RSIC
RETIREMENT SYSTEM INVESTMENT COMMISSION

Commission Meeting Agenda

Thursday, September 12, 2019 9:30 a.m.

RSIC Presentation Center

Meeting to Convene Thursday, September 12, 2019 at 9:30 a.m.

I. Call to Order and Consent Agenda
   A. Adoption of Proposed Agenda
   B. Approval of June Minutes

II. Chair's Report

III. Audit & Enterprise Risk Management Committee Report

IV. CEO's Report
   A. Budget Recommendation

V. CIO's Report
   A. Investment Performance Summary
   B. Fiscal Year 2019 AIP Progress Report
   C. Delegated Investment Report

VI. Meketa Presentation – Global Interest Rates

VII. Portfolio Framework
   A. Consensus Items Review
   B. Benchmarks Discussion
   C. Performance Reporting Progress Review

VIII. Strategic Calendar Discussion

IX. Executive Session to discuss investment matters pursuant to S.C. Code Sections 9-16-80 and 9-16-320; to discuss personnel matters pursuant to S.C. Code Ann. Section 30-4-70(a)(1); and to receive advice from legal counsel pursuant to S.C. Code Section 30-4-70(a)(2).

X. Potential Actions Resulting from Executive Session

XI. Adjourn

DRAFT

South Carolina Retirement System Investment Commission
Meeting Minutes

June 13, 2019 9:30 a.m.
Capitol Center
1201 Main Street, 15th Floor
Columbia, South Carolina 29201
Meeting Location: Presentation Center

Commissioners Present:
Dr. Ronald Wilder, Chair
Dr. Rebecca Gunnlaugsson, Vice Chair
Ms. Peggy Boykin, PEBA Executive Director
Mr. Allen Gillespie
Mr. Edward Giobbe
Mr. Reynolds Williams (Via Telephone)
Mr. William H. Hancock
Mr. William J. Condon, Jr. (Absent)

I. CALL TO ORDER AND CONSENT AGENDA

Chair Dr. Ronald Wilder called to order the meeting of the South Carolina Retirement System Investment Commission ("Commission") at 9:30 a.m. Mr. William Hancock made a motion to approve the proposed agenda as presented, Dr. Rebecca Gunnlaugsson seconded the motion, which was unanimously approved.

Mr. Edward Giobbe made a motion to approve the amended minutes from the February 21, 2019 Commission meeting and the draft minutes from the April 11, 2019 Commission meeting. Dr. Gunnlaugsson seconded the motion, which passed unanimously.

II. CHAIR'S REPORT

The Chair reported that his report would be presented in Executive Session.

III. AUDIT & ENTERPRISE RISK MANAGEMENT COMMITTEE REPORT

Mr. Hancock, Chair of the Audit & Enterprise Risk Management Committee ("Committee"), began his report by stating that the Committee met on June 4, 2019. He reported that, during the meeting, a compliance update was provided, and no material exceptions were noted. In addition, an update on the continuing buildout of the South Carolina Retirement System Investment Commission's ("RSIC") Enterprise Risk Management function was received.

Next, Mr. Hancock noted that an Internal Audit update was provided. The Committee was reminded about the Cash Management Implementation Review, which will likely take place in the latter part of calendar-year 2019. The Committee was also made aware that an agreed-upon procedures review of RSIC's cash disbursements and payroll functions will be conducted for the period ending June 30, 2018.

Mr. Hancock then explained that the Committee met in Executive Session to discuss the recently issued Request for Information ("RFI") for an internal audit and consulting services vendor. Following Executive Session, the Committee voted to select and begin contractual negotiations with one of the vendors. The name of the vendor will be announced to the Commission following the completion of contractual negotiations. Mr. Hancock further explained that the Committee is planning for the vendor to conduct a risk assessment and present a three-year audit plan for approval by the Committee at its August meeting. Thereafter, the vendor will begin executing on the three-year audit plan.

Mr. Hancock concluded by stating that the Committee received presentations on the South Carolina Retirement Systems' Valuation Policy and Procedures as well as RSIC's and Albourne's Operational Due Diligence Procedures.

IV. CEO'S REPORT

Mr. Hitchcock noted that the General Assembly approved the RSIC's fiscal year budget for 2019-2020, which included the RISC's request to reduce the budget by $500,000 from the previous year. Mr. Hitchcock stated that the reduction reflected the RSIC's hard work and commitment to operating the agency as efficiently as possible.

V. CIO'S REPORT

Dr. Wilder recognized Mr. Geoffrey Berg, Chief Investment Officer, for his report. Mr. Berg introduced Mr. David King, Senior Reporting Officer, to provide the investment performance update through April 30, 2019. Mr. King noted that fiscal year to date ("FYTD") the Plan had returned 5.09 percent, versus the policy benchmark return of 4.86 percent. He noted that FYTD the Plan had paid out $929 million in net benefits including $376 million of final TERI payments The Plan's value at the beginning of the fiscal year was $31.3 billion, while its value as of April 30, 2019 stood at $31.9 billion.

Mr. King then turned to the Portfolio exposures versus the policy targets, stating that the Plan continued to hold an overweight in global public equity and cash, noting that this was offset by an underweight in core fixed income and credit. He stated that all asset classes were within the allowable ranges outlined in the Statement of Investment Objectives and Policies.

He then turned to a review of the Plan's market value over time. He noted that the Plan's market value as of April 30, 2019 was just under its previous peak in January 2018. Mr.

King noted that since RSIC's inception, the Plan had increased its assets by $6.3 billion and paid out $13.3 billion in net benefit payments.

Mr. King provided a brief review of FYTD performance, noting that almost all asset classes were positive, with strong returns in public REITS and public infrastructure. Looking at relative returns versus the policy benchmark, he noted that the Other Opportunistic allocation was the highest outperforming asset class, followed by private equity and equity options, while private infrastructure, portable alpha hedge funds, and mixed credit were underperforming versus the policy benchmarks.

The Chair noted that the Plan achieved one of its strategic plan goals by exceeding the assumed rate of return over the trailing three years and expressed his pleasure in seeing this occurrence. After a brief discussion, Mr. King concluded his report.

Mr. Berg stated that over the past two and half years, the Commission had spent a great deal of time formulating its approach to co-investing, resulting in a structuring of a private equity co-investment program. He formally announced the commencement of RSIC's partnership with GCM Grosvenor ("GCM"), which is expected to establish RSIC as a preferred limited partner with a reliable, organized, and streamlined decision-making process.

Mr. Berg then introduced Director Mr. James Wingo to provide a presentation on the co-investment platform. Mr. Wingo explained that, as part of its research, RSIC had assembled a very extensive database of transactions, which had helped the Investment Team develop a set of principles on how to approach the co-investment arena.

Mr. Wingo identified the three principles behind the rationale for investing in a co-investment platform in order to build both scale and diversification into the program:

- Co-investments are expected to improve the PE program's net returns without increasing risk;
- The selection of general partners ("GPs") is more important than selection of individual transactions; and
- RSIC's reputation and relationships are the keys to access attractive co-investment flow.

Mr. Wingo explained how these principles informed the process which RSIC and GCM will employ on the co-invest platform. This relationship will allow RSIC to take advantage of GCM's middle-market relationships, as well as utilizing GCM resources that are necessary to capitalize on RSIC's own transaction flow.

Mr. Wingo stated that one of the main goals of the partnership is to improve RSIC's competitive position amongst limited partners in order to build a diversified platform of co-investments, and he explained how the program will be structured so as to allow RSIC to meet the GP's most important goals when they allocate co-investments.

Mr. Wingo defined the important factors in the platform beginning with RSIC being responsive to GP's needs to have LPs with an efficient decision-making process. Secondly, he explained that GPs want to build strategic relationships with investors that can commit in size to their funds. Mr. Wingo noted that RSIC is currently underweight in private equity targets and there is an interest in building extensive primary relationships with new GPs and the program is focused on maintaining excellent communication and transparency with the GPs.

Mr. Wingo stated that another key aspect is flexibility in sizing. The current target sizing is between $10 and $30 million and the partnership retains the flexibility to capitalize on opportunities that are outside that band. Mr. Berg stated that this partnership is going to be a way to improve returns without increasing risk through the reduction of cost. In response to a question from Mr. Gillespie, Mr. Berg explained that the long-term objective is for every dollar invested into private equity, 33 cents would be in co-investments.

After a discussion of past and projected costs related to private equity investments, Mr. Berg stated that the GCM platform should eventually save RSIC tens of millions in fees every year. Mr. Hitchcock added that the platform's fee savings translate into improved returns. There being no further questions, this concluded the CIO's report.

VI. PORTFOLIO FRAMEWORK PROPOSAL

The Chair introduced Mr. Hitchcock and Mr. Berg for the portfolio framework proposal discussion. Mr. Hitchcock recognized Mr. Wingo, Mr. Berg, as well as Messrs. Frank Benham and Aaron Lally, from Meketa Investment Group ("Meketa"), for their hard work on this project. He stated that since the last Commission meeting, Meketa and Staff had worked diligently to make significant progress on the proposed portfolio framework. Mr. Hitchcock noted that the information being presented was to generate conversation and move the Commission towards a consensus on the major decisions that will have to made in order to adopt and implement this framework. He explained that he would like the portfolio framework to become a part of the Statement of Investment Objectives and Policies ("SIOP").

Mr. Berg began by outlining the topics that would be discussed as part of the portfolio framework topic: (1) portfolio simplification; followed by (2) samples of draft performance reporting; (3) a benchmarking discussion with input by Meketa; and finally, (4) a discussion of the time frames appropriate for evaluating investment decisions. Mr. Berg noted that there would not be a vote taken on the topics; rather, he reiterated that the goal was to help the Commission begin to form a consensus.

(A) <u>Portfolio Simplification</u>

Mr. Berg stated that currently the portfolio consists of 19 asset classes or sub-asset classes that have a target weight in the portfolio, and 21 underlying benchmarks. He noted that six of these asset classes have a target weight of 2 percent or less, and indicated that Meketa's work (initially presented in February) suggested that simplification could yield lower volatility without reducing the portfolio's expected return. Mr. Berg explained that the simplified policy portfolio would have less complexity than the current policy, relying upon five or six major asset classes. He noted that this simplified policy portfolio would serve as a home base and would provide a very straightforward way to weigh any decision to use a more complex approach: if Staff decided to move away from home base, it should be done only if an improvement in returns or a reduction of risk was expected. Mr. Berg directed the Commission's attention to a depiction of the 19 asset classes in the current portfolio (not including cash) and the condensing of those asset classes, first into 11 asset classes ("Mix A" or the "simpler portfolio") and then further consolidated to five major asset class groupings plus portable alpha ("Mix B" or the "simplest portfolio"). He explained the simplest portfolio is projected to have the same return as the current portfolio, but with lower volatility. The Chair asked if all the sub-asset classes continue to be included in the portfolio, why the returns were different in the simpler portfolio. Mr. Berg responded by stating that the return improvement from Mix A to Mix B came from the reduction or elimination of certain strategies, including the reduction of credit as well as the elimination of GTAA as a target from the portfolio. As an example, Mr. Benham noted that reducing certain credit-related risks and making Mix B's Bond asset class more core-oriented resulted in an overall reduction of risk, and an improvement in returns. He noted that the Commission's assignment of benchmarks, as well as the weights assigned to those benchmarks, would indicate where the Plan's default position will be. Mr. Berg explained that in the simplified home base portfolio, the use of investments such as REITs and equity options would be measured to determine whether or not Staff's implementation decision had increased returns and/or lowered risk.

Ms. Boykin stated that the simplification makes a lot of sense, and it makes sense for Staff to be able to evaluate decisions to deviate from that simplified benchmark.

(B) Performance Reporting

Mr. Berg commenced the discussion of performance reporting by emphasizing that the slides presented at the meeting were stylized examples of reporting, noting that an extensive amount of work needed to be done to provide both the Commissioners and the CIO with the performance analysis information they would need to oversee the portfolio according to the proposed portfolio framework. Mr. Berg pointed out that good performance reporting should make it easy to find the right question to ask.

Mr. Berg then discussed the performance analysis framework. He first identified the three key measures of the performance analysis framework - the value from diversification, quality of portfolio structure, and quality of implementation – that would help both the Commissioners and the CIO assess whether and how Staff's implementation decisions added value as compared to (a) the two-asset reference portfolio and (b) the simplified policy benchmark portfolio. Mr. Berg summarized these three key components as follows.

- Value from diversification: the goal of reporting is to help assess whether a diversified portfolio (that is, the simplified policy benchmark portfolio selected by the Commission) produced better returns than the simple, two-asset Reference Portfolio.

- Quality of portfolio structure: Mr. Berg explained that two categories of portfolio structure decisions cause the portfolio to look differently than the policy benchmark portfolio: (i) if the portfolio has an overweight or underweight to an asset class; and (ii) if an asset class is constructed differently than the benchmark. The goal here is to help assess whether these decisions added value.

- Quality of implementation: Mr. Berg explained that the goal of reporting on this score is to help assess whether the external managers have added value versus expectations (measured in the form of a benchmark appropriate to the manager's mandate).

A wide-ranging discussion ensued. In concluding this portion of his presentation, Mr. Berg stressed that, while the reporting provided to the Commission would ultimately look simpler, there is a great deal of complexity in creating the reports. He recommended that in future meetings the performance reviews alternate between short-term and long-term performance reviews, with all meetings including a review of asset class overweight/underweight positions.

Mr. Berg then presented suggested timeframes for thinking about and judging the quality of different investment decisions. He explained that one can draw different conclusions from evaluating outcomes over short vs. long periods of time. He stated that even the optimal Policy Benchmark Portfolio (over 30 years) will at times appear sub-optimal through a short-term lens but noted that practical limitations prevent serious consideration of ten or 20-year evaluation periods. Accordingly, Staff recommended the following proposed timeframes: value from diversification, five years; quality of portfolio structure, three years; and quality of implementation, three years.

A break was taken from 10:55 a.m. until 11:09 a.m.

Before moving on to the topic of benchmarking, Mr. Berg briefly discussed portable alpha, and explained the program is a way of implementing certain asset class exposures. Mr. Berg posed the question to the Commission as to whether they wanted to (a) continue to have portable alpha be a part of the policy benchmark portfolio, which would make the Commission responsible for the decision whether to use portable alpha, or (b) place portable alpha in the implementation benchmark, making the CIO fully responsible for any use, and performance impact, of portable alpha.

Mr. Giobbe asked Mr. Berg to elaborate more on portable alpha and how it had been used in the last few years. Mr. Berg responded by noting that the Plan had been using portable alpha since July 1, 2016 and explaining that portable alpha entails a marriage of a beta source with an alpha engine. He stated that portable alpha had been used in approximately ten percent of the portfolio, and praised the work done by Mr. Bryan Moore, Managing Director, to reduce the risk in the portable alpha program. He also noted that the

Retirement System's actuaries had assigned a value to portable alpha separate and distinct from the rest of the Plan.

Mr. Hancock asked the other Commissioners whether they would like to discuss this issue, move it to an implementation benchmark or leave it the same. Mr. Gillespie stated that he was of mixed minds because of portable alpha's leverage characteristics, but then stated that he was inclined to keep portable alpha out of the policy portfolio. After further discussion, the Commissioners arrived at a consensus that portable alpha should come out of the policy benchmark and become part of the implementation benchmark.

Benchmarks

Mr. Berg noted that Meketa is exploring different approaches to benchmarking private market asset classes (including private equity, private debt, real estate) and portable alpha hedge funds, as well as the topic of whether a policy benchmark should employ the 'opportunity cost' or simply the actual performance of an appropriate benchmark. Meketa will offer recommendations at the Commission's September 2019 meeting.

(C) Asset Allocation Discussion

Mr. Berg introduced Mr. Wingo to provide the asset allocation presentation. Mr. Wingo identified three key issues: (1) setting the appropriate level of risk for the Plan through selection of the Reference Portfolio; (2) considering appropriate directions of portfolio migration from the perspective of changes to expected risk and return; and (3) confirming a number of portfolio themes consistent with the Plan's directional goals.

Mr. Wingo identified four key factors that influence the appropriate level of risk:

- the Plan's assumed rate of return (maximizing the probability of meeting or exceeding the Plan's assumed rate of return);
- the Plan's funding ratio (maximizing the probability of achieving full funding levels within a given period of time);
- Plan contribution rates (minimizing the probability of having to raise contribution rates); and
- Plan tail risk (minimizing the probability of catastrophic Plan outcomes).

Mr. Wingo discussed these four risk factors, explaining how each affects the Plan. He discussed how both the current Plan and Mix B (the simplest portfolio) compared to peers. There was a discussion between the Commissioners and Messrs. Hitchcock and Berg regarding the value proposition of different potential directional movements Commission's migration to a more simplified portfolio.

Mr. Wingo noted that a 70 percent equities / 30 percent bonds portfolio appeared to best approximate the Plan's risk target. A lengthy discussion among the Commissioners ensued.

(D) Asset Allocation Discussion with Meketa

Mr. Benham directed the Commissioners to the portion of Meketa's asset allocation discussion dealing with the Reference Portfolio. He first summarized the purpose and composition of a reference portfolio, and then noted that Meketa and Staff had agreed to use global equities and domestic bonds for the Reference Portfolio. Mr. Benham noted that Meketa selected global equity for the equity portion of its recommended reference portfolio because it represents a fair expression of the opportunity set of liquid, commonly invested and risky assets. With respect to bonds, he explained that U.S. Treasuries serve as a long-term, "risk free" asset, although they do contain some inherent interest rate risk. Based on the current asset allocation targets, Mr. Benham stated that Meketa believes that the mix that most closely resembles the risk of the portfolio would be a 70 percent global equity and 30 percent U.S. Treasury benchmark. He then noted that Messrs. Berg and Hitchcock had asked Meketa to look back at the Portfolio over the last five years to determine what the closest reference portfolio would have been historically. Mr. Benham explained that the Commission's reference portfolio would have been much more conservative just a few years ago, more closely resembling a 60/40 mix, but then gradually evolving to 65/35 and now to 70/30 as a result of the Commission's changes in asset allocation.

Mr. Benham noted that Meketa supported Staff's efforts to develop a simplified portfolio but stressed two things: (a) no changes are needed at this time, as the current portfolio is very efficient as currently structured, and (b) making frequent asset allocation changes can be detrimental to long-term goals. On the latter score, Mr. Benham reminded the Commissioners of the survey it had presented at the Commission's February 2019 meeting regarding the frequency of asset allocation changes of peer plans, noting that the vast majority of the plans Meketa advises revisits asset allocation only every three to five years. Meketa believes that asset allocation should be viewed as a strategic, long term decision by a board, with staff given the latitude to make shorter-term tactical decisions.
Mr. Benham then reviewed other asset allocation-related concepts and themes, including embracing simplicity at the policy level (noting that most peer plans set policy targets for ten or fewer asset classes).

<u>Areas of Consensus</u>

Mr. Hitchcock summarized the Commission's deliberations. He first summarized the consensus that had been reached regarding portable alpha's inclusion in the implementation benchmark. Mr. Hitchcock observed a consensus among the Commissioners with regard to using the 70/30 portfolio recommended by Meketa and Staff as the Reference Portfolio. As to the extent and type of simplification which the Commission would like to see, it was the consensus of the Commission that Staff and Meketa should conduct further work, including building out a revised reporting framework, based on Mix B (the simplest portfolio) without portable alpha, as the starting point for further consideration of the portfolio framework.

VII. DELEGATED INVESTMENT REPORT

Mr. Berg noted that two delegated investments had closed since the last Commission meeting, a private equity investment with TA Associates VIII ("TA"), which closed on May 2, 2019 in the amount of $75 million, and an infrastructure investment with Actis Long Life Infrastructure Fund in the amount of $75 million, which closed on April 30, 2019.

VIII. EXECUTIVE SESSION

Mr. Gillespie moved that the Commission recede into Executive Session to discuss investment matters pursuant to S.C. Code Sections 9-16-80 and 9-16-320; and to receive advice from legal counsel pursuant to S.C. Code Section 30-4-70(a)(2). Mr. Hancock seconded the motion, which passed unanimously.

IX. POTENTIAL ACTION RESULTING FROM EXECUTIVE SESSION

The Chair reported that the Commission took no action in Executive Session.

X. ADJOURNMENT

After Executive Session, the meeting adjourned by unanimous consent at 1:52 p.m.

[Staff Note: In compliance with S.C. Code Section 30-4-0, public notice of and the agenda for this meeting was delivered to the press and to parties who requested notice and were posted at the entrance, in the lobbies and near the 15th Floor Presentation Center at 1201 Main Street, Columbia, S.C.,3:45 p.m. on June 10, 2019]

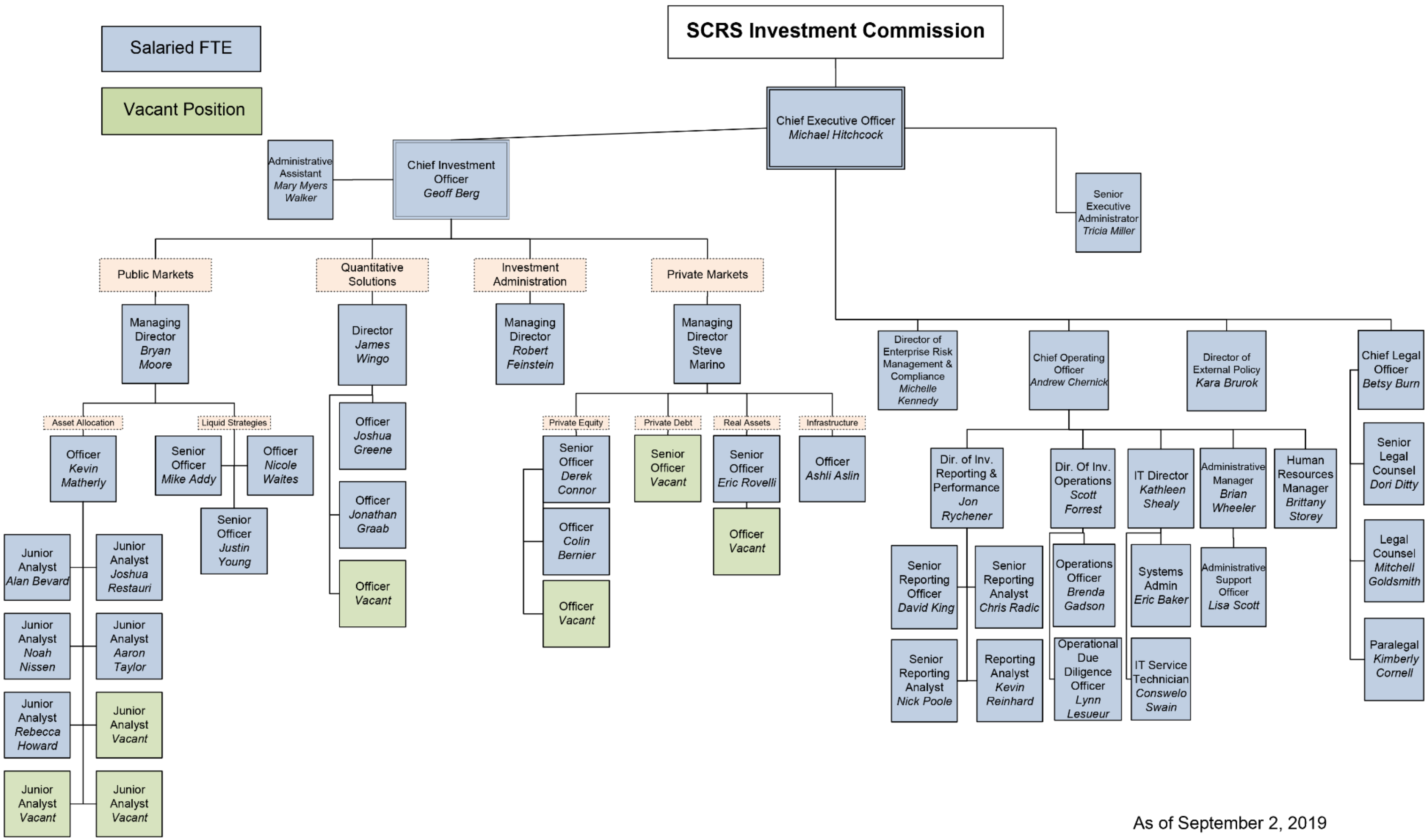
Retirement System Investment Commission

Budget Request Fiscal Year 2021

RSIC

SC Retirement System Investment Commission

Organizational Chart

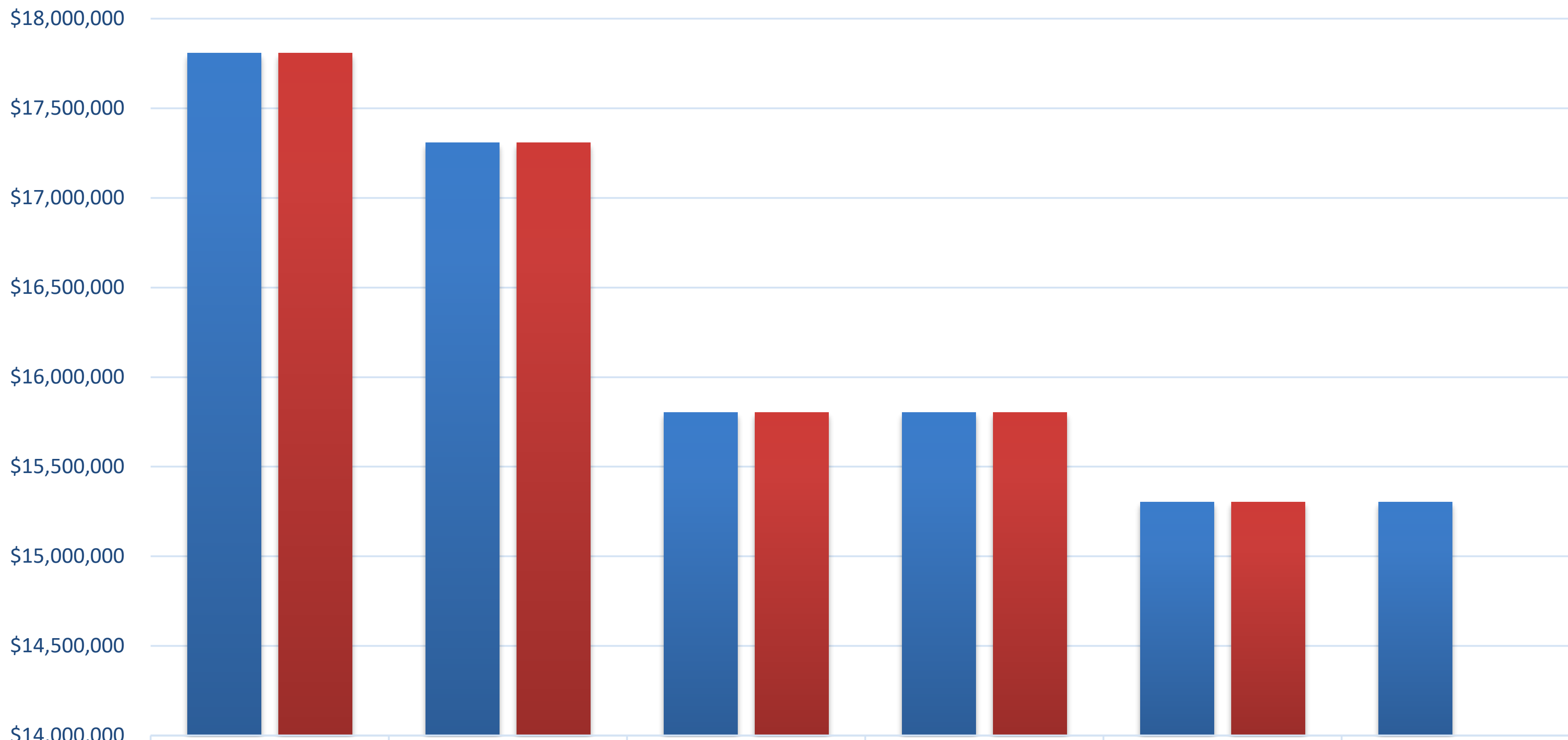


As of September 2, 2019

RSIC
SC RETIREMENT SYSTEM INVESTMENT COMMISSION

Appropriations History (since FY16)

RSIC is solely Other Funds



	FY16	FY17	FY18	FY19	FY20	FY21
Requested	$17,809,132	$17,308,138	$15,803,000	$15,803,000	$15,303,000	$15,303,000
Approved	$17,809,132	$17,308,138	$15,803,000	$15,803,000	$15,303,000	

RSIC
SC Retirement System Investment Commission

FY19 Expenditures

- Additional expenditures were processed for FY19 vs. FY18 for the following initiatives:
  - Additional Personal Services expenses associated with increased FTEs during FY
  - Initiation of additional services offered by Albourne
  - Expenses associated with Fiduciary Audit which was completed in November 2018

RSIC FY20 Current Funding

Total Budget
(Other Funds)
$15,303,000

Personal Services:
$7,200,000

Employer Contributions:
$2,000,000

Other Operating Expenses: $6,103,000

FY20 Anticipated Additional Expenditures

- Additional expenditures are anticipated in FY20 vs. FY 19 for the following initiatives:
  - Further buildout of Microsoft Dynamics System
  - Engagement of Deloitte for Risk Assessment, Audit Plan development & execution of Year 1
  - Albourne Hedge Fund Consulting services
  - Filling open FTE positions (Personal Services)

  There will be some cost savings associated with consolidation of system service providers, which will result in a net Other Operating Expense savings.

RSIC FY21 Budget Request

Total Budget
(Other Funds)
$15,303,000

Personal Services:
$7,200,000

Employer Contributions:
$2,000,000

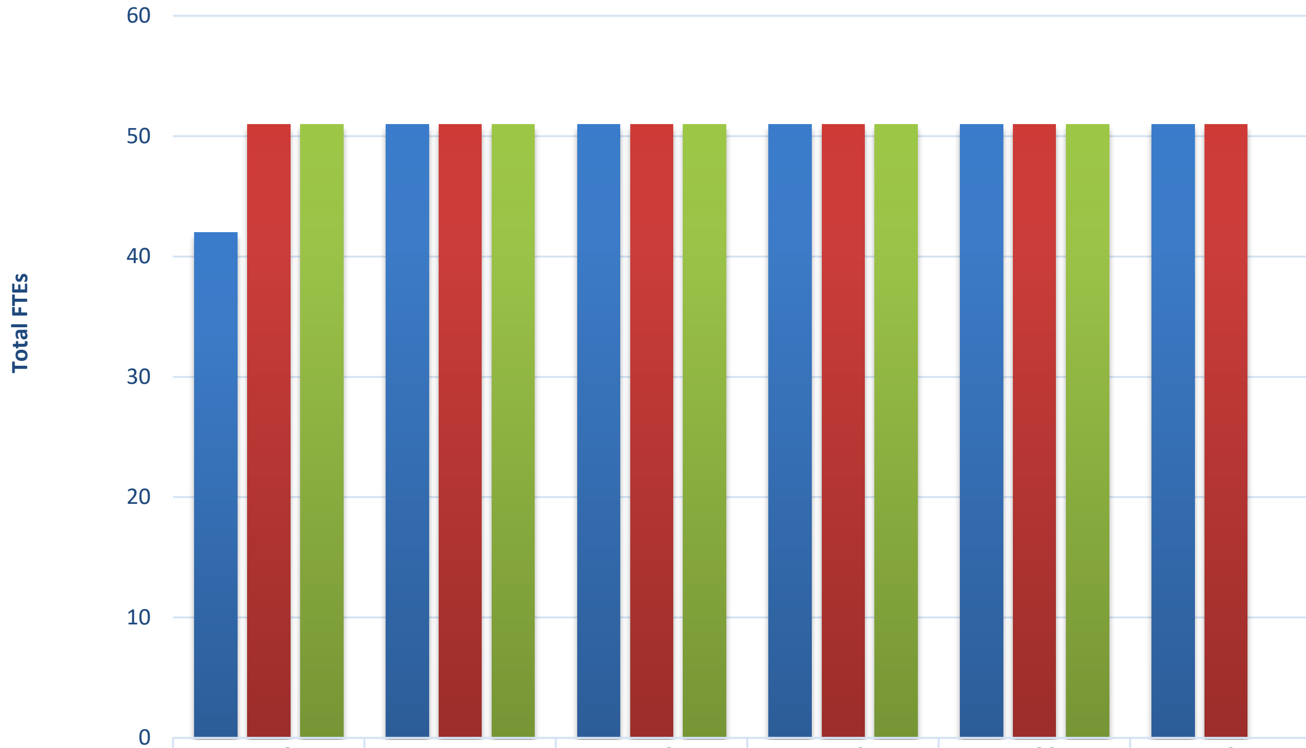
Other Operating Expenses: $6,103,000

Budget Request Summary for FY21

- The Commission is requesting the same budget amount for FY21 as in FY20.
- The Commission is not requesting any additional FTEs for FY21 and has plans in place to continue to fill open FTEs to best meet agency needs.

