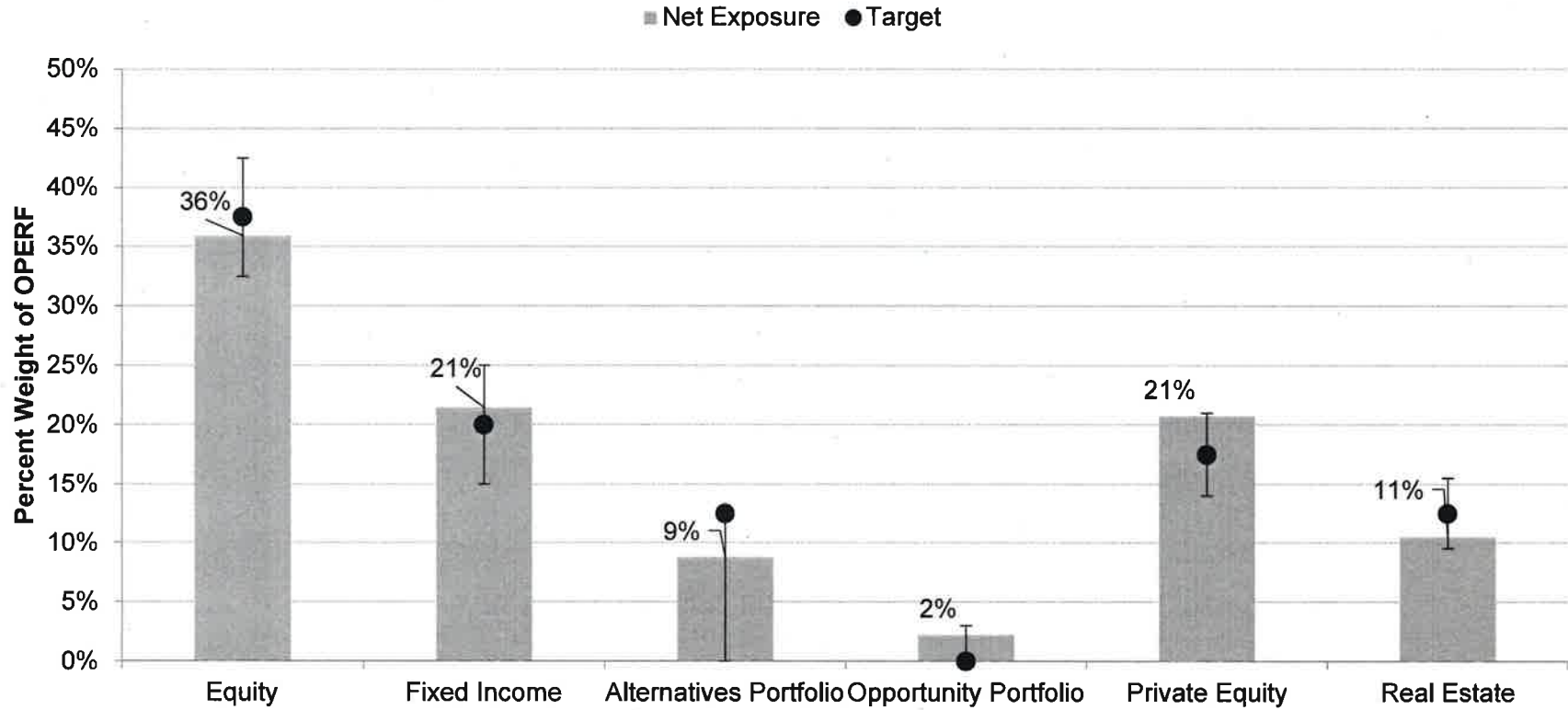


Capital Market Assumptions from Callan

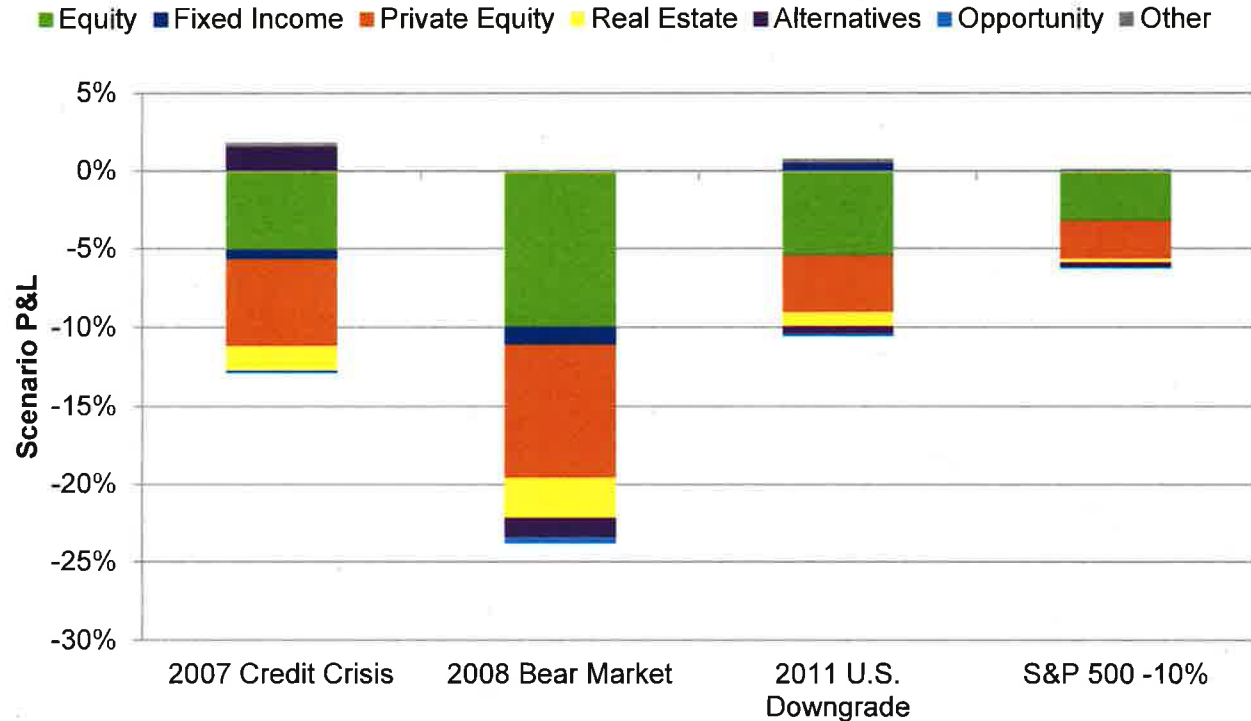


¹ Ex-ante, holdings-based correlations between asset classes as estimated by Aladdin

OPERF Allocations



Scenario Analysis (Change in OPERF NAV)



Scenario Definitions

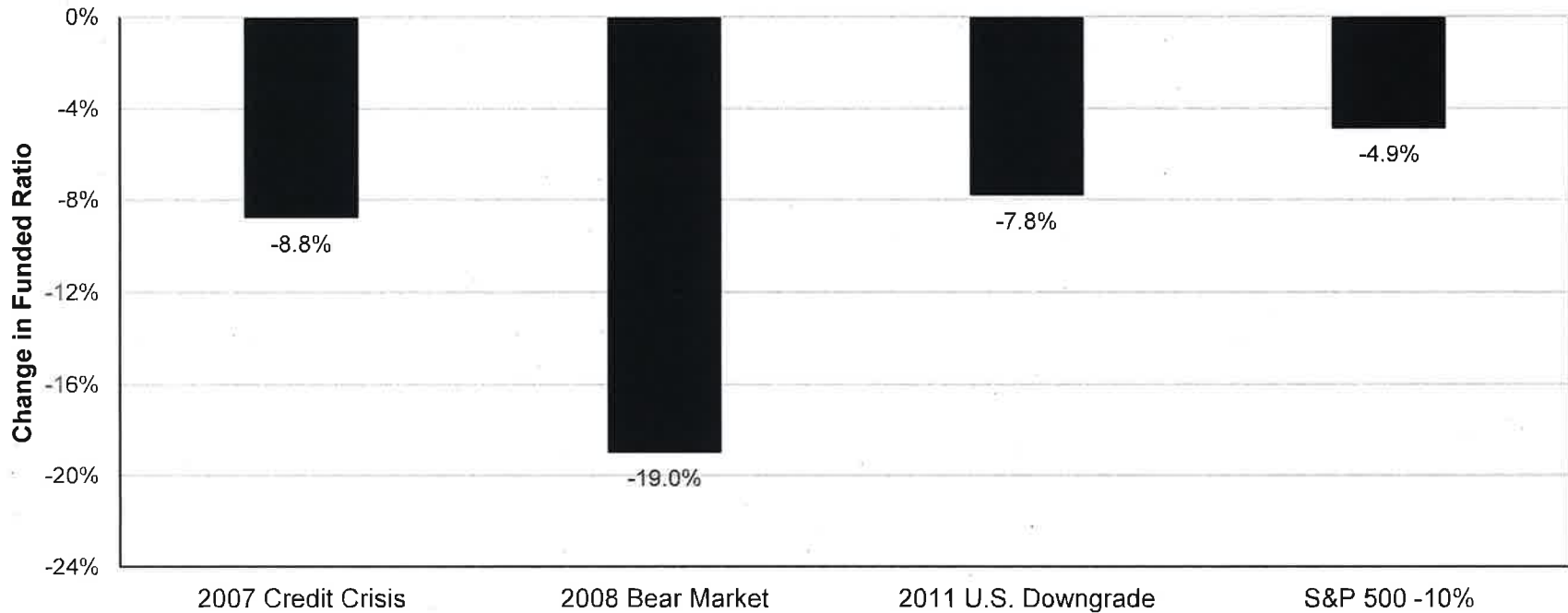
2007 Credit Crisis: June 29, 2007 to July 1, 2008. Credit and liquidity crisis stemming from a severe slowdown in the housing market causing significant spread widening and increased implied volatility.

2008 Market Crash: September 12, 2008 to November 3, 2008. Credit and liquidity crisis and equity market crash set off by Lehman Brothers bankruptcy. Significant spread widening caused by massive deleveraging.

2011 U.S. Downgrade: July 21, 2011 to September 20, 2011. The period starts with a 50% chance of a U.S. downgrade by S&P and ends with the announcement of "Operation Twist" by the Fed. U.S. stock market incurred losses while U.S. bonds rallied on flight-to-safety flows.

	2007 Credit Crisis	2008 Bear Market	2011 U.S. Downgrade	S&P 500 -10%
Equity	-5.0%	-9.9%	-5.4%	-3.2%
Fixed Income	-0.6%	-1.1%	0.6%	0.1%
Private Equity	-5.5%	-8.6%	-3.6%	-2.5%
Real Estate	-1.5%	-2.6%	-0.9%	-0.3%
Alternatives	1.6%	-1.3%	-0.5%	-0.3%
Opportunity	-0.2%	-0.4%	-0.2%	-0.1%
Other	0.2%	0.1%	0.2%	0.1%
Total	-11.0%	-23.7%	-9.8%	-6.1%

Scenario Analysis (Change in Funded Ratio)



Explanation

Estimated OPERF performance across different scenarios in the previous slide is applied to PERS' 2017 Funded Ratio of 80.1%, as reported by Milliman. This Funded Ratio is inclusive of \$5.6 billion in Side Accounts. For example, Aladdin estimates OPERF would sustain an 11.0% loss in the "2007 Credit Crisis" scenario. When applied to the 2017 Funded Ratio of 80.1%, a repeat of the 2007 Credit Crisis scenario would result in an 8.8% decline in the Funded Ratio.

Liquidity Report

Asset Class	Liquidity (\$M)				∞	Uncalled Commitment	Next 12 Months
	1 Week	1 Month	1 Quarter				
Cash & Overlay	1,619						
Public Equity	25,355	2,062	633	633			
Fixed Income	11,607	2,503					
Private Equity					15,804	-10,167	
Real Estate	598				7,403	-1,844	
Alternatives	1,102	940	1,069		3,567	-2,430	
Opportunity	393		280		1,038	-649	
Proj PERS Cash Flow							-3,600
Total	40,675	5,505	1,981	28,445		-15,089	-3,600

Public Equity - 1 Month = AQR 130/30, Arrowstreet 130/30, & Callan US Micro Cap Value portfolios

Public Equity - 1 Quarter = 50% Lazard Closed-End Fund portfolio

Public Equity - ∞ = 50% Lazard Closed-End Fund portfolio

Fixed Income - 1 Month = Below Investment Grade

Real Estate - 1 Week = REIT composite

- Table periods approximate the time required to liquidate different OPERF allocations.

Top 10 Investment Management Exposures

Rank	Manager	Market Value (\$mm)	Market Value (%)	Asset Class
1	Internally-Managed	14,205	18.6%	Cash, Fixed Income, Public Equity
2	Dimensional Fund Advisors	4,873	6.4%	Public Equity
3	AQR	3,560	4.7%	Alternatives, Public Equity
4	Arrowstreet Capital	3,058	4.0%	Public Equity
5	KKR	2,922	3.8%	Fixed Income, Private Equity
6	AllianceBernstein	2,380	3.1%	Fixed Income, Public Equity
7	Lazard	2,178	2.9%	Public Equity
8	BlackRock	2,082	2.7%	Alternatives, Fixed Income
9	Acadian	1,763	2.3%	Public Equity
10	Wellington	1,675	2.2%	Fixed Income



**OREGON
STATE
TREASURY**

Tobias Read
Oregon State Treasurer

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

oregon.gov/treasury

Callan

December 12, 2018



Oregon Investment Council

Third Quarter 2018

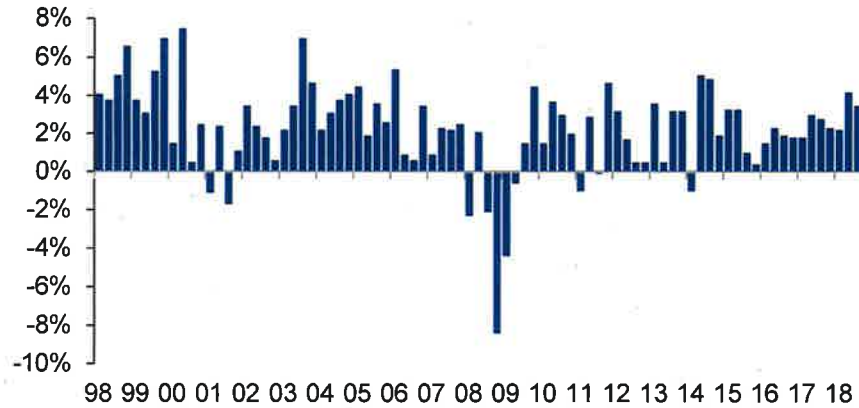
Performance Review



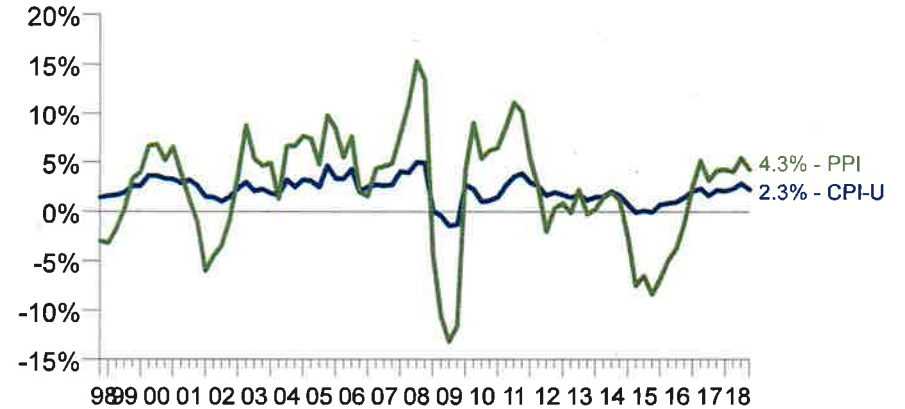
U.S. Economy

For periods ended September 30, 2018

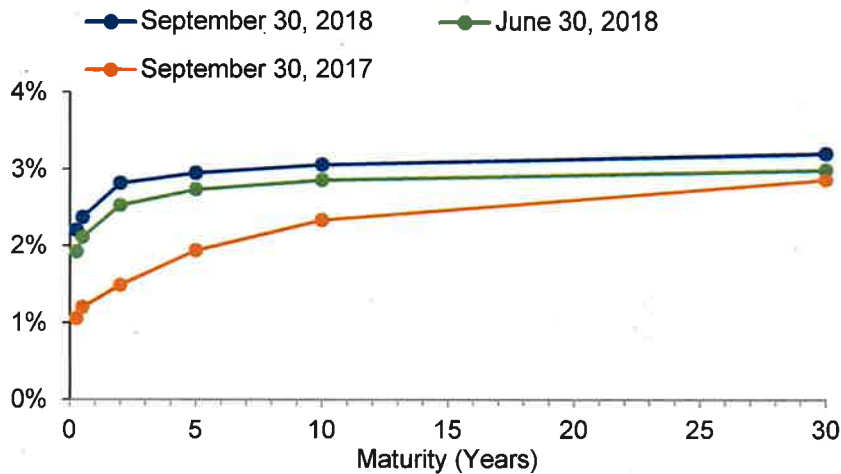
Quarterly Real GDP Growth



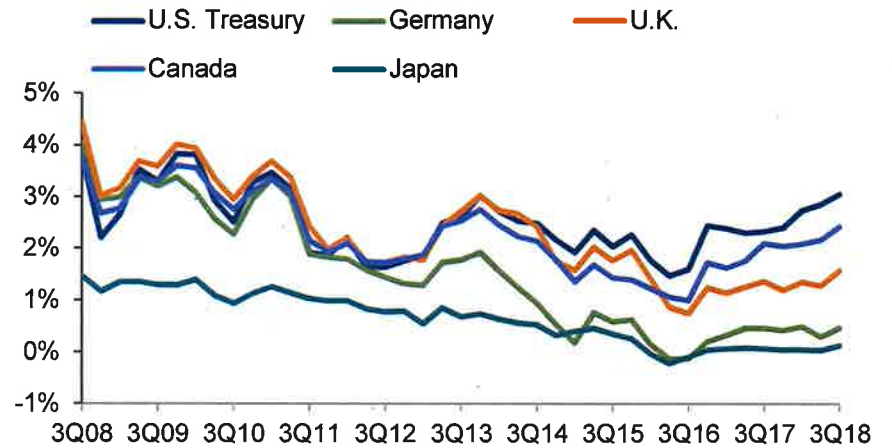
Inflation Year-Over-Year



U.S. Treasury Yield Curves



10-Year Global Government Bond Yields



Sources: Bureau of Labor Statistics, Bloomberg

Performance By Asset Class

For periods ended September 30, 2018

Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
S&P 500	Russell 2000	S&P 500	S&P 500	S&P 500	Russell 3000
7.7%	11.5%	17.9%	17.3%	13.9%	12.0%
Russell 3000	Russell 3000	Russell 3000	Russell 2000	Russell 3000	S&P 500
7.1%	10.6%	17.6%	17.1%	13.5%	12.0%
Russell 2000	S&P 500	Russell 2000	Russell 3000	Russell 2000	Russell 2000
3.6%	10.6%	15.2%	17.1%	11.1%	11.1%
Merrill Lynch High Yield	NCREIF ODCE	NCREIF ODCE	MSCI Emerging Markets	NCREIF ODCE	Merrill Lynch High Yield
2.4%	6.5%	8.7%	12.8%	10.7%	9.3%
NCREIF ODCE	Merrill Lynch High Yield	Merrill Lynch High Yield	MSCI ACWI ex-US	Merrill Lynch High Yield	MSCI Emerging Markets
2.1%	2.5%	2.9%	10.0%	5.5%	5.8%
MSCI ACWI ex-US	90 Day T-Bill	MSCI ACWI ex-US	NCREIF ODCE	MSCI ACWI ex-US	NCREIF ODCE
0.7%	1.3%	1.8%	8.8%	4.1%	5.6%
90 Day T-Bill	Bloomberg Aggregate	90 Day T-Bill	Merrill Lynch High Yield	MSCI Emerging Markets	MSCI ACWI ex-US
0.5%	(1.6%)	1.6%	8.2%	4.0%	5.2%
Bloomberg Aggregate	MSCI ACWI ex-US	MSCI Emerging Markets	Bloomberg Aggregate	Bloomberg Aggregate	Bloomberg Aggregate
0.0%	(3.1%)	(0.4%)	1.3%	2.2%	3.8%
MSCI Emerging Markets	MSCI Emerging Markets	Bloomberg Aggregate	90 Day T-Bill	90 Day T-Bill	90 Day T-Bill
(0.9%)	(7.4%)	(1.2%)	0.8%	0.5%	0.3%

OPERF Total Regular Account

Performance Summary for the Third Quarter 2018

Total Fund:

For the quarter ended September 30, 2018, the Total Regular Account advanced 2.93% (+2.81% net of fees), beating the 2.73% return of the Policy Benchmark, and ranked in the 35th percentile of Callan's \$10B+ public fund peer group. For the 12 months ended September 30, 2018, the Total Regular Account gained 9.11% (+8.62% net of fees), coming in just ahead of the 8.58% return for the Policy Target, and ranked in the 12th percentile of Callan's \$10B+ public fund peer group. Longer term results trail the Policy Target but mostly rank in the top half of the peer group, if not the top third.

