ALASKA RETIREMENT MANAGEMENT BOARD

April 4-5, 2019

Board of Trustees Meeting

Alaska State Museum
Lecture Hall
395 Whittier Street
Juneau, AK
(907) 465-2901

Teleconference: 1-800-315-6338
Access Code: 12762#

THURSDAY, APRIL 4, 2019

I. **9:00 am** **Call to Order**

II. **Roll Call**

III. **Public Meeting Notice**

IV. **Approval of Agenda**

V. **Public/Member Participation, Communications, and Appearances**
(Three Minute Limit)

VI. **Approval of Minutes – December 11-12, 2018**
January 11, 2019

VII. **9:10** **Election of Officers**
Vice Chair Position

VII. **9:15** **Staff Reports**

1. Retirement & Benefits Division Report
   A. Staff Introductions
   B. Membership Statistics (informational)
   C. Buck Invoices (informational)
   Ajay Desai, Director, Division of Retirement & Benefits
   Kevin Worley, CFO, Division of Retirement & Benefits

2. Treasury Division Report
   A. Staff Introductions
   Pamela Leary, Director, Treasury Division

3. Calendar/Disclosures
   Stephanie Alexander, Liaison Officer

4. CIO Report
   Bob Mitchell, Chief Investment Officer

5. Fund Financial Presentation and Cash Flow Update
   Scott Jones, Comptroller, DOR
   Kevin Worley, CFO, Division of Retirement & Benefits

VIII. 9:45 Reports

6. Chair Report, *Robert Johnson*

7. Committee Reports
   - A. Audit Committee, *Robert Johnson, Chair*
   - B. Operations Committee, *TBD, Chair*
   - C. Defined Contrib. Plan Committee, *Bob Williams, Chair*
   - D. Retiree Health Plan Advisory Board, *Gayle Harbo*
   - E. General Consultant Evaluation Committee
   - F. Real Assets Consultant Evaluation Committee

8. Legal Report, *Stuart Goering, Assistant Attorney General*

10:00–10:30 9. Performance Measurement – 4th Quarter
Paul Erlendson and Steve Center, Callan LLC

10:30AM – 10 MINUTE BREAK

10:40-11:25 10. PERS/TRS Asset Liability Study
Jay Kloepfer, Callan LLC

11:25-12:00 11. What is Factor-Based Investing?
Greg Behar, Legal & General

LUNCH – 12:00PM - 1:15PM

1:15–1:45 12. Blending Alpha-Seeking, Factor and Indexing Strategies
Sara Shores & Laura Champion, BlackRock

1:45–2:15 13. Overdiversification
Gaurav Mallik, Sonya Park, and Robert Shapiro
State Street Global Advisors

2:15 PM – 10 MINUTE BREAK

2:25 – 3:25 14. Risk Parity Presentation
Gregor Andrade, AQR Capital Management, LLC

RECESS

FRIDAY, APRIL 5, 2019

9:00		Call to Order
9:00–9:45	15.	Portfolio Risk Management (truView +) *Zach Hanna, Deputy Chief Investment Officer*
9:45-10:30	16.	CIO Update *Bob Mitchell, Chief Investment Officer*

10:30AM – 5 MINUTE BREAK

10:35–11:00	17.	Manager Selection / Monitoring & Watch List *Shane Carson, Manager of External Equity and Defined Contribution Investments*
11:00–11:30	18.	International Equities: Review of the Investment Management Lifecycle *Daniel Morgan & Michael Putica, State Street Global Markets*
11:30–12:00	19.	IAC Presentation – ARMB & Fixed-Income *Bob Shaw, ARMB Investment Advisory Council Member*

LUNCH – 12:00PM - 1:15PM

1:15-1:45	20.	Cyber Security Update *Scott Jones, Comptroller* *Ajay Desai, Director, Division of Retirement & Benefits* DRB IT Modernization Status Report *Ajay Desai, Director, Division of Retirement & Benefits* Office of Information Technology Security *Mark Breunig, Chief Technology Officer, OIT*
1:45–2:45	21.	Executive Session

2:45PM – 10 MINUTE BREAK

2:55–3:05 22. Procurement Actions
- A. RFP General Consultant 19-006
- B. RFP Real Assets Consultant 19-007
- C. RFS Investment Advisor 19-009

3:05– 23. Investment Actions
- A. Manager Watch List
  Resolution 2019-01
- B. DC Real Assets
- C. Investment Guideline Revision
  Resolution 2019-02
- D. Manager Termination Action Items

Bob Mitchell, Chief Investment Officer

IX. Unfinished Business

X. New Business
Creation of the Investment Advisory Council Committee

XI. Other Matters to Properly Come Before the Board

XII. Public/Member Comments

XIII. Investment Advisory Council Comments

XIV. Trustee Comments

XV. Future Agenda Items

XVI. Adjournment

NOTE: Times are approximate and every attempt will be made to stay on schedule; however, adjustments may be made.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
MEETING

Location:
Atwood Building
550 West Seventh Avenue
Anchorage, Alaska

MINUTES OF
December 13-14, 2018

Thursday, December 13, 2018

CALL TO ORDER

CHAIR ROBERT JOHNSON called the meeting of the Alaska Retirement Management Board (ARMB) to order at 9:03 a.m.

ROLL CALL

Eight ARMB trustees were present at roll call to form a quorum.

Board Members Present
Robert Johnson, *Chair*
Gail Schubert, *Vice Chair*
Gayle Harbo, *Secretary*
Tom Brice
Kristin Erchinger
Commissioner John Quick
Commissioner Bruce Tangeman
Norman West
Bob Williams - Arrived Late

Board Members Absent
None

Investment Advisory Council Members Present
Dr. William Jennings
Dr. Jerrold Mitchell

Investment Advisory Council Members Absent
Robert Shaw (Present December 14, 2018)

Department of Revenue Staff Present
Bob Mitchell, Chief Investment Officer

Scott Jones, State Comptroller
Pamela Leary, Director, Treasury Division
Nicholas Orr, Manager of Real Assets
Mark Moon, Manager Internal Public Equity
Shane Carson, Manager of External Equity and Defined Contribution Investments
Stephanie Alexander, Board Liaison

Department of Administration Staff Present
Ajay Desai, Director, Division of Retirement and Benefits (DRB)
Kathy Lea, Chief Pension Officer, DRB
Christina Maiquis, Acting Chief Financial Officer, DRB (phone)

Consultants, Invited Participants, and Others Present
Walt McGhee, American Century Investments
Patricia Ribeiro, American Century Investments
Niamh Fitzgerald, BMO Global Asset Management
Chris Jenks, BMO Global Asset Management
Patrick Dimick, Bridgewater Associates, LP
Joel Whidden, Bridgewater Associates, LP
Steve Center, Callan LLC
Paul Erlendson, Callan LLC
Gary Robertson, Callan LLC
Stuart Goering, Department of Law, Assistant Attorney General
Kelly Carbone, DePrince, Race, & Zollo, Inc.
Greg Ramsby, DePrince, Race, & Zollo, Inc.
Randy Renfrow, DePrince, Race, & Zollo, Inc.
Liz Davidsen, Empower
Melissa Beedle, KPMG
Beth Stuart, KPMG
Aidan Nicholson, Mondrian Investment Partners Limited
Todd Rittenhouse, Mondrian Investment Partners Limited
Ashraf Haque, Sands Capital Management
Luke Iglehart, Sands Capital Management

PUBLIC MEETING NOTICE

STEPHANIE ALEXANDER, Board Liaison, confirmed public meeting notice requirements had been met.

APPROVAL OF AGENDA

MS. HARBO moved to approve the agenda. MS. ERCHINGER seconded the motion.

MS. ERCHINGER, as Chair of the Actuarial Committee, moved to table Item 10, the action on Resolution 2019-19, to be discussed at a meeting to be scheduled in January.

A roll call vote was taken, and the motion to table Resolution 2019-19 passed unanimously.

The agenda, as amended tabling Item 10, was approved without objection.

PUBLIC/MEMBER PARTICIPATION, COMMUNICATIONS, AND APPEARANCES

None

APPROVAL OF MINUTES: September 20 - 21, 2018

MS. HARBO moved to approve the minutes of the September 20 - 21, 2018 meeting. MS. ERCHINGER seconded the motion.

The minutes were approved without objection.

ELECTION OF OFFICERS

MS. HARBO moved to nominate and approve CHAIR JOHNSON to serve another term in the position of Chair of the ARM Board. MS. ERCHINGER seconded the motion.

The motion passed unanimously.

MS. HARBO moved to nominate and approve VICE-CHAIR SCHUBERT to serve another term in the position of Vice-Chair of the ARM Board. MS. ERCHINGER seconded the motion.

The motion passed unanimously.

MS. ERCHINGER moved to nominate and approve MS. HARBO to serve another term in the position of Secretary of the ARM Board. MR. BRICE seconded the motion.

The motion passed unanimously.

STAFF REPORTS

1. RETIREMENT & BENEFITS DIVISION REPORT

CHAIR JOHNSON introduced Director AJAY DESAI and Acting Chief Financial Officer CHRISTINA MAIQUIS to present the Retirement & Benefits Division Report. MS. MAIQUIS informed the Membership Statistical Report, Buck Report, and Health Reimbursement Arrangement information are included in the Board packet. Through September 30, 2018, Public Employees' Retirement Systems (PERS) saw an increase in active members of 248, and Teachers' Retirement System (TRS) saw an increase in active members of 1,046. The retiree accounts expanded as expected, with an increase in PERS of 298 and an increase in TRS of 307.

MS. MAIQUIS presented the summarization of the Buck invoice for the first quarter, ended September 30, 2018. The work related to the actuarial evaluation, audit requests, and GASB requirements. Buck completed new work for this quarter relating to the fiscal year 2020 final PERS/TRS contribution rates.
MS. ERCHINGER inquired if the fees relating to GASB 67, 68, 74, and 75 were anticipated to be recurring expenses. MS. MAIQUIS anticipates the fees to continue going forward, unless there is a change in the GASB requirements.

MS. MAIQUIS advised the health reimbursement arrangement annual contribution amount for FY20 is calculated at $2,121.60. This is an increase of .89% over last year.

2. TREASURY DIVISION REPORT

CHAIR JOHNSON invited Treasury Division Director PAMELA LEARY to present the Treasury Division Report. MS. LEARY commented on the change in Administration. The new Commissioners were introduced at the beginning of the meeting. MS. LEARY informed a majority of Treasury Division staff had to submit resignation letters during the normal course of a change in Administration and MS. LEARY was pleased to announce the staff remains in its same construct as before the change in Administration.

COMMISSIONER TANGEMAN commented on the importance of the Treasury staff being able to continue their work. He was pleased with the success of the efforts in completing the process quickly.

MS. LEARY advised the Administration's budget is due to be released tomorrow. She will provide a report at the next full Board meeting.

CHAIR JOHNSON requested an interim report be provided by MS. LEARY during tomorrow's meeting, if at all possible.

3. CALENDAR/DISCLOSURE

MS. ALEXANDER stated the disclosure memo is included in the packet and there are no transactions requiring additional review. The 2018 calendar to-date and the 2019 calendar are also provided in the packet. MS. ALEXANDER advised she will poll the members to determine the best date for the potential January 2019 meeting.

4. CIO REPORT

BOB MITCHELL, Chief Investment Officer (CIO), reviewed the report for September and October 2018, entitled Summary of Portfolio Moves. The portfolio has remained within its bands during this time period. A new column has been added called Authority, which references the Board resolutions that give authority for the CIO to make the corresponding changes. There were a total of five rebalancing transactions. Three related to liquidating assets to satisfy outflows for the Military Fund on September 25, October 25, and October 30. The October 30 transaction was accidentally truncated while converting the data files for the

presentation from Excel to PDF. The remaining two transactions were internal rebalancing to equalize the relative asset allocation of the plans.

MR. MITCHELL discussed the next section; Futures, Rolls and Adjustments. The new addition in the report is the request by MR. WILLIAMS to include the dollar amount of the transactions. Any positive number shown represents money flowing into the strategy. Any negative number shown represents money flowing out of the strategy. The current transactions reflect the normal quarterly activity of the derivative instruments, rolling the existing positions from the September expiry to December expiry. Item 10 shows the cash flows related to margins for the derivatives employed in the program.

MR. MITCHELL continued the presentation describing the activities listed under Investment Actions. Items 11, 12, 34, and 35 were highlighted because they correspond to the ARM Board's concurrence and direction for staff to liquidate the TIPS portfolio. MR. MITCHELL gave a general characterization of the remaining transactions. The run rate of the portfolio is the difference between contributions and benefit payments. The portfolio experienced cash outflows of approximately $200 million. During this period, staff funded two tactical asset allocation mandates approved by the ARM Board in March, one to Fidelity for $200 million and one to Pine Bridge for $200 million. Funding for this allocation came from liquidations in MLPs, domestic and international equities, treasuries, and opportunistic fixed income.

MR. MITCHELL explained the portfolio has experienced challenges to-date during the fiscal year. The equity market has been down about 8% overall, with small cap allocations lagging large cap allocations. The broad portfolio was approximately $26.5 billion at the beginning of the fiscal year and is now closer to $25 billion. The portfolio asset allocation is well within its bands, but as a result of the relative movement, fixed income is slightly overweight. Staff continues to monitor the situation.

MR. MITCHELL continued the presentation describing the Watch List section. At the request of MR. WEST, a listing of all of the managers currently on the watch list has been added to the report. MR. MITCHELL informed he will fulfill the request for staff to conduct a presentation regarding the watch list at the April Board meeting. He noted the manager Tortoise Capital Advisors was placed on the watch list about a year ago due to the qualitative reasons of the sale of the company by its founders to the firm Lovell Minnick. Staff has been in contact with Tortoise on multiple occasions, including an onsite visit in June. Staff has spent a considerable amount of time reviewing the firm and has come to the conclusion the portfolio managers are now more incented to perform for ARM Board's account than previously. Because of this degree of comfort, staff recommends removing Tortoise from the watch list at this time.

VICE-CHAIR SCHUBERT moved to remove Tortoise Capital Advisors from the watch list based on staff's recommendations. MS. HARBO seconded the motion.

The motion passed unanimously.

MR. MITCHELL continued the presentation informing members that as part of the private equity investment guidelines, he has discretion as CIO to commit up to $100 million in a private equity limited partnership investment. MR. MITCHELL advised he made a commitment during this time period of $40 million to the Warburg Pincus Global Growth fund. There were no questions from members regarding the transaction. MR. MITCHELL announced the founder of Almanac, MR. MCGURK, retired from Almanac a number of years ago and recently passed away. Staff does not believe his passing has a direct impact on the portfolio.

5. FUND FINANCIAL PRESENTATION AND CASH FLOW UPDATE

CHAIR JOHNSON introduced State Comptroller SCOTT JONES and MS. MAIQUIS to present the Fund Financial Report. MR. JONES advised the Fund Financial Report, as of October 31, 2018, was included in the packet. He noted the plans were up in November, with the PERS Plan at $18.3 billion, TRS at $8.9 billion, Judicial Retirement System (JRS) at $210 million, National Guard and Naval Militia Retirement System (NGNMRS) at $39 million, SBS at $3.9 billion, and Deferred Comp at $932 million. The total nonparticipant-directed plans were at $25.9 billion and the participant-directed plans were at $6.3 billion, for a total of $32.3 billion. Internal investments totaled $8.8 billion. Since then, through December 10th, the plans were down and the fiscal-year-to-date income was at a loss of $490 million. The nonparticipant-directed plans totaled $25.4 billion.

MS. MAIQUIS reported total contributions, as of the end of October 2018, were $633 million and expenditures were $778 million, for a net withdrawal of $145 million. The Division received $16.4 million in Medicaid drug reimbursement subsidies within this period for PERS, TRS, and JRS Plans combined. There were no questions.

REPORTS

6. CHAIR REPORT

CHAIR JOHNSON offered a warm welcome to the new Trustees, COMMISSIONER QUICK and COMMISSIONER TANGEMAN. CHAIR JOHNSON reminded the Board about discussions at the previous meeting regarding the need to select a panel for general consultant evaluation contract review. CHAIR JOHNSON proposed the panel consist of MR. MITCHELL, MR. BRICE, MS. HARBO, Chief Pension Officer KATHY LEA, and himself. There was no objection.

CHAIR JOHNSON noted the same review process has to be formed for the Real Assets Consultant Evaluation Committee. He proposed the panel consist of MS. ERCHINGER, STEVE SIKES, and MR. MITCHELL. There was no objection.

CHAIR JOHNSON discussed the five resolutions, 2018-14 through 2018-18, that were presented and tabled the first day of the September Board meeting. The content of 2018-15 through 2018-18 focused on revised investment guidelines. The second day of the September Board meeting, Resolutions 2018-14 through 2018-16 were voted upon and passed. There

was no indication in the minutes of the disposition of Resolutions 2018-17 and 2018-18. CHAIR JOHNSON conferred with MS. ALEXANDER and MR. MITCHELL, and the best recollection is there was discussion before the Board to pull Resolutions 2018-17 and 2018-18 from consideration due to drafting issues. CHAIR JOHNSON noted, for the record, Resolutions 2018-17 and 2018-18 were never presented and never passed. The proposed Resolution 2018-20 being brought before the Board today embraces some of the same subject matters. There were no comments, nor objections from Trustees. CHAIR JOHNSON expressed appreciation to STUART GOERING, Assistant Attorney General, for bringing attention to this matter, and to MS. ALEXANDER for her assistance in addressing the issue.

CHAIR JOHNSON reported on the continued discussions regarding the creation of what he calls an Operations Committee, which would combine the preexisting Salary and Budget Committees, and add the subject of policies and procedures. CHAIR JOHNSON believes Callans' findings and recommendations from their recent review of policies and procedures provide an impetus for the creation of this committee. He informed no actions are prepared for today. CHAIR JOHNSON suggested the Salary and Budget Committees have a joint meeting prior to the April Board meeting to consider the recommendation to the full Board to create the Operations Committee. CHAIR JOHNSON noted this item may fall within the category of other matters to come before the Board or new matters to be considered. There were no questions.

7. COMMITTEE REPORTS

A. Audit Committee

CHAIR JOHNSON, as Chair of the Audit Committee, reported the Audit Committee met yesterday and auditor KPMG delivered clean opinions regarding all the plans. Discussion occurred focused on internal controls relating to audits and data produced from both DOR and DRB. CHAIR JOHNSON informed KPMG does not opine on the sufficiency of internal controls, but will comment if they observe any issues. No issues were observed. KPMG made note the ARM Board and the Committee share a fiduciary obligation for oversight of the establishment and maintenance by management of programs and controls designed to prevent, deter and detect fraud. The Committee requested input from DOR and Administration during the next Committee meeting responding to the cost/benefits of an internal audit program.

CHAIR JOHNSON conveyed the recent turnover in critical operations within DRB and noted the decrease in the number of audits undertaken with respect to subdivision. CHAIR JOHNSON reiterated the funding for these efforts, whether it be internal auditing in the future or ensuring key staff be retained, comes from the Trust. It is not a general fund issue. CHAIR JOHNSON noted the Board has expressed repeatedly their support of Trust funds being expended to accomplish appropriate oversight to conduct audits and to undertake efforts on behalf of beneficiaries.

B. Actuarial Committee

MS. ERCHINGER, Chair of the Actuarial Committee, informed the Committee met yesterday and covered three primary presentations. The presentation given by MR. GOERING regarding liability layering and the possibility of amortizing each year's unfunded liability over a new 25-year closed period will be discussed under a separate agenda item later in today's meeting.

The presentations by Buck, the primary actuary, and by GRS, the review actuary, focused on the 2017 Experience Study and review of the proposed assumption changes. MS. ERCHINGER described the proposed assumption changes. She explained the overall investment return assumption has been 8% for a period of time. The 8% is comprised of a real return assumption of 4.88% and an inflation assumption of 3.12%. After much consideration and support from the Committee, Buck, and GRS, the Committee recommends a reduction to the inflation assumption from 3.12% to 2.50%. This produces an investment return assumption of 7.38%. The recommendation falls within the acceptable assumption ranges of both the actuary and review actuary.

The change in the inflation rate will result in a change to the payroll growth rates. The previous payroll growth rate assumption was inflation plus 50 basis points or 3.62%. The Committee recommends reducing the payroll growth rate to inflation plus 25 basis points or 2.75%. MS. ERCHINGER discussed the change in the inflation assumption and payroll growth rates will have a fairly large impact on future payroll base assumptions. These are a significant consideration in setting the contribution rate. Lower payroll growth over time will necessitate higher contribution rates.

MS. ERCHINGER commented the Committee postponed the recommendation to the Board today with respect to Resolution 2018-19 in order to provide the two new Trustees a sufficient amount of time to review the changes prior to the vote. MS. ERCHINGER commented Buck did a great job developing the summary of documents given to the Committee regarding the proposed changes. These are available for review.

C. Defined Contribution Plan Committee

MR. WILLIAMS reported the Defined Contribution Committee met yesterday and heard a presentation by SHANE CARSON, which focused on the real assets investment options and the process underway to replace the $148 million currently invested in the U.S. Real Estate Trust Index and the U.S. TIPS Index. MR. WILLIAMS noted the Committee also heard a presentation from MS. LEA and representatives from Empower regarding efforts to prepare for the over 11,000 eligible DC retirements that could occur in the near future. Discussions ensued regarding development of effective outreach to ensure members are receiving and reviewing important information.

MR. WILLIAMS noted ongoing marketing in support of the open DC option for municipalities and school districts. Currently, only nine school districts, out of 54, are participating. Efforts will continue with the Department of Education to collaborate on ways to communicate the availability of this very competitive option.

MS. HARBO believes some of the challenges have been with employers not providing the information to employees and not setting aside time to educate employees on the importance of investing for their future. She feels it is critical for employers to assist in the process. Other challenges include individuals who choose not to participate in investments plans and individuals who do not seem interested in learning about the options available.

MR. WILLIAMS hopes the ongoing targeted focus will address some of these specific issues identified. He noted there was public testimony at the end of the Committee meeting yesterday concerning the website. The comments were timely because the website is in the process being updated.

MS. HARBO inquired as to status of the wait time for receiving an appointment with an Empower counselor. MR. WILLIAMS noted the issue was addressed in the report because there were times it took up to two months to get an appointment with a counselor. MS. LEA indicated there have been issues with DRB and Empower regarding scheduling counseling appointments. She informed DRB has added non-permanent staff to relieve some of the duties of the counselors in order to provide more time for individual counseling. LIZ DAVIDSEN, State Director for Empower, stated there are currently three retirement plan advisors available for one-on-one counseling and two more advisors will be added in January to help with the demand. Assessments will be ongoing to determine adequate staffing needs.

CHAIR JOHNSON announced all the committees are open for any Trustee to join. There are no quorum restrictions. He urged the Commissioners to participate in the Audit and Actuarial Committees because of the lengthy discussions that occur regarding decisional processes.

8. LEGAL REPORT

MR. GOERING reported on the employment status, during the change of Administration, of the Department of Law attorneys who advise the ARM Board and DRB. Essentially, all of the Department of Law attorneys were retained after the standard resignations had been tendered. MR. GOERING informed there have been some changes at the Department of Law, but the changes do not affect the ARM Board's legal team at this time. A vacancy exists for one position representing DRB and Department of Law is working to fill that position.

MR. GOERING commented he had the opportunity to personally interact with DRB on several occasions during the interim period when his resignation was submitted and when it was rejected. He found DRB was extremely responsive. The responses were both timely and accurate. He complimented and expressed appreciation to DRB for the way they handled the State employees' recent requests.

MR. GOERING discussed the two items of litigation that involve the ARM Board. There have been no changes in status since the previous report. The Metcalfe case involves a claim by a class of former State employees who voluntarily cashed out of their defined benefit plans and became former employees. They now claim the right under the Alaska Constitution's diminishment clause to have the opportunity to be reemployed and to pay back into the retirement systems in order to reinstate retirement pension and healthcare benefits. The

period has been closed by statute for about 10 years. The case is pending briefing in front of the Supreme Court. This is the second time to the Supreme Court. The State won on summary judgment in the Superior Court the second time. MR. GOERING believes that decision will be upheld.

MR. GOERING described the second case is pending summary judgment in Superior Court. It involves a claim that the retiree-paid dental benefit plan cannot be changed post-retirement. The case is complex. The decision would not affect the State's direct financial obligations, but it would dictate whether or not the potential for a multiplicity of plans may exist. The Superior Court tentatively decided the dental plans were subject to the same protections under the Constitution as other plans for purposes of taking evidence on the diminution issues.

MR. GOERING commented MS. ERCHINGER referenced a couple of issues that were discussed at the Actuarial Committee meeting. He noted there is no agenda item referencing the issues. MR. GOERING informed his advice memo was provided to the members of the Actuarial Committee and MS. ALEXANDER has copies for the remaining Trustees. He suggested Trustees take the opportunity to read his advice memo and any further consultation could occur under the agenda item Unfinished Business. CHAIR JOHNSON agreed it makes sense to afford Trustees the opportunity to read the advice memo. Addressing the subject under Unfinished Business was accepted without objection. CHAIR JOHNSON believes MR. GOERING has the opening to give a presentation because MS. ERCHINGER, as Chair of the Actuarial Committee, made reference to the subject.

9. KPMG - AUDIT REPORT

CHAIR JOHNSON invited BETH STUART and MELISSA BEEDLE of KPMG to present a high-level overview of the Audit Report. MS. STUART advised all five of the Retirement and Benefit Reports of the audited financial statements received an unmodified, clean opinion. The explanatory information included under other matter language is contained on page three. For FY18, there were no required changes under the Governmental Accounting Standards Board (GASB) and no changes to the accounting policies. The significant estimates within the financial statements relating to the net pension liability and the net OPEB were evaluated by KPMG's accounting specialists. The conclusion was the assumptions were reasonable and the accounting was appropriate in the financial statements.

MS. STUART explained the KPMG audit is not designed to issue an opinion on internal control issues or to seek out issues that may exist. During the audit, KPMG obtains an understanding of internal control and processes used by DRB and any matters identified would be communicated within the report. No significant internal control matters were identified. MS. STUART reiterated the required communications by KPMG to the Audit Committee and the ARM Board. KPMG works closely with management throughout the audit process, but KPMG is directly responsible to the ARM Board.

MS. STUART discussed the roles and responsibilities of the various members involved in the financial reporting audit process. Management is responsible for the financial statements and for internal controls. Board members set the tone for the overall organization and oversee the

financial reporting processes. Auditors have the responsibility to perform the audit, follow professional standards and to make the required communications to the Board. MS. STUART reviewed the summary of audit fees provided.

CHAIR JOHNSON requested KPMG provide comments and observations to DRB or Administration on the current state of internal controls and whether or not a formal internal audit should occur. The Audit Committee has a sense the built-in controls and dynamics suggest a great deal of oversight already exists. MS. STUART agreed to provide comments.

MR. WILLIAMS inquired as to the reason for the significant change in fees from 2017 to 2018. MS. STUART explained implementation of new required accounting standards in the first year is challenging. There were new accounting standards in 2017, and none this year.

MS. STUART expressed appreciation to the staff and especially MS. MAIQUIS during the audit process. MS. STUART is aware the Department is short-staffed at the moment. She was impressed with the professionalism, responsiveness, leadership, and diligence of MS. MAIQUIS under the difficult set of circumstances. MS. STUART informed KPMG was able to issue the audit reports over three weeks earlier this year compared to last year.

MS. ERCHINGER added to the compliment to Department of Administration staff over the last few years, especially with the implementation of new accounting pronouncements and the audit of employer's underlying data. MS. ERCHINGER expressed concern for the Department's ability to continue to maintain the tremendous amount of additional work with what seems to be fewer resources over time. MS. ERCHINGER reiterated the Committee recognized much of work being completed by both Department of Revenue and Administration are the direct costs of the Retirement System and not the State of Alaska's general fund. She hopes conversations regarding cuts to balance the State budget will take consider the staffing needed in order to adequately account for and report on the assets and the Retirement System resources.

MS. ERCHINGER specifically thanked MR. DESAI for his critical work, and MS. MAIQUIS for her valuable and additional efforts in stepping up to fulfill her role. She expressed concern regarding staff burnout, given the workload related to the pronouncements. MS. ERCHINGER highlighted the importance of consistent staffing and the benefit of institutional knowledge.

CHAIR JOHNSON recessed the meeting from 10:28 a.m. to 10:46 a.m.

10. 2014 - 2018 EXPERIENCE STUDY

Action: Relating to Acceptance of Experience Study Actuarial Assumptions Resolution 2018-19

CHAIR JOHNSON noted Item 10 was tabled earlier. He encouraged those interested to listen to the recording of the robust discussions of yesterday's Actuarial Committee meeting and to

review the minutes once they are prepared. CHAIR JOHNSON noted the meeting will continue with Item 11, Item 13, and then the break for lunch.

11. THOUGHTS ON STRATEGIC ASSET ALLOCATION

MR. MITCHELL provided context for his presentation and noted his expressed desire at the June and September meetings to evaluate the allocation to alternative asset investments. Alternatives represent about a third of the portfolio, but comprise well over half of the fees paid. It is important to consider what value has been gained from the alternative investments compared to traditional asset classes. Over the last 10 years, performance has been robust in domestic equities, with annualized returns of over 10%. The alternative portfolios have been stodgy and challenged compared to a blend of stocks and bonds.

MR. MITCHELL intends to continue to study the alternative investments between now and the June 2019 meeting, when the issue of strategic asset allocation is addressed again. The primary purpose of this presentation is to review the decisions made by the ARM Board and ASPIB over a long period of time and compare the results with a proxy of public market alternatives. The exercise requires making assumptions, which are not perfect, and the members should be mindful of this throughout the presentation. MR. MITCHELL believes the analysis contains worthwhile information.

MR. MITCHELL showed the current strategic asset allocation for 13 of the 14 plans that will be the focus of today's presentation. There is approximately 54% allocated to public equities, approximately14% allocated to fixed income, including the dedication to fixed income within all asset classes, and approximately a third of the portfolio is allocated to alternatives, including private equity, real assets, and absolute return. The expected 30-year return for this portfolio using Callan's capital market assumptions is 7.4%.

MR. MITCHELL noted some of the slides in the presentation are sourced from Callan's annual conference last year. Callan's next annual conference is scheduled for the end of January. MR. MITCHELL reviewed a slide showing the 10-year expected return of various asset classes beginning in 1989 through 2018. Over this period of time, the return expectations for domestic equities and fixed income have declined about six percentage points, the inflation expectation has declined about three percentage points, and the risk expectation has remained flat. The result is less return for more risk taken.

MR. MITCHELL explained the slides illustrating the exercise of reviewing different portfolio asset allocations to achieve a return target of 7.5% over the10-year periods from 1995 to 2015, and into 2017. The risk profiles of those portfolios have increased from about 6% to 24% during that same time period. MR. MITCHELL discussed the slides showing the ARMB actual asset allocation during the years from 1991 to 2017, which reflect the trends shown in the previous charts. The PERS portfolio is used as a proxy. The domestic equity allocation has declined. The international equity allocation has increased. The fixed income allocation has decreased. The private equity and alternative equity allocations have increased.

In order to compare the ARMB portfolio with portfolios that are comprised of only publically traded equities and fixed income, MR. MITCHELL placed the private equity, alternative equity, and other assets into the equities portion, and placed the real assets, absolute return, and cash into the fixed income portion. The ARMB portfolio has increased to about a 60/40 split between equity and fixed income, and has remained roughly there for a number of years. MR. MITCHELL showed the annualized return from 1991 to 2018 for a portfolio with a 60/40 split of S&P 500 and Bloomberg Aggregate bond index of 8.39%, compared to the PERS actual 60/40 split of 8.07%. The PERS benchmark was 7.65%. There was a period in the '90s where over half of the PERS portfolio was in fixed income.

MR. MITCHELL discussed the equity allocation composition split between domestic equities and international equities over the same time periods. The investments into international equities have increased over time and this decision has cost the portfolio returns over the long-term. MR. MITCHELL highlighted the impact of fees on returns. The PERS portfolio has outperformed its benchmark gross of fees, but has underperformed its benchmark net of fees by about 29 basis points over the long-term. The current run rate of fees is in the low 40-basis-point range.

MR. MITCHELL moved onto the portfolio's risk profile and characteristics. Over the 27-year period, the PERS portfolio has had a slightly greater risk profile than the public equivalent and a slightly lower risk profile than the benchmark. He noted the benchmark contains publically traded elements; whereas the portfolio also contains privately traded aspects. The publically traded elements display higher volatility, by virtue of their instantaneous pricing, compared to quarterly or annual pricing of private equity. This makes the PERS' risk profile appear less risky than the benchmark, even though it is not less risky.

MR. MITCHELL explained a key observation in reviewing the data. The conclusions are very sensitive to the start and end points of the analysis. Almost any picture could be represented with careful selection of the start and end points. The full set of data shown in this presentation is the 27 years that corresponds with the Plan's engagement with Callan. MR. MITCHELL reviewed the slides showing the comparison of PERS gross portfolio, PERS net portfolio, PERS benchmark, and the public equivalent for different time periods; nine years, 10 years, and 15 years. MR. MITCHELL showed a chart of rolling six-year periods and characterized the net-of-fee portfolio as struggling to keep up with the benchmark. The notable period with issues is FY09. The takeaway is a case could be made for either a 60/40 allocation or an alternative allocation, depending on what trough or peak is chosen.

MR. MITCHELL shared an anecdote from the October National Education Conference where he attended with 49 other public pension CIOs. He was discussing portfolio asset allocation with two state pension CIOs that had what he characterized as polar opposite portfolios. One was predominantly indexed public markets with approximately 10% in private equities, and the other contained over 50% in alternatives. The question was asked if their portfolios were first quartile, and they both responded affirmatively. Both styles have worked over time. MR. MITCHELL believes the key is to be comfortable with the style chosen for the portfolio and have conviction to maintain it.

MR. MITCHELL discussed the slide entitled Asset Class Level Performance - FY09 and After. It represents each asset class in the portfolio and illustrates the performance of FY09, the nine years directly after, and the 10-year performance, including FY09. MR. MITCHELL noted all the asset classes were negative except for fixed income. He explained the real assets contained about 70% invested in non-core, riskier strategies, which experienced permanent impairments and were not available for a robust recovery. Over the 10-year period, the allocation to real estate decreased from about 70% to about 35%, with the addition of infrastructure, timberland, and MLPs into the portfolio. MR. MITCHELL emphasized draw-downs have significant impacts, even to subsequent years of large portfolio return increases. One example given was the 27% drawdown in domestic equities in FY09. It improved 250% over the next nine years, but the 10-year return was 160%.

MR. MITCHELL believes it is important to mitigate these types of draw-downs, and one consideration is to broadly diversify the portfolio with the use of alternatives. MR. MITCHELL commented absolute return yielded a negative 12% during '09. He explained hedge funds rely heavily on leverage for many of the strategies. They had extreme difficulty navigating through the crisis and suffered because of illiquidity. MR. MITCHELL expressed disappointment in absolute return's performance over the past 10 years in its similarity to fixed income's performance. He advised additional analysis of the role of absolute return is warranted and will be given more attention.

MR. WILLIAMS referenced the graph that showed the benchmark containing increased international equities. He noted the effect adjusted the return significantly downward. He asked for the initial reasoning for the decision and if the reasoning remains valid today. MR. MITCHELL believes the decision was driven, in part, by the need to seek more risk and to more broadly reflect the market capitalization of equities. MR. MITCHELL stated DR. MITCHELL will conduct a discussion on international equities later in the meeting. He believes it is a key question going forward and will review historical performance of international equities later in his presentation.

MR. MITCHELL discussed the public markets provide a low-cost, liquid and transparent option. Alternatives have higher fees, less liquidity, less transparency, and should only be invested in with good reason. The public markets have a passive option with index funds that broadly represents the asset class. Alternatives do not have a passive option and have to be invested actively. The onus of picking the right managers is a significant consideration in alternatives because of the dispersion of returns within the quartiles. MR. MITCHELL believes the private equity program is strong and the managers are skillful. This will be reviewed by GARY ROBERTSON of Callan later in the meeting. Staff will also present on the weighting of public assets and alternative assets at the April meeting.

MR. MITCHELL reviewed a chart showing the returns of the S&P 500 and EAFE from January 1970 through November 2018. The S&P 500 has clearly outperformed over the long period of time. MR. MITCHELL showed that period of time split into two pieces. From January 1970 until March 2008, the two indices achieved very similar performance. The separation occurred in the period between March 2008 and current, effectively post-crisis. The last 10 years has been a period of very strong domestic equity performance. MR.

MITCHELL discussed the 10-year forecasts from Callan, J.P. Morgan, and Horizon. These are an average compiled from over 30 estimates of forward-looking projections. Callan's 10-year return assumption for domestic equities is 4.6%, for developed international markets is 4.5%, and for emerging markets is 4.8%.

MS. ERCHINGER commented on MR. WILLIAMS' previous question and recalled when she initially became a member of the Board, the portfolio was lagging peers in international equity allocation, which may have created a drag on performance. The decision was made to move in the direction of international equity, but the timing was not advantageous. MS. ERCHINGER cautioned about leaving asset classes that are performing poorly, but may eventually recover. She recognized the importance of the 10-year performance period and noted the recent conditions are not within historical norms. MS. ERCHINGER expressed concern the "new normal" is very unusual and may not continue the way people assume.

MR. MITCHELL believes MS. ERCHINGER's comments are important observations. He agrees looking in the recent past at what has performed well can be dangerous and can result in buying high and selling low. MR. MITCHELL described ways to navigate these elements includes having a principle-based approach to strategic asset allocation, maintaining consistency, and being able to evolve. He noted the 30-year expected return for the strategic asset allocation using Callan's assumptions is 7.4%. If the ARMB were to allocate a 60/40 portfolio, the expected return would drop to 6.40%. MR. MITCHELL noted staff is not advocating a position in this presentation. Staff will endeavor to provide recommendations, along with the basis for the recommendations going forward.

MS. HARBO expressed appreciation to MR. MITCHELL for his presentation. She noted he spoke of the portfolio's net-of-fee performance and in looking over the presentations provided in the member packet, the managers primarily report gross-of-fee numbers. MS. HARBO requested the managers give net-of-fee performance numbers. MR. MITCHELL said he would inform the managers.

MR. WILLIAMS commented he expects fixed income not to perform as well as equities, but to provide more stability. He expressed concern with the dips in international equities. MR. WILLIAMS noted he did not expect the loss of premium that occurred in private equity, with returns nearing the S&P 500 at some points. He asked if the assumption of a higher premium was unrealistic. MR. MITCHELL noted the expectation for private equity is 350 basis points above public market equivalents over time. It is important to evaluate if that spread is reasonable. MR. MITCHELL informed the numbers presented reflect the median expectation for private equity. There are significant benefits that can be achieved in selecting managers that outperform the median.

13. PERFORMANCE REVIEW - 3RD QUARTER

CHAIR JOHNSON introduced MR. ERLENDSON and MR. CENTER of Callan, LLC to present the 3rd Quarter Performance Measurement for the quarter ending September 30, 2018. MR. CENTER welcomed the two new Trustees to the Board. MR. ERLENDSON outlined the presentation will discuss the general economy, individual asset classes, and the

performance of the fund, using PERS as a proxy. If domestic equity markets are positive at the end of the year, it will reflect a 10-year run of positive returns in the domestic stock market, the occurrence of which has never happened. Historically, during a 10-year period, markets should have been negative two of the calendar years. The current market disturbance is normal.

MR. ERLENDSON noted a historical precedent will occur in the first part of next year, marking 10 years of growth in gross domestic product (GDP). One of the reasons the growth has been able to continue is the rate has been consistently low, averaging about 2.3% per year. Employment growth has been fairly strong, with an average of 126,000 new job creations a month since the beginning of 2009, and more recently, over 200,000 jobs a month since 2011. MR. ERLENDSON noted industry experts like BEN BERNANKE do not believe this is sustainable because only approximately 100,000 people are entering the workforce each month. Wage growth is increasing and has begun to apply pressure on the previous muted inflation. In 2018, inflation averaged higher than the previous four years at 2.3%. The Federal Open Market Committee of the Federal Reserve met on November 8th and did not change interest rates. The rates are expected to be raised in December, which may slow down job creation.

MR. ERLENDSON reviewed the expectations of economic growth from global purchasing managers. The U.S. remains positive, but Europe, Japan, and emerging markets have dampened their expectations. Stress in the markets recently has stemmed from talk of trade tariffs and trade practices. China, Korea, and Taiwan comprise about 58% of the emerging markets index and a large portion of their GDP is dependent on exports. The average annual growth in world trade over the last 20 years has been about 5% and has decreased more recently to about 3.7%. Their economies have been hurt by the slowdown. Approximately 8% of the U.S. GDP is dependent on exports. The U.S. is in a better position as trade volumes begin to decrease.

MR. ERLENDSON reviewed the 3rd quarter performance of various asset classes within the U.S. stock market. The S&P was up 7.7%. The bond market was flat. Emerging markets were negative. Commodities were negative. MR. ERLENDSON gave an update on performance year-to-date since September. The S&P is up only about 50 basis points. All other indexes are negative.

MR. ERLENDSON reviewed a chart showing the dispersion between the returns of growth equities and value equities. This difference over the last six years is the largest it has ever been. Any tilt toward valuation as a premise for choosing stocks has been a headwind for managers. MR. ERLENDSON explained earnings per share is measured by the total earnings of a company divided by the number of shares. The steep incline in the earnings per share growth is due to low interest rates and the artificial increase driven by companies buying back significant amounts of outstanding shares. When there are fewer shares by which the same amount of earnings are distributed, the earnings per share will increase. There are roughly half as many shares today as there were 10 years ago. For the second quarter of 2018, the earnings per share growth rate was about 27%. The long-term average is less than 7%. The

higher the earnings per share growth, the lower the stock market returns, because of unsustainability. The slowdown in the growth of the stock market has begun.

MR. ERLENDSON reviewed the returns of non-U.S. companies since the 1990s, and noted the sine wave pattern of leading returns and lagging returns as compared to the U.S. market. The question remains if this pattern will continue in the future. MR. ERLENDSON discussed the fixed income market and noted the yields for taking additional risk are approaching long-term lows. The bond market may be getting overpriced versus long-term averages. MR. ERLENDSON informed the portfolio has performed very well. He believes the upcoming asset allocation study will provide a good time to reassess the risk profile of the fund and to review the best long-term policy for the Board going forward.

MS. ERCHINGER inquired to what degree the stock market returns are an artificial construct based on the inflow of cash from companies bringing funds from overseas and international markets, as opposed to pure economic performance. MR. CENTER noted that debate is currently popular among economists. He believes much of the money companies held overseas was actually invested in U.S. Treasuries because the yields were good. He does not think the inflow of those funds will have a significant impact. MR. CENTER discussed the belief the last two quarters of GDP growth have been a transitory period, based on changes in the taxes and concerns over trade and tariff wars. Many U.S. producers front-loaded supplies. The expectation is Q4 will not see that same sort of growth. He believes a slowdown is coming, but the likelihood of a recession within the next 18 to 24 months is low.

MR. CENTER began the PERS performance review and noted some of the alternative data numbers are preliminary, and may differ slightly from the finalized numbers. The plan has remained close to the target asset allocation over time and is within the allotted ranges. Relative to peers, the plan has a lower allocation to fixed income, a lower allocation to domestic equities, a higher allocation to non-U.S. equities, and a higher allocation to alternatives, particularly real assets. Knowing the allocation differences helps to explain some of the return differences shown for the PERS plan relative to peers, specifically over the last decade when the domestic equity market drove performance.

The PERS' performance was in the top quartile the last one-year, three years, and five years. PERS was slightly below median over the last 10 years. MR. CENTER explained the Sharpe ratio is a measure of risk adjusted performance. The risk-free return of investing in cash is subtracted from the plan's return and then divided by standard deviation. The plan has done very well over the last three years. The Sharpe ratio is a bit distorted because volatility has been so low in the near-term. The Sharpe ratio is expected to be closer to the 10-year number. Private markets are not valued as often, which contributes to smoothing volatility. The projected standard deviation for the portfolio is about 12, and has been low at 2.5 during the last three years.

MR. CENTER reviewed the plan's attribution for the last year and noted most of the performance has been driven by the manager effect. The PERS plan is ahead of its benchmark by 1.55%. Key drivers to performance came from the real assets portfolio and private equity. The key detractor was the opportunistic asset class. MR. CENTER discussed

the chart comparing the PERS long-term performance versus the actuarial return and the target return. The plan continues to struggle to catch up to the actuarial return post-2008. The plan has outperformed the target return over the last one, two, three, five, and seven-year periods. Over 10 years, the plan has fallen below median and has trailed the target return by approximately 30 basis points. The plan has beaten the target by about eight basis points over the full 27-year tracking period.

CHAIR JOHNSON inquired as to the performance since September 30th, in relation to other public funds. MR. CENTER noted the return information is provided quarterly and he does not trace the performance mid-quarter. He asked MR. MITCHELL to respond. MR. MITCHELL reported staff tracks public market performance for benchmark purposes and then it has to be revised as the private data becomes available. The rough estimate, without the private data revisions, is the plan is 10 to 20 basis points ahead of the index quarter-to-date, returning approximately negative 2%. MR. ERLENDSON commented on the importance of looking at trends over longer periods of time to determine if the status is remaining the same, improving, or deteriorating. The relative results shown seem to be improving.

MR. CENTER showed another example of the recent low volatility environment. Over the last four years, the difference between the top peer performer and the bottom peer performer was about 3.5%, as opposed to the wide volatility in 2009, where the spread was about 13%. MR. CENTER reviewed the portfolio's asset class performance. Domestic equity slightly trailed its benchmark over most time periods. This was due to small cap lagging and active large cap managers underperforming. The large cap portfolio is now 70% passive, with the remaining split between the quasi-passive internally managed scientific beta and portable alpha portfolios, active managers Lazard, and equity yield. One of the passive large cap allocations is an equally-weighted S&P Index that has lagged the S&P. During this period, it has been detrimental to have an equal-weighted index, opposed to a market capitalization weighted index, because the performance has been driven by the top-10 performing stocks. The scientific beta portfolio also experienced a period of underperformance. The strategy provides diversification and is expected to have periods of outperformance over time.

The small cap portfolio is about 20% passive and has outperformed the index across all time periods shown. It is above median for all periods three years and longer. Exposure to the micro-cap managers was mixed recently. Staff continues to monitor BMO Discipline Small Cap Core strategy because of their varying performance over the last two years. The international equity portfolio has outperformed the benchmark over all time periods one-year and longer, and continues to perform well relative to peers.

MR. CENTER informed Callan has been working with staff to identify additional emerging market growth equity managers to complement the existing structure. Interviews with potential managers will occur at tomorrow's meeting. The current two emerging market managers have experienced performance issues and have struggled compared to both the benchmark and to peers.

MR. CENTER directed the Board's attention to the internally managed, high quality fixed income portfolio. It is outperforming the benchmark. The portfolio contains no credit risk, and is not expected to rank high among the peer group, which is heavily invested in credit. The opportunistic equity portfolio has done fairly well, returning over 13% last year. There have been some changes with the taxable municipal composite with the Guggenheim portfolio closing. The Western Asset portfolio has performed well relative to the indices. International fixed income has struggled during this period where the U.S. market has driven performance. It remains a good diversifier to the other fixed income exposures. The high yield portfolio continues to perform well relative to benchmarks.

MR. CENTER advised Callan is not the consultant for real assets, but did show the chart listing the strong performance from real assets, particularly timber, energy, and infrastructure. The absolute return portfolio performed favorably compared to its benchmark, returning 6.8% over the last year. He believes the program is structured fairly well. MR. CENTER reviewed the few changes made to the Defined Contribution plan this quarter that included the combination of some stable value funds, and the combination of some passive fixed income portfolios.

The PERS plans' asset allocation as of September 30th was about 60% invested in the target date funds and the remaining split between the passive options and the active options. He explained the chart showing the inflows and outflows of the plan. The inflows exceed the outflows at this time. The TRS structure is very similar. The SBS structure is very similar, and the inflows and outflows are close to equal. The Deferred Comp plan is about 20% invested in target date funds and the remaining split between the passive and active options. The outflows exceed the inflows, making the plan cash-flow negative every quarter.

MR. CENTER reviewed the target date funds have performed in the top decile versus the peer group over most time periods. MR. ERLENDSON noted the ARMB was an early adopter of target date funds and staff designed its own glide path, which is the distribution of equities and fixed income. The performance is a testament to the funds doing well relative to the objectives and compared to others in the marketplace. MR. CENTER discussed a chart of the active options. The two laggards were the international equity fund and the Stable Value fund. The passive strategies are tracking the benchmarks as expected. A few of the passive fixed income portfolios were ultimately combined with a new Blackrock Bond Index fund and will appear on the chart next quarter.

MR. CENTER invited the Board to attend Callan's annual conference on January 28th through 30th in San Francisco.

CHAIR JOHNSON recessed the meeting from 12:14 p.m. to 1:35 p.m.

12. PRIVATE EQUITY REVIEW

MR. ERLENDSON introduced GARY ROBERTSON of Callan, who presented the overview of the private equity program via speaker-phone. The portfolio is performing above the expected average. The pace of liquidity in the private market is very high and generates

abundant distributions. This has been the fourth year prices have been high. The investment pace into companies has slowed slightly. The gross cash flow back to the portfolio has been a record dollar amount this year. The net cash flow has increased. Net asset value (NAV) is the value of the companies in the portfolio. The NAV was larger this year. The portfolio is fully diversified and invested in all the major private equity strategy types; venture capital, buyouts and special situations, subordinated debt, and distressed debt.

MR. ROBERTSON explained the structure of the private equity portfolio. There are two external managers, Abbott and Pathway, and an in-house portfolio. Each manages a portfolio of limited partnerships. The limited partnerships each manage a portfolio of private companies. ARMB provides funds to the managers that flow all the way down to the private companies. The return cash flow goes back through the limited partnership and external oversight manager to the ARMB portfolio. Partnerships typically have a 10-year legal life. Extensions can be sought. It is normal that some partnerships will take up to 15 years to fully liquidate. A key element in the private equity program that is different from funding a public equity manager is this constant liquidation and continual replenishment of capital over time.

MR. ROBERTSON discussed the private equity target increased 4%, $98 million, last year because the total ARMB assets increased 4%, $1.1 billion, last year. The total NAV of the private equity portfolio increased 16%, $350 million, last year. The private equity portfolio's target is 9%, and the current assets are slightly above, at 9.7%. This is due to outperformance. The two external managers comprise approximately 40% each of the portfolio and the in-house portfolio is approaching 20%. MR. ROBERTSON explained the uncalled capital fell to 51% this year versus 60% last year. This capital powers the portfolio forward and there will always be some degree of uncalled capital in the portfolio. MR. ROBERTSON believes it is getting close to the right amount going forward.

CHAIR JOHNSON inquired if the monies that are committed, but not yet called, are kept in a liquid position or liquidated at the time called. MR. ROBERTSON noted most plan sponsors keep the uncalled funds invested in their total asset allocation, with a small liquidity reserve for near-term calls. MR. MITCHELL agreed, and explained staff is cognizant of the magnitude of the uncalled commitments and its bearing on the liquidity profile of the portfolio. However, the portfolio remains fully invested in the strategic asset allocation. The contingent obligation is outstanding and funds are made available when capital calls occur.

MR. WILLIAMS requested additional information on the investment allocation of the different private equity strategies. MR. ROBERTSON explained the opportunity sets in the market consist of 12% venture capital, 60% to 70% buyouts and special situations, and 5% to 10% subordinated debt and distressed debt. Most plan sponsors have a preponderance of buyouts. MR. ROBERTSON noted the portfolio is well-diversified with 25% venture capital, 38% buyouts, 27% special situations, 4% distressed, and about 6% secondary and mezzanine. The geographical diversification is standard and appropriate with approximately 26% international and the remainder in U.S. The portfolio is well-diversified by industry. The largest grouping is 42% in tech/software and includes various arrays of businesses.

MR. ROBERTSON continued the presentation showing a timeline of commitments to partnerships. He noted it matches the economic cycle closely. There are few commitments during recessions and many commitments during economic booms. The ARMB's portfolio started committing in 1998, at the tail end of the tech boom. It was a 3% allocation and then dropped. The market fell apart and it was a tough time that has dampened the IRR returns, especially for Abbott's portfolio. In 2002, the ARMB increased its allocation from 3% to 6% by hiring Pathway. This timing worked out tremendously well because the buyout boom immediately followed. In 2006, the allocation increased to 7%. In 2007, the in-house portfolio began and experienced some tough market conditions, but has been recovering nicely. The allocation increased to 8% in 2011, and to 9% in 2013.

MR. ROBERTSON reviewed the markets are currently in a quandary period. Valuations are high at 10-times earnings before interest, tax, depreciation and amortization (EBITDA). Public markets have started zig-zagging. The economic fundamentals still look strong. Leading indicators are not signaling a recession. Distributions remain robust for the sixth year in a row. Private equity is a very popular asset class. Fundraising is booming, with record funds being raised. The use of leverage is increasing. The new Administration lifted particular Dodd-Frank era reforms, particularly the guideline that banks should not lend more than six times cash flow.

MR. ROBERTSON discussed private equity industry returns overall have beaten private equity returns in the 1-year, 3-year, 5-year, 15-year, and 20-year. The 10-year private equity return trailed public equity by 10 basis points. The private equity return premium is expected to compress in the future and investors are beginning to reassess their benchmark toward a 2%-plus premium over the Russell or S&P. The ARMB is currently using a 3.5% premium.

MR. ROBERTSON described the private equity portfolio's cumulative flows since inception, current valuation, and the partnership's ratios. The committed amount increased 10% off the base, compared to 9% last year, and is on track for a good portfolio replacement over time. The paid-in capital increased 12% off the base, compared to 14% last year. The general partners take their time to ensure the investments have good valuations. The current volatility could lead to more capital being invested next year. The uncalled decreased by 1% off the base, compared to a 5% decline last year. The portfolio distributed $597 million, compared to $575 million last year. This is over a quarter of its starting value. The net yield was 3%, up from 2% last year. The NAV increased 16%, and the NAV increase amount listed should be $350 million, not $357 million. Overall, the performance is very similar to last year.

MR. ROBERTSON explained the ratios displayed. DPI is distributions divided by paid-in capital. As of this year, the portfolio has received back all of its capital. RVPI is residual value or NAV divided by paid-in capital. For every dollar paid in, the portfolio has 53 cents remaining in portfolio value, and the original dollar has been paid back. TVPI is total value divided by paid in, which is 1.53, and translates to an 11% return. The portfolio is above median in all areas. MR. ROBERTSON reviewed the specific ratios and performance percentiles for Abbott, Pathway, and the in-house portfolio. There are no concerns. The portfolio is well-positioned with high quality individual names. MR. ROBERTSON noted the

first half of the fiscal year was much more volatile. The expectations are the market will moderate and not be as robust next year.

14. IS INTERNATIONAL INVESTING STILL WORTHWHILE?

CHAIR JOHNSON outlined the remaining agenda schedule for the day is Item 14, a 10-minute break, Item 15, and lastly, Item 22. There were no objections.

CHAIR JOHNSON introduced DR. JERRY MITCHELL of the Investment Advisory Counsel to present on international investing. DR. MITCHELL expressed appreciation to members and staff for the opportunity to speak on a topic very dear to his heart. He acknowledged the presentations by Callan and MR. BOB MITCHELL this morning covered much of the information that will be reviewed now. DR. MITCHELL noted his presentation is purposefully less rich in data, less scientific, and more impressionistic and opinionated than most presented at Board meetings.

DR. MITCHELL believes the topic discussion regarding whether or not international investing is still worthwhile is timely because international equities have underperformed domestic equities this year. As of yesterday, domestic equities were close to flat and international equities were negative 14%. The caveat is bearing in mind performance measurement is very much a time-dependent calculation. The starting point and ending point in a series of yearly returns is critical in determining the outcome. The same wariness is appropriate in selecting the index chosen to represent domestic and foreign markets. The benchmark may significantly influence the outcome of research and judgment as to whether the portfolio has done well or poorly. Having reviewed each of those considerations, it is clear international markets have underperformed this year.

DR. MITCHELL discussed the underperformance has prompted the expected questioning regarding the utility of non-U.S. stocks as an asset class. Human nature embraces a winner and walks away from a loser. Examples of past asset class infatuations that have gone sour include real estate, small cap, junk bonds, timber, and absolute return. Foreign markets are engulfed in difficulty, both economically and politically. Europe is in chaos with issues such as Brexit, the north/south divide, the end of monetary stimulus, and nationalism. Japan has been stagnant for a decade and carries deflation as a constant threat. China is immersed in debt and the government statistics and company earning cannot be trusted. Emerging markets have become submerging markets.

DR. MITCHELL shared anecdotally the process he underwent in 1970 to introduce the firm he was working for to international investing. In preparing for this presentation, DR. MITCHELL wondered if the same five reasons used to validate international investing in 1970 could be applied today to answer the question: Is international investing still worthwhile? DR. MITCHELL requested members participate interactively and anonymously by writing whether they agree, disagree, or are neutral to each of the five reasons presented. The determinations will be tallied and revealed during the IAC comment period tomorrow. DR. MITCHELL noted foreign markets include both developed and emerging markets.

DR. MITCHELL informed the first reason for international investing is valuation. The 12-month forward price/earnings ratio of the U.S. market is 18, and is 13 for foreign markets. The price-to-book ratio for the U.S. market is about three times, and 1.5 times for foreign markets. The yield of the U.S. market is 1.9%, and 3.4% for foreign markets. Other metrics such as price-to-cash flow, the Shiller CAPE ratio, and the PEG ratio have similar patterns. Foreign markets are cheaper. They sell at a steep discount on the order of 30% to the U.S. market and are a better value. He requested members write down whether they agree, disagree, or are neutral to the first reason for international investing, and will repeat the process after discussion of each of the five reasons.

DR. MITCHELL discussed the second reason for foreign investing is growth. Investors want lower valuations, along with the ability for the investment to grow. According to most economists, U.S. GDP growth is probably in a range of around 2%. Europe is basically in the same growth range. Japan remains sluggish and could possibly grow from flat to 1%. Emerging economies are in the growth range of 7% to 8%. Some recent studies suggest GDP growth does not always lead to earnings growth, and earnings growth does not always lead to good equity performance. DR. MITCHELL believes economic growth provides a platform for future earnings growth, and foreign markets have a long-term advantage. The 2019 approximate forecasts place U.S. earnings at 8%, emerging markets at 15%, Europe at 10%, and Japan at perhaps 5%.

DR. MITCHELL reviewed the third reason for foreign investing is diversification. The investment sentiment remains; the way to reduce risk and enhance return is to build a portfolio of non-correlated assets. It is dangerous, imprudent, and perhaps a dereliction of fiduciary duty for Trustees and institutional investment professionals to concentrate funds into only one asset class. DR. MITCHELL believes the various international markets are non-correlated and the declines and gains fluctuate in the same manner as other investments. Diversification benefits from foreign equities should continue for both economic and cultural reasons.

The fourth reason for foreign investing is the opportunity set, meaning more choice in a greater universe of economies and companies. International investing provides access to trends, products, and entrepreneurship not found domestically. Direct exposure to personal economic growth of the massive populations outside the U.S. is beneficial. Some of the pure-play investments, such as mining, telecommunications equipment, and consumer electronics, may only be available abroad.

DR. MITCHELL reviewed the last reason to invest internationally is timing. This may be the most difficult to identify and perhaps the most important. He agrees the attempts of timing the market for most investors, more often than not, results in underperformance or disaster, but that does not mean timing should be ignored completely or that timing an investment to take advantage of persistent patterns might at least be worth consideration. Looking at the period from 1970 to present, the U.S. market has outperformed foreign markets 25 times, and foreign markets have outperformed the U.S. market 23 times. It seems to have a certain pattern of predictable cyclicality between periods of U.S. advantage and periods of international advantage. It is unknown whether the cyclicality will continue, but it is known

the U.S. has experienced an extended period of outperformance. A good entry point for an investment is beneficial towards a satisfactory return. Foreign markets are currently low.

DR. MITCHELL requested MS. ALEXANDER collect the member responses and results will be presented tomorrow. DR. MITCHELL highlighted his opinions regarding the most frequently asked questions on formulating and executing an international investment program. Currency exposure should not be hedged. Foreign-based managers are not better international investors than U.S.-based managers. Both indexing and active managers should be used for international investing. The allocation weight for domestic/international should be 60% domestic and 40% foreign, with a plus or minus 10% variance. The allocation weight for developed/emerging should be 60% developed and 40% emerging, with a plus or minus 10% variance. Politics is not the critical variable in international investing. The portfolio does not have international exposure through U.S. multinationals. China will be the best performing market in 2019.

CHAIR JOHNSON recessed the meeting from 3:00 p.m. to 3:16 p.m.

15. FARMLAND PORTFOLIO

Action: Real Assets Investments - Farmland
Resolution 2018-20

MR. MITCHELL introduced NICHOLAS ORR, Manager of Real Assets, to present the recommendations regarding changes to the existing farmland guidelines. MR. ORR made a presentation during the previous Board meeting covering the real assets of real estate, infrastructure, timberland, and farmland. Resolutions were passed at that meeting with respect to changes to investment guidelines for real estate and infrastructure. Board feedback was gathered concerning farmland and timberland guidelines with the intent to discuss final recommendations during this meeting. Following the presentation, an action item will occur.

MR. ORR began with an overview of the farmland portfolio. It began in 2004, and currently has $852 million, comprised of $585 million with manager UBS and $267 million with manager Hancock. The investments are allocated to row crops and permanent crops. Currently the split is about 84% row crops and 16% permanent crops. The NCREIF Index is approximately 60% row crops and 40% permanent crops.

MR. ORR described row crops consist of grain commodities and vegetables. They are planted seasonally in a row, with the potential for the crop type to be changed. They are leased, and the crop may have multiple uses. Permanent crops are more capital intensive, are planted once, and have to be maintained. They are typically for food, like oranges and pistachios, rather than having multiple uses. The current yield expectation for row crops is 3% to 5%, and for permanent crops is 7% to 9%. A gross nominal return of between 3% and 6% is low for an illiquid asset class.

MR. ORR explained the expected capital appreciation and cap rates for row crops are challenged. The cap rate generally decreases as property values increase. Property values

have increased since 2005. Interest rates are a component of pricing in the farmland space and if interest rates remain the same or rise, the appreciation of farmland will struggle. Another way to see accreted farmland returns is if prices were high in row crops, specifically soy and corn. Double-digit returns occurred during most of the period between 2006 and 2014, primarily due to the Renewable Fuel Standards Act, which mandated ethanol production increase from four billion gallons a year to 15 billion gallons a year, and the growth and affluence of the Chinese middle class. Those factors have since abated and prices have decreased. Row crop prices are expected to remain near long-term averages going forward.

MR. ORR reviewed the returns of permanent crops are competitive to the returns of row crops. Permanent crops retain diversification benefits and have particularly low correlation to the Barclays Ag Index. Currently, 86% of the permanent crop space uses a directly operated investment structure. ARMB guidelines allow for investment in leased properties only, and as such, the portfolio is not able to fully benefit from permanent crops. The directly operated investment structure offers higher returns, more control, better information, and alignment with duration of capital expenditures.

MR. ORR recommends changing the farmland allocation from 80% row crops to 60% row crops, and from 20% permanent crops to 40% permanent crops. The second recommendation is to allow for investment into directly operated permanent crops.

CHAIR JOHNSON inquired as to the tax implications of directly operated permanent crops. MR. ORR suggested additional discussions with the CIO and Counsel are appropriate regarding specifics. He believes blockers could be applied and the portfolio would not have unrelated business taxable income (UBTI), nor be subject to unrelated business income tax (UBIT). MR. MITCHELL noted private equity used blockers initially, but has since shifted away from them. He feels a similar course could be taken with permanent crops, if there are no concerns from Counsel.

In response to questions and comments from MR. WEST and VICE-CHAIR SCHUBERT, trustees, staff and counsel discussed issues related to UBIT.

MR. WEST asked if leasing provisions are recommended to be removed for row crops. MR. ORR noted direct operations in row crops do not occur. It is more cost effective for smaller farm owners to operate because of the government provides minimum payments. MR. WEST reminded the Board that direct operations in permanent crops hook the plan to the crop commodity, as well as increasing the investments in property, plant, and equipment.

MR. WILLIAMS asked if staff is confident we have the competence to move into direct operations of permanent crops and to be able to provide above median returns. MR. ORR expressed confidence in the recommendation. He explained the arrangement would not be considerably different than the current process. Instead of leasing to the farmer, who is operating the property, the portfolio would pay the farmer to operate, and the portfolio would take on the commodity risk. Many of the commodities hold long-term contracts to suppliers.

There were no further questions from members.

MR. BRICE moved to approve Resolution 2018-20. MS HARBO seconded the motion.

A roll call vote was taken, and the motion passed unanimously.

22. INTERNAL EQUITY MANAGEMENT

MR. MITCHELL introduced MARK MOON, Manager Internal Public Equity, to present on internal equity management. MR. MITCHELL reminded the Board of the organizational change within the Treasury Division, which occurred last year, whereby MR. MOON was promoted to oversee the Internal Equity Team. He is the senior portfolio manager. MR. MOON brings with him a 30-year investment background, which includes designing, researching, and communicating to investors about equity strategies, long and short, and fixed income derivatives. He has had the opportunity to work and study with a number of amazing financial experts, including DICK THALER, DANNY KAHNEMAN, and STEVE ROSS. MR. MOON utilizes this experience to efficiently and effectively manage the internal strategies.

MR. MOON described his overall view of equities and partitions strategies into two broad categories; systematic strategies and high expected alpha strategies. Systematic strategies choose stocks from a well-defined universe, utilize an understandable and repeatable process of selection, do not contain heavy concentrations of individual stocks, and maintain performance that is driven by the overall broad systemic exposures of the portfolio. High expected alpha strategies focus on comparative advantages in perhaps a narrow space, a particular set of analytics, particular forecasts, and usually run a higher concentrated portfolio. If the higher expected alpha strategy managers can succeed, they are probably more deserving of far higher fees than managers running systematic strategies.

The Internal Equity Department runs systematic strategies, in which staff has the tools and knowledge to execute. The internal equity management focuses on improving net-of-fee returns by eliminating the external manager fees, while deepening the expertise within the Department. The first strategy began in 2004 with REITs. There are currently nine distinct mandates, comprising about $5.5 billion. MR. MOON highlighted the themes that are consistent with the market environment. Growth is outperforming value, and large cap is outperforming small cap. All nine of the strategies are performing in line with their benchmarks.

MR. MOON described each strategy and gave a brief update. The Russell 1000 Growth, the Russell Top 200, and the S&P 600 Index strategies have outperformed their benchmarks. The Russell 1000 Value and the S&P 500 Equal Weight Index have underperformed their benchmarks. The Equity Yield and REIT strategies were quasi-active, and have been moved to more passive strategies. The Scientific Beta and STOXX Minimum Variance strategies are quasi-active, in that the portfolio weights are licensed by the providers and replicated by staff.

MR. MOON noted six of the nine strategies are domestic large cap. The recommendation for improvement is to combine the six large cap mandates into a single portfolio that targets systematic exposures deemed appropriate and consistent with the existing array of individual strategies. He explained the portfolio would be essentially an enhanced index, with weights tilted in favor of certain value-added exposures and tilted away from exposures deemed to be detracting. MR. MOON believes the new portfolio can be created and managed internally using existing infrastructure and human resources. The portfolio would be scaled in such a way that offers the opportunity to demonstrate the efficacy of the concept without materially affecting the existing individual mandates.

MR. MOON explained the strategic tilt pilot portfolio would be optimized against the Russell 1000 Index with constraints and limitations on sector differences of +/- 3%, a tracking error not to exceed 200 basis points per annum, monthly rebalancing, and less than 120% annual turnover. He conveyed if the pilot portfolio structure was approved, staff would run the consolidated portfolio along with the existing mandates for several quarters and then report back to the Board with a recommendation to roll-out the consolidated portfolio more generally.

MR. MOON showed the conceptual framework and mapping for the strategic tilt portfolio and related it to a composite constructed from 20 years of data. Staff believes the strategic tilt portfolio will offer a chance to be more efficient as a group in streamlining operations, provide the potential for reducing manager fees, and broadly leverage staff's expertise to other areas within the portfolio.

MR. MITCHELL informed the action item adjacent to this presentation was scheduled during tomorrow's meeting. He believes it is appropriate to proceed with action today.

MS. HARBO requested additional information regarding the timeline for the pilot program, what metrics are used for evaluation, and when it would possibly become a real program. MR. MOON reported staff feels the strategic tilts are currently consistent with a number of the underlying equity strategies and this is an appropriate way to try to enhance risk-adjusted performance. The evaluation is staff's execution of this portfolio, which should only take a couple of quarters. Execution issues are not anticipated, but would become obvious very quickly.

MS. ERCHINGER commented on the difficulty for active large cap management to outperform the index. She inquired if this is the best use of staff's energy and time. MR. MOON indicated the process will not take a tremendous amount of staff work and the initial development of data resources has already been conducted. MS. ERCHINGER inquired as to the implementation process requested within the action item. MR. MITCHELL reviewed the intent is to take $100 million from existing large cap strategies and fund this strategy. Staff would come back before the Board to contemplate the potential of folding the remaining large cap strategies into this portfolio.

MR. WILLIAMS remarked the idea of building internal capacity is appealing. He asked how much more staff time the Equal Weight S&P 500 Index takes to run than passive portfolios.

MR. MOON explained some of the portfolios have higher rebalancing similarities. The process is focused mainly on data preparation and portfolio execution by the staff operational specialists.

MR. ERLENDSON requested additional discussion regarding the turnover rate, which is higher than he expected. MR. MOON explained the turnover rate of 120% seems reasonable to staff and is the same rate employed by some of the third-party manager strategies from whom the portfolio licenses.

DR. JENNINGS commented the process of portfolio consolidation makes sense. He asked if staff is relinquishing any mechanisms needed for the overall portfolio allocations in value and growth management. MR. MITCHELL noted the current ability to change the weightings to affect the broader portfolio structures is a flexibility that is not needed. He expressed being comfortable with consolidation.

23. INVESTMENT ACTIONS

B. Internally Managed Pilot Portfolio

MR. MITCHELL stated it is staff's recommendation that the Alaska Retirement Management Board direct staff to invest and internally manage an initial investment of $100 million in a pilot portfolio, incorporating factor exposures, as described in the Internal Equity Management presentation to the ARM Board in December of 2018.

MR. WEST moved that the Alaska Retirement Management Board direct staff to invest and internally manage an initial investment of $100 million in a pilot portfolio, incorporating factor exposures, as described in the Internal Equity Management presentation to the ARM Board in December of 2018. MR. WILLIAMS seconded the motion.

A roll call vote was taken, and the motion passed unanimously.

RECESS FOR THE DAY

CHAIR JOHNSON recessed the meeting at 4:44 p.m.

Friday, December 14, 2018

CALL TO ORDER

CHAIR JOHNSON reconvened the meeting at 9:03 a.m.

Trustees Schubert, Harbo, Brice, Erchinger, West, and Williams were also present.

16. BRIDGEWATER RISK PARITY OVERVIEW

MR. MITCHELL informed this presentation is a result of members' willingness to learn more regarding risk parity, after the lecture during the education conference in October entitled "How Would a Hedge Fund Guy Invest a Public Pension Portfolio." Bridgewater has employed risk parity strategies for over 20 years. MR. MITCHELL introduced Bridgewater representatives JOEL WHIDDEN and PATRICK DIMMICK. MR. WHIDDEN has been with Bridgewater for 17 years and is responsible for business development. MR. DIMMICK has been with the Bridgewater research portfolio team for 12 years. MR. WHIDDEN commented Bridgewater was founded by RAY DALIO about 25 years ago as a way to invest for their beneficiaries, children and grandchildren, by developing a program that could provide consistent returns throughout all market conditions, without the need to predict the future. Today's presentation will address topics requested by MR. MITCHELL and discuss how to build a diversified asset allocation.

MR. DIMICK explained risk parity is the oldest idea in investing; diversification. The process focuses on how to build a diversified buy-and hold, long-term portfolio that can allow for either more return for the same amount of risk taken or earn the same amount of return with more stable volatility. MR. DIMICK discussed the two key steps in the portfolio construction. The surprises in economic conditions of either growth or inflation cause asset returns to fluctuate wildly and inconsistently from one year to the next and/or one decade to the next. The first step is to collect asset classes in such a way that neutralize or flatten the portfolio to the impact of inevitable growth or inflation surprises.

The second step after constructing the portfolio to be indifferent to either economic growth or inflation is to utilize leverage in order to increase returns depending on the portfolio's purpose. Leverage is not the key to risk parity. It is a tool that can be used or not used depending on the investment objectives. MR. DIMICK reviewed most institutional portfolios have their managers create tactical tilts that can help in some years and hurt in others, which is over 90% of the risk taken. Deviating from the long-term strategic asset allocation is the decision that impacts the portfolio the greatest over the long-term.

MR. DIMICK showed how the traditional 60/40 allocation has delivered a 9.8% total return since 1970. The rate of return on cash during that time was 5.1%, which makes the extra compensation for the equity volatility during the boom/bust cycles at 4.5%. Upwards of 80% to 85% of the risk is from equities, which makes the portfolio more like an 80/20 mix. The process of risk parity is the way to hold assets that would allow for a greater than 4.5% return above cash with less volatility. The traditional concentrated portfolio is 95% correlated to the draw-downs of the equity market. The historic 9.8% returns may provide enough funding to pay benefits, but the current cash rates are so low, the 4.5% equity return above cash may not be sufficient.

MR. DIMICK discussed charts showing a comparison of a traditional concentrated portfolio, which receives most of the cumulative returns from equities, global large cap indices, and very small contributions from other asset classes, and a diversified simulated risk parity portfolio, which receives more balanced cumulative returns from many asset classes. The two portfolios have the same amount of risk and similar size in losing periods, but the returns are higher for the diversified approach over long periods. Bridgewater created the All Weather risk parity portfolio in 1996. All the charts showing time periods after 1996 utilize real data. All the charts showing time periods before 1996 utilize simulated data. The simulated history is reliable and it is important to show periods before 1996 to illustrate how the portfolio would have responded in extreme environments of high interest rates, high inflation, or depressions.

MR. WHIDDEN informed the All Weather risk parity strategy was initially created for internal use, but one of their clients asked to invest in the strategy in early 2000's. Since then, the volatility that occurred in the early 2000's and in 2008, was cause for more investors to consider greater diversification in their portfolios. Bridgewater has 325 institutional clients around the world and approximately 200 of those clients invest in the All Weather portfolio. It is used in a variety of ways. One way is a pilot-like program, dedicating a small allocation to compare side-by-side with a traditional allocation, until there is comfort to increase the allocation. Another way it is used is as a diversifying strategy alongside multi-asset class and absolute return. The sizing within portfolios varies greatly, ranging from 2% to 30%, but the average allocation across the client base is 7%. There is a small group of plans that has adopted the principles and applied those at their total portfolio level themselves.

MR. DIMMICK conveyed clients are encouraged to implement the strategy on their own, as much as they are comfortable. MR. WHIDDEN explained the process begins with a partnership, whereby Bridgewater teaches the concepts and how to build the portfolio. The client either can manage the assets in-house or in combination with external managers. The portfolio generally uses asset classes that already exist in client's portfolios, but are held in a different mix.

MR. MITCHELL inquired as to the minimum useful allocation amount to be effective for the broad portfolio. He requested additional discussion regarding the magnitude of underperformance this strategy may encounter relative to a traditional 60/40 portfolio and how risk parity clients are reacting in an environment like now where peers are outperforming because of a concentration in stocks. MR. WHIDDEN believes a double-digit allocation size

of any strategy would have the most effect on the portfolio. Many clients do not want to start at that level and take the very natural path of starting smaller and growing as time progresses. The experience has been an initial range of 2% to 5%.

MR. DIMICK discussed a risk parity balanced approach basically earns the average return of all of the assets, rather than being dominated by a single asset class in the portfolio. The risk parity portfolio will never be the best performing portfolio in the world and will, by definition, earn a lower return than the best asset class in a given year or decade. The best performing asset class in the recent decade has clearly been U.S. equities. It has been the best 10-year period ever for an equity concentrated portfolio. The balanced approach has under-performed the equity-dominated U.S. equity portfolios for quite a few years. It is unknown, however, what asset class with be the best performer in the next decade, and thus, it makes sense to be diversified.

MR. DIMICK highlighted the discussion comes back to the goals of the clients and their comfort with the expected range of outcomes. If the goal is paying benefits consistently over the next 10 to 40 years, he believes risk parity is the winning strategy. If the goal is to be in the top quartile of peers over the next one to seven years, he believes risk parity is probably not the right choice. There will be short-term periods that lag the concentrated portfolios.

CHAIR JOHNSON asked if clients amend the strategy over time because of investor impatience. MR. WHIDDEN noted Bridgewater clients has been investing with the firm for an average of 12 years. The All Weather is a passive strategy and the only aspect that can be altered is the size of the investment. The mix of the assets cannot be changed. On net, Bridgewater is seeing more clients utilize this strategy. Almost none of Bridgewater's clients have their entire portfolio in this strategy. It is utilized it as a piece of the portfolio.

MR. DIMICK continued the presentation discussing the construction of the risk parity portfolio. There is no way to know the future returns of each asset class, the future volatility for each asset class, nor the correlation of the asset returns to one another. MR. DIMICK described the annual excess returns in economic environments of rising growth, falling growth, rising inflation, and falling inflation from 1970 to now, for the asset classes of world equities, world nominal bonds, world IL bonds, and commodities. It is understandable to see that world equities do especially well, better than their long-term average of 4% above cash, during a growth period when business is good, sales are high, and inflation is falling. Equity returns are basically zero when growth is disappointing expectations and inflation is rising. The environment that is good or bad for any given asset class is intuitive, logical, and reliable.

MR. DIMICK described the risk parity portfolio is diversified through four portfolios of equal size representing the economic biased environments that drive asset class returns. One portfolio will do well when growth is rising or strong. One portfolio will do well when growth is falling or weak. One portfolio will do well when inflation is rising. One portfolio will do well when inflation is falling. The diversification of economic biases within the risk parity portfolio is the key to consistent returns over cash regardless of the economic environment. The traditional portfolio, which contains primarily equity risk, will do well in a

good economic environment and do poorly in a bad economic environment. MR. DIMICK provided granularity into the composition of each economic biased portfolio.

MR. DIMICK reviewed the risk target of a 60/40 traditional portfolio is about 10%. The All Weather portfolio risk target is about 10%. It uses a modest amount of 1.6 times leverage to achieve long-term returns at 6% above cash, rather than a traditional portfolio long-term returns at 4% above cash, with the same amount of volatility. If no leverage were used, the returns would be the same as a traditional 60/40 portfolio, with dramatically less volatility. Leverage does not have to be used, but it is an option that can be implemented wisely and beneficially to achieve higher returns. MR. DIMICK highlighted there are going to be money losing periods with both the balanced portfolio and the traditional portfolio because they both hold assets that can be sold when people run to cash. The balanced portfolio does not have the economic environment risks, as the traditional portfolio does. Risk parity is the approach developed to most consistently generate wealth over time, with no reliance on predictions of the future.

CHAIR JOHNSON expressed appreciation for the interesting presentation and requested the IAC members provide commentary during the IAC Comments agenda item.

17. SANDS CAPITAL MANAGEMENT - EMERGING MARKETS GROWTH

MR. MITCHELL informed the next two agenda items are presentations from the two finalists from the search process conducted by Callan and staff that was requested by the ARMB for an emerging markets growth manager. MR. MITCHELL introduced representatives from Sands Capital Management, LUKE IGLEHART, managing director of the client and business development team, and ASHRAF HAQUE, senior portfolio manager and one of the co-PMs of the emerging markets (EM) growth strategy. MR. IGLEHART advised Sands is an independent growth manager and has been in business since 1992. For the last 15 years, Sands has been exclusively managing institutional assets. Sands exists to enhance the wealth of clients by investing in high-quality companies with an orientation to owning those businesses for the long-term. The underlying philosophy is stock prices of companies will follow the earnings power trajectory of that business over long-term, full market cycles.

MR. IGLEHART described a global understanding of the opportunity set is necessary for competitive positioning. The EM strategy was developed about six years ago. All of Sands' strategies are managed with the same philosophy and even though each strategy has a discrete portfolio management team, who has been working together for 10 to 15 years, they all draw on the efforts of the global research team. The portfolios are very concentrated and conviction-weighted. The portfolios hold between 30 to 40 stocks, and the top 10 or 12 companies could easily represent 40% to 50% of the portfolio. Turnover is approximately 20% annualized; half of which is adds and trims, and half of which is buying five to seven new businesses. The investment team consists of about 40 individuals, across all the strategies of the firm, who maintain an extremely low ratio of companies per analyst. Sands owns just over a hundred businesses.

MR. HAQUE explained EM investing can be extremely volatile. The approach to mitigate the volatility is to be very selective and very long-term. The exciting influences for EM include the increase in people moving to the cities and the increase in individual wealth. The potential detriments to EM are geopolitical issues, particularly in Russia and China. Understanding and being focused on innovation, disruption, and change is critically important to finding businesses that will grow earnings at a compounded annual rate for the next five or more. The investment team considers volatility periods, like the current period, as opportunities to increase their biggest positions, as long as conviction remains.

MR. HAQUE outlined the six core investment criteria by which every business is measured; sustainable above average earnings growth, leadership position in the business space, significant competitive advantage, professional management's clear mission and value-added focus, financial strength, and fair valuations relative to the market and future earnings. The investment process is similar to most fundamental managers, but the questions asked when managers sit across the table from individual CEOs are very different, and focus on strategic issues regarding the direction of the business in the three to five-year range.

MR. HAQUE conveyed the biggest risk to the portfolio is avoiding permanent capital loss. The portfolio mitigates this risk by investing in businesses that are growing, have low debt, and are in countries with low macro currency risk.

CHAIR JOHNSON asked more about the macro risk issues and assessments of the impact of trade policy, especially with respect to China. MR. HAQUE explained China is an important part of the strategy, comprising approximately a third of the portfolio. India is important as well, comprising approximately another third of the portfolio. The businesses the portfolio owns in China tend to be domestically oriented and benefit from domestic consumption, rather than exports, and are not really impacted by trade issues.

MR. ERLENDSON requested information on how the portfolio addresses concentration risks within the benchmark relative to creating wealth for clients. MR. HAQUE noted the benchmark has changed significantly over the last 10 years. He believes it is a backward-looking benchmark, meaning it is not reflecting the current growth and wealth creation, but is still heavy in state-owned enterprises, energy companies, and financials. The portfolio is benchmark-aware, but does not try to match the benchmark. The firm philosophy is concerned about absolute risk and not benchmark relative risk. The portfolio has about 75% in technology, consumer, and healthcare. MR. HAQUE noted countries like Korea and Taiwan are included in the benchmark, but he does not believe these markets are emerging anymore and does not believe they are good places to own assets for five to 10 years.

MR. MITCHELL inquired as to the tracking error of the portfolio over time, given its concentrated nature, and how it compares to the benchmark. He asked for the correlation of the portfolio's performance to the broader ex-U.S. equity market. MR. HAQUE believes the tracking error historically runs in the 6% range, and is anticipated to continue in that range. The portfolio's tracking error normally will be higher than peers because of the concentration and willingness to take long-term views.

MR. HAQUE noted the benchmark itself has been changing and has come closer to reflecting the components of consumer businesses the portfolio owns. The benchmark may continue to change as the market develops. MR. HAQUE discussed the correlation between global equity markets and the portfolio is relative to the drivers of those capital markets. The capital flight dynamics of sell-offs have tended to impair business in energy, financial, or export space which will be directly impacted by a trade war. The companies in the portfolio that are local and secular have not encountered as much negative impact from the fear of sell-off. It is apparent when U.S. markets sell off, the EM portfolio tends to sell off as much or even more. MR. HAQUE described the portfolio's geographic representation and discussed particulars of individual holdings.

VICE-CHAIR SCHUBERT requested a discussion regarding a failure the portfolio has encountered and what was learned. MR. HAQUE explained a five-year look-back was completed recently for the strategy and approximately 50% of the stocks chosen did not produce the performance expectations. The biggest takeaway was the positive results came from the businesses with the highest convictions. The lesson is to be even more diligent and thoughtful to ensure the companies that are making it into the portfolio meet all the high conviction criteria, and concentrate on those. The internet company Netshoes out of Brazil is an example of where the financial strength and the competitive advantages were misread. The company was a small weighting, and lost about 50% because they were out-competed.

MR. IGLEHART commented on the importance of recognizing the volatility and risk within the EM space, including different global leaders starting trade wars. It is critical to select companies focused on niche growth opportunities, which have significant competitive advantages, and can sustain growth during a volatile geo-political macro environment.

CHAIR JOHNSON recessed the meeting from 10:44 a.m. to 10:55 a.m.

CHAIR JOHNSON requested MR. MITCHELL introduce members in the audience from University of Alaska. MR. MITCHELL informed the Department has hosted two interns during the summertime for the last two years from University of Alaska, Anchorage and Fairbanks. One of the previous interns is in attendance today with fellow UAA Finance Club students to observe the proceedings and manager presentations. CHAIR JOHNSON welcomed the students.

18. EMERGING MARKETS EQUITY - AMERICAN CENTURY INVESTMENTS

MR. MITCHELL advised American Century Investments is the second of the two finalists identified through the search process for an emerging markets growth manager. He requested WALT MCGHEE, Vice President Institutional Business Development, and PATRICIA RIBEIRO, Senior Portfolio Manager, introduce themselves during their presentation.

MR. MCGHEE highlighted MS. RIBEIRO brings 34 years of industry experience, including time at Citigroup as the co-head of global research and managed portfolios, and time at JPMorgan as the head of Latin American research and managed portfolios. She joined American Century's emerging market equity team in 2006, was promoted to portfolio

manager of the emerging market equity strategy in 2009, and manages approximately $4 billion of client assets.

MR. MCGHEE explained the presentation is built to address what he understands to be the Board's objective for this particular emerging markets equity mandate. He read, "To capture the growth style in the emerging market equity pool with the intention of smoothing the significant deviation and relative performance when growth is in favor." MR. MCGHEE hopes to emphasize the key points of differentiation of the American Century strategy that are well-suited to achieve the ARMB's objectives. American Century is an independent and privately held firm, which offers a long and successful history of serving public fund clients. The portfolio offers consistent and disciplined alpha exposures to large, mid, and small cap names, regional and sector exposures, growth, momentum, and would complement the existing ARMB value exposures, while delivering top ranking, risk-adjusted and meaningful net-of-fee performance over time. The firm offers a dedicated relationship management team that provides a single point of contact and resources to effectively monitor and respond to the unique needs of the ARMB.

MR. MCGHEE informed American Century was started in 1958, employs about 1,300 people, including 70 portfolio managers, 75 analysts, and 15 traders. Its offices are located in Missouri, California, New York, London, Sydney, and Hong Kong. The entire global investment team is located in New York. This emerging market equity portfolio was introduced in 1997. Approximately 20% of the assets under management are in non-U.S. equity strategies.

MS. RIBEIRO explained one of the differentiators of American Century's emerging markets equity strategy is its growth philosophy of looking for inflection point. This characteristic is different from standard growth managers. The inflection point is a fundamental change happening at the company level that will drive accelerated earnings going forward. Past growth of a company is not as relevant as significant changes that will trigger the forward trajectory of earnings opportunities and growth acceleration.

MS. RIBEIRO described the strategy is fundamentally focused on bottom-up selection. The team of seven is strong and dedicated with many years of experience in understanding emerging markets. Most of the team has either lived or were born and raised in emerging markets. The strategy is pure-play emerging markets with exposure across the whole market capitalization. The portfolio holds between 80 and 95 high conviction names and is the range necessary to manage through the challenges of the asset class. MS. RIBEIRO reviewed the consistent long-term performance of the portfolio generating positive alpha over the 36 rolling periods shown.

MR. ERLENDSON asked for additional information on capitalization and if the American Century's stand-alone emerging markets small cap strategy impairs or assists the ability to get small cap exposure within this strategy. MS. RIBEIRO noted the small cap strategy was launched three years ago and is an extension of the current work. It has helped in finding ideas in the small cap space. The liquidity for small cap is lower at about $2 million a day. Companies are identified that may not be a candidate for the all-cap strategy because of

liquidity issues, but as the stock appreciates over a period of time, the liquidity gets larger and then it becomes an opportunity for the all-cap portfolio. The overlap is approximately 38 to 40 names. The all-cap portfolio is designed for a capacity of $10 billion to $12 billion.

MS. RIBEIRO continued the presentation illustrating how the portfolio philosophy is applied on a day-to-day basis, showing when to initiate a position during an inflection point and when to divest the position as the acceleration is starting to roll over. Taking advantage of being ahead of the consensus period is important. Understanding valuation is necessary, but does not drive the process. MS. RIBEIRO described an example of an owned asset within the portfolio, its initial attraction for the portfolio and its current status.

MR. MITCHELL asked for comment regarding the suitability of the underlying index representing the opportunity set within emerging markets, and how index-aware the portfolio is from an implementation perspective. MS. RIBEIRO noted the portfolio is index-aware, but the index does not propel the portfolio decisions. The universe of companies is considered and the first elimination aspect is liquidity. The next review level is potential inflection point and sustainability. Consensus is considered and the detailed fundamental research process continues. The quant analytical team supports the portfolio, reviewing factors and identifying any unwanted risks. Guidelines are followed to ensure the stocks are not drifting too far from the objective.

MS. RIBEIRO discussed the background of the seasoned EM investment team. The EM investment team is purposefully responsible for countries, rather than sectors. The macro view gets incorporated into the analytical side of the bottom-up selection. She noted many of the team members speak the languages of the countries they cover. This is important because management of the companies tend to feel comfortable and relaxed speaking their own language and providing more information, as opposed to following the presentation exactly. The analysts have a very good understanding of what works in one country versus another country, because of their experienced understanding of the different challenges in cultures, economics, and geo-political status. Compensation is based on performance of the emerging markets product over the long-term and not individual performance, which contributes to collaborative work and a strong team. The large cap investment teams are responsible for sectors and are utilized when additional global sectorial expertise is needed.

CHAIR JOHNSON inquired if the portfolio managers are investing more in entities that have a domestic focus rather than an export focus, given the current trade issues. MS. RIBEIRO agreed. The portfolio has much more exposure in demand consumption. The export exposure is minimal at about 3%, and is not coming from China, which makes the direct challenges related to the trade wars very small.

MS. RIBEIRO described a graphic showing how the American Century portfolio has a very consistent negative correlation with the ARMB's other two EM managers over a long period of time. She noted the one-year, and really since July of 2018, the portfolio has been challenged. The spread between value outperforming growth in 2018 is significant, and the largest it has been since 2008. The portfolio is top quartile for annualized return, alpha, information ratio, Sharpe ratio, and batting average for the five years from October 2013 to

September 2018. MS. RIBEIRO discussed country deviation compared to the benchmark is minimal. The sector deviation is larger and is where the strongest convictions are held.

There were no additional questions from Board members.

CHAIR JOHNSON recessed the meeting from 11:43 a.m. to 1:02 p.m.

19. U.S. MICRO CAP VALUE

MR. MITCHELL advised DePrince, Race & Zollo (DRZ) currently manages two mandates for ARMB. Today's presentation regards the domestic microcap strategy that has been active since 2011. It consists of approximately $80 million in assets and has been on the watch list for about a year. MR. MITCHELL introduced KELLY CARBONE, DRZ, who introduced GREG RAMSBY and RANDY RENFROW, co-portfolio managers U.S. Microcap Value Strategy. MS. CARBONE expressed appreciation to the ARMB for its support and patience through this extraordinarily difficult time for the value investment process. The ARMB's patience has allowed DRZ to generate a three-year return ended September 30, 2018, of 21.5%, which is ahead of the Russell Microcap Value Index by almost 400 basis points on an annualized basis net of the 1% fee. The quarter-to-date return is ahead of the benchmark by about 130 basis points.

MS. CARBONE explained the time period of 2012 through 2015 was truly difficult because the market was speculative, providing above average annual returns. The investment team remained committed to their 30-year investment discipline. The snap-back has been profound and is expected to produce additional alpha once a rotation occurs towards value and away from growth and momentum.

MR. RAMSBY stated the most unique aspect of their investment process is the focus on dividends. He reviewed a graphic illustrating how dividends represent almost half of the total return in small cap value in the last 25 years. Dividends are much less of a factor for growth managers. Each individual security in the portfolio must have a 1% dividend yield and meet the market cap cut-off of about $1.5 billion. The focus narrows to a review of 10 years of relative valuation and correlation in the market; price-to-book, price-to-earnings, cash flow, yield. The fundamental bottom-up research is the next step in the process, which identifies and quantifies the catalysts that will cause the business to outperform.

MR. RAMSBY outlined the sell decision is triggered when any of the criteria is violated, such as the yield falls below 1%, the market cap gets too big, the stock outperforms and hits the valuation target. If the catalyst does not manifest as expected, the position is reevaluated to determine if and how the improvement story has changed. The portfolio holds between 65 and 80 names, with the largest positions consisting of about 3% to 4%, and the top 10 holdings consisting of about 20% to 30%.

MR. MITCHELL requested comment on the appropriateness of the benchmark. MR. RAMSBY explained it has been historically difficult to find a good microcap index. He believes this portfolio is benchmarked against the most representative benchmark available;

the Russell Microcap Value Index. There are still times when the benchmark contains companies and sectors that are not owned and cannot be owned in the portfolio, due to the dividend requirements and valuations. Healthcare is an example of a sector that does not meet the criteria and therefore cannot be held and is not in the portfolio.

MR. MITCHELL asked if there is a more appropriate way to benchmark their performance, given the benchmark is not reflective of the portfolio. MR. RAMSBY suggested the portfolio is expected to beat the benchmark over a market cycle net of fees. He noted the importance of paying attention to the relationship between value and growth performance in the market. The characteristics of the portfolio are opposite of growth, and even the stocks in the value index were dominated by non-dividend paying value stocks during the growth favor.

MR. RENFROW described the top 10 holdings; their businesses, specialties, products, management, earnings, and future outlooks. He reviewed nine positions in the portfolio that were acquired by larger companies over the last two years. This confirms managers' fundamental analysis and valuations are in line with strategic buyers. These types of takeovers are expected to continue. MS. CARBONE informed there are prominent private equity firms that are looking for the ability to buy and hold microcap companies. This is an indication the M&A activity will be ongoing. She noted some of DRZ's clients view the microcap value strategy as a proxy for private equity, while offering lower fees, liquidity, and transparency.

There were no further questions.

20. INTERNATIONAL SMALL CAP EQUITY PORTFOLIO

MR. MITCHELL informed Mondrian has been investing as an international fixed income manager on behalf of the plans since 1997. The most recent engagement was in 2010, with the international small cap equity mandate being discussed today. Mondrian manages approximately $170 million in the strategy. Due to performance, the strategy was placed on the watch list in June.

MR. MITCHELL introduced TODD RITTENHOUSE, Client Services, who introduced his colleague AIDAN NICHOLSON, senior portfolio manager with the international small cap team. MR. RITTENHOUSE described Mondrian as an independent employee-owned firm that manages about $55 billion primarily for institutional investors. All 55 of the investment professionals are based in London. The six-person international small cap team has worked together for 15 years.

CHAIR JOHNSON asked what plans Mondrian has regarding Brexit. MR. NICHOLSON noted the firm is relatively unimpacted by Brexit and regulation will remain the same. Approximately 85% of Mondrian's clients are based in North America. MR. NICHOLSON described the investment philosophy as value-oriented, defensive management that finds long-term defendable growth areas with an expected increase in dividend streams. The intent is to provide meaningfully returns above the domestic rate of inflation, while seeking to preserve

capital during market declines. The portfolio typically has performance that is less volatile than other small cap managers and the index.

MR. NICHOLSON noted the portfolio's performance is compared to both the MSCI World Ex US Small Cap index and the MSCI EAFE index. The MSCI World Ex US Small Cap index has an approximate 10% weighting to Canadian investments. The EAFE does not include Canadian stocks. The portfolio has a higher weighting to Canadian investments than the MSCI World Ex US Small Cap index, and those investments have outperformed the local Canadian market in each calendar year from 2010 to present. The Canadian market, as a whole, has underperformed EAFE by an average of 10% a year.

MR. NICHOLSON described an illustration showing returns in a bear market and bull market compared to the MSCI World Ex-US Small Cap Index. He discussed the downside protection is built into the selection of each stock by identifying business models that have recurring revenues from service, long-term contracts, replacement related demands, and high quality revenue-generating assets. The defensive positioning means the portfolio does not always capture the full upside with bull markets. The full cycle performance has outperformed the MSCI World Ex US Small Cap index by 1.1% per annum and has given real return comparative to the U.S. CPI. The portfolio's standard deviation is below the MSCI World Ex-US Small Cap benchmark volatility for all periods shown.

MR. MITCHELL requested additional explanation on stock valuation during a commodity down cycle. MR. NICHOLSON advised the investment philosophy and implementation has remained the same for 15 years. The portfolio's downside protection has added significant recent outperformance versus the MSCI World Ex-US Small Cap index. The volatility in the market is greater now and the environment has moved from quantitative easing to quantitative tapering, which has contributed to relative performance in this period. MR. NICHOLSON explained the impact the withdrawal of monetary stimulus may have on markets around the world. Strength is seen within New Zealand, Singapore, Scandinavia, and Canada.

MR. NICHOLSON reviewed the portfolio is underweight Japan, and overweight France, Germany, New Zealand, Singapore, Canada, and Norway. The market outlook has not changed over a number of years, inasmuch as progress has been slow in deleveraging the debt overhang in the developed world. The gradual shift toward a monetary tightening stance will alter the risk appetite, giving rise to social and political risk, and causing higher levels of volatility, as seen through 2018. MR. NICHOLSON does not believe significant eroding will result, but does feel periods of uncertainty and relative weakness can be expected going forward. Mondrian is well-suited to harness these alpha opportunities through their disciplined investment approach.

MR. ERLENDSON commented the portfolio's price-to-book ratio, P/E multiples, Z scores have increasingly moved in the direction of growth fundamentals over time. He asked if this was due to the market environment or intentional growth-oriented characteristics. MR. NICHOLSON agreed the style analytics do not always screen the portfolio to value. The portfolio's focus is on the business model, in terms of the downside reduction of market risks

through the discount dividend methodology. This has been exhibited particularly in the portfolio's software companies.

There were no further questions.

21. BMO DISCIPLINED SMALL-CAP CORE STRATEGY

MR. MITCHELL informed BMO has managed a small cap strategy on behalf of the ARMB for almost two years. The portfolio contains approximately $92 million in assets. BMO has an expected tracking error of about 2.5%. BMO was asked to present to the Board today to discuss the sources of their year-to-date underperformance by about 600 basis points. MR. MITCHELL noted managers being placed on the watch list have a six-year horizon, and BMO only has a two-year history. MR. MITCHELL introduced NIAMH FITZGERALD, managing director BMO Global Asset Management (GAM), and CHRIS JENKS, director with the disciplined equity team.

MS. FITZGERALD discussed BMO GAM manages approximately $260 billion globally across offices in the UK, U.S., Canada, Hong Kong, and the Middle East. About $22 billion is managed within the disciplined equity team. The investment team is based in the U.S. and is comprised of 15 investment professionals with an average of 18 years experience. MR. JENKS informed the small cap core strategy began in 2010, and has approximately $287 million in assets under management. The investment team is stable and has had no significant turnover the last five years. The investment process and philosophy has been utilized since 1985. The portfolio maintains a team-based approach to management through the integration of quantitative analysis, which brings consistency and discipline, with fundamental analysis, which brings transparency and intuition. This is combined into one holistic investment decision-making process. The objective of the strategy is to outperform the benchmark by a range of 3% to 4% over a full market cycle. The five-year numbers for the strategy show an outperformance of 2.8% annualized compared to the benchmark, with a 3.6% tracking error. MR. JENKS noted the information ratio of the metrics for the portfolio is .8, which is near the top decile ranking within the small cap core universe.

MR. ERLENDSON commented an expectation for 3% to 4% above benchmark over a full market cycle seems like a heroic hurdle. He asked if the expectation is being reconsidered, especially given the current performance deficit. MR. JENKS highlighted the short-term deficit is explainable and believes the contributing market conditions are unsustainable. The portfolio managers feel the long-term expectation numbers are within a reasonable and thoughtful range. The research is based off of the great inefficiencies within the small cap universe and the portfolio's dedication to the risk controls. MR. JENKS described each step of the portfolio's stock selection and investment process. The portfolio is a core strategy with an emphasis on company valuations.

MR. JENKS showed the returns of both the U.S. large cap and small cap markets through September 30, 2018. The Russell 2000 benchmark was up approximately 11.5%. The portfolio was up 7.8% gross of fees. Momentum factors dominated the market during this time and a flight to higher quality stocks occurred. There was a continued outperformance of

companies with higher sales and earnings growth relative to more attractively valued securities in the market. Value underperformed growth through September 30, 2018. There was an extreme degree of leadership by the most expensive 10% segment of the U.S. equity market. Given the emphasis on valuation and the process, the portfolio holds no weight in the most expensive decile of the small cap universe, which has been a tremendous headwind during this period.

MR. JENKS reported the benchmark returned 3.6% in the most recent quarter compared to the portfolio of 2.5% gross of fees. The one-year return for the benchmark was about 15% and the one-year return for the portfolio was about 12.5% gross of fees. Since the end of the 3rd quarter to-date, lower risk stocks have wildly outperformed higher risk stocks within the broader U.S. equity market and value indices have outperformed growth indices. Within that value index composition, the lower risk stocks have been trading more expensive relative to their historical average, and as a result, the portfolio has not picked up a tailwind from value investing. The underperformance compared to the benchmark has continued.

VICE-CHAIR SCHUBERT commented on the intention of the portfolio to outperform the Russell 2000 by 3% to 4% per year. She noted it is possible BMO is overselling its intended performance. The one-year numbers show an underperformance to the benchmark of 3%, plus the underperformance of the projected 3% above the benchmark, equals the 6% total underperformance from the stated intent. She asked if this was the way to view the underperformance. MR. MITCHELL agreed. He explained the market behavior has been unexpected, extreme, and in direct opposition to the strategy. He is not recommending action at this point, but is carefully watching the strategy's performance profile. MR. JENKS reiterated the performance expectation is over a full market cycle and not a one-year period. He explained BMO has seen similar cyclical lows in other mandates managed and the time-tested process has demonstrated the ability to recover.

VICE-CHAIR SCHUBERT expressed her preference for managers is to begin the presentation talking about the underperformance and why it happened, rather than showing a longer-term annualized outperformance that is irrelevant to the concerns at-hand.

MR. WILLIAMS conveyed his greatest concern is the stated intent the portfolio will outperform the Russell 2000 by 3% to 4% year over the long-term. He asked how long the horizon needs to be to reach the outperformance. MR. JENKS noted it is difficult to asses when the market trends causing the headwinds will abate. He does not believe the headwinds are sustainable and expects the strategy to drastically improve relative to the benchmark. The sources of underperformance can be explained quantitatively. MR. JENKS discussed the graphics showing the standard valuation factors in the market today. The underperformance can be compared to the late 1990s' tech bubble. He believes the current investor behavior and market trends are cyclical. MR. JENKS advised the transparent investment process has not changed in 30 years, and has demonstrated the ability to recover from cyclical lows.

CHAIR JOHNSON recessed the meeting from 2:40 p.m. to 2:50 p.m.

CHAIR JOHNSON requested MR. MITCHELL comment on the last three watch list presentations. MR. MITCHELL informed staff is monitoring all managers, including the watch list managers. No action is recommended at this time. The investment strategies of the watch list managers have all remained the same. DRZ and Mondrian strategies are out of favor, but have seen recent improvements in performance. BMO continues to underperform during this extreme environment. A return to a more normal environment should provide improvement. If staff becomes uncomfortable and tolerance erodes, a recommendation to terminate would be brought before the Board.

CHAIR JOHNSON asked MR. MITCHELL for a sense of the tone during staff discussions with managers during unhappy circumstances. MR. MITCHELL explained the focus of discussions tends to be on the consistency of the approach, the belief the strategy will work going forward, and reasons for underperformance. The staff member who has the most interaction with managers is MR. CARSON. The tone is not one of cross-examination. It is professional and direct with the intent to understand the source of underperformance.

23. INVESTMENT ACTIONS

A. EM Growth Manager Hire

MR. MITCHELL discussed the earlier presentations from the two EM growth manager finalists. This is the last step in the search process initiated by the Board action in June. He requested the ARM Board deliberate regarding which of the two managers to consider hiring for an initial investment of up to $200 million, subject to successful contract and fee negotiations.

CHAIR JOHNSON asked for comments regarding the current timing of hiring an EM growth manager, given the market conditions. MR. MITCHELL reviewed his understanding the motivation for conducting the search was to provide balance within the existing emerging markets structure. Staff believes the relative underperformance in emerging markets is partially due to the value style being out of favor for a prolonged period of time. Reallocating within emerging markets toward the growth style would help balance the performance profile within the asset class.

MR. WEST commented his observations of the market lead him to believe value investing may not produce the kinds of results over time that it has historically. He feels the ability to properly identify value in an equity is getting more difficult because access to information has increased. MR. WEST favored the presentation of American Century and feels their process was more structured and quantifiable than Sands.

MR. WEST moved to direct staff to invest $200 million within the emerging markets growth area with American Century Investments. MR. BRICE seconded the motion.

MS. ERCHINGER requested feedback from IAC. DR. MITCHELL noted he does not know either manager well and does not have enough information to provide an opinion on which manager to choose. He does, however, recommend moving forward with commitments to

emerging markets at this time. He feels emerging markets are undervalued and will grow faster than developed markets over the long-term.

DR. JENNINGS suggested choosing one of the two managers, rather than splitting the allocation between two managers. He feels the choice of either manager should be the one the Board has the most confidence in and believes has the most persuasive strategy. DR. JENNINGS noted American Century has an intriguing angle with the all-cap opportunities.

MR. SHAW advised he knows both firms very well. The San Francisco Retirement System has retained Sands for their Select Growth flagship product. Both portfolios have performed well compared to their peers over the last five years. Sands is a secular growth manager. Sands' performance pattern is different from American Century in that Sands rebalances to target every month or quarter and is relatively volatile. The upside of companies is captured this way. The ARMB would want to have confidence a portfolio with Sands could be maintained for a very long period of time. MR. SHAW believes hiring an EM growth manager will provide balance to the current two EM value-oriented managers. MR. SHAW favors Sands because of his previous experience with them.

VICE-CHAIR SCHUBERT inquired about the possibility of hiring both managers at the full $200 million each. She agreed American Century was really detailed, in terms of their process, and thought Sands Capital gave more information about the markets and their strategy. MR. MITCHELL informed that decision is within the Board's purview. The determination would have to be made to either overweight emerging markets or take funding from the existing emerging markets value managers and shift it to a growth bias. MR. MITCHELL would have to review the portfolio to ascertain if another source of capital is available. He noted $400 million is approximately 1.7% of the total portfolio size. MR. MITCHELL advised staff is also currently engaged in two other activities regarding emerging markets. One is a China-only search and the other is in contract negotiations with Legal and General regarding a smart beta mandate.

MR. WILLIAMS expressed his concerns regarding the emerging markets asset class and the underperformance over the last 10 years. He understands the need for diversification in the plans and believes both candidates are strong considerations. MR. WILLIAMS favored Sands and noted their enthusiasm and confidence.

MS. ERCHINGER commented her preference was Sands and their strategy was easier to understand. She thought American Century's inflection point discussion was interesting, but felt the implementation would be difficult.

MR. WEST noted staff has done full due diligence on both managers and requested staff's recommendation. MR. MITCHELL conveyed he will support the ARM Board's decision 100%. He walked the Board through the process and evaluation staff followed to determine the two finalists. The preference of staff is Sands Capital.

MR. WEST withdrew his motion. There was no objection from the second MR. BRICE.

MR. WILLIAMS made a motion to invest $200 million with Sands Capital, subject to successful contract and fee negotiations. MR. WEST seconded the motion.

A roll call vote was taken, and the motion passed unanimously.

UNFINISHED BUSINESS

CHAIR JOHNSON noted MR. GOERING was scheduled to discuss his opinion on layering, in the context of the decisions respective to the assumptions and setting the contribution rate. The discussion was primarily for the benefit of the new COMMISSIONERS, who were not present at the moment. CHAIR JOHNSON expressed appreciation for the memorandum prepared by MR. GOERING that was provided to each Board member. No further discussion was requested.

NEW BUSINESS
None

OTHER MATTERS TO PROPERLY COME BEFORE THE BOARD
None

PUBLIC/MEMBER COMMENTS
None

INVESTMENT ADVISORY COUNCIL COMMENTS

DR. JENNINGS noted the IAC will first discuss their risk parity opinions, as requested, and their general comments will follow. He believes a small risk parity allocation is sound and reasonable because it provides further diversification. DR. JENNINGS does not believe it would be wise to have risk parity allocation for an entire portfolio. He feels it is critical to adapt to changing circumstances, including yield curve and leverage. The overall risk parity presentation highlighted the importance the U.S. equity risk is on the ARMB portfolio. The portfolio does not contain symmetrical risk.

DR. MITCHELL agreed a small commitment to risk parity is reasonable and feels it would enable staff and the Board to view the process in practice. He noted a latent concern with the leader of Bridgewater becoming an outgoing figure in both investing and in presenting his philosophy of life.

MR. SHAW informed he has known the Bridgewater firm for about 15 years. He believes it would be valuable to build a small in-house portfolio and engage in the learning partnership that is offered. MR. SHAW conveyed their process is guarded closely.

MR. MITCHELL informed he will continue to provide the Board with the study and analysis phase of risk parity. In the event there is interest from the Board after additional exploration, staff would conduct a search for an appropriate manager and product. There was no objection.

DR. MITCHELL expressed appreciation for those who participated in the interactive process yesterday during his presentation. There were 23 papers submitted containing the responses to the five questions, totaling 115 data points. Seventy-eight of the responses or 68% agreed international investing, as described, was a good idea. Twenty-five of the responses or 22% were neutral, and 12 responses or 10% disagreed. The greatest unanimity was the discussion point on opportunity set, where 19 people agreed, two disagreed, and two were neutral.

TRUSTEE COMMENTS

MS. ERCHINGER expressed appreciation to former COMMISSIONER RIDLE and COMMISSIONER FISHER for their service to the Board and to the State. She welcomed the two new Commissioners and looks forward to working with them.

MS. HARBO shared gratitude the investment team and Division of Retirement and Benefits staff remains in their positions. She expressed appreciation for their work on behalf of members and wished all a merry Christmas.

MR. WILLIAMS discussed his excitement regarding the risk parity diversification strategy. He described the usefulness of the five-year rolling return chart shown on page 33 of the presentation. In the event the Board invests in the strategy, MR. WILLIAMS suggests information be provided to future Boards explaining the strategic philosophy, time horizon, and return expectations.

FUTURE AGENDA ITEMS

CHAIR JOHNSON noted MS. ALEXANDER will make recommendations as to convening a January meeting.

ADJOURNMENT

There being no objection and no further business to come before the Board, the meeting was adjourned at 3:45 p.m. on December 14, 2018, on a motion made by MS. HARBO and seconded by MR. WEST.

Chair of the Board of Trustees
Alaska Retirement Management Board
ATTEST:

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Corporate Secretary

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
MEETING

Location
Alaska State Museum
Lecture Hall
395 Whittier Street
Juneau, Alaska

MINUTES OF
January 11, 2019

Friday, January 11, 2019

CALL TO ORDER

CHAIR ROBERT JOHNSON called the meeting of the Alaska Retirement Management Board (ARMB) to order at 2:00 p.m.

ROLL CALL

Nine ARMB trustees were present at roll call to form a quorum.

Board Members Present
Robert Johnson, *Chair*
Gail Schubert, *Vice-Chair* (telephonic)
Gayle Harbo, *Secretary*
Tom Brice
Kristin Erchinger
Acting Commissioner Bruce Tangeman (arrived late)
Acting Commissioner Jonathan Quick
Norman West
Bob Williams

Board Members Absent
None

Also Present
Bob Mitchell, Acting Chief Investment Officer
Pamela Leary, Director, Treasury Division
Ajay Desai, Director, Division of Retirement and Benefits
Stephanie Alexander, Board Liaison
Paul Wood, GRS (telephonic)
Nils Andreassen, AML Executive Director

PUBLIC MEETING NOTICE

STEPHANIE ALEXANDER confirmed that public meeting notice requirements had been met.

APPROVAL OF AGENDA

MRS. HARBO moved to approve the agenda. MS. ERCHINGER seconded the motion.

The agenda was approved.

PUBLIC/MEMBER PARTICIPATION, COMMUNICATIONS AND APPEARANCES

None.

REPORTS

1. COMMITTEE REPORTS

A. Actuarial Committee

MS. ERCHINGER reported that the Actuarial Committee had met in the morning for about an hour and fifteen minutes to take up the sole issue of reviewing and approving for action by the ARM Board the 2017 Experience Study for Actuarial Assumptions. She explained that Alaska Statute requires the Board to conduct an experience study of the retirement system every four years to compare actual experience to assumptions and consider changes in assumptions as recommended by the actuaries.

The Board had copies of the "Summary of Current and Proposed Assumptions/Methods for 2017 Experience Study," which is a compilation of all of the economic, demographic, and funding method assumptions that were reviewed by the Board. MS. ERCHINGER discussed the primary assumption changes that were recommended, referring Board members to tables of information in the document. MS. ERCHINGER noted that over the past 18 months, the Actuarial Committee has had numerous meetings to consider the various assumptions in much more detail, but today's meeting focused on just one: whether or not to recommend to the full Board layering each new year's actuarial gains and losses over a new closed period. She explained that currently, the annual gains and losses are amortized over a closed 25-year period, and as the end of that period is approached, significant volatility is expected. The recommendation is to change how those gains and losses are amortized so they would be spread out over a new 25-year period each year. The Board's legal counsel, Stuart Goering, has advised the committee that current statute would allow them to do this, but the closed period must still be 25 years.

2. 2014 – 2018 EXPERIENCE STUDY

Resolution 2018-19 Relating to Acceptance of Experience Study, Actuarial Assumptions

MS. ERCHINGER stated that the Actuarial Committee recommended to the full Board that PERS,

TRS, JRS, and the Alaska National Guard and Naval Militia Retirement System's actuarial experience analysis as of June 30, 2017, as well as the assumption and method changes recommended therein and attached as Exhibit A, right-hand column, compared by Buck, be approved.

MS. ERCHINGER so moved.

CHAIR JOHNSON clarified that Resolution 2018-19 had been tabled at the December meeting, and now has the added attachment of Exhibit A, the "Summary" document.

MS. ERCHINGER noted that the Board and the committee have at times expressed concern that a 25-year period is too long, and she would like the Board to consider recommending to the legislature that they consider allowing the Board the flexibility to amortize the new actuarial gains and losses over some period of time less than 25 years. She stated that GRS has recommended 10 to 15 years. PAUL WOOD from GRS assented that actuarial best practices suggest an amortization period for gains and losses of about 10 to 15 years, and shortening the period from 25 years would be a good step toward layering.

A roll call vote was taken, and Resolution 2018-19 was unanimously approved.

MS. ERCHINGER added that the Actuarial Committee had also discussed two recent updates to the three scenarios provided to the committee from Buck. The numbers previously given did not include the impact of federal subsidies to state plans, but the Department of Administration has implemented EGWP as of January 1, 2019, so the new numbers project how that will affect the cost of the plan. Also, healthcare administrative costs were removed from the table of projected numbers because they were already reflected in normal costs.

UNFINISHED BUSINESS

None.

NEW BUSINESS

None.

OTHER MATTERS TO PROPERLY COME BEFORE THE BOARD

CHAIR JOHNSON raised the idea of replacing at least one Anchorage meeting with a meeting in Juneau to save costs, and confirmed that there is no opposition to considering it.

CHAIR JOHNSON stated that he would like the Board to create an operations committee, as they have discussed recently, which would amalgamate the existing salary and budget committees. He suggested that the new committee hold its opening meeting at the next ARM Board meeting, and have members who are currently members of either the salary committee or the budget committee, namely Ms. Harbo, Mrs. Schubert, Mr. West, Ms. Erchinger, Chair Johnson, and Commissioner Quick. CHAIR JOHNSON noted that Mr. Williams had also expressed an interest, and the Commissioner of Revenue or staff should also participate in the operations committee. VICE-CHAIR SCHUBERT

agreed, and there were no objections. CHAIR JOHNSON thanked her for stepping up as interim chair and likely chair of the new committee.

PUBLIC/MEMBER COMMENTS

NILS ANDREASSEN, executive director of the Alaska Municipal League, thanked the Actuarial Committee for its excellent work on the delivery of the experience study for the last four years. MR. ANDREASSEN expressed concern about the overall employer contribution rate increasing as a result of ARM Board decisions and changes in assumptions.

INVESTMENT ADVISORY COUNCIL COMMENTS

No IAC members were present.

TRUSTEE COMMENTS

MS. HARBO thanked Ms. Erchinger for all of her work in establishing the Actuarial Committee and working with the actuaries, resulting in a lot of progress in the past four or five years.

COMMISSIONER QUICK thanked the Board for allowing the resolution to be postponed for a month. He added that the public can rest assured that good people are doing good work to make sure the retirement system is well managed.

FUTURE AGENDA ITEMS

CHAIR JOHNSON noted that the next meeting will be in April, and ideas for agenda items can be sent to him, Mr. Mitchell, or Ms. Alexander.

ADJOURNMENT

There being no objection and no further business to come before the board, the meeting was adjourned at 2:30 p.m. on January 11, 2019, on a motion made by MRS. HARBO and seconded by MR. BRICE.

Chair of the Board of Trustees
Alaska Retirement Management Board

ATTEST:

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Corporate Secretary

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Division of Retirement & Benefits Report
April 4, 2019

Retirement System Membership Activity as of December 31, 2018 –

Attached for your information are the membership statistics for the quarter ending

- December 31, 2018

We see net increases in active members from last quarter, primarily in PERS Tier 4 and TRS Tier 3 members:

- PERS Tier 1-3 active members decreased from 13,300 to 13,138, or a decrease of 162.
- PERS Tier 4 active members increased from 21,406 to 21,986, or an increase of 580.
- PERS active members had a net increase of 418.

- TRS Tier 1-2 active members decreased from 4,507 to 4,503, or a decrease of 4.
- TRS Tier 3 active members increased from 5,933 to 5,947, or an increase of 14.
- TRS active members had a net increase of 10.

Retiree counts have changed in the following manner:

- PERS retirees increased from 35,518 to 35,668, or an increase of 150 (Tiers 1-4).
- TRS retirees decreased from 13,297 to 13,278, or a decrease of 19 (Tiers 1-3).

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Retirement System Membership Activity as of December 31, 2018

ACTION: _____

DATE: April 4, 2019

INFORMATION: **X**

BACKGROUND:

Information related to PERS, TRS, JRS, NGNMRS, SBS, and DCP membership activity as requested by the Board.

STATUS:

Membership information as of December 31, 2018.

MEMBERSHIP STATISTICS AS OF SEPTEMBER 30, 2018

	PERS						TRS					JRS	NGNMRS	SBS	DCP
	DB				DC	SYSTEM	DB			DC	SYSTEM				
	Tier I	Tier II	Tier III	Total	Tier IV	TOTAL	Tier I	Tier II	Total	Tier III	TOTAL				
Active Members	1,180	3,390	8,730	13,300	21,406	34,706	338	4,169	4,507	5,933	10,440	70	n/a	20,967	6,139
Terminated Members															
Entitled to Future Benefits	354	2,069	3,105	5,528	1,212	6,740	39	647	686	528	1,214	2	n/a	25,106	5,121
Other Terminated Members	1,090	2,163	7,753	11,006	12,277	23,283	264	1,591	1,855	2,199	4,054	-	n/a	n/a	n/a
Total Terminated Members	1,444	4,232	10,858	16,534	13,489	30,023	303	2,238	2,541	2,727	5,268	2	n/a	25,106	5,121
Retirees & Beneficiaries	23,674	7,891	3,887	35,452	66	35,518	10,648	2,630	13,278	19	13,297	132	706	n/a	n/a
Managed Accounts	n/a	n/a	n/a	n/a	5,608	5,608	n/a	n/a	n/a	1,501	1,501	n/a	n/a	1,824	1,987
Retirements - 1st QTR FY19	93	169	131	393	18	411	61	137	198	3	201	9	25	n/a	n/a
Full Disbursements - 1st QTR FY19	37	62	103	202	468	670	5	22	27	102	129	-	n/a	526	170
Partial Disbursements - 1st QTR FY19	n/a	n/a	n/a	n/a	73	73	n/a	n/a	n/a	19	19	n/a	n/a	1,099	568

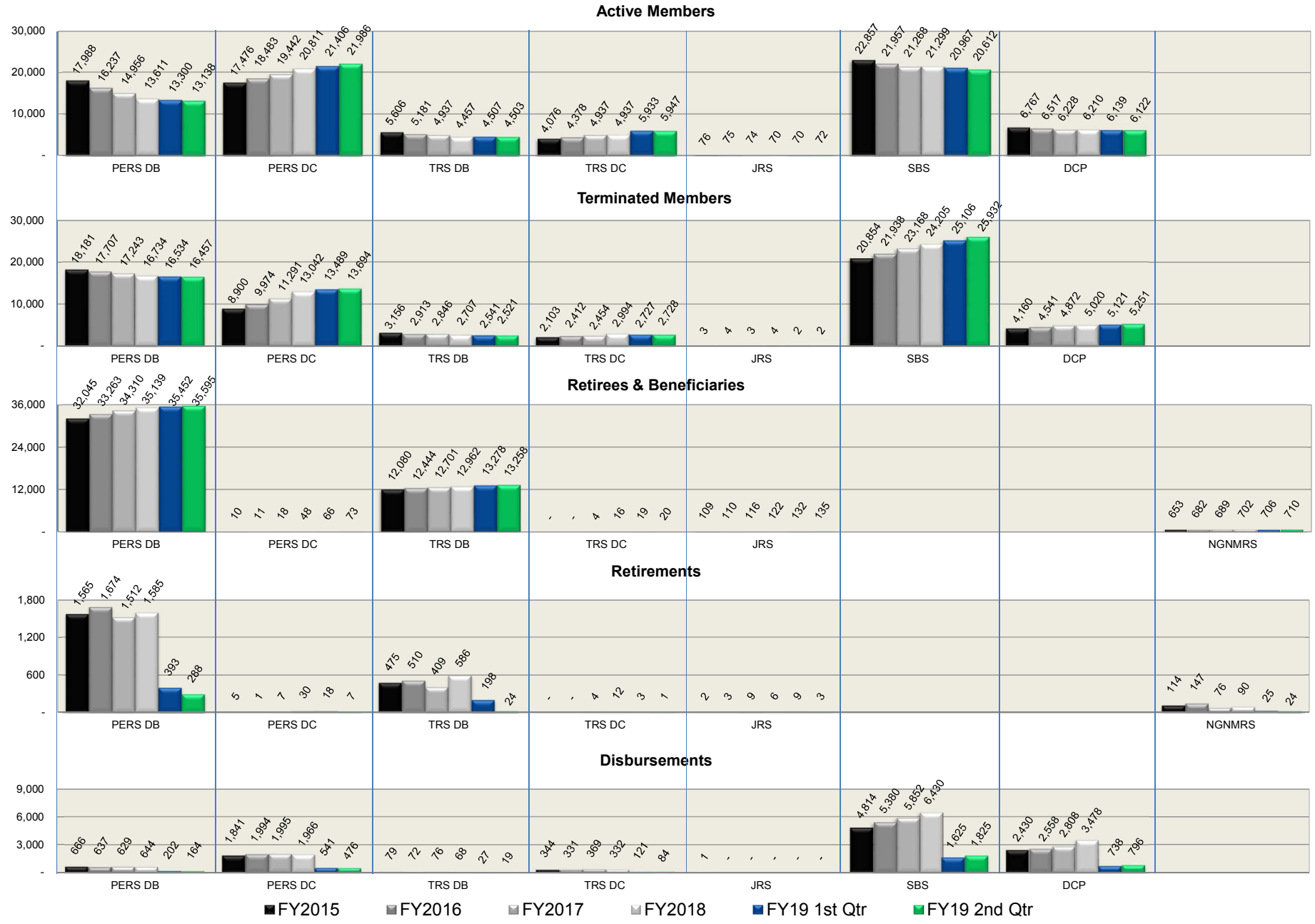
MEMBERSHIP STATISTICS AS OF DECEMBER 31, 2018

	PERS						TRS					JRS	NGNMRS	SBS	DCP
	DB				DC	SYSTEM	DB			DC	SYSTEM				
	Tier I	Tier II	Tier III	Total	Tier IV	TOTAL	Tier I	Tier II	Total	Tier III	TOTAL				
Active Members	1,144	3,338	8,656	13,138	21,986	35,124	337	4,166	4,503	5,947	10,450	72	n/a	20,612	6,122
Terminated Members															
Entitled to Future Benefits	347	2,049	3,105	5,501	1,254	6,755	37	640	677	514	1,191	2	n/a	25,932	5,251
Other Terminated Members	1,088	2,148	7,720	10,956	12,440	23,396	262	1,582	1,844	2,214	4,058	-	n/a	n/a	n/a
Total Terminated Members	1,435	4,197	10,825	16,457	13,694	30,151	299	2,222	2,521	2,728	5,249	2	n/a	25,932	5,251
Retirees & Beneficiaries	23,616	8,007	3,972	35,595	73	35,668	10,611	2,647	13,258	20	13,278	135	710	n/a	n/a
Managed Accounts	n/a	n/a	n/a	n/a	5,643	5,643	n/a	n/a	n/a	1,511	1,511	n/a	n/a	1,931	2,131
Retirements - 2nd QTR FY19	57	129	102	288	7	295	7	17	24	1	25	3	24	n/a	n/a
Full Disbursements - 2nd QTR FY19	16	57	91	164	395	559	4	15	19	68	87	-	n/a	526	136
Partial Disbursements - 2nd QTR FY19	n/a	n/a	n/a	n/a	81	81	n/a	n/a	n/a	16	16	n/a	n/a	1,299	660

Alaska Division of Retirement and Benefits

FY 2019 QUARTERLY REPORT OF MEMBERSHIP STATISTICS

Annual & Quarterly Trends as of December 31, 2018



LEGEND

Active Members - All active members at the time of the data pull,
except SBS & DCP, which are counts of contributors during the final quarter of each period.