5 Year FTE Request vs. Approved

FTE Request History



	FY16	FY17	FY18	FY19	FY20	FY21
Approved FTEs Prior FY	42	51	51	51	51	51
Prior FY Approved + Request	51	51	51	51	51	51
FY Approved FTEs	51	51	51	51	51	

RSIC
SC Retirement System Investment Commission

Full Time Employee (FTE) Status Update

- 7 Vacant FTEs
  - 3 Junior Analysts
  - 1 Private Debt Officer
  - 1 Private Equity Officer
  - 1 Quantitative Solutions Officer
  - 1 Real Assets Officer

RETIREMENT SYSTEM
INVESTMENT COMMISSION

CIO Comments

September 12, 2019

Fiscal Year Performance

- What worked well?
  - Overweight to equities (December to June)
  - Recent vintage private markets investments
  - Strong performance from lower-risk private debt investments
  - Real estate performance

- What has not worked well?
  - Underweight to fixed income (December to June)
  - Legacy private equity and private debt investments
  - Portable alpha hedge funds (-8 bps impact to plan)
  - Active management (despite strong second half)
  - Equity options (disappointing beta)

Current Environment/Positioning

- Material deterioration in global economic outlook
  - 50 bps reduction to 2019 inflation estimate since December
  - 30 bps reduction to US GDP growth forecast since May
  - Markets struggling to see end to trade war

- High asset prices
  - Government bond yields substantially lower around the world
    - 10Y Treasury = 1.55% vs. 2.85% one year ago
  - >$15T of negative-yield global government bonds (low supply of quality yield product)
  - US equity valuations elevated vs. historical levels
  - Non-US equities cheap vs. US – but with concerns about economic growth
  - Equity leverage levels high (public and private)
  - Real estate cap rates low

- Portfolio underweight Core Fixed Income, overweight Cash & Short Duration
  - Otherwise positioned very close to target weights

RETIREMENT SYSTEM INVESTMENT COMMISSION

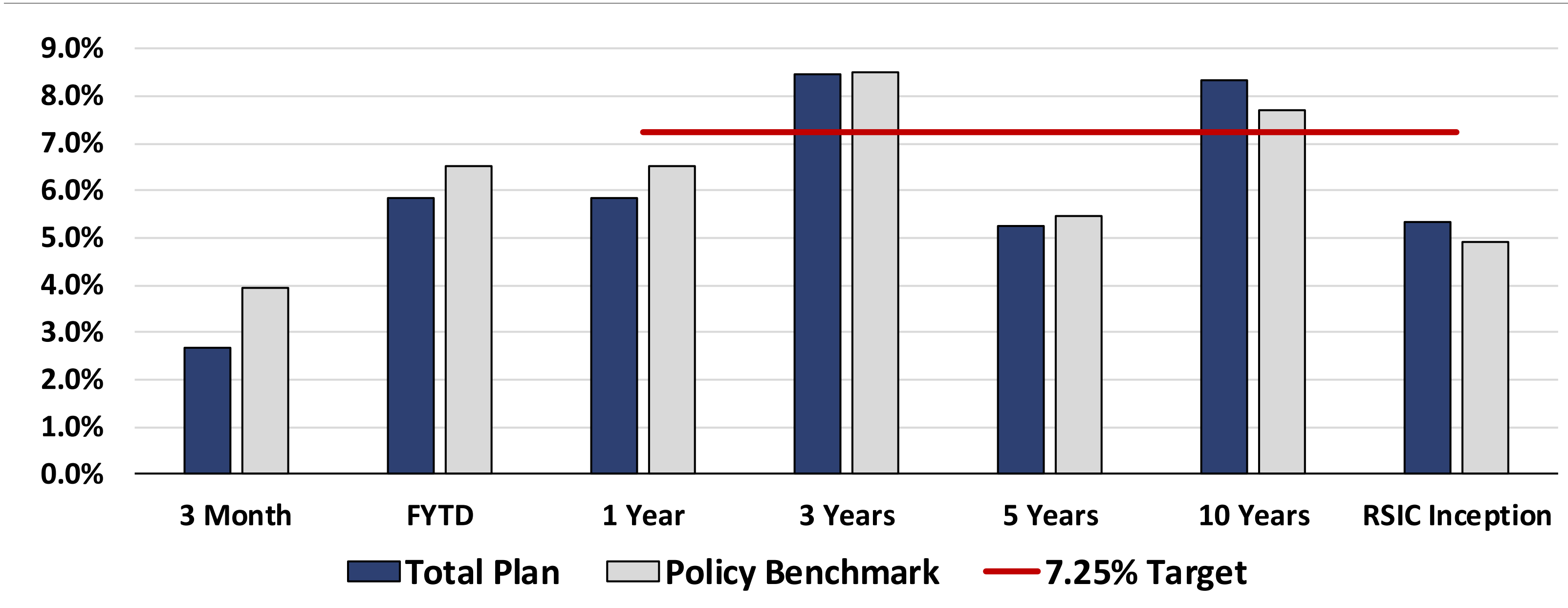
Performance Update

09/12/19 Investment Commission Meeting

Data as of June 30th, 2019

Performance - Plan & Policy Benchmark[2]

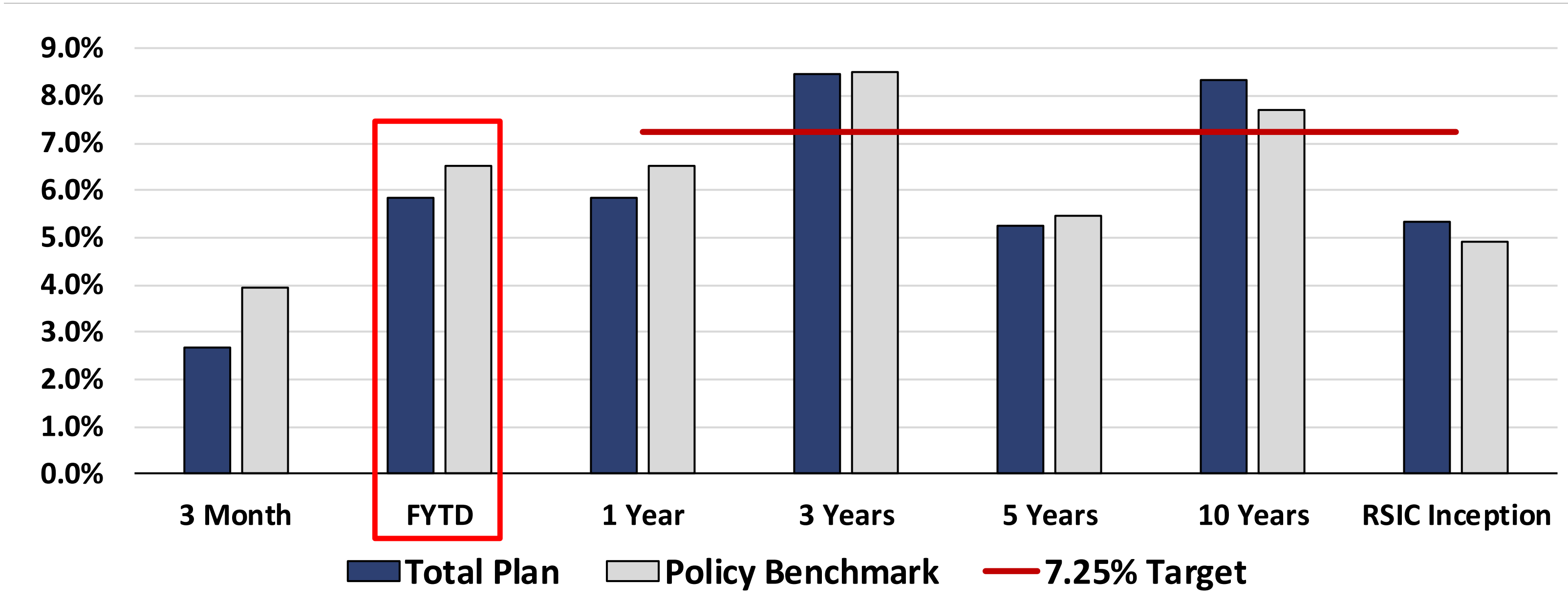
As of June 30, 2019



Historic Plan Performance As of 06/30/19	Market Value (In Millions)	3 Month	FYTD	1 Year	Annualized 3 Years	5 Years	10 Years	RSIC Inception
Total Plan	**$31,980**	**2.65%**	**5.84%**	**5.84%**	**8.48%**	**5.26%**	**8.33%**	**5.34%**
Policy Benchmark		3.93%	6.50%	6.50%	8.51%	5.45%	7.69%	4.92%
Excess Return		-1.28%	-0.66%	-0.66%	-0.03%	-0.19%	0.64%	0.41%
Net Benefit Payments (In Millions)		($170)	($1,081)	($1,081)	($3,350)	($5,475)	($10,328)	($13,466)
Current 3-month Roll off Return:		*7.92%*	*N/A*	*0.24%*	*2.11%*	*3.67%*	*11.52%*	*N/A*
Next 3-month Roll off Return:		*2.65%*	*N/A*	*2.34%*	*3.49%*	*-1.00%*	*11.17%*	*N/A*

Performance - Plan & Policy Benchmark[2]

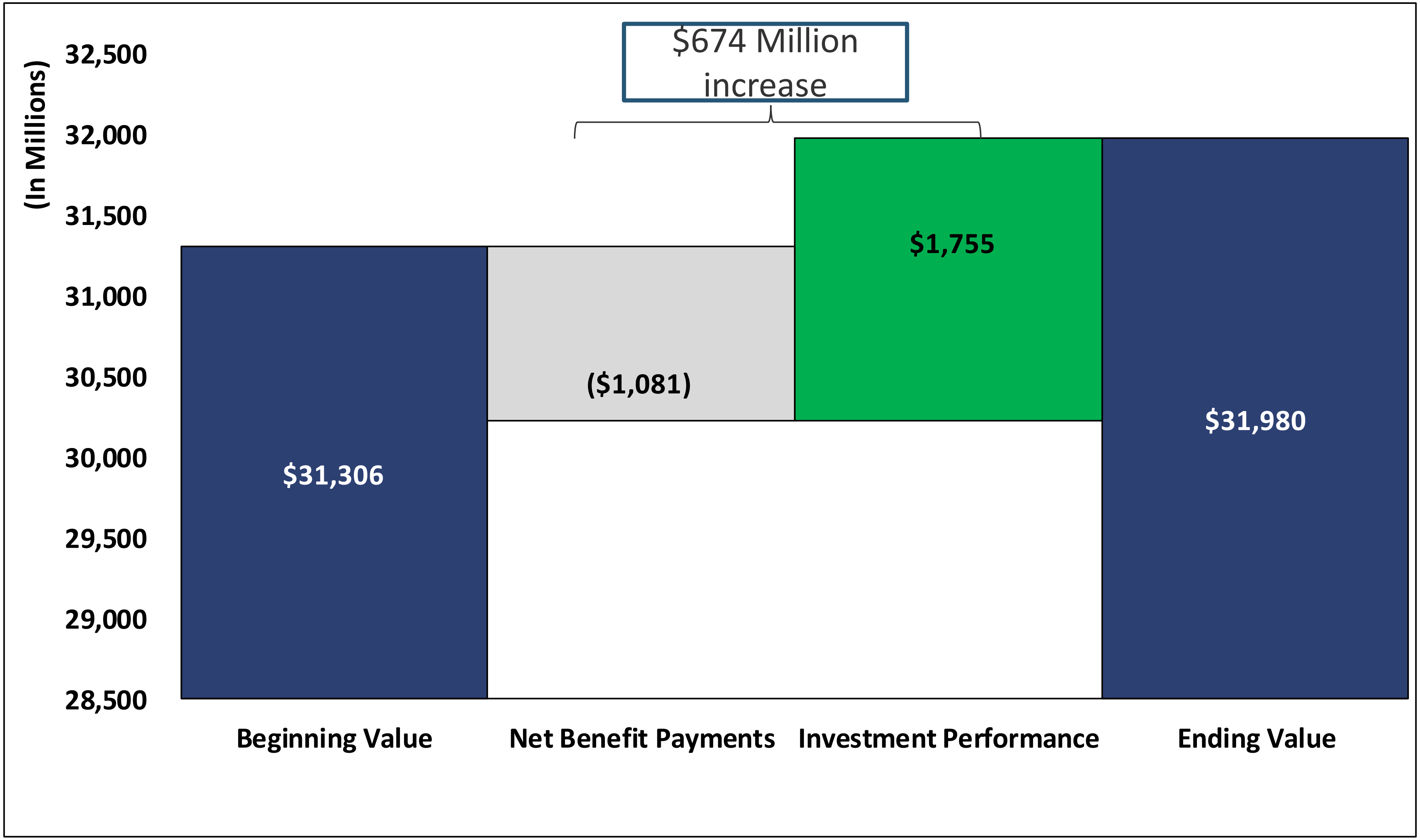
As of June 30, 2019



Historic Plan Performance As of 06/30/19	Market Value (In Millions)	3 Month	FYTD	1 Year	Annualized 3 Years	5 Years	10 Years	RSIC Inception
Total Plan	**$31,980**	**2.65%**	**5.84%**	**5.84%**	**8.48%**	**5.26%**	**8.33%**	**5.34%**
Policy Benchmark		3.93%	6.50%	6.50%	8.51%	5.45%	7.69%	4.92%
Excess Return		-1.28%	-0.66%	-0.66%	-0.03%	-0.19%	0.64%	0.41%
Net Benefit Payments (In Millions)		($170)	($1,081)	($1,081)	($3,350)	($5,475)	($10,328)	($13,466)
Current 3-month Roll off Return:		*7.92%*	*N/A*	*0.24%*	*2.11%*	*3.67%*	*11.52%*	*N/A*
Next 3-month Roll off Return:		*2.65%*	*N/A*	*2.34%*	*3.49%*	*-1.00%*	*11.17%*	*N/A*

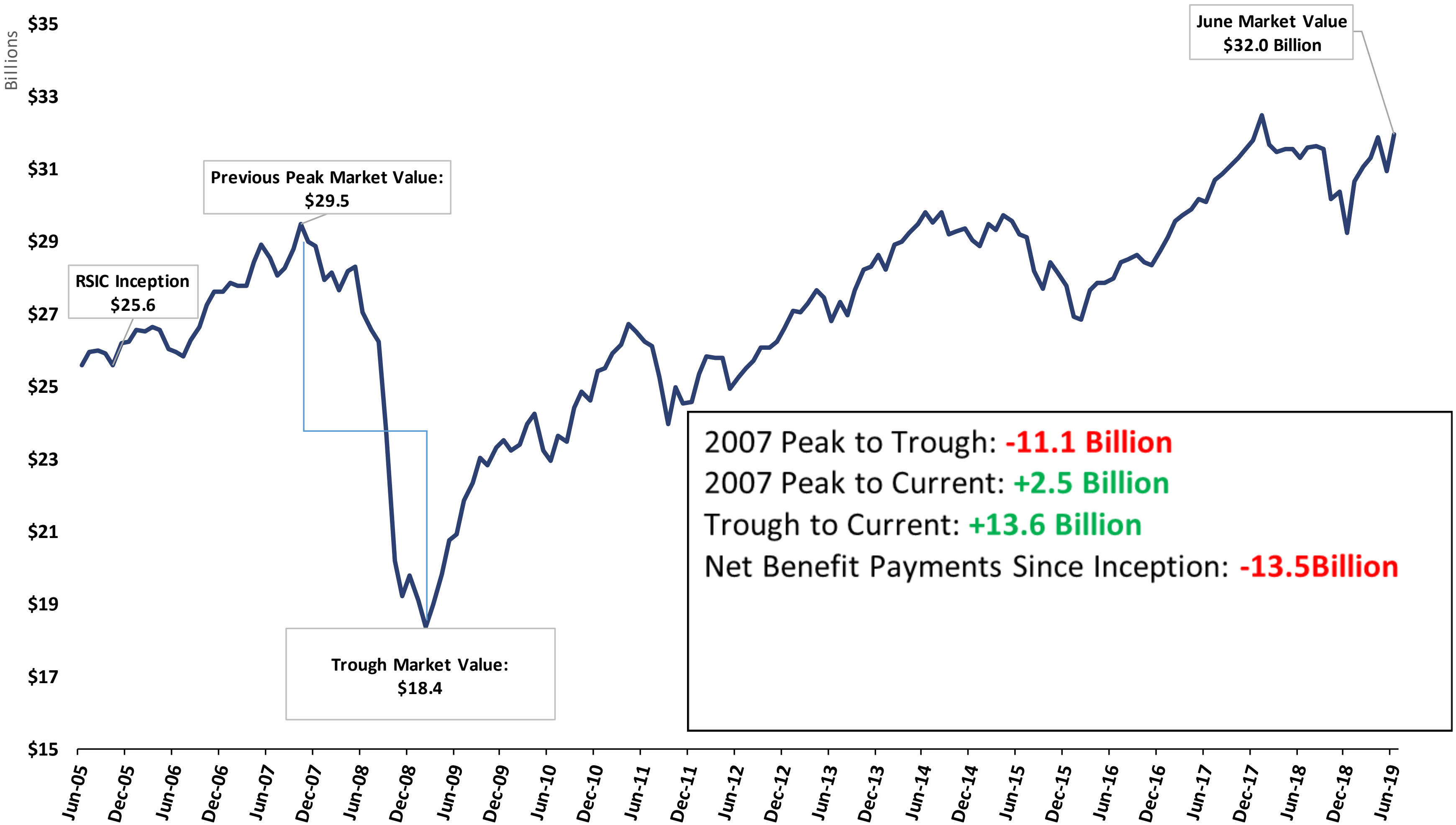
FYTD Benefits and Performance[2]

FYE June 30, 2019



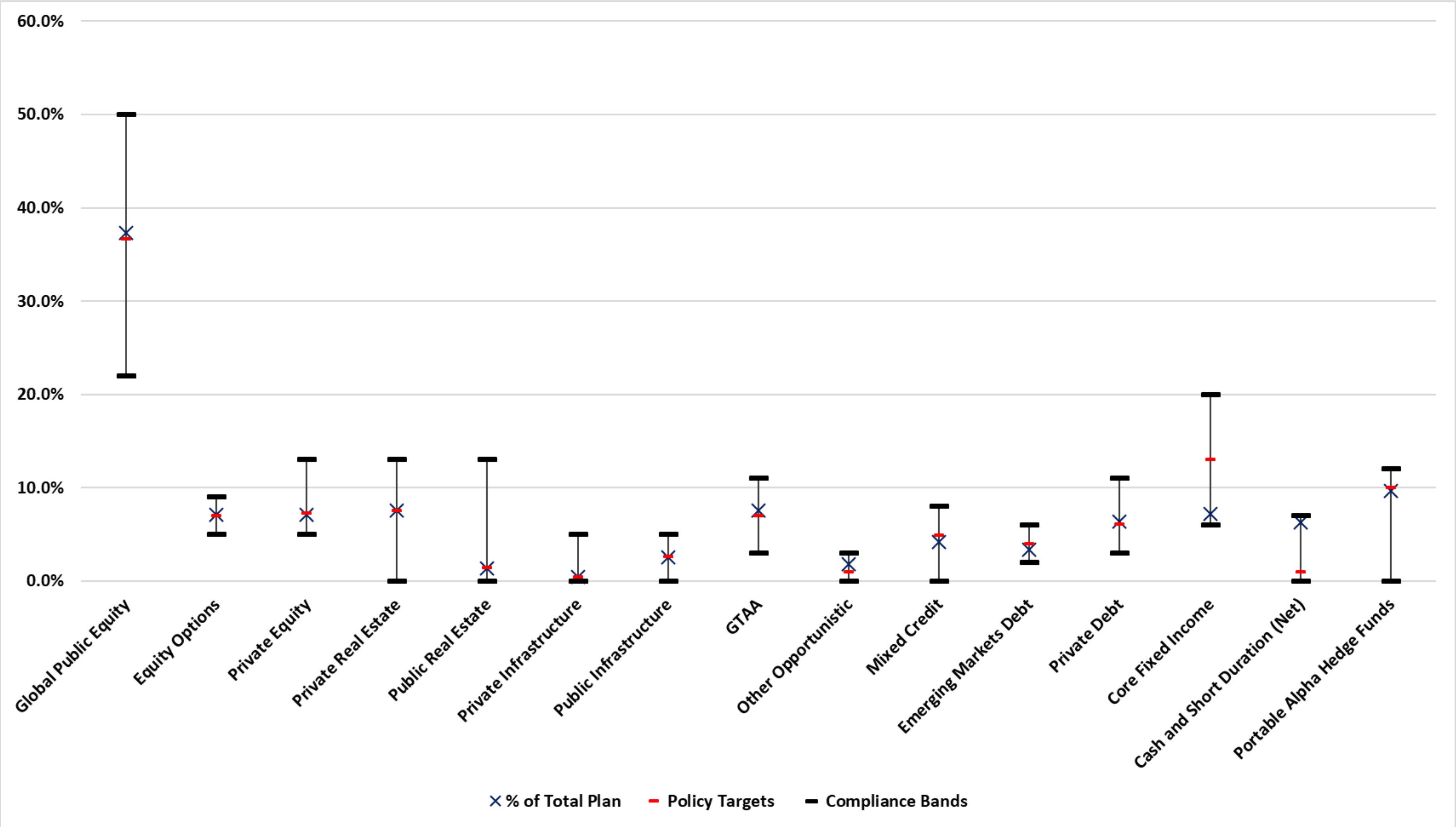
RSIC Market Value Through Time

As of June 30, 2019



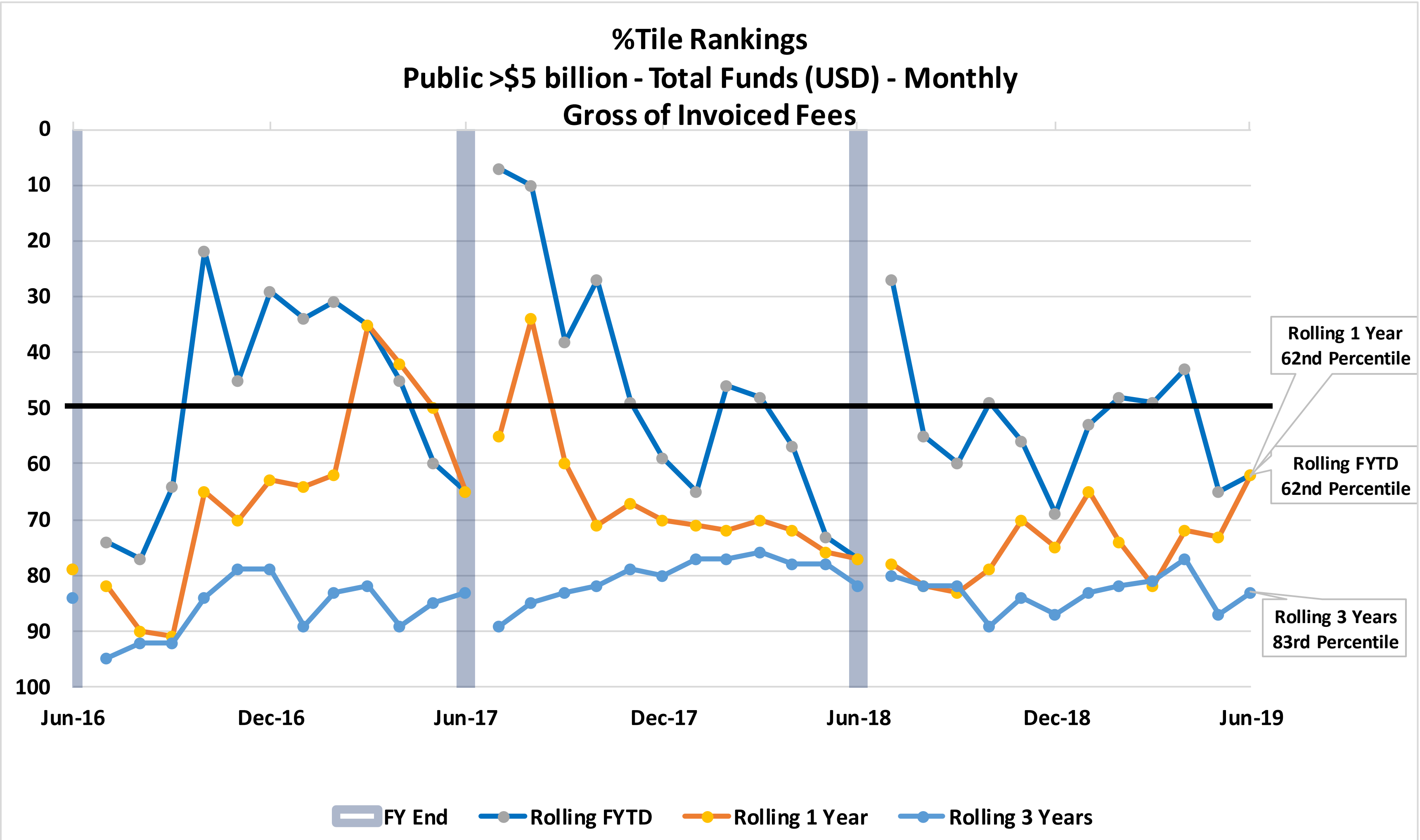
Portfolio Exposure & Policy Weights [4,8]

As of June 30, 2019



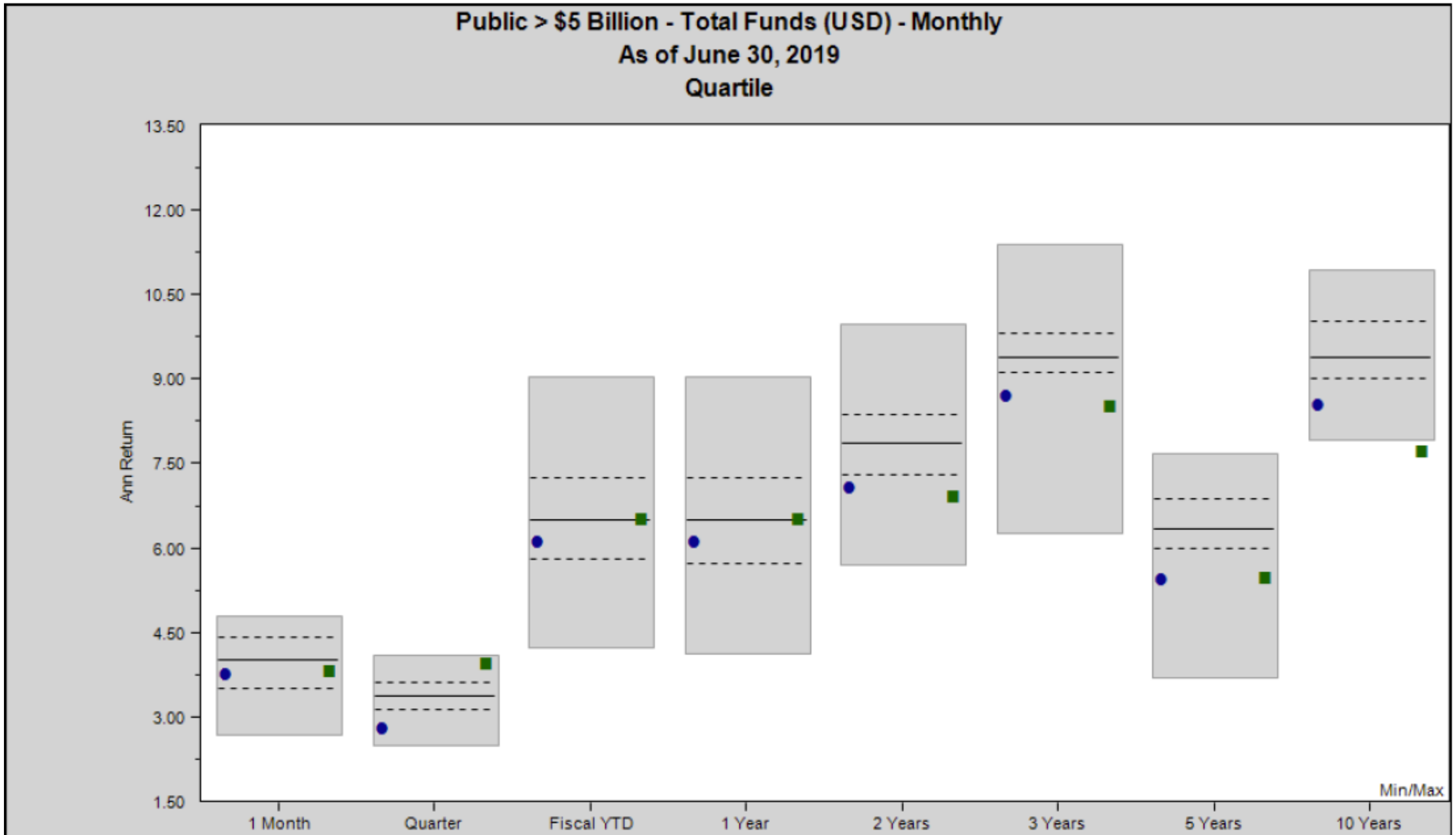
RSIC Universe Rankings[11]

As of June 30, 2019



Bank of New York Public Funds > $5 billion[11]

As of June 30, 2019



	1 Month		Quarter		Fiscal YTD		1 Year		2 Years		3 Years		5 Years		10 Years	
	Value	%Tile	Value	%Tile	Value	%Tile	Value	%Tile	Value	%Tile	Value	%Tile	Value	%Tile	Value	%Tile
Maximum	4.79		4.10		9.05		9.05		9.98		11.38		7.68		10.94	
25th Percentile	4.40		3.60		7.24		7.24		8.37		9.82		6.88		10.02	
Median Percentile	4.00		3.38		6.50		6.50		7.87		9.39		6.33		9.39	
75th Percentile	3.52		3.12		5.72		5.72		7.29		9.13		5.99		9.00	
Minimum	2.67		2.50		4.13		4.13		5.70		6.26		3.69		7.91	
# of Portfolios	36		36		34		34		34		33		33		32	
● Total SC with Overlay	3.75	61	2.77	92	6.10	62	6.10	62	7.05	81	8.69	83	5.44	88	8.53	88
■ SC Policy Benchmark	3.79	61	3.93	10	6.50	51	6.50	51	6.89	83	8.51	86	5.45	88	7.69	100

Universe Source: The Bank of New York Mellon Corporation; Universe Status: Final, Calculated