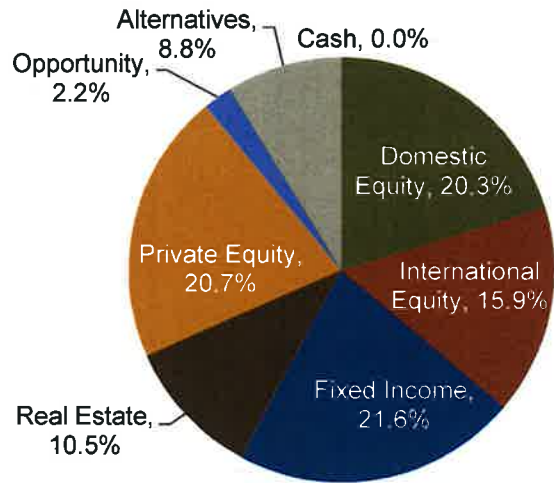
Asset Classes:

- **Total Fixed Income:** The Fixed Income Portfolio added 0.27% (+0.24% net of fees) for the quarter versus a gain of 0.12% for the Custom Fixed Income Benchmark, and ranked in the 57th percentile of Callan's Public Funds \$10+B US Fixed Income (Gross) peer group. For the trailing year, the Portfolio retreated 0.01% (-0.17% net of fees), protecting against the 0.38% decline in the benchmark, and ranked in the 33rd percentile of the peer group. 10 year results remain well ahead of the benchmark and rank in the top third of the peer group.
- **Total Public Equity:** Total Public Equity portfolio rose 3.79% (+3.73% net of fees) for the quarter versus a gain of 3.88% for the MSCI ACWI IMI Net benchmark, and ranked in the 56th percentile of its peer group. For the trailing year, the portfolio surged 10.03% (+9.68% net of fees), just beating the 9.63% return of the benchmark and ranked near the median of the peer group.
 - **U.S. Equity:** The U.S. Equity Portfolio advanced 6.24% (+6.21% net of fees) for the quarter, lagging the Russell 3000 Index return of 7.12%, and ranked in the 69th percentile of Callan's Public Fund: \$10B+ Domestic Equity (gross) peer group. On a trailing 12 month basis, the Portfolio soared 16.40% (+16.25% net of fees) versus a return of 17.58% for the benchmark and ranked in the 77th percentile of the peer group. 10 year results are behind those of the benchmark (+11.84% net of fees versus +12.01%), and rank in the 33rd percentile of the peer group.
 - **International Equity:** The International Equity Portfolio gained 0.42% (+0.32% net of fees) for the quarter, just beating the 0.39% return of the MSCI ACWI ex-U.S. IMI Index, and ranked in the 52nd percentile of Callan's Public Fund: \$10B+ International Equity (gross) peer group. For the trailing year, the Portfolio returned 2.69% (+2.16% net of fees) easily beating the benchmark return of 1.79%, and ranked in the 37th percentile of the peer group. 10 year results remain comfortably ahead of the benchmark (+6.93% net of fees versus +5.60%) and continue to rank in the top quartile of the peer group.
- **Total Real Estate:** The Real Estate Portfolio continues to show competitive absolute results over the last decade with an annualized return of 6.24% net of fees.
- **Opportunity Portfolio:** The Opportunity Portfolio's results over the last ten years continue to be favorable on an annualized return of 8.50% net of fees.
- **Alternative Portfolio:** The Alternative Portfolio has returned 3.19% per annum net of fees over the last five years.
- **Total Private Equity:** The Private Equity Portfolio's returns remain strong with an annualized return of 10.29% net of fees over the last ten years.

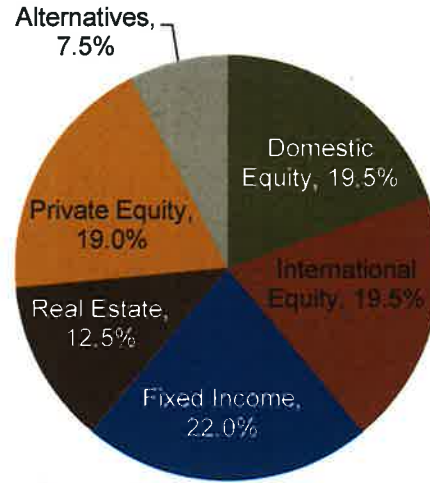
OPERF Total Regular Account

Asset Allocation as of September 30, 2018

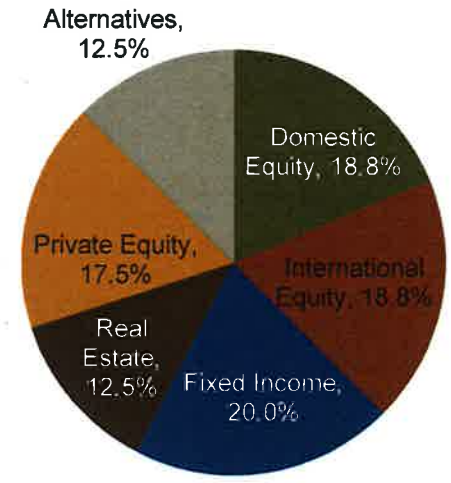
Actual Allocation



Interim Policy Target**



Strategic Policy Target



Asset Class	\$000s** Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Total Fixed Income	16,435,621	21.6%	22.0%	(0.4%)	(321,369)
U.S. Equity Portfolio	15,438,160	20.3%	19.5%	0.8%	585,374
Non-U.S. Equity Portfolio	12,087,966	15.9%	19.5%	(3.6%)	(2,764,820)
Total Real Estate	7,995,443	10.5%	12.5%	(2.0%)	(1,525,574)
Opportunity Portfolio	1,710,839	2.2%	0.0%	2.2%	1,710,839
Alternative Portfolio	6,677,430	8.8%	7.5%	1.3%	964,820
Total Private Equity	15,804,119	20.7%	19.0%	1.7%	1,332,173
Cash	18,559	0.0%	0.0%	0.0%	18,559
Total	76,168,137	100.0%	100.0%		

*As of April 1, 2018, the Interim Policy Target was changed to 19% Russell 3000+300 Bps quarter lag, 22% Oregon Custom FI Benchmark, 12.5% Oregon Custom Real Estate Benchmark, 39% MSCI ACWI IMI Net and 7.5% CPI+4%.

**Totals provided by OST Staff

OPERF Total Regular Account

Net Cumulative Performance by Asset Class as of September 30, 2018

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years
Total Regular Account	2.81	8.62	9.65	8.21	9.64	8.14
Total Regular Account ex-Overlay	2.84	8.76	9.55	8.16	9.57	8.08
OPERF Policy Benchmark*	2.73	8.57	10.05	8.78	10.36	8.50
Total Fixed Income	0.24	-0.17	1.87	2.25	3.35	5.59
OPERF Total Custom FI Benchmark	0.12	-0.38	1.42	1.83	2.79	3.98
Callan Public Fund \$10bn+ U.S. Fixed	0.31	-0.29	2.79	2.97	3.05	4.75
Total Public Equity	3.73	9.68	13.89	9.11	12.56	9.13
MSCI ACWI IMI Net	3.88	9.63	13.47	8.69	11.78	8.49
U.S. Equity	6.21	16.25	16.63	12.54	16.38	11.84
Russell 3000 Index	7.12	17.58	17.07	13.46	16.86	12.01
Callan Large Public > \$10bn U.S. Equity	6.60	17.11	16.98	13.25	16.49	12.11
Non-U.S. Equity	0.32	2.16	11.06	5.67	8.93	6.93
MSCI ACWI ex USA IMI**	0.39	1.79	10.14	4.39	7.49	5.60
Callan Large Public >\$10bn Non-U.S. Equity	0.49	2.35	11.00	5.38	8.38	6.37
Total Real Estate	2.20	9.73	9.39	10.37	11.18	6.24
Total Real Estate ex REITs	2.15	9.83	10.32	11.35	11.53	5.74
OPERF Custom Real Estate Benchmark	1.81	7.47	8.19	9.73	10.20	6.20
Callan Public Plan - Real Estate	1.90	8.23	8.39	9.81	10.41	5.34
Opportunity Portfolio	3.37	8.92	8.17	7.72	9.17	8.50
Russell 3000 Index	7.12	17.58	17.07	13.46	16.86	12.01
CPI + 5%	1.37	7.34	6.96	6.36	6.41	6.39
Total Alternative	0.18	1.97	4.82	3.19	2.28	--
CPI + 4%	1.17	6.36	6.07	5.57	5.59	--
Total Private Equity	5.32	18.77	12.07	13.18	12.07	10.29
OIC - Russell 3000 + 300 BPS Qtr Lag	4.65	18.18	14.90	16.66	16.37	13.88

*Policy Benchmark = 22.5% OPERF Total Custom FI Benchmark, 20.0% Russell 3000 Index, 20.0% MSCI ACWI ex US IMI, 20.0% Russell 3000 + 300 bps Qtr Lag, 12.5% Oregon Custom Real Estate Benchmark and 5.0% CPI + 400 bps.

**Non-US Equity Benchmark performance through May 31, 2008, is MSCI ACWI ex US Gross and is linked thereafter with the MSCI ACWI ex-US IMI Net Index.

OPERF Total Regular Account

Net Calendar Year Performance by Asset Class

	3 Qtrs. 2018	2017	2016	2015	2014
Total Regular Account	4.61	15.39	7.11	2.01	7.29
Total Regular Account ex-Overlay	4.70	15.38	6.73	2.02	7.28
OPERF Policy Benchmark*	4.73	15.64	8.95	1.57	8.24
Total Fixed Income	-0.58	3.70	3.06	0.54	3.52
OPERF Total Custom FI Benchmark	-0.74	3.32	2.52	0.16	3.04
Callan Public Fund \$10bn+ U.S. Fixed	-1.11	4.99	5.25	-0.50	6.31
Total Public Equity	3.40	24.41	9.89	-1.75	3.31
MSCI ACWI IMI Net	3.69	23.95	8.36	-2.19	3.84
U.S. Equity	8.97	20.40	14.90	-0.87	9.85
Russell 3000 Index	10.57	21.13	12.74	0.48	12.56
Callan Large Public > \$10bn U.S. Equity	10.31	20.80	13.66	0.06	11.78
Non-U.S. Equity	-3.24	30.23	4.67	-2.59	-2.88
MSCI ACWI ex USA IMI**	-3.27	27.81	4.41	-4.60	-3.89
Callan Large Public >\$10bn Non-U.S. Equity	-2.71	29.01	4.84	-3.58	-2.81
Total Real Estate	7.35	10.05	7.88	9.89	14.16
Total Real Estate ex REITs	7.72	11.19	10.01	12.67	12.01
OPERF Custom Real Estate Benchmark	5.73	6.70	8.88	13.48	11.26
Callan Public Plan - Real Estate	5.99	7.76	8.24	11.05	13.46
Opportunity Portfolio	7.29	10.47	6.12	2.14	8.81
Russell 3000 Index	10.57	21.13	12.74	0.48	12.56
CPI + 5%	6.21	7.18	6.99	5.39	5.33
Total Alternative	-0.11	8.30	6.61	-4.32	4.44
CPI + 4%	5.45	6.19	6.16	4.76	4.78
Total Private Equity	13.18	17.32	6.26	7.79	15.90
OIC - Russell 3000 + 300 BPS Qtr Lag	12.20	22.22	18.37	2.49	21.24

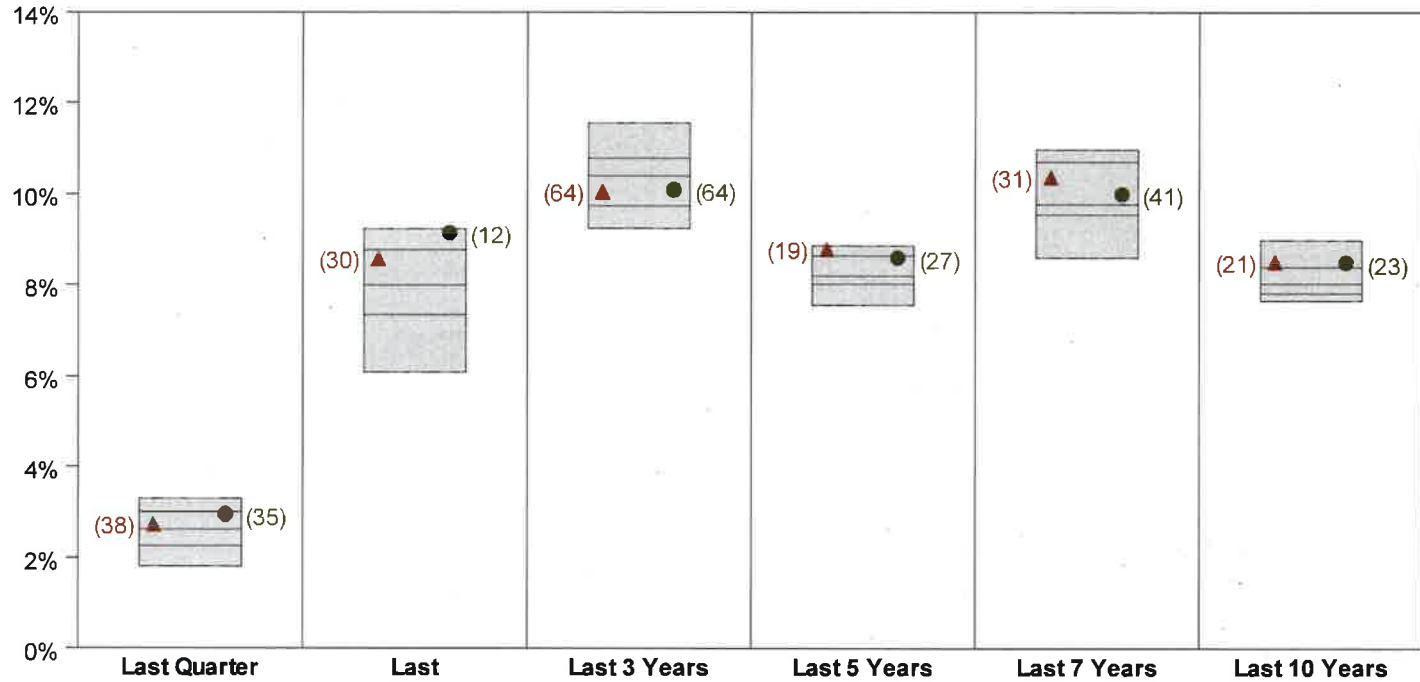
*Policy Benchmark = 22.5% OPERF Total Custom FI Benchmark, 20.0% Russell 3000 Index, 20.0% MSCI ACWI ex US IMI, 20.0% Russell 3000 + 300 bps Qtr Lag, 12.5% Oregon Custom Real Estate Benchmark and 5.0% CPI + 400 bps.

**Non-US Equity Benchmark performance through May 31, 2008, is MSCI ACWI ex US Gross and is linked thereafter with the MSCI ACWI ex-US IMI Net Index.

OPERF Total Regular Account

Gross Performance and Peer Group Rankings* as of September 30, 2018

Performance vs Large Public Funds (>10B) (Gross)



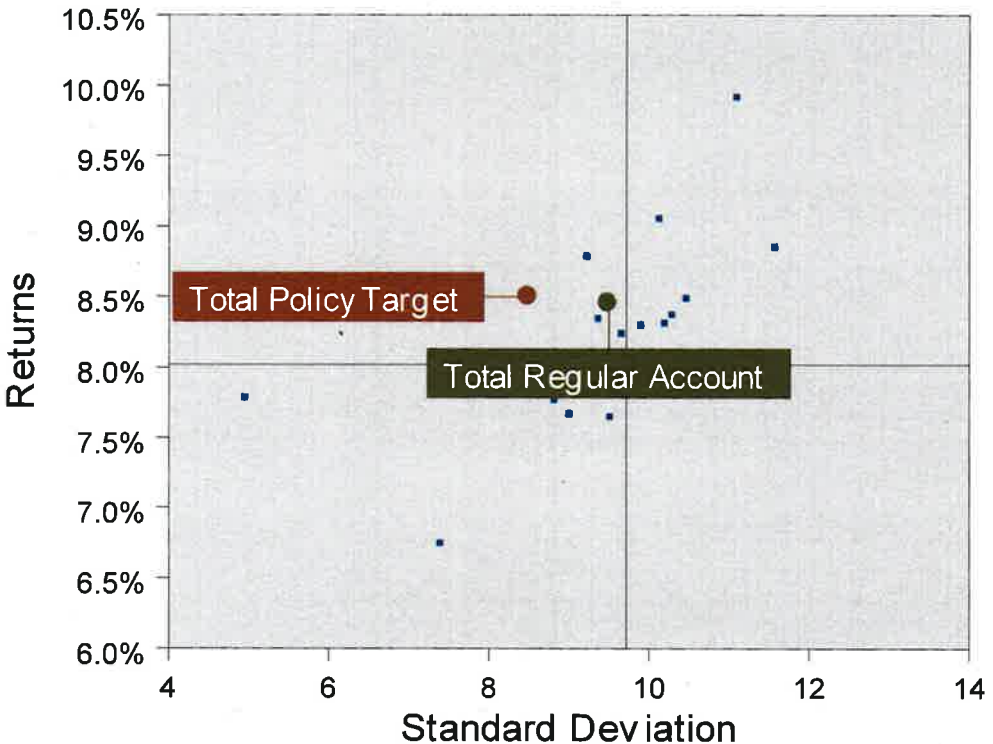
	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years
10th Percentile	3.30	9.23	11.55	8.86	10.97	8.98
25th Percentile	3.01	8.76	10.79	8.64	10.70	8.39
Median	2.62	7.99	10.39	8.19	9.78	8.02
75th Percentile	2.26	7.34	9.74	8.02	9.54	7.81
90th Percentile	1.81	6.09	9.24	7.54	8.59	7.65
Total Regular Account ●	2.93	9.11	10.05	8.56	9.97	8.45
Total Policy Target ▲	2.73	8.57	10.05	8.78	10.36	8.50

*Versus Callan's Very Large Public Funds (> \$10 billion) Peer Group

OPERF Total Regular Account

Risk vs Return

Large Public Funds (>10B) (Gross)
Annualized Ten Year Risk vs Return





Appendix

U.S. Equity Performance

U.S. equity markets posted broad-based gains in the quarter fueled by strong economic growth, robust corporate earnings, and heightened stock buybacks. Several major indices hit record levels during the quarter; the S&P 500 saw its biggest gain in five years. Volatility was muted despite ongoing trade war threats.

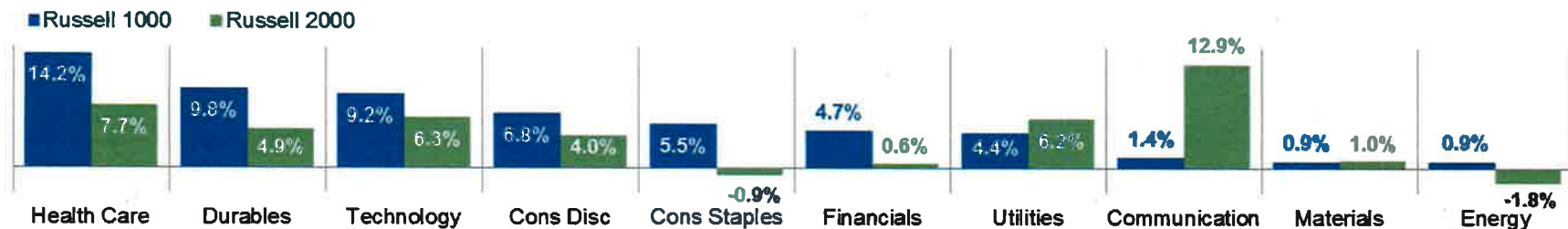
Large Cap Outpaced Small Cap

- FAANG stocks plus Microsoft had a more muted impact, but still contributed nearly 25% of the S&P 500's quarterly return.
- All sectors landed in positive territory led by Health Care (+14.5%), Industrials (+10%), and Communication Services (+9.9%).

Growth Continued to Outperform Value

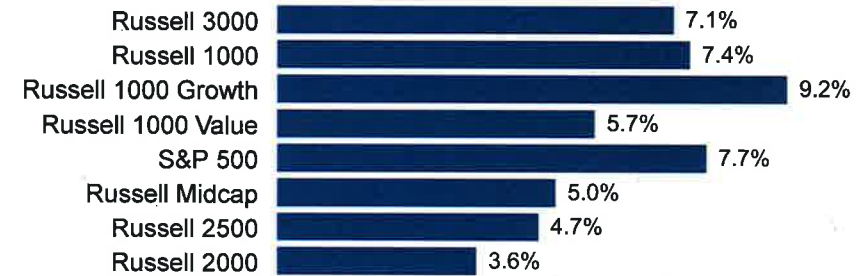
- Growth outpacing Value this year by the widest margin in 15 years (R1G YTD: +17.1% vs. R1V YTD: +3.9%) driven by ongoing FAANG stock euphoria.
- Momentum continued as the leading factor; Value is worst-performing style for last 18 months.