Terminated Members - All members who have terminated without refunding their account,
except SBS & DCP, which are counts of members with balances at the end of the period less active members.

Retirees & Beneficiaries - All members who have retired from the plans, including beneficiaries eligible for benefits.

Managed Accounts - Individuals who have elected to participate in the managed accounts option with Empower.

Retirements - The number of retirement applications processed.

Full Disbursements - All types of disbursements that leave the member balance at zero.

Partial Disbursements - All types of disbursements that leave the member balance above zero. If more than one partial disbursement is completed during the quarter for a member, they are counted only once for statistical purposes.

ALASKA RETIREMENT MANAGEMENT BOARD
STAFF REPORT
Division of Retirement & Benefits Report
April 4, 2019

Summary of Monthly Billings / Buck –

Attached for your information are the quarterly payments related to actuarial services provided by the Division's consulting actuary, Buck.

Items listed represent regular and non-regular costs incurred under our current contract with Buck.

The listed costs are charged to the System or Plan noted on the column headings.

Summary through the three months ended December 31, 2018

New for this quarter is the attendance of and presentation at the New York City ARMB Investment Education Conference October 2018.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	Summary of Monthly Billings - Buck	ACTION:	
DATE:	April 4, 2019	INFORMATION:	X

BACKGROUND:

AS 37.10.220(a)(8) prescribes that the Alaska Retirement Management Board (Board) "coordinate with the retirement system administrator to have an annual actuarial valuation of each retirement system prepared to determine system assets, accrued liabilities, and funding ratios…."

As part of the oversight process, the Board has requested that the Division of Retirement & Benefits provide quarterly summary updates to review billings and services provided for actuarial valuations and other systems' request.

STATUS:

Attached are the summary totals for the six months ended December 31, 2018.

Conduent Human Resource Services
Billing Summary
For the Three Months Ended September 30, 2018

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial valuations	$ 77,700	31,546	4,481	11,495	-	-	-	-	-	$ 125,222
KPMG audit information request	5,125	2,091	36	174	-	-	-	-	-	7,426
ARMB presentations and meeting attendance	100,265	40,915	715	3,413	-	-	-	-	-	145,308
FY20 final PERS/TRS contribution rates	9,693	3,956	-	-	-	-	-	-	-	13,649
GASB 68 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	9,505	4,201	96	490	-	-	-	-	-	14,292
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	19,527	8,632	197	1,005	-	-	-	-	-	29,361
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	18,682	6,937	62	-	-	-	-	-	-	25,681
GASB 75 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	1,852	689	6	-	-	-	-	-	-	2,547
TOTAL	$ 242,349	98,967	5,593	16,577	-	-	-	-	-	$ 363,486
For the Three Months Ended September 30, 2017	$ 84,243	33,373	1,865	599	-	-	23	745	185	$ 121,033

For the Three Months Ended December 31, 2018

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial Valuations	$ 45,115	39,150	2,005	19,477	-	-	-	-	-	$ 105,747
KPMG audit information request	10,052	4,101	73	342	-	-	-	-	-	14,568
ARMB presentations and meeting attendance	36,368	14,840	260	1,238	-	-	-	-	-	52,706
Attendance and preparation for October NYC ARMB Investment Education Conference	782	319	5	26	-	-	-	-	-	1,132
GASB 68 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	29,652	13,108	298	1,527	-	-	-	-	-	44,585
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	28,234	12,482	285	1,454	-	-	-	-	-	42,455
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	44,491	16,522	147	-	-	-	-	-	-	61,160
GASB 75 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	33,443	12,421	110	-	-	-	-	-	-	45,974
TOTAL	$ 228,137	112,943	3,183	24,064	-	-	-	-	-	$ 368,327
For the Three Months Ended December 31, 2017	$ 288,798	166,622	596	2,005	-	-	7	510	126	$ 458,664

Summary through the Six Months Ended December 31, 2018

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial valuations	$ 122,815	70,696	6,486	30,972	-	-	-	-	-	$ 230,969
KPMG audit information request	15,177	6,192	109	516	-	-	-	-	-	21,994
ARMB presentations and meeting attendance	136,633	55,755	975	4,651	-	-	-	-	-	198,014
Attendance and preparation for October NYC ARMB Investment Education Conference	782	319	5	26	-	-	-	-	-	1,132
FY20 final PERS/TRS contribution rates	9,693	3,956	-	-	-	-	-	-	-	13,649
GASB 68 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	39,157	17,309	394	2,017	-	-	-	-	-	58,877
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/ JRS/NGNMRS)	47,761	21,114	482	2,459	-	-	-	-	-	71,816
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	63,173	23,459	209	-	-	-	-	-	-	86,841
GASB 75 valuation reports as of 6/30/17 (PERS/TRS/ JRS)	35,295	13,110	116	-	-	-	-	-	-	48,521
TOTAL	$ 470,486	211,910	8,776	40,641	-	-	-	-	-	731,813
Summary through the Six Months Ended December 31, 2017	$ 373,041	199,995	2,461	2,604	-	-	30	1,255	311	$ 579,697

ALASKA RETIREMENT MANAGEMENT BOARD
M E M O R A N D U M

To: ARMB Trustees
From: Stephanie Alexander
Date: March 21, 2019
Subject: Financial Disclosures

As required by AS 37.10.230 and Alaska Retirement Management Board policy relating to investment conduct and reporting, trustees and staff must disclose certain financial interests. We are hereby submitting to you a list of disclosures for individual transactions made by trustees and staff.

4rd Quarter – October 1, 2018 to December 31, 2018

Name	Position Title	Disclosure Type	Disclosure Date
Bob Mitchell	Chief Investment Officer	Equities	12/06/2018
Bob Mitchell	Chief Investment Officer	Equities	12/18/2018
Greg Samorajski	Deputy Commissioner	Equities, Fixed Income	01/09/2019
Victor Djajalie	State Investment Officer	Equities	11/02/2018
Victor Djajalie	State Investment Officer	Equities	01/16/2019

CALENDAR AS OF JAN. 2019

ALASKA RETIREMENT MANAGEMENT BOARD
2019 Meeting Calendar

DATE	LOCATION	DESCRIPTION
April 3 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee
April 4-5 Thursday-Friday	**Juneau, AK**	**Board of Trustees Meeting:** **Performance Measurement – 4th Quarter* **Absolute Return Annual Plan* **Capital Markets – Asset Allocation* **Manager Presentations*
May 2 Thursday	Anchorage, AK or Telephonic	Actuarial Committee **As necessary: follow-up/additional discussion/questions on valuations*
May 3 Friday	**Anchorage, AK**	**Board of Trustees Meeting** **Actuary High Level Valuation Results Presentation* **As necessary*
June 19 Wednesday	Anchorage, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee
June 20-21 Thursday - Friday	**Anchorage, AK**	**Board of Trustees Meeting:** **Draft Actuary Report/Draft Actuary Certification* **Adopt Asset Allocation* **Review Private Equity Annual Plan* **Performance Measurement - 1st Quarter* **Manager Presentations*
September 18 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Budget Committee
September 19-20 Thursday - Friday	**Juneau, AK**	**Board of Trustees Meeting:** **Set Contribution Rates* **Final Actuary Reports/Adopt Valuation* **Audit Results/Assets – KPMG* **Approve Budget* **Performance Measurement – 2nd Quarter* **Real Estate Annual Plan* **Real Estate Evaluation – Townsend Group* **Manager Presentations*
November 7-8 Thurs.- Fri. (placeholder)	**New York, NY**	**Board of Trustees Meeting: Investment Education Conference**
November 15 Friday (placeholder)	Telephonic	Audit Committee
December 11 Wednesday	Anchorage, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee
December 12-13 Thursday-Friday	**Anchorage, AK**	**Board of Trustees Meeting:** **Audit Report - KPMG* **Performance Measurement – 3rd Quarter* **Manager Review (Questionnaire)* **Private Equity Review* **Manager Presentations*

DRAFT

ALASKA RETIREMENT MANAGEMENT BOARD
2019 Meeting Calendar

DATE	LOCATION	DESCRIPTION
April 3 Wednesday	Juneau, AK	Operations Committee Audit Committee Defined Contribution Plan Committee
April 4-5 Thursday-Friday	**Juneau, AK**	**Board of Trustees Meeting:** **Performance Measurement – 4th Quarter* **Absolute Return Annual Plan* **Capital Markets – Asset Allocation* **Manager Presentations*
May 2 Thursday	Telephonic	Actuarial Committee **As necessary: follow-up/additional discussion/questions on valuations*
May 3 Friday	**Telephonic**	**Board of Trustees Meeting** **Actuary High Level Valuation Results Presentation* **As necessary*
June 19 Wednesday	Juneau AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
June 20-21 Thursday - Friday	**Juneau AK**	**Board of Trustees Meeting:** **Draft Actuary Report/Draft Actuary Certification* **Adopt Asset Allocation* **Review Private Equity Annual Plan* **Performance Measurement - 1st Quarter* **Manager Presentations*
September 18 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
September 19-20 Thursday - Friday	**Juneau, AK**	**Board of Trustees Meeting:** **Set Contribution Rates* **Final Actuary Reports/Adopt Valuation* **Audit Results/Assets – KPMG* **Approve Budget* **Performance Measurement – 2nd Quarter* **Real Estate Annual Plan* **Real Estate Evaluation – Townsend Group* **Manager Presentations*
November 15 Friday (placeholder)	Telephonic	Audit Committee
December 11 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
December 12-13 Thursday-Friday	**Juneau, AK**	**Board of Trustees Meeting:** **Audit Report - KPMG* **Performance Measurement – 3rd Quarter* **Manager Review (Questionnaire)* **Private Equity Review* **Manager Presentations*

Summary of Portfolio Moves
November 2018 - February 2019

Item	Action	Date	Amount	Description/Summary	Authority
	Rebalance Transactions:				
1	Rebalance Retirement Funds	11/1, 11/6, 11/23, 12/21, 1/17, 1/25		Available upon request.	
	Futures Rolls and Adjustments:				
2	Cash Equitization - Large Cap	12/10/2018	$13,602,180	Sold Dec. 2018 S&P 500 eMini contracts.	ARMB Resolution 2017-05
3	Cash Equitization - Large Cap	12/10/2018	($13,623,038)	Bought Mar. 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
4	Cash Equitization - Small Cap	12/10/2018	$11,215,025	Sold Dec. 2018 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
5	Cash Equitization - Small Cap	12/10/2018	($16,084,543)	Bought Mar. 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
6	Portable Alpha - Large Cap	12/10/2018	$406,605,269	Sold Dec. 2018 S&P 500 eMini contracts.	ARMB Resolution 2017-05
7	Portable Alpha - Large Cap	12/10/2018	($406,991,780)	Bought Mar. 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
8	Portable Alpha - Small Cap	12/10/2018	$312,811,959	Sold Dec. 2018 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
9	Portable Alpha - Small Cap	12/10/2018	($313,262,500)	Bought Mar. 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
10	Cash Equitization - Large Cap	12/14/2018	$3,921,750	Sold Mar. 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
11	Portable Alpha Cash Transfers	Multiple Dates		Multiple cash transfers for PA futures accounts to maintain margin positions.	ARMB Resolution 2017-05
	Investment Actions:				
12	Multiple Terminated Strategies	11/14/2018	($66,471)	Swept residual cash positions.	ARMB action.
13	Short-Term Investment Pool	11/14/2018	$66,471	Invested in strategy.	ARMB action.
14	MacKay Shields High Yield	11/15/2018	($6,800,000)	Liquidated from strategy.	ARMB Resolution 2017-05
15	Short-Term Investment Pool	11/15/2018	$6,800,000	Invested in strategy.	ARMB Resolution 2017-05
16	Intermediate US Treasury	11/26/2018	($50,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
17	Short-Term Investment Pool	11/26/2018	$50,000,000	Invested in strategy.	ARMB Resolution 2017-05
18	Multiple Terminated Strategies	1/15/2019	($929,408)	Swept residual cash positions.	ARMB action.
19	Short-Term Investment Pool	1/15/2019	$929,408	Invested in strategy.	ARMB action.
20	Analytic Buy/Write Strategy	1/16/2019	($100,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
21	Russell 200	1/16/2019	($203,963,211)	Liquidated from strategy.	ARMB Resolution 2017-05
22	Lazard Infrastructure	1/16/2019	($70,500,000)	Liquidated from strategy.	ARMB Resolution 2017-05
23	Brookfield Infrastructure	1/16/2019	($29,500,000)	Liquidated from strategy.	ARMB Resolution 2017-05
24	Short-Term Investment Pool	1/16/2019	($46,036,789)	Liquidated from strategy.	ARMB Resolution 2017-05
25	SSgA MSCI ACWI ex-US IMI	1/16/2019	$300,000,000	Invested in strategy.	ARMB Resolution 2017-05
26	Brandes	1/16/2019	$150,000,000	Invested in strategy.	ARMB Resolution 2017-05
27	Intermediate US Treasury	1/25/2019	($100,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
28	Short-Term Investment Pool	1/25/2019	$100,000,000	Invested in strategy.	ARMB Resolution 2017-05
29	MacKay Shields High Yield	1/31/2019	($50,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
30	Short-Term Investment Pool	1/31/2019	$50,000,000	Invested in strategy.	ARMB Resolution 2017-05
31	Schoders ILS	1/31/2019	($100,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
32	Short-Term Investment Pool	1/31/2019	$100,000,000	Invested in strategy.	ARMB Resolution 2017-05
33	Tortoise Capital Advisors	2/12-15/2019	($170,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
34	Intermediate US Treasury	2/12-15/2019	$170,000,000	Invested in strategy.	ARMB Resolution 2017-05
35	Allianz Structured Alpha 1000 Plus LLC	2/15/2019	($100,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
36	Intermediate US Treasury	2/15/2019	$100,000,000	Invested in strategy.	ARMB Resolution 2017-05
	Watch List:				
37	Lazard Emering Income	Apr. 2017		Performance	ARMB Resolution 2012-25
38	DRZ Micro Cap	Oct. 2017		Performance	ARMB Resolution 2012-25
39	Mondrian International Small Cap	Jun. 2018		Performance	ARMB Resolution 2012-25
40	Lazard EM Equity	Sep. 2018		Performance	ARMB Resolution 2012-25
41	Prisma Absolute Return	Sep. 2018		Transition of co-CEOs to advisory roles.	ARMB Resolution 2012-25
	Other Actions:				
42	Neuberger Berman Dyal Capital Partners IV	Dec. 2018		Committed $40 million to the fund.	ARMB Resolution 2016-06
43	NGP Natural Resources XII	Dec. 2018		Committed $40 million to the fund.	ARMB Resolution 2016-06
44	Summit Growth Equity X	Feb. 2019		Committed $40 million to the fund.	ARMB Resolution 2016-06
	Announcements:				
45	Participant communication	12/24/2018		Requested that investment options include certificates of deposit and a brokerage window.	

Current managers on Watch List

DB Plan	6 year Performance	Test 1	Test 2	Test 3
Lazard Emerging Income	-1.27%			
LIBOR 3 months	0.90%	Fail		
DePrince, Race & Zollo Micro Cap	9.70%			
Russell Micro Value Index	9.67%	Pass		
CAI Micro Cap Value Style (Gross)	10.32%		Pass	
Peer Group Percentile	56%			Pass
Mondrian Intl Sm Cap	5.40%			
EAFE Small Cap Index	7.03%	Fail		
CAI International Small Cap Style (Gross)	7.67%		Fail	
Peer Group Percentile	88%			Fail
Lazard Emerging	-0.69%			
MSCI Emerging Mkts Idx	1.30%	Fail		
CAI Emerging Markets Equity DB (Gross)	0.70%		Fail	
Peer Group Percentile	90%			Fail
Prisma Capital	3.62%			
Fund of Funds Index	2.62%	Pass		
Absolute Return Hedge FoF Style (Net)	3.91%		Pass	
Peer Group Percentile	53%			Pass

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Fund Financials – Cash Flow Report
April 4, 2019

Scott Jones, State Comptroller, Department of Revenue

As of February month-end, total plan assets were as follows: PERS - $18.6 billion, TRS - $8.9 billion, JRS - $212 million, NGNMRS - $40 million, SBS - $4.0 billion, DCP - $948 million. Total non-participant direct plans totaled $26.1 billion, and participant-directed plans totaled $6.5 billion. Total assets were $32.6 billion.

Year-to-date income was $707 million, and the plans experienced a net withdrawal of $551 million. Total assets were up 0.48% year-to-date.

Internally managed assets totaled $8.9 billion

As of month-end, all plans were within the bands of their asset allocations.

Kevin Worley, Chief Financial Officer, Division of Retirement and Benefits

Presented is the Division of Retirement and Benefits (DRB) Supplement to the Treasury Division's Financial Report as of February 28, 2019.

DRB's supplement report expands on the ARMB Financial Report column "Net Contributions (Withdrawals)" located on pages 1 and 2. DRB reports the summary totals of actual employee and employer, State of Alaska, and other revenue contributions, as well as benefit payments, refunds / distributions, and combined administrative / investment expenditures. DRB's report presents cash inflows / outflows for the 8 months ended February 28, 2019 (page 1) and the month of February 2019 (page 2).

Also presented are participant-directed distributions by plan and by type for the 8-month period on page 3.

"Notes for the DRB Supplement to the Treasury Report" includes information for the pension and healthcare plans. Additional information regarding other income is also presented on pages 4 and 5.

ALASKA RETIREMENT MANAGEMENT BOARD
FINANCIAL REPORT

As of February 28, 2019

ALASKA RETIREMENT MANAGEMENT BOARD
Schedule of Investment Income and Changes in Invested Assets by Fund
Fiscal Year-to-Date through February 28, 2019

	Beginning Invested Assets	Investment Income [1]	Net Contributions (Withdrawals)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income [2]
Public Employees' Retirement System (PERS)						
Defined Benefit Plans:						
Retirement Trust	$ 9,279,978,252	$ 198,908,396	$ (190,035,001)	$ 9,288,851,647	0.10%	2.17%
Retirement Health Care Trust	7,653,992,293	166,181,742	(209,461,509)	7,610,712,526	-0.57%	2.20%
Total Defined Benefit Plans	16,933,970,545	365,090,138	(399,496,510)	16,899,564,173	-0.20%	2.18%
Defined Contribution Plans:						
Participant Directed Retirement	1,041,422,342	21,344,349	65,732,689	1,128,499,380	8.36%	1.99%
Health Reimbursement Arrangement	356,026,985	8,564,249	27,362,098	391,953,332	10.09%	2.32%
Retiree Medical Plan	99,169,627	2,380,567	7,603,514	109,153,708	10.07%	2.31%
Defined Benefit Occupational Death and Disability:						
Public Employees	20,872,152	503,845	1,667,197	23,043,194	10.40%	2.32%
Police and Firefighters	9,776,610	231,969	645,726	10,654,305	8.98%	2.30%
Total Defined Contribution Plans	1,527,267,716	33,024,979	103,011,224	1,663,303,919	8.91%	2.09%
Total PERS	**18,461,238,261**	**398,115,117**	**(296,485,286)**	**18,562,868,092**	0.55%	2.17%
Teachers' Retirement System (TRS)						
Defined Benefit Plans:						
Retirement Trust	5,466,056,988	116,283,244	(149,640,821)	5,432,699,411	-0.61%	2.16%
Retirement Health Care Trust	2,883,838,182	62,648,908	(80,503,078)	2,865,984,012	-0.62%	2.20%
Total Defined Benefit Plans	8,349,895,170	178,932,152	(230,143,899)	8,298,683,423	-0.61%	2.17%
Defined Contribution Plans:						
Participant Directed Retirement	442,323,051	9,130,847	20,436,419	471,890,317	6.68%	2.02%
Health Reimbursement Arrangement	105,665,716	2,545,041	6,461,431	114,672,188	8.52%	2.34%
Retiree Medical Plan	36,357,065	860,657	1,708,197	38,925,919	7.07%	2.31%
Defined Benefit Occupational Death and Disability	3,797,783	89,094	128,226	4,015,103	5.72%	2.31%
Total Defined Contribution Plans	588,143,615	12,625,639	28,734,273	629,503,527	7.03%	2.10%
Total TRS	**8,938,038,785**	**191,557,791**	**(201,409,626)**	**8,928,186,950**	-0.11%	2.17%
Judicial Retirement System (JRS)						
Defined Benefit Plan Retirement Trust	176,358,294	3,823,882	(371,439)	179,810,737	1.96%	2.17%
Defined Benefit Retirement Health Care Trust	31,621,813	702,580	(186,362)	32,138,031	1.63%	2.23%
Total JRS	**207,980,107**	**4,526,462**	**(557,801)**	**211,948,768**	1.91%	2.18%
National Guard/Naval Militia Retirement System (MRS)						
Defined Benefit Plan Retirement Trust	39,449,053	650,260	(196,024)	39,903,289	1.15%	1.65%
Other Participant Directed Plans						
Supplemental Annuity Plan	3,905,659,481	88,867,328	(38,646,065)	3,955,880,744	1.29%	2.29%
Deferred Compensation Plan	938,806,799	23,148,523	(13,825,720)	948,129,602	0.99%	2.48%
Total All Funds	**32,491,172,486**	**706,865,481**	**(551,120,522)**	**32,646,917,445**		
Total Non-Participant Directed	26,162,960,813	564,374,434	(584,817,845)	26,142,517,402	-0.08%	2.18%
Total Participant Directed	6,328,211,673	142,491,047	33,697,323	6,504,400,043	2.78%	2.25%
Total All Funds	**$ 32,491,172,486**	**$ 706,865,481**	**$ (551,120,522)**	**$ 32,646,917,445**	**0.48%**	**2.19%**

Notes:

(1) Includes interest, dividends, securities lending, expenses, realized and unrealized gains/losses

(2) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates and can be found at: http://www.revenue.state.ak.us/treasury/programs/programs/other/armb/investmentresults.aspx

ALASKA RETIREMENT MANAGEMENT BOARD
Schedule of Investment Income and Changes in Invested Assets by Fund
For the Month Ended February 28, 2019

	Beginning Invested Assets	Investment Income (1)	Net Contributions (Withdrawals)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income (2)
Public Employees' Retirement System (PERS)						
Defined Benefit Plans:						
Retirement Trust	$ 9,188,535,392	$ 140,191,486	$ (39,875,231)	$ 9,288,851,647	1.09%	1.53%
Retirement Health Care Trust	7,514,171,501	116,153,259	(19,612,234)	7,610,712,526	1.28%	1.55%
Total Defined Benefit Plans	16,702,706,893	256,344,745	(59,487,465)	16,899,564,173	1.18%	1.54%
Defined Contribution Plans:						
Participant Directed Retirement	1,092,201,994	27,190,249	9,107,137	1,128,499,380	3.32%	2.48%
Health Reimbursement Arrangement	382,449,112	5,902,448	3,601,772	391,953,332	2.49%	1.54%
Retiree Medical Plan	106,539,841	1,644,211	969,656	109,153,708	2.45%	1.54%
Defined Benefit Occupational Death and Disability:						
Public Employees	22,472,699	346,784	223,711	23,043,194	2.54%	1.54%
Police and Firefighters	10,417,138	160,676	76,491	10,654,305	2.28%	1.54%
Total Defined Contribution Plans	1,614,080,784	35,244,368	13,978,767	1,663,303,919	3.05%	2.17%
Total PERS	**18,316,787,677**	**291,589,113**	**(45,508,698)**	**18,562,868,092**	1.34%	1.59%
Teachers' Retirement System (TRS)						
Defined Benefit Plans:						
Retirement Trust	5,384,358,926	82,167,090	(33,826,605)	5,432,699,411	0.90%	1.53%
Retirement Health Care Trust	2,829,849,711	43,735,015	(7,600,714)	2,865,984,012	1.28%	1.55%
Total Defined Benefit Plans	8,214,208,637	125,902,105	(41,427,319)	8,298,683,423	1.03%	1.54%
Defined Contribution Plans:						
Participant Directed Retirement	456,258,048	11,560,475	4,071,794	471,890,317	3.43%	2.52%
Health Reimbursement Arrangement	111,994,670	1,729,225	948,293	114,672,188	2.39%	1.54%
Retiree Medical Plan	38,091,976	588,224	245,719	38,925,919	2.19%	1.54%
Defined Benefit Occupational Death and Disability	3,931,553	60,708	22,842	4,015,103	2.13%	1.54%
Total Defined Contribution Plans	610,276,247	13,938,632	5,288,648	629,503,527	3.15%	2.27%
Total TRS	**8,824,484,884**	**139,840,737**	**(36,138,671)**	**8,928,186,950**	1.18%	1.59%
Judicial Retirement System (JRS)						
Defined Benefit Plan Retirement Trust	178,044,990	2,714,046	(948,299)	179,810,737	0.99%	1.53%
Defined Benefit Retirement Health Care Trust	31,660,637	489,405	(12,011)	32,138,031	1.51%	1.55%
Total JRS	**209,705,627**	**3,203,451**	**(960,310)**	**211,948,768**	1.07%	1.53%
National Guard/Naval Militia Retirement System (MRS)						
Defined Benefit Plan Retirement Trust	39,429,279	574,321	(100,311)	39,903,289	1.20%	1.46%
Other Participant Directed Plans						
Supplemental Annuity Plan	3,889,243,528	72,088,774	(5,451,558)	3,955,880,744	1.71%	1.85%
Deferred Compensation Plan	929,002,292	21,731,309	(2,603,999)	948,129,602	2.06%	2.34%
Total All Funds	**32,208,653,287**	**529,027,705**	**(90,763,547)**	**32,646,917,445**		
Total Non-Participant Directed	25,841,947,425	396,456,898	(95,886,921)	26,142,517,402	1.16%	1.54%
Total Participant Directed	6,366,705,862	132,570,807	5,123,374	6,504,400,043	2.16%	2.08%
Total All Funds	**$ 32,208,653,287**	**$ 529,027,705**	**$ (90,763,547)**	**$ 32,646,917,445**	**1.36%**	**1.64%**

Notes:

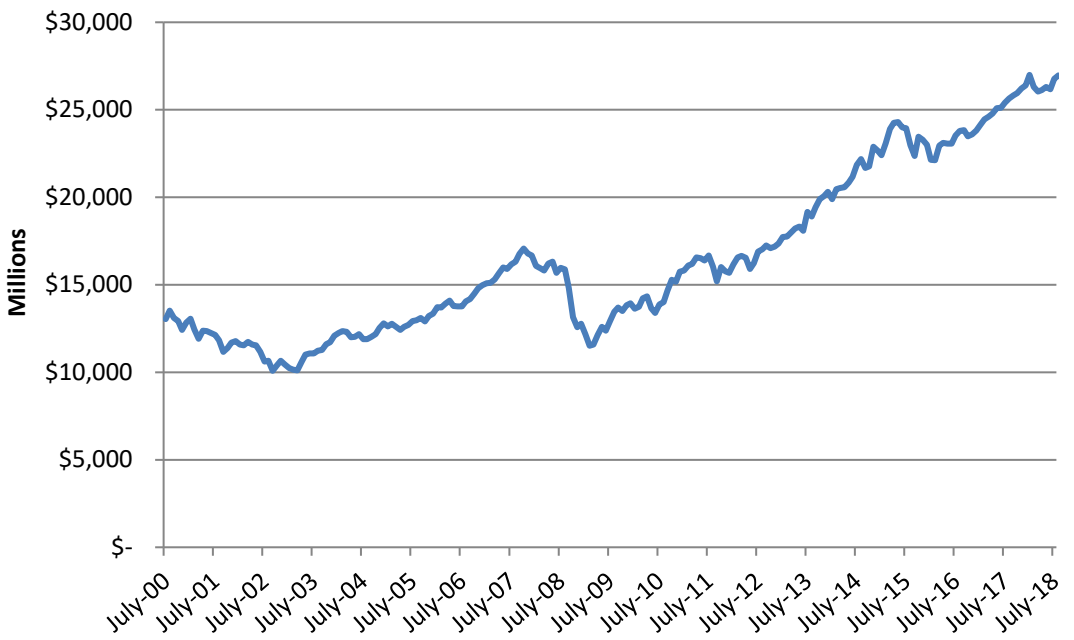
(1) Includes interest, dividends, securities lending, expenses, realized and unrealized gains/losses

(2) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates and can be found at: http://www.revenue.state.ak.us/treasury/programs/programs/other/armb/investmentresults.aspx

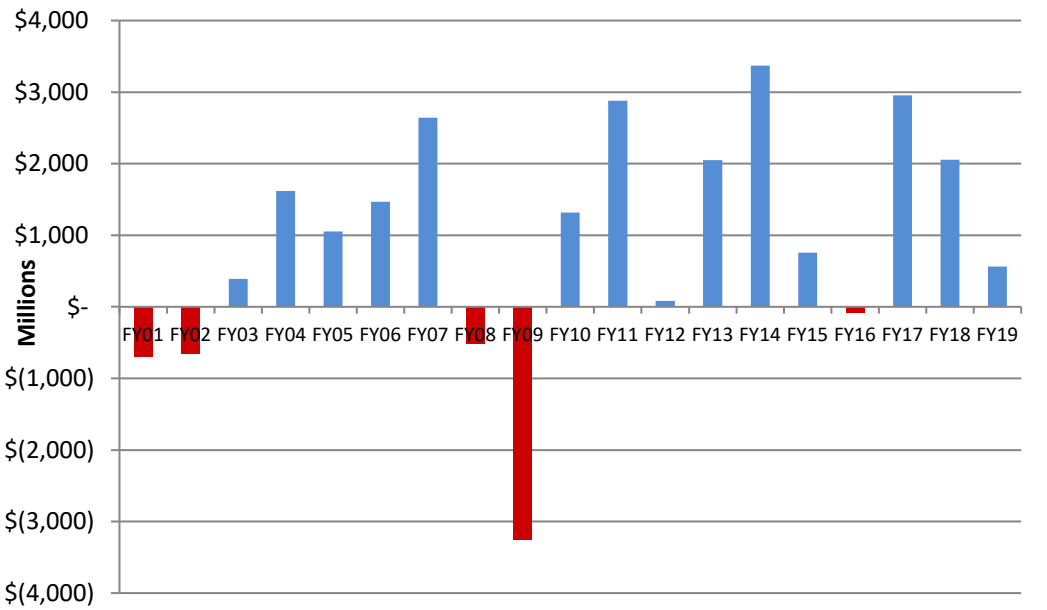
Total Non Participant Directed Assets

As of February 28, 2019

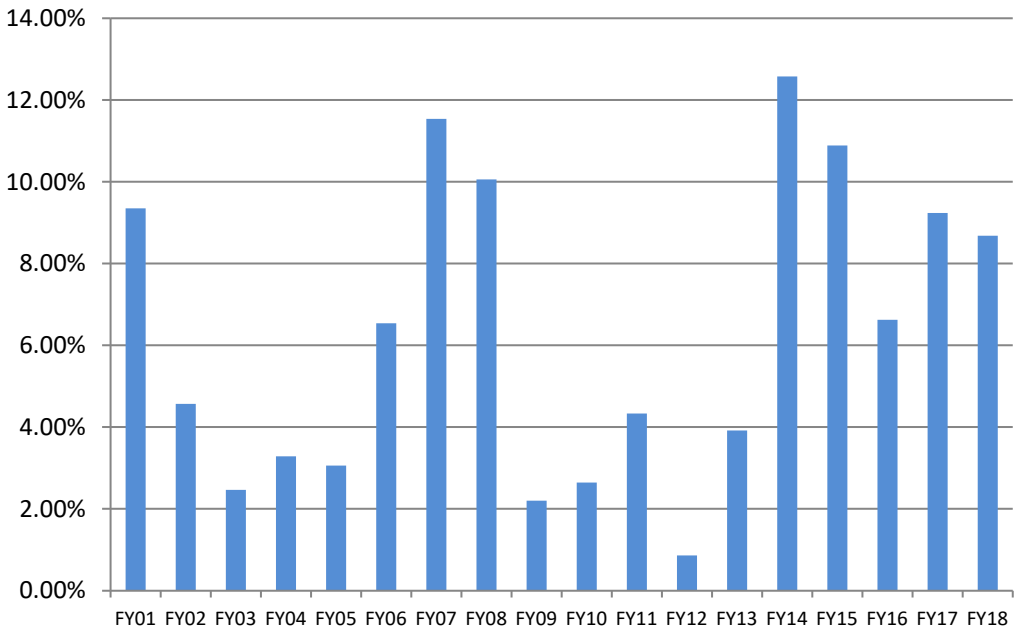
Total Assets History



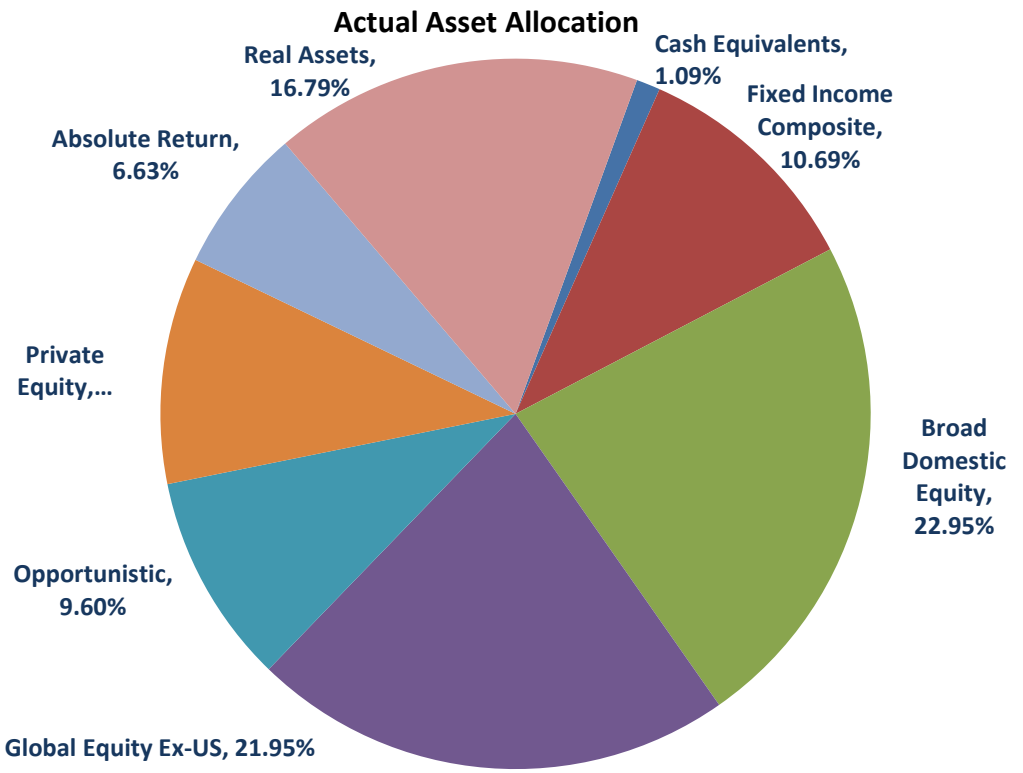
Income by Fiscal Year



5-year Annualized Returns as of Fiscal Year End

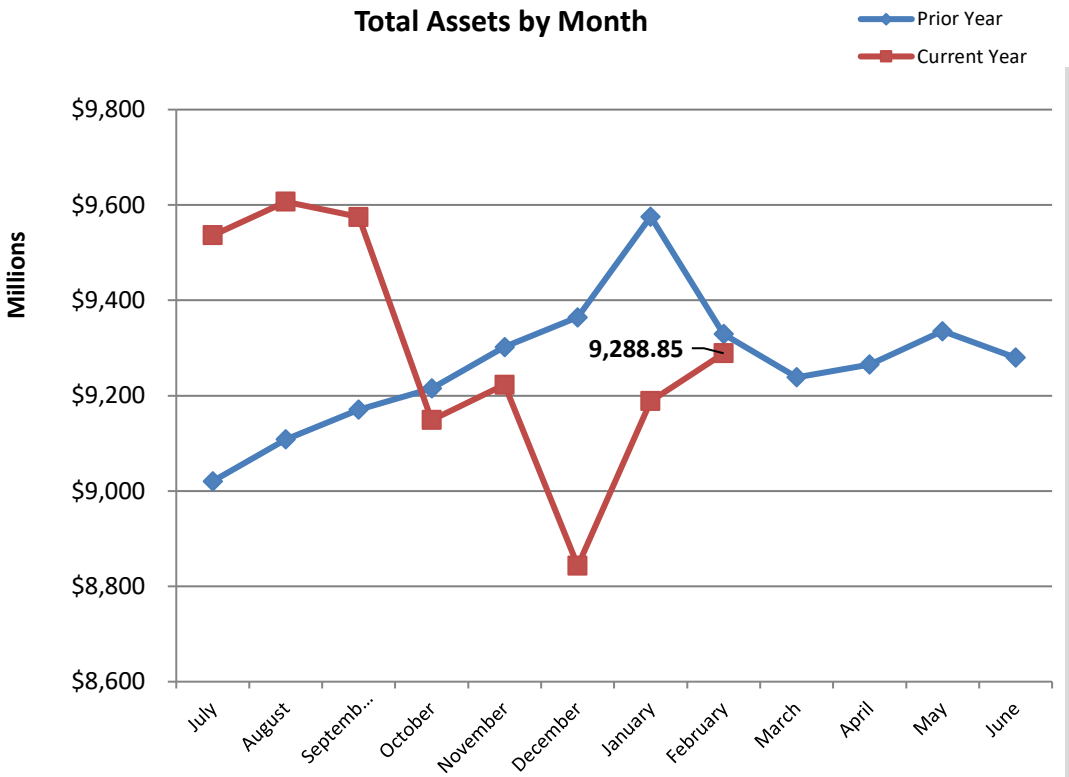


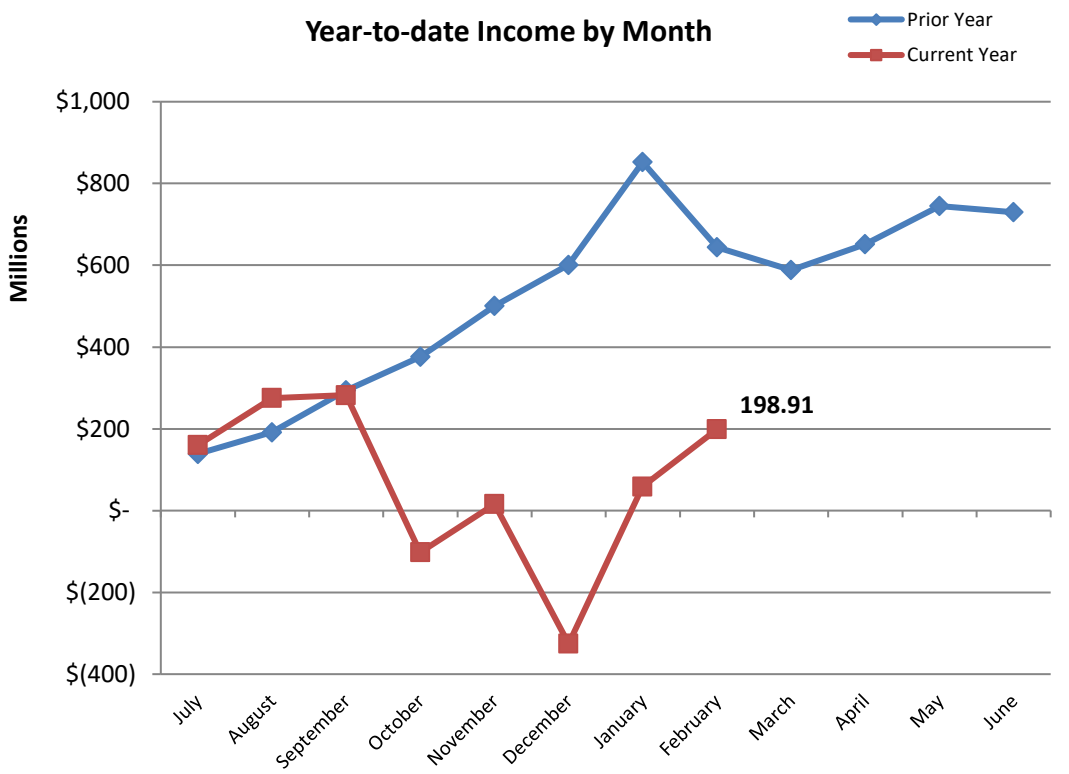
Actual Asset Allocation

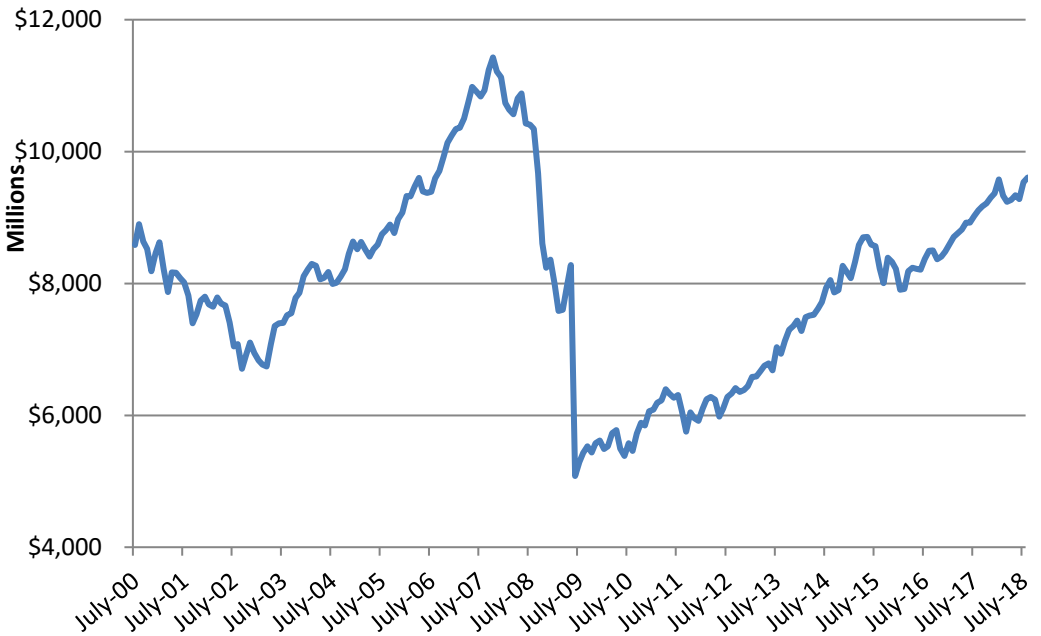


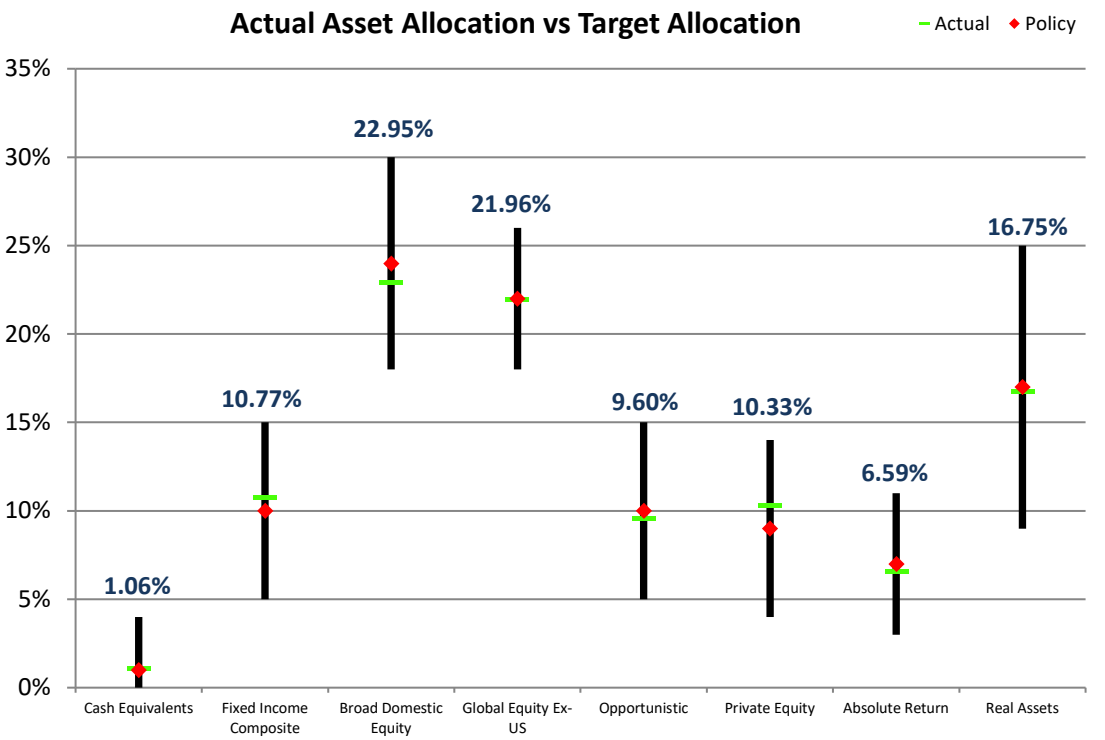
Public Employees' Retirement Pension Trust Fund

Fiscal Year-to-Date through February 28, 2019



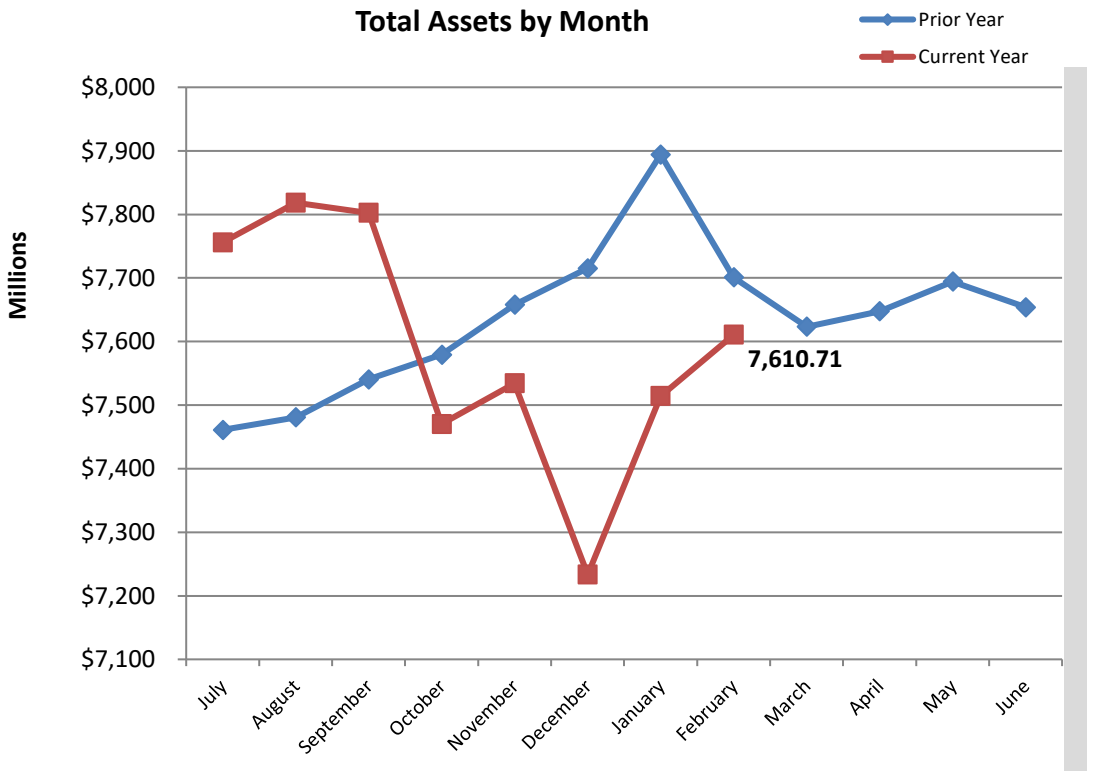


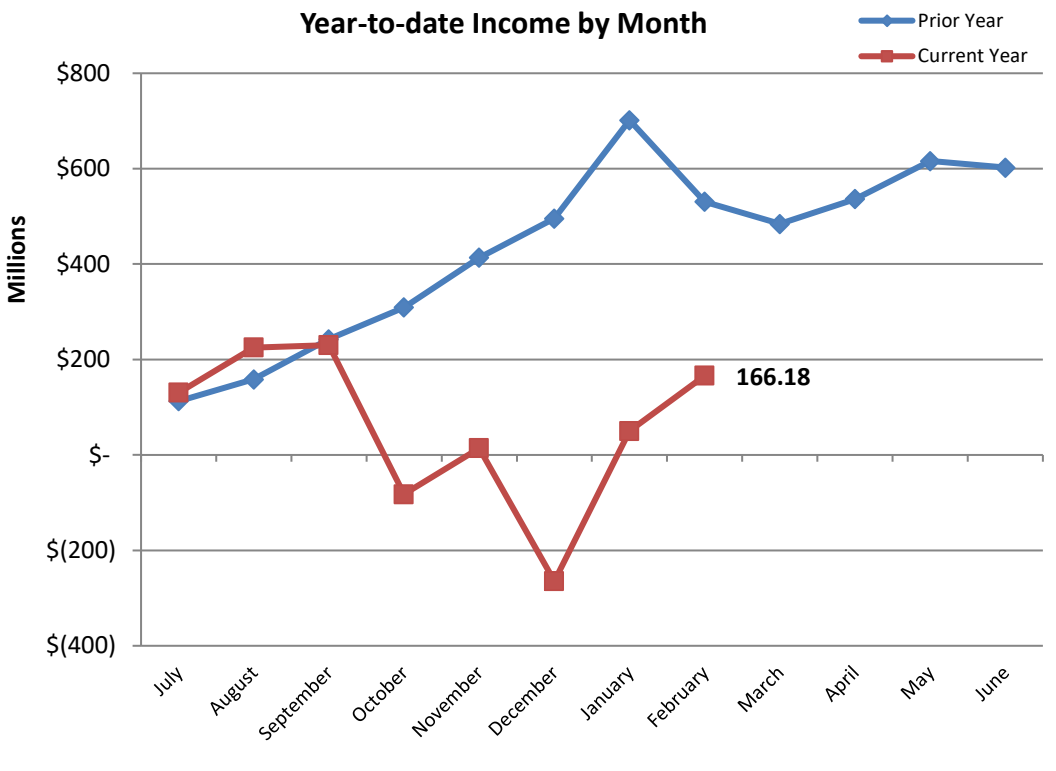


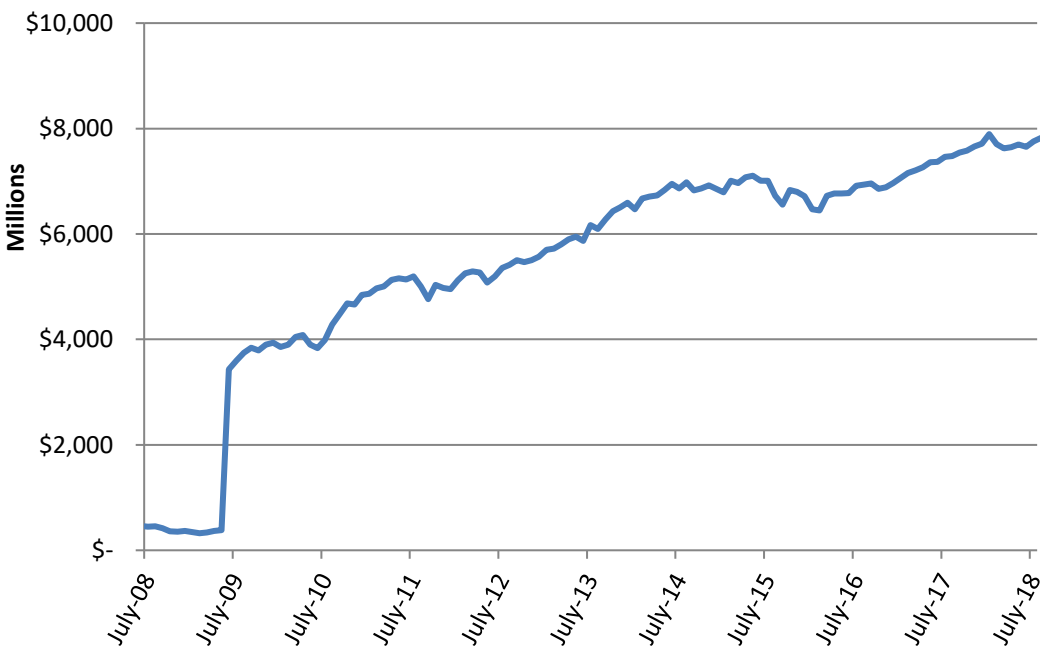


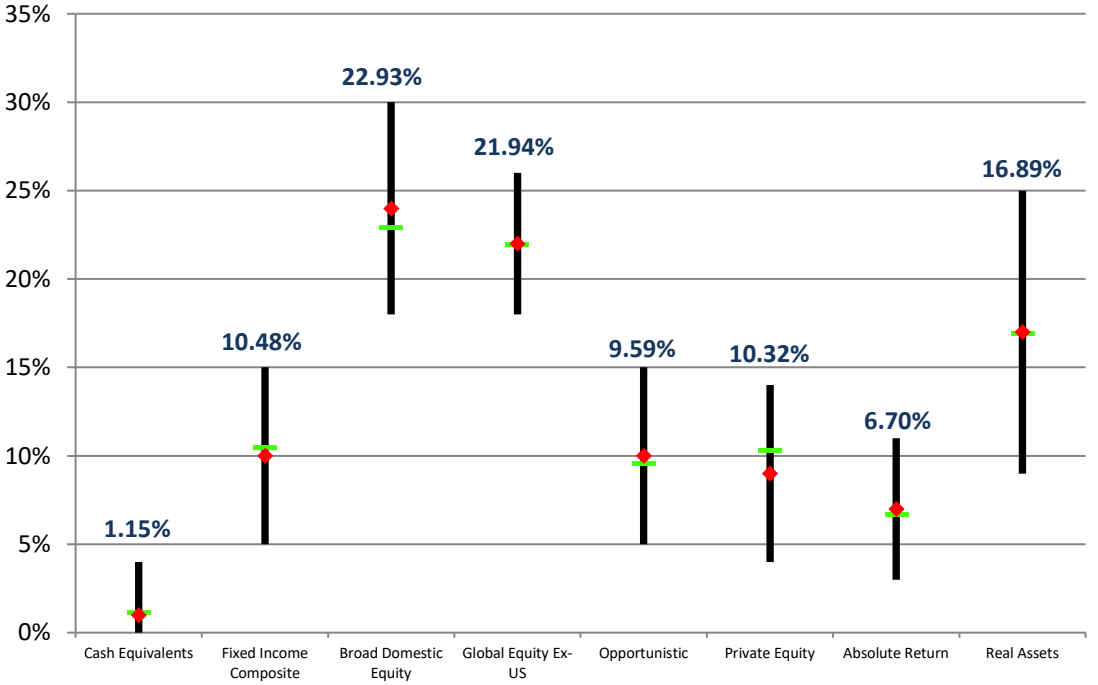
Public Employees' Retirement Health Care Trust Fund

Fiscal Year-to-Date through February 28, 2019



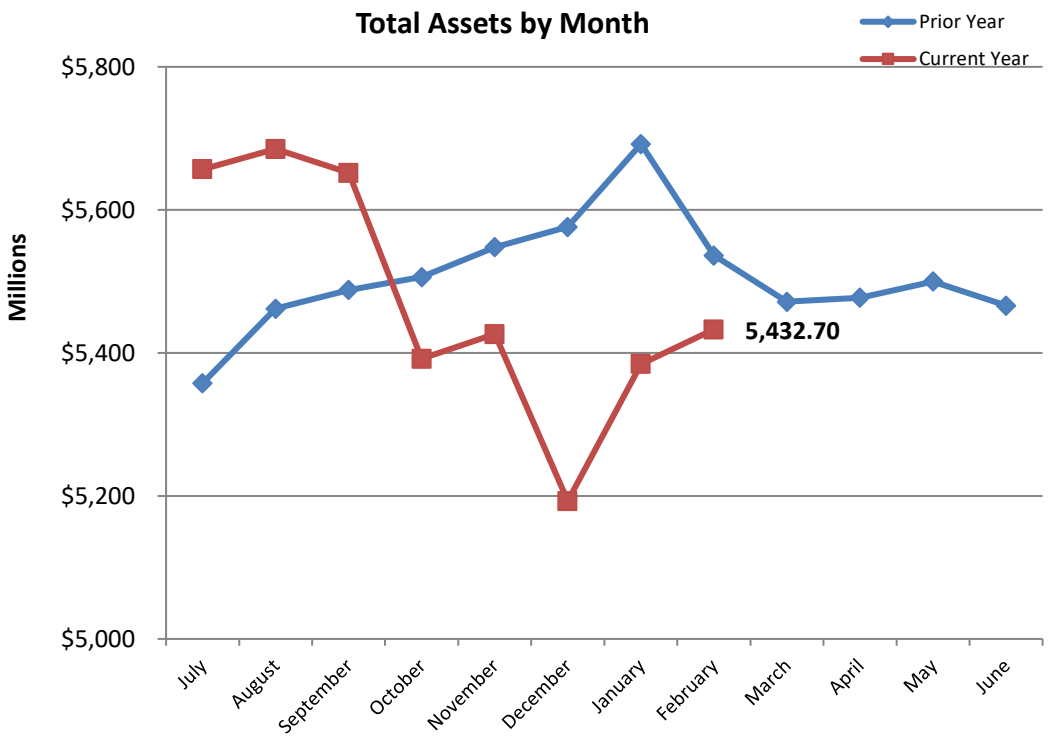


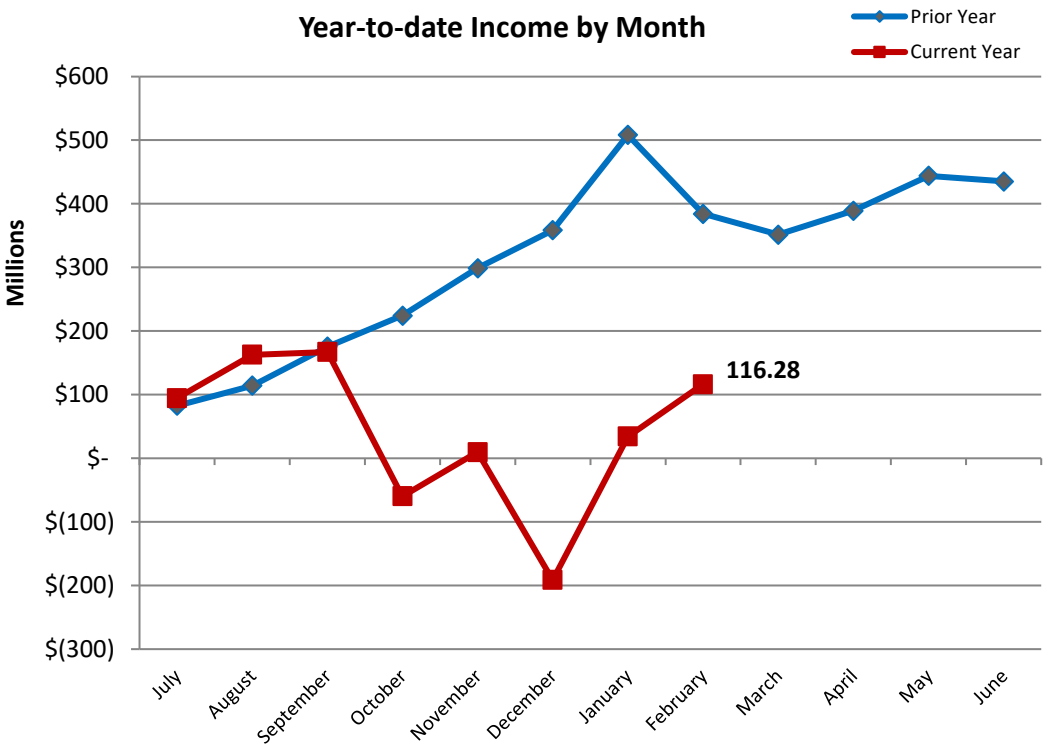


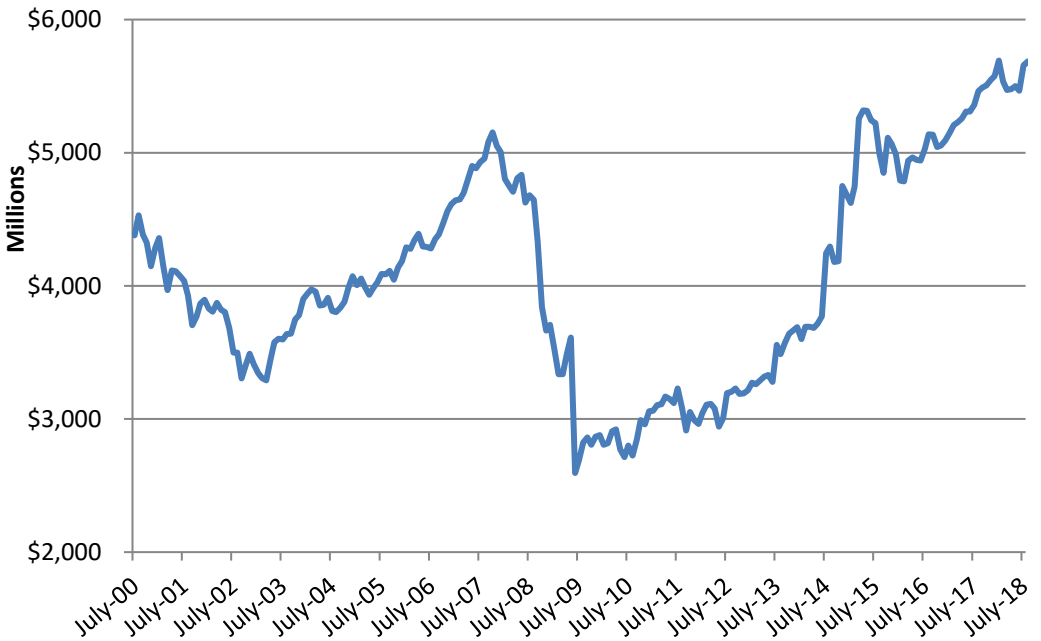


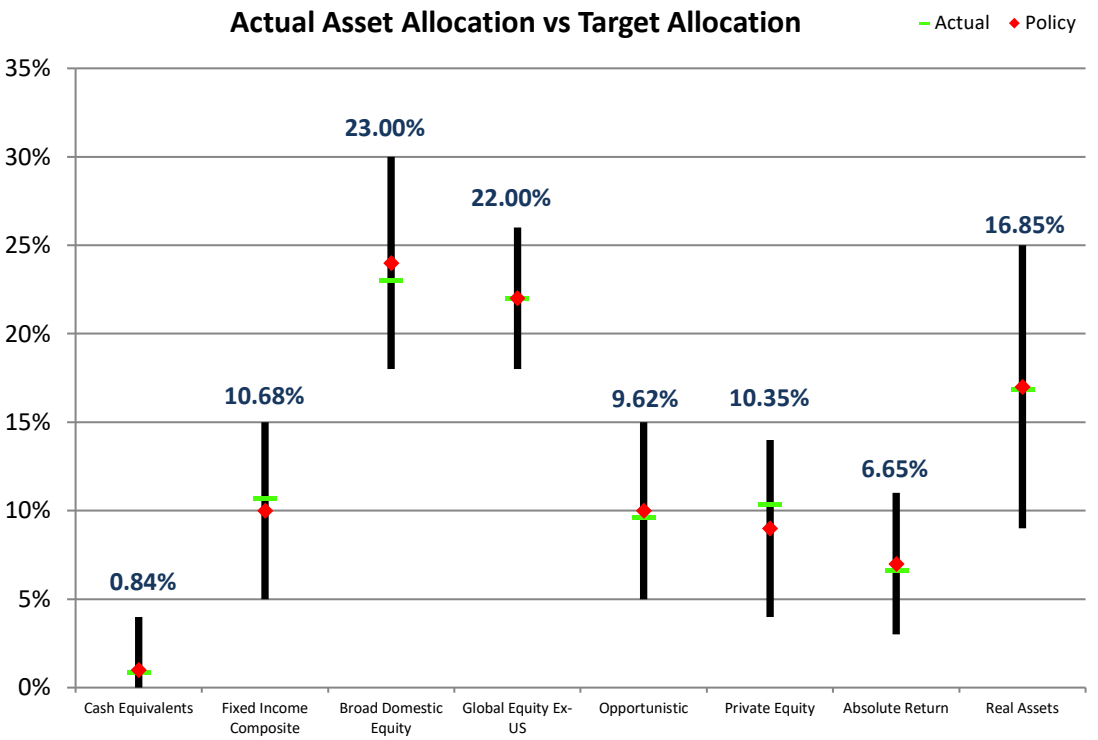
Teachers' Retirement Pension Trust Fund

Fiscal Year-to-Date through February 28, 2019



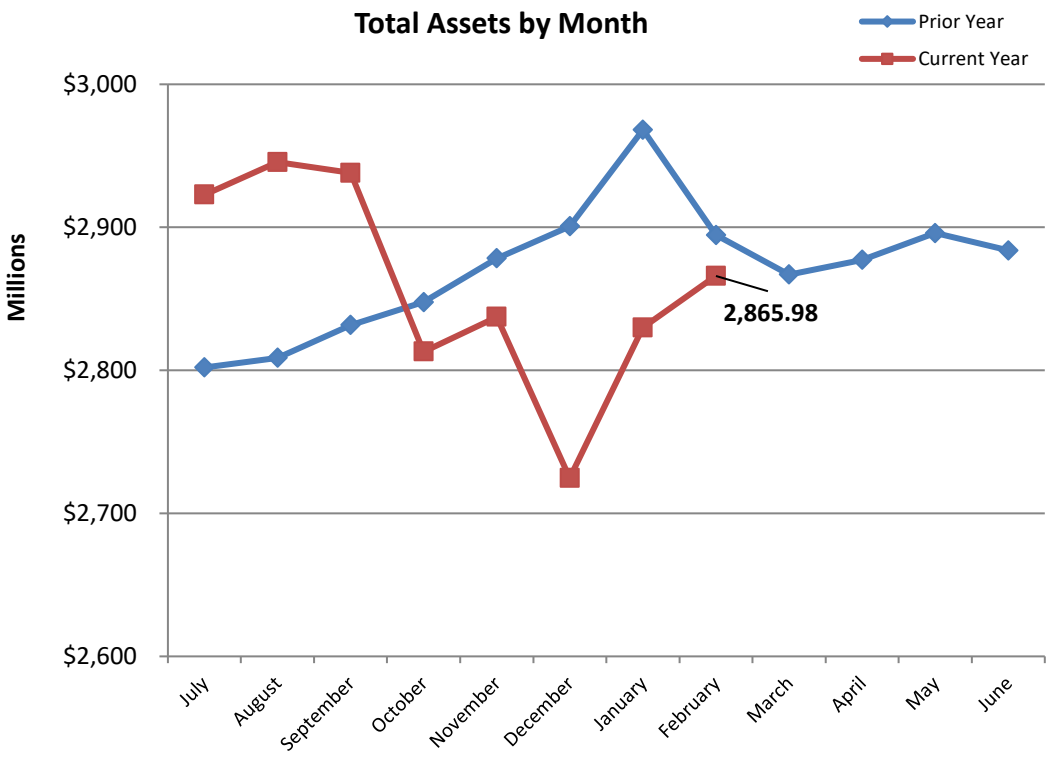


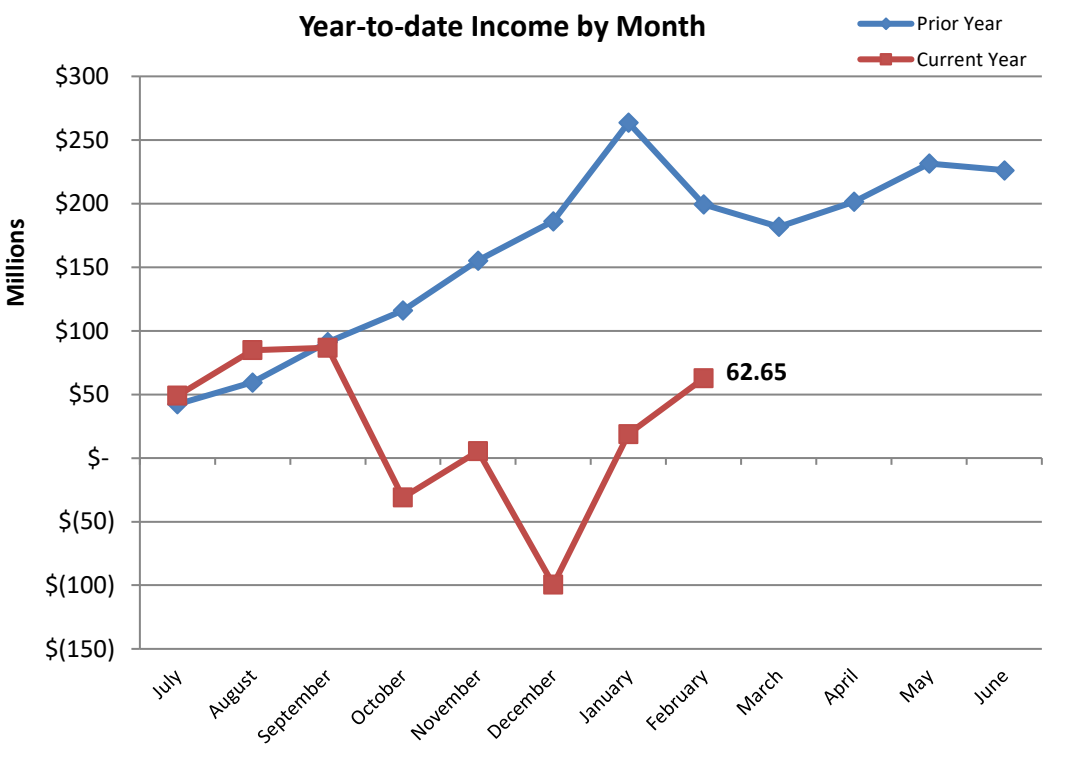


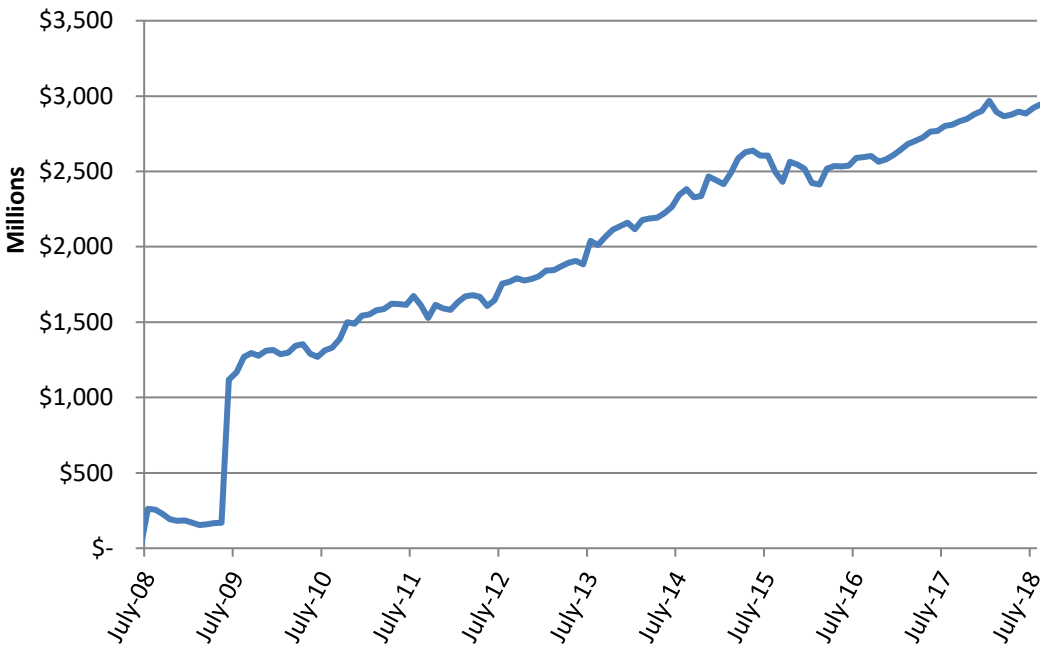


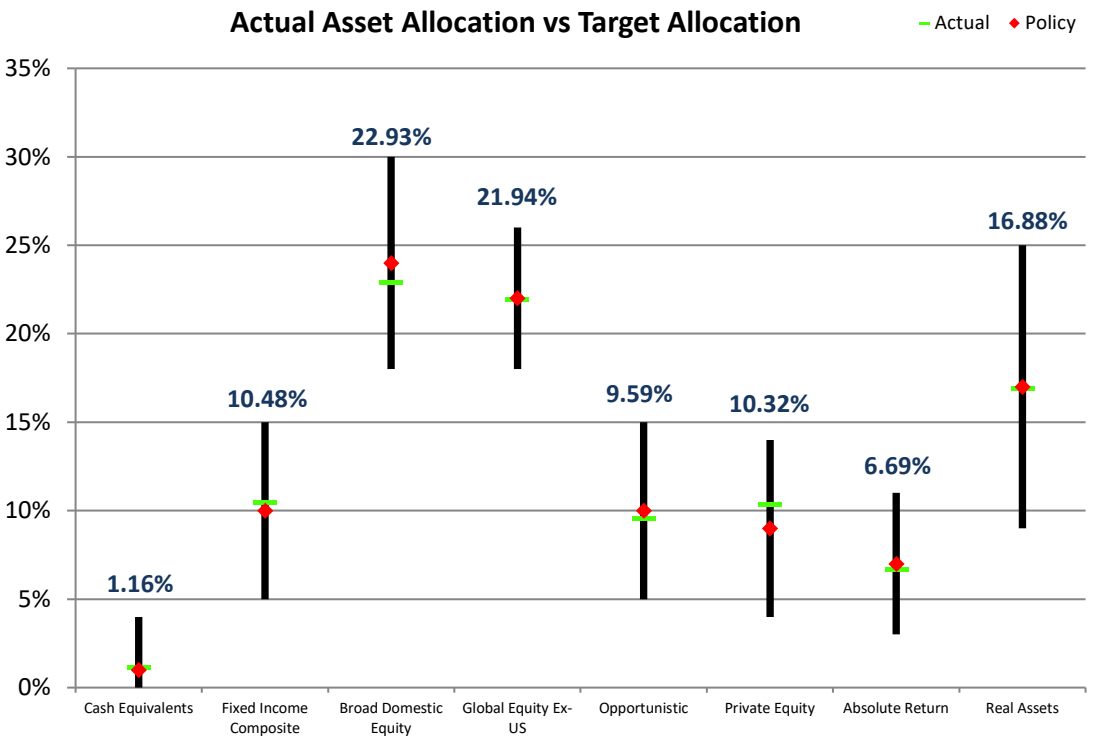
Teachers' Retirement Health Care Trust Fund

Fiscal Year-to-Date through February 28, 2019



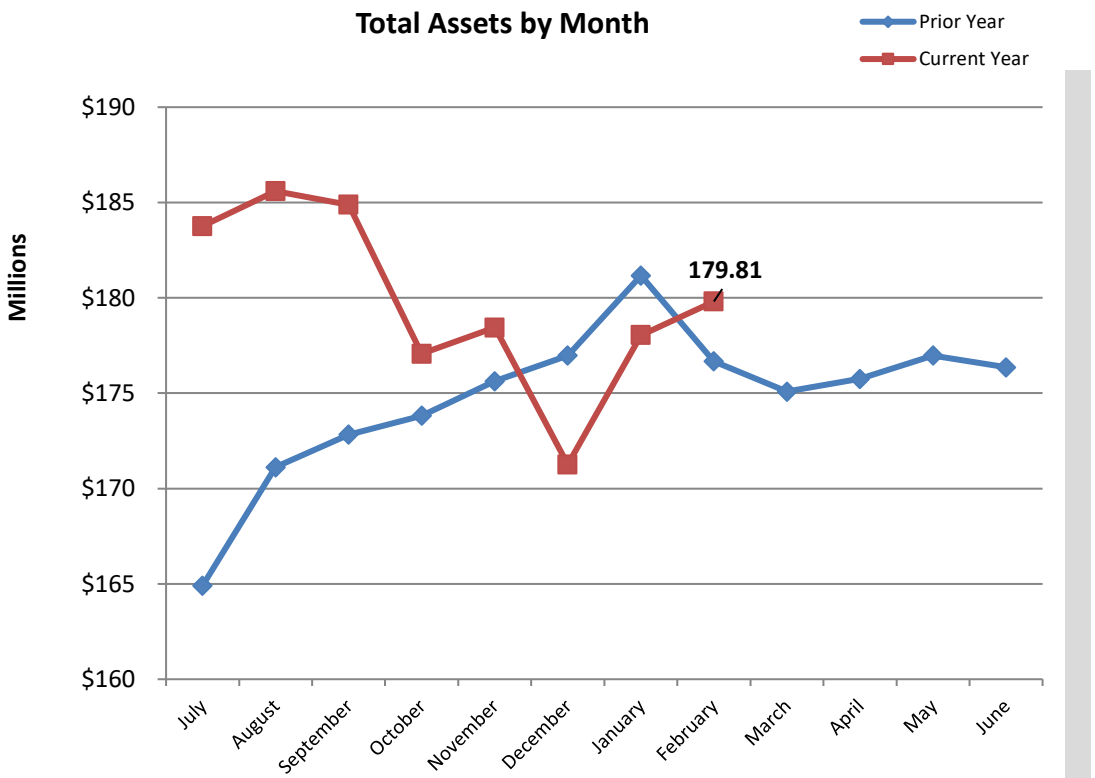


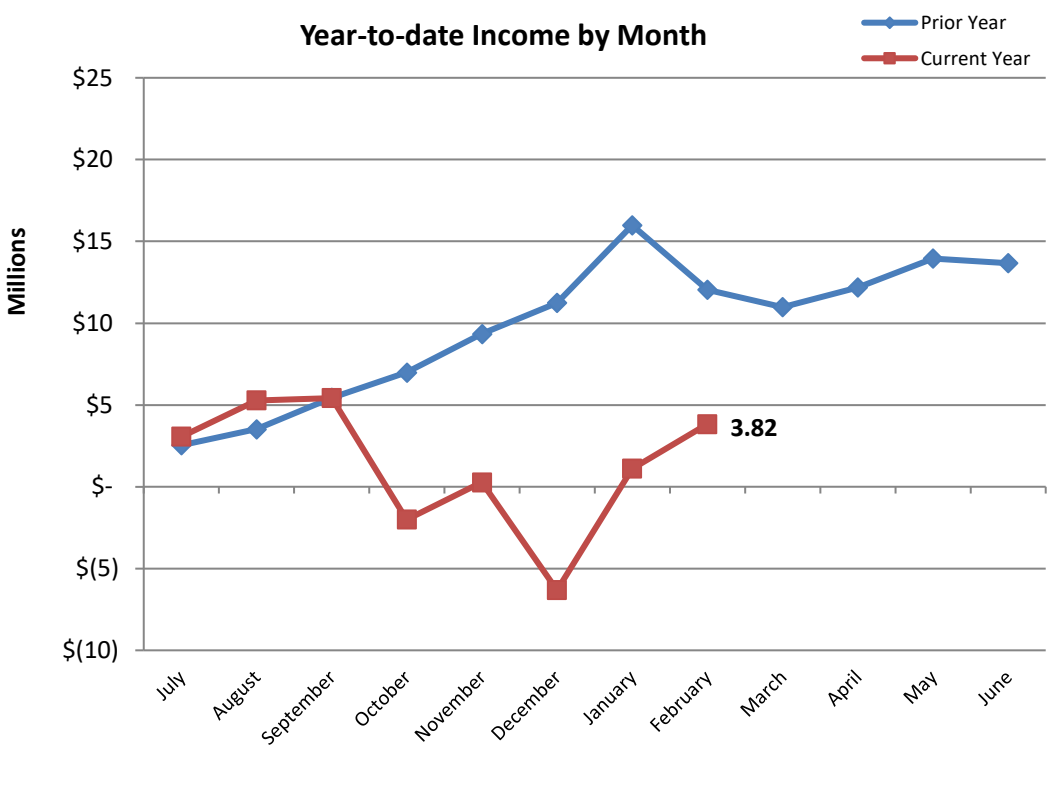


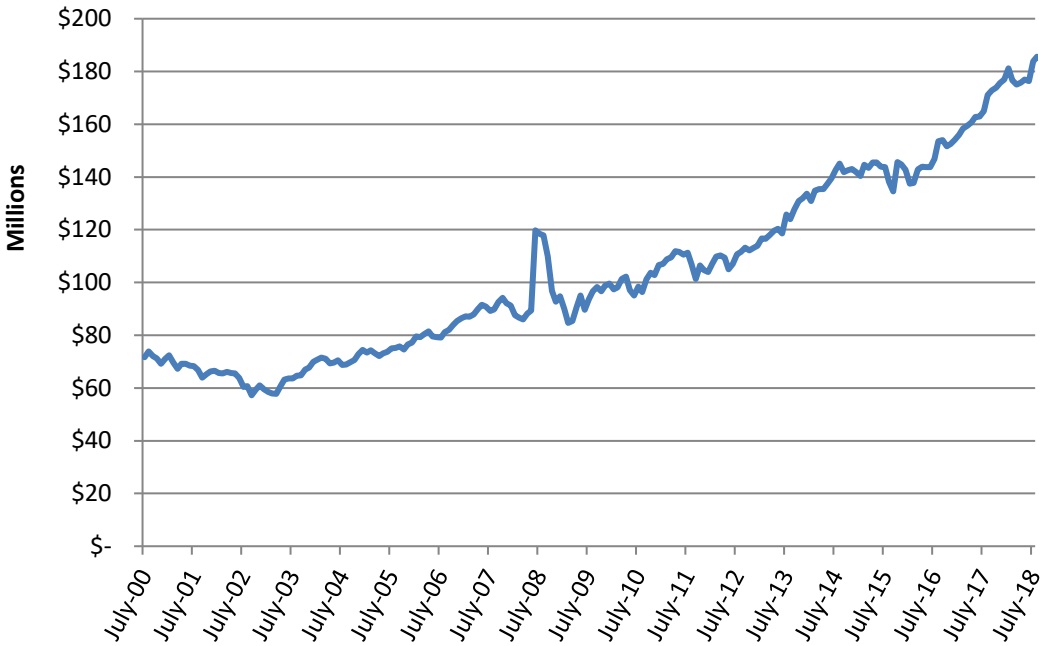


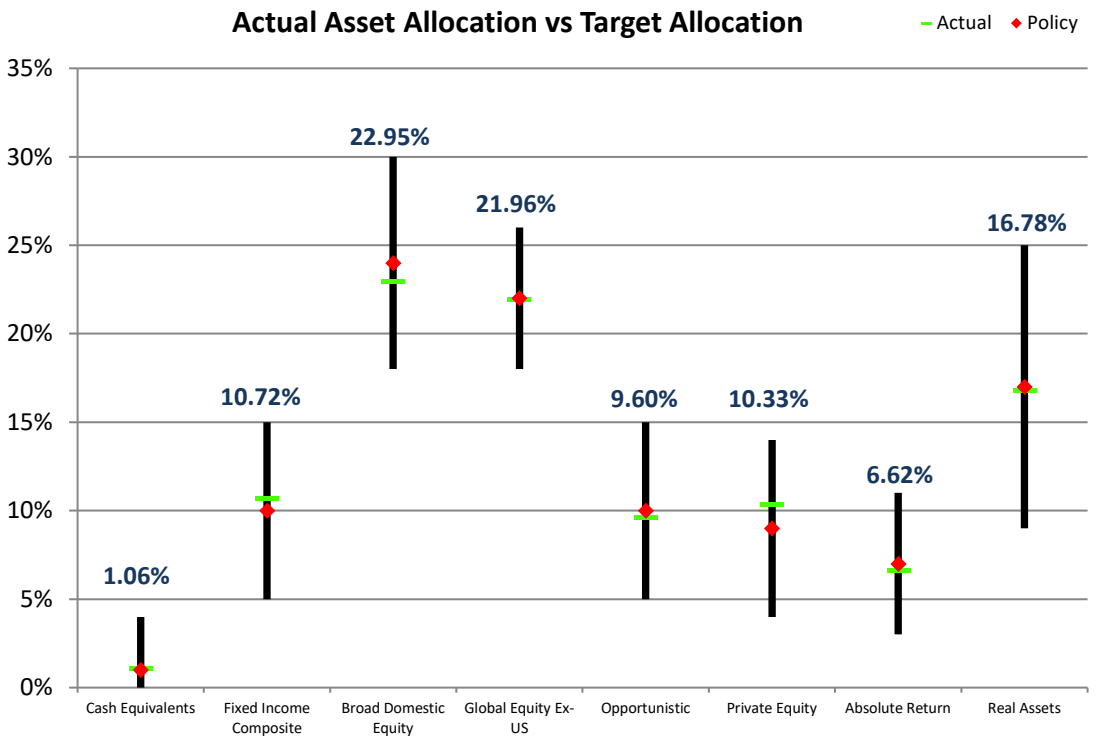
Judicial Retirement Pension Trust Fund

Fiscal Year-to-Date through February 28, 2019



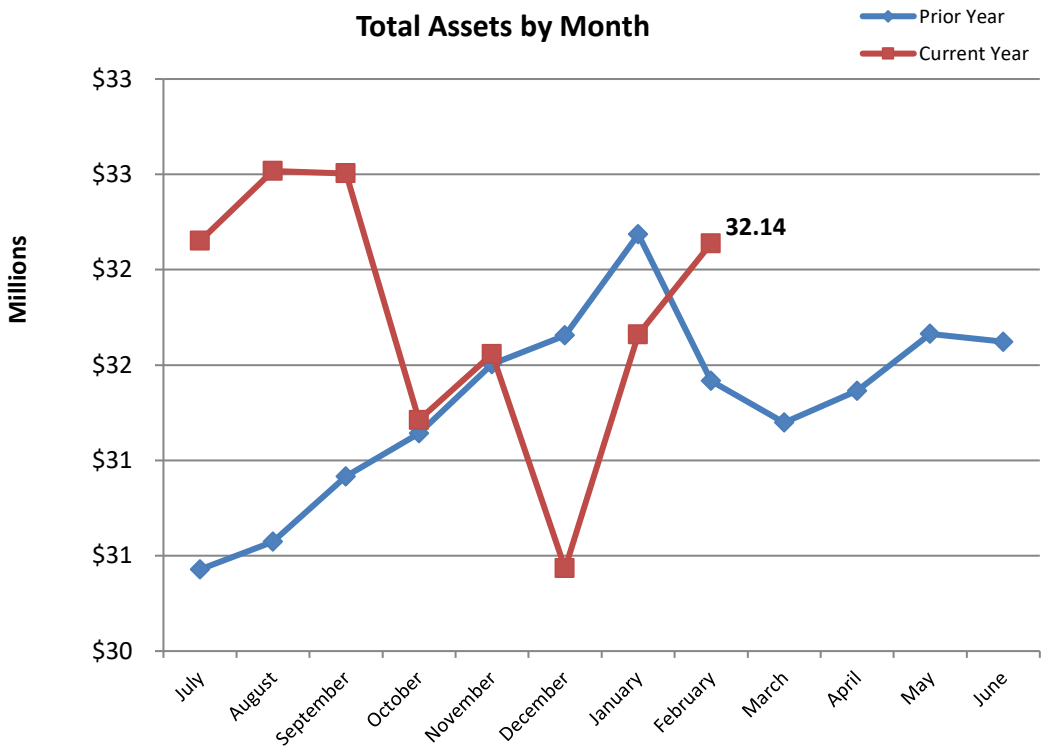


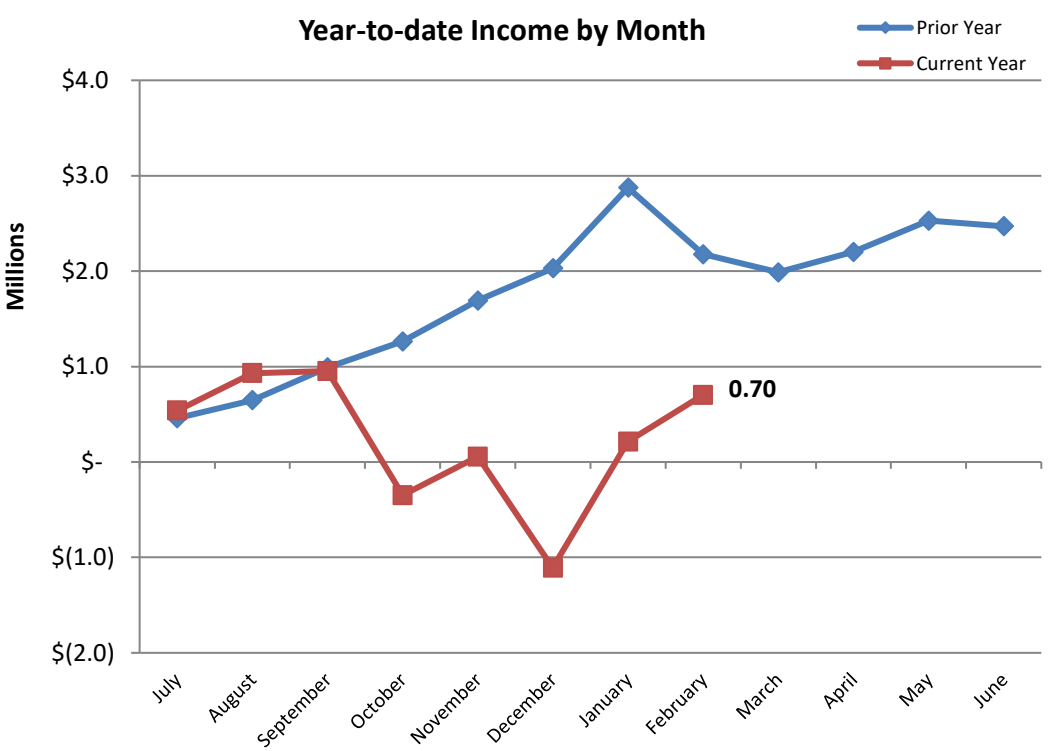


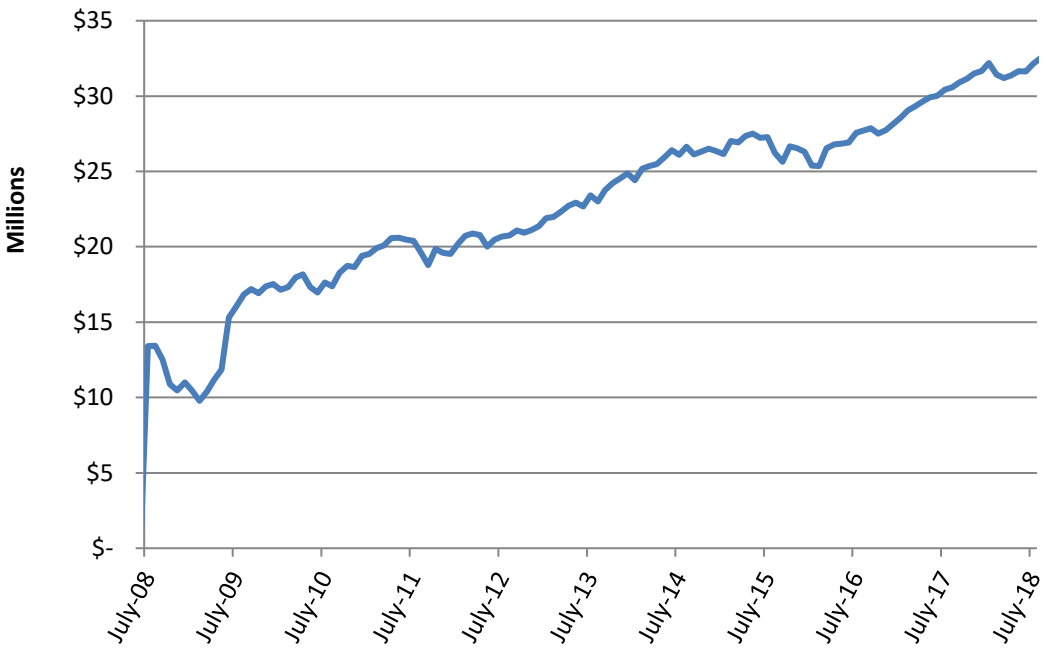


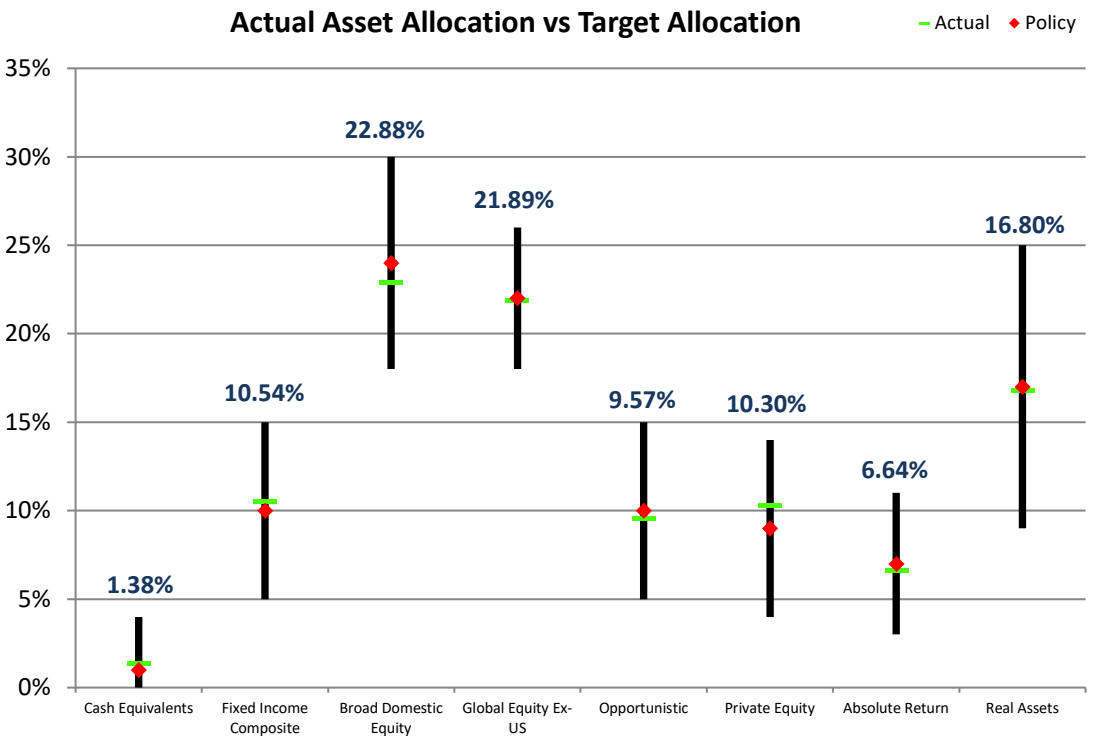
Judicial Retirement Health Care Trust Fund

Fiscal Year-to-Date through February 28, 2019



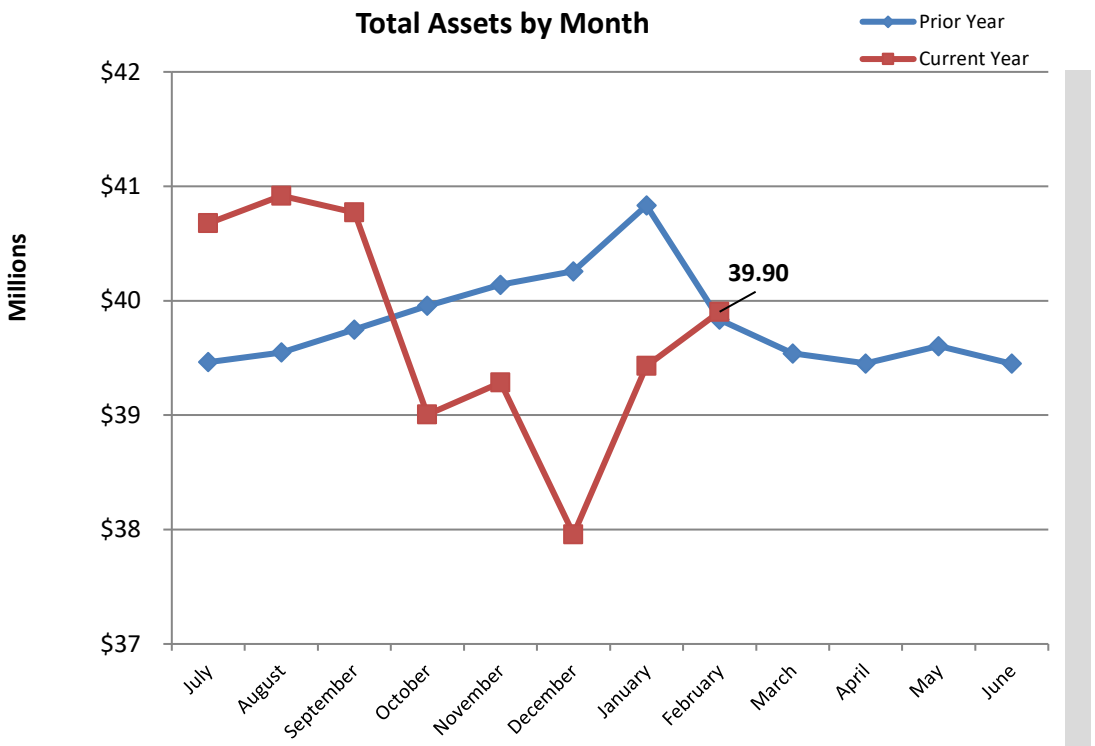


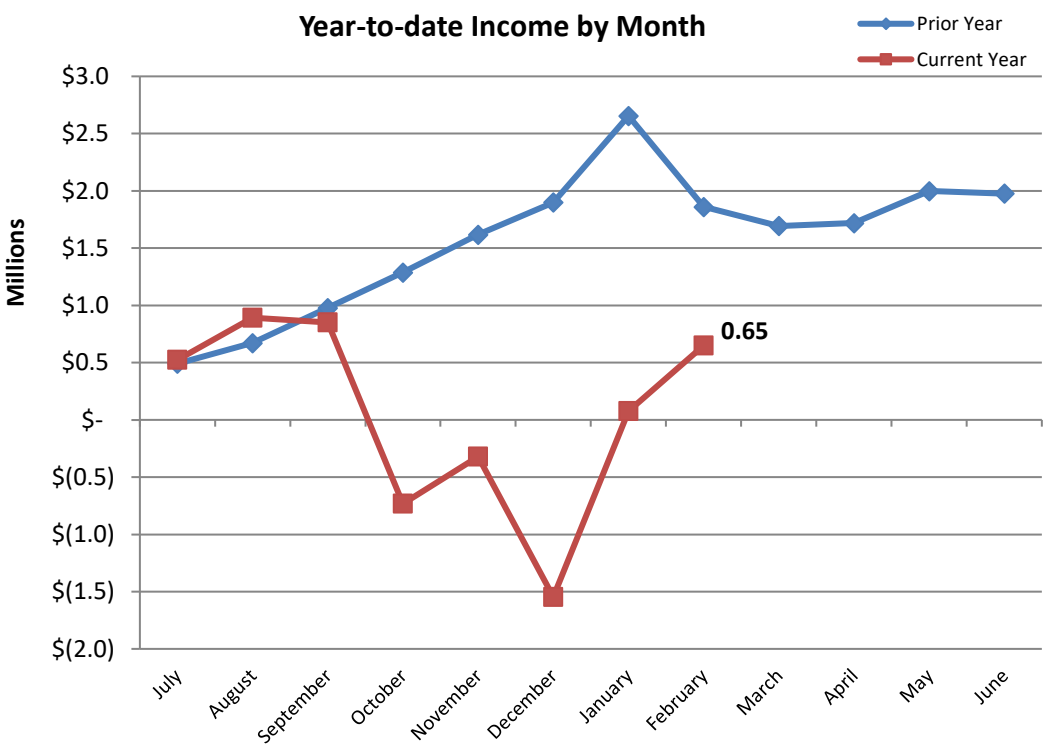


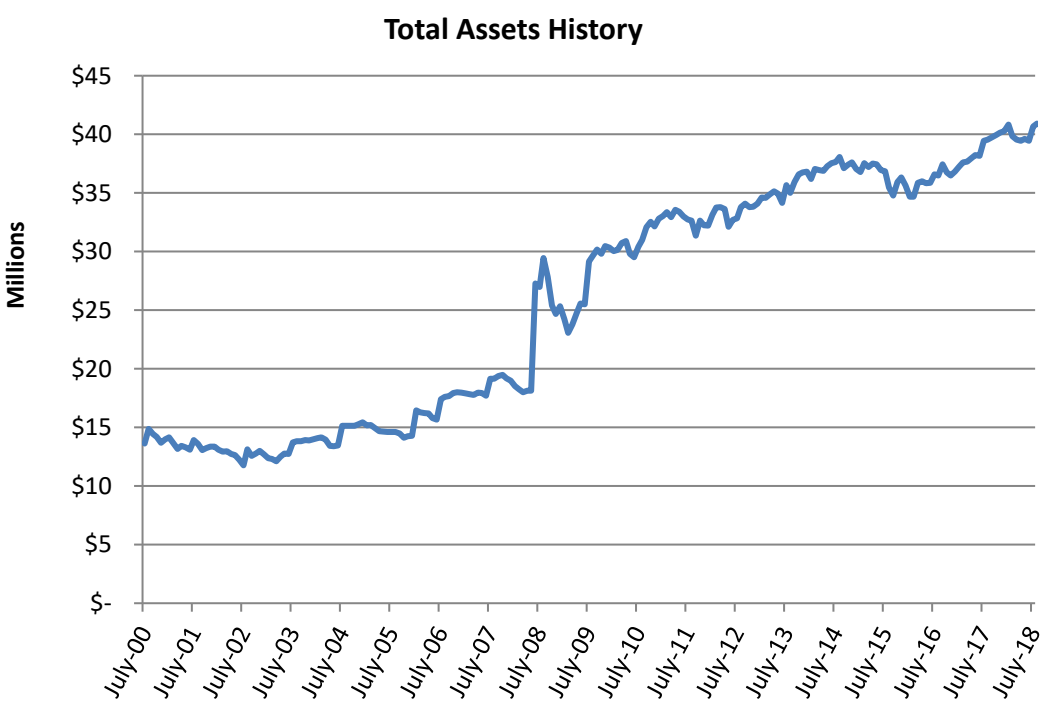


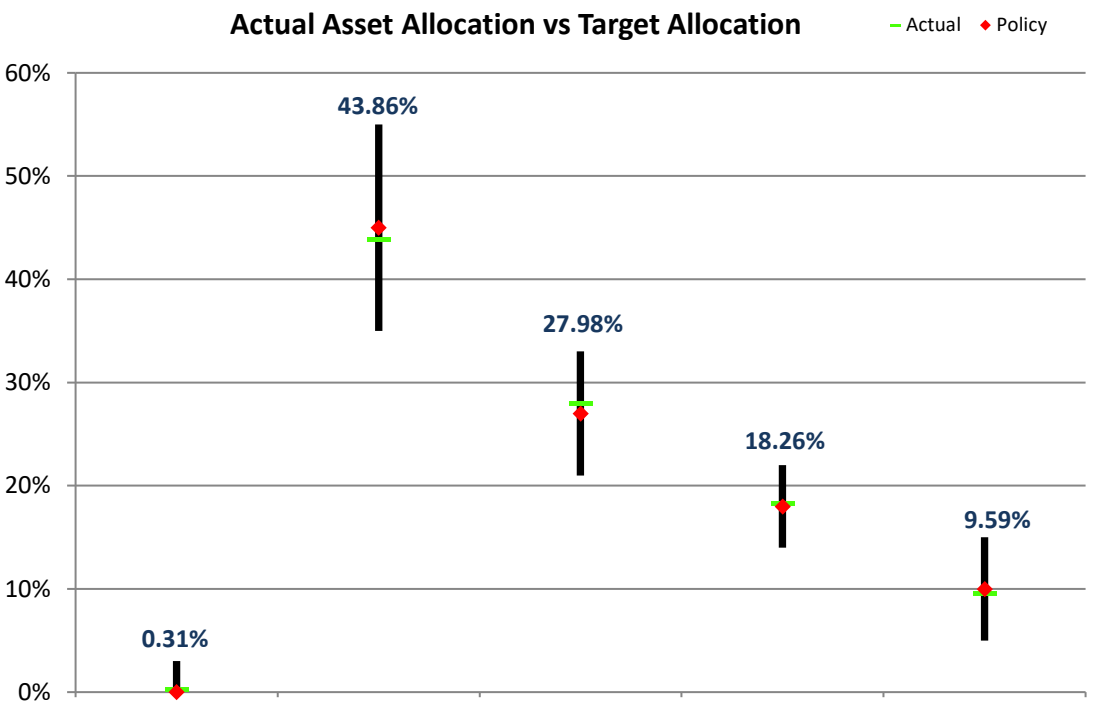
Military Retirement Trust Fund

Fiscal Year-to-Date through February 28, 2019









ALASKA RETIREMENT MANAGEMENT BOARD

Reporting of Funds by Manager

All Non-Participant Directed Plans

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended February 28, 2019

	Beginning Invested Assets	Investment Income	Net Contributions and (Withdrawals)	Ending Invested Assets	% increase (decrease)	% Change due to Investment Income
Cash						
Short-Term Fixed Income Pool	$ 355,282,992	$ 741,829	$ (71,557,011)	$ 284,467,810	-19.93%	0.23%
Securities Lending Income Pool	92,717	71,651	(92,177)	72,191	-22.14%	153.66%
Total Cash	355,375,709	813,480	(71,649,188)	284,540,001	-19.93%	0.25%
Fixed Income						
ARMB US Treasury Fixed Income	2,524,675,961	(653,012)	270,000,000	2,794,022,949	10.67%	-0.02%
Domestic Equities						
Small Cap						
Passively Managed						
ARMB S&P 600	150,468,609	6,552,493	-	157,021,102	4.35%	4.35%
SSgA Russell 2000 Growth	5,768	471	-	6,239	8.17%	8.17%
SSgA Russell 2000 Value	7,226	1,887	-	9,113	26.11%	26.11%
Total Passive	150,481,603	6,554,851	-	157,036,454	4.36%	4.36%
Actively Managed						
ARMB Futures Small Cap	3,454,108	839,736	-	4,293,844	24.31%	24.31%
Arrowmark	50,890,696	2,945,388	106,368	53,942,452	6.00%	5.78%
BMO Global Asset Management	48,828,877	2,174,503	-	51,003,380	4.45%	4.45%
DePrince, Race & Zollo Inc.- Micro Cap	85,170,688	4,623,642	-	89,794,330	5.43%	5.43%
Frontier Capital Mgmt. Co.	93,914,330	4,160,763	-	98,075,093	4.43%	4.43%
Jennison Associates, LLC	67,198,628	3,528,945	-	70,727,573	5.25%	5.25%
Lord Abbett & Co.- Micro Cap	81,125,860	9,408,052	177,924	90,711,836	11.82%	11.58%
T. Rowe Small Cap Growth	45,242,486	2,604,590	-	47,847,076	5.76%	5.76%
Transition Account	(1,520)	-	-	(1,520)	-	-
Victory Capital Management	119,338,862	4,445,490	-	123,784,352	3.73%	3.73%
Zebra Capital Management	83,073,317	5,064,968	-	88,138,285	6.10%	6.10%
Total Active	678,236,332	39,796,077	284,292	718,316,701	5.91%	5.87%
Total Small Cap	828,717,935	46,350,928	284,292	875,353,155	5.63%	5.59%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended February 28, 2019

Large Cap						
Passively Managed						
ARMB Russell 1000 Growth	1,559,803,280	55,765,011	-	1,615,568,291	3.58%	3.58%
ARMB Russell 1000 Value	1,356,000,881	43,098,783	-	1,399,099,664	3.18%	3.18%
ARMB Russell Top 200	175,705,116	5,353,477	-	181,058,593	3.05%	3.05%
Total Passive	3,091,509,277	104,217,271	-	3,195,726,548	3.37%	3.37%
Actively Managed						
Allianz Global Investors	-	444	-	444	100.00%	100.00%
ARMB Equity Yield	368,011,845	14,904,208	-	382,916,053	4.05%	4.05%
ARMB Futures Large Cap	3,144,443	299,315	-	3,443,758	9.52%	9.52%
ARMB Portable Alpha	426,438,088	12,593,110	567,153	439,598,351	3.09%	2.95%
Quantitative Management Assoc.	-	252	-	252	100.00%	100.00%
ARMB S&P 500 Equal Weight	364,911,989	13,437,024	-	378,349,013	3.68%	3.68%
ARMB Scientific Beta	369,455,519	12,812,457	-	382,267,976	3.47%	3.47%
Barrow, Hanley, Mewhinney & Strauss	1,117	213	-	1,330	19.07%	19.07%
Lazard Freres	327,765,540	13,885,953	202,602	341,854,095	4.30%	4.24%
McKinley Capital Mgmt	-	4,818	-	4,818	100.00%	100.00%
Transition Account	-	6,416	-	6,416	100.00%	100.00%
Total Active	1,859,728,541	67,944,210	769,755	1,928,442,506	3.69%	3.65%
Total Large Cap	4,951,237,818	172,161,481	769,755	5,124,169,054	3.49%	3.48%
Total Domestic Equity	5,779,955,753	218,512,409	1,054,047	5,999,522,209	3.80%	3.78%
Global Equities Ex US						
Small Cap						
Mondrian Investment Partners	177,862,908	3,216,437	-	181,079,345	1.81%	1.81%
Schroder Investment Management	184,041,580	2,702,672	-	186,744,252	1.47%	1.47%
Total Small Cap	361,904,488	5,919,109	-	367,823,597	1.64%	1.64%
Large Cap						
Allianz Global Investors	137,066	(819)	-	136,247	-0.60%	-0.60%
Arrow Street Capital	369,438,848	6,779,862	-	376,218,710	1.84%	1.84%
Baillie Gifford Overseas Limited	344,855,686	14,327,033	363,078	359,545,797	4.26%	4.15%
Blackrock ACWI Ex-US IMI	505,111,733	9,959,009	-	515,070,742	1.97%	1.97%
Brandes Investment Partners	929,439,821	511,868	-	929,951,689	0.06%	0.06%
Cap Guardian Trust Co	535,287,624	21,773,110	522,727	557,583,461	4.17%	4.07%
Lazard Freres	317,276,485	5,904,160	97,543	323,278,188	1.89%	1.86%
McKinley Capital Management	329,040,735	5,784,768	-	334,825,503	1.76%	1.76%
State Street Global Advisors	1,260,850,700	24,662,056	-	1,285,512,756	1.96%	1.96%
Total Large Cap	4,591,438,698	89,701,047	983,348	4,682,123,093	1.98%	1.95%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended February 28, 2019

Emerging Markets Equity						
DePrince, Race, and Zollo Emerging Markets	279,014,773	7,960,307	-	286,975,080	2.85%	2.85%
Lazard Asset Management	413,168,491	(12,680,953)	-	400,487,538	-3.07%	-3.07%
Total Emerging Markets	692,183,264	(4,720,646)	-	687,462,618	-0.68%	-0.68%
Total Global Equities	5,645,526,450	90,899,510	983,348	5,737,409,308	1.63%	1.61%
Opportunistic						
Alternative Equity Strategy						
Analytic Buy Write Account	607,039,274	8,533,652	200,290	615,773,216	1.44%	1.41%
ARMB STOXX Minimum Variance	620,509,825	16,559,024	30,822	637,099,671	2.67%	2.67%
Total Alternative Equity Strategy	1,227,549,099	25,092,676	231,112	1,252,872,887	2.06%	2.04%
Opportunistic Fixed Income						
Fidelity Inst. Asset Mgmt. High Yield CMBS	105,106,919	1,325,268	-	106,432,187	1.26%	1.26%
Fidelity Institutional Asset Management	208,515,922	1,921,076	-	210,436,998	0.92%	0.92%
Lazard Emerging Income	68,727,354	417,313	-	69,144,667	0.61%	0.61%
MacKay Shields, LLC	50,260,763	740,257	-	51,001,020	1.47%	1.47%
Mondrian Investment Partners	101,055,916	220,917	-	101,276,833	0.22%	0.22%
Western Asset Management	58,036,717	169,846	35,465	58,242,028	0.35%	0.29%
Total Opportunistic Fixed Income	591,703,591	4,794,677	35,465	596,533,733	0.82%	0.81%
Other Opportunities						
Project Pearl	10,058,397	-	-	10,058,397	-	-
Schroders Insurance Linked Securities	233,102,072	204,104	-	233,306,176	0.09%	0.09%
Total Other Opportunities	243,160,469	204,104	-	243,364,573	0.08%	0.08%
Tactical Allocation Strategies						
Eaton Vance High Yield	22,955	-	-	22,955	-	-
Fidelity Signals	204,933,837	3,202,571	-	208,136,408	1.56%	1.56%
PineBridge	204,077,194	4,040,849	-	208,118,043	1.98%	1.98%
Total Tactical Allocation Strategies	409,033,986	7,243,420	-	416,277,406	1.77%	1.77%
Total Opportunistic	2,471,447,145	37,334,877	266,577	2,509,048,599	1.52%	1.51%

Alaska Retirement Management Board
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For the Month Ended February 28, 2019

Private Equity						
Abbott Capital	1,023,550,698	6,246,041	(5,802,766)	1,023,993,973	0.04%	0.61%
Advent International GPE Fund VIII-B	18,820,903	-	375,000	19,195,903	1.99%	-
Angelo, Gordon & Co.	(5,685)	9,442	-	3,757	166.09%	166.09%
Dyal Capital Partners III	27,138,962	-	(382,786)	26,756,176	-1.41%	-
Dyal Capital Partners IV	2,078,372	-	-	2,078,372	-	-
Glendon Opportunities	42,541,173	-	-	42,541,173	-	-
KKR Lending Partners II	39,771,219	724,079	-	40,495,298	1.82%	1.82%
Lexington Capital Partners VIII	34,040,618	-	6,411,972	40,452,590	18.84%	-
Lexington Partners VII	23,254,941	-	(891,525)	22,363,416	-3.83%	-
Merit Capital Partners	13,745,234	-	-	13,745,234	-	-
NB SOF III	30,426,183	1	(525,773)	29,900,411	-1.73%	0.00%
NB SOF IV	10,662,975	-	-	10,662,975	-	-
New Mountain Partners IV	24,406,432	-	-	24,406,432	-	-
New Mountain Partners V	14,106,474	-	2,805,102	16,911,576	19.89%	-
NGP XI	52,992,204	(4,222,488)	(984,359)	47,785,357	-9.83%	-8.04%
NGP XII	12,657,183	(185,640)	(313,176)	12,158,367	-3.94%	-1.49%
Onex Partnership III	13,000,286	-	-	13,000,286	-	-
Pathway Capital Management LLC	1,159,516,560	9,120,250	(3,647,881)	1,164,988,929	0.47%	0.79%
Resolute Fund III	19,823,400	-	-	19,823,400	-	-
Resolute Fund IV	5,508,769	-	-	5,508,769	-	-
Summit Partners GE IX	25,097,134	-	2,300,000	27,397,134	9.16%	-
Warburg Pincus X	13,447,616	(1,634,386)	-	11,813,230	-12.15%	-12.15%
Warburg Pincus XI	28,331,338	240,753	(532,050)	28,040,041	-1.03%	0.86%
Warburg Pincus XII	50,354,373	964,599	-	51,318,972	1.92%	1.92%
Total Private Equity	2,685,267,362	11,262,651	(1,188,242)	2,695,341,771	0.38%	0.42%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended February 28, 2019

Absolute Return						
Allianz Global Investors	327,815,363	14,472,471	(100,000,000)	242,287,834	-26.09%	5.21%
Crestline Investors, Inc.	505,319,511	-	-	505,319,511	-	-
Crestline Specialty Fund	30,485,273	-	-	30,485,273	-	-
Crestline Specialty Lending Fund II	18,328,799	-	4,545,729	22,874,528	24.80%	-
JPM Systemic Alpha	173,123,212	2,448,702	-	175,571,914	1.41%	1.41%
KKR Apex Equity Fund	3,683,160	(3,683,160)	-	-	-100.00%	-100.00%
Man Group Alternative Risk Premia	205,697,884	1,933,982	-	207,631,866	0.94%	0.94%
Prisma Capital Partners	436,031,776	(4,045,915)	-	431,985,861	-0.93%	-0.93%
Zebra Global Equity Advantage Fund	39,685,765	(62,881)	-	39,622,884	-0.16%	-0.16%
Zebra Global Equity Fund	77,509,817	337,246	-	77,847,063	0.44%	0.44%
Total Absolute Return Investments	1,817,680,560	11,400,445	(95,454,271)	1,733,626,734	-4.62%	0.64%
Real Assets						
Farmland						
Hancock Agricultural Investment Group	278,633,193	2,203,214	-	280,836,407	0.79%	0.79%
UBS Agrivest, LLC	577,131,904	10,102,795	-	587,234,699	1.75%	1.75%
Total Farmland	855,765,097	12,306,009	-	868,071,106	1.44%	1.44%
Timber						
Hancock Natural Resource Group	96,094,901	(64,721)	-	96,030,180	-0.07%	-0.07%
Timberland Invt Resource LLC	267,275,894	-	-	267,275,894	-	-
Total Timber	363,370,795	(64,721)	-	363,306,074	-0.02%	-0.02%
Energy						
EIG Energy Fund XIV-A	11,226,343	(675)	-	11,225,668	-0.01%	-0.01%
EIG Energy Fund XV	24,133,323	122,915	-	24,256,238	0.51%	0.51%
EIG Energy Fund XVI	55,187,935	1,492,650	-	56,680,585	2.70%	2.70%
Total Energy	90,547,601	1,614,890	-	92,162,491	1.78%	1.78%
REIT						
REIT Transition Account	-	-	-	-	-	-
ARMB REIT	213,432,937	1,148,581	-	214,581,518	0.54%	0.54%
Total REIT	213,432,937	1,148,581	-	214,581,518	0.54%	0.54%
Master Limited Partnerships						
Advisory Research MLP	297,005,301	(2,714,086)	-	294,291,215	-0.91%	-0.91%
Tortoise Capital Advisors	478,681,395	(4,563,839)	(170,000,000)	304,117,556	-36.47%	-1.16%
Total Master Limited Partnerships	775,686,696	(7,277,925)	(170,000,000)	598,408,771	-22.85%	-1.05%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended February 28, 2019

Infrastructure Private						
IFM Global Infrastructure Fund-Private	438,234,115	326,805	-	438,560,920	0.07%	0.07%
JP Morgan Infrastructure Fund-Private	117,756,755	1,310,561	-	119,067,316	1.11%	1.11%
Total Infrastructure Private	555,990,870	1,637,366	-	557,628,236	0.29%	0.29%
Infrastructure Public						
Brookfield Investment Mgmt.-Public	78,041,492	1,938,397	178,612	80,158,501	2.71%	2.48%
Lazard Asset Mgmt.-Public	78,389,398	1,621,547	239,319	80,250,264	2.37%	2.07%
Total Infrastructure Public	156,430,890	3,559,944	417,931	160,408,765	2.54%	2.27%
Real Estate						
Core Commingled Accounts						
JP Morgan	260,077,284	115,067	-	260,192,351	0.04%	0.04%
UBS Trumbull Property Fund	72,189,628	-	-	72,189,628	-	-
Total Core Commingled	332,266,912	115,067	-	332,381,979	0.03%	0.03%
Core Separate Accounts						
LaSalle Investment Management	201,155,106	-	(29,743,750)	171,411,356	-14.79%	-
Sentinel Separate Account	170,136,667	-	(727,489)	169,409,178	-0.43%	-
UBS Realty	513,356,951	10,090,878	(930,812)	522,517,017	1.78%	1.97%
Total Core Separate	884,648,724	10,090,878	(31,402,051)	863,337,551	-2.41%	1.16%
Non-Core Commingled Accounts						
Almanac Realty Securities V	1,456,254	-	(387,771)	1,068,483	-26.63%	-
Almanac Realty Securities VII	35,834,183	-	1,058,240	36,892,423	2.95%	-
Almanac Realty Securities VIII	125,785	(50,269)	324,945	400,461	218.37%	-17.44%
BlackRock US Core Property Fund	207,670,425	-	-	207,670,425	-	-
Clarion Ventures 4	27,571,714	2,511,463	-	30,083,177	9.11%	9.11%
Colony Investors VIII, L.P.	1,633,624	-	-	1,633,624	-	-
Coventry	255,803	-	-	255,803	-	-
ING Clarion Development Ventures III	2,519,880	(153,973)	-	2,365,907	-6.11%	-6.11%
KKR Real Estate Partners Americas II	6,222,101	-	-	6,222,101	-	-
KKR Real Estate Partners Americas L.P.	21,074,230	-	89,514	21,163,744	0.42%	-
Silverpeak Legacy Pension Partners II, L.P.	3,617,951	-	-	3,617,951	-	-
Silverpeak Legacy Pension Partners III, L.P.	4,472,944	-	-	4,472,944	-	-
Tishman Speyer Real Estate Venture VI	20,641,796	1,416,523	-	22,058,319	6.86%	6.86%
Tishman Speyer Real Estate Venture VII	781,273	32,705	-	813,978	4.19%	4.19%
Total Non-Core Commingled	333,877,963	3,756,449	1,084,928	338,719,340	1.45%	1.12%
Total Real Estate	1,550,793,599	13,962,394	(30,317,123)	1,534,438,870	-1.05%	0.91%
Total Real Assets	4,562,018,485	26,886,538	(199,899,192)	4,389,005,831	-3.79%	0.60%
Total Assets	$ 25,841,947,425	$ 396,456,898	$ (95,886,921)	$ 26,142,517,402	1.16%	1.54%

ALASKA RETIREMENT MANAGEMENT BOARD

Reporting of Funds by Manager

Participant Directed Plans

Supplemental Annuity Plan
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
February 28, 2019

Participant Options	**Beginning Invested Assets**	**Investment Income**	**Net Contributions (Withdrawals)**	**Transfers In (Out)**	**Ending Invested Assets**	**% Change in Invested Assets**	**% Change due to Investment Income (1)**
T. Rowe Price							
Stable Value Fund	$ 378,203,292	$ 740,917	$ (2,738,186)	$ 2,134,800	$ 378,340,823	0.04%	0.20%
Small Cap Stock Fund	175,255,382	11,810,400	(43,517)	399,828	187,422,093	6.94%	6.73%
Alaska Balanced Trust	1,111,444,459	11,945,000	(2,030,110)	939,499	1,122,298,848	0.98%	1.08%
Long Term Balanced Fund	660,581,495	11,849,295	(68,211)	(1,755,803)	670,606,776	1.52%	1.80%
AK Target Date 2010 Trust	10,232,737	134,358	9,352	9,542	10,385,989	1.50%	1.31%
AK Target Date 2015 Trust	81,456,719	1,234,798	(265,165)	332,913	82,759,265	1.60%	1.52%
AK Target Date 2020 Trust	94,097,740	1,680,933	(14,643)	(402,264)	95,361,766	1.34%	1.79%
AK Target Date 2025 Trust	77,110,278	1,575,961	364,239	982,928	80,033,406	3.79%	2.03%
AK Target Date 2030 Trust	58,909,489	1,326,241	34,439	88,930	60,359,099	2.46%	2.25%
AK Target Date 2035 Trust	55,416,788	1,351,777	531,888	(38,517)	57,261,936	3.33%	2.43%
AK Target Date 2040 Trust	54,951,871	1,420,941	362,400	159,057	56,894,269	3.53%	2.57%
AK Target Date 2045 Trust	63,281,091	1,692,855	385,218	(133,652)	65,225,512	3.07%	2.67%
AK Target Date 2050 Trust	71,082,549	1,901,236	225,485	(121,073)	73,088,197	2.82%	2.67%
AK Target Date 2055 Trust	60,927,758	1,637,603	792,209	(68,850)	63,288,720	3.88%	2.67%
AK Target Date 2060 Trust	5,042,895	133,399	(10,219)	(94,000)	5,072,075	0.58%	2.67%
Total Investments with T. Rowe Price	2,957,994,543	50,435,714	(2,464,821)	2,433,338	3,008,398,774		
State Street Global Advisors							
Money Market	48,780,545	89,154	(832,609)	104,941	48,142,031	-1.31%	0.18%
S&P 500 Stock Index Fund Series A	458,895,777	14,571,746	(888,741)	(8,734,786)	463,843,996	1.08%	3.21%
Russell 3000 Index	71,269,416	2,500,829	(163,030)	(28,801)	73,578,414	3.24%	3.51%
US Real Estate Investment Trust Index	37,172,857	350,864	(324,053)	448,111	37,647,779	1.28%	0.94%
World Equity Ex-US Index	59,332,600	1,129,700	(50,627)	866,560	61,278,233	3.28%	1.89%
US Treasury Inflation Protected Securities Index	42,111,623	(5,889)	(106,377)	239,641	42,238,998	0.30%	-0.01%
Total Investments with SSgA	717,562,818	18,636,404	(2,365,437)	(7,104,334)	726,729,451		
BlackRock							
Passive U.S. Bond Index Fund	103,842,358	(57,991)	(324,702)	3,437,388	106,897,053	2.94%	-0.06%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	62,562,253	1,259,931	(109,914)	(428,732)	63,283,538	1.15%	2.02%
Northern Trust							
Environmental, Social, and Governance Fund	47,281,556	1,814,716	(186,684)	1,662,340	50,571,928	6.96%	3.78%
Total All Funds	$ 3,889,243,528	$ 72,088,774	$ (5,451,558)	$ -	$ 3,955,880,744	1.71%	1.85%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Supplemental Annuity Plan
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
February 28, 2019
$ (Thousands)

Invested Assets (at fair value)	July	August	September	October	November	December	January	February
Investments with T. Rowe Price								
Stable Value Fund	$ 355,917	$ 363,879	$ 369,544	$ 373,441	$ 374,495	$ 382,274	$ 378,203	$ 378,341
Small Cap Stock Fund	181,818	192,895	189,729	172,923	177,009	156,442	175,255	187,422
Alaska Balanced Trust	1,149,694	1,155,054	1,144,920	1,104,106	1,108,918	1,082,282	1,111,444	1,122,299
Long Term Balanced Fund	690,744	693,992	690,403	654,861	660,551	630,635	660,581	670,607
AK Target Date 2010 Trust	10,224	10,332	10,477	10,540	10,537	10,210	10,233	10,386
AK Target Date 2015 Trust	85,669	85,913	85,682	81,246	82,044	78,566	81,457	82,759
AK Target Date 2020 Trust	95,933	97,261	97,663	93,194	93,831	89,514	94,098	95,362
AK Target Date 2025 Trust	77,962	79,810	79,145	75,437	76,556	72,746	77,110	80,033
AK Target Date 2030 Trust	58,998	60,191	60,272	57,512	58,699	55,234	58,909	60,359
AK Target Date 2035 Trust	54,648	56,123	56,190	53,521	54,177	51,406	55,417	57,262
AK Target Date 2040 Trust	54,939	56,321	56,549	53,608	54,348	51,036	54,952	56,894
AK Target Date 2045 Trust	62,116	63,775	64,636	60,954	62,184	58,011	63,281	65,226
AK Target Date 2050 Trust	71,313	72,734	73,411	69,234	70,566	65,679	71,083	73,088
AK Target Date 2055 Trust	58,693	60,532	61,791	58,774	59,913	56,286	60,928	63,289
AK Target Date 2060 Trust	3,459	4,069	4,121	4,345	4,957	4,559	5,043	5,072
State Street Global Advisors								
Money Market	42,005	40,850	43,080	46,118	46,268	49,692	48,781	48,142
S&P 500 Stock Index Fund Series A	469,954	484,173	488,706	461,005	470,784	425,162	458,896	463,844
Russell 3000 Index	76,432	78,281	77,681	72,900	74,021	65,142	71,269	73,578
US Real Estate Investment Trust Index	35,067	36,342	35,138	34,078	36,532	33,048	37,173	37,648
World Equity Ex-US Index	55,690	55,661	58,202	54,600	55,447	54,910	59,333	61,278
Long US Treasury Bond Index	12,732	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	33,228	36,218	38,180	39,322	40,096	41,051	42,112	42,239
World Government Bond Ex-US Index	12,569	-	-	-	-	-	-	-
Investments with BlackRock								
Passive U.S. Bond Index Fund	-	111,572	107,003	100,001	100,208	101,791	103,842	106,897
Government/Credit Bond Fund	49,922	-	-	-	-	-	-	-
Intermediate Bond Fund	41,183	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford								
AK International Equity Fund	69,890	68,052	68,018	61,819	61,571	58,080	62,562	63,284
Investments with Northern Trust								
Environmental, Social, and Governance Fund	54,712	53,437	53,544	49,257	51,252	45,119	47,282	50,572
Total Invested Assets	**$ 3,965,512**	**$ 4,017,465**	**$ 4,014,083**	**$ 3,842,792**	**$ 3,884,963**	**$ 3,718,875**	**$ 3,889,244**	**$ 3,955,881**
Change in Invested Assets								
Beginning Assets	$ 3,905,659	$ 3,965,512	$ 4,017,465	$ 4,014,083	$ 3,842,792	$ 3,884,963	$ 3,718,875	$ 3,889,244
Investment Earnings	64,770	58,603	(2,073)	(171,828)	46,202	(159,774)	180,878	72,089
Net Contributions (Withdrawals)	(4,918)	(6,650)	(1,309)	537	(4,031)	(6,315)	(10,510)	(5,452)
Ending Invested Assets	**$ 3,965,512**	**$ 4,017,465**	**$ 4,014,083**	**$ 3,842,792**	**$ 3,884,963**	**$ 3,718,875**	**$ 3,889,244**	**$ 3,955,881**

Source data provided by the record keeper, Empower Retirement.

