

June 13, 2019



**Pennsylvania State Employees'  
Retirement System – Defined  
Benefit Plan**

First Quarter 2019

Executive Summary

---

**Thomas H. Shingler**  
Senior Vice President

**Bud Pellecchia**  
Senior Vice President

**Britton M. Murdoch**  
Vice President

Callan

---

**Market Environment**

## Total Rebound in Q1 After a Severe Downtraft in Q4 2018

- The Fed raised rates four times in 2018, but placed further hikes on pause in 2019
- Market has since generated the strongest first quarter since 2009
- Wage pressures are building as the unemployment rate stays below 4%
- CPI fell back below 2% year-over-year in December and remained there through the first quarter
- Oil prices plummeted from \$84 to \$52 in Q4, seemingly altering the outlook for inflation. Prices rebounded to \$70+ in Q1, thanks to supply risks from Russia and Iran

### Returns for Periods ended March 31, 2019

	1 Quarter	1 Year	5 Years	10 Years	25 Years
<b>U.S. Equity</b>					
Russell 3000	14.04	8.77	10.36	16.00	9.78
S&P 500	13.65	9.50	10.91	15.92	9.80
Russell 2000	14.58	2.05	7.05	15.36	8.99
<b>Non-U.S. Equity</b>					
MSCI World ex USA	10.45	-3.14	2.20	8.82	5.04
MSCI Emerging Markets	9.93	-7.40	3.68	8.95	--
MSCI ACWI ex USA Small Cap	10.26	-9.48	3.26	11.86	--
<b>Fixed Income</b>					
Bloomberg Barclays Aggregate	2.94	4.48	2.74	3.77	5.33
3-Month T-Bill	0.60	2.12	0.74	0.43	2.54
Bloomberg Barclays Long Gov/Credit	6.45	5.24	5.35	7.23	7.34
Bloomberg Barclays Global Agg ex-US	1.52	-4.13	-0.26	2.46	4.40
<b>Real Estate</b>					
NCREIF Property	1.80	6.83	9.13	8.50	9.36
FTSE NAREIT Equity	16.33	20.86	9.12	18.28	10.27
<b>Alternatives</b>					
CS Hedge Fund	3.99	0.20	2.26	5.42	7.72
Cambridge Private Equity*	-0.53	10.61	11.94	13.76	15.20
Bloomberg Commodity	6.32	-5.25	-8.92	-2.56	2.15
Gold Spot Price	1.34	-2.17	0.23	3.45	4.88
<b>Inflation - CPI-U</b>	<b>1.18</b>	<b>1.86</b>	<b>1.47</b>	<b>1.80</b>	<b>2.21</b>

\*Cambridge PE data are available through December 31, 2018.

Source: Callan

# Callan Periodic Table of Investment Returns

Returns Ranked in Order of Performance (as of March 31, 2019)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	1 Qtr. 2019
Real Estate 13.84%	U.S. Fixed Income 8.43%	Non-U.S. Fixed Income 22.37%	Emerging Market Equity 55.82%	Real Estate 37.96%	Emerging Market Equity 34.00%	Real Estate 42.12%	Emerging Market Equity 39.38%	U.S. Fixed Income 5.24%	Emerging Market Equity 78.51%	Small Cap Equity 26.85%	U.S. Fixed Income 7.84%	Real Estate 27.73%	Small Cap Equity 38.82%	Real Estate 15.02%	Large Cap Equity 1.38%	Small Cap Equity 21.31%	Emerging Market Equity 37.28%	Cash Equivalent 1.87%	Real Estate 14.59%
U.S. Fixed Income 11.63%	High Yield 5.28%	U.S. Fixed Income 10.26%	Small Cap Equity 47.25%	Emerging Market Equity 25.55%	Real Estate 15.35%	Emerging Market Equity 32.17%	Non-U.S. Equity 12.44%	Non-U.S. Fixed Income 4.39%	High Yield 58.21%	Real Estate 19.63%	High Yield 4.98%	Emerging Market Equity 18.23%	Large Cap Equity 32.39%	Large Cap Equity 13.69%	U.S. Fixed Income 0.55%	High Yield 17.13%	Non-U.S. Equity 24.21%	U.S. Fixed Income 0.01%	Small Cap Equity 14.58%
Cash Equivalent 6.18%	Cash Equivalent 4.42%	Real Estate 2.82%	Real Estate 40.69%	Non-U.S. Equity 20.38%	Non-U.S. Equity 14.47%	Non-U.S. Equity 25.71%	Non-U.S. Fixed Income 11.03%	Cash Equivalent 2.06%	Real Estate 37.13%	Emerging Market Equity 18.88%	Non-U.S. Fixed Income 4.36%	Non-U.S. Equity 16.41%	Non-U.S. Equity 21.02%	U.S. Fixed Income 5.97%	Cash Equivalent 0.05%	Large Cap Equity 11.96%	Large Cap Equity 21.83%	High Yield -2.08%	Large Cap Equity 13.65%
Small Cap Equity -3.02%	Small Cap Equity 2.49%	Cash Equivalent 1.78%	Non-U.S. Equity 39.42%	Small Cap Equity 18.33%	Large Cap Equity 4.91%	Small Cap Equity 18.37%	U.S. Fixed Income 6.97%	High Yield -26.16%	Non-U.S. Equity 33.67%	High Yield 15.12%	Large Cap Equity 2.11%	Small Cap Equity 16.35%	High Yield 7.44%	Small Cap Equity 4.89%	Real Estate -0.79%	Emerging Market Equity 11.19%	Small Cap Equity 14.65%	Non-U.S. Fixed Income -2.15%	Non-U.S. Equity 10.45%
Non-U.S. Fixed Income -3.91%	Emerging Market Equity -2.61%	High Yield -1.37%	High Yield 28.97%	Non-U.S. Fixed Income 12.54%	Small Cap Equity 4.55%	Large Cap Equity 15.79%	Large Cap Equity 5.49%	Small Cap Equity -33.79%	Small Cap Equity 27.17%	Large Cap Equity 15.06%	Cash Equivalent 0.10%	Large Cap Equity 16.00%	Real Estate 3.67%	High Yield 2.45%	Non-U.S. Equity -3.04%	Real Estate 4.06%	Non-U.S. Fixed Income 10.51%	Large Cap Equity -4.38%	Emerging Market Equity 9.93%
High Yield -5.86%	Non-U.S. Fixed Income -3.75%	Emerging Market Equity -6.16%	Large Cap Equity 28.68%	High Yield 11.13%	Cash Equivalent 3.07%	High Yield 11.85%	Cash Equivalent 5.00%	Large Cap Equity -37.00%	Large Cap Equity 26.47%	Non-U.S. Equity 8.95%	Small Cap Equity -4.18%	High Yield 15.81%	Cash Equivalent 0.07%	Cash Equivalent 0.03%	Small Cap Equity -4.41%	Non-U.S. Equity 2.75%	Real Estate 10.36%	Real Estate -5.63%	High Yield 7.26%
Large Cap Equity -9.11%	Real Estate -3.81%	Non-U.S. Equity -15.80%	Non-U.S. Fixed Income 19.36%	Large Cap Equity 10.88%	High Yield 2.74%	Non-U.S. Fixed Income 8.16%	High Yield 1.87%	Non-U.S. Equity -43.56%	Non-U.S. Fixed Income 7.53%	U.S. Fixed Income 6.54%	Real Estate -6.46%	U.S. Fixed Income 4.21%	U.S. Fixed Income -2.02%	Emerging Market Equity -2.19%	High Yield -4.47%	U.S. Fixed Income 2.65%	High Yield 7.50%	Small Cap Equity -11.01%	U.S. Fixed Income 2.94%
Non-U.S. Equity -13.37%	Large Cap Equity -11.89%	Small Cap Equity -20.48%	U.S. Fixed Income 4.10%	U.S. Fixed Income 4.34%	U.S. Fixed Income 2.43%	Cash Equivalent 4.85%	Small Cap Equity -1.57%	Real Estate -48.21%	U.S. Fixed Income 5.93%	Non-U.S. Fixed Income 4.95%	Non-U.S. Equity -12.21%	Non-U.S. Fixed Income 4.09%	Emerging Market Equity -2.60%	Non-U.S. Fixed Income -3.09%	Non-U.S. Fixed Income -6.02%	Non-U.S. Fixed Income 1.49%	U.S. Fixed Income 3.54%	Non-U.S. Equity -14.09%	Non-U.S. Fixed Income 1.52%
	Non-U.S. Equity -21.40%	Large Cap Equity -22.10%	Cash Equivalent 1.15%	Cash Equivalent 1.33%	Non-U.S. Fixed Income -8.65%	U.S. Fixed Income 4.33%	Real Estate -7.39%	Emerging Market Equity -53.33%	Cash Equivalent 0.21%	Cash Equivalent 0.13%	Emerging Market Equity -18.42%	Cash Equivalent 0.11%	Non-U.S. Fixed Income -3.08%	Non-U.S. Equity -4.32%	Emerging Market Equity -14.92%	Cash Equivalent 0.33%	Cash Equivalent 0.86%	Emerging Market Equity -14.57%	Cash Equivalent 0.60%