Quarter ended September 30, 2018

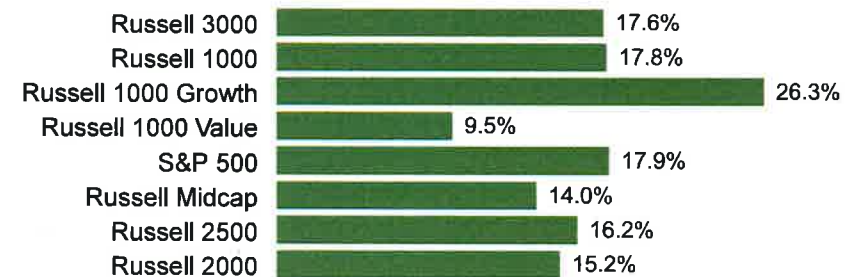


Sources: FTSE Russell, Standard & Poor's

U.S. Equity: Quarterly Returns

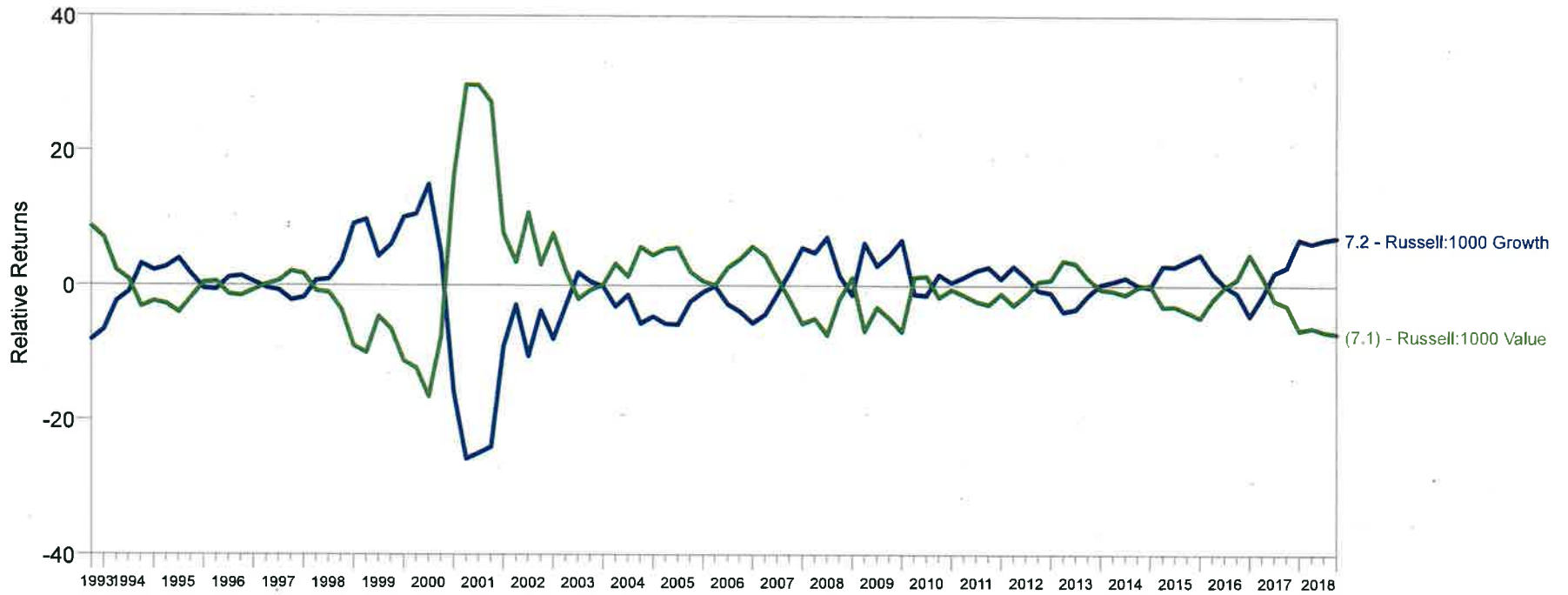


U.S. Equity: Annual Returns



Growth Continues to Outperform Value

Relative Returns relative to Russell:1000 Index for 25 Years ended September 30, 2018



Source: FTSE Russell

Non-U.S. Equity Performance

Market divergence emerged after synchronized growth in 2017. U.S. continues to gain; non-U.S. markets lagged.

Non-U.S. Developed Positive Territory but Lags U.S.

- Dollar rallied against euro and yen given strong U.S. economy and Fed's contractionary monetary policy
- Strong earnings boosted Health Care & Telecomm; Energy benefited from positive supply-demand dynamics. Real Estate, Financials, and Staples adversely impacted by rising rates
- Growth moderately outperformed value. Volatility and small cap factors were out of favor given market uncertainties

Emerging Markets Faltered

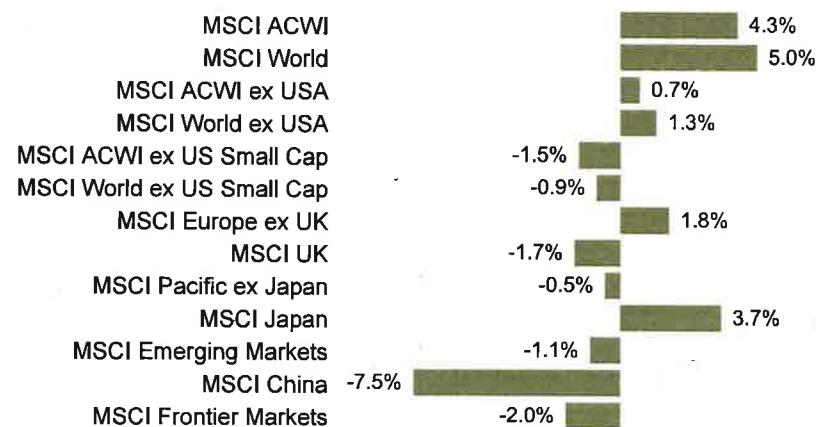
- EM pressured by rising dollar, U.S. interest rates, trade frictions
- China weakened by economic slowdown; regulatory concerns weighed on Chinese Tech companies
- Energy top performer on rising oil prices; Consumer Discretionary negatively impacted by China and India

Non-U.S. Small Cap Trailed Large Cap

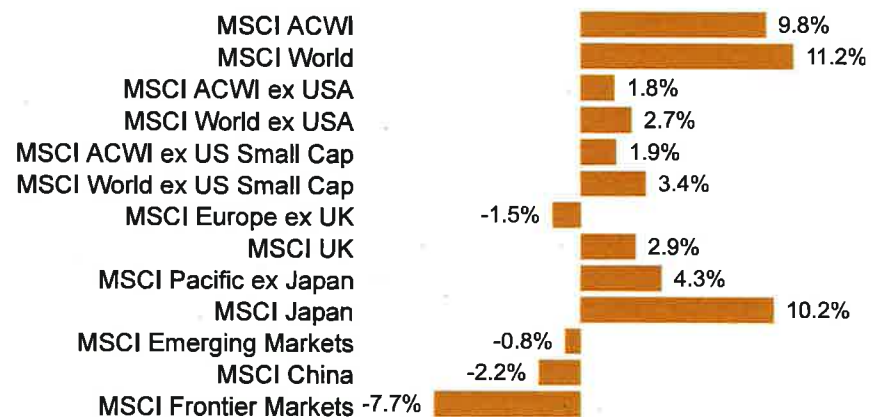
- Both non-U.S. developed and emerging market small cap underperformed large cap as appetite for risk waned due to rising rates/dollar and trade tensions
- Value was favored as Energy thrived

Source: MSCI

Global Equity: Quarterly Returns



Global Equity: Annual Returns



U.S. Fixed Income Performance

Fixed income performance was flat. Yield curve rose across maturity spectrum on better-than-expected corporate earnings and solid U.S. economic data.

- 10-year U.S. Treasury yield reached a high of 3.10% before settling at 3.06%
- The yield curve flattened with shorter-term rates rising faster than longer-term

Investment Grade Corporates Earned Strong Quarter

- +0.97% for the quarter; -2.3% YTD
- New issuance remained strong with an average of 2-3x oversubscribed demand throughout the quarter
- Spreads continued to narrow despite leverages increasing

High Yield Top Performer for Quarter

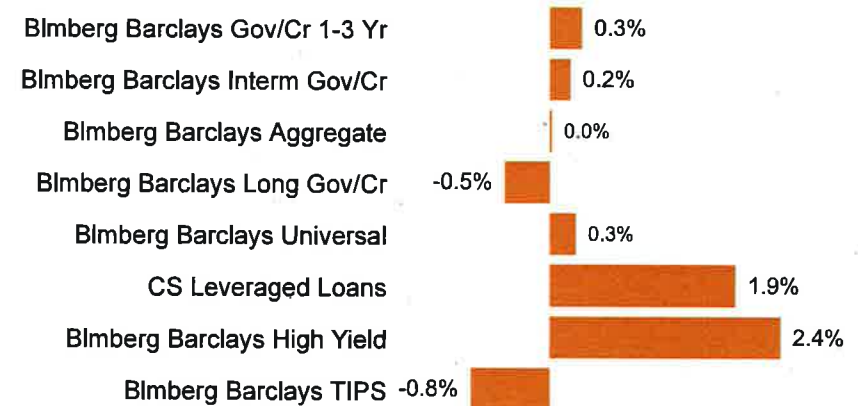
- +2.4% for the quarter; +2.6% YTD
- Low new issuance volume and stable fundamentals compressed spreads
- Bond issuance was \$41 billion, 33% lower than 3Q17

Bank Loans Remain Strong

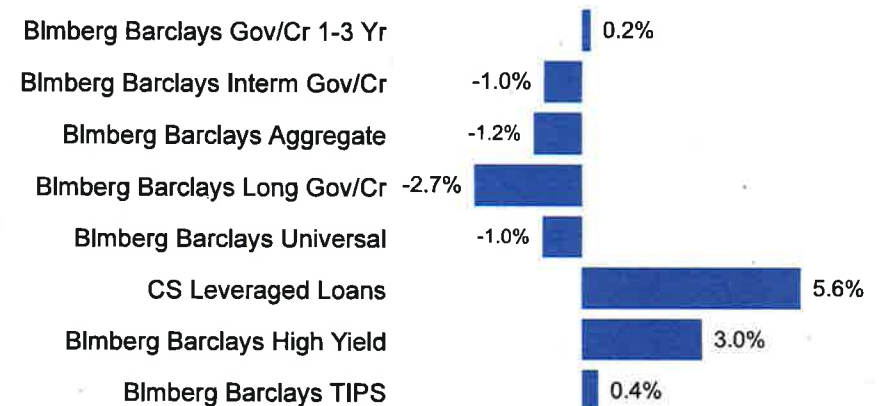
- +1.9% for the quarter; +4.0% YTD
- Demand continues for floating rate securities despite covenant-lite structures and higher spread duration
- Heavy issuance continued through the quarter

Sources: Bloomberg Barclays, Credit Suisse

U.S. Fixed Income: Quarterly Returns

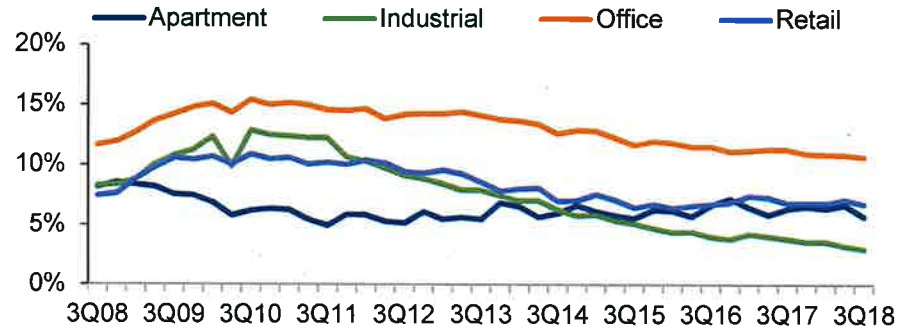


U.S. Fixed Income: Annual Returns

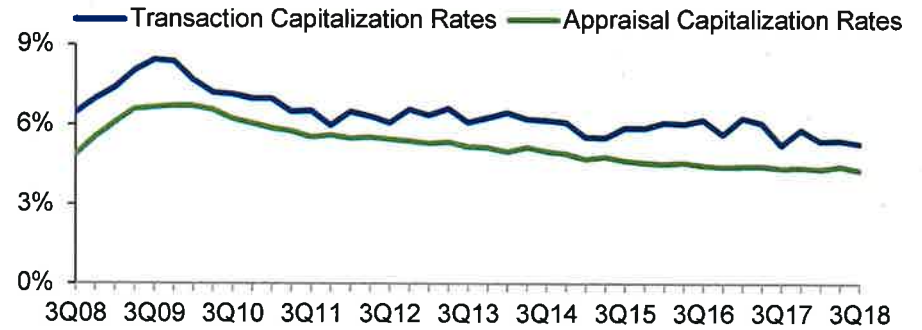


Real Estate Market

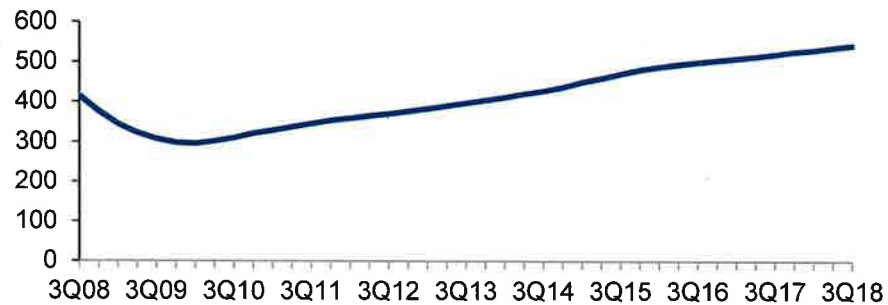
Vacancy by Property Type



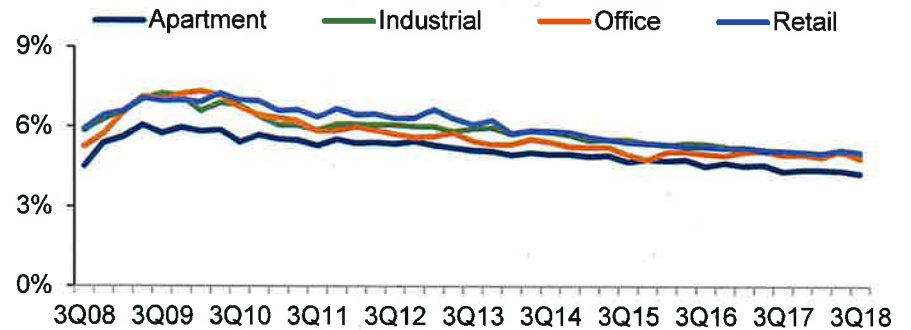
Current Value vs Transaction Cap Rates



Price Index



Current Value Cap Rates by Property Type



- Supply and demand fundamentals are balanced but peaking. Supply is in check and aided by strict commercial real estate lending standards. Demand continues on the back of synchronized domestic growth.
- Transaction volumes took a step back from current cycle peak levels but remain robust, supporting pricing which remains expensive.
- The industrial sector is performing the strongest, benefitting as structural shifts in the economy, property markets, and consumer habits continue to dampen demand for traditional retail space. Office is performing as expected late in the cycle and tenant improvements and other capital expenditures are increasingly eroding cash flow. Multi-family remains strong except for very high-end properties in some markets, though luxury rents have rebounded from last year's lulls.

Source: NCREIF. Note: Transaction capitalization rate is equal-weighted.

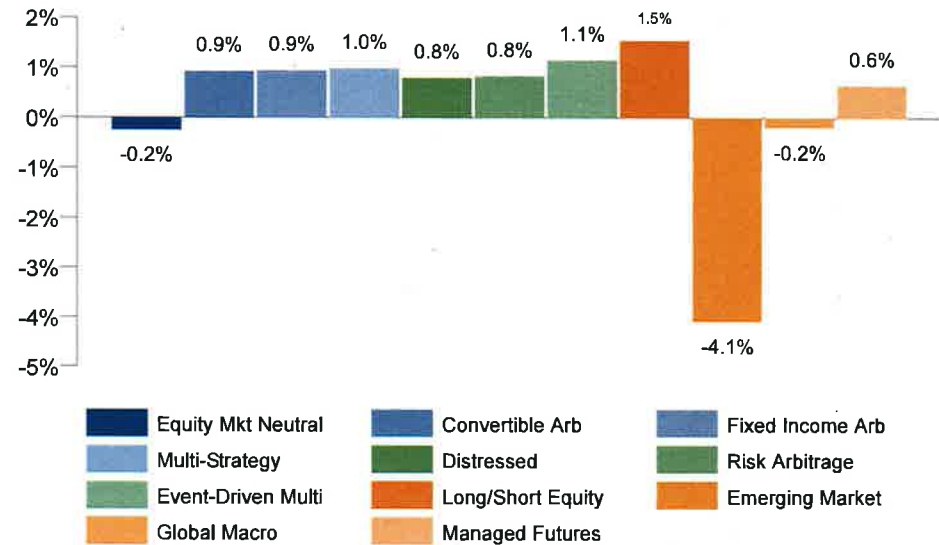
Hedge Fund Performance

Active Trading Grinds Forward Under Market Stress

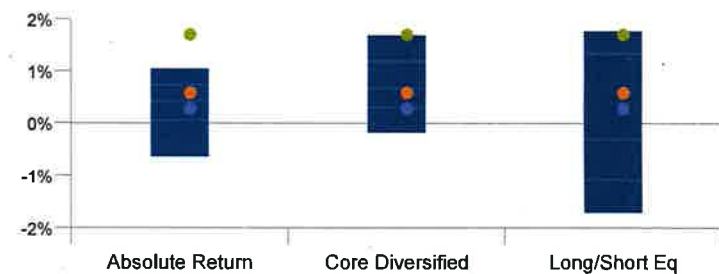
- A resilient U.S. economy stimulated by tax cuts and falling unemployment pushed up U.S. stocks and the U.S. dollar in the third quarter. The stronger dollar tied to rising short-term rates undermined a slowing Chinese economy as well as markets linked to it.
- Divergent economic forces around the globe created a modestly profitable trading environment for most hedge funds. The Credit Suisse Hedge Fund Index gained 0.6%.
- Aided by climbing U.S. stock prices, Long/Short Equity (+1.5%) topped CS hedge fund strategies.
- Supported by the strong U.S. corporate environment, event-driven strategies (Event-Driven Multi, Distressed, Risk Arb) made modest but steady gains.
- Emerging Markets (-4.1%) suffered the most, surrendering its excess returns over passive benchmarks from prior quarters.
- Reflecting live hedge fund portfolios, the HFRI FOF Composite Index, net of all fees, inched forward 0.3%.
- Hedge fund portfolios with a long bias to U.S. equities or credit likely performed better than portfolios more laden with non-U.S. strategies; trend-following and other macro trading lagged.

Sources: Callan, Credit Suisse

CS Hedge Fund Strategy Returns (quarter ended September 30, 2018)



Callan Hedge FOFs Style Group Returns (quarter ended September 30, 2018)



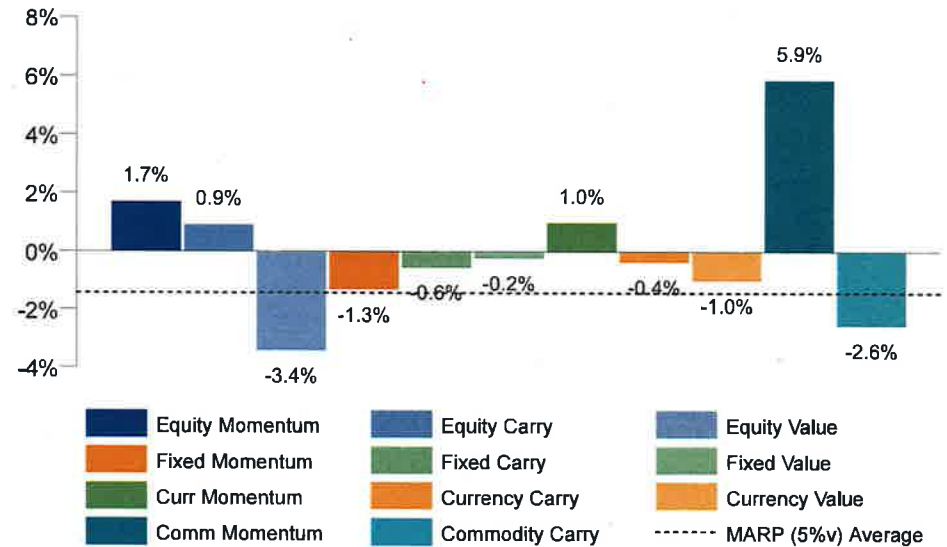
	Absolute Return	Core Diversified	Long/Short Eq
25th Percentile	0.7	1.2	1.3
Median	0.4	0.7	-0.3
75th Percentile	0.1	0.3	-1.1
CS Hedge Fund Index	0.6	0.6	0.6
HFRI Fund of Funds	0.3	0.3	0.3
T-Bills + 5%	1.7	1.7	1.7

MAC Performance

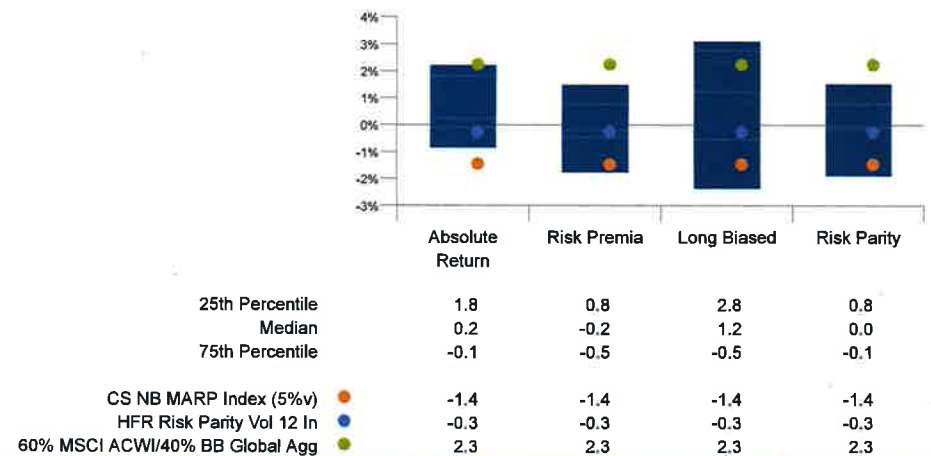
Strong Growth in U.S. Challenges MAC Strategies

- Callan’s Multi-Asset Class (MAC) Peer Groups continued to struggle in the third quarter, particularly those overweighting bonds and underweighting U.S. growth stocks, as a stronger dollar and rising rates created a difficult top-down environment.
- HFR Risk Parity Index targeting 12% volatility slipped 0.3%, given its typical fixed income bias. Reflecting a material U.S. equity influence, a global balanced index of 60% stocks and 40% bonds gained 2.3%.
- CS NB Multi Asset Risk Premia Index (-1.4%) is an equal risk-weighted index of alternative risk factors (value, carry, momentum, and liquidity) across four capital markets (equity, fixed income, currency, and commodities) targeting 5% volatility.
- Within CS NB MARP, Equity Value (-3.4%) sank again, adding to losses from the prior two quarters for a 11.9% year-to-date loss. Supported by rising energy prices, Commodity Momentum (+5.9%) was strong again, leading to a 16% YTD gain.