Deferred Compensation Plan
Schedule of Invested Assets and Changes in Invested Assets
for the Month Ended
February 28, 2019

Participant Options	**Beginning Invested Assets**	**Investment Income**	**Net Contributions (Withdrawals)**	**Transfers In (Out)**	**Ending Invested Assets**	**% Change in Invested Assets**	**% Change due to Investment Income (1)**
T. Rowe Price							
Stable Value Fund	$ 181,109,114	$ 354,694	$ (823,897)	$ 1,783,930	$ 182,423,841	0.73%	0.20%
Small Cap Stock Fund	108,577,459	7,285,422	(103,778)	(239,520)	115,519,583	6.39%	6.72%
Alaska Balanced Trust	29,950,125	323,874	(50,642)	(31,043)	30,192,314	0.81%	1.08%
Long Term Balanced Fund	85,785,872	1,530,737	(341,506)	(402,280)	86,572,823	0.92%	1.79%
AK Target Date 2010 Trust	3,792,533	49,747	(16,107)	(955)	3,825,218	0.86%	1.31%
AK Target Date 2015 Trust	8,682,921	131,847	(7,572)	266,156	9,073,352	4.50%	1.50%
AK Target Date 2020 Trust	24,338,384	432,867	26,017	62,242	24,859,510	2.14%	1.78%
AK Target Date 2025 Trust	18,159,390	371,501	54,502	339,859	18,925,252	4.22%	2.02%
AK Target Date 2030 Trust	12,351,647	277,044	28,205	(319,234)	12,337,662	-0.11%	2.27%
AK Target Date 2035 Trust	7,332,377	178,592	53,082	(9,050)	7,555,001	3.04%	2.43%
AK Target Date 2040 Trust	8,008,431	205,251	35,459	(34,132)	8,215,009	2.58%	2.56%
AK Target Date 2045 Trust	5,727,195	151,854	22,533	(57,619)	5,843,963	2.04%	2.66%
AK Target Date 2050 Trust	4,161,817	109,192	22,635	(176,178)	4,117,466	-1.07%	2.67%
AK Target Date 2055 Trust	3,938,931	104,723	31,054	(28,211)	4,046,497	2.73%	2.66%
AK Target Date 2060 Trust	903,619	23,963	(2,619)	598	925,561	2.43%	2.65%
Total Investments with T. Rowe Price	502,819,815	11,531,308	(1,072,634)	1,154,563	514,433,052		
State Street Global Advisors							
Money Market	15,327,727	28,019	(510,270)	535,014	15,380,490	0.34%	0.18%
Russell 3000 Index	45,028,513	1,576,761	(18,139)	(249,148)	46,337,987	2.91%	3.51%
US Real Estate Investment Trust Index	13,522,766	131,508	(199,875)	301,063	13,755,462	1.72%	0.97%
World Equity Ex-US Index	19,034,012	360,028	16,727	209,583	19,620,350	3.08%	1.88%
US Treasury Inflation Protected Securities Index	16,285,492	(2,762)	(11,008)	(60,533)	16,211,189	-0.46%	-0.02%
Total Investments with SSgA	109,198,510	2,093,554	(722,565)	735,979	111,305,478		
BlackRock							
S&P 500 Index Fund	208,227,795	6,686,655	(651,208)	(2,535,316)	211,727,926	1.68%	3.24%
Passive U.S. Bond Index Fund	54,857,709	(30,322)	(139,251)	534,665	55,222,801	0.67%	-0.06%
Total Investments with BlackRock	263,085,504	6,656,333	(790,459)	(2,000,651)	266,950,727		
Brandes/Baillie Gifford (2)							
AK International Equity Fund	33,398,386	669,193	(25,422)	(264,680)	33,777,477	1.14%	2.01%
Northern Trust							
Environmental, Social, and Governance Fund	20,500,077	780,921	7,081	374,789	21,662,868	5.67%	3.77%
Total All Funds	$ 929,002,292	$ 21,731,309	$ (2,603,999)	$ -	$ 948,129,602	2.06%	2.34%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Deferred Compensation Plan
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
February 28, 2019
$ (Thousands)

Invested Assets (at fair value)	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**
Investments with T. Rowe Price								
Interest Income Fund	$ 175,629	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Stable Value Fund	-	179,111	178,901	181,148	181,120	183,242	181,109	182,424
Small Cap Stock Fund	114,946	121,797	119,170	108,520	110,186	98,100	108,577	115,520
Alaska Balanced Trust	29,501	30,253	30,453	29,783	29,587	29,690	29,950	30,192
Long Term Balanced Fund	91,224	91,105	90,275	84,960	85,535	81,754	85,786	86,573
AK Target Date 2010 Trust	4,051	4,078	4,033	3,719	3,714	3,627	3,793	3,825
AK Target Date 2015 Trust	9,541	9,477	9,462	8,904	8,919	8,424	8,683	9,073
AK Target Date 2020 Trust	26,229	26,594	26,248	24,788	24,957	23,259	24,338	24,860
AK Target Date 2025 Trust	17,470	18,025	18,796	17,895	17,951	17,041	18,159	18,925
AK Target Date 2030 Trust	11,744	12,182	12,394	11,761	11,977	11,442	12,352	12,338
AK Target Date 2035 Trust	6,910	7,082	7,175	7,003	7,245	6,777	7,332	7,555
AK Target Date 2040 Trust	7,998	8,245	8,258	7,661	7,798	7,372	8,008	8,215
AK Target Date 2045 Trust	5,688	5,882	6,020	5,585	5,698	5,209	5,727	5,844
AK Target Date 2050 Trust	3,958	4,104	4,123	3,927	4,169	3,803	4,162	4,117
AK Target Date 2055 Trust	4,248	4,300	4,309	3,993	4,058	3,604	3,939	4,046
AK Target Date 2060 Trust	399	873	885	871	891	831	904	926
State Street Global Advisors								
Money Market	13,653	13,538	13,947	13,871	13,719	15,762	15,328	15,380
Russell 3000 Index	43,890	45,212	46,616	44,549	45,322	40,964	45,029	46,338
US Real Estate Investment Trust Index	12,810	13,334	12,770	12,568	13,412	11,794	13,523	13,755
World Equity Ex-US Index	18,373	18,043	18,531	17,578	17,738	17,829	19,034	19,620
Long US Treasury Bond Index	5,169	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	13,533	14,313	15,603	15,686	15,910	15,962	16,285	16,211
World Government Bond Ex-US Index	4,626	-	-	-	-	-	-	-
Investments with BlackRock								
S&P 500 Index Fund	220,701	226,134	226,417	210,346	214,014	192,991	208,228	211,728
Passive U.S. Bond Index Fund	-	57,464	55,702	52,868	53,253	54,245	54,858	55,223
Government/Credit Bond Fund	27,364	-	-	-	-	-	-	-
Intermediate Bond Fund	22,131	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford								
AK International Equity Fund	38,417	37,121	36,340	32,598	32,467	30,963	33,398	33,777
Investments with Northern Trust								
Environmental, Social, and Governance Fund	23,391	23,420	23,413	21,103	22,227	19,502	20,500	21,663
Total Invested Assets	**$ 953,592**	**$ 971,688**	**$ 969,841**	**$ 921,685**	**$ 931,868**	**$ 884,186**	**$ 929,002**	**$ 948,130**
Change in Invested Assets								
Beginning Assets	$ 938,807	$ 953,592	$ 971,688	$ 969,841	$ 921,685	$ 931,868	$ 884,186	$ 929,002
Investment Earnings	17,321	18,962	(977)	(46,214)	12,333	(48,008)	48,001	21,731
Net Contributions (Withdrawals)	(2,536)	(866)	(869)	(1,943)	(2,150)	326	(3,184)	(2,604)
Ending Invested Assets	**$ 953,592**	**$ 971,688**	**$ 969,841**	**$ 921,685**	**$ 931,868**	**$ 884,186**	**$ 929,002**	**$ 948,130**

Source data provided by the record keeper, Empower Retirement.

Defined Contribution Retirement - Participant Directed PERS
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
February 28, 2019

Participant Options	Beginning Invested Assets	Investment Income	Net Contributions (Withdrawals)	Transfers In (Out)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income (1)
T. Rowe Price							
Stable Value Fund	$ 42,674,340	$ 83,957	$ 69,983	$ 732,436	$ 43,560,716	2.08%	0.19%
Small Cap Stock Fund	73,309,074	4,934,194	397,346	(202,354)	78,438,260	7.00%	6.72%
Alaska Balanced Trust	25,958,905	277,186	108,136	(503,894)	25,840,333	-0.46%	1.08%
Long Term Balanced Fund	18,075,522	321,475	78,665	(677,226)	17,798,436	-1.53%	1.81%
AK Target Date 2010 Trust	2,488,811	32,575	10,602	(10,000)	2,521,988	1.33%	1.31%
AK Target Date 2015 Trust	11,627,841	175,521	60,417	(113,181)	11,750,598	1.06%	1.51%
AK Target Date 2020 Trust	33,257,916	589,815	92,061	(148,195)	33,791,597	1.60%	1.77%
AK Target Date 2025 Trust	52,839,218	1,072,905	651,166	(14,833)	54,548,456	3.23%	2.02%
AK Target Date 2030 Trust	54,986,223	1,238,706	312,322	30,114	56,567,365	2.88%	2.25%
AK Target Date 2035 Trust	66,175,631	1,615,094	793,426	(43,898)	68,540,253	3.57%	2.43%
AK Target Date 2040 Trust	78,031,820	2,015,299	1,021,054	(153,394)	80,914,779	3.69%	2.57%
AK Target Date 2045 Trust	100,504,239	2,694,843	954,729	(184,700)	103,969,111	3.45%	2.67%
AK Target Date 2050 Trust	119,386,300	3,195,259	906,720	(90,624)	123,397,655	3.36%	2.67%
AK Target Date 2055 Trust	102,847,289	2,768,589	2,226,025	(128,193)	107,713,710	4.73%	2.66%
AK Target Date 2060 Trust	1,027,856	27,631	20,574	977	1,077,038	4.78%	2.66%
Total Investments with T. Rowe Price	783,190,985	21,043,049	7,703,226	(1,506,965)	810,430,295		
State Street Global Advisors							
Money Market	10,861,321	19,998	(167,328)	137,095	10,851,086	-0.09%	0.18%
S&P 500 Stock Index Fund Series A	104,423,255	3,346,593	584,114	(1,235,554)	107,118,408	2.58%	3.21%
Russell 3000 Index	11,093,769	391,978	95,377	209,807	11,790,931	6.28%	3.49%
US Real Estate Investment Trust Index	16,493,932	159,795	84,132	(121,859)	16,616,000	0.74%	0.97%
World Equity Ex-US Index	51,635,750	986,185	274,234	926,459	53,822,628	4.24%	1.89%
US Treasury Inflation Protected Securities Index	19,307,738	(2,853)	41,354	(43,554)	19,302,685	-0.03%	-0.01%
Total Investments with SSgA	213,815,765	4,901,696	911,883	(127,606)	219,501,738		
BlackRock							
Passive U.S. Bond Index Fund	41,438,980	(23,830)	148,713	1,218,124	42,781,987	3.24%	-0.06%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	43,773,644	875,671	267,679	(1,168,010)	43,748,984	-0.06%	2.02%
Northern Trust							
Environmental, Social, and Governance Fund	9,982,620	393,663	75,636	1,584,457	12,036,376	20.57%	3.64%
Total All Funds	$ 1,092,201,994	$ 27,190,249	$ 9,107,137	$ -	$ 1,128,499,380	3.32%	2.48%

Notes: Source data provided by the record keeper, Empower Retirement.
(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.
(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Defined Contribution Retirement - Participant Directed PERS
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
February 28, 2019
$ (Thousands)

Invested Assets (at fair value)	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**
Investments with T. Rowe Price								
Alaska Money Market	$ 5,386	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Stable Value Fund	-	14,421	27,852	43,006	42,923	42,735	42,674	43,561
Small Cap Stock Fund	78,194	80,707	78,140	70,928	72,995	66,254	73,309	78,438
Alaska Balanced Trust	27,299	27,398	27,772	26,476	26,390	25,347	25,959	25,840
Long Term Balanced Fund	24,785	23,022	21,415	18,340	18,335	17,322	18,076	17,798
AK Target Date 2010 Trust	2,508	2,531	2,485	2,475	2,498	2,391	2,489	2,522
AK Target Date 2015 Trust	11,859	12,041	12,061	11,560	11,610	11,260	11,628	11,751
AK Target Date 2020 Trust	32,186	32,603	32,961	31,733	32,373	31,441	33,258	33,792
AK Target Date 2025 Trust	51,239	52,236	52,640	50,610	51,842	49,749	52,839	54,548
AK Target Date 2030 Trust	54,629	55,604	55,869	52,674	53,924	51,203	54,986	56,567
AK Target Date 2035 Trust	64,604	65,985	66,600	62,955	64,639	61,268	66,176	68,540
AK Target Date 2040 Trust	76,369	78,405	79,081	74,522	76,486	72,102	78,032	80,915
AK Target Date 2045 Trust	98,208	100,893	102,389	95,950	98,572	92,542	100,504	103,969
AK Target Date 2050 Trust	116,864	119,654	121,128	113,790	116,862	109,868	119,386	123,398
AK Target Date 2055 Trust	95,705	98,774	100,844	95,643	98,512	93,612	102,847	107,714
AK Target Date 2060 Trust	815	862	993	910	871	848	1,028	1,077
State Street Global Advisors								
Money Market	4,623	10,005	10,109	10,920	10,831	11,295	10,861	10,851
S&P 500 Stock Index Fund Series A	98,610	102,254	104,741	98,753	102,188	94,932	104,423	107,118
Russell 3000 Index	10,944	11,591	11,693	10,948	11,204	10,089	11,094	11,791
US Real Estate Investment Trust Index	16,265	16,461	15,806	15,382	16,180	14,906	16,494	16,616
World Equity Ex-US Index	46,988	47,280	49,117	46,658	47,989	47,138	51,636	53,823
Long US Treasury Bond Index	1,210	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	14,922	16,824	17,904	18,781	18,827	18,831	19,308	19,303
World Government Bond Ex-US Index	7,351	-	-	-	-	-	-	-
Investments with BlackRock								
Government/Credit Bond Fund	49,222	-	-	-	-	-	-	-
Passive U.S. Bond Index Fund	-	68,174	55,842	40,665	40,659	41,088	41,439	42,782
Intermediate Bond Fund	22,335	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford								
AK International Equity Fund	45,645	45,336	45,452	41,823	42,313	40,748	43,774	43,749
Investments with Northern Trust								
Environmental, Social, and Governance Fund	10,616	10,404	10,307	9,439	10,026	9,241	9,983	12,036
Total Invested Assets	**$ 1,069,378**	**$ 1,093,466**	**$ 1,103,203**	**$ 1,044,943**	**$ 1,069,048**	**$ 1,016,210**	**$ 1,092,202**	**$ 1,128,499**
Change in Invested Assets								
Beginning Assets	$ 1,041,422	$ 1,069,378	$ 1,093,466	$ 1,103,203	$ 1,044,943	$ 1,069,048	$ 1,016,210	$ 1,092,202
Investment Earnings	23,080	17,895	(334)	(66,086)	15,087	(63,567)	68,079	27,190
Net Contributions (Withdrawals)	4,876	6,192	10,071	7,826	9,018	10,729	7,912	9,107
Ending Invested Assets	**$ 1,069,378**	**$ 1,093,466**	**$ 1,103,203**	**$ 1,044,943**	**$ 1,069,048**	**$ 1,016,210**	**$ 1,092,202**	**$ 1,128,499**

Source data provided by the record keeper, Empower Retirement.

Defined Contribution Retirement - Participant Directed TRS
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
February 28, 2019

Participant Options	Beginning Invested Assets	Investment Income	Net Contributions (Withdrawals)	Transfers In (Out)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income (1)
T. Rowe Price							
Stable Value Fund	$ 17,336,406	$ 34,060	$ 21,031	$ 197,716	$ 17,589,213	1.46%	0.20%
Small Cap Stock Fund	31,303,258	2,103,939	144,846	(111,832)	33,440,211	6.83%	6.72%
Alaska Balanced Trust	10,990,199	117,345	43,417	(274,188)	10,876,773	-1.03%	1.08%
Long Term Balanced Fund	7,659,856	136,357	39,449	(292,636)	7,543,026	-1.53%	1.81%
AK Target Date 2010 Trust	745,052	9,809	8,565	-	763,426	2.47%	1.31%
AK Target Date 2015 Trust	3,421,370	51,880	43,191	(12,970)	3,503,471	2.40%	1.51%
AK Target Date 2020 Trust	9,781,252	175,306	122,947	-	10,079,505	3.05%	1.78%
AK Target Date 2025 Trust	17,176,722	348,977	213,455	21,526	17,760,680	3.40%	2.02%
AK Target Date 2030 Trust	20,260,862	456,909	270,172	(152,012)	20,835,931	2.84%	2.25%
AK Target Date 2035 Trust	30,049,544	736,738	333,762	106,944	31,226,988	3.92%	2.43%
AK Target Date 2040 Trust	31,908,571	824,642	366,466	-	33,099,679	3.73%	2.57%
AK Target Date 2045 Trust	48,452,493	1,300,938	522,896	-	50,276,327	3.76%	2.67%
AK Target Date 2050 Trust	67,677,440	1,813,082	658,391	(140,727)	70,008,186	3.44%	2.67%
AK Target Date 2055 Trust	34,175,464	921,084	680,848	(31,402)	35,745,994	4.60%	2.67%
AK Target Date 2060 Trust	302,104	8,088	2,232	-	312,424	3.42%	2.67%
Total Investments with T. Rowe Price	331,240,593	9,039,154	3,471,668	(689,581)	343,061,834		
State Street Global Advisors							
Money Market	3,022,180	5,705	23,718	19,669	3,071,272	1.62%	0.19%
S&P 500 Stock Index Fund Series A	42,005,323	1,346,740	210,661	(487,865)	43,074,859	2.55%	3.22%
Russell 3000 Index	3,605,413	126,931	22,042	3,253	3,757,639	4.22%	3.51%
US Real Estate Investment Trust Index	6,648,664	64,697	30,656	836	6,744,853	1.45%	0.97%
World Equity Ex-US Index	22,994,278	439,772	95,771	498,800	24,028,621	4.50%	1.89%
US Treasury Inflation Protected Securities Index	7,043,102	(1,147)	31,640	(92,841)	6,980,754	-0.89%	-0.02%
Total Investments with SSgA	85,318,960	1,982,698	414,488	(58,148)	87,657,998		
BlackRock							
Passive U.S. Bond Index Fund	16,290,378	(9,635)	76,986	526,786	16,884,515	3.65%	-0.06%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	19,345,299	387,875	90,091.00	(472,623)	19,350,642	0.03%	2.03%
Northern Trust							
Environmental, Social, and Governance Fund	4,062,818	160,383	18,561.00	693,566	4,935,328	21.48%	3.63%
Total All Funds	$ 456,258,048	$ 11,560,475	$ 4,071,794	$ -	$ 471,890,317	3.43%	2.52%

Notes: Source data provided by the record keeper, Empower Retirement.
(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.
(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Defined Contribution Retirement - Participant Directed TRS
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
February 28, 2019
$ (Thousands)

Invested Assets (at fair value)	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**
Investments with T. Rowe Price								
Alaska Money Market	$ 1,894	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Stable Value Fund	-	5,764	10,959	17,254	17,485	17,146	17,336	17,589
Small Cap Stock Fund	34,424	35,326	33,876	30,707	31,368	28,362	31,303	33,440
Alaska Balanced Trust	11,394	11,458	11,456	11,077	10,957	10,683	10,990	10,877
Long Term Balanced Fund	10,335	9,630	8,893	7,621	7,648	7,279	7,660	7,543
AK Target Date 2010 Trust	826	836	843	725	727	715	745	763
AK Target Date 2015 Trust	3,397	3,396	3,354	3,221	3,360	3,289	3,421	3,503
AK Target Date 2020 Trust	9,951	9,943	9,992	9,600	9,743	9,385	9,781	10,080
AK Target Date 2025 Trust	16,938	17,131	17,113	16,474	16,761	16,150	17,177	17,761
AK Target Date 2030 Trust	20,121	20,288	20,233	19,384	19,641	18,873	20,261	20,836
AK Target Date 2035 Trust	29,766	29,990	30,167	28,528	29,335	27,880	30,050	31,227
AK Target Date 2040 Trust	31,409	31,857	32,148	30,214	31,092	29,380	31,909	33,100
AK Target Date 2045 Trust	48,740	49,511	49,641	46,683	47,610	44,891	48,452	50,276
AK Target Date 2050 Trust	68,156	69,233	69,024	65,046	66,485	62,663	67,677	70,008
AK Target Date 2055 Trust	32,138	32,606	32,751	31,327	32,485	31,065	34,175	35,746
AK Target Date 2060 Trust	179	195	250	238	244	229	302	312
State Street Global Advisors								
Money Market	690	2,573	2,677	2,894	2,746	2,966	3,022	3,071
S&P 500 Stock Index Fund Series A	41,127	42,492	42,944	40,386	41,452	38,385	42,005	43,075
Russell 3000 Index	3,621	3,663	3,757	3,505	3,634	3,305	3,605	3,758
US Real Estate Investment Trust Index	6,751	6,695	6,396	6,212	6,577	6,053	6,649	6,745
World Equity Ex-US Index	21,323	21,370	22,069	21,074	21,523	21,065	22,994	24,029
Long US Treasury Bond Index	306	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	5,367	6,094	6,486	6,939	6,924	6,951	7,043	6,981
World Government Bond Ex-US Index	2,765	-	-	-	-	-	-	-
Investments with BlackRock								
Government/Credit Bond Fund	20,232	-	-	-	-	-	-	-
Passive U.S. Bond Index Fund	-	26,480	21,597	15,809	15,796	16,050	16,290	16,885
Intermediate Bond Fund	8,292	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford								
AK International Equity Fund	20,619	20,325	20,320	18,707	18,782	18,035	19,345	19,351
Investments with Northern Trust								
Environmental, Social, and Governance Fund	4,614	4,398	4,270	3,858	4,047	3,795	4,063	4,935
Total Invested Assets	**$ 455,376**	**$ 461,254**	**$ 461,219**	**$ 437,483**	**$ 446,422**	**$ 424,594**	**$ 456,258**	**$ 471,890**
Change in Invested Assets								
Beginning Assets	$ 442,323	$ 455,376	$ 461,254	$ 461,219	$ 437,483	$ 446,422	$ 424,594	$ 456,258
Investment Earnings	10,017	7,587	(129)	(28,187)	6,395	(27,052)	28,939	11,560
Net Contributions (Withdrawals)	3,036	(1,709)	95	4,451	2,543	5,224	2,725	4,072
Ending Invested Assets	**$ 455,376**	**$ 461,254**	**$ 461,219**	**$ 437,483**	**$ 446,422**	**$ 424,594**	**$ 456,258**	**$ 471,890**

Source data provided by the record keeper, Empower Retirement.

ALASKA RETIREMENT MANAGEMENT BOARD

FINANCIAL REPORT
(Supplement to the Treasury Division Report)

As of February 28, 2019

Prepared by the Division of Retirement & Benefits

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Eight Months Ending February 28, 2019

	Contributions				Expenditures				Net
	Contributions EE and ER	State of Alaska	Other	Total Contributions	Benefits	Refunds & Disbursements	Administrative & Investment	Total Expenditures	Contributions/ (Withdrawals)
Public Employees' Retirement System (PERS)									
Defined Benefit Plans:									
Retirement Trust	$ 246,891,392	$ 135,367,000	$ 17,710	$ 382,276,102	$ (560,883,201)	$ (7,338,906)	$ (4,088,996)	$ (572,311,103)	$ (190,035,001)
Retirement Health Care Trust	67,917,091	-	32,217,206	100,134,297	(299,059,451)	-	(10,536,355)	(309,595,806)	(209,461,509)
Total Defined Benefit Plans	314,808,483	135,367,000	32,234,916	482,410,399	(859,942,652)	(7,338,906)	(14,625,351)	(881,906,909)	(399,496,510)
Defined Contribution Plans:									
Participant Directed Retirement	105,936,510	-	-	105,936,510	-	(37,143,948)	(3,059,873)	(40,203,821)	65,732,689
Health Reimbursement Arrangement [(a)]	27,503,984	-	-	27,503,984	(56,359)	-	(85,527)	(141,886)	27,362,098
Retiree Medical Plan [(a)]	7,835,128	-	13,500	7,848,628	(213,959)	-	(31,155)	(245,114)	7,603,514
Occupational Death and Disability: [(a)]									
All Others	1,755,971	-	-	1,755,971	(83,424)	-	(5,350)	(88,774)	1,667,197
Peace Officers and Firefighters	819,534	-	-	819,534	(171,200)	-	(2,608)	(173,808)	645,726
Total Defined Contribution Plans	143,851,127	-	13,500	143,864,627	(524,942)	(37,143,948)	(3,184,513)	(40,853,403)	103,011,224
Total PERS	**458,659,610**	**135,367,000**	**32,248,416**	**626,275,026**	**(860,467,594)**	**(44,482,854)**	**(17,809,864)**	**(922,760,312)**	**(296,485,286)**
Teachers' Retirement System (TRS)									
Defined Benefit Plans:									
Retirement Trust	41,631,100	128,174,000	19,533	169,824,633	(315,390,776)	(1,938,397)	(2,136,281)	(319,465,454)	(149,640,821)
Retirement Health Care Trust	10,762,844	-	10,307,410	21,070,254	(97,669,295)	-	(3,904,037)	(101,573,332)	(80,503,078)
Total Defined Benefit Plans	52,393,944	128,174,000	10,326,943	190,894,887	(413,060,071)	(1,938,397)	(6,040,318)	(421,038,786)	(230,143,899)
Defined Contribution Plans:									
Participant Directed Retirement	32,535,793	-	-	32,535,793	-	(10,990,380)	(1,108,994)	(12,099,374)	20,436,419
Health Reimbursement Arrangement [(a)]	6,509,194	-	-	6,509,194	(22,269)	-	(25,494)	(47,763)	6,461,431
Retiree Medical Plan [(a)]	1,801,205	-	8,695	1,809,900	(89,270)	-	(12,433)	(101,703)	1,708,197
Occupational Death and Disability [(a)]	145,249	-	-	145,249	(16,196)	-	(827)	(17,023)	128,226
Total Defined Contribution Plans	40,991,441	-	8,695	41,000,136	(127,735)	(10,990,380)	(1,147,748)	(12,265,863)	28,734,273
Total TRS	**93,385,385**	**128,174,000**	**10,335,638**	**231,895,023**	**(413,187,806)**	**(12,928,777)**	**(7,188,066)**	**(433,304,649)**	**(201,409,626)**
Judicial Retirement System (JRS)									
Defined Benefit Plan Retirement Trust	3,839,451	4,909,000	-	8,748,451	(9,050,557)	-	(69,333)	(9,119,890)	(371,439)
Defined Benefit Retirement Health Care Trust	397,120	-	102,576	499,696	(650,437)	-	(35,621)	(686,058)	(186,362)
Total JRS	**4,236,571**	**4,909,000**	**102,576**	**9,248,147**	**(9,700,994)**	**-**	**(104,954)**	**(9,805,948)**	**(557,801)**
National Guard/Naval Militia Retirement System (NGNMRS)									
Defined Benefit Plan Retirement Trust [(a)]	851,686	-	-	851,686	(954,986)	-	(92,724)	(1,047,710)	(196,024)
Other Participant Directed Plans									
Supplemental Annuity Plan	111,364,807	-	-	111,364,807	-	(145,105,658)	(4,905,214)	(150,010,872)	(38,646,065)
Deferred Compensation Plan	28,491,713	-	-	28,491,713	-	(41,089,288)	(1,228,145)	(42,317,433)	(13,825,720)
Total All Funds	**696,989,772**	**268,450,000**	**42,686,630**	**1,008,126,402**	**(1,284,311,380)**	**(243,606,577)**	**(31,328,967)**	**(1,559,246,924)**	**(551,120,522)**
Total Non-Participant Directed	418,660,949	268,450,000	42,686,630	729,797,579	(1,284,311,380)	(9,277,303)	(21,026,741)	(1,314,615,424)	(584,817,845)
Total Participant Directed	278,328,823	-	-	278,328,823	-	(234,329,274)	(10,302,226)	(244,631,500)	33,697,323
Total All Funds	**$ 696,989,772**	**$ 268,450,000**	**$ 42,686,630**	**$ 1,008,126,402**	**$ (1,284,311,380)**	**$ (243,606,577)**	**$ (31,328,967)**	**$ (1,559,246,924)**	**$ (551,120,522)**

(a) Employer only contributions.

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Month Ended February 28, 2019

	Contributions				Expenditures				Net
	Contributions EE and ER	State of Alaska	Other	Total Contributions	Benefits	Refunds & Disbursements	Administrative & Investment	Total Expenditures	Contributions/ (Withdrawals)
Public Employees' Retirement System (PERS)									
Defined Benefit Plans:									
Retirement Trust	$ 31,462,116	$ -	$ 6,753	$ 31,468,869	$ (70,338,217)	$ (824,308)	$ (181,575)	$ (71,344,100)	$ (39,875,231)
Retirement Health Care Trust	8,921,243	-	6,430,926	15,352,169	(33,903,513)	-	(1,060,890)	(34,964,403)	(19,612,234)
Total Defined Benefit Plans	40,383,359	-	6,437,679	46,821,038	(104,241,730)	(824,308)	(1,242,465)	(106,308,503)	(59,487,465)
Defined Contribution Plans:									
Participant Directed Retirement	13,362,869	-	-	13,362,869	-	(4,140,396)	(115,336)	(4,255,732)	9,107,137
Health Reimbursement Arrangement [(a)]	3,608,618	-	-	3,608,618	(4,293)	-	(2,553)	(6,846)	3,601,772
Retiree Medical Plan [(a)]	981,466	-	4,191	985,657	(14,200)	-	(1,801)	(16,001)	969,656
Occupational Death and Disability: [(a)]									
All Others	234,307	-	-	234,307	(10,429)	-	(167)	(10,596)	223,711
Peace Officers and Firefighters	97,304	-	-	97,304	(20,729)	-	(84)	(20,813)	76,491
Total Defined Contribution Plans	18,284,564	-	4,191	18,288,755	(49,651)	(4,140,396)	(119,941)	(4,309,988)	13,978,767
Total PERS	**58,667,923**	**-**	**6,441,870**	**65,109,793**	**(104,291,381)**	**(4,964,704)**	**(1,362,406)**	**(110,618,491)**	**(45,508,698)**
Teachers' Retirement System (TRS)									
Defined Benefit Plans:									
Retirement Trust	5,761,113	-	5,259	5,766,372	(39,248,565)	(265,944)	(78,468)	(39,592,977)	(33,826,605)
Retirement Health Care Trust	1,503,656	-	2,124,942	3,628,598	(10,847,480)	-	(381,832)	(11,229,312)	(7,600,714)
Total Defined Benefit Plans	7,264,769	-	2,130,201	9,394,970	(50,096,045)	(265,944)	(460,300)	(50,822,289)	(41,427,319)
Defined Contribution Plans:									
Participant Directed Retirement	4,670,302	-	-	4,670,302	-	(555,669)	(42,839)	(598,508)	4,071,794
Health Reimbursement Arrangement [(a)]	950,969	-	-	950,969	(1,912)	-	(764)	(2,676)	948,293
Retiree Medical Plan [(a)]	251,598	-	1,014	252,612	(6,204)	-	(689)	(6,893)	245,719
Occupational Death and Disability [(a)]	24,893	-	-	24,893	(2,025)	-	(26)	(2,051)	22,842
Total Defined Contribution Plans	5,897,762	-	1,014	5,898,776	(10,141)	(555,669)	(44,318)	(610,128)	5,288,648
Total TRS	**13,162,531**	**-**	**2,131,215**	**15,293,746**	**(50,106,186)**	**(821,613)**	**(504,618)**	**(51,432,417)**	**(36,138,671)**
Judicial Retirement System (JRS)									
Defined Benefit Plan Retirement Trust	242,718	-	-	242,718	(1,189,028)	-	(1,989)	(1,191,017)	(948,299)
Defined Benefit Retirement Health Care Trust	24,887	-	23,772	48,659	(57,738)	-	(2,932)	(60,670)	(12,011)
Total JRS	**267,605**	**-**	**23,772**	**291,377**	**(1,246,766)**	**-**	**(4,921)**	**(1,251,687)**	**(960,310)**
National Guard/Naval Militia Retirement System (NGNMRS)									
Defined Benefit Plan Retirement Trust [(a)]	-	-	-	-	(98,528)	-	(1,783)	(100,311)	(100,311)
Other Participant Directed Plans									
Supplemental Annuity Plan	14,252,730	-	-	14,252,730	-	(18,042,539)	(1,661,749)	(19,704,288)	(5,451,558)
Deferred Compensation Plan	2,277,668	-	-	2,277,668	-	(4,750,218)	(131,449)	(4,881,667)	(2,603,999)
Total All Funds	**88,628,457**	**-**	**8,596,857**	**97,225,314**	**(155,742,861)**	**(28,579,074)**	**-**	**(187,988,861)**	**(90,763,547)**
Total Non-Participant Directed	54,064,888	-	8,596,857	62,661,745	(155,742,861)	(1,090,252)	(1,715,553)	(158,548,666)	(95,886,921)
Total Participant Directed	34,563,569	-	-	34,563,569	-	(27,488,822)	(1,951,373)	(29,440,195)	5,123,374
Total All Funds	**$ 88,628,457**	**$ -**	**$ 8,596,857**	**$ 97,225,314**	**$ (155,742,861)**	**$ (28,579,074)**	**$ (3,666,926)**	**$ (187,988,861)**	**$ (90,763,547)**

(a) Employer only contributions.

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Eight Months Ending February 28, 2019

PARTICIPANT DIRECTED DISBURSEMENTS BY PLAN AND BY TYPE

	PERS DCR Plan	TRS DCR Plan	Supplemental Annuity Plan	Deferred Compensation	TOTAL	% of Total
Payment to Beneficiary	$ 10,543	$ -	$ 146,636	$ 130,546	$ 287,725	0.1%
Death Benefit	505,853	73,768	7,032,228	1,153,841	8,765,690	3.7%
Disability / Hardship	85,714	-	119,647	97,913	303,274	0.1%
Minimum Required Distribution	66,941	11,995	6,603,026	2,353,032	9,034,994	3.9%
Qualified Domestic Relations Order	589,805	-	3,361,480	531,310	4,482,595	1.9%
Separation from Service / Retirement	35,885,092	10,904,617	127,123,854	36,711,184	210,624,747	89.9%
Purchase of Service Credit	-	-	718,787	111,462	830,249	0.4%
Transfer to a Qualifying Plan	-	-	-	-	-	0.0%
TOTAL	$ 37,143,948	$ 10,990,380	$ 145,105,658	$ 41,089,288	$ 234,329,274	100.0%

Notes for the DRB Supplement to the Treasury Report

February 2019

This report is the DRB supplement to the Treasury Division's Financial Report. It expands their "Net Contributions (Withdrawals)" column into contributions and expenditures. It shows contributions received from both employees and employers, contributions from the State of Alaska, and other non-investment income. It also expands expenditures into benefits, refunds & disbursements, and administrative & investment expenditures. The net amount of total contributions and total expenditures, presented as "Net Contributions (Withdrawals)", agrees with the same column in the Treasury Division's Financial Report. Page one shows the year-to-date totals for the first eight months of Fiscal Year 2019, while page two shows only the month of February 2019.

Highlights – On page one, for the **eight months** ending February 28, 2019:

- PERS DB Pension – Average employer and employee contributions of $30.9 million per month; benefit payments of approximately $70.1 million per month; refunds average $917 thousand; and Administrative and Investment expenditures of $511 thousand per month (DOR and DRB).
- PERS DB Healthcare – Average employer contributions of $8.5 million per month; other income of $13.5 million from Aetna Rx rebates (most recently received in December for 2nd Quarter CY2018) and $18.5 million from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018); benefit payments of approximately $37.4 million per month; and average Administrative and Investment expenditures of $1.3 million per month (DOR and DRB).
- PERS DC Pension – Average employer and employee contributions of $13.2 million per month; participant disbursements average $4.6 million per month; and average Administrative and Investment expenditures of $382 thousand per month (DOR and DRB).
- PERS DCR Health – For HRA, RMP, and OD&D, only employer contributions average $4.7 million per month on behalf of participating employees; benefit payments of approximately $66 thousand per month. Currently, 41 benefits are being paid from the Occupational Death & Disability plans, 33 retirees are participating in RMP, and 35 retirees are participating in HRA. Administrative and investment expenditures were approximately $16 thousand per month (DOR and DRB).
- TRS DB Pension - Average employer and employee contributions of $5.2 million per month; benefit payments of approximately $39.4 million per month; refunds average $242 thousand; and average Administrative and Investment expenditures of $267 thousand per month (DOR and DRB).
- TRS DB Healthcare – Average employer contributions of $1.3 million per month; other income of $4.2 million from Aetna Rx rebates (most recently received in December for 2nd Quarter CY2018) and $6.1 million from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018); benefit payments of approximately $12.2 million per month; and average Administrative and Investment expenditures of $488 thousand per month (DOR and DRB).

- TRS DC Pension – Average employer and employee contributions of $4.1 million per month; participant disbursements average $1.4 million per month; and average Administrative and investment expenditures of $139 thousand per month (DOR and DRB).
- TRS DCR Health – For HRA, RMP, and OD&D, only employer contributions average $1.1 million per month on behalf of participating employees; benefit payments of approximately $16 thousand per month. Currently, 9 benefits are being paid from the Occupational Death & Disability plans, 13 retirees are participating in RMP, and 12 retirees are participating in HRA. Administrative and investment expenditures were approximately $5 thousand per month (DOR and DRB).
- JRS Pension – Average employer and employee contributions of $480 thousand per month; benefit payments of approximately $1.1 million per month; and average Administrative and Investment expenditures of $9 thousand per month (DOR and DRB).
- JRS Healthcare – Average employer contributions of $50 thousand per month; other income of $35 thousand from Aetna Rx rebates (most recently received in December for 2nd Quarter CY2018) and $67 thousand from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018); benefit payments of approximately $81 thousand per month; and average Administrative and Investment expenditures of $4 thousand per month (DOR and DRB).
- NGNMRS – Annual contribution from DMVA in the amount of $852 thousand was received in July; combination of lump-sum and monthly benefit payments of $119 thousand per month; and average Administrative and Investment expenditures of $12 thousand per month (DOR and DRB).
- SBS – Average employer and employee contributions and transfers in of $13.9 million per month. Participant disbursements average of $18.1 million per month; and average Administrative and Investment expenditures of $613 thousand per month (DOR and DRB).
- Deferred Compensation – Average member-only contributions and transfers in of $3.6 million per month; participant disbursements average of $5.1 million per month; and average Administrative and Investment expenditures of $154 thousand per month (DOR and DRB).

Highlights – On page two, activity for the **one month** of February 2019 only:

- PERS DB Healthcare – $6.4 million from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018.
- TRS DB Healthcare – $2.1 million from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018.
- JRS Healthcare – $24 thousand from Medicare drug subsidy (most recently received in February for 4th Quarter CY2018.
- All other funds – Nothing significant to report

If you have any questions or comments, please let me know.

Callan

April 4, 2019

ARMB Board Meeting

Investment Performance
Periods Ended December 31, 2018

Steve Center, CFA
Senior Vice President

Paul Erlendson
Senior Vice President

Agenda

- Market and Economic Environment

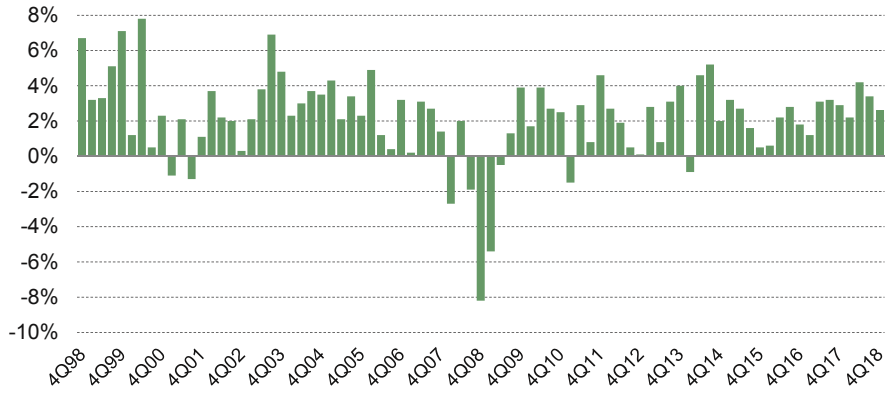
- Total Fund Performance
  - Major Asset Classes

U.S. Economy

December 31, 2018

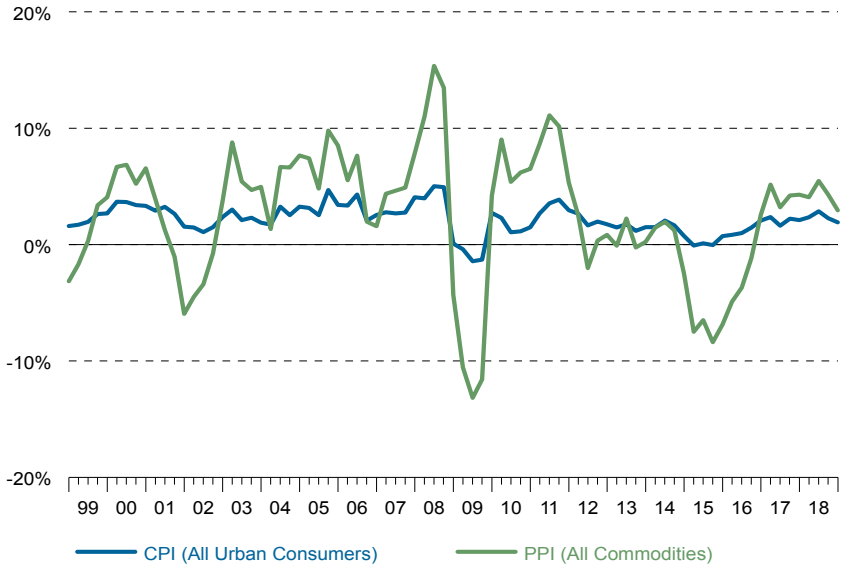
- Fourth quarter GDP growth came in at 2.6% (annualized)
  - Down from 3.4% in the third quarter and 4.2% in the second quarter
  - The figure, while down from prior quarters, was very solid compared to consensus expectations of 2.2%
  - Consumer spending led the report, up 2.8% (annualized)
- Labor market remains strong
  - Unemployment climbed to 3.9% in December; although this was largely due to a rise in the participation rate
  - Approximately 239,000 nonfarm payrolls were added per month during the fourth quarter
- Modest inflation
  - Headline CPI climbed 1.9% in 2018, while Core CPI was up 2.2% during the year
  - Core PCE in line with Fed's 2% target
- The Fed raised rates, but strikes a more dovish tone looking ahead into 2019
  - A 25 bp hike in December brought the target range to 2.25% to 2.50%
  - The Fed's outlook for 2019 has signaled market participants to expect two rate hikes instead of the previously anticipated three

Quarterly Real GDP Growth (20 Years)



Source: Bureau of Economic Analysis

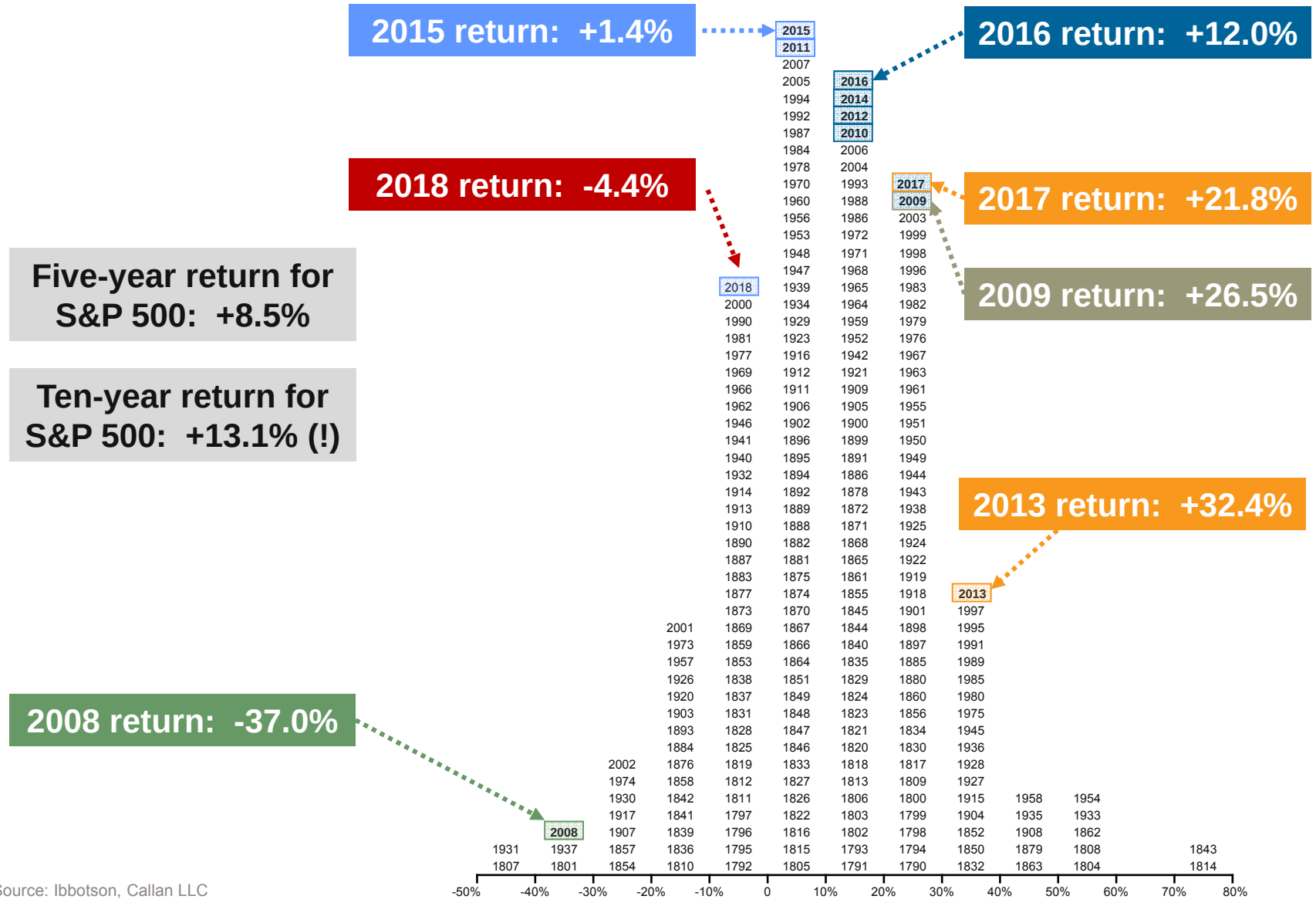
Inflation Year-Over-Year



Source: Bureau of Labor Statistics

Stock Market Returns by Calendar Year

2018 Performance in Perspective: History of the U.S. Stock Market (230 Years of Returns)



Source: Ibbotson, Callan LLC

Asset Class Performance

Periodic Table of Investment Returns for Periods Ended December 31, 2018

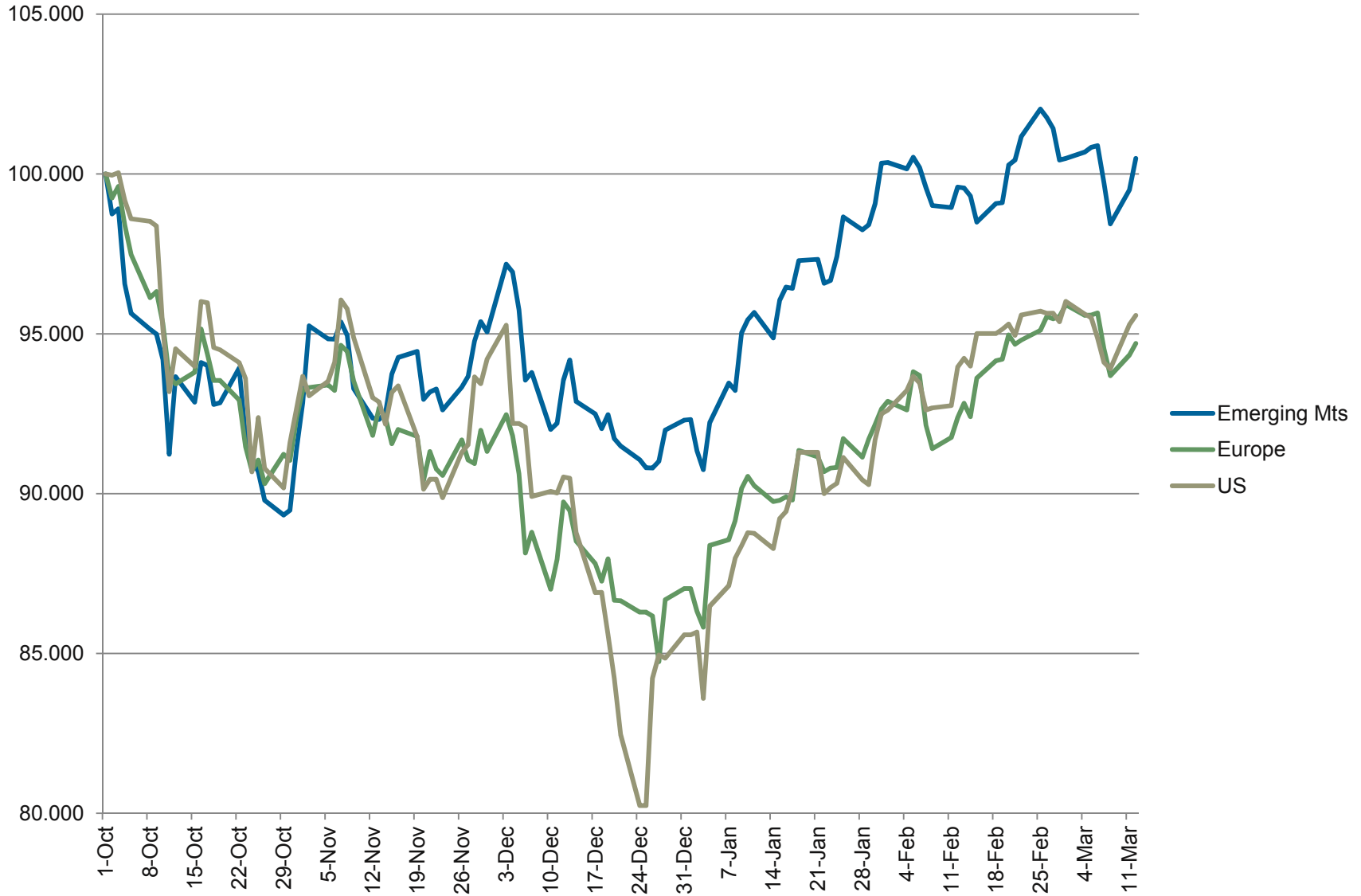
Best

Worst

Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years	Last 10 Years	Last 20 Years
Blmbg:Aggregate 1.6%	3 Month T-Bill 1.9%	3 Month T-Bill 1.9%	MSCI:EM Gross 9.7%	S&P:500 8.5%	S&P:500 13.1%	MSCI:EM Gross 8.8%
3 Month T-Bill 0.6%	Blmbg:Aggregate 0.0%	Blmbg:Aggregate 0.0%	S&P:500 9.3%	Russell:2000 Index 4.4%	Russell:2000 Index 12.0%	Russell:2000 Index 7.4%
MSCI:EM Gross (7.4%)	S&P:500 (4.4%)	S&P:500 (4.4%)	Russell:2000 Index 7.4%	Blmbg:Aggregate 2.5%	MSCI:EM Gross 8.4%	S&P:500 5.6%
Blmbg:Commodity Price Idx **(10.0%)**	Russell:2000 Index (11.0%)	Russell:2000 Index (11.0%)	MSCI:EAFE 2.9%	MSCI:EM Gross 2.0%	MSCI:EAFE 6.3%	Blmbg:Aggregate 4.5%
MSCI:EAFE (12.5%)	Blmbg:Commodity Price Idx **(13.0%)**	Blmbg:Commodity Price Idx **(13.0%)**	Blmbg:Aggregate 2.1%	3 Month T-Bill 0.6%	Blmbg:Aggregate 3.5%	MSCI:EAFE 3.5%
S&P:500 (13.5%)	MSCI:EAFE (13.8%)	MSCI:EAFE (13.8%)	3 Month T-Bill 1.0%	MSCI:EAFE 0.5%	3 Month T-Bill 0.4%	3 Month T-Bill 1.9%
Russell:2000 Index (20.2%)	MSCI:EM Gross (14.2%)	MSCI:EM Gross (14.2%)	Blmbg:Commodity Price Idx **(0.8%)**	Blmbg:Commodity Price Idx **(9.4%)**	Blmbg:Commodity Price Idx **(4.2%)**	Blmbg:Commodity Price Idx **(0.1%)**

Diversification Returning?

Equity Index Returns - Fourth Quarter through March 12, 2019



Source: MSCI Equity Indices

U.S. Equity Market

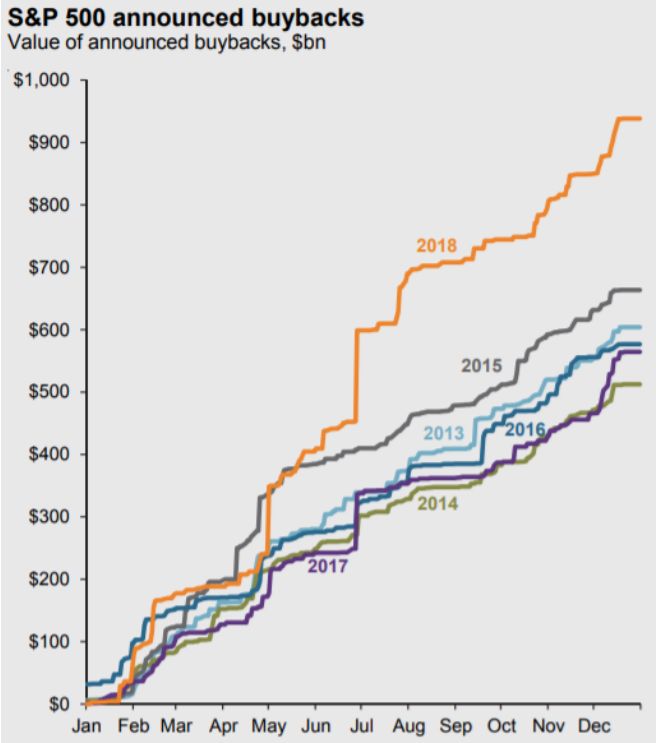
December 31, 2018

- The S&P 500 Index fell 4.4% in 2018
  - In the fourth quarter, the index dropped 13.5%, with a 9.0% decline in December alone
  - The Energy sector (-23.7%) led the drawdown, while Utilities (1.4%) was the only sector to record a gain during the quarter
- Growth underperformed Value in the fourth quarter, narrowing the YTD divergence
  - R1000 Growth dropped 15.9% in the fourth quarter, while R1000 Value comparatively fell 11.7%
- Large caps outperformed small and mid caps both in the fourth quarter and during 2018 as a whole
  - Last Quarter, the R1000 was down 13.8% vs. the R2000 which declined 20.2%

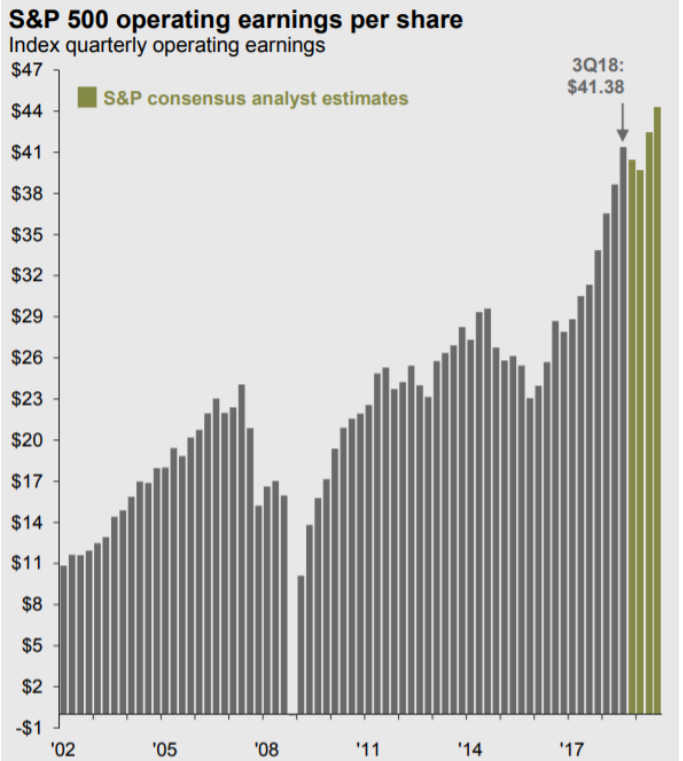
Large Cap Equity	Last Quarter	Last 2 Quarters	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Russell 1000 Index	-13.82	-7.42	-4.78	9.09	8.21	13.28
Russell 1000 Growth	-15.89	-8.17	-1.51	11.15	10.40	15.29
Russell 1000 Value	-11.72	-6.69	-8.27	6.95	5.95	11.18
Mid Cap Equity						
Russell Midcap Index	-15.37	-11.14	-9.06	7.04	6.26	14.03
Russell Midcap Growth	-15.99	-9.63	-4.75	8.59	7.42	15.12
Russell Midcap Value	-14.95	-12.15	-12.29	6.06	5.44	13.03
Small Cap Equity						
Russell 2000 Index	-20.20	-17.35	-11.01	7.36	4.41	11.97
Russell 2000 Growth	-21.65	-17.33	-9.31	7.24	5.13	13.52
Russell 2000 Value	-18.67	-17.36	-12.86	7.37	3.61	10.40

S&P 500 Earnings

December 31, 2018



Source: JP Morgan Guide to the Markets. As of December 31, 2018



Source: JP Morgan Guide to the Markets. As of December 31, 2018

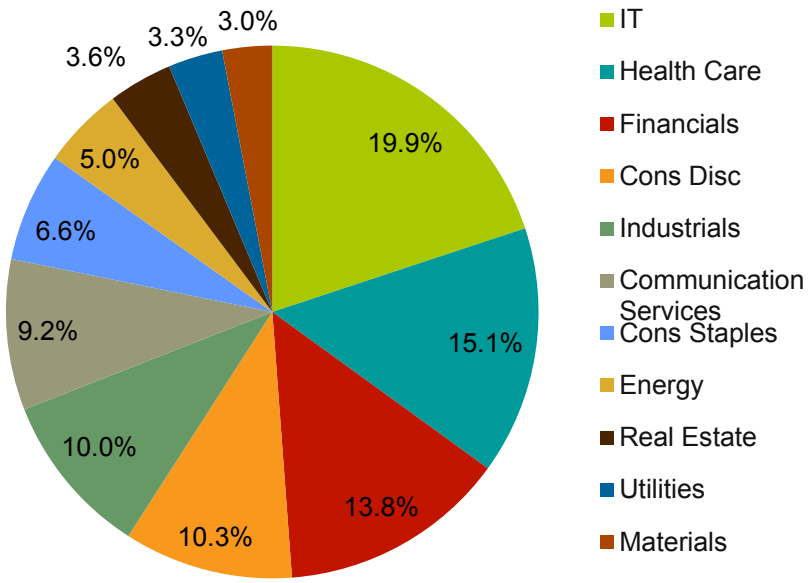
- For Q4 2018 (with 96% of the companies in the S&P 500 reporting actual results for the quarter), 69% of S&P 500 companies have reported a positive EPS surprise and 61% have reported a positive sales surprise
- For Q4 2018, the blended earnings growth rate for the S&P 500 is 13.1%; if 13.1% is the actual growth rate for the quarter, it will mark the fifth straight quarter of double-digit earnings growth for the index
  - Five sectors are reporting double-digit earnings growth, led by Energy, Communication Services, and Consumer Discretionary

Source: FACTSET; Earnings Insight as of March 1, 2019

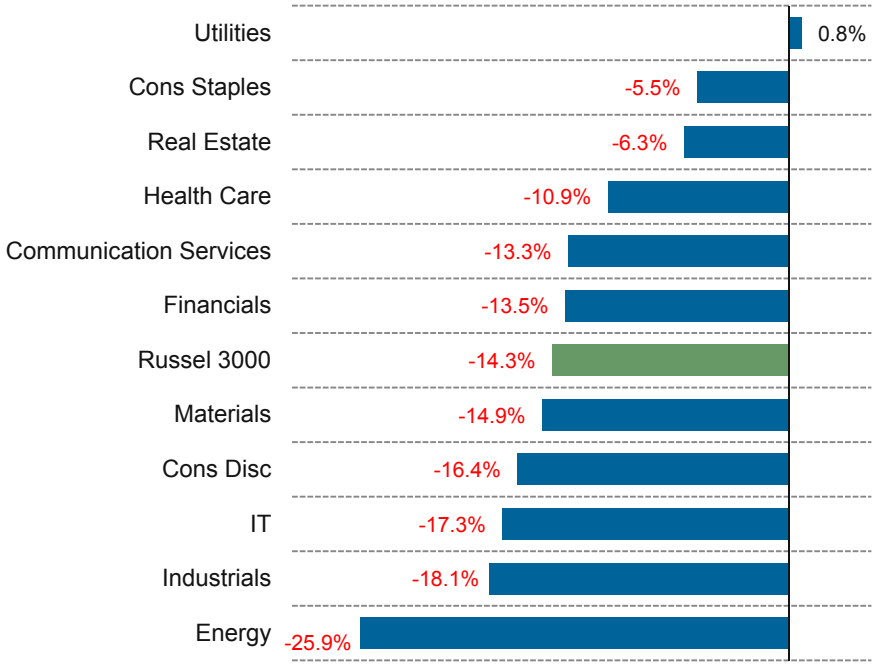
U.S. Equity Returns

December 31, 2018

Economic Sector Exposure (Russell 3000)



Quarterly Returns (Russell 3000)

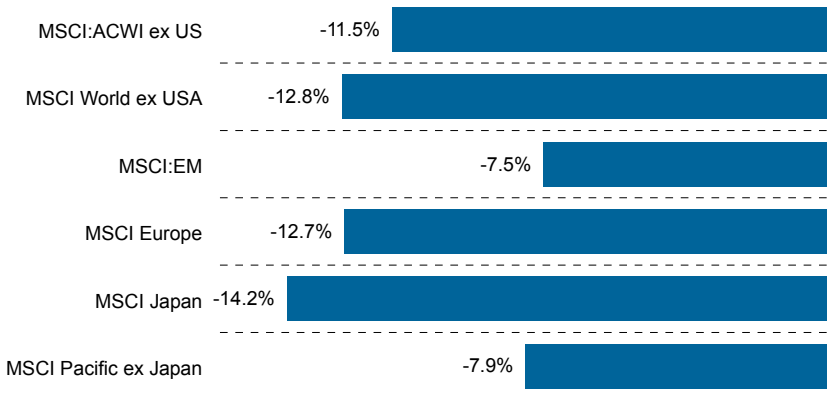


- The Russell 1000 Index declined 13.8% in the fourth quarter. Energy (-24.8%) experienced the most severe losses, while Industrials (-17.7%), IT (-17.3%), and Consumer Discretionary (-16.0%) all fell by over 15%
- The Russell 2000 Index was down 20.2% in the fourth quarter. Energy (-41.1%), Materials (-26.3%), Health Care (-25.8%), Industrials (-21.3%), and Consumer Discretionary (-20.1%) all fell by over 20%

International Equity Returns

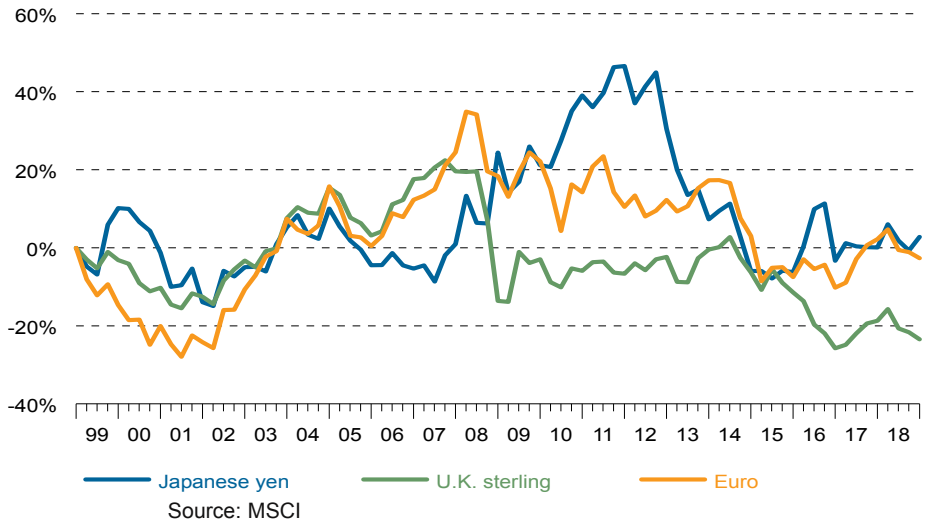
December 31, 2018

Regional Quarterly Performance (U.S. Dollar)



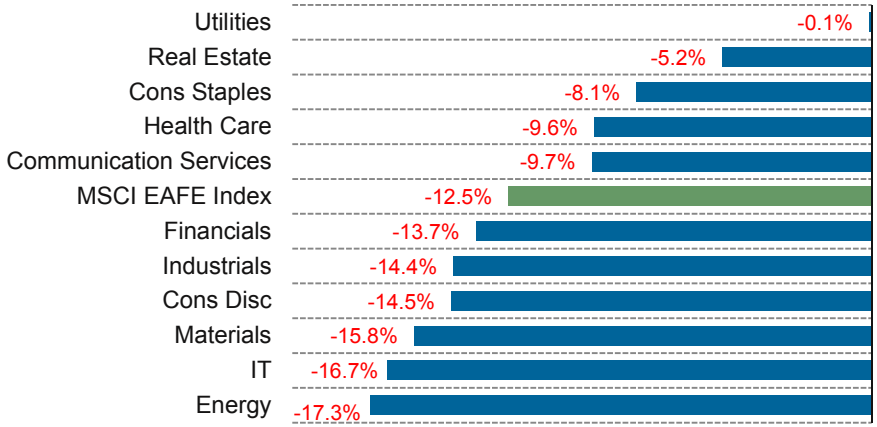
Source: MSCI

Major Currencies' Cumulative Returns (vs. U.S. Dollar)



Source: MSCI

MSCI EAFE Sector Returns



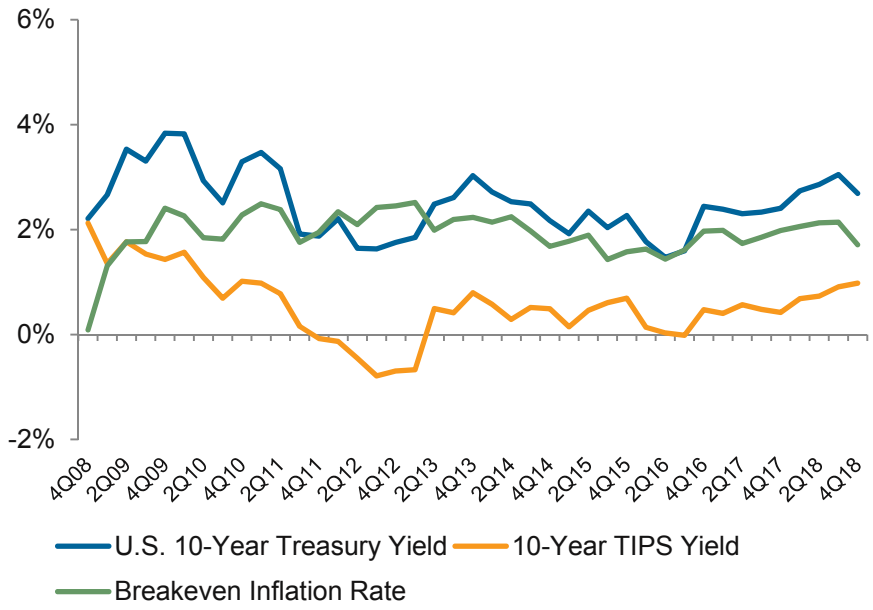
Source: MSCI

- Japan was the weakest performing region (-14.2%)
- The dollar appreciated against most major currencies in the fourth quarter, with the exception of the yen; the pound fell by 2.3% and the euro dropped by 1.6%; the yen gained 3.5%
- All sectors declined in the fourth quarter, with Energy (-17.3%) producing the largest losses

Yield Curve Changes

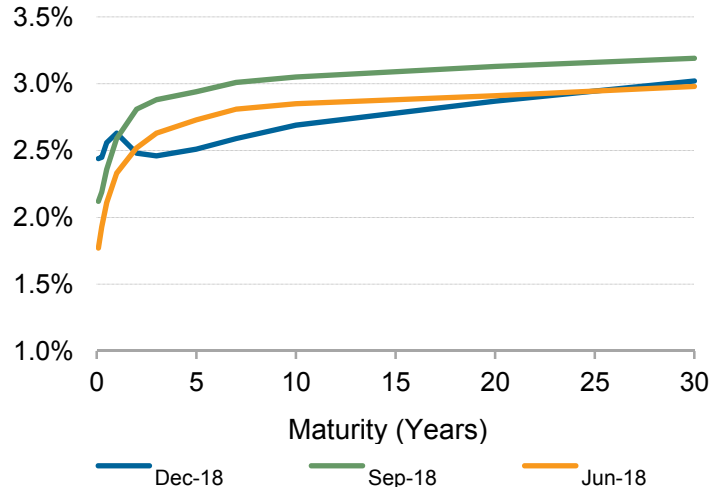
December 31, 2018

Historical 10-Year Yields

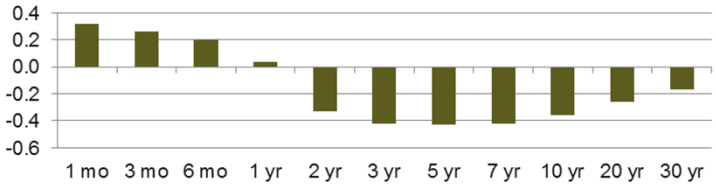


Source: Bloomberg

Treasury Yield Curve



Changes September to December 2018



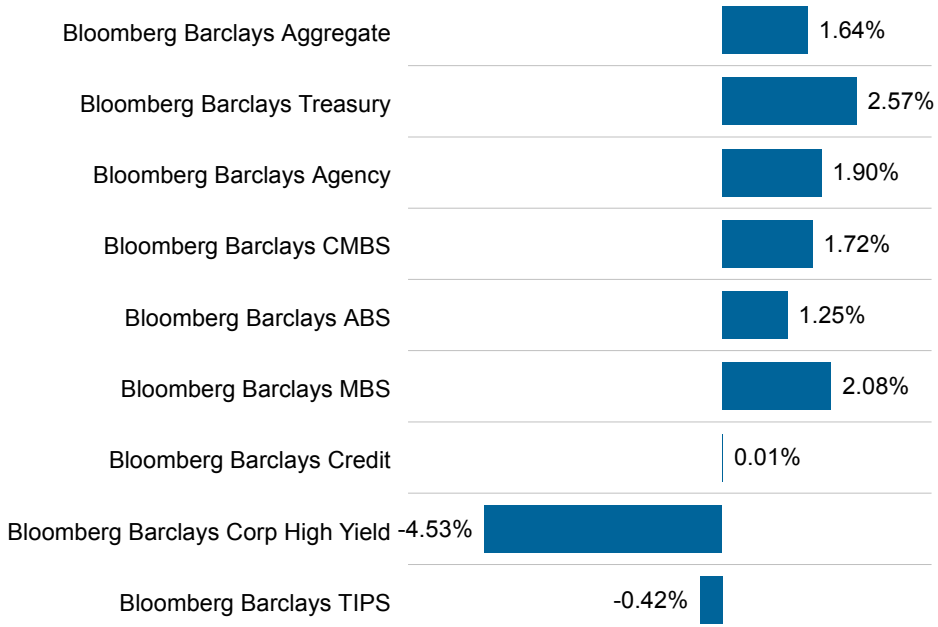
Source: U.S. Department of the Treasury

- Fears of slowing global growth pushed investors into the relative safety of fixed income investments
- The Federal Reserve raised the federal funds target rate by 25bps leading to higher yields on short-dated Treasuries
- The result of these two pressures led to a flatter overall Treasury curve and a partial inversion where rates on 1-year notes exceeded those with maturities of 2-, 3-, 5-, and 7-years

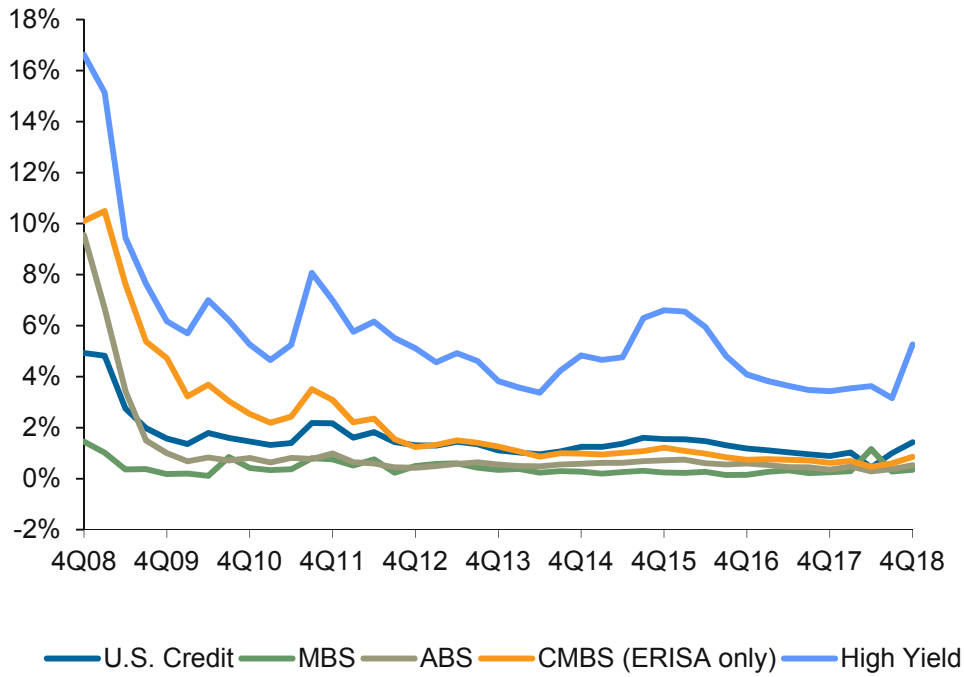
Total Rates of Return by Bond Sector

December 31, 2018

Total Returns



Effective Yield Over Treasuries

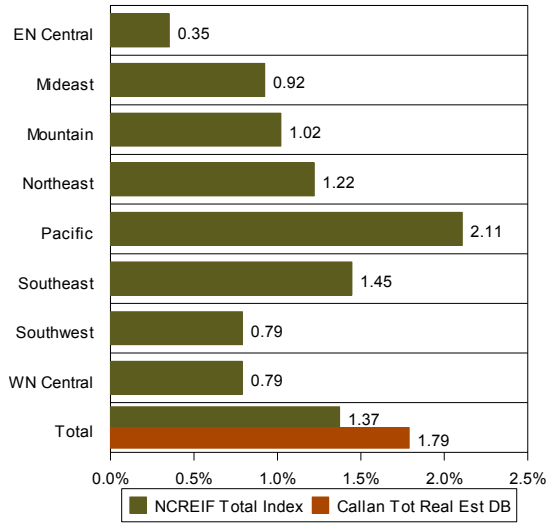


- The Bloomberg Aggregate Index gained 1.6% amid falling yields across all but the shortest parts of the curve
- High quality segments, such as Treasuries and MBS, performed well
- Credit underperformed as risk appetite faded and worries mounted over rising corporate leverage; high yield was down sharply as demand and liquidity evaporated against the volatile equity backdrop
- Spreads on investment grade credit widened 47bps in the quarter and 60 bps for the year
- High yield spreads widened 210 bps and 183 bps for the quarter and year respectively

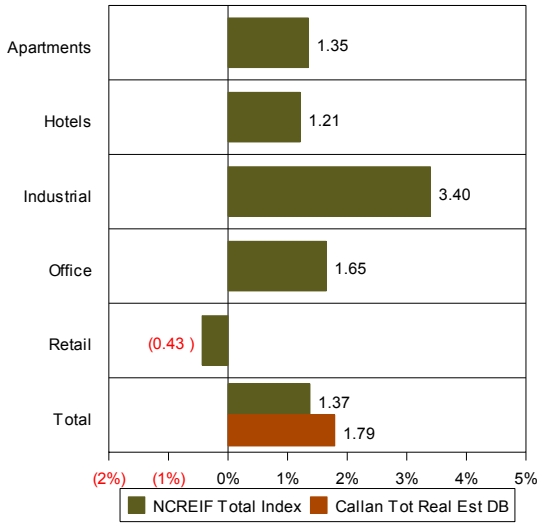
Real Estate Overview

December 31, 2018

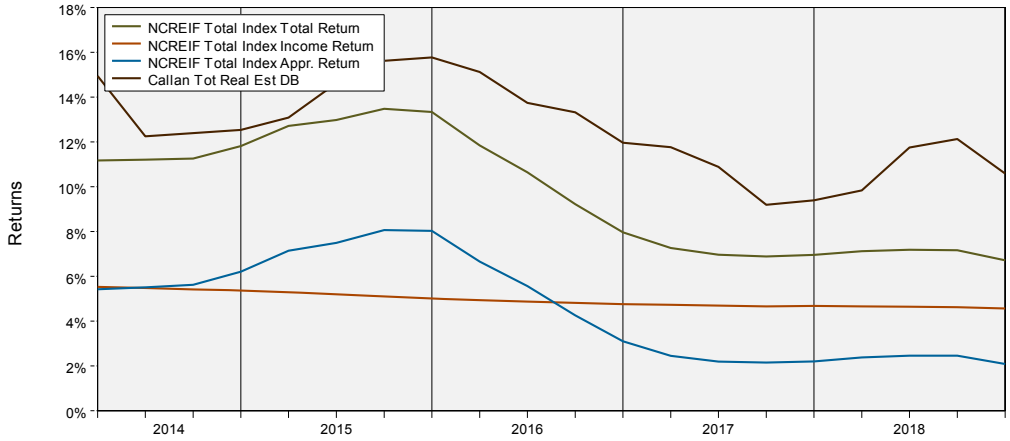
NCREIF Total Index Returns by Geographic Area
Quarter Ended December 31, 2018



NCREIF Total Index Returns by Property Type
Quarter Ended December 31, 2018



Rolling 1 Year Returns



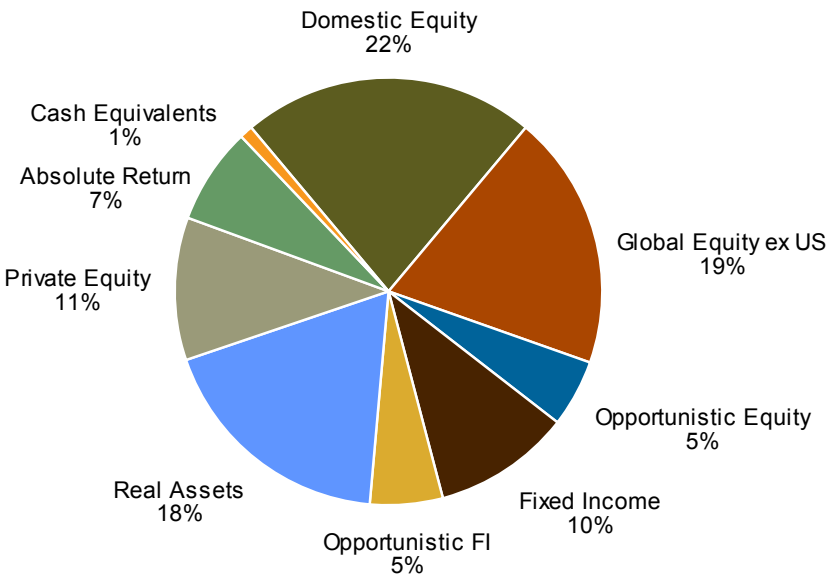
Callan

Pension Plan

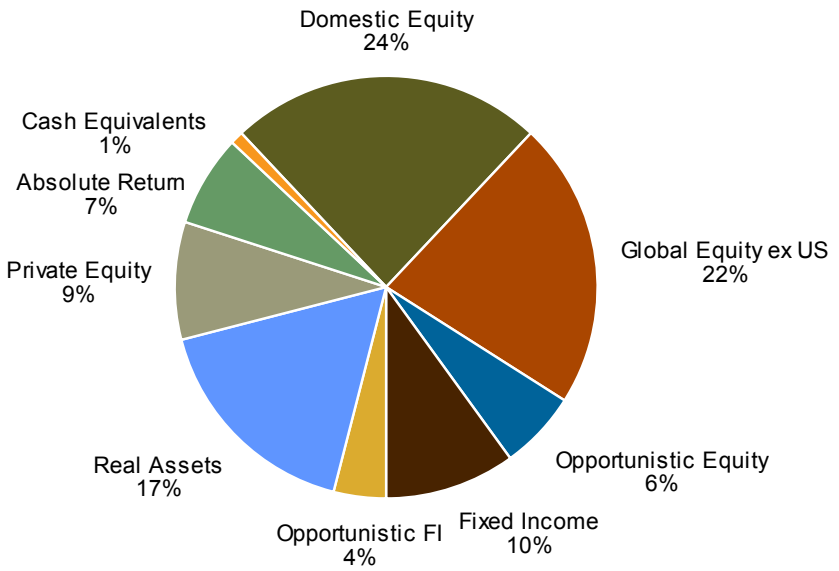
Asset Allocation – Public Employees' Retirement System

Quarter Ending December 31, 2018

Actual Asset Allocation



Target Asset Allocation



Asset Class	$000s Actual	Weight Actual	Target	Percent Difference	$000s Difference
Domestic Equity	1,961,710	22.2%	24.0%	(1.8%)	(161,821)
Global Equity ex US	1,707,133	19.3%	22.0%	(2.7%)	(239,436)
Opportunistic Equity	453,458	5.1%	6.0%	(0.9%)	(77,425)
Fixed Income	923,610	10.4%	10.0%	0.4%	38,806
Opportunistic FI	483,062	5.5%	4.0%	1.5%	129,140
Real Assets	1,630,417	18.4%	17.0%	1.4%	126,250
Private Equity	955,784	10.8%	9.0%	1.8%	159,460
Absolute Return	641,596	7.3%	7.0%	0.3%	22,233
Cash Equivalents	91,275	1.0%	1.0%	0.0%	2,794
Total	8,848,044	100.0%	100.0%		

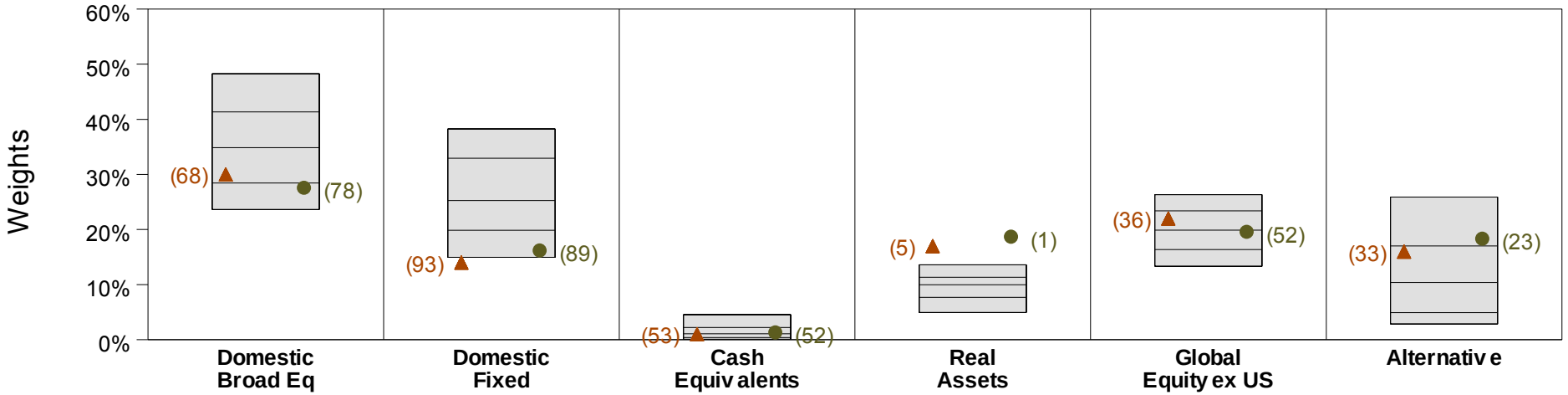
PERS is used as illustrative throughout the presentation.

The other plans exhibit similar modest and understandable variations from strategic target allocations.

Asset Allocation vs. Public Funds (PERS)

Callan Public Fund Database

Asset Class Weights vs Callan Public Fund Sponsor Database



	Domestic Broad Eq	Domestic Fixed	Cash Equivalents	Real Assets	Global Equity ex US	Alternative
10th Percentile	48.27	38.25	4.56	13.58	26.32	25.89
25th Percentile	41.33	32.95	2.22	11.35	23.39	17.01
Median	34.85	25.26	1.10	9.97	19.89	10.40
75th Percentile	28.42	19.86	0.40	7.68	16.37	4.91
90th Percentile	23.64	14.96	0.08	4.95	13.32	2.86
Fund ●	27.30	15.90	1.03	18.43	19.29	18.05
Target ▲	30.00	14.00	1.00	17.00	22.00	16.00

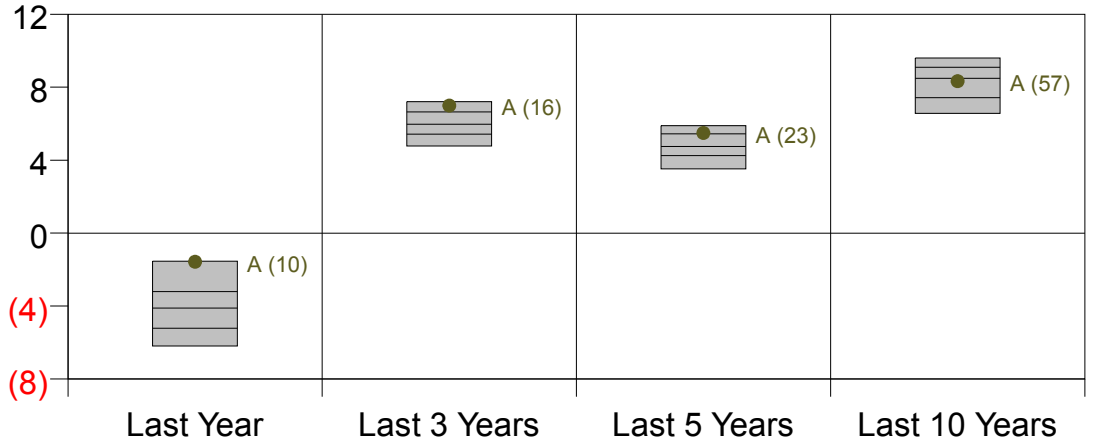
- Fixed Income, Real Assets, and Alternatives are overweight while other asset classes are underweight. The Q4 equity market declines drove equities below target and fixed income above target. Fixed income well below the "average" weighting of other public funds.
- Weightings to real assets and alternatives remain high relative to other public funds.
- ARMB's pension funds' asset allocation targets reflect a "growth" orientation.

*Note that "Alternative" includes private equity and absolute return

Total Fund Return vs Public Funds (PERS)

Callan Public Fund Database

Returns
for Periods Ended December 31, 2018
Group: Callan Public Fund Sponsor Database



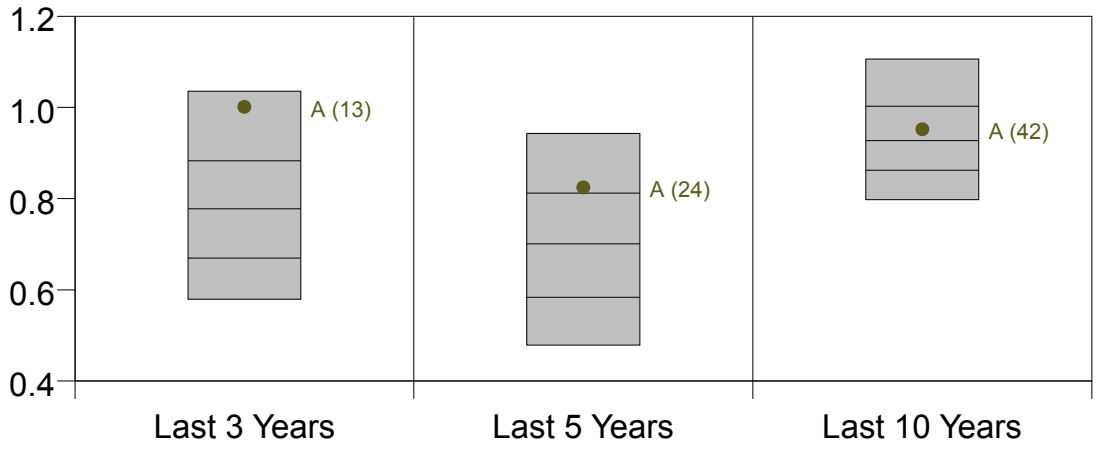
	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	(1.54)	7.21	5.90	9.61
25th Percentile	(3.21)	6.65	5.45	9.10
Median	(4.11)	5.97	4.76	8.49
75th Percentile	(5.22)	5.43	4.26	7.43
90th Percentile	(6.19)	4.78	3.53	6.58
Member Count	209	208	202	181
PERS - Total Fund ● A	(1.57)	7.00	5.49	8.34

- As displayed on the previous slide, ARMB's pension portfolio allocation policy reflects an orientation toward capital growth as opposed to income generation.
- It is worth noting that the Funds' lower weighting to Domestic Equity compared to Public Fund peers will reflect relative return rankings versus that peer group based on domestic equity results.

Total Fund Sharpe Ratio Rankings vs Public Funds (PERS)

Callan Public Fund Database

Sharpe Ratio
for Periods Ended December 31, 2018
Group: Callan Public Fund Sponsor Database



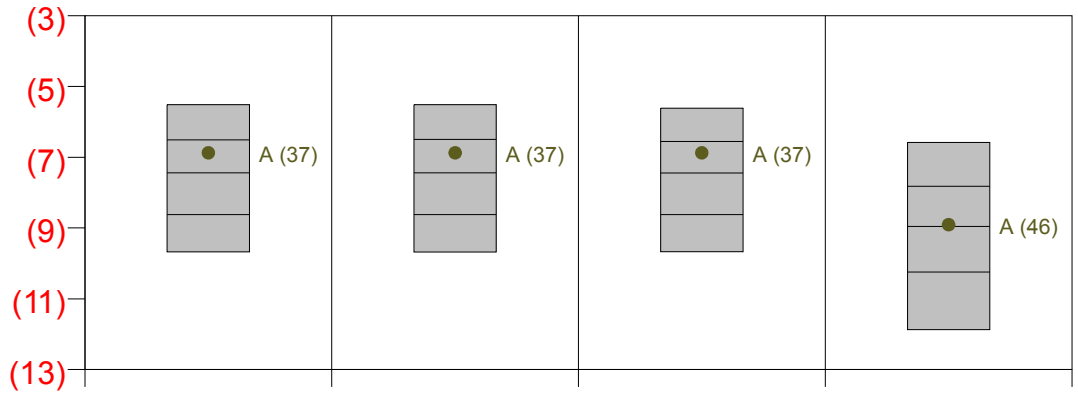
	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	1.04	0.94	1.11
25th Percentile	0.88	0.81	1.00
Median	0.78	0.70	0.93
75th Percentile	0.67	0.58	0.86
90th Percentile	0.58	0.48	0.80
Member Count	208	202	181
PERS - Total Fund ● A	1.00	0.82	0.95

- Sharpe ratio is a risk-adjusted measure of return.
- ARMB's risk-adjusted return (Sharpe ratio) was above the Public Funds median for the three-, five-, and 10-year periods.

Total Maximum Drawdown Rankings vs Public Funds (PERS)

Callan Public Fund Database

Maximum Drawdown
for Periods Ended December 31, 2018
Group: Callan Public Fund Sponsor Database



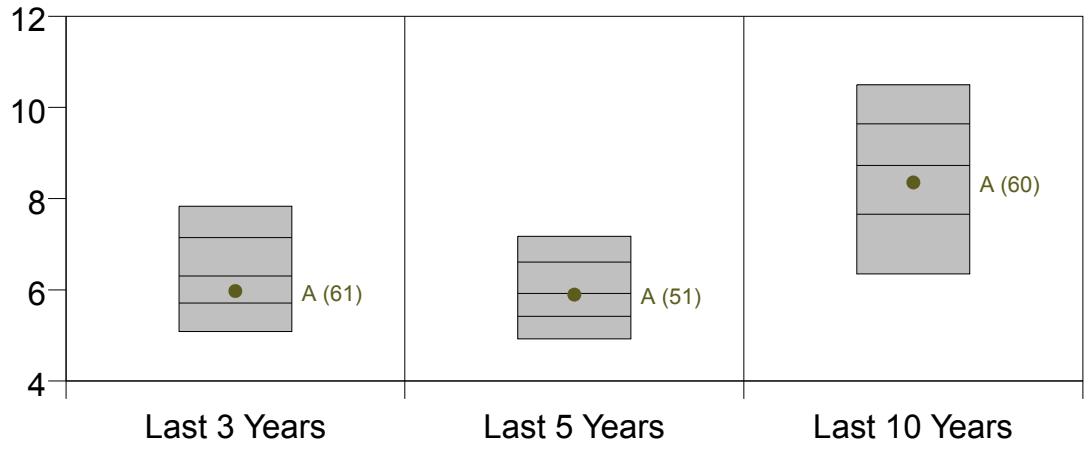
	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	(5.51)	(5.51)	(5.61)	(6.58)
25th Percentile	(6.51)	(6.49)	(6.55)	(7.82)
Median	(7.44)	(7.44)	(7.44)	(8.95)
75th Percentile	(8.62)	(8.62)	(8.62)	(10.24)
90th Percentile	(9.67)	(9.68)	(9.66)	(11.87)
Member Count	209	208	202	181
PERS - Total Fund ● A	(6.87)	(6.87)	(6.87)	(8.90)

- "Maximum drawdown" is a measure of the largest loss from peak to trough in a given period.
- Lower rankings reflect larger drawdowns (i.e. bigger losses). ARMB had ranked below-median over the five- and 10-year periods but now ranks above median for all trailing periods shown as of December 31, 2018.
- Drawdowns in the last year and three years reflect performance during the fourth quarter of 2018.

Standard Deviation Ranking vs Public Funds (PERS)

Callan Public Fund Database

Standard Deviation
for Periods Ended December 31, 2018
Group: Callan Public Fund Sponsor Database



	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	7.84	7.18	10.50
25th Percentile	7.15	6.61	9.64
Median	6.31	5.92	8.73
75th Percentile	5.71	5.42	7.66
90th Percentile	5.09	4.93	6.35
Member Count	208	202	181
PERS - Total Fund ● A	5.97	5.90	8.36

- "Standard deviation" measures variability of returns. It is one measurement of investment risk.
- Less standard deviation results in lower rankings. A lower ranking of standard deviation is good.
- ARMB's portfolio diversification has resulted in moderate levels of volatility compared to peers.

PERS Performance – 4th Quarter 2018 & Trailing Year

Relative Attribution Effects for Quarter ended December 31, 2018

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	24%	24%	(14.58%)	(14.30%)	(0.07%)	(0.01%)	(0.08%)
Opportunistic	10%	10%	(5.56%)	(7.64%)	0.20%	(0.00%)	0.20%
Fixed-Income	10%	10%	2.13%	2.24%	(0.01%)	(0.03%)	(0.04%)
Real Assets	18%	17%	(2.21%)	(2.07%)	(0.03%)	0.06%	0.03%
Global Equity ex US	20%	22%	(12.05%)	(11.87%)	(0.04%)	0.05%	0.01%
Private Equity	10%	9%	(0.07%)	(15.42%)	1.54%	(0.07%)	1.47%
Absolute Return	7%	7%	(2.10%)	(4.95%)	0.20%	(0.00%)	0.20%
Cash Equivalents	1%	1%	0.58%	0.56%	0.00%	0.00%	0.00%
Total			**(6.87%)**	**= (8.66%)**	**+ 1.80%**	**+ (0.01%)**	**1.79%**

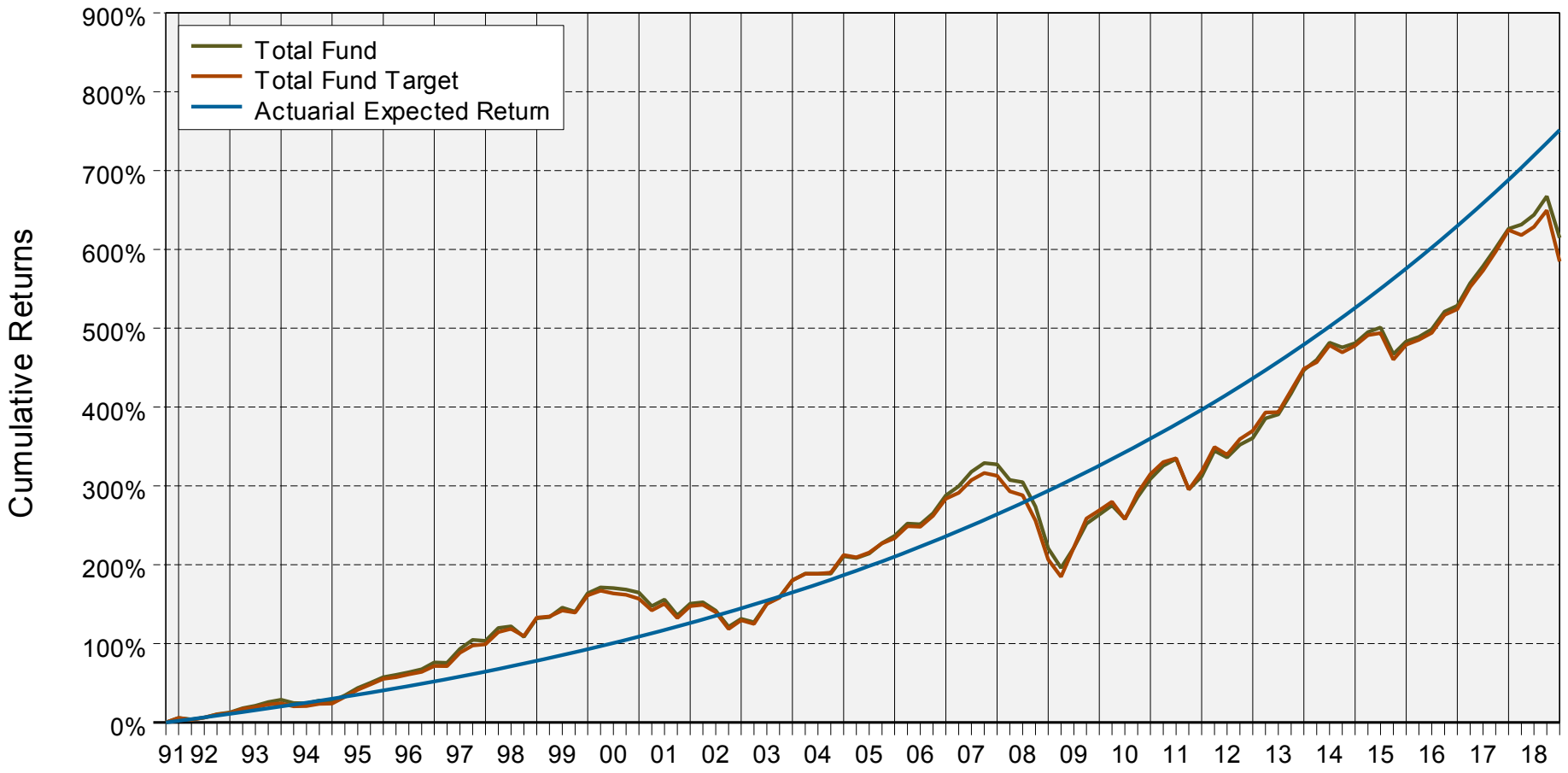
One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	23%	24%	(5.44%)	(5.24%)	(0.04%)	(0.06%)	(0.11%)
Opportunistic	10%	10%	(1.00%)	(2.50%)	0.16%	(0.02%)	0.14%
Fixed-Income	10%	10%	1.33%	1.41%	(0.01%)	(0.02%)	(0.03%)
Real Assets	18%	17%	4.96%	0.83%	0.63%	0.06%	0.69%
Global Equity ex US	22%	22%	(14.46%)	(14.76%)	0.09%	0.03%	0.13%
Private Equity	9%	9%	22.48%	(9.65%)	2.79%	(0.06%)	2.73%
Absolute Return	7%	7%	1.47%	(4.03%)	0.38%	(0.01%)	0.37%
Cash Equivalents	1%	1%	2.05%	1.87%	0.00%	0.00%	0.00%
Total			**(1.57%)**	**= (5.53%)**	**+ 4.03%**	**+ (0.08%)**	**3.95%**

- The long-term benchmark for private equity is the Russell 3000 Index plus 350 basis points

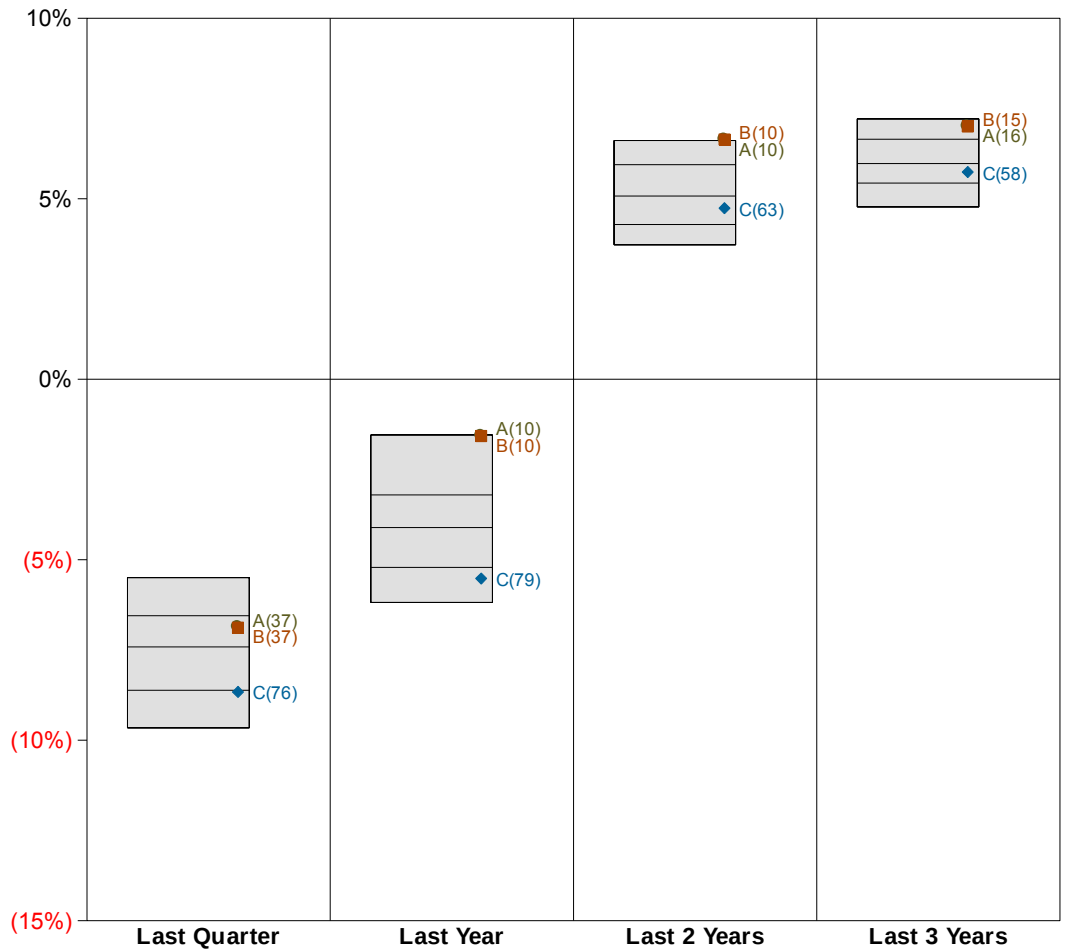
PERS Long-Term Total Fund Performance as of 12/31/18

Cumulative Returns Actual vs Target



- Each Fund has two targets: the asset allocation policy return and the actuarial return.
- Total Fund returns continue to closely track the strategic allocation target.
- Setbacks in 3Q15 and the most recent quarter have hindered the Total Fund's progress toward closing the gap versus the actuarial return following the Global Financial Crisis of 2008/2009.

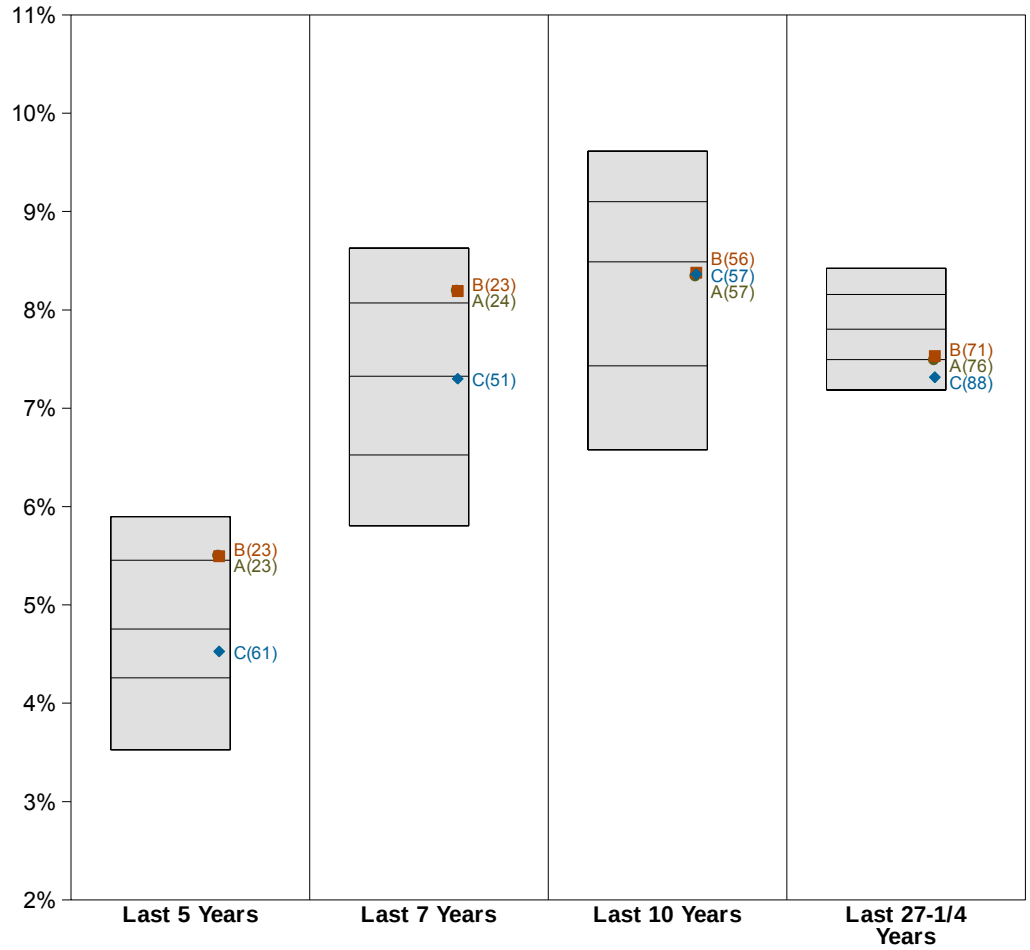
Annualized Total Fund Returns as of 12/31/18



	Last Quarter	Last Year	Last 2 Years	Last 3 Years
10th Percentile	(5.50)	(1.54)	6.61	7.21
25th Percentile	(6.55)	(3.21)	5.94	6.65
Median	(7.42)	(4.11)	5.07	5.97
75th Percentile	(8.62)	(5.22)	4.28	5.43
90th Percentile	(9.66)	(6.19)	3.72	4.78
PERS Total Plan ● A	(6.87)	(1.57)	6.63	7.00
TRS Total Plan ■ B	(6.88)	(1.58)	6.64	7.00
Target Index ◆ C	(8.66)	(5.52)	4.74	5.74

- PERS and TRS have outperformed their target for the last quarter, year, two-year, and three-year periods.
- PERS 4th quarter performance led the target significantly, outperforming by 179 basis points. Outperformance in Private Equity was the primary contributor.

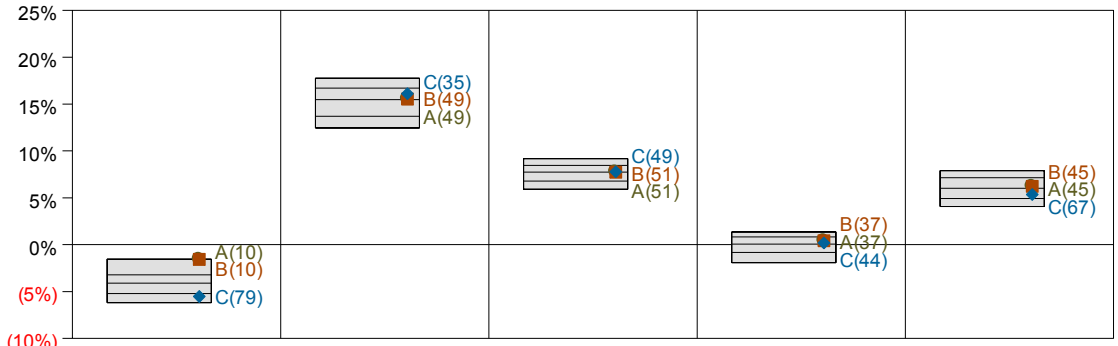
Longer-Term Total Fund Returns as of 12/31/18



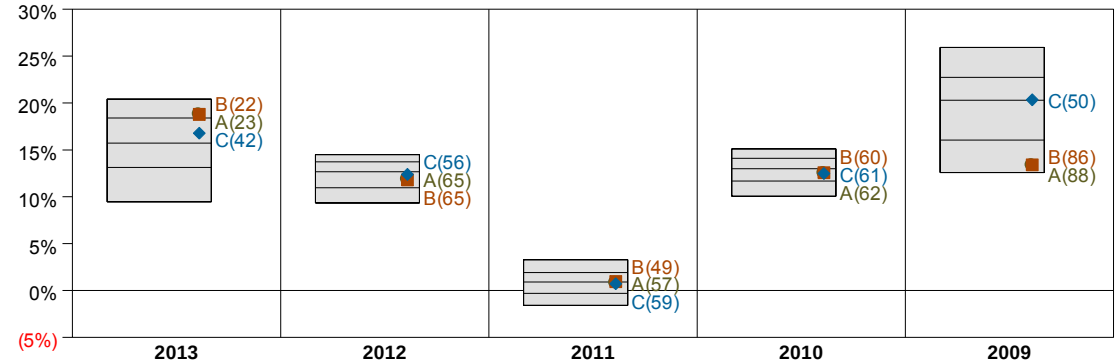
	Last 5 Years	Last 7 Years	Last 10 Years	Last 27-1/4 Years
10th Percentile	5.90	8.63	9.61	8.42
25th Percentile	5.45	8.07	9.10	8.16
Median	4.76	7.33	8.49	7.80
75th Percentile	4.26	6.53	7.43	7.49
90th Percentile	3.53	5.80	6.58	7.19
PERS Total Plan ● A	5.49	8.19	8.34	7.48
TRS Total Plan ■ B	5.50	8.19	8.38	7.53
Target Index ◆ C	4.53	7.30	8.36	7.31

- Five-year performance is above target and median.
- Seven-year performance is also above target and median.
- 10-year return is in line with target but below median.
- 27¼ year return for PERS beats the target by 17 basis points.

Calendar Period Total Fund Performance



	2018	2017	2016	2015	2014
10th Percentile	(1.54)	17.77	9.16	1.35	7.89
25th Percentile	(3.21)	16.71	8.47	0.83	7.14
Median	(4.11)	15.48	7.75	0.06	6.03
75th Percentile	(5.22)	13.71	6.79	(0.84)	4.93
90th Percentile	(6.19)	12.46	5.90	(1.92)	4.08
PERS Total Plan ● A	(1.57)	15.52	7.74	0.40	6.22
TRS Total Plan ■ B	(1.58)	15.54	7.74	0.41	6.22
Target Index ◆ C	(5.52)	16.11	7.77	0.18	5.35

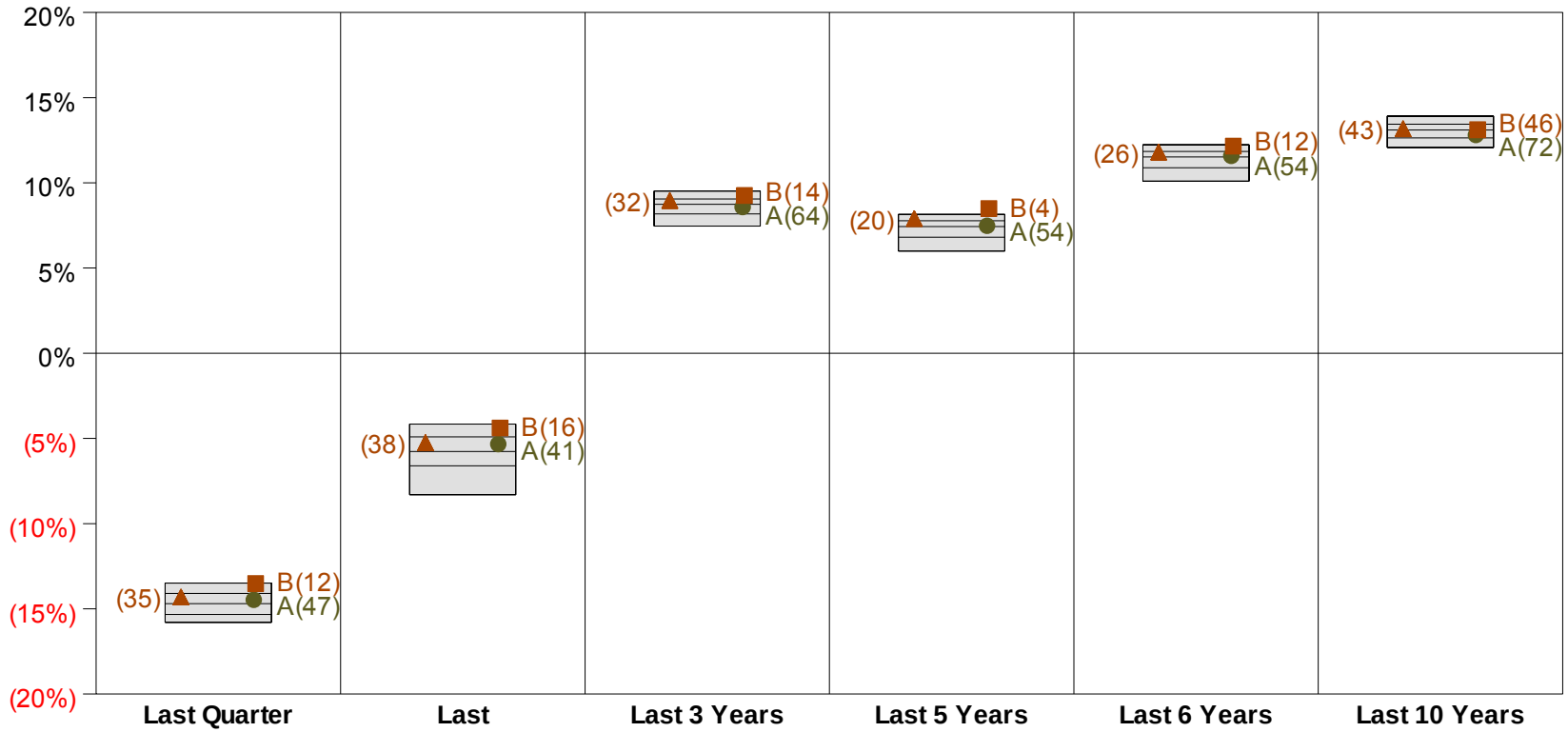


	2013	2012	2011	2010	2009
10th Percentile	20.41	14.49	3.29	15.11	25.92
25th Percentile	18.40	13.73	1.93	14.10	22.73
Median	15.73	12.66	0.91	12.99	20.29
75th Percentile	13.13	10.96	(0.30)	11.68	16.03
90th Percentile	9.45	9.34	(1.58)	10.07	12.59
PERS Total Plan ● A	18.74	11.81	0.77	12.45	13.31
TRS Total Plan ■ B	18.79	11.79	0.95	12.55	13.40
Target Index ◆ C	16.78	12.38	0.72	12.49	20.33

- Peer group range of returns during 2016, 2015, and 2014 were very tight.
- Wide range of peer group returns during calendar 2013 due to varying fixed-income allocations within the Public Fund universe.
- PERS ranks above median in five and TRS ranks above median in six of the 10 periods shown.