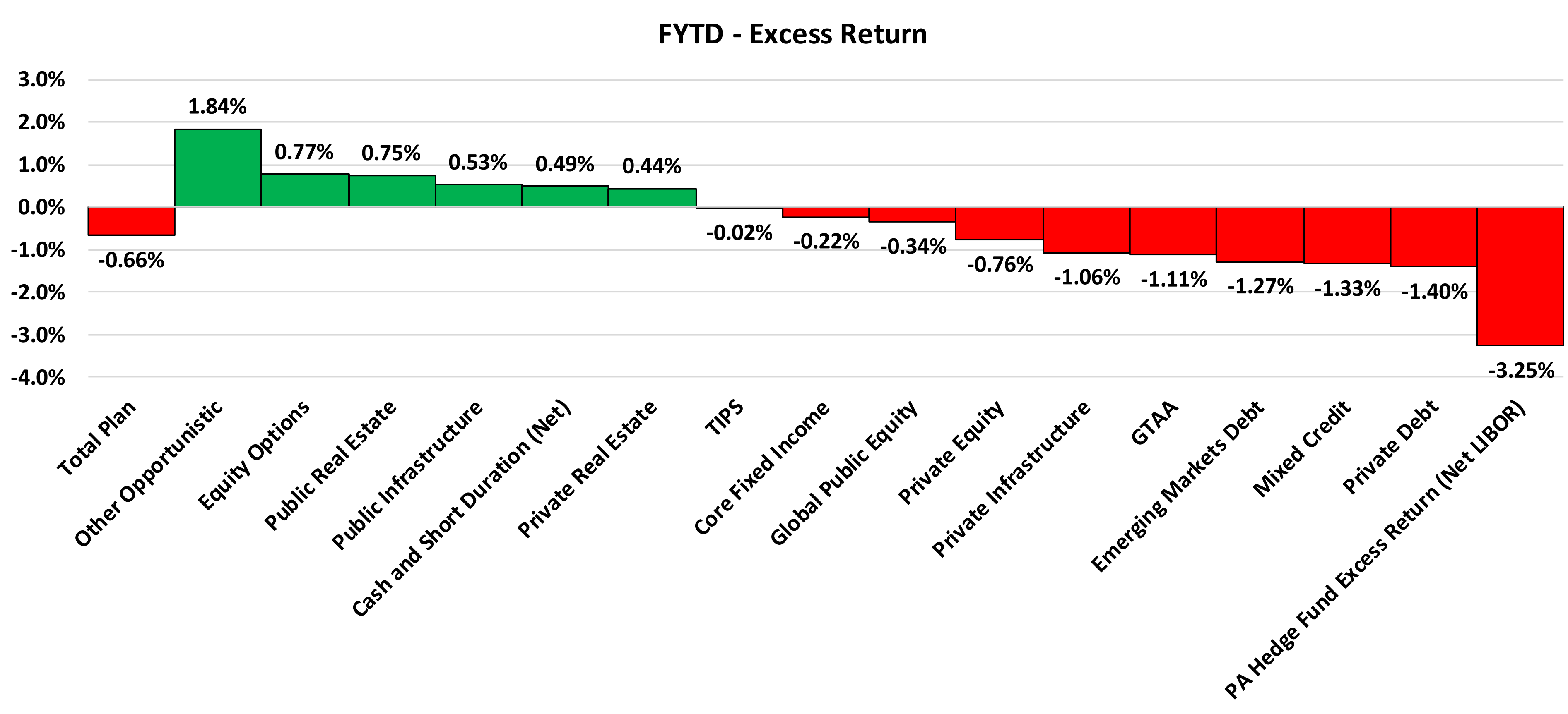
Performance – Plan & Asset Classes[1,3,4,10]

As of June 30, 2019

Asset Class / Benchmark returns as of 06/30/19	Plan Weight	3 Month	YTD	FYTD	Annualized 1 Year	Annualized 3 Years	Annualized 5 Years
Total Plan	100.0%	2.65%	10.79%	5.84%	5.84%	8.48%	5.26%
Policy Benchmark		*3.93%*	*10.35%*	*6.50%*	*6.50%*	*8.51%*	*5.45%*
Global Public Equity	37.3%	3.34%	16.09%	4.11%	4.11%	11.29%	5.84%
Global Public Equity Blend		*3.17%*	*15.70%*	*4.45%*	*4.45%*	*11.38%*	*6.02%*
Equity Options	7.1%	1.94%	8.84%	2.40%	2.40%	6.85%	n/a
Blended Equity Options BM		*2.86%*	*9.16%*	*1.63%*	*1.63%*	*6.91%*	n/a
Private Equity	7.1%	3.10%	4.08%	8.47%	8.47%	12.81%	10.30%
Private Equity Blend		*13.85%*	*-1.30%*	*9.23%*	*9.23%*	*15.28%*	*11.76%*
GTAA	7.5%	2.60%	13.29%	4.77%	4.77%	5.44%	2.96%
GTAA Benchmark Blend		*3.23%*	*12.51%*	*5.88%*	*5.88%*	*6.59%*	*3.97%*
Other Opportunistic	1.8%	-1.87%	5.44%	7.72%	7.72%	n/a	n/a
GTAA Benchmark Blend		*3.23%*	*12.51%*	*5.88%*	*5.88%*	n/a	n/a
Core Fixed Income	5.3%	2.78%	5.82%	7.65%	7.65%	2.50%	2.87%
Barclays US Aggregate Bond Index		*3.08%*	*6.11%*	*7.87%*	*7.87%*	*2.31%*	*2.95%*
TIPS	1.9%	2.85%	6.16%	4.82%	4.82%	n/a	n/a
Barclays US Treasury Inflations Notes		*2.86%*	*6.15%*	*4.84%*	*4.84%*	n/a	n/a
Cash and Short Duration (Net)	6.3%	0.82%	1.73%	2.80%	2.80%	1.45%	1.11%
ICE BofA Merrill Lynch 3-Month T-Bill		*0.64%*	*1.24%*	*2.31%*	*2.31%*	*1.38%*	*0.87%*
Mixed Credit	4.2%	1.93%	5.31%	4.39%	4.39%	6.45%	2.87%
Mixed Credit Blend		*2.09%*	*7.83%*	*5.72%*	*5.72%*	*6.38%*	*4.53%*
Private Debt	6.3%	1.10%	3.34%	3.07%	3.07%	6.85%	4.79%
S&P/LSTA Leveraged Loan + 150 Bps on a 3-month lag		*4.47%*	*1.11%*	*4.47%*	*4.47%*	*7.17%*	*5.12%*
Emerging Markets Debt	3.4%	4.76%	9.94%	9.50%	9.50%	4.98%	2.81%
Emerging Markets Debt Blend		*4.86%*	*10.03%*	*10.77%*	*10.77%*	*4.91%*	*2.46%*
Private Real Estate	7.5%	0.95%	2.23%	6.90%	6.90%	8.82%	11.65%
Private Real Estate Custom Benchmark		*1.11%*	*2.53%*	*6.46%*	*6.46%*	*8.11%*	*10.55%*
Public Real Estate	1.3%	2.10%	19.29%	11.96%	11.96%	5.19%	n/a
FTSE NAREIT Equity REITs Index		*1.24%*	*17.78%*	*11.21%*	*11.21%*	*4.20%*	n/a
Public Infrastructure	2.5%	4.69%	20.84%	13.22%	13.22%	6.60%	n/a
Private Infrastructure	0.5%	5.09%	2.98%	11.63%	11.63%	n/a	n/a
Dow Jones Brookfield Global Infrastructure Net Index		*4.32%*	*20.73%*	*12.69%*	*12.69%*	*7.64%*	n/a
PA Hedge Fund Excess Return (Net LIBOR)	9.7%	0.04%	0.01%	-0.75%	-0.75%	3.79%	3.49%
Portable Alpha HF Blend		*0.62%*	*1.24%*	*2.50%*	*2.50%*	*0.83%*	*1.01%*
PA Collateral Excess Return (Net LIBOR)	14.3%	0.18%	0.33%	-0.13%	-0.13%	1.76%	n/a
Portable Alpha Benchmark		*0.34%*	*0.67%*	*1.31%*	*1.31%*	*0.48%*	n/a

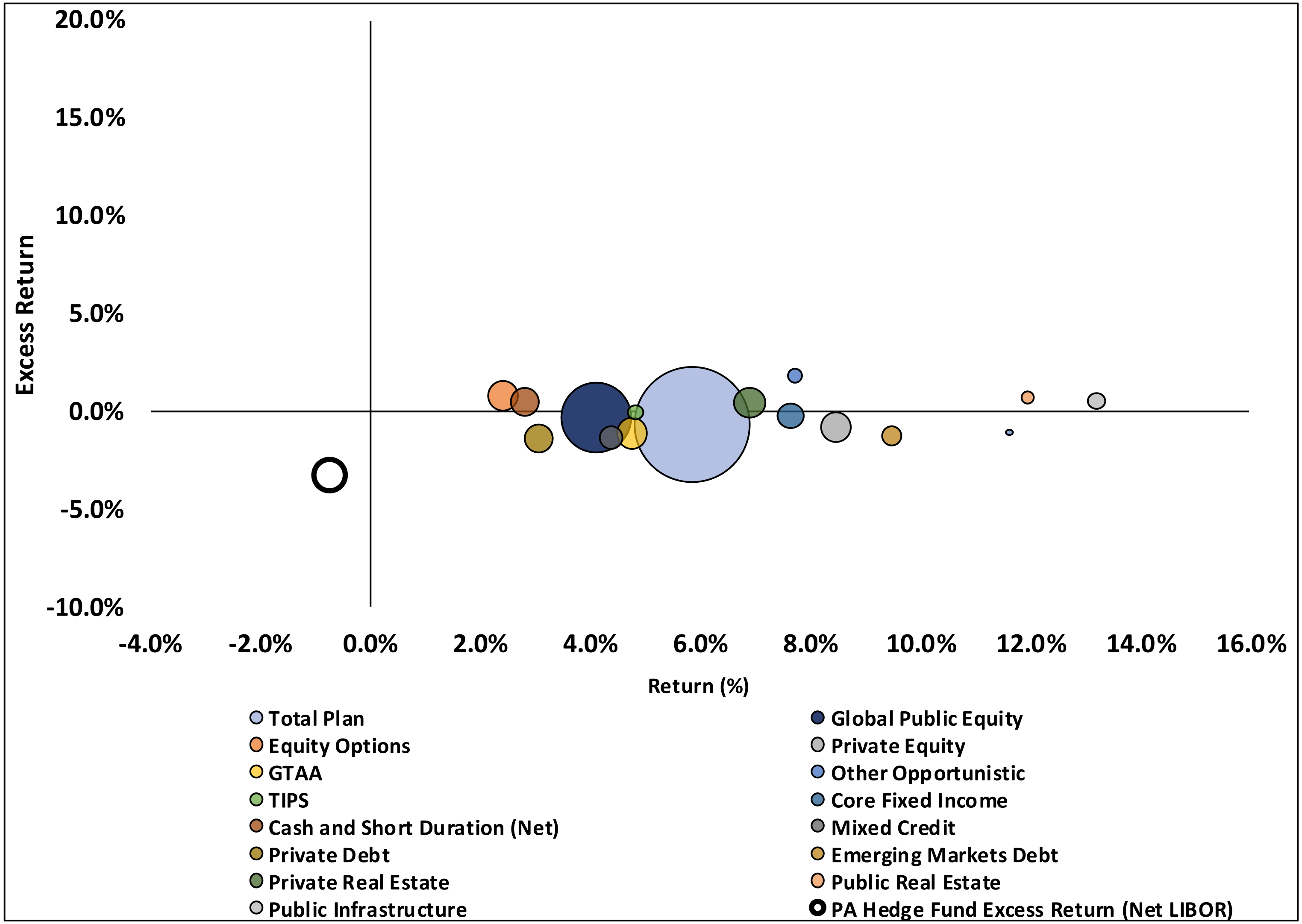
Relative Performance to Policy Benchmarks[1,3,4,10]

FYE June 30, 2019



FYTD Asset Class Returns & Excess[3,4,5,10]

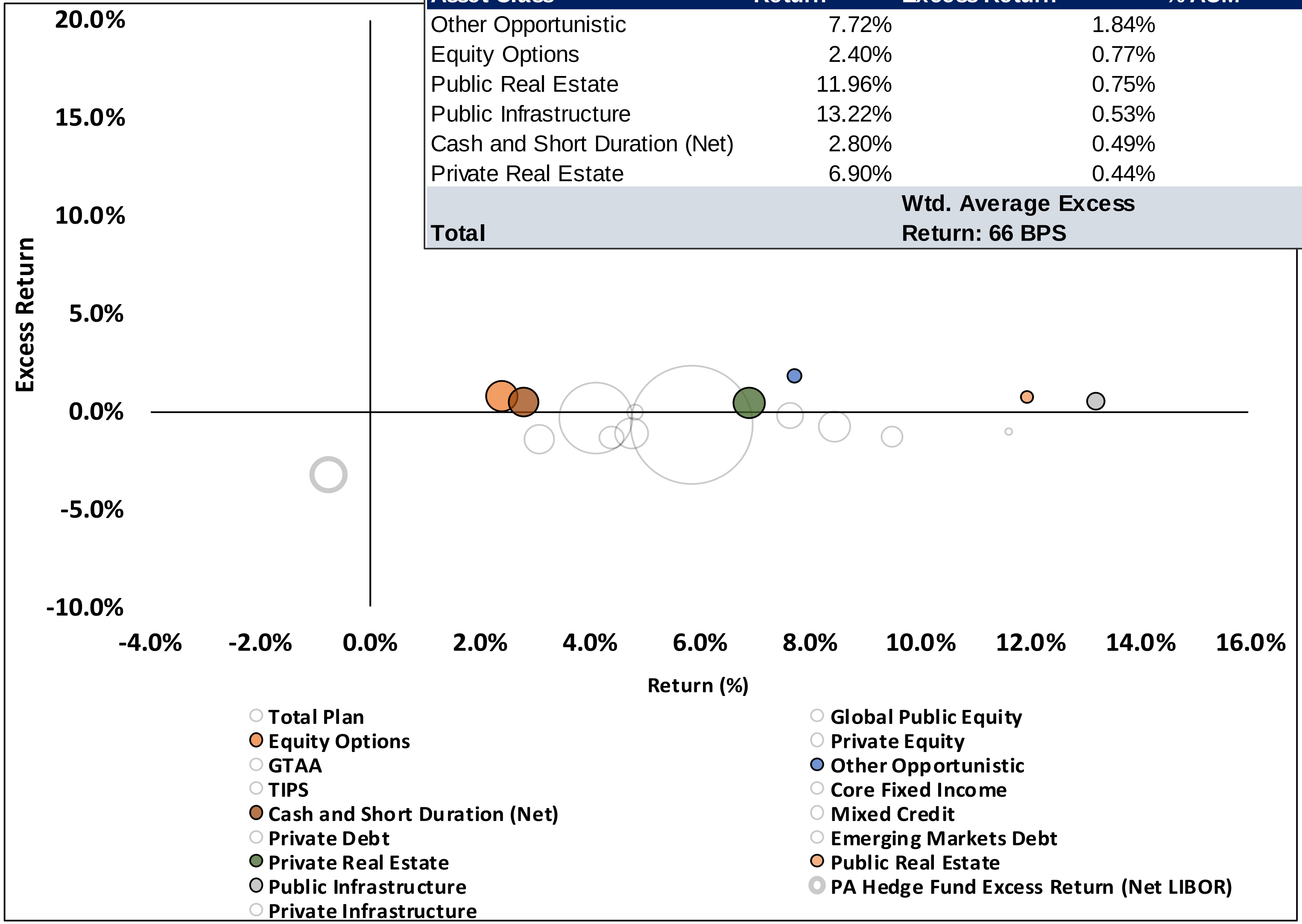
FYE June 30, 2019



FYTD Asset Class Returns & Excess[3,4,5,10]

FYE June 30, 2019

Asset Class	Return	Excess Return	% AUM
Other Opportunistic	7.72%	1.84%	1.79%
Equity Options	2.40%	0.77%	7.11%
Public Real Estate	11.96%	0.75%	1.35%
Public Infrastructure	13.22%	0.53%	2.50%
Cash and Short Duration (Net)	2.80%	0.49%	6.28%
Private Real Estate	6.90%	0.44%	7.54%
Total		**Wtd. Average Excess Return: 66 BPS**	**26.56%**

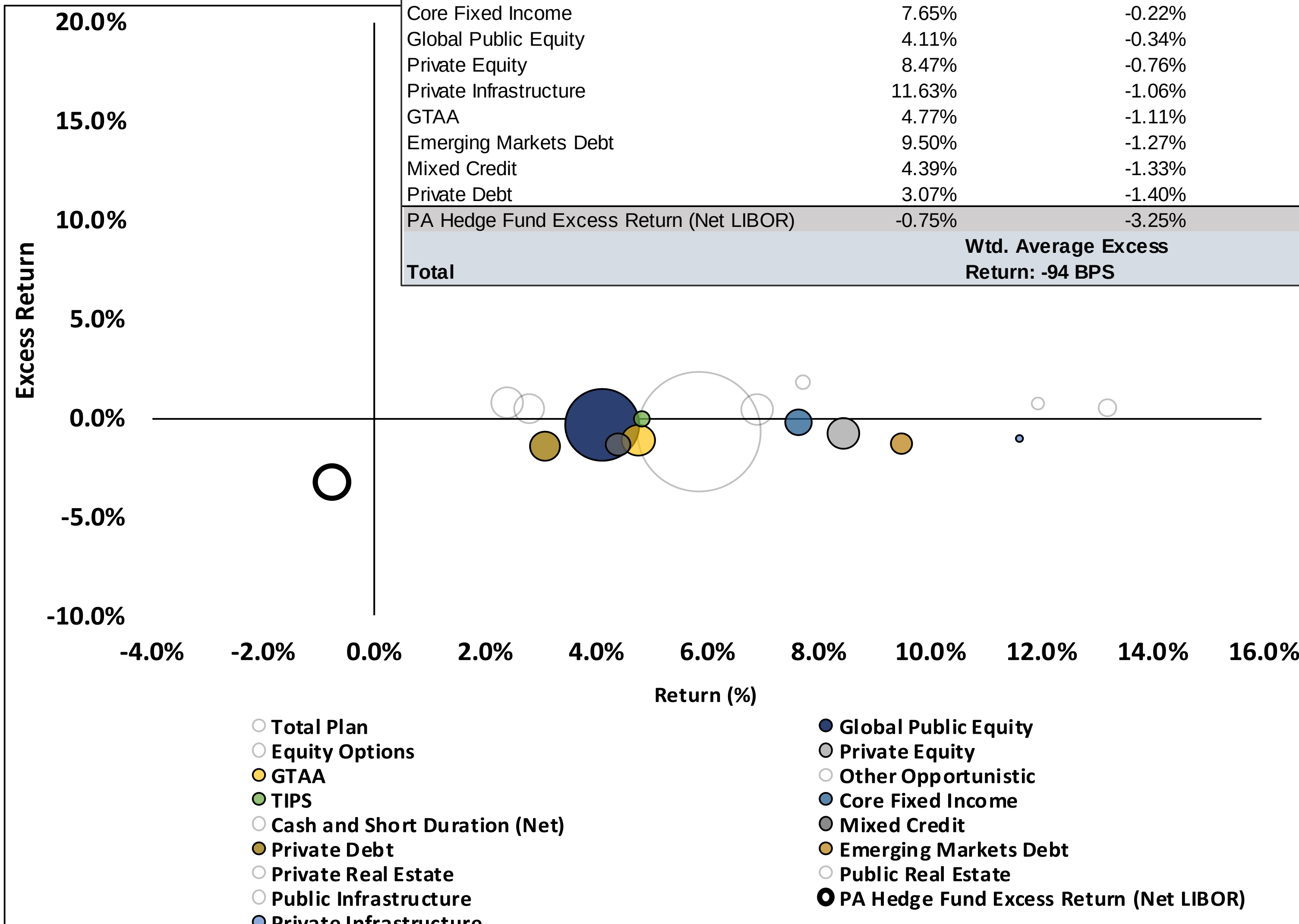


STATE OF SOUTH CAROLINA
RETIREMENT SYSTEM INVESTMENT COMMISSION

FYTD Asset Class Returns & Excess[3,4,5,10]

FYE June 30, 2019

Asset Class	Return	Excess Return	% AUM
TIPS	4.82%	-0.02%	1.93%
Core Fixed Income	7.65%	-0.22%	5.29%
Global Public Equity	4.11%	-0.34%	37.26%
Private Equity	8.47%	-0.76%	7.10%
Private Infrastructure	11.63%	-1.06%	0.46%
GTAA	4.77%	-1.11%	7.52%
Emerging Markets Debt	9.50%	-1.27%	3.36%
Mixed Credit	4.39%	-1.33%	4.19%
Private Debt	3.07%	-1.40%	6.33%
PA Hedge Fund Excess Return (Net LIBOR)	-0.75%	-3.25%	9.65%
Total		**Wtd. Average Excess Return: -94 BPS**	**73.44%**



Attribution of Plan Excess Returns to Policy Benchmark[1,3,4,7,10]

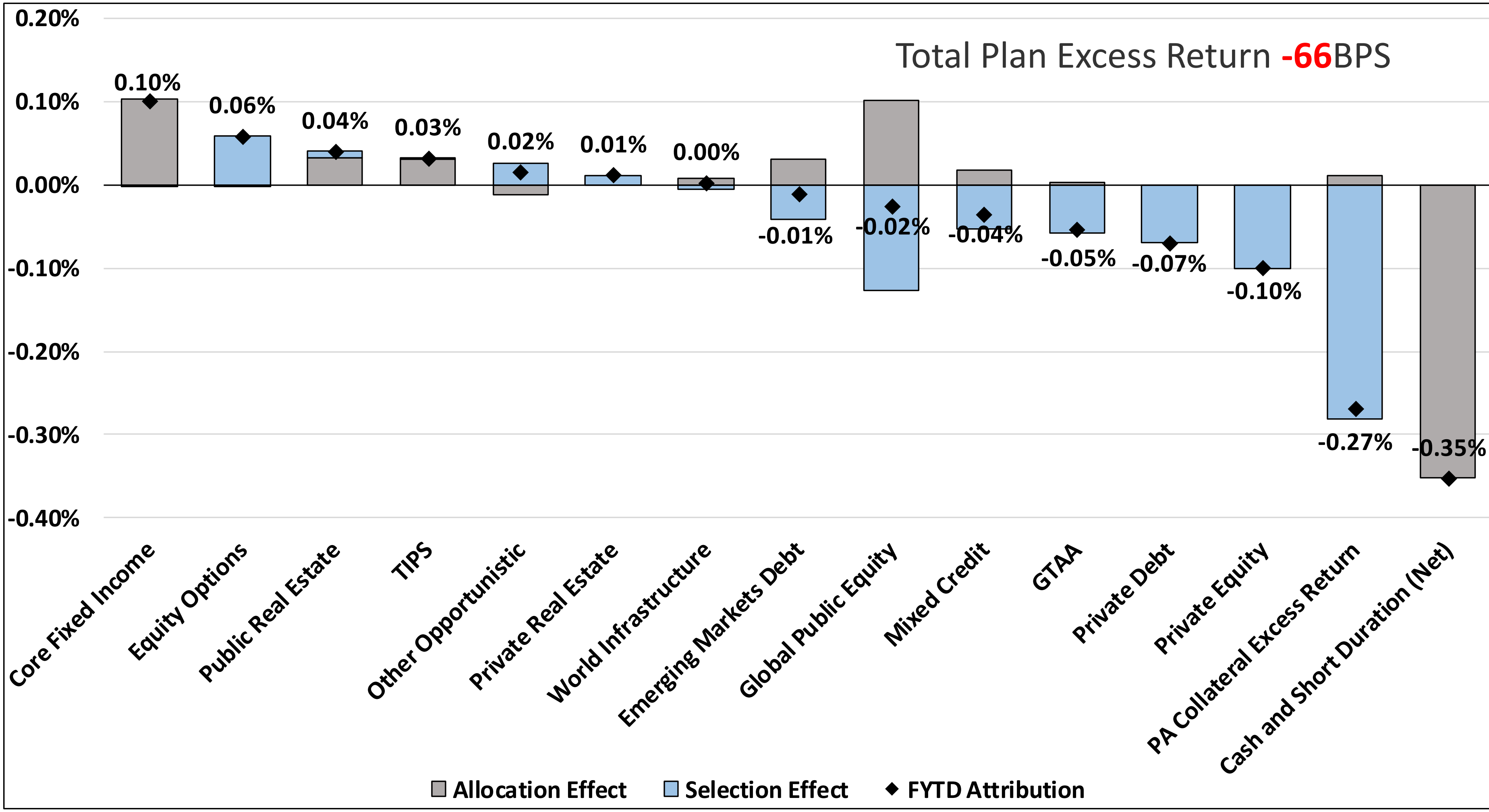
FYE June 30, 2019

Fiscal Year Attribution	Total Attribution	Allocation Effect	Selection Effect	Average O/U Weight	Asset Class FY Return	Asset Class BM Return
Core Fixed Income	0.10%	0.10%	0.00%	-3.31%	7.65%	7.87%
Equity Options	0.06%	0.00%	0.06%	-0.21%	2.40%	1.63%
Public Real Estate	0.04%	0.03%	0.01%	0.03%	11.96%	11.21%
TIPS	0.03%	0.03%	0.00%	-0.42%	4.82%	4.84%
Other Opportunistic	0.02%	-0.01%	0.03%	0.74%	7.72%	5.88%
Private Real Estate	0.01%	0.00%	0.01%	0.00%	6.90%	6.46%
World Infrastructure	0.00%	0.01%	-0.01%	0.00%	12.55%	12.69%
Emerging Markets Debt	-0.01%	0.03%	-0.04%	-0.28%	9.50%	10.77%
Global Public Equity	-0.02%	0.10%	-0.13%	2.87%	4.11%	4.45%
Mixed Credit	-0.04%	0.02%	-0.05%	-0.58%	4.39%	5.72%
GTAA	-0.05%	0.00%	-0.06%	0.42%	4.77%	5.88%
Private Debt	-0.07%	0.00%	-0.07%	0.00%	3.07%	4.47%
Private Equity	-0.10%	0.00%	-0.10%	0.00%	8.47%	9.23%
Cash and Short Duration (Net)	-0.35%	-0.35%	0.00%	0.74%	2.31%	2.31%
PA Collateral Excess Return	-0.27%	0.01%	-0.28%	0.03%	-0.13%	1.31%
PA Hedge Fund Excess Return	-0.31%	0.01%	-0.32%	0.03%	-0.75%	2.50%
Ported Short Duration	0.05%	0.00%	0.05%	n/a	1.18%	n/a
Ported Cash	-0.01%	0.00%	-0.01%	n/a	-0.13%	n/a

	Total Plan Excess Return	Allocation Effect	Selection Effect	Interaction / Other	RSIC Return	RSIC Policy Benchmark Return
FYTD Total	-0.66%	-0.03%	-0.63%	-0.01%	5.84%	6.50%

Attribution of Plan Excess Returns to Policy Benchmark[1,3,4,7,10]

FYE June 30, 2019



APPENDIX

Asset Allocation and SIOP Compliance

FYE June 30, 2019

Asset Allocation	Market Value as of 06/30/19	Overlay Exposures	Net Position	% of Total Plan	Policy Targets	Difference	Allowable Ranges	SIOP Compliance
Equities	**13,439**		**16,460**	**51.5%**	**51.0%**	**0.5%**	**31% - 59%**	YES
Global Public Equity	9,347	2,570	11,917	37.3%	36.7%	0.6%	22% - 50%	YES
Equity Options	1,822	450	2,272	7.1%	7.0%	0.1%	5% - 9%	YES
Private Equity	2,270	0	2,270	7.1%	7.3%	-0.2%	5% - 13%	YES
Real Assets	**3,789**		**3,789**	**11.8%**	**12.0%**	**-0.2%**	**7% - 17%**	YES
Private Real Estate	2,413		2,413	7.5%	7.5%	0.0%	0% - 13%	YES
Public Real Estate	431		431	1.3%	1.5%	-0.1%	0% - 13%	YES
Private Infrastructure	147		147	0.5%	0.4%	0.0%	0% - 5%	YES
Public Infrastructure	798		798	2.5%	2.6%	-0.1%	0% - 5%	YES
Opportunistic	**2,977**		**2,977**	**9.3%**	**8.0%**	**1.3%**		
GTAA	2,404	0	2,404	7.5%	7.0%	0.5%	3% - 11%	YES
Other Opportunistic	573	0	573	1.8%	1.0%	0.8%	0% - 3%	YES
Credit	**4,439**		**4,439**	**13.9%**	**15.0%**	**-1.1%**	**10% - 20%**	YES
Mixed Credit	1,341		1,341	4.2%	4.9%	-0.7%	0% - 8%	YES
Emerging Markets Debt	1,075		1,075	3.4%	4.0%	-0.6%	2% - 6%	YES
Private Debt	2,023		2,023	6.3%	6.1%	0.2%	3% - 11%	YES
Rate Sensitive	**4,250**		**4,315**	**13.5%**	**14.0%**	**-0.5%**	**4% - 24%**	YES
Core Fixed Income	768	1,539	2,308	7.2%	13.0%	-5.8%	6% - 20%	YES
Cash and Short Duration (Net)	3,481	-1,474	2,008	6.3%	1.0%	5.3%	0% - 7%	YES
Portable Alpha Hedge Funds	3,086	-3,086	0	9.7%*	10.0%	-0.3%	0% - 12%	YES
Total Plan	**$31,980**	-	**$31,980**	**100.0%**	**110.0%**			
Total Hedge Funds	3,310		**$3,310**	**10.4%**	n/a	n/a	0% - 20%	YES
Total Private Markets	6,853	-	**$6,853**	**21.4%**	n/a	n/a	14% - 25%	YES

Total Hedge Fund exposure: 10.4% and consisted of: 9.7% Portable Alpha Hedge Funds, 0.7% to a hedge fund in Mixed Credit *Portable Alpha Hedge Funds are expressed and benchmarked as gross exposure but employed in conjunction with the Overlay Program and are offset when looking at total plan market value.

Footnotes & Disclosures

Footnotes

1. Represents asset class benchmarks as of reporting date. Benchmarks for asset classes may have changed over time.
2. Benefit payments are the net of Plan contributions and disbursements.
3. "Cash" market value is the aggregate cash held at the custodian, Russell Investments, and strategic partnerships.
4. Asset class exposures and returns include blended physical and synthetic returns and current notional values (EM Debt, GTAA, Global Public Equity, Real Estate, Core Fixed Income, Private Equity, TIPS, Equity Options, and Commodities). Synthetic returns are provided by Russell Investments gross of financing costs. To accommodate for financing costs, LIBOR is added to the synthetic returns and removed from the collateral return.
5. Performance contribution methodology: Contribution is calculated by taking the sum of the [beginning weight] X [monthly return].
6. Source: Russell Investments; Net notional exposure.
7. Allocation Effect: [Asset Class Weight – Policy Weight] * [Benchmark Return – Plan Policy Benchmark]
   Selection Effect: [Asset Class Return – Policy Benchmark Return] * Asset Class Weight in Plan
8. The target weights to Private Equity, Private Debt, and Private Real Estate will be equal to their actual weights, reported by the custodial bank, as of the prior month end. When flows have occurred in the asset classes, flow adjusted weights are used to more accurately reflect the impact of the asset class weights. In the case of Private Equity, the use of the flow adjusted weight will affect the target allocation to Public Equity, such that the combined target weight of both asset classes shall equal 44% of the Plan. For Private Debt, the use of the flow adjusted weight will affect the target allocation to Mixed Credit, such that the combined target weight of both asset classes shall equal 11% of the Plan. For Private Real Estate, the use of the flow adjusted weight will affect the target allocation to Public Real Estate, such that the combined target weight of both asset classes shall equal 9% of the Plan. For Private Infrastructure, the use of the flow adjusted weight will affect the target allocation to Public Infrastructure, such that the combined target weight of both asset classes shall equal 3% of the Plan.
9. Policy Ending Value is an estimate of the Plan NAV had it earned the Policy Benchmark return.
10. Collateral held to support the overlay program represents opportunity cost associated with financing the overlay program. The Overlay collateral consists of Ported Cash, Ported Short Duration, and Portable Alpha Hedge Funds. The cost of holding these assets is proxied using 3 Month LIBOR. PA Hedge Funds and PA Collateral are expressed in this report as excess return over *LIBOR.* These benchmarks are not components of the Policy benchmark. The Portable Alpha Hedge Fund benchmark is considered a return target.
11. RSIC Peer Universe is Bank of New York Public Plans Greater than $5 Billion. The universe includes fund returns that are gross of invoiced fees. The RSIC percentile rank represents the RSIC return gross of invoiced fees.