Alternative Risk Factor Breakdown (quarter ended September 30, 2018)



Callan Multi-Asset Class Style Group Returns (quarter ended 9/30/18)



Sources: Callan, Credit Suisse Neuberger Berman

Private Equity Market

Funds Holding Final Closes YTD through September 30, 2018

Strategy	# of Funds	Amount \$millions	%
Venture Capital	270	45,756	12.4%
Buyouts	148	175,110	47.3%
Growth Equity	38	24,553	6.6%
Mezzanine	44	42,482	11.5%
Distressed/Restructuring	11	23,103	6.2%
Energy	22	20,222	5.5%
Secondaries, Co-Investment, & Other	55	27,368	7.4%
Fund-of-Funds	29	11,496	3.1%
Total	617	370,090	100.0%

- Institutional investors continue to pursue broad diversification in their private equity portfolios. Buyouts fundraising accounts for less than half of total fundraising and there is a healthy appetite for Venture Capital and Growth Equity.
- Despite elevated pricing in the secondary market, secondary funds are garnering significant amount of capital.
- Investors are returning to Energy, but with a degree of caution.

Source: PitchBook

Net IRRs Through June 30, 2018

Strategy	Last Quarter	1 Year	3 Years	5 Years	10 Years	15 years	20 Years	25 Years
Venture Capital	6.57	20.13	9.14	17.36	10.85	10.71	17.81	24.57
Growth Equity	6.06	22.69	12.72	14.97	11.57	13.60	13.75	14.99
Buyouts	3.87	18.03	13.93	14.76	9.69	14.55	12.21	13.46
Mezzanine	1.23	12.89	10.35	10.35	9.20	9.81	8.60	9.71
Credit Opportunities	2.80	9.98	7.56	8.26	10.10	10.29	10.24	10.68
Control-Oriented Distressed	2.31	8.58	9.35	10.08	9.50	11.12	10.81	11.43
S&P 500	3.43	14.37	11.93	13.42	10.17	9.30	6.46	9.60

Source: Thomson/Cambridge & Callan

- Total private equity outperformed the public markets by a solid 3.5% in the last year. Venture Capital and Growth Equity contributed the most to this outperformance.

TAB 7 – Fixed Income Review
OPERF and other OST-managed funds

December 2018



Oregon Investment Council

OPERF Fixed Income Review

Fixed Income Portfolio

Summary Observations

- The Total Fixed Income portfolio continues to perform well and has exceeded the Custom Target Index over both near term and longer term periods.
- As of September 30, 2018, the Fixed Income portfolio employed 7 strategies and accounted for 18% of OPERF.
 - The Portfolio is roughly 46% Core, 37% Treasuries and 18% Below Investment Grade
 - The Core portion is managed by four managers – AllianceBernstein, BlackRock, Wellington and Western
 - The Treasury portion is managed by OST Staff
 - Non-Core is managed by Oak Hill and KKR
 - The Portfolio is diversified across sectors of the fixed income market
- The portfolio is positioned to perform well in a down equity market consistent with its stated role in the OPERF portfolio.

Strategic Role and Policy Objectives of Fixed Income

Strategic Role

- Provide income and diversification to other assets (particularly equities) in the portfolio.
- Target allocation is 22% of the Total Fund.
- The investable universe can be described as investment grade securities as defined by the Bloomberg Barclays Aggregate index and below investment grade debt (leveraged loans and high yield).

Policy Objectives

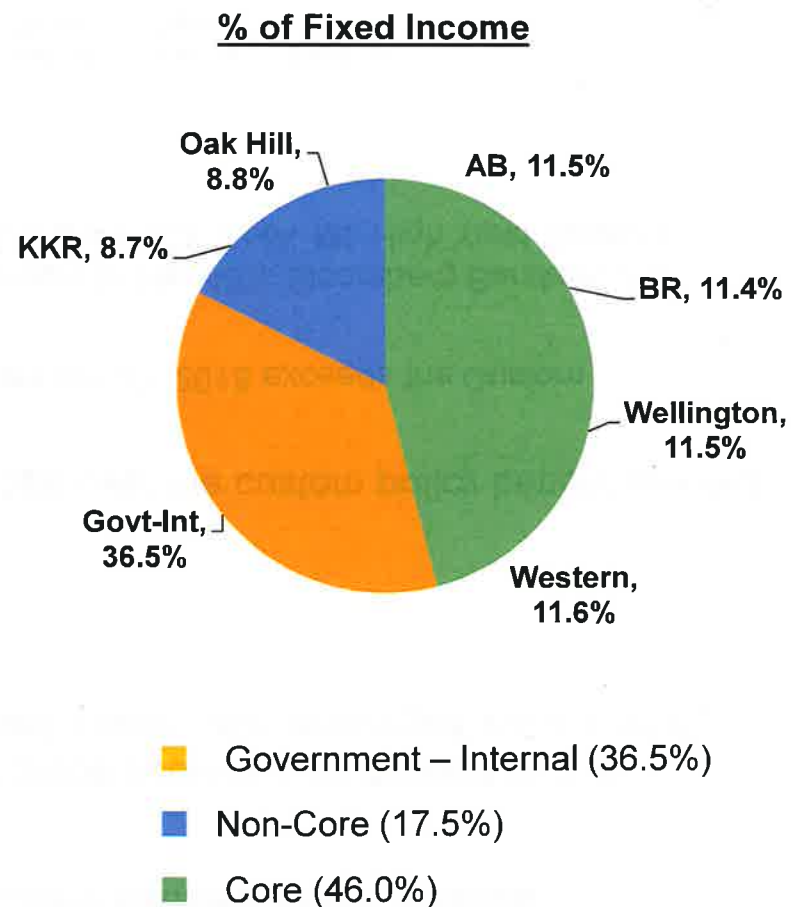
- Over a market cycle, achieve a rate of return at least 25 bps over the custom policy benchmark net of fees at a tracking error between 0.5-1.0%.
 - Portfolio return of 5.6% over trailing 10 years ended September 30, 2018 exceeds the Custom Benchmark by 1.6% net of fees
 - Custom Benchmark = 37% Bloomberg Barclays U.S. Treasury Index; 46% Bloomberg Barclays U.S. Aggregate Index; 13% S&P/LSTA Leveraged Loan Index; and 4% ICE BofA ML High Yield Master II Index

Returns
for Periods Ended September 30, 2018

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
OIC - PERS Fixed Income	0.24	(0.17)	1.87	2.25	5.59
OPERF Total Custom FI Benchmark	0.12	(0.38)	1.42	1.83	3.98
Public Fund 10+ B US FI	0.41	(0.19)	2.82	2.99	4.76

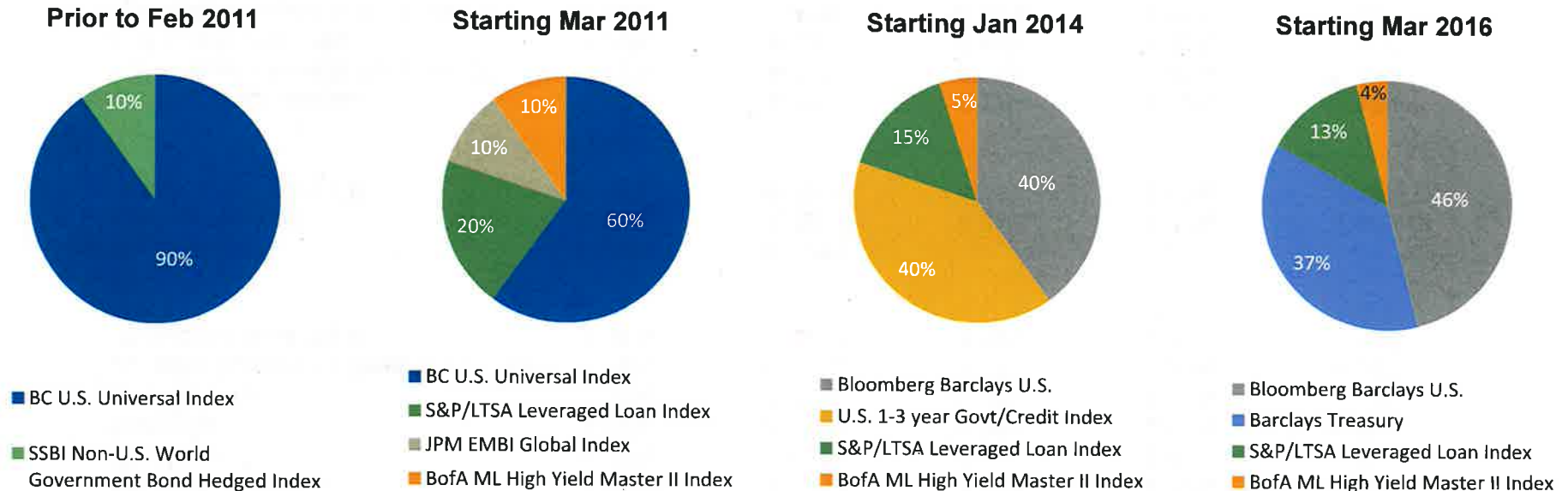
Fixed Income Managers

	September 30, 2018	
	Market Value	% of Total Fund
Total Fixed Income	\$14,110,964,038	18.53%
Core Fixed Income	\$6,505,677,888	8.54%
AllianceBernstein	1,617,139,294	2.12%
BlackRock	1,609,714,811	2.11%
Wellington	1,633,715,230	2.14%
Western Asset	1,645,108,553	2.16%
US Government	\$5,101,819,466	6.70%
Government Portfolio	5,101,819,466	6.70%
Non-Core Fixed Income	\$2,503,452,796	3.29%
KKR Credit Advisors	1,237,161,788	1.62%
Oak Hill	1,266,291,008	1.66%



Fixed Income Portfolio Evolution

Changes in the Custom Fixed Income Index



Significant Changes:

- Eliminated developed government non-U.S. fixed income (hedged) in March 2011
- Added emerging market debt, leveraged loans and high yield (total of 40%) in March 2011
- Added 40% high quality short duration in January 2014 and changed from the U.S. Universal to the Aggregate
- In March 2016, replaced short duration with full treasury curve (Bloomberg Barclays Treasury Index)

Performance

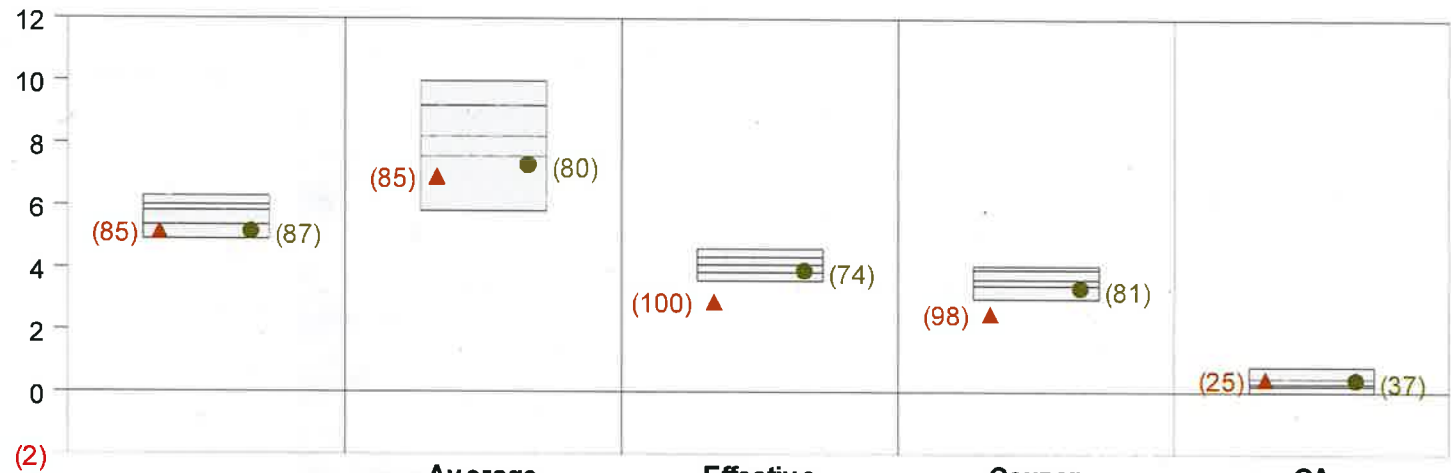
Net of Fees, Period Ending September 30, 2018

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Total Fixed Income	0.24%	(0.17%)	1.87%	2.25%	5.59%
Oregon Custom FI Benchmark (15)	0.12%	(0.38%)	1.42%	1.83%	3.98%
Lg Public >10 B DF	0.31%	(0.29%)	2.79%	2.97%	4.75%
Core Fixed Income	0.37%	(0.79%)	2.04%	2.85%	5.53%
AllianceBernstein	(0.05%)	(0.81%)	1.73%	2.74%	5.32%
BlackRock	0.16%	(1.01%)	1.54%	2.47%	4.88%
Wellington	0.31%	(1.20%)	2.08%	2.98%	5.70%
Western Asset	0.41%	(0.77%)	2.57%	3.11%	6.07%
Oregon Custom FI Benchmark (16)	0.02%	(1.22%)	1.31%	2.25%	4.05%
CAI Core Bond Style	0.16%	(0.82%)	1.86%	2.63%	4.63%
US Government*	(0.59%)	(1.58%)	-	-	-
Blmbg Treasury	(0.59%)	(1.62%)	0.23%	1.34%	2.68%
Callan Core Bond FI	0.16%	(0.82%)	1.86%	2.63%	4.63%
Non-Core Fixed Income	1.62%	4.58%	5.77%	4.72%	7.82%
Leveraged Loans & Bond Idx (23)	1.75%	4.33%	5.21%	3.93%	6.06%
KKR Credit Advisors	1.29%	4.33%	5.09%	4.30%	8.10%
Leveraged Loans & Bond Idx (17)	2.05%	4.41%	6.33%	4.64%	7.28%
Oak Hill	1.94%	4.83%	6.48%	5.16%	-
Leveraged Loans & Bond Idx (18)	1.93%	4.86%	5.75%	4.35%	6.63%
Leveraged Bank Loans	1.90%	5.30%	5.39%	4.42%	6.16%

* Benchmark definitions in the Appendix

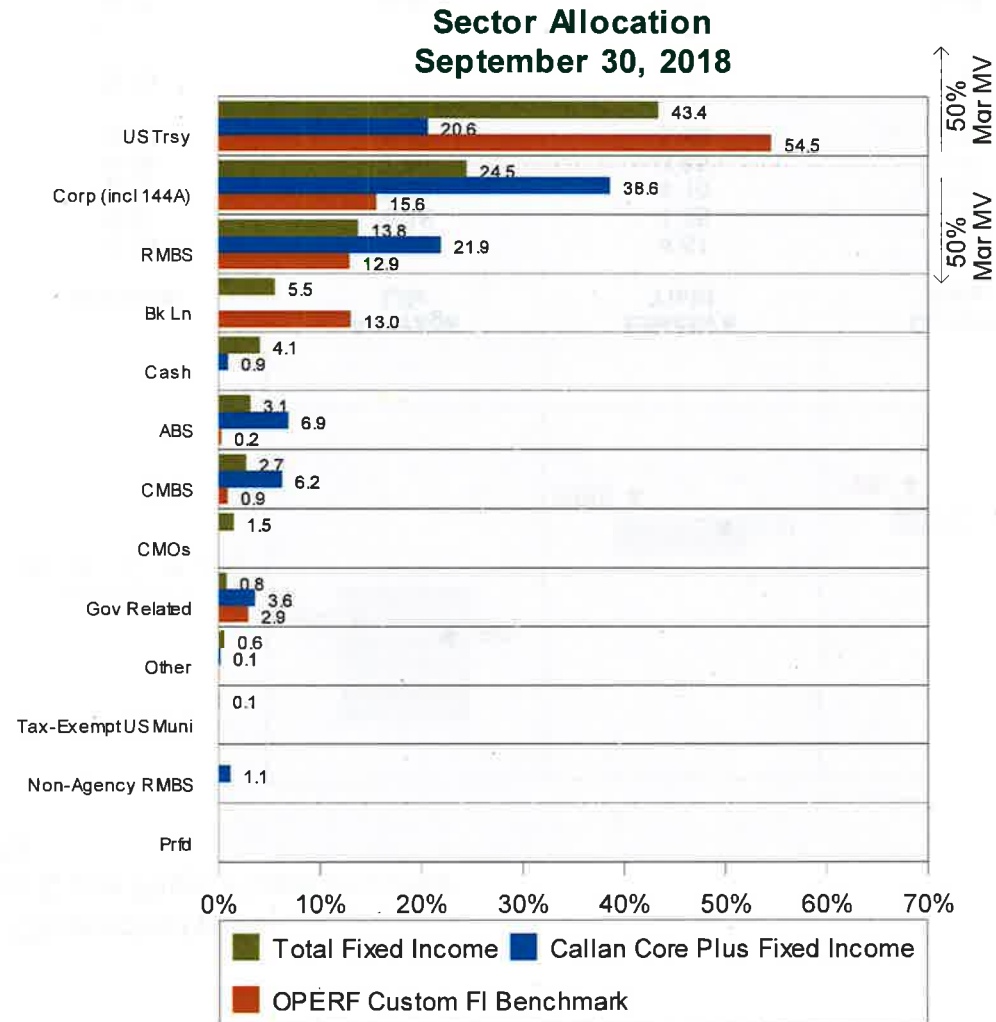
Fixed Income Portfolio Characteristics

Fixed Income Portfolio Characteristics Rankings Against Callan Core Plus Fixed Income as of September 30, 2018



	Duration	Average Life	Effective Yield	Coupon Rate	OA Convexity
10th Percentile	6.29	9.98	4.61	4.07	0.83
25th Percentile	6.00	9.18	4.35	3.94	0.46
Median	5.82	8.20	4.10	3.63	0.28
75th Percentile	5.36	7.56	3.85	3.43	0.22
90th Percentile	4.90	5.82	3.58	3.00	(0.00)
Total Fixed Income ●	5.10	7.25	3.87	3.31	0.36
OPERF Custom FI Benchmark ▲	5.15	6.91	2.93	2.56	0.46

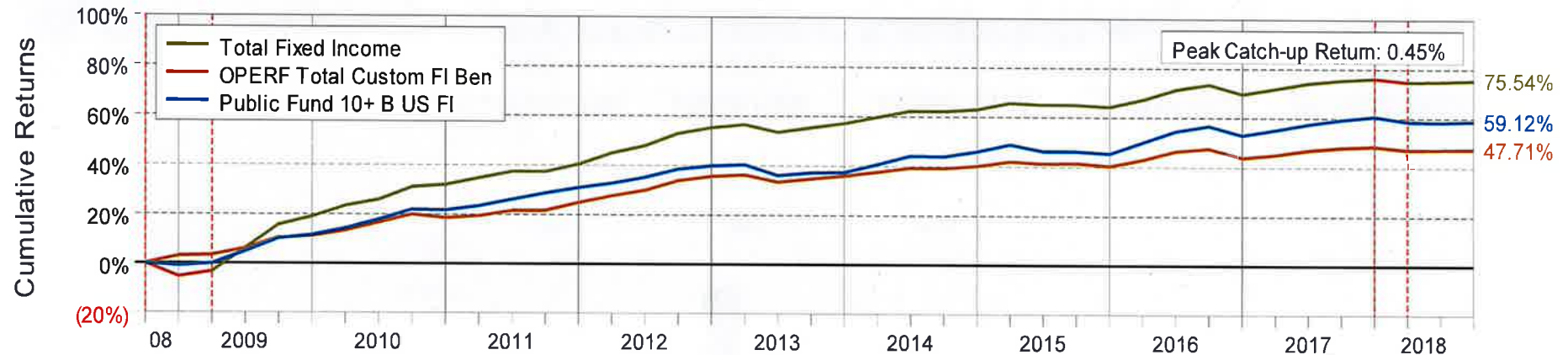
Fixed Income Sector Allocation



Absolute Cumulative Drawdown Analysis

10 Years Ended September 30, 2018

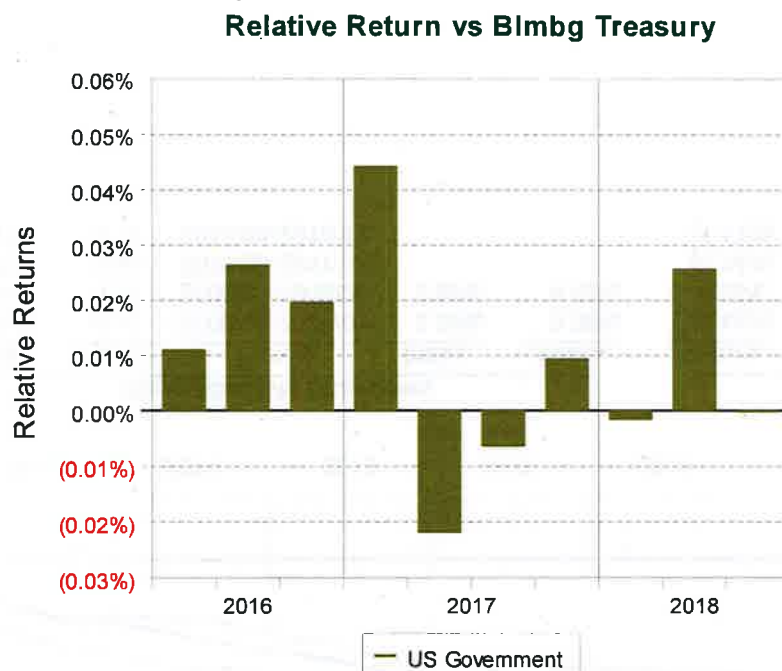
Absolute Cumulative Drawdown Analysis



	Worst Absolute Drawdown					Current Absolute Drawdown				
	Return	Years	Period	Index	Peers	Return	Years	Period	Index	Peers
Total Fixed Income	(3.30)%	0.50	2008/09-2009/03	3.38%	0.08%	(0.45)%	0.75	2017/12-2018/09	(0.74)%	(1.11)%
Recovery from Trough	9.88%	0.25	2009/03-2009/06	2.66%	4.92%	0.36%	0.50+	2018/03-2018/09	0.22%	0.11%
OPERF Total Custom FI Ben	(1.57)%	0.50	2016/09-2017/03			(0.74)%	0.75	2017/12-2018/09		
Public Fund 10+ B US FI	(2.37)%	0.75	2015/03-2015/12			(1.11)%	0.75	2017/12-2018/09		