Total Domestic Equity through 12/31/18

Performance vs Public Fund - Domestic Equity (Gross)



		Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile		(13.49)	(4.16)	9.51	8.15	12.24	13.92
25th Percentile		(14.10)	(4.91)	9.05	7.77	11.84	13.45
Median		(14.70)	(5.76)	8.73	7.44	11.52	13.10
75th Percentile		(15.34)	(6.60)	8.18	6.82	10.88	12.64
90th Percentile		(15.80)	(8.30)	7.46	6.00	10.10	12.07
Domestic Equity Pool	A	(14.58)	(5.43)	8.47	7.37	11.48	12.70
Standard & Poor's 500	B	(13.52)	(4.38)	9.26	8.49	12.15	13.12
Russell 3000 Index		(14.30)	(5.24)	8.97	7.91	11.82	13.18

Domestic Equity Component Returns

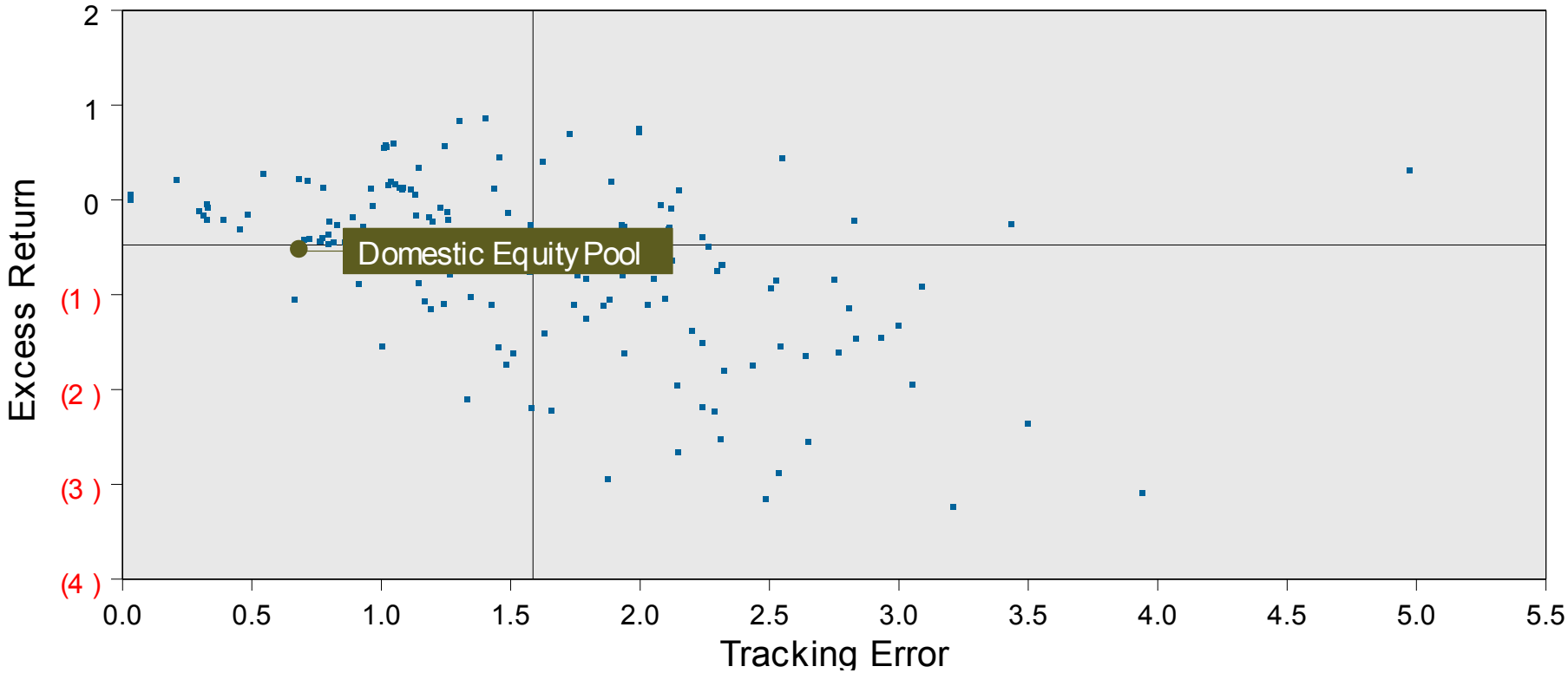
Returns for Periods Ended December 31, 2018

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years
Total Dom Equity Pool	(14.58%)	(5.43%)	8.47%	7.37%	11.48%
Russell 3000 Index	(14.30%)	(5.24%)	8.97%	7.91%	11.82%
Large Cap Managers	(13.65%)	(4.91%)	8.69%	8.04%	12.00%
Large Cap Active	(13.84%)	(6.44%)	8.05%	7.62%	11.89%
Large Cap Passive	(13.88%)	(4.44%)	9.10%	8.31%	12.08%
Russell 1000 Index	(13.82%)	(4.78%)	9.09%	8.21%	12.01%
Small Cap Managers	(19.78%)	(8.85%)	8.37%	5.04%	10.56%
Small Cap Active	(19.72%)	(8.46%)	8.67%	5.25%	10.80%
Small Cap Passive	(20.05%)	(9.45%)	7.62%	4.46%	9.24%
Russell 2000 Index	(20.20%)	(11.01%)	7.36%	4.41%	9.49%
Opportunistic Equity	(8.83%)	(1.23%)	6.85%	5.44%	7.59%

- The active large cap allocation (fourth line in the table above) has trailed its benchmark (the Russell 1000 index) over all periods shown.
- The overall small cap allocation has contributed positive excess return when compared to its benchmark (the Russell 2000 index).

Domestic Equity Excess Return and Risk

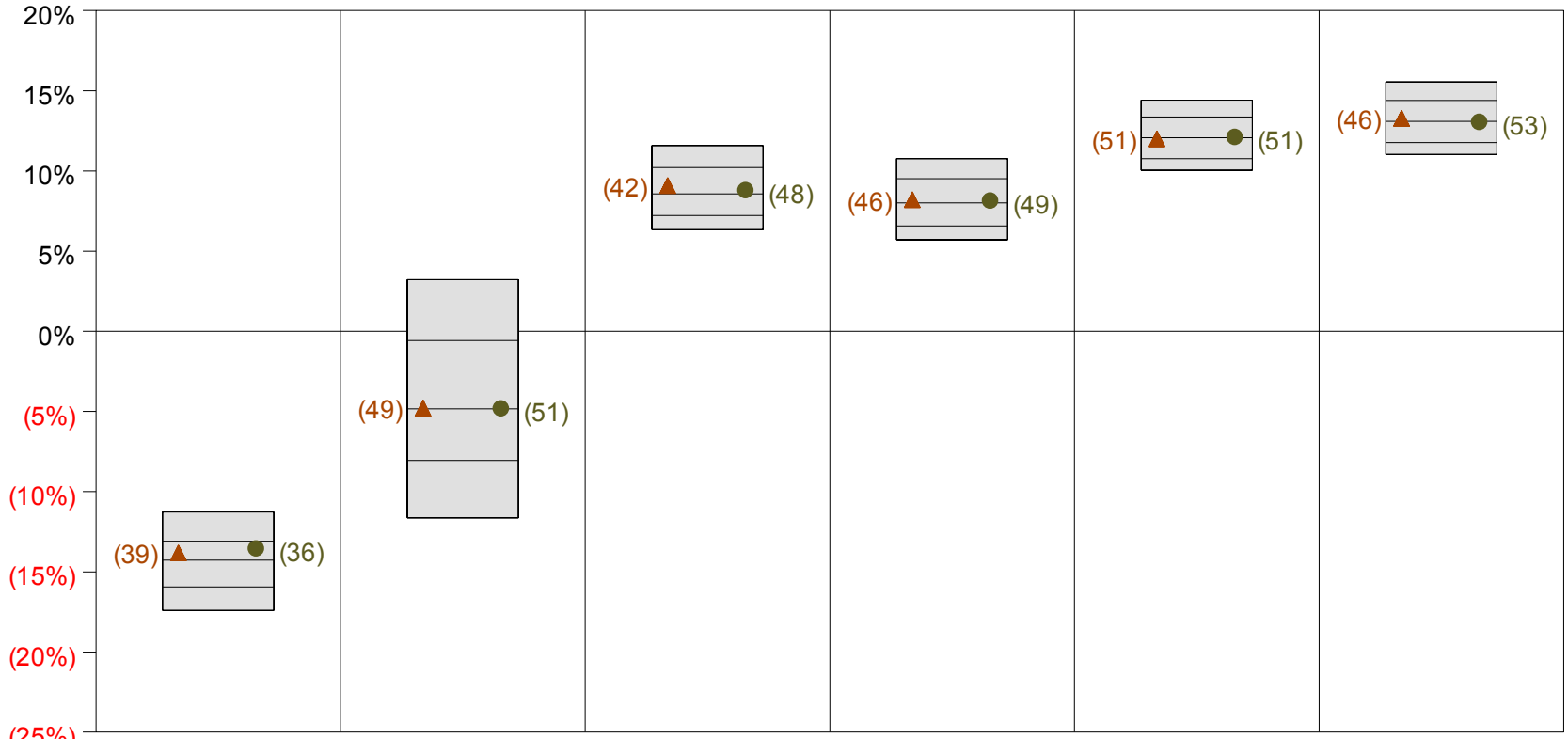
Risk Analysis vs. Public Fund – Domestic Equity (Gross)
Five Years Ended December 31, 2018



- The Domestic Equity Pool has slightly underperformed the Russell 3000 Index over five years but exhibits very tight tracking (low tracking error) to the benchmark relative to public fund peers.

Large Cap Domestic Equity through 12/31/18

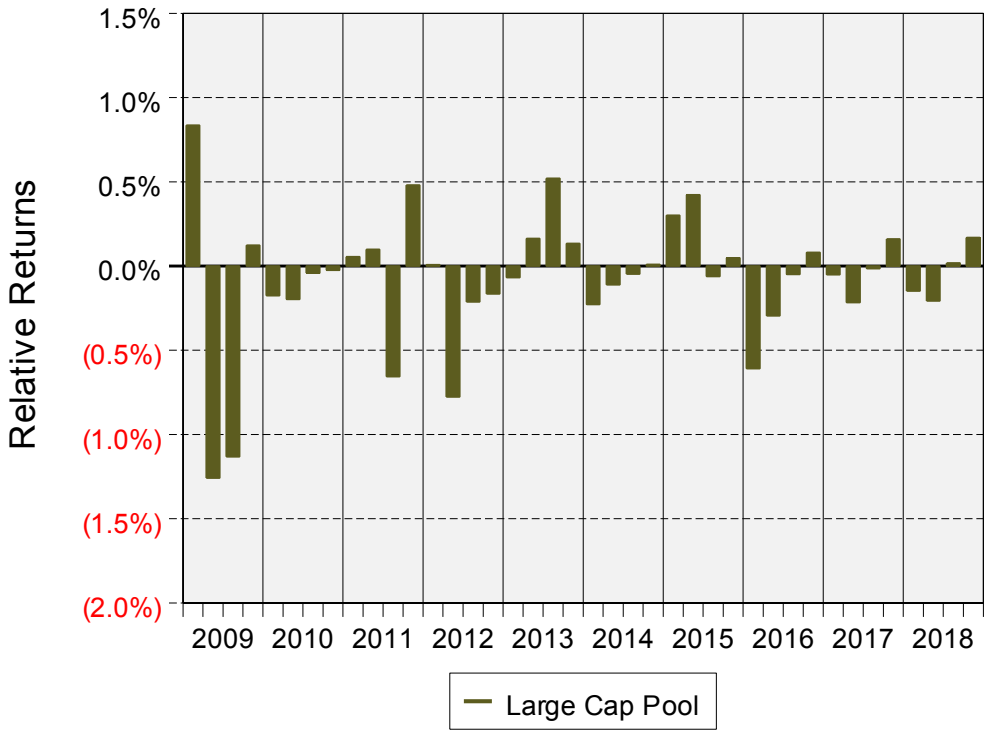
Performance vs Callan Large Capitalization (Gross)



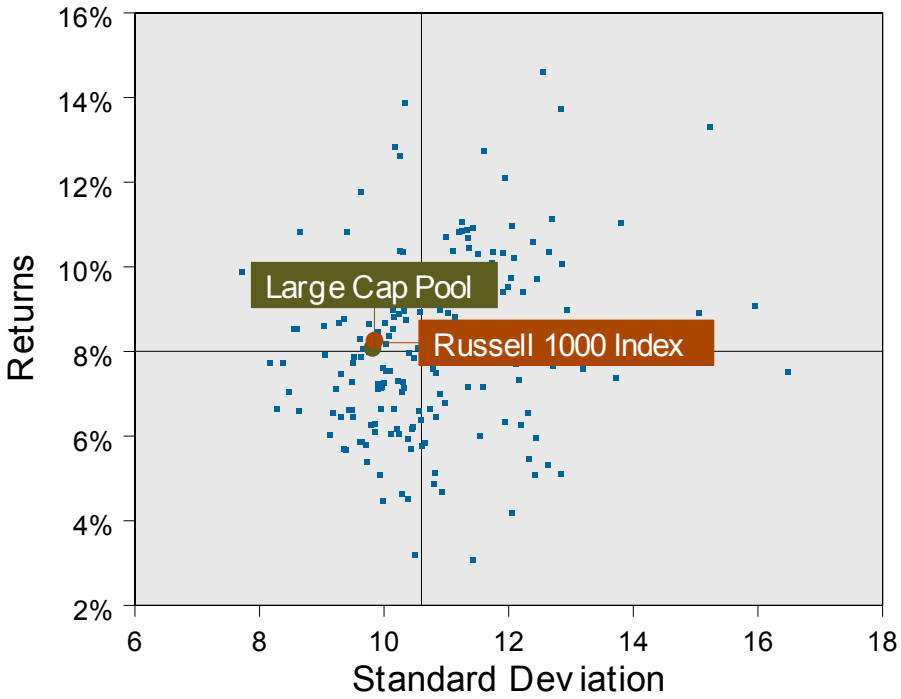
	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile	(11.27)	3.22	11.58	10.77	14.41	15.55
25th Percentile	(13.10)	(0.58)	10.21	9.51	13.36	14.39
Median	(14.26)	(4.84)	8.56	8.01	12.07	13.09
75th Percentile	(15.94)	(8.06)	7.22	6.58	10.77	11.78
90th Percentile	(17.40)	(11.63)	6.34	5.71	10.04	11.02
Large Cap Pool ●	(13.65)	(4.91)	8.69	8.04	12.00	12.95
Russell 1000 Index ▲	(13.82)	(4.78)	9.09	8.21	12.01	13.28

Large Cap Domestic Equity as of 12/31/18

Relative Return vs Russell 1000 Index



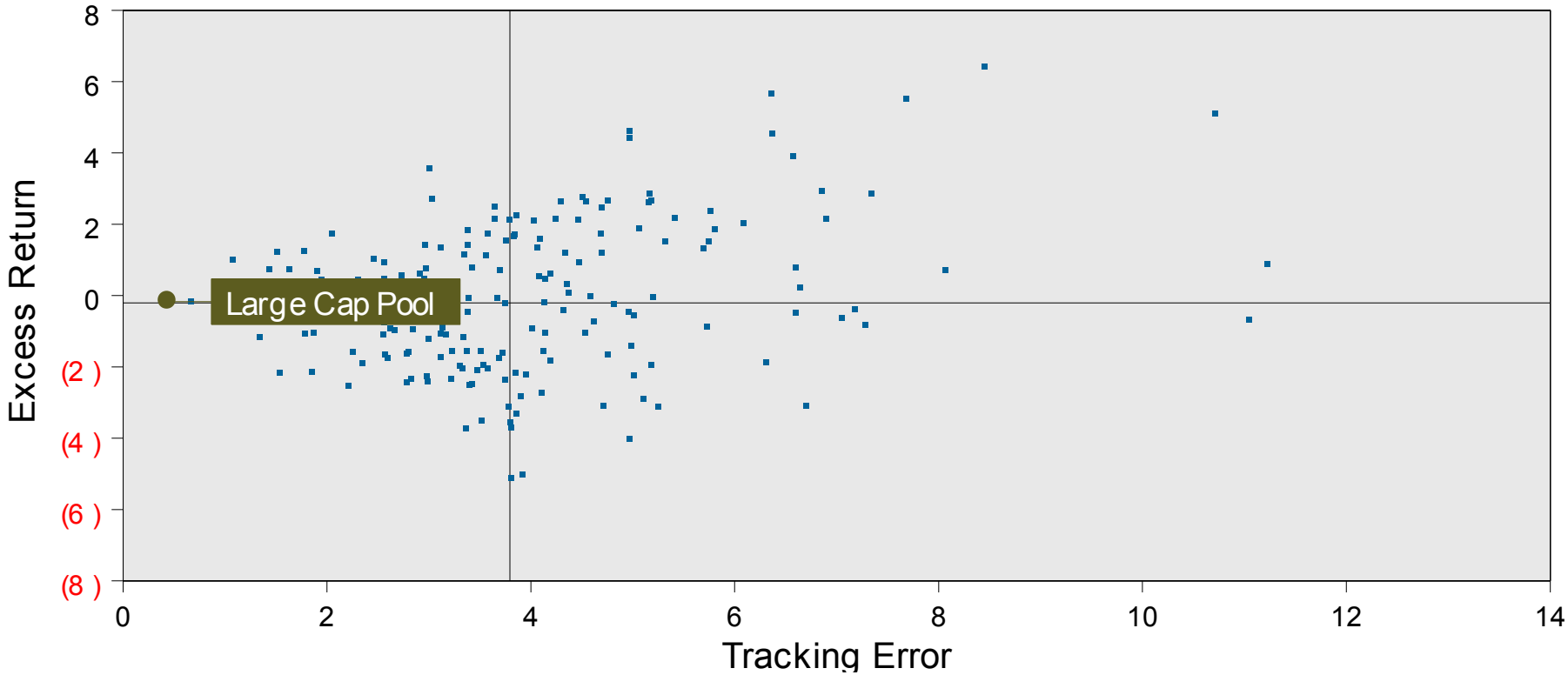
Callan Large Capitalization (Gross) Annualized Five Year Risk vs Return



- Over half of the large cap allocation is passively managed.
- Long-term performance exhibits market-like returns with similar risk.

Large Cap Domestic Equity Excess Return and Risk

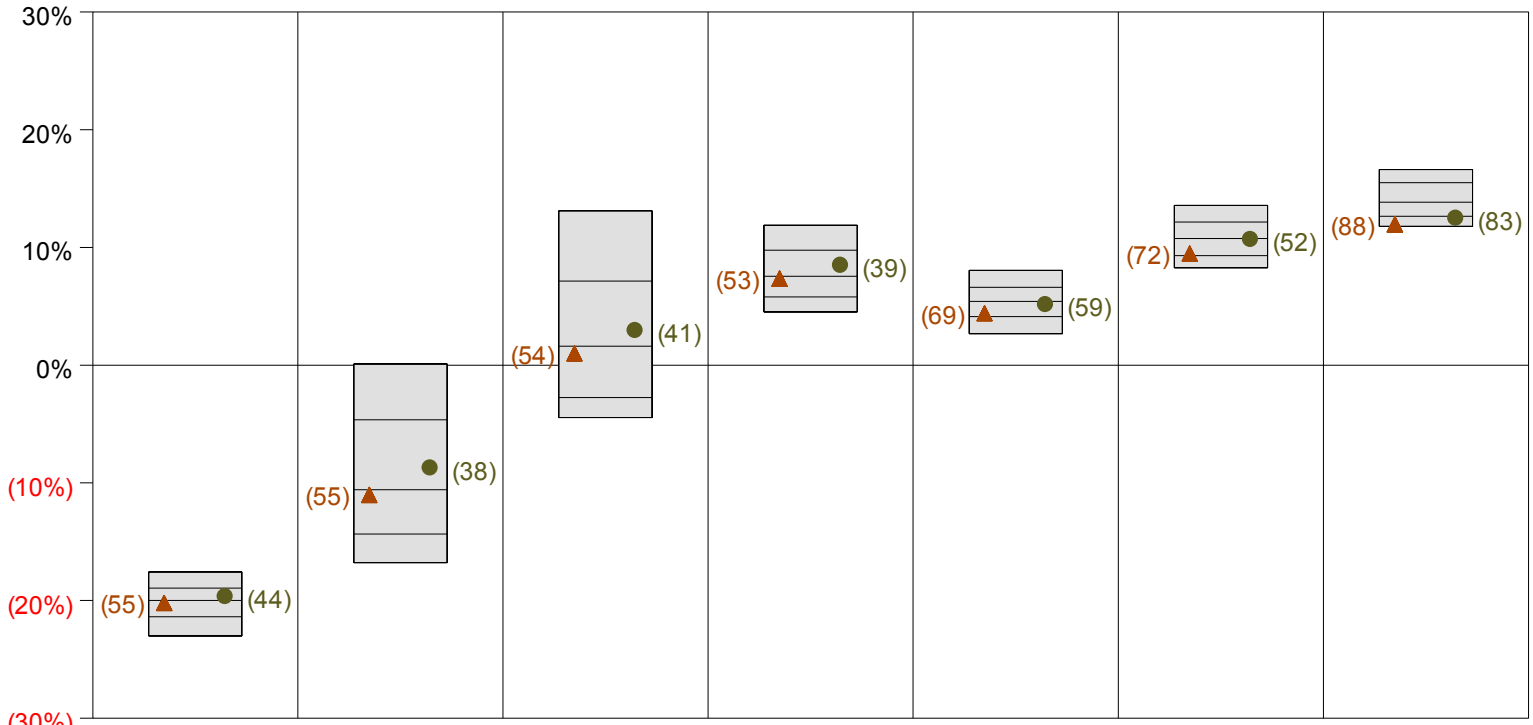
Risk Analysis vs. Callan Large Capitalization (Gross)
Five Years Ended December 31, 2018



- The Large Cap Domestic Equity Pool has moderately underperformed the Russell 1000 Index over five years but exhibits extremely tight tracking (low tracking error) to the benchmark relative to large cap peers.

Small Cap Domestic Equity through 12/31/18

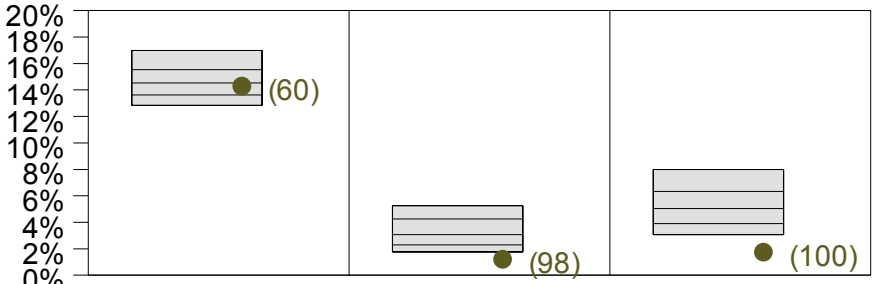
Performance vs Callan Small Capitalization (Gross)



	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile	(17.57)	0.11	13.10	11.88	8.05	13.56	16.62
25th Percentile	(18.94)	(4.65)	7.14	9.77	6.61	12.16	15.50
Median	(20.00)	(10.58)	1.61	7.56	5.42	10.75	13.84
75th Percentile	(21.37)	(14.35)	(2.75)	5.80	4.12	9.30	12.65
90th Percentile	(23.01)	(16.78)	(4.46)	4.52	2.67	8.27	11.80
Small Cap Pool ●	(19.78)	(8.85)	2.84	8.37	5.04	10.56	12.37
Russell 2000 Index ▲	(20.20)	(11.01)	1.00	7.36	4.41	9.49	11.97

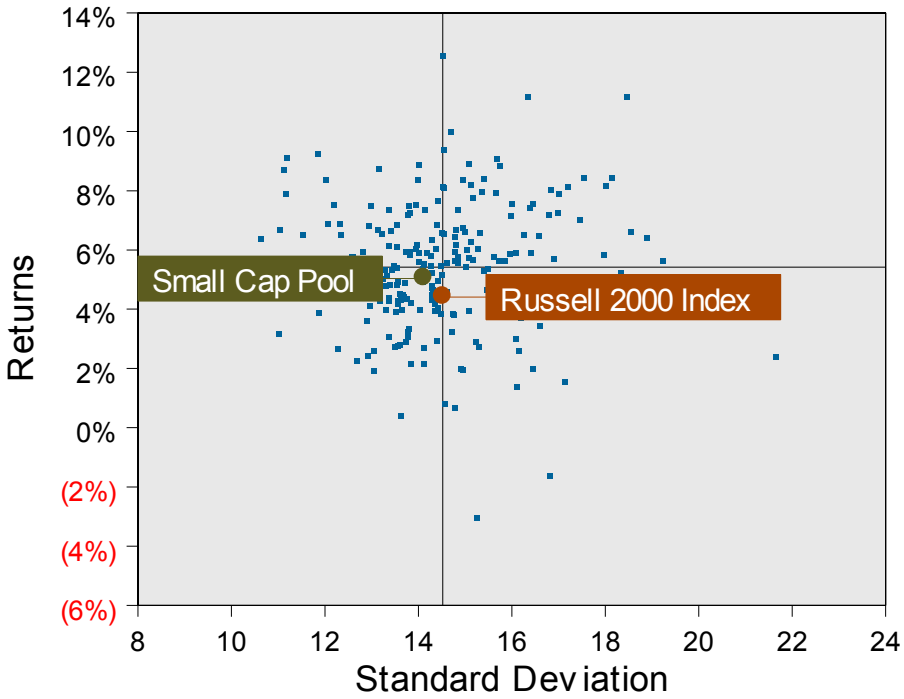
- The composite has outperformed the index across all time periods shown and ranks above median for periods out to three years.

Small Cap Domestic Equity through 12/31/18



	Standard Deviation	Downside Risk	Tracking Error
10th Percentile	16.99	5.26	7.99
25th Percentile	15.54	4.25	6.33
Median	14.52	3.07	5.05
75th Percentile	13.63	2.29	3.90
90th Percentile	12.84	1.76	3.06
Small Cap Equity Pool	14.14	1.05	1.58

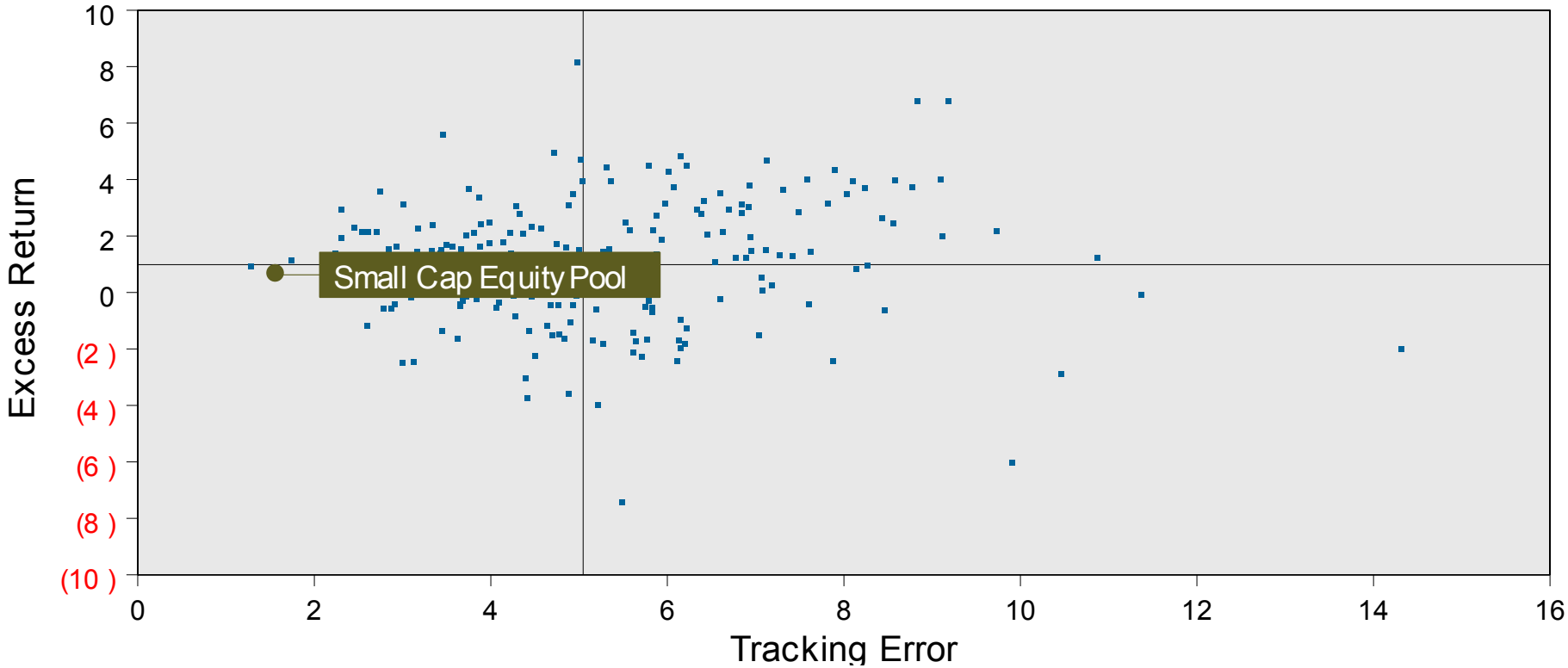
Callan Small Capitalization (Gross)
Annualized Five Year Risk vs Return



- The five-year risk statistics of standard deviation, downside risk, and tracking error compare favorably versus the peer group of small cap managers.

Small Cap Domestic Equity Excess Return and Risk

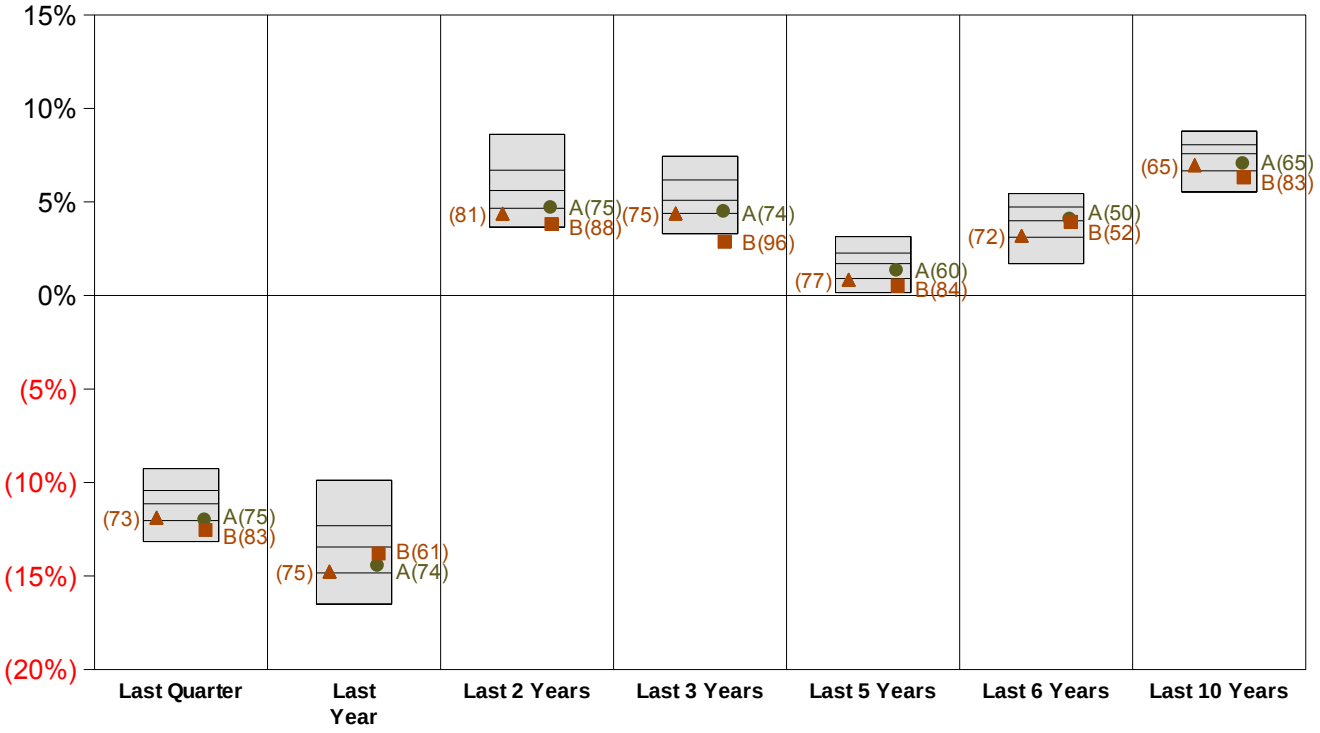
Risk Analysis vs. Callan Small Capitalization (Gross)
Five Years Ended December 31, 2018



- The Small Cap Domestic Equity Pool has outperformed the Russell 2000 Index over five years while exhibiting very tight tracking (low tracking error) to the benchmark relative to small cap peers.

International Equity through 12/31/18

Performance vs Public Fund - International Equity (Gross)

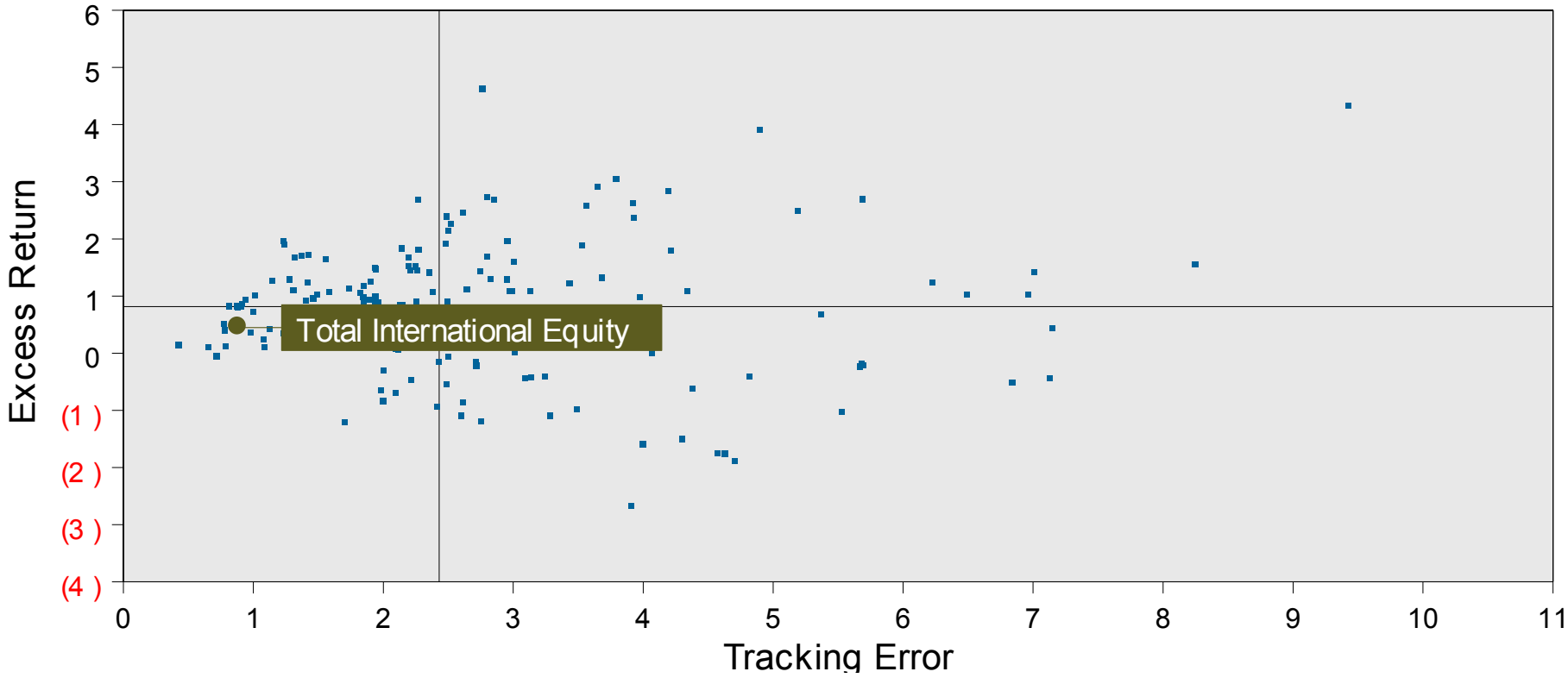


		Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile		(9.25)	(9.88)	8.62	7.44	3.15	5.45	8.79
25th Percentile		(10.43)	(12.31)	6.69	6.18	2.27	4.73	8.06
Median		(11.14)	(13.44)	5.61	5.09	1.71	4.00	7.58
75th Percentile		(12.03)	(14.83)	4.67	4.39	0.91	3.12	6.66
90th Percentile		(13.16)	(16.50)	3.65	3.31	0.16	1.71	5.54
Total International Equity	● A	(12.04)	(14.49)	4.65	4.43	1.30	4.03	7.00
MSCI EAFE Index	■ B	(12.54)	(13.79)	3.82	2.87	0.53	3.94	6.32
MSCI ACWI ex US IMI	▲	(11.87)	(14.76)	4.38	4.39	0.85	3.20	6.97

- The composite has outperformed the benchmark over all trailing periods of one year and longer.

International Equity Excess Return and Risk

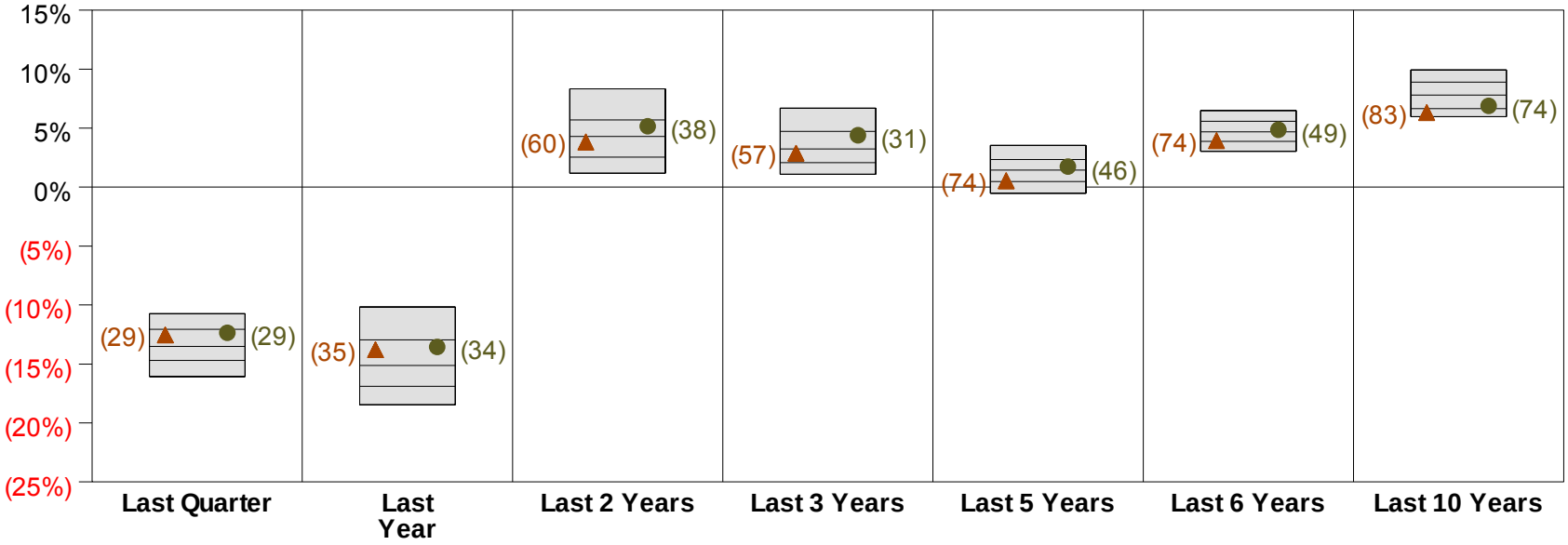
Risk Analysis vs. Public Fund – International Equity (Gross)
Five Years Ended December 31, 2018



- The Total International Equity portfolio has outperformed the MSCI ACWI ex US IMI over five years while exhibiting very tight tracking (low tracking error) to the benchmark relative to public fund peers.

International Equity ex Emerging Markets through 12/31/18

Performance vs Callan Non-US Equity (Gross)



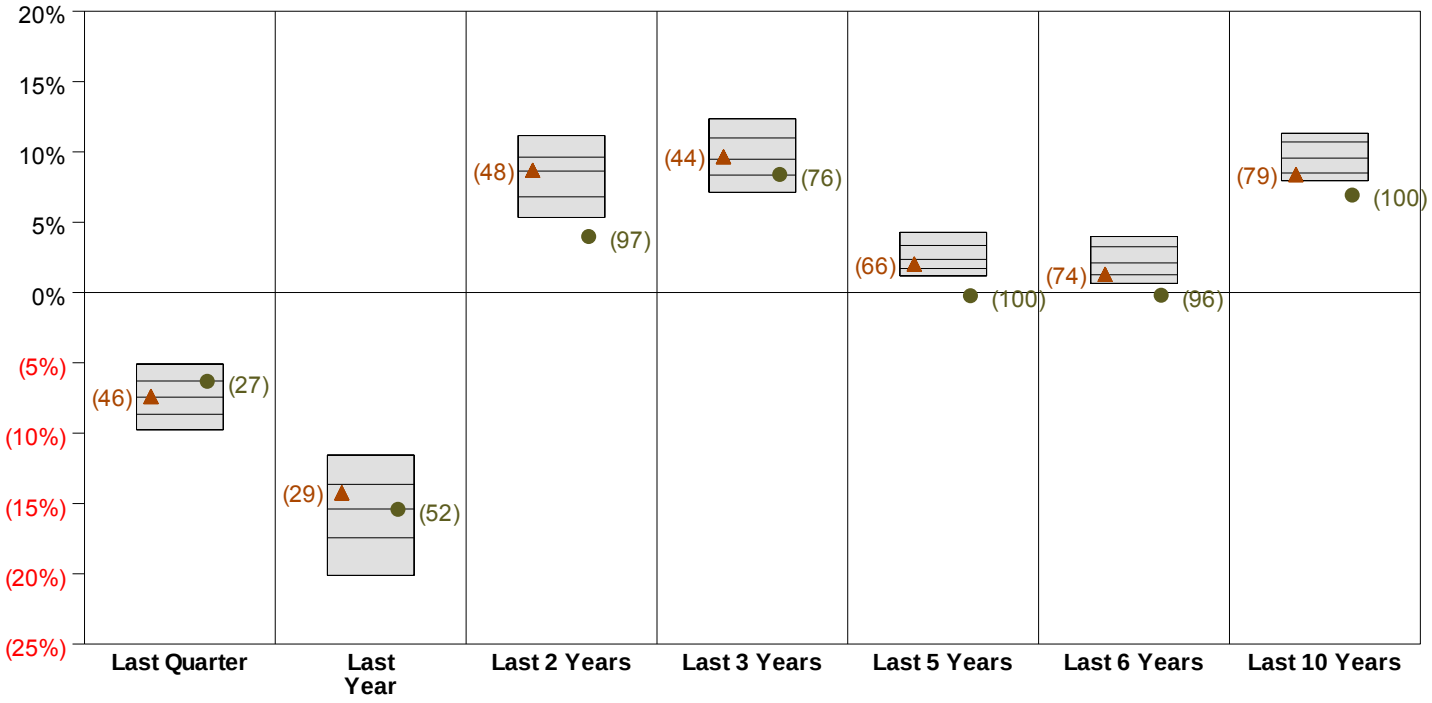
	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile	(10.74)	(10.17)	8.32	6.69	3.53	6.49	9.92
25th Percentile	(12.05)	(12.96)	5.68	4.72	2.32	5.58	8.91
Median	(13.51)	(15.13)	4.30	3.24	1.43	4.69	7.79
75th Percentile	(14.69)	(16.89)	2.53	2.06	0.47	3.87	6.65
90th Percentile	(16.07)	(18.45)	1.18	1.08	(0.52)	3.03	5.96
Int'l Equity Pool (ex Emerging. Mkt) ●	(12.51)	(13.69)	5.00	4.25	1.58	4.71	6.73
MSCI EAFE ▲	(12.54)	(13.79)	3.82	2.87	0.53	3.94	6.32

International Equity ex Emerging Markets through 12/31/18

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Int'l Equity Pool (ex Emerging Market)	**(12.51%)**	**(13.69%)**	**4.25%**	**1.58%**	**6.73%**
Arrowstreet ACWI ex -US	(12.55%)	(13.50%)	5.56%	-	-
Baillie Gifford ACWI ex US	(15.00%)	(16.32%)	3.90%	-	-
Blackrock ACWI ex US IMI	(11.89%)	(14.52%)	4.65%	1.08%	-
Brandes Investment	(11.78%)	(9.56%)	3.33%	1.88%	6.69%
Capital Guardian	(13.20%)	(11.54%)	6.49%	2.08%	7.75%
Lazard Asset Intl	(10.48%)	(13.63%)	2.70%	0.91%	6.75%
McKinley Capital	(15.10%)	(17.65%)	2.98%	2.93%	7.06%
SSgA Int'l	(11.68%)	(14.34%)	4.69%	1.15%	-
Schroder Inv Mgmt	(18.51%)	(20.67%)	2.42%	3.21%	-
Mondrian Intl Sm Cap	(14.28%)	(13.47%)	5.12%	2.98%	-
MSCI EAFE Index	(12.54%)	(13.79%)	2.87%	0.53%	6.32%
MSCI ACWI ex-US IMI Index	(11.87%)	(14.76%)	4.39%	0.85%	6.97%

Emerging Markets through 12/31/18

Performance vs Callan Emerging Broad (Gross)



	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile	(5.08)	(11.56)	11.16	12.35	4.29	3.99	11.32
25th Percentile	(6.29)	(13.63)	9.63	11.00	3.34	3.24	10.71
Median	(7.45)	(15.40)	8.63	9.47	2.36	2.11	9.56
75th Percentile	(8.66)	(17.43)	6.80	8.34	1.70	1.26	8.50
90th Percentile	(9.76)	(20.12)	5.34	7.12	1.18	0.65	7.95
Emerging Markets Pool	(6.43)	(15.54)	3.87	8.28	(0.35)	(0.31)	6.81
MSCI EM Gross	(7.39)	(14.24)	8.69	9.65	2.03	1.30	8.39

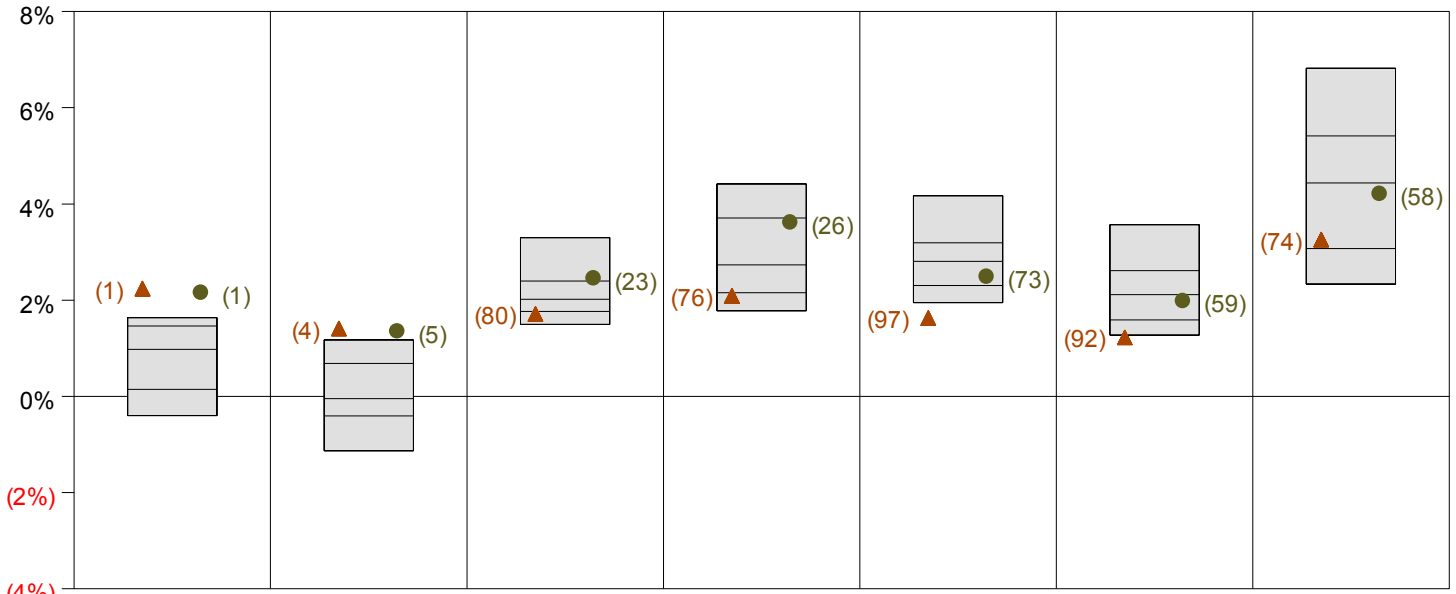
- After underperforming by 3.76% in 2Q17, 1.38% in 3Q17, 1.68% in 4Q17, and 4.03% in 2Q18, the Emerging Markets Pool lags the benchmark and ranks below median for trailing periods of one year and longer despite outperforming by 96 basis points and ranking in the 27th percentile this quarter.

Emerging Markets Pool through 12/31/18

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Emerging Markets Pool	**(6.43%)**	**(15.54%)**	**8.28%**	**(0.35%)**	**6.81%**
DRZ Emerging (net)	(7.73%)	(21.04%)	-	-	-
Lazard Emerging (net)	(5.55%)	(18.09%)	8.11%	(0.67%)	7.31%
MSCI Emerging Mkts Idx	(7.39%)	(14.24%)	9.65%	2.03%	8.39%

Total Fixed Income as of 12/31/18

Performance vs Public Fund - Domestic Fixed (Gross)



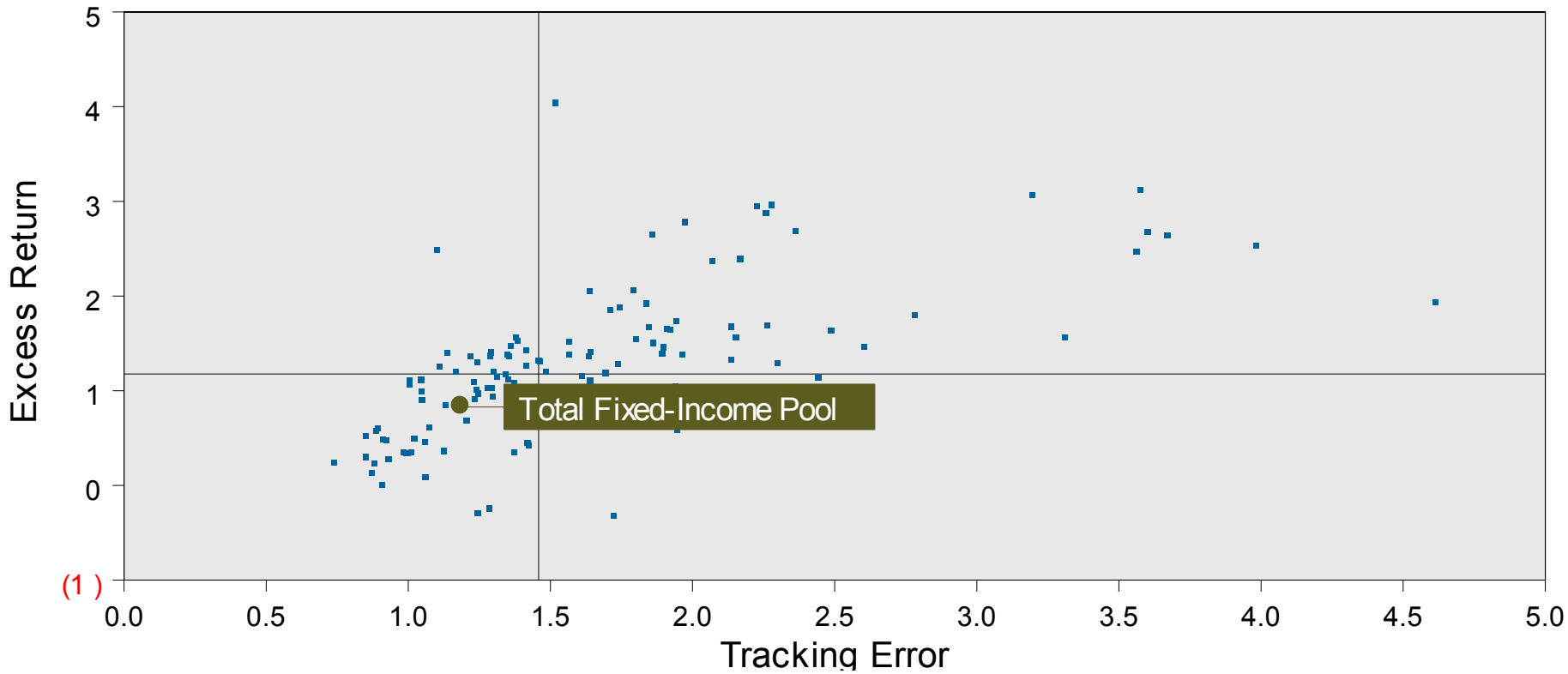
	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years
10th Percentile	1.63	1.17	3.30	4.42	4.17	3.57	6.82
25th Percentile	1.46	0.68	2.40	3.71	3.20	2.61	5.41
Median	0.98	(0.05)	2.02	2.73	2.81	2.11	4.43
75th Percentile	0.15	(0.41)	1.77	2.15	2.30	1.59	3.07
90th Percentile	(0.40)	(1.13)	1.49	1.78	1.95	1.27	2.33
Total Fixed-Income Pool	2.13	1.33	2.43	3.59	2.46	1.96	4.18
Fixed-Income Target	2.24	1.41	1.71	2.09	1.63	1.23	3.26

- The Total Bond portfolio has a custom target, intermediate in nature, that reflects a cautious view on the risk of rising rates.
- The composite's returns outperform the benchmark over periods of two years and longer.

Includes In-House and External Portfolios

Total Fixed Income Excess Return and Risk

Risk Analysis vs. Public Fund – Domestic Fixed (Gross)
Five Years Ended December 31, 2018



- The Total Fixed Income portfolio has outperformed the Fixed Income Target over five years and exhibits modest tracking error to the benchmark relative to public fund peers despite the custom nature of the benchmark.

Opportunistic through 12/31/18

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Opportunistic	**(5.55%)**	**(1.10%)**	**-**	**-**	**-**
Opportunistic Equity	**(8.83%)**	**(1.23%)**	**6.85%**	**5.44%**	**-**
ARMB STOXX Min Var	(7.86%)	0.81%	8.37%	-	-
Analytic SSgA/Buy Write	(9.73%)	(3.85%)	5.67%	5.69%	-
Russell 1000 Index	(13.82%)	(4.78%)	9.09%	8.21%	13.28%
Taxable Muni Composite	**2.05%**	**(0.09%)**	**5.43%**	**7.08%**	**-**
Western Asset Taxable Muni	2.05%	(0.21%)	5.76%	7.35%	-
Blmbg Gov/Credit Bd	1.46%	(0.42%)	2.19%	2.53%	3.46%
Blmbg Aggregate Index	1.64%	0.01%	2.06%	2.52%	3.48%
Blmbg Intmdt Treas	2.24%	1.41%	1.20%	1.47%	1.79%
Blmbg Muni Tax Bd Idx	1.31%	(1.39%)	4.79%	6.44%	7.20%
International Fixed Income Pool	**0.84%**	**(3.77%)**	**3.42%**	**(0.50%)**	**1.38%**
Lazard Emerging Income	0.24%	(5.58%)	1.82%	(1.27%)	1.10%
Mondrian Investment Partners	1.13%	(2.07%)	4.86%	0.31%	1.83%
Citi Non-US Gvt Bd Idx	1.31%	(1.82%)	3.32%	0.28%	1.27%
Mondrian Benchmark	0.87%	(3.74%)	3.91%	(0.16%)	1.10%
Tactical FI					
FIAM Tactical Bond	(0.96%)	(0.60%)	5.32%	-	-
Schroders Insurance Linked	(1.78%)	1.47%	-	-	-
Blmbg Aggregate Index	1.64%	0.01%	2.06%	2.52%	3.48%
T-Bills + 6%	2.01%	7.87%	7.02%	6.63%	6.38%
High Yield	**(1.45%)**	**1.56%**	**6.69%**	**4.41%**	**9.94%**
FIAM High Yield CMBS	(0.28%)	3.88%	4.49%	-	-
MacKay Shields	(2.54%)	0.39%	8.68%	5.34%	10.53%
High Yield Target(1)	(3.05%)	(0.60%)	7.87%	4.18%	11.20%

(1) ML Hi Yield Master II from 12/31/06; ML Hi Yield Cash Pay prior to 12/31/06.

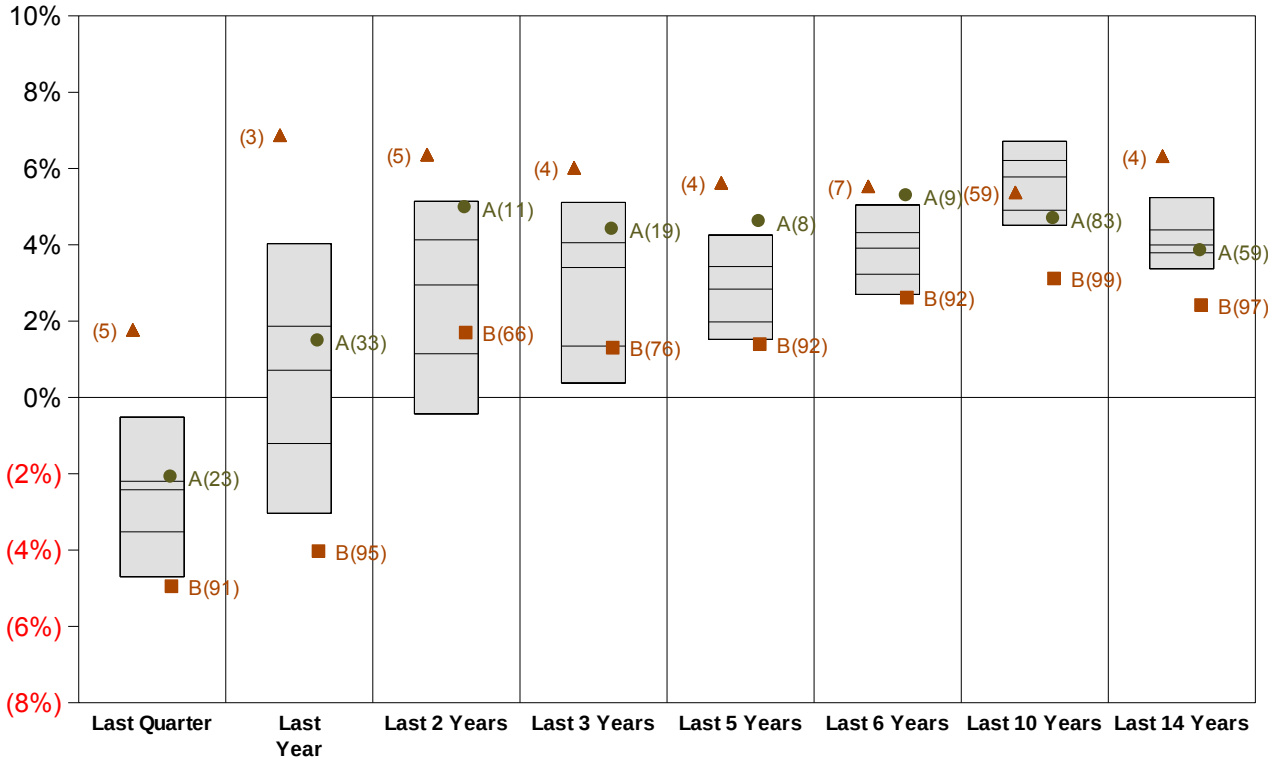
Real Assets through 12/31/18

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years
Real Assets	**(2.24%)**	**4.96%**	**6.16%**	**6.07%**	**7.08%**
Real Assets Target (1)	(2.07%)	0.85%	4.94%	6.49%	6.62%
Real Estate Pool	0.69%	5.88%	7.26%	9.59%	9.61%
Real Estate Target (2)	0.63%	5.67%	6.95%	9.28%	9.43%
Private Real Estate	1.58%	7.58%	7.68%	9.70%	9.96%
NCREIF Total Index	1.37%	6.72%	7.21%	9.33%	9.60%
ARMB REIT	(6.00%)	(4.12%)	4.08%	8.31%	7.28%
NAREIT Equity Index	(6.06%)	(4.04%)	4.24%	8.32%	7.39%
Total Farmland	1.44%	4.80%	4.37%	4.84%	7.11%
UBS Farmland	1.73%	5.17%	4.68%	5.37%	8.13%
Hancock Agricultural	0.82%	4.02%	3.72%	3.74%	5.33%
ARMB Farmland Target (3)	1.83%	6.27%	5.83%	6.31%	7.84%
Total Timber	1.11%	5.36%	1.57%	4.27%	4.98%
Timberland Investment Resources	1.54%	5.42%	1.87%	3.96%	4.66%
Hancock Timber	(0.07%)	5.32%	0.75%	4.58%	5.34%
NCREIF Timberland Index	0.97%	3.44%	3.22%	4.98%	5.75%
Total Energy Funds *	1.72%	12.56%	1.63%	(5.36%)	(4.16%)
CPI + 5%	0.53%	6.77%	6.98%	6.33%	6.35%
MLP Composite *	(16.73%)	(14.67%)	(1.26%)	(4.85%)	0.65%
Advisory Research (FKA FAMCO) MLP	(17.65%)	(15.08%)	(1.69%)	(6.24%)	(1.11%)
Tortoise Capital Adv MLP	(16.15%)	(14.51%)	(0.94%)	(3.63%)	2.25%
Alerian MLP Index	(17.30%)	(12.42%)	(1.06%)	(7.31%)	(2.24%)
Total Infrastructure *	(0.69%)	7.98%	10.71%	-	-
Brookfield	(6.07%)	(7.84%)	6.16%	-	-
Lazard	(5.46%)	(8.19%)	10.48%	-	-
JPM Infrastructure	2.05%	8.60%	6.43%	-	-
IFM Infrastructure	1.61%	19.58%	13.45%	-	-
Global Infrastructure Idx	(5.12%)	(9.50%)	6.92%	4.10%	5.84%

Real estate returns are provided to Callan by ARMB's real estate consultant.

Absolute Return Composite through 12/31/18

Performance vs Callan Absolute Rtn Hedge Fund of Funds (Net)



		Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 6 Years	Last 10 Years	Last 14 Years
10th Percentile		(0.51)	4.03	5.14	5.11	4.26	5.05	6.71	5.24
25th Percentile		(2.20)	1.87	4.13	4.06	3.43	4.32	6.21	4.39
Median		(2.42)	0.71	2.95	3.41	2.84	3.91	5.78	4.00
75th Percentile		(3.52)	(1.21)	1.15	1.35	1.98	3.23	4.91	3.79
90th Percentile		(4.70)	(3.03)	(0.43)	0.38	1.52	2.70	4.51	3.37
Absolute Return	● A	(2.10)	1.47	4.96	4.40	4.60	5.27	4.67	3.84
HFRI Fund of Funds Compos	■ B	(4.95)	(4.03)	1.70	1.30	1.40	2.62	3.12	2.42
T-Bills + 5%	▲	1.77	6.87	6.36	6.02	5.63	5.53	5.38	6.33

- The absolute return composite outperformed the HFRI FoF Index for all trailing periods shown.

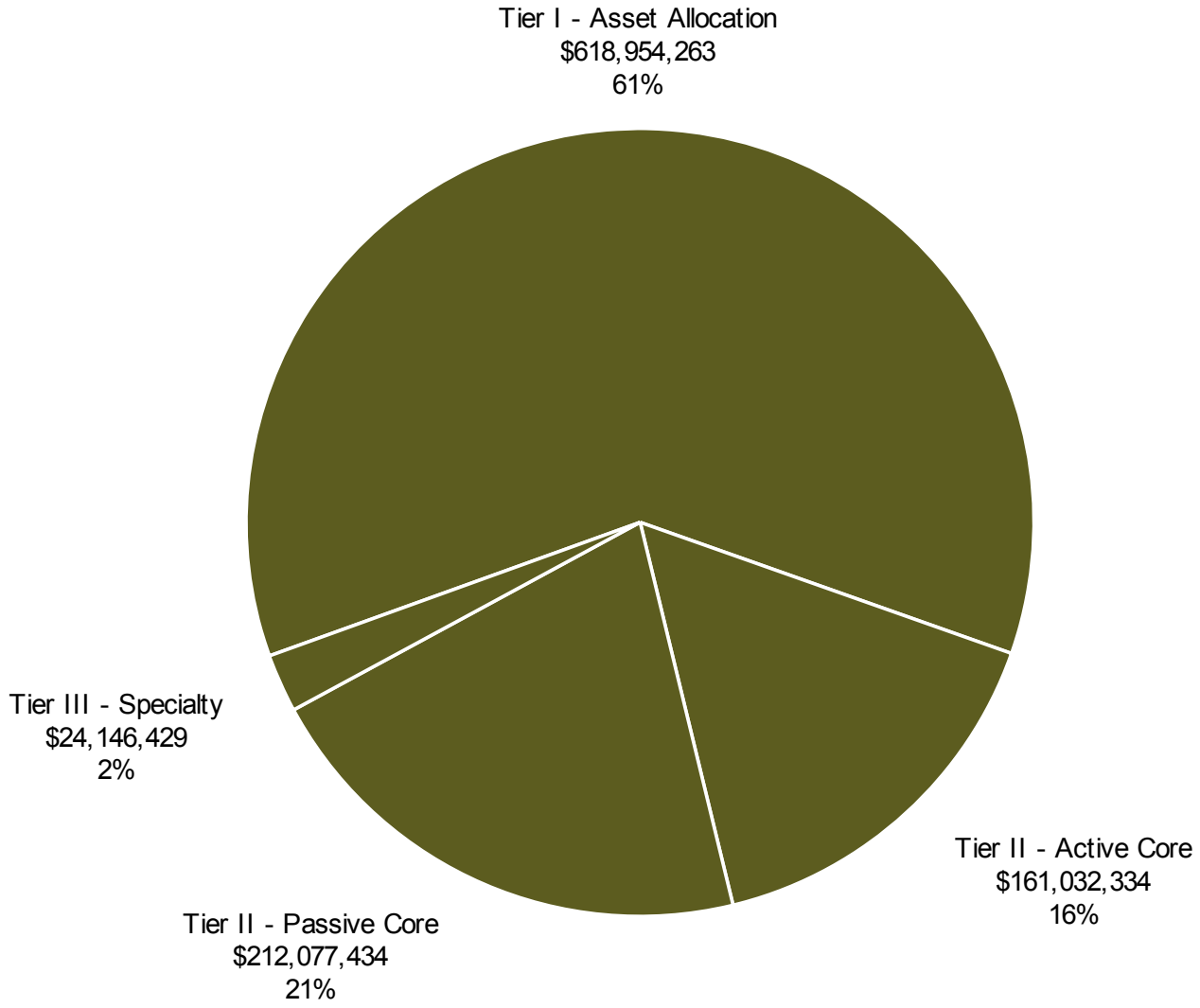
Absolute Return Composite through 12/31/18

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Absolute Return	**(2.10%)**	**1.47%**	**4.40%**	**4.60%**	**4.67%**
Crestline ABS	1.07%	6.10%	8.59%	8.21%	7.02%
Prisma ABS	(2.51%)	0.45%	1.89%	1.96%	-
Allianz Stuctured Alpha 1000+	(7.51%)	(1.14%)	6.35%	-	-
Crestline Specialty Lending Fund	3.23%	12.78%	12.66%	-	-
Crestline Specialty Lending Fund II	2.63%	(0.90%)	-	-	-
Zebra Global Equity	2.39%	(3.41%)	-	-	-
Zebra Global Advantage	6.29%	(6.39%)	-	-	-
JP Morgan Systematic Alpha	(0.55%)	(11.88%)	-	-	-
Man Group Alternative Risk Premia	(2.88%)	(2.14%)	-	-	-
HFRI Fund of Funds Index	(4.95%)	(4.03%)	1.30%	1.40%	3.12%

Defined Contribution Plan

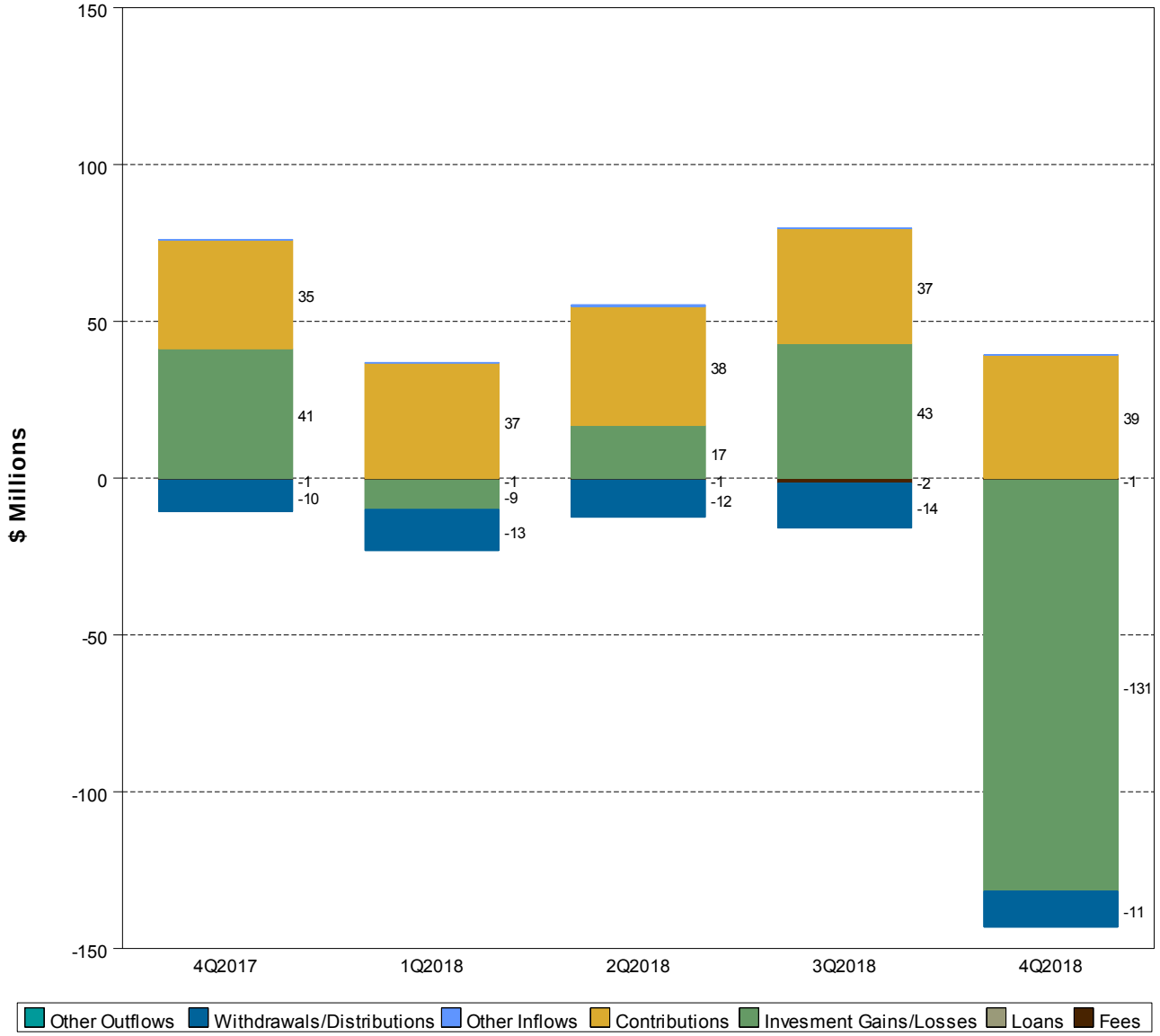
PERS DC Plan

December 31, 2018



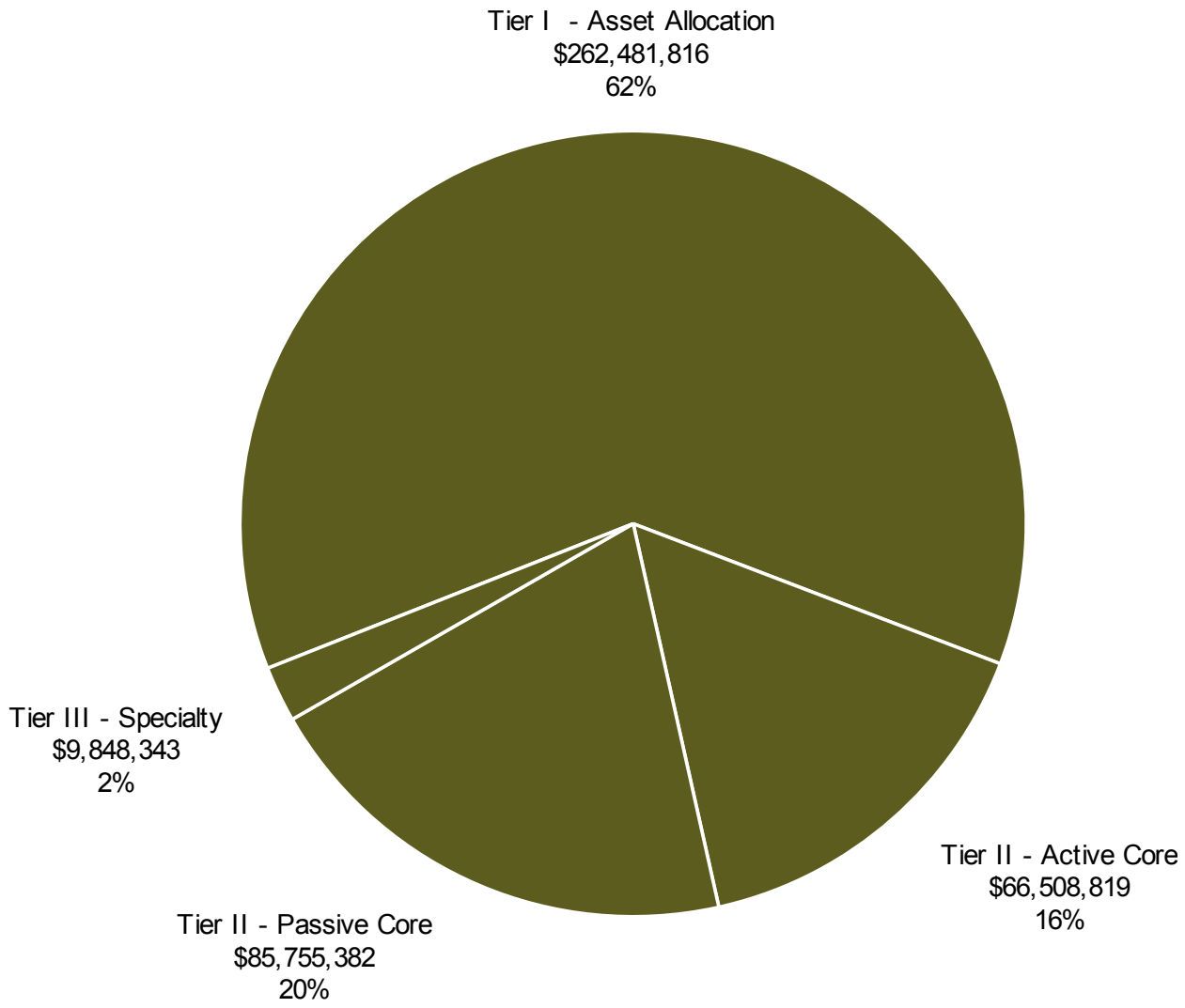
PERS DC Plan: Asset Changes

December 31, 2018



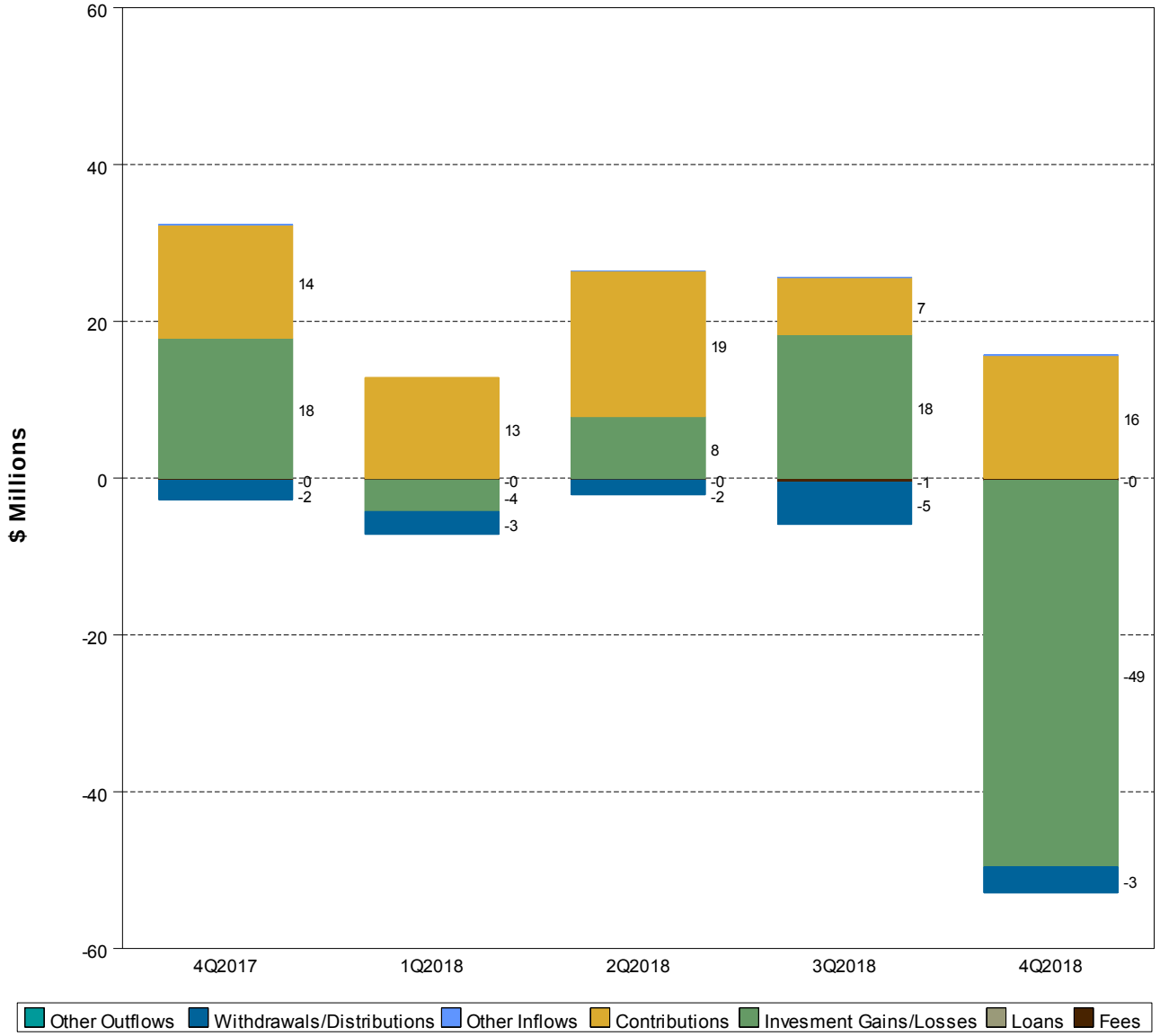
TRS DC Plan

December 31, 2018



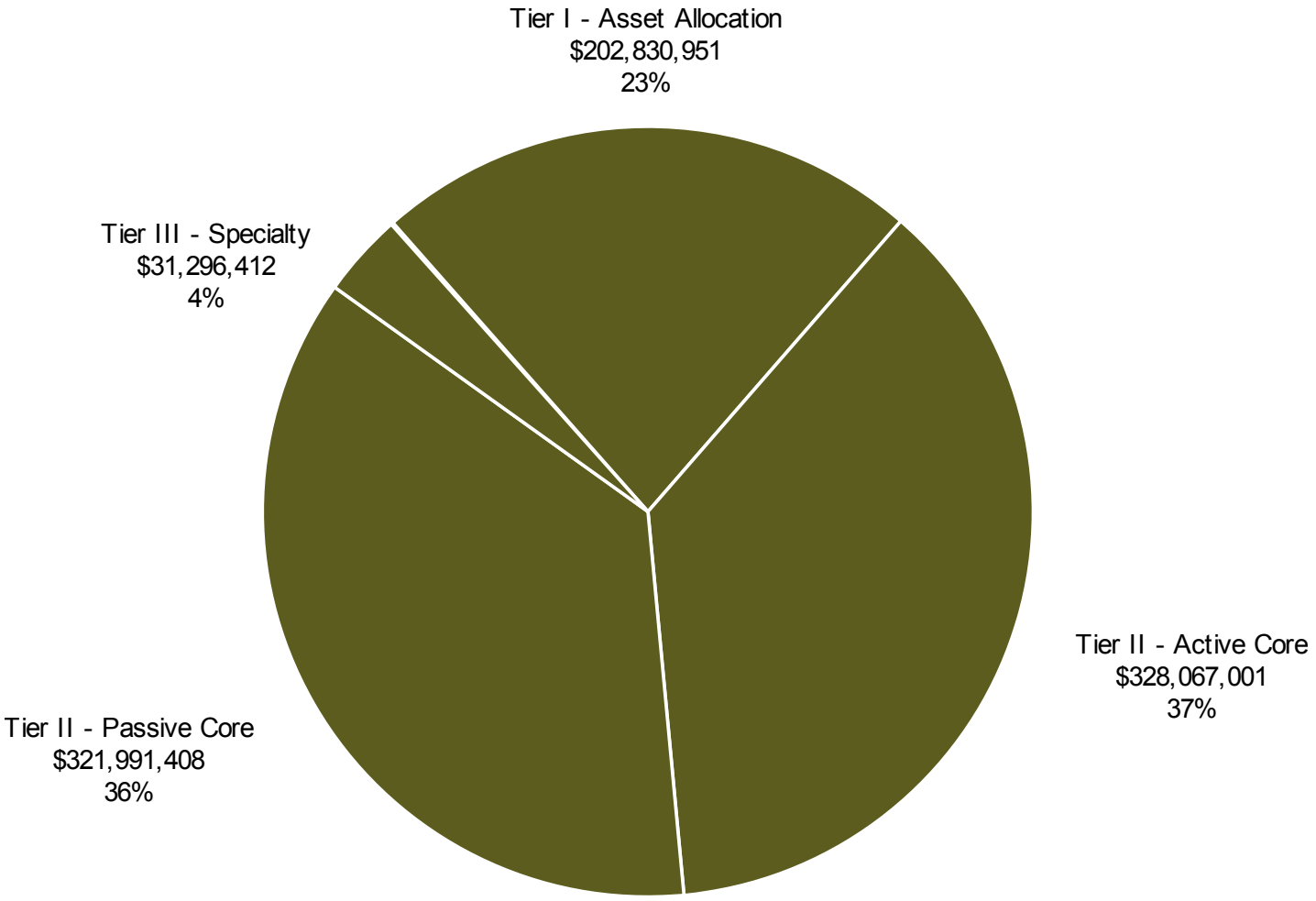
TRS DC Plan: Asset Changes

December 31, 2018



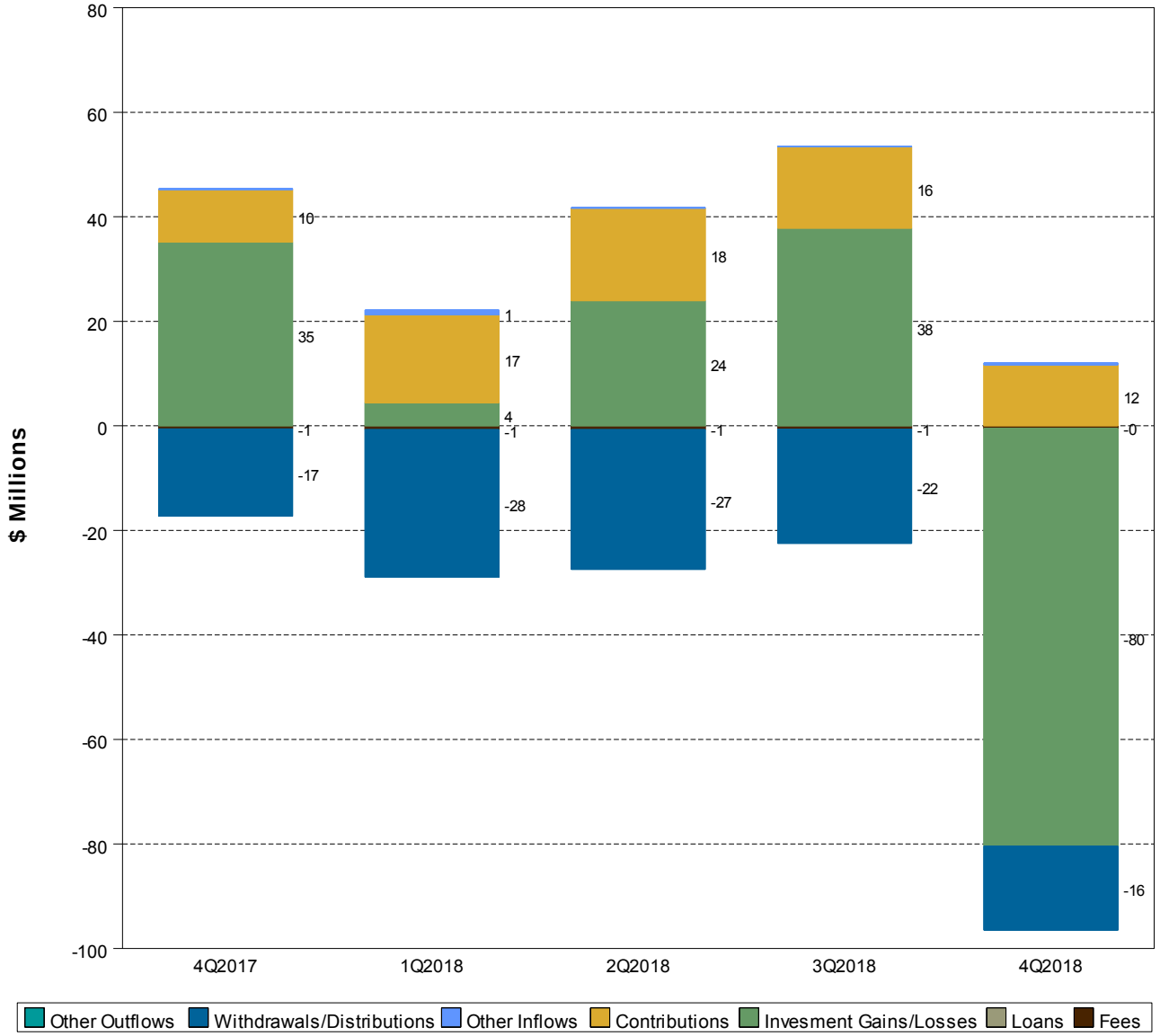
Deferred Comp Plan

December 31, 2018



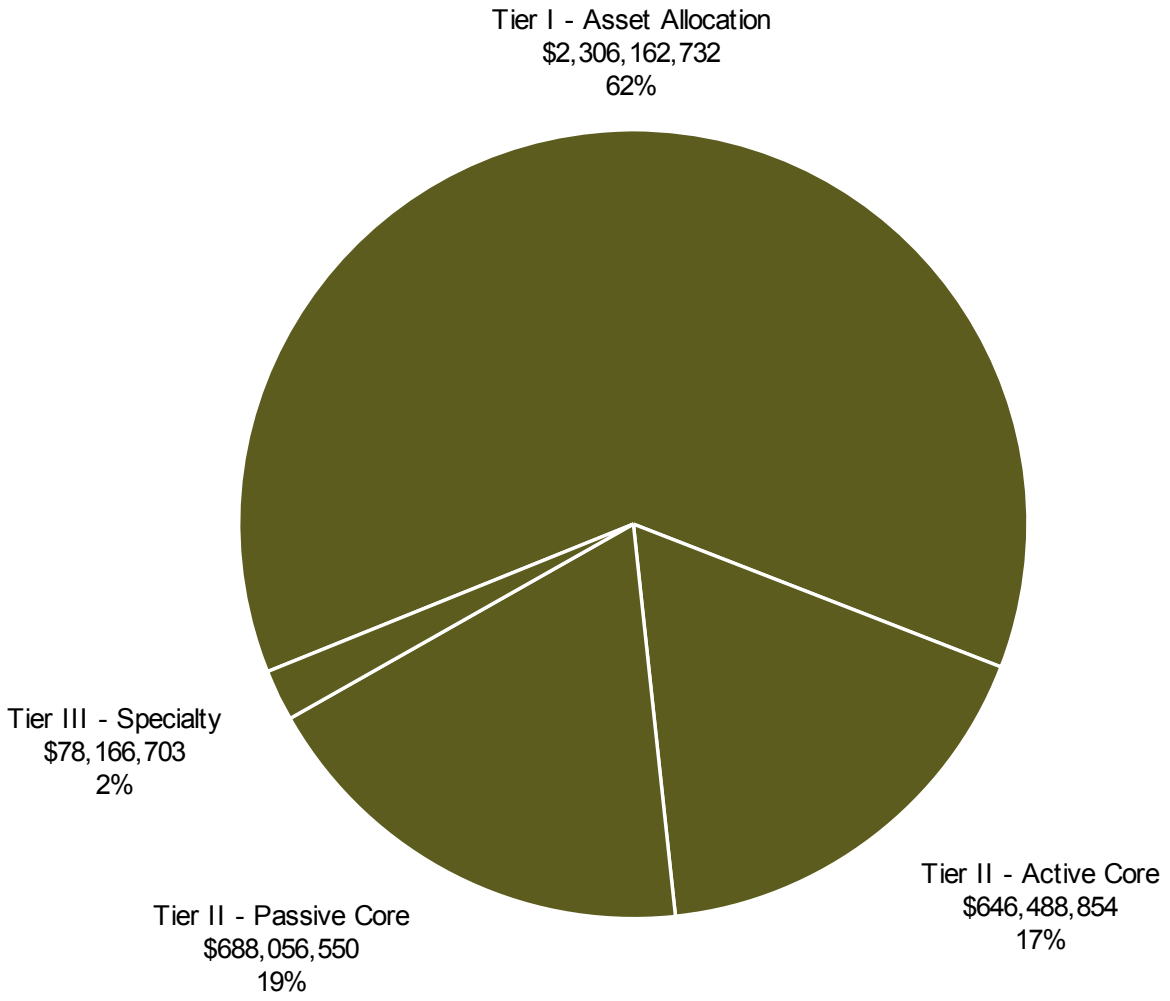
Deferred Comp Plan: Asset Changes

December 31, 2018



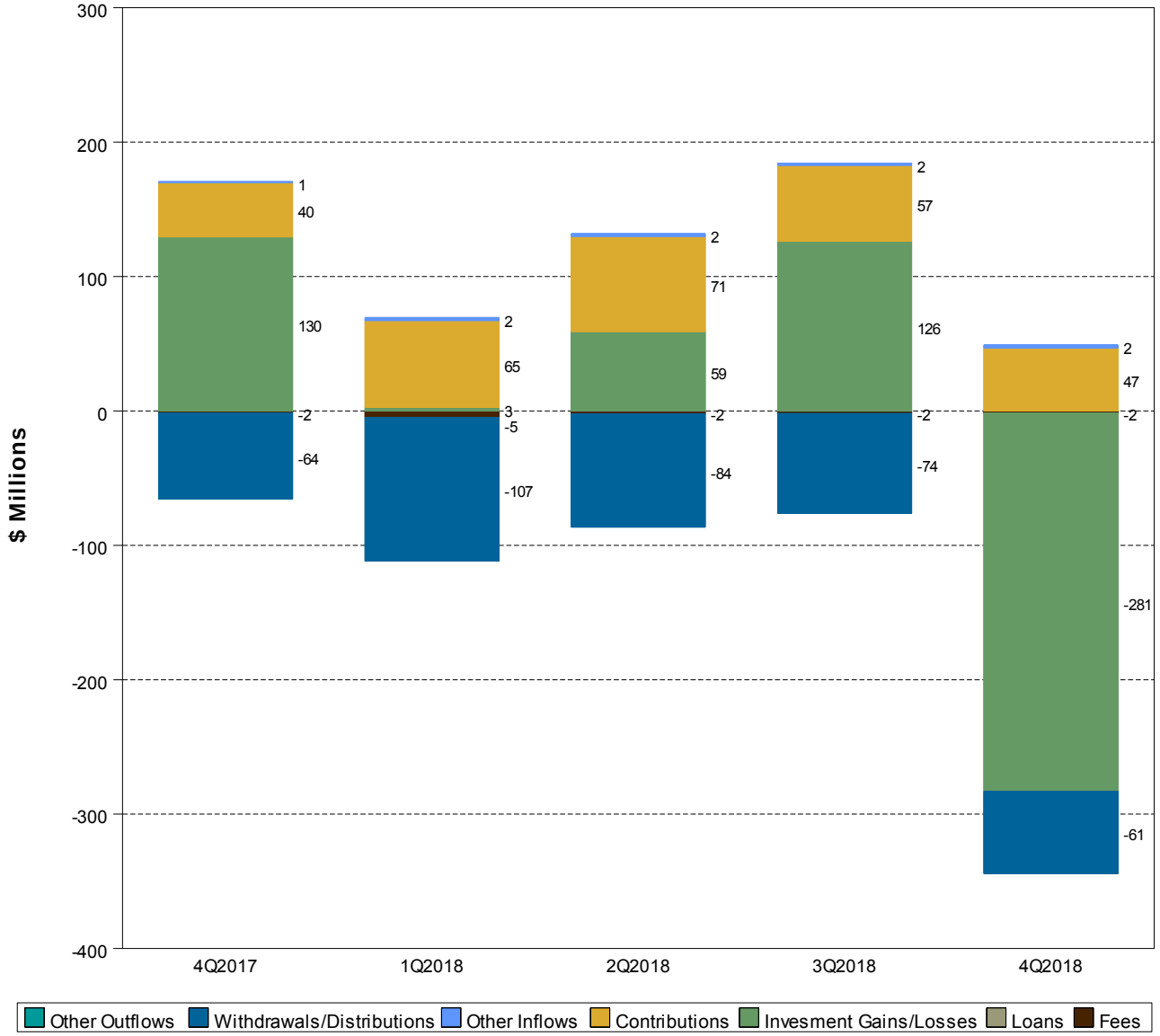
SBS Fund

December 31, 2018



SBS Fund: Asset Changes

December 31, 2018



Individual Account Option Performance: 12/31/18

Balanced & Target Date Funds

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Tier I - Asset Allocation										
Alaska Balanced Trust	**-3.7** 36	**-1.9** 8	**4.0** 27	**3.6** 17	**5.2** 25	**3.4** 79		**-0.1** 54	**0.2** 100	**0.9** 30
CAI MA Tgt Alloc Cons MFs										
Passive Target	-3.9 42	-2.0 11	4.0 27	3.6 17	5.1 35	3.6 73				0.8 33
Alaska Long-Term Balanced	**-7.4** 42	**-4.2** 27	**5.4** 25	**4.5** 23	**7.3** 20	**5.7** 63		**-0.4** 77	**0.3** 100	**0.7** 43
CAI MA Tgt Alloc Mod MFs										
Passive Target	-7.6 45	-4.2 27	5.5 24	4.6 21	7.3 20	5.9 59				0.7 43
Target 2010 Trust	**-5.1** 69	**-2.5** 22	**4.5** 46	**3.8** 33	**6.1** 20	**4.3** 63		**-0.2** 79	**0.2** 100	**0.7** 60
CAI Tgt Date 2010										
Custom Index	-5.1 67	-2.4 21	4.5 44	3.8 30	6.1 19	4.3 59				0.7 60
Target 2015 Trust	**-6.1** 76	**-3.1** 34	**5.1** 24	**4.2** 11	**7.0** 11	**5.0** 50		**0.1** 39	**0.2** 100	**0.7** 54
CAI Tgt Date 2015										
Custom Index	-6.1 73	-3.1 34	5.1 24	4.2 13	7.0 11	5.1 48				0.7 63
Target 2020 Trust	**-7.5** 90	**-4.0** 39	**5.7** 12	**4.7** 5	**7.9** 7	**5.9** 25		**0.1** 16	**0.2** 99	**0.7** 58
CAI Tgt Date 2020										
Custom Index	-7.5 90	-4.0 38	5.7 12	4.6 6	7.9 7	6.0 19				0.7 62
Target 2025 Trust	**-8.7** 88	**-4.8** 38	**6.2** 8	**4.9** 6	**8.6** 9	**6.7** 23		**-0.0** 25	**0.2** 99	**0.6** 59
CAI Tgt Date 2025										
Custom Index	-8.7 88	-4.8 37	6.2 8	5.0 6	8.6 9	6.8 16				0.6 63
Target 2030 Trust	**-9.8** 80	**-5.5** 31	**6.6** 14	**5.2** 7	**9.2** 8	**7.4** 30		**-0.1** 35	**0.2** 100	**0.6** 47
CAI Tgt Date 2030										
Custom Index	-9.8 80	-5.5 30	6.6 11	5.2 6	9.2 8	7.6 24				0.6 50
Target 2035 Trust	**-10.8** 72	**-6.2** 24	**6.9** 10	**5.4** 6	**9.6** 6	**8.1** 44		**-0.1** 31	**0.3** 99	**0.6** 40
CAI Tgt Date 2035										
Custom Index	-10.8 72	-6.1 23	7.0 8	5.4 5	9.6 5	8.2 35				0.6 41
Target 2040 Trust	**-11.6** 69	**-6.7** 21	**7.1** 8	**5.5** 6	**9.9** 5	**8.6** 44		**-0.1** 30	**0.3** 100	**0.6** 26
CAI Tgt Date 2040										
Custom Index	-11.5 69	-6.6 18	7.2 7	5.6 6	9.9 5	8.7 35				0.6 29
Target 2045 Trust	**-12.0** 66	**-7.0** 17	**7.2** 7	**5.6** 7	**9.9** 7	**8.7** 68		**-0.1** 29	**0.3** 99	**0.6** 27
CAI Tgt Date 2045										
Custom Index	-12.0 63	-6.9 13	7.3 6	5.6 6	9.9 5	8.9 45				0.6 28

Returns:
- above median
- third quartile
- fourth quartile

Risk:
- below median
- second quartile
- first quartile

Risk Quadrant:

Excess Return Ratio:
- above median
- third quartile
- fourth quartile

Tracking Error:
- below median
- second quartile
- first quartile

Sharpe Ratio:
- above median
- third quartile
- fourth quartile

Individual Account Option Performance: 12/31/18

Balanced & Target Date Funds

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Target 2050 Trust	**-12.0** 57	**-7.0** 13	**7.2** 7	**5.6** 6	**9.9** 7	**8.8** 71		**-0.1** 35	**0.3** 100	**0.6** 25
CAI Tgt Date 2050 Custom Index	-12.0 56	-6.9 12	7.3 6	5.6 4	9.9 7	8.9 55				0.6 27
Target 2055 Trust	**-12.0** 53	**-7.0** 11	**7.2** 9	**5.6** 11	**9.9** 11	**8.8** 77		**-0.2** 42	**0.3** 99	**0.6** 28
CAI Tgt Date 2055 Custom Index	-12.0 51	-6.9 10	7.3 8	5.6 10	9.9 10	8.9 56				0.6 29
Target 2060 Trust	**-12.0** 53	**-7.1** 12	**7.1** 18						**0.3** 100	
CAI Tgt Date 2060 Custom Index	-12.0 50	-6.9 10	7.3 11							

Returns:
- above median
- third quartile
- fourth quartile

Risk:
- below median
- second quartile
- first quartile

Risk Quadrant:

Excess Return Ratio:
- above median
- third quartile
- fourth quartile

Tracking Error:
- below median
- second quartile
- first quartile

Sharpe Ratio:
- above median
- third quartile
- fourth quartile

Other Options: 12/31/18

Passive Strategies

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Index Funds										
SSgA S&P 500 Index Fund (i)	**-13.5** 22	**-4.4** 19	**9.2** 9	**8.5** 8	**12.7** 1	**9.8** 20		**-0.7** 9	**0.0** 82	**0.8** 10
Callan S&P 500 Index MFs										
S&P 500 Index	-13.5 22	-4.4 13	9.3 5	8.5 3	12.7 1	9.8 35				0.8 5
BlackRock S&P 500 Index Fund (i)	**-13.5** 22	**-4.4** 13	**9.2** 11	**8.5** 11	**12.7** 1	**9.8** 35		**-1.7** 22	**0.0** 95	**0.8** 11
Callan S&P 500 Index MFs										
S&P 500 Index	-13.5 22	-4.4 13	9.3 5	8.5 3	12.7 1	9.8 35				0.8 5
SSgA Russell 3000 Index Fund (i)	**-14.3** 46	**-5.3** 54	**8.9** 34	**7.9** 41	**12.5** 43	**10.1** 72		**0.1** 36	**0.0** 100	**0.7** 32
CAI Mut Fd: Large Cap Broad Style (Net)										
Russell 3000 Index	-14.3 46	-5.2 53	9.0 34	7.9 41	12.5 43	10.1 71				0.7 33
SSgA World Equity ex-US Index Fund (i)	**-11.5** 19	**-14.1** 32	**4.8** 11	**0.8** 40	**5.0** 75	**11.1** 67		**0.1** 29	**0.7** 99	**0.0** 40
CAI MF: Non-U.S. Equity Style										
MSCI ACWI x U.S. Index (Net)	-11.5 19	-14.2 33	4.5 15	0.7 40	4.8 77	11.1 67				0.0 40
BlackRock Passive US Bd Index Fund (i)	**1.6** 21									
Callan Core Bond MFs										
Blmbg Aggregate	1.6 17	0.0 28	2.1 68	2.5 36	2.1 80	3.0 37				0.6 51
SSgA US TIPS (i)	**-0.4** 25	**-1.3** 42	**2.0** 48	**1.6** 25	**0.8** 46	**3.5** 55		**-3.1** 97	**0.0** 100	**0.3** 21
CAI TIPS MFs										
Blmbg U.S. TIPS Index	-0.4 25	-1.3 38	2.1 42	1.7 20	0.9 29	3.5 53				0.3 13
SSgA US REIT Index Fund (i)	**-6.5** 34	**-4.2** 26	**1.9** 53	**7.7** 35	**8.0** 42	**12.6** 25		**-1.9** 98	**0.1** 100	**0.6** 45
CAI Mut Fd: Real Estate Database										
DJ US Select REIT Index	-6.6 38	-4.2 27	2.0 52	7.9 32	8.2 33	12.7 21				0.6 44

Returns:
- above median
- third quartile
- fourth quartile

Risk:
- below median
- second quartile
- first quartile

Risk Quadrant:

Excess Return Ratio:
- above median
- third quartile
- fourth quartile

Tracking Error:
- below median
- second quartile
- first quartile

Sharpe Ratio:
- above median
- third quartile
- fourth quartile

(i) – Indexed scoring method used. Green: manager & index ranking differ by less than +/- 10 percentiles; Yellow: manager and index ranking differ by +/- 20 percentiles; Red: manager & index ranking differ by more than 20 percentiles.

Other Options: 12/31/18

Active Equity, Stable Value, and Money Market

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Active and Other Funds										
Northern Trust ESG Fund	**-11.6** 7									
Callan Lg Cap Broad MF										
MSCI USA ESG	-11.7 9	-3.1 40	9.3 31	7.8 44	11.9 55	8.9 95				0.8 16
International Equity Fund	**-13.5** 51	**-15.9** 61	**0.3** 91						**2.8** 73	
CAI Mut Fd: Non-U.S. Equity Style										
MSCI ACWI ex US Index	-11.4 19	-13.8 25	5.0 10	1.1 32	5.3 62	11.1 66				0.0 31
T. Rowe Price Small Cap	**-16.1** 11	**-2.9** 23	**10.1** 17	**6.8** 13	**12.7** 10	**12.5** 91		**0.8** 1	**3.8** 92	**0.5** 7
CAI Mut Fd: Sm Cap Broad Style										
Russell 2000 Index	-20.2 55	-11.0 53	7.4 47	4.4 50	10.4 52	14.5 54				0.3 46
T. Rowe Price Stable Value	**0.7** 5	**2.4** 8	**2.4** 1	**2.4** 1	**2.5** 1	**0.1** 94		**11.8** 11	**0.1** 11	**30.4** 1
Callan Stable Value CT										
5 Yr U.S. Treas Rolling	0.4 81	1.7 76	1.4 79	1.4 58	1.5 47	0.1 78				10.5 34
SSgA Inst Treasury Money Market	**0.5** 10	**1.7** 11	**0.9** 9	**0.5** 12	**0.4** 14	**0.3** 6		**-3.3** 100	**0.0** 93	**-0.2** 11
Callan Money Market Funds										
FTSE 3 Mo T-Bill	0.6 5	1.9 5	1.0 2	0.6 2	0.4 2	0.4 3				-0.1 2

Returns:
above median
third quartile
fourth quartile

Risk:
below median
second quartile
first quartile

Risk Quadrant:

Excess Return Ratio:
above median
third quartile
fourth quartile

Tracking Error:
below median
second quartile
first quartile

Sharpe Ratio:
above median
third quartile
fourth quartile

Callan

Callan Update

Published Research Highlights from 4Q18

2018 Nuclear Decommissioning Funding Study

Greg Allen's Reflections on 30 Years at Callan

Puttin' on the Risk: How Investors Can Use Open Protocol

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A Look at the New Communication Services Sector

Irina Sushch

ESG Hitting Its Stride in U.S.

Anna West

Additional Reading

Private Equity Trends quarterly newsletter

Active vs. Passive quarterly charts

Capital Market Review quarterly newsletter

Monthly Updates to the Periodic Table

Market Pulse Flipbook quarterly markets update

Callan Institute Events

Upcoming Conferences, Workshops, and Webinars

2019 June Regional Workshops

- Atlanta, June 4, 2019
- San Francisco, June 5, 2019

"Callan College"—Ongoing fiduciary education Introduction to Investments sessions

- San Francisco, April 16–17, 2019
- San Francisco, July 16–17, 2019
- Chicago, October 22–23, 2019

Webinars: On-Demand now available at https://www.callan.com/ondemandwebinar/

Our library of pre-recorded webinars on specific investment-related topics, such as:

- ESG Adoption and Implementation Trends
- Infrastructure: Real Perspectives on an Evolving Asset Class
- Investigating Private Equity Implementation

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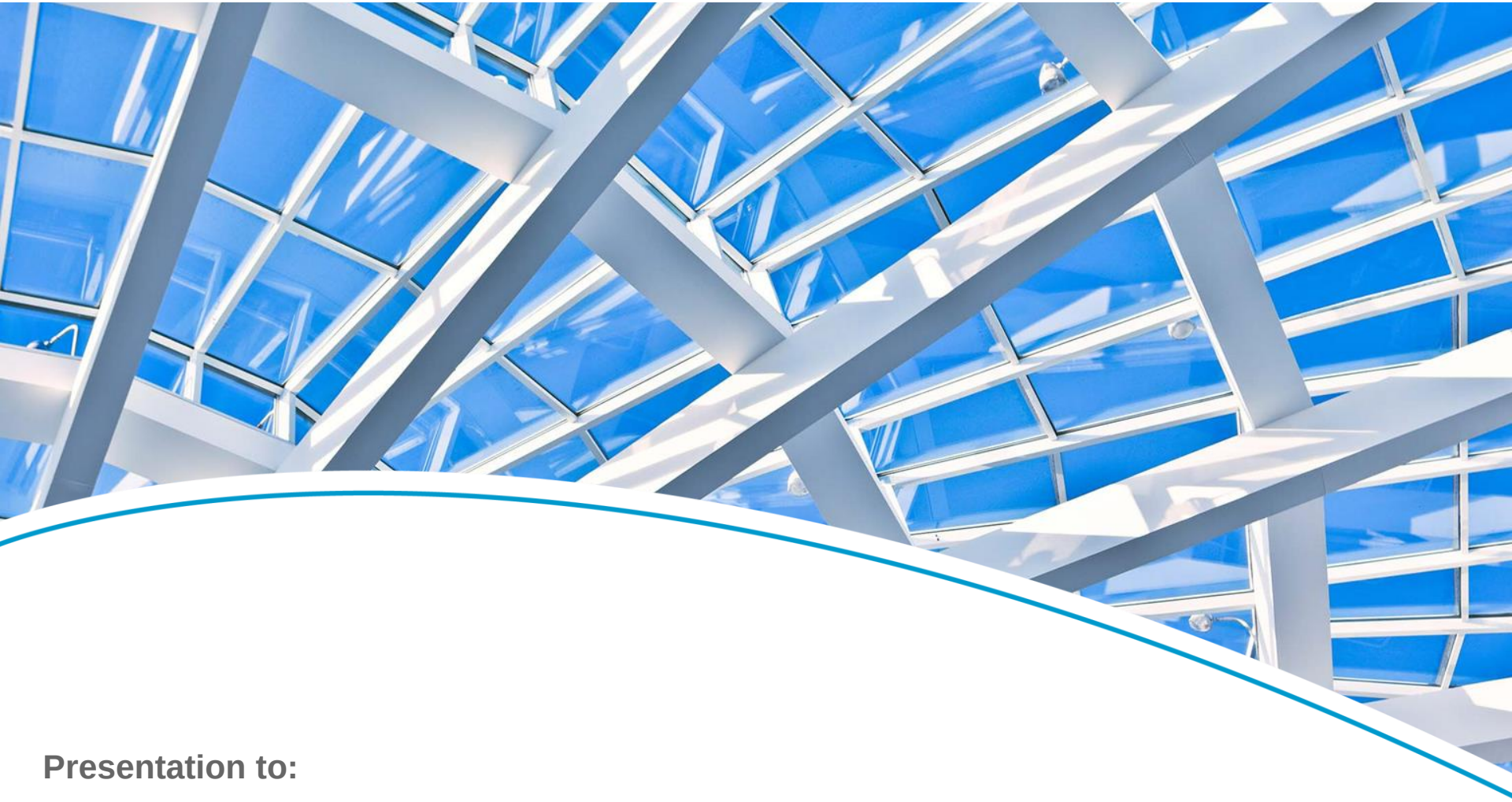
— Greg Allen, CEO, CRO



Presentation to:

Alaska Retirement Management Board (ARMB)

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What is factor-based investing?

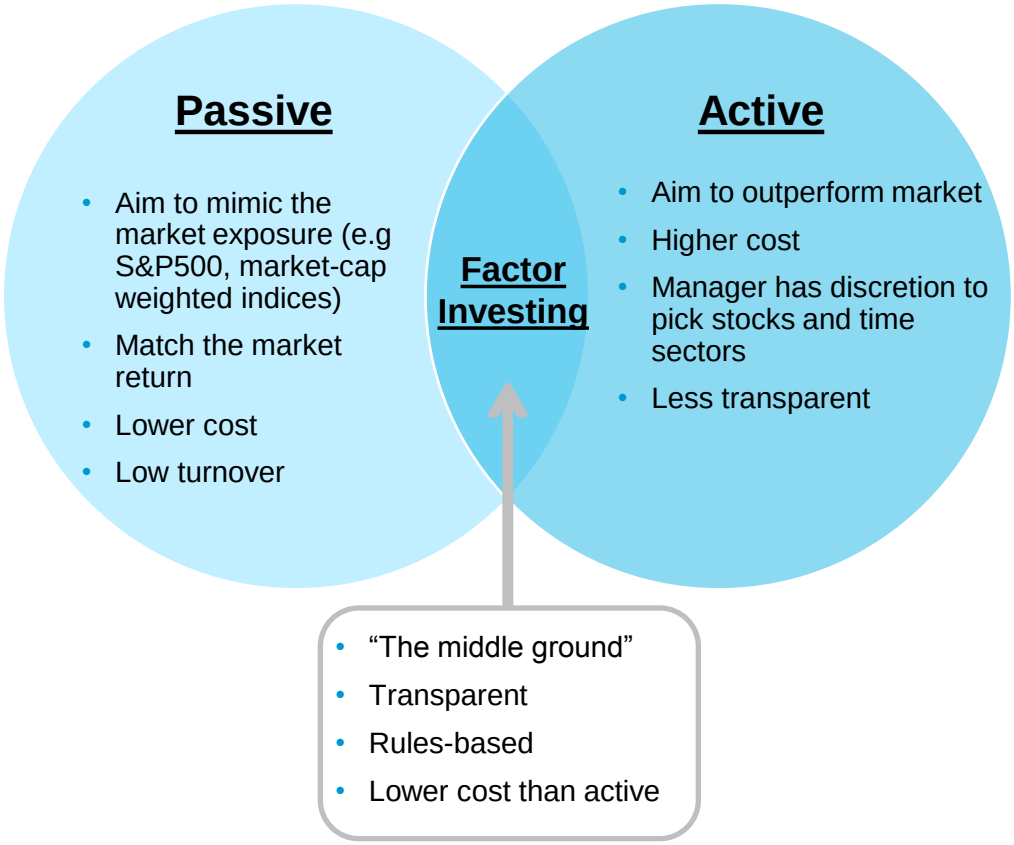
The foregoing is based on data provided by LGIMA for the purposes of providing this analysis in response to an unsolicited request and should not be relied upon in making an investment until a full investment advisory assessment can be provided.

Introduction

- What is factor-based investing?

- Why should ARMB use factor-based strategies?
  - How are factor-based strategies different than active manager strategies and market-cap weighted index strategies?
    - Reduce cost
    - Higher risk-adjusted returns
    - More consistent returns
    - More transparency
    - Diversification

- How are factor-based strategies implemented?
  - LGIMA's multi-factor index strategies



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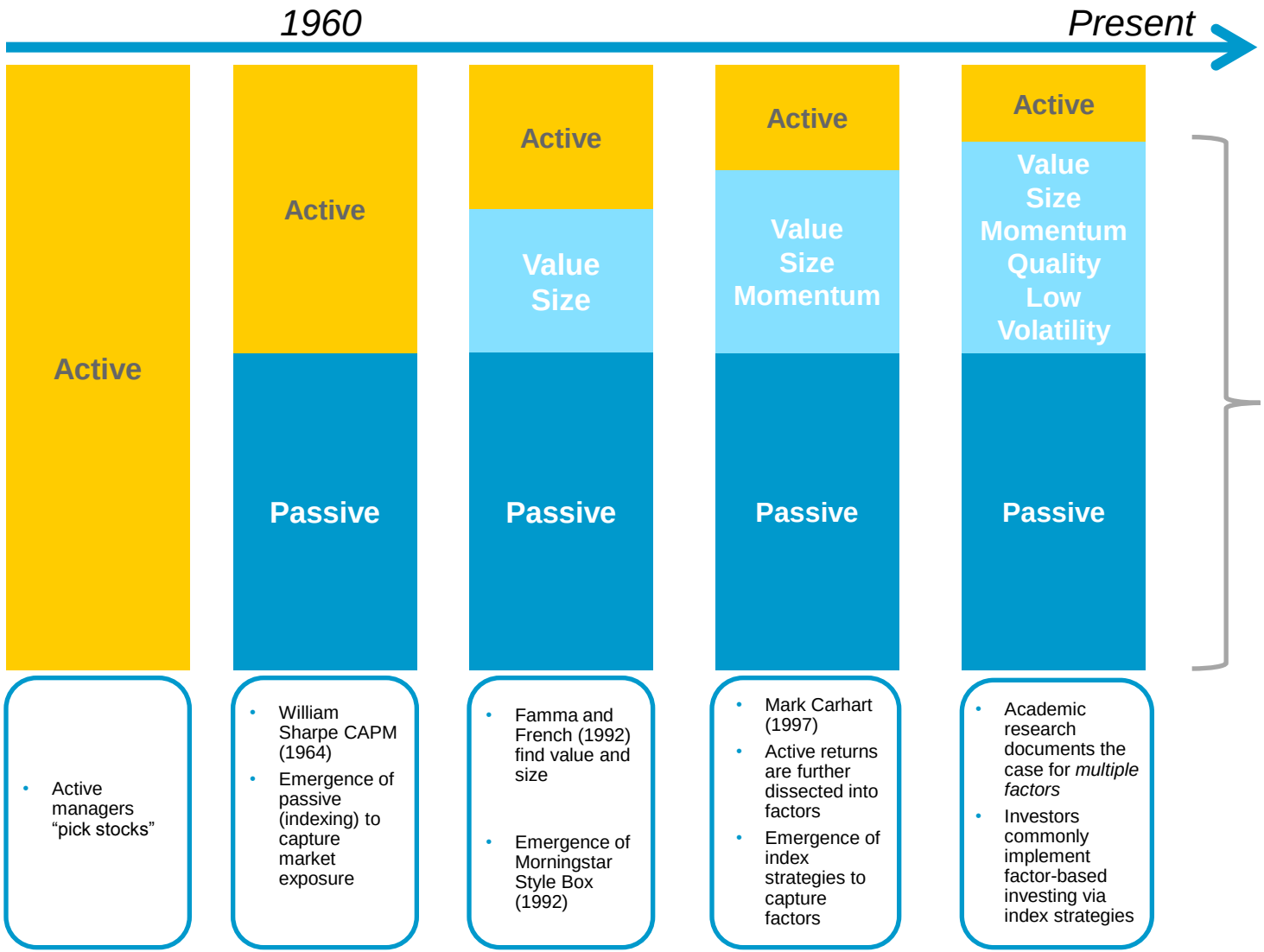
History of factors



Factors can be implemented through active or passive strategies. Passive provide:

- ✓ Lower management fees
- ✓ Lower transaction costs
- ✓ Higher transparency

Approximately 90% of traditional active manager performance can be attributed to factor tilts and beta. The remainder can be classified as "alpha"*

*Source: LGIMA, Bloomberg, Morningstar, Kenneth French Data Library, Scientific Beta. Data as of December 31, 2018 using monthly returns over 15-year period.
Factor returns inclusive of market, size, value, momentum and quality based off of Fama, French, Carhart methodology.
Study refers to the average monthly performance of the top quartile of active large cap US equity mutual funds over a 15-year period.
Chart depicted above are intended for illustrative purposes only

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What is a factor?

A fundamental question of finance - What drives a portfolio's returns?

- Academics began questioning if expected return was only driven by one factor (market exposure) or if there were *other sources of risk* that could explain a stock's returns
- They found that there were other sources of risk (i.e. *factors*) for which investors are compensated
- These factors are economically grounded and have *historically earned a higher risk adjusted return than market-cap based strategies*

Value	Low volatility	Size	Momentum
Stocks that are 'cheap' against their fundamental metrics	Stocks with lower volatility	Small capitalization stocks	Buy stocks that are trending upwards and avoid stocks that are trending downward

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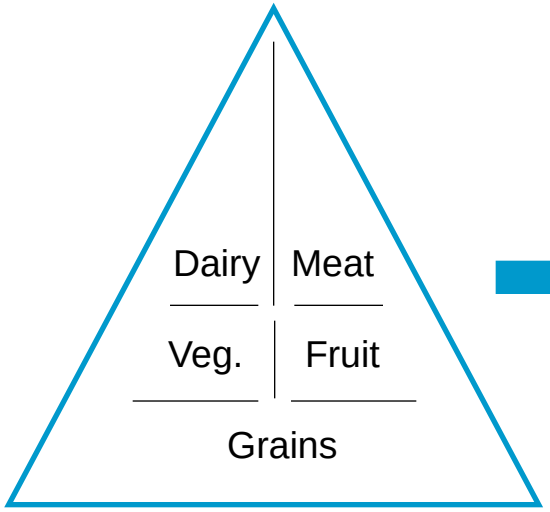
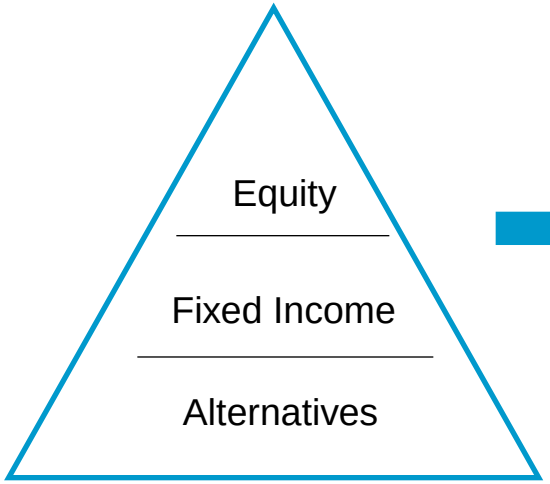
A balanced (factor) diet

Factors as the fundamental building blocks of investment returns



Nutrients	
Fiber	**65%**
Protein	**25%**
Carbohydrates	**<1%**
Fat	**10%**
Sodium	**>1%**



Factors	
Value	**25%**
Low Volatility	**25%**
Size	**25%**
Momentum	**25%**

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Why do factors exist?

Example - The value factor

Value	Rational for factors - Risk-based and Behavioral
Stocks that are 'cheap' against their fundamental metrics	**Risk-based explanation:** • Value stocks are typically more cyclical, more highly leveraged, and less profitable than average stocks • The value premium is compensation for higher real or perceived risk **Behavioral explanation:** • "Lottery effect" - Shunning value and overpaying for growth • An overly pessimistic view on a stock can push the stock price far below its fair value

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Buffet's Alpha or Beta? A real world example

A real world example

"Buffett's returns appear to be neither luck nor magic, but rather, reward for the use of leverage combined with a focus on **cheap, safe, quality** stocks."

- "Whether we're talking about socks or stocks, I like buying **quality** merchandise when it is marked down."
- "It's far better to buy a wonderful company at a **fair price**, than a fair company at a wonderful price."
- "We simply attempt to be fearful when others are greedy and to be greedy only when others are fearful."
- "Price is what you pay. **Value** is what you get."
- "Investors should remember that excitement and expenses are their enemies."

Source: 29 Warren Buffett Quotes on Investing & Success.
Buffet's Alpha (2013) Frazzzini, Kabiller, and Pederson.

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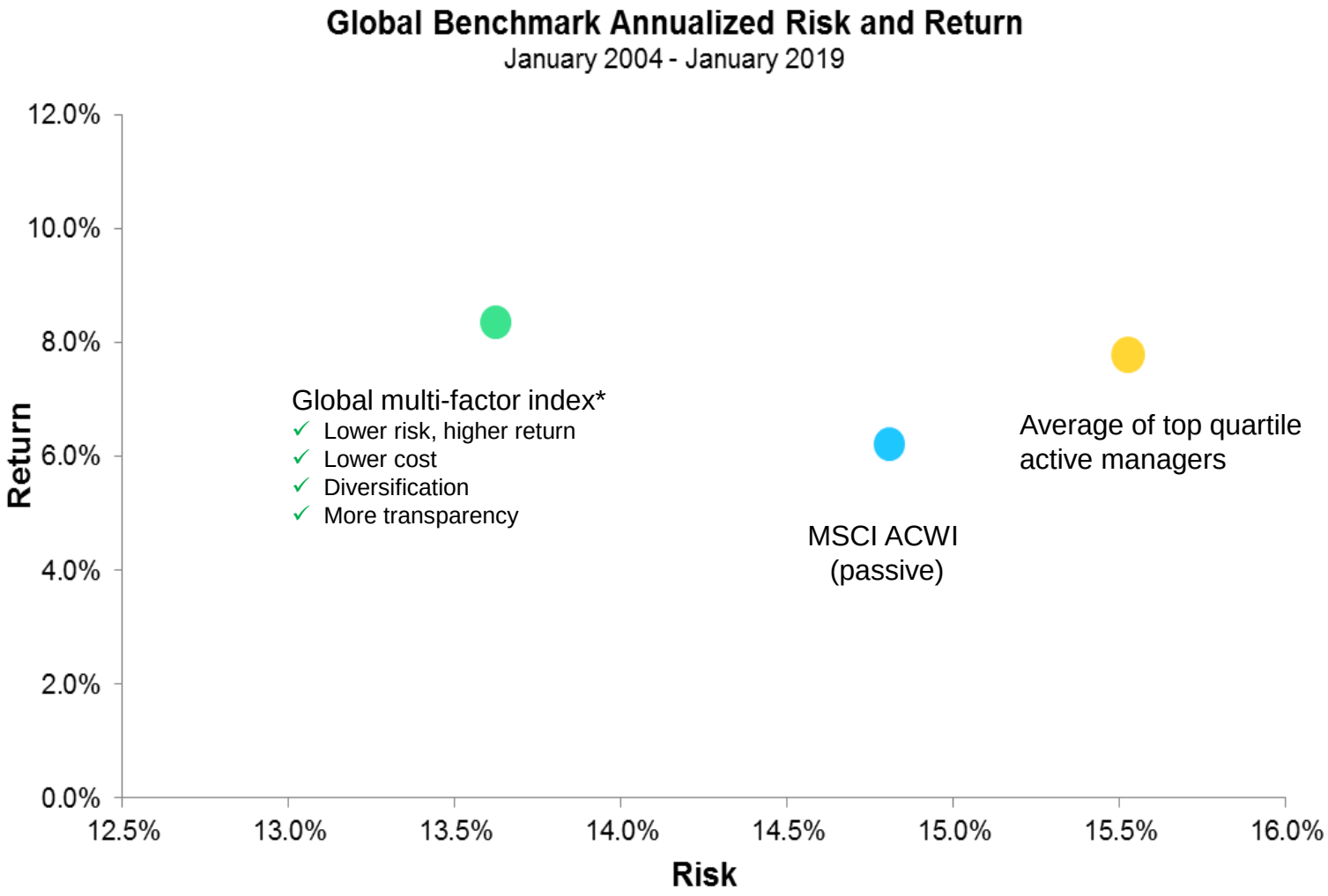
How have factors performed?