Callan

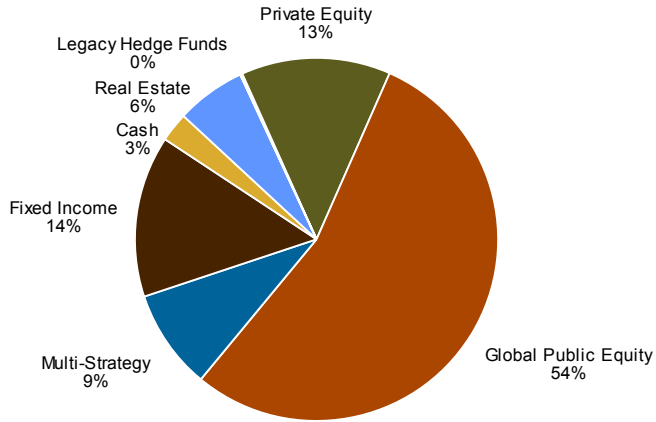
---

**PA SERS Defined Benefit Plan  
Performance Review**

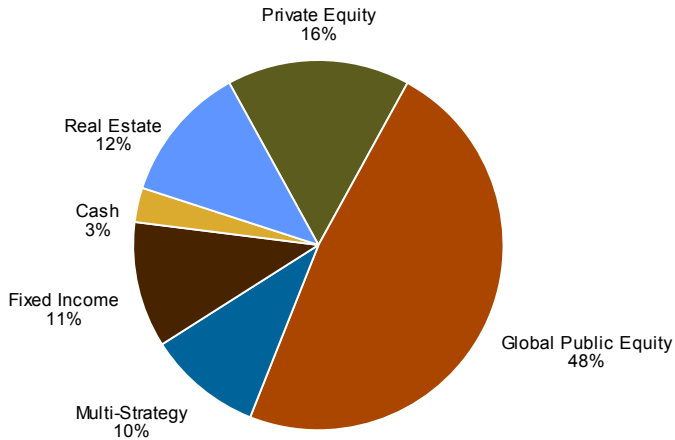
# Total Fund

## Actual Asset Allocation versus Target as of March 31, 2019

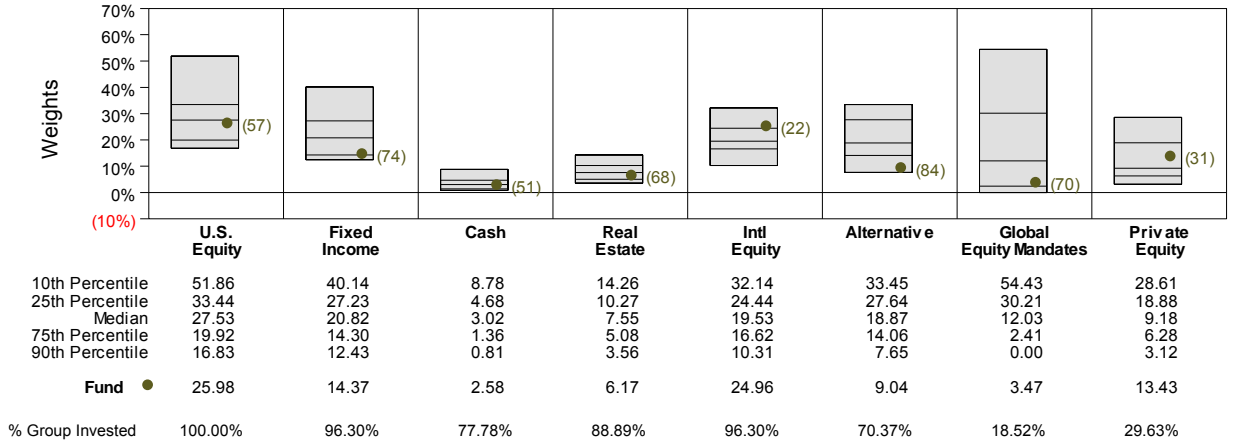
Actual Asset Allocation



Target Asset Allocation



Asset Class Weights vs Callan Public Fund Spons- V Lg DB (>10B)



Asset Class	\$000s Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Private Equity	3,870,849	13.4%	16.0%	(2.6%)	(741,690)
Global Public Equity	15,686,052	54.4%	48.0%	6.4%	1,848,436
Multi-Strategy	2,561,057	8.9%	10.0%	(1.1%)	(321,780)
Fixed Income	4,141,513	14.4%	11.0%	3.4%	970,393
Cash	744,061	2.6%	3.0%	(0.4%)	(120,790)
Real Estate	1,778,722	6.2%	12.0%	(5.8%)	(1,680,682)
Legacy Hedge Funds	46,114	0.2%	0.0%	0.2%	46,114
<b>Total</b>	<b>28,828,369</b>	<b>100.0%</b>	<b>100.0%</b>		

\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

## Total Fund

### Attribution Analysis versus Target – Net of Fees as of March 31, 2019

#### Relative Attribution Effects for Quarter ended March 31, 2019

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Fixed Income	14%	11%	3.66%	2.94%	0.11%	(0.15%)	(0.05%)
Real Estate	7%	12%	4.32%	0.67%	0.25%	0.30%	0.55%
Multi-Strategy	9%	10%	7.12%	4.00%	0.28%	0.03%	0.31%
Global Public Equity	53%	48%	12.89%	12.29%	0.30%	0.22%	0.53%
Legacy Hedge Funds	0%	0%	0.47%	4.62%	(0.01%)	(0.00%)	(0.01%)
Private Equity	14%	16%	0.62%	0.62%	0.00%	0.10%	0.10%
Cash	3%	3%	0.42%	0.60%	(0.00%)	0.02%	0.01%
<b>Total</b>			<b>8.21%</b>	<b>= 6.77%</b>	<b>+ 0.93%</b>	<b>+ 0.52%</b>	<b>1.44%</b>

- **What helped relative attribution?**

- Outperformance relative to target from Global Public Equity, Multi-Strategy, Real Estate and Fixed Income managers
- An overweight to Global Public Equity and underweight to Real Estate (attribution based on target return)

- **What hurt relative attribution?**

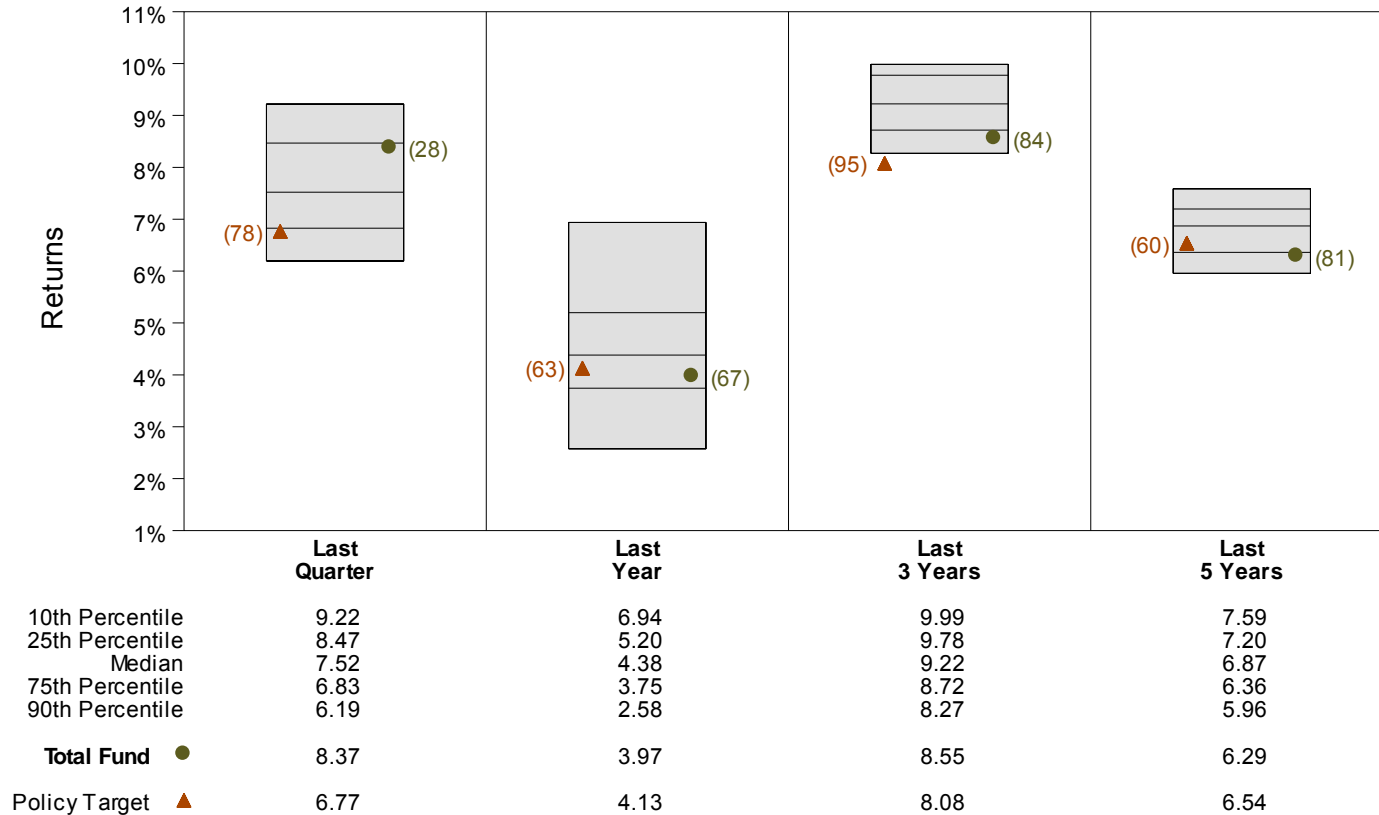
- An overweight to Fixed Income (attribution based on target return)