Internally Managed Treasury Portfolio

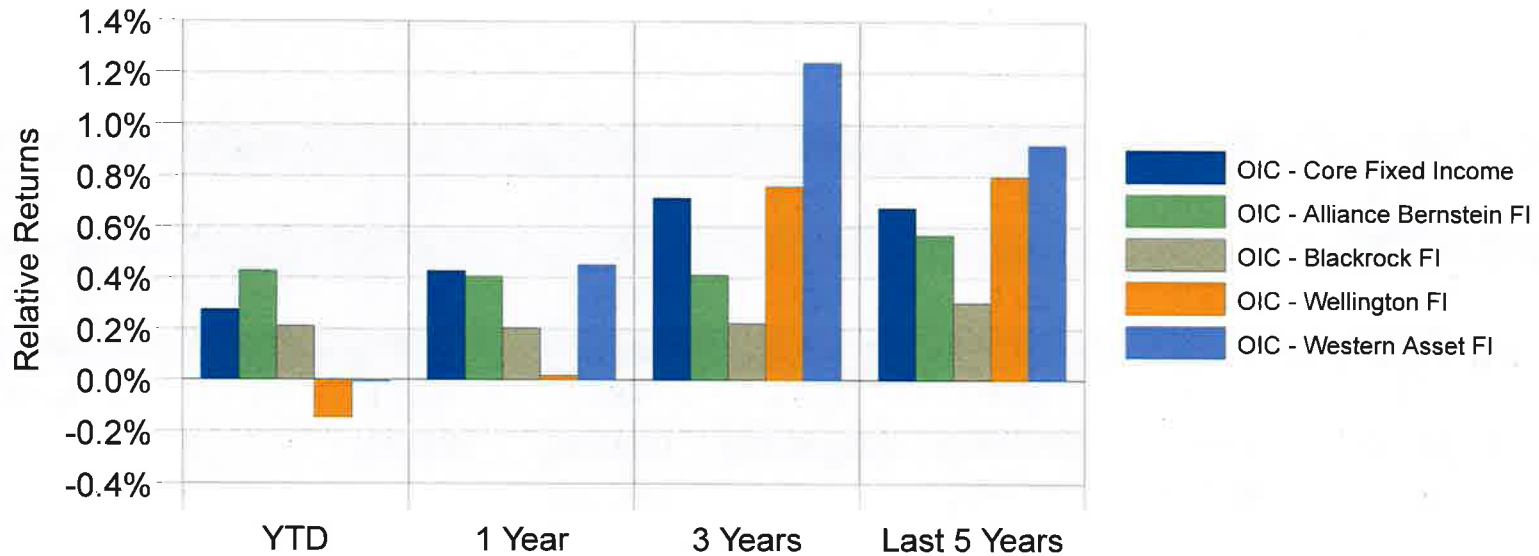
10 Quarters ended September 30, 2018



	Returns	Standard Deviation	Sharpe Ratio	Excess Return	Tracking Error	Information Ratio
OIC-Treasury	-1.56%	2.89%	-0.90%	0.02	0.04%	0.71%
Blmbg:Treasury	-1.58%	2.89%	-0.91%	0.00	0.00%	0.00%

Core Bond Manager Performance

Relative Returns vs Blmbg:Aggregate
Ending September 30, 2018



Below Investment Grade Returns and Selected Metrics

5 Years Ended September 30, 2018

	Returns	Standard Deviation	Sharpe Ratio	Maximum Drawdown	Excess Return	Tracking Error	Information Ratio
OIC - Non-Core FI	4.74%	2.53%	1.67%	-4.39	0.25%	0.93%	1.03%
<i>Leveraged Loans & Bond Idx (23)</i>	<i>4.49%</i>	<i>2.86%</i>	<i>1.39%</i>	<i>-6.07</i>	<i>0.00%</i>	<i>0.00%</i>	<i>0.00%</i>
OIC - KKR Asset Management FI	4.31%	2.59%	1.47%	-4.57	-0.33%	1.53%	0.60%
<i>Leveraged Loans & Bond Idx (17)</i>	<i>4.64%</i>	<i>3.10%</i>	<i>1.33%</i>	<i>-6.52</i>	<i>0.00%</i>	<i>0.00%</i>	<i>0.00%</i>
OIC - Oak Hill FI	5.20%	2.69%	1.74%	-4.11	0.85%	0.75%	1.16%
<i>Leveraged Loans & Bond Idx (18)</i>	<i>4.35%</i>	<i>2.63%</i>	<i>1.46%</i>	<i>-5.62</i>	<i>0.00%</i>	<i>0.00%</i>	<i>0.00%</i>

Fixed Income as Equity Hedge

Correlation to MSCI ACWI IMI (OPERF Total Equity Benchmark)

Correlation relative to MSCI:ACWI IMI
for Periods Ended September 30, 2018

	Last 5 Years	Last 10 Years	Last 20 Years
OST-Passive Target	0.01	0.01	(0.20)
Blmbg:Aggregate	(0.01)	(0.22)	(0.34)
Blmbg:Treasury	(0.19)	(0.59)	(0.57)
BofA ML:US High Yield Master II	0.62	0.82	0.71
S&P:LSTA Lev Loan	0.39	0.71	0.59

- OST Passive Target = 46% Bloomberg U.S. Aggregate; 37% Bloomberg U.S. Treasury; 13% S&P/LSTA Leveraged Loan Index; 4% ICE BofA ML High Yield Master II

Benchmark References

- (15) Prior to February 28, 2011, index is Oregon Custom FI 90/10 Benchmark (90% BC US Universal Index and 10% SSBI Non-US World Gov't Bond Hedged Index). From March 1, 2011 to December 31, 2013, index is Oregon Custom FI Benchmark 60% BC US Universal Index, 20% S&P/LSTA Leveraged Loan Index, 10% JMP EMBI Global Index, and 10% BofA ML High Yield Master II Index). From January 1, 2014 to February 29, 2016, index is Oregon Custom FI Benchmark (40% Barclays Capital U.S. Aggregate Bond, 40% Barclays Capital U.S. 1-3 Govt/Credit Bond Index, 15% S&P/LSTA Leveraged Loan Index, and 5% BofA ML High Yield Master II Index). From March 1, 2016 to Present, index is 46% Barclays Aggregate Bond, 37% Barclays Treasury, 4% BofA ML High Yield Master II and 13% S&P/LSTA.
- (16) Prior to February 28, 2011, index is Oregon Custom External FI 90/10 Benchmark (90% BC US Universal and 10% SSBI Non-US World Gov't Bond Hedged Index). From March 1, 2011 to December 31, 2013, index is Oregon Custom External FI Benchmark (90% BC US Universal Index and 10% JMP EMBI Global Index). From January 1, 2014 to Current, index is Oregon Custom External FI Benchmark (100% Barclays Capital U.S. Aggregate Bond).
- (17) 65% S&P-LSTA/35% Merrill HY Master II.
- (18) 85% S&P-LSTA/15% Merrill HY Master II.
- (23) 75% S&P-LSTA/25% Merrill HY Master II.

Index Descriptions

- **Bloomberg Barclays Aggregate:** The Bloomberg Barclays US Aggregate Bond Index is a broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency).
- **Bloomberg Barclays Treasury Index:** The Bloomberg Barclays US Treasury Index measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury with at least one year to maturity.
- **ICE BofA ML US High Yield Master II Index:** tracks the performance of US dollar denominated below investment grade rated corporate debt publically issued in the US domestic market. To qualify for inclusion in the index, securities must have a below investment grade rating (based on an average of Moody's, S&P, and Fitch) and an investment grade rated country of risk (based on an average of Moody's, S&P, and Fitch foreign currency long term sovereign debt ratings). Each security must have greater than 1 year of remaining maturity, a fixed coupon schedule, and a minimum amount outstanding of \$100 m.
- **S&P/LSTA (Loan Syndications and Trading Association) U.S. Leveraged Loan Index (LLI):** The index is a fixed-weighted index that tracks the performance of the U.S. senior loan market. Term loans from syndicated credits must meet the following criteria at issuance in order to be eligible for inclusion in the LLI: Senior secured; U.S. dollar denominated; minimum initial term of one year; minimum initial spread of *LIBOR* + 125 basis points; US\$ 50 million initially funded loans. The loan must have been bought by an institutional investor, and must currently be in their portfolio. Market value as of October 31, 2018 is \$1.3 trillion with 1709 constituents.

Definition of Terms

- Alpha represents the historical return from an asset, based on factors unrelated to the underlying factors affecting the market. As such, Alpha is a measure of the return for asset specific (or residual) risk. Alpha is used as a measure of a manager's contribution to performance due to security or sector selection. A positive (negative) Alpha indicates that a portfolio was positively (negatively) rewarded for the residual risk taken for a given level of market exposure. If the market excess return is 2% and the portfolio Beta is 1.1, then the manager would have to have an excess return greater than 2.2% for the manager to have contributed to performance above and beyond the performance of the market.
- Beta is a measure of the systematic risk of a security or portfolio. Beta measures the historical sensitivity of portfolio or security excess returns to movements in the excess return of the market index. The value for Beta is expressed as a percentage of the market where the market Beta is 1.00. A security or portfolio with a Beta above the market has volatility greater than the market. If the Beta of a security was 1.3, a 1 percent increase in the market return resulted, on average, in a 1.3 percent increase in the security's return. A security or portfolio with Beta below the market has lower volatility than the market and the return on the security will move less than the market return. If the Beta of the security was .9, a 1 percent decrease in the market resulted in only a .9 percent decrease in the security's return.
- Down Market Capture is determined by the index which has a Down-Capture ratio of 100% when the index is performing negatively. If a manager captures less than 100% of the declining market it is said to be "defensive".
- Excess Return is a portfolio return minus the benchmark.
- Information Ratio is a risk statistic that measures the excess return per unit of residual "non-market" risk in a portfolio. The ratio is equal to the Alpha divided by the Residual Risk. Because the Information Ratio represents a residual-risk adjusted measure of the excess returns of a portfolio, the resulting value can be looked at as the excess return per unit of risk that is due solely to the specific risks associated with the securities in the portfolio and by definition could be diversified away.
- Maximum Drawdown is the maximum loss from a peak to a trough of a portfolio, before a new peak is attained.

Definition of Terms

- R-Squared indicates the extent to which the variability of the portfolio returns are explained by market action. It can also be thought of as measuring the diversification relative to the appropriate benchmark. An r-squared value of .75 indicates that 75% of the fluctuation in a portfolio return is explained by market action. An r-squared of 1.0 indicates that a portfolio's returns are entirely related to the market and it is not influenced by other factors. An r-squared of zero indicates that no relationship exists between the portfolio's return and the market.
- Sharpe Ratio is a commonly used measure of risk-adjusted return. It is calculated by subtracting the "risk-free" return (usually 3 Month Treasury Bill) from the portfolio return and dividing the resulting "excess return" by the portfolio's risk level (standard deviation). The result is a measure of return gained per unit of risk taken.
- Sortino Ratio measures excess return over a benchmark divided by downside risk. The natural appeal is that it identifies value-added per unit of truly bad risk. The danger of interpretation, however, lies in the two areas: (1) the statistical significance of the denominator, and (2) its reliance on the persistence of skewness in return distributions.
- Standard Deviation is a statistical measure of portfolio risk. It reflects the average deviation of the observations from their
- Sample mean. Standard deviation is used as an estimate of risk since it measures how wide the range of returns typically is. The wider the typical range of returns, the higher the standard deviation of returns, and the higher the portfolio risk. If returns are normally distributed (e.g., has a bell shaped curve distribution) then approximately 2/3 of the returns would occur within plus or minus one standard deviation from the sample mean.
- Tracking Error is a statistical measure of a portfolio's risk relative to an index. It reflects the standard deviation of a portfolio's individual quarterly or monthly returns from the index's returns. Typically, the lower the Tracking Error, the more "index-like" the portfolio.
- Up Market Capture is determined by the index which has an Up-Capture ratio of 100% when the index is performing positively. If a manager captures more than 100% of the rising market it is said to be "offensive".

December 12, 2018

Oregon Investment Council

Fixed Income Portfolio 2018 Review and 2019 Plan

Geoff Nolan, Senior Investment Officer
Garrett Cudahey, Investment Officer
Tom Lofton, Investment Officer



OREGON
STATE
TREASURY



Agenda

1. Background/Objectives

2. Looking Back and Looking Ahead

3. Fixed Income Program Overview

4. Discussion on Select Accounts

5. Appendix

Background / Objectives

Putting Fixed Income in Context

- Oregon Investment Council (OIC) Oversight
 - The OIC sets policy and is ultimately responsible for the Investment Program
 - The OIC is a policy-setting council that largely delegates investment management activities to the Oregon State Treasury (OST) and qualified external fiduciaries.
 - The OIC has authority to set and monitor portfolio risk. Both short term and long term risks are critical.
 - To exploit market inefficiencies, the OIC must be contrarian, innovative and opportunistic in its investment approach.
 - Internal incentive structures should be carefully evaluated to ensure proper alignment with specific investment objectives.
 - Adequate resources are required to successfully compete in global capital markets.
- Role of Fixed Income in Oregon Public Employees Retirement Fund (OPERF) = Diversification & Liquidity
 - The role of fixed income investments, pursuant to policy INV 401, is to:
 - provide diversification to the OPERF portfolio in general and to equity securities in particular, and
 - provide liquidity to help meet OPERF's cash flow needs.
 - Realized Fixed Income Benefits:
 - ✓ Adding Diversification: Correlation to OPERF portfolio of 0.11 and Equities of -0.01. (as of 10/31/18)
 - ✓ Adding Liquidity: (a) ~\$11BN available within 7 days

Fixed Income's Role: Providing Diversification and Liquidity for OPERF



Agenda

1. Background/Objectives

2. Looking Back and Looking Ahead

3. Fixed Income Program Overview

4. Discussion on Select Accounts

5. Appendix

Looking Back and Looking Ahead

- 2018 Market Update
 - Fixed income markets buffeted by variety of headwinds -- Fed rate hikes, rate and spread volatility, equity volatility, concerns of slowing global growth – resulting in a dispersion of YTD investment total return outcomes: ⁽¹⁾
 - Investment Grade: -3.7% U.S. Government: -1.4% High Yield: -0.1% Leveraged Loans +3.3%
 - Other Markets: EM Sovereigns -6.1%; S&P 500 +5.1%
- 2018 Highlights
 - Inaugural Local Government Investor Day Conference
 - Updated Oregon Short Term Fund (OSTF) ABS Policy to Allow for Additional High Quality ABS Exposure
 - Annual Manager Due Diligence Sessions Completed
 - Team Build Out Started – Adding 3 Investment Analysts
- 2019 Goals
 - Finish Team Buildout → Adding 1 Investment Officer
 - Continue Team Development → People Are An Organization's Most Valuable Asset
 - Continue to Develop Bench Strength: new analyst training / intra-desk rotations; team cross-training
 - Strategic Fixed Income Asset Allocation Review
 - Client Outreach Initiatives → Goals = Educate / Enhance Communication & Transparency
 - (1) Local Government Outreach, (2) Client Portfolio Dashboard

2018 Review: Difficult Fixed Income Markets

2019 Goals: Team & Platform Initiatives



OREGON
STATE
TREASURY

Fixed Income Portfolio 2018 Annual Review and 2019 Plan

5

(1) returns as of 11/30/18; Source: CreditSights

Agenda

1. Background/Objectives

2. Looking Back and Looking Ahead

3. Fixed Income Program Overview

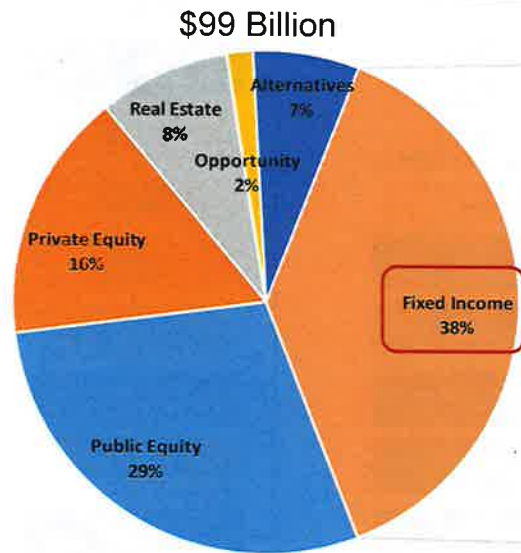
4. Discussion on Select Accounts

5. Appendix

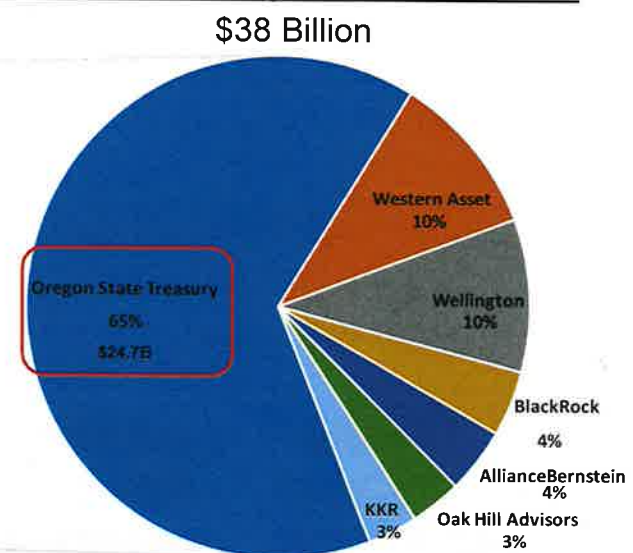
OST Fixed Income Program Overview

Putting Fixed Income in Context

Oregon State Treasury Asset Mix



Fixed Income Manager Concentration



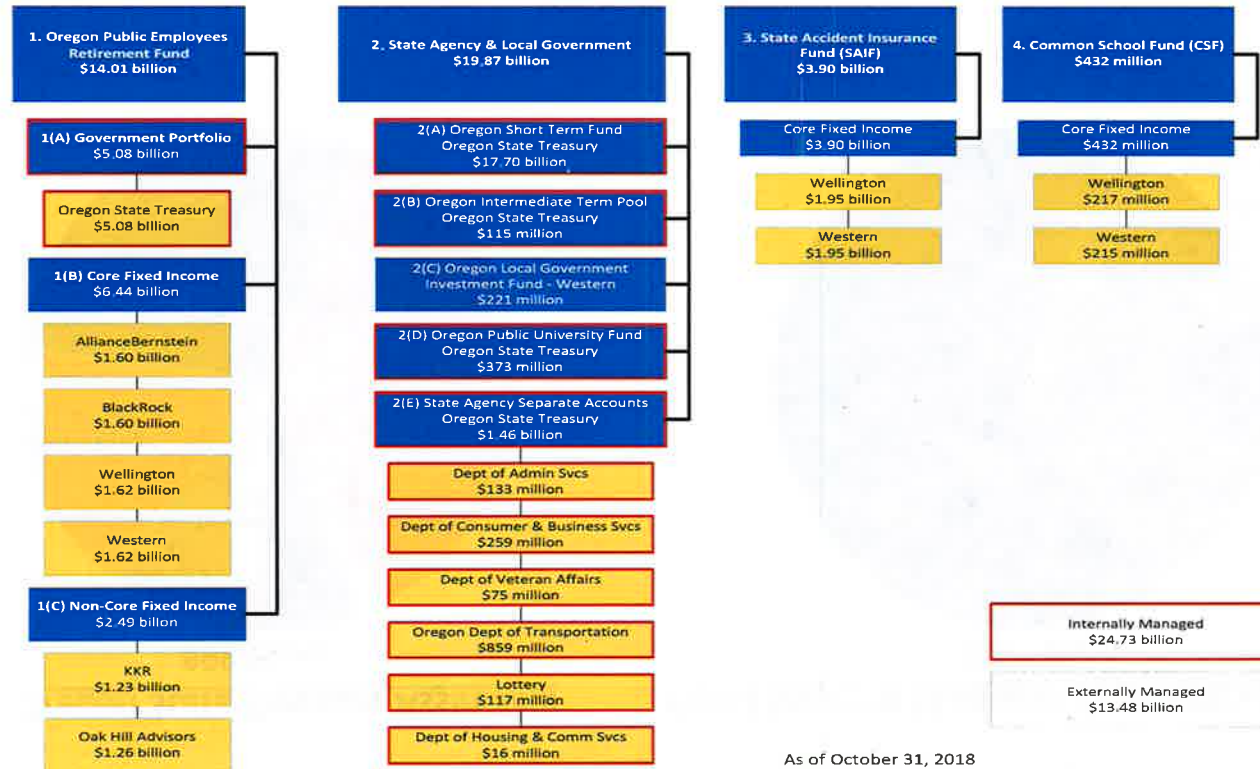
As of October 31, 2018

Fixed Income & OST-Managed Funds Represent a Significant Portion of OST Assets



OST Fixed Income Program Overview

Putting Fixed Income in Context



OST Oversees A Variety of Strategies That Serve A Diverse Oregonian Client Base



Agenda

1. Background/Objectives

2. Looking Back and Looking Ahead

3. Fixed Income Program Overview

4. Discussion on Select Accounts

5. Appendix

Select Accounts Discussion

- Oregon Public Employees Retirement Fund (OPERF) – Fixed Income
 - Geoff Nolan, Senior Investment Officer
- Oregon Short Term Fund (OSTF)
 - Garrett Cudahey, Investment Officer
- Oregon Intermediate Term Pool (OITP)
 - Tom Lofton, Investment Officer

2018: Difficult Fixed Income Markets. Meeting OPERF, OSTF & OITP Portfolio Objectives.