Source: LGIMA, eVestment, SciBeta, Morningstar.
Active managers – Benchmarked to MSCI ACWI NR USD.
*Global multi-factor Index" represents the performance of the SciBeta Global MBMS 4F EW Index.

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Summary of benefits and how to implement

- Higher risk adjusted returns, more consistency, more transparency, more diversification, lower cost

LGIMA's approach:

Replicate Scientific Beta's multi-factor indices with a process that is focused on **minimizing costs** and **mitigating risk**

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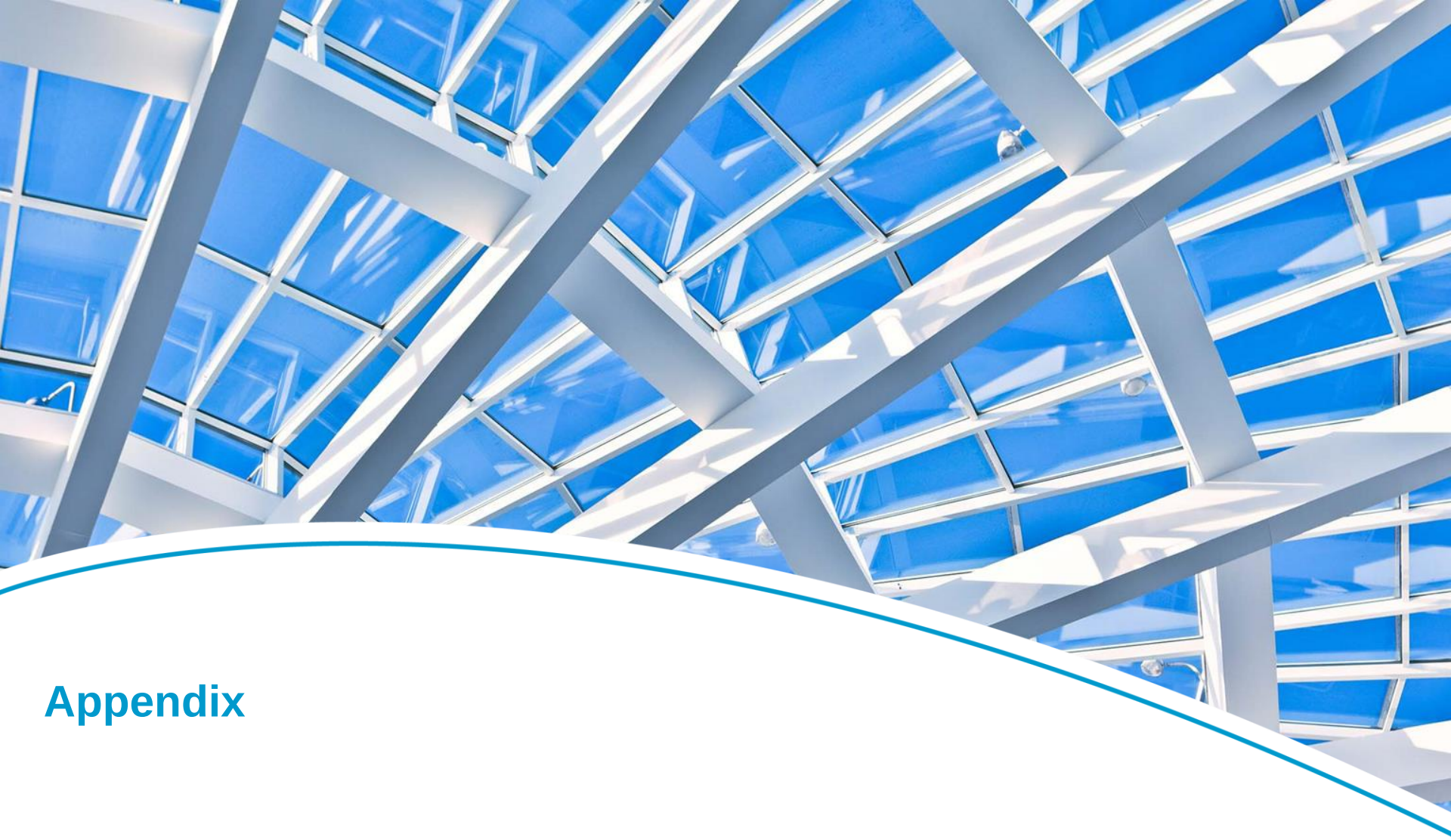


Appendix

Biographies

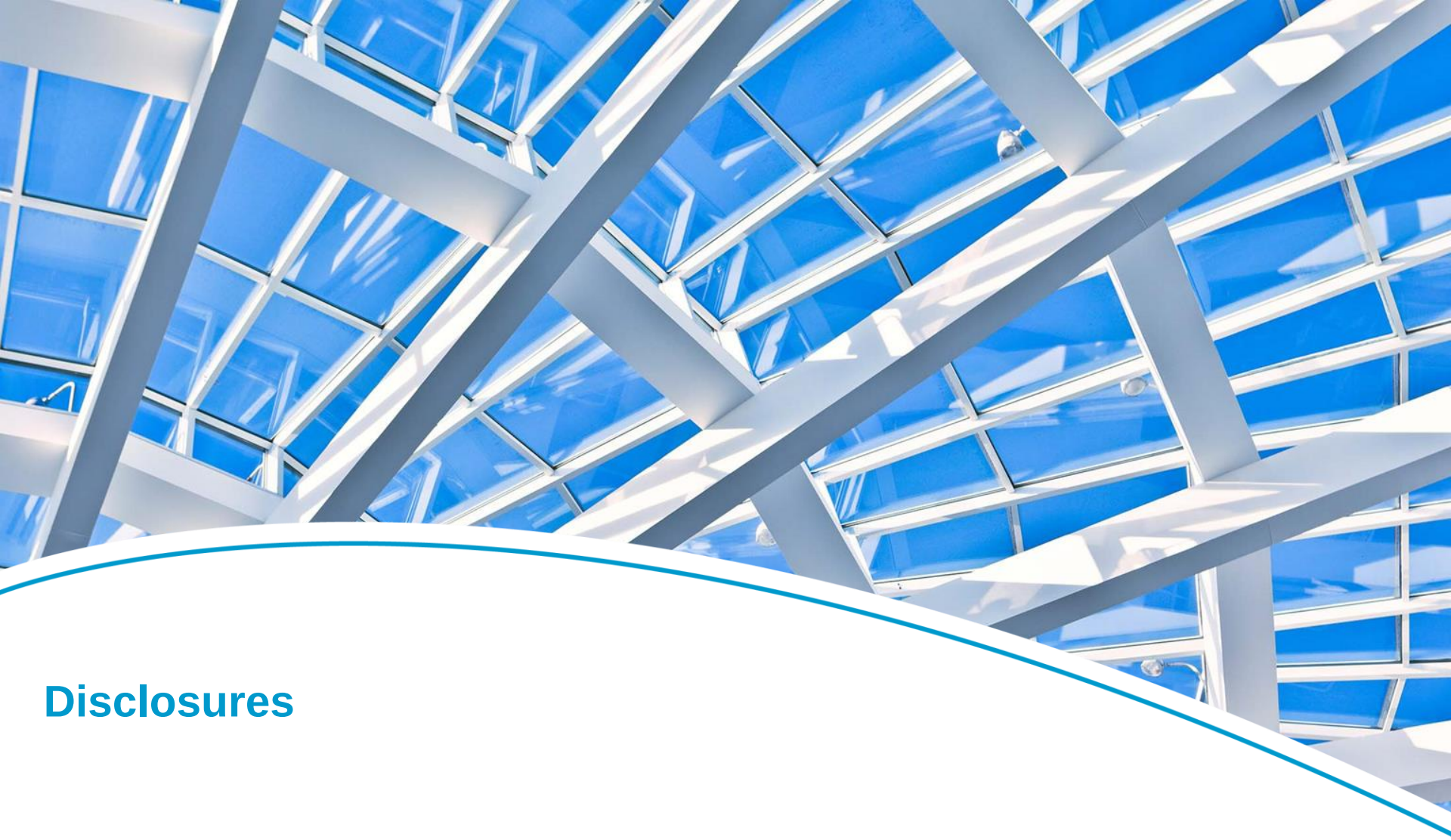
Greg Behar, Head of Index Strategy

Greg joined LGIMA in 2015 as Head of Index Strategy. Greg is responsible for providing investment thought leadership to investors and is responsible for developing comprehensive investment solutions and insights across the spectrum of index strategies.

Prior to joining LGIMA, Greg was a Senior Vice President and Head of Global Equity Investment Strategy at Northern Trust Asset Management. Greg's team provided investment thought leadership to investors globally and collaborated with investors to provide investment solutions and insights across the spectrum of index, quantitative, and fundamental active equity strategies. Greg was previously a Senior Investment Strategist for the Global Quantitative Management and Global Index Equity teams.

Prior to joining Northern Trust, Greg was a Portfolio Specialist for the active quantitative equity strategies at Deutsche Asset Management.

Greg holds a BA in economics from Binghamton University and serves on various index advisory panels.



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Index, Factors & Alpha:
Seeking complementary returns in equities

Sara Shores, CFA

Managing Director

Global Head of Investment Strategy, Factor-Based Investing

April 2019

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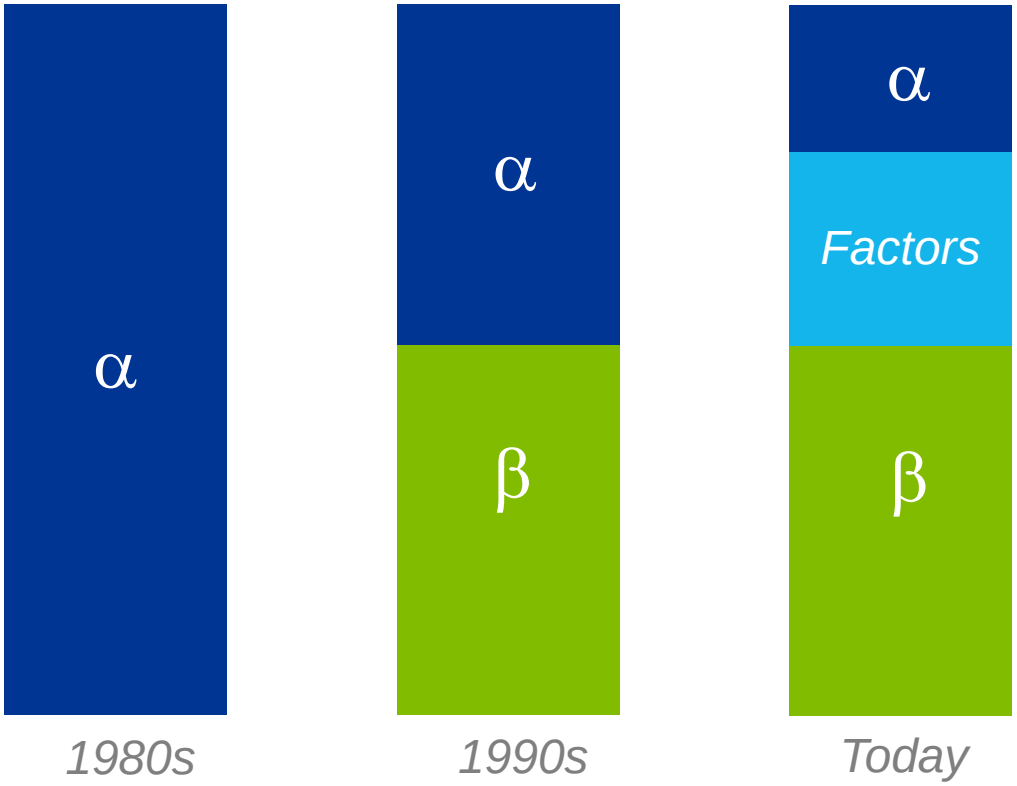
What Drives Returns?



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Factor-based investing seeks to capture broad, persistent drivers of returns

Portfolio returns can be broken down into macro factors, style factors and pure alpha

Market Exposure

Active Non-Market Exposure

Macro Factors

Primary drivers of returns across asset classes and broad markets, historically rewarding investors for taking on systematic and non-diversifiable risks

- **Economic growth** — *Bearing exposure to the business cycle*
- **Rates** — *Bearing risk of rising rates*
- **Inflation** — *Bearing risk to changes in prices*
- **Credit** — *Bearing risk of company default*
- **Emerging markets** — *Exposure to political and sovereign risks*
- **Liquidity** — *Exposure of holding illiquid assets*

Style Factors

Rewarded characteristics within asset classes capturing a risk premium, behavioral bias or structural impediment

- **Value** — *Buying cheap*
- **Momentum** — *Taking on trends*
- **Quality** — *Seeking stable earnings*
- **Minimum Volatility** — *Flight to safety*
- **Carry** — *Harvest income*

Pure Alpha

Idiosyncratic risk only consistently rewarded for managers with skill

Security selection

Country and industry selection

Market and factor timing

Source: BlackRock

Our philosophy

We invest in broad, persistent drivers of return that meet four key criteria:

Economic Rationale

Based on strong economic intuition and academic evidence*

Value Creation

Empirical evidence of positive returns*

Diversification

Low correlation with other factors

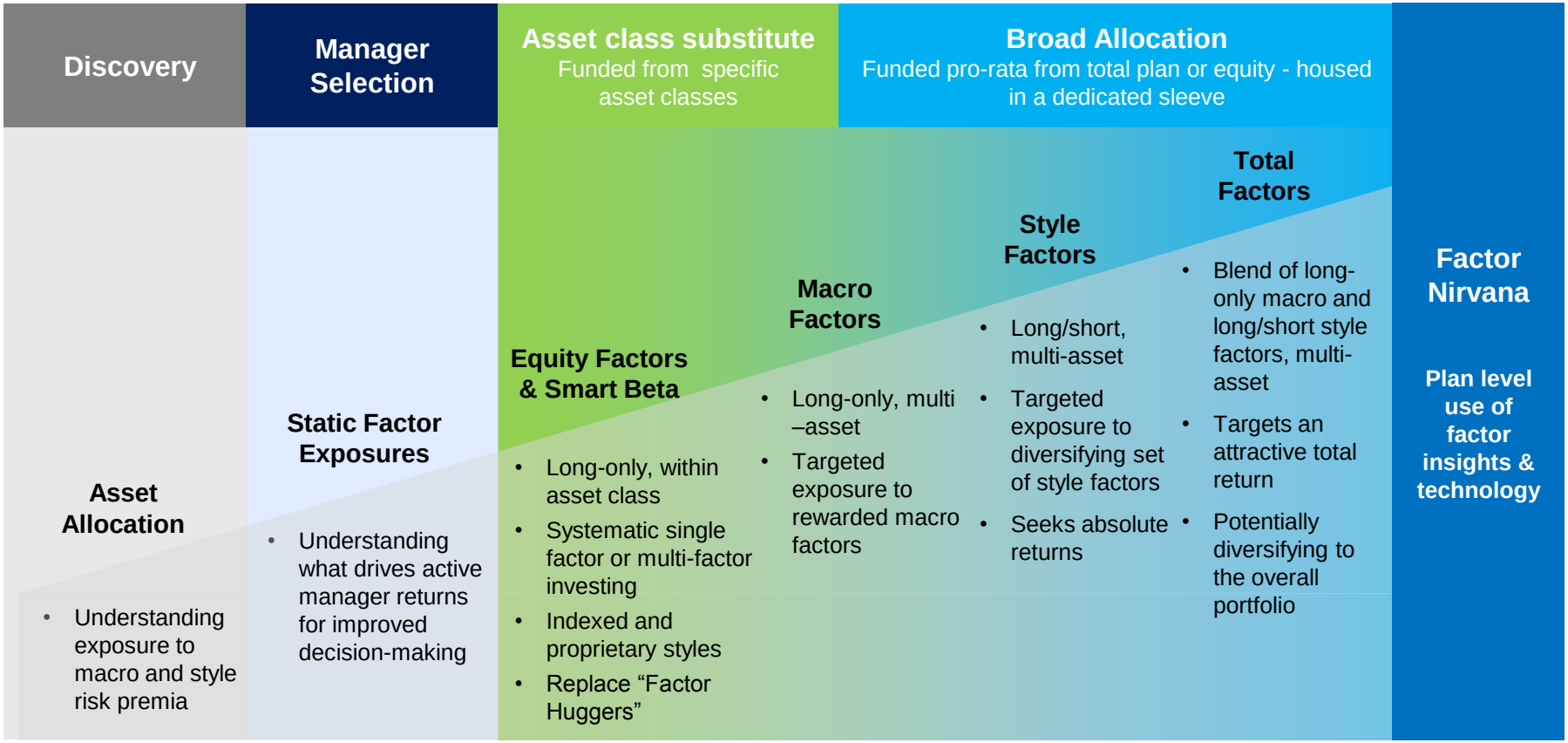
Efficient Implementation

Captured and implemented in transparent, repeatable manner

* Bender, Jennifer, Briand, Remy, Melas, Dimitris, and Raman Aylur Subramanian (2013), *"Foundations of Factor Investing",* MSCI Research Insight

The factor journey

Investors typically use factors in an effort to enhance return, reduce risk, diversify, and improve manager selection



Using different factor approaches, investors can evolve allocations to meet portfolio needs

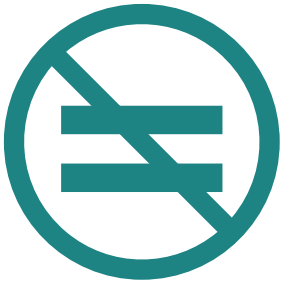
Index, Factors & Alpha

Are you getting the most out of your equity allocation…

Low forward capital market expectations across asset classes

Equites provide an attractive relative opportunity…

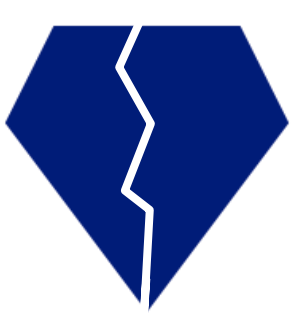
…but we believe incremental value-add over the market is increasingly valuable in a low-return environment



Outperformance does not always = alpha

Some “active” managers may look attractive on the surface…

…but an analysis of the drivers of their return may expose certain managers as “factor huggers” (managers providing factors exposures, while charging active fees)



Low cost and value are not synonymous

Institutional fee levels have fallen…

…but paying the appropriate price for each component of portfolio returns may help maximize portfolio efficiency after fees

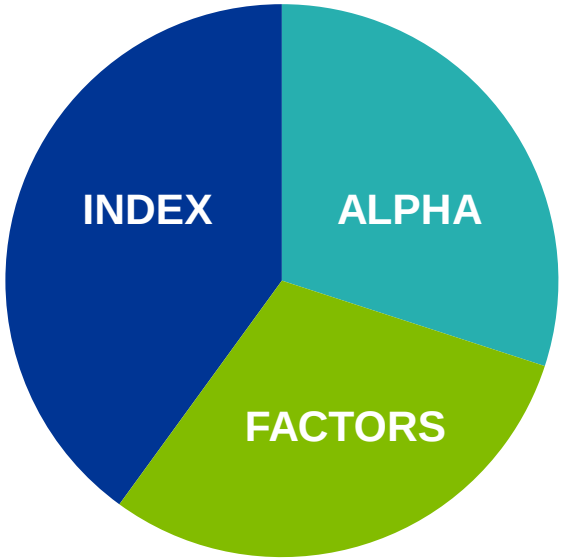
Active risk budget is not being optimized

A typical barbell allocation can target a specific active risk level…

…but may fail to incorporate lower-risk strategies that have potential to generate efficient alpha, or to consider the complementary aspects of strategies across Index, Factors and Alpha

Seek better equity outcomes by combining complementary return sources

Market cap-weighted *beta* exposure, to anchor relative to a strategic benchmark



Seeks to deliver *excess return* by uncovering harder to access insights across companies, industries, countries and trends

Seeks to deliver outperformance via broad and persistent drivers of excess *return*

Manager skill should be more than just the ability to outperform a benchmark

*Alpha includes factor timing exposure

For illustrative purposes only. There is no guarantee that a positive investment outcome will be achieved.

Each equity return component has very different characteristics

	Index	Index Plus	Factor-based	Alpha-seeking
Fees	Low	Low	Moderate	Higher
Transparency	High	High	High to Moderate	Lower
Potential Outperformance	None	Moderate	Moderate	Higher
Active return drivers	None	Event driven	Broad & persistent	Harder to access
Active risk	Minimal	Minimal	Moderate	Low-High
Turnover	Minimal	Minimal	Moderate	Moderate – Higher
Universe coverage	Full	Full	Broad regions	Broad to specialized
Scalability of strategy	Very high	High	High	Moderate

Each offering therefore plays a different role within the portfolio

For illustrative purposes only. Actual characteristics will vary depending on the specific strategy.

Be deliberate in combining *Index, Factors*, & *Alpha* to enhance portfolio design

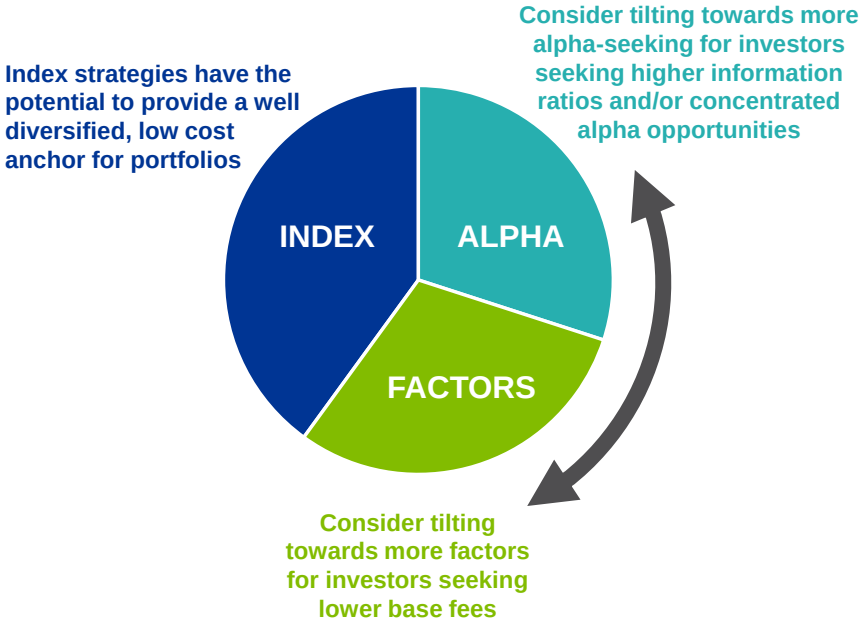
Index strategies **provide the anchor for strategic stock/bond benchmarks in target risk allocation**

Active risk can be allocated to *Factor strategies* and *Alpha-seeking strategies*

- The higher the conviction in alpha, the higher allocation to alpha-seeking strategies
- The more fee sensitive, the higher the allocation to factors
- Robust portfolios are a result of considering alpha expectations, fee sensitivity, active risk budget and due diligence capabilities

Investment Performance Drivers	
Cap-weighted Index strategies	
Index + Deliberate Factors	
Index + Differentiated Alpha	
Complementary **Index + Deliberate Factors + Alpha**	

Combining all three brings together complementary sources of return, which may result in more efficient portfolios



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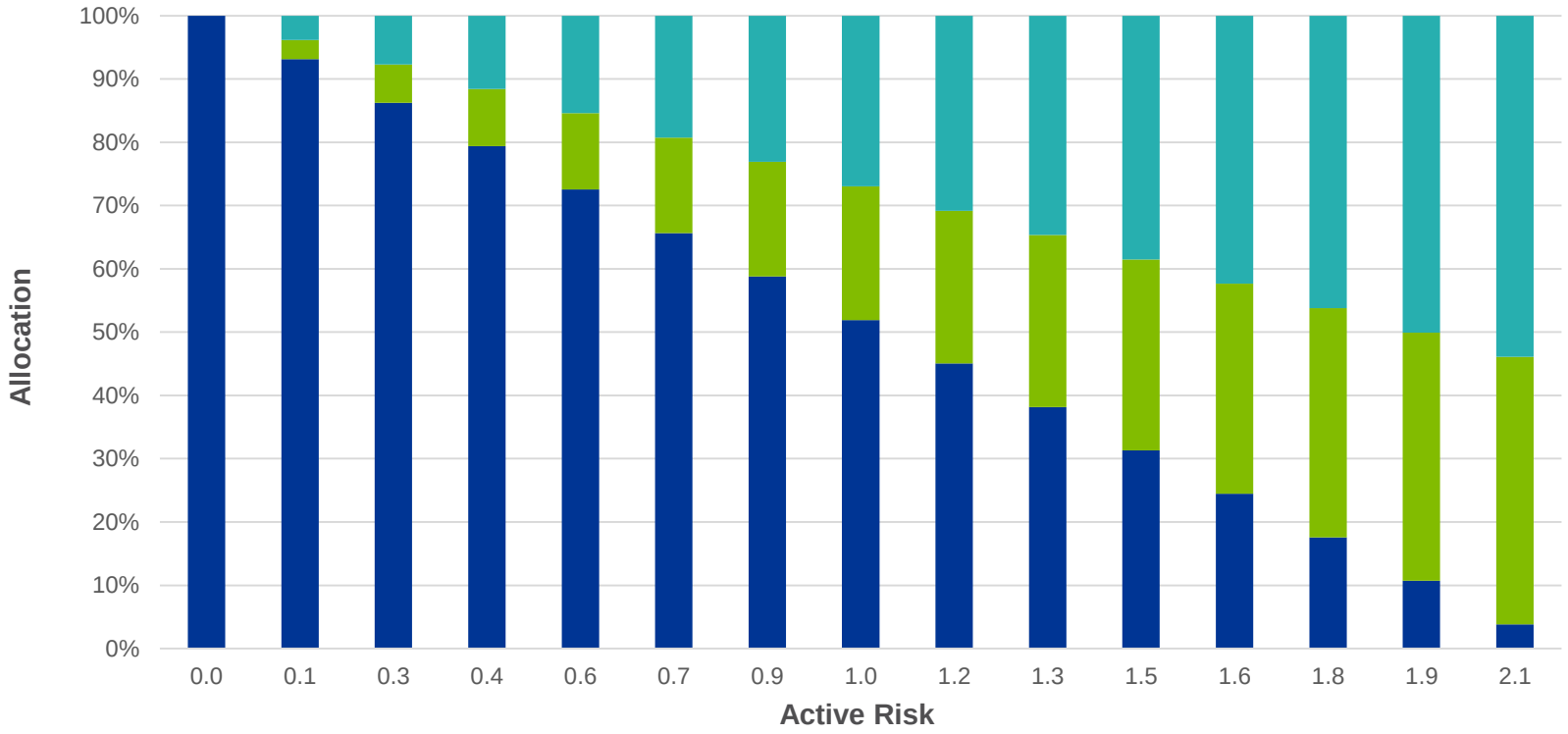
Allocations shift with investor preferences

The mix of index, factors, and alpha is different at varying levels of active risk



Allocation (%)

Index	100%	93%	86%	79%	73%	66%	59%	52%	45%	38%	31%	25%	18%	11%	4%
Multi-Factor	0%	3%	6%	9%	12%	15%	18%	21%	25%	27%	30%	33%	36%	39%	42%
Lower Risk Alpha Seeking	0%	4%	8%	12%	15%	19%	23%	27%	30%	35%	39%	42%	46%	50%	54%

The above illustration assumes an information ratio of 0.35 for the Multi-Factor strategy and 0.50 for the Lower Risk Alpha-Seeking strategy. These do not reflect any specific fund, but the general strategy within the category. This is for illustrative purposes only and should not be interpreted as investment advice or recommendation.

The “appropriate mix” will vary based on investor objectives and preferences

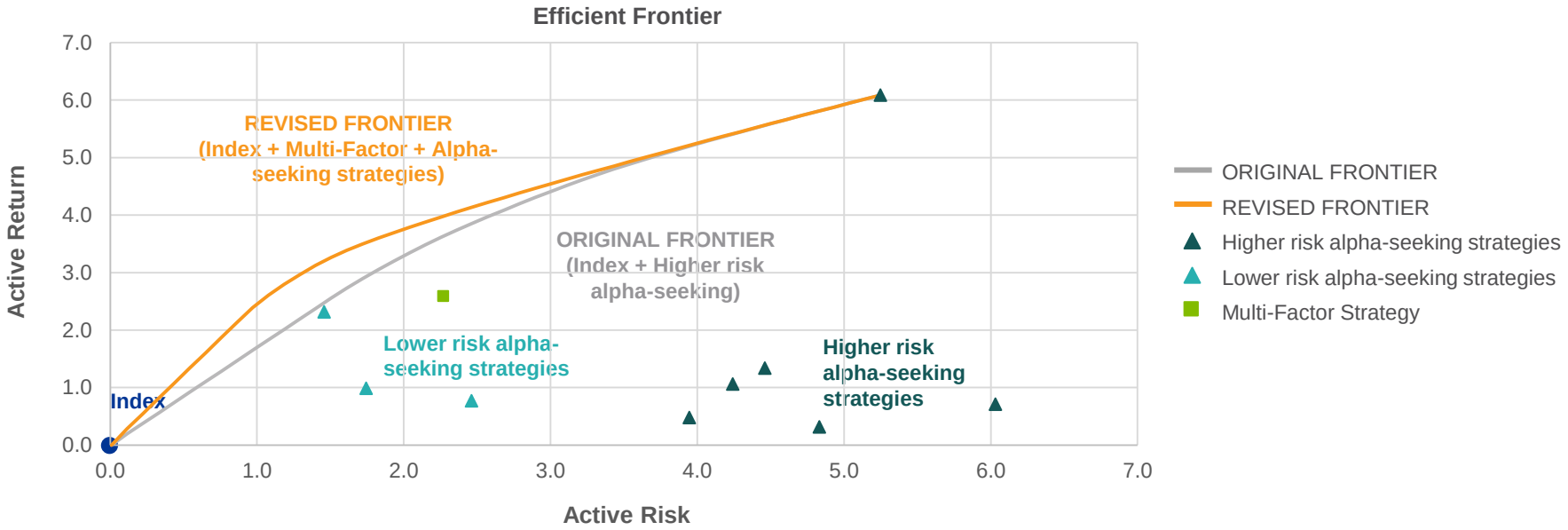
	Key Considerations	Portfolio Ingredients (*Index, Factors & Alpha*)
1	**Risk Budget** What is my active risk budget?	• Tracking error designed to be close to zero for pure index strategies • Factor strategies typically targeting moderate active risk • Active managers vary from modest active risk for systematic strategies to significant active risk for more high conviction approaches
2	**Outperformance Target** What is my return target?	• Modest outperformance might be generated via simple tilts to rewarded factors • Higher return targets often require enhanced alpha discovery techniques and/or the use of leverage
3	**Investment Philosophy** What are my underlying investment beliefs or biases?	• Portfolio design may be different depending on inherent beliefs on efficient markets (index) or the potential reward for risk taken targeting persistent return drivers (factors) or idiosyncratic outperformance (alpha) • Philosophies and beliefs have likely changed over time and will going forward • There may be additional objectives to consider, such as ESG
4	**Value** What am I getting for my money?	• Pay the right price for deliberate exposure to each component of returns • Generally, index is highly scalable and lowest cost; Factors are somewhat scalable and lower cost than alpha; Alpha is harder to access and very valuable
5	**Governance, Oversight & Constraints** What are my manager research resources and underlying limitations?	• Index strategies seek to deliver market access with few surprises; may require less ongoing governance and oversight • Factor portfolios can out/underperform, offer the potential for long run returns, subject to short term cyclicality of factors, require review and monitoring • Active portfolios can out/under perform, subject to discovering new sources of return and/or forecasting error, require regular review and monitoring • Additional incremental return may be available by relaxing investment constraints (liquidity/term, long-bias, etc.)

For illustrative purposes only and should not be interpreted as investment advice or recommendation.

Enriching the opportunity set by adding complementary exposures

Improving the active efficient frontier

- We believe investors can enhance the opportunity set by adding exposures across Index, Factors, and Alpha-seeking strategies
  - This approach seeks to improve upon the traditional barbell method by incorporating complementary sources of return
- Inclusion of these strategies adds more sources of diversifying active management to the portfolio, pushing up the efficient frontier



Source: eVestment Alliance, MSCI as of 3/31/2018. Information shown is calculated using net of fees composite monthly return data (April 2013 to March 2018) for equity managers identified as being benchmarked to the MSCI World Index in eVestment. Multi-Factor Strategy is proxied by MSCI World Diversified-Multiple Factor Index Net USD. Index strategy is proxied by the MSCI World Index. Reflects trailing five year annualized excess returns and annualized active risk. Past performance is not a guarantee of future results. Please see "Case Study Methodology" outlined below for additional information. Efficient frontier modeled using Markov Processes International with above source data. ***Portfolio and analysis provided for illustrative purposes only to demonstrate a potential approach to using factors to enhance manager structure. It is not representative of any actual client's portfolio and is not a recommendation of an investment strategy or allocation.***

For the case study the following steps were undertaken. All data is as of 3/31/2018:

1) The top 25 active equity strategies by AUM that self-benchmarked to the MSCI World Index in eVestment were used as the starting point for manager selection.
2) Of the 25 managers, only those that self-reported net of fees strategy returns were used in the analysis.
3) Managers that pursued niche investment strategies (ex. ESG, REIT) were excluded.
4) Managers with negative trailing five year returns were also excluded. "Lower risk" managers are those with Active Risk less than 300bps; "Higher Risk" managers are those with Active Risk greater than 300bps.
5) Trailing five year annualized active risk and annualized active return were calculated using net of fee returns as reported in eVestment.
6) MSCI World and MSCI Diversified Multiple-Factor (DMF) Indices were used to proxy "Index" and "Multi-Factor" strategies. These are unmanaged indices that do not reflect any management fees, transaction costs or expenses.

Note: For investors wishing to utilize this framework, we recommend it be done while taking into account the effective fees that an active or indexed portfolio managers may charge for the share class or vehicle available to the specific investor. Using MPI, an efficient frontier was created for both the initial screened set off managers plus the MSCI World Index, as well as the revised manager set (including DMF). The two efficient frontiers were them compared to see how the curve changes. For the resulting efficient frontier, we plotted the resulting portfolio allocation at varying levels of active risk.

This analysis contains backtested index data from MSCI. Please see "Index Disclosures" in the Appendix for additional information.

Appendix

Factor-Based Strategies Group

Factor-Based Strategies Group Global Leadership Team

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Deputy Chief Investment Officer

Sara Shores, CFA
Head of Investment Strategy

Bob Bass
Head of Factor Allocation Platform

Portfolio Management & Research

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Matt Silva, CFA, CAIA
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He Ren
Vice President

Melissa Zhang
Associate

Muling Si
Analyst

Jonathan Adams, PhD
Vice President

Paolo Miranda
Vice President

Ying Chan
Vice President

APAC

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EMEA

Katharina Schwaiger, PhD
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Justin Peterson
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Jack Davies, CFA
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Antony Bogodist
Associate

Paige Whistler
Associate

Scott Gladstone
Associate

Ward Bortz
Director

Katelyn Gallagher
Director

Content Strategy

Di Sanborn
Director

Pieter Nelissen
Vice President

APAC

Ben Garland, CFA
Director

EMEA

David Gibbon, CFA
Managing Director

Jim Snow
Director

Hannah Wallis
Vice President

James Kilburn
Associate

Trading

Centralised trading function and capital markets presence helps increase liquidity and improve execution

Risk & Quantitative Analysis

Leverage BlackRock Solutions® analytics and Risk & Quantitative Analysis Group to help generate alpha

Aladdin®

Proprietary platform integrates portfolio management, risk analytics, trading and operations

BlackRock Investment Institute

Connects investors across BlackRock to help them make better investment decisions

Source: BlackRock as at January 2019, subject to change.

BlackRock has a deep-rooted foundation in Systematic and Factor Investing

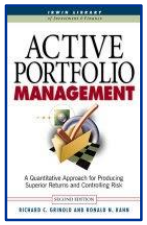
1979:
First known computer program created to identify stocks with higher dividend yields

1985:
Alpha Tilts launched, a factor tilted portfolio combining **Value**, **Size** and **Momentum**

1996:
Quality developed

1998:
T-Cost models developed

1999:
Grinold/Kahn publish Active Portfolio Management 2nd edition



Factor Based Strategy Group:
focused on harvesting broad, persistent drivers of return

Systematic Active Equity (SAE):
focused on delivering consistent and differentiated alpha through unique sources and tools

1975 | 1980s | 1990s | 2000s

Includes innovations from predecessor firms

Important Notes

This analysis contains back-tested index data

- Index returns are for illustrative purposes only and do not represent any actual fund performance
- Index performance returns do not reflect any management fees, transaction costs or expenses
- Indexes are unmanaged and one cannot invest directly in an index
- Past performance does not guarantee future results
- Data for time periods prior to the index inception date is hypothetical and is provided for informational purposes only to indicate historical performance had the index been available over the relevant time period
- Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect the actual fund performance
- Actual performance of any vehicle may vary significantly from hypothetical index performance due to transaction costs, liquidity or other market factors

Index methodology is available at www.msci.com.

Index Name Index Inception Date Dates of Back-Tested Returns 1-Year 5-Year 10-Year MSCI World Diversified Multi-Factor Index 3/19/15 11/30/98 – 3/19/15 20.06% 12.34% 8.49%

Index Name	Index Inception Date	Dates of Back-Tested Returns	1-Year	5-Year	10-Year
MSCI World Diversified Multi-Factor Index	3/19/15	11/30/98 – 3/19/15	20.06%	12.34%	8.49%

Important Notes cont'd

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Important Notes cont'd

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It is not possible to directly invest in an unmanaged index.

Risk
Investing in the bond market is subject to certain risks including market, interest-rate, issuer, credit, and inflation risk. Equities may decline in value due to both real and perceived general market, economic, and industry conditions. Mortgage and asset-backed securities may be sensitive to changes in interest rates, subject to early repayment risk, and while generally backed by a government, government-agency or private guarantor there is no assurance that the guarantor will meet its obligations. High-yield, lower-rated, securities involve greater risk than higher-rated securities; portfolios that invest in them may be subject to greater levels of credit and liquidity risk than portfolios that do not. Investors will, at times, incur a tax liability. Income from municipal bonds may be subject to state and local taxes and at times the alternative minimum tax. Derivatives may involve certain costs and risks such as liquidity, interest rate, market, credit, management and the risk that a position could not be closed when most advantageous. Investing in derivatives could lose more than the amount invested.

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Alaska Retirement Management Board

Gaurav Mallik
Sonya K. Park
Robert K. Shapiro , CAIA , CFA

April 4, 2019

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Diversification of US Pension Funds

Diversification is a concept that originates from Markowitz as it relates to portfolio theory

It has applications in asset allocation as it relates to manager selection and the properties of the drivers of returns

We observe, large investors employ too many active managers (over diversify) due in part to policy requirements and fund capacity constraints.

By combining too many active managers , a plan's active risk (tracking error) will fall dramatically resulting in the plan being unable to achieve its return goals

We also examine the fee per unit of risk and find that there are efficiencies to be gained by reducing the number of active managers where there are truly uncorrelated return drivers and perhaps also examining systematic strategies where there exist no capacity constraints

Source: P&I and SSGA, Data from P&I is as of September 30, 2015.
Mckay, Shapiro, and Thomas. "What Free Lunch? The Costs of Overdiversification", Financial Analysts Journal, Q1 2018.

The Problem of Overdiversification

Portfolio Theory

Diversification is the only “free lunch” in finance

Pension Fund Reality

Overdiversification = expensive index fund

Questions

- How much diversification is too much diversification?
- What rules can we use to estimate the right amount of diversification?
- How can factor-based methods help solve the problem of overdiversification?

Source: State Street Global Advisors Investment Solutions Group

Diversification Across US DB Plans

Number of All Funds Employed by US Defined Benefit Plans

As of September 30, 2015

Panel A Pension Total Assets	Number of DB Plans	Min. Number of Funds	Max Number of Funds	Avg. Number of Funds
Less than $1 Billion	2	3	22	6
From $1–$10 Billion	18	7	104	40
From $10–$25 Billion	39	4	207	56
From $25–$50 Billion	13	8	219	82
Greater than $50 Billion	16	15	297	163
All Pensions	**88**	**4**	**297**	**75**

Number of Equity Funds Employed by US Defined Benefit Plans

As of September 30, 2015

Panel B Pension Total Assets	Number of DB Plans	Min. Number of Funds	Max Number of Funds	Avg. Number of Funds
Less than $1 Billion	2	0	3	2
From $1–$10 Billion	18	3	22	12
From $10–$25 Billion	39	2	36	14
From $25–$50 Billion	13	4	34	16
Greater than $50 Billion	16	11	67	30
All Pensions	**88**	**0**	**67**	**17**

- Pension funds employ an average of 75 external funds
- Number is distorted by the extensive number of private equity LPs
- Focusing on public equities, the average pension plan typically allocate to 17 external funds
- What is the impact of this level of diversification on active risk and the potential to add value?

Source: P&I, SSGA, As of September 30, 2015.
P&I aggregates the number of external investment funds employed by the largest 200 plan sponsors in the United States. For this study, they exclusively focus on the defined benefit (DB) plans, of which P&I received manager data. This resulted in 88 plans. The data was collected by direct mailings to US defined benefit plan sponsors.

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Research Results

Average Statistics of Equally Weighted Composites

		Avg. Statistics for 10,000 Equal Weighted Portfolio Simulations					
Risk Attribute	Avg. Stats for 638 Strategies	2 Equal Weighted Funds	4 Equal Weighted Funds	6 Equal Weighted Funds	8 Equal Weighted Funds	9 Equal Weighted Funds	10 Equal Weighted Funds
Security Count	155.7	238.8	486.7	648.2	782.4	837.4	898.3
Predicted Beta	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Active Risk (%)	3.3	2.4	1.8	1.5	1.3	1.3	1.2
Active Share (%)	72.6	61.1	50.3	44.7	41.0	39.6	38.4
Asset Specific Risk (%)	36.4	35.7	34.7	34.1	33.4	32.8	32.4
Factor Risk (%)	63.6	64.3	65.3	65.9	66.6	67.2	67.6

Source: Morningstar, Axioma, and SSGA, As of December 31, 2015.

- Active Risk and Active Share drop significantly as we diversify from 1 to 10 funds in the portfolio

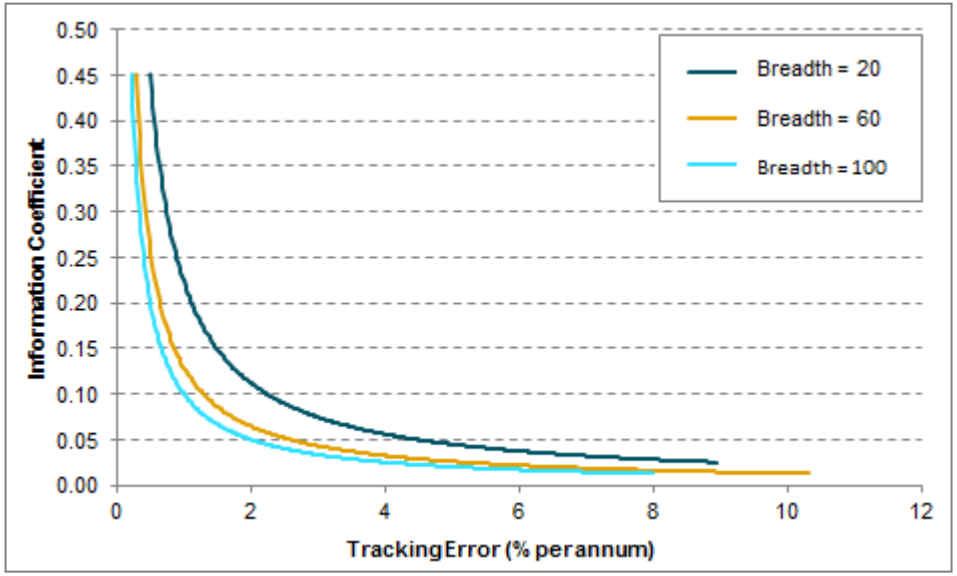
The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.

The Fundamental Law and the Active Risk Tradeoff

Active Return = IC * $\sqrt{Breadth}$ * σ_{te}

IC = Information Coefficient, which is effectively the correlation between security forecasts and subsequent security returns
Breadth = the number of independent forecasts made
$\sigma_{te,=}$ Tracking error, or active risk

Required Information Coefficient Necessary to Hit 1% Excess Return



Source: Grinhold and Kahn (1991), SSGA (2016).

Comments

- As tracking error declines, the IC must rise in order to keep expected returns constant
- The required IC increases exponentially!
- Should we expect an exponential increase in IC as we add more managers?

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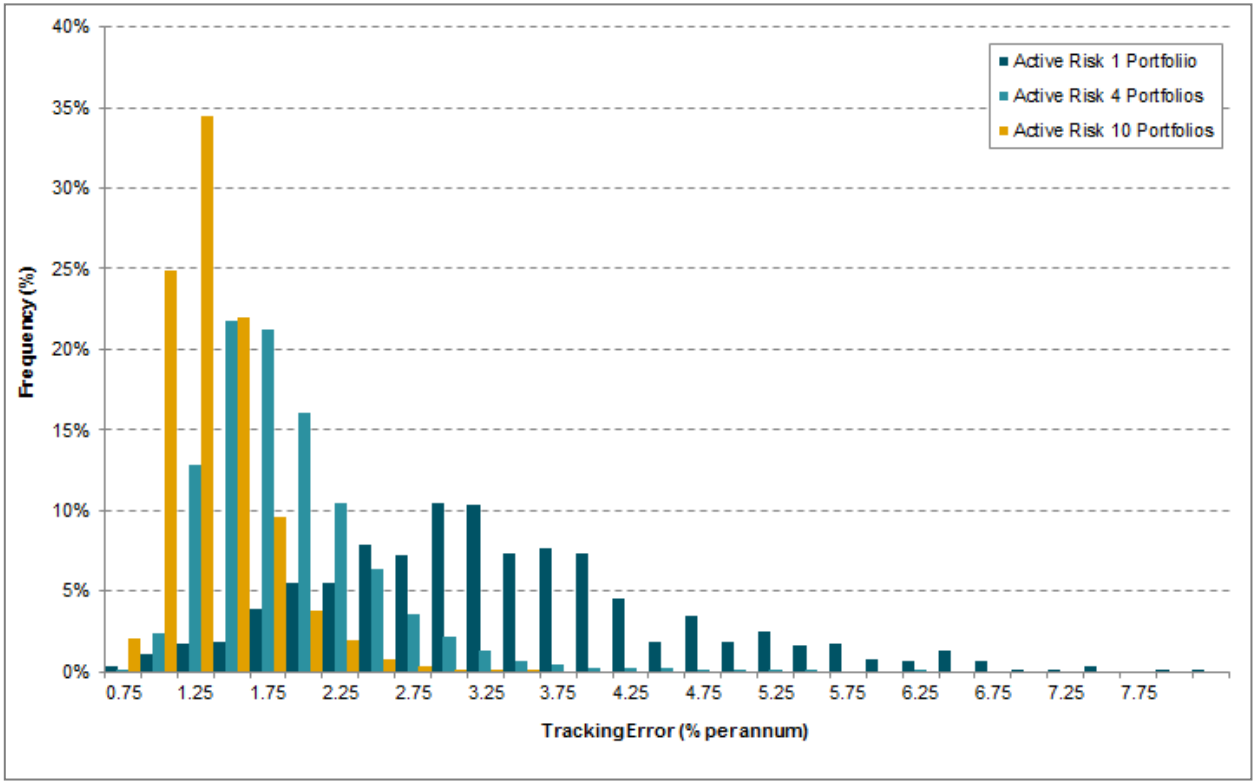
Active Risk Breakdown for Simulations

Active Risk Opportunity Set for Research Universe and 4 & 10 Equal Weighted Sims



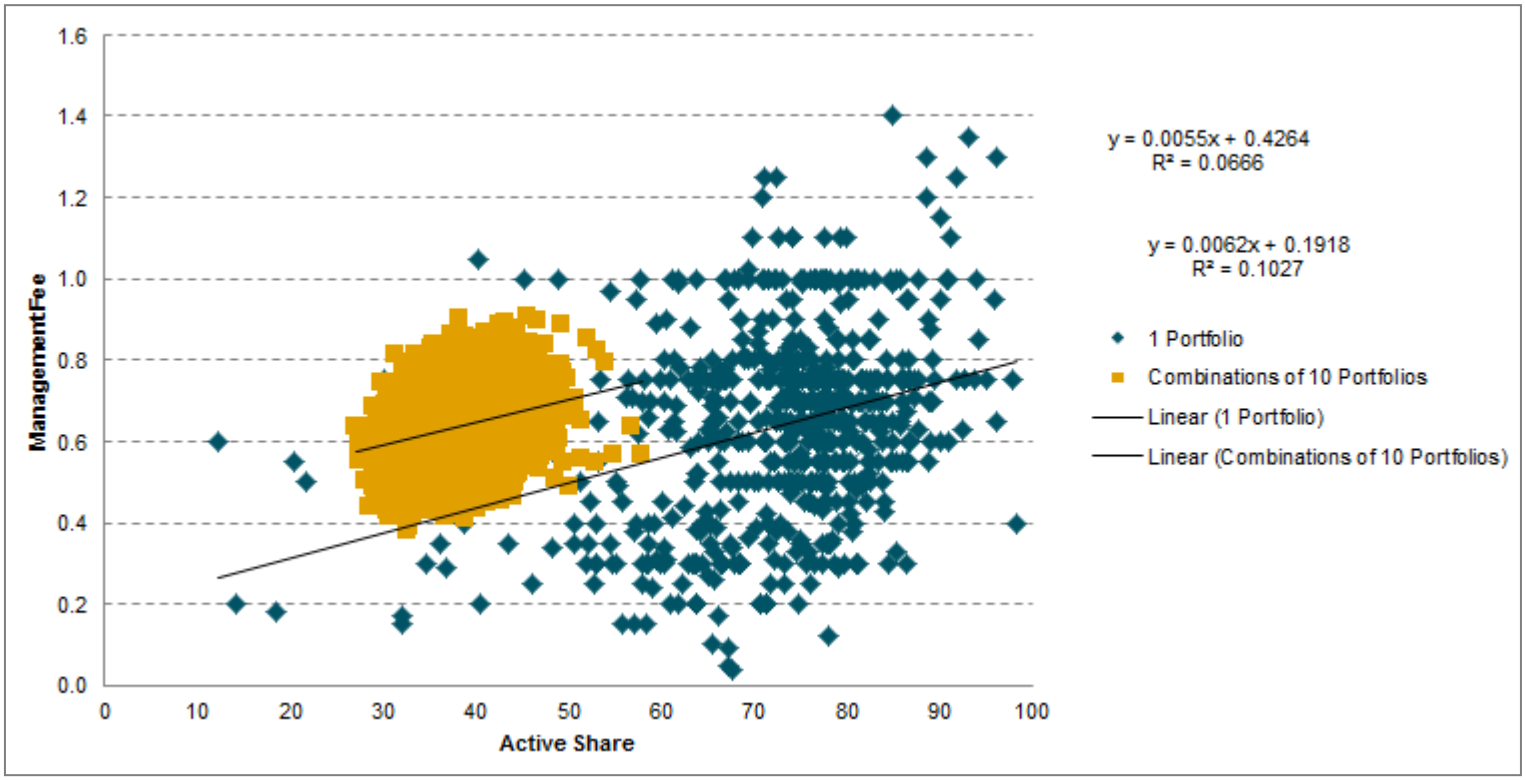
Source: Morningstar, Axioma, and SSGA, As of December 31, 2015.

- As we diversify from1 to 10 funds in the equal weight portfolios, the Active Risk opportunity set diminishes significantly

The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.

Diversification's Impact of Fees and Active Share

Active Share versus Management Fees



Source: Morningstar, Axioma, and SSGA, As of December 31, 2015.

- Notice the leftward shift that occurs as we increase the number of portfolios. Less Active Share, but fees remain constant.

The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.

Diversification Impact on Fee Ratios

- FAR Ratio = Fees for Active Risk = Management Fee/Active risk
- FAS Ratio = Fees for Active Share = Management Fee/Active Share

		Avg. Statistics for 10,000 Equal Weighted Portfolio of Number of Strategies Listed Below					
Risk Attribute	**Avg. Stats for 638 Strategies**	**2**	**4**	**6**	**8**	**9**	**10**
Security Count	155.7	238.8	486.7	648.2	782.4	837.4	898.3
Predicted Beta	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Active Risk (%)	3.3	2.4	1.8	1.5	1.3	1.3	1.2
Active Share (%)	72.6	61.1	50.3	44.7	41.0	39.6	38.4
Management Fee/Active Risk	0.19	0.27	0.35	0.43	0.49	0.49	0.53
Management Fee/Active Share	0.009	0.010	0.013	0.014	0.016	0.016	0.017

Source: Morningstar, Axioma, and SSGA, As of December 31, 2015.

- Both the FAR and FAS ratio increase as we expand the number of external funds

The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.

Measure Active Share and Active Risk at Total Portfolio Level

Two “Active” Managers

	Portfolio 1: Russell 1000 Value	Portfolio 2: Russell 1000 Growth	50/50 Blend of Portfolio 1 and 2
Benchmark	Russell 1000 Index	Russell 1000 Index	Russell 1000 Index
Active Risk (%)	2.80	2.70	0.09
Active Share (%)	45.00	44.00	1.00
Fee (%)	0.75	0.75	0.75

Source: Factset, SSGA, As of December 31, 2017.

- Separately, each of these “active” managers have reasonable active risk and active share.
- Together, their active risk is close to zero (0.09%), similar to an index fund.
- Active risk should be measured at the total portfolio level.

The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.

Fees per Unit of Active Risk

If all the underlying managers have the same level of active risk (σ_i), the active correlations between the managers are 0, and we equally weight these managers ($w_i = 1/n$), the overall level of active risk (σ_a)can be expressed by,

$\sigma_a = \sigma_i * 1/\sqrt{n}$

By introducing fees and rearranging the terms we can quickly show that,

$Fees/\sigma_a = (Fees / \sigma_i) * \sqrt{n}$

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. “What Free Lunch? The Costs of Overdiversification.” Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44-58

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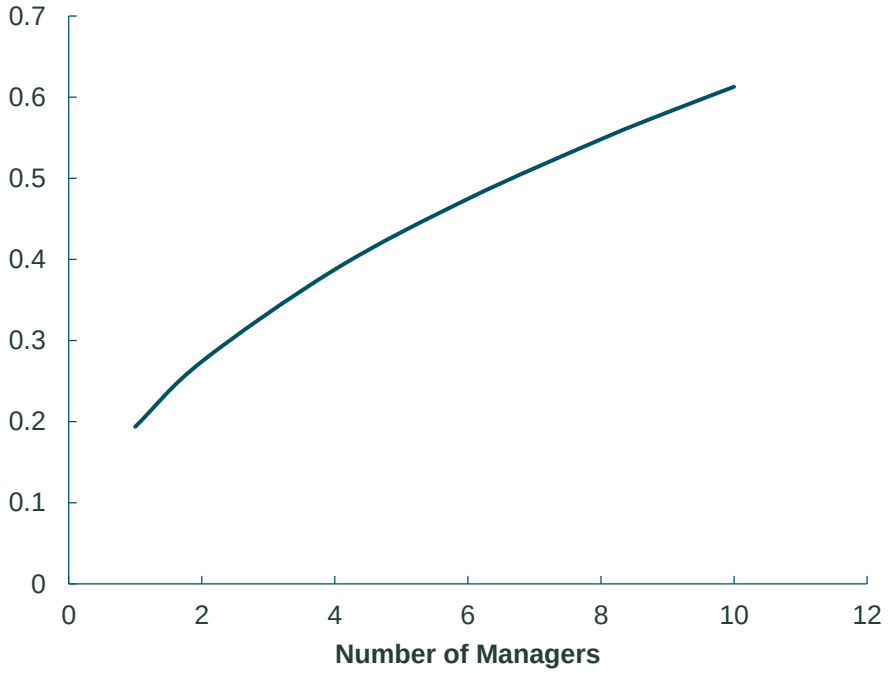
Predicted Fee Efficiency

Fees (bps) to Active Risk Ratio



- The predicted FAR ratio closely proxies the actual ratio
- This suggests that we can quickly estimate the FAR ratio, as we build out a diversified equity program

The information contained above is for illustrative purposes only and is not indicative of the performance of any product managed by SSGA. We constructed the table above by selecting Equity Mutual Funds from Morningstar and equally-weighting them in a holding portfolio. The mutual funds were selected at random, and the results above are from running that randomized selection 10,000 times. This illustration is as of December 31, 2015. This information is not the result of actual trading.
Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. “What Free Lunch? The Costs of Overdiversification.”
Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44-58

Source: Morningstar, Axioma, and SSGA, As of December 31, 2015

Optimal Number of Managers

One method: Use the desired Fees/Active Risk level (FAR ratio) to solve for the number of managers

Assume that a plan CIO is willing to pay 25 bps per unit of active risk. Assume each manager runs at 4% active risk and charges a flat 50 bps. We can solve for the number of active managers:

$$\text{Number of managers} = (\text{FAR} * \sigma_i / \text{Fees})^2$$
$$= [(0.25 * 4\% / 0.50\%]^2$$
$$= 4$$

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. "What Free Lunch? The Costs of Overdiversification." Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44-58.

Factor Risk versus Stock Specific Risk

Assume we hire 10 managers, each with an active risk (σ_i) of 8%. Additionally, assume that stock specific risk (σ_s) accounts for 85% of active risk for each manager, with factor risk (σ_f) at 15%. The active variance can be expressed as the sum of the variances of each component.

$\sigma_i^2 = \sigma_s^2 + \sigma_f^2 = 8\%^2$

Using this, we can calculate the level of active risk stemming from specific and factor risk using the following:

$\sigma_s^2 / (\sigma_s^2 + \sigma_f^2) = 0.85 \longrightarrow \sigma_s = 7.4\%$

$\sigma_f^2 / (\sigma_s^2 + \sigma_f^2) = 0.15 \longrightarrow \sigma_f = 3.1\%$

If we equal weight the 10 managers, factor risk will stay constant, but specific risk will decline by the square of N.

$\sigma_s = 7.4\%/\sqrt{10} = 2.3\%$

With the decline in stock specific risk, active risk now falls to 3.9% since,

$3.9\%^2 = 3.1\%^2 + 2.3\%^2$

And now the proportion of active risk stemming from specific falls to **36**%, while the proportion to factor risk rises to **64**%.

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. "What Free Lunch? The Costs of Overdiversification." Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44-58

Low Active Risk Model Portfolio

- Total active risk of 75 basis points
- Large core (75%) index portfolio
- Satellite sleeve of eight active managers, each with an active risk of 4%
- Active strategies derive half active risk from stock-specific, half from factors

				Low Active Risk			
				Stock		Cumulative	Cumulative
			Active	Specific	Factor	Specific	Factor
		Weight	Risk	Risk	Risk	Risk	Risk
Core Portfolio							
	MSCI World	75%	0.00%	0%	0%	0%	0%
Satellite							
1	Active 1	3.13%	4.00%	50%	50%	2.83%	2.83%
2	Active 2	3.13%	4.00%	50%	50%	2.00%	2.83%
3	Active 3	3.13%	4.00%	50%	50%	1.63%	2.83%
4	Active 4	3.13%	4.00%	50%	50%	1.41%	2.83%
5	Active 5	3.13%	4.00%	50%	50%	1.26%	2.83%
6	Active 6	3.13%	4.00%	50%	50%	1.15%	2.83%
7	Active 7	3.13%	4.00%	50%	50%	1.07%	2.83%
8	Active 8	3.13%	4.00%	50%	50%	1.00%	2.83%
Total Satelletite Statistics		25%	3.00%	11.1%	88.9%	1.00%	2.83%
Total Equity Portfolio		100%	0.75%	11.1%	88.9%	0.50%	1.41%

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. "What Free Lunch? The Costs of Overdiversification." Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44–58.
Results for DM and EM Jan98 — May18.

Medium Active Risk Model Portfolio

- Total active risk of 142 basis points
- Large core (75%) portfolio with some active risk (1.25%) — mostly factor risk
- Satellite sleeve of six active managers, each with an active risk of 6%
- Active strategies derive 60% active risk from stock-specific, 40% from factors

			Medium Active Risk				
				Stock		Cumulative	Cumulative
			Active	Specific	Factor	Specific	Factor
		Weight	Risk	Risk	Risk	Risk	Risk
Core Portfolio							
	MSCI World	75%	1.25%	25%	75%	0.63%	1.08%
Satellite							
1	Active 1	4.17%	6.00%	60%	40%	4.65%	3.79%
2	Active 2	4.17%	6.00%	60%	40%	3.29%	3.79%
3	Active 3	4.17%	6.00%	60%	40%	2.68%	3.79%
4	Active 4	4.17%	6.00%	60%	40%	2.32%	3.79%
5	Active 5	4.17%	6.00%	60%	40%	2.08%	3.79%
6	Active 6	4.17%	6.00%	60%	40%	1.90%	3.79%
Total Satelletite Statistics		25%	4.24%	20.0%	80.0%	1.90%	3.79%
Total Equity Portfolio		100%	1.42%	12.6%	87.4%	0.47%	1.25%

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. "What Free Lunch? The Costs of Overdiversification." Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44–58.
Results for DM and EM Jan98 — May18

High Active Risk Model Portfolio

- Total active risk of 264 basis points
- Core (50%) portfolio with more active risk (1.50%) — 60% factor risk
- Satellite sleeve of four active managers, each with an active risk of 8%
- Active strategies derive 80% active risk from stock-specific, 20% from factors

			High Active Risk				
				Stock		Cumulative	Cumulative
			Active	Specific	Factor	Specific	Factor
		Weight	Risk	Risk	Risk	Risk	Risk
Core Portfolio							
	Factor Based	50%	1.50%	40%	60%	0.95%	1.16%
Satellite							
1	Active 1	12.50%	8.00%	80%	20%	7.16%	3.58%
2	Active 2	12.50%	8.00%	80%	20%	5.06%	3.58%
3	Active 3	12.50%	8.00%	80%	20%	4.13%	3.58%
4	Active 4	12.50%	8.00%	80%	20%	3.58%	3.58%
Total Satelletite Statistics		50%	5.06%	50.0%	50.0%	3.58%	3.58%
Total Equity Portfolio		100%	2.64%	49.2%	50.8%	1.85%	1.88%

Source: SSGA, for illustrative purposes.
McKay, Shawn, Shapiro, Robert., and Ric Thomas. 2018. “What Free Lunch? The Costs of Overdiversification.” Financial Analysts Journal. Vol 74, no 1. (First Quarter): 44–58.
Results for DM and EM Jan98 — May18

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Expiration Date: May 31, 2019

Appendix A: Biographies

Biography

Gaurav Mallik

Gaurav is a Senior Managing Director of State Street Global Advisors and the Chief Portfolio Strategist. He leads a team of professionals responsible for helping advisors, consultants and institutional clients analyze economic and market developments, assess the impact to their portfolios and identify specific products and solutions to help them manage risk and take advantage of market opportunities. His team covers all equity and fixed income products: Index, Factor-based solutions and Fundamental Equities.

Prior to this role, he was responsible for redefining and growing State Street Global Advisor's Quantitiative equity investment capability across traditional active and smart beta. He has considerable experience working with clients on strategies for investing in emerging markets and has managed assets covering both active emerging market equities and cross asset within emerging markets.

He started his career as a part of the quantitative credit research team at State Street Global Markets. He joined State Street Global Markets from SKG, Inc., a company he founded with State Street in 2001 focused on trading illiquid bonds. Gaurav spent 7 years in research and quantitative modeling on the sell-side.

Gaurav holds an MBA in Finance from Cornell University, a Master in Electrical Engineering, with a focus on Neural Networks, from Boston University and a BS in Electrical Engineering from Robert Gordon's University in Aberdeen. He has written several papers on liquidity in credit markets and has presented research at academic and practitioner conferences.

Sonya K. Park

Sonya is a Vice President of State Street Global Advisors and a Senior Relationship Manager in the San Francisco Office. She is responsible for managing existing SSGA client relationships and driving new business development in the Western U.S. Prior to joining State Street Global Advisors in 2011, Sonya was a Vice President at Dimensional Fund Advisors in the Institutional Sales & Services Group.

Prior to Dimensional Fund Advisors, Sonya was an Associate Director at Watson Pharmaceuticals. Sonya has also worked at Lehman Brothers as an Equity Research Analyst and began her career at SEI Corporation.

Sonya earned a BA from the University of Pennsylvania and an MBA from the NYU Stern School of Business and has been working in the financial services industry since 1993. Sonya holds the FINRA 7 and 63 registrations. Sonya also holds the NFA Series 3 and is an Associated Person of SSGA Funds Management, Inc. ('SSGA FM') SSGA FM is a Commodity Trading Advisor registered with the Commodity Futures Trading Commission.

Biography

Robert K. Shapiro , CAIA , CFA

Rob is a Vice President of State Street Global Advisors and is an Investment Strategist in the Investment Solutions Group. In this role, he provides analysis and research focusing on building custom multi-asset class solutions for institutional clients. Previously, Rob was a portfolio manager in the Alternative Investment group where he created and managed alternative and absolute return strategies. Prior to this role, Rob was a Portfolio Manager in the North American Enhanced Equity Team where he managed both large-cap and small-cap strategies and conducted extensive research on quantitative equity modeling. Before joining North American Enhanced, Rob was a member of Information Technology and a liaison to the Enhanced Equity group. Before joining SSGA in 2005, Rob worked at Putnam Investments as a quantitative research associate.

Rob graduated from Brandeis University with a BA in Economics and an MBA in Finance from Bentley University. He has also earned the Chartered Financial Analyst and the Chartered Alternative Investment Analyst designations and is a member of the Boston Security Analyst Society, the CFA Institute and the CAIA Association.

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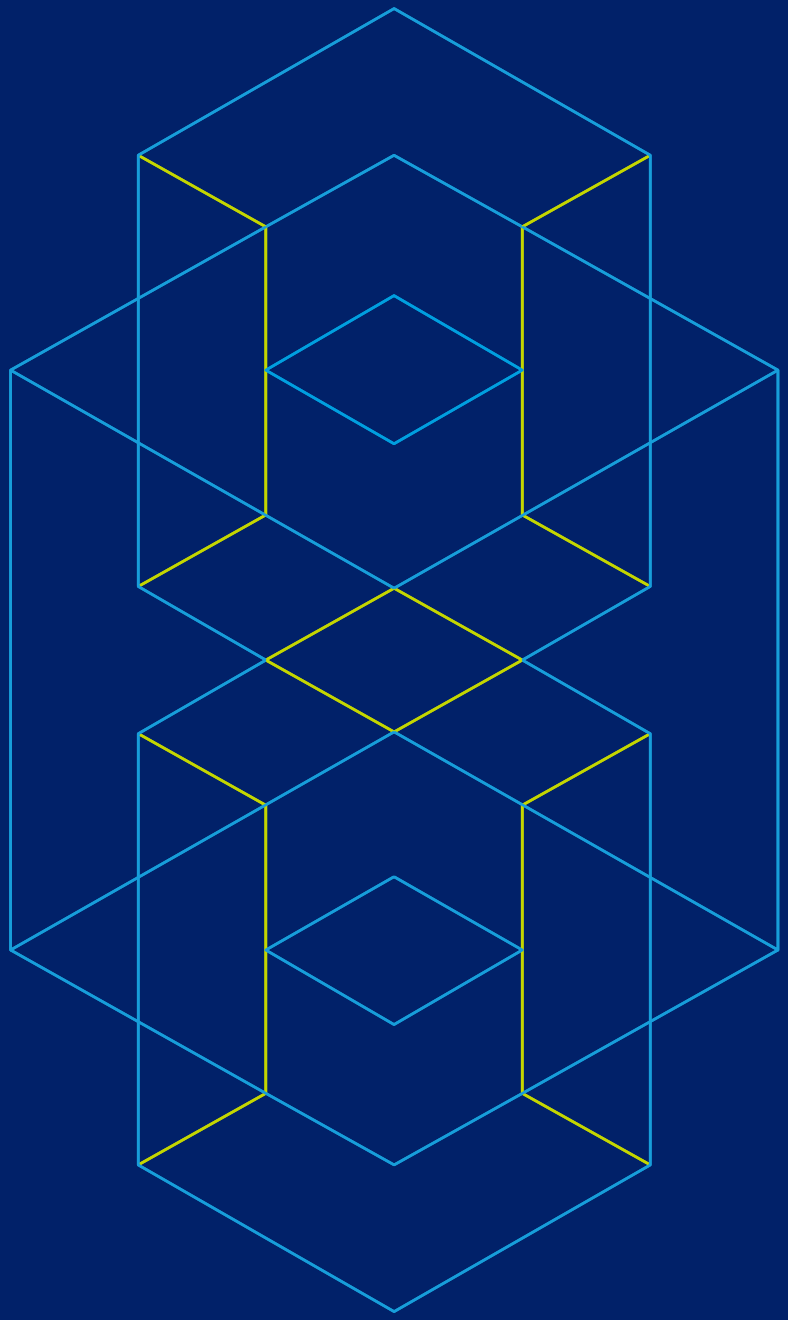
Risk Parity: Concepts and Implementation

Prepared Exclusively for Alaska Retirement Management Board

April 2019



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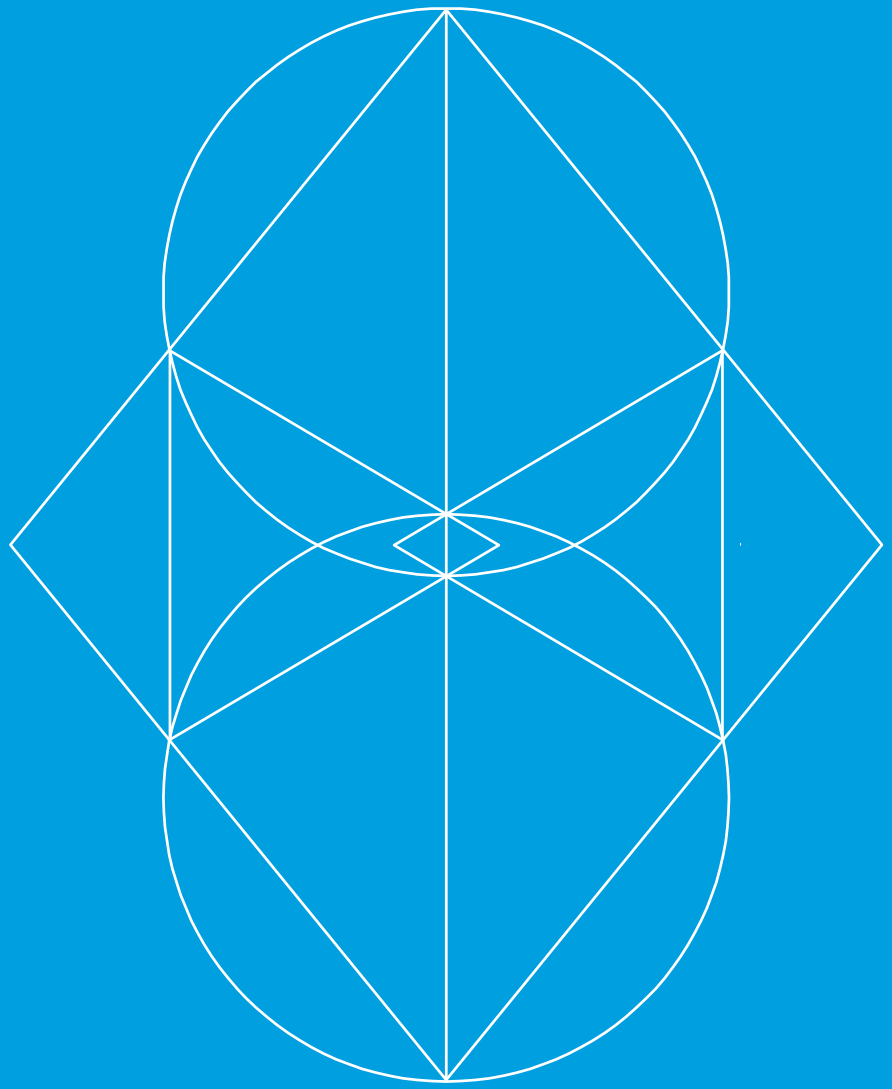
The Current Environment

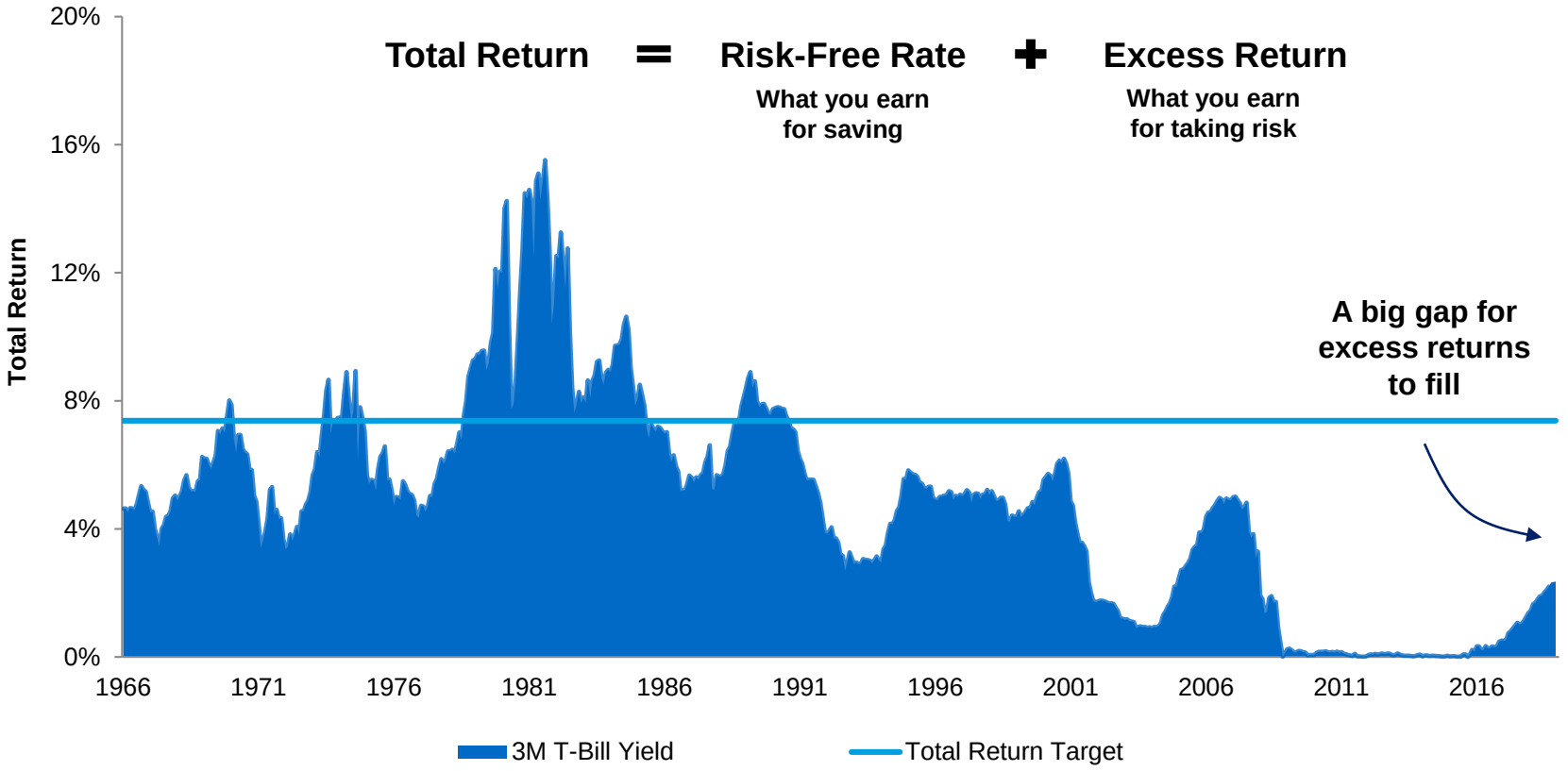


Hard for Asset Allocators to Expect to Meet Return Targets

The excess return required from traditional asset allocations is high

U.S. 3-Month Yields with ARMB's 7.38% Total Return Objective

January 1966 – December 2018



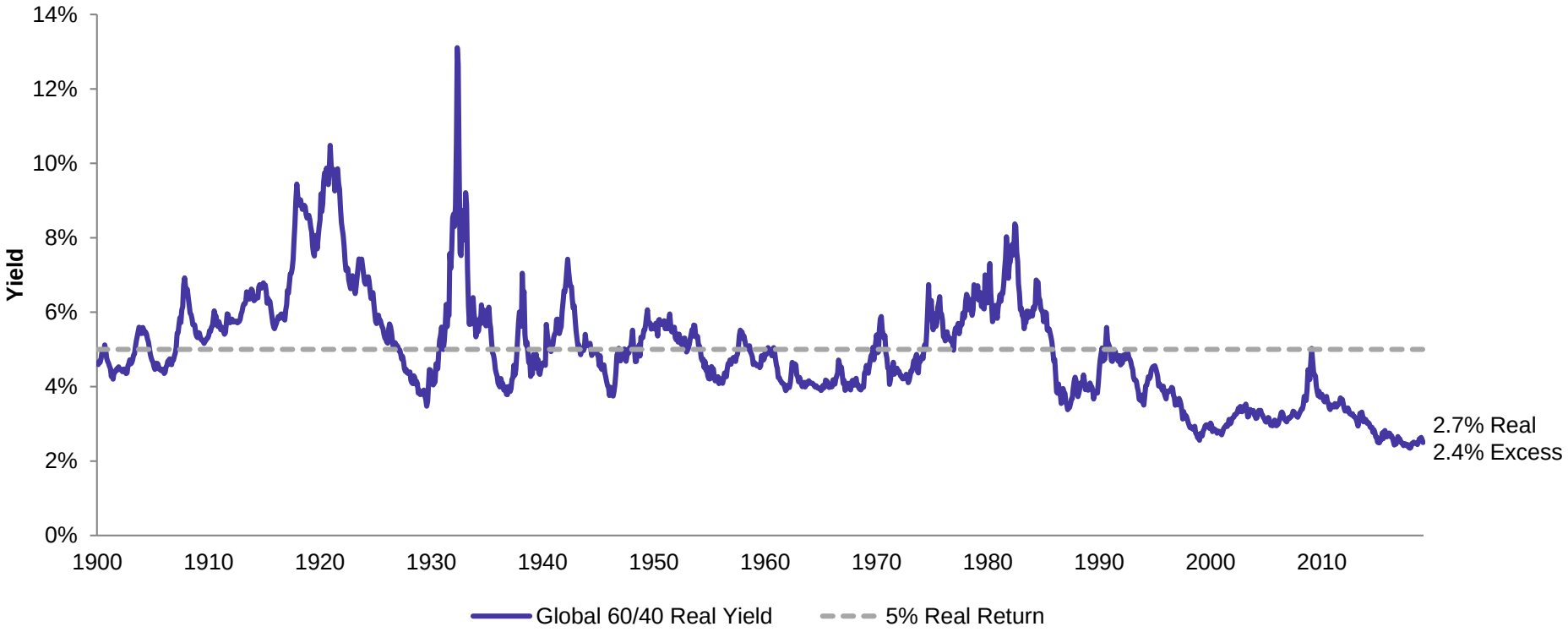
Source: AQR, Bloomberg. For illustrative purposes only. Data from January 1, 1966 through December 31, 2018. We assume a return target of 8%. 3-Month T-Bills is the Federal Funds Rate 3-month T-Bill Index used to proxy the cash rate. Targets may be subject to change and there is no guarantee that they will be met. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Hard for Asset Allocators to Expect to Meet Return Targets

Expected total and real returns are below average

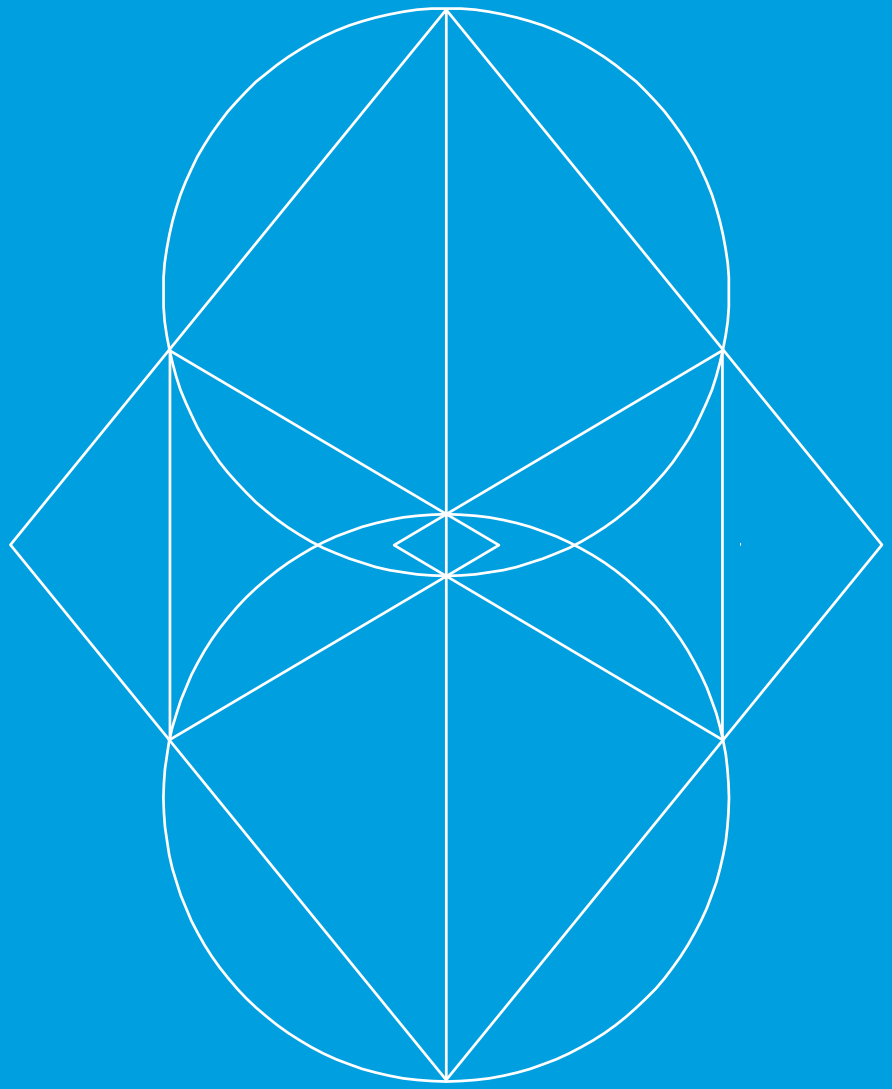
Valuation Based Expected Real Yield of a 60/40 Global Stock/Bond Portfolio

January 1900 – February 2019



Source: AQR, Bloomberg, Robert Shiller's Data Library, Ibbotson Associates (Morningstar), Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics, MSCI. Data from January 1, 1900 through February 28, 2018. Due to data availability, Global 60/40 portfolio is proxied by a U.S. 60/40 portfolio prior to November 1979. Average expected returns are the average of 60/40 real yield. The real equity yield is an average of the Shiller earnings yield (using 10-year earnings) scaled by 1.075 (embedding an annual EPS growth of 1.5%) and dividend yield plus 1.5% (roughly the long-run real growth of dividends-per-share and earnings-per-share). The universe of stocks represented is the S&P 500 for the U.S. and the MSCI World for global. The real bond yield is the yield on long-term government bonds for each country minus long-term expected inflation based on Blue Chip Economic Indicators, Consensus Economics and the Federal Reserve Bank of Philadelphia. For the global bond real yield series, we have weighted by GDP of each constituent country of the MSCI World. Before survey data became available in 1978, expected long-term U.S. inflation is based on statistical estimates and on 1-year ahead Livingston inflation forecasts. This is one set of estimates of ex-ante real yields for equities and bonds, but other reasonable specifications should tell broadly the same story. U.S. 60/40 is 60% U.S. stocks and 40% U.S. long-term bonds; Global 60/40 is 60% MSCI World and 40% GDP-Weighted 10-year government bonds. Please read important disclosures in the Appendix.

Traditional Asset Allocation and Risk Parity



Risk Parity Improves on Traditional Asset Allocation

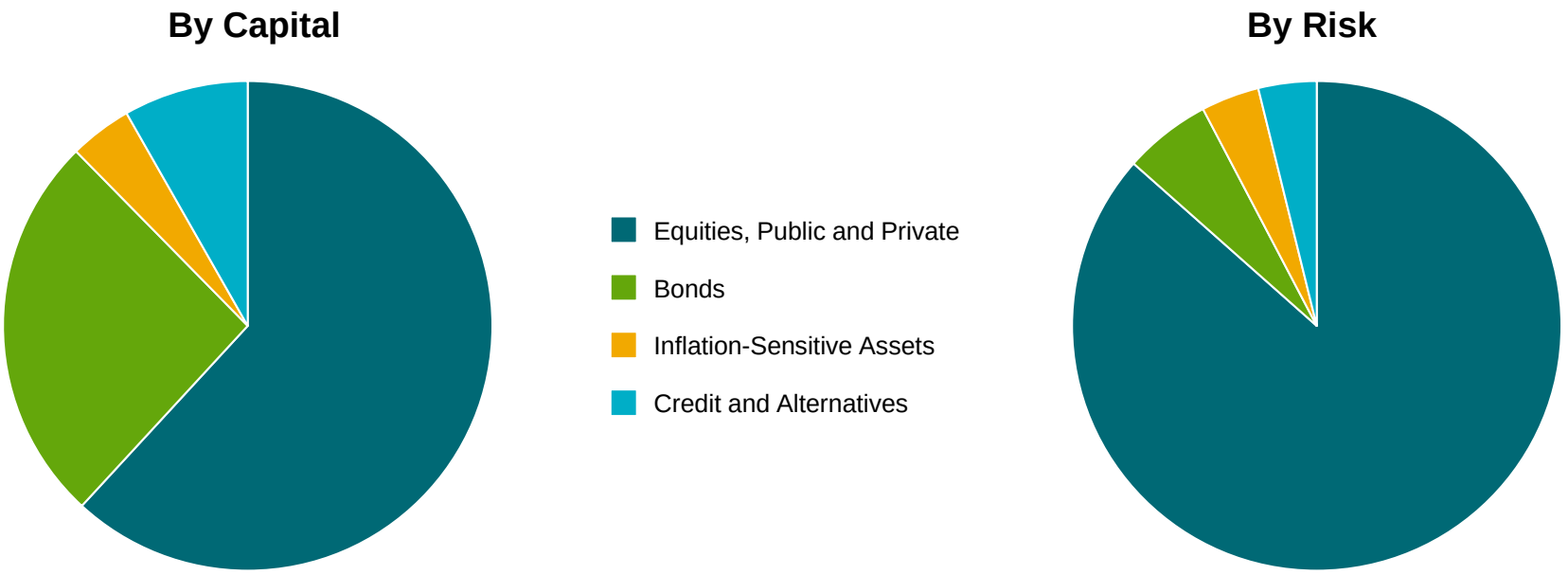
Making everything matter but nothing matter too much

Investment goal	Realize a higher long-term, risk-adjusted return
Traditional approach	Diversify *capital* globally and across asset classes
Risk parity improvement	Diversify *risk* globally and across asset classes
Risk parity implementation	Keep it diversified and risk-targeted at all times (some, but not all managers agree)

Traditional Allocations Aren't Risk Balanced

Equity concentration is a primary issue for many investors

Traditional Allocation



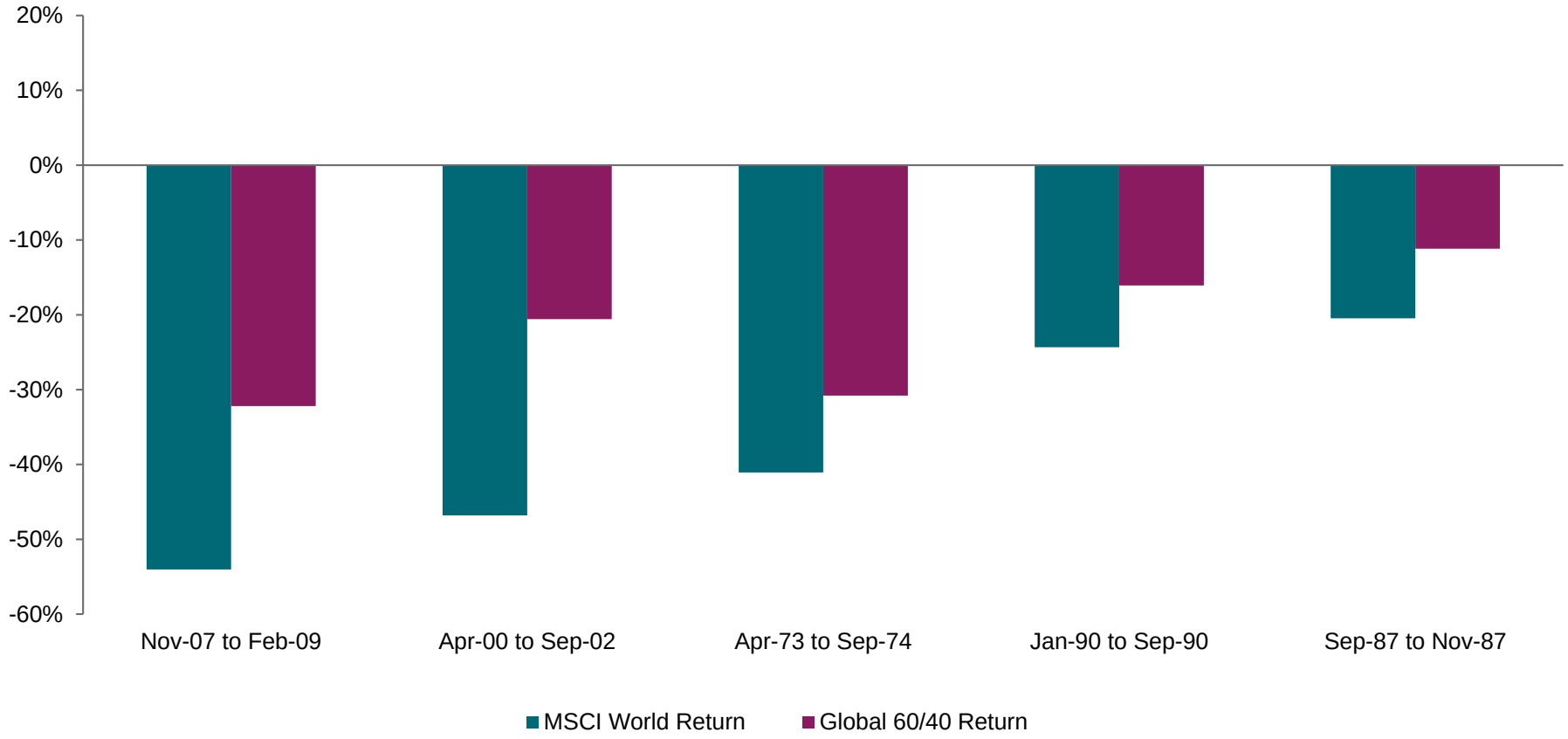
Source: AQR. "By Capital" and "By Risk" allocation charts are for illustrative purposes only and are intended to illustrate an asset class allocation and corresponding risk allocation/exposure of the typical multi-asset class, or "traditional" portfolio. The illustrative allocation above does not represent the actual or target allocation of any AQR client account, fund or strategy, or that of any other adviser.

…So Bad Times for the Economy and Strategy Can Coincide

When stocks fall, traditional portfolios tend to suffer

Worst 5 Drawdowns for MSCI World with Corresponding Global 60/40 Returns

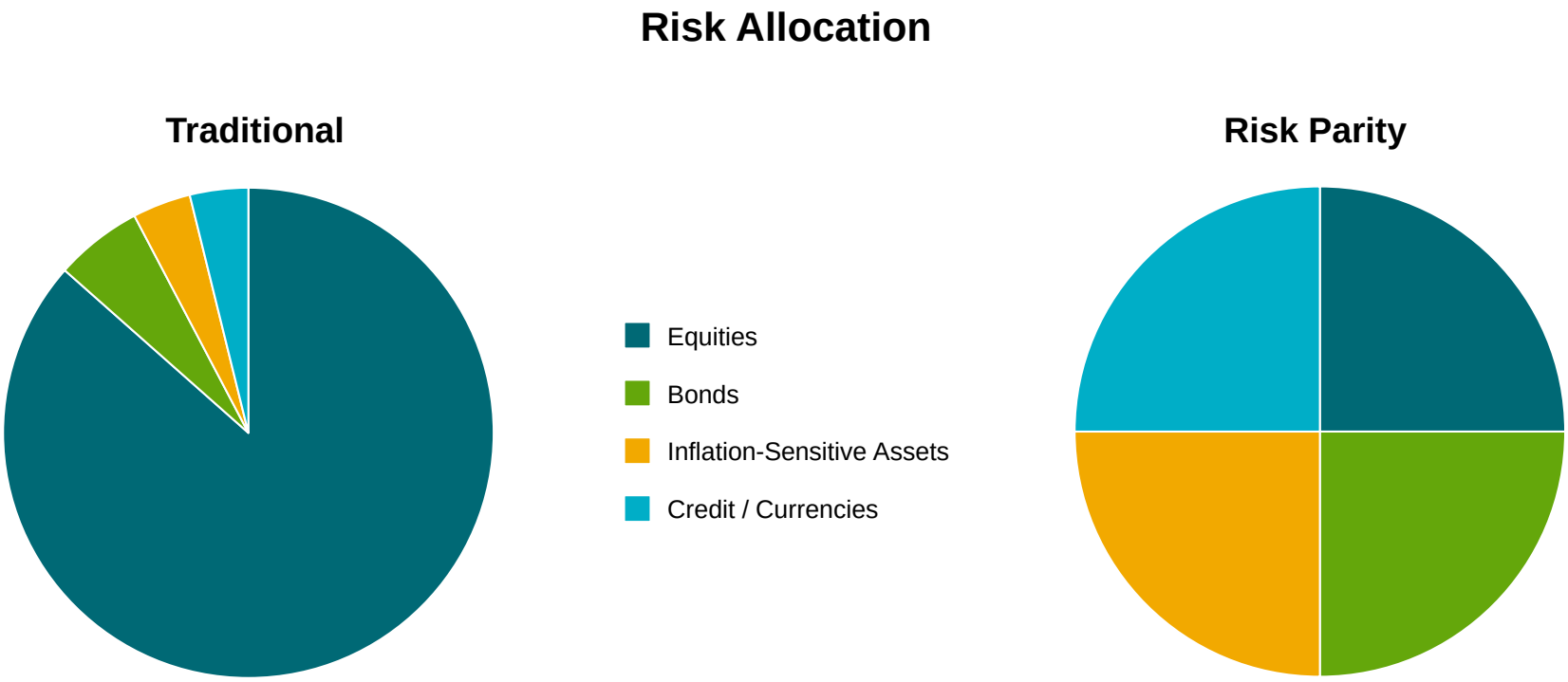
January 1970 – December 2018



Source: AQR, Bloomberg. Global 60/40 Portfolio is based on 60% MSCI World Index and 40% Barclays Capital Global Aggregate Bond Index. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Risk Parity Is Risk Balanced

Targets equal risk across four broad asset classes



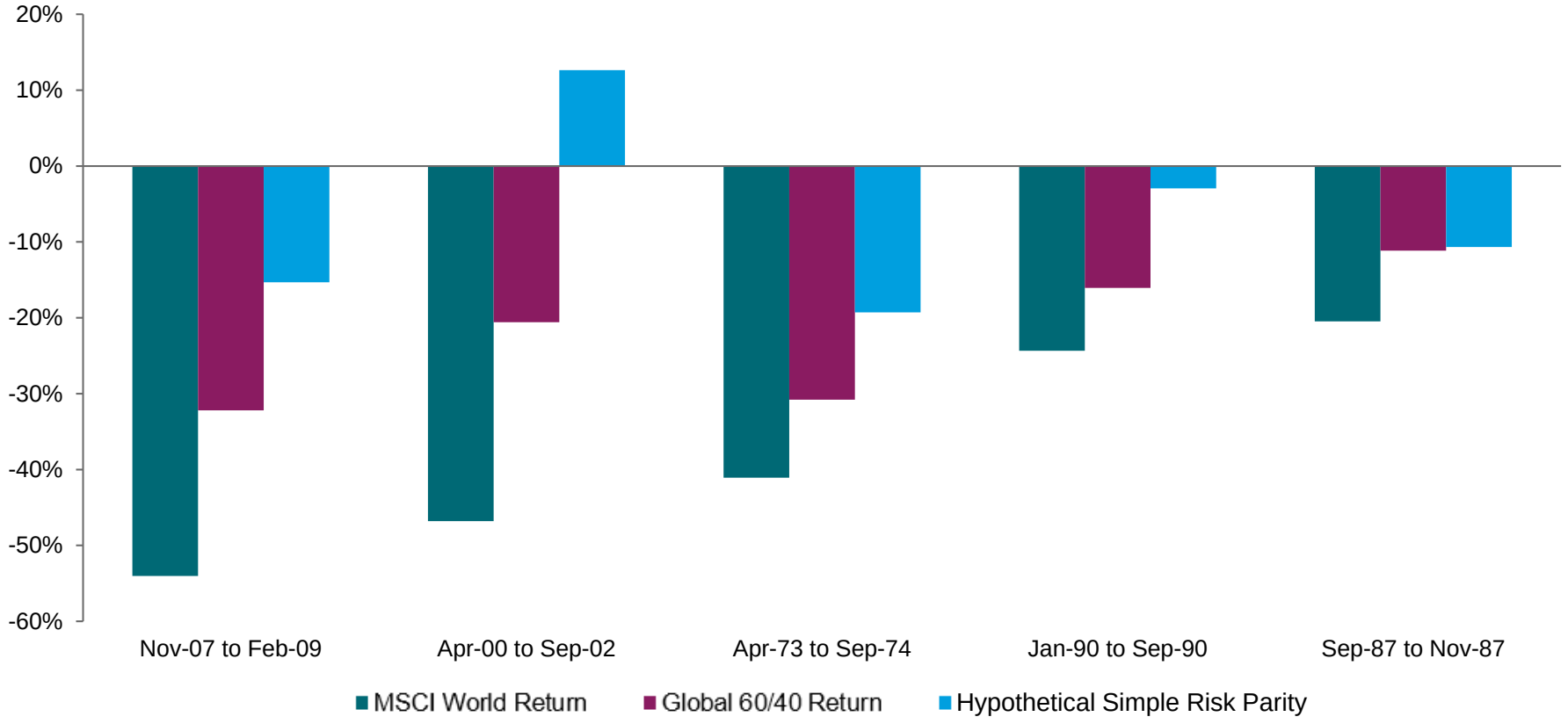
Source: AQR. Charts are for illustrative purposes only. The illustrative allocation above does not represent the actual allocation of any AQR client account, fund or strategy.

…So Risk Parity Returns Are Less Driven by Equity Markets

When stocks perform poorly, risk parity can be a diversifier

Worst 5 Drawdowns for MSCI World with Global 60/40 and Simple Risk Parity

January 1970 – December 2018



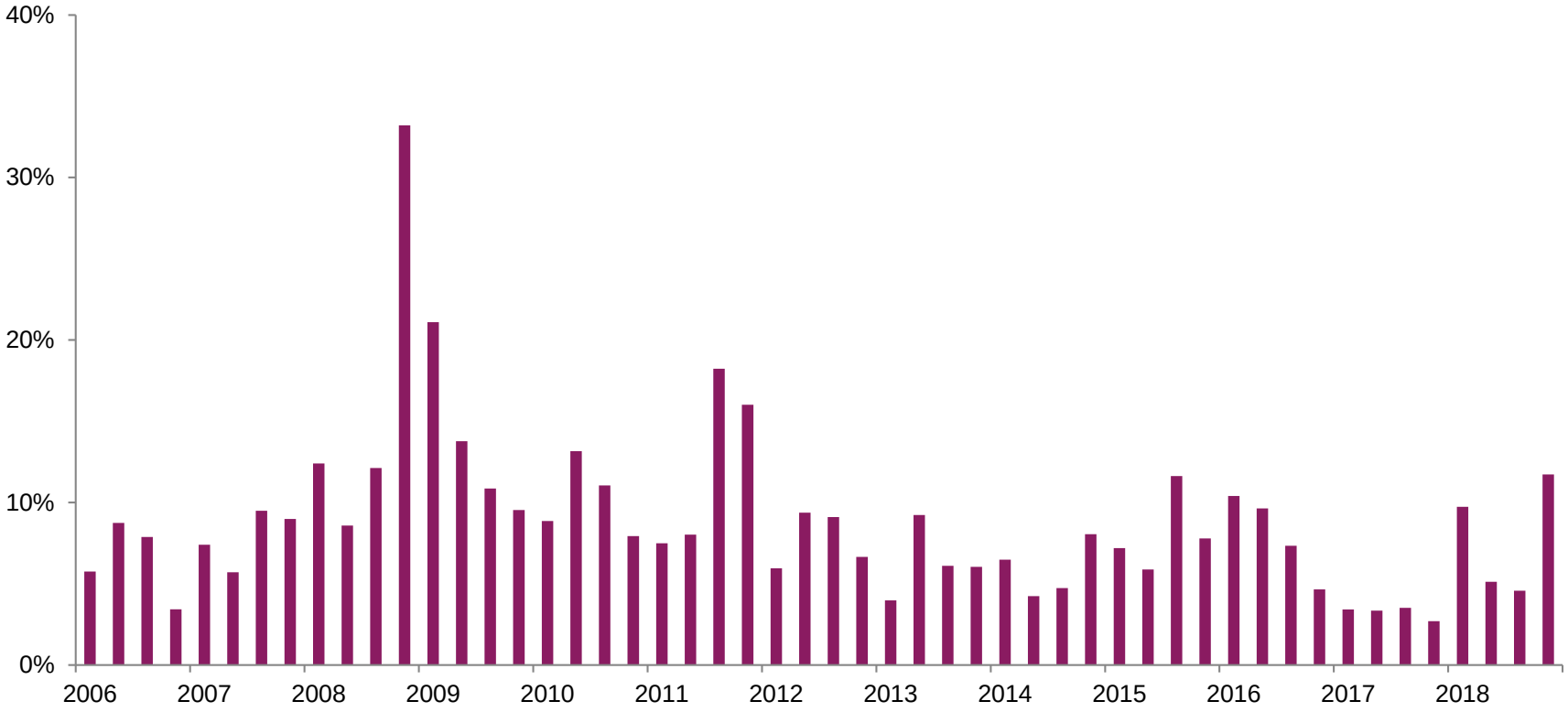
Source: AQR, Bloomberg. Global 60/40 Portfolio is based on 60% MSCI World Index and 40% Barclays Capital Global Aggregate Bond Index. Simple Risk Parity is constructed by allocating equal risk, rebalanced monthly, across three asset classes (stocks, bonds and commodities) based on each asset class' previous 12-month realized volatility to target a total annualized portfolio volatility of 10%. Returns are gross of fees. Please see the Appendix for more details regarding the asset class construction. For illustrative purposes only and not representative of a portfolio that AQR currently manages. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please see Appendix for detailed construction methodology.

Traditional Portfolios Are Not Risk Managed

Portfolio volatility levels and risk allocations can vary a lot

Quarterly Realized Volatility of Global 60/40

January 2006 – December 2018



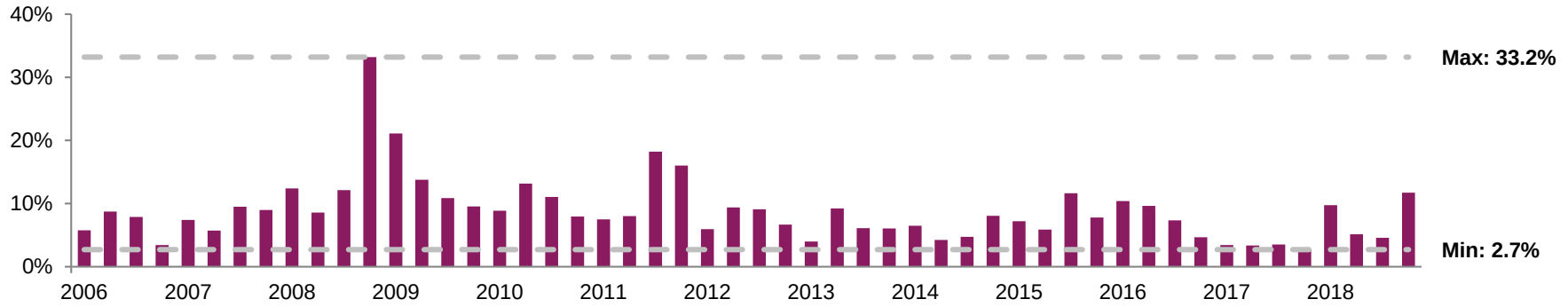
Source: AQR, Bloomberg. Data using 3-day returns. 60/40 Portfolio is based on 60% MSCI World Index and 40% Bloomberg Barclays Global Aggregate Bond Index from January 1, 2006, through December 31, 2018. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Risk Parity Can Be Risk Managed

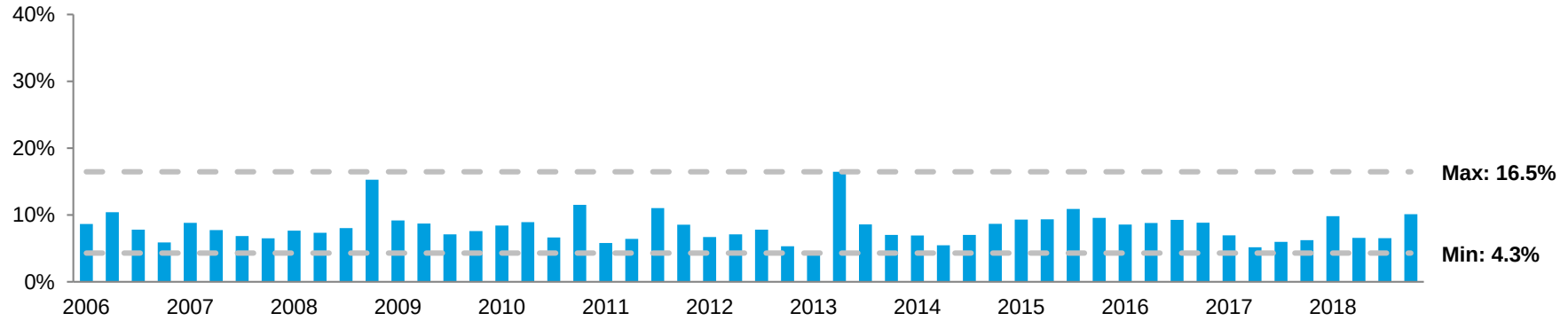
Risk targeting may provide more consistent realized portfolio volatility

Quarterly Realized Volatility

Global 60/40

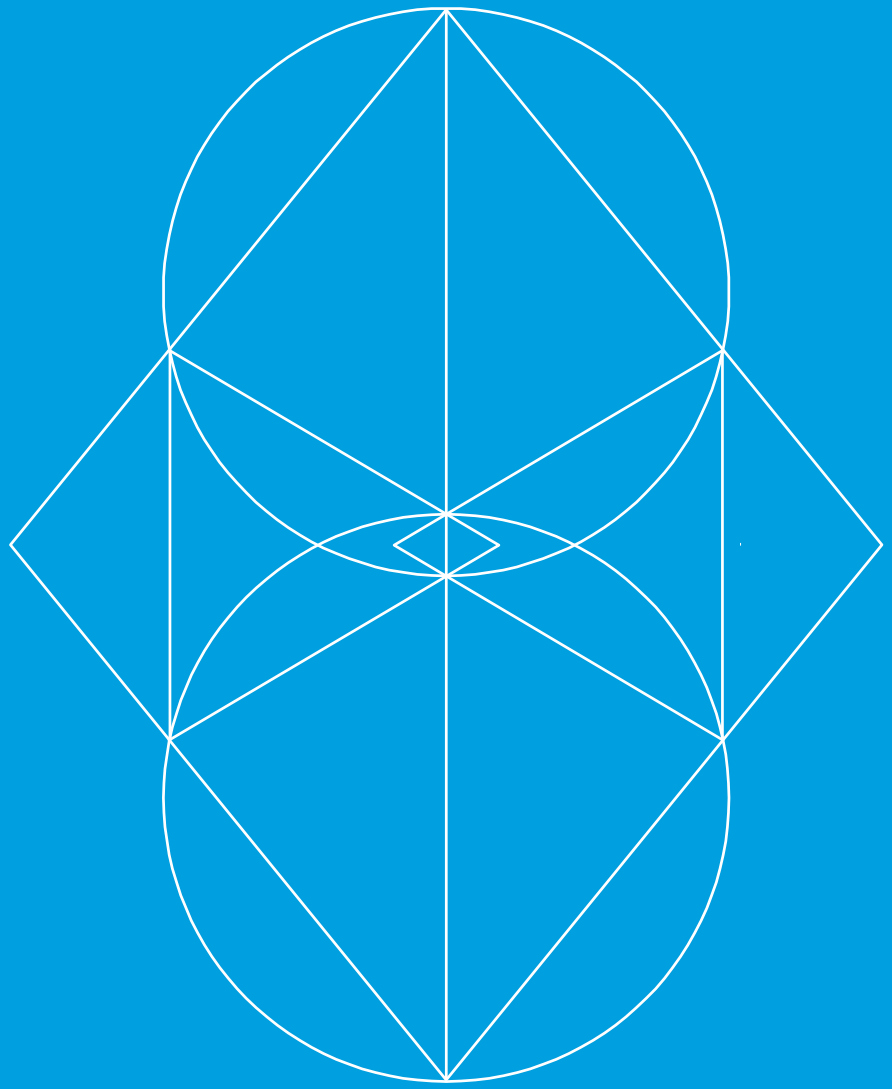


Hypothetical Dynamic Risk Parity



Source: AQR, Bloomberg. Data using 3-day returns, from January 1, 2006 to December 31, 2018. 60/40 Portfolio is based on 60% MSCI World Index and 40% Bloomberg Barclays Global Aggregate Bond Index. Dynamic Risk Parity is a hypothetical model portfolio that allocates equal risk across three major categories (equities, nominal interest rates, inflation-sensitive assets). It was constructed with an active risk model which means exposures are adjusted to target equalized asset class risk contribution and target consistent portfolio volatility throughout time. Past performance is not a guarantee of future performance. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please read important disclosures in the Appendix.

Conceptual Frameworks for Risk Parity



There's More Than One Conceptual Framework for Risk Parity

But each path reaches the same destination

(1) Minimum Assumption

No asset class is "better" than another

(2) Environmental Balance

Balance portfolio performance across economic environments

(3) Mean-Variance Optimization

MVO without the no-leverage constraint

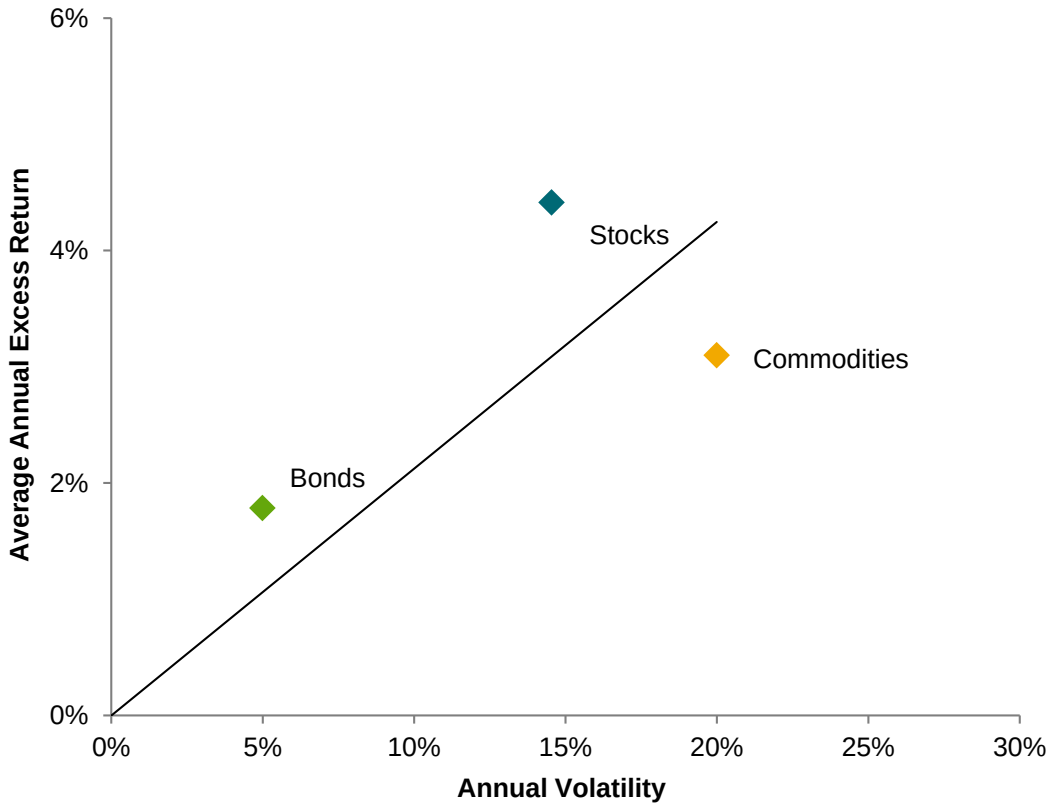
Source: Shutterstock. For illustrative purposes only.

1) Minimum Assumption: Three Premises for Risk Parity

Risk-adjusted returns are similar, so risk allocations should be too

Historical Asset Class Risk and Return Scatter Plot

January 1971 – December 2018



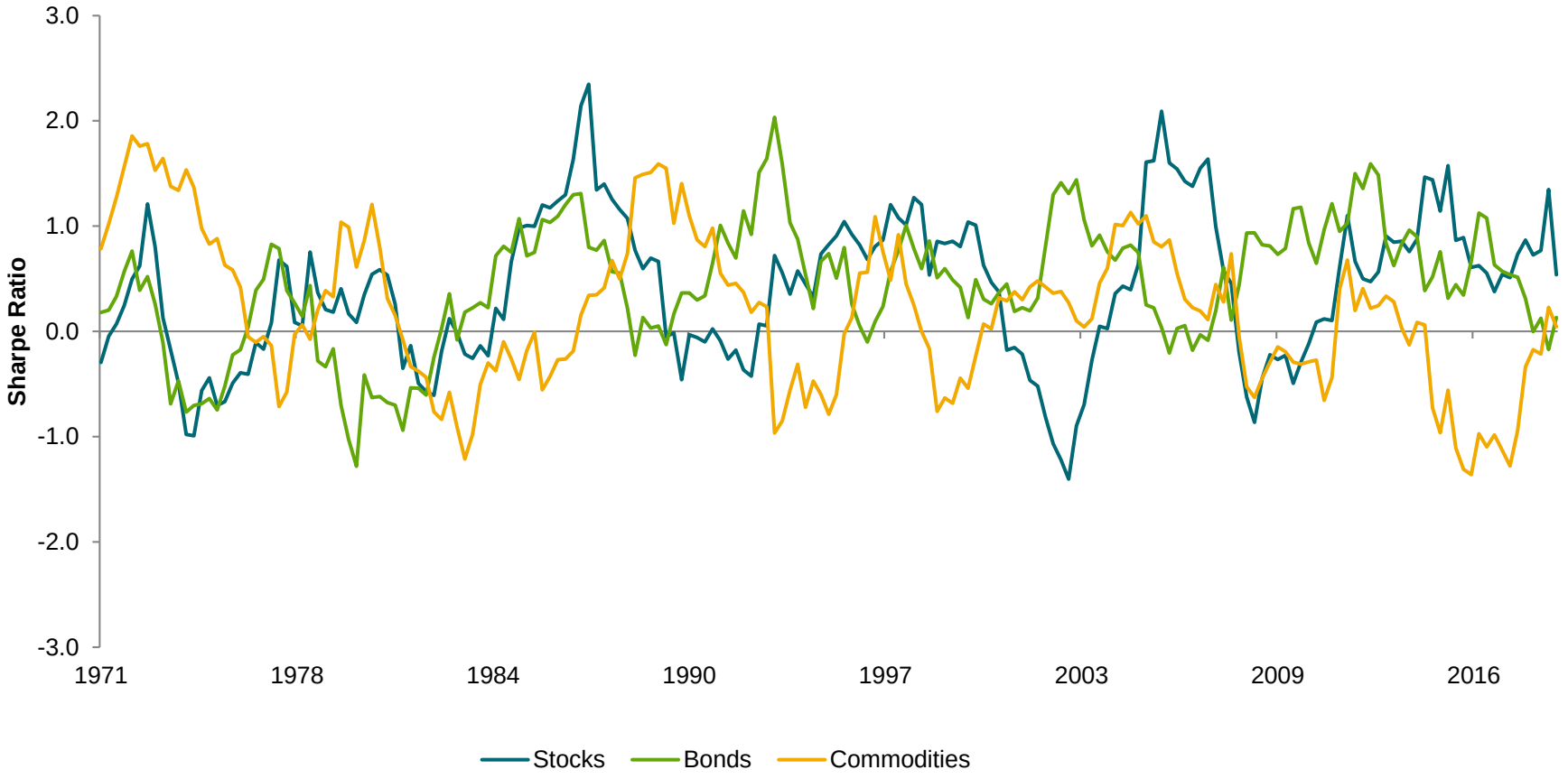
Source: AQR, Barclays Live, Bloomberg, Ibbotson Associates (Morningstar). Excess returns are in excess of cash proxied by the ICE BofAML U.S. 3-Month T-Bill Index. Stocks are defined as the MSCI World Index. Bonds are defined as the Bloomberg Barclays U.S. Government Index and, prior to 1973, the Ibbotson U.S. Intermediate Government Bond Index. Commodities are defined as the S&P GSCI Total Return Index. Please read important disclosures in the Appendix.

1) Minimum Assumption: Three Premises for Risk Parity

Assets pay off at different times, so diversification may have a benefit

Rolling 3-Year Asset Class Sharpe Ratios

December 1971 – December 2018



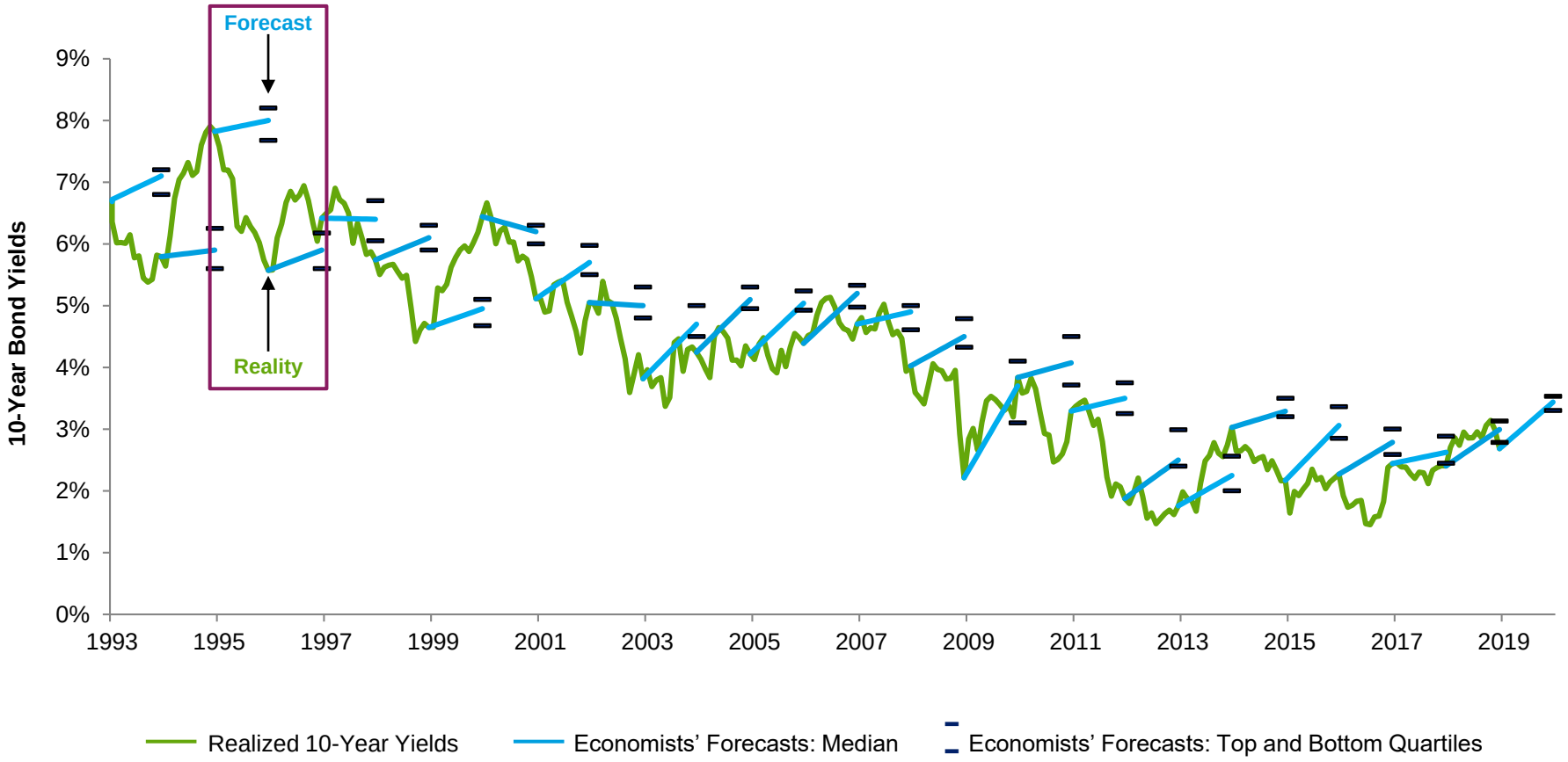
Source: AQR, Barclays Live, Bloomberg, Ibbotson Associates (Morningstar). Stocks are defined as the MSCI World Index. Bonds are defined as the Bloomberg Barclays U.S. Government Bond Index and, prior to 1973, the Ibbotson U.S. Intermediate Government Bond Index. Commodities are defined as the S&P GSCI Total Return Index. The risk free rate is assumed to be the U.S. 3-month Treasury Bill in Sharpe ratio calculations. Diversification does not eliminate the risk of experiencing investment losses. Please read important disclosures in the Appendix.