Disclosures

- Returns are provided by BNY Mellon and are time-weighted, total return calculations. Net of fee performance is calculated and presented after the deduction of fees and expenses. Periods greater than one year are annualized. Past performance is no guarantee of future results. Policy benchmark is the blend of asset class policy benchmarks using policy weights. Asset class benchmarks and policy weights are reviewed annually by the Commission's consultant and adopted by the Commission and have changed over time. The policy benchmark return history represents a blend of these past policies.
- Overlay allocation detail is provided by Russell Investments.
- This report was compiled by the staff of the South Carolina Retirement System Investment Commission and has not been reviewed, approved or verified by the external investment managers. No information contained herein should be used to calculate returns or compare multiple funds, including private equity funds.
- Effective October 1, 2005, the State Retirement System Preservation and Investment Reform Act ("Act 153") established the Commission and devolved fiduciary responsibility for investment and management of the assets of the South Carolina Retirement Systems upon RSIC.
- Allocation / exposure percentages might not add up to totals due to rounding.

Footnotes & Disclosures

Benchmarks

- **Global Public Equity Blend**:
  7/2018 – Present: Weighted average of regional sub-asset class targets in Policy Portfolio. 51.4% MSCI US IMI Index for U.S. Equity, 31.4% MSCI World ex-US IMI Index for Developed Market Equity (non-U.S.), and 17.1% MSCI Emerging Markets IMI Index for Emerging Market Equity
  7/2016 – 6/2018: MSCI All-Country World Investable Markets Index (net of dividends)
  Prior to 7/2016: MSCI All-Country World Index (net of dividends)

- **Equity Options Strategies:**
  7/2018 – Present: 50% CBOE S&P Buy Write Index (BXM) / 50% CBOE S&P 500 Put Write Index (PUT)
  Prior to 6/2018: CBOE S&P 500 Buy Write Index (BXM)

- **Private Equity Blend**: 80% Russell 3000 Index on a 3-month lag / 20% MSCI EAFE (net of dividends) on a 3-month lag Plus 300 basis points

- **Core Fixed Income**: Bloomberg Barclays US Aggregate Bond Index

- **Emerging Market Debt**: 50% JP Morgan EMBI Global Diversified (US Dollar) / 50% JP Morgan GBIEM Global Diversified (Local)

- **Private Debt** : S&P/LSTA Leveraged Loan Index + 150 basis points on a 3-month lag

- **Mixed Credit Blend**:
  7/2016 – Present: 1/2 Bloomberg Barclays US Corporate High Yield 2% Issuer Capped Bond Index
  1/2 S&P/LSTA Leveraged Loan Index
  Prior to 6/2016: 1/3 Bloomberg Barclays US Corporate High Yield 2% Issuer Capped Bond Index
  1/3 S&P/LSTA Leveraged Loan Index
  1/3 Bloomberg Barclays US Mortgage Backed Securities (MBS) Index

- **GTAA Blend**:
  7/2018 – Present: Total System Policy Benchmark ex-Private Markets and Portable Alpha
  7/2016 – 6/2018: 50% MSCI World Index (net of dividends)
  50% Bloomberg Barclays US Aggregate Bond Index
  Prior to 7/2016: 50% MSCI World Index (net of dividends)
  50% FTSE World Government Bond Index (WGBI)

- **Other Opportunistic**:
  7/2018 – Present: Total System Policy Benchmark ex-Private Markets and Portable Alpha
  7/2016 – 6/2018: 50% MSCI World Index (net of dividends)
  50% Bloomberg Barclays US Aggregate Bond Index

- **Private Real Estate Blend:**
  7/2018 – Present: NCREIF Open-End Diversified Core (ODCE) Index *Net of Fees* + 100 basis points
  Prior to 6/2018: NCREIF Open-end Diversified Core (ODCE) Index *Gross of Fees* + 75 basis points

- **Public Real Estate:** FTSE NAREIT Equity REITs Index

- **Infrastructure:** Dow Jones Brookfield Global Infrastructure Index

- **Cash & Short Duration**: ICE BofA Merrill Lynch 3-Month US Treasury Bill Index

- **Portable Alpha Hedge Fund Blend**:
  7/2018 – Present: ICE BofA Merrill Lynch 3-Month T-Bills + 250 basis points
  7/2016-6/2018: *Prior to FY 2019, there was not a benchmark for Portable Alpha Hedge Funds, so effectively* zero
  Prior to 7/2016 HFRI Fund Weighted Composite Index (NOTE: PA HFs were considered Low Beta Hedge Funds at this time).

- **Portable Alpha Benchmark**:
  7/2018 – Present: *Weighted average of monthly weights for PA Hedge Funds* ICE BofA Merrill Lynch 3-Month T-Bills + 250 basis points, and Zero for Ported Cash and Short Duration
  7/2016-6/2018: *Prior to FY 2019, there was not a benchmark for Portable Alpha Hedge Funds, so effectively* zero

Meeting Material

South Carolina Retirement System Investment Commission

Performance Report
As of June 30, 2019

Total Retirement System

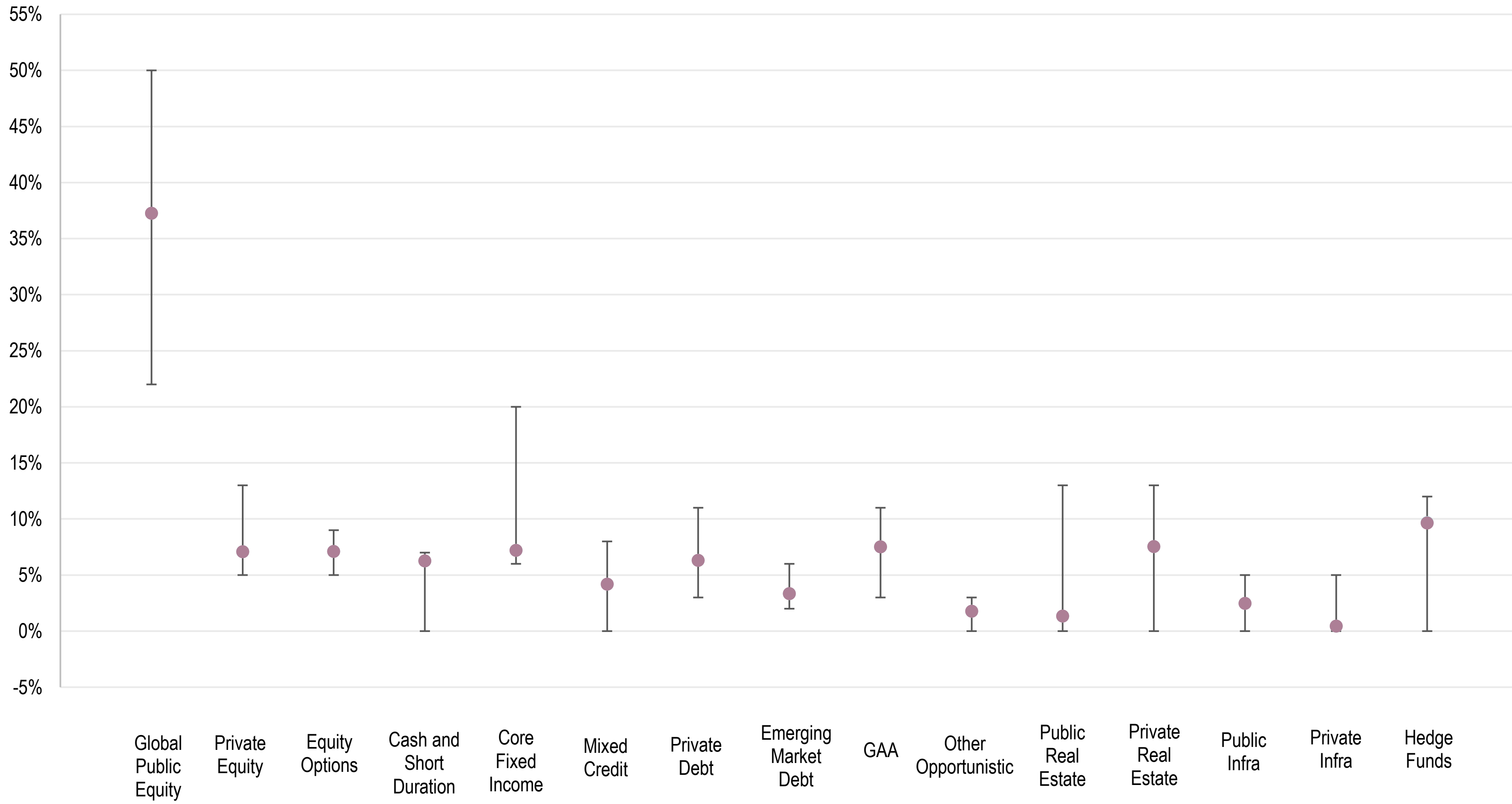
As of June 30, 2019

Allocation vs. Targets and Policy

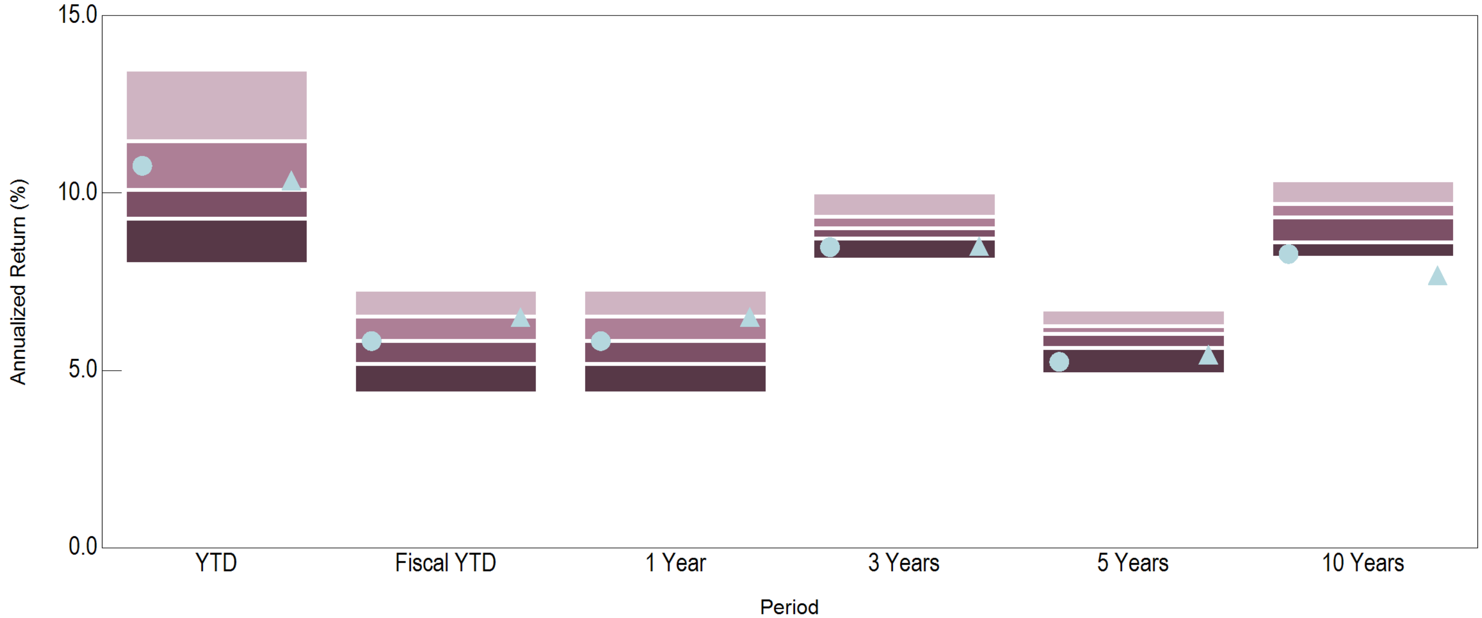
	MV at 6/30/2019	Overlay Exposures	Net Position	% of Total System	% of Total System (Net)	FY 19 Policy Targets	Allowable Ranges	SIOP Compliance?
Total System	**31,979,716,057**	**-**	**31,979,716,057**	**100%**	**100%**	**110%**	**-**	**-**
Equity	**13,439,183,911**	**3,020,364,174**	**16,459,548,085**	**42%**	**51%**	**51%**	**31-59%**	**Yes**
Global Public Equity	9,347,283,515	2,569,922,574	11,917,206,089	29%	37%	37%	22-50%	Yes
Private Equity	2,270,082,739	-	2,270,082,739	7%	7%	7%	5-13%	Yes
Equity Options	1,821,817,657	450,441,600	2,272,259,257	6%	7%	7%	5-9%	Yes
Conservative Fixed Income	**4,249,528,421**	**65,723,283**	**4,315,251,704**	**13%**	**13%**	**14%**	**4-24%**	**Yes**
Cash and Short Duration	3,481,286,114	(1,473,564,893)	2,007,721,221	11%	6%	1%	0-7%	Yes
Core Fixed Income	768,242,307	1,539,288,177	2,307,530,484	2%	7%	13%	6-20%	Yes
Diversified Credit	**4,438,970,567**	**-**	**4,438,970,567**	**14%**	**14%**	**15%**	**10-20%**	**Yes**
Mixed Credit	1,341,334,413	-	1,341,334,413	4%	4%	5%	0-8%	Yes
Private Debt	2,022,972,563	-	2,022,972,563	6%	6%	6%	3-11%	Yes
Emerging Market Debt	1,074,663,591	-	1,074,663,591	3%	3%	4%	2-6%	Yes
Opportunistic	**2,977,309,382**	**-**	**2,977,309,382**	**9%**	**9%**	**8%**		
GAA	2,404,366,400		2,404,366,400	8%	8%	7%	3-11%	Yes
Other Opportunistic	572,942,982	-	572,942,982	2%	2%	1%	0-3%	Yes
Real Assets	**3,788,636,319**	**-**	**3,788,636,319**	**12%**	**12%**	**12%**	**7-17%**	**Yes**
Public Real Estate	430,728,340	-	430,728,340	1%	1%	1%	0-13%	Yes
Private Real Estate	2,412,646,956	-	2,412,646,956	8%	8%	8%	0-13%	Yes
Public Infrastructure	798,351,924	-	798,351,924	2%	2%	3%	0-5%	Yes
Private Infrastructure	146,909,099	-	146,909,099	0%	0%	0%	0-5%	Yes
Hedge Funds PA	3,086,087,457	(3,086,087,457)	-	10%	0%	10%	0-12%	**Yes**

Includes cash in the Russell Overlay separate account.
Percentages may not sum to 100% due to rounding.

Actual vs. Policy Ranges:
(Including Overlay)

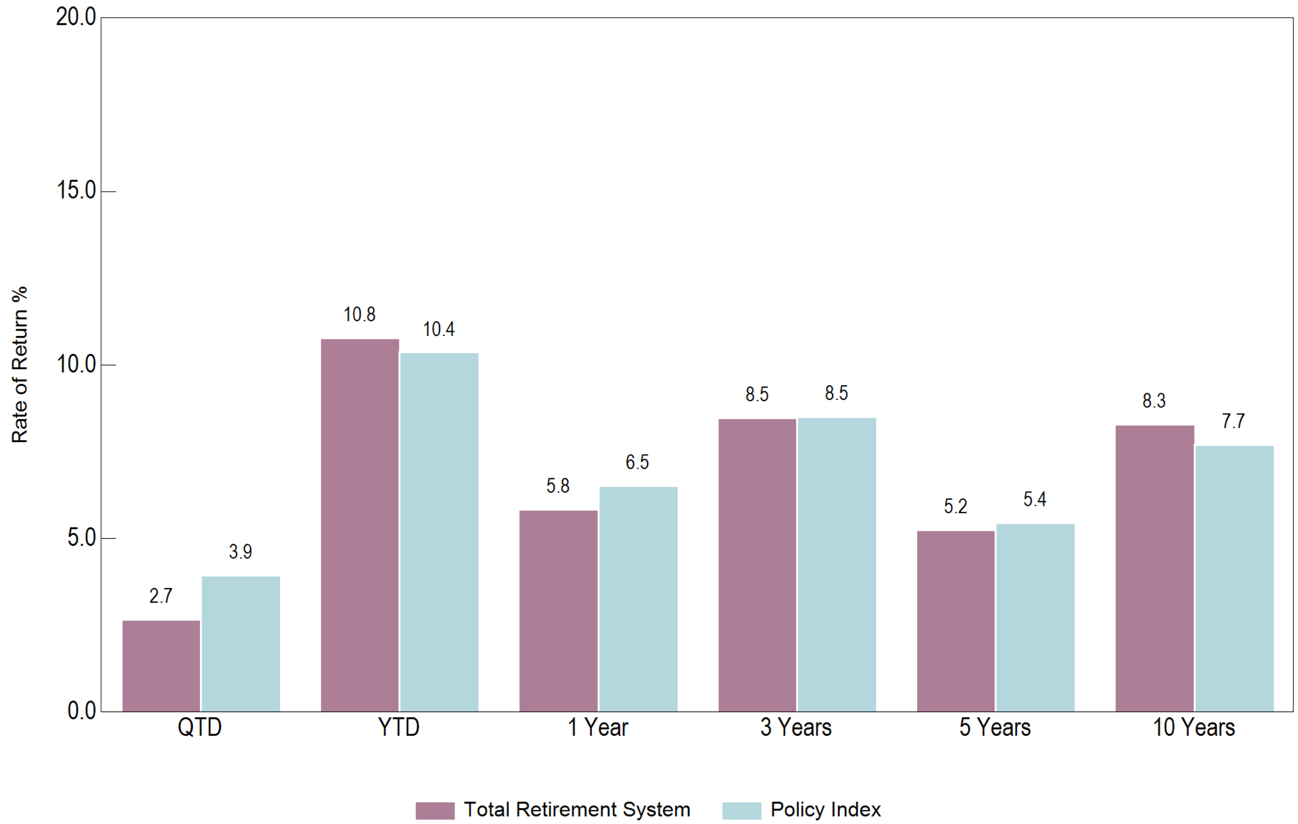


InvMetrics Public DB > $5B Net Return Comparison
Ending June 30, 2019



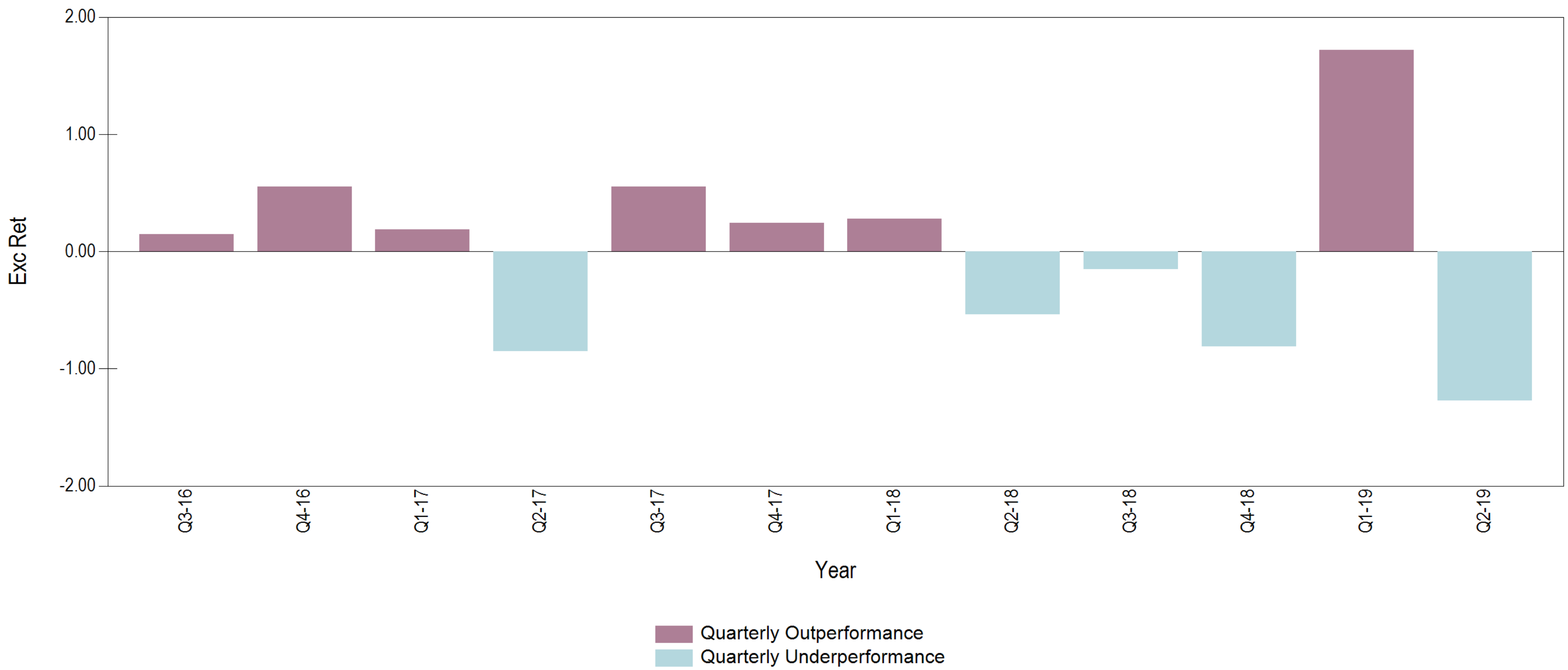
	Return (Rank)											
5th Percentile	13.5		7.3		7.3		10.0		6.7		10.3	
25th Percentile	11.5		6.5		6.5		9.3		6.3		9.7	
Median	10.1		5.8		5.8		9.0		6.0		9.3	
75th Percentile	9.3		5.2		5.2		8.7		5.6		8.6	
95th Percentile	8.0		4.4		4.4		8.1		4.9		8.2	
# of Portfolios	31		30		30		30		27		25	
Total Retirement System	10.8	(35)	5.8	(51)	5.8	(51)	8.5	(82)	5.2	(87)	8.3	(93)
Policy Index	10.4	(44)	6.5	(26)	6.5	(26)	8.5	(82)	5.4	(85)	7.7	(99)

Net Return Summary
Ending June 30, 2019



Returns for periods greater than one year are annualized.

Quarterly Excess Performance vs. Policy Benchmark



Total Retirement System

As of June 30, 2019

Net Asset Class Performance Summary

	Market Value ($)	% of Portfolio	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Total Retirement System	**31,979,716,060**	**100.0**	**2.7**	**10.8**	**5.8**	**8.5**	**5.2**	**8.3**	**6.3**	**Jul-94**
Policy Index			*3.9*	*10.4*	*6.5*	*8.5*	*5.4*	*7.7*	*5.8*	*Jul-94*
Global Public Equity	**9,347,283,515**	**29.2**	**3.1**	**15.7**	**2.7**	**11.0**	**5.8**	**10.4**	**4.6**	**Jun-99**
FY '19 Global Public Equities Custom Benchmark			*3.2*	*15.7*	*4.5*	*11.4*	*6.0*	*10.1*	*5.0*	*Jun-99*
Private Equity	**2,270,082,739**	**7.1**	**3.1**	**4.1**	**8.5**	**12.7**	**10.2**	**12.6**	**7.8**	**Apr-07**
80% Russell 3000/20% MSCI EAFE + 300 basis points on a 3-month lag			*13.9*	*-1.3*	*9.2*	*15.3*	*11.8*	*17.6*	*14.4*	*Apr-07*
Equity Options	**1,821,817,657**	**5.7**	**1.7**	**8.8**	**3.0**	**7.1**	**--**	**--**	**7.1**	**Jul-16**
FY '19 CBOE 50/50 Put/Buy			*2.9*	*9.2*	*1.6*	*6.9*	*5.7*	*8.1*	*6.9*	*Jul-16*
Short Duration	**1,154,502,786**	**3.6**	**1.1**	**2.5**	**3.8**	**2.1**	**1.8**	**--**	**1.9**	**Mar-10**
BBgBarc US Govt/Credit 1-3 Yr. TR			*1.5*	*2.7*	*4.3*	*1.6*	*1.5*	*1.6*	*1.4*	*Mar-10*
Cash and Overlay	**2,326,783,328**	**7.3**	**0.6**	**1.0**	**1.9**	**0.8**	**0.3**	**0.2**	**1.1**	**Oct-05**
ICE BofAML 91 Days T-Bills TR			*0.6*	*1.2*	*2.3*	*1.4*	*0.9*	*0.5*	*1.3*	*Oct-05*
Core Fixed Income	**768,242,307**	**2.4**	**2.9**	**6.1**	**7.4**	**3.1**	**3.3**	**4.5**	**6.0**	**Jul-94**
BBgBarc US Aggregate TR			*3.1*	*6.1*	*7.9*	*2.3*	*2.9*	*3.9*	*5.5*	*Jul-94*
Mixed Credit	**1,341,334,413**	**4.2**	**1.9**	**5.3**	**4.4**	**6.5**	**2.9**	**7.4**	**6.1**	**May-08**
50% S&P LSTA Leveraged Loan Index/50% Barclays High Yield Index			*2.1*	*7.8*	*5.7*	*6.4*	*4.5*	*6.7*	*6.0*	*May-08*
Private Debt	**2,022,972,563**	**6.3**	**1.1**	**3.3**	**3.1**	**6.8**	**4.8**	**9.3**	**6.9**	**Jun-08**
S&P LSTA Leveraged Loan Index + 150 basis points on a 3-month lag			*4.5*	*1.1*	*4.5*	*7.2*	*5.1*	*9.5*	*5.2*	*Jun-08*
Emerging Market Debt	**1,074,663,591**	**3.4**	**4.8**	**10.0**	**9.6**	**5.0**	**2.8**	**5.4**	**5.4**	**Jul-09**
50% JP Morgan EMBI Global Diversified (USD)/50% JP Morgan EMBI Global Diversified			*4.9*	*10.0*	*10.8*	*4.9*	*2.5*	*5.6*	*5.6*	*Jul-09*
GAA	**2,404,366,400**	**7.5**	**2.6**	**13.3**	**4.8**	**5.1**	**2.7**	**7.2**	**4.9**	**Aug-07**
Total System Policy Benchmark ex-Private Markets			*3.2*	*12.5*	*5.9*	*6.6*	*4.0*	*6.7*	*4.5*	*Aug-07*
Other Opportunistic	**572,942,982**	**1.8**	**-1.9**	**5.4**	**7.8**	**--**	**--**	**--**	**8.1**	**Jul-17**
Total System Policy Benchmark ex-Private Markets			*3.2*	*12.5*	*5.9*	*6.6*	*4.0*	*6.7*	*5.6*	*Jul-17*
Hedge Funds Portable Alpha	**3,086,087,457**	**9.7**	**0.7**	**1.3**	**1.8**	**5.6**	**4.7**	**8.1**	**7.9**	**Jul-07**
ICE BAML 3 Month T-Bill + 250 BPS SC Custom			*1.2*	*2.5*	*4.8*	*2.5*	*1.7*	*1.0*	*1.4*	*Jul-07*
Public Real Estate	**430,728,340**	**1.3**	**2.1**	**19.3**	**12.0**	**5.2**	**--**	**--**	**5.2**	**Jul-16**
FTSE NAREIT Equity REIT			*1.2*	*17.8*	*11.2*	*4.2*	*7.9*	*15.5*	*4.2*	*Jul-16*
Private Real Estate	**2,412,646,956**	**7.5**	**0.9**	**2.2**	**6.9**	**8.8**	**11.7**	**11.5**	**7.1**	**Jul-08**
NCREIF ODCE Net + 100 BPS SC Custom			*1.1*	*2.5*	*6.4*	*8.1*	*10.5*	*9.3*	*5.9*	*Jul-08*
Public Infrastructure	**798,351,924**	**2.5**	**4.7**	**20.8**	**13.2**	**6.6**	**--**	**--**	**7.0**	**Jun-16**
DJ Brookfield Global Infrastructure			*4.3*	*20.7*	*12.7*	*7.6*	*4.4*	*12.1*	*9.2*	*Jun-16*
Private Infrastructure	**146,909,099**	**0.5**	**5.1**	**3.0**	**11.6**	**--**	**--**	**--**	**11.6**	**Jul-18**
DJ Brookfield Global Infrastructure			*4.3*	*20.7*	*12.7*	*7.6*	*4.4*	*12.1*	*12.7*	*Jul-18*

Statistics Summary
5 Years Ending June 30, 2019

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Retirement System	5.2%	6.0%	-0.2	1.0	0.7	1.2%
Policy Index	5.4%	5.7%	--	1.0	0.8	0.0%
Global Public Equity	5.8%	11.7%	-0.2	1.0	0.4	1.3%
FY '19 Global Public Equities Custom Benchmark	6.0%	11.8%	--	1.0	0.4	0.0%
Private Equity	10.2%	3.7%	-0.1	0.1	2.5	10.8%
80% Russell 3000/20% MSCI EAFE + 300 basis points on a 3-month lag	11.8%	10.9%	--	1.0	1.0	0.0%
Short Duration	1.8%	0.7%	0.8	0.6	1.5	0.5%
BBgBarc US Govt/Credit 1-3 Yr. TR	1.5%	0.9%	--	1.0	0.7	0.0%
Cash and Overlay	0.3%	0.3%	-3.6	1.0	-2.0	0.2%
ICE BofAML 91 Days T-Bills TR	0.9%	0.3%	--	1.0	0.0	0.0%
Core Fixed Income	3.3%	2.8%	0.4	0.9	0.9	0.7%
BBgBarc US Aggregate TR	2.9%	2.9%	--	1.0	0.7	0.0%
Mixed Credit	2.9%	3.3%	-1.0	0.8	0.6	1.7%
50% S&P LSTA Leveraged Loan Index/50% Barclays High Yield Index	4.5%	3.4%	--	1.0	1.1	0.0%
Private Debt	4.8%	3.0%	-0.1	0.3	1.3	3.6%
S&P LSTA Leveraged Loan Index + 150 basis points on a 3-month lag	5.1%	3.0%	--	1.0	1.4	0.0%
Emerging Market Debt	2.8%	8.5%	0.3	1.1	0.2	1.4%
50% JP Morgan EMBI Global Diversified (USD)/50% JP Morgan EMBI Global Diversified	2.5%	8.0%	--	1.0	0.2	0.0%
GAA	2.7%	8.2%	-0.4	1.1	0.2	2.9%
Total System Policy Benchmark ex-Private Markets	4.0%	7.1%	--	1.0	0.4	0.0%
Hedge Funds Portable Alpha	4.7%	4.1%	0.7	-0.9	0.9	4.2%
ICE BAML 3 Month T-Bill + 250 BPS SC Custom	1.7%	0.5%	--	1.0	1.6	0.0%
Private Real Estate	11.7%	2.4%	0.3	0.1	4.5	4.6%
NCREIF ODCE Net + 100 BPS SC Custom	10.5%	4.1%	--	1.0	2.3	0.0%

Return calculations are rounded to the nearest tenth of percent and may differ slightly from BNYM reported returns.