Oregon Public Employees Retirement Fund (OPERF): Fixed Income

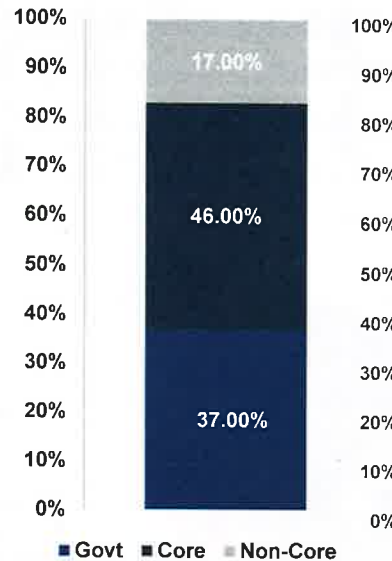
Objective – To provide diversification to the OPERF portfolio in general and to equity exposures in particular. Additionally, the fixed income portfolio is designed to provide liquidity and income to help meet cash flow needs. Over a market cycle of three to five years, and on a net-of-fee basis, the performance objective is to achieve a total return of at least 25 basis points above the custom policy benchmark while maintaining an annualized targeted tracking error between 0.5 to 1.0 percent.

Strategy – OPERF’s fixed income portfolio is deployed into three actively managed strategies: a U.S. government allocation; a core bond allocation; and an allocation to bank loan and high yield securities.

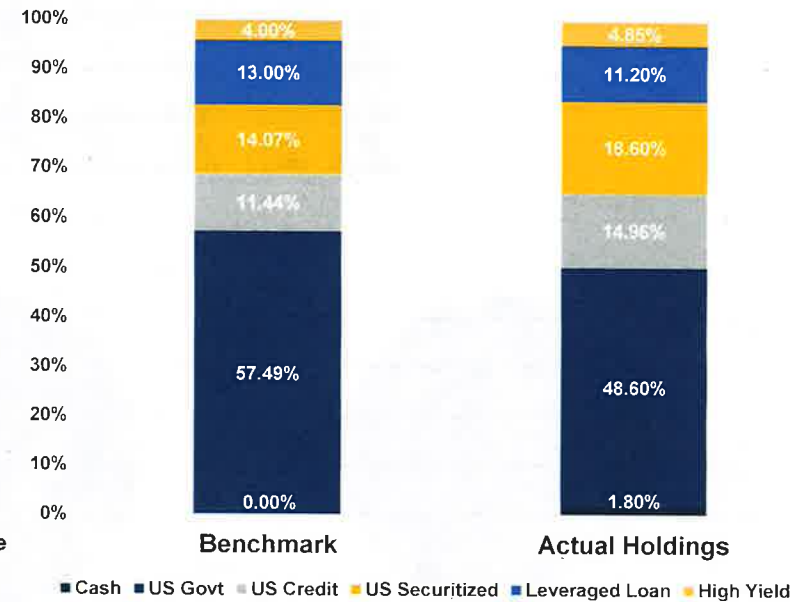
Benchmark – The benchmark is a custom blend comprised of:

- 37% Bloomberg Barclays U.S. Treasury Index;
- 46% Bloomberg Barclays U.S. Aggregate Index;
- 13% S&P/LSTA Leveraged Loan Index; and
- 4% Bank of America Merrill Lynch High Yield Master II Index.

Strategy Weighting



Benchmark & Actual Sector Weightings



Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
OPERF FI	14,016,646	4.20	3.80	5.06	4.97	AA-	AA-
CORE FI	6,444,153	4.08	3.60	6.05	5.90	AA-	AA-
NON-CORE	2,494,791	6.87	6.02	0.84	0.65	B	B+
GOVT	5,077,700	3.05	3.03	5.89	5.83	AAA	AAA

	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
OPERF Total Fixed Income	14,016,659	-0.67	-0.58	-1.24	-0.94	0.34	1.52	1.49	1.85	3.00	6.21
OPERF Custom Fixed Income Benchmark		-0.61	-0.48	-1.34	-1.06	0.04	1.18	1.16	1.46	2.41	4.25
Excess Return		-0.06	-0.10	0.10	0.12	0.30	0.34	0.33	0.39	0.59	1.96

As of October 31, 2018



OPERF Core Fixed Income Portfolio

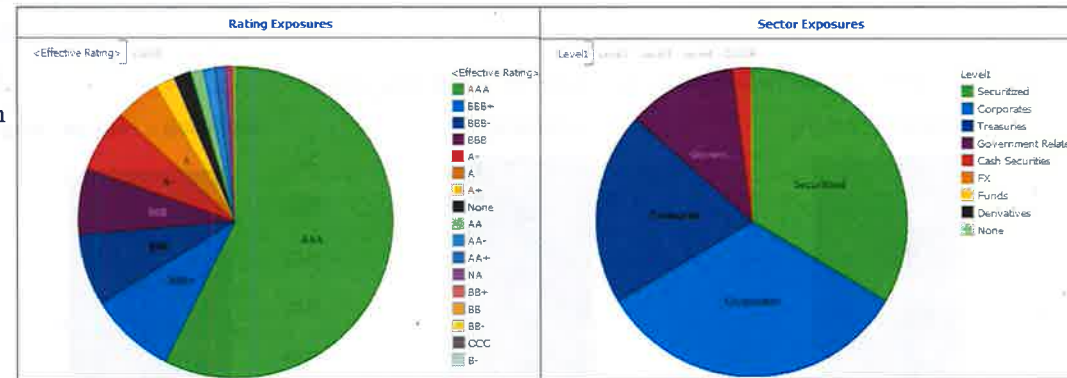
Objective – The OPERF Core Fixed Income Portfolio is designed to provide exposure to the broad, liquid U.S. investment grade bond universe in order to provide a diversifying return stream to OPERF that seeks to complement OPERF’s risk-asset exposures while providing liquidity and income to help fund both the plan’s beneficiary payment obligations and other investment opportunities. The performance goal is a higher, after-fee and risk-adjusted return relative to the broad U.S. investment grade bond market.

Strategy – To achieve its objective, the core allocation is actively invested against the Bloomberg Barclays U.S. Aggregate index which encompasses the liquid, investment grade government, corporate and securitized bond markets in the United States. Staff seeks to allocate the core mandate amongst high-conviction firms that are complementary to each other in the way they view markets and structure portfolios.

Managers – The portfolio is currently allocated to the following four external firms:

- AllianceBernstein
- BlackRock
- Wellington Management
- Western Asset

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
CORE FI	6,444,153	4.08	3.60	6.05	5.90	AA-	AA
Western Asset	1,623,912	4.21	3.60	6.41	5.90	AA-	AA
Wellington	1,618,236	4.08	3.60	6.36	5.90	AA-	AA
BlackRock	1,596,624	4.07	3.60	5.87	5.90	AA-	AA
AllianceBernstein	1,605,381	3.95	3.60	5.56	5.90	AA	AA



Benchmark – Bloomberg Barclays U.S. Aggregate Bond Index

	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
Core Fixed Income	6,444,153	-0.95	-0.93	-2.26	-1.81	-0.09	1.62	1.77	2.39	2.99	6.06
AllianceBernstein	1,605,381	-0.73	-0.74	-1.90	-1.60	-0.25	1.45	1.68	2.32	2.69	5.98
BlackRock	1,596,624	-0.81	-0.79	-2.19	-1.87	-0.44	1.20	1.48	2.10	2.68	5.20
Wellington	1,618,236	-0.95	-0.86	-2.07	-1.66	0.23	1.94	2.14	2.59	3.28	6.17
Western Asset	1,623,912	-1.29	-1.33	-2.87	-2.12	0.09	1.87	1.80	2.55	3.31	6.77
OPERF Custom Core Fixed Income Benchmark		-0.79	-0.79	-2.38	-2.05	-0.59	1.04	1.27	1.85	2.25	4.31
Excess Return		-0.16	-0.14	0.12	0.24	0.50	0.58	0.50	0.54	0.74	1.75

As of October 31, 2018



OPERF Non-Core Fixed Income Portfolio

Objective – The non-core allocation is designed to provide enhanced expected return opportunities and diversification from the government and core fixed income allocations by accessing risk and return sources different from those traditionally available in the core and government portions of the OPERF fixed income portfolio.

Strategy – To achieve the objective, the non-core allocation is actively invested in a mix of bank loans and high yield bonds that offer exposure to corporate credit spreads with limited interest rate risk given the floating rate nature of bank loans. A significant portion of the bank loan allocation is in secured positions that are higher in the capital structure than traditional high-yield bonds and thus offer better protection through higher recovery rates in the event of a default or credit event.

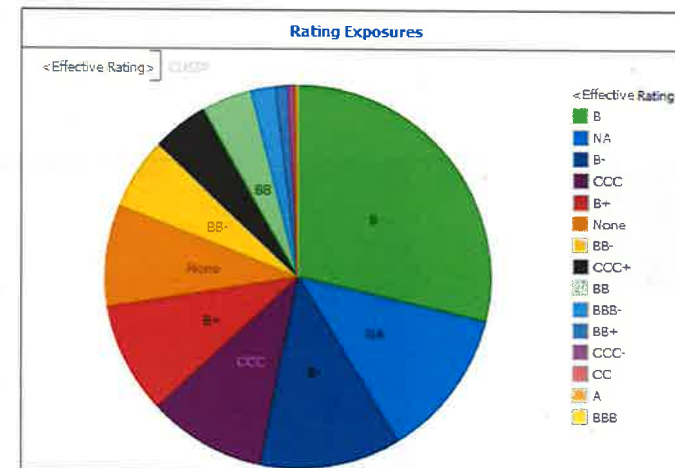
Managers – The portfolio is allocated to two external firms:

- KKR
- Oak Hill Advisors

Benchmark – Each manager has a unique benchmark:

- KKR - 65% S&P LSTA Leveraged Loan Index; 35% BAML High Yield Master II
- Oak Hill - 85% S&P LSTA Leveraged Loan Index; 15% BAML High Yield Master II

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating		Option Adjusted Spread	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
NON-CORE	2,494.791	6.87	6.02	0.84	0.65	B	B+	418.64	346.99
Oak Hill Advisors	1,264.407	6.43	5.90	0.59	0.39	B	B+	383.68	344.09
KKR	1,230.385	7.32	6.16	1.08	0.91	B	B+	454.57	349.96



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year
Non-Core Fixed Income	2,494,791	-0.35	0.44	3.40	3.57	4.74	5.37	4.26	4.39	5.92
KKR	1,230,385	-0.55	-0.10	3.30	3.06	3.75	4.60	3.57	3.92	5.74
KKR Custom Leveraged Loans/Bond Index		-0.59	0.57	2.89	3.24	4.85	5.83	4.24	4.24	5.40
Excess Return		0.04	-0.67	0.41	-0.18	-1.10	-1.23	-0.67	-0.32	0.34
Oak Hill Advisors	1,264,407	-0.15	0.98	3.50	4.07	5.73	6.18	5.04	4.89	6.01
Oak Hill Custom Leveraged Loans/Bond Index		-0.27	0.85	3.53	3.98	4.82	5.57	4.18	4.09	5.07
Excess Return		0.12	0.13	-0.03	0.09	0.91	0.61	0.86	0.80	0.94

As of October 31, 2018



OPERF Government Portfolio

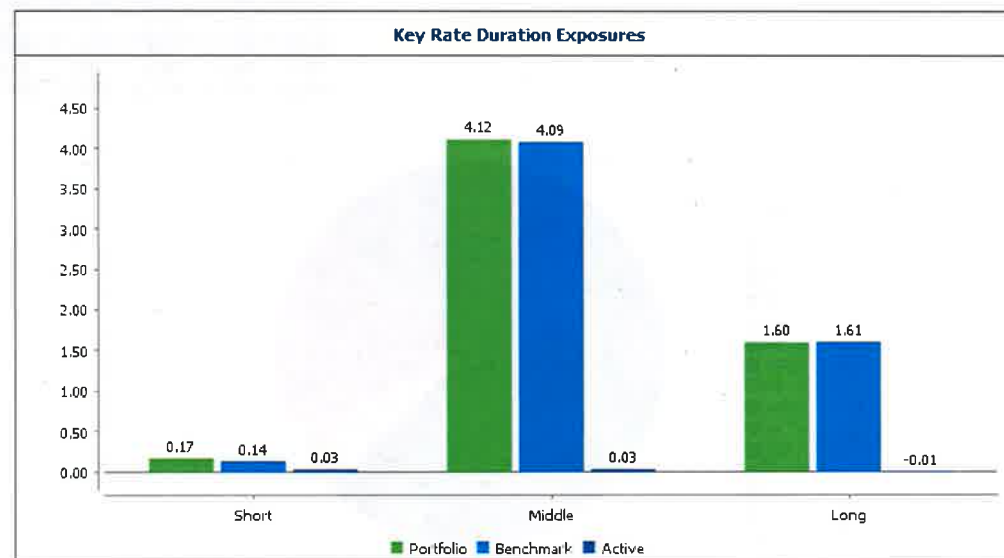
Objective – The Government Portfolio’s objective is to enhance the diversification benefit of the OPERF fixed income portfolio versus OPERF’s otherwise large allocation to risk assets (e.g., Public Equity, Private Equity, Real Estate and Alternatives) and to provide a reliable source of liquidity. Over a market cycle of three to five years, and on a net-of-fee basis, the objective is to achieve a return of 0.00 basis points above the policy benchmark while maintaining an annualized targeted tracking error between 0.5 to 1.0 percent.

Strategy – The Government Portfolio is managed to closely match the benchmark with minimal active risk. To achieve this goal, staff seeks to maintain a key rate duration profile similar to the benchmark while holding fewer positions than the benchmark in order to reduce trading costs.

Manager – Oregon State Treasury

Benchmark – Bloomberg Barclays U.S. Treasury Index

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
GOVT Portfolio	5,077,700	3.05	3.03	5.89	5.83	AAA	AAA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year
OPERF Government Fixed Income	5,077,700	-0.47	-0.64	-2.11	-1.94	-1.31	-0.57
OPERF Government Fixed Income Benchmark		-0.48	-0.65	-2.14	-1.97	-1.33	-0.52
Excess Return		0.01	0.01	0.03	0.03	0.02	-0.05

As of October 31, 2018



Oregon Short Term Fund (OSTF)

Objective – The investment objectives of the Oregon Short Term Fund (“OSTF”) are, in priority order, preservation of principal, maintenance of a sufficient level of liquidity to meet all state agency and local government operating requirements and attainment of a yield greater than money market and other short-term alternatives through investments in high-quality, U.S. dollar-denominated fixed income securities. The fund serves as a short-term cash investment vehicle for agencies and local government entities in the State of Oregon, including OPERF.

Strategy – OSTF is invested consistent with the fund’s objectives by creating a diversified portfolio comprised of a broad range of fixed income investments. Securities may include the following: U.S. government securities, including U.S. Treasury obligations and securities issued by U.S. Agencies and instrumentalities; securities issued by foreign governments and instrumentalities; certificates of deposit and time deposits in certain qualified depositories; commercial paper; corporate bonds; asset-backed securities; municipal securities; bankers’ acceptances; repurchase agreements; and investments in the Oregon Local Government Intermediate Fund. Investments may be made in securities that are issued at a discount or pay interest based on a fixed or floating rate coupon. All securities are denominated in U.S. dollars.

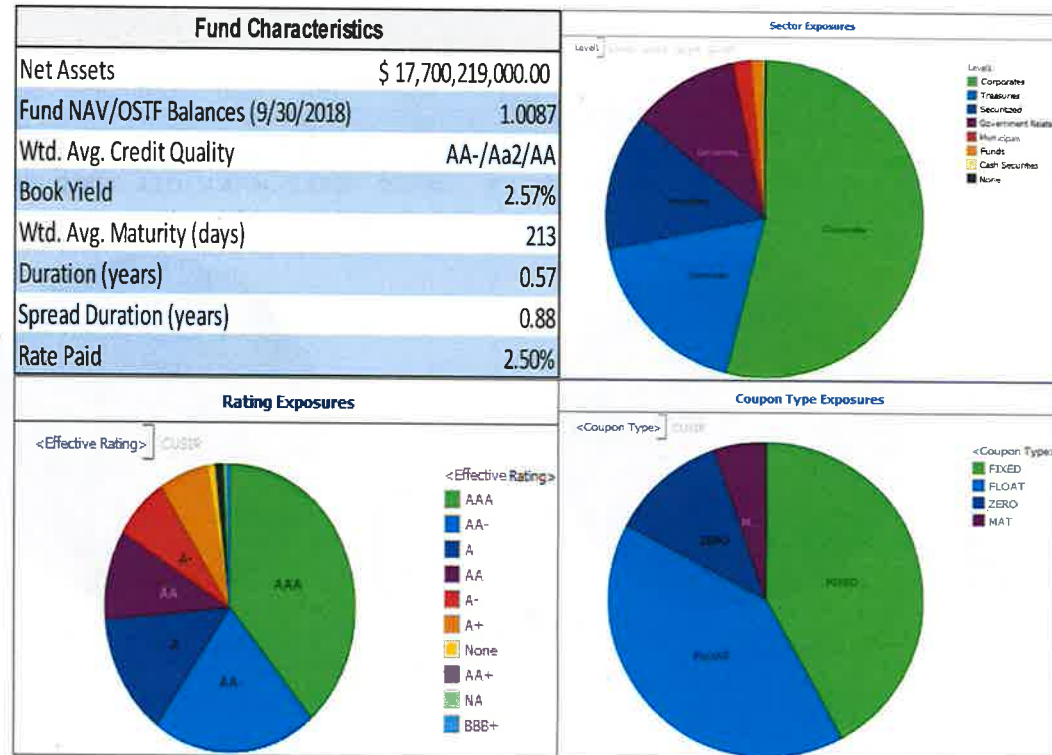
Manager – Oregon State Treasury

Benchmark – 3-Month U.S. T-Bill Index

	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
Oregon Short Term Fund*	17,700,219	0.15	0.56	1.61	1.76	1.52	1.38	1.16	1.05	1.05	1.19
91 Day Treasury Bill		0.17	0.51	1.48	1.68	1.20	0.90	0.68	0.55	0.42	0.35
Excess Return		-0.02	0.05	0.13	0.08	0.32	0.48	0.48	0.50	0.63	0.84

As of October 31, 2018

* Includes investments in Oregon Local Government Intermediate Fund



Oregon Intermediate Term Pool (OITP)

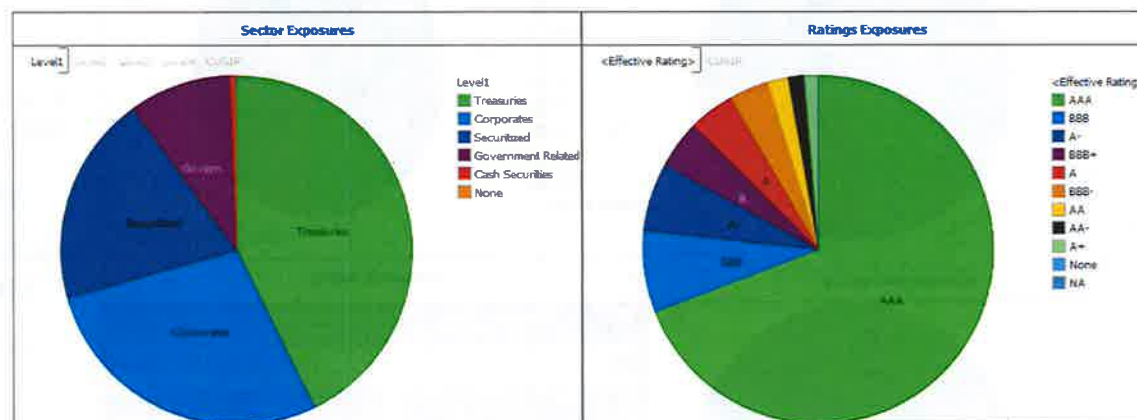
Objective – The Oregon Intermediate Term Pool (“OITP”) is a high-quality, intermediate-duration investment pool that is offered to Oregon State Agencies. The OITP investment objective is to maximize total return (i.e., principal and income) within stipulated risk parameters. OITP is not appropriate for funds needed to cover short-term (i.e., less than 1 year) needs. The OITP performance goal portfolio is to meet or outperform the total return of the Bloomberg Barclays 3-5 Year U.S. Aggregate Index.

Strategy – OITP is actively managed and comprises a diversified portfolio of investment grade fixed income investments as prescribed in the portfolio guidelines. OITP may have exposures, subject to diversification requirements, to several types of investment grade public debt market instruments denominated in U.S. dollars.

Manager – Oregon State Treasury

Benchmark – Bloomberg Barclays 3-5 Year Aggregate Index

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
OITP	114,750	3.32	3.31	3.29	3.69	AA	AA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year
Oregon Intermediate Term Pool*	114,750	-0.13	0.07	-0.56	-0.75	0.24	1.12	1.22	1.33	1.95
Oregon Intermediate Pool Custom Benchmark		-0.05	0.15	-0.73	-1.04	-0.23	0.84	1.01	1.14	1.18
Excess Return		-0.08	-0.08	0.17	0.29	0.47	0.28	0.21	0.19	0.77

As of October 31, 2018

* Includes Investments in the Oregon Short Term Fund



Oregon Local Government Fund (OLGIF)

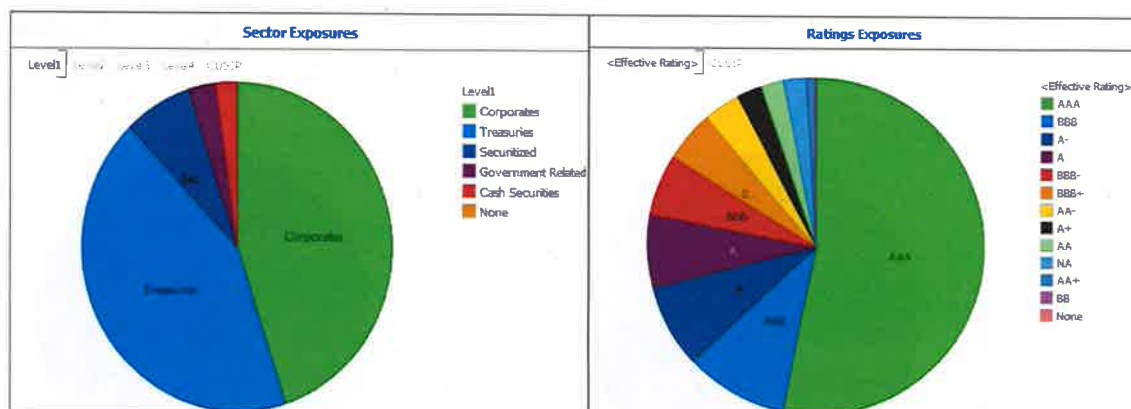
Objective – The Oregon Local Government Intermediate Fund ("OLGIF") is a commingled investment pool for local governments offered by Oregon State Treasury. The OLGIF investment objective is to achieve a total return (i.e., principal and income) greater than its benchmark over a full market cycle. OLGIF is expected to provide a risk and return profile consistent with a diversified investment-grade and intermediate-duration fixed income portfolio.