1) Minimum Assumption: Three Premises for Risk Parity

Market timing is hard, so a strategic allocation is always relevant

U.S. Treasury Historical 10-Year Yield versus Economists' Forecasts

January 1993 – December 2018



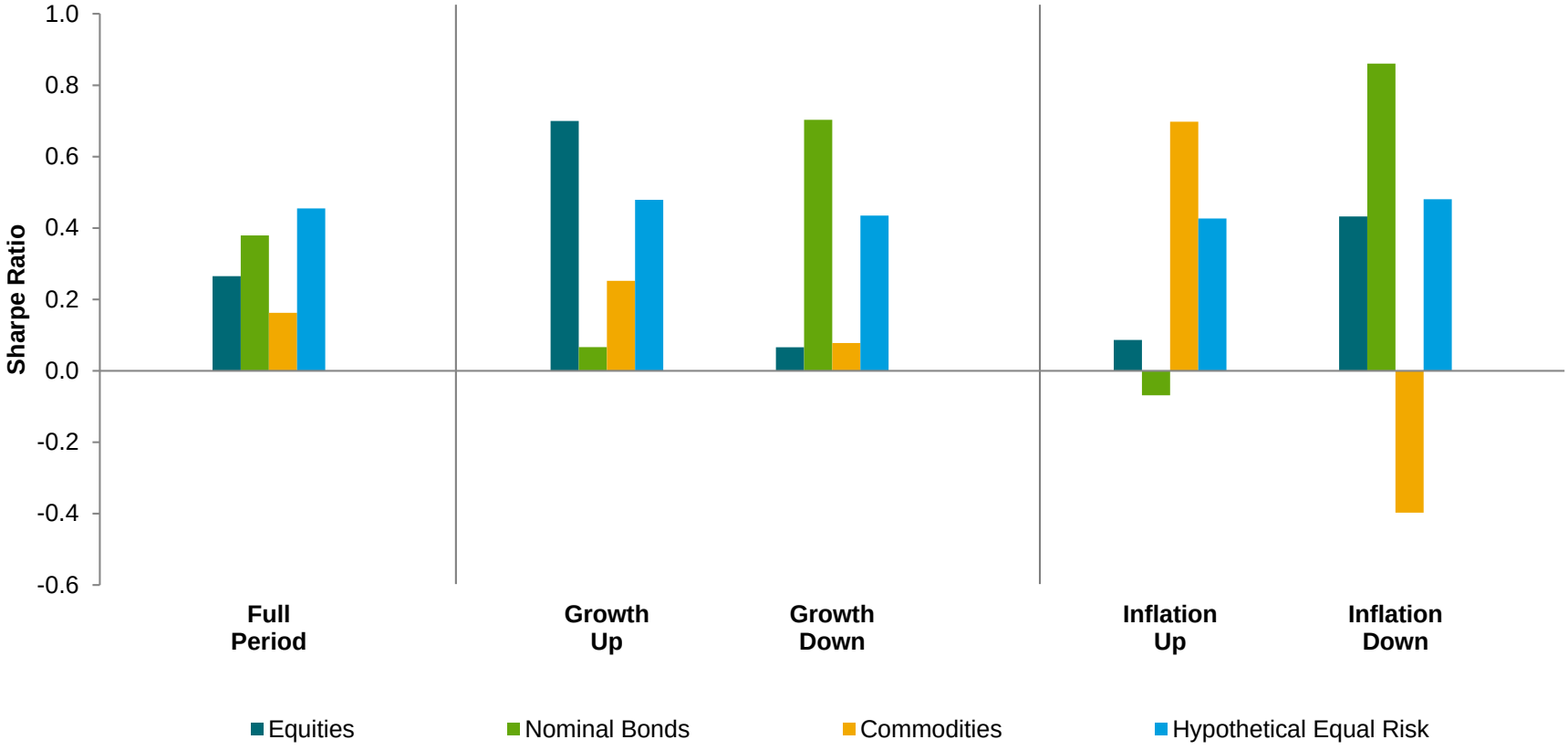
Source: AQR, Consensus Economics, Bloomberg. Economists' forecasts are based on linear interpolation of beginning of 12 month forecast at the start of each calendar year. Estimate error in Economists' forecasts is the difference in yields. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

2) Environmental Balance: Balance Risk of Growth and Inflation

Construct a portfolio less sensitive to important economic drivers

Asset Class and Portfolio Risk-Adjusted Returns in Different Macro Environments

January 1972 – December 2017

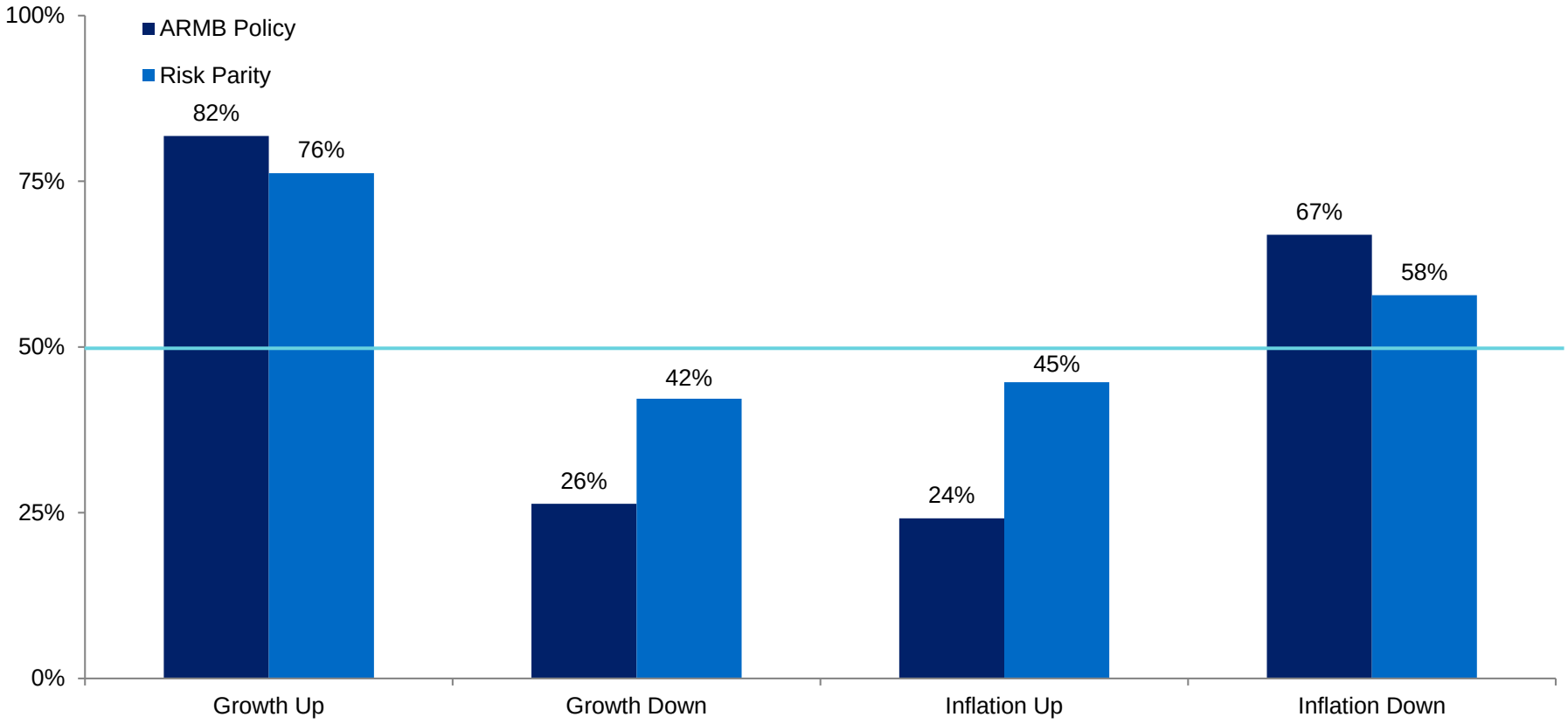


Source: AQR, Barclays Live, Bloomberg, Ibbotson Associates (Morningstar). The Equal Risk Weight Strategy is constructed by allocating equal risk, rebalanced monthly, across three asset classes based on the previous 12 month realized volatility to target a total annualized portfolio volatility of 10%. Stocks are defined as the MSCI World Index. Bonds are defined as the Bloomberg Barclays U.S. Government Bond Index and, prior to 1973, the Ibbotson U.S. Intermediate Government Bond Index. Commodities are defined as the S&P GSCI Total Return Index. The risk free rate is assumed to be the U.S. 3-month Treasury Bill in Sharpe ratio calculations. Please see the Appendix for more details on the macroeconomic environmental indicators. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

2) Environmental Balance: Balance Risk of Growth and Inflation

How can risk parity help ARMB meet objectives in different environments?

Odds of Achieving ARMB's 7.38% Return Target over a 10 Year Horizon (Callan Assumptions)



Source(s): AQR, Callan. There is no guarantee, express or implied, that long-term return and/or volatility targets will be achieved. Realized returns and/or volatility may come in higher or lower than expected. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Risk Parity's volatility is equal to the expected volatility of ARMB's portfolio using Callan's Assumptions. Please refer to Market Environment Descriptions and Callan Capital Market Assumptions in the Appendix. Please read important disclosures in the Appendix.

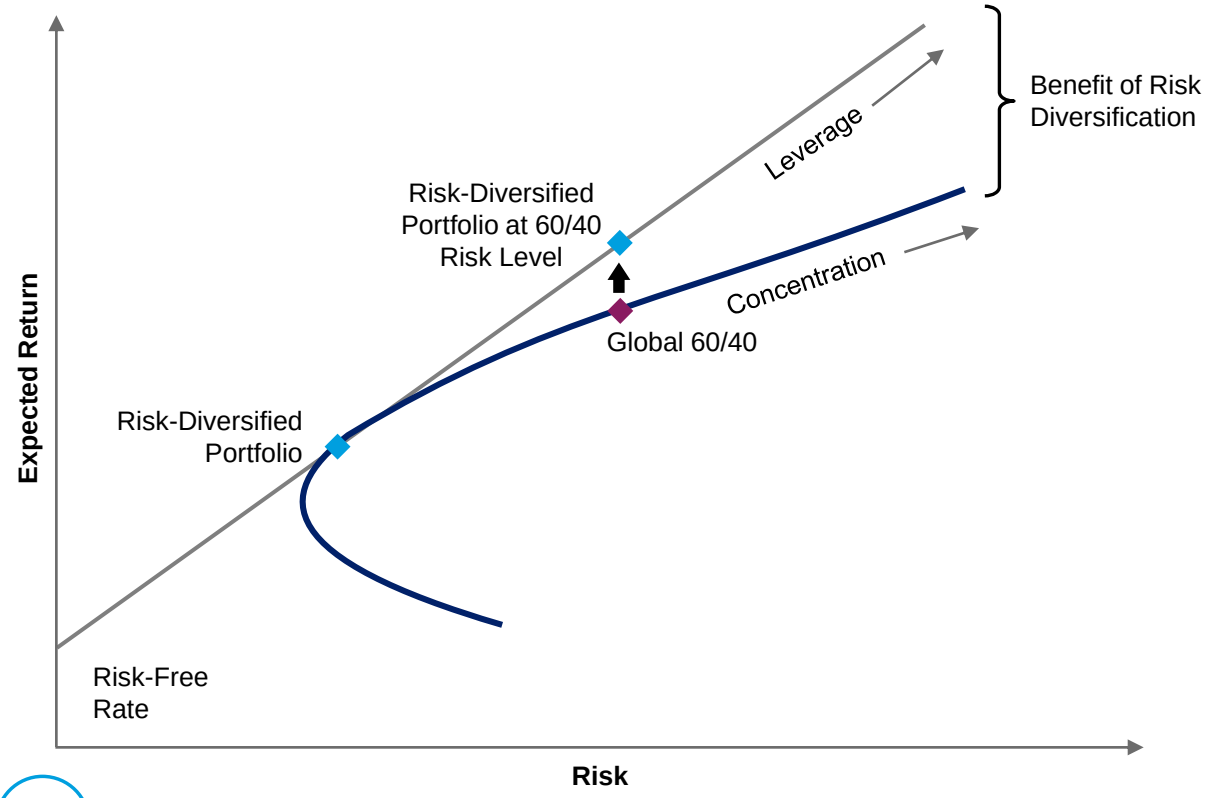
3) MVO: The No-Leverage Constraint Leads to Concentration

Leverage aversion theory affects both asset allocation and returns

Constraints on leverage cause investors to overweight risky assets, creating concentrated portfolios

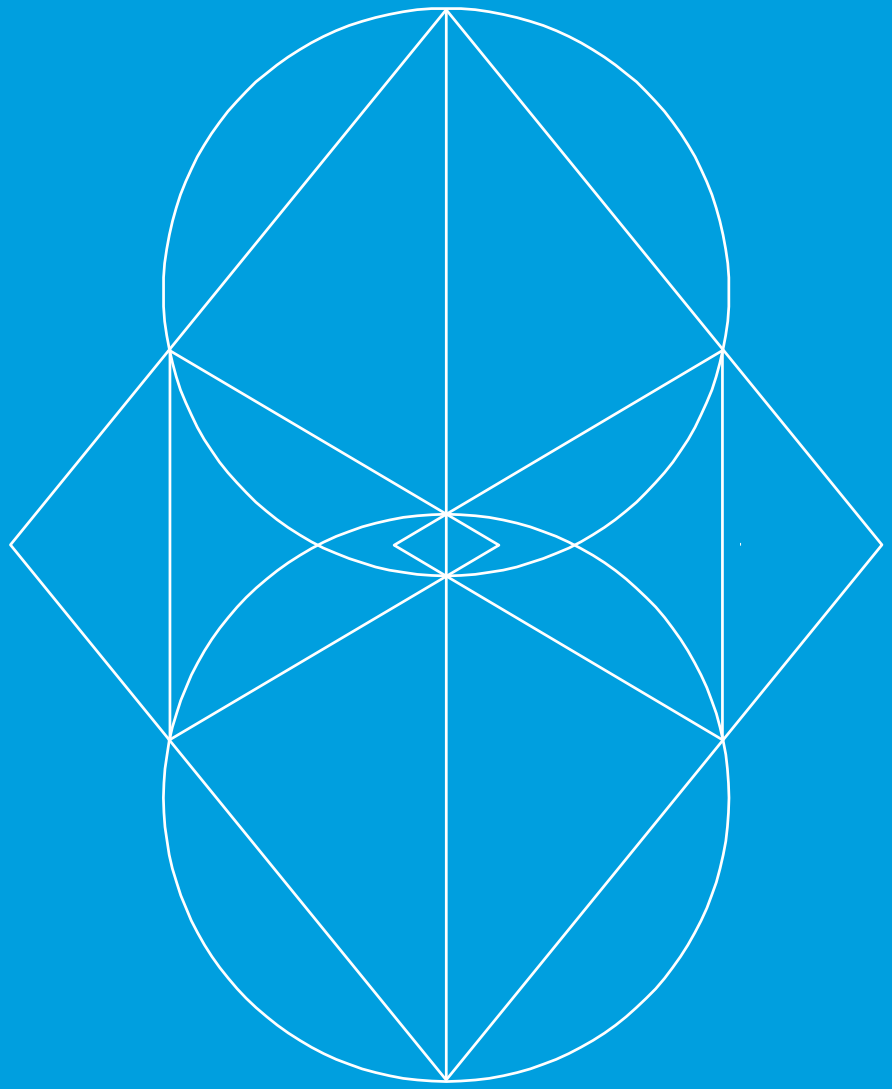
Leverage aversion suggests risk-balanced portfolios may be more efficient than the "Market Portfolio"

Applying leverage to a risk-balanced portfolio should have higher returns at a similar level of risk



Source: AQR. Chart is for illustrative purposes only. Diversification does not eliminate the risk of experiencing investment losses.

Managing a Risk Parity Portfolio



Managing Risk Parity Is an Active Process

Implementation of a risk-targeted risk parity strategy

Prepare Investment Universe	Forecast Risk	Construct Target Portfolio	Rebalance
Collect intraday data	Estimate asset volatility	Calculate asset class risk targets required to achieve equal risk contribution	Rebalance as positions drift or risk estimates change, subject to thresholds
Clean, check, and aggregate data	Build dynamic covariance matrix of assets	Determine unconstrained portfolio exposures	Use electronic execution or other low cost methods
Load data into risk model	Create asset class level risk forecasts	Apply portfolio and trading constraints	
		Generate portfolio trades	

Source: AQR. Investment process is subject to change at any time without notice.

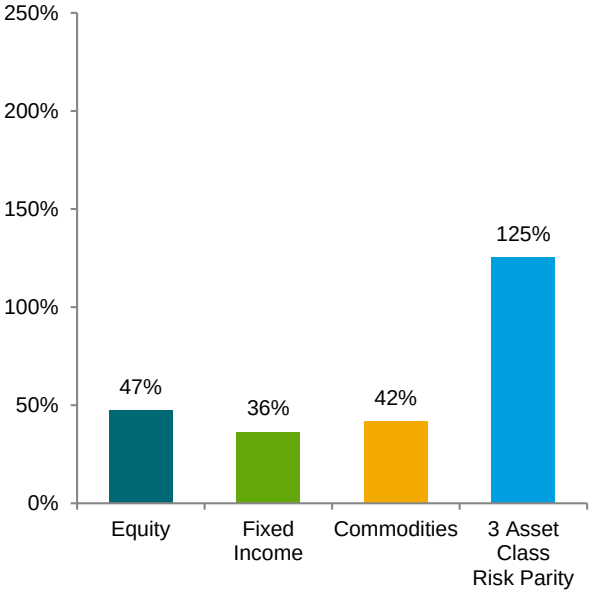
Rebalance Asset Exposures as Risk Forecasts Evolve

Positioning can differ markedly across market environments

Hypothetical Exposures for 3 Asset Class Risk Parity Portfolio at 10% Volatility

Volcker Fed Fighting Inflation

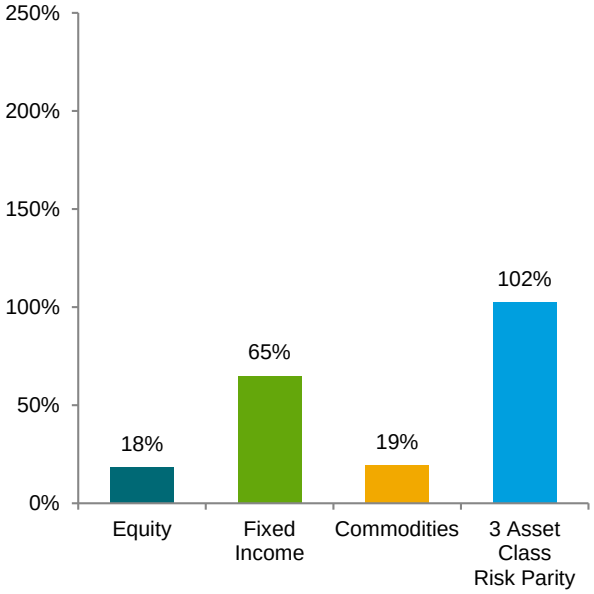
October 31, 1980



It's possible for bond volatility to be higher than equity volatility — and bond exposures to be relatively small

Financial Crisis

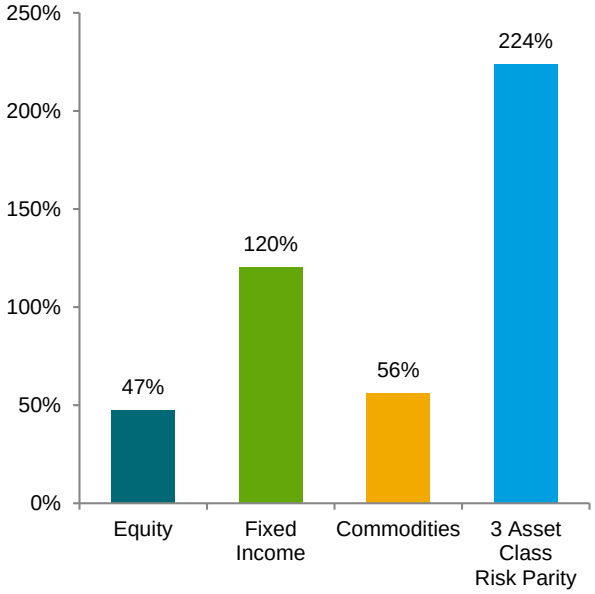
September 30, 2008



Risk spiked in the GFC, especially in equities and commodities, so all exposures were much smaller, but bonds relatively less so

Low Volatility Environment

June 30, 2014



In a period of below average volatility, like mid-2014, exposures were higher than average

Source: AQR. Morgan Markets, Bloomberg, MSCI, Barclays Live, Datastream, Reuters, Markit, Credit Suisse, Citi Velocity. The above exposure examples are based on a hypothetical 3-asset class risk parity strategy, which is not representative of an actual AQR strategy, and are for illustrative purposes only. The hypothetical asset class exposures shown are calculated using the volatility forecasts and volatility targets of three asset classes (developed equities, developed bonds and commodities). The volatility targets are sized using asset class correlation forecasts such that the risk contribution across asset classes is equal and the hypothetical strategy targets 10% annualized volatility, as asset class volatility forecasts evolve across the different periods, so do the exposures. The methodology used to calculate the asset class volatility and correlation forecasts are commensurate with those used in all AQR risk parity strategies, and the data reflects the historical data represented by the securities for the respective asset classes. Developed equities data includes the broad market-cap weighted indices which are sufficiently liquid to trade in each of the following countries/regions: Australia, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Spain, Switzerland, United Kingdom, United States, and continental Europe. Developed bonds data includes GDP-weighted government bonds from the following countries: Australia, Canada, Germany, Japan, United Kingdom, United States. Commodities data includes individual futures consistent with the weighting and composition of the Bloomberg Commodity Index. Hypothetical performance results have certain inherent limitations, some of which are disclosed in the Appendix.

Managing the Risk of Leverage

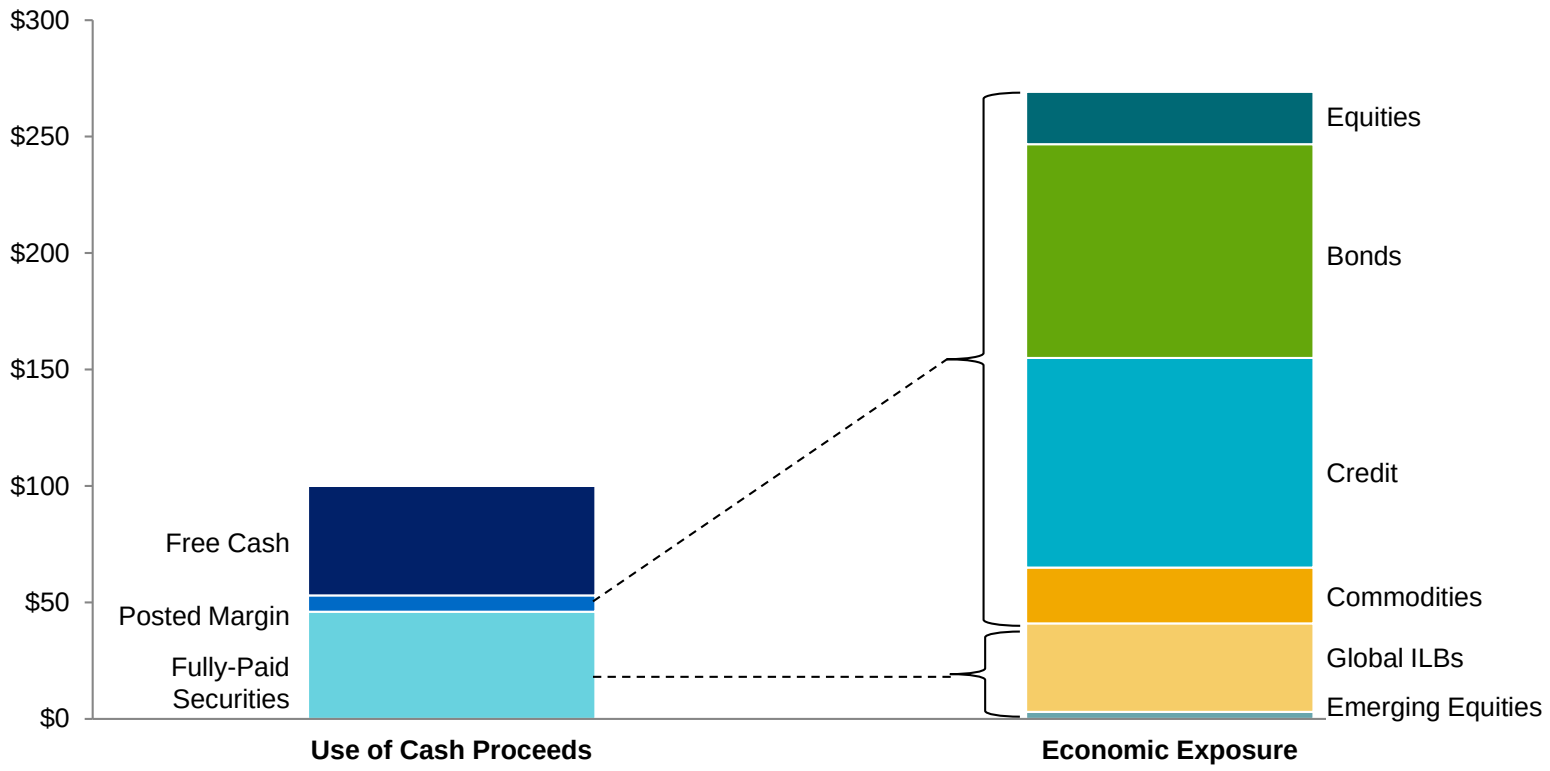
Leverage always involves some element of unique risk

Volatility target	Manage portfolio volatility to target a consistent level
Exposure limits	Employ sensible constraints to manage tail risk
Liquid holdings	Maintain a portfolio of liquid assets
Ample cash	Hold ample cash to maintain financing
Risk reduction process	Have a plan for reducing risk targets if returns are very poor

Managing the Risk of Leverage

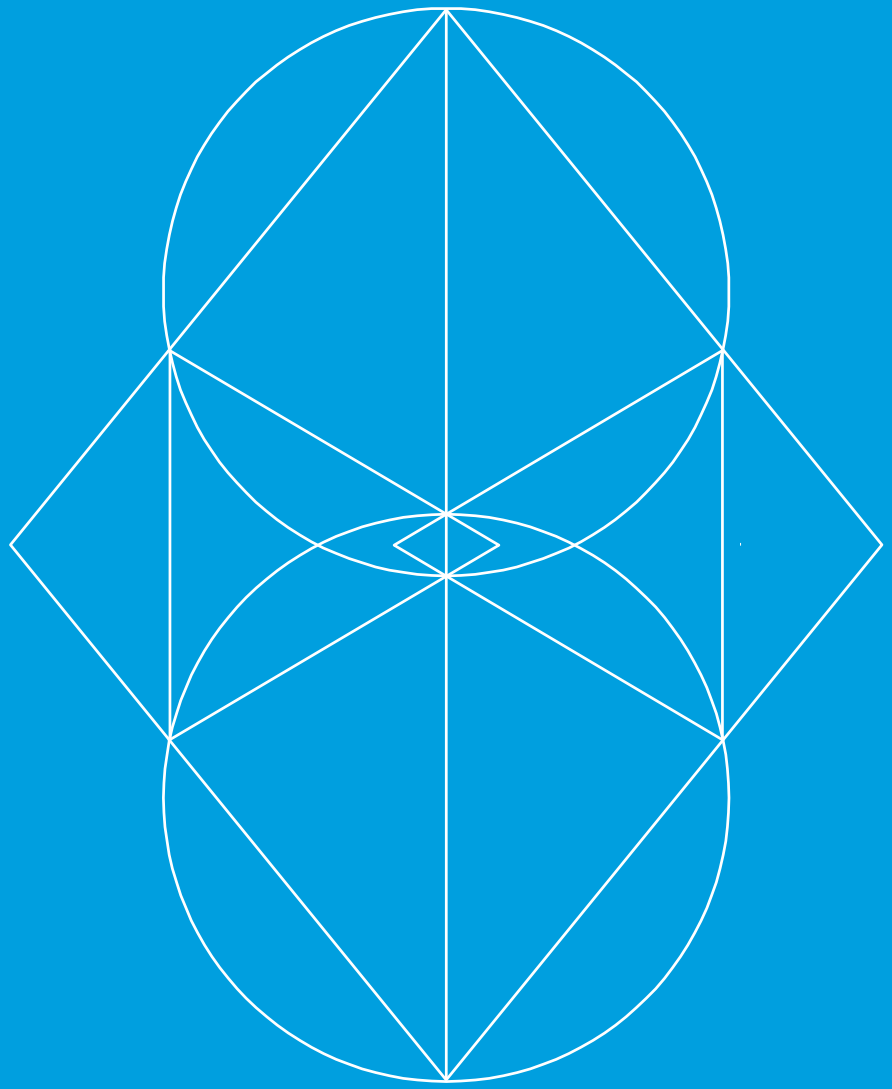
Example of the uses of cash in a leveraged fund

Sample Risk Balanced Allocation Notional Exposures and Cash Usage



Source: AQR. Charts are for illustrative purposes only and are not based on an actual portfolio AQR manages. Strategies are subject to change based on market conditions and implementation practices at any time.

Risk Parity for the Long Run

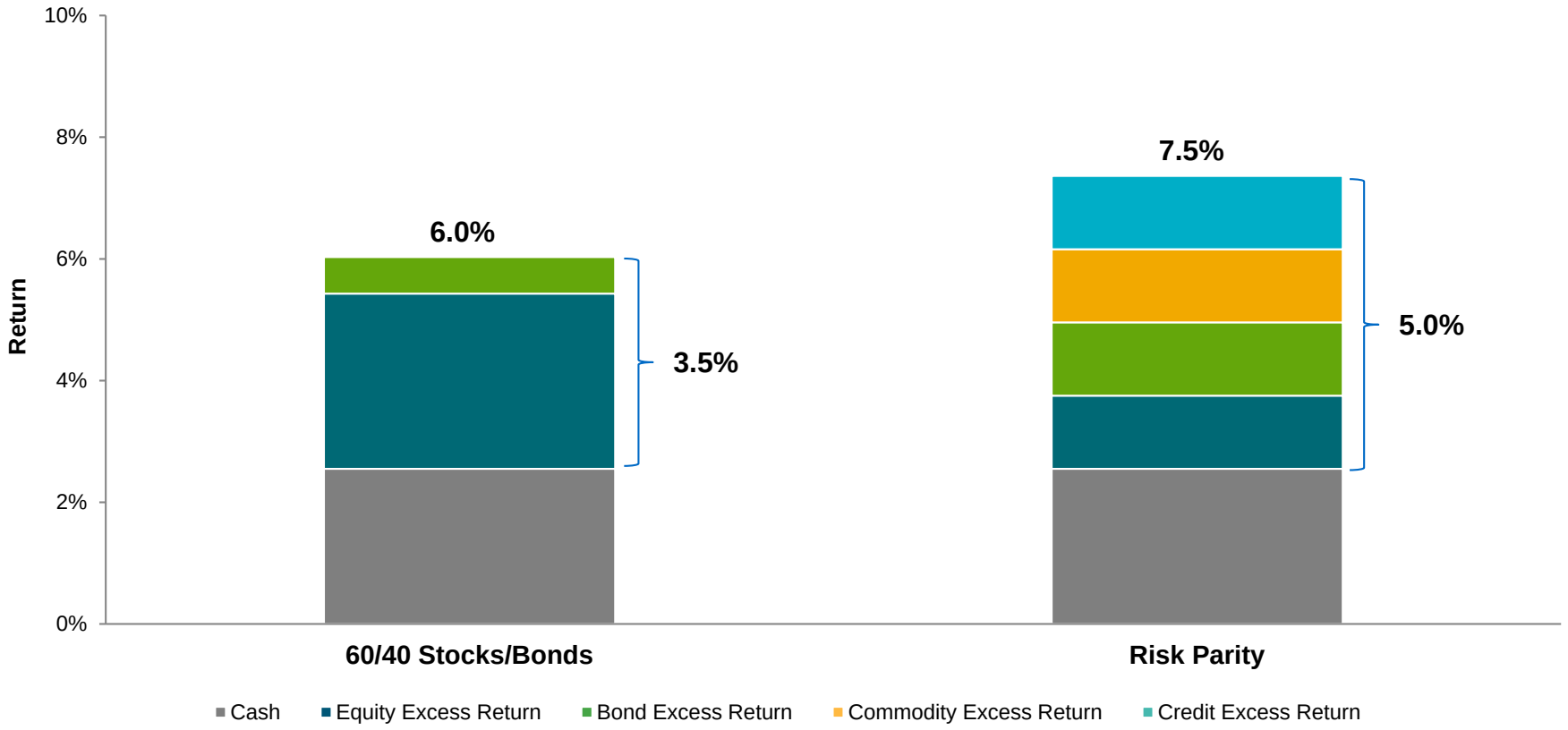


Risk Parity Is Expected to Outperform 60/40 In the Long Run

There's a benefit to making everything matter, but nothing matter too much

Expected Asset Class Contribution to Total Return

Based on a Hypothetical Equal Risk Contribution



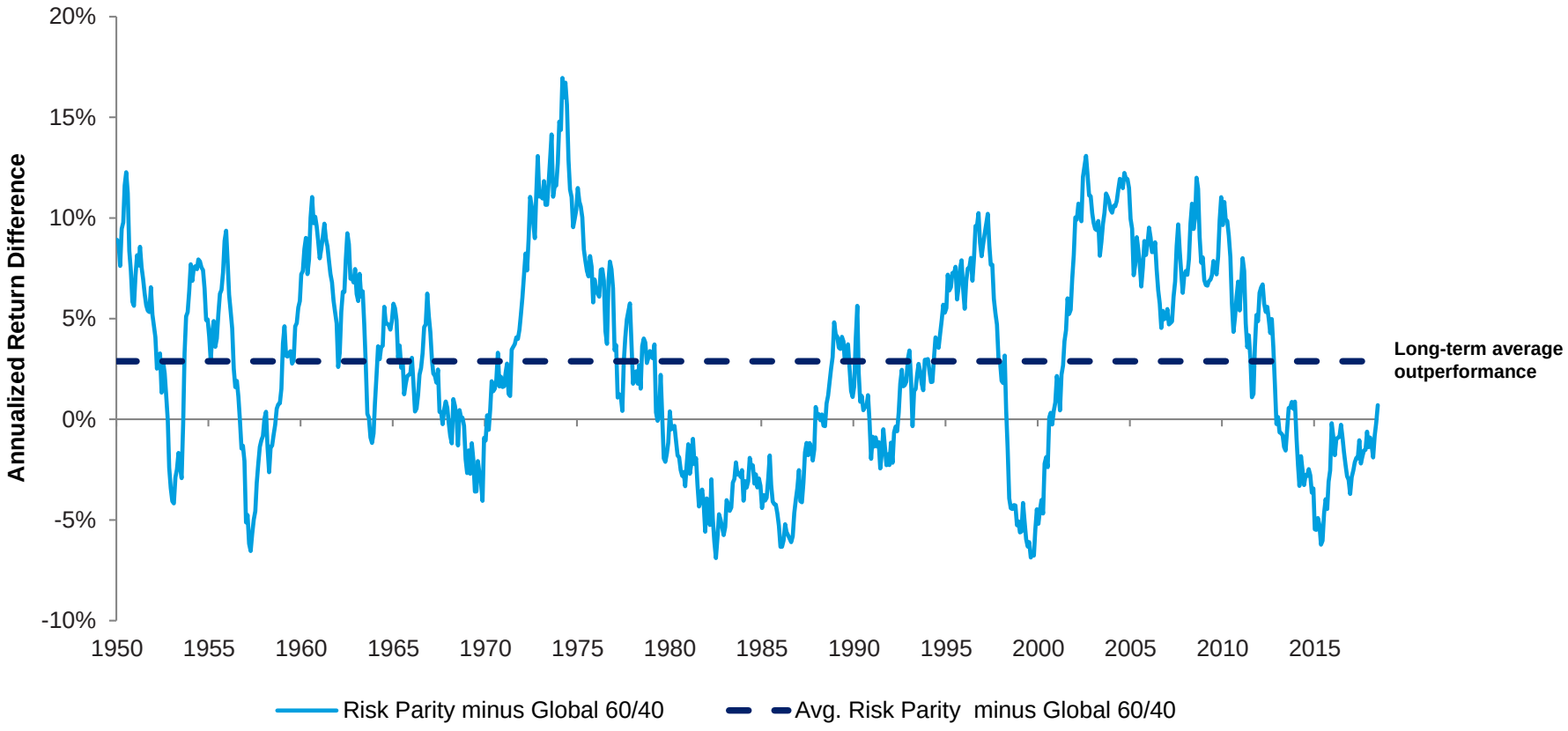
Source: AQR. Expected excess return from diversification results are based on a hypothetical equal risk contribution Risk Parity strategy consisting of equities, bonds, inflation-sensitive assets, and credit/currencies. Probability of outperformance is based on an investment horizon of 5 years and a long-term cash assumption of 3%. Assumptions are consistent with our long-term static asset class correlations and volatilities, and assert equal risk adjusted returns of 0.3 for each asset class and 3% long-term return for cash. Diversification does not eliminate the risk of experiencing investment losses. 60/40 Portfolio is based on 60% MSCI World Index and 40% Barclays Capital Global Aggregate Bond Index. There is no guarantee, express or implied, that long-term return and/or volatility targets will be achieved. Realized returns and/or volatility may come in higher or lower than expected. Please read important disclosures in the Appendix.

Risk Parity Is Expected to Outperform 60/40 In the Long Run

But we can't expect risk parity to outperform in every environment

Hypothetical Rolling 3-Year Annualized Returns of 3-Asset Class Risk Parity* minus Global 60/40

August 1947 – December 2018



*3-Asset Class Risk Parity consists of stocks, bonds, and commodities

Source: AQR. Risk Parity is represented by Simple Risk Parity from August 1947 – December 1969 and the GRPEL backtest from January 1970 onwards. Simple Risk Parity is constructed by allocating equal risk, rebalanced monthly, across three asset classes (stocks, bonds and commodities) based on each asset class' previous 12 month realized volatility to target a total annualized portfolio volatility of 10%. Please see the Appendix for more details regarding the asset class construction. Returns are gross of fees. Global 60/40 is based a 60% monthly exposure to GDP-weighted global equities prior to 1970 and the MSCI World Index thereafter and a 40% monthly exposure to GDP-weighted global USD hedged bonds as defined in the Appendix. Please see GRP-EL 10% Volatility backtest description in the Appendix. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Benchmarking Risk Parity

The right benchmark depends on the question you are trying to answer

Does risk parity achieve its return objective?

- A function of expected risk-adjusted return and target volatility
- Example: Cash+5%

How does risk parity compare to the alternative (traditional) asset allocation choice?

- Typically a fixed mix of stocks and bonds
- Example: Global 60/40

How does a risk parity manager compare to peers or passive risk parity indices?

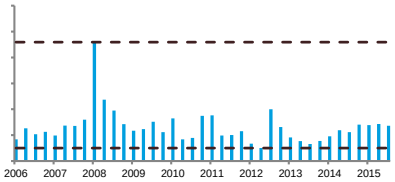
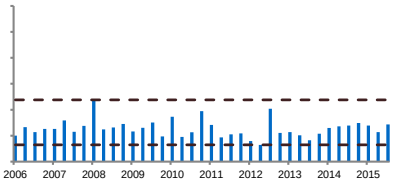
- Measures a manager's relative performance due to implementation choices
- Example: HFR Risk Parity Indices, S&P Risk Parity Indices

Each of these benchmarks has benefits and drawbacks

Source: AQR.

Impact of Implementation Choices

Major sources of tracking error across risk parity implementations

	Design Choices		
Allocation across asset classes	**Equal Risk Contribution**	**Not-Quite-Balanced Risk Allocation**	**Balanced across Economic Environments**
Allocation within asset classes	**Market-Cap Weighting** • Market index weighted	**Alternative Weighting** • GDP weighted • Risk weighted • Valuation weighted	**Liquidity Weighting** • Production weighted • Trading-volume weighted
Risk targeting	**Static Risk Model** 	**Dynamic Risk Model** 	

Source: AQR. Charts are for illustrative purposes only and are not based on an actual portfolio AQR manages.

Risk Parity for the Long Run
Improving on traditional asset allocation

Traditional Allocations Have a Problem

- Many investors are overly concentrated in equity risk and vulnerable to equity market drawdowns
- Risk levels of equity dominated portfolios can be difficult to bear in periods of high market volatility

Risk Parity Is Less Dependent on Equities

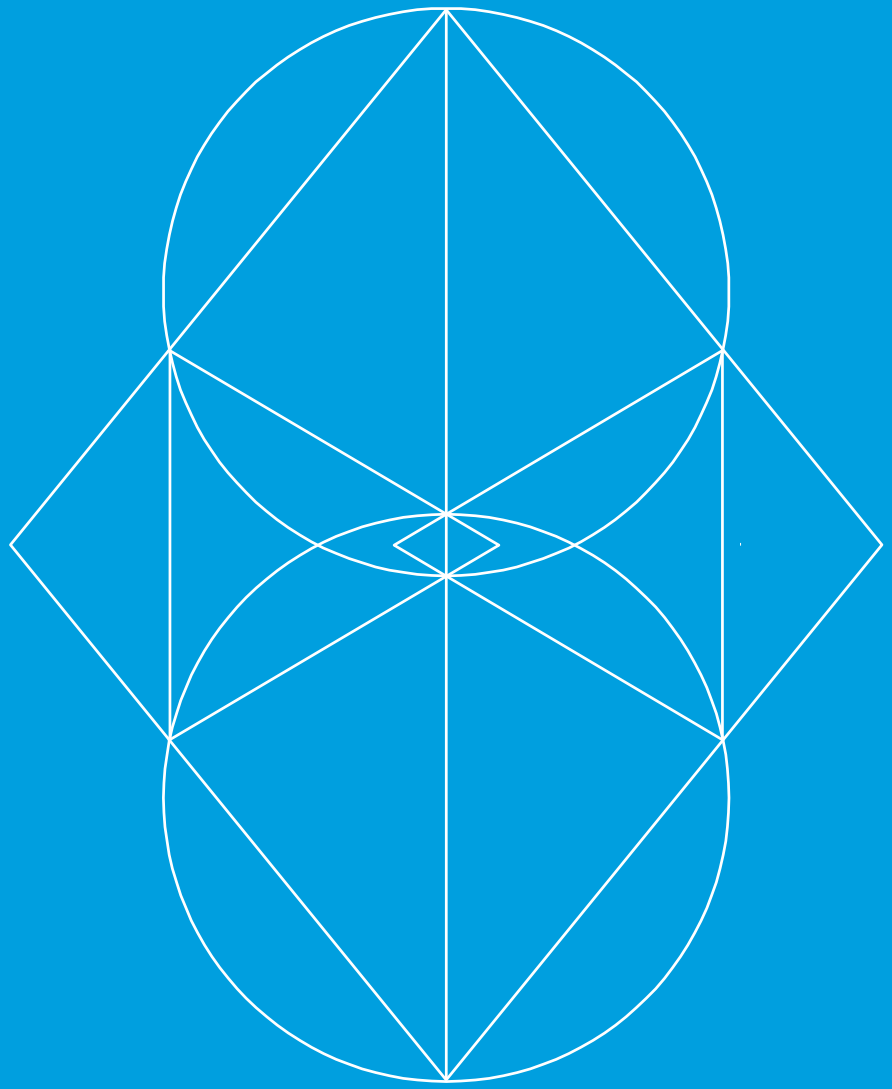
- Meaningful allocations to multiple sources of risk and return
- Risk-diversified allocations result in more similar performance across different macroeconomic environments

Risk Parity May Help Investors Achieve Long-Term Return Targets

- May deliver higher expected returns for the same amount of risk
- However, risk parity does not outperform in every environment

Diversification does not eliminate the risk of experiencing investment losses. There is no guarantee, express or implied, that long-term return and/or volatility targets will be achieved. Realized returns and/or volatility may come in higher or lower than expected.

Appendix

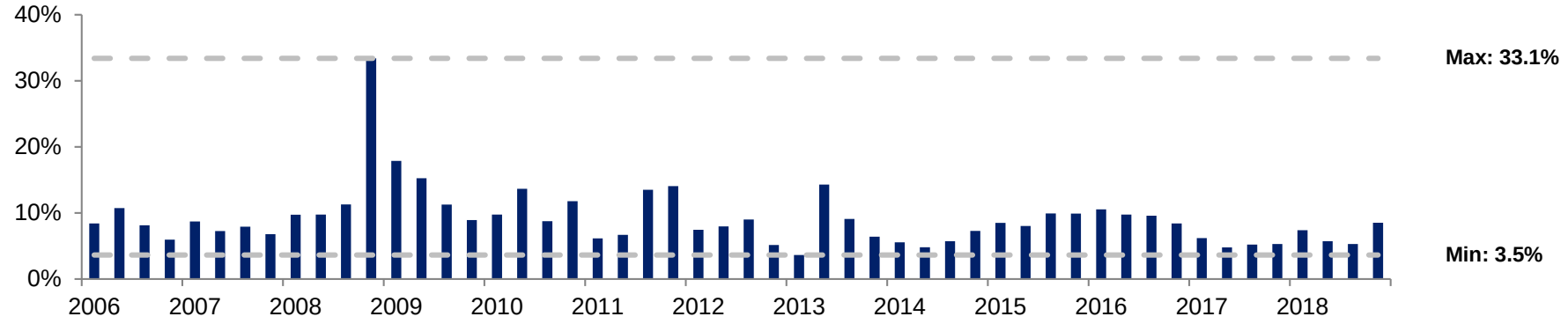


Impact of Implementation Choices

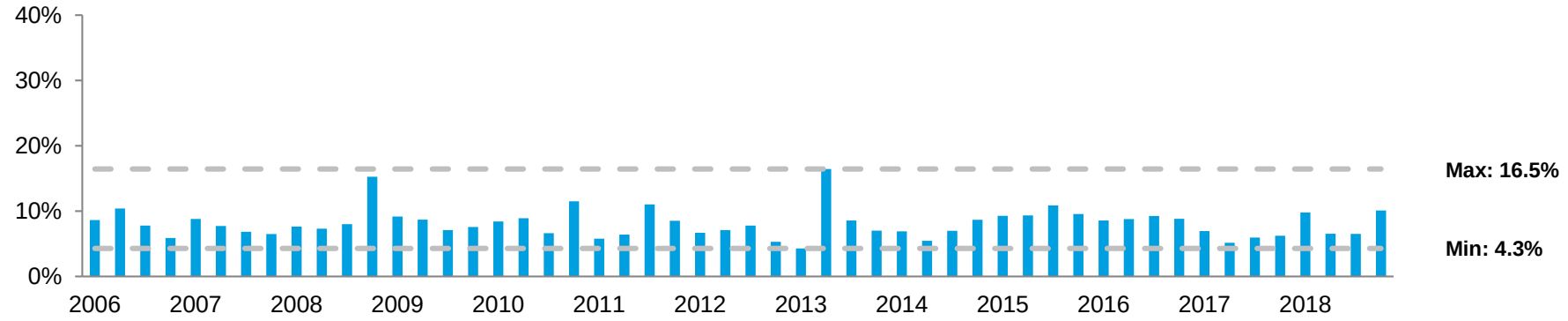
Comparison of risk measurement and management choices

Quarterly Realized Volatility

Hypothetical Static Risk Parity



Hypothetical Dynamic Risk Parity



Source: AQR, Bloomberg. Data using 3-day returns, from January 1, 2006 to December 31, 2018. Static Risk Parity is a hypothetical model portfolio that allocates equal risk across four major categories (equities, nominal interest rates, inflation-sensitive assets, credit). The strategy was constructed with a long-term risk model which means the exposures to the different asset classes will remain relatively constant through time. The strategy analyzes and trades more than 50 markets across the four major asset classes: global developed and emerging equity indices; developed bond futures and inflation-linked bonds; emerging currencies and credit spreads; and commodities, including agriculturals, energies, and metals. The long-term volatility of the strategy will average 10%, but the volatility at any point in time may be either higher or lower. Dynamic Risk Parity is a hypothetical model portfolio that allocates equal risk across three major categories (equities, nominal interest rates, inflation-sensitive assets). It was constructed with an active risk model which means exposures are adjusted to target equalized asset class risk contribution and target consistent portfolio volatility throughout time. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please read important disclosures in the Appendix.

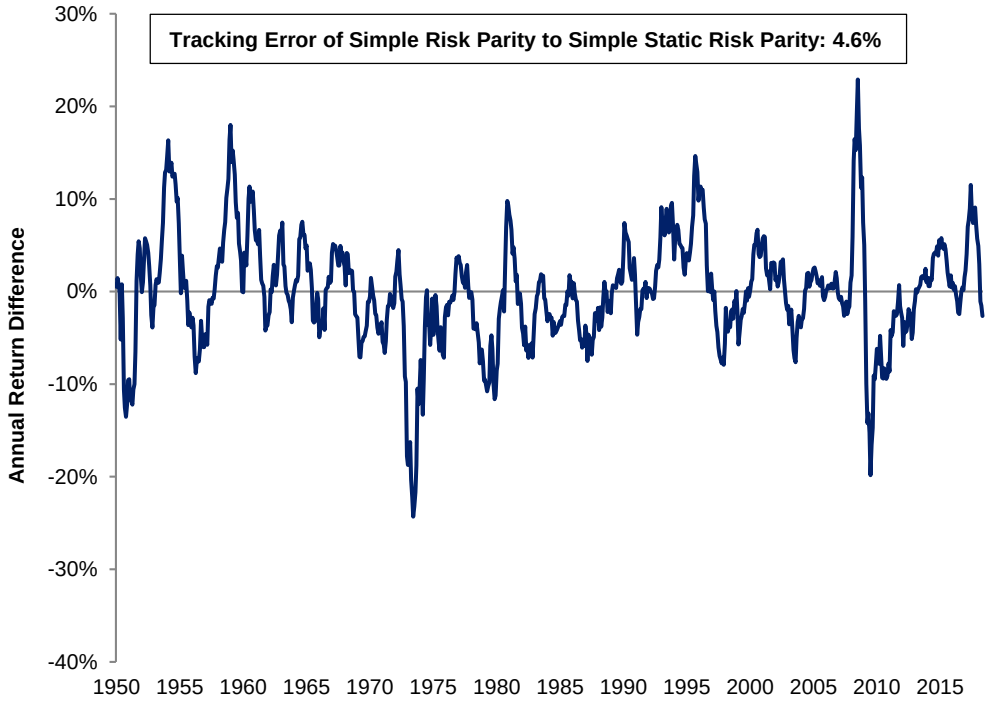
Impact of Implementation Choices

Comparison of risk measurement and management choices

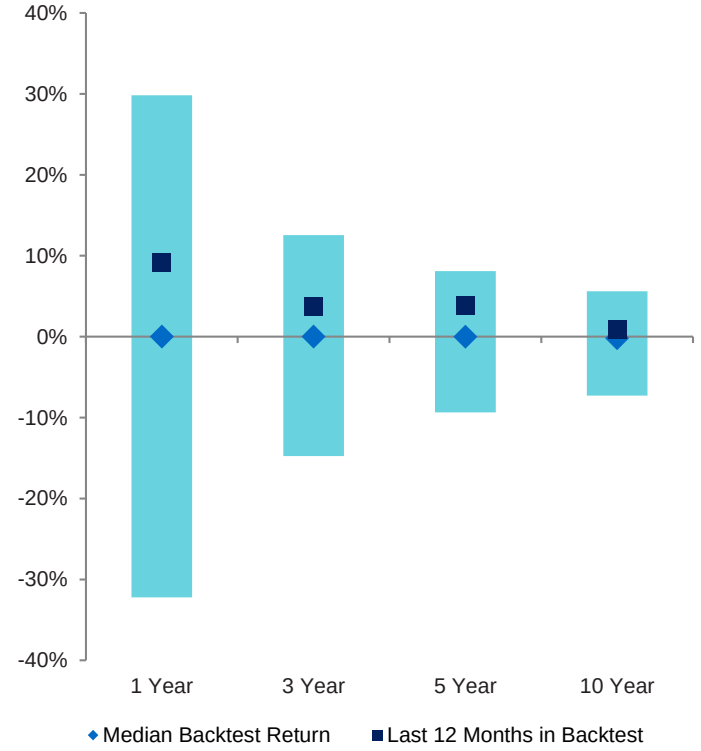
Rolling 1-Year Simple Risk Parity minus Simple Static Risk Parity

August 1950 – December 2018

1-Year Rolling Hypothetical Return Difference



Dispersion of Hypothetical Returns

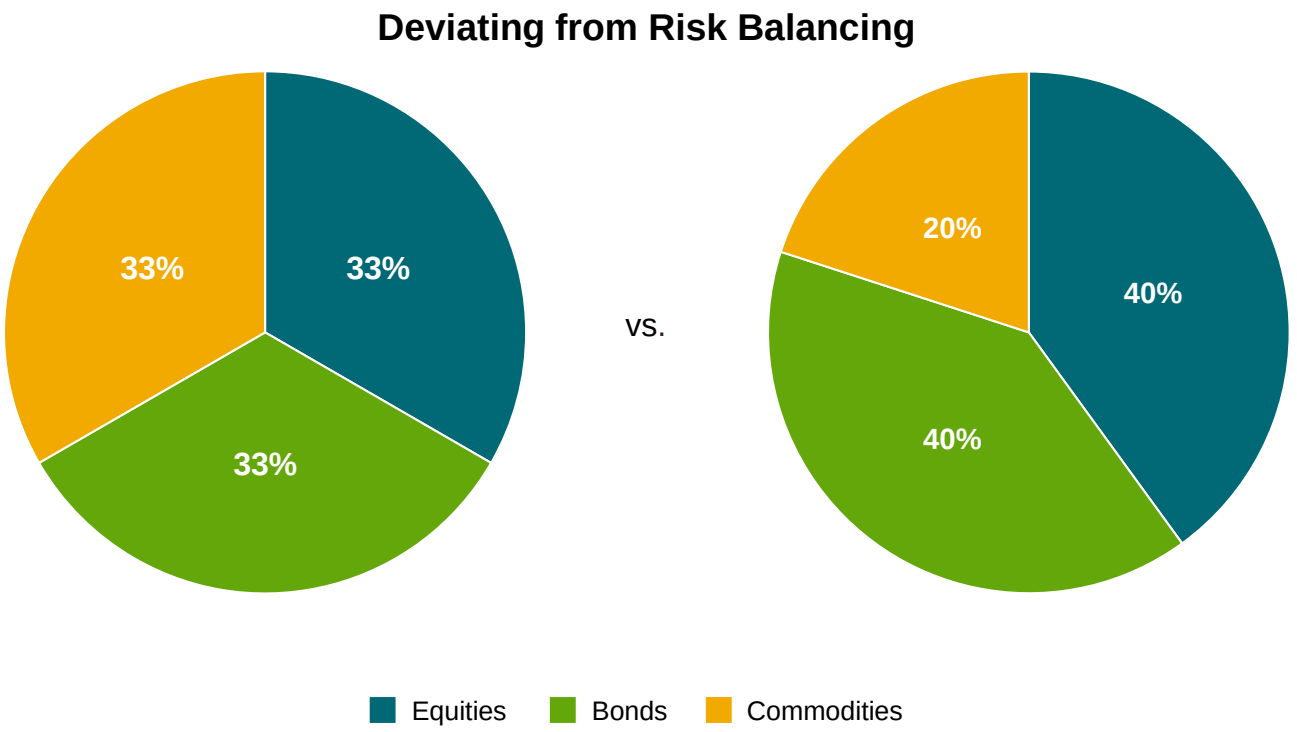


Source: AQR. Simple Risk Parity is constructed by allocating equal risk, rebalanced monthly, across three asset classes (stocks, bonds and commodities) based on each asset class' previous 12-month realized volatility to target a total annualized portfolio volatility of 10%. Returns are gross of fees. Please see the Appendix for more details regarding the asset class construction. Simple Static Risk Parity is a hypothetical model portfolio that allocates equal risk across three major categories (equities, nominal interest rates, inflation-sensitive assets). The strategy was constructed with a long-term risk model which means the exposures to the different asset classes will remain relatively constant through time. The strategy analyzes and trades more than 50 markets across the three major asset classes: global developed and emerging equity indices; developed bond futures and inflation-linked bonds, and commodities, including agriculturals, energies, and metals. The long-term volatility of the strategy will average 12%, but the volatility at any point in time may be either higher or lower. For illustrative purposes only and not representative of a portfolio that AQR currently manages. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please read important disclosures in the Appendix.

Impact of Implementation Choices

Comparison of alternative asset class weighting schemes

Example of an Alternative Implementation Choice



Source: AQR. Charts are for illustrative purposes only. The illustrative risk allocation above does not represent the actual risk allocation of any AQR client account, fund or strategy.

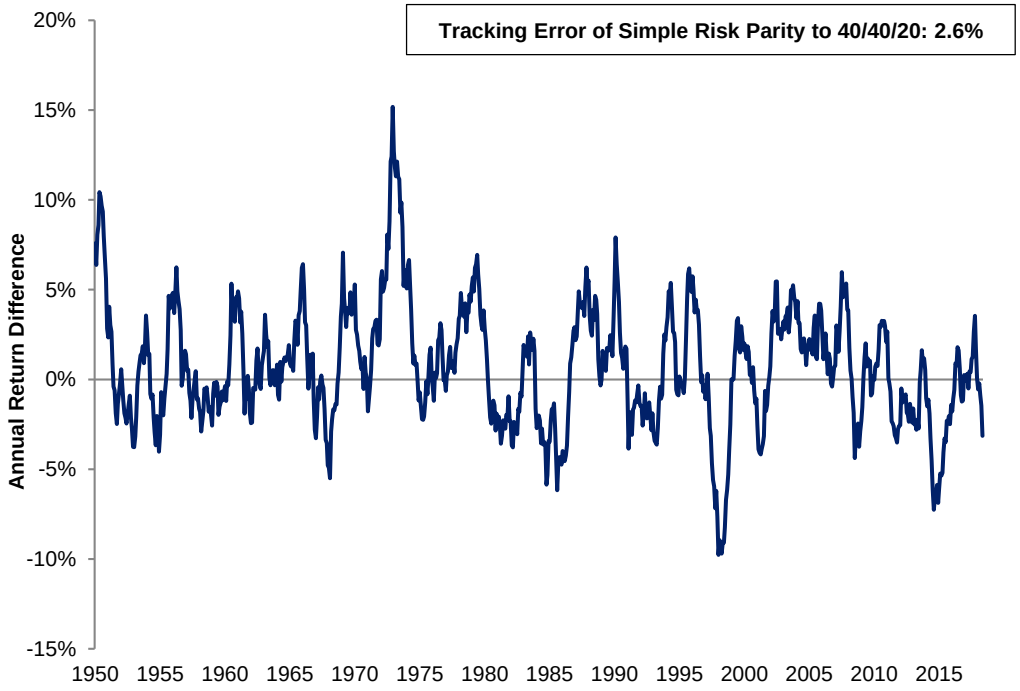
Impact of Implementation Choices

Comparison of alternative asset class weighting schemes

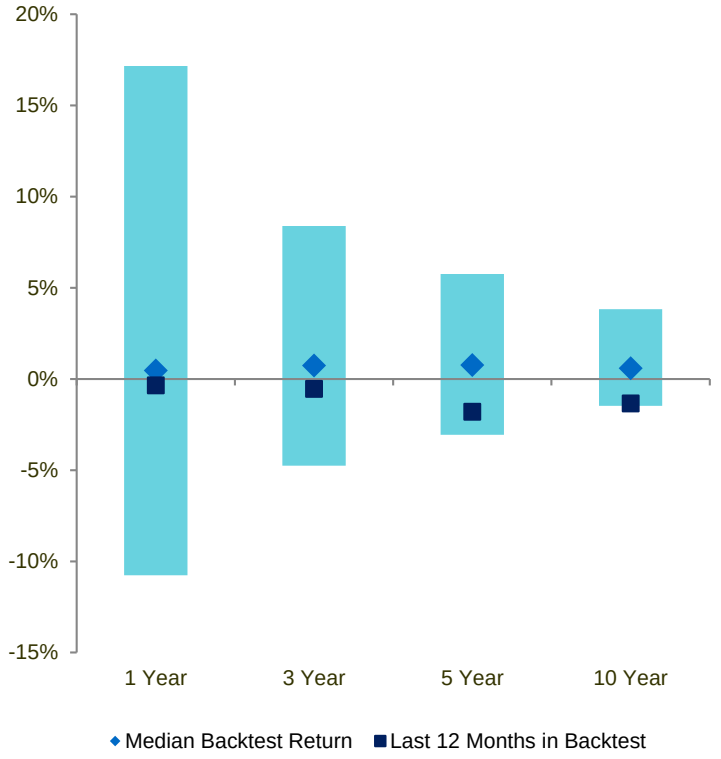
Simple Risk Parity minus 40/40/20 Risk-Weighted

August 1950 – December 2018

1-Year Rolling Hypothetical Return Difference



Dispersion of Hypothetical Returns



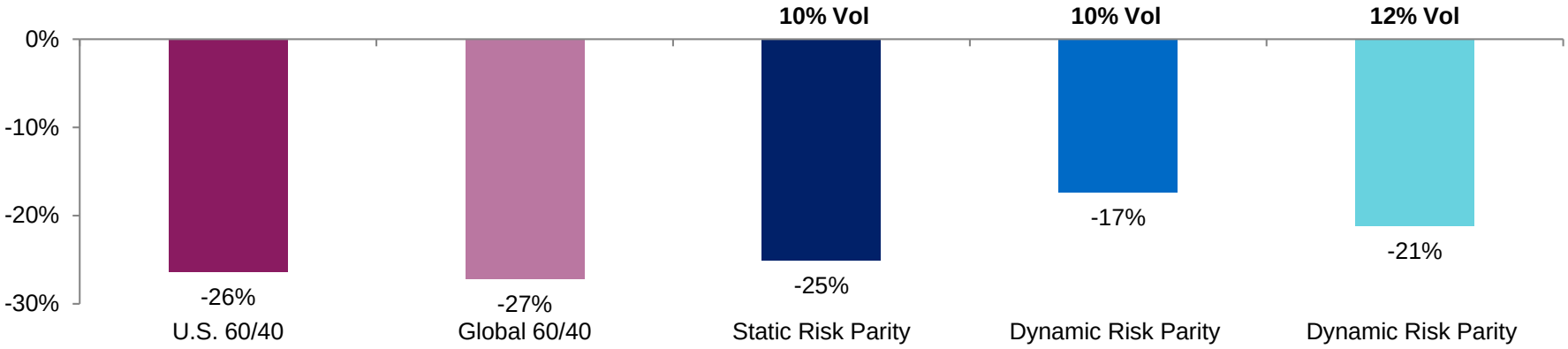
Source: AQR. Simple Risk Parity is constructed by allocating equal risk, rebalanced monthly, across three asset classes (stocks, bonds and commodities) based on each asset class' previous 12-month realized volatility to target a total annualized portfolio volatility of 10%. Returns are gross of fees. Please see the Appendix for more details regarding the asset class construction. 40/40/20 Risk-Weighted is constructed by allocating risk as 40% to stocks, 40% to bonds and 20% to commodities, rebalanced monthly, based on each asset class' previous 12 month realized volatility to target a total annualized portfolio volatility of 10%. For illustrative purposes only and not representative of a portfolio that AQR currently manages. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please read important disclosures in the Appendix.

Volatility Targeting May Reduce Tail Event Severity

Risk targeting may reduce the tails of portfolios

Average Top 3 Drawdowns for Hypothetical Portfolios

January 1980 – December 2016



Risk Statistics for Hypothetical Portfolios

	U.S. 60/40	Global 60/40	Static Risk Parity (10 Vol)	Dynamic Risk Parity (10 Vol)	Dynamic Risk Parity (12 Vol)
Expected Excess Return	3.5%	3.5%	4.8%	5.0%	6.0%
Realized Volatility	10.8%	9.6%	9.9%	9.5%	11.4%
Volatility of Volatility	4.3%	3.6%	3.3%	2.0%	2.4%
Max Drawdown	-31.0%	-38.1%	-28.9%	-18.0%	-21.4%
Probability of -6% or Greater Loss in 10 Days	0.5%	0.5%	0.4%	0.3%	0.6%
Expected Tail Loss over 10 Days (2.5% Probability of Event)	-5.3%	-5.2%	-4.9%	-4.4%	-5.3%

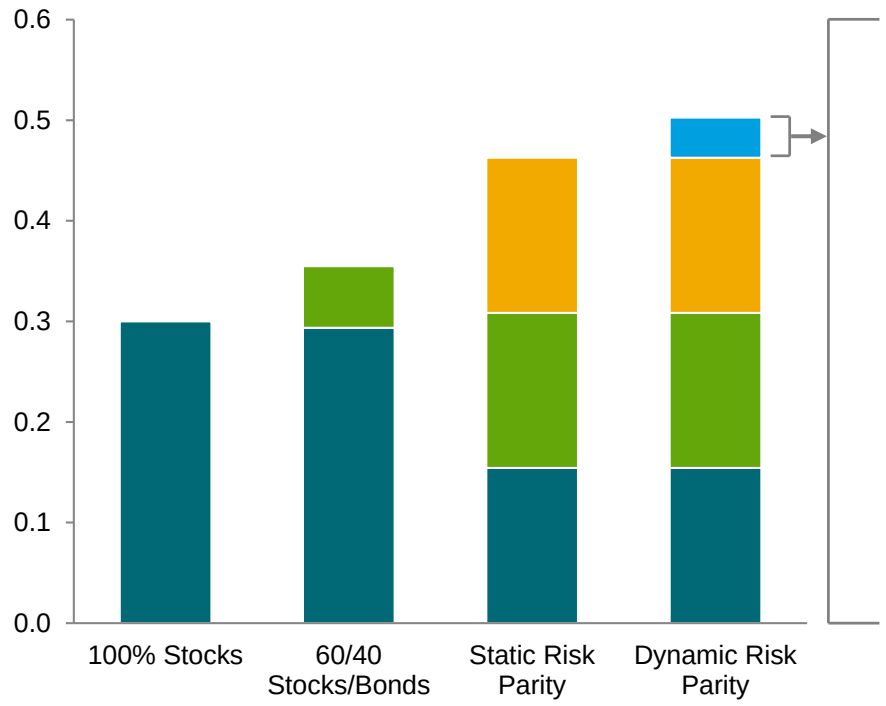
Source: AQR and Bloomberg. Returns are in excess of T-Bills. Time period of the analysis is January 1, 1980 - December 31, 2016. Static Risk Parity is a hypothetical model portfolio that allocates equal risk across three major categories (equities, nominal interest rates, inflation-sensitive assets). The strategy was constructed with a long-term risk model which means the exposures to the different asset classes will remain relatively constant through time. The strategy analyzes and trades more than 50 markets across the three major asset classes: global developed and emerging equity indices; developed bond futures and inflation-linked bonds, and commodities, including agriculturals, energies, and metals. The long-term volatility of the strategy will average 10%, but the volatility at any point in time may be either higher or lower. Dynamic Risk Parity is a similar hypothetical model portfolio except differs in that it was constructed with an active risk model which means exposures are adjusted to target equalized asset class risk contribution and target consistent portfolio volatility throughout time. U.S. and Global 60/40 consist of hypothetical capital-weighted portfolios of 60% equities and 40% bonds. U.S. equities consist of S&P 500 and U.S. bonds consist of 10-year Treasuries. Global equities and global bonds are consistent with the Investment Universe in this presentation. Largest drawdowns calculated as the average of the five most negative peak to trough returns over the period. Volatility is calculated using the annualized standard deviation of three-day overlapping returns. Volatility of volatility is the standard deviation of rolling 60 day volatility. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix.

Volatility Targeting in Risk Parity Portfolios

Volatility targeting helps, but diversification of risk is most important

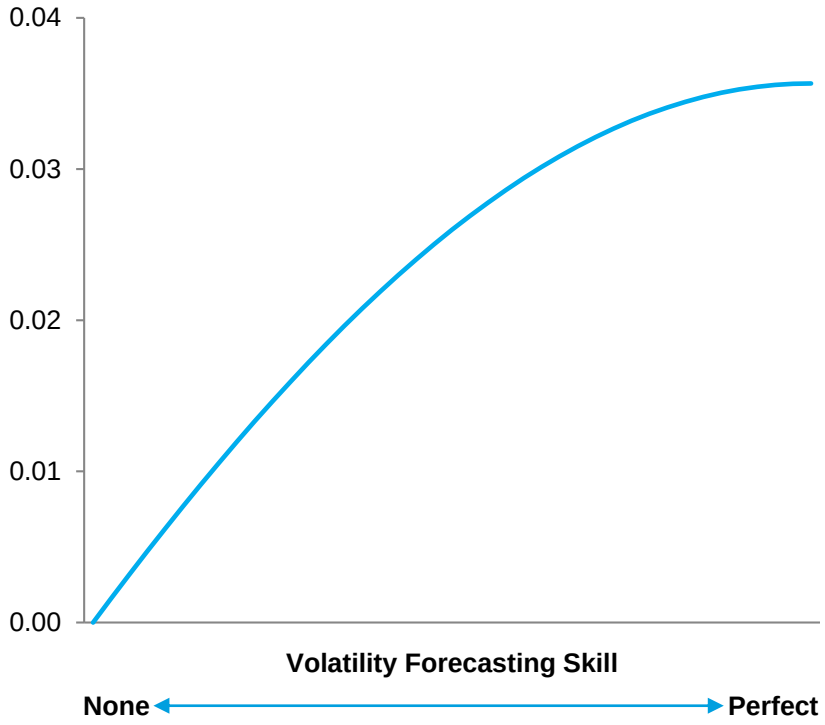
Expected Sharpe Ratio Improvement

Hypothetical Benefit from Diversification



Expected Sharpe Ratio Improvement

Hypothetical Benefit from Risk Targeting



Source: AQR. Expected Sharpe ratio improvement from diversification results are based on a hypothetical equal risk contribution. Static Risk Parity is a hypothetical model portfolio that allocates equal risk across three major categories (equities, nominal interest rates, inflation-sensitive assets). The strategy was constructed with a long-term risk model which means the exposures to the different asset classes will remain relatively constant through time. The strategy analyzes and trades more than 50 markets across the three major asset classes: global developed and emerging equity indices; developed bond futures and inflation-linked bonds, and commodities, including agriculturals, energies, and metals. The long-term volatility of the strategy will average 10%, but the volatility at any point in time may be either higher or lower. Dynamic Risk Parity is a similar hypothetical model portfolio except differs in that it was constructed with an active risk model which means exposures are adjusted to target equalized asset class risk contribution and target consistent portfolio volatility throughout time. Global 60/40 consists of a hypothetical capital-weighted portfolio of 60% developed equities and 40% developed bonds consistent with the Investment Universe in this presentation. Assumptions are consistent with our long-term static asset class correlations and volatilities, and assert equal risk adjusted returns of 0.3 for each asset class. Volatility is calculated using the annualized standard deviation of three-day overlapping returns. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix.

A Global Investment Universe

Risk parity portfolios are usually diversified across and within asset classes

Equity Risk

Developed

Australia
Canada
Eurostoxx
France
Germany
Hong Kong
Italy
Japan
Netherlands
Spain
Switzerland
United Kingdom
United States

Mid Cap

United States

Small Cap

United States

Emerging

Brazil
China
Chile
Hungary
India
Indonesia
Malaysia
Mexico
Peru
Philippines
Poland
Russia
South Africa
South Korea
Taiwan
Thailand
Turkey

Nominal Interest Rate Risk

Developed

Australia
Canada
Germany
Japan
United Kingdom
United States

Emerging

Czech Republic
Hong Kong
Hungary
Mexico
Poland
Singapore
South Africa
South Korea

Inflation Risk

Inflation-Linked Bonds

France
Germany
United Kingdom
United States

Commodities

Aluminum
Brent Oil
Cocoa
Coffee
Copper
Corn
Cotton
Crude Oil
Feeder Cattle
Gas Oil
Gold
Heating Oil
KC Wheat
Lead
Lean Hogs
Live Cattle
Natural Gas
Nickel
Silver
Soybeans
Soy Meal
Soy Oil
Sugar
Unleaded Gas
Wheat
Zinc

Credit/Default Risk

Credit Spreads

Emerging Sovereign
Europe – High Yield
Europe – Investment Grade
North America – High Yield
North America – Investment Grade

Emerging Currencies

Brazilian Real
Chilean Peso
Chinese Yuan
Czech Koruna
Hungarian Forint
Indian Rupee
Mexican Peso
Polish Zloty
Russian Ruble
South African Rand
South Korean Won
Turkish Lira

Instruments used: single stocks, futures, government bonds, swaps, and currency forwards

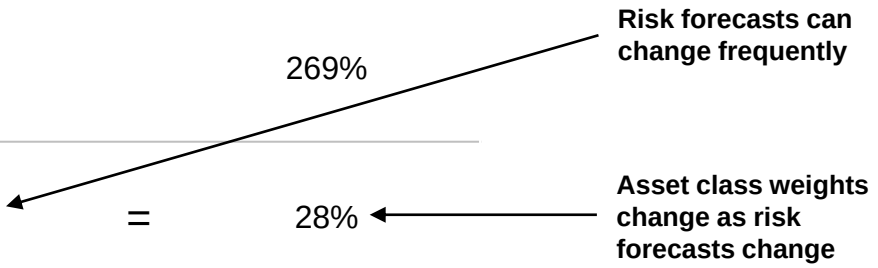
Diversification does not eliminate the risks of experiencing investment losses.

Construct Portfolio Using Risk Forecasts and Constraints

Risk forecasts translate risk targets into position sizes

Volatility and Exposures Example

	Sample Asset Volatility Target		Volatility Forecast for Asset		Position Size as % of Strategy
Total Portfolio	10%				269%
Stock Weight	3.5%	÷	12.4%	=	28%
Bond Weight	4.6%	÷	5.2%	=	88%
Inflation Weight	3.6%	÷	6.8%	=	53%
Credit Weight	3.5%	÷	3.5%	=	100%



Source: AQR. Volatility targets, forecasts and position sizes are presented for illustrative, informational purposes. This chart is not intended to forecast or predict future events, but rather to demonstrate AQR's investment process. The illustrations above do not represent the actual or target volatility or allocation of any AQR client account, fund or strategy, and do not represent AQR's actual volatility forecast for any asset class.

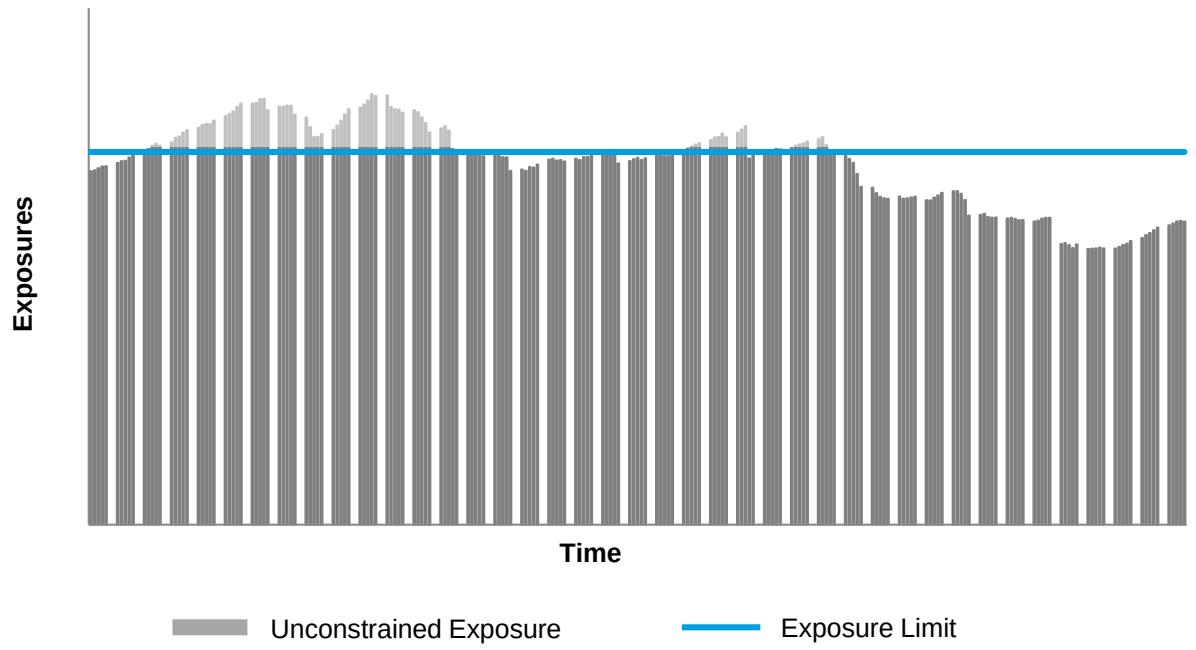
Managing the Risk of Leverage

Enforce exposure limits

Exposures are capped because risk levels can jump

Asset class exposure limits are established to mitigate the risks of leverage and fat-tailed returns

Illustrative Exposure Limits

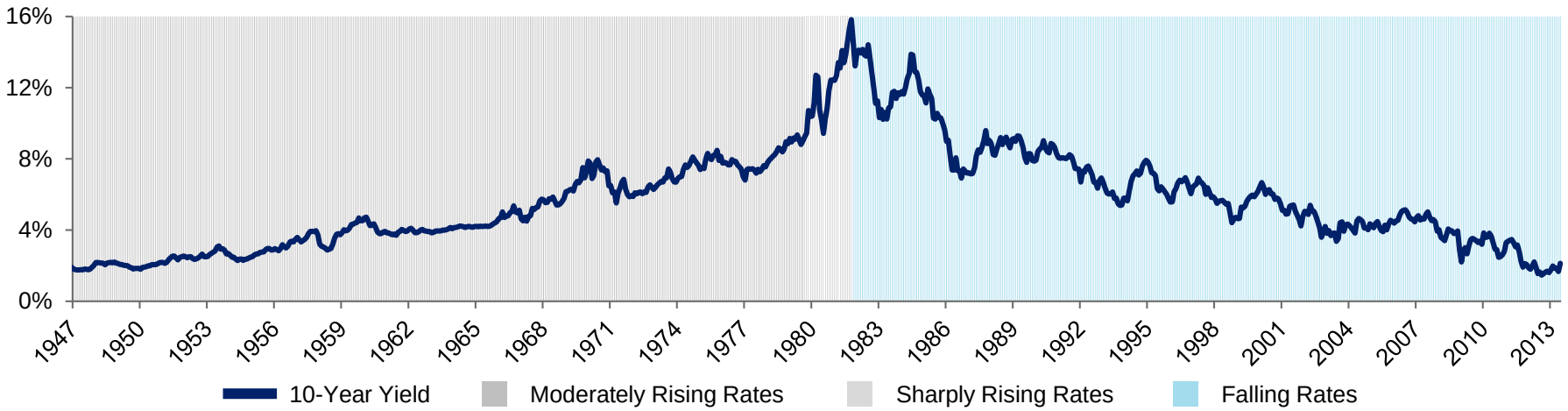


Source: AQR.
*The above data represents the portfolio exposure cap for the GRP 10% volatility strategy. Exposures are subject to change at any time without notice. The illustrative chart above does not represent the actual or target exposures of any AQR client account, fund or strategy, or that of any other adviser. Please read important disclosures in the Appendix.

How Might Risk Parity Perform in a Rising Rate Environment?

Risk parity can still outperform traditional allocations when rates rise

Yield on a 10-Year U.S. Treasury Note



By Subperiod:	Total Annualized Gross Returns			Volatility			Sharpe Ratios		
	U.S. 60/40	Global 60/40	Hypothetical Risk Parity	U.S. 60/40	Global 60/40	Hypothetical Risk Parity	U.S. 60/40	Global 60/40	Hypothetical Risk Parity
Rising Rates: *1947–1981*	7.8%	8.0%	10.9%	8.9%	7.1%	10.4%	**0.38**	**0.49**	**0.62**
• Moderately Rising Rates: *August 1947–September 1979*	8.0%	8.2%	11.9%	8.6%	6.8%	10.0%	0.47	0.63	0.80
• Sharply Rising Rates: *October 1979–September 1981*	4.9%	3.8%	-5.6%	12.1%	10.7%	14.6%	-0.65	-0.83	-1.26
Falling Rates: *1981–2013*	10.8%	9.7%	13.9%	9.7%	9.4%	9.4%	0.62	0.52	0.97
Full Sample	9.3%	8.8%	12.3%	9.3%	8.3%	9.9%	**0.50**	**0.50**	**0.77**

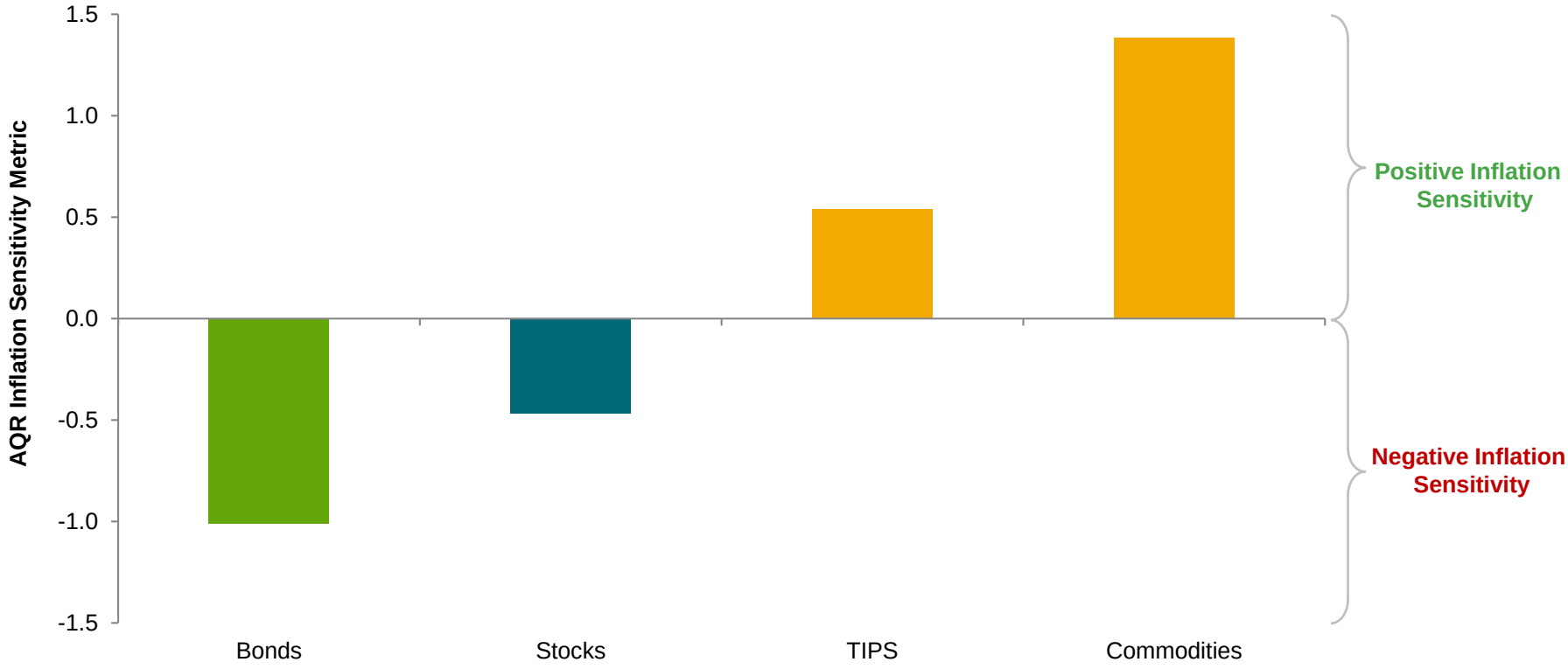
Source: AQR. Data from August 1947-June 2013. Simple Risk Parity is constructed by AQR by allocating equal risk, rebalanced monthly, across three asset classes (stocks, bonds and commodities) based on each asset class' previous 12 month realized volatility to target a total annualized portfolio volatility of 10%. Please see the Appendix for more details regarding the asset class construction. Global 60/40 is based on a 60% monthly exposure to GDP-weighted global equities prior to 1970 and the MSCI World Index thereafter and a 40% monthly exposure to GDP-weighted global USD hedged bonds as defined in the Appendix. U.S. 60/40 is based on a 60% monthly exposure to the S&P 500 Index and a 40% monthly exposure to U.S. Treasuries prior to 1976 and the Bloomberg Barclays U.S. Aggregate Bond Index thereafter. The risk free rate is assumed to be the U.S. 3-month Treasury Bill in Sharpe ratio calculations. AQR has reviewed the above research and believes that the findings are still valid even without the inclusion of more current data. Past performance is not a guarantee of future performance. Hypothetical data has inherent limitations, some of which are disclosed in the Appendix. Please read important disclosures in the Appendix.

Why Do Inflation-Sensitive Assets Matter in a Diversified Portfolio?

Commodities and linkers have done well during periods of rising inflation

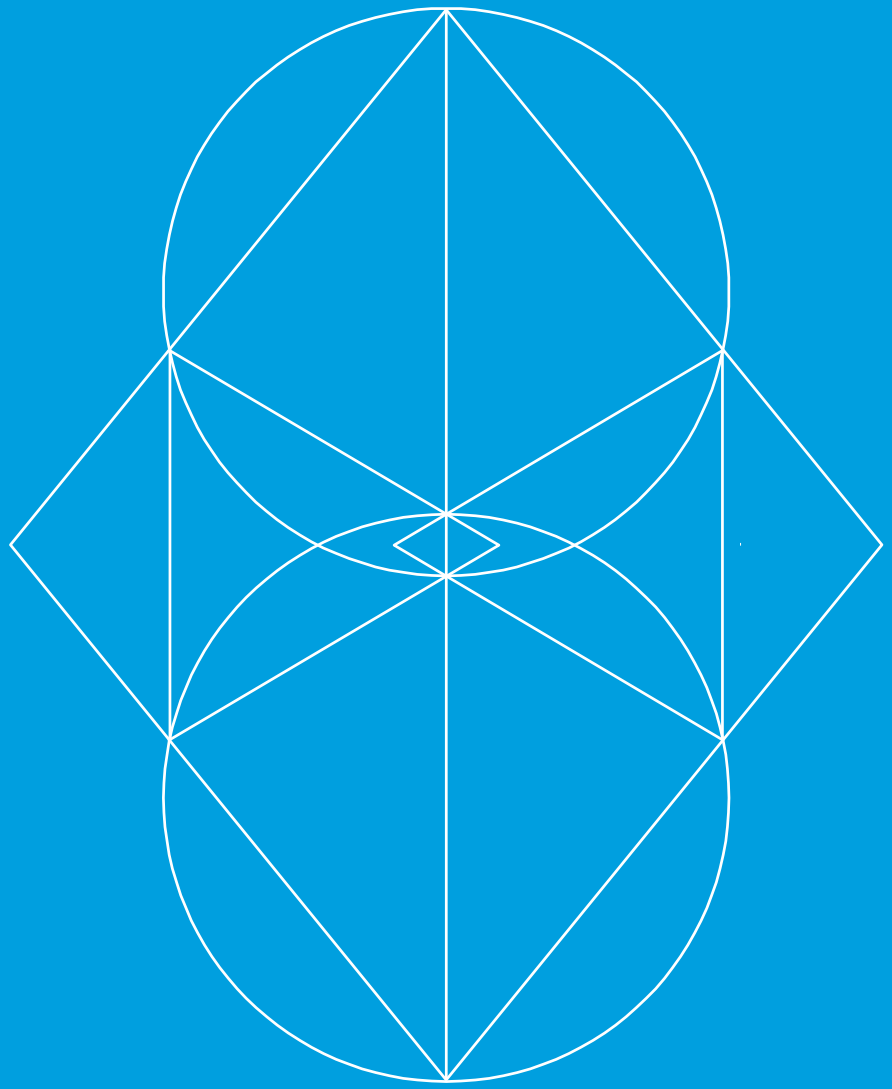
Inflation Sensitivity to Stocks, Bonds, TIPS, and Commodities

January 1970 – December 2017



Sources: AQR, Bloomberg, Datastream. Data using the following sources: 10 year U.S. Treasury securities scaled to a constant duration (Bonds); S&P 500 Index (Equities); 10 year U.S. TIPS (TIPS); S&P GSCI Index (Commodities). Inflation data utilized in the metric is sourced from the U.S. Bureau of Labor Statistics, while inflation expectations are sourced from the Survey of Professional Forecasters. AQR's Inflation Sensitivity Measure combines three measurements to analyze the inflation properties of assets and strategies: relative performance of assets in positive versus negative inflation surprise periods; relative performance of assets in various inflation regimes (Decreasing / Flat / Increasing Inflation) and realized correlation of an asset's excess returns to subsequent annual inflation. Inflation Measure: U.S. seasonally adjusted CPI. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Disclosures



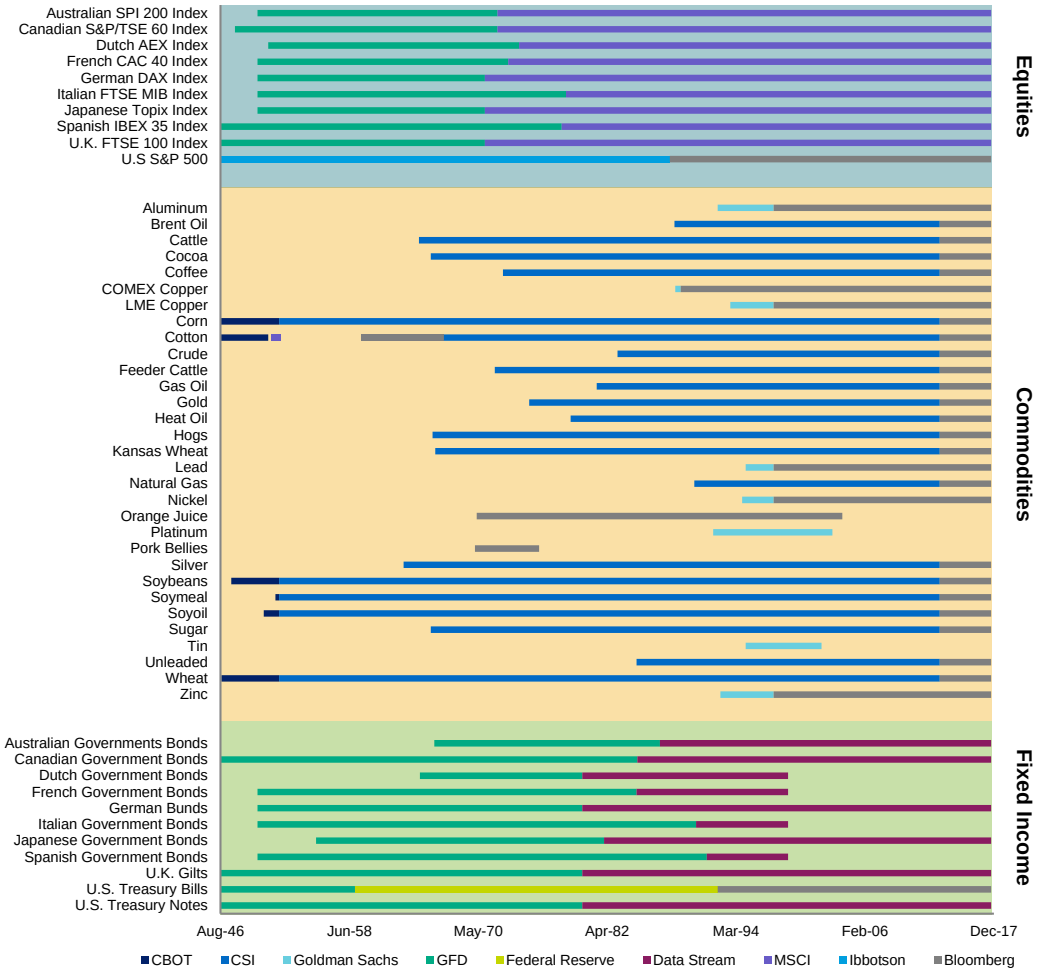
Simple Risk Parity

Description of Simple Risk Parity hypothetical portfolio

- Assumes equal volatility targets across global equities, global bonds and commodities
- The equal volatility targets are determined such that the volatility of overall portfolio averages 10% over the complete history
- Volatility estimates are calculated using rolling 12-month annualized standard deviation
- The exposure for each asset is adjusted as the volatility estimates evolve such that the portfolio targets 10% volatility over time
- There are no leverage constraints and the model makes no explicit assumptions about correlation between asset classes

Asset class weighting

- Global equities are GDP–weighted for the primary equity index for 10 developed countries
- Global bonds are GDP–weighted across government bonds for 10 developed countries
- Commodities are an equally weighted basket of futures which currently consists of 31 contracts



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The risk reduction process described herein will not always be successful at controlling risks or limiting portfolio losses.

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Gross performance results do not reflect the deduction of investment advisory fees, which would reduce an investor's actual return. For example, assume that $1 million is invested in an account with the Firm, and this account achieves a 10% compounded annualized return, gross of fees, for five years. At the end of five years that account would grow to $1,610,510 before the deduction of management fees. Assuming management fees of 1.00% per year are deducted monthly from the account, the value of the account at the end of five years would be $1,532,886 and the annualized rate of return would be 8.92%. For a 10-year period, the ending dollar values before and after fees would be $2,593,742 and $2,349,739, respectively. AQR's asset based fees may range up to 2.85% of assets under management, and are generally billed monthly or quarterly at the commencement of the calendar month or quarter during which AQR will perform the services to which the fees relate. Where applicable, performance fees are generally equal to 20% of net realized and unrealized profits each year, after restoration of any losses carried forward from prior years. In addition, AQR funds incur expenses (including start-up, legal, accounting, audit, administrative and regulatory expenses) and may have redemption or withdrawal charges up to 2% based on gross redemption or withdrawal proceeds. Please refer to AQR's ADV Part 2A for more information on fees. Consultants supplied with gross results are to use this data in accordance with SEC, CFTC, NFA or the applicable jurisdiction's guidelines.

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The Bloomberg Barclays U.S. Aggregate Bond Index is a broad-based benchmark that measures the investment grade, U.S. dollar-denominated, fixed-rate taxable bond market, including Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM passthroughs), ABS and CMBS.

The Bloomberg Barclays U.S. Government Bond Index is comprised of the U.S. Treasury and U.S. Agency Indices. The U.S. Government Index includes Treasuries (public obligations of the U.S. Treasury that have remaining maturities of more than one year) and U.S. agency debentures (publicly issued debt of U.S. Government agencies, quasi-federal corporations and corporate or foreign debt guaranteed by the U.S. Government). The U.S. Government Index is a component of the U.S. Government/Credit Index and the U.S. Aggregate Index.

The Bloomberg Barclays Global Aggregate Bond Index is a flagship measure of global investment grade debt from twenty-four local currency markets. This multi-currency benchmark includes treasury, government-related, corporate and securitized fixed-rate bonds from both developed and emerging markets issuers.

The Ibbotson U.S. Intermediate Government Bond Index is a custom index designed to measure the performance of U.S. government bonds.

The MSCI World Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets.

The S&P GSCI™ Total Return index measures a fully collateralized commodity futures investment that is rolled forward from the fifth to the ninth business day of each month.

The S&P GSCI™ Total Return is significantly different than the return from buying physical commodities.

Performance Disclosures

Construction of Macroeconomic Indicators

We choose to construct macro indicators, or risk factors, mainly based on fundamental economic data, and not based on asset market returns (which are "too close" to the patterns we try to explain). For example, potential market–based proxies of economic growth include equity market returns, the relative performance of cyclical industries, dividend swaps, and estimates from cross–sectional regressions of asset returns on growth surprises. This choice brings its own problems, notably timing challenges as macroeconomic data are backward-–looking, published with lags and later revised, while asset prices are clearly forward–looking. The impact of publication lags and the mismatch between backward– and forward–looking perspectives can be mitigated by using longer windows. Thus, we use contemporaneous annual economic data and asset returns through our analysis (past–year data with quarterly overlapping observations). Arguably composite growth surprise indices are the best proxies of economic growth news, but such composites are available at best going back to 1990s. Forecast changes in economist surveys as well as business and consumer confidence surveys may be the next best choices because they are reasonably forward-looking and timely. In a globalized world, it is not clear whether we should focus only on domestic macro developments, but data constraints make us focus on U.S. data. Finally, it is not clear how real economic growth ties to expected corporate cash flow growth (e.g., earnings per share) that influence stock prices or to real yields that influence all asset prices but especially those of bonds.

Each of our macro indicators combines two series, which are first normalized to Z–scores: that is, we subtract a historical mean from each observation and divide by a historical volatility. When we classify our quarterly 12–month periods into, say, 'growth up' and 'growth down' periods, we compare actual observations to the median so as to have an equal number of up and down observations (because we are not trying to create an investable strategy where data should be available for investors in real time, we use the full sample median).

The underlying series for our **growth indicator** are the Chicago Fed National Activity Index (CFNAI) and the "surprise" in industrial production growth over the past year. Since there is no uniquely correct proxy way to capture "growth"; averaging may make the results more robust and signals appropriate humility. CFNAI takes this averaging idea to extremes as it combines 85 monthly indicators of U.S. economic activity. The other series – the difference between actual annual growth in industrial production and the consensus economist forecast a year earlier – is narrower but more directly captures the surprise effect in economic developments. We use median forecasts from the Survey of Professional Forecasters data as published by the Philadelphia Fed. While data surprises a priori have a zero mean, this series has exhibited a downward trend in recent decades, reflecting the (partly unexpected) relative decline of the U.S. manufacturing sector.

Our **inflation indicator** is also an average of two normalized series. One series measures the de–trended level of inflation (CPIYOY minus its mean, divided by volatility), while the other measures the surprise element in realized inflation (CPIYOY minus consensus economist forecast a year earlier).

The other macro **indicator for real yield** combines the level and change aspects. For example, both high and rising real yields can imply adverse conditions for many investors. We study real long-term bond yields (subtracting a survey-based forecast of long-term inflation from the 10-year Treasury yield) and real short yields (subtracting a survey-based forecast of next-year inflation from the three-month Treasury bill rate). We normalize both their levels and one-year changes, and then average these to give us a composite Real Yield Indicator.

Performance Disclosures

Callan Capital Market Assumptions: 10 Year Return and Risk Projections

Callan 10-Year Return and Risk Projections

	Return	Volatility
Broad U.S. Equity	7.2%	18.0%
Large Cap	7.0%	17.1%
Small/Mid Cap	7.3%	22.7%
Global ex-US	7.3%	21.1%
Dev. Non-US	7.0%	19.8%
Emerging	7.3%	27.5%
Short Duration	3.4%	2.1%
US Fixed	3.8%	3.8%
Long Duration	3.8%	10.7%
TIPS	3.8%	5.1%
High Yield	5.4%	10.4%
Non US Fixed	1.4%	9.2%
Emerging Debt	5.1%	9.5%
Real Estate	6.3%	15.7%
PE	8.5%	29.3%
HFs	5.5%	8.9%
Commodities	3.2%	18.0%
Cash	2.5%	0.9%
Inflation	2.3%	1.5%

Performance Disclosures

Callan Capital Market Assumptions: Correlation Expectations

Correlation Expectations (10 Years)

	Broad	Large Cap	Sm/Mid Cap	Global ex-U.S.	Dev. Non-U.S.	EM Equity	Short Duration	U.S. Fixed	Long Duration	TIPS	High Yield	Non-U.S. Fixed	EM Debt	Real Estate	Private Equity	Hedge Funds	Comm.	Cash Equiv.	Inflation
Broad U.S. Equity	1.00																		
Large Cap	1.00	1.00																	
Small/Mid Cap	0.96	0.93	1.00																
Global ex-U.S. Equity	0.85	0.84	0.84	1.00															
Dev. Non-U.S. Equity	0.81	0.80	0.80	0.99	1.00														
Emerging Market Equity	0.87	0.86	0.86	0.94	0.88	1.00													
Short Duration	-0.23	-0.22	-0.26	-0.25	-0.23	-0.28	1.00												
U.S. Fixed	-0.11	-0.10	-0.15	-0.14	-0.12	-0.17	0.88	1.00											
Long Duration	0.11	0.11	0.10	0.08	0.09	0.04	0.74	0.93	1.00										
TIPS	-0.05	-0.04	-0.08	-0.06	-0.05	-0.09	0.56	0.64	0.53	1.00									
High Yield	0.64	0.63	0.62	0.63	0.61	0.62	-0.13	0.02	0.19	0.06	1.00								
Non-U.S. Fixed	0.01	0.01	0.00	0.07	0.05	0.10	0.48	0.53	0.54	0.40	0.12	1.00							
Emerging Market Debt	0.57	0.57	0.55	0.57	0.54	0.58	-0.04	0.10	0.20	0.18	0.60	0.01	1.00						
Real Estate	0.74	0.73	0.72	0.71	0.68	0.70	-0.13	-0.04	0.17	0.00	0.56	-0.05	0.47	1.00					
Private Equity	0.92	0.92	0.88	0.88	0.86	0.86	-0.30	-0.23	-0.01	-0.14	0.55	0.06	0.45	0.66	1.00				
Hedge Funds	0.76	0.76	0.74	0.74	0.72	0.73	-0.08	0.09	0.29	0.09	0.57	-0.05	0.54	0.64	0.62	1.00			
Commodities	0.15	0.15	0.15	0.16	0.16	0.16	-0.22	-0.10	-0.04	0.12	0.10	0.15	0.19	0.20	0.18	0.21	1.00		
Cash Equivalents	-0.04	-0.03	-0.08	-0.04	-0.01	-0.10	0.30	0.10	-0.04	0.12	-0.11	0.00	-0.07	-0.06	0.00	-0.07	0.07	1.00	
Inflation	-0.01	-0.02	0.02	0.01	0.00	0.03	-0.20	-0.28	-0.29	0.10	0.07	-0.10	0.00	0.10	0.06	0.20	0.40	0.00	1.00

Source: Callan

AQR

ALASKA RETIREMENT MANAGEMENT BOARD

Risk Management

Zachary Hanna, CFA
Deputy Chief Investment Officer

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

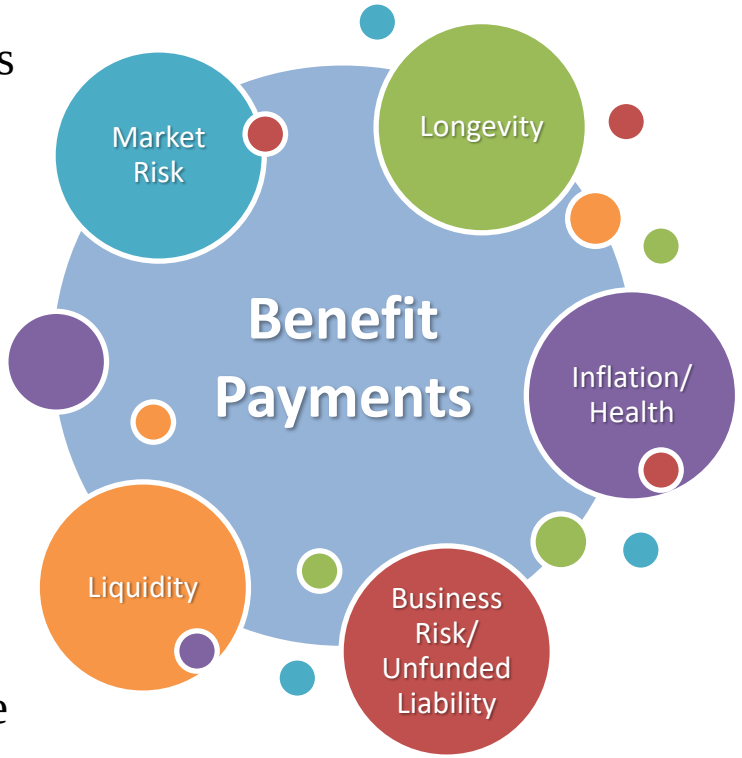
Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

What Does Risk Mean to a Retirement System?

What does Risk mean to the ARMB?

- At its most comprehensive, risk is anything that could impact the objectives of the retirement systems
- The defined benefit systems' primary objective is to pay all benefits when they are due
- Risk encompasses both assets and liabilities
- Defined benefit systems are designed to be able to take risks – pooling market, longevity, and other risks across time and a broad pool of participants
- Setting and monitoring investment risks is one of the primary roles of the ARMB



What Should Retirement Systems Do About Risk?

Risks should be understood, managed, and monitored:

- Understand the potential implications of risks that are expected to be compensated and set those risks at appropriate levels
- Reduce and manage uncompensated risk
- Understand the implications of risks that cannot be managed
- Monitor risks for potential control points and action
- Prioritize attention towards those risks that have the highest impact and likelihood

Elements of ARMB Risk Management

Identify and Analyze
- Capital market expectations
- Market data
- Economic outlook
- **Actuarial data**
- **Peer information**
- Staff, consultant, and manager analysis

Take Action
- Set actuarial assumptions
- Set asset allocation
- Set investment policies with risk guidelines and benchmarks
- Guide portfolio construction

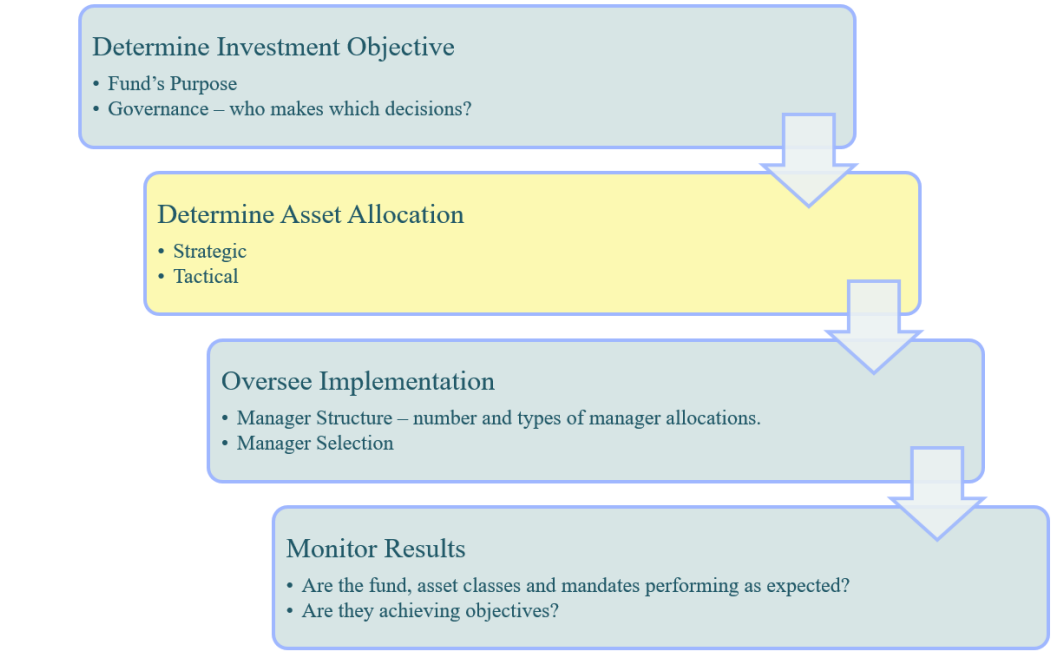
Control
- Rebalancing
- Manager changes
- Contingency plans
- Hedging?

Monitor
- Investment performance reports
- Accounting reports
- R&B reports
- Periodic returns (daily+)
- Internal controls
- Compliance monitoring
- **Risk reports (truView)**

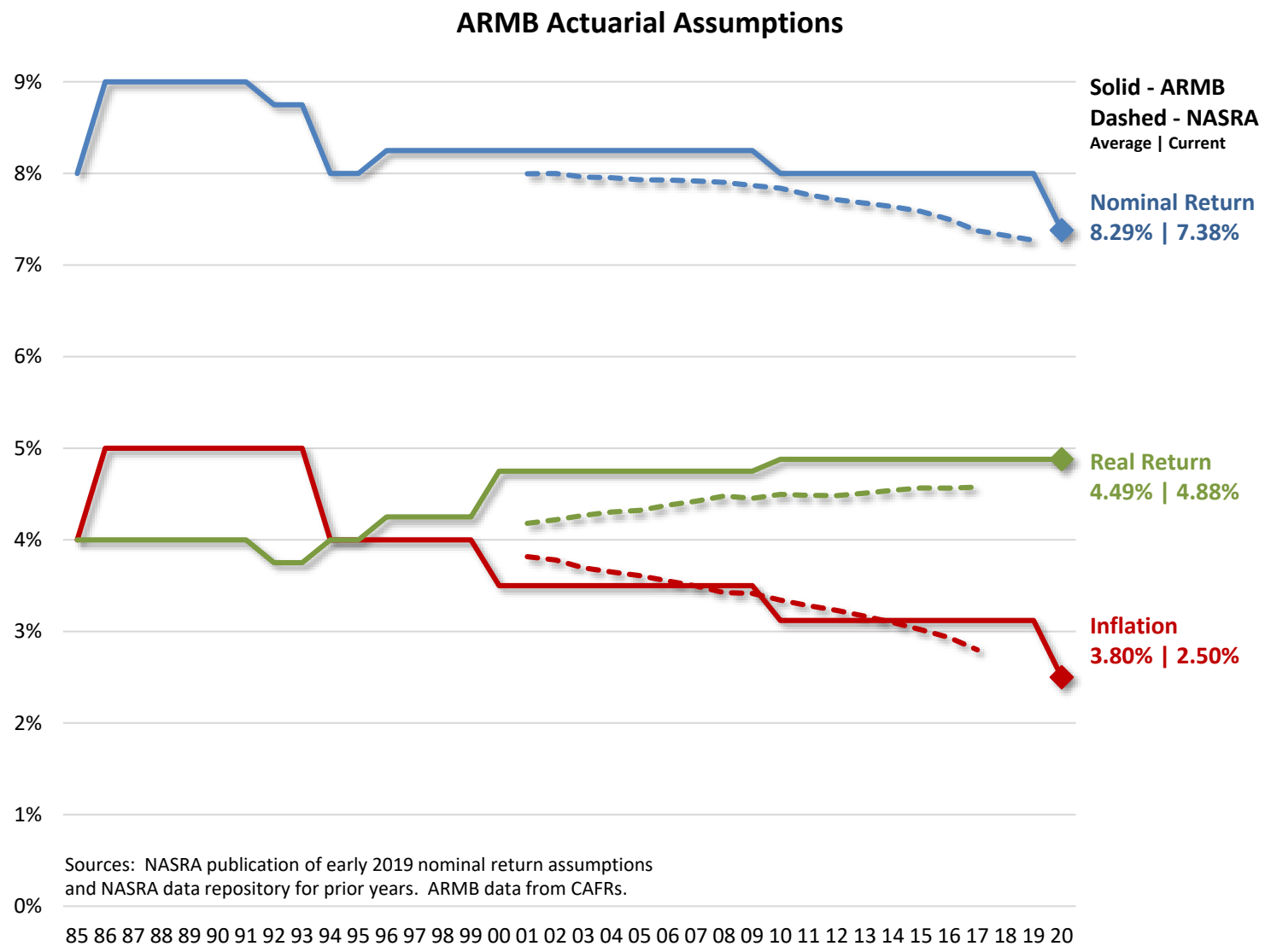
Risk Feedback for Asset Allocation:

Risk – Peers – Liquidity

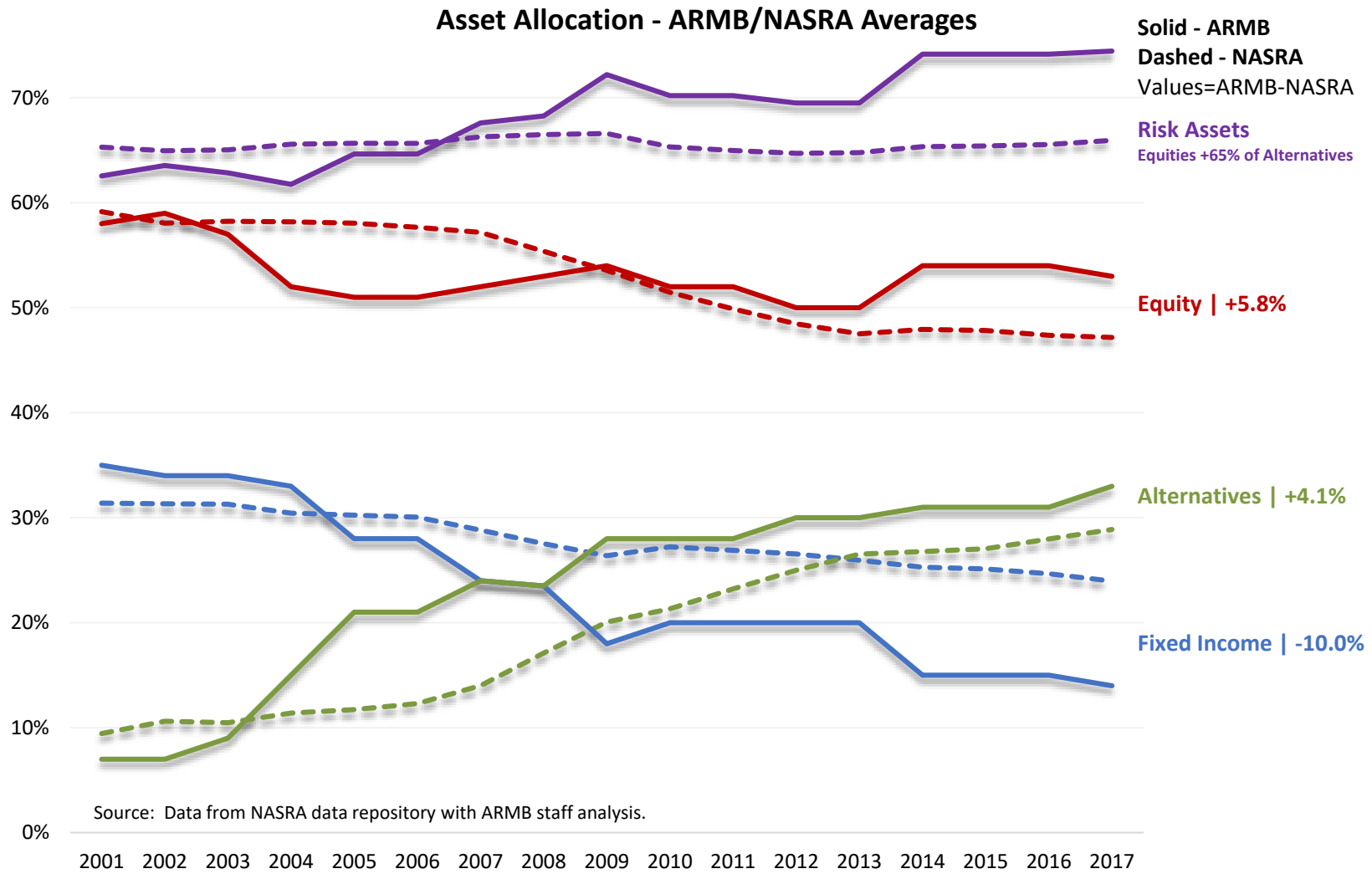
Key Board Decisions



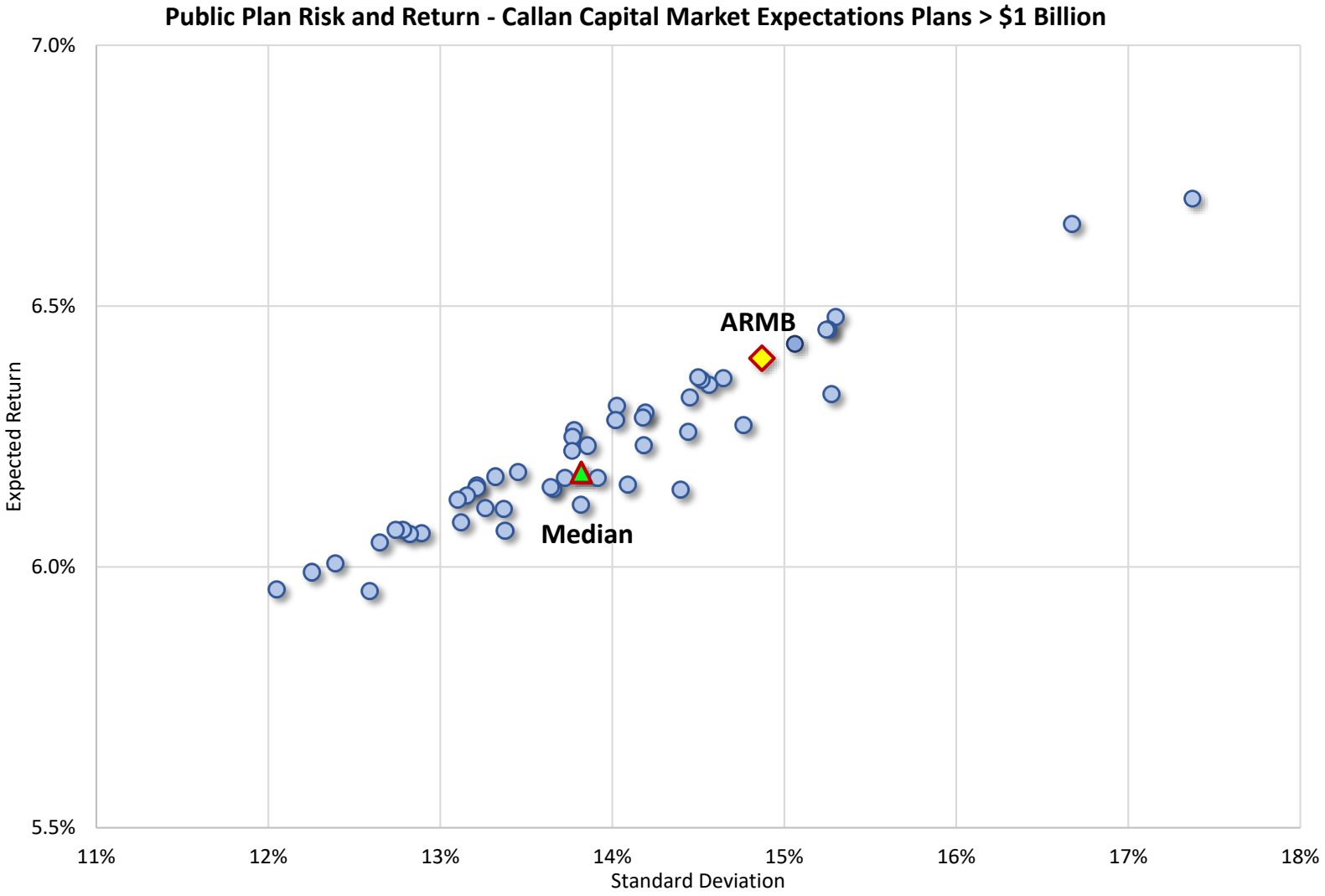
Actuarial Assumptions – ARMB and NASRA



Asset Allocation – ARMB and NASRA



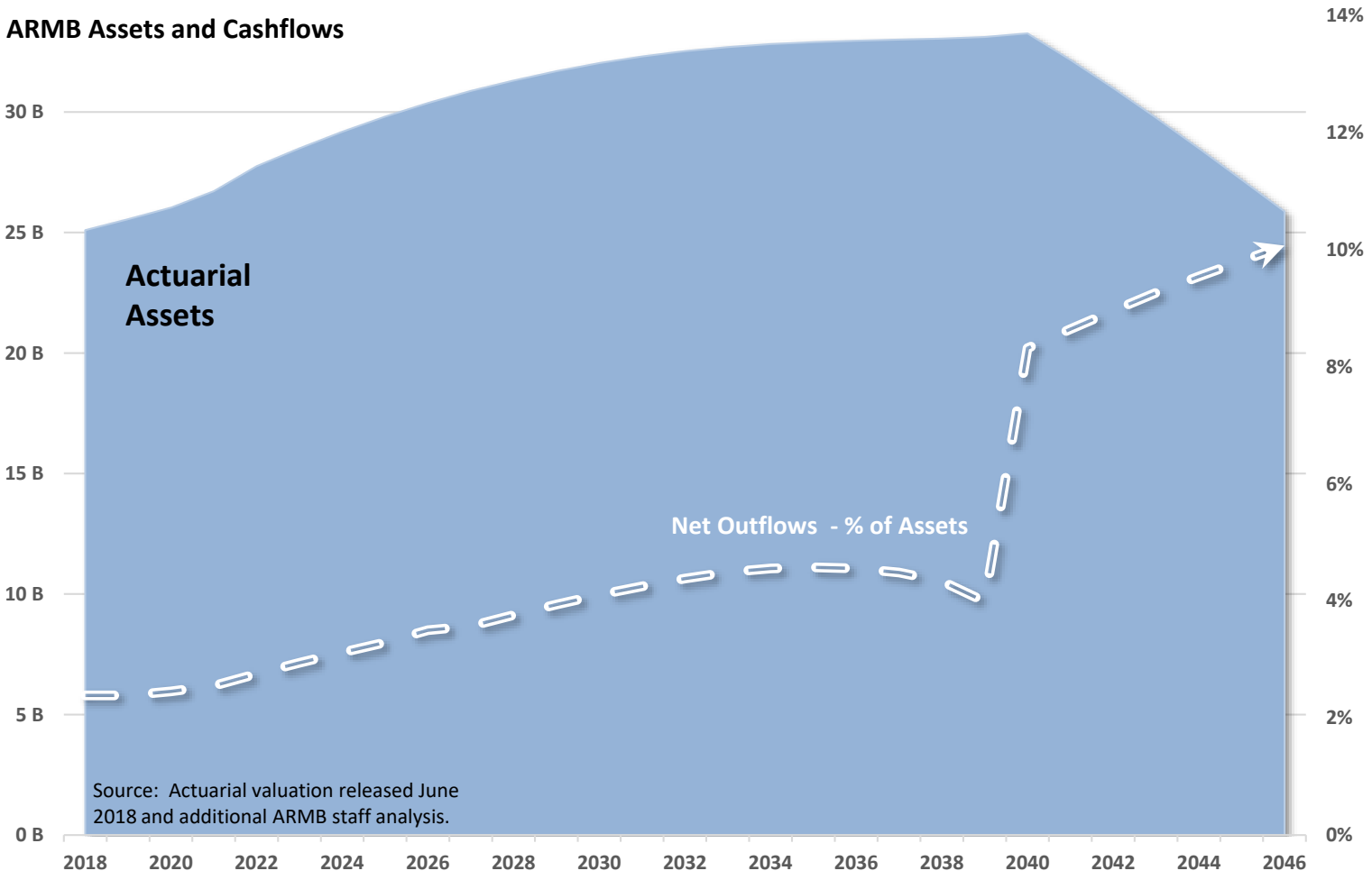
Risk and Return – ARMB and Callan Database



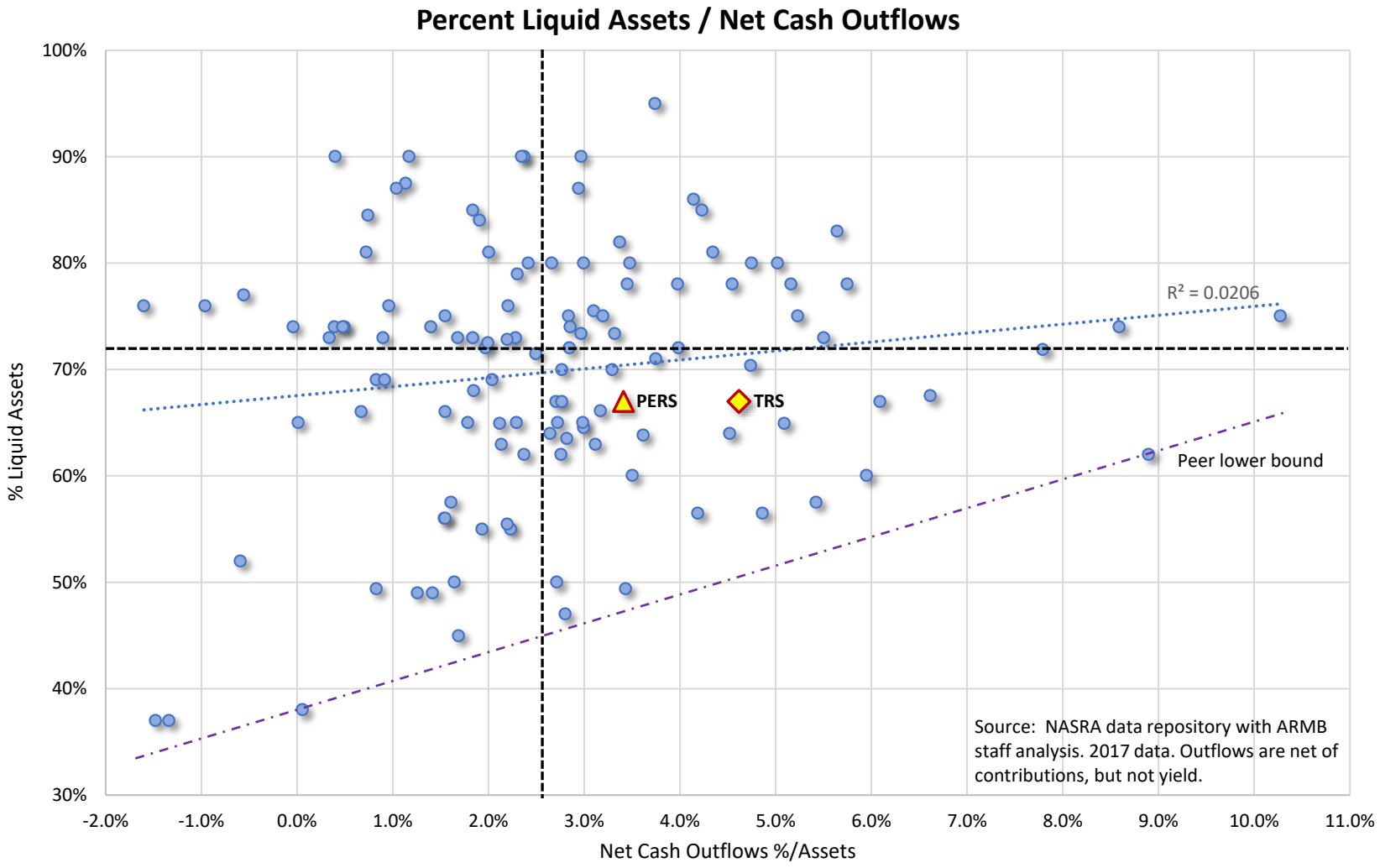
Source and Notes: Callan provided detailed asset allocation information for 51 plans with greater than one billion in assets and used a unified set of capital market assumptions to produce the risk and return results. Compared to the median, the ARMB has 1.08 times (+105 bps) more risk and 1.04 times (+22 bps) more return.