\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

## Gross of Fee Performance versus Peers and Benchmark (As of March 31, 2019)

### Callan Public Fund Spons- V Lg DB (>10B)



\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

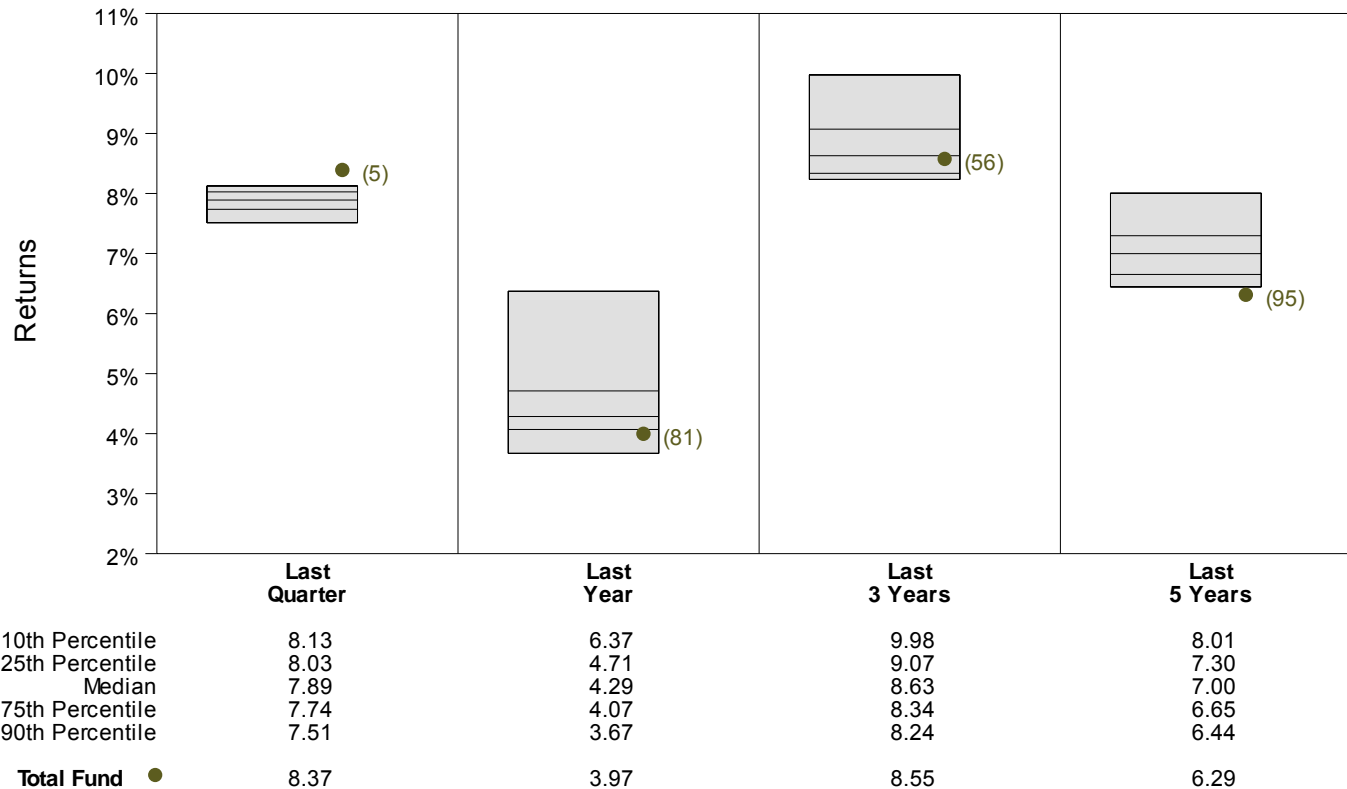


# Total Fund

## Asset Allocation-Adjusted Gross of Fee Peer Performance Comparison as of March 31, 2019

- For this comparison, each fund in the Database is adjusted to have the same asset allocation as Pennsylvania SERS. This removes large asset allocation variances among plans and allows for a greater focus on manager performance.

### Asset Allocation Adjusted Ranking

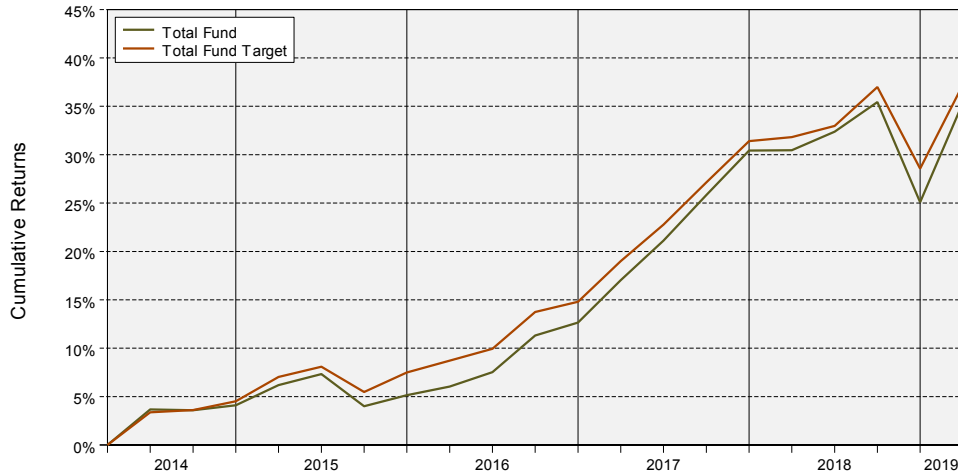


\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

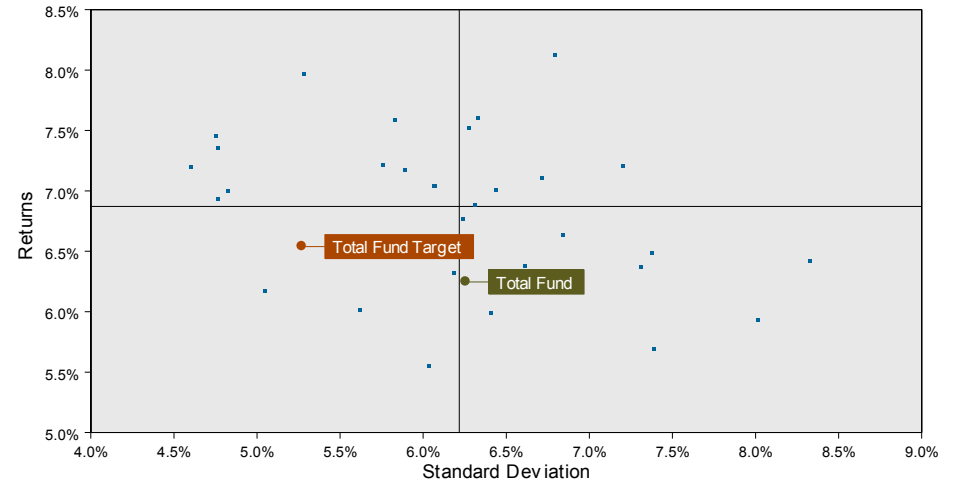
# Total Fund

## Performance versus Total Fund Target as of March 31, 2019

Cumulative Returns Actual vs Target



Five Year Annualized Risk vs Return



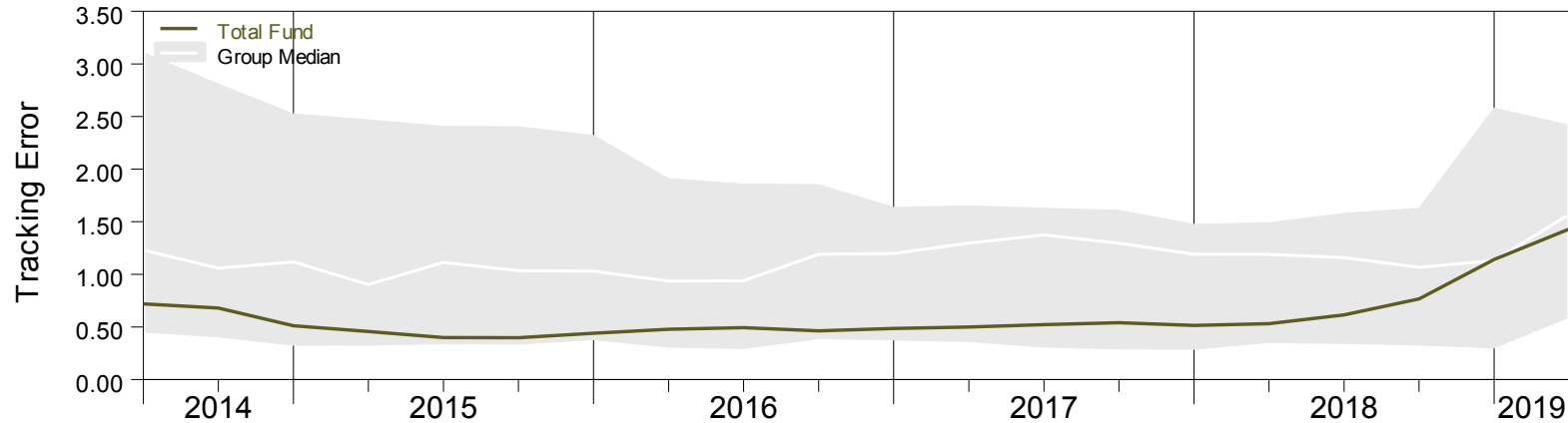
Squares represent membership of the Callan Public Fund Spons- V Lg DB (>10B)

\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

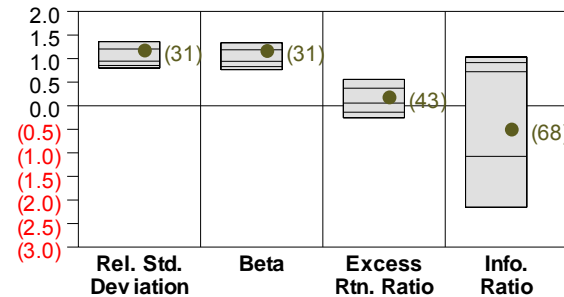
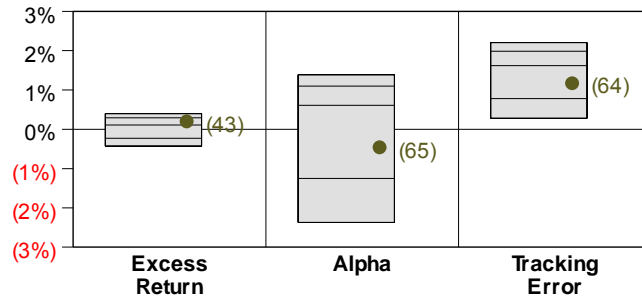
# Total Fund

## Risk Statistics versus Peers as of March 31, 2019

Rolling 12 Quarter Tracking Error vs Targets Compared to Callan Public Fund Spons- V Lg DB (>10B)



Risk Statistics Rankings vs Total Fund Target  
Rankings Against Very Large Public Funds (>10B)  
Five Years



	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Total Fund
Excess Return	0.40	0.29	0.11	(0.23)	(0.43)	0.16
Alpha	1.39	1.10	0.61	(1.25)	(2.37)	(0.49)
Tracking Error	2.21	1.99	1.62	0.78	0.28	1.14

	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	Total Fund
Rel. Std. Deviation	1.36	1.20	0.95	0.85	0.80	1.14
Beta	1.34	1.19	0.94	0.83	0.77	1.13
Excess Rtn. Ratio	0.56	0.37	0.06	(0.14)	(0.26)	0.14
Info. Ratio	1.03	0.92	0.72	(1.08)	(2.15)	(0.54)

\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Asset Class Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance</b>						
<b>Total Fund</b>	<b>\$28,828</b>	<b>100.00%</b>	<b>8.21%</b>	<b>3.36%</b>	<b>7.90%</b>	<b>5.64%</b>
Total Fund Custom Benchmark(1)	-	-	6.75%	4.12%	8.28%	6.08%
Public Market Equiv Benchmark(2)	-	-	4.42%	2.46%	8.42%	6.33%
<b>Global Public Equity</b>	<b>\$15,686</b>	<b>54.41%</b>	<b>12.89%</b>	<b>2.27%</b>	<b>10.75%</b>	<b>6.52%</b>
MSCI ACWI IMI	-	-	12.29%	1.89%	10.58%	6.33%
<b>Fixed Income</b>	<b>\$4,142</b>	<b>14.37%</b>	<b>3.66%</b>	<b>3.61%</b>	<b>3.57%</b>	<b>2.72%</b>
Bimbg Aggregate	-	-	2.94%	4.48%	2.03%	2.74%
<b>Multi-Strategy</b>	<b>\$2,561</b>	<b>8.88%</b>	<b>7.12%</b>	<b>5.55%</b>	-	-
S&P/LSTA Leveraged Loan	-	-	4.00%	2.97%	5.67%	3.62%
Russell 3000 Index	-	-	14.04%	8.77%	13.48%	10.36%
<b>Real Estate</b>	<b>\$1,779</b>	<b>6.17%</b>	<b>4.32%</b>	<b>(0.71%)</b>	<b>1.87%</b>	<b>4.92%</b>
Real Estate Custom Benchmark	-	-	0.67%	6.05%	6.65%	8.90%
CPI +3% (Qtr lag)	-	-	0.27%	4.91%	5.03%	4.52%
<b>Private Equity</b>	<b>\$3,871</b>	<b>13.43%</b>	<b>0.62%</b>	<b>9.11%</b>	<b>10.01%</b>	<b>8.92%</b>
Burgiss Private Equity Custom Index	-	-	(0.73%)	10.15%	12.61%	11.44%
Russell 3000 +3% (Qtr lag)	-	-	(12.95%)	(1.76%)	12.25%	11.16%
<b>Cash</b>	<b>\$744</b>	<b>2.58%</b>	<b>0.42%</b>	<b>2.13%</b>	<b>1.50%</b>	<b>1.14%</b>
3-month Treasury Bill	-	-	0.60%	2.12%	1.19%	0.74%

(1) Total Fund Custom Benchmark returns provided by RVK. Benchmark consists of: 16% SERS Private Equity Composite, 48% MSCI ACW IM Index, 12% Real Estate Custom Benchmark, 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

(2) Public Market Equivalent Benchmark returns provided by RVK. Benchmark consists of: 16% Russell 3000+3% (Qtr Lag), 48% MSCI ACW IM Index, 12% CPI+3% (Qtr Lag), 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

# Asset Class Returns

As of March 31, 2019

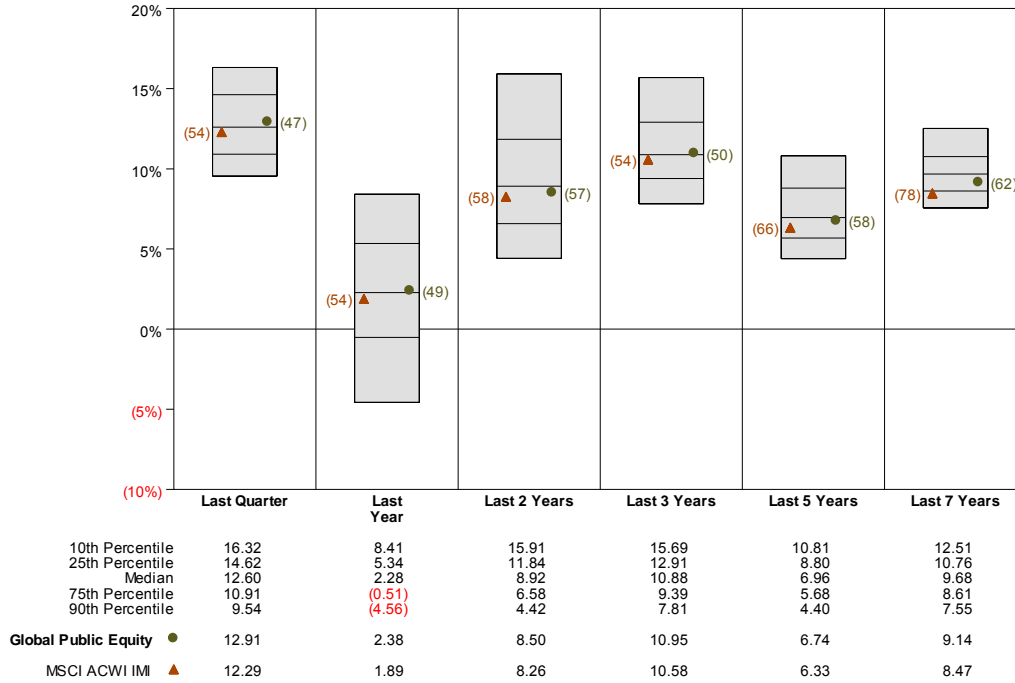
	Last 7 Years	Last 10 Years
<b>Net Performance</b>		
<b>Total Fund</b>	<b>7.15%</b>	<b>8.86%</b>
Total Fund Custom Benchmark(1)	7.50%	9.99%
Public Market Equiv Benchmark(2)	8.30%	10.49%
<b>Global Public Equity</b>	<b>8.92%</b>	<b>12.81%</b>
MSCI ACWI IMI	8.47%	12.27%
<b>Fixed Income</b>	<b>3.07%</b>	<b>6.85%</b>
Blmbg Aggregate	2.48%	3.77%
<b>Multi-Strategy</b>	-	-
S&P/LSTA Lev eraged Loan	4.33%	7.97%
Russell 3000 Index	12.63%	16.00%
<b>Real Estate</b>	<b>6.90%</b>	<b>4.54%</b>
Real Estate Custom Benchmark	9.91%	6.73%
CPI +3% (Qtr lag)	4.55%	4.80%
<b>Private Equity</b>	<b>10.25%</b>	<b>11.35%</b>
Burgiss Private Equity Custom Index	12.85%	13.09%
Russell 3000 +3% (Qtr lag)	15.70%	16.57%
<b>Cash</b>	<b>0.89%</b>	<b>0.71%</b>
3-month Treasury Bill	0.56%	0.43%

(1) Total Fund Custom Benchmark returns provided by RVK. Benchmark consists of: 16% SERS Private Equity Composite, 48% MSCI ACW IM Index, 12% Real Estate Custom Benchmark, 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

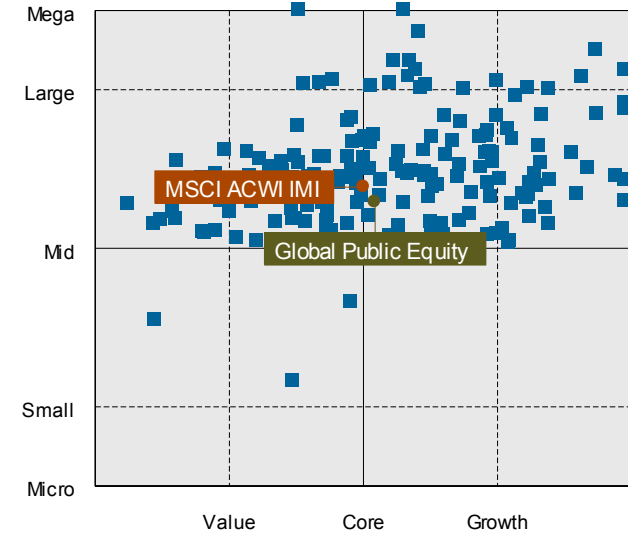
(2) Public Market Equivalent Benchmark returns provided by RVK. Benchmark consists of: 16% Russell 3000+3% (Qtr Lag), 48% MSCI ACW IM Index, 12% CPI+3% (Qtr Lag), 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

# Global Equity as of March 31, 2019

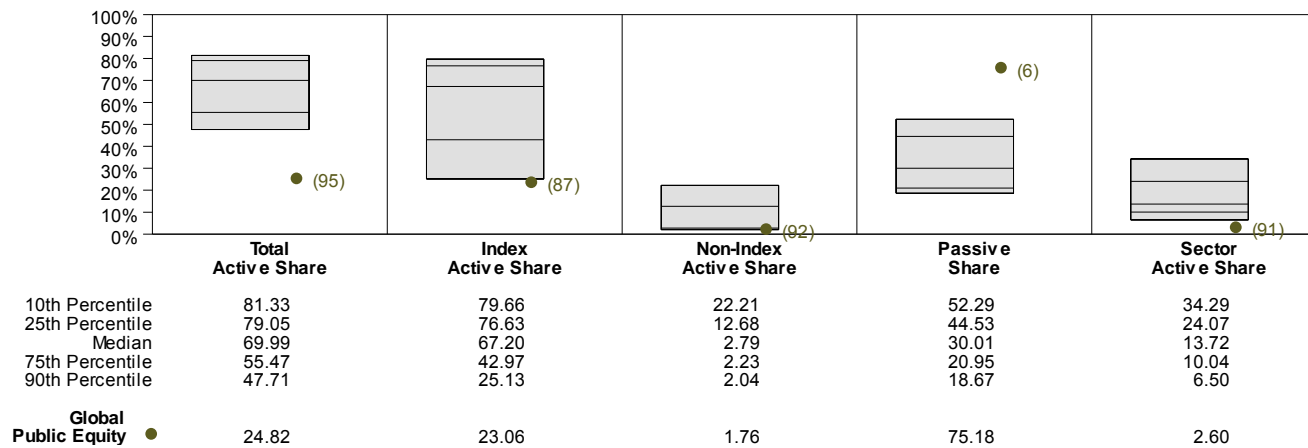
## Performance vs Callan Global Equity (Gross)



## Style Map vs Callan Global Equity Holdings as of March 31, 2019



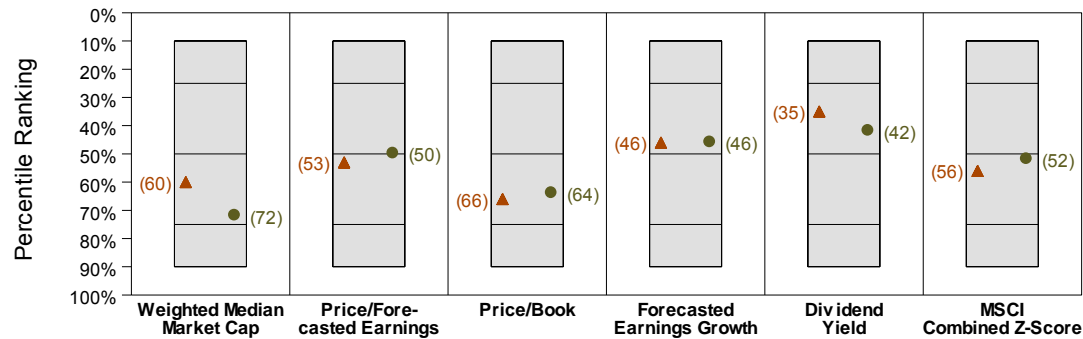
## Active Share vs. Pub Pln- GIBI Equity



# Global Equity

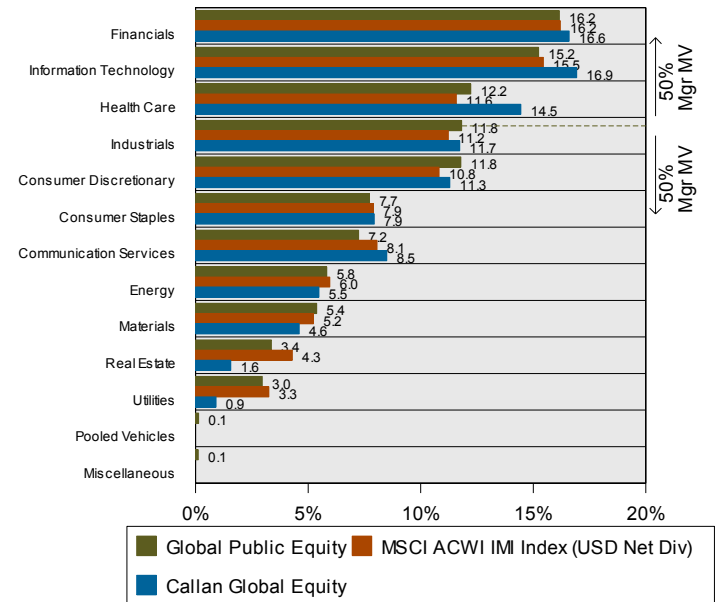
As of March 31, 2019

**Portfolio Characteristics Percentile Rankings**  
Rankings Against Callan Global Equity  
as of March 31, 2019



	Weighted Median Market Cap	Price/Forecasted Earnings	Price/Book	Forecasted Earnings Growth	Dividend Yield	MSCI Combined Z-Score
10th Percentile	93.16	22.87	4.52	17.80	3.37	1.00
25th Percentile	62.09	19.74	3.65	14.67	2.78	0.71
Median	46.69	15.49	2.33	12.28	2.14	0.07
75th Percentile	33.10	13.17	1.86	9.82	1.56	(0.35)
90th Percentile	20.27	11.47	1.46	8.03	1.11	(0.71)
<b>Global Public Equity</b>	34.83	15.50	2.13	12.50	2.34	0.05
MSCI ACWI IMI Index (USD Net Div)	42.48	15.10	2.10	12.53	2.46	(0.01)

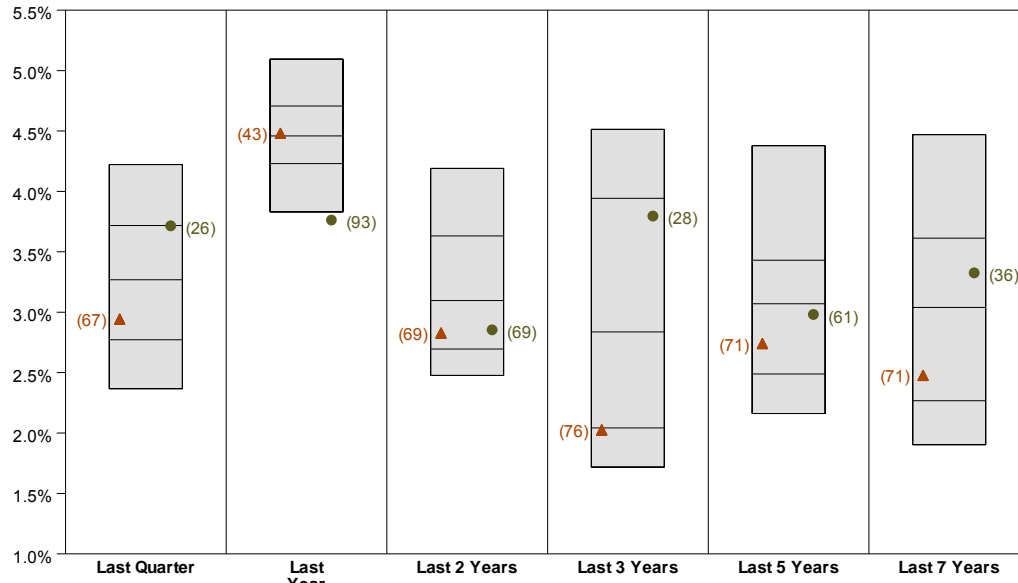
**Sector Allocation**  
March 31, 2019



# Fixed Income

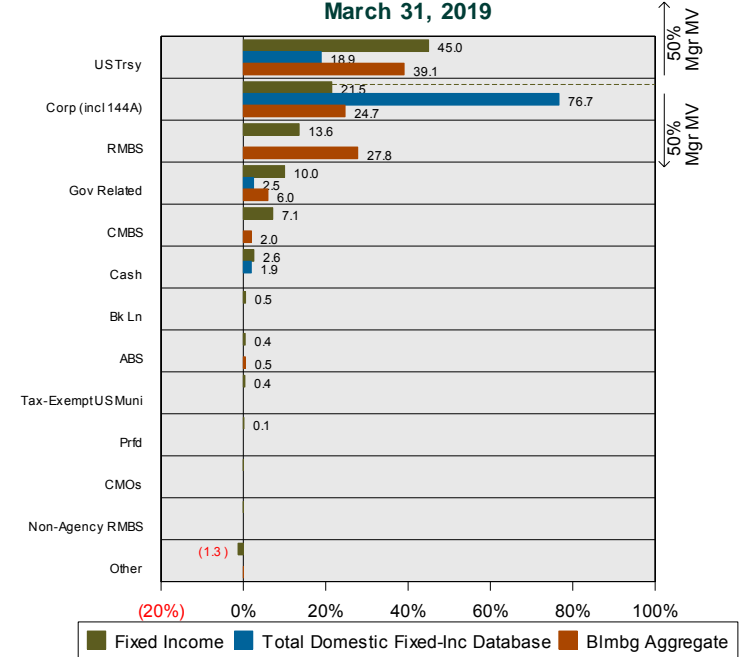
As of March 31, 2019

Performance vs Public Fund - Domestic Fixed (Gross)



	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 7 Years
10th Percentile	4.22	5.09	4.19	4.51	4.38	4.47
25th Percentile	3.72	4.71	3.63	3.94	3.43	3.61
Median	3.27	4.46	3.10	2.84	3.07	3.04
75th Percentile	2.77	4.23	2.70	2.04	2.49	2.27
90th Percentile	2.37	3.83	2.48	1.72	2.16	1.90
<b>Fixed Income</b> ●	3.71	3.75	2.84	3.79	2.97	3.32
<b>Blmbg Aggregate</b> ▲	2.94	4.48	2.83	2.03	2.74	2.48

Sector Allocation  
March 31, 2019

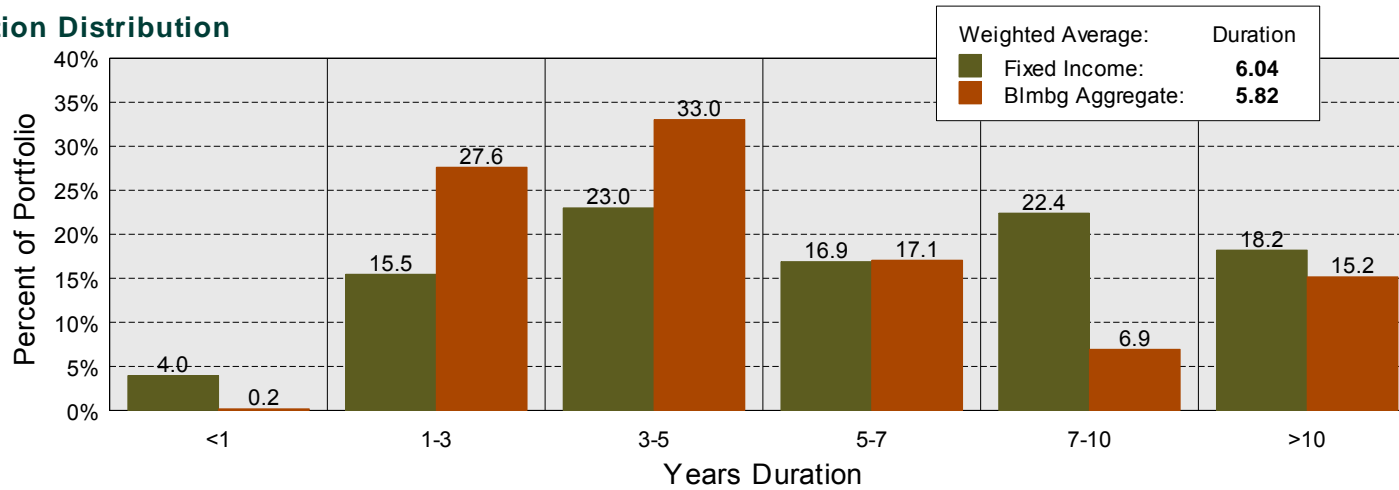




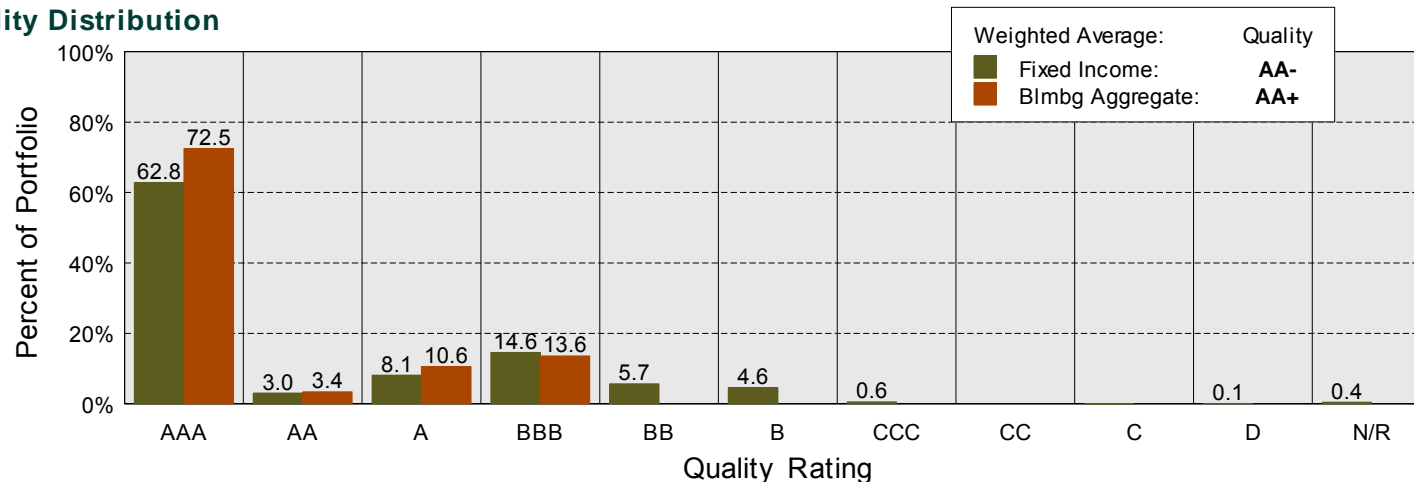
# Fixed Income

As of March 31, 2019

**Duration Distribution**



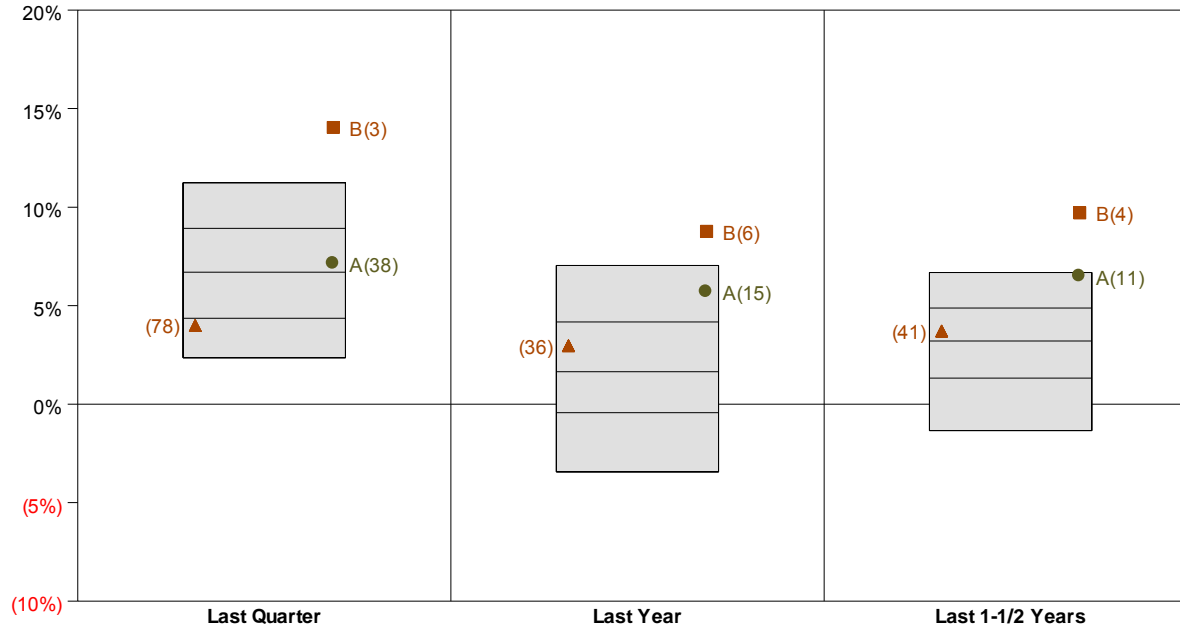
**Quality Distribution**



# Multi-Strategy

As of March 31, 2019

Performance vs Callan Multi-Asset Database (Gross)



	Last Quarter	Last Year	Last 1-1/2 Years
10th Percentile	11.24	7.04	6.69
25th Percentile	8.93	4.17	4.87
Median	6.70	1.64	3.21
75th Percentile	4.36	(0.44)	1.32
90th Percentile	2.36	(3.44)	(1.34)
Multi-Strategy <span style="color: green;">●</span> A	7.13	5.69	6.49
Russell 3000 Index <span style="color: brown;">■</span> B	14.04	8.77	9.71
S&P/LSTA Leveraged Loan <span style="color: brown;">▲</span>	4.00	2.97	3.71

Callan

---

**Appendix I – Investment Manager Returns**

# Investment Manager Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance- Equity</b>						
<b>Global Public Equity</b>	<b>\$15,686</b>	<b>100.00%</b>	<b>12.89%</b>	<b>2.27%</b>	<b>10.75%</b>	<b>6.52%</b>
MSCI ACWI IMI	-	-	12.29%	1.89%	10.58%	6.33%
<b>Global Mandates</b>	<b>\$1,000</b>	<b>6.37%</b>	<b>15.48%</b>	<b>12.34%</b>	<b>14.97%</b>	<b>10.72%</b>
Walter Scott & Prtnrs Gbl Gr Eq	1,000	6.37%	15.48%	12.34%	14.97%	10.72%
MSCI World	-	-	12.48%	4.01%	10.68%	6.78%
<b>U.S. Equity</b>	<b>\$7,489</b>	<b>47.75%</b>	<b>14.75%</b>	<b>7.20%</b>	<b>12.13%</b>	<b>9.19%</b>
Russell 3000 Index	-	-	14.04%	8.77%	13.48%	10.36%
<b>U.S. Mid/Large Cap Equity</b>	<b>\$5,921</b>	<b>37.75%</b>	<b>14.38%</b>	<b>8.05%</b>	<b>12.85%</b>	<b>9.99%</b>
MCM Russell 1000 Index	5,476	34.91%	13.98%	9.46%	13.59%	10.67%
Russell 1000 Index	-	-	14.00%	9.30%	13.52%	10.63%
Iridian Asset Mgmt MCV	445	2.83%	19.56%	(7.67%)	5.28%	4.25%
Russell MidCap Index	-	-	16.54%	6.47%	11.82%	8.81%
Russell MidCap Value Idx	-	-	14.37%	2.89%	9.50%	7.22%
<b>U.S. Small Cap Equity</b>	<b>\$1,568</b>	<b>10.00%</b>	<b>16.19%</b>	<b>4.34%</b>	<b>9.12%</b>	<b>5.16%</b>
S&P 600 Small Cap Index	-	-	11.61%	1.57%	12.55%	8.45%
MCM Russell 2000 Core Index	318	2.03%	14.58%	2.04%	-	-
Russell 2000 Index	-	-	14.58%	2.05%	12.92%	7.05%
MCM Russell 2000 Val Index	568	3.62%	11.88%	0.10%	-	-
Russell 2000 Value Index	-	-	11.93%	0.17%	10.86%	5.59%
Emerald Adv Div Sm Cap Grth	682	4.35%	20.84%	9.34%	-	-
Russell 2000 Growth Index	-	-	17.14%	3.85%	14.87%	8.41%
<b>Non-U.S. Equity</b>	<b>\$7,195</b>	<b>45.87%</b>	<b>10.68%</b>	<b>(4.19%)</b>	<b>8.63%</b>	<b>2.92%</b>
MSCI ACWI ex US IMI	-	-	10.31%	(4.96%)	7.94%	2.67%
<b>Non-U.S. Dev eloped Markets Equity</b>	<b>\$5,445</b>	<b>34.71%</b>	<b>10.69%</b>	<b>(3.56%)</b>	<b>8.24%</b>	<b>2.86%</b>
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>\$4,714</b>	<b>30.05%</b>	<b>10.49%</b>	<b>(2.69%)</b>	<b>9.19%</b>	<b>3.39%</b>
BlackRock MSCI World Ex US Index	4,703	29.98%	10.52%	(2.66%)	-	-
MSCI World ex US	-	-	10.45%	(3.14%)	7.29%	2.20%
<b>Non-U.S. Dev Small Cap Equity</b>	<b>\$732</b>	<b>4.66%</b>	<b>11.96%</b>	<b>(9.50%)</b>	<b>6.28%</b>	<b>1.79%</b>
FIS Group Non-U.S. Small Cap	190	1.21%	8.73%	-	-	-
MSCI ACWI ex US Small Cap	-	-	10.26%	(9.48%)	7.01%	3.26%
Harris Assoc Int'l SCV	542	3.46%	13.14%	(10.21%)	6.00%	1.63%
MSCI World ex US Sm Cap	-	-	10.93%	(8.66%)	7.28%	3.69%
<b>Emerging Mkts Equity</b>	<b>\$1,750</b>	<b>11.16%</b>	<b>10.67%</b>	<b>(7.90%)</b>	<b>11.76%</b>	<b>4.13%</b>
BlackRock Emg Mkts Index	685	4.37%	9.83%	(7.52%)	-	-
Leading Edge Emg Mkts Fund	216	1.38%	11.43%	-	-	-
Macquarie Emg Mkts Equity	324	2.07%	9.38%	(6.72%)	12.30%	4.16%
Martin Currie Emg Mkts Equity	432	2.76%	12.02%	(8.94%)	14.37%	5.65%
MSCI EM	-	-	9.93%	(7.40%)	10.68%	3.68%
GlobeFlex Emerging Small Cap	92	0.59%	10.14%	(10.12%)	8.94%	2.76%
MSCI EM Small Cap	-	-	7.76%	(12.42%)	5.95%	1.77%
Northern Trust Equity Transition	1	0.01%	(1.60%)	(16.23%)	(8.20%)	(5.00%)

\*Market values may not sum as a result of accounts funded within the quarter or accounts in the process of liquidation. The market values and performance of such accounts are included within their relevant composites.

# Investment Manager Returns

As of March 31, 2019

	Last 7 Years	Last 10 Years
<b>Net Performance- Equity</b>		
<b>Global Public Equity</b>	<b>8.92%</b>	<b>12.81%</b>
MSCI ACWI IMI	8.47%	12.27%
<b>Global Mandates</b>	<b>11.47%</b>	<b>15.10%</b>
Walter Scott & Prtnrs Gbl Gr Eq	11.48%	13.88%
MSCI World	9.17%	12.38%
<b>U.S. Equity</b>	<b>11.85%</b>	<b>15.50%</b>
Russell 3000 Index	12.63%	16.00%
<b>U.S. Mid/Large Cap Equity</b>	<b>12.43%</b>	<b>15.96%</b>
MCM Russell 1000 Index	12.78%	-
Russell 1000 Index	12.79%	16.05%
Iridian Asset Mgmt MCV	10.31%	15.23%
Russell MidCap Index	11.99%	16.88%
Russell MidCap Value Idx	11.30%	16.39%
<b>U.S. Small Cap Equity</b>	<b>9.03%</b>	<b>13.28%</b>
S&P 600 Small Cap Index	12.12%	17.00%
Russell 2000 Index	10.74%	15.36%
Russell 2000 Value Index	9.61%	14.12%
Russell 2000 Growth Index	11.79%	16.52%
<b>Non-U.S. Equity</b>	<b>5.34%</b>	<b>9.48%</b>
MSCI ACWI ex US IMI	4.90%	9.20%
<b>Non-U.S. Developed Markets Equity</b>	<b>6.10%</b>	<b>10.18%</b>
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>6.44%</b>	<b>9.98%</b>
MSCI World ex US	5.28%	8.82%
<b>Non-U.S. Dev Small Cap Equity</b>	<b>5.57%</b>	<b>11.85%</b>
MSCI ACWI ex US Small Cap	6.05%	11.86%
Harris Assoc Int'l SCV	5.45%	13.61%
MSCI World ex US Sm Cap	7.04%	12.25%
<b>Emerging Mkts Equity</b>	<b>2.98%</b>	<b>7.60%</b>
MSCI EM	2.69%	8.95%
MSCI EM Small Cap	2.60%	10.37%
Northern Trust Equity Transition	(3.74%)	-

# Investment Manager Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Fixed Income</b>						
<b>Fixed Income</b>	<b>\$4,142</b>	<b>100.00%</b>	<b>3.66%</b>	<b>3.61%</b>	<b>3.57%</b>	<b>2.72%</b>
Blmbg Aggregate	-	-	2.94%	4.48%	2.03%	2.74%
<b>Core Fixed Income</b>	<b>\$1,882</b>	<b>45.44%</b>	<b>3.49%</b>	<b>4.49%</b>	<b>2.53%</b>	<b>2.92%</b>
MCM Bond Index	1,059	25.58%	2.96%	4.53%	1.99%	2.71%
Blmbg Aggregate	-	-	2.94%	4.48%	2.03%	2.74%
PIMCO Core Bond Fund	635	15.32%	3.85%	4.66%	2.75%	3.09%
Blmbg Agg ex Treasury	-	-	3.47%	4.65%	2.60%	3.08%
Taplin, Canida & Habacht Corp FI	188	4.54%	5.26%	3.74%	4.25%	3.31%
Blmbg Credit	-	-	4.87%	4.89%	3.48%	3.61%
<b>Core-Plus Fixed Income</b>	<b>\$863</b>	<b>20.83%</b>	<b>4.89%</b>	<b>1.86%</b>	<b>7.05%</b>	<b>2.90%</b>
Brandywine Global Opp	192	4.65%	3.10%	(6.07%)	2.11%	1.55%
FTSE WGBI	-	-	1.74%	(1.57%)	0.95%	0.59%
Pyramis Gbl Adv HY CMBS	324	7.82%	2.66%	5.69%	4.93%	5.06%
Blmbg US Univ CMBS ex Aaa	-	-	4.37%	6.91%	4.78%	3.87%
Stone Harbor Gbl HY	183	4.43%	7.58%	6.02%	6.92%	3.42%
FTSE US High Yield	-	-	7.36%	5.86%	8.63%	4.35%
Stone Harbor EMD	163	3.93%	8.69%	(0.38%)	6.12%	4.49%
JPM EMBI Global	-	-	6.59%	3.52%	5.20%	4.80%
<b>Global TIPS</b>	<b>\$832</b>	<b>20.10%</b>	<b>3.29%</b>	<b>1.95%</b>	<b>1.80%</b>	<b>1.95%</b>
Brown Brothers TIPS	220	5.32%	3.08%	2.49%	1.63%	1.99%
NISA Inv Adv TIPS	497	11.99%	3.23%	2.66%	1.73%	1.96%
Blmbg US TIPS	-	-	3.19%	2.70%	1.70%	1.94%
New Century Global TIPS	115	2.79%	3.95%	(1.93%)	2.42%	1.85%
Blmbg Wld Gov I-L Undhdg	-	-	3.93%	(1.74%)	2.41%	1.69%
<b>Nominal U.S. Treasuries</b>	<b>\$565</b>	<b>13.64%</b>	<b>2.93%</b>	<b>5.63%</b>	<b>0.57%</b>	<b>2.87%</b>
PIMCO US Treasuries	565	13.64%	2.93%	5.63%	0.92%	3.12%
Blmbg US Treas Bell 10Y	-	-	3.08%	5.60%	0.11%	2.59%

\*Market values may not sum as a result of accounts funded within the quarter or accounts in the process of liquidation. The market values and performance of such accounts are included within their relevant composites.

# Investment Manager Returns

As of March 31, 2019

	Last 7 Years	Last 10 Years
<b>Net Performance - Fixed Income</b>		
<b>Fixed Income</b>	<b>3.07%</b>	<b>6.85%</b>
Blmbg Aggregate	2.48%	3.77%
<b>Core Fixed Income</b>	<b>2.91%</b>	<b>5.44%</b>
MCM Bond Index	2.37%	3.63%
Blmbg Aggregate	2.48%	3.77%
Blmbg Agg ex Treasury	2.87%	4.36%
Taplin, Canida & Habacht Corp FI	3.82%	7.00%
Blmbg Credit	3.71%	6.22%
Brandywine Global Opp	2.62%	-
FTSE WGBI	0.52%	2.20%
Pyramis Gbl Adv HY CMBS	8.02%	13.49%
Blmbg US Univ CMBS ex Aaa	4.52%	10.55%
Stone Harbor Gbl HY	5.46%	9.59%
FTSE US High Yield	5.93%	10.88%
Stone Harbor EMD	4.25%	9.46%
JPM EMBI Global	4.73%	8.12%
<b>Global TIPS</b>	<b>1.02%</b>	<b>2.62%</b>
Brown Brothers TIPS	1.36%	-
NISA Inv Adv TIPS	0.67%	2.41%
Blmbg US TIPS	1.21%	3.41%
New Century Global TIPS	1.89%	-
Blmbg Wld Gov I-L Undhdg	1.48%	4.02%
<b>Nominal U.S. Treasuries</b>	<b>2.30%</b>	<b>-</b>
PIMCO US Treasuries	2.50%	-
Blmbg US Treas Bell 10Y	2.06%	2.84%

# Investment Manager Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Multi-Strategy</b>						
<b>Multi-Strategy</b>	<b>\$2,561</b>	<b>100.00%</b>	<b>7.12%</b>	<b>5.55%</b>	-	-
S&P/LSTA Leveraged Loan	-	-	4.00%	2.97%	5.67%	3.62%
Russell 3000 Index	-	-	14.04%	8.77%	13.48%	10.36%
<b>Credit Focused Strategies</b>	<b>\$911</b>	<b>35.59%</b>	<b>4.45%</b>	<b>4.05%</b>	-	-
Blackstone Keystone(1)	911	35.59%	4.45%	4.05%	6.61%	4.71%
HFRI Fund of Funds Compos	-	-	4.62%	0.15%	3.94%	2.20%
<b>Opp. Equity &amp; Fixed Income</b>	<b>\$1,525</b>	<b>59.56%</b>	<b>9.08%</b>	<b>6.32%</b>	-	-
SEI Str. Credit: HY Bank Loans(2)	332	12.97%	0.04%	3.54%	17.49%	6.82%
FTSE US High Yield	-	-	7.36%	5.86%	8.63%	4.35%
Eaton Vance GMARA	193	7.54%	2.06%	-	-	-
3 month LIBOR + 6%	-	-	2.10%	8.56%	7.62%	7.10%
MCM Russell 3000 Index(3)	1,000	39.04%	14.02%	8.75%	-	-
Russell 3000 Index	-	-	14.04%	8.77%	13.48%	10.36%
<b>Private Credit(4)</b>	<b>\$124</b>	<b>4.85%</b>	<b>2.64%</b>	<b>13.00%</b>	-	-

(1) Blackstone Keystone since inception returns are included in the Legacy Hedge Fund composite through 9/30/2017.

(2) SEI HY Bank Loans since inception returns are included in the Fixed Income composite through 9/30/2017.

(3) Russell 3000 Index since inception returns are included in the Global Public Equity composite through 9/30/2017.

(4) Private Debt performance has a 1 Qtr lag.



# Investment Manager Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Real Estate</b>						
<b>Real Estate</b>	<b>\$1,779</b>	<b>100.00%</b>	<b>4.32%</b>	<b>(0.71%)</b>	<b>1.87%</b>	<b>4.92%</b>
Real Estate Custom Benchmark