Strategy – OLGIF is actively managed to achieve a total return greater than the benchmark by investing in U.S. dollar-denominated investment grade fixed income securities as prescribed in the portfolio guidelines and consistent with the fund's benchmark.

Manager – Western Asset

Benchmark – Bloomberg Barclays 1-5 Year U.S. Government/Credit Index

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
Western Asset	220,955	3.23	3.13	2.60	2.66	AA-	AA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year
Oregon Local Government Investment Fund	220,954	-0.05	0.22	-0.09	-0.25	0.21
Bloomberg Barclays 1-5 Year Government/Credit Index		0.05	0.30	-0.02	-0.29	0.17
Excess Return		-0.10	-0.08	-0.07	0.04	0.04

As of October 31, 2018



Oregon Public University Fund (PUF)

Objective – The objective for the Public University Fund (“PUF”) is a high-quality fixed income portfolio that maximizes total return over a long-term horizon within stipulated risk parameters while providing adequate liquidity to meet participant cash flow needs. Based on historical market performance, total returns generated over extended periods are anticipated to be greater than returns realized in shorter-maturity strategies.

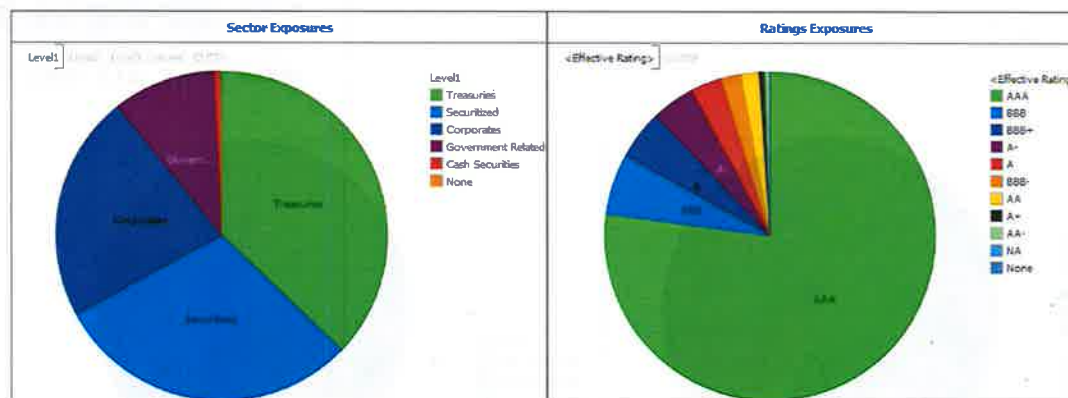
Strategy – PUF is actively managed to create a diversified portfolio of investment grade bonds invested over longer horizons than permitted in OSTF.

Manager – Oregon State Treasury

Benchmark – Custom benchmark comprised of:

- 75% Bloomberg Barclays Aggregate 3 - 5 Years
- 25% Bloomberg Barclays Aggregate 5 - 7 Years

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
PUF	372,988	3.33	3.37	3.70	4.02	AA+	AA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year
Public University Fund*	372,988	-0.14	0.03	-0.71	-0.93
Public University Fund Custom Benchmark		-0.11	0.08	-0.88	-1.14
Excess Return		-0.03	-0.05	0.17	0.21

As of October 31, 2018

* Includes Investments in the Oregon Short Term Fund



State Agency Separate Accounts

Objective – The investment objectives, constraints and requirements for individual agency accounts are bespoke. The over-arching Fixed Income Investment Policy that covers these separate agency accounts contains the following objectives: (1) determine what funds are eligible for discreet investment management; (2) define the role of fixed income within the OIC’s general investment policies for internally-managed funds; 3) establish specific short- and long-term policy objectives for these funds; and 4) outline strategies for implementing the OIC’s fixed income investment policies.

Strategy – Specific risk tolerances of state agency separate accounts vary, but all have the primary goal of achieving a maximum yield while preserving principal. The management strategy for state agency separate accounts eschews trading and adheres to a buy and hold discipline. Separate accounts are constructed to provide sufficient liquidity and be well-diversified amongst sectors and issuers with a weighted-average, minimum credit rating of single A. Staff conducts periodic meetings with agencies to review each agency’s specific portfolio objectives and liquidity needs to ensure individual strategies are still relevant.

Constraints – All state agency accounts overseen by OST are governed by OIC Policy INV 402: Internal Fixed Income Portfolio Investments. INV 402 limits investment exposures by product, concentration and rating. Additionally, each agency portfolio has bespoke guidelines which further restrict exposures and define investment goals.

	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
DAS Insurance*	133,655	0.08	0.43	1.15	1.23	1.23	1.38	1.40	1.35	1.21	1.90
DCBS Insurance**	114,426	0.08	0.42	1.13	1.14	1.13	1.45	1.48	1.58	1.35	2.10
DCBS Workers Benefit**	144,707	0.07	0.46	1.10	1.19	1.36	1.64	1.61	1.70	1.64	2.78
DHCS Elderley Housing	1,524	-1.75	-2.43	-3.74	-2.80	-1.89	0.98	1.78	3.35	2.97	5.14
DHCS Housing	14,390	-0.87	-0.71	-2.47	-2.17	-1.50	-0.71	-0.17	0.09	0.21	1.81
Lottery	117,481	-0.59	-0.78	-2.99	-2.68	-1.79	0.46	1.30	2.15	1.92	3.94
Veterans Affairs**	74,633	0.16	0.51	1.51	1.73	1.51	1.34	1.13	0.94	0.86	1.23
Oregon Department of Transportation*	859,419	0.21	0.60	1.72	1.99	1.62	1.38	1.35	1.35	1.51	2.67

As of October 31, 2018

* Includes Investments in the Oregon Short Term Fund

** Includes investments in both the Oregon Short Term Fund and the Oregon Intermediate Term Pool



State Accident Insurance Fund (SAIF)

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

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

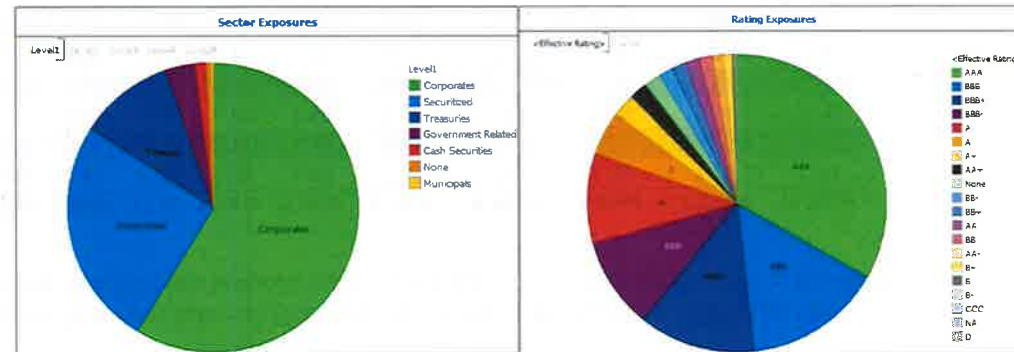
Managers – The SAIF portfolio is allocated to two external firms:

- Western Asset
- Wellington Management

Benchmark – SAIF’s investment objective and liability structure give rise to a uniquely created custom benchmark that is comprised of the following components:

- 50% Bloomberg Barclays U.S. Corporate Index
- 20% Bloomberg Barclays Mortgage Backed Fixed Rate Security Index
- 15% Bloomberg Barclays U.S. Government Index
- 10% Bloomberg Barclays Corporate Intermediate Index
- 5% Bloomberg Barclays Ba to B U.S. High Yield 2% Issuer Cap

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
SAIF FI	3,943,323	4.16	4.06	6.03	6.00	A	A+
Wellington	1,953,117	4.26	4.06	5.93	6.00	A	A+
Western Asset	1,950,058	4.09	4.06	6.20	6.00	A	A+
Pledged Securities	40,148	2.93		2.78		AAA	NA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
State Accident Insurance Fund	3,903,175	-1.05	-0.76	-2.58	-1.93	0.77	2.76	2.45	3.17	3.54	6.57
Wellington	1,953,117	-0.97	-0.60	-2.29	-1.73	0.86	2.72	2.55	3.21	3.60	6.77
Western Asset	1,950,058	-1.13	-0.92	-2.88	-2.14	0.67	2.79	2.35	3.12	3.49	6.37
State Accident Insurance Fund Custom Benchmark		-1.04	-0.90	-2.64	-2.21	0.05	1.90	1.81	2.46	2.77	5.66
Excess Return		-0.01	0.14	0.06	0.28	0.72	0.86	0.64	0.71	0.77	0.91

As of October 31, 2018



Common School Fund (CSF)

Objective – The objective for the Common School Fund (CSF) fixed income allocation is to provide portfolio diversification while achieving a total return representative of the broad, investment grade U.S. bond universe.

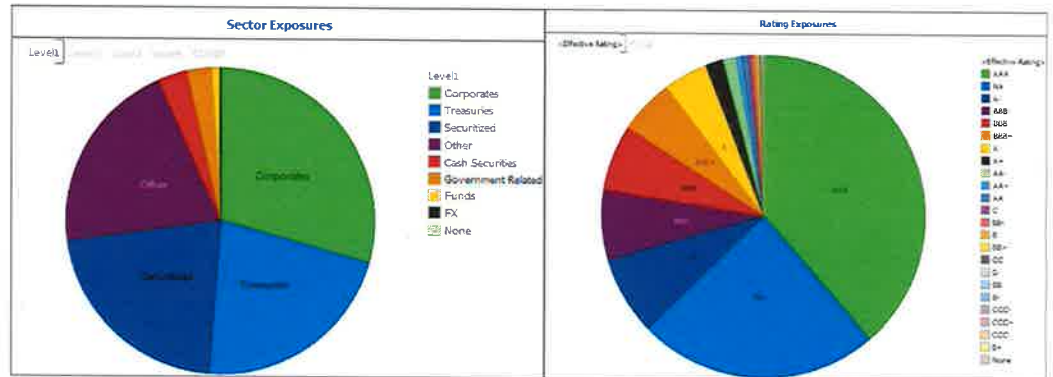
Strategy – To meet this objective, the CSF fixed income allocation is actively managed and invested in core U.S. fixed income holdings.

Managers – The CSF fixed income allocation is split between two external firms:

- Western Asset
- Wellington Management

Benchmark – Bloomberg Barclays U.S. Aggregate Bond Index

Portfolio	NAV (\$Ms)	Yield to Maturity		Duration		Effective Rating	
		Portfolio	Benchmark	Portfolio	Benchmark	Portfolio	Benchmark
CSF FI	432,088	3.24	3.60	5.11	5.90	AA-	AA
Western Asset	215,313	4.32	3.60	6.48	5.90	AA-	AA
Wellington	216,775	2.16	3.60	3.76	5.90	A+	AA



	Market Value (\$Ms)	1 Mth	3 Mth	YTD	1 Year	2 Year	3 Year	4 Year	5 Year	7 Year	10 Year
Common School Fund	432,088	-1.15	-1.18	-2.50	-2.08	0.13	1.82	1.66	2.37	3.00	5.88
Wellington		-0.97	-0.91	-2.17	-1.84	0.01	1.58	1.45	2.16	2.72	5.58
Western Asset		-1.32	-1.45	-2.81	-2.32	0.26	2.06	1.87	2.58	3.29	6.27
Bloomberg Barclays U.S. Aggregate Index		-0.79	-0.79	-2.38	-2.05	-0.59	1.06	1.21	1.84	2.13	4.35
Excess Return		-0.36	-0.39	-0.12	-0.03	0.72	0.76	0.45	0.53	0.87	1.53

As of October 31, 2018



Agenda

1. Background/Objectives

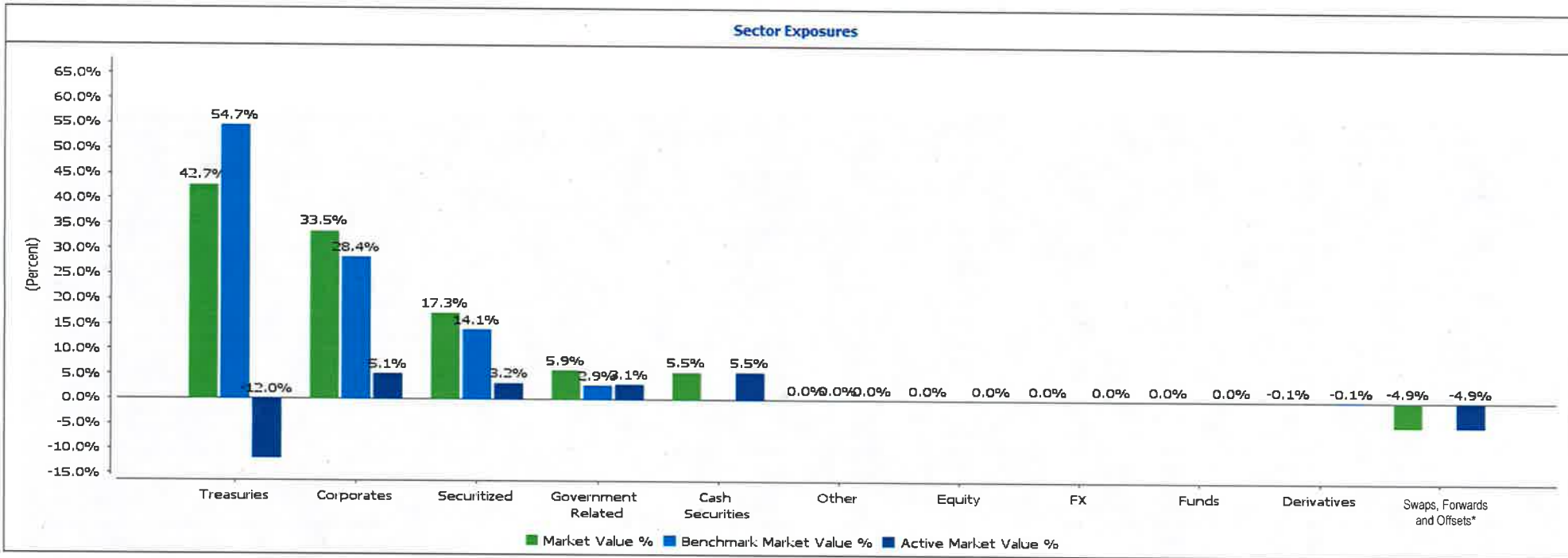
2. Looking Back and Looking Ahead

3. Fixed Income Program Overview

4. Discussion on Select Accounts

5. Appendix

OPERF Fixed Income Sector Exposure



*Includes interest rate swaps, currency forwards and other fixed income derivatives as well as related cash offsets associated with forwards, derivatives and certain positions in the "Cash Securities" category above.



Data as of October 31, 2018

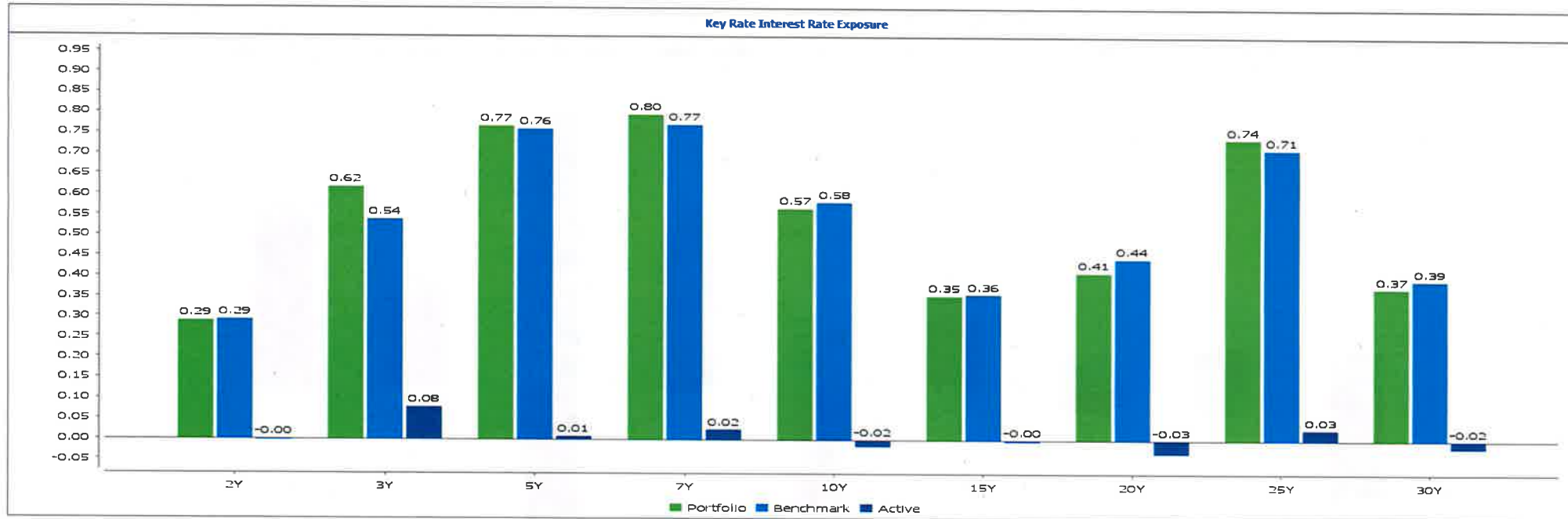
OPERF Fixed Income Issuer Exposure

Issuer Exposures										
Security Description	Market Value (m)	Market Value %	Duration	Duration Contribution	Spread Duration	Spread Duration Contribution	Yield to Worst	OAS	Effective Rating	
- FI	14,015,646	100.0%	5.06	5.06	2.79	2.79	4.01	115	AA-	
+ UNITED STATES TREASURY	5,833,449	41.6%	6.51	2.71	0.00	0.00	3.02	0	AAA	
+ FEDERAL NATIONAL MORTGAGE ASSOCIATION	1,290,505	9.2%	5.48	0.50	6.06	0.56	3.92	41	AAA	
+ OREGON STATE TREASURY	477,094	3.4%	0.57	0.02	0.88	0.03	2.70	25	AA	
+ GOVERNMENT NATIONAL MORTGAGE ASSOCIATION II	328,686	2.3%	3.98	0.09	4.53	0.11	3.55	41	AAA	
+ STATE STREET	256,591	1.8%	0.00	0.00	0.00	0.00	2.31	0		
+ FEDERAL HOME LOAN MORTGAGE CORPORATION - GOLD	253,159	1.8%	5.19	0.09	5.79	0.10	3.87	38	AAA	
+ CDS REF OB	87,887	0.6%	0.00	0.00	0.00	0.00	0.00	0		
+ GOLDMAN SACHS GROUP INC/THE	80,294	0.6%	4.88	0.03	5.16	0.03	3.95	103	A-	
+ BANK OF AMERICA CORP	75,091	0.5%	5.25	0.03	5.61	0.03	4.19	116	A-	
+ FEDERAL HOME LOAN BANKS	68,665	0.5%	0.07	0.00	0.07	0.00	0.97	-13	AAA	
+ JAPAN (GOVERNMENT OF)	63,470	0.5%	2.06	0.01	0.00	0.00	-0.14	6	A	
+ JPMORGAN CHASE & CO	62,781	0.4%	4.85	0.02	5.48	0.02	4.01	102	A	
+ UNITED STATES OF AMERICA	53,456	0.4%	4.74	0.02	0.00	0.00	3.00	-1	AAA	
+ FORD MOTOR CREDIT COMPANY LLC	48,687	0.3%	0.69	0.00	0.70	0.00	3.94	150	BBB+	
+ MEXICO (UNITED MEXICAN STATES) (GOVERNMENT)	43,515	0.3%	9.92	0.03	7.21	0.02	6.32	128	BBB+	
+ CITIGROUP INC	42,669	0.3%	5.83	0.02	6.38	0.02	4.33	128	BBB+	
+ MORGAN STANLEY	41,867	0.3%	5.11	0.02	5.33	0.02	4.14	113	A-	
+ KINDER MORGAN INC	39,446	0.3%	0.73	0.00	0.74	0.00	3.16	86	BBB-	
+ SEDGWICK CLAIMS MANAGEMENT SERVICES INC	39,244	0.3%	0.16	0.00	1.67	0.00	4.74	338	CCC+	
+ CASH & EQUIVALENTS	39,054	0.3%	0.00	0.00	0.00	0.00	2.51	0		
+ SELECTA GROUP BV	35,554	0.3%								
+ CVS HEALTH CORP	34,592	0.2%	5.56	0.02	6.67	0.02	4.35	124	BBB	
+ RESIDUAL FUNDING CORP PRINCIPAL STRIP	33,982	0.2%	1.68	0.00	1.71	0.00	2.92	7	AAA	
+ ALMONDE INC	33,042	0.2%	0.19	0.00	4.67	0.01	8.04	541	B-	
+ WELLS FARGO & COMPANY	32,041	0.2%	7.62	0.02	7.75	0.02	4.36	120	A	
+ GOVERNMENT NATIONAL MORTGAGE ASSOCIATION I	31,740	0.2%	3.99	0.01	4.44	0.01	3.84	55	AAA	