Liquidity – Assets and Cashflows over Time

- Based on 2018 actuarial assumptions, ARMB assets should continue to grow through 2039
- Outflows, net of contributions and yield, start at 2.4% of assets and grow to 4.6% over this period
- Assets decrease and net outflows increase rapidly after 2039

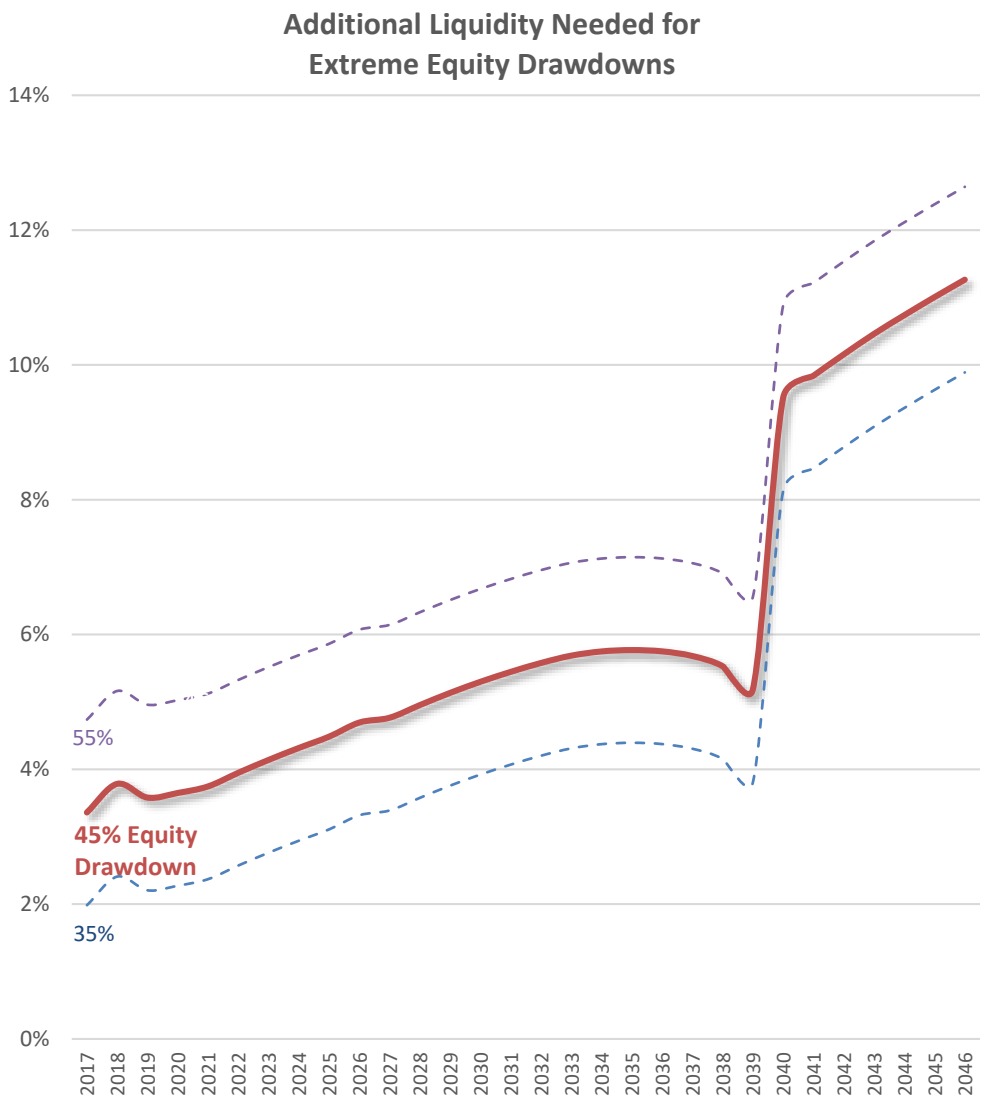


Liquidity – Cashflow for ARMB and NASRA

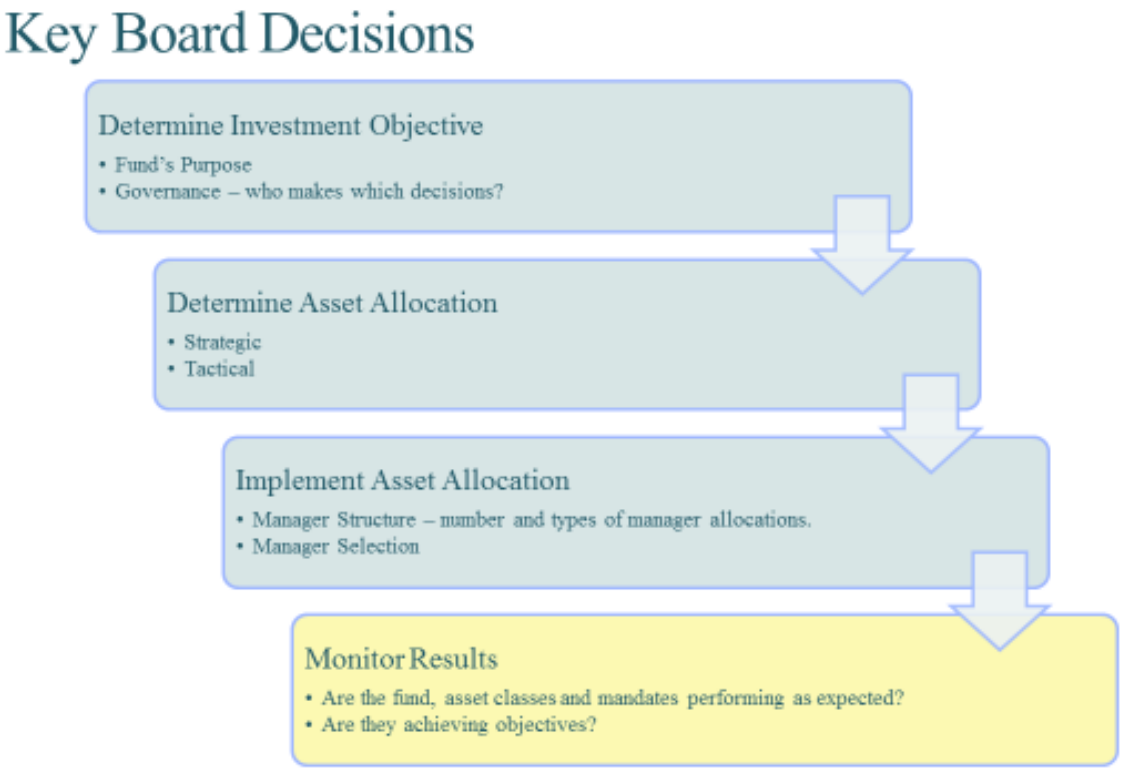


Liquidity – Maintaining Risk Posture in a Crisis

- The ARMB needs liquidity to pay benefits, meet investment obligations, and rebalance to maintain the board's strategic asset allocation.
- As of 12/31/18, the ARMB had $1.8 billion in commitments to private equity and other investments that will be drawn down over time – 7% of total assets. Staff currently estimates that 1% of the plan would be called each year in a crisis.
- Staff ran stress tests to estimate how much liquidity would be needed to fully rebalance back to equity targets during an extreme one-year equity drawdown similar to the financial crisis.
- The ARMB would need ~ 4% more high quality fixed income to be able to fully rebalance. This number increases over time as the plan becomes more mature. A two-year crisis similar to the tech meltdown might require 3-4% more liquidity.



Risk Monitoring: truView



Risk Monitoring Tool: truView

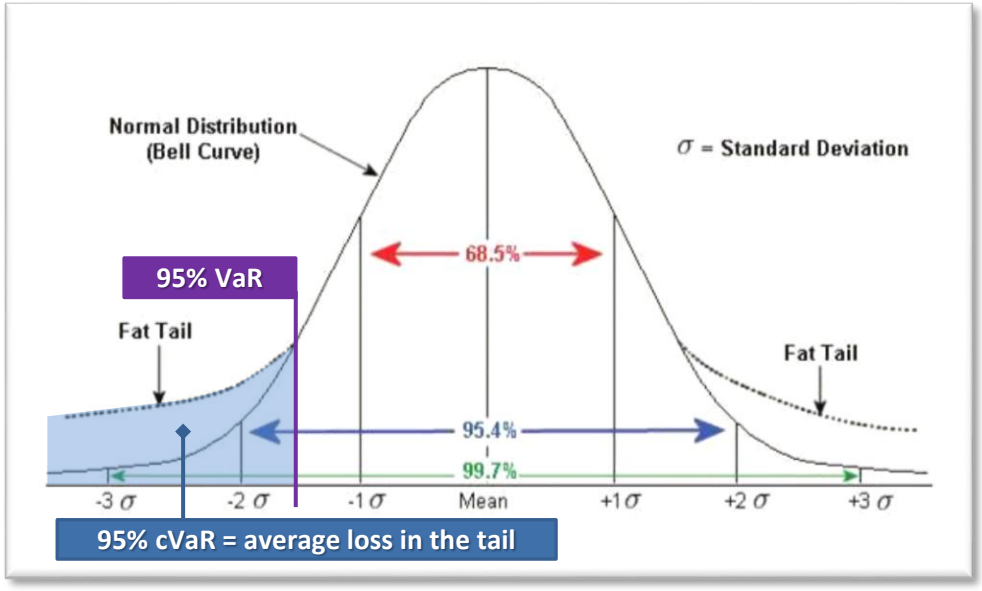
- The ARMB is using truView for portfolio risk analytics. truView is State Street Global Exchange's risk measurement platform.

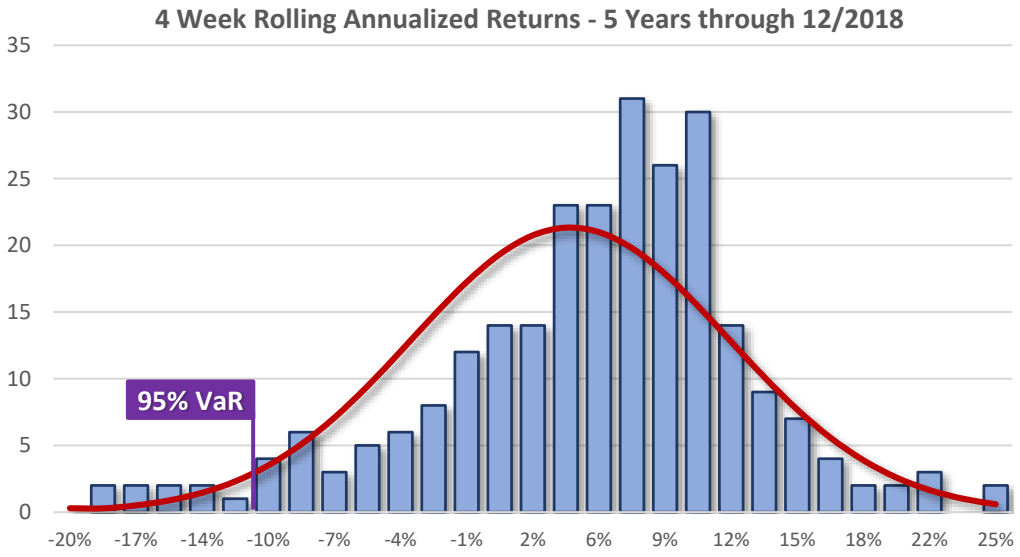
- truView has daily holdings for two-thirds of the portfolio. The remaining third is largely alternative fund investments that are proxied using risk-appropriate benchmarks. The risk metrics are based on weekly-sampled monthly returns for the past five years. The analytics are run every six months and the current results are as of December 31, 2018.

- truView provides information that can be used to monitor risk in the ARMB's portfolio and to answer questions like the following:
  - Is the portfolio risk positioned according to the ARMB's asset allocation?
  - Is the ARMB taking more or less risk than the strategic benchmark by asset class?
  - Are specific investment mandates or managers adding to or reducing risk?
  - Does the ARMB have unexpected risk exposures or concentration in asset classes, countries, currencies, or sectors?
  - What is the plan's exposure to equity markets?
  - What is the plan's interest rate sensitivity?
  - How would the ARMB's current portfolio perform in historic market events or scenarios?
  - What is the probability and magnitude of potential losses?

What is Value-at-Risk?

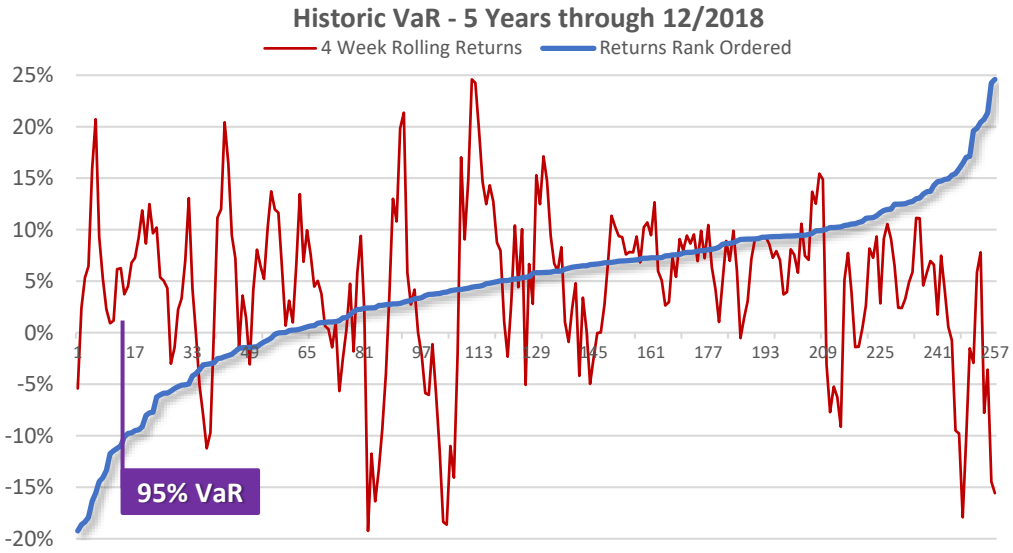
- Value-at-risk (VaR) is a commonly used measure of potential loss.
- It is an estimate of the loss that should not be exceeded with a specific frequency over a given time horizon.
- VaR can be estimated parametrically using the mean and standard deviation, but this ignores fat tails (kurtosis, skewness).
- VaR can also be estimated using historic market information, which includes past fat tails – this is the approach truView takes.
- Expected shortfall (conditional VaR or cVaR) is the average loss contained in the left tail.
- Why is VaR important?
  - Another measure of potential loss
  - A tool for measuring diversification benefit
  - VaR differences between historical and parametric provide some insight into fat tails

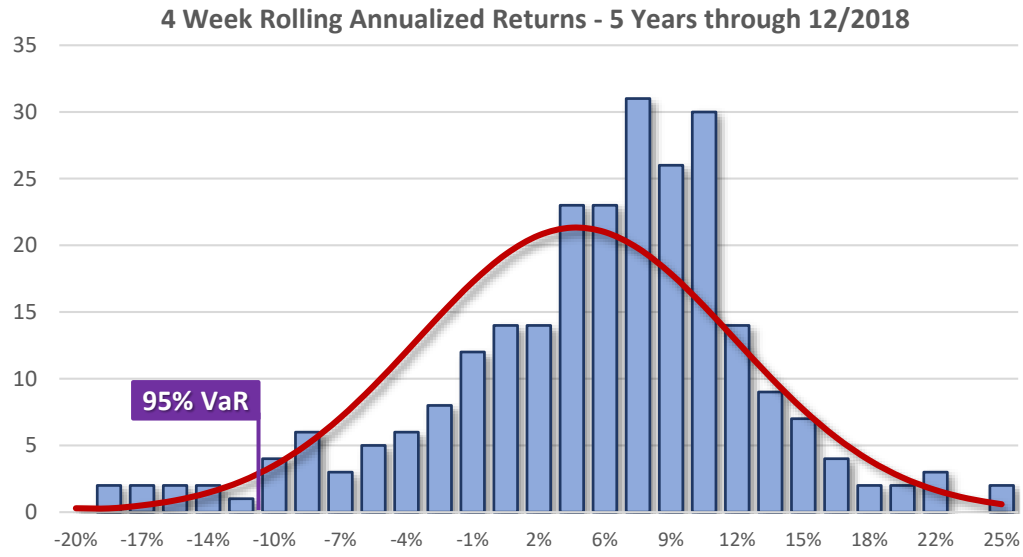




truView – VaR and Estimated Shortfall

- Overall the VaR was 11.5% and the estimate shortfall (cVaR) was 15.6%. Volatility increased, but was still historically low.
- truView calculated the estimated shortfall to be 1.2 times what it would have been if returns were normally distributed, which provides a useful sense of the magnitude of the fat tail. This ratio is similar to what it has been historically.
- The ARMB's current capital market assumptions result in a parametric VaR of 16.7% and an estimated shortfall of 22.8%.
- Adjusting for an average fat tail results in a forward estimated shortfall of 28% for the ARMB at current risk levels.





truView – Asset Allocation

- As expected, public equities contribute most (60%) of the portfolio's volatility.
- The four most volatile asset classes are 71% of the asset allocation and 93% of the volatility.
- The low volatility environment of the past five years resulted in a measured volatility of 8.0% compared with the 14.7% forward expectation.
- No significant asset class deviations from the benchmark.

Volatility Decomposition

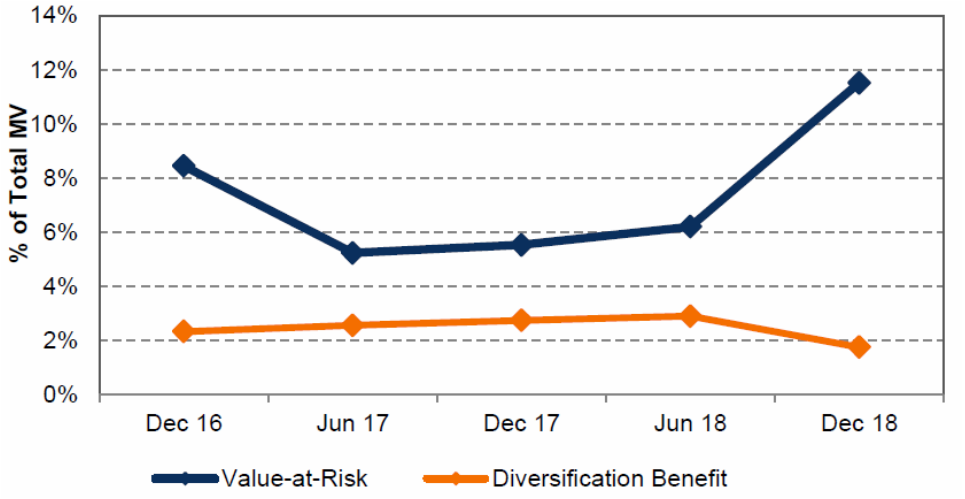
	Market Value (Millions)	Allocation (%)	Volatility[1] (% per annum)	Volatility Contribution (% of Total Vol)
Broad Domestic Equity	5,556	23.0%	12.5%	33.6%
Global Equity Ex-US	4,540	18.8%	12.1%	25.9%
Real Assets	4,324	17.9%	9.9%	18.3%
Broad Fixed Income	2,677	11.1%	3.5%	-1.0%
Private Equity	2,674	11.1%	11.1%	15.0%
Absolute Return	1,840	7.6%	4.2%	3.8%
Opportunistic	2,245	9.3%	4.3%	4.5%
Cash	254	1.1%	1.3%	0.0%
TOTAL	24,109	100.0%	8.0%	100.0%

Asset Allocation Relative to Policy Benchmark

	Market Value (Millions)	Allocation (%)	Policy Benchmark (%)	Relative (%)
Broad Domestic Equity	5,556	23.0%	24.0%	-1.0%
Global Equity Ex-US	4,540	18.8%	22.0%	-3.2%
Real Assets	4,324	17.9%	17.0%	0.9%
Broad Fixed Income	2,677	11.1%	10.0%	1.1%
Private Equity	2,674	11.1%	9.0%	2.1%
Absolute Return	1,840	7.6%	7.0%	0.6%
Opportunistic	2,245	9.3%	10.0%	-0.7%
Cash	254	1.1%	1.0%	0.1%
TOTAL	24,109	100.0%	100.0%	0.0%

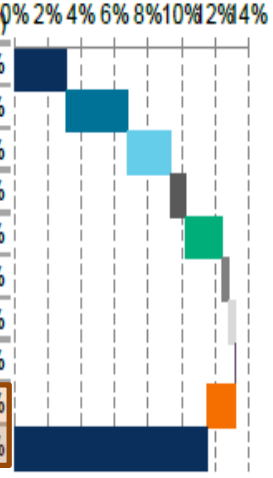
truView – Asset Class Risk & Diversification

- The value-at-risk of 11.5% increased significantly since the last six months of the year had periods of material negative returns.
- Overall, volatility during the five-year look-back period is still lower than expected prospectively.
- Public equities contributed 65% of the VaR during this time period and fixed income was a strong diversifier.
- Asset class diversification provided a 1.7% risk reduction. This is less than anticipated by the ARMB's capital market assumptions, but is likely to increase moving forward.



Asset Class Risk & Diversification

	Allocation (%)	Value-at-Risk[1] Contribution (% of Total VaR)	Value-at-Risk[1] (% of Total MV)
Broad Domestic Equity	23.0%	32.5%	3.1%
Global Equity Ex-US	18.8%	32.2%	3.7%
Real Assets	17.9%	18.9%	2.6%
Broad Fixed Income	11.1%	-5.5%	0.9%
Private Equity	11.1%	19.5%	2.1%
Absolute Return	7.6%	1.4%	0.4%
Opportunistic	9.3%	0.9%	0.5%
Cash	1.1%	0.1%	0.0%
Diversification Benefit	-	-	-1.7%
TOTAL	100.0%	100.0%	11.5%



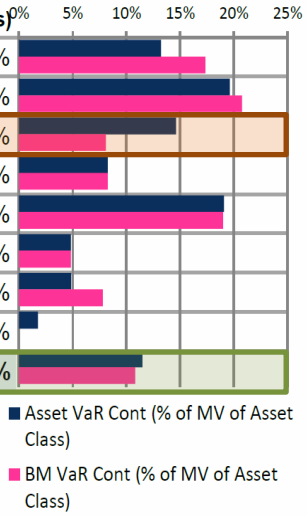
truView – Portfolio and Benchmark VaR

- Overall, the portfolio VaR of 11.5% was modestly higher than it's benchmark of 10.8%.

- The main contributor was the real assets portfolio, specifically the commodity-exposed public market investments in the portfolio. Over the past five years, these investments had a material reduction in value and look risky from a historical perspective, but are likely less risky prospectively. This position will moderate over time and should not be a significant contributor to risk over the long term.

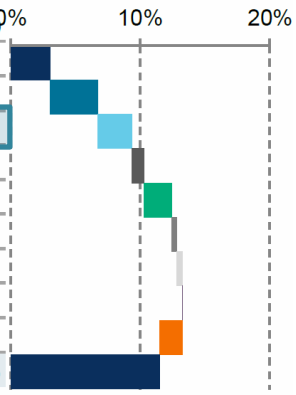
Portfolio and Benchmark Risk

	Allocation (%)	Assets VaR[1] (% of MV of the Asset Class)	Benchmark VaR[1] (% of MV of the Asset Class)
Broad Domestic Equity	23.0%	13.2%	17.4%
Global Equity Ex-US	18.8%	19.6%	20.8%
Real Assets	17.9%	14.6%	8.1%
Broad Fixed Income	11.1%	8.3%	8.3%
Private Equity	11.1%	19.1%	19.0%
Absolute Return	7.6%	4.8%	4.8%
Opportunistic	9.3%	4.9%	7.8%
Cash	1.1%	1.8%	0.0%
TOTAL	**100.0%**	**11.5%**	**10.8%**



Asset Class Risk & Diversification

	Allocation (%)	Value-at-Risk[1] Contribution (% of Total VaR)	Value-at-Risk[1] (% of Total MV)
Broad Domestic Equity	23.0%	32.5%	3.1%
Global Equity Ex-US	18.8%	32.1%	3.7%
Real Assets	17.9%	18.9%	2.6%
Broad Fixed Income	11.1%	-5.5%	0.9%
Private Equity	11.1%	19.5%	2.1%
Absolute Return	7.6%	1.4%	0.4%
Opportunistic	9.3%	0.9%	0.5%
Cash	1.1%	0.1%	0.0%
Diversification Benefit	-	-	-1.7%
TOTAL	**100.0%**	**100.0%**	**11.5%**



truView – Equity Beta and VaR

Equity Beta

- Equity betas were fairly normal.
- As expected, small capitalization domestic stocks and emerging market stocks had higher betas to broader markets. 5-year betas for international small cap were lower than expected due to more limited exposure to Brexit and trade issues.

Sub Asset Class Beta Analysis

Asset Class / [Benchmark]	Market Value (Millions)	Allocation (%)	Beta[1] 1Y to the Benchmark	Beta[1] 5Y to the Benchmark
Broad Domestic Equity / [Russell 3000]	**5,556**	**55.0%**	**0.98**	**1.00**
Large Cap Pool (AYQK)	4,771	47.3%	0.96	0.98
Small Cap Pool (AYQC)	785	7.8%	1.11	1.09
Global Equity Ex-Us / [MSCI ACWI Ex US IMI]	**4,540**	**45.0%**	**0.97**	**0.98**
Emerging Markets Pool (AYSC)	370	3.7%	1.08	1.16
IE Large Cap Pool (AYRC)	3,834	38.0%	0.96	0.97
IE Small Cap Pool (AYRK)	335	3.3%	1.00	0.83
TOTAL Equity / [MSCI ACWI]	**10,096**	**100.0%**	**0.98**	**0.99**

Equity Value-at-Risk

- Overall, the equity portfolio has a lower VaR than its benchmark due to the inherently lower volatility of some of the ARMB strategies, such as the equity yield portfolio.

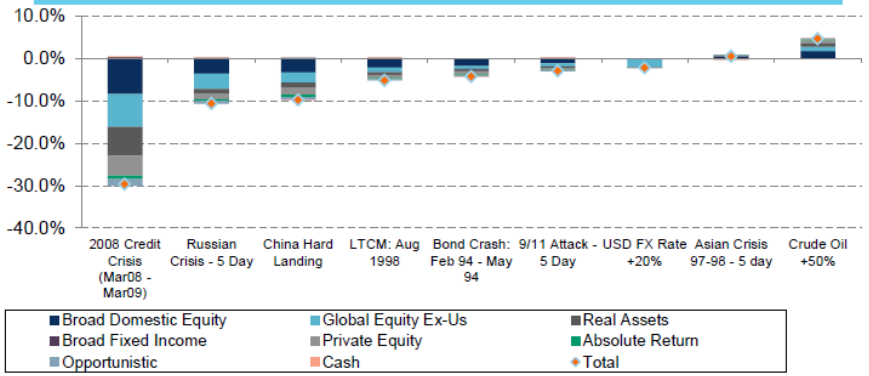
Sub Asset Class Value at Risk Analysis

Asset Class / [Benchmark]	Market Value (Millions)	Allocation (%)	Value-at-Risk of the Portfolio (% of Market Value[1])	Value-at-Risk of the Benchmark (% of Market Value[1])
Broad Domestic Equity / [Russell 3000]	**5,556**	**55.0%**	**13.24%**	**17.36%**
Large Cap Pool (AYQK)	4,771	47.3%	13.65%	-
Small Cap Pool (AYQC)	785	7.8%	17.75%	-
Global Equity Ex-Us / [MSCI ACWI Ex US IMI]	**4,540**	**45.0%**	**19.65%**	**20.78%**
Emerging Markets Pool (AYSC)	370	3.7%	25.38%	-
IE Large Cap Pool (AYRC)	3,834	38.0%	20.23%	-
IE Small Cap Pool (AYRK)	335	3.3%	15.44%	-
TOTAL	**10,096**	**100.0%**	**16.90%**	**20.08%**

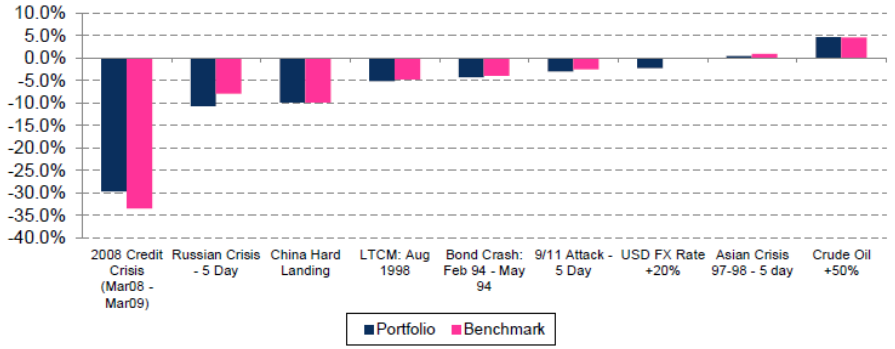
truView – Stress Tests

- The following truView stress tests provide perspective on how historic or macroeconomic events would impact the current portfolio.
- The 2008 Global Financial Crisis is the most impactful scenario with a 29.7% loss.
- This loss is similar to what the ARMB experienced during that time period and similar to the estimate produced when viewing forward capital market expectations through a fat-tailed lens.

Asset Class Breakdown



Portfolio vs. Benchmark



Historic Stress Tests (Assets)

	Market Value (Millions)	Allocation (%)	2008 Credit Crisis (Mar08 - Mar09)	Russian Crisis - 5 Day	China Hard Landing	LTCM: Aug 1998	Bond Crash: Feb 94 - May 94	9/11 Attack - 5 Day	USD FX Rate +20%	Asian Crisis 97-98 - 5 day	Crude Oil +50%
Broad Domestic Equity	6,282	24.9%	-8.4%	-3.6%	-3.4%	-2.2%	-1.8%	-1.1%	0.0%	0.4%	1.7%
Global Equity Ex-Us	5,875	23.3%	-7.8%	-3.6%	-2.3%	-1.0%	-0.6%	-0.8%	-2.1%	-0.3%	1.0%
Real Assets	4,249	16.8%	-6.8%	-1.2%	-1.4%	-0.7%	-0.5%	-0.4%	-0.1%	0.1%	0.8%
Broad Fixed Income	2,098	8.3%	0.3%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.1%
Private Equity	2,114	8.4%	-4.7%	-1.3%	-1.6%	-0.8%	-0.6%	-0.4%	0.0%	0.2%	0.7%
Absolute Return	1,590	6.3%	-0.8%	-0.4%	-0.6%	-0.3%	-0.2%	-0.1%	0.0%	0.1%	0.2%
Opportunistic	2,528	10.0%	-1.5%	-0.6%	-0.7%	-0.3%	-0.3%	-0.2%	0.0%	0.0%	0.2%
Cash	486	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL	**25,223**	**100.0%**	**-29.7%**	**-10.7%**	**-9.8%**	**-5.2%**	**-4.3%**	**-3.0%**	**-2.3%**	**0.5%**	**4.6%**

truView – Summary

- As expected, risk is dominated by equity and equity-like investments.
- There were no unexpected risk exposures by allocation, country, currency, or sector.
- The portfolio VaR is modestly higher than its benchmark.
- The real estate portfolio had a higher overall VaR than its benchmark. This is not expected to persist.
- Volatility has been low, but considering forward estimated shortfall at 28% is a useful way of incorporating a potential increase in volatility and a fat-tailed distribution with the ARMB's current portfolio.
- When considering the ARMB's asset allocation, every 1% reduction in standard deviation is expected to reduce this estimated shortfall by roughly 2%.

ALASKA RETIREMENT MANAGEMENT BOARD

CIO Update

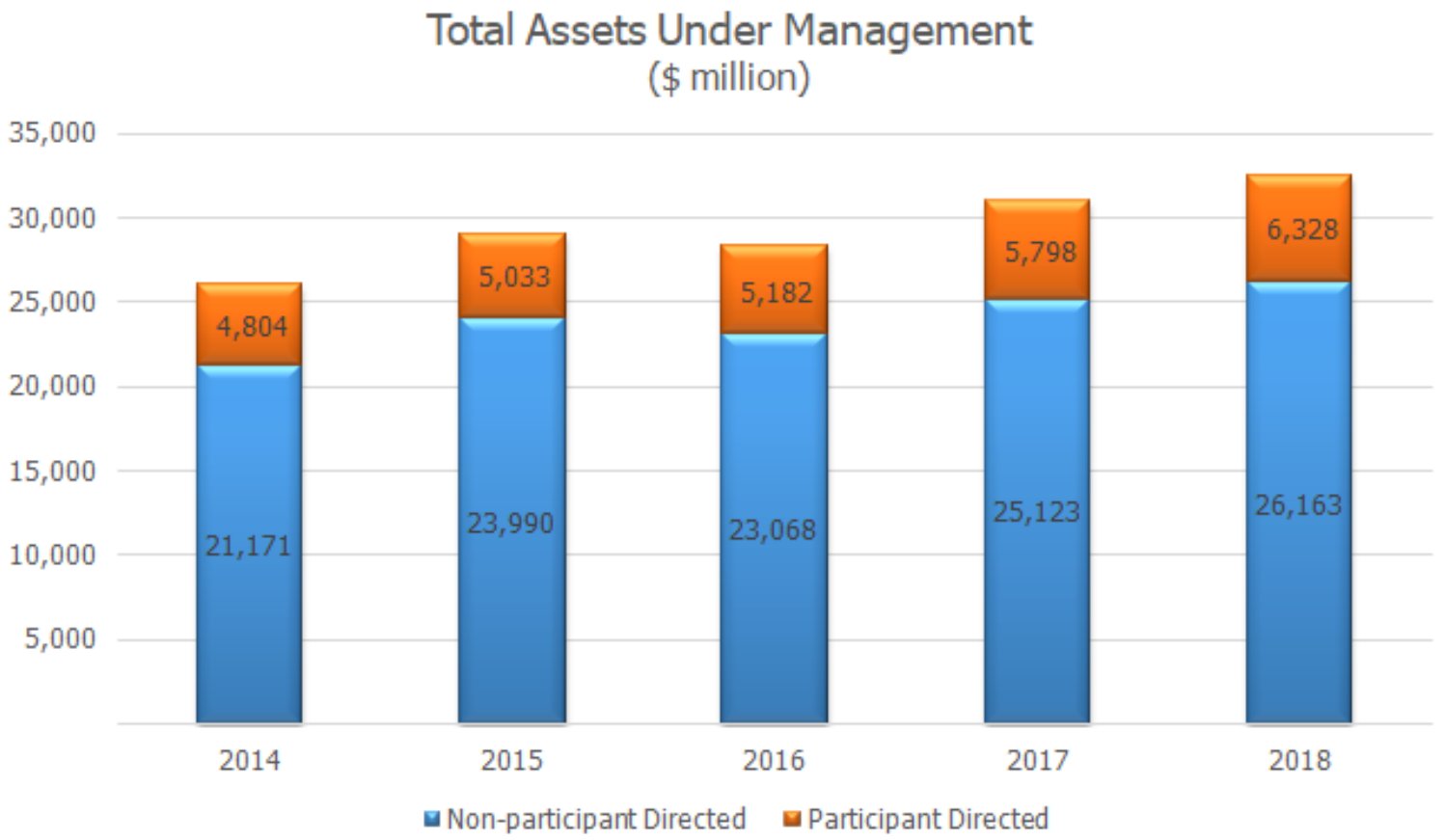
Bob Mitchell, CFA
Chief Investment Officer
April 4-5, 2019

Summary

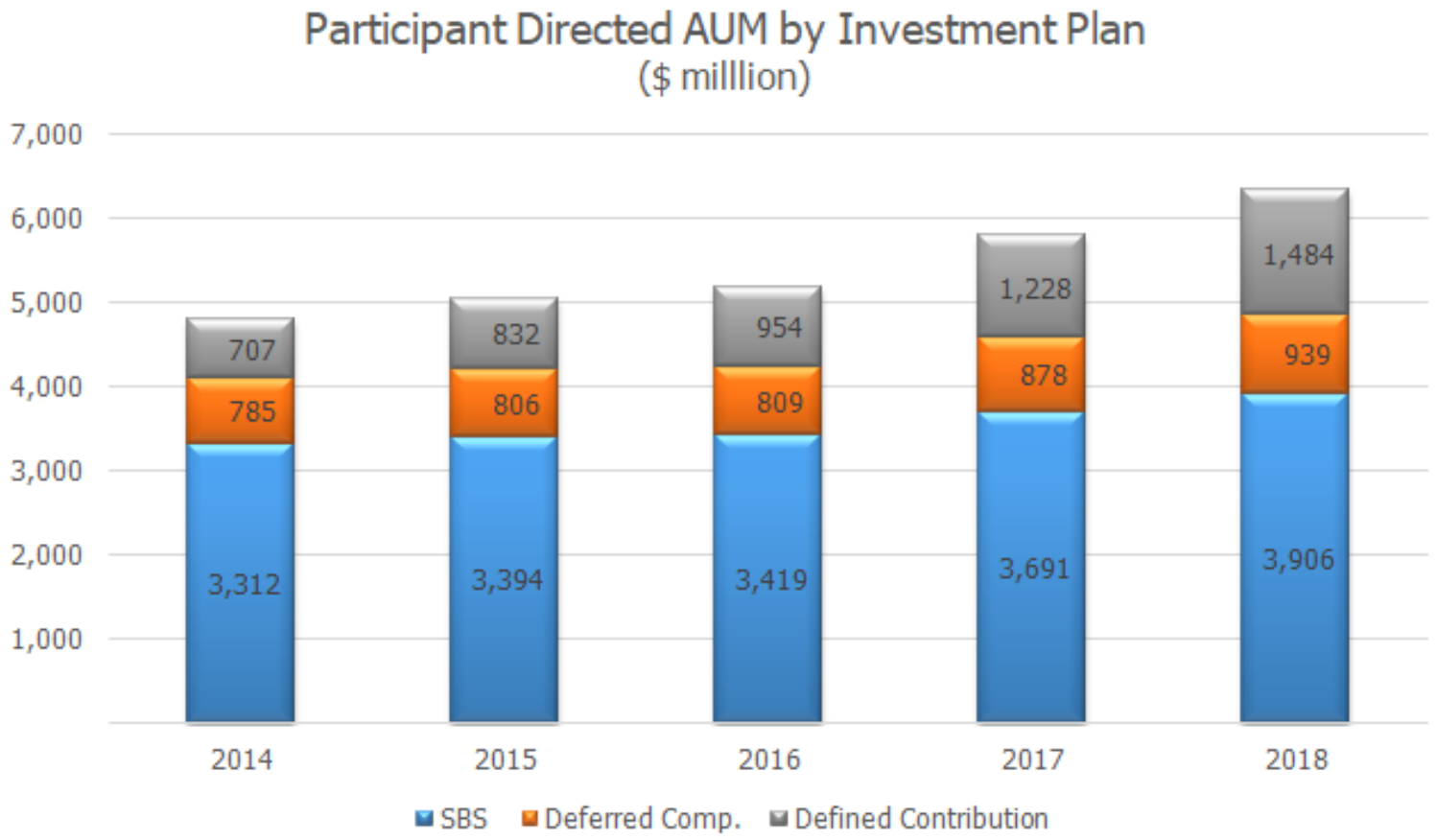
- Overview of ARMB Assets Under Management
- Recommended Approach to Setting Strategic Asset Allocation
- Observations on Manager Structure

Overview of Assets Under Management

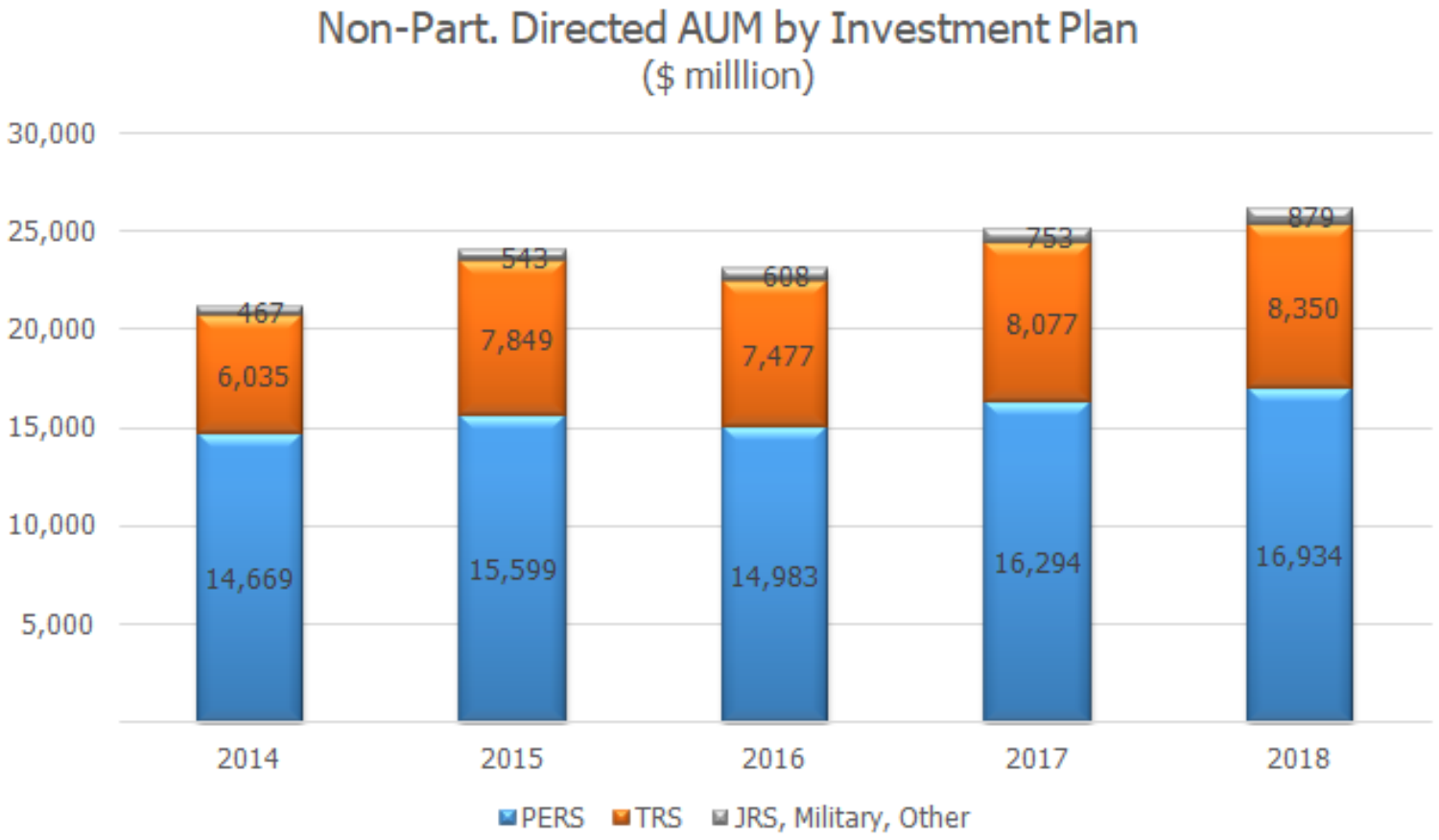
Assets Under Management



Assets Under Management



Assets Under Management



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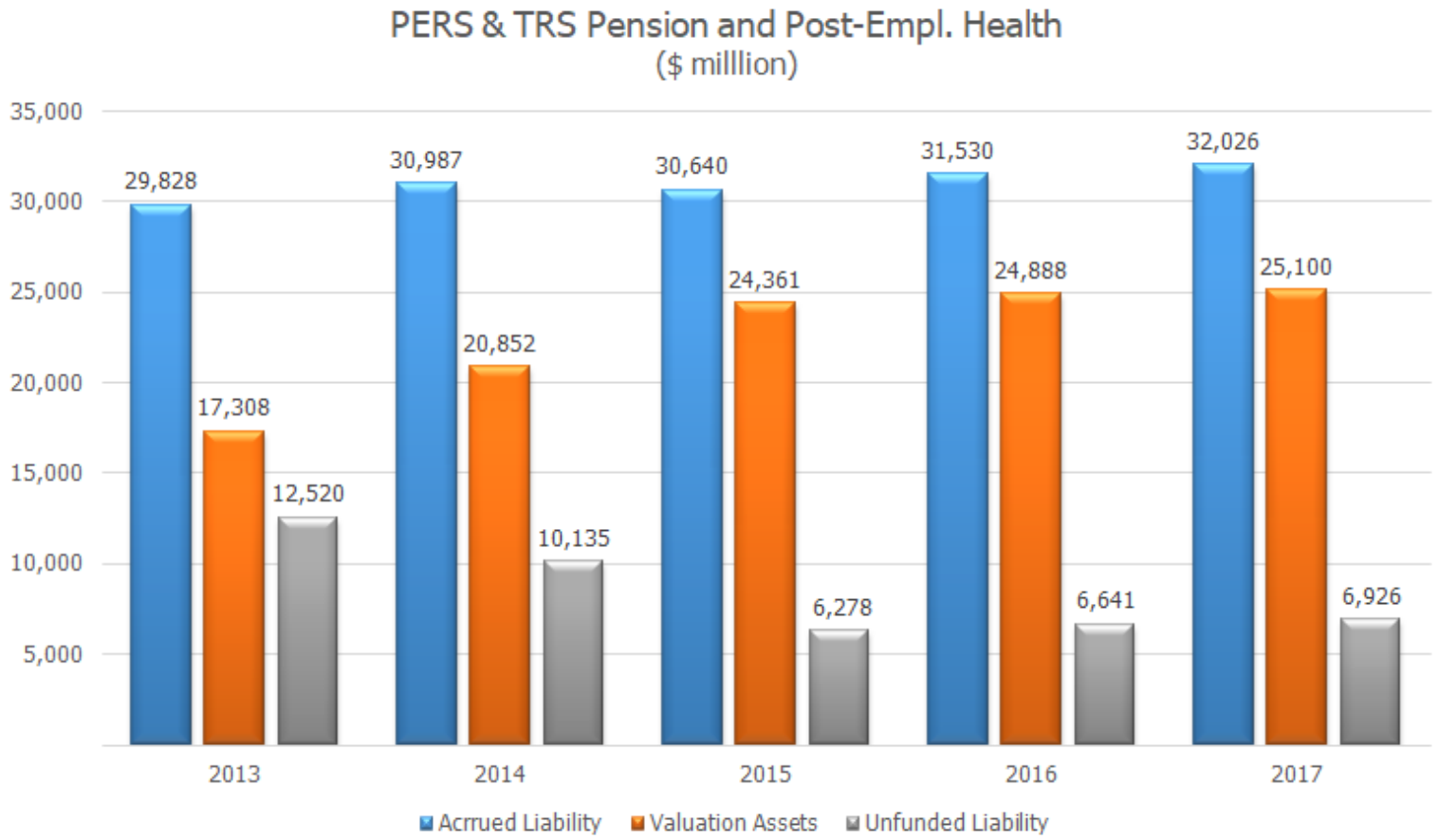


Source: Buck

Setting the Strategic Asset Allocation

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

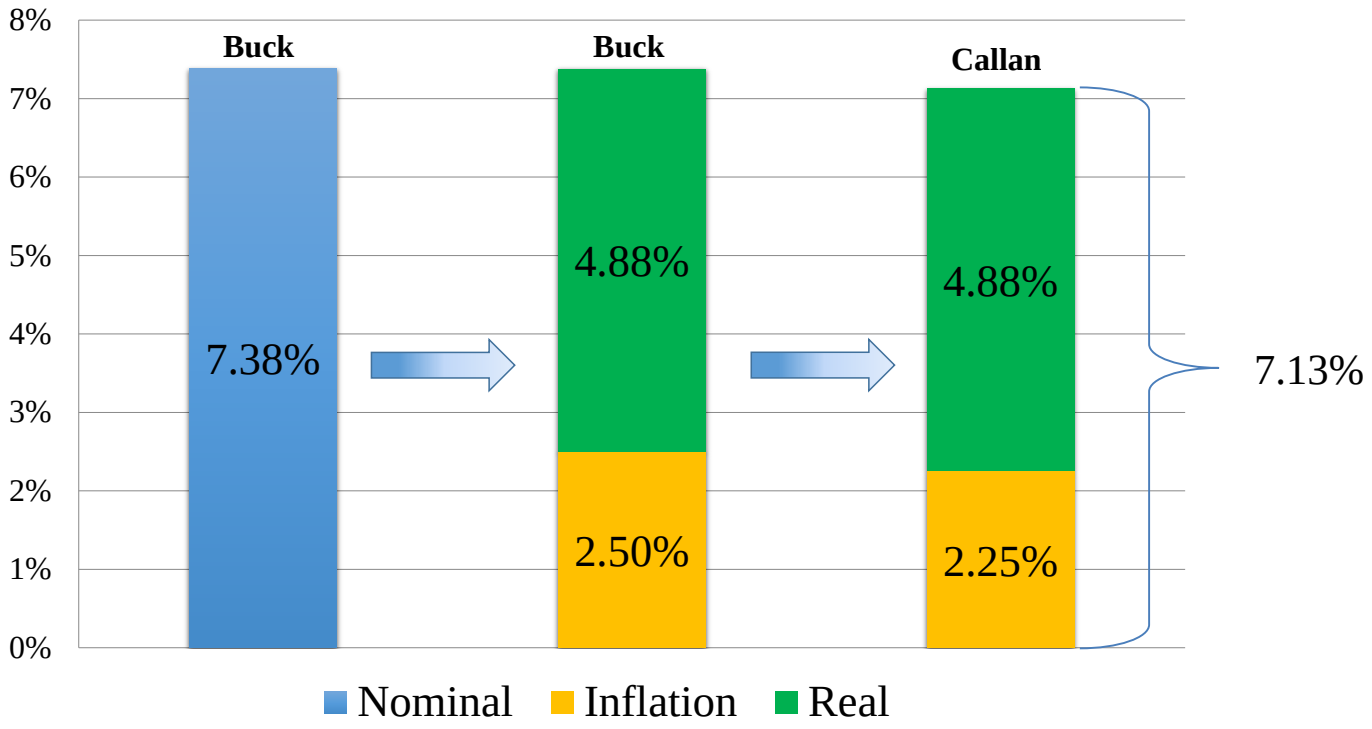
Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

Fund's Purpose

Achieve the "expected long-term total return, as determined by the actuarially-required rate of return, while minimizing risk as determined by the projected standard deviation of the range of potential future returns."

– ARMB Policy & Procedures Manual



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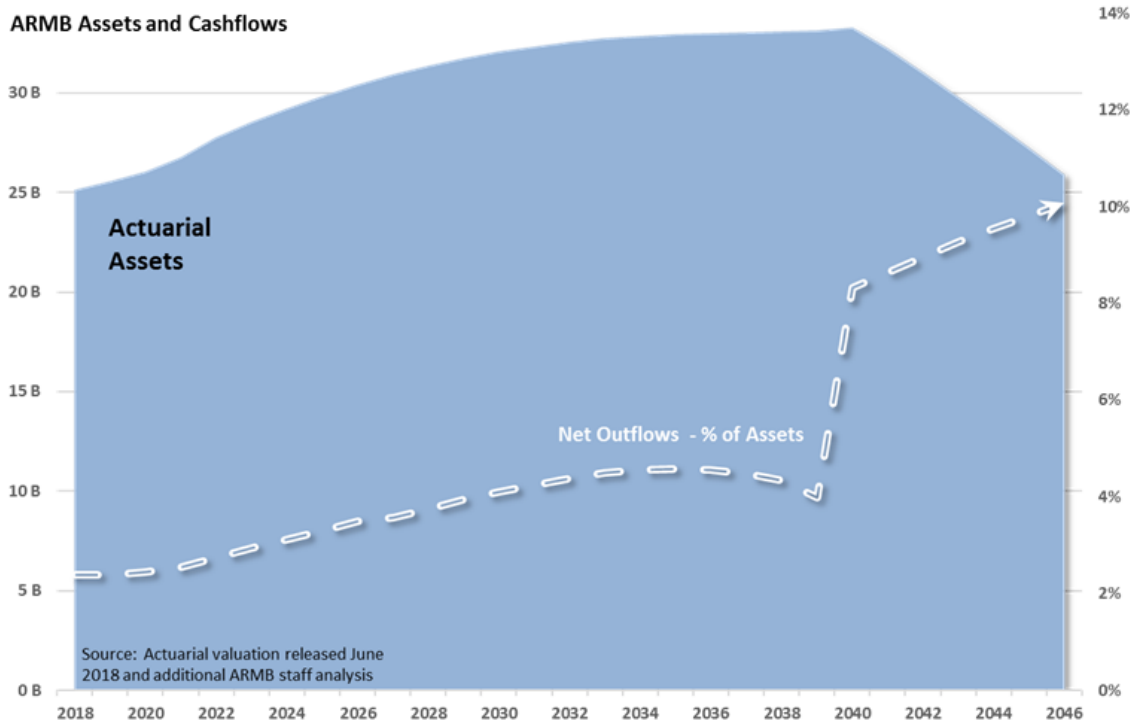
Strategic Asset Allocation – Basic Elements

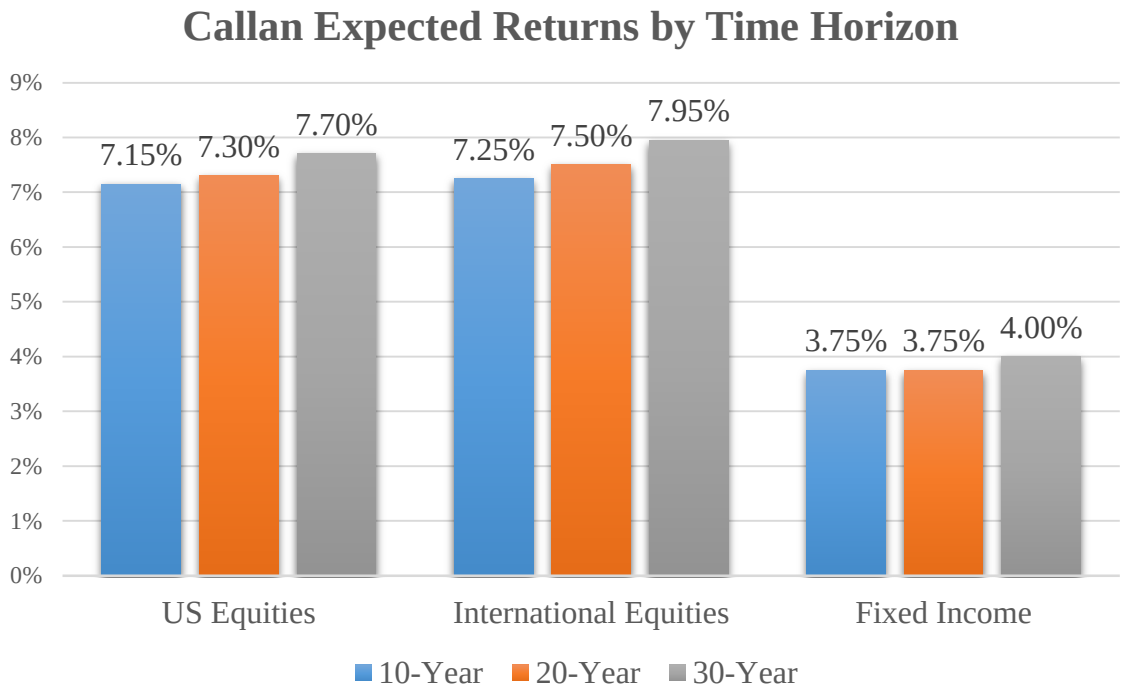
- Identify the time horizon over which the portfolio should be expected to achieve the required rate of return.
- Identify asset classes to be used.
- Identify an allocation to these asset classes that is expected to achieve the required rate of return. This is the Strategic Asset Allocation (SAA).
- Identify the policy portfolio – this is a portfolio comprised of passive publicly-traded equities and fixed income with the same risk profile as the SAA.

Strategic Asset Allocation – Time Horizon



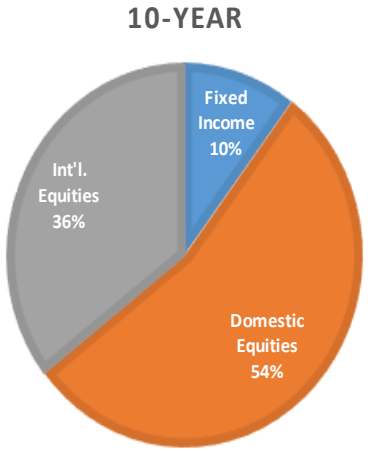
- Liabilities extend for decades.
- Duration of liabilities is ~ 14 years at the current rate of 7.38%.
- Weighted average time to payment ~ 20-25 years.
- Will likely recommend a time horizon between 14 and 25 years.
  - Results in a slightly less aggressive allocation – reduces sequence risk.
  - The impact, relative to a more aggressive allocation, is modest over the shorter-term.

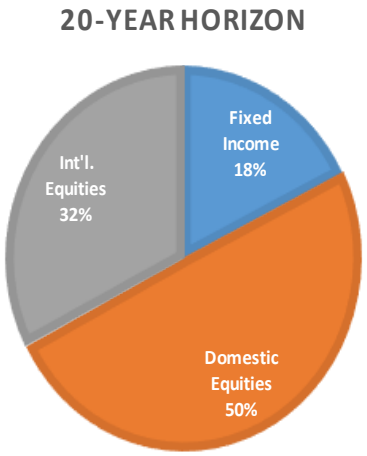
Strategic Asset Allocation – Time Horizon & Return

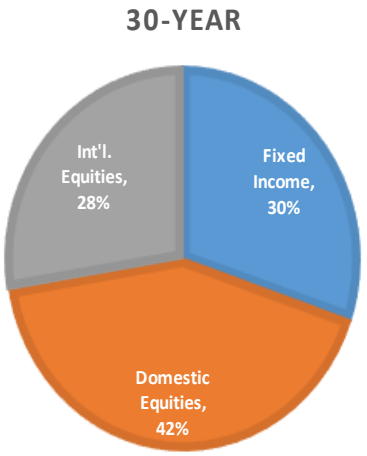


- Callan's expected returns increase as the time horizon extends.
- As a result, the expected returns of a portfolio will also increase as the time horizon extends.

Strategic Asset Allocation – Time Horizon & Return



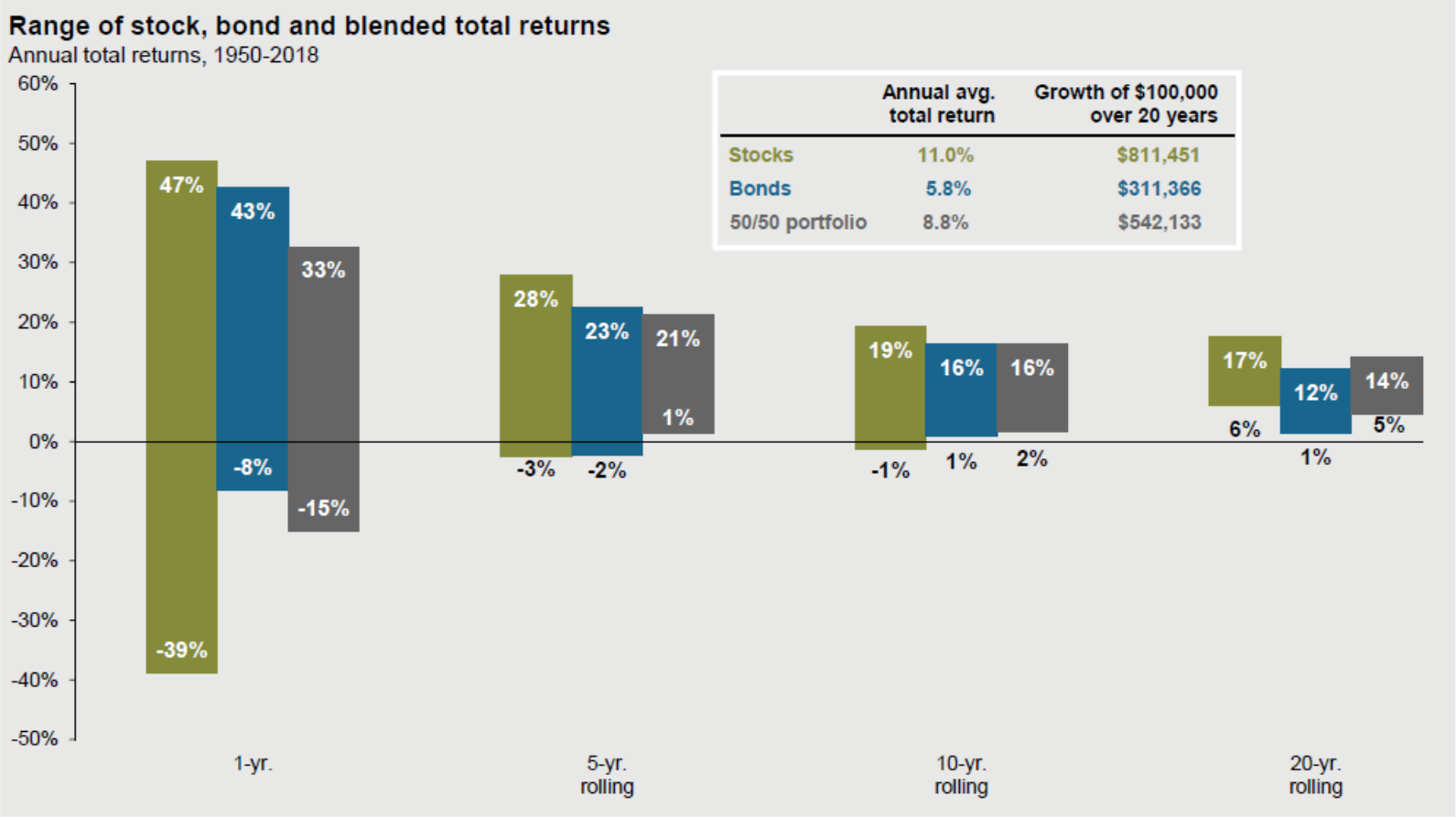




- At a fixed return target, the risk-profile of a portfolio will decline as the time horizon extends, as fewer risk-seeking assets are required to achieve a return objective.
- Because return expectations are more compressed in the shorter-term, the 10-year expected return of a lower-risk portfolio is only modestly lower.
- For example, staff estimates the 10-year return of these three portfolios, using Callan's assumptions are approximately 7.13%, 6.98% and 6.63%, respectively.
- Why not just take more risk? The answer: sequence risk.

May not sum to 100% due to rounding.

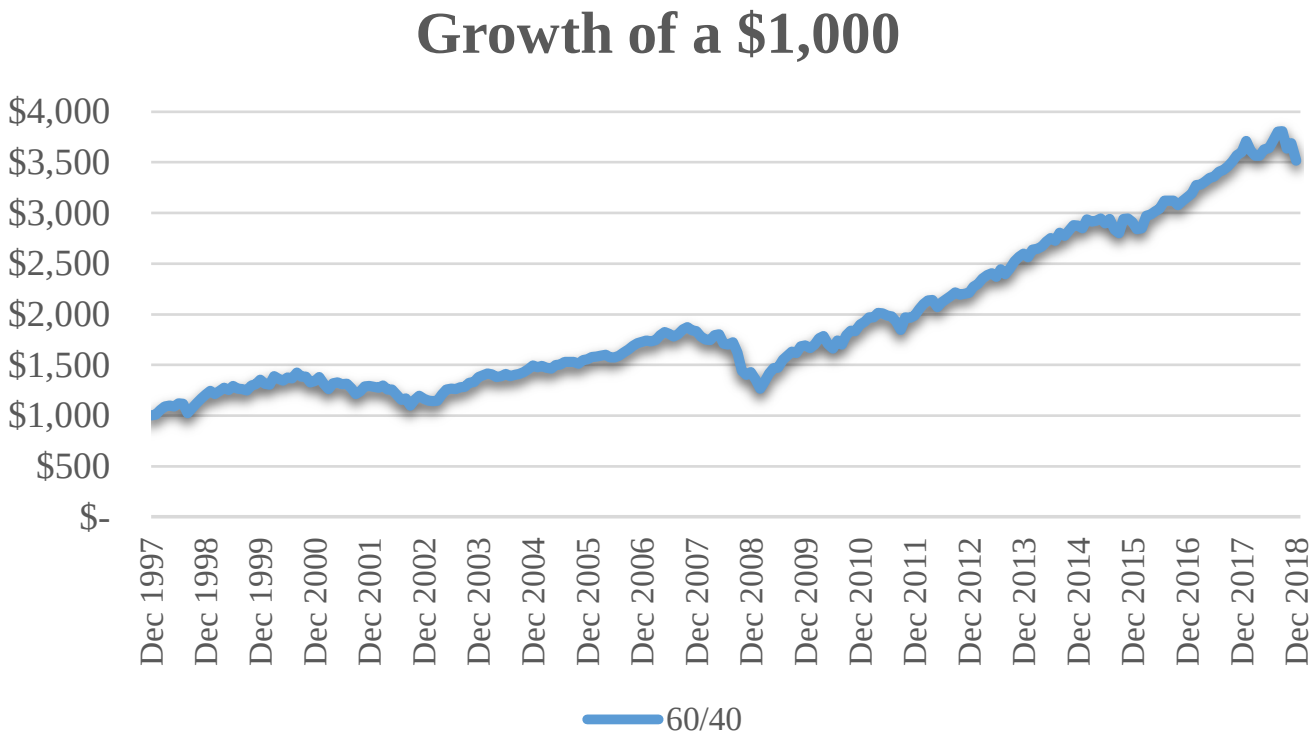
There is Less Certainty in Short-Term Outcomes



Source: Barclays, Bloomberg, FactSet, Federal Reserve, Robert Shiller, Strategas/Ibbotson, J.P. Morgan Asset Management.
Returns shown are based on calendar year returns from 1950 to 2018. Stocks represent the S&P 500 Shiller Composite and Bonds represent Strategas/Ibbotson for periods from 1950 to 2010 and Bloomberg Barclays Aggregate thereafter. Growth of $100,000 is based on annual average total returns from 1950 to 2018.
Guide to the Markets – U.S. Data are as of February 28, 2019.

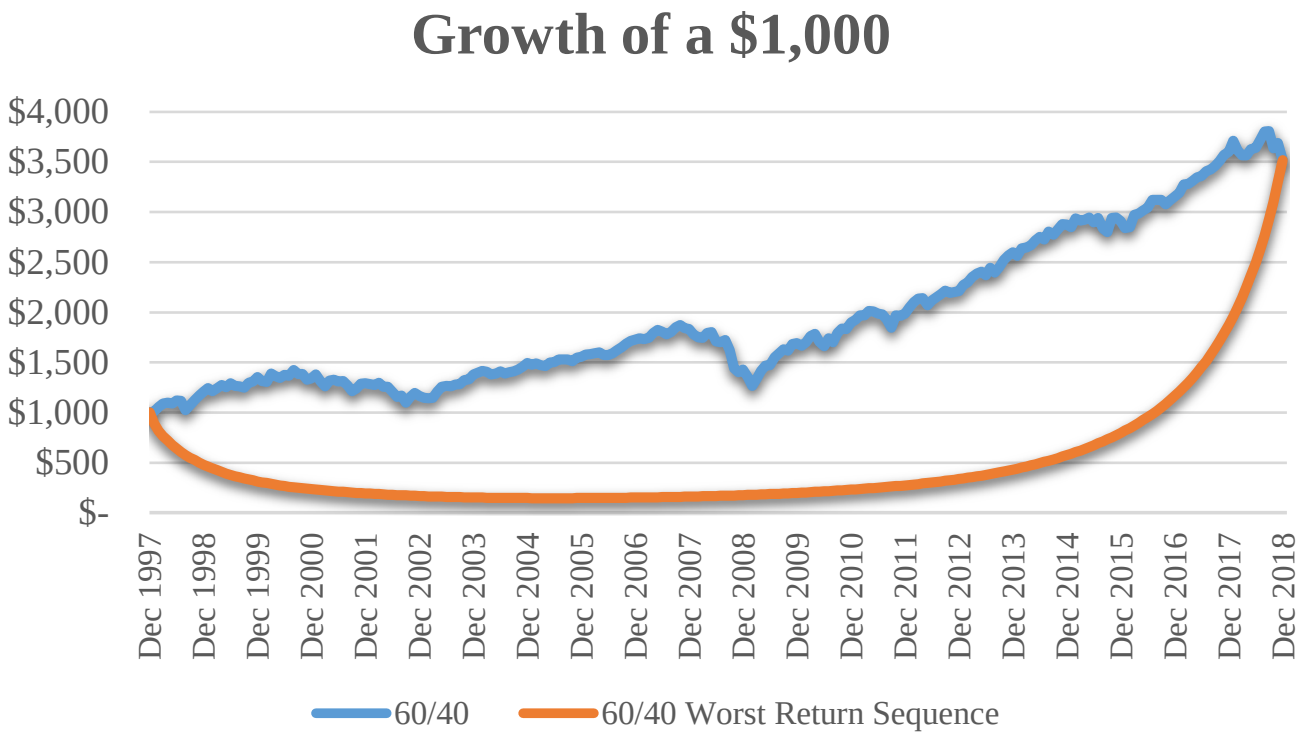
J.P.Morgan
Asset Management

Sequence Risk with No Withdrawals



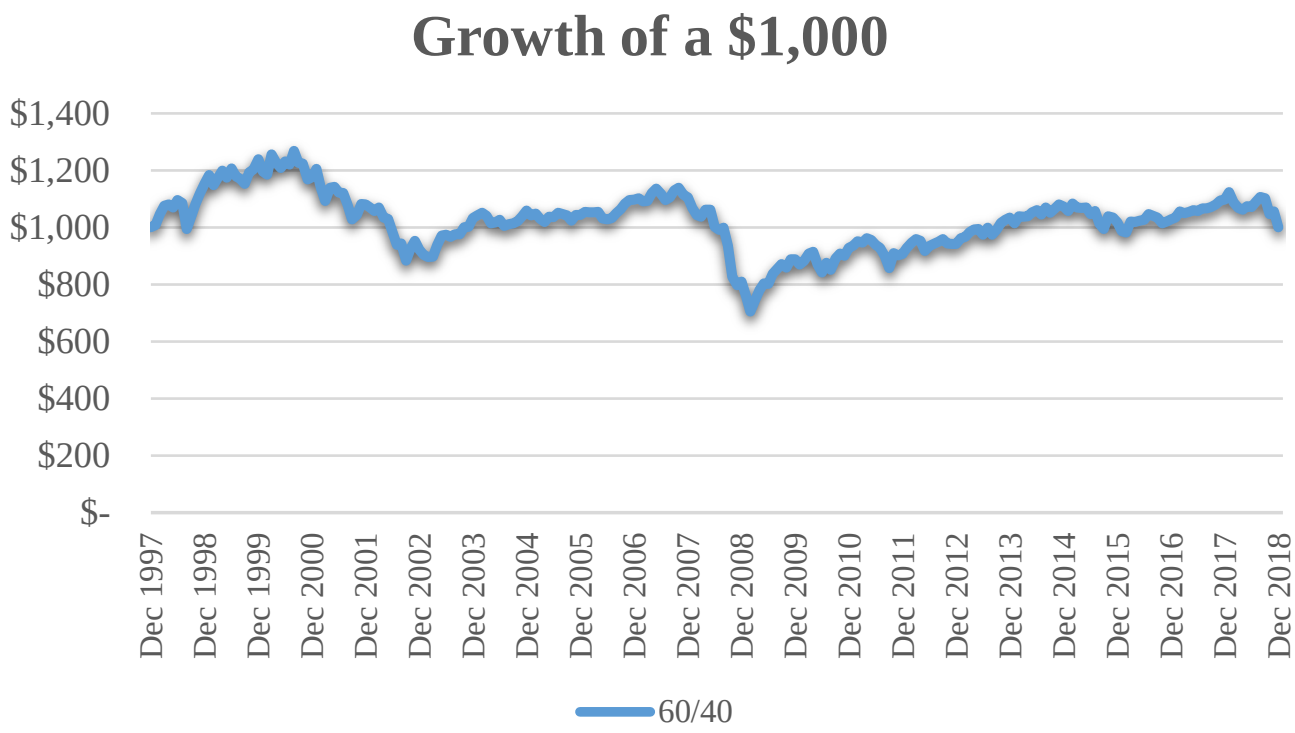
- Portfolio comprised of 60% S&P 500, 40% BB Aggregate for the 20 years ended 12/31/2018, rebalanced monthly.
- No withdrawals are made.

Sequence Risk with No Withdrawals



- Portfolio comprised of 60% S&P 500, 40% BB Aggregate for the 20 years ended 12/31/2018, rebalanced monthly. Second portfolio comprised of re-ordered 20-year returns from worst to best.
- No withdrawals are made.

Sequence Risk with Withdrawals



- Portfolio comprised of 60% S&P 500, 40% BB Aggregate for the 20 years ended 12/31/2018, rebalanced monthly.
- Initial withdrawal of 4.9% (annualized), growing at 2%/year.

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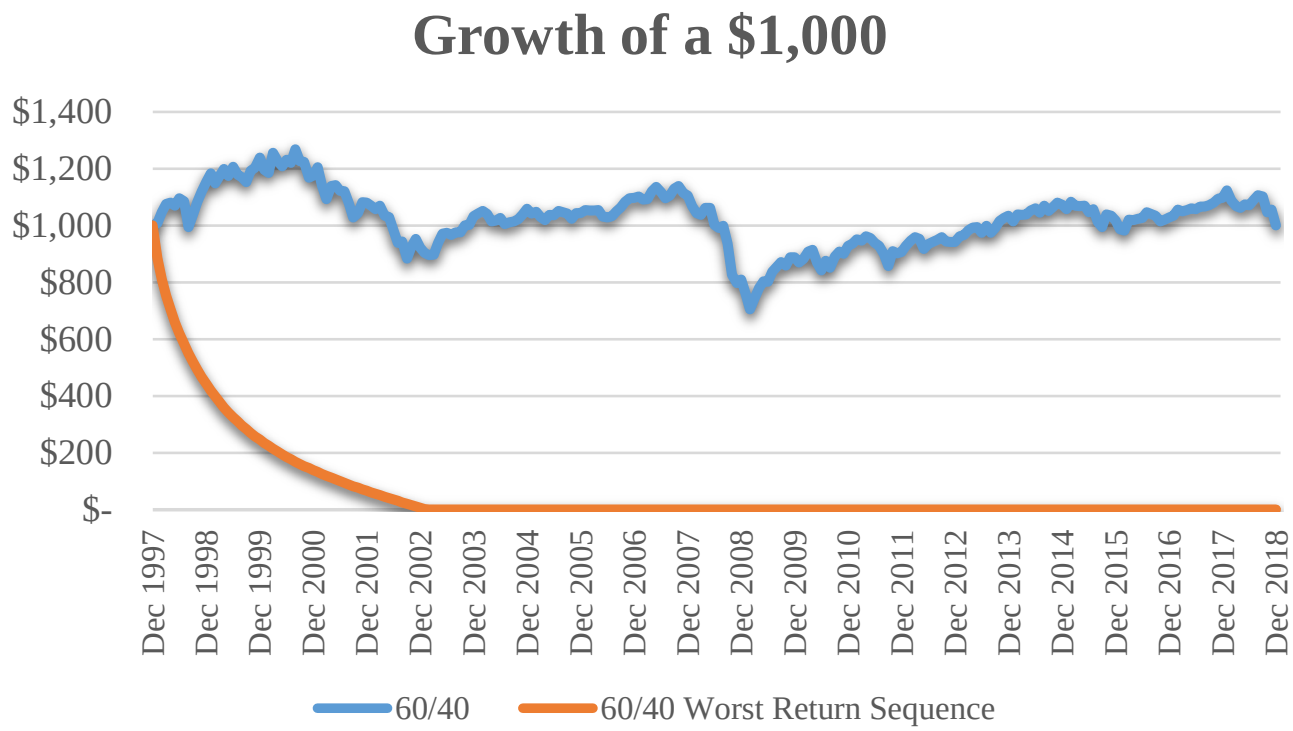

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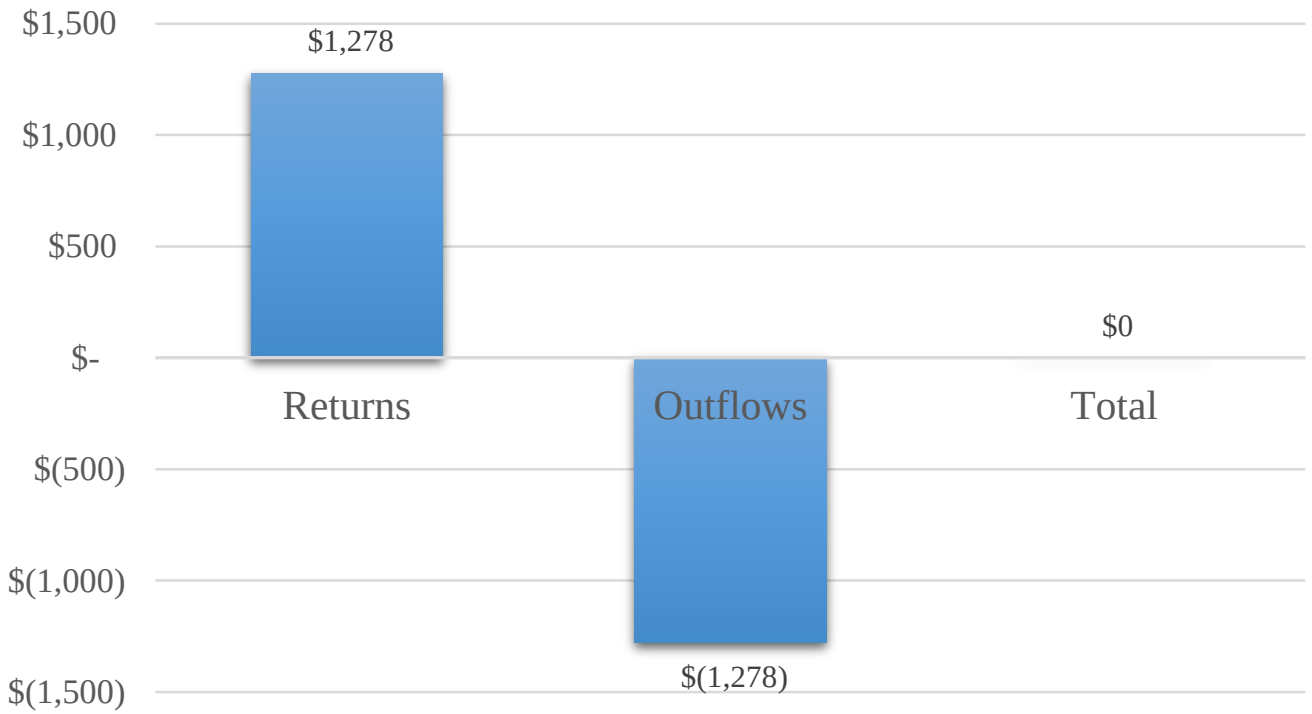
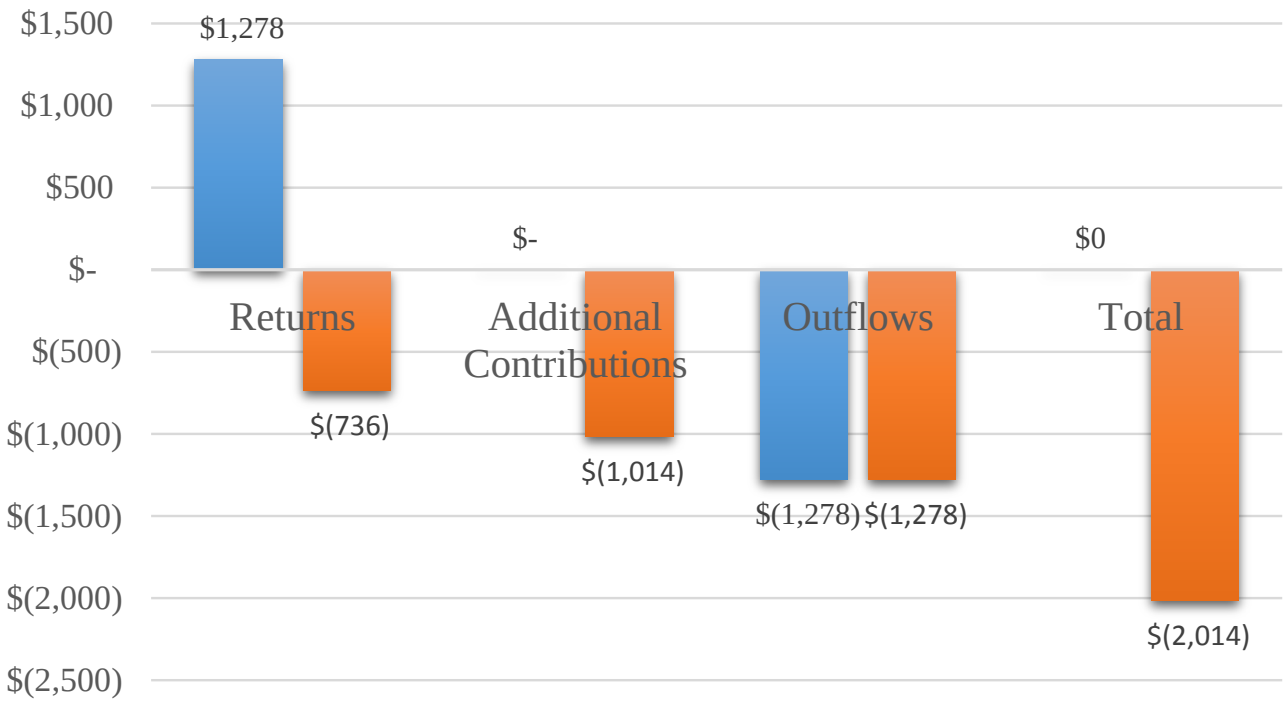
Impact of Withdrawals – Base Case



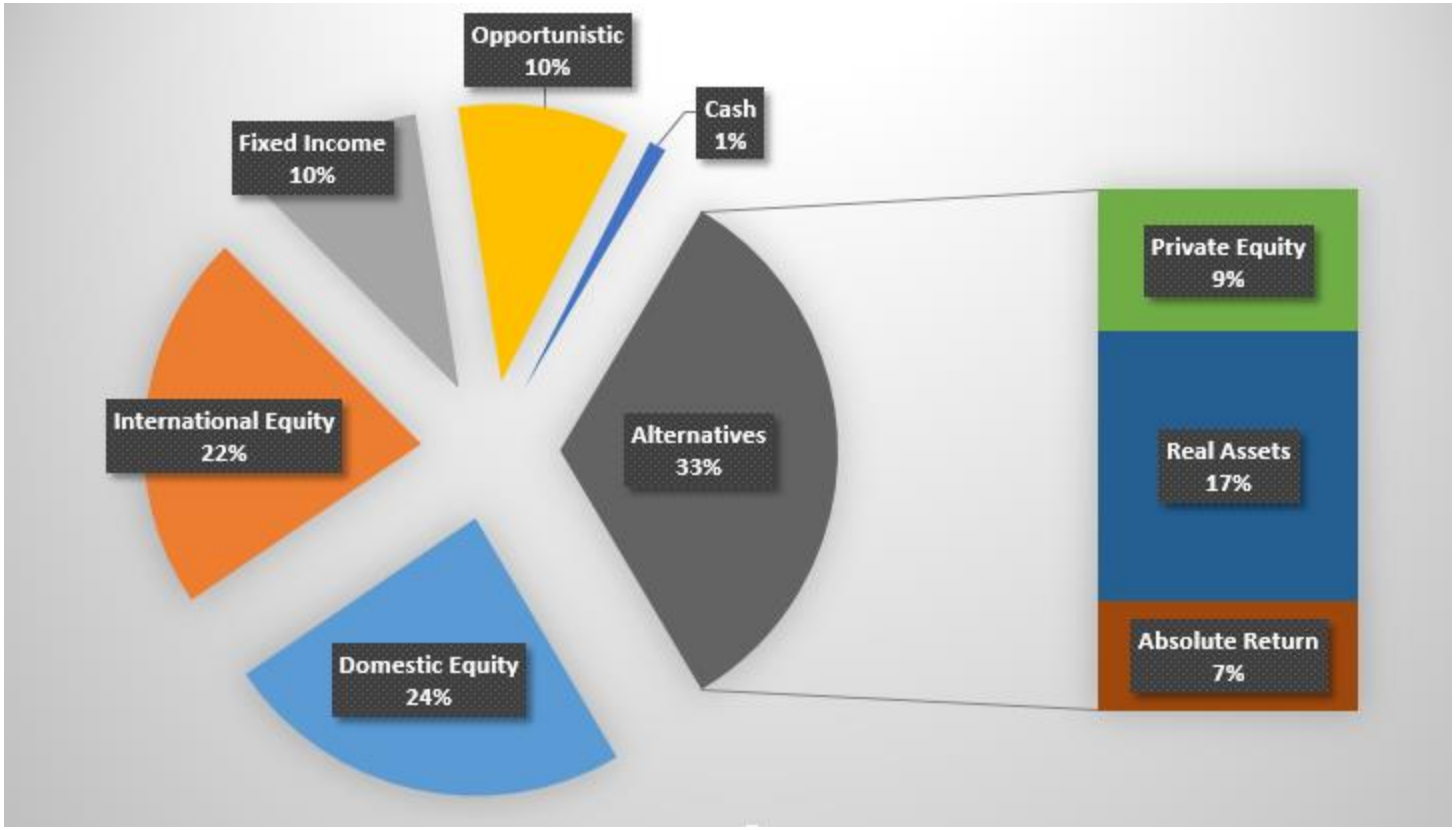
- In the base case, the sum total of outflows equals the sum total of investment returns by design (the spending rate was calibrated to make this happen, since we know the actual returns after the fact). The ending principal amount is equal to the beginning amount.

Impact of Withdrawals – Base & Worst Cases

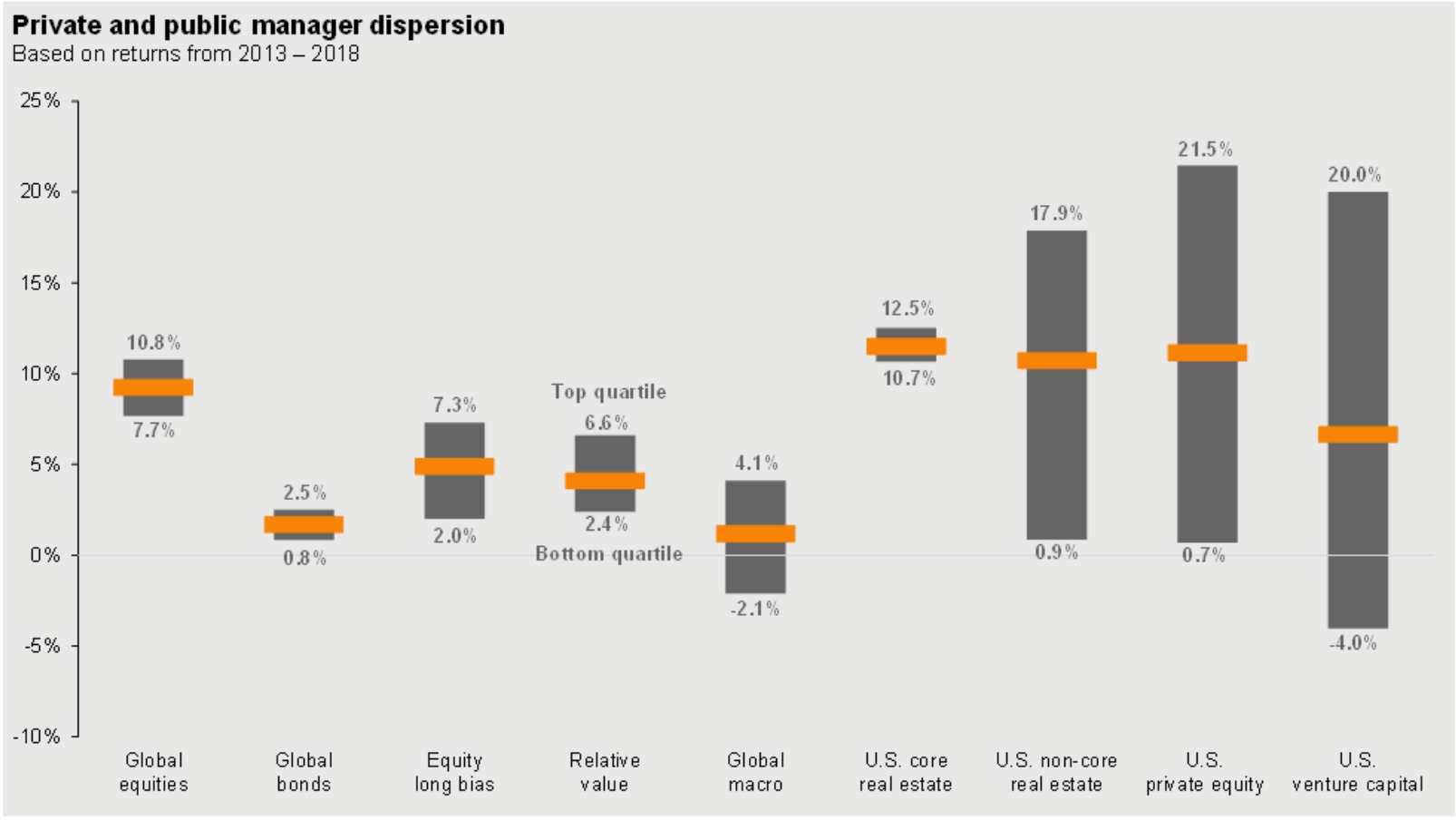


- In the base case, the sum total of outflows equals the sum total of investment returns. The ending principal amount is equal to the beginning amount.
- In the worst case, the returns are negative early in the period. All remaining principal is consumed to pay outflows and additional contributions of $1,014 are required. The total cost equals the initial principal ($1,000) and additional contributions ($1,014) for a total of $2,014.

FY19 Strategic Asset Allocation



Manager Dispersion



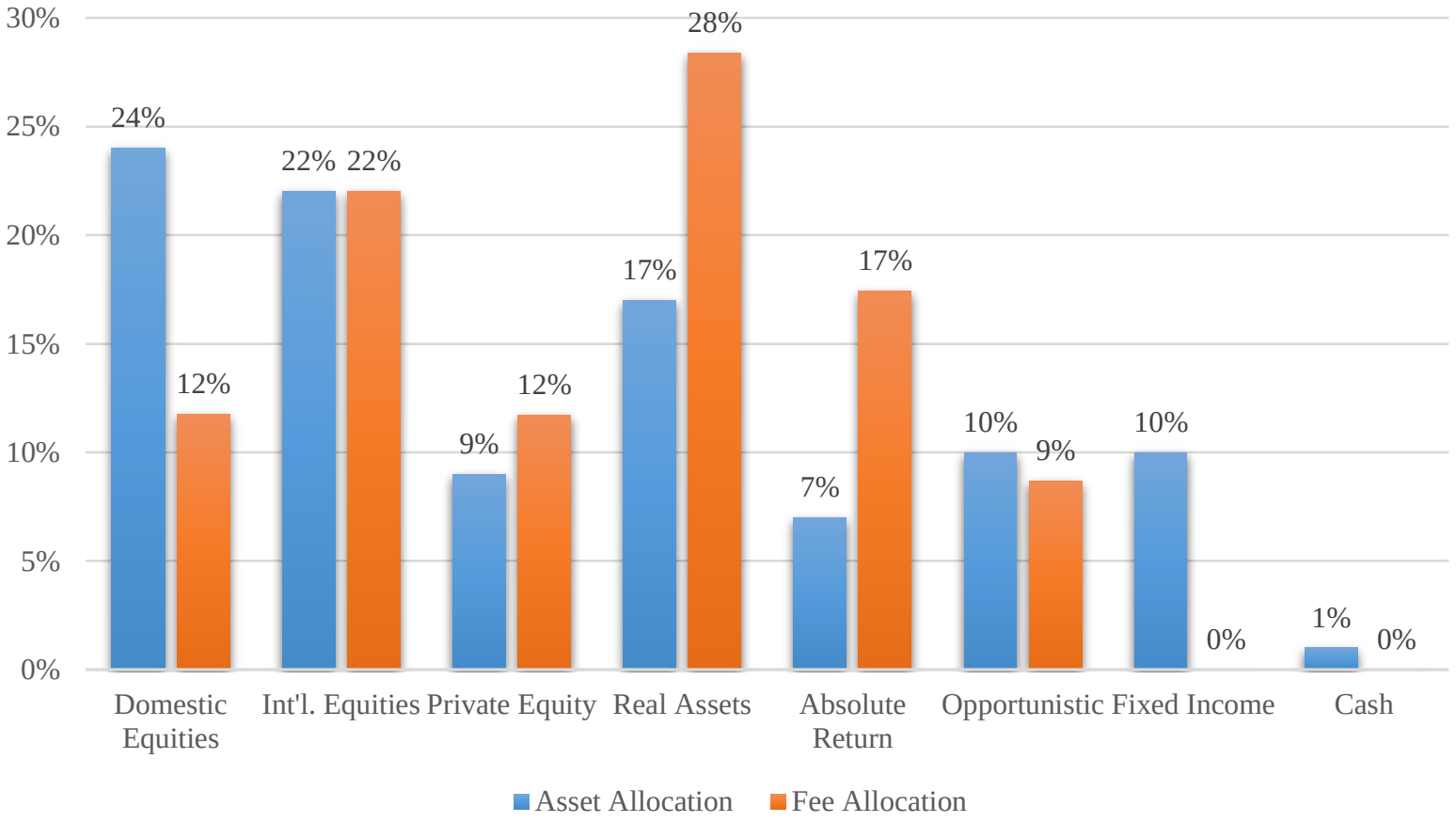
Sources: Lipper, NCREIF, Cambridge Associates, HFRI, J.P. Morgan Asset Management.

Global equities (large cap) and global bonds dispersion are based on the world large stock and world bond categories, respectively. Manager dispersion is based on: 2013 – 2018 annual returns for global equities, global bonds, U.S. core real estate and hedge funds. U.S. non-core real estate, U.S. private equity and U.S. venture capital are represented by the 5-year horizon internal rate of return (IRR).

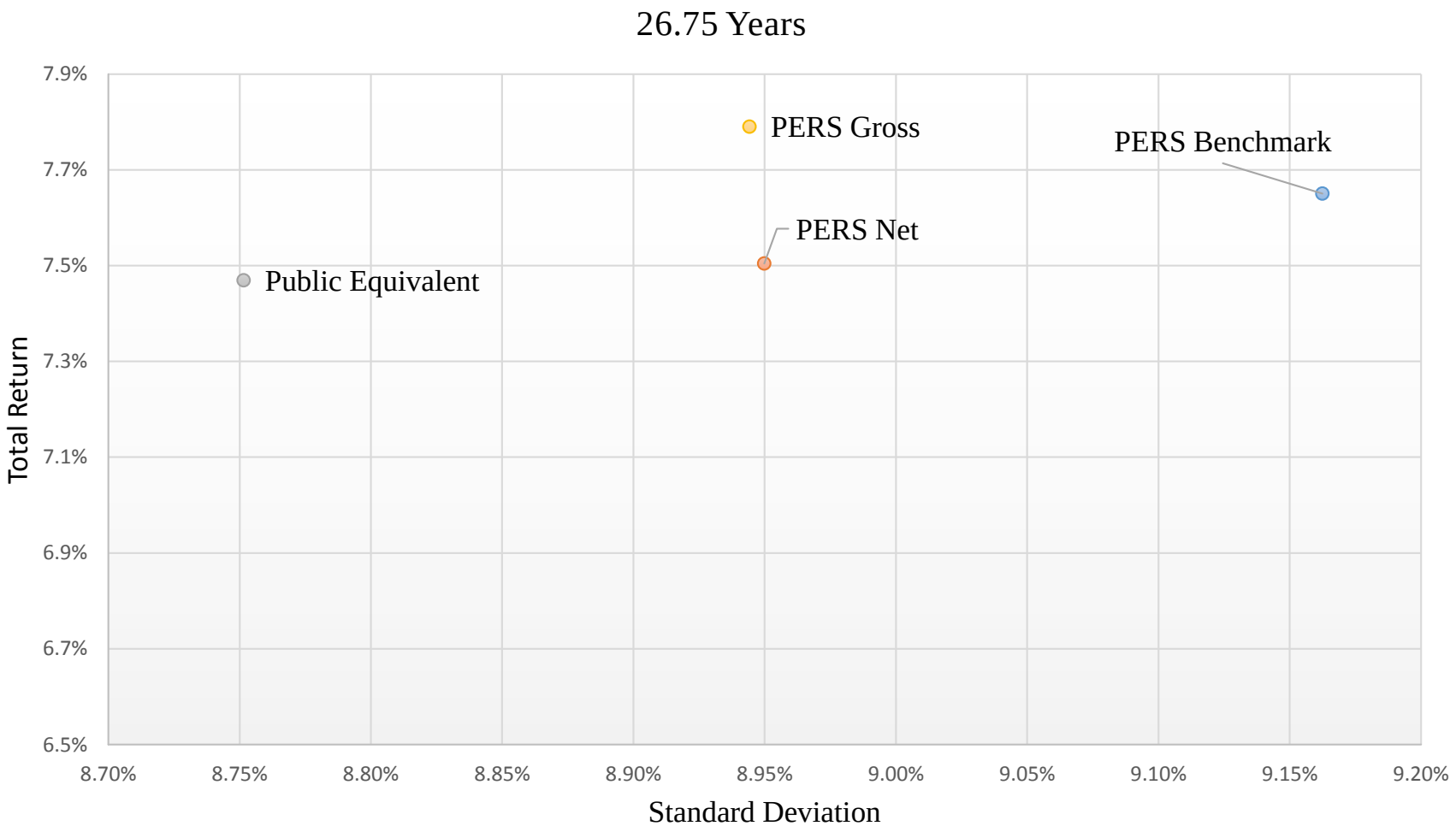
Data are as of December 31, 2018.

J.P.Morgan
Asset Management

Asset Allocation vs. Fee Allocation



Long Term Return and Risk

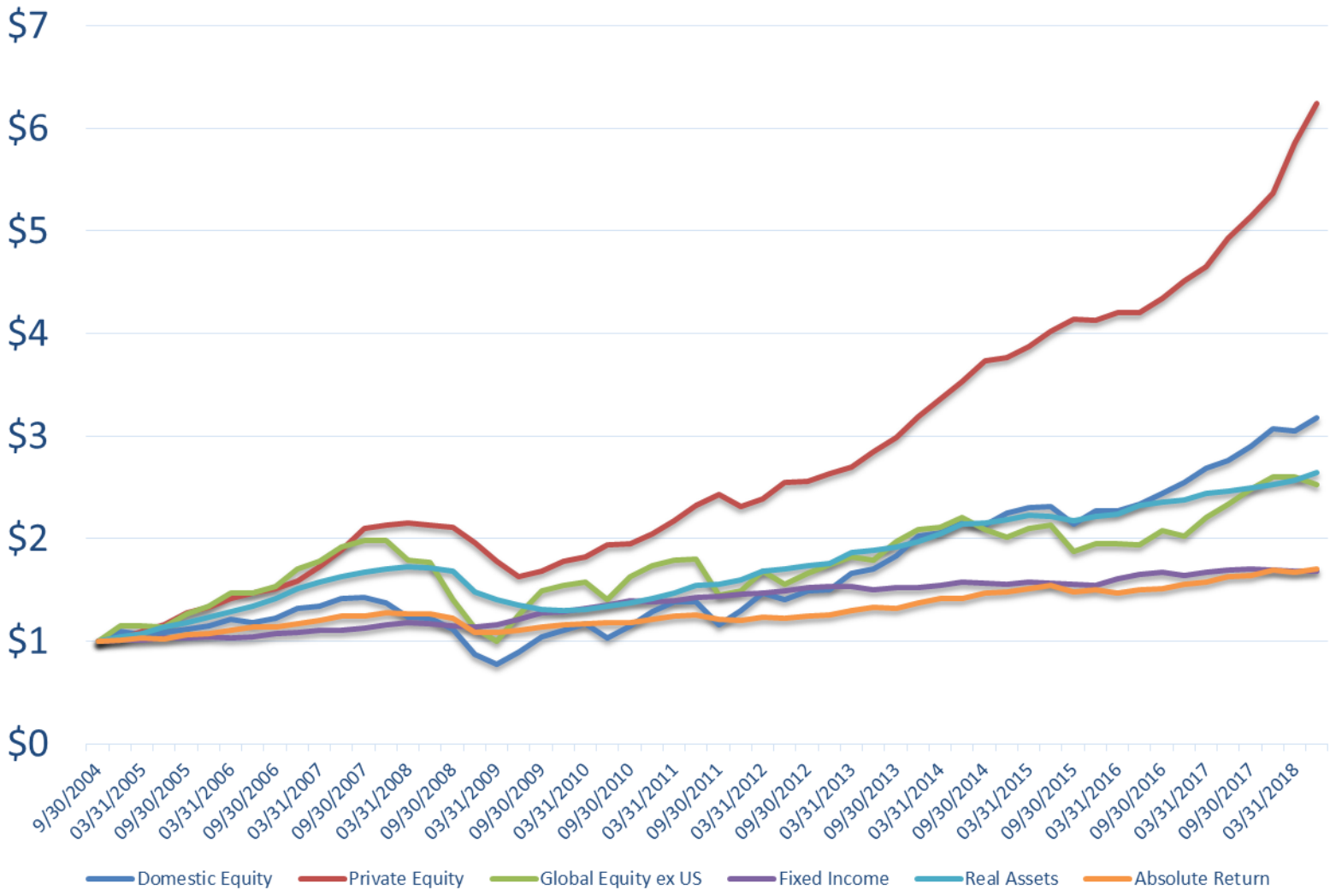


Source: Callan, Bloomberg

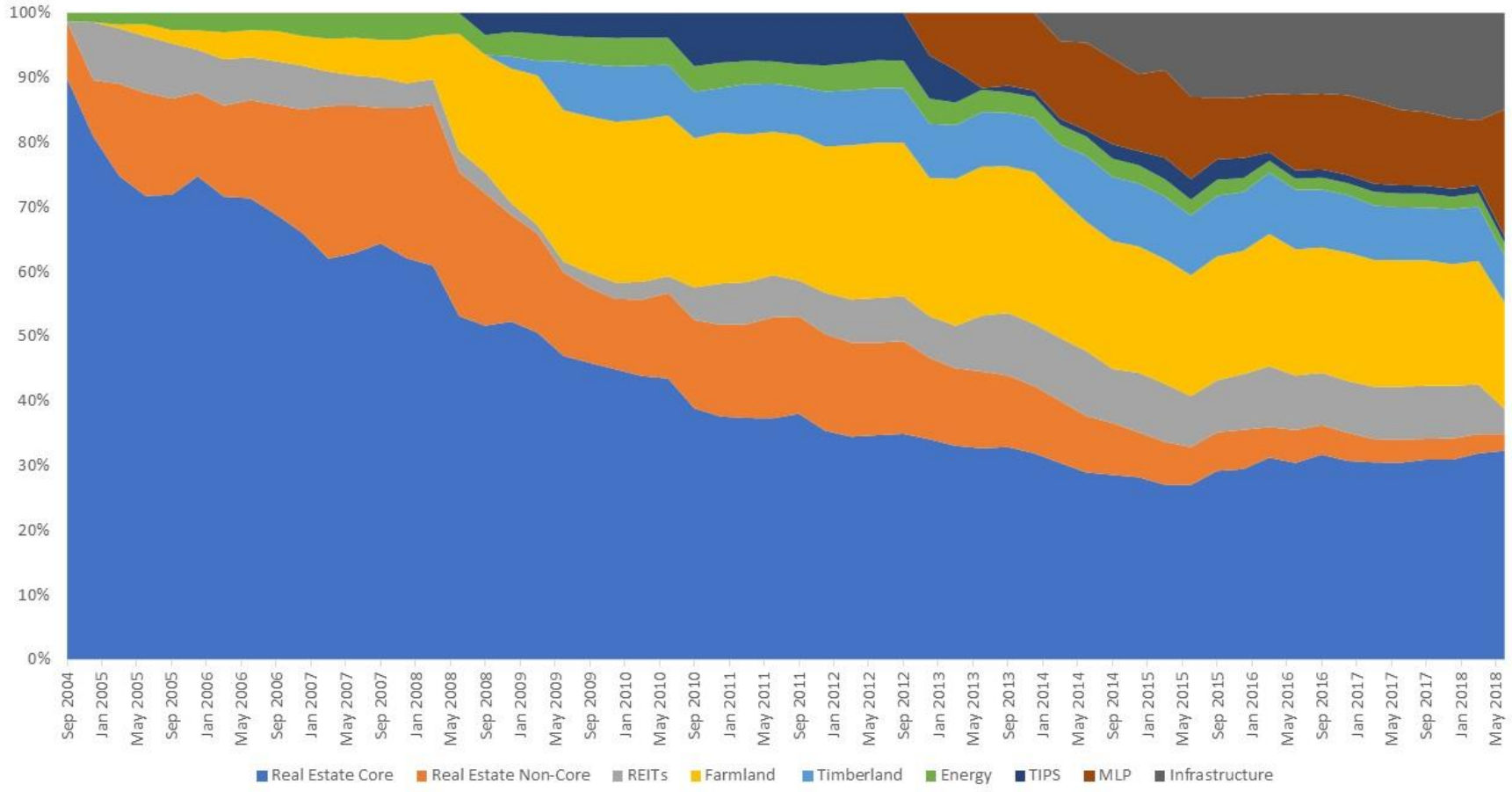
Takeaways – December Presentation

- The public markets provide a low-cost and readily-available investment option for the ARMB.
- Alternatives often involve sacrificing liquidity and transparency. We should invest if we expect a material improvement in risk-adjusted returns, relative to the public markets.
- The PERS strategic allocation to alternatives has outperformed public equivalents over long periods of time.
- Any comparison between competing investment portfolios is sensitive to the start and end dates used. One should do so with caution.
- Staff believes it is reasonable to evaluate net-of-fee performance of alternatives over rolling 6- to 10-year periods.

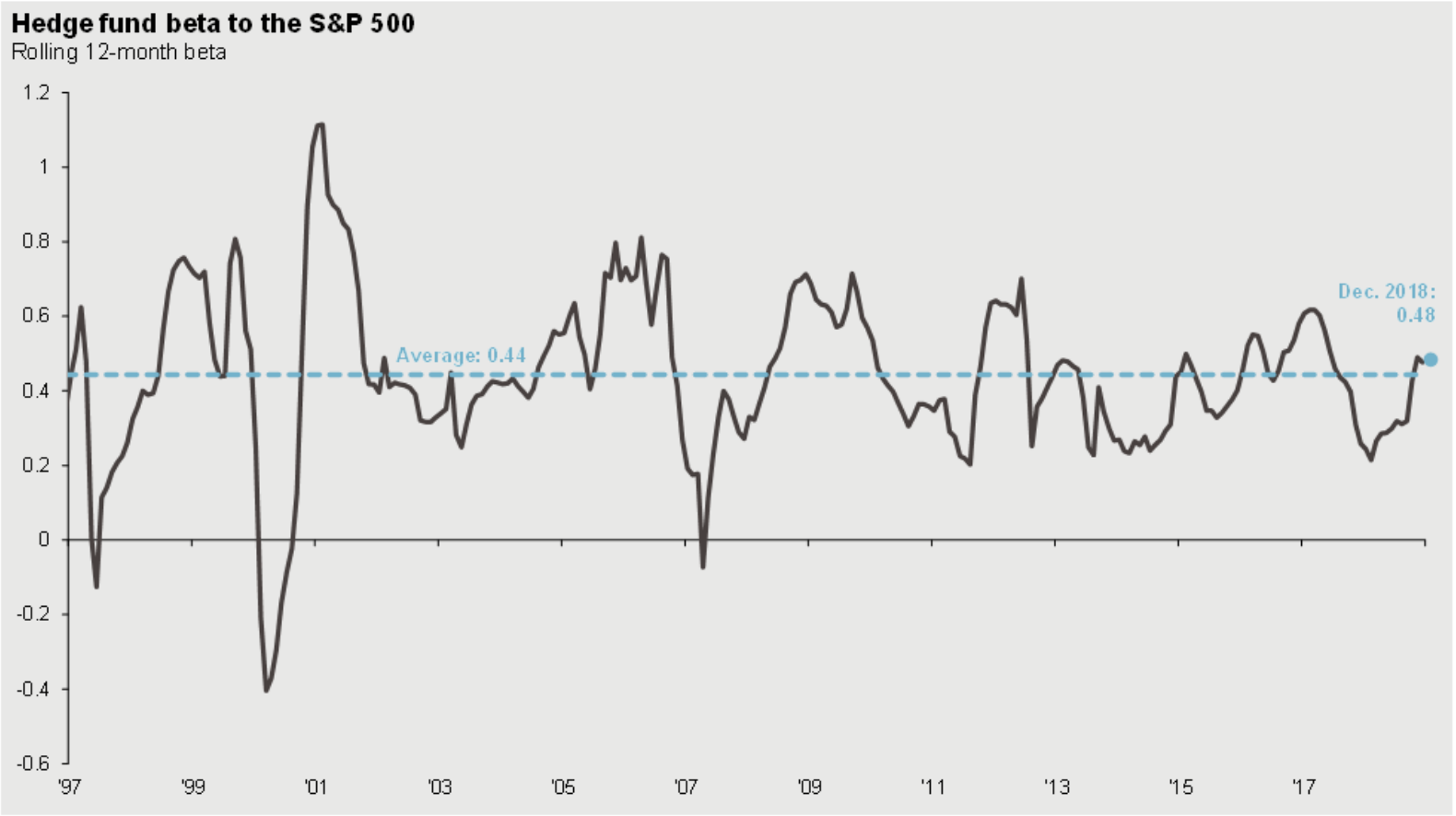
Asset Class Comparison – Growth of a $



Real Asset Composition Over Time



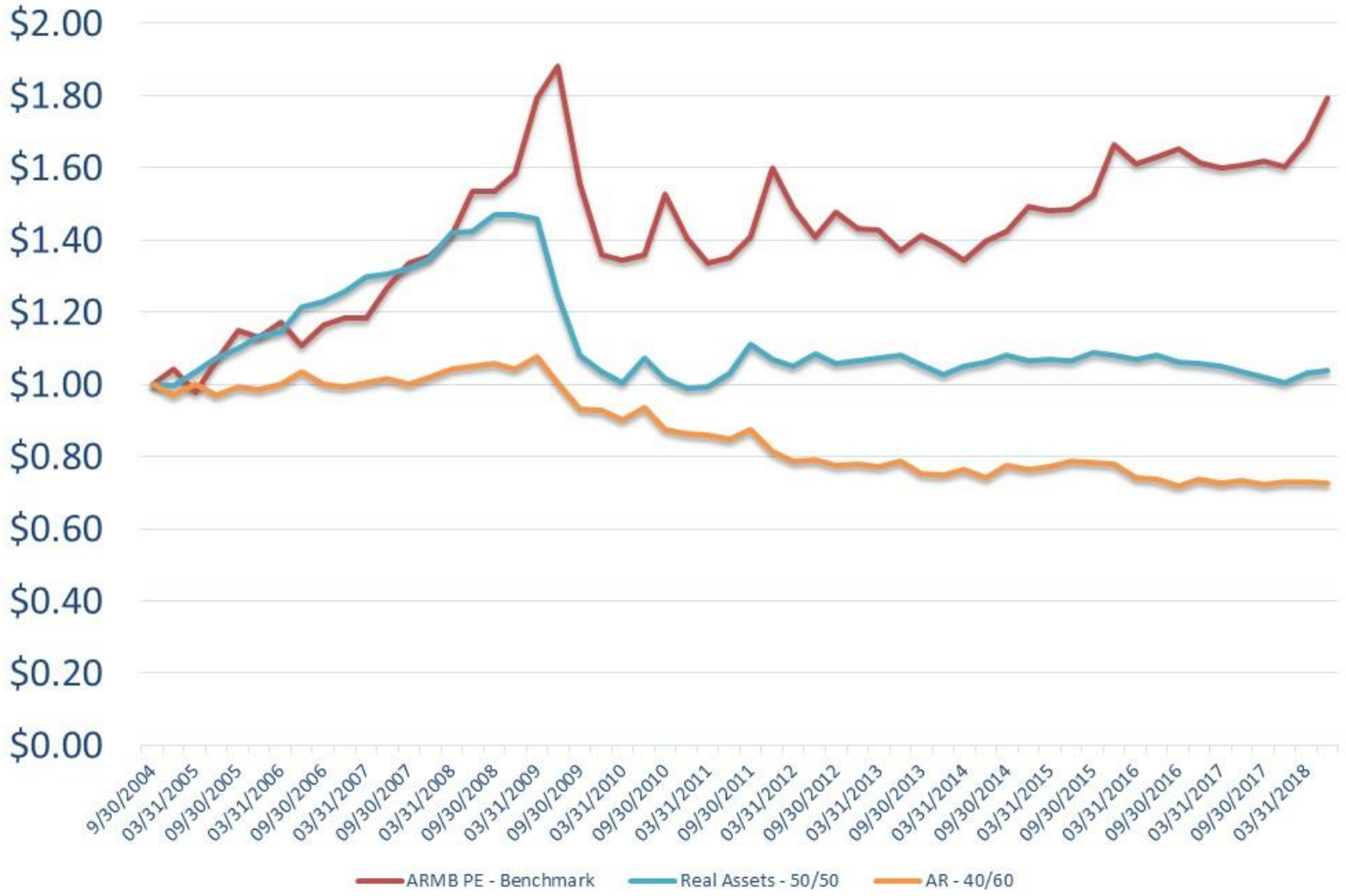
Absolute Return



Source: HFRI, Standard & Poor's, FactSet, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

J.P.Morgan
Asset Management

Alternatives – Relative Growth of a $



Asset Class Recommendations

- Alternatives
  - Evaluate the role of the Real Assets asset class with the incoming Real Assets consultant on July 1 with a goal of making recommendations to ARMB at its September meeting, in line with the Real Assets annual plan discussion.
  - Discontinue investment in Absolute Return, transfer some investments to other asset classes, and allow the remaining portfolio to run off.
  - In light of the relatively high cost of alternative investments, the increased importance of manager selection as a driver of returns in alts, and the increase in model-related risk (inputs, rebalancing) when optimizing relatively illiquid asset classes, consider the case where alts are capped at 20% of the overall portfolio asset allocation.
- Fixed Income/Cash
  - Simplify the asset allocation by combining into one asset class, changing the benchmark to a combination of the underlying components. Consider broadening investment strategies if allocation increases.

Manager Structure and Selection

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

Monitor Results

- Are the fund, asset classes and mandates performing as expected?
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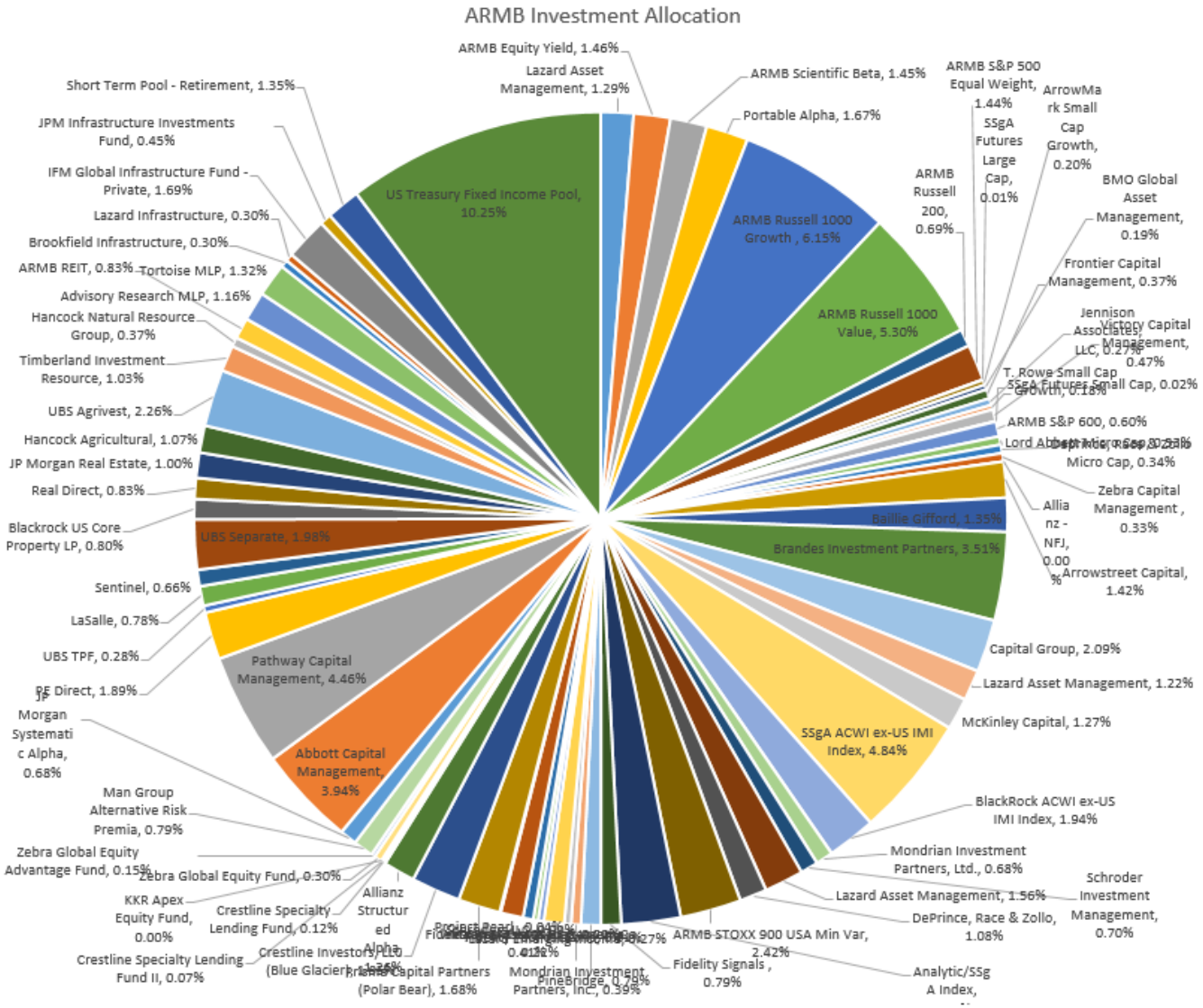
Implementation – Manager Structure & Selection



Manager Recommendations

- Evaluate manager structure within each asset class on a rolling basis over the next 6-12 months.
  - Reduce the number of mandates and simplify.
  - Consider increasing active risk in targeted areas.
- Continue focus on improving net-of-fee outcomes by reducing investment manager fees.

ALASKA RETIREMENT MANAGEMENT BOARD

Manager Selection, Monitoring, and Watch List

Shane Carson, CAIA, CFA
Manager of External Public Equity and DC Investments

Key Board Decisions

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Presentation Outline

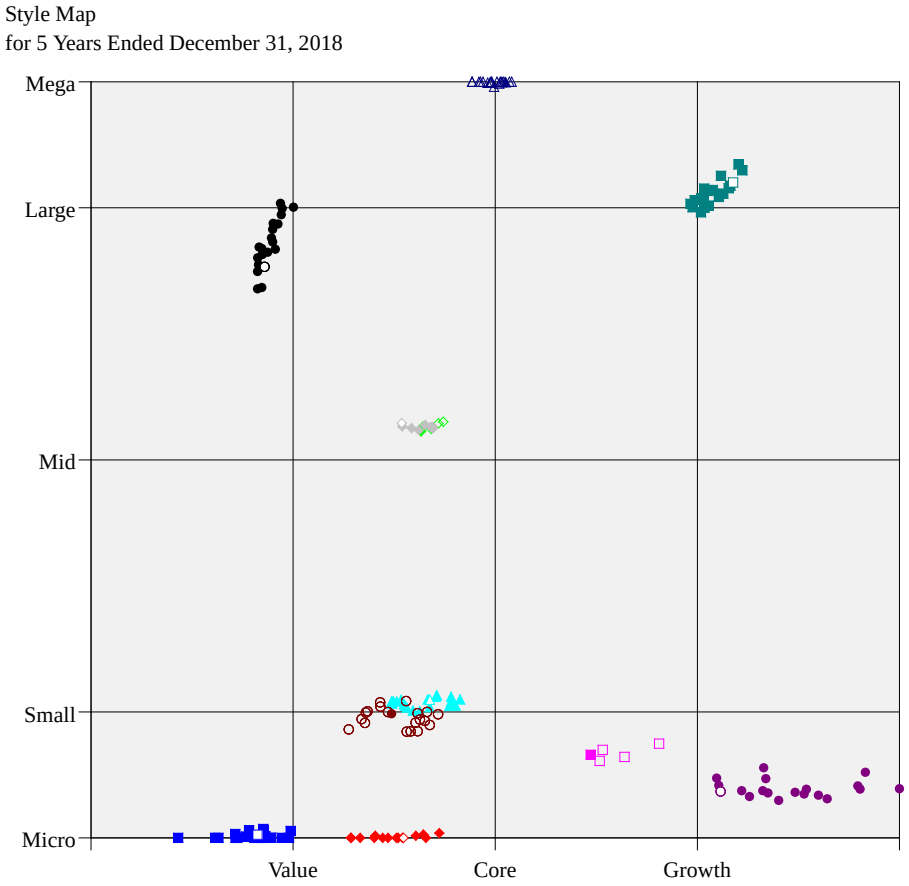
- Evaluation criteria when selecting investment managers
- Manager monitoring methodology and frequency
- Purpose of the Watch List and recommended changes

Summary Example of Manager Selection and Evaluation Criteria

Category	Selected Criteria
Firm	Ownership structure and stability Adequacy of systems and support
Key personnel / Investment Team	Thought leader Committed with minimal distractions Team stability Compensation structure
Portfolio	Philosophy and idea generation Portfolio construction and risk controls Capacity management
Quantitative analysis	Performance analysis Exposures consistent with expectations Relative and absolute risk within expectations
Other considerations	Fees Headline risk Client service

Monitoring

- Method and frequency specific to each asset class and potentially each strategy
- Daily, monthly, quarterly
  - Performance
  - Style and exposures
- Conference calls
- On-site due diligence
- Board presentations
- Consultants



Watch List – Purpose and Application

- The Board hires and terminates managers
  - Staff monitors those managers
- Purpose of a Watch List policy
  - Mechanism to communicate formal notification to the Board and any investment manager for whom an issue has been identified and that staff is working to resolve the issue
  - Policy should be
    - Transparent
    - Consistent
    - Fair
  - Procedural step
    - Provides an interim step allowing staff and the Board to assess the significance of the issue and to identify appropriate next steps
- Does not apply to closed-end funds

Watch List - Dangers

- Dangers of a Watch List
  - Strict rules-based decisions can lead to inefficient portfolio management
    - Qualitative exceptions
    - Understand "why"
  - Misinterpretation of purpose and intent
    - Is the Watch List a procedural step or a higher burden of proof?
  - Drive costly and unproductive turnover

Current Watch List Guidelines

- Resolution 2012-25, Relating to Watch List Guidelines
  - Adopted September 20, 2012
- Selected excerpts
  - Performance of investment managers will be monitored on an ongoing basis
  - Board may terminate a manager at any time
  - There are various factors...
    - ...separated into two broad categories – qualitative and quantitative
  - ...intermediate step which may be taken to either resolve the problem or terminate the manager

Current Watch List Guidelines

- Qualitative
  - Violation of investment guidelines
  - Deviation from stated investment style and philosophy
  - Changes in ownership
  - Turnover of key personnel
  - Litigation
- Quantitative
  - Requires (where applicable) failure of three out of three tests
    - Test 1: Trailing 6-year annualized performance relative to the agreed upon market index. Fail if underperform by 1% per annum, gross of fees.
    - Test 2: Trailing 6-year relative to an appropriate style index (if applicable). Fail if underperform by 1% per annum, gross of fees.
    - Test 3: Performance compared to an appropriate peer group. Fail if cumulative performance is at 65% or lower.

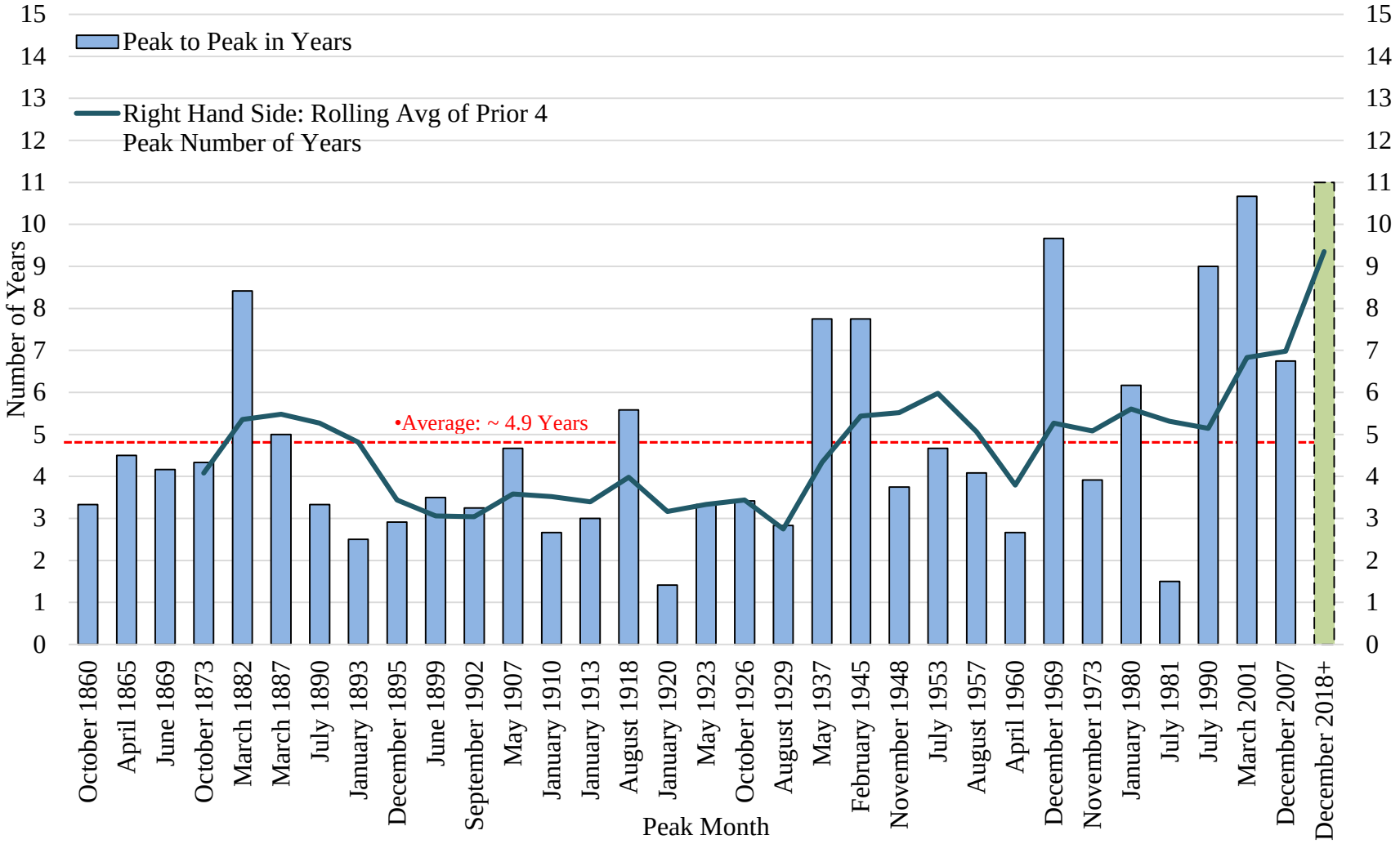
Significant Recommended Changes

- Add language stating the purpose of the Watch List
  - Further clarifying the purpose of the Watch List Guidelines for trustees, staff, and investment managers
- Remove language requiring the fund performance objectives
  - "preservation of capital"
  - "consistent positive returns"
- Remove timing of manager being on the Watch List for violation of guidelines
  - Allow staff determination of significance and resolution

Significant Recommended Changes

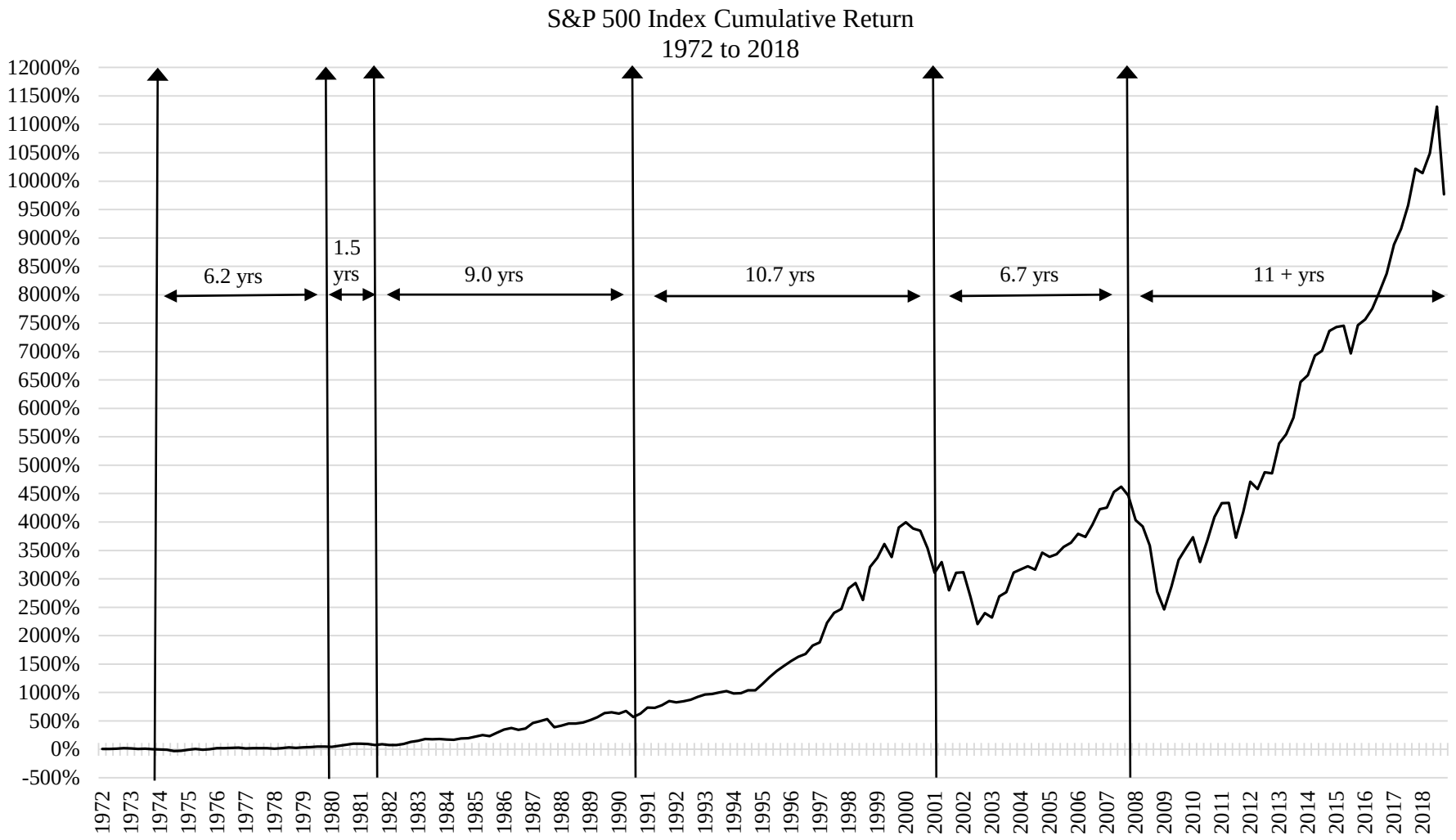
- Remove the style specific test and modify the hurdle for the quantitative measurement
  - Require Watch List if failure of any one test (if applicable)
  - Test 1:
    - Fail if net of fee, trailing 6-year annualized performance is less than the agreed upon market index or performance benchmark
  - Test 2:
    - Fail if gross of fee, trailing 6-year annualized performance is less than the median performance of an appropriate peer group

Business Cycles



Source: National Bureau of Economic Research, US Business Cycle Expansions and Contractions
https://www.nber.org/cycles/cyclesmain.html

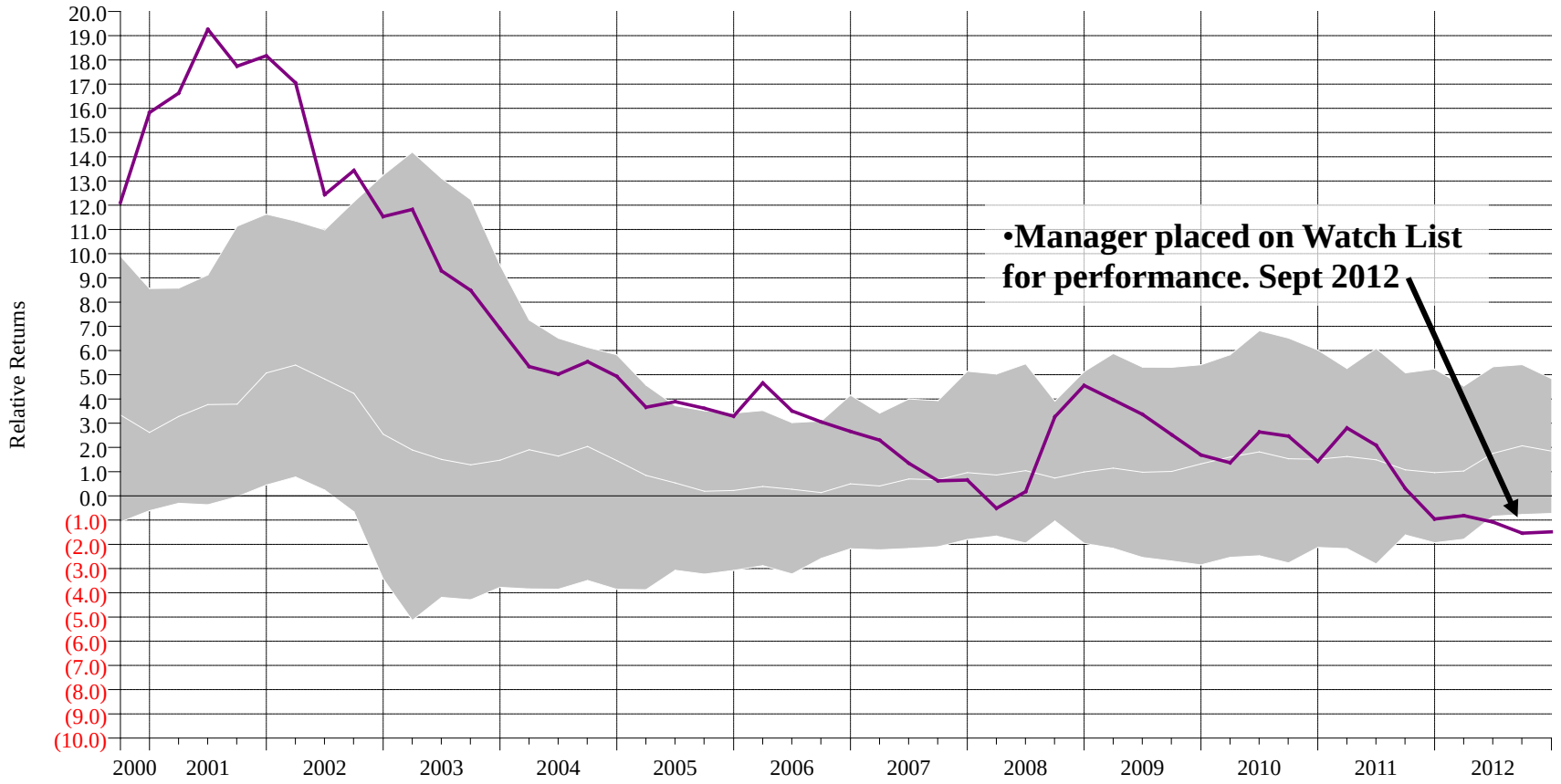
Market Cycles



Source: Callan PEP and NBER

Practical Manager Example

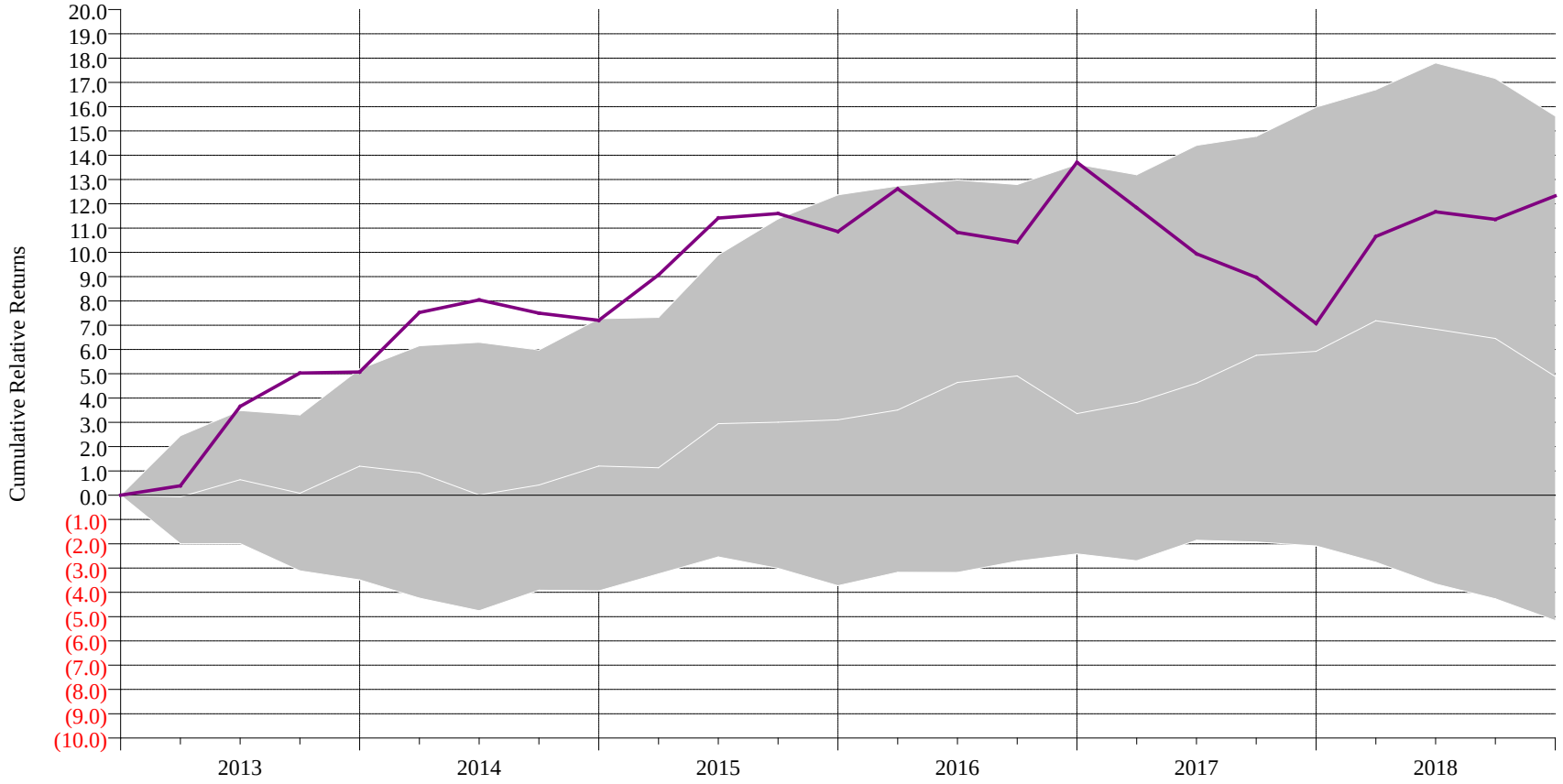
Rolling 3-Year Gross of Fee Relative Returns Relative To MSCI:EAFE
Manager Watch List Example
Since Inception Ended December 31, 2012



Watch List methodology prior to September 2012
Group area Callan Non-US Developed Broad Equity (10th to 90th) Percentile

Practical Manager Example

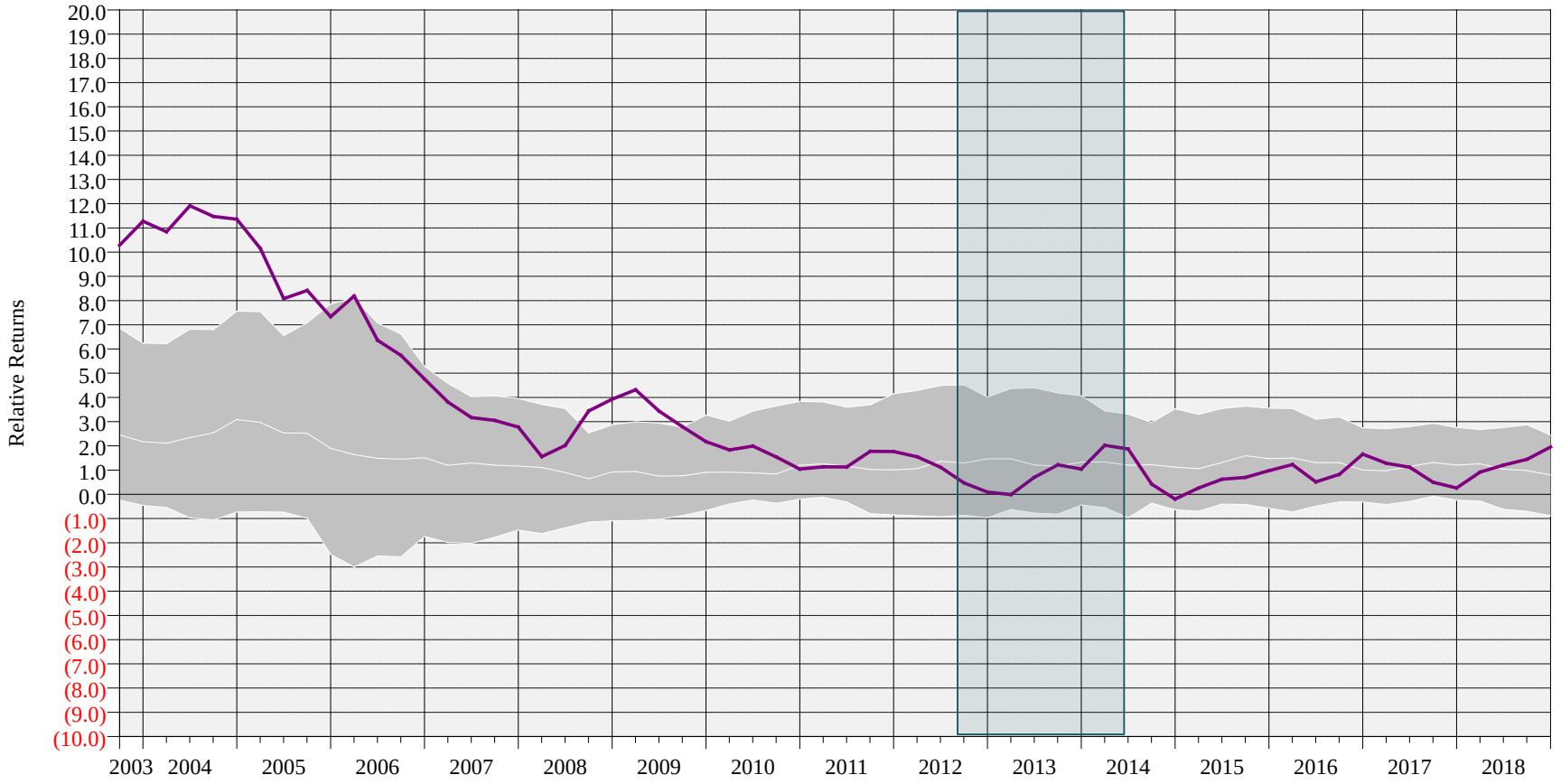
Gross of Fee Cumulative Relative Returns Relative To MSCI:EAFE
Manager Watch List Example
Since December 2012 Ended December 31, 2018



Group area Callan Non-US Developed Broad Equity (10th to 90th) Percentile

Practical Manager Example

Rolling 6-Year Gross of Fee Relative Returns Relative To MSCI:EAFE
Manager Watch List Example
Since Inception Ended December 31, 2018



- Shaded area represents period manager was on the Watch List
- Group area Callan Non-US Developed Broad Equity (10th to 90th) Percentile

Recommendation

The Alaska Retirement Management Board adopt Resolution 2019-01, amending the Watch List Guidelines to reflect those changes detailed in the Manager Selection, Monitoring, and Watch List presentation at the April 2019 ARMB meeting.

Global Markets

International Equities

Review of the Investment Management Lifecycle

Prepared for

Alaska Retirement Management Board

April 5, 2019

Daniel Morgan, Senior Vice President
Michael Putica, Managing Director

STATE STREET

General

Investment Lifecycle Overview

Anatomy of the Investment Management Process

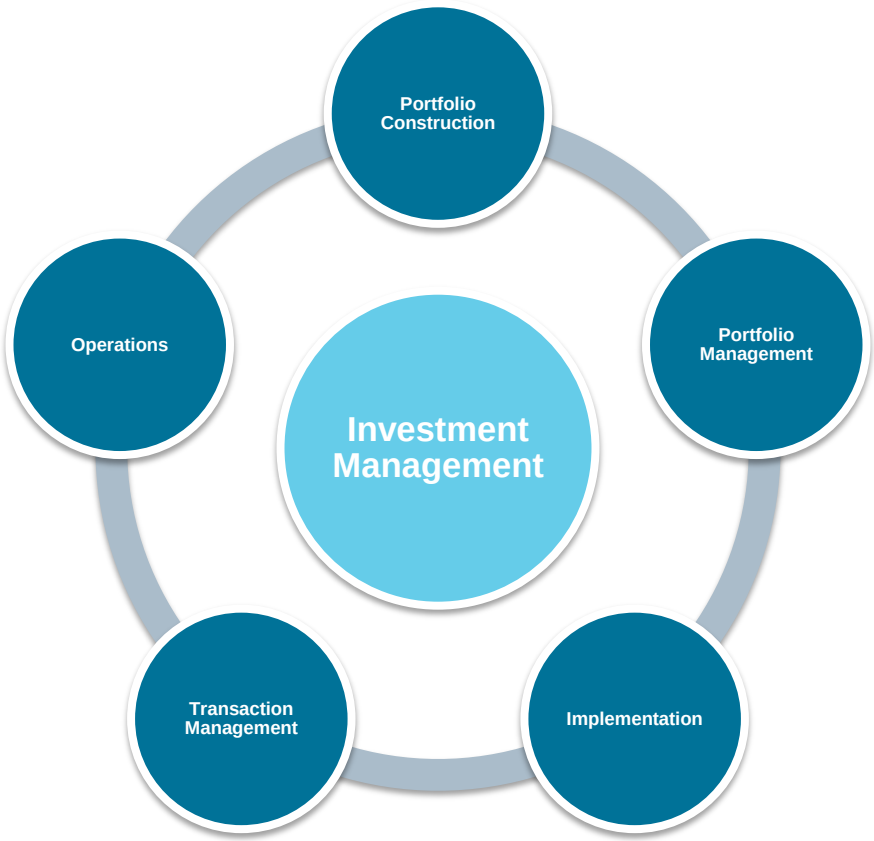
Portfolio Construction
- Portfolio strategy and design
- Research
- Access to market data services and news
- Portfolio optimization through risk platforms

Portfolio Management
- Order entry
- Compliance – pre trade against mandate rules
- Portfolio monitoring, rebalancing and implementation of model changes
- Corporate action voting and processing
- Proxy voting decisions
- Cash management

Implementation
- Vendor selection and monitoring, commission management
- Trade execution – decision across venues and liquidity providers
- Trading system connectivity
- Oversight of trading functions and review of execution quality

Transaction Management - Middle Office
- Trade lifecycle processing – trade confirmations, portfolio allocations, messaging to settlement agents and settlement monitoring
- Investment Record Keeping (IBOR)
- Portfolio reconciliation, corporate action booking, start of day positions
- Collateral management

Operations – Administration, Accounting, Custody
- Trade capture and trade settlements function
- Accounting Record Keeping (ABOR) and reporting
- Data management and portfolio reconciliation
- Corporate action, proxy voting processing
- Safekeeping of assets



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International Equity Trading

High level requirements

There are a range of fundamental requirements in operating an international trading operation

Infrastructure	▪ Portfolio management systems, including pre- and post-trade compliance ▪ Multi-asset class, multi-venue trading systems (order and execution management) ▪ Portfolio risk and optimization tools ▪ Back and middle office systems ▪ Portfolio monitoring, TCA, best execution reporting
Fund Governance	▪ Risk, legal and compliance oversight and control process ▪ Performance presentation ▪ Counterparty selection and monitoring ▪ Exposure and portfolio risk monitoring and oversight ▪ Regulatory reporting obligations ▪ Valuations and reconciliations
Staff	▪ Portfolio managers, strategists and research associates to make investment decisions ▪ Middle and back office operations staff for administration
Data Management Capabilities	▪ Index / Quantitative model feeds ▪ Trade confirmations / SWIFT messaging to back office ▪ Custody and accounting reports ▪ Timely data back to the front office for investment decision making

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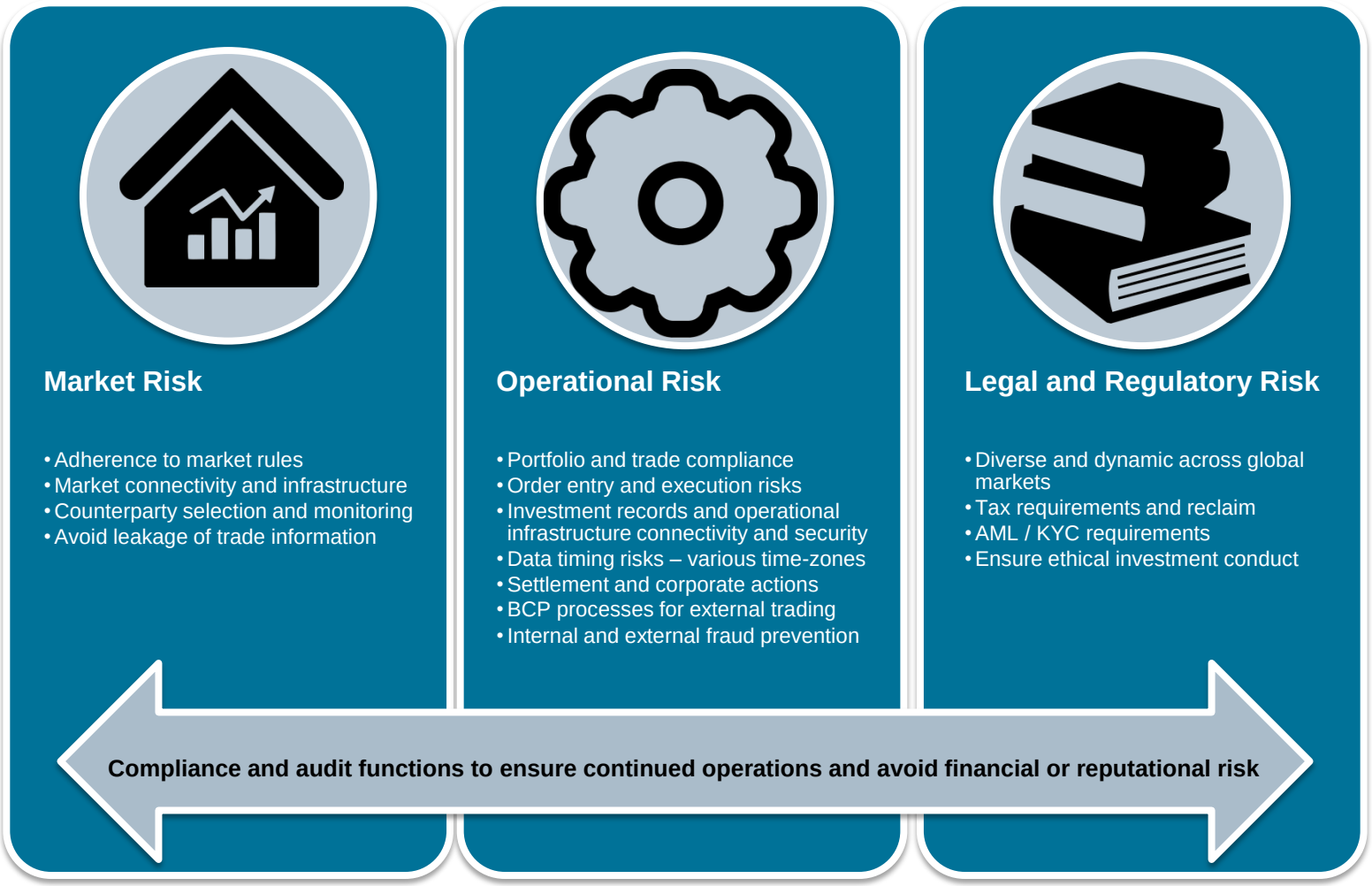
Investment Implementation Risks

Investment Oversight and Risk Management



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International Equities Trading – Developed Markets

Operational and Execution Risks

Trading in international equity portfolios involves careful coordination across time zones requiring access to hundreds of liquidity venues including exchanges, dark pools and brokers

Trade types

- Basket trades and singe stock
- Market and limit order types

Trade Strategy

- Cash management
- Algos and trade sequencing
- ETF and futures hedge execution
- Coordinated FX for funding and hedging purposes

Market-specific nuances

- Market microstructure specific to each market
- Open and close auctions
- Stamp duties
- Settlement timing
- Holidays

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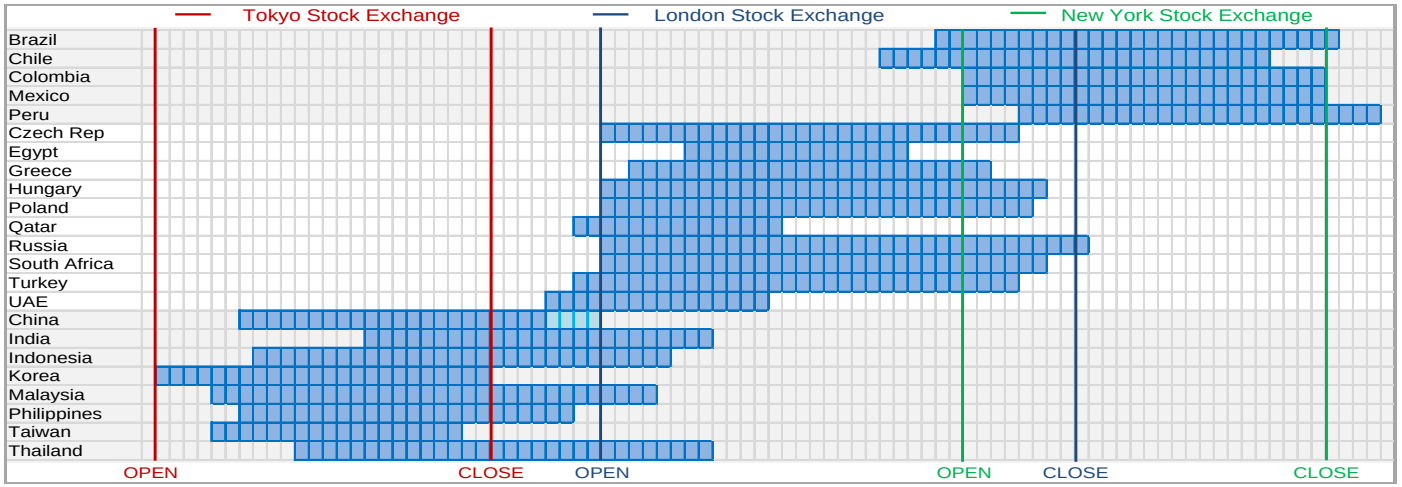
International Equities Trading – Emerging Markets

Operational and Execution Risks

Market structure and trading conventions vary by EM country and require special attention

Equity Markets and Trading Considerations	▪ Settlement timing and requirements (e.g., pre-funding of purchases) ▪ Regulatory framework including transferability, stamp duties, taxes and other market charges ▪ Exchange trading hours and schedules (including holidays)
Cash Accounts and FX Trading Considerations	▪ "Off-Book Markets" (deposits are held and FX transactions are executed with sub-custodian) ▪ "Restricted" currencies where trading onshore directly with 3rd party broker is prohibited ▪ Use of standing FX instructions with custodian for automatic repatriation trades (batch process) ▪ Manual instruction may reduce costs via netting opportunities, greater control over timing
Exchange Trading Hours	

Source: State Street Global Markets

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STATE STREET.

ARMB & Fixed-Income

Asset Class Investing should not be done in Isolation;

A. Fund Investment Horizon?

   Inside of 5 years, Equity Risk should be limited; but

   Outside of 10 (or 20 years), Equity risk can be emphasized.

B. Fund Liquidity / Cash Out Flow Needs?

   The More Stable / Predictable, Increased Risk can be assumed.

C. Regulatory / Social Restrictions?

   ERISA, Tobacco, Energy (Coal, Fracking), etc.

D. Which selected Asset Classes provide the best Risk / Reward?

ARMB Characteristics:

A. Investment Horizon – Remains > 20 Years;
B. Equity Like – Over 70%;
C. Debt (Traditional Fixed-Income) - 10%; and
D. Other - 20%.

Fixed-Income Is A Highly Complex Asset Class:

A. Type: US Treasuries, US Agencies, Mortgages, Municipals (Tax-exempt and Taxable), Corporates, TIPS, etc.;
B. Tenor: 1-day (overnight) to 100 years (Disney & Coca-Cola);
C. Quality: Sovereign (US) to High-Yield;
D. Structure: Zero, Fixed, Floating, Callable, etc.; and
E. Trading: Highly Liquid (electronic trading & tight bid/ask spreads) or “By Appointment Only.”

This is only the Surface.

Roles That Fixed-Income Can Assume:

A. Diversification

   Low Correlation to Other Asset Classes.

B. Liquidity:

   Ability to Buy or Sell in All Market Environments; and

   Market Makers (Primary Dealers, etc.) have bids / asks across a broad set of securities.

C. Protection in Severe Downturns (aka, 2008/2009):

   Maintaining Value in Significant (-10%+ Equity Market Declines).

Diversification:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Broad Domestic Equity	1.000																		
2 Large Cap	0.996	1.000																	
3 Small/Mid Cap	0.966	0.940	1.000																
4 International Equity	0.840	0.840	0.800	1.000															
5 Emerging Markets Equity	0.866	0.860	0.845	0.865	1.000														
6 Global ex-US Equity	0.874	0.872	0.839	0.987	0.936	1.000													
7 Intermediate Treasuries	-0.164	-0.150	-0.200	-0.170	-0.210	-0.188	1.000												
8 Domestic Fixed	-0.110	-0.100	-0.135	-0.110	-0.160	-0.130	0.880	1.000											
9 Opportunistic	0.985	0.990	0.924	0.828	0.840	0.857	-0.024	0.044	1.000										
10 Real Estate	0.732	0.730	0.705	0.660	0.650	0.677	-0.040	-0.030	0.729	1.000									
11 Timber	0.584	0.580	0.570	0.520	0.510	0.533	-0.030	-0.020	0.580	0.800	1.000								
12 Farmland	0.554	0.550	0.540	0.490	0.480	0.502	-0.050	-0.050	0.545	0.750	0.600	1.000							
13 Infrastructure	0.673	0.670	0.650	0.660	0.640	0.674	-0.200	-0.100	0.658	0.680	0.800	0.650	1.000						
14 MLPs	0.855	0.850	0.830	0.830	0.830	0.855	-0.250	-0.115	0.837	0.670	0.760	0.600	0.600	1.000					
15 Real Assets	0.763	0.759	0.739	0.706	0.694	0.724	-0.108	-0.058	0.754	0.912	0.956	0.729	0.853	0.816	1.000				
16 Absolute Return	0.802	0.800	0.770	0.730	0.755	0.761	0.060	0.080	0.815	0.605	0.605	0.460	0.600	0.740	0.691	1.000			
17 Private Equity	0.948	0.945	0.915	0.895	0.910	0.927	-0.220	-0.200	0.920	0.715	0.715	0.570	0.600	0.880	0.795	0.780	1.000		
18 Cash Equivalents	-0.043	-0.030	-0.080	-0.010	-0.100	-0.040	0.400	0.100	-0.016	-0.060	-0.060	-0.050	0.150	0.090	0.001	-0.070	0.000	1.000	
19 Inflation	-0.010	-0.020	0.020	0.000	0.030	0.010	-0.250	-0.280	-0.061	0.100	0.174	0.150	0.090	0.180	0.150	0.200	0.060	0.000	1.000

Liquidity:

A. Tight Spreads;
B. Able to Buy or Sell In Significant Size; and
C. Not “By Appointment Only”

Protection in Severe Downturns (aka, 2008/2009):

During Market Environments of Significant Stress, the Characteristics noted on the prior two pages (Diversification and Liquidity) can vanish;

Asset Correlations move towards 1.0; and

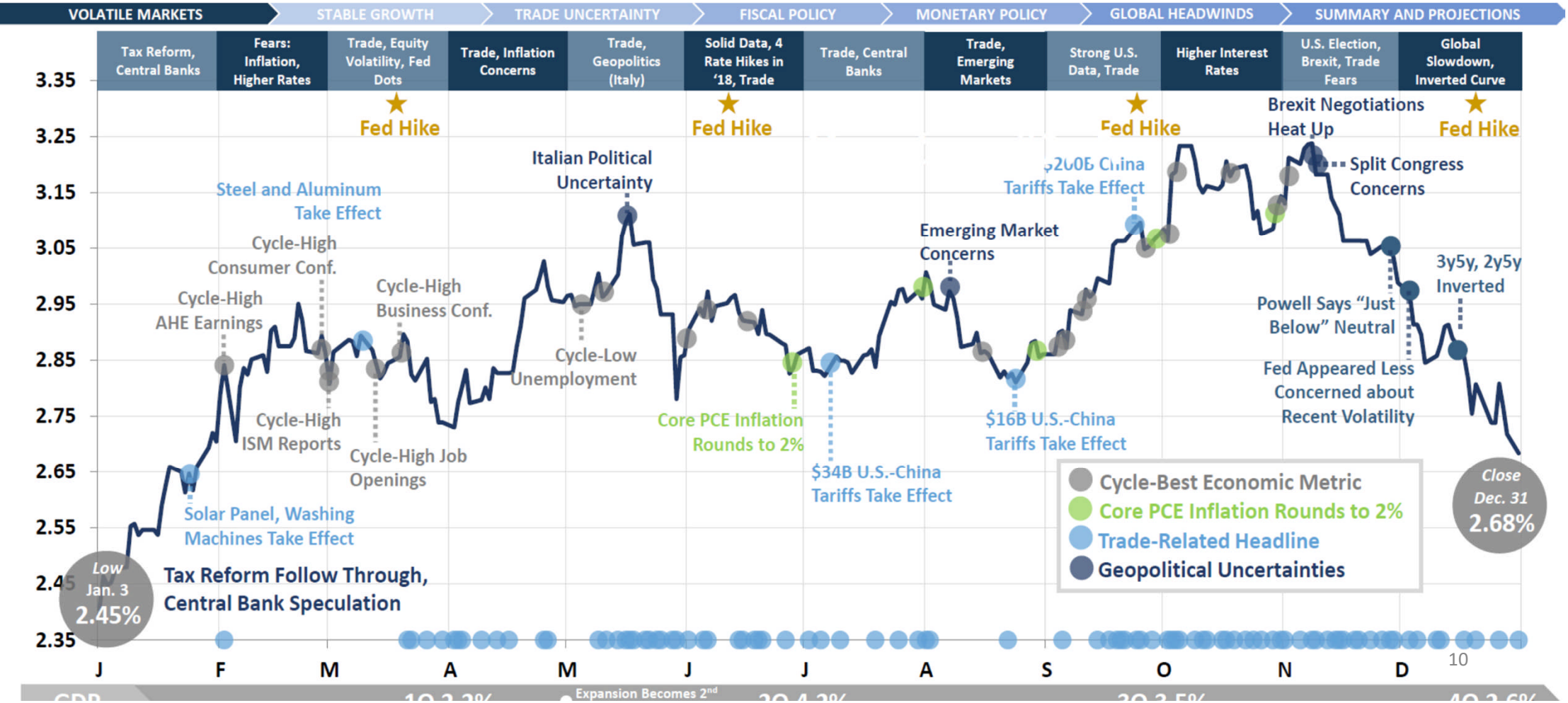
Liquidity Dries as Buyers step back.

All of This Occurs…”AT THE WORST POSSIBLE TIME.”

Returns: Sept. 2008 – March 2009:

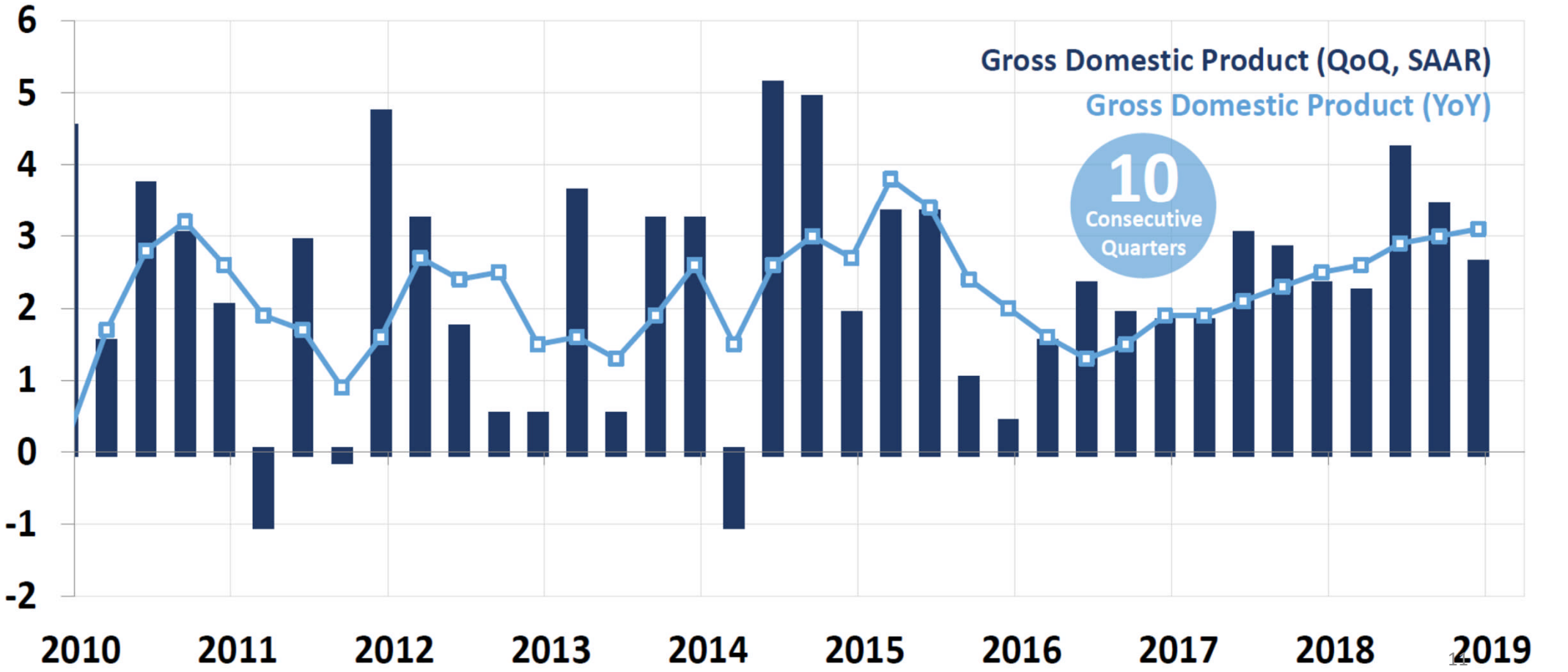
A. S&P 500: -30.54%
B. Barclays Agg: +4.70%
C. Long-Term Corps: +0.79%
D. Long-Term US Tsy: +12.45%

Setting the Table – Current Economic Environment:



Setting the Table – Current Economic Environment:

VOLATILE MARKETS | STABLE GROWTH | TRADE UNCERTAINTY | FISCAL POLICY | MONETARY POLICY | GLOBAL HEADWINDS | SUMMARY AND PROJECTIONS



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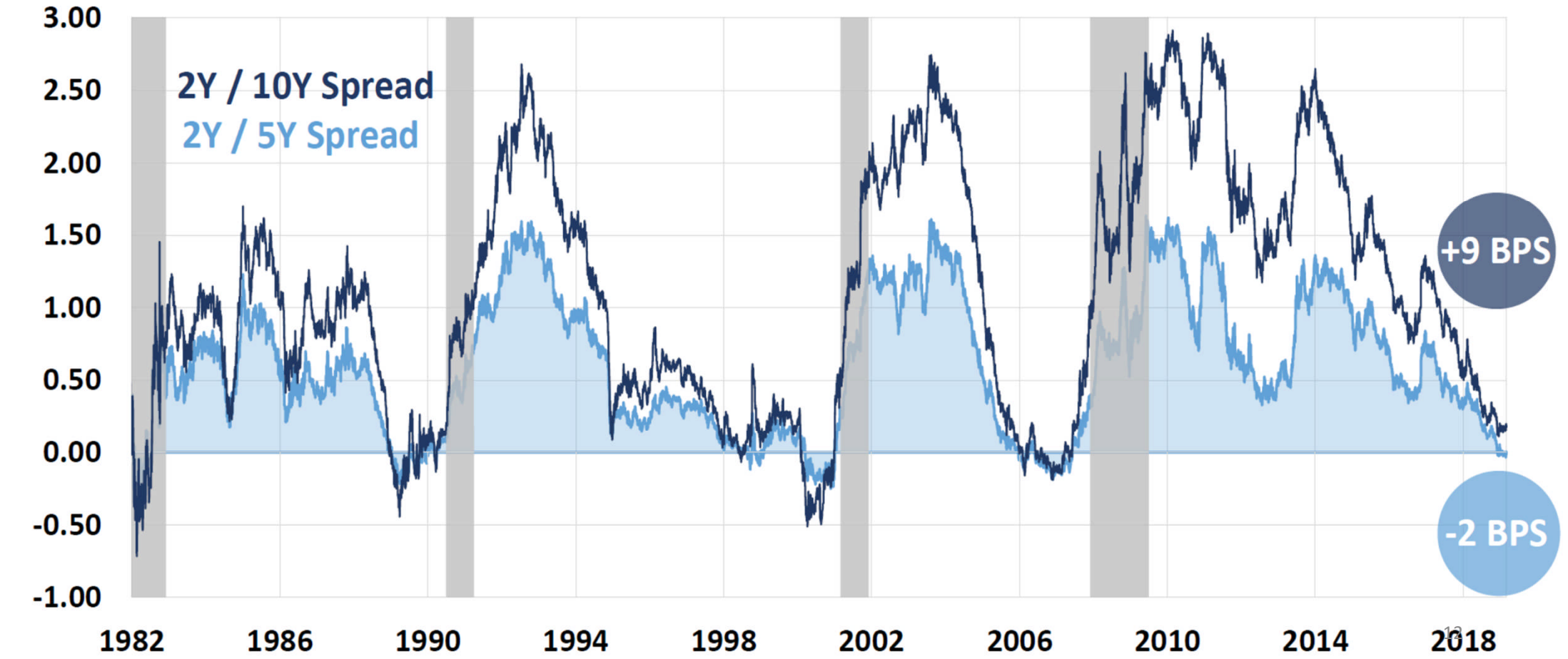

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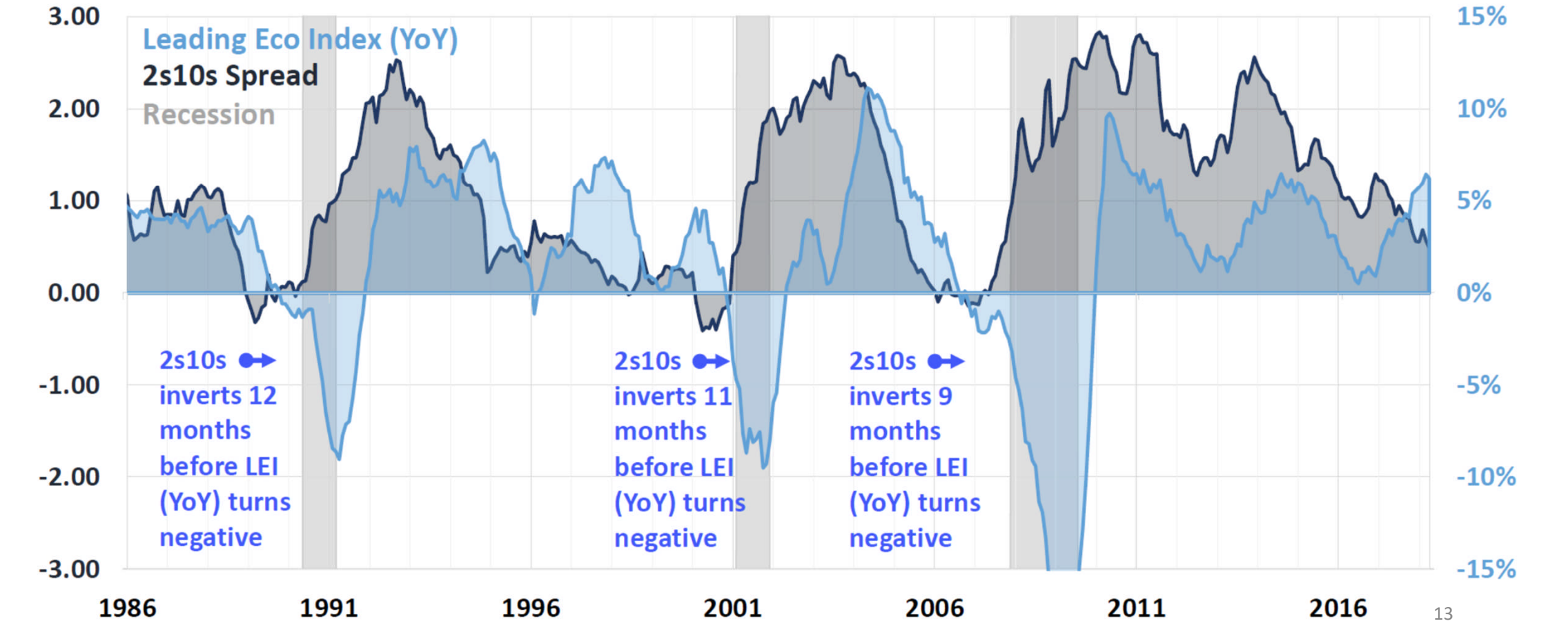

Setting the Table – Current Economic Environment:

		Level at Time of Initial Yield Curve Inversion			
Leading Economic Indicators	**Signal for Recession**	**1989**	**2000**	**2006**	**Current**
Leading Indicator Index (YoY Change)	YoY Change Declines	+4.1%	+3.3%	+2.7%	+2.9%
Initial Jobless Claims (YoY Change)	YoY Change Declines for Consecutive Months	-8.1%	-2.4%	-4.1%	+0.2%
Weekly Hours Worked (Hours)	Hours Fall below 40.8	41.1	41.5	40.9	42.0
Consumer Confidence - Expectations (YoY)	YoY Change Declines	+5.4%	+2.3%	+1.6%	+1.1%
New Orders - Consumer Goods (YoY Change)	YoY Change Declines for 3+ Consecutive Months	+6.2%	-2.3%	+3.3%	+2.2%
Building Permits (YoY Change)	YoY Change Declines	+11.6%	-1.6%	+1.8%	+0.5%
New Orders - Core Capital Goods (YoY Change)	YoY Change Declines	+1.4%	+11.4%	+6.7%	*+0.8%*
ISM Manufacturing New Orders (Index)	Index Falls below 47.2	57.3	56.2	58.9	55.5
Stock Prices (YoY Change)	YoY Change Declines	+14.8%	+11.4%	+5.2%	-3.6%
Yield Curve	**Signal for Recession**				
2-Year / 10-Year Treasury (Spread)	Turns Negative	19 Mos	13 Mos	26 Mos	0.17%

Setting the Table – Current Economic Environment:

TAILWINDS

- Strong U.S. Consumer
- Trade Deal Could Unleash Business Investment
- One More Year of Fiscal Boost
- Mild Inflation Likely to Persist

INTEREST RATES

- Slower Pace of Gradual (0-1 Hike)
- Likely Near Peak for Rate Cycle

HEADWINDS / RISKS

- Tax-Cut Benefits Fade over Time
- Fiscal Boost to Fade
- Housing to Remain Sluggish
- Potential Trade Policy Misstep
- Fed Policy Error More Likely as Rates Near Neutral
- Assets Prices Still Appear High
- Slowing Global Growth
- Higher Global Debt Loads
- Aging U.S. Population

ARMB – Fixed-Income

A. High (70%+) Exposure to Equity Characteristics;
B. 2nd Longest Economic Expansion (#1 in June/July 2019);
C. Yield Curve Inversion (Recession Signal) is near; and
D. Corporate Spreads are tight relative to history.

Recommendation / Discussion Points

A. Tactical Shifts (away from Long-Term Strategic Allocations) are difficult to get right – Numerous decisions are needed:

    1. What Assets to Buy and Sell;
    2. Dollar Value (or Portfolio Percentage) to shift; and
    3. When to unwind the tactical shift.

    Poor timing on any of these factors can eliminate some or all of the value from a Tactical Shift.

Recommendation / Discussion Points

B. Picking Apart the Fixed-Income Market:

1. Corporate Bonds. If you look at A-AAA credits from 2000 – 2018, there is a significant spike in spreads from late 2007 through late 2009, which lines-up closely with the negative returns for the US equity markets.

   If I am looking for diversification during periods of very poor equity returns that give me the opportunity to rebalance, Corporate Bonds (both IG and HY) are likely not the place to be.

2. Treasury Bonds (US 10 Year). This is the segment of fixed-income in which I would want to have exposure in order to have confidence that returns would exhibit a low correlation to equities during periods of market stress. Data from PIMCO shows that in the 1st half (12/2007 to 09/2008) of the GFC, the S&P 500 was down 19.3% while the 10-year US Treasury rose 4.5%.

Nuts & Bolts – Implementation Issues & Options

A. Internal Management:

1. Can In-House Staff manage the assets – Does Staff have the Skills & Experience Needed?
2. What is the backup plan if a key staff member leaves?
3. What Systems are in place? Tradeweb, MarketAccess, YieldBook, Bloomberg FIT, etc.

Nuts & Bolts – Implementation Issues & Options

B. Which Segments of Fixed-Income could be managed in-house:

1. US Market:
    i. US Treasuries;
    ii. US Agency;
    iii. US Investment Grade Corporates; and
    iv. US High Yield.

2. Non-US:
    i. Sovereigns;
    ii. Investment Grade Corporates; and
    iii. Emerging Markets.

Conclusions

A. A Highly Complex & Multi-faceted Asset Class that belays most attempts to be pigeonholed.

B. Common Talking Point: A Diversification (Read: Risk Reduction) Tool in an overall portfolio of equity and fixed-income assets.

C. However, Diversification is not the only leading role:

    1. Capital Preservation; and
    2. Liquidity.

D. Management. The depth (high daily trading volumes and tight bid/ask spreads) of the major segments of allow for cost effective internal management.

Conclusions

Your bonds shouldn't behave like stocks when volatility hits.

If the stock market always rose, then many investors might not bother with bonds. But unfortunately, equity markets often experience volatility and corrections. When this happens, it's important to have investments within a portfolio that are designed to provide resilience. That is the essence of why investors should seek balanced, diversified portfolios. When one part of a portfolio struggles, another part can pick up the slack.

Source: Capital Group

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Division of Retirement & Benefits (DRB) Report - IT Modernization
April 04, 2019

The report intends to offer a status update on the DRB's IT modernization project:

Project Background: A primary goal of the DRB is to modernize the IT and work processes to drive efficiency, accuracy, and security associated with its core business and services. DRB capital project is for an integrated, enterprise-wide system that supports all of our core business functions for pension and health plans of all tiers including demographic information as a single source of truth. The system will be an enterprise-level retirement information system solution providing many modern tools to enable the state to maintain and improve service to members. The system will integrate core business processes, facilitate consistency and will enable additional oversight and accountability.

Project Overview: Implementing a multi-year DRB modernization project will require a massive effort and two-step procurement process. The first step seeks an appropriate project management consulting firm. A firm that is specialized in information technology project management delivering expertise to state employee benefits, public retirement plans, and health insurance in the US. As a second step, DRB would be seeking vendors for an enterprise-wide solution.

Project Management: The consulting firm will align with the DRB's strategy, assist in enterprise-wide system selection plans and roadmaps, participate in a deeper dive in business process analysis and workflow design. Additionally, the firm will assist division staff in developing the requirements of the RFP for soliciting and securing a vendor solution for modernizing DRB's enterprise platform.

Responsibilities include:

- Provide consulting services on solutions
- Manage vendor relations
- Manage project deliverables
- Prepare project documentation
- Manage the change control process
- Manage project reporting
- Facilitate required meetings between stakeholders
- Manage project milestones
- Manage risk and issues
- Manage quality assurance and user testing
- Manage data analysis, cleansing, and conversion
- Provide guidance for business process improvement

Deliverables:

- End to end project management supported by ongoing project status reports to stakeholders
- Project management documentation developed during the course of the project.
- Project management oversight
- Product verification and validation
- Requirements management
- Risk and issue management
- User testing
- Organizational readiness
- System rollout support up to go-live date

Current Status: DRB has signed the agreement with Linea Solutions, Inc in mid-February. The total price of this agreement will be $3,196,652.00, that is a 22.2% reduction in cost from the original bid with a total savings of $912,222.00. The Notice Of Intent to Award (NOIA) was issued on Friday 02/01/19. The contract was signed on 2/18/2019.

Linea Solutions facilitated a project kick-off meeting on 3/13/19 and held initial sessions for requirements gathering beginning on 3/13/19. Linea has begun work to develop the overall Project Management Plan.

Next Step: Linea project management team will assess the detail requirements and assist DRB and procurement team to create an RFP for the enterprise-wide system development vendor specialized in Public Retirement Systems for both Pension and Health.

Questions?

Physical and Cyber Security Overview

April 2019

Areas of Exposure

The ARMB's exposure to risk can be broadly placed into two categories:

1. Internal to the State of Alaska

2. External to the State of Alaska

Types of Risk

- Improper permissions
  - Ex: Back office staff gaining permissions to execute trades, too much authority (send wires without proper controls, network file access (god account) , etc.
- Improper or inadequate Business Continuity Plans (disaster recovery)
  - Ex: five nines, site back, failed backups, server faults, etc.
- Loss of information/data
  - Ex: Loss of USB thumb drive with personally identifiable information (PII) on it, Unauthorized access to information
  - Ex: Malware, Virus, Spyware, unpatched hardware, social engineering, BYOD (bring your own device), improper access to physical spaces, etc.
- Unauthorized access to information
  - Ex: Malware, Virus, Spyware, unpatched hardware, BYOD, improper access to physical spaces, etc.

Internal Areas of Exposure

Internal areas of exposure exist in the Treasury Division and the Division of Retirement and Benefits. Both of these Divisions have security provided and controlled by Divisions within the Department of Administration.

- Physical access to work space is controlled by the Division of General Services
- Access to networks and network storage is provided and controlled by the Office of Information Technology

Statutory Authority

- Alaska Statute 44.21 designates the Commissioner of the Department of Administration (DOA) with the responsibility for oversight of all State of Alaska executive branch information technology.
- The Office of Information Technology (OIT) provides core information technology services to all state agencies.
- The Division of Retirement and Benefits (DRB) administers pension and health benefit plans and must adhere strict standards to protect members' Personal Identifiable Information (PII) and health information protected under Health Insurance Portability and Accountability Act (HIPAA).

Risk Management Policy

- Business owners must implement a formal risk assessment and management process
- State Security Office (SSO) must ensure that risk assessment requirements are met annually
- SSO personnel tasked with assessing risk within the enterprise must identify potential vulnerabilities for the department during the risk assessment process.

What's at Risk Internally?

Treasury Division

- Confidential contracts
- Proprietary trading or business information
- Material non-public investment information
- Unauthorized or improper trading
- Improper access/authority to Custodial Bank Accounts
- Business continuity issues

Division of Retirement and Benefits

- Personally identifiable information of retirement system participants
  - Social security numbers, names, birthdates, addresses, etc.
- Health care information (HIPAA)
- Business continuity issues

DRB Specific Federal Requirements

Death Master File (DMF)

This is the database the Social Security Administration maintains. To use this database, DRB needed to adhere to a 20-point security checklist established by the Center for Internet Security (CIS) as cybersecurity security best practices (https://www.cisecurity.org/).

Basic Controls

1. Inventory and Control of Hardware Assets
2. Inventory and Control of Software Assets
3. Continuous Vulnerability Management
4. Controlled Use of Administrative Privileges
5. Secure Configurations for Hardware and Software on Mobile Devices, Laptops, Workstations, and Servers
6. Maintenance, Monitoring and Analysis of Audit Logs

DRB Specific Federal Requirements

Foundational Controls

7. Email and Web Browser Protections
8. Malware Defenses
9. Limitation and Control of Network Ports, Protocols, and Services
10. Data Recovery Capability
11. Secure Configurations for Network Devices such as Firewalls, Routers, and Switches
12. Boundary Defense
13. Data Protection
14. Controlled Access Based on the Need to Know
15. Wireless Access Control
16. Account Monitoring and Control

DRB Specific Federal Requirements

Organizational Controls

17. Implement a Security Awareness and Training Program
18. Application Software Security
19. Incident Response and Management
20. Penetration Tests and Red Team Exercise

Internal Policies and Safeguards (DRB)

- Database Security
  - DRB has implemented encryption technology on software and hardware to secure its data.
- Physical Security
  - DRB has strictly enforced policies and procedures regarding identification badges and keycards, and computer use and access.
- Privacy
  - The DRB does not share any member's personal information with any other State of Alaska agency.
- Training and Awareness
  - All DRB staff are required to pass a HIPAA data safe handling certification course and are trained on Alaska Statute 40.25.151, *Confidentiality of Retirement Records*

External Security (DRB)

- Access
  - Members accessing the DRB website must pass through multiple firewall and authentication points before being granted access to DRB information.
- Data Transmissions
  - Member data received by e-mail is encrypted using Secure Sockets Layer (SSL) technology.
- External Entity
  - The HIPAA Privacy Rule requires that a covered entity, such as DRB, obtain satisfactory assurances that its Business Associate (BA) will appropriately safeguard the protected health information it receives or creates on behalf of the covered entity.

External Areas of Exposure

External Areas of Exposure

- External Investment Managers
- Actuaries
- Books of Record
- External Auditors
- Indirect Exposure to External Entities

What's at Risk Externally?

External Investment Managers

- Trading strategies
- Proprietary data
- Unauthorized or improper trading and/or cash movements
- Business continuity issues

Actuaries (Buck Consultants, Gabriel, Roeder, Smith)

- Personally identifiable information of participants
- Protected HIPAA data

What's at Risk Externally?

Books of Record

- State Street
  - Banking information for investment accounts
  - Unauthorized trade and/or cash movements
  - Business continuity issues

- Empower Retirement
  - Personally identifiable information of participants (PII)
  - Banking information of participants
  - Unauthorized trade and/or cash movements
  - Business continuity issues

What's at Risk Externally?

External Auditors

- KPMG
  - HIPAA
  - PII
  - Contracts
  - Material non-public information

Indirect Exposure (Health Care Providers)

- AETNA, MODA, Payflex, OptumRx
  - HIPAA
  - PII
  - Banking information of participants
  - Business continuity issues

Thank You

QUESTIONS?

Office of Information Security

Presented by

Department of Administration

John Boucher, CIO

Mark Breunig, CISO

A Brief History

- External Factors
  - Increasing external threats
  - Successful cyber-attacks, and the increasing number and sophistication of attackers
- Internal Factors
  - Changes introduced by AO 284
  - Changes in Alaska's economy

ISO Mission

1. Ensure that robust security is provided for all SOA information collected, processed, transmitted, stored, or disseminated in general support systems and major applications.
2. Build and encourage a culture and awareness of security throughout the SOA.
3. Support the goals and business objectives of the SOA

ISO Objectives

- Confidentiality: ensuring the privacy of sensitive state and citizen data
- Integrity: state information should be seen as accurate and trusted
- Availability –the information must be available and useable when it is needed

Recent Accomplishments

- New endpoint detection and response tools
- Providing Security Awareness Training for all State of Alaska employees
- Enhanced threat protection and filtering for email coming into the State of Alaska email system
- Installed new network border security that protects the State against connections to malicious Internet domains

What's Next?

- Continue to enhance the State's security posture and its ability to respond to incidents
- Standardize and implement government and industry security frameworks at an enterprise level
- Develop departmental awareness on the evolving nature of security threats and collaborate on building response plans
- Assist agencies in meeting compliance to external data handling standards

Questions?

For more information on Information Security Office services, priorities, or other issues, please contact:

Mark Breunig, CISO

Mark.Breunig@alaska.gov

269-8836

ALASKA RETIREMENT MANAGEMENT BOARD

RFP Evaluation Committee – General Consultant 19-006

SUBJECT: Proposal Review – General Consultant RFP

ACTION: x

DATE: April 5, 2019

INFORMATION: ____

BACKGROUND:

AS 37.10.220 sets forth the powers and duties of the Alaska Retirement Management Board (Board) which include hiring investment advisors and contracting for other services necessary to execute the board's powers and duties. The Board has contracted with Callan LLC (Callan) to provide general investment consultant services to the trustees and staff. The current contract with Callan expires June 30, 2019. At its September 2018 meeting, the Board directed staff to prepare a Request for Proposals (RFP) for an investment consultant. The RFP Evaluation Committee consisted of ARMB Trustee Tom Brice, ARMB Trustee Gayle Harbo, Chief Pension Officer Kathy Lea and Chief Investment Officer Bob Mitchell.

STATUS:

Staff prepared an RFP notice which was published on the State of Alaska on-line public notice website, and on the ARMB website. The notice set forth the requirements for the position, the deadline for submitting a proposal, and a calendar for the investment consultant procurement process.

Four proposals were received within the deadline, and each met minimum qualifications for the position. Staff provided each committee member with the RFP, a copy of each proposal and scoring evaluation sheets for the purpose of independently reviewing and scoring each proposal consistently and fairly. Staff scored each cost proposal based on criteria set out in the RFP and provided the results of the scoring to the committee. Pursuant to the calendar set out in the RFP, the committee met Wednesday, March 6, 2019, for the purpose of reviewing and consolidating the scoring sheets of the individual committee members. Upon tallying final scores, members of the Evaluation Committee found Callan LLC to be the high scorer.

RECOMMENDATION:

The RFP Evaluation Committee recommends to the Board that staff publish a notice of intent to award the general investment consulting services contract to Callan LLC and, upon expiration of a 10-day notice period if there are no protests, that a contract be entered into with Callan LLC.

ALASKA RETIREMENT MANAGEMENT BOARD

RFP Evaluation Committee – Real Assets Consultant 19-007

SUBJECT: Proposal Review – Real Assets Consultant RFP

ACTION: x

DATE: April 5, 2019

INFORMATION: ____

BACKGROUND:

AS 37.10.220 sets forth the powers and duties of the Alaska Retirement Management Board (Board) which include hiring investment advisors and contracting for other services necessary to execute the board's powers and duties. The Board has contracted with The Townsend Group, an AON Company (Townsend) to provide real estate consultant services to the trustees and staff. The current real estate contract with Townsend expires June 30, 2019. At its September 2018 meeting, the Board directed staff to prepare a Request for Proposals (RFP) for an real assets consultant. The RFP Evaluation Committee consisted of ARMB Trustee Bob Williams, Deputy Chief Investment Officer Zachary Hanna, and Chief Investment Officer Bob Mitchell.

STATUS:

Staff prepared an RFP notice which was published on the State of Alaska on-line public notice website, and on the ARMB website. The notice set forth the requirements for the position, the deadline for submitting a proposal, and a calendar for the real assets consultant procurement process.

Six proposals were received within the deadline, and each met minimum qualifications for the position. Staff provided each committee member with the RFP, a copy of each proposal and scoring evaluation sheets for the purpose of independently reviewing and scoring each proposal consistently and fairly. Staff scored each cost proposal based on criteria set out in the RFP and provided the results of the scoring to the committee. Pursuant to the calendar set out in the RFP, the committee met Tuesday, March 5, 2019, for the purpose of reviewing and consolidating the scoring sheets of the individual committee members. Upon tallying final scores, members of the Evaluation Committee found Callan LLC to be the high scorer.

RECOMMENDATION:

The RFP Evaluation Committee recommends to the Board that staff publish a notice of intent to award the real assets consulting services contract to Callan LLC and, upon expiration of a 10-day notice period if there are no protests, that a contract be entered into with Callan LLC.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Investment Advisory Council Member Contract Expiration

ACTION: **X**

INFORMATION: ____

DATE: April 5, 2019

BACKGROUND:

AS 37.10.270 provides that the Alaska Retirement Management Board (Board) may appoint an investment advisory council (IAC) composed of at least three and not more than five members. Members shall possess experience and expertise in financial investments and management of investment portfolios for public, corporate, or union pension benefit funds, foundations or endowments. Currently, three IAC members are under contract to provide advisory services to the board and its staff. The three advisory positions are designated by areas of expertise: an academic advisor, an advisor with experience as trustee/manager of a public fund or endowment, and an advisor with experience as a portfolio manager. IAC members currently attend Board meetings, an annual manager review meeting, and the annual education conference.

STATUS:

The contract for IAC member Robert Shaw expires June 30, 2019. Mr. Shaw holds Seat One which has the following description: *The candidate shall possess experience and expertise in financial investments and management of investment portfolios for public, corporate or union pension benefit funds, foundations or endowments. Preference will be given to candidates with a minimum of ten years' experience as a manager/director or trustee of a pension or public fund of $10 billion or more in market value.* Mr. Shaw was first appointed July 1, 2013 and reappointed to a second term July 1, 2016.

RECOMMENDATION:

That the Board direct staff to advertise and solicit applications from persons interested in serving on the Investment Advisory Council.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	Resolution 2019-01 Watch List Guidelines	ACTION:	X
DATE:	April 4-5, 2019	INFORMATION:	

BACKGROUND:

The Alaska Retirement Management Board (ARMB) has established qualitative and quantitative criteria to evaluate investment manager performance and will, from time to time, as necessary, modify guidelines for the evaluation.

At the September 2012 ARMB meeting, staff presented to the Board the analysis of business cycles and manager excess returns suggesting the performance review timeline of investment managers should be expanded from three years to six years.

At the September 2012 ARMB meeting, the board adopted Resolution 2012-25 which amended the ARMB Watch List Guidelines to require review of managers based on a six-year performance history relative to the mandate's market index, style benchmark, and peer group.

STATUS:

At the April 2019 ARMB meeting, staff is recommending several changes to the Watch List Guidelines. The following changes are the more significant:

- Add language stating the purpose of the Watch List.
- Reduce the number of performance-related criteria from three to two, eliminating reference to style indices.
- Remove timing of manager being on the Watch List for violation of guidelines.

Staff is recommending the board adopt Resolution 2019-01, Relating to Watch List Guidelines, which implements the modifications as presented by staff at the April 2019 ARMB meeting.

RECOMMENDATION:

The Alaska Retirement Management Board adopt Resolution 2019-01, amending the Watch List Guidelines to reflect those changes detailed in the Manager Selection, Monitoring, and Watch List presentation at the April 2019 ARMB meeting.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Watch List Guidelines

Resolution ~~2012~~2019-~~25~~01

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee to the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has established an asset allocation for the funds that considers earnings and liabilities on a current as well as a future basis; and

WHEREAS, the Board has established qualitative and quantitative criteria to evaluate investment manager performance; and

WHEREAS, the Board will from time to time as necessary modify guidelines for the evaluation.

NOW THEREFORE BE IT RESOLVED THAT THE ALASKA RETIREMENT MANAGEMENT BOARD adopt the Watch List Guidelines, attached hereto and made a part hereof.

This resolution repeals and replaces Resolution ~~2006~~2012-~~01~~ 25

DATED at ~~Fairbanks~~Juneau, Alaska this ~~20th~~ 5th day of

~~September~~April, ~~2012~~2019.

ATTEST:

Secretary

Chair

Chair

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Secretary

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GUIDELINES FOR MANAGER "WATCH LIST"

These Watch List Guidelines are established for the purpose of providing staff a mechanism to communicate formal notification to the Board and any investment manager for whom an issue has been identified and that staff is working to resolve the issue.

The performance of the Board's investment managers will be monitored on an ongoing basis. The Board may place a manager on ~~a~~ the "Watch List" at any time. The Board may also terminate a manager at any time whether or not a manager is on the "Watch List".

Managers may be placed on a "Watch List" for a variety of reasons, including but not limited to: p~~P~~ersonnel changes, violation of policy and investment guidelines, style deviation, and underperformance ~~and asset allocation changes~~. ~~The ARMB has two clearly stated fund performance objectives in the investment guidelines, the preservation of capital and consistent positive returns. These "Watch List" guidelines were formulated with these objectives as a foundation~~. There are various factors that should be taken into account when considering placing a manager on a "Watch List". These can be separated into two broad categories – qualitative and quantitative factors. The former focuses on personnel, organizational and legal issues while the latter addresses performance.

Placing a manager on the "Watch List" is an intermediate step which may be taken to either resolve the problem or terminate the manager. Managers may only be removed from the "Watch List" ~~under these two conditions~~through resolution or termination.

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QUALITATIVE FACTORS

Below are *qualitative* factors that may be considered in determining whether an investment manager should be placed on the "Watch List."

FACTOR	*EVALUATION*	ACTION STEPS
• Violation of investment guidelines	• Review portfolio holdings vis-a-vis the investment guidelines - individual securities. - their percentage weight in the portfolio.	Correct violation. Review violations with manager to re-establish appropriate guidelines. Manager to compensate ARMB for any losses that occurred from violation. Evaluate nature and seriousness of violation and take appropriate action.~~Place on watch list for one year~~ ~~— may terminate on additional violation.~~
• Deviation from stated investment style and philosophy	• Style mapping – total fund analysis. • Style attribution – manager specific style analysis.	Place on watch list. Monitor for ongoing fit with asset allocation policy. Terminate if no longer consistent with asset allocation structure.
• Changes in ownership	Require immediate notification of any pending changes in ownership.	Place on watch list for 18 months. Qualitatively determine if change may detrimentally affect asset performance.
• Turnover of key personnel	Require manager to establish a list of key personnel, and rank in level of importance, at the inception of the account. Manager updates on an as needed basis.	Place on watch list. May terminate if 60% of the key personnel turnover on the account (as specified in the manager-provided list) and/or 2 out of the top 3 people leave.
• Litigation	Require manager to notify immediately if entity which manages the funds is involved in any litigation.	Evaluate seriousness and likely impact of changes on the investment process and take appropriate action.

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QUANTITATIVE FACTORS

Below are *quantitative* factors that may be considered in determining the appropriateness of placing an investment manager on the ~~"~~Watch List.~~"~~

~~⇒ Minimum of six years of performance required prior to placement on the watch list.~~

⇒ ~~Three~~ One of~~out of three~~ two (where applicable) performance tests must be failed for~~ watch~~ Watch ~~list~~List recommendation.

PERFORMANCE TEST	***BENCHMARK***	**FAIL CRITERIA**
Test 1: Trailing 6 year results	Annualized performance relative to the agreed upon market index or performance benchmark.	Fail if ~~underperform index by 1% per annum over measurement period, gross of fees.~~net of fee, trailing 6-year annualized performance is less than the agreed upon market index or performance benchmark.
~~Test 2: Trailing 6 year results~~	~~Relative to an appropriate style index (if applicable).~~	~~Fail if underperform style index by 1% per annum over measurement period, gross of fees.~~
Test ~~3~~2: Peer group comparison	Annualized ~~P~~performance ~~compared~~ relative to that of an appropriate peer group.	Fail if gross of fee, ~~cumulative performance is at 65% percentile or lower over relevant timeframe.~~trailing 6-year annualized performance is less than the median performance of an appropriate peer group.

The following factors are important to monitor on an ongoing basis to understand and track the performance of the investment managers who have been placed on the watch list:

FACTOR	***EVALUATION TECHNIQUE***

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Consistency of returns	• Rolling 6 year returns relative to market index. • Rolling 6 year returns relative to appropriate style group. • Rolling correlations to market index.
Risk-adjusted performance	• Rolling 6 year information ratio. • Risk reward chart. • Sharpe ratio. • Treynor ratio.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Watch List Guidelines

Resolution 2019-01

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee to the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has established an asset allocation for the funds that considers earnings and liabilities on a current as well as a future basis; and

WHEREAS, the Board has established qualitative and quantitative criteria to evaluate investment manager performance; and

WHEREAS, the Board will from time to time as necessary modify guidelines for the evaluation.

NOW THEREFORE BE IT RESOLVED THAT THE ALASKA RETIREMENT MANAGEMENT BOARD adopt the Watch List Guidelines, attached hereto and made a part hereof.

This resolution repeals and replaces Resolution 2012-25

DATED at Juneau, Alaska this 5th day of April, 2019.

_____
Chair

ATTEST:

_____
Secretary

GUIDELINES FOR MANAGER WATCH LIST

These Watch List Guidelines are established for the purpose of providing staff a mechanism to communicate formal notification to the Board and any investment manager for whom an issue has been identified and that staff is working to resolve the issue.

The performance of the Board's investment managers will be monitored on an ongoing basis. The Board may place a manager on the Watch List at any time. The Board may also terminate a manager at any time whether or not a manager is on the Watch List.

Managers may be placed on a "Watch List" for a variety of reasons, including but not limited to: personnel changes, violation of policy and investment guidelines, style deviation, and underperformance. . There are various factors that should be taken into account when considering placing a manager on a Watch List. These can be separated into two broad categories – qualitative and quantitative factors. The former focuses on personnel, organizational and legal issues while the latter addresses performance.

Placing a manager on the Watch List is an intermediate step which may be taken to either resolve the problem or terminate the manager. Managers may only be removed from the Watch List through resolution or termination.

QUALITATIVE FACTORS

Below are *qualitative* factors that may be considered in determining whether an investment manager should be placed on the Watch List.

FACTOR	***EVALUATION***	**ACTION STEPS**
• Violation of investment guidelines	• Review portfolio holdings vis-a-vis the investment guidelines - individual securities. - their percentage weight in the portfolio.	Correct violation. Review violations with manager to re-establish appropriate guidelines. Manager to compensate ARMB for any losses that occurred from violation. Evaluate nature and seriousness of violation and take appropriate action.
• Deviation from stated investment style and philosophy	• Style mapping – total fund analysis. • Style attribution – manager specific style analysis.	Place on watch list. Monitor for ongoing fit with asset allocation policy. Terminate if no longer consistent with asset allocation structure.
• Changes in ownership	Require immediate notification of any pending changes in ownership.	Place on watch list for 18 months. Qualitatively determine if change may detrimentally affect asset performance.
• Turnover of key personnel	Require manager to establish a list of key personnel, and rank in level of importance, at the inception of the account. Manager updates on an as needed basis.	Place on watch list. May terminate if 60% of the key personnel turnover on the account (as specified in the manager-provided list) and/or 2 out of the top 3 people leave.
• Litigation	Require manager to notify immediately if entity which manages the funds is involved in any litigation.	Evaluate seriousness and likely impact of changes on the investment process and take appropriate action.

QUANTITATIVE FACTORS

Below are *quantitative* factors that may be considered in determining the appropriateness of placing an investment manager on the Watch List.

⇒ One of two (where applicable) performance tests must be failed for Watch List recommendation.

PERFORMANCE TEST	***BENCHMARK***	**FAIL CRITERIA**
Test 1: Trailing 6 year results	Annualized performance relative to the agreed upon market index or performance benchmark.	Fail if net of fee, trailing 6-year annualized performance is less than the agreed upon market index or performance benchmark.
Test 2: Peer group comparison	Annualized performance relative to that of an appropriate peer group.	Fail if gross of fee, trailing 6-year annualized performance is less than the median performance of an appropriate peer group.

The following factors are important to monitor on an ongoing basis to understand and track the performance of the investment managers who have been placed on the watch list:

FACTOR	***EVALUATION TECHNIQUE***
Consistency of returns	• Rolling 6 year returns relative to market index. • Rolling 6 year returns relative to appropriate style group. • Rolling correlations to market index.
Risk-adjusted performance	• Rolling 6 year information ratio. • Risk reward chart. • Sharpe ratio. • Treynor ratio.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Participant-Directed Plans
Real Assets Fund

ACTION: **X**

INFORMATION:

DATE: April 4-5, 2019

BACKGROUND

At the September 2016 meeting of the Alaska Retirement Management Board (ARMB), staff from Callan LLC (Callan), presented their Investment Structure Evaluation of the participant-directed plans. In this evaluation, Callan recommended combining the existing U.S. Treasury Inflation Protected Securities Index Fund (TIPS) and the existing U.S. Real Estate Investment Trust Index Fund (REITs) into a single multi-asset class real assets fund.

Callan stated that, compared to a single asset, a diversified approach to inflation protection may offer benefits as different asset classes behave differently at various points in an inflationary cycle.

STATUS

Participant assets impacted by this action were approximately $67 million in the REITs fund and $83 million in the TIPS fund as of December 31, 2018 across all four plans.

Staff initially evaluated 13 strategies offered by 11 managers screened from the Callan PEP database supplemented with strategies already known to staff. Each strategy was evaluated on several metrics, including but not limited to: stated objective, fees, complexity, and the ability and willingness to assist in developing participant communications.

Staff recommends the ARMB direct staff to contract with BlackRock to offer the Strategic Completion Fund in the participant-directed plans and map participants from the existing REITs fund and TIPS fund into the Strategic Completion Fund once satisfying appropriate participant notification requirements.

RECOMMENDATION

The Alaska Retirement Management Board direct staff to contract with BlackRock to offer the Strategic Completion Fund in the Alaska Supplemental Annuity Plan, the Defined Contribution Retirement Plans (PERS Tier IV, TRS Tier III) and the Deferred Compensation Plan subject to successful contract and fee negotiations.

Additionally, the Alaska Retirement Management Board direct staff to map participant assets from the existing U.S. Real Estate Investment Trust Index Fund and U.S. Treasury Inflation Protected Securities Index Fund into the Strategic Completion Fund once satisfying appropriate participant notification requirements.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: PineBridge Investment Guideline Revision ACTION: X

DATE: April 4 - 5, 2019 INFORMATION: ____

BACKGROUND:

PineBridge was hired by ARMB in 2018 to invest $200 million in a multi asset global tactical asset allocation strategy called Global Dynamic Asset Allocation. The portfolio is actively managed and benchmarked against a 60% MSCI ACWI and 40% Bloomberg Barclays Global Treasury Total Return Index.

Custom investment guidelines for the Global Dynamic Asset Allocation strategy were developed by staff and PineBridge as part of the contract negotiation process. The structure of these guidelines was based on ARMB's existing investment guidelines for other asset class and recognizing unique aspects of PineBridge's tactical approach.

Separately, since January 2017, ARMB has participated in a securities lending arrangement with State Street Bank & Trust to lend its securities under specified terms.

STATUS:

The PineBridge investment guidelines restrict securities lending by stating: "The Portfolio is not permitted to lend or pledge securities in the account, unless it is part of an option strategy, such as a covered call."

The intent of this language is to limit PineBridge's ability to directly lend or pledge securities. It is not intended to limit the ability of the portfolio to participate in ARMB's securities lending program managed by State Street Bank.

The guidelines have been revised to clarify that participation in ARMB's securities lending program is allowable.

RECOMMENDATION:

The ARMB approve Resolution 2019-02 which adopts the revised Global Dynamic Asset Allocation Investment Guidelines.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Global Dynamic Asset Allocation Investment Guidelines

Resolution 2019-02

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee to the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has established an asset allocation for the funds that considers earnings and liabilities on a current as well as a future basis; and

WHEREAS, the Board has authorized investment in tactical asset allocation for the Public Employees' Retirement System, Teachers' Retirement System, and Judicial Retirement System, including investments for those systems in the State of Alaska Retirement and Benefit Plans Trust; and

WHEREAS, the Board establishes and from time to time as necessary, modifies investment policies, procedures, and guidelines for tactical asset allocation;

NOW THEREFORE, BE IT RESOLVED THAT THE ALASKA RETIREMENT MANAGEMENT BOARD adopts the Global Dynamic Asset Allocation Investment Guidelines, attached hereto and made a part hereof, as the tactical asset allocation guidelines applicable to PineBridge Investments.

DATED at Juneau, Alaska this _____ day of April, 2019.

_____
Chair

ATTEST:

_____
Secretary

GLOBAL DYNAMIC ASSET ALLOCATION ("GDAA")
INVESTMENT GUIDELINES

A. Investment Objective

The investment objective of the GDAA Portfolio ("Portfolio") is to outperform the benchmark net of fees by 200 bps or more, and achieve a total return of US CPI Urban Consumers Less Food & Energy Index + 5%, over a full market cycle. An additional objective is to provide fundamental downside protection, specifically in stressed environments that result in protracted bear markets.

The results will be achieved primarily through passive management of market exposure using dynamic asset allocation. Portfolio risk will be managed dynamically, yet is expected to average the Benchmark risk over a full market cycle. It is understood such results are an objective of the Portfolio and cannot be guaranteed.

B. Benchmark and Permissible Ranges

The benchmark for the Portfolio is constructed as follows:

Index	Benchmark
MSCI All Country World Daily Total Return Net Index	60%
Bloomberg Barclays Global Treasury Total Return Index	40%

While portfolio implementation is expected to be passive in terms of security selection, portfolio asset class weights are expected to deviate significantly from these benchmark weights. Portfolio exposures are broadly expected to be in the following ranges:

Asset Class	Permissible Ranges	
	Minimum	Maximum
Equity Asset Classes	20%	85%
Fixed Income Asset Classes	20%	85%
Liquid Alternatives *	0%	15%

* Liquid Alternatives include commodities and any future liquid asset classes added to PineBridge's research coverage universe (as defined by asset classes covered in PineBridge's unabridged Capital Market Line document) that do not fall in the equity or fixed income categories as defined by the nature of the security instrument rather than how PineBridge may assign the asset class for portfolio modeling and construction.

PineBridge will request permission from Alaska Retirement Management Board ("ARMB") staff before investing outside of these ranges.

C. Investable Securities

The list of asset classes in Exhibit A of these guidelines reflects the current composition of the Capital Market Line asset class constituents maintained by PineBridge. As such, liquid asset classes in this list reflect potential ARMB portfolio investments over time. The asset class list in Exhibit A is subject to change over time as PineBridge evolves the asset class structure with the market opportunity set.

Assets of the Portfolio generally shall be allocated among cash instruments, exchange trade funds (ETFs), derivatives, and funds/trusts/portfolios managed by PineBridge Investments, LLC and its affiliates ("PineBridge"). Allocations made to funds/trusts/portfolios managed by PineBridge shall be managed without a management fee however, shall be subject to normal operating costs and expenses (e.g. administrator and custodian fees and expenses).

The assets of the Portfolio and the transactions that may be entered into by the Portfolio may include long and short positions in U.S. and non-U.S. equities and equity-related instruments, fixed income and other debt-related instruments; securitization products, such as MBS, CMBS, ABS, and CLOs; derivatives, including

options, warrants, futures and other commodities, currencies, currency forwards, and other over-the-counter derivative instruments such as total return swaps; repurchase and reverse repurchase agreements; hybrid securities, including preferred stocks and convertible bonds, convertible preferred stocks, bonds or preferred stocks with warrants, contingent convertibles (CoCo's), and zero or low coupon convertibles; real estate related securities; and Cash and Cash Equivalents (as defined below).

The use of derivatives within the Portfolio is expected to be for replicating market exposures, efficient rebalancing of the asset allocation, and hedging purposes. The net long exposure of the Portfolio will be maintained between 40% and 100%; the gross long exposure may increase to 180% under certain circumstances, excluding currency hedging. The Portfolio may hold "Cash and Cash Equivalents," which include cash, short-term investment funds managed by the custodian and money-market instruments, which include (i) U.S. Government securities, (ii) obligations issued or guaranteed by U.S. and foreign corporations payable in U.S. dollars (e.g., commercial paper) and (iii) obligations of domestic banks, which include certificates of deposit, time deposits, unsecured bank promissory notes and bankers' acceptances.

Gross long exposure is defined as:

Base market value of all long cash equity and fixed income market positions	+
Absolute base market value of all underlying long exposure of equity/fixed income/commodity derivative positions	+
Absolute base market of all underlying short exposure of equity/fixed income/commodity derivative positions	+
Total gross long ($)	=
Total market value of the portfolio (NAV)	/
Gross long exposure (%)	=

Net long exposure is defined as:

Base market value of all long cash equity and fixed income market positions	+
Absolute base market value of all underlying long exposure of equity/fixed income/commodity derivative positions	+
Absolute base market of all underlying short exposure of equity/fixed income/commodity derivative positions	–
Total net long ($)	=
Total market value of the portfolio (NAV)	/
Net long exposure (%)	=

For both gross long and net long calculations, Cash & Cash Equivalents asset classes (including currency related derivatives) are excluded from the calculation of the numerator. However, Cash & Cash Equivalents asset classes are included in the calculation of the denominator.

D. Investment Restrictions

1. Manager has full discretion on security selection. In the event the aggregate total of any equity security held by the ARMB exceeds five percent (5%) of total shares outstanding, the ARMB will notify portfolio managers who will act to sell the security in a commercially reasonable manner until the aggregate is

below five percent (5%). The ARMB will be responsible for monitoring its aggregate position size and notifying Manager if action needs to be taken.

2. No more than ten percent of the voting stock of any corporation may be acquired or held.

3. The Portfolio will not purchase the securities of a company for the purpose of acquiring control or management thereof.

4. Certificates of deposit must be issued by domestic United States banks or trust companies which are members of the Federal Deposit Insurance Corporation, and are readily saleable in a recognized secondary market for such instruments.

5. Bankers' acceptances must have been drawn on and accepted by United States banks which have capital and surplus of at least $200 million each.

6. The issuing bank for negotiable certificates of deposit and bankers acceptances must have total assets in excess of $5 billion.

7. All futures and options positions must be reported to the client each month. The report must show both the nominal position and the "economic impact" of all derivative positions.

8. Repurchase agreements must be collateralized only by U.S. Treasury obligations, including bills, notes, and bonds, and only when the collateral carries a market value equal to or greater than 102% of the amount of the repurchase agreements, and only when the custodial bank appointed by retirement funds will take custody of the collateral.

9. The Portfolio may not hold more than 5% of the portfolio's assets in any one corporate debt issuer.

10. The Portfolio may not purchase more than 10% of the currently outstanding par value of any bond issue.

11. Internal cross trading is permitted but only in accordance with requirements under: (1) 29 U.S.C. §1108(b)(19); (2) 29 C.F.R. §2550.408b-19; and (3) 26 U.S.C. §4975(d)(22).

12. Futures and options contracts must be traded on an exchange. With respect to OTC derivatives, the period of the contract may not exceed twelve months and must be transacted with a counterparty authorized by PineBridge's Counterparty Approval Committee with an investment grade issuer rating by S&P, Moody's or Fitch. In the event that, after such investment is made, the counterparty fails to meet the minimum credit issuer rating requirement, the investment manager shall take appropriate measures within six months.

13. The Portfolio does not gain leverage through borrowing.

14. The Portfolio may not purchase securities on margin.

15. The Portfolio may not short individual stocks or bonds.

16. PineBridge~~The Portfolio~~ is not permitted to lend or pledge securities in the account, unless it is part of an option strategy, such as a covered call. However, the Portfolio may participate in ARMB's securities lending program.

17. Short positions shall be held against long exposures at the asset class level. The resulting net long asset class exposure will be at least 0%.

18. The Portfolio will not invest in illiquid asset classes, such as Private Equity.

19. There shall be no investment in private placements, except Rule 144A securities, Regulation S securities, and commingled funds and trusts managed by PineBridge.

20. The Portfolio may not invest in securities originated by PineBridge with the exception of PineBridge managed comingled funds/trusts.

21. The Portfolio will not invest in certain statutorily specified types of companies doing significant business in Iran. The Alaska Retirement Management Board provided the initial restricted list and will notify PineBridge of any amendments to the universe.

E. Brokerage and Commissions

In carrying out its functions, a manager will use its best efforts to obtain prompt execution of orders at the most favorable prices reasonably obtainable, and in doing so, will consider a number of factors, including, without limitation, the overall direct net economic result to the ARMB (including commissions, which may not be the lowest available but which ordinarily will not be higher than the generally prevailing competitive range), the financial strength and stability of the broker, the efficiency with which the transaction is effected, the ability to effect the transaction at all where a large block is involved, the availability of the broker to stand ready to execute possible difficult transactions in the future and other matters involved in the receipt of "brokerage and research services" as defined in and in compliance with Section 28(e) of the Securities Exchange Act of 1934, as amended, and regulations thereunder.

If the manager determines execution only transactions do not result in the greatest net benefit to ARMB considering the factors described in this section E, the manager is encouraged to execute transactions with a brokerage firm participating in a commission recapture program with the ARMB.

Exhibit A

PineBridge Asset Class Structure

Multi Assset Coverage Universe

Equities

US Equity
Canadian Equity
UK Equity
Japanese Equity
Australian Equity
Singaporean Equity
International Small Cap
EM Equity
EM Asian Equity
South Korean Equity
Taiwanese Equity
Indian Equity
Indonesian Equity
EM EMEA Equity
Russian Equity
Hungarian Equity
EM LatAm Equity
Brazilian Equity
Mexican Equity
Peruvian Equity
US Equity Value
US Equity Financials
US Equity Large Broad
US Equity Large Growth
US Equity Large Value
US Equity Mid Broad
US Equity Mid Growth
US Equity Mid Value
US Equity Small Broad
US Equity Small Growth
US Equity Small Value
German Equity
French Equity
Italian Equity
Spanish Equity
Swiss Equity
Dutch Equity
Productivity Basket
Productivity Basket - AI & IOT
European Financials
Productivity Basket - Cloud
Productivity Basket - Cyber
Productivity Basket - Big
Productivity Basket - SaaS
Productivity Basket - IT
European Small Cap Equity

Fixed Income

3M US Tbill
3M Canadian Tbill
3M Mexican Tbill
3M German Tbill
3M UK Tbill
3M Japanese Tbill
3M Australian Tbill
3M Singapore Tbill
US Govt Bond
Canadian Govt Bond
Mexican Govt Bond
German Govt Bond
UK Govt Bond
Japanese Govt Bond
Australian Govt Bond
Singapore Govt Bond
US TIPS
US Municipal
US Intermediant Credit
US Long Credit
US High Yield
US CLO AAA
US Bank Loans
MBS
CMBS
ABS
Asian Credit
CoCo Bond
EM Local Currency Debt
EM Sovereign
EM Corporate
EM Corporate IG
EM Corporate HY
EM Sovereign IG
EM Sovereign HY
Brazilian Local Currency
Peruvian Local Currency
Argentinian Hard Currency
Indonesian Local Currency
US CLO AA
US CLO A
US CLO IG
Asian Credit HY
Asian Credit IG

Alternatives

Commodity
Real Estate *
Hedge Fund of Funds
Private Equity
Private Credit
Listed Infrastructure *
Private Infrastructure
US Timber
Listed Private Equity *

Currencies

USD
CAD
GBP
CHF
JPY
AUD
SGD
EME
MXN
EMD

* Investments in REITS and other listed alternatives should be included in "Equity Asset Classes" for purposes of determining Permissable Ranges in Section B.

GLOBAL DYNAMIC ASSET ALLOCATION ("GDAA")
INVESTMENT GUIDELINES

A. Investment Objective

The investment objective of the GDAA Portfolio ("Portfolio") is to outperform the benchmark net of fees by 200 bps or more, and achieve a total return of US CPI Urban Consumers Less Food & Energy Index + 5%, over a full market cycle. An additional objective is to provide fundamental downside protection, specifically in stressed environments that result in protracted bear markets.

The results will be achieved primarily through passive management of market exposure using dynamic asset allocation. Portfolio risk will be managed dynamically, yet is expected to average the Benchmark risk over a full market cycle. It is understood such results are an objective of the Portfolio and cannot be guaranteed.

B. Benchmark and Permissible Ranges

The benchmark for the Portfolio is constructed as follows:

Index	Benchmark
MSCI All Country World Daily Total Return Net Index	60%
Bloomberg Barclays Global Treasury Total Return Index	40%

While portfolio implementation is expected to be passive in terms of security selection, portfolio asset class weights are expected to deviate significantly from these benchmark weights. Portfolio exposures are broadly expected to be in the following ranges:

Asset Class	Permissible Ranges	
	Minimum	Maximum
Equity Asset Classes	20%	85%
Fixed Income Asset Classes	20%	85%
Liquid Alternatives *	0%	15%

* Liquid Alternatives include commodities and any future liquid asset classes added to PineBridge's research coverage universe (as defined by asset classes covered in PineBridge's unabridged Capital Market Line document) that do not fall in the equity or fixed income categories as defined by the nature of the security instrument rather than how PineBridge may assign the asset class for portfolio modeling and construction.

PineBridge will request permission from Alaska Retirement Management Board ("ARMB") staff before investing outside of these ranges.

C. Investable Securities

The list of asset classes in Exhibit A of these guidelines reflects the current composition of the Capital Market Line asset class constituents maintained by PineBridge. As such, liquid asset classes in this list reflect potential ARMB portfolio investments over time. The asset class list in Exhibit A is subject to change over time as PineBridge evolves the asset class structure with the market opportunity set.

Assets of the Portfolio generally shall be allocated among cash instruments, exchange trade funds (ETFs), derivatives, and funds/trusts/portfolios managed by PineBridge Investments, LLC and its affiliates ("PineBridge"). Allocations made to funds/trusts/portfolios managed by PineBridge shall be managed without a management fee however, shall be subject to normal operating costs and expenses (e.g. administrator and custodian fees and expenses).

The assets of the Portfolio and the transactions that may be entered into by the Portfolio may include long and short positions in U.S. and non-U.S. equities and equity-related instruments, fixed income and other debt-related instruments; securitization products, such as MBS, CMBS, ABS, and CLOs; derivatives, including

options, warrants, futures and other commodities, currencies, currency forwards, and other over-the-counter derivative instruments such as total return swaps; repurchase and reverse repurchase agreements; hybrid securities, including preferred stocks and convertible bonds, convertible preferred stocks, bonds or preferred stocks with warrants, contingent convertibles (CoCo's), and zero or low coupon convertibles; real estate related securities; and Cash and Cash Equivalents (as defined below).

The use of derivatives within the Portfolio is expected to be for replicating market exposures, efficient rebalancing of the asset allocation, and hedging purposes. The net long exposure of the Portfolio will be maintained between 40% and 100%; the gross long exposure may increase to 180% under certain circumstances, excluding currency hedging. The Portfolio may hold "Cash and Cash Equivalents," which include cash, short-term investment funds managed by the custodian and money-market instruments, which include (i) U.S. Government securities, (ii) obligations issued or guaranteed by U.S. and foreign corporations payable in U.S. dollars (e.g., commercial paper) and (iii) obligations of domestic banks, which include certificates of deposit, time deposits, unsecured bank promissory notes and bankers' acceptances.

Gross long exposure is defined as:

Base market value of all long cash equity and fixed income market positions	+
Absolute base market value of all underlying long exposure of equity/fixed income/commodity derivative positions	+
Absolute base market of all underlying short exposure of equity/fixed income/commodity derivative positions	+
Total gross long ($)	=
Total market value of the portfolio (NAV)	/
Gross long exposure (%)	=

Net long exposure is defined as:

Base market value of all long cash equity and fixed income market positions	+
Absolute base market value of all underlying long exposure of equity/fixed income/commodity derivative positions	+
Absolute base market of all underlying short exposure of equity/fixed income/commodity derivative positions	–
Total net long ($)	=
Total market value of the portfolio (NAV)	/
Net long exposure (%)	=

For both gross long and net long calculations, Cash & Cash Equivalents asset classes (including currency related derivatives) are excluded from the calculation of the numerator. However, Cash & Cash Equivalents asset classes are included in the calculation of the denominator.

D. Investment Restrictions

1. Manager has full discretion on security selection. In the event the aggregate total of any equity security held by the ARMB exceeds five percent (5%) of total shares outstanding, the ARMB will notify portfolio managers who will act to sell the security in a commercially reasonable manner until the aggregate is

below five percent (5%). The ARMB will be responsible for monitoring its aggregate position size and notifying Manager if action needs to be taken.

2. No more than ten percent of the voting stock of any corporation may be acquired or held.

3. The Portfolio will not purchase the securities of a company for the purpose of acquiring control or management thereof.

4. Certificates of deposit must be issued by domestic United States banks or trust companies which are members of the Federal Deposit Insurance Corporation, and are readily saleable in a recognized secondary market for such instruments.

5. Bankers' acceptances must have been drawn on and accepted by United States banks which have capital and surplus of at least $200 million each.

6. The issuing bank for negotiable certificates of deposit and bankers acceptances must have total assets in excess of $5 billion.

7. All futures and options positions must be reported to the client each month. The report must show both the nominal position and the "economic impact" of all derivative positions.

8. Repurchase agreements must be collateralized only by U.S. Treasury obligations, including bills, notes, and bonds, and only when the collateral carries a market value equal to or greater than 102% of the amount of the repurchase agreements, and only when the custodial bank appointed by retirement funds will take custody of the collateral.

9. The Portfolio may not hold more than 5% of the portfolio's assets in any one corporate debt issuer.

10. The Portfolio may not purchase more than 10% of the currently outstanding par value of any bond issue.

11. Internal cross trading is permitted but only in accordance with requirements under: (1) 29 U.S.C. §1108(b)(19); (2) 29 C.F.R. §2550.408b-19; and (3) 26 U.S.C. §4975(d)(22).

12. Futures and options contracts must be traded on an exchange. With respect to OTC derivatives, the period of the contract may not exceed twelve months and must be transacted with a counterparty authorized by PineBridge's Counterparty Approval Committee with an investment grade issuer rating by S&P, Moody's or Fitch. In the event that, after such investment is made, the counterparty fails to meet the minimum credit issuer rating requirement, the investment manager shall take appropriate measures within six months.

13. The Portfolio does not gain leverage through borrowing.

14. The Portfolio may not purchase securities on margin.

15. The Portfolio may not short individual stocks or bonds.

16. PineBridge is not permitted to lend or pledge securities in the account, unless it is part of an option strategy, such as a covered call. However, the Portfolio may participate in ARMB's securities lending program.

17. Short positions shall be held against long exposures at the asset class level. The resulting net long asset class exposure will be at least 0%.

18. The Portfolio will not invest in illiquid asset classes, such as Private Equity.

19. There shall be no investment in private placements, except Rule 144A securities, Regulation S securities, and commingled funds and trusts managed by PineBridge.

20. The Portfolio may not invest in securities originated by PineBridge with the exception of PineBridge managed comingled funds/trusts.

21. The Portfolio will not invest in certain statutorily specified types of companies doing significant business in Iran. The Alaska Retirement Management Board provided the initial restricted list and will notify PineBridge of any amendments to the universe.

E. Brokerage and Commissions

In carrying out its functions, a manager will use its best efforts to obtain prompt execution of orders at the most favorable prices reasonably obtainable, and in doing so, will consider a number of factors, including, without limitation, the overall direct net economic result to the ARMB (including commissions, which may not be the lowest available but which ordinarily will not be higher than the generally prevailing competitive range), the financial strength and stability of the broker, the efficiency with which the transaction is effected, the ability to effect the transaction at all where a large block is involved, the availability of the broker to stand ready to execute possible difficult transactions in the future and other matters involved in the receipt of "brokerage and research services" as defined in and in compliance with Section 28(e) of the Securities Exchange Act of 1934, as amended, and regulations thereunder.

If the manager determines execution only transactions do not result in the greatest net benefit to ARMB considering the factors described in this section E, the manager is encouraged to execute transactions with a brokerage firm participating in a commission recapture program with the ARMB.

Exhibit A

PineBridge Asset Class Structure

Multi Assset Coverage Universe

Equities

US Equity
Canadian Equity
UK Equity
Japanese Equity
Australian Equity
Singaporean Equity
International Small Cap
EM Equity
EM Asian Equity
South Korean Equity
Taiwanese Equity
Indian Equity
Indonesian Equity
EM EMEA Equity
Russian Equity
Hungarian Equity
EM LatAm Equity
Brazilian Equity
Mexican Equity
Peruvian Equity
US Equity Value
US Equity Financials
US Equity Large Broad
US Equity Large Growth
US Equity Large Value
US Equity Mid Broad
US Equity Mid Growth
US Equity Mid Value
US Equity Small Broad
US Equity Small Growth
US Equity Small Value
German Equity
French Equity
Italian Equity
Spanish Equity
Swiss Equity
Dutch Equity
Productivity Basket
Productivity Basket - AI & IOT
European Financials
Productivity Basket - Cloud
Productivity Basket - Cyber
Productivity Basket - Big
Productivity Basket - SaaS
Productivity Basket - IT
European Small Cap Equity

Fixed Income

3M US Tbill
3M Canadian Tbill
3M Mexican Tbill
3M German Tbill
3M UK Tbill
3M Japanese Tbill
3M Australian Tbill
3M Singapore Tbill
US Govt Bond
Canadian Govt Bond
Mexican Govt Bond
German Govt Bond
UK Govt Bond
Japanese Govt Bond
Australian Govt Bond
Singapore Govt Bond
US TIPS
US Municipal
US Intermediant Credit
US Long Credit
US High Yield
US CLO AAA
US Bank Loans
MBS
CMBS
ABS
Asian Credit
CoCo Bond
EM Local Currency Debt
EM Sovereign
EM Corporate
EM Corporate IG
EM Corporate HY
EM Sovereign IG
EM Sovereign HY
Brazilian Local Currency
Peruvian Local Currency
Argentinian Hard Currency
Indonesian Local Currency
US CLO AA
US CLO A
US CLO IG
Asian Credit HY
Asian Credit IG

Alternatives

Commodity
Real Estate *
Hedge Fund of Funds
Private Equity
Private Credit
Listed Infrastructure *
Private Infrastructure
US Timber
Listed Private Equity *

Currencies

USD
CAD
GBP
CHF
JPY
AUD
SGD
EME
MXN
EMD

* Investments in REITS and other listed alternatives should be included in "Equity Asset Classes" for purposes of determining Permissable Ranges in Section B.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	Allianz Structured Alpha 1000 Plus	ACTION:	X
DATE:	April 4-5, 2019	INFORMATION:	

BACKGROUND:

Allianz was hired at the September 2014 board meeting to manage a Structured Alpha 1000 Plus portfolio for the Alaska Retirement Management Board. The portfolio targets a 10%+ net return trading options on equity indices. As of February 28, 2019, Allianz manages approximately $242 million for the ARMB in the Structured Alpha 1000 Plus portfolio.

STATUS:

Returns since inception for the portfolio have been close to target, however the strategy has a high correlation to equity market drawdowns. In 2018, equity market volatility led to performance that fell short of the target due to multiple market corrections and the costs associated with restructuring the portfolio. Additionally, volatility has returned to lower levels than anticipated, which has reduced the level of expected return normally associated with the strategy after market corrections.

It is unclear whether recently experienced spikes in volatility are the result of a structural change in the markets, or are related to the fact that we are likely late in an economic cycle. Given the correlation to equity drawdowns – a significant risk already contained in the broader portfolio - and to this uncertainty, staff recommends redeeming from the strategy.

RECOMMENDATION:

The Alaska Retirement Management Board direct staff to terminate the Allianz Structured Alpha 1000 Plus portfolio.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Lazard Emerging Income Fund Redemption

ACTION: X

DATE: April 4 - 5, 2019

INFORMATION: ____

BACKGROUND:

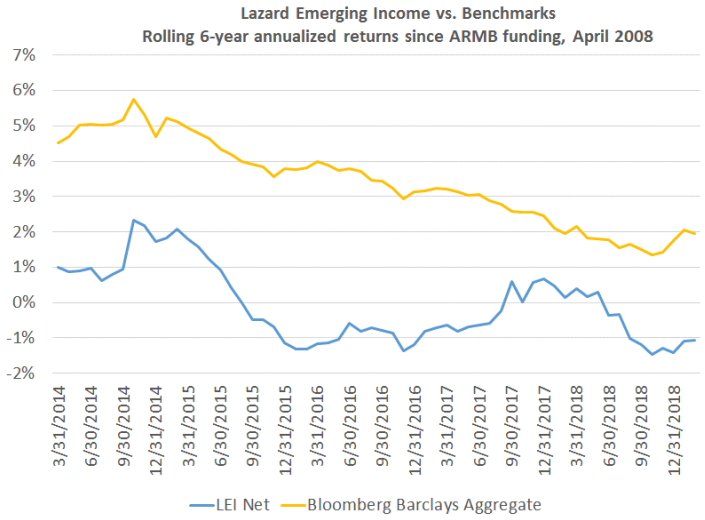
The Lazard Emerging Income (LEI) strategy was initially funded by the Alaska Retirement Management Board (ARMB) in 2008. The strategy is a short duration strategy that invests in emerging/frontier market currency and local debt. The thesis of the strategy is that higher short-term yields offered by emerging/frontier markets are attractive on a risk-adjusted basis because much of the high volatility of local market currency can be diversified away due to low correlations between emerging/frontier markets.

The return expectation of the strategy is 3-Month Libor + 4 to 5%. For watch list purposes, performance vs. 3-Month Libor is measured. The strategy is within the Opportunistic Asset Class and has a value of approximately $69 million. The strategy was placed on the watch list in April 2017 due to benchmark underperformance.

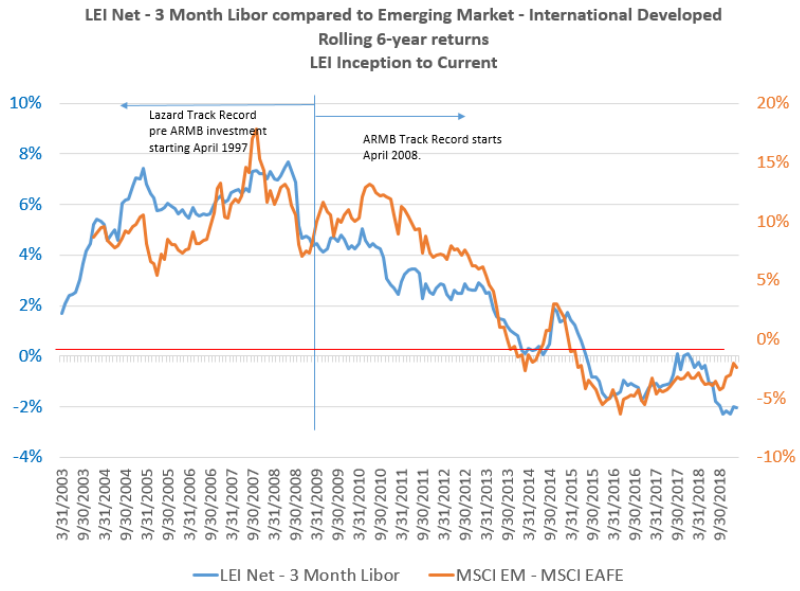
STATUS:

While short-term local market yields have been high relative to developed markets during ARMB's investment period, currency depreciation has negatively impacted returns more than anticipated and resulted in total net returns that are below expectations. Lower yields, global trade tensions, and idiosyncratic impacts (Argentina, Turkey, etc.) have also pressured results.

The Bloomberg Barclays Aggregate Index, though not the benchmark for this strategy, is also a relevant point of reference as it represents the opportunity cost of investing in this strategy. The chart below displays the rolling 6-year performance of LEI and the Bloomber Barclays Aggregate Index since initially investing in the strategy.



Additionally, the shape of the LEI excess return over 3-Month Libor is very similar to the return differential between passive emerging and developed market equity returns. This similarity suggests that LEI's exposure to emerging markets is arguably already being provided through the ARMB's equity exposure and is not a unique uncorrelated return stream.



RECOMMENDATION:

The Alaska Retirement Management Board terminate its investment in the Lazard Emerging Income Fund.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	Lazard Asset Management Global Mandate Restructure	ACTION:	X
DATE:	April 4-5, 2019	INFORMATION:	

BACKGROUND:

Lazard Asset Management (Lazard) was selected as a global equity manager by the Alaska State Pension Investment Board in 1993.

Lazard employs a relative value investment approach searching for undervalued, but financially productive, companies. Portfolio construction is driven by stock selection.

The allocations to country and regional exposures are a residual of the stock selection process and are not directed by staff or ARMB target allocations.

STATUS:

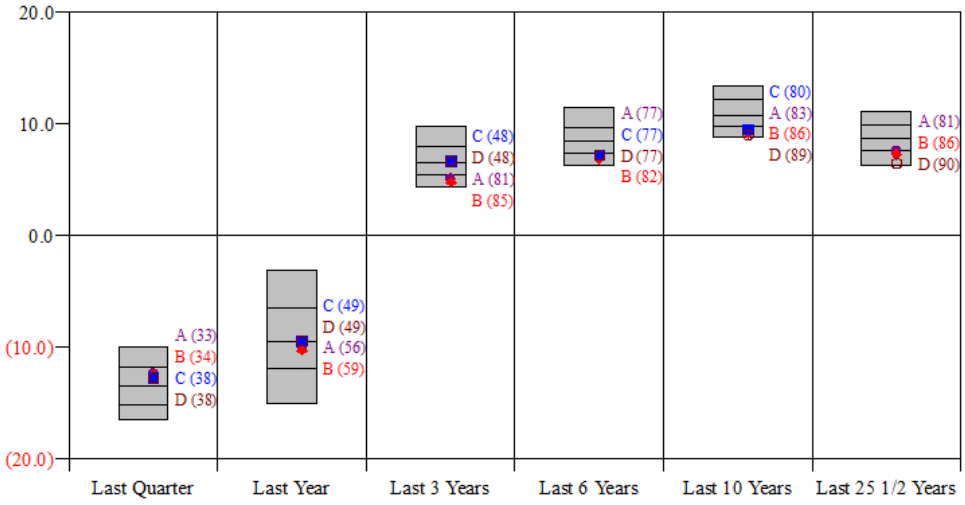
As of December 31, 2018, total assets invested in the global equity mandate were approximately $601.1 million. The ARMB does not have a dedicated allocation to global equities. Lazard invests using two accounts, one for U.S. equities and one for international equities. The U.S. equity account was valued at approximately $304.9 million and the international equity account was valued at approximately $296.2 million.

Performance versus relevant benchmarks and peers for the overall global portfolio (the mandate) and for the U.S. and international components is evaluated below. Staff utilizes the convention of using net-of-fee returns when analyzing performance versus benchmarks and gross-of-fee returns when comparing performance to peers.

The Global Portfolio:

- Net-of-fee performance has lagged the benchmark over the most recent 6-year period by .27%. Over 10 and 25.5 years, net performance has been .12% and .82% higher than the benchmark.
- Relative to its peers, gross-of-fee performance has been in the bottom quartile over 6-, 10- and 25.5-year periods. The 25.5-year gross performance is 1.12% below the median peer.

Returns
for Periods Ended December 31, 2018
Group: Callan Global Equity

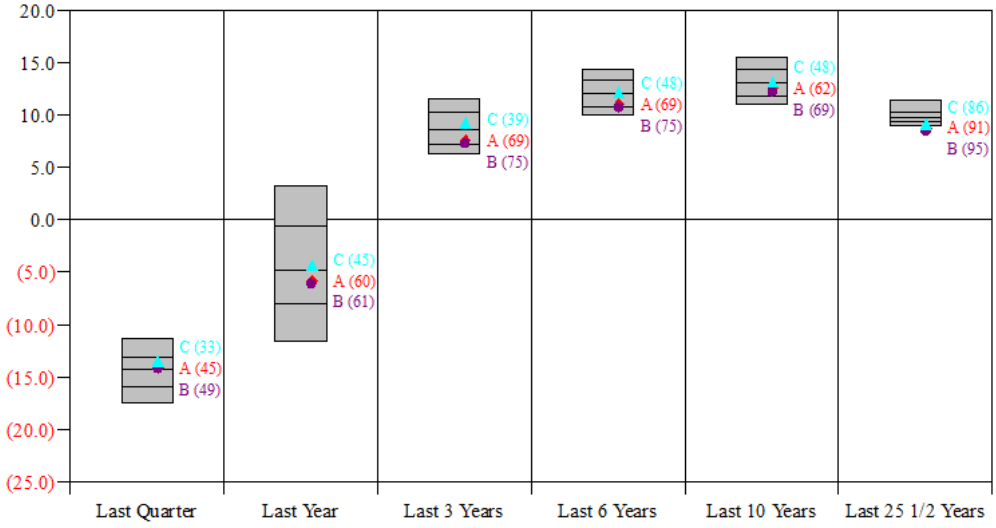


		Last Quarter	Last Year	Last 3 Years	Last 6 Years	Last 10 Years	Last 25 1/2 Years
25th Percentile		(11.78)	(6.54)	7.89	9.66	12.18	9.92
Median		(13.42)	(9.52)	6.55	8.39	10.73	8.65
75th Percentile		(15.21)	(11.89)	5.42	7.29	9.78	7.63
Lazard Global Eq	A	(12.37)	(10.03)	5.04	7.17	9.40	7.53
Lazard Global Eq (NoF)	B	(12.44)	(10.29)	4.74	6.87	9.09	7.23
MSCI:ACWI	C	(12.75)	(9.41)	6.60	7.14	9.46	--
Lzd Glbl: Global Blended Benchmark	D	(12.75)	(9.41)	6.60	7.14	8.97	6.41

The US Component:

- Net-of-fee performance has lagged the S&P 500 over 6-, 10- and 25.5-year periods by 1.47%, .92% and .67%, respectively.
- Relative to its peers, gross-of-fee performance has been below median over 6- and 10-year periods, and bottom quartile over 25.5 years. The 25.5-year gross performance is 1.01% below the median peer.

Returns
for Periods Ended December 31, 2018
Group: Callan Large Capitalization

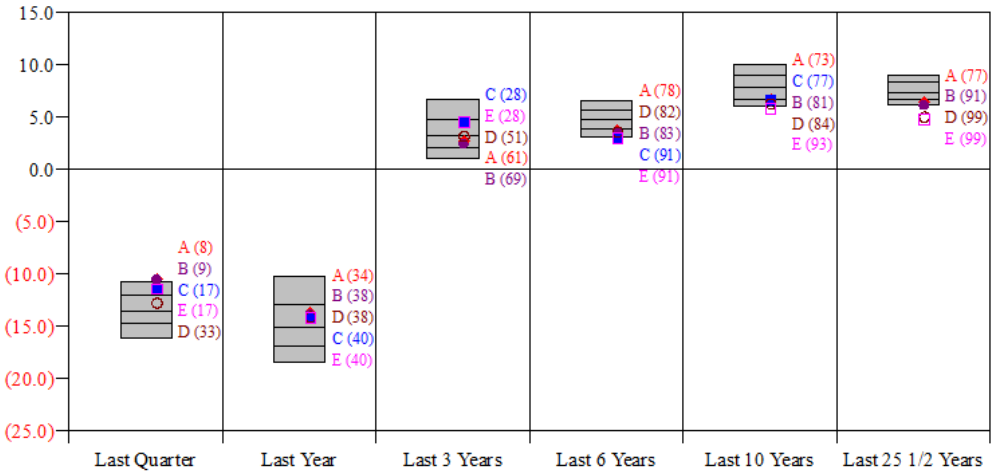


	Last Quarter	Last Year	Last 3 Years	Last 6 Years	Last 10 Years	Last 25 1/2 Years
25th Percentile	(13.10)	(0.58)	10.21	13.36	14.39	10.27
Median	(14.26)	(4.84)	8.56	12.07	13.09	9.80
75th Percentile	(15.94)	(8.06)	7.22	10.77	11.78	9.36
Lazard Domestic Eq Performance ◆ A	(14.13)	(5.81)	7.59	11.03	12.56	8.79
Lazard Domestic Eq (NoF) ● B	(14.22)	(6.12)	7.24	10.68	12.20	8.43
S&P:500 ▲ C	(13.52)	(4.38)	9.26	12.15	13.12	9.10

The International Component:

- Net-of-fee performance has outperformed the international benchmark over 6-, 10- and 25.5-year periods by .47%, .65% and 1.28%, respectively.
- Relative to its peers, gross-of-fee performance has been in, or close to, bottom quartile over 6-, 10- and 25.5-year periods. The 25.5-year gross performance is .84% below the median peer.

Returns
for Periods Ended December 31, 2018
Group: Callan Non-US Equity



	Last Quarter	Last Year	Last 3 Years	Last 6 Years	Last 10 Years	Last 25 1/2 Years
25th Percentile	(12.05)	(12.96)	4.72	5.58	8.91	8.35
Median	(13.51)	(15.13)	3.24	4.69	7.79	7.26
75th Percentile	(14.69)	(16.89)	2.06	3.87	6.65	6.60
Lazard Int'l Eq Performance ◆ A	(10.48)	(13.63)	2.70	3.78	6.75	6.42
Lazard Int'l Eq (NoF) ⬟ B	(10.56)	(13.92)	2.37	3.45	6.41	6.06
MSCI:ACWI ex US ■ C	(11.46)	(14.20)	4.48	2.98	6.57	--
MSCI:World ex US ○ D	(12.78)	(14.09)	3.11	3.52	6.24	4.96
Lzd Glbl: Custom Intl Benchmark □ E	(11.46)	(14.20)	4.48	2.98	5.76	4.78

Staff recommends restructuring the mandate and terminating the US component, investing the proceeds from the U.S. equity component within other existing passive domestic equity mandates. The remaining international component would be benchmarked against the MSCI All Country World Index ex-US. It is staff's intent to evaluate all active international equity portfolios at an upcoming ARMB meeting, including this portfolio, to assess contributions to risk-adjusted performance beyond those available through passive and factor-based strategies.

RECOMMENDATION:

The Alaska Retirement Management Board direct staff to convert the existing global equity mandate managed by Lazard Asset Management into an international equity mandate, subject to successful contract and fee negotiations, and to reallocate the existing U.S. portion of the global mandate to other domestic equity portfolios.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Schroder Advanced ILS Fund Redemption

ACTION: X

DATE: April 4 - 5, 2019

INFORMATION: _____

BACKGROUND:

In December 2015, the Alaska Retirement Investment Board (ARMB) invested in the Schroder Advanced ILS Fund to invest in insurance-linked securities. Insurance-linked securities represent public and private investment instruments that provide exposure to various insurance risks. Such insurance risks include weather-related risks, catastrophic events, and life-related risks.

The performance objective is to exceed the 3-month T-Bill + 6% over a business cycle and to provide a diversified return stream from its lack of correlation with the business cycle. Historically, the asset class produced an attractive risk-return ratio. The strategy is currently part of the Opportunistic asset class within ARMB's portfolio with a value of approximately $233 million.

STATUS:

The ARMB has experienced lower returns than originally expected. Since inception, returns have underperformed the 3-month T-Bill + 6% benchmark. The strategy has also underperformed the Swiss Re Cat Bond Index, an index comprised of publicly traded insurance-linked securities.

Schroder Advanced ILS Fund Performance July 2016 through January 2019

	Schroder Gross Performance	Schroder Net Performance	3 Month T Bill + 6%	Swiss Re Cat Bond Index
*2016	3.39%	3.00%	3.13%	3.68%
2017	-4.94%	-5.66%	6.86%	0.54%
2018	0.45%	-0.30%	7.87%	2.81%
**2019	0.14%	0.08%	0.67%	1.58%
Annualized	-0.44%	-1.19%	7.20%	3.34%

* From inception July 2016

** Through January 2019

Performance has been negatively impacted by low yields resulting, in part, from higher levels of investment capital being allocated to this type of investment, and by higher experienced insurance losses from hurricanes and wildfires in 2017 and 2018.

The Schroder Advanced ILS Fund is relatively illiquid with redemption openings in June and December. This lack of immediate liquidity is due to the nature of the holdings with a material portion of the portfolio placed in privately negotiated contracts that are primarily on a 12-month renewal cycle.

While the holding period of this investment has been relatively short, staff believes the Fund's prospective performance, illiquidity, and cost suggest that ARMB should reallocate this capital to other investment opportunities.

RECOMMENDATION:

The Alaska Retirement Management Board terminate its investment in the Schroder Advanced ILS Fund.