Disclosure Appendix	
Item 1.	Fiscal year begins July 1.
Item 2.	All returns are presented net of management fees.
Item 3.	Policy index performance is calculated by multiplying each asset class target weight by the performance of its respective benchmark, with the exception of portable alpha hedge funds which is included in the policy benchmark as: target weight x 250 bps.
Item 4.	As stipulated in the Statement of Investment Objectives and Policies, the target weights to Private Equity, Private Debt, Real Estate and Private Market Infrastructure will be equal to their actual flow adjusted weights, reported by the custodial bank, as of the prior month end. In the case of Private Equity, the use of the actual flow adjusted weight will affect the target allocation to Global Equity (excluding Equity Options). For example, in FY 18-19, the combined target weight of both of these asset classes shall equal 44% of the Plan. For Private Debt, the use of the actual flow adjusted weight will affect the target allocation to Mixed Credit, such that the combined target weight of both asset classes in FY 18-19 shall equal 11% of the Plan. For private market Real Estate, the use of the actual flow adjusted weight will affect the target allocation to public market Real Estate (REITs), such that the combined target weight of both asset classes in FY 18-19 shall equal 9% of the Plan. For Private Market Infrastructure, the use of the actual flow adjusted weight will affect the target allocation to Public Infrastructure, such that the combined target weight of both asset classes in FY 18-19 shall equal 3% of the Plan.
Item 5.	Overlay exposure is reported from Russell. Market values and performance reported by BNYM are reconciled to manager reported data for public markets strategies.
Item 6.	Total retirement system performance is calculated inclusive of the overlay investments. Individual asset class performance is reported by BNYM excluding synthetic exposure from the overlay program.
Item 7.	Asset classes with less than five years of historical returns are excluded from the risk statistics summary.
Item 8.	Effective July 1, 2018, the Global Public Equities benchmark is a weighted average of the underlying regional sub-asset class targets in the policy portfolio. This consists of the MSCI U.S. IMI Net TR USD for the U.S. Equity allocation, the MSCI World EX U.S. IMI Net TR USD for the Developed Market Equity (non-U.S.), and the MSCI Emerging IMI Net TR USD for the Emerging Market Equity allocation. Prior to July 1, 2018, this benchmark was the MSCI ACWI IMI Net USD. Effective July 1, 2018, the Equity Options benchmark is 50% CBOE S&P 500 Putwrite / 50% CBOE S&P 500 Buywrite. Prior to July 1, 2018, the benchmark was the CBOE S&P 500 Buywrite index. Effective July 1, 2018, the Hedge Funds Portable Alpha benchmark is ICE BAML 2 Month T-Bill +250 bps. Prior to July 1, 2018, the benchmark was 3-month Libor Total Return USD. This is applicable to the asset class benchmark only. See item 3 for inclusion in policy index. Effective July 1, 2018, the Private Real Estate benchmark is NCREIF ODCE Net + 100 bps. Prior to July 1, 2018, the benchmark was NCREIF ODCE + 75 bps. Effective July 1, 2018, the GAA and Other Opportunistic and Risk Parity Assets benchmarks are the Total System Policy Benchmark ex-Private Markets and Portable Alpha. Prior to July 1, 2018, the benchmark was 50% MSCI World / 50% Barclays Aggregate Bond Index.

Disclaimer

WE HAVE PREPARED THIS REPORT FOR THE SOLE BENEFIT OF THE SOUTH CAROLINA RETIREMENT SYSTEM.

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

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

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

PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

RETIREMENT SYSTEM
INVESTMENT COMMISSION

Annual Investment Plan Progress Report
Fiscal Year 2019 – Fourth Quarter Update

Geoff Berg, CIO
Robert Feinstein, Managing Director
Steve Marino, Managing Director
Bryan Moore, Managing Director

Summary Update

- AIP included 34 different goals/initiatives
  - 28 from the investment team
    - 16 of these are “single-year” initiatives
    - 12 are multi-year, or “ongoing” initiatives
  - Non-investment team initiatives relate to Reporting, IT, and Legal initiatives

- Progress from prior meeting noted in yellow

Current-Year Initiatives - Investments

- Over 90% of current-year initiatives were completed.

INITIATIVE	Single or Multi-Yr	STATUS
A. INVESTMENT TEAM - CURRENT YEAR INITIATIVES		
Implement Policy Asset Allocation	Single	COMPLETED
TIPS: create implementation plan for exposure	Single	COMPLETED
EM small cap manager search	Single	COMPLETED
Passive Index Menu	Single	COMPLETED
Evaluate insurance-linked strategies	Single	COMPLETED
Evaluate impact of rising rates on Securities Lending	Single	COMPLETED
Work with Securities Lending agent to improve reporting	Single	COMPLETED
Co-investment platform - design & implementation	Single	COMPLETED
Develop strategy to exploit credit market turbulence	Single	COMPLETED
Active/Enhanced/Passive Framework	Single	COMPLETED
Evaluate additional alt beta strategies	Single	COMPLETED
Use of Equity Options in international markets	Single	COMPLETED
Currency hedging - evaluate options (w/Meketa)	Single	COMPLETED
PD and Credit: Develop way to track key differentials	Single	COMPLETED
Re-underwrite existing active equity strategies	Single	COMPLETED
Rebalancing options (cost/benefit analysis)	Single	VERY EARLY

Multi-Year and Ongoing Initiatives - Investments

- We completed three ongoing initiatives and have made progress on the remaining nine

B. INVESTMENT TEAM - MULTI-YEAR INITIATIVES		
Challenging beliefs (continue)	Multi	ONGOING
Mixed Credit: monitor secured vs. unsecured mix	Multi	COMPLETED
Build-out of Investment Risk function	Multi	ONGOING
Fee and expense review - structural vs. variable	Multi	ONGOING
Manager debates (GAA)	Multi	COMPLETED
Enhance Private Markets quantitative underwriting	Multi	ONGOING
Infrastructure: build out private portfolio	Multi	ONGOING
Personnel - Opportunities for cross-asset class work	Multi	ONGOING
Non-PA HFs: complete wind-down	Multi	COMPLETED
Asset consolidation w/high conviction mgrs; improve cost	Multi	ONGOING
TAA and Rebalancing - strengthen capabilities	Multi	ONGOING
Review of investment process	Multi	ONGOING

Non-Investment Initiatives

- Progress has been made on non-investment initiatives, most of which are multi-year

INITIATIVE	Single or Multi-Yr	STATUS
C. NON-INVESTMENT TEAM AIP INITIATIVES		
Ops - Explore improvements to FI portfolio accounting	Single	COMPLETED
Ops - Assess performance reporting ecosystem needs	Multi	NEARING COMPLETION
Ops - Enhance IT infrastructure to support RSIC business needs	Multi	ONGOING
Ops - Research, implement CMS solution	Multi	ONGOING
Legal - Evaluate contracting/closing process	Multi	ONGOING
Legal - Assess different ownership structures	Multi	ONGOING

Delegated Investments (June 14, 2019 to September 11, 2019)

Asset Class	Investment	Investment Amount	Closing Date
Private Equity	Great Hill Partners VII	$52.5 M	June 26, 2019
Private Credit	KKR BDC (Strategic Credit Opportunities Partners, LLC)	$125 M	June 25, 2019

South Carolina Retirement System Investment Commission

Collapsing Global Interest Rates in 2019

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Summary – Current State of the Markets

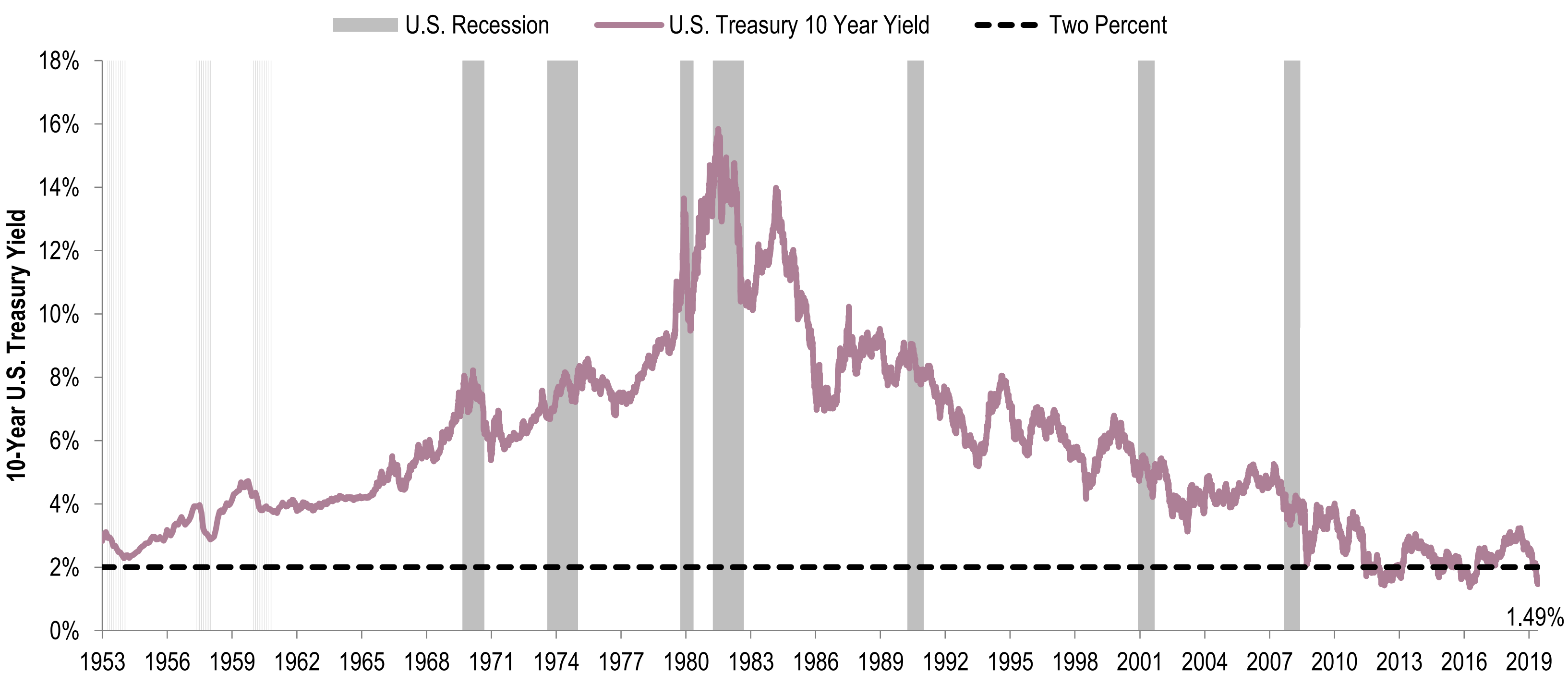
- Recent weeks have seen the Treasury yield curve provide grim signals regarding future economic prospects for the U.S.
  - The U.S. Ten-Year Treasury yield fell below 2% for the first time in almost three years, reaching close to historical lows.
  - Additionally, the yield curve "inverted" from the perspective of the 10-year and 2-year yields, adding to the earlier inversion seen at the 10-year vs. 3-month yields.
  - While inversions do not provide information regarding timing, a "10-2" inversion has always been (eventually) followed by a recession.
- However, in a still highly interconnected developed world, U.S. yields cannot be evaluated in isolation. U.S. Treasury yields currently offer the highest yields for government bonds across the developed world.[1]
  - While U.S. Treasury bonds are expensive relative to their history, they may actually still be cheap relative to the rest of the developed world, leaving room for yields to push even lower, or stay low for the foreseeable future.
- An environment with Treasury yields at or near all-time lows and equity prices (in the U.S.) at or near all-time peaks is not conducive to future high expected returns.
- Furthermore, current economic expectations of low growth across the world (especially the developed world) should also create headwinds for equity returns.
- However, while forecasts are pessimistic, market performance has been strong in 2019, with double-digit returns (or close to) in most major equity and credit markets and positive fixed income performance.

[1] Potential currency effects aside.

U.S. 10-Year Treasury Yield Falls Below Two Percent

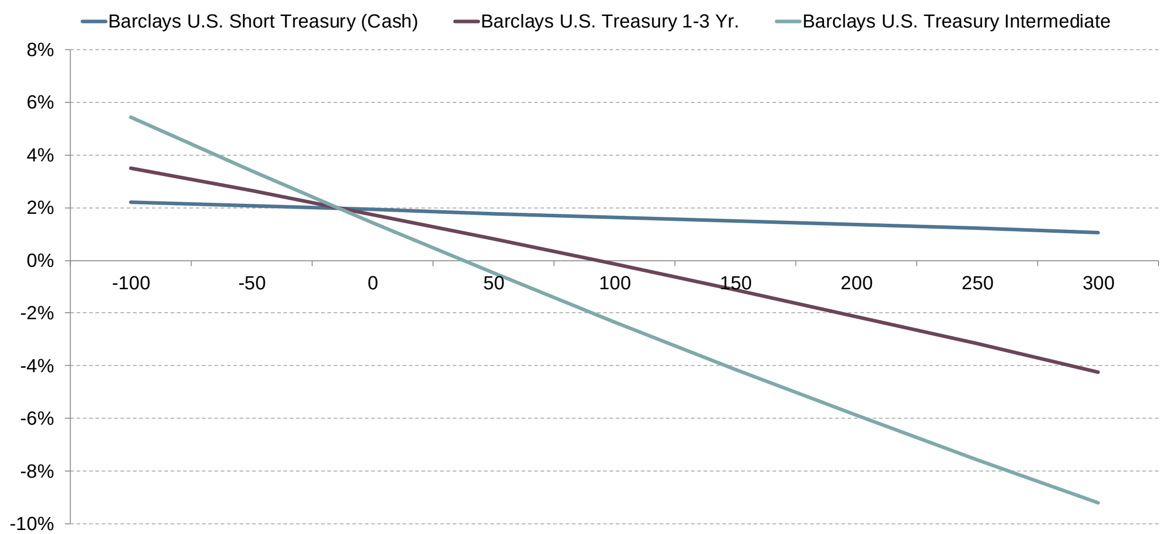
- In August, the U.S. 10-Year Treasury yield fell below 2% for the first time since November 2016.
- The yield decrease continued through the month, reaching a low of 1.47% on August 28, which represents a 99.9th percentile level relative to its history (i.e., very close to a historical low).

U.S. 10-Year Treasury Yield
April 1, 1953 – August 30, 2019



Total Return Given Changes in Interest Rates (bps)[1]

(As of August 31, 2019)



	Total Return for Given Changes in Interest Rates (bps)									Statistics	
	-150	-100	-50	0	50	100	150	200	250	Duration	YTW
Barclays U.S. Short Treasury (Cash)	2.4%	2.2%	2.1%	1.9%	1.8%	1.6%	1.5%	1.4%	1.2%	0.29	1.93
Barclays U.S. Treasury 1-3 Yr.	4.4%	3.5%	2.6%	1.7%	0.8%	-0.1%	-1.1%	-2.1%	-3.2%	1.83	1.56
Barclays U.S. Treasury Intermediate	7.5%	5.4%	3.4%	1.4%	-0.5%	-2.3%	-4.1%	-5.9%	-7.6%	3.88	1.66
Barclays U.S. Treasury Long	34.5%	22.5%	11.7%	1.9%	-6.8%	-14.5%	-21.0%	-26.5%	-30.9%	18.49	2.12

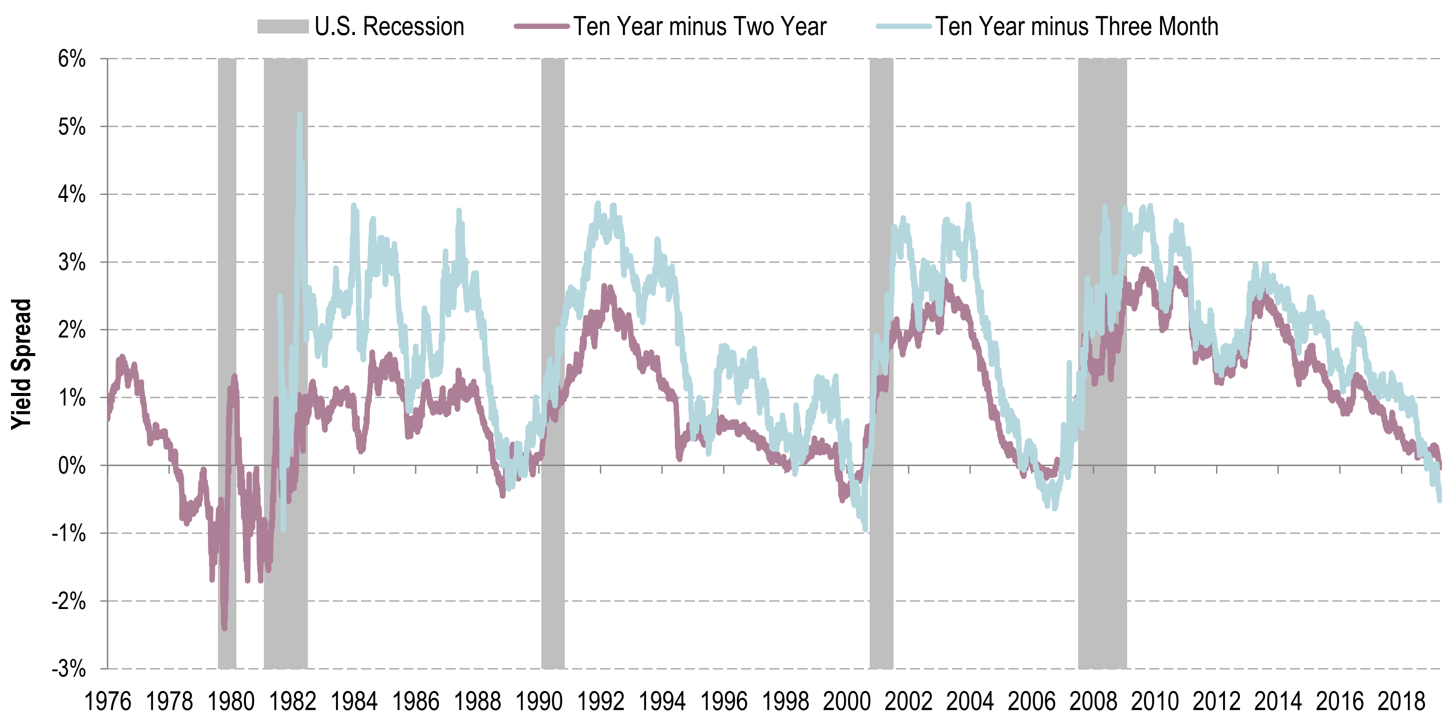
- A low rate environment means fixed income investments can face significant losses in the event of rising interest rates, especially for longer duration instruments.

[1] Data represents the expected total return from a given change in interest rates (shown in basis points) over a 12-month period assuming a parallel shift in rates. Data is as of July 31, 2019 via Barclays, Bloomberg, and Meketa Investment Group.

Treasury Yield Curve Briefly Inverts at the "10 minus 2"

- The U.S. Treasury yield curve inverted in August from the perspective of the 10-year yield relative to the 2-year yield. This inversion has always preceded recessions, albeit with variable lead times.
- However, given the increased central bank intervention in bond markets during this cycle, it can be argued that the predictive power of the inversion is likely less conclusive.

U.S. Treasury Yield Slope
January 2, 1962 – August 30, 2019



"Low-Rate Environment" Is a Global Issue

- U.S. Treasury yields are not the only sovereign bond yields that are near all-time lows.
- In fact, U.S. ten-year yields are currently the highest among G-7 countries,[1] and
- The U.S. dollar's status as the world's reserve currency combined with the status of Treasuries as a primary "safe haven" for investors may mean there is room for yields to go lower.
- As testament to the extreme low rate environment, Germany's government bond yield curve is completely negative.

G-7 10-Year Government Bond Yields (%)
September 4, 2019

Country	2-Year Yield	5-Year Yield	10-Year Yield	30-Year Yield
United States	1.46	1.34	1.48	1.98
Canada	1.30	1.12	1.11	1.39
France	-0.82	-0.74	-0.35	0.48
Germany	-0.90	-0.89	-0.66	-0.14
Italy	-0.34	0.26	0.82	1.88
Japan	-0.31	-0.36	-0.29	0.11
United Kingdom	0.35	0.34	0.49	0.99

[1] G-7 represent the seven largest advanced economies in the world, per the IMF. The countries are Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

Developed World Economic Growth Is Lagging, but the U.S. Remains Resilient

- Consistent with the low interest rate environment, economic growth across the developed world is projected to decrease going forward, with some countries teetering near recession.
  - Uncertainty regarding the effects of tariffs and potential trade wars may further decrease these estimates.
- However, the U.S. is also leading this category, with its economy projected to grow a healthy 2.3% in 2019, more than double the average (of 1.0%) of the rest of the G-7 countries.

G-7 Real GDP Annual Growth (%)[1]
August 30, 2019

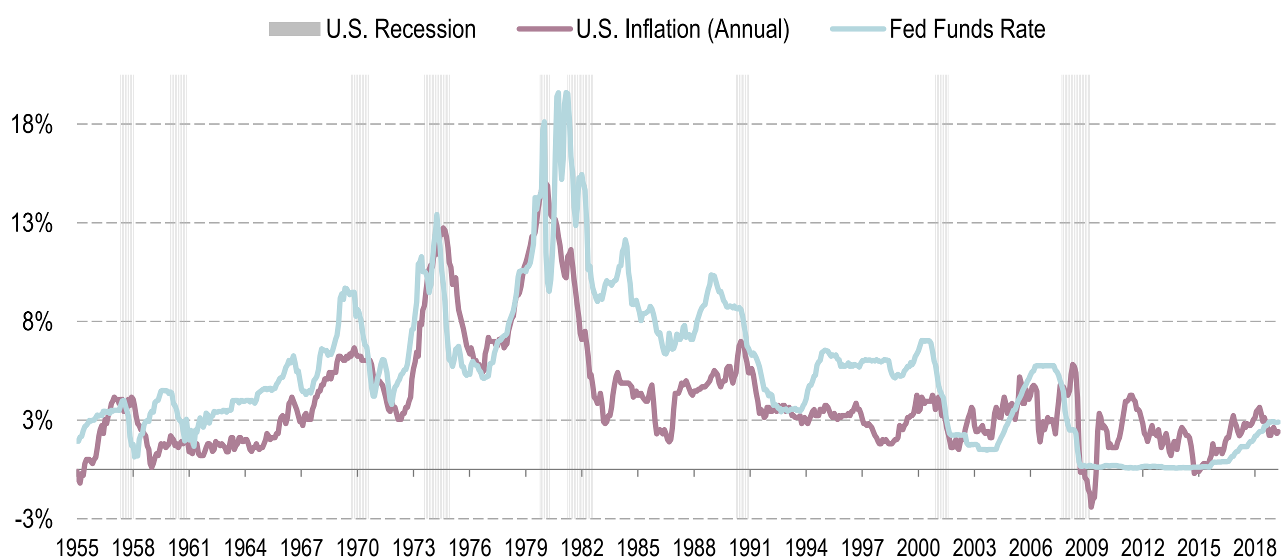
Country	2015	2016	2017	2018	2019	2020	2021
United States	2.9	1.6	2.4	2.9	2.3	1.8	1.8
Canada	0.7	1.1	3.0	1.9	1.4	1.8	1.7
France	1.1	1.1	2.3	1.7	1.3	1.3	1.4
Germany	1.7	2.2	2.5	1.5	0.6	1.0	1.4
Italy	0.9	1.1	1.7	0.9	0.1	0.5	0.6
Japan	1.3	0.6	2.0	0.8	1.0	0.4	0.9
United Kingdom	2.3	1.8	1.8	1.4	1.3	1.2	1.7

1 Source: Bloomberg (Contributor Composite). Shaded values represent forecasts.

The Role of U.S. Inflation

- The Fed easing program initiated after the Global Financial Crisis had among its objectives jumpstarting growth and bringing inflation back to its long term "symmetric" objective of ~2%.
- Ten years into an expansion, inflation has not yet materialized as a material risk to markets.
  - In fact, the opposite has perhaps been true, as deflationary forces (mainly from abroad) were factors that led the Federal Reserve to recently cut rates.
- With rates and growth at very low levels and expected to remain low, an unexpected burst of inflation in the economy could potentially have negative effects on markets, something the U.S. has not seen since the stagflation of the 1970s.

U.S. Inflation and Fed Funds Rate
May 1954 – July 2019



Market Performance Has Been Strong in 2019

- Even though economic forecasts are pessimistic, market performance has been strong so far in 2019, with major equity and credit indices posting double-digit returns (or close to) and fixed income markets averaging returns well north of 5%.

As of August 31, 2019	YTD (%)	1 YR (%)
S&P 500	18.3	2.9
Russell 3000	18.0	1.3
MSCI EAFE	9.7	-3.3
MSCI EM	3.9	-4.4
MSCI ACWI ex USA	8.8	-3.3
Barclays Aggregate	9.1	10.2
Barclays TIPS	9.1	7.5
Barclays High Yield	11.0	6.6

- However, the grim forecasts may have started to materialize in market prices. For the month of August, major global equity indices experienced losses ranging from 2 to 5% for the month.
  - Across equity markets, August losses were most acute for Emerging Markets (down 4.9% in USD terms), giving back almost all of the gains from earlier in the year.

Potential Impact of Low Rates in Expected Returns

- Low interest rates lead to low expected returns for the majority of asset classes.

Expected Returns and Interest Rates
Stylized Example[1]

3-Month Treasury Yield (%)	Core Bonds	High Yield	U.S. Equities	Developed Non-U.S. Equities	Emerging Market Equities	Private Equity	Real Estate
0.0	0.5	4.0	6.0	6.0	7.0	8.0	4.0
1.0	1.5	5.0	7.0	7.0	8.0	9.0	5.0
2.0 (Current)	2.5	6.0	8.0	8.0	9.0	10.0	6.0
3.0	3.5	7.0	9.0	9.0	10.0	11.0	7.0
4.0	4.5	8.0	10.0	10.0	11.0	12.0	8.0

- It is worth noting that the level of interest rates affects the expected return of fixed income assets directly, whereas expected returns of other asset classes such as equities, are influenced by other factors, such as the equity risk premium.
- While interest rates pushing lower can generate positive returns for fixed income assets over the short term, expected returns going forward will decrease as rates decrease.

[1] Expected Returns constructed using a risk premia approach based on a combination of current and historical spreads.

Portfolio Framework

September 12, 2019

Topics

- Review of consensus items
- Benchmarks – RSIC
- Benchmarks - Meketa
- Performance reporting progress
- SIOP & AIP impact

Consensus Items

- Broad agreement on:
  - Benefit of reporting framework tied to investment decisions
  - Reference portfolio (70/30 mix)
  - Reduction in complexity (five asset class Policy Benchmark)
  - Portable Alpha is an *implementation decision*
  - Focus on long-term evaluation periods (for investment decision-making)

- Additional discussion/work/focus needed on:
  - Benchmarking for private markets asset classes
  - Performance reporting
  - Policy documentation (SIOP & AIP)

Why Simplify The Policy Benchmark?

- Current Policy benchmark ensures a complex portfolio (21 underlying benchmarks)
- Proposed path (five asset class Policy benchmark) establishes a simpler "home base"
  - *New paradigm: We use a more complex approach when we expect the incremental complexity to bring additional return.*
  - *Other sub-asset classes remain available, but do not have target weights*
- Large Bond allocation improves plan liquidity (and therefore ability to exploit market opportunities)
  - With three-year evaluation period for tactical views, we expect to use this flexibility
  - Importance of quality reporting to share these tactical allocation positions and their performance impact on the plan (through the Implementation Benchmark)

Benchmark Review: Private Equity Example

- Key question: *What question do we want a benchmark to help us answer?*

- *"Did our Private Equity do for us what we hoped it would do?"*
  - We judge success by whether our portfolio earned at least 300 bps more than a public equity benchmark portfolio (after all fees).

- *"How did an average Private Equity portfolio perform relative to public equity...and how did RSIC's portfolio perform relative to a generic Private Equity portfolio?"*
  - *Tells us whether PE improved the Policy Benchmark return*
  - *Also tells us whether the RSIC PE portfolio outperformed the universe*

Example (Private Equity Benchmarking)

Stylized Example

- Example:
  - Our Private Equity portfolio earns 14% annualized return
  - Burgiss Private Equity Universe median returns 17%
  - Public Equity returns 9%
  - *Current* PE benchmark return is therefore 12% (public equity earns 9% + 3% spread)
- The *current benchmark* enables us to evaluate one thing:
  - How did we perform versus public equity?
- Using a *universe benchmark* enables us to answer *two* important questions:
  - Asset Allocation: Did the decision to include Private Equity in the Policy Benchmark improve its performance?
  - Manager Selection: How did our portfolio perform relative to this "generic" universe of Private Equity?
- We believe that the latter method makes sense in our decision-based framework

Implications Of Benchmarking On Performance Analysis ***Stylized Example***

Current Approach (Public Markets-Based):

(A) Reference Portfolio

(B) Policy Benchmark

(C) Implementation Benchmark

(D) Actual Portfolio

(E) Value from diversification

Private Equity's benchmark always earns 3% more than public equity

Value = +3%

Guaranteed

(F) Quality of Portfolio Structure

(G) Quality of implementation

Did our Private Equity program beat its benchmark?

Value = +2%

Variable

Implications Of Benchmarking On Performance Analysis *Stylized Example*

Alternative Approach (Private Equity Universe):

(A)
Reference Portfolio

(B)
Policy Benchmark

(C)
Implementation Benchmark

(D)
Actual Portfolio

(E)
Value from diversification

Did the inclusion of Private Equity in the Policy Benchmark improve returns?

Value = +8%

Variable

(F)
Quality of Portfolio Structure

(G)
Quality of implementation

Did we add value through our implementation of the Private Equity program?

Value = -3%

Variable

Example (Private Equity Benchmarking)

Stylized Example

- Current Framework (public equity + 300 bps):
  - Did we outperform public equity? **Yes (by 5%)**

- Universe Framework:
  - Asset Allocation: Did the decision to include "generic" Private Equity in the Policy Benchmark return its return? **Yes (+8%)**
  - Manager Selection: How did our portfolio perform relative to this "generic" universe of Private Equity? **No (-3%)**

- The latter method adds depth to performance analysis in a decision-based framework

South Carolina Retirement System Investment Commission

Benchmark Review

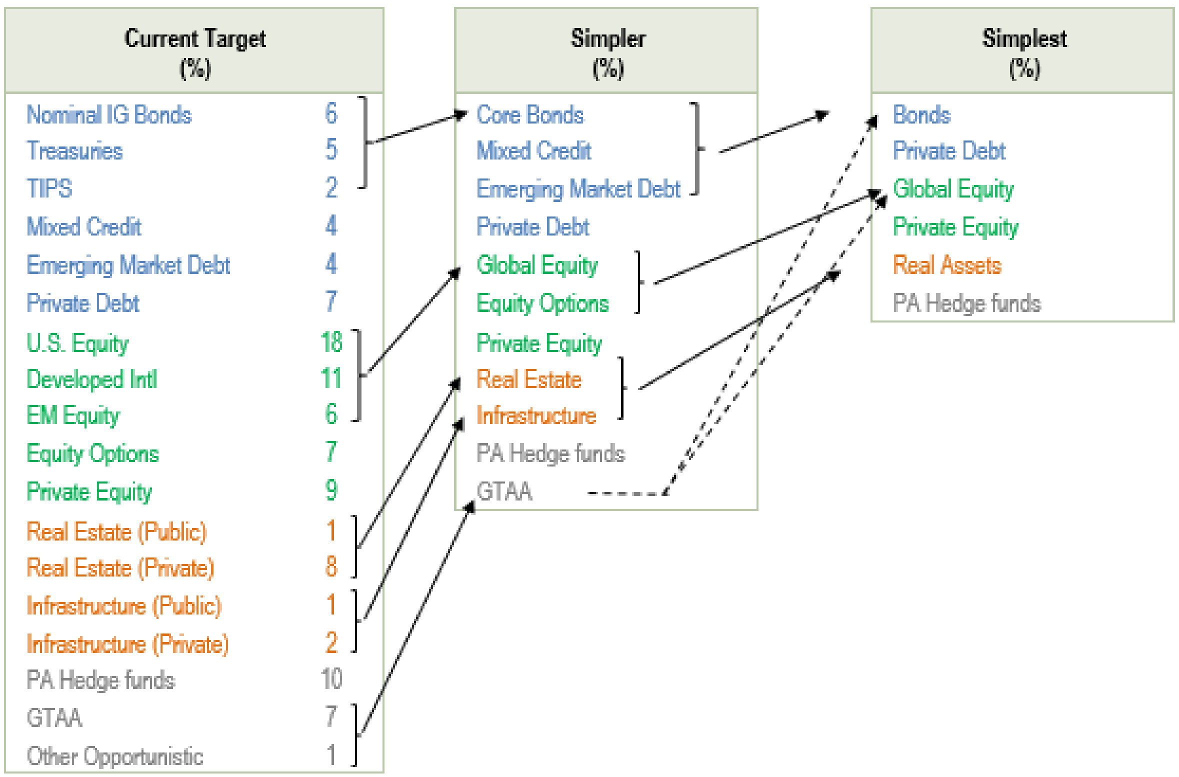
M E K E T A   I N V E S T M E N T   G R O U P
100 LOWDER BROOK DRIVE   SUITE 1100   WESTWOOD MA 02090
781 471 3500   fax 781 471 3411   www.meketagroup.com

Introduction

- RSIC Staff and Meketa are working to provide an improved framework for evaluating the success of the investment program.
- The structure that was discussed at the past two Commission meetings is based on four benchmarks/portfolios:
  - The **Reference Portfolio** - This two-asset portfolio will be determined by the Commission and serve as an overall risk guide.
    - At the June meeting, Meketa recommended the Commission adopt the 70% global equity and 30% US Treasury benchmark as the Reference Portfolio
  - **Policy Benchmark** - The Commission will continue to set policy targets and ranges, and the policy benchmark will be determined by these targets.
    - Comparing the Policy Benchmark to the Reference Portfolio will be a useful tool to evaluate the value from diversification.
  - **Implementation Benchmark** – This benchmark will be determined by the actual weights of different asset classes in the portfolio.
    - Comparing the Implementation Benchmark to the Policy Benchmark will be a useful tool to evaluate the success of tactical decisions as well as style or “misfit” differences.
    - The Policy and Implementation Benchmarks should use the same indices, but with different weights.
  - **Actual Portfolio**
    - Comparing the actual portfolio returns to the Implementation Benchmark will be a useful tool to evaluate the success of active management.

The Policy Portfolio

- Meketa presented several options for simplifying the policy portfolio framework (see below).
- The consensus of the Commissioners was to adopt a policy portfolio with five asset classes.
  - This would require the adoption of five policy-level benchmarks.
  - These would be combined and weighted according to the target allocations set by the Commission to form the **Policy Benchmark**.



The Policy Portfolio Benchmarks

The first two categories in the proposed Policy Portfolio are **Bonds** and **Private Debt**.

- **Bonds** – as outlined on the prior page, this category would include all public market bonds, regardless of credit quality.
  - The most appropriate benchmarks for this would be the Bloomberg Barclays Aggregate or the Bloomberg Barclays Universal.
  - Both indices encompass the broad opportunity set of dollar-denominated, predominantly high quality bonds.
  - The Aggregate comprises 84% of the Universal. In addition, the Universal includes high yield bonds, Eurodollar bonds, and 144As.
  - Neither index includes some assets in which the Commission might (and currently does) invest, such as TIPS, Bank Loans, and EM debt.

- **Private Debt** – this would include any private market debt vehicles (i.e., those not marked to market daily).
  - The current benchmark is the S&P LSTA Leveraged Loan + 150 bp.
  - The current portfolio is composed primarily of senior loans that are not publicly traded.
  - While the Leveraged Loan index is composed of publicly traded bank loans, we believe it is an appropriate policy benchmark.
  - A spread of 150 is consistent with our capital markets expectations (i.e., it is between that of senior and junior direct lending).

The Policy Portfolio Benchmarks

The next two categories in the proposed Policy Portfolio are **Global Equity** and **Private Equity**.

- **Global Equity** – this category would include all public market equities, regardless of geography, along with equity option strategies.
  - The most suitable benchmarks for this would be the MSCI ACWI (All Country World Index) or the MSCI ACWI IMI.
  - Both indices are market cap-weighted composites of the global stock market, thus representing the appropriate opportunity set.
  - The ACWI comprises 88% of the IMI. In addition, the IMI includes many smaller cap stocks globally.

- **Private Equity** – this would include any private market equity vehicles.
  - The current benchmark is 80% Russell 3000 / 20% MSCI EAFE + 300 bp.
  - We believe a more appropriate opportunity set would be a universe of private equity funds.
  - The most appropriate benchmarks would be the Cambridge Private Equity composite and the Burgiss Private Equity composite.

The Policy Portfolio Benchmarks

The last category in the proposed Policy Portfolio is **Real Assets**.

- **Real Assets** – this category would include all real estate and infrastructure assets, regardless of whether they are public or private market.
  - Possible benchmarks for this would include the NCREIF ODCE Net (perhaps with a spread), or a mix of the ODCE and the Burgiss Infrastructure composite.
  - The ODCE is a composite of core real estate funds. It is a good proxy for the broad private real estate universe.
  - Since real estate is the largest component of RSIC's Real Assets allocation, the ODCE would serve as the best single benchmark.
  - The ODCE Net + 100 bp currently serves as the benchmark for the real estate portfolio. This spread is worth reconsidering.

Recommendations

Asset Class	Current Benchmarks	Recommended Policy Benchmarks
Bonds	*Multiple benchmarks*	Bloomberg Barclays Aggregate
Private Debt	S&P LSTA Leveraged Loan Index +150 basis points on a 3-month lag	*No change*[1]
Global Equity	*Multiple benchmarks*	MSCI ACWI IMI
Private Equity	80% Russell 3000 Index/20% MSCI EAFE Index + 300 basis points on a 3-month lag	Burgiss Private Equity
Real Assets	*Multiple benchmarks*	NCREIF ODCE Net

- For the Policy Benchmarks, we recommend using indices that act as the best proxy for the opportunity set in each asset class, as outlined above.
- There will be ex-benchmark investments in the majority of these asset classes, but we believe these will reflect implementation decisions by staff rather than policy decisions by the Commissioners.

[1] The Private Debt and Private Equity portfolios & benchmarks will be reported on a 3-month lag; the Real Assets portfolio & benchmark may also require lagged reporting.

Private Markets Benchmarking

Private Markets Benchmarking

- In June 2019, Meketa Investment Group provided a preview of some potential private market benchmarking changes.
- The Retirement System currently uses public market indices “plus a spread” to benchmark the majority of its private markets investments.
  - This approach helps the Commissioners evaluate whether being in the asset class has been beneficial.
  - Such a comparison is appropriate when being measured over very long time periods.
- The other common approach is to use fund universe benchmarks that are composed of individual funds in the asset class.
  - This approach would help the Commissioners evaluate implementation of the asset class by staff.
  - This type of comparison can be used over somewhat shorter time periods.
- The fund universe approach is fairly widely accepted by the industry in private equity, but less so in other private market asset classes because of incomplete or non-comprehensive data sets.
  - Our recent analysis indicates that fund universes have improved in other private market asset classes and may now be sufficiently robust for use as benchmarks.

Scope of This Report

- We took a two-pronged approach to our analysis.

1.	We evaluated what other large public pensions are doing for private markets (and hedge funds).
2.	We evaluated which data providers have the most complete and representative datasets for the fund universe benchmark approach.

- We compare the Retirement System's benchmarks to those used by peer plans.
- We highlight the pros and cons of the two common approaches to benchmarking (public market index plus a spread and fund universe benchmarks).
- We identify the tradeoffs the Commissioners would need to understand if the recommendations are accepted.

Part One - What Do Other Large Public Pensions Do?

- No two plans are exactly the same.
- Below is the most common approach for each asset class based on our review.

Asset Class	Most common benchmark by other large public pensions
Private Equity	Extreme variety of approaches - most common was public market index + spread of 200-300 bps
Private Debt	S&P LSTA Leveraged Loan Index + 100-200 bps
Real Estate (Private)	NCREIF ODCE with no spread
Infrastructure (Private)	CPI + 400 bps
Hedge Funds	HFRI indices

- The full list of plans and benchmarks is included in the appendix.

Caveats and Considerations on What Peers are Doing

- **Private Equity**
  - Of all the asset classes, this has the most variety of benchmarks across peer plans.
  - For those that use the fund universe approach; Burgiss, Cambridge Associates and State Street are the most common.
  - For those that use public market indices plus a spread, there is extreme variety in the public market index chosen as the starting point (Russell 2000, Russell 3000, S+P 500, MSCI ACWI, FTSE All World, etc.).
  - Spreads range from zero (Public School Retirement System of Missouri) to 500 bp (New York State Teachers Retirement System).

- **Private Debt**
  - Many plans do not have a strategic target weight to private debt.
  - For those that do, the benchmarks used are very similar to what the Retirement System is currently using.
  - Spreads range from zero (Public School Retirement System of Missouri and Tennessee Consolidated Retirement System) to 300 bp (New York State Teachers Retirement System).

Caveats and Considerations on What Peers are Doing (continued)

- **Private Real Estate**
  - This asset class has the most consistent results.
  - The vast majority of plans use NCREIF ODCE.
  - Some are explicit that the index is the Net of Fees version, while many simply say “NCREIF ODCE” with no clarification if it is the gross or net version.
  - Many plans do not add a spread.
  - For those that do, the highest spread was 150 bp.

- **Private Infrastructure**
  - Many plans do not have a strategic target weight to infrastructure.
  - For those that do, nearly everyone uses CPI plus a spread.
  - Spreads range from 300 bp to 500 bp (Maryland State Retirement and Pension System).
  - At least one plan (Teachers Retirement System of Texas) uses Cambridge Associates Infrastructure.
  - At least one plan (Maryland) puts a 10% cap on total annual return.

Overall Thoughts

- There is no industry standard for private market benchmarking.
- Some asset classes have generally consistent results (real estate and infrastructure) while others do not (private equity).
- Some plans only used the public market index plus a spread approach.
- Others use fund universe data providers.
- Most have a mix.
- The following page summarizes the pros and cons of both approaches.

Pros and Cons of Each Approach

	Public Index Plus Spread	Fund Universes
Pros	• Easy to calculate • Easy to understand • Transparent • Benchmark returns are available almost immediately	• Returns will more closely resemble that of the portfolio • More realistically represents the opportunity set • Less volatile performance reporting • No explicit spread (or “alpha”) built into the benchmark
Cons	• The spread amount is subjective and there is no industry standard • Use of the spread means it fails one traditional criteria of a valid benchmark (i.e., be investable) • Performance is often much more volatile than that of the asset class • Performance can be significantly different than the asset class over short periods of time • Composition mismatch (e.g., different sectors in public vs. private infrastructure and debt)	• Fails several of the traditional criteria of a valid benchmark (i.e., investable, unambiguous and known in advance) • Performance data is only reported quarterly and on a significant lag • Performance methodology inconsistencies can exist (e.g., mixture of time weighted and internal rate of return) • Lack of transparency into the underlying exposures of the fund universe (which constantly changes) • Difference in how robust and representative the fund universe composite is for different asset classes

- There is no “correct” answer and both approaches have a number of benefits and challenges.

Data Providers of Fund Universe Benchmarks

- **Cambridge Associates**
  - Cambridge Associates tracks over 7,500 funds on a quarterly basis.
  - Sourcing: Voluntary manager submission of quarterly financials.
- **Burgiss**
  - Burgiss database includes nearly 7,900 private funds.
  - Sourcing: Burgiss Limited Partner clients (public pensions, fund of funds, foundations, etc.) that use their services to track underlying portfolio.
- **Preqin**
  - Preqin tracks over 7,000 private funds primarily for fundraising, dry powder estimates, and deals/exits.
  - Sourcing: Surveys and FOIA requests from public funds.
- **Pitchbook**
  - Pitchbook tracks over 3,400 private funds primarily for fundraising, dry powder estimates, and deals/exits.
  - Sourcing: Surveys and FOIA requests from public funds.

Data Provider Analysis

- The appendix provide a comparison (by asset class) of each data provider
- We focused on these four providers because they cover a broad range of asset classes.
  - In addition there are a few additional vendors that focus solely on one asset class (e.g. the Townsend Group[1] – real estate).
- For our analysis we evaluated:
  - number of funds in each database
  - consistency of reporting
  - performance
  - underlying geographic exposure
  - underlying sector exposure

- **Conclusion:**
  - Cambridge Associates and Burgiss have the preferred method for sourcing performance information and generally had the most robust and complete data sets.

[1] The Townsend Group was acquired by AON in early 2018.

Burgiss vs. Cambridge Associates

Asset Class	Explanation
Private Equity	• Burgiss has the most robust data set for Private Equity. • The composition of the Burgiss universe more closely resembles the private equity portfolio of a large public pension plan, such as RSIC
Private Debt	• Burgiss has the most robust data set overall. • Burgiss tracks more funds per year over the last five calendar years.
Real Estate	• Burgiss has a more robust data set overall. • Burgiss tracks more funds per year over the last five calendar years.
Infrastructure	• Burgiss has the most robust data set. • Cambridge has less than five funds per year in years 2011, 2016, 2017 and 2018. • Cambridge is much more heavily skewed outside the US.

- Burgiss and Cambridge Associates have the preferred and consistent method of collecting private fund data.
- There are subtle differences in the composition of funds within each data set.
- Long-term returns are similar across both vendors.

Performance Reporting Progress

- Goal: Streamlined performance reporting package
  - Improved content with considerable reduction in complexity/quantity
- Goal: Provide new *decision-based* performance report for quarter ending September
- Full risk reporting capabilities not yet established (risk system implementation underway)

Page #	Report Content	Designed	Produced
p.1	Summary report (top level)	✓	✓
p.2	Evaluating Diversification (quilt chart)	✓	✓
p.3	Attribution report (Portfolio Structure)	✓	✓
p.4	Attribution report (Implementation)	✓	✓
p.5	Current Portfolio Positioning (weights)	✓	✓
p.6	Compliance report	✓	✓
p.7	Risk report	✗	✗

Impacts on SIOP and AIP documents

- Embed framework principles into the AIP & SIOP documents
- Amend documents to reflect consensus points
- Changes likely to be substantial (requiring revamped templates)
- Timeline for distribution of draft documents: mid-October
- Request feedback prior to November meeting
- Consideration at November meeting

Appendix

Private Equity Benchmark Analysis

Private Equity Funds
As of September 30, 2018

Vintage Year	Cambridge Associates	Burgiss	Preqin	Pitchbook
2000	287	255	257	60
2001	155	135	182	33
2002	77	78	126	29
2003	97	72	122	28
2004	140	133	151	44
2005	222	213	235	70
2006	244	280	281	103
2007	266	304	291	103
2008	218	264	266	95
2009	103	97	114	50
2010	113	121	132	60
2011	161	199	205	88
2012	174	209	168	96
2013	159	184	195	83
2014	187	295	230	104
2015	210	292	211	119
2016	166	293	261	110
2017	119	288	191	90
2018	91	254	121	35

Observations

- Coverage is strong across Cambridge Associates, Burgiss, and Preqin with over 3,000 tracked by each for vintage years 2000 and 2018.
- Burgiss tracks the most funds with 3,966 since 2000

Total Funds

Cambridge Associates	Burgiss	Preqin	Pitchbook
3,189	**3,966**	**3,739**	**1,400**

Private Equity Funds
As of September 30, 2018

Vintage Year	Cambridge Associates	Burgiss	Preqin	Pitchbook
2000	3.1%	2.2%	8.0%	6.4%
2001	8.6%	6.1%	11.6%	8.3%
2002	7.9%	11.5%	10.4%	7.7%
2003	9.8%	9.5%	9.8%	9.3%
2004	7.6%	9.1%	9.0%	7.8%
2005	7.5%	7.4%	8.0%	9.1%
2006	7.4%	6.7%	8.3%	8.0%
2007	9.2%	9.6%	10.6%	10.1%
2008	8.4%	9.8%	12.7%	12.5%
2009	14.2%	15.5%	14.5%	15.8%
2010	13.6%	13.3%	14.2%	12.3%
2011	15.0%	16.5%	16.1%	14.9%
2012	14.8%	15.0%	16.5%	15.5%
2013	13.6%	15.3%	15.5%	14.6%
2014	15.2%	15.4%	16.1%	15.3%
2015	14.5%	12.8%	16.6%	14.7%
2016	9.9%	9.2%	NA	14.7%
2017	1.7%	0.8%	NA	0.8%
2018	-9.6%	-8.3%	NA	0.0%

Observations

- With the exception of 2002, Cambridge Associates and Burgiss have similar vintage year data with an average difference in vintage year median of 1.0% excluding 2002.
- Results from Preqin and Pitchbook are slightly higher returns in most vintage years.
- Benchmark providers accumulating data through financial statements (Cambridge Associates & Burgiss) will have higher consistency each quarter with number of fund reporting vs. FOIA requests.

Cambridge Associates Private Equity Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	280	304	264	97	121	199	209	184	295	292	293	
Lower Quartile	0.7%	3.6%	2.3%	8.6%	4.6%	9.5%	8.8%	9.2%	8.9%	5.3%	0.0%	
Median	6.7%	9.6%	9.8%	15.5%	13.3%	16.5%	15.0%	15.3%	15.4%	12.8%	9.2%	
Upper Quartile	12.9%	15.1%	17.7%	23.2%	21.2%	23.7%	21.9%	21.8%	24.6%	20.7%	22.1%	
Lower/Med Spread	*6.0%*	*6.1%*	*7.5%*	*6.9%*	*8.7%*	*7.0%*	*6.3%*	*6.0%*	*6.5%*	*7.6%*	*9.2%*	***7.1%***
Med/Upper Spread	*6.2%*	*5.4%*	*8.0%*	*7.7%*	*7.9%*	*7.2%*	*6.9%*	*6.5%*	*9.2%*	*7.9%*	*12.9%*	***7.8%***

Burgiss Private Equity Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	244	266	218	103	113	161	174	159	187	210	166	
Lower Quartile	1.3%	3.3%	3.6%	7.6%	5.6%	8.6%	5.9%	8.7%	9.5%	5.8%	0.4%	
Median	7.4%	9.2%	8.4%	14.2%	13.6%	15.0%	14.8%	13.6%	15.2%	14.5%	9.9%	
Upper Quartile	13.2%	14.8%	16.5%	22.0%	20.8%	21.3%	21.5%	21.1%	24.2%	23.5%	22.0%	
Lower/Med Spread	*6.1%*	*5.9%*	*4.8%*	*6.6%*	*7.9%*	*6.3%*	*8.9%*	*4.9%*	*5.7%*	*8.7%*	*9.5%*	***6.8%***
Med/Upper Spread	*5.8%*	*5.6%*	*8.1%*	*7.8%*	*7.3%*	*6.3%*	*6.6%*	*7.5%*	*9.0%*	*9.0%*	*12.1%*	***7.7%***

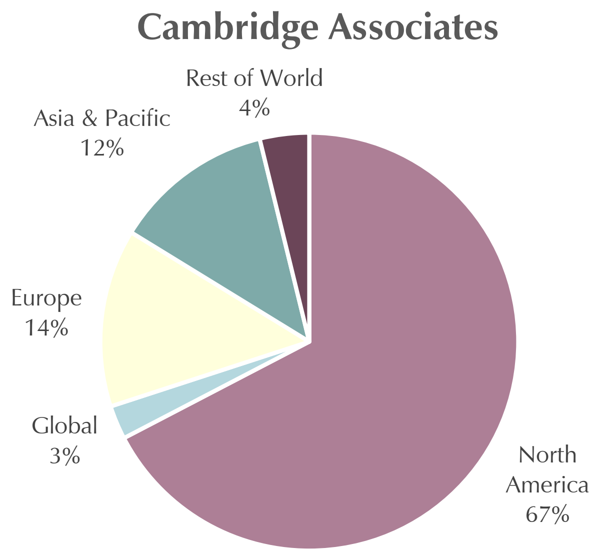
End-to-end Private Equity Returns
As of September 30, 2018

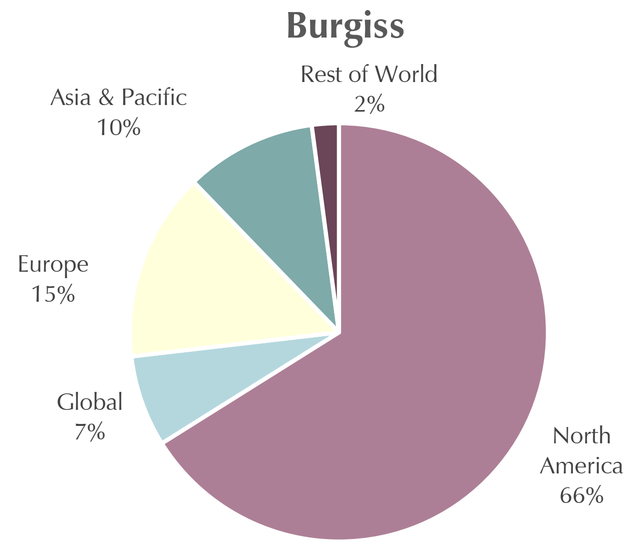
	Cambridge Associates	Burgiss
1 Quarter	3.6%	3.8%
1 Year	18.1%	18.8%
3 Year	14.5%	14.7%
5 Year	14.6%	14.6%
10 Year	11.7%	11.5%

Observations

- End-to-end horizon pooled returns are consistent between Cambridge Associates and Burgiss.
- Burgiss returns range from 3,709 funds for one quarter to 4,606 funds for a ten year return, while Cambridge Associates ranged from 2,981 funds for the third quarter and 3,904 funds for a ten year return.
- FOIA requests can be aggregated to produce vintage year returns, but without the quarterly cash flows, end-to-end returns are not available.

Private Equity Funds
Geographic Exposure
(By Number of Funds)*
As of September 30, 2018



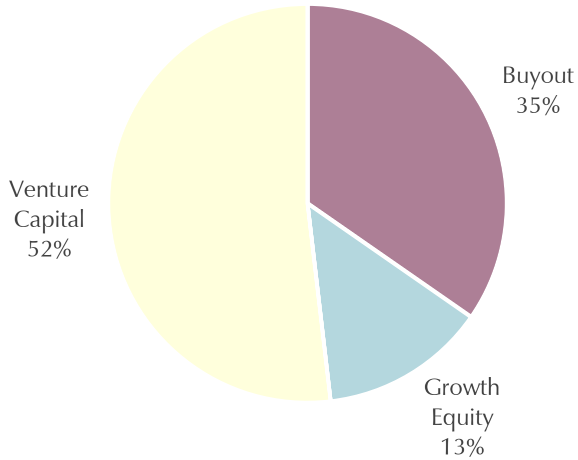


- Both providers have approximately 2/3 of the index in North America funds.

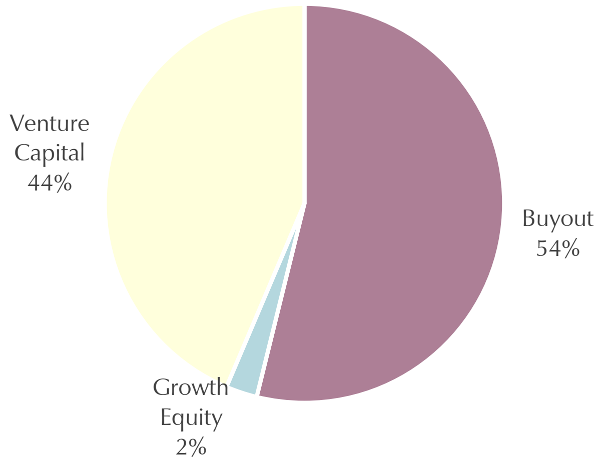
** Based on number of funds by geography.*

Private Equity Funds
Sector Exposure
(By Number of Funds)*
As of September 30, 2018

Cambridge Associates



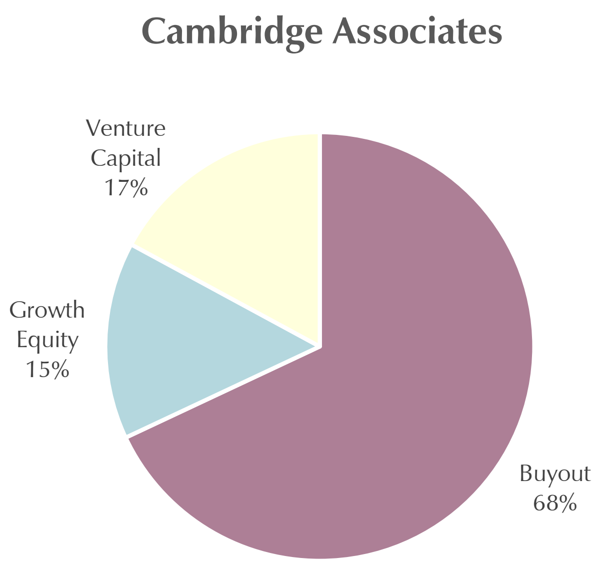
Burgiss

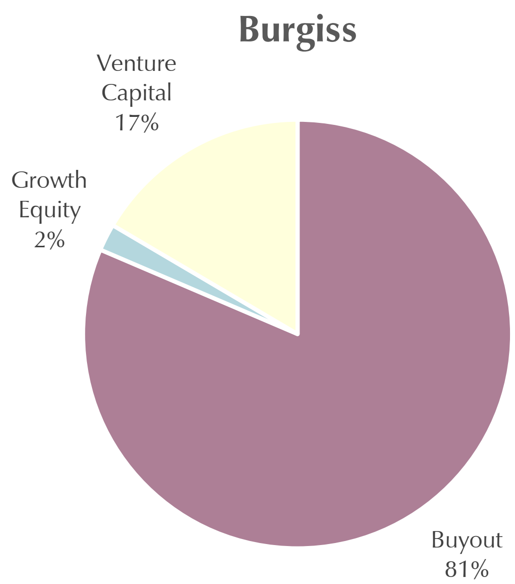


- Burgiss and Cambridge Associates have a similar number of Venture Capital funds in their benchmark between 2,200 and 2,300 each.
- Burgiss tracks almost 700 more buyout and growth equity funds than Cambridge Associates.

** Based on number of funds by sector type.*

Private Equity Funds
<u>Sector Exposure</u>
<u>(By Committed Capital)*</u>
As of September 30, 2018



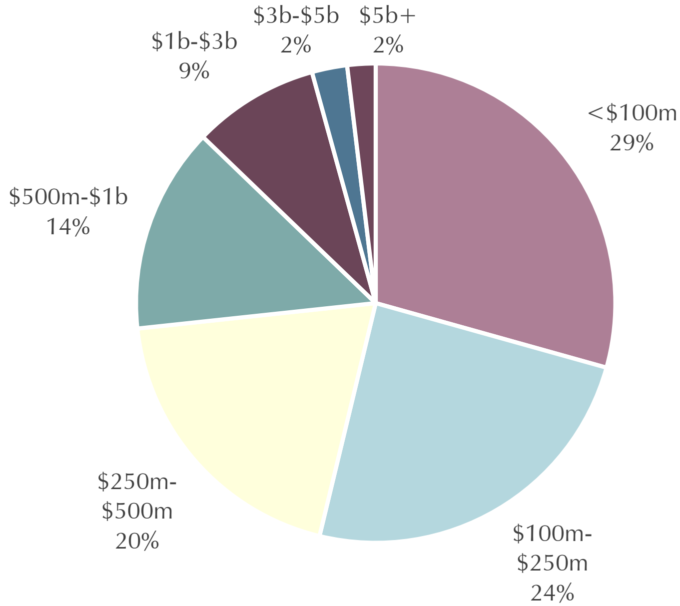


- Based on committed capital to funds, Cambridge Associates is weighted approximately 2/3 to buyout funds and Burgiss is just over 80% weighted to buyout.

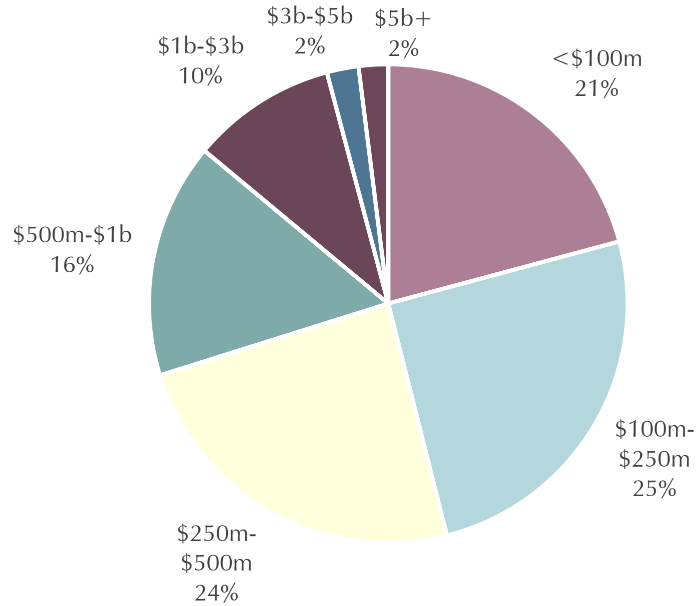
** Based on committed capital by sector.*

Private Equity Funds
Exposure by Fund Size
(By Number of Funds)
As of September 30, 2018

Cambridge Associates



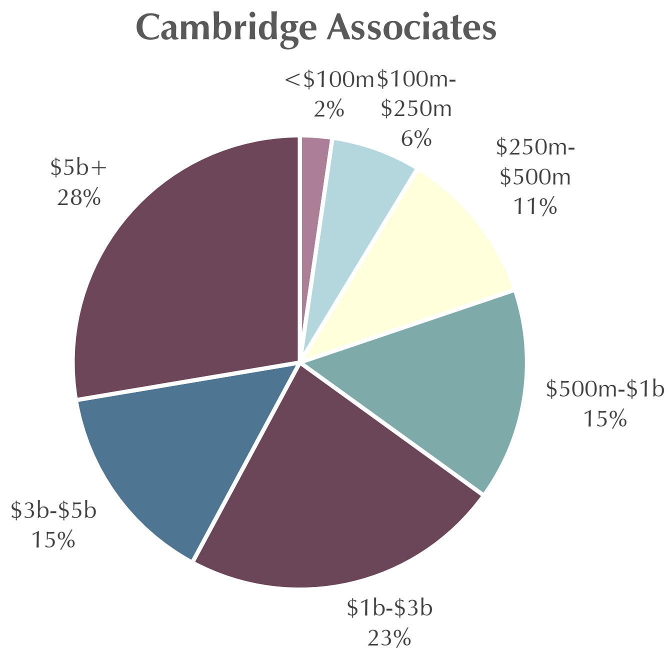
Burgiss

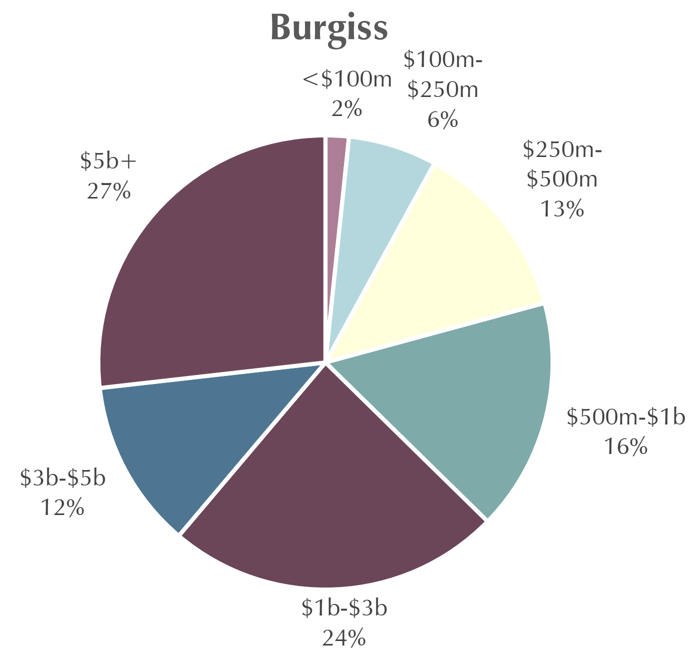


- Both have similar composition of funds (based on number funds in the identified size range).
- Less than 15% of Funds in both vendor's database have more than $1 billion in commitments.

** Based on number of funds.*

Private Equity Funds
Exposure by Fund Size
(By Committed Capital)*
As of September 30, 2018





- By committed capital, funds over $1 billion in assets represent 66% of Cambridge Associates universe.
- Similar sized funds represent 63% of the Burgiss universe.

* *Based on fund commitments.*

- Cambridge Associate and Burgiss have the preferred and consistent method of collecting private fund data. FOIA requests are not always timely and may not allow the benchmark to include the same funds every quarter.

- Burgiss has the most robust data set for Private Equity with Cambridge Associates also providing a substantial fund universe.

Private Debt Benchmark Analysis

Private Debt Funds

As of September 30, 2018

Vintage Year	Cambridge Associates	Burgiss	Preqin	Pitchbook
2000	14	11	23	3
2001	11	21	20	6
2002	17	14	21	2
2003	14	18	15	7
2004	14	22	16	7
2005	24	27	20	11
2006	33	27	23	24
2007	31	32	26	18
2008	37	52	37	26
2009	19	15	12	13
2010	35	48	35	21
2011	40	38	27	12
2012	36	50	26	24
2013	38	54	40	20
2014	34	69	32	18
2015	40	76	53	23
2016	30	60	33	15
2017	25	71	42	15
2018	10	40	26	11

Observations

- Coverage is strong across Cambridge Associates, Burgiss, and Preqin with between 500 and 745 funds tracked between 2000 and 2018.
- Burgiss tracks the most funds with 745 since 2000

Total Funds

Cambridge Associates	Burgiss	Preqin	Pitchbook
502	**745**	**527**	**276**

Private Debt Funds

As of September 30, 2018

Vintage Year	Cambridge Associates (%)	Burgiss (%)	Preqin (%)	Pitchbook (%)
2000	13.7	13.4	16.0	15.4
2001	14.7	13.5	13.5	27.4
2002	23.7	12.5	12.8	10.0
2003	9.6	11.8	8.9	6.6
2004	7.0	3.9	9.3	9.1
2005	7.0	7.2	8.0	8.3
2006	8.4	5.3	8.3	7.5
2007	7.7	5.1	9.4	8.9
2008	11.7	10.5	12.3	11.0
2009	11.7	12.7	17.3	12.1
2010	11.7	10.7	11.0	9.5
2011	8.3	11.5	9.6	9.3
2012	8.3	9.0	8.2	8.1
2013	8.0	9.1	9.3	9.9
2014	10.3	9.7	11.2	10.7
2015	11.4	10.0	10.5	12.1
2016	9.9	9.9	NA	11.9
2017	5.4	8.7	NA	10.9
2018	0.3	1.7	NA	-1.8

Observations

- With the exception of 2002, Cambridge Associates and Burgiss have similar vintage year data with an average difference in vintage year median of 1.5% excluding 2002.
- Results from Preqin and Pitchbook are not as consistent across all vintage years.
- Benchmark providers accumulating data through financial statements (Cambridge Associates & Burgiss) will have higher consistency each quarter with number of fund reporting vs. FOIA requests.

Cambridge Associates Private Debt Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	33	31	37	19	35	40	36	38	34	40	30	
Lower Quartile	5.5%	2.6%	9.0%	9.7%	8.6%	5.3%	5.5%	5.4%	8.1%	8.1%	7.6%	
Median	8.4%	7.7%	11.7%	11.7%	11.7%	8.3%	8.3%	8.0%	10.3%	11.4%	9.9%	
Upper Quartile	11.0%	13.1%	15.6%	16.5%	13.7%	11.9%	12.9%	10.3%	15.5%	16.8%	14.3%	
Lower/Med Spread	*3.0%*	*5.1%*	*2.7%*	*2.0%*	*3.1%*	*3.0%*	*2.8%*	*2.7%*	*2.2%*	*3.3%*	*2.3%*	*2.9%*
Med/Upper Spread	*2.6%*	*5.4%*	*3.9%*	*4.7%*	*2.0%*	*3.6%*	*4.6%*	*2.3%*	*5.2%*	*5.4%*	*4.4%*	*4.0%*

Burgiss Private Debt Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	28	32	52	15	48	38	50	54	69	76	60	
Lower Quartile	2.2%	1.7%	7.3%	10.3%	7.6%	7.5%	5.7%	7.2%	7.5%	7.7%	6.9%	
Median	5.3%	5.1%	10.5%	12.7%	10.7%	11.5%	9.0%	9.1%	9.7%	10.0%	9.9%	
Upper Quartile	8.2%	9.1%	14.9%	16.1%	14.3%	14.0%	12.0%	10.5%	12.1%	13.7%	12.8%	
Lower/Med Spread	*3.1%*	*3.4%*	*3.2%*	*2.4%*	*3.1%*	*4.0%*	*3.3%*	*1.8%*	*2.3%*	*2.3%*	*3.0%*	*2.9%*
Med/Upper Spread	*3.0%*	*4.0%*	*4.4%*	*3.4%*	*3.5%*	*2.5%*	*3.0%*	*1.4%*	*2.3%*	*3.7%*	*2.9%*	*3.1%*

End-to-end Private Debt Returns

As of September 30, 2018

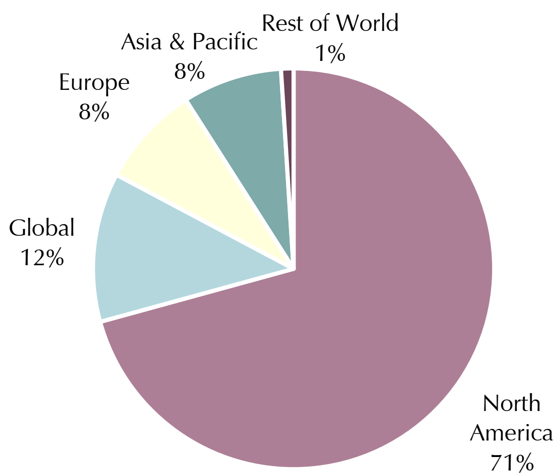
	Cambridge Associates	Burgiss
1 Quarter	0.8%	1.8%
1 Year	6.1%	8.6%
3 Year	8.2%	8.4%
5 Year	8.4%	8.1%
10 Year	9.3%	9.6%

Observations

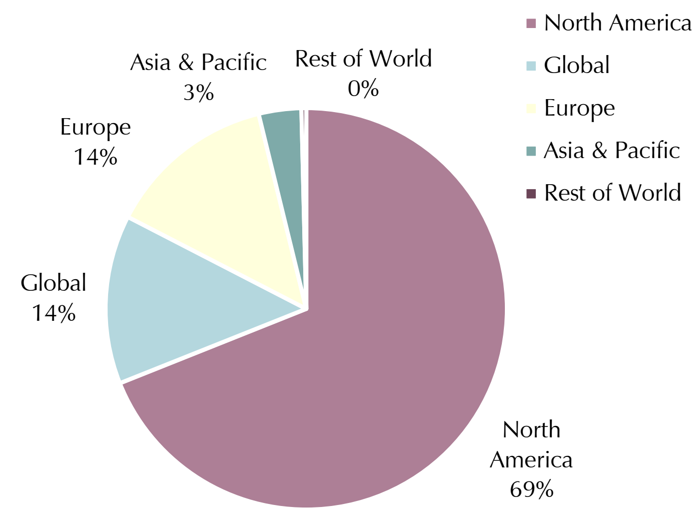
- End-to-end horizon pooled returns are similar between Cambridge Associates and Burgiss.
- Burgiss returns include range from 644 funds for one quarter to 798 funds for a ten year return, while Cambridge Associates ranged from 453 funds for the third quarter and 553 funds for a ten year return.
- FOIA requests can be aggregated to produce vintage year returns, but without the quarterly cash flows, end-to-end returns are not available.

Private Debt Funds
Geographic Exposure
(By Number of Funds)*
As of September 30, 2018

Cambridge Associates



Burgiss

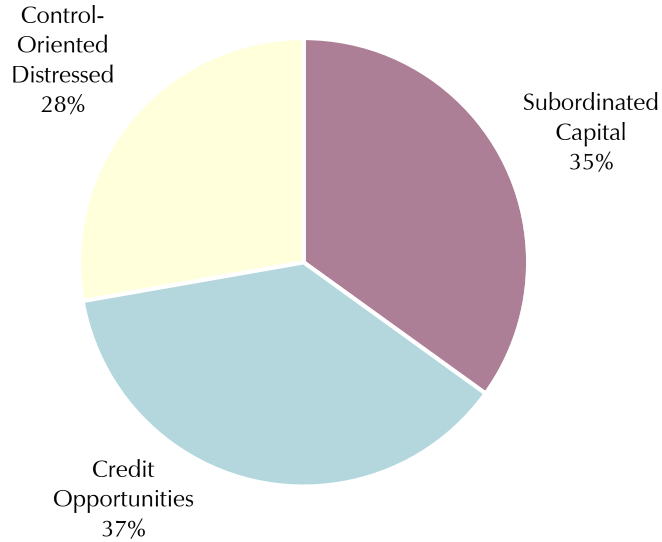


- Both providers have approximately 70% of the index in North America funds.

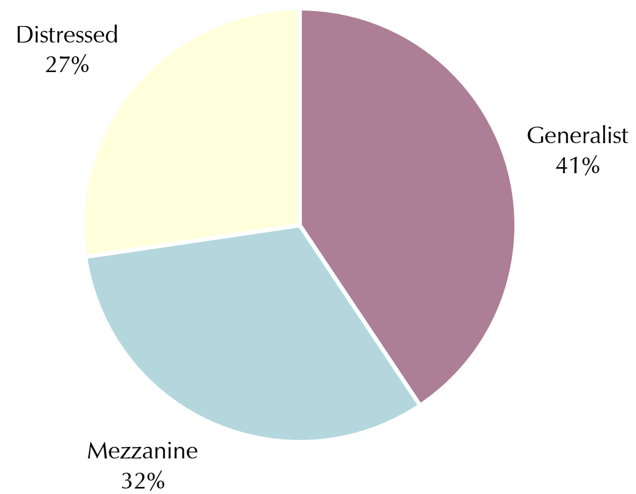
* *Based on number of funds by geography.*

Private Debt Funds
Sector Exposure
(By Number of Funds)*
As of September 30, 2018

Cambridge Associates



Burgiss

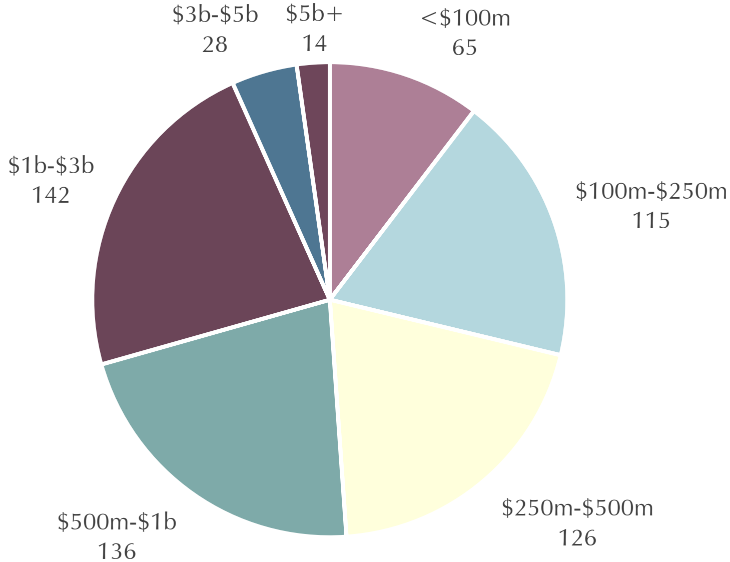


- Although Burgiss and Cambridge Associates have different classifications for debt funds, both have distressed, which account for approximately one quarter of the index.

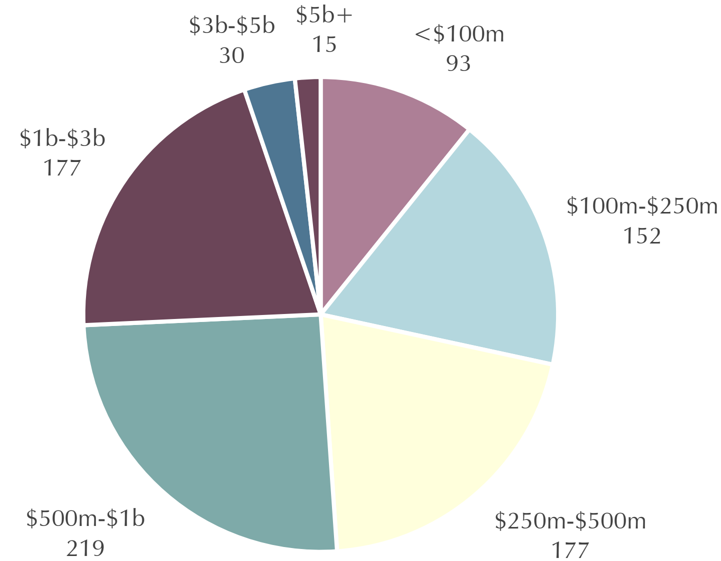
** Based on number of funds by sector.*

Private Debt Funds
<u>Exposure by Fund Size</u>
<u>(By Number of Funds)*</u>
As of September 30, 2018

Cambridge Associates



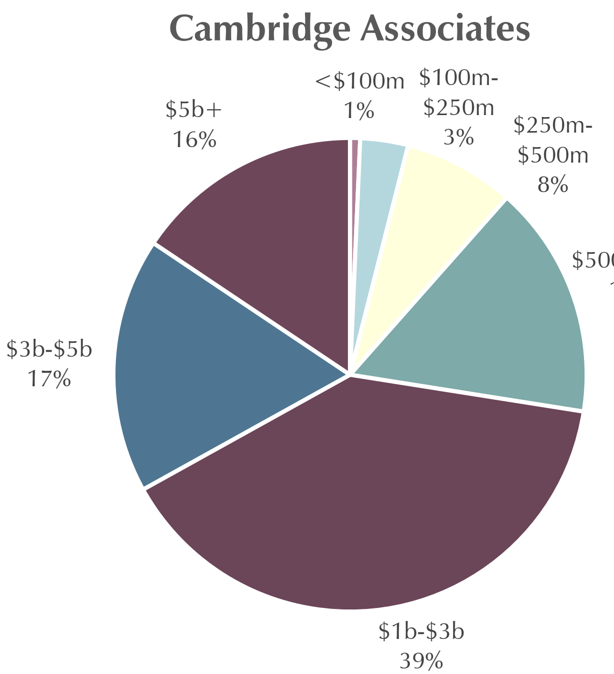
Burgiss

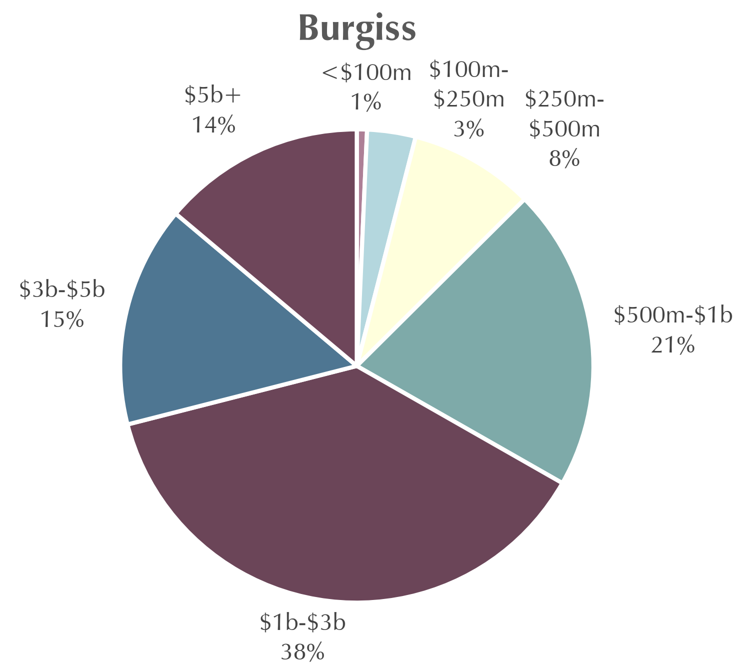


- Approximately 40% of the funds are between $500 million and $3 billion.
- Results are fairly consistent across both vendors.

** Based on number of funds.*

Private Debt Funds
Exposure by Fund Size
(By Committed Capital)*
As of September 30, 2018





- Funds between $1b - $5 b in assets represent 56% of the Cambridge Associates universe.
- Similar sized funds represent 53% of the Burgiss universe.

** Based on fund commitments.*

- Cambridge Associate and Burgiss have the preferred and consistent method of collecting private fund data. FOIA requests are not always timely and may not allow the benchmark to include the same funds every quarter.

- Cambridge Associate and Burgiss have the most robust data sets.

Private Real Estate Benchmark Analysis

Number of Real Estate Funds Tracked

As of September 30, 2018

Vintage Year	Cambridge Associates	Burgiss	Preqin	Pitchbook
2006	39	64	324	44
2007	55	90	407	58
2008	48	67	376	42
2009	27	29	220	28
2010	20	26	243	31
2011	50	40	293	39
2012	27	43	364	60
2013	33	67	368	45
2014	32	57	400	45
2015	30	69	408	71
2016	22	65	414	54
2017	14	55	425	35
2018	11	29	381	40
Total	**408**	**701**	**4,623**	**592**

Observations

- Each provider has consistently tracked a meaningful volume of vintage fund data over multiple decades; Cambridge Associates and Burgiss datasets span back to 1997-1998 with Preqin (2000) and Pitchbook (2004) beginning in following years.
- Preqin reports a significantly larger number of individual funds tracked, however some appear to have limited or incomplete data.
- A main advantage offered by Preqin and Pitchbook is a high level of transparency into underlying fund-level performance information.
- Cambridge Associates offers the most comprehensive historical performance (benchmark) data but does not feature the same level of granularity with respect to individual fund information as Preqin or Pitchbook.

Real Estate Funds

As of September 30, 2018

Vintage Year	Cambridge Associates (%)	Burgiss (%)	Preqin (%)	Pitchbook (%)
2006	-0.03	-1.9	3.3	-0.1
2007	1.3	3.0	7.0	6.3
2008	5.1	7.3	9.1	7.4
2009	11.3	10.8	14.8	9.3
2010	16.9	12.1	15.0	12.1
2011	12.7	14.5	18.1	16.3
2012	10.6	12.7	15.7	12.7
2013	12.0	13.2	13.5	12.1
2014	11.7	10.7	12.9	14.2
2015	10.0	9.8	13.0	11.5
2016	11.7	9.5	NM	9.2
2017	11.0	5.0	NM	12.3
2018	-4.7	-7.1	NM	-4.9

Observations

- Each benchmark provider displays similar data with respect to the general evolution of vintage year returns over the selected period, however they vary somewhat in magnitude as a result of differing coverage of underlying real estate strategies.
- The benchmark providers gathering data from financial statements (Cambridge Associates and Burgiss) will demonstrate a higher level of accuracy and consistency across each quarter and/or vintage year relative to those gathering data through surveys and FOIA requests (Preqin and Pitchbook).

Cambridge Associates Real Estate Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	64	94	71	39	37	77	52	64	66	57	40	
Lower Quartile	-4.1%	-3.6%	0.2%	9.1%	9.9%	8.6%	8.2%	7.3%	6.9%	7.4%	8.3%	
Median	-0.1%	3.4%	5.9%	11.7%	13.8%	13.0%	12.3%	12.0%	10.8%	10.2%	11.5%	
Upper Quartile	5.5%	7.9%	11.0%	18.3%	17.5%	20.1%	18.3%	15.0%	14.2%	16.3%	14.9%	
Lower/Med Spread	*4.0%*	*7.0%*	*5.7%*	*2.6%*	*3.9%*	*4.4%*	*4.0%*	*4.7%*	*3.9%*	*2.9%*	*3.3%*	*4.2%*
Med/Upper Spread	*5.6%*	*4.5%*	*5.0%*	*6.6%*	*3.8%*	*7.1%*	*6.1%*	*3.0%*	*3.5%*	*6.1%*	*3.3%*	*5.0%*

Burgiss Real Estate Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	66	90	67	29	26	40	43	67	57	69	65	
Lower Quartile	-8.1%	-5.2%	-0.5%	5.7%	9.5%	9.1%	9.7%	10.1%	6.5%	6.5%	2.2%	
Median	-1.9%	3.0%	7.3%	10.8%	12.1%	14.5%	12.7%	13.2%	10.7%	9.8%	9.5%	
Upper Quartile	1.8%	7.9%	9.9%	14.0%	18.2%	18.5%	18.5%	17.2%	14.7%	15.3%	13.4%	
Lower/Med Spread	*6.3%*	*8.1%*	*7.8%*	*5.2%*	*2.6%*	*5.3%*	*3.0%*	*3.1%*	*4.2%*	*3.3%*	*7.3%*	*5.1%*
Med/Upper Spread	*3.7%*	*4.9%*	*2.5%*	*3.2%*	*6.1%*	*4.0%*	*5.8%*	*4.0%*	*4.0%*	*5.5%*	*4.0%*	*4.3%*

End-to-end Real Estate Returns

As of September 30, 2018

	Cambridge Associates (%)	Burgiss (%)	NCREIF ODCE* (%)
1 Quarter	1.4	1.8	1.9
1 Year	9.6	10.1	7.9
3 Year	9.7	10.1	8.2
5 Year	11.6	11.4	9.9
10 Year	5.7	4.5	4.5

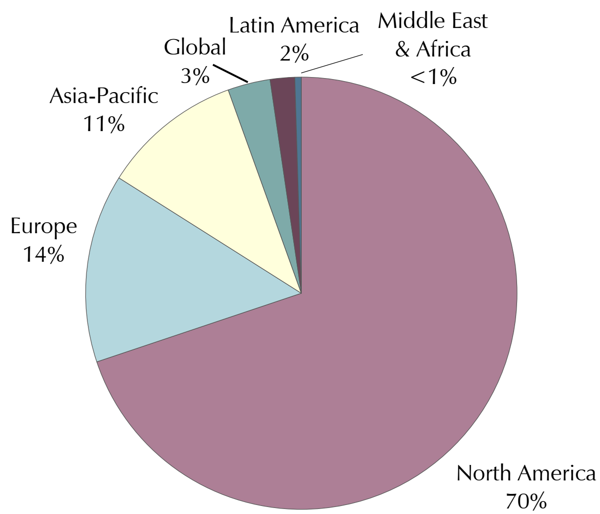
Observations

- End-to-end horizon pooled returns from Cambridge Associates and Burgiss have generally produced similar results. NCREIF ODCE returns are generally lower than those reported by other benchmark providers as the index tracks data for a select number of open-end commingled funds pursuing a core strategy.
- Rolling returns provided by Cambridge Associates include between 769 and 955 individual funds depending on time period while those provided by Burgiss include between 685 and 954 funds. NCREIF ODCE returns represent 25 individual open-end core funds.

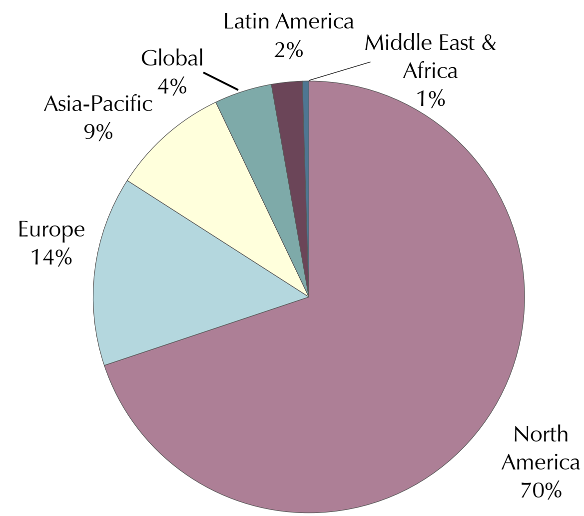
** Equal-weighted, net.*

Real Estate Funds
Geographic Exposure
(By Number of Funds*)
As of September 30, 2018

Cambridge Associates



Burgiss

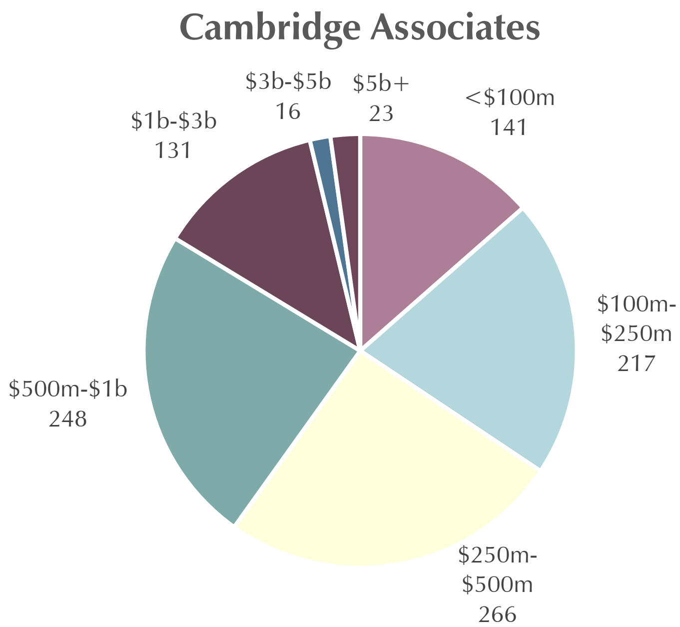


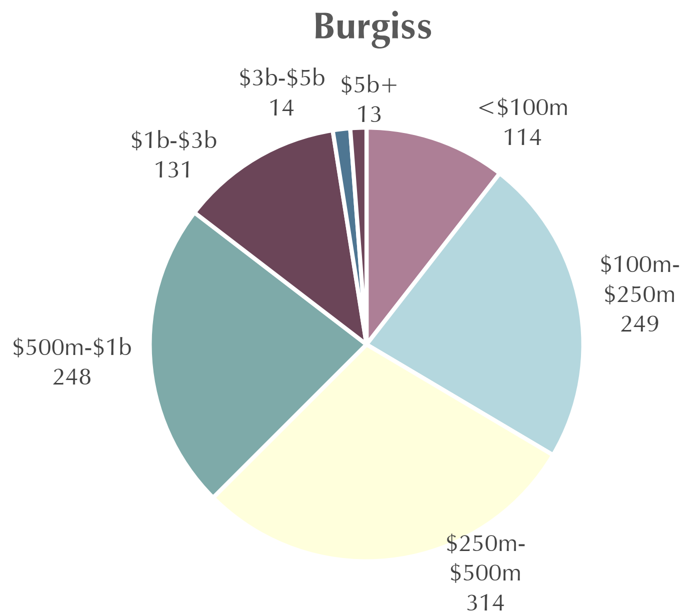
Observations

- Cambridge Associates and Burgiss have diverse geographic coverage across North America, Europe, Asia-Pacific, and Middle East/Africa.
- Geographic concentrations for each provider are very similar as a percentage of total funds covered.

** Based on number of funds by geography.*

Real Estate Funds
Exposure by Fund Size
(By Number of Funds)*
As of September 30, 2018



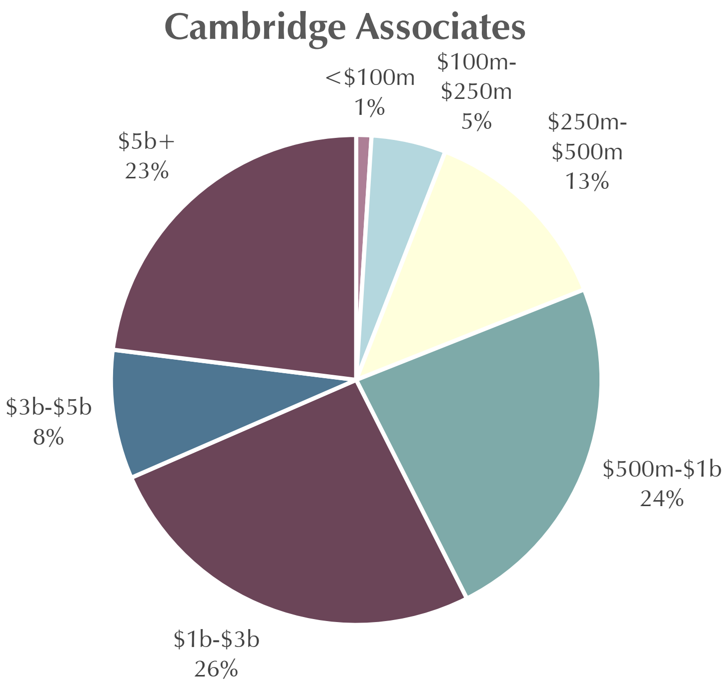


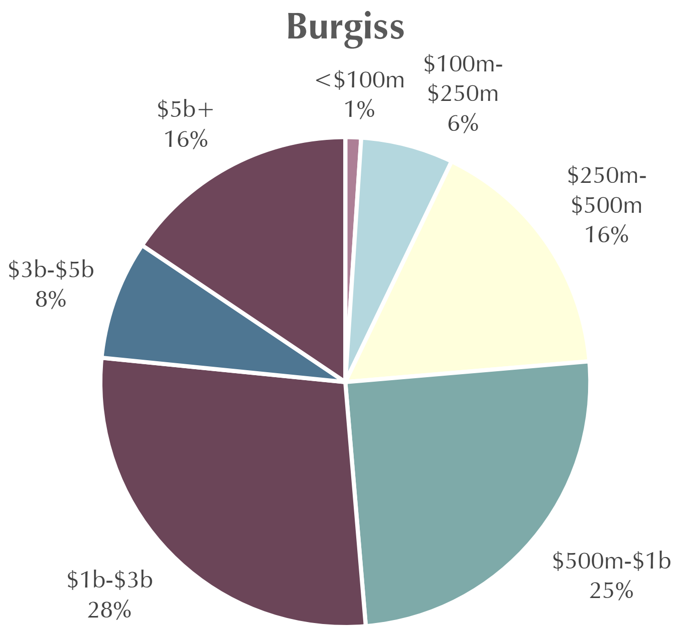
- Funds greater than $5 billion represent just 2% of the participating private real estate funds for Cambridge Associates and 1% for Burgiss.

- Approximately 3/4 of the funds are less than $1 billion in total commitments by fund count.

** Based on number of funds.*

Real Estate Funds
<u>Exposure By Fund Size</u>
<u>(By Committed Capital)*</u>
As of September 30, 2018





- Funds over $1 billion in assets represent 57% of the Cambridge Associates universe.
- Similar sized funds represent 52% of the Burgiss universe.

* Based on fund commitments.

- Cambridge Associates and Burgiss utilize the preferred and most accurate method of gathering private fund data (quarterly financial statements) and, as a result, represent the best option for benchmarking fund-level performance among the data providers covered.
- Conversely, benchmark providers using FOIA requests and other surveys to collect private fund data are likely to yield greater variability in regard to timeliness/accuracy which may prevent benchmarks from including the same funds within each quarter/period.

Private Infrastructure

Infrastructure Funds
Vintage Year Coverage as of 9/30/18

Vintage Year	Cambridge Associates	Burgiss	Preqin	Pitchbook
2006	8	15	5	4
2007	8	12	11	6
2008	10	12	8	6
2009	3	5	0	1
2010	13	13	11	5
2011	3	5	10	8
2012	11	13	6	9
2013	8	12	16	6
2014	10	17	10	9
2015	10	17	10	3
2016	4	15	9	4
2017	4	15	NA	4
2018	2	16	NA	5
Total	**94**	**167**	**96**	**70**

Observations

- Prior to 2006, no provider had more than four funds in a vintage.
- Burgiss appears to have the most robust fund universe for infrastructure funds.
  - Burgiss includes almost twice as many funds as the others, and have 12+ funds in 10 of 12 years.
- Preqin's benchmark claims to have more coverage, but further analysis revealed that only 96 of 147 funds have performance data.

Infrastructure Funds
Median Vintage Year Returns as of 9/30/18

Vintage Year	Cambridge Associates (%)	Burgiss (%)	Preqin (%)	Pitchbook (%)
2006	5.2	2.9	8.6	-
2007	6.9	3.6	8.9	7.2
2008	8.2	6.4	8.1	9.0
2009	-	7.9	-	-
2010	6.3	4.2	15.0	11.1
2011	-	10.0	10.5	5.8
2012	9.5	10.3	11.1	11.3
2013	4.0	9.4	9.3	12.5
2014	6.6	11.9	13.4	12.5
2015	6.5	11.0	14.4	-
2016	-	11.8	13.1	-
2017	-	0.7	-	-
2018	-	-12.2	-	-8.0

Observations

- Burgiss is the only service to track sufficient funds to produce a median return for each vintage year.
- Based on different levels of vintage year coverage, all four providers can produce drastically different results.
- The providers who accumulate data through financial statements (e.g., Cambridge Associates & Burgiss) will offer higher consistency of quarterly reporting than those using FOIA requests.

**A minimum of five funds is required to provide a vintage year median.*

Cambridge Associates Infrastructure Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	8	8	10	3	13	3	11	8	10	10	4	
Lower Quartile	-4.9%	0.5%	6.7%	---	4.8%	---	6.2%	-1.7%	2.1%	0.3%	---	
Median	5.2%	6.9%	8.2%	---	6.3%	---	9.5%	4.0%	6.6%	6.5%	---	
Upper Quartile	6.5%	13.0%	10.7%	---	8.3%	---	15.4%	10.4%	12.3%	12.6%	---	
Lower/Med Spread	*10.1%*	*6.3%*	*1.5%*	*NA*	*1.5%*	*NA*	*3.3%*	*5.7%*	*4.5%*	*6.2%*	*NA*	*4.9%*
Med/Upper Spread	*1.4%*	*6.2%*	*2.4%*	*NA*	*2.1%*	*NA*	*5.8%*	*6.4%*	*5.8%*	*6.1%*	*NA*	*4.5%*

Burgiss Infrastructure Funds
As of September 30, 2018

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
# of Funds	15	12	12	5	13	5	13	12	17	17	15	
Lower Quartile	-3.0%	-1.8%	-0.2%	5.9%	-3.5%	6.4%	-0.7%	-3.8%	8.1%	8.7%	10.3%	
Median	2.9%	3.6%	6.4%	7.9%	4.2%	10.0%	10.3%	9.4%	11.9%	11.0%	11.8%	
Upper Quartile	8.0%	12.0%	12.0%	11.1%	13.6%	17.3%	16.2%	10.7%	20.6%	15.0%	17.2%	
Lower/Med Spread	*5.9%*	*5.4%*	*6.6%*	*2.0%*	*7.7%*	*3.7%*	*10.9%*	*13.2%*	*3.8%*	*2.3%*	*1.5%*	*5.7%*
Med/Upper Spread	*5.1%*	*8.4%*	*5.6%*	*3.3%*	*9.4%*	*7.2%*	*6.0%*	*1.3%*	*8.7%*	*4.0%*	*5.4%*	*5.8%*

Infrastructure Funds Trailing Period Returns

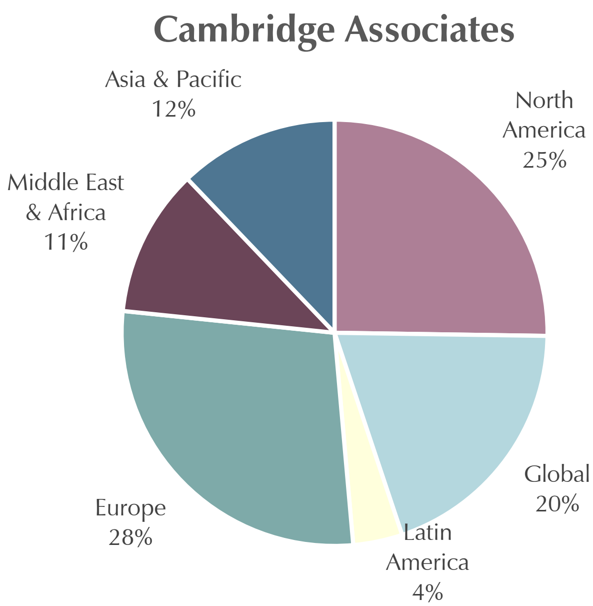
As of 9/30/18

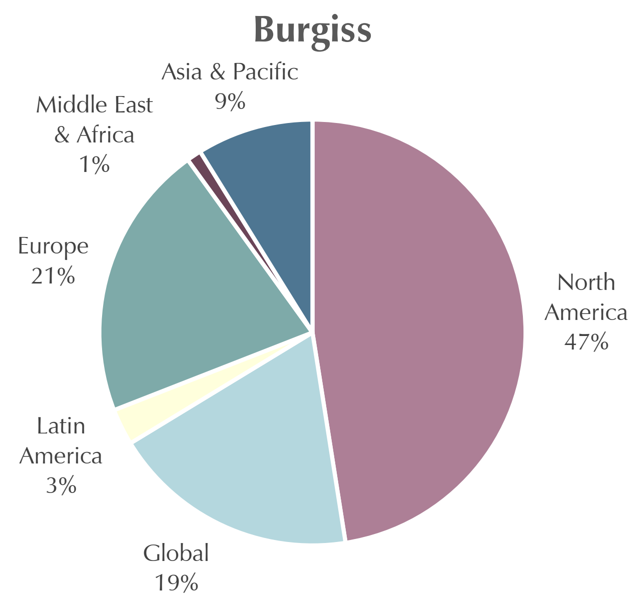
	Cambridge Associates (%)	Burgiss (%)
1 Quarter	2.2	2.3
1 Year	9.1	12.4
3 Year	12.3	11.6
5 Year	10.6	10.3
10 Year	8.2	7.7

- The Cambridge Associates and Burgiss universes have produced similar end-to-end pooled returns.
- Burgiss' returns included as many as 179 funds, depending on the timeframe, while Cambridge Associates' included as many as 106 funds.
- Aggregated end-to-end returns can be calculated as a dollar-weighted or equal-weighted return.
  - There will be a difference, as funds varied in size from under $100 million to greater than $15 billion.
  - Dollar-weighted pooled returns arguably give a more accurate depiction of the investable universe (i.e., the opportunity set) by aggregating funds based on their actual size.

* *Reflects dollar-weighted pooled returns. Note that Burgiss does not provide equal-weighted returns.*

Infrastructure Funds
Geographic Exposure
(By Number of Funds)*
As of September 30, 2018

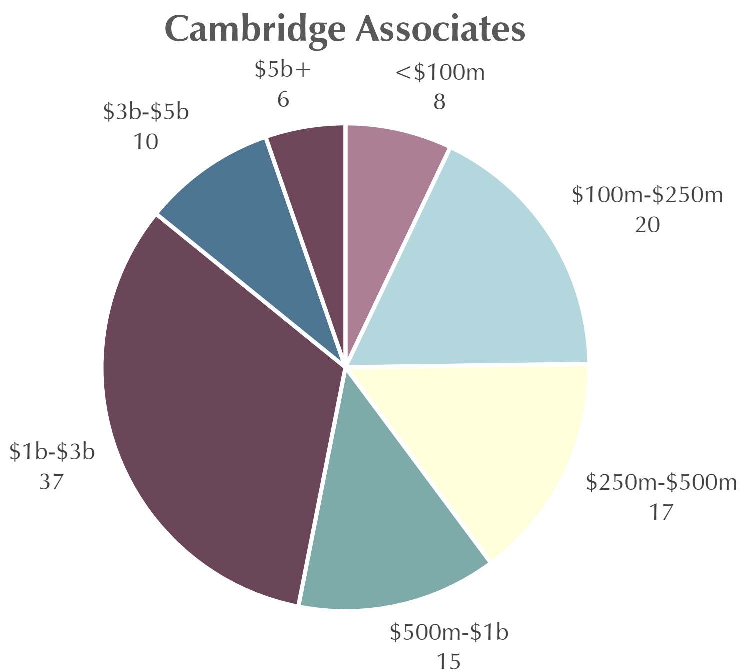


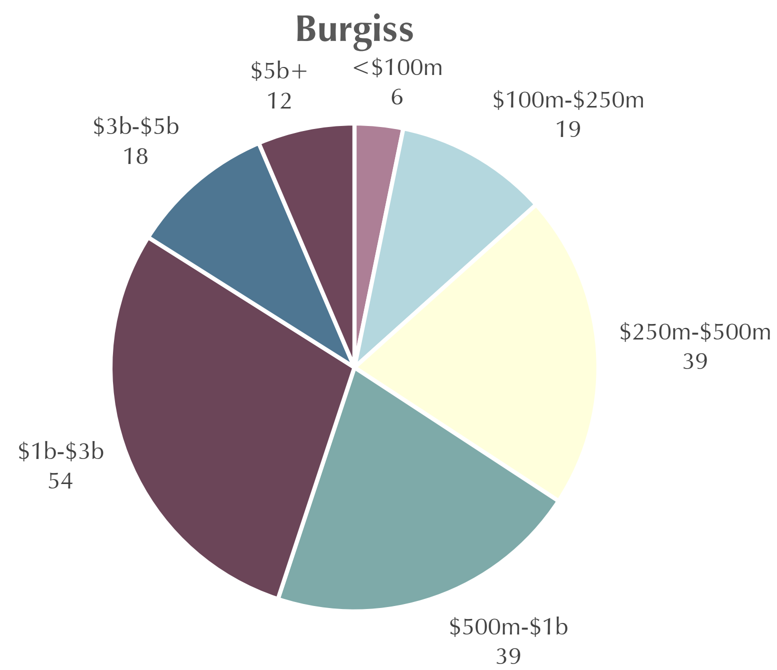


- Cambridge Associate has diverse coverage by geography with Europe being the largest contributor by number of funds with 28%.
- North America focused funds are approximately half of Burgiss infrastructure universe.

** Based on number of funds by geography.*

Infrastructure Funds
<u>Exposure by Fund Size</u>
<u>(By Number of Funds)*</u>
As of September 30, 2018

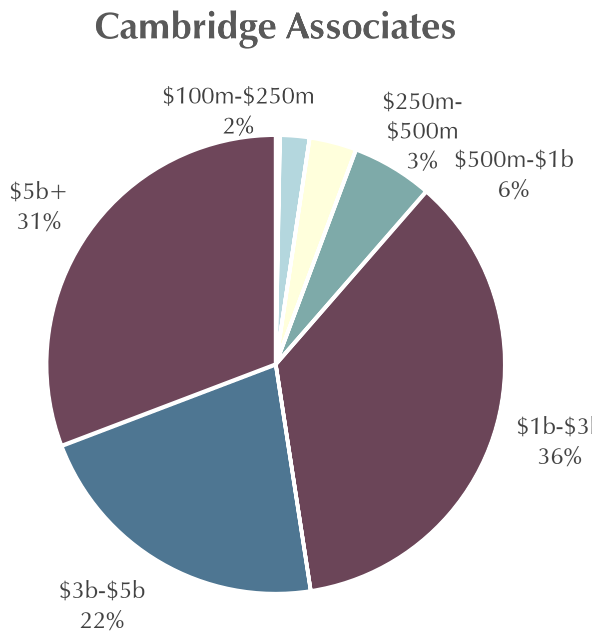


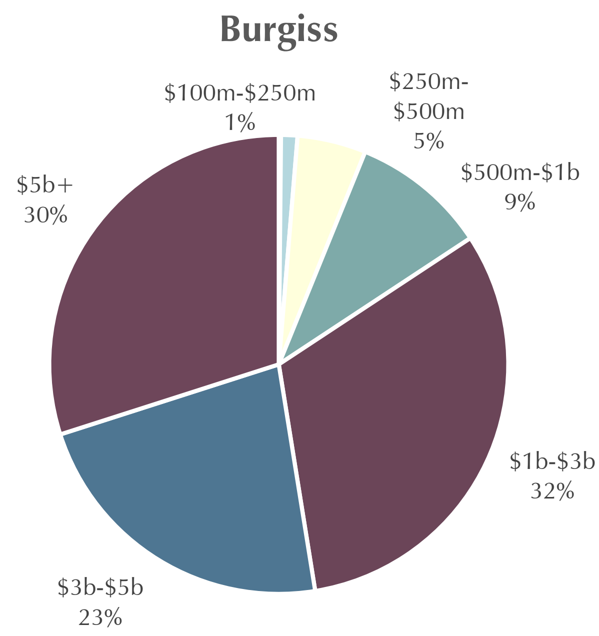


- Funds between $1 billion and $3 billion make up the largest section of the universe for both Cambridge Associates and Burgiss.

** Based on number of funds.*

Infrastructure Funds
Exposure by Fund Size
(by Committed Capital)*
As of September 30, 2018





- The universe for both Cambridge Associates and Burgiss are dominated by funds $1 billion and greater.

** Pie chart based on fund commitments.*

- Cambridge and Burgiss offer the most robust data sets.
- Cambridge appears to be a better benchmark for a global Infrastructure allocation.
- Burgiss appears to be a better benchmark for an allocation that has more exposure to North America.

Portable Alpha Hedge Funds

Observations

- The Retirement System currently uses a public market plus spread benchmark for its portable alpha hedge funds allocation (BofA Merrill Lynch 3-Month T-Bills +250 basis points).

- The approach of using cash plus a spread is the most common approach across the industry for similar programs (i.e., hedge fund portfolios that are designed to be market neutral).

- There is no industry standard for the amount of the spread.
  - Some plans use an aspirational amount that effectively reflects their expectations for "alpha".
  - Some plans use an amount that is consistent with their capital market expectations.
  - Some programs use their cost of borrowing for the combined amount.

- An inherent shortcoming in this approach is that benchmark performance will always be positive.

- While the portable alpha program is designed to have minimal market beta (to both equity and fixed income), the results *will not be positive every single month, unlike the benchmark.*

The Fund Universe Approach

- The Retirement System could consider a fund universe approach (as previously discussed briefly when the Commission adopted a secondary benchmark in 2018).
- The existing secondary benchmark is 50% HFRI Macro Index/50% HRI FoF Conservative.
- This composite was selected because it includes two hedge fund universes that have low market beta and that roughly proxy the composition of the System's program.
- According to HFRI:
  - **HFRI FoF Conservative:** "A Fund in the HFRI FoF Conservative Index shows generally consistent performance regardless of market conditions".
  - **HFRI Macro Index:** "Macro managers may hold equity securities, [but] the overriding investment thesis is predicated on the impact movements in underlying macroeconomic variables may have on security prices, as opposed to equity funds, in which the fundamental characteristics on the company are the most significant [and] are integral to investment thesis"

Changes to the Fund Universe Approach

- The composition of the portable alpha program has been weighted toward market neutral and global macro funds since 2013.

Sub-Strategy	Current Targets	Anticipated Future State
Equity Market Neutral	40%	30%
Global Macro	30%	30%
Fixed Income Arbitrage	10%	25%
Long/Short Equity	10%	0%
CTA	5%	10%
Insurance	5%	5%

- Staff anticipates slightly modifying this composition in the future.
- The proposed benchmark will encompass the two largest components of the historical and anticipated structures, without "overfitting" to accommodate the smaller allocations.

Another Option: Beta Adjustment

- The current HFRI fund universe was selected based on our belief that it has low beta sensitivity.
  - However, it likely includes numerous underlying funds with some inherent market exposures (e.g., equity and credit risk).
- The Retirement System could consider a "beta adjustment" in hopes of customizing the HFRI fund universe return profile to be closer to an apples-to-apples comparison with its portable alpha exposure.
- This would start by selecting a benchmark that best mirrors the exposures of the PA program.
  - Simplest to select a single benchmark for this.
- Measure beta of this composite against the System's largest beta exposure (e.g., global equities).
  - Time period would depend on the objective of the program (e.g., trailing 5-year beta).
- Then measure return of the HF index and subtract the impact of equity beta in that index.
- For example:

HFRI Macro Return – Beta * (MSCI ACWI return)

- This assumes the PA program is truly market neutral
  - Could make another adjustment for the actual beta in the program

Universe Definitions

- **HFRI Macro (Total) Index**: Investment Managers which trade a broad range of strategies in which the investment process is predicated on movements in underlying economic variables and the impact these have on equity, fixed income, hard currency and commodity markets. Managers employ a variety of techniques, both discretionary and systematic analysis, combinations of top down and bottom up theses, quantitative and fundamental approaches and long and short term holding periods.
- **HFRI EH: Equity Market Neutral Index**: In many but not all cases, portfolios are constructed to be neutral to one or multiple variables, such as broader equity markets in dollar or beta terms, and leverage is frequently employed to enhance the return profile of the positions identified. Statistical Arbitrage/Trading strategies consist of strategies in which the investment thesis is predicated on exploiting pricing anomalies which may occur as a function of expected mean reversion inherent in security prices; high frequency techniques may be employed and trading strategies may also be employed on the basis on technical analysis or opportunistically to exploit new information the investment manager believes has not been fully, completely or accurately discounted into current security prices. Equity Market Neutral Strategies typically maintain characteristic net equity market exposure no greater than 10% long or short.
- **HFRI Relative Value (Total) Index**: Investment Managers who maintain positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. Managers employ a variety of fundamental and quantitative techniques to establish investment theses, and security types range broadly across equity, fixed income, derivative or other security types.

Performance Comparison

Performance Comparison

- Below is a comparison of RSIC asset class performance relative to the existing benchmarks and potential new benchmarks.
- Returns are as of September 30, 2018.
- 10-year performance comparison was used.

Private Equity

	10 yr
Private Equity	**10.7%**
80% Russell 3000 Index/20% MSCI EAFE Index + 300 basis points on a 3-month lag	13.0
Cambridge Associates Private Equity	11.7
Burgiss Private Equity	11.5

Private Debt

	10 yr
Private Debt	**8.1%**
S&P LSTA Leveraged Loan Index +150 basis points on a 3-month lag	6.0
Cambridge Associates Private Debt	9.3
Burgiss Private Debt	9.6

Private Real Estate

	10 yr
Private Real Estate	**8.0%**
RSIC blended private real estate benchmark[1]	6.0
Cambridge Associates Private Real Estate	5.7
Burgiss Private Real Estate	4.5

Private Infrastructure

	10 yr
Private Infrastructure	**n/a**
Dow Jones Brookfield Global Infrastructure Index	10.4
Cambridge Associates Private Infrastructure	8.2
Burgiss Private Infrastructure	7.7

[1] NCREIF ODCE Net Index +100 basis points since July 1, 2018. Previously NCREIF ODCE Gross Index +75 basis points.

Peer Plan Benchmark Grids

Private Equity[1]

Plan Name	Private Equity
California Public Employees Retirement System	Custom FTSE All World, All Cap Equity + 150 bps, Quarter Lag
California State Teachers Retirement System	Weighted blend of the CalSTRS Custom Private Equity Index and Custom Tactical Index (both quarter lagged)
Florida Retirement System	MSCI ACWI net +300 bps
Teachers Retirement System of Texas	Customized State Street Private Equity Index - composed of the quarterly reported SSPEI, one quarter lagged and adjusted for the most recent quarter-end currency spot prices. Quarterly returns are geometrically linked for longer return horizons.
New York State Teachers Retirement System	S&P 500 Index (Plus 5%)
Wisconsin Retirement System	Burgiss Global All Private Equity
Ohio Public Employees Retirement System	State Street Private Equity Index ("SSPEI")
State Teachers Retirement System of Ohio	Russell 3000 Index +100 bps for private equity
Virginia Retirement System	MSCI ACWI IMI +250 bps – lagged one quarter
Michigan Public School Employees Ret. System	S&P 500 Index + 300 bps
Maryland State Retirement and Pension System	MSCI ACWI + 200 bps
Tennessee Consolidated Retirement System	Cambridge Associates custom PE benchmark
Public School Retirement System of Missouri	Russell 3000 Index
Arizona State Retirement System	Russell 2000 Index, lagged one quarter
Indiana Public Retirement System	Custom weighted public index +300 bps – lagged one quarter
Employees Retirement System of Texas	MSCI ACWI IMI + 300 bps (over a 10-year period)
Wyoming Retirement System	Custom blend of vintage year funds
Missouri State Employees Retirement System	Burgiss All Equity Universe (weighted by vintage year)
Oregon Public Employees' Retirement System	Russell 3000 Index + 300 bps – lagged one quarter
Alaska Retirement Management Board	Russell 3000 Index plus 350 basis points
Iowa Public Employees Retirement System	Policy benchmark index for each private market asset class is the return of the portfolio itself[2]

[1] The research was conducted on most current available public documents at time of report production. Data may become outdated or inaccurate in the future.
[2] Long-term return objective is Wilshire 5000 Index + 300 bps

Private Debt[1]

Plan Name	Private Debt
California Public Employees Retirement System	n/a
California State Teachers Retirement System	n/a
Florida Retirement System	n/a
Teachers Retirement System of Texas	n/a
New York State Teachers Retirement System	S&P/LSTA Leveraged Loan Index (Plus 3%)
Wisconsin Retirement System	Credit Suisse Leveraged Loan Index + 1%
Ohio Public Employees Retirement System	n/a
State Teachers Retirement System of Ohio	n/a
Virginia Retirement System	n/a
Michigan Public School Employees Ret. System	n/a
Maryland State Retirement and Pension System	n/a
Tennessee Consolidated Retirement System	50% Barclay's High Yield 2% Issuer Capped Index + 50% Credit Suisse Leveraged Loan Index
Public School Retirement System of Missouri	ICE BofAML U.S. High Yield Master II Index
Arizona State Retirement System	S&P/LSTA Leveraged Loan Index + 250 bps
Indiana Public Retirement System	n/a
Employees Retirement System of Texas	S&P LTSA Leveraged Loan Index + 150 bps
Wyoming Retirement System	Custom blend of vintage year funds
Missouri State Employees Retirement System	S&P/LSTA U.S. Leveraged Loan Index + 2%
Oregon Public Employees' Retirement System	n/a
Alaska Retirement Management Board	n/a
Iowa Public Employees Retirement System	Policy benchmark index for each private market asset class is the return of the portfolio itself[2]

[1] The research was conducted on most current available public documents at time of report production. Data may become outdated or inaccurate in the future.
[2] Long-term return objective is S&P LSTA Leveraged Loan Index + 100 bps

(Private) Real Estate[1]

Plan Name	Private Real Estate
California Public Employees Retirement System[2]	MSCI/PREA U.S. ACOE Quarterly Property Fund Index (Unfrozen)
California State Teachers Retirement System	NCREIF ODCE Value Weighted index Net of fees (quarter lagged)
Florida Retirement System	76.5% NCRIEF ODCE Net, 13.5% NCRIEF ODCE Net +150 bps and 10% FTSE EPRA/NAREIT net
Teachers Retirement System of Texas	NCREIF ODCE – lagged one quarter
New York State Teachers Retirement System	NCRIEF ODCE
Wisconsin Retirement System	NCRIEF ODCE
Ohio Public Employees Retirement System	NCREIF ODCE Net +85 bps
State Teachers Retirement System of Ohio	85% NCREIF NPI and 15% FTSE NAREIT Equity REITs
Virginia Retirement System	85% NCREIF ODCE Net 1Q lag and 15% FTSE NAREIT developed REITs
Michigan Public School Employees Ret. System	NCREIF NPI **minus** 130 bps
Maryland State Retirement and Pension System	85% NCREIF ODCE (1quarter lag, gross),15% FTSE EPRA/NAREIT Developed (net)
Tennessee Consolidated Retirement System	NCREIF NPI Index
Public School Retirement System of Missouri	NCREIF ODCE
Arizona State Retirement System	NCREIF ODCE Net – lagged one quarter
Indiana Public Retirement System	70% FTSE NAREIT All Equity REITS and 30% Barclays CMBS
Employees Retirement System of Texas	NCREIF – ODCE Net
Wyoming Retirement System	Custom blend of vintage year funds
Missouri State Employees Retirement System	NCREIF ODCE
Oregon Public Employees' Retirement System	NCREIF – ODCE Net +50 bps
Alaska Retirement Management Board	NCREIF NPI Index
Iowa Public Employees Retirement System	Policy benchmark index for each private market asset class is the return of the portfolio itself[3]

[1] The research was conducted on most current available public documents at time of report production. Data may become outdated or inaccurate in the future.
[2] Real estate and infrastructure included in "Real Assets" bucket
[3] Long-term return objective is NCRIEF ODCE Net

Infrastructure[1]

Plan Name	Infrastructure
California Public Employees Retirement System	Included in “real assets”
California State Teachers Retirement System	CPI+300 bps – lagged one quarter
Florida Retirement System	n/a
Teachers Retirement System of Texas	66% Cambridge Associates Infrastructure and 34% CPI – lagged one quarter
New York State Teachers Retirement System	n/a
Wisconsin Retirement System	n/a
Ohio Public Employees Retirement System	n/a
State Teachers Retirement System of Ohio	n/a
Virginia Retirement System	CPI +400 bps – lagged one quarter
Michigan Public School Employees Ret. System	Included in real estate
Maryland State Retirement and Pension System	CPI-U + 500 bps (10% cap)
Tennessee Consolidated Retirement System	n/a
Public School Retirement System of Missouri	n/a
Arizona State Retirement System	CPI ex-Food and Energy + 350 bps
Indiana Public Retirement System	n/a
Employees Retirement System of Texas	CPI + 400 bps
Wyoming Retirement System	Custom blend of vintage year funds
Missouri State Employees Retirement System	n/a
Oregon Public Employees’ Retirement System	CPI + 400 bps
Alaska Retirement Management Board	S&P Global Infrastructure
Iowa Public Employees Retirement System	Policy benchmark index for each private market asset class is the return of the portfolio itself[2]

[1] The research was conducted on most current available public documents at time of report production. Data may become outdated or inaccurate in the future.
[2] Long-term return objective is CPI + 500 bps

Hedge Funds[1]

Plan Name	Hedge Funds	Notes
California Public Employees Retirement System	n/a	
California State Teachers Retirement System	Weighted blend of underlying strategies	
Florida Retirement System	CPI + 450 bps	Hedge funds included in catch-all bucket called "strategic investments" with benchmark of CPI + 450 bps
Teachers Retirement System of Texas	3 month Libor + 200 bps	Hedge funds are defined as "absolute return" "high probability of generating a positive absolute return regardless of market conditions"
New York State Teachers Retirement System	n/a	
Wisconsin Retirement System	60% MSCI World Custom Net 40% Bloomberg Barclays Capital Govt/Credit	Hedge funds included in "multi-asset"
Ohio Public Employees Retirement System	Custom benchmark using the HFRI single strategy indices weighted by the target allocations listed in the Annual Investment Plan	
State Teachers Retirement System of Ohio	Not included in policy benchmark. Small exposure lumped into "alternatives" which is a mix of PE and Opportunistic benchmarks	System has an "Opportunistic Diversified" bucket benchmarked to Russell 3000 Index **minus** 100 bps. Consists of 70+ commingled funds, co-investments, and direct investments involving domestic and global energy, infrastructure and specialty finance funds.
Virginia Retirement System	Weighted average of exposure to representative HFRI sub-strategy indices	
Michigan Public School Employees Ret. System	T-Bills + 400 bps	HFRI FOF Conservative – lagged one month
Maryland State Retirement and Pension System	3 Month T-Bill + 400 bps	Secondary bench is HFRI Fund of Funds Conservative + 100 bps
Tennessee Consolidated Retirement System	n/a	
Public School Retirement System of Missouri	n/a	
Arizona State Retirement System	n/a	
Indiana Public Retirement System	Weighted average of exposure to representative HFRI sub-strategy indices	
Employees Retirement System of Texas	U.S. 3-Month Treasury bill + 400 bps	HFRI style indices are used for comparison purposes
Wyoming Retirement System	HFRI FoF Index	
Missouri State Employees Retirement System	HFRI Fund Weighted Composite Index	
Oregon Public Employees' Retirement System	CPI + 400 bps	
Alaska Retirement Management Board	3-month Treasury Bill + 500 bps	
Iowa Public Employees Retirement System	n/a	

[1] The research was conducted on most current available public documents at time of report production. Data may become outdated or inaccurate in the future.

Top Three Most Common per Asset Class

	Private Equity	Frequency
1	Custom weighted index	5
2	MSCI ACWI + spread (200-300 bps)	4
3	Fund universe (Cambridge Associates or Burgiss)	3

	Private Debt	Frequency
1	S&P LTSA Leveraged Loan Index + spread (150 – 300 bps)	4
2	Custom weighted index	2
3	Credit Suisse Leveraged Loan Index + spread (100 bps)	1

	Real Estate	Frequency
1	NCREIF ODCE[1] with **no spread**	8
2	Custom weighted index	6
3	NCREIF ODCE + spread (50-85 bps)	2

[1] Includes net version and gross version.

Top Three Most Common per Asset Class (continued)

	Infrastructure	Frequency
1	CPI + spread (300 - 500 bps)	6
2	Custom weighted index	2
3	Included as actual performance of the asset class	1

	Hedge Funds	Frequency
1	CPI or T-Bills + spread (200 - 500 bps)	7
2	HFRI related indices	5
3	Other	2

RETIREMENT SYSTEM INVESTMENT COMMISSION

Proposed Strategic Calendar

Michael Hitchcock, CEO

Purpose

- Align regular meeting schedule to maximize the availability of quarterly performance data.
- Provide clarity for annual and nonannual strategic topics that should be covered at each Commission meeting.
- Ensure that strategic items are covered on a regular rather than *ad hoc* basis.
- Provide visibility into future meeting topics in order to better inform presentations and discussions which will also aid in ensuring that meeting materials are timely posted.
- Aid in instilling a longer term focus on investment performance evaluation.

September Commission Meeting

- Meeting Date – Second Thursday
- Annual Items:
  - Fiscal Year End Investment Performance Review (long term focus)
  - Asset Class Deep Dive – Public Equity
  - Annual Budget Approval
  - Current AIP Progress Review
  - Strategic Investment Topic Presentation (Meketa, Albourne, Manager, etc.)
  - Delegated Investment Report
  - CEO review/CEO discussion of CIO review
- Non-Annual items
  - Retiree Representative Selection – every 4 years
  - Commissioner Committee Selection – every 2 years

December Commission Meeting

- Meeting Date – First Thursday
- Annual Items
  - Actuarial Update
  - Asset Class Deep Dive – Private Equity (including delegated investments and co-investments)
  - SIOP Review
  - Commission Provides AIP Direction
  - Current AIP Progress Review
  - Strategic Investment Topic Presentation (Meketa, Albourne, Manager, etc.)
  - Quarterly Investment Performance Review
- Non-Annual Items
  - Fiduciary Audit Report Presentation – every 4 years

March Commission Meeting

- Meeting Date – First Thursday
- Annual Items
  - Capital Market Expectations Review
  - Target Portfolio Review
  - AIP Introduction
  - Quarterly Investment Performance Review
  - Asset Class Deep Dive – Private Credit
  - Delegated Investment Report
  - Strategic Investment Topic Presentation (Meketa, Albourne, Manager, etc.)
  - Current AIP Progress Review

April Commission Meeting

- Meeting Date – Third Thursday
- Annual Items
  - Macro-Economic Presentation and Discussion
  - AIP Approval
  - Asset Class Deep Dive – Real Assets
  - Delegated Investment Report
  - Strategic Investment Topic Presentation (Meketa, Albourne, Manager, etc.)
- Non-Annual Items
  - Infrastructure/Business Plan review – every 3 years
  - Strategic Plan Review - every 5 years
  - Fiduciary Training – every 2 years

June Commission Meeting

- Meeting Date – First Thursday
- Annual Items
  - Quarterly Investment Performance Review
  - Asset Class Deep Dive – Bonds
  - Delegated Investment Report
  - Strategic Investment Topic Presentation (Meketa, Albourne, Manager, etc.)
  - Current AIP Progress Review
  - Commissioner Self-Evaluation
  - Legislative Update
  - General Investment Consultant Performance Review
- Non-Annual Items
  - Chair/Vice-Chair Selection – every 2 years
  - ALM Study and Asset Allocation Review – every 5 years

Other Considerations

- Are there additional strategic items that Commissioners would like to see included?
- *Ad hoc* items will also appear on agendas i.e., investment recommendations that fall outside the delegation policy.
- Commissioners may also set *ad hoc* items for the next or future meeting agendas.
- Meeting agendas may also include reports from Committees, Chair, CEO, etc., as needed, but are not necessarily contemplated as strategic items for purposes of this calendar.