Data as of October 31, 2018



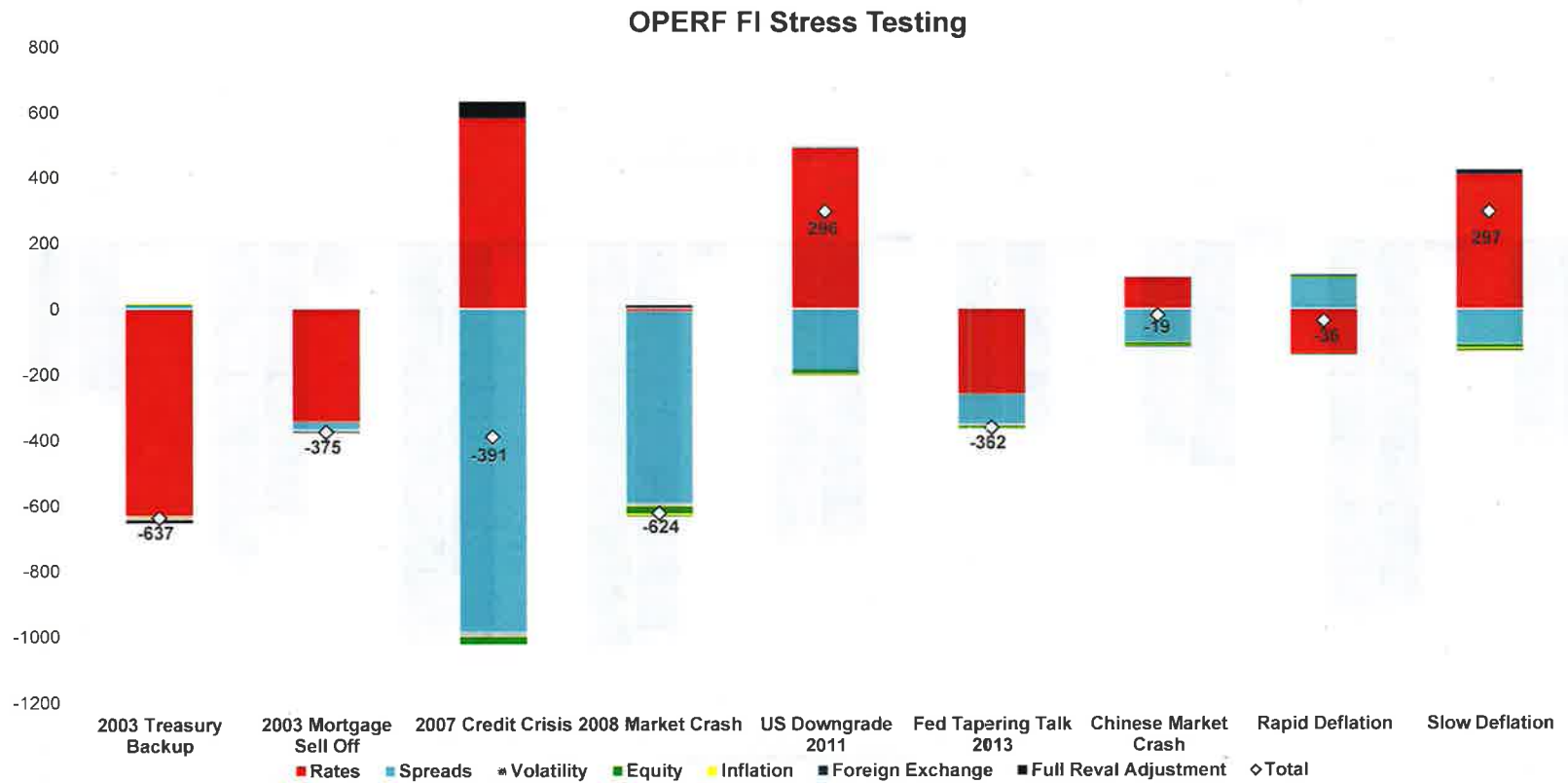
OPERF Fixed Income Interest Rate Exposure



Data as of October 31, 2018



OPERF Fixed Income Stress Testing



Data as of October 31, 2018



OPERF Non-Core Stress Testing

Scenario Definitions

1. 2003 Treasury Backup

Treasuries sell-off resulting in a loss on interest rate returns. Equities and alternatives benefit as investors seek returns in other investments.

2. 2003 Mortgage Sell Off

An unexpected rise in Treasury yields engendered a massive sell-off of mortgage backed securities (MBS), resulting in increased MBS spreads and decreased credit spreads. Convexity selling as mortgage durations lengthen.

3. 2007 Credit Crisis

The Credit Crisis of 2007 resulted from the bursting of the housing bubble, a consequence of an unprecedented expansion of credit that helped feed a boom in the housing market. The bursting of the bubble forced banks to write down bad loans caused by mortgage delinquencies. The crisis saw a massive decrease in Treasury yields and a widening of both MBS and credit spreads.

4. 2008 Market Crash

Credit & liquidity crisis and equity market crash set off by Lehman Brothers bankruptcy. Significant credit spreads widening caused by massive deleveraging.

5. 2011 US Downgrade

The period begins with an indication of a 50% chance of a US downgrade from S&P and ends with the Fed's Operation Twist announcement. The stock market incurred losses while bond markets saw gains due to flight to quality.

6. 2013 Fed Tapering Scare

The timing and magnitude of Bernanke's testimony in front of Congress surprised the market, causing market volatility and both equity and bonds to sell off. Emerging Markets suffered badly due to a flight of money to the US.

7. Chinese Market Crash

Chinese stock market crash beginning with the popping of the stock market bubble on June 12, 2015.

8. Rapid Deflation

Oil price drops which causes short-end of the inflation curve to drop. The short end of the nominal curve is held unchanged since nominal rates in the short end are already very low. Due to the new round of quantitative easing agency mortgage rate spreads widen.

9. Slow Deflation

Oil price is kept unchanged. The 10yr inflation rate drops 200 bps. The 10yr nominal rate drops to historical lows while short-term nominal rates are held constant. Agency mortgage rate spreads tighten.

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Legal Disclaimer Information

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Updated Jan 2016







**OREGON
STATE
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TAB 8 – Asset Allocations & NAV Updates

Asset Allocations at October 31, 2018

OPERF	Regular Account							Target Date Funds	Variable Fund	Total Fund
	Policy	Target ¹	\$ Thousands	Pre-Overlay	Overlay	Net Position	Actual	\$ Thousands	\$ Thousands	\$ Thousands
Public Equity	32.5-42.5%	37.5%	25,917,275	35.2%	(700,551)	25,216,724	34.3%	935,465	500,990	26,653,179
Private Equity	13.5-21.5%	17.5%	15,751,620	21.4%		15,751,620	21.4%			15,751,620
Total Equity	50.0-60.0%	55.0%	41,668,896	56.6%	(700,551)	40,968,344	55.7%			42,404,800
Opportunity Portfolio	0-3%	0.0%	1,664,545	2.3%		1,664,545	2.3%	1,256,222		1,664,545
Fixed Income	15-25%	20.0%	14,016,659	19.0%	2,052,330	16,068,988	21.8%			17,325,211
Real Estate	9.5-15.5%	12.5%	8,226,505	11.2%	(4,600)	8,221,905	11.2%			8,221,905
Alternative Investments	0-12.5%	12.5%	6,652,587	9.0%		6,652,587	9.0%			6,652,587
Cash ²	0-3%	0.0%	1,362,851	1.9%	(1,347,479)	15,673	0.0%		2,464	18,136
TOTAL OPERF		100%	\$ 73,592,042	100.0%	\$ -	\$ 73,592,042	100.0%	\$ 2,191,687	\$ 503,454	\$ 76,287,183

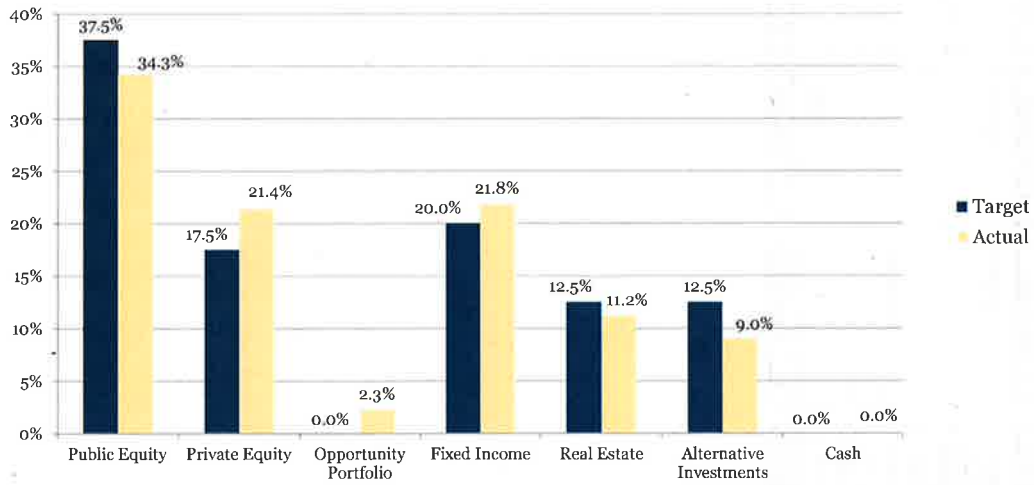
¹Targets established in June 2015. Interim policy benchmark consists of: 40% MSCI ACWI IMI Net, 22.5% Custom FI Benchmark, 20% Russell 3000+300bps (1 quarter lagged), 12.5% NCREIF ODCE net (1 quarter lagged), & 5% CPI+400bps.

²Includes cash held in the policy implementation overlay program.

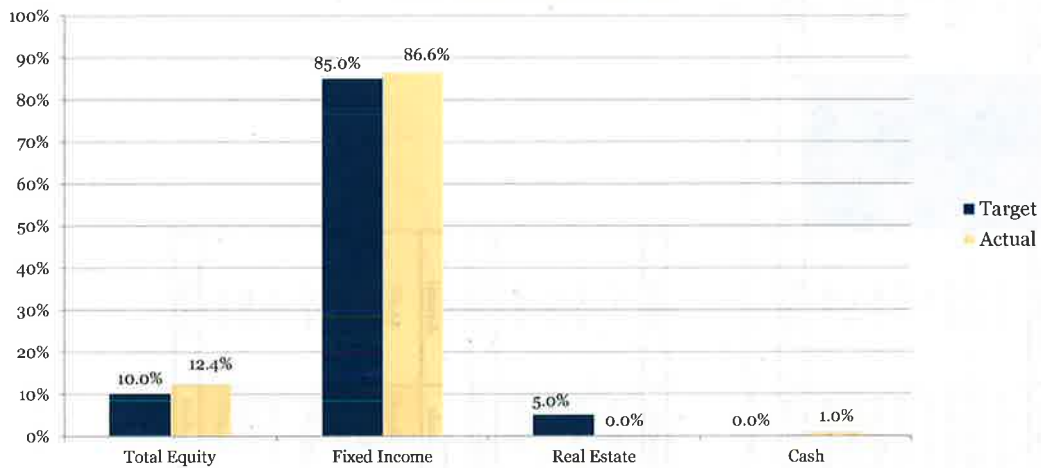
SAIF	Policy	Target	\$ Thousands	Actual
Total Equity	7-13%	10.0%	564,544	12.4%
Fixed Income	80-90%	85.0%	3,943,323	86.6%
Real Estate	0-7%	5.0%	-	0.0%
Cash	0-3%	0.0%	43,258	1.0%
TOTAL SAIF			\$ 4,551,125	100.0%

CSF	Policy	Target	\$ Thousands	Actual
Global Equities	40-50%	45.0%	719,496	44.5%
Private Equity	8-12%	10.0%	215,119	13.3%
Total Equity	58-62%	55.0%	934,615	57.8%
Fixed Income	25-35%	25.0%	432,088	26.7%
Real Estate	8-12%	10.0%	105,759	6.5%
Diversifying Strategies	8-12%	10.0%	88,914	5.5%
Cash	0-3%	0.0%	54,428	3.4%
TOTAL CSF			\$ 1,615,802	100.0%

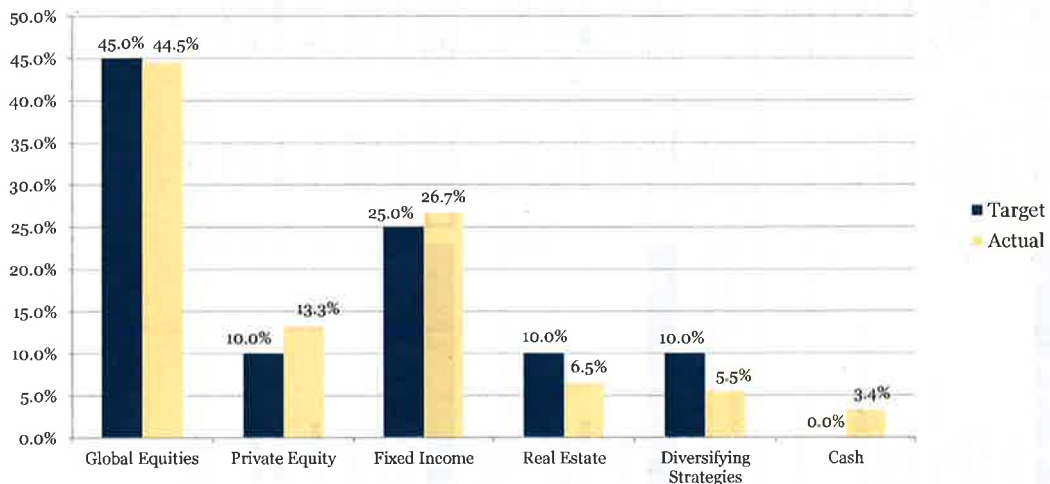
OPERF Asset Allocation



SAIF Asset Allocation



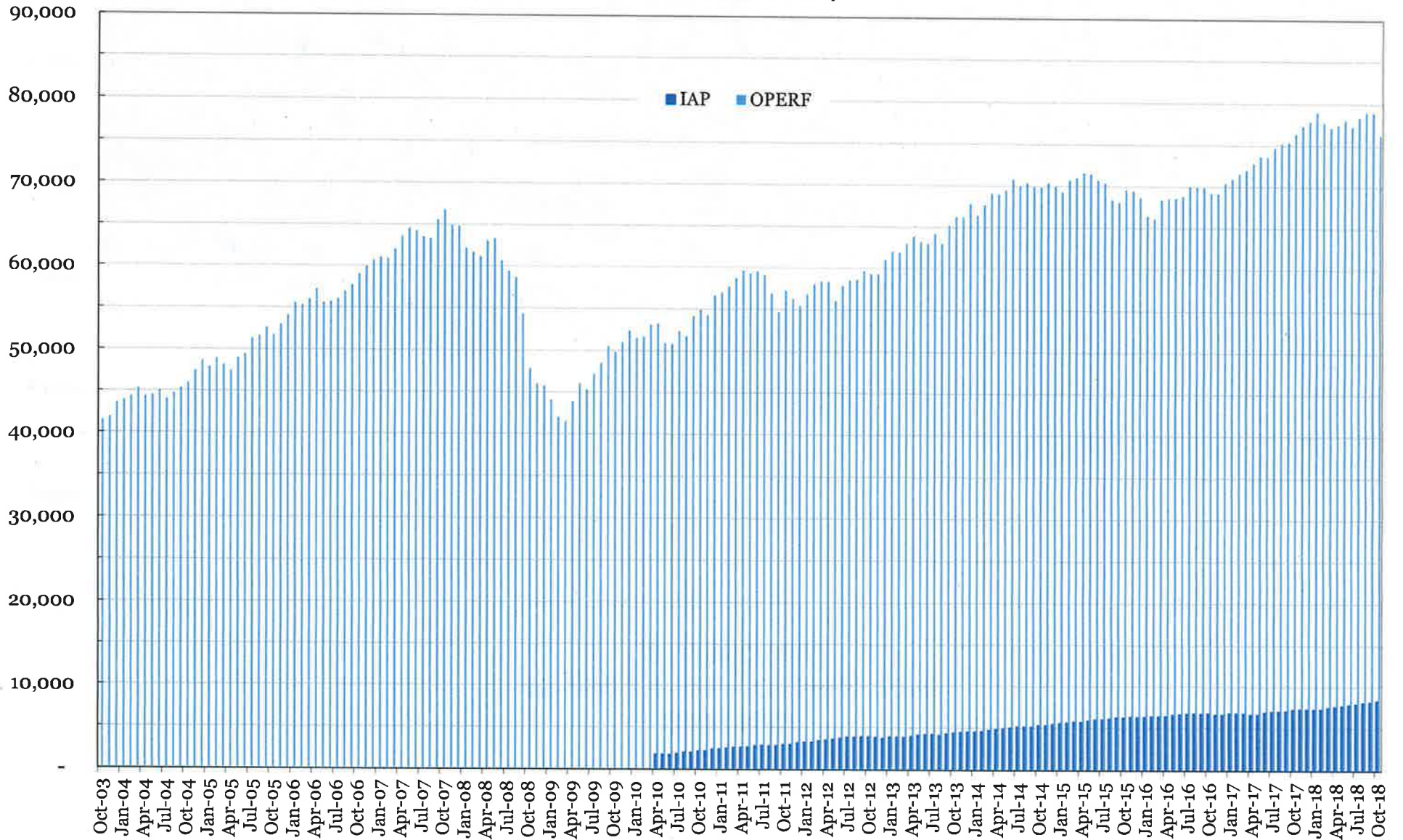
CSF Asset Allocation



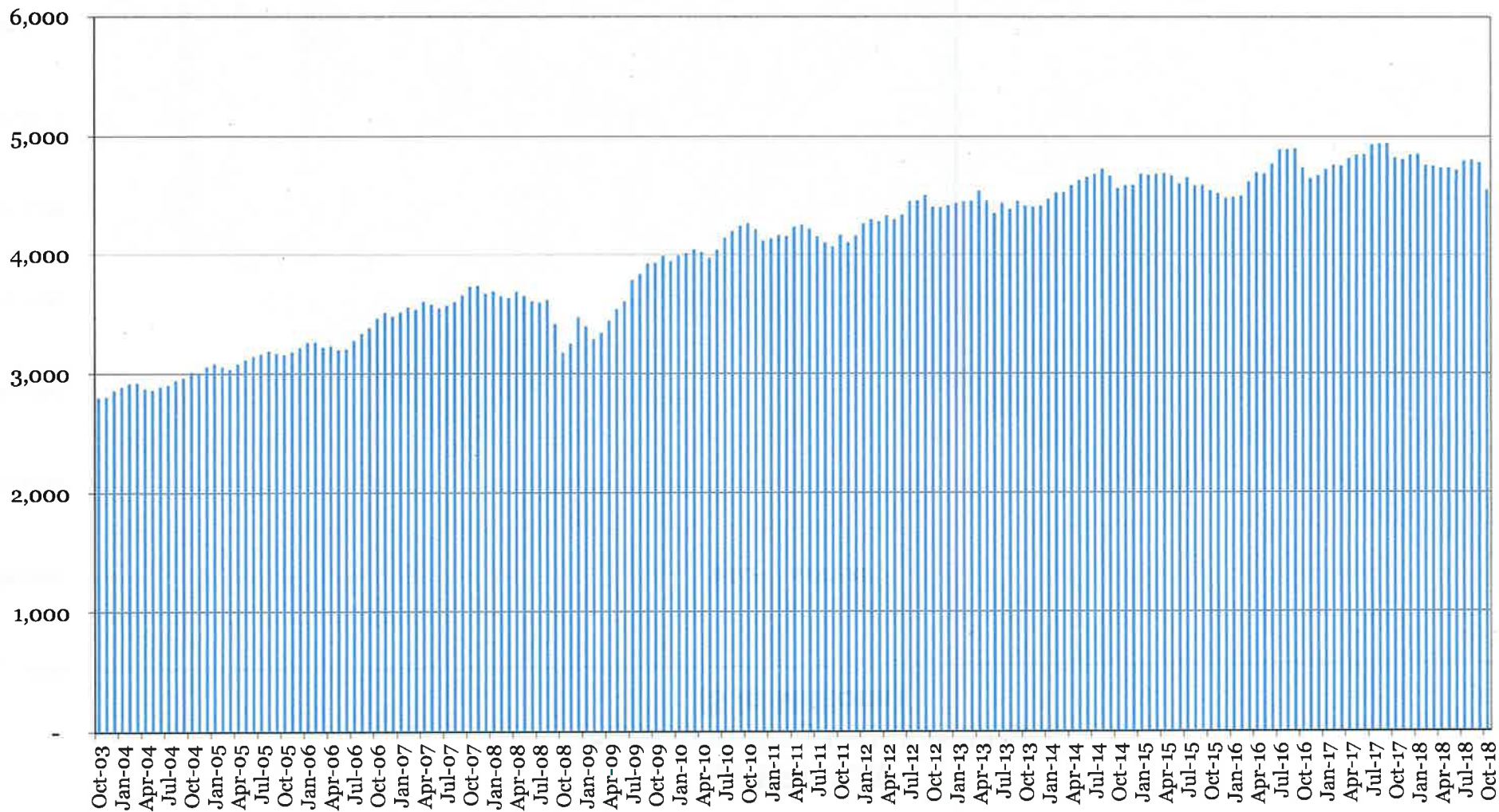
OPERF NAV

15 years ending October 2018

(\$ in Millions)



SAIF NAV
15 years ending October 2018
(\$ in Millions)



TAB 9 – Calendar — Future Agenda Items

2019 OIC Forward Calendar¹ and Planned Agenda Topics

January 31, 2019:	2020 OIC Calendar Approval Alternatives Portfolio Investment Recommendation Private Equity Investment Recommendation Private Equity Program Review Placement Agent Report IAP Update
March 13, 2019:	Real Estate Portfolio Review OIC Governance Discussion Q4 2018 OPERF Performance & Risk Report CSF Annual Review
April 24, 2019:	OPERF Asset Allocation & Capital Market Assumptions Update Securities Lending Update OPERF SAA Overlay Review OPERF Liquidity Analysis SAIF Annual Review
June 5, 2019	Alternatives Portfolio Review Q1 OPERF Performance & Risk Report OIC Governance Discussion Operations Update
August 7, 2019	Opportunity Portfolio Review OSGP Annual Review Corporate Governance Update
September 18, 2019	CEM Benchmarking Report Q2 OPERF Performance & Risk Report OSGP Annual Review
October 30, 2019	General Consultant Recommendation Currency Overlay Review Public Equity Program Review
December 11, 2019	Fixed Income Program Review Q3 OPERF Performance & Risk Report

¹ All meetings on Wednesday, except the first meeting on Thursday, January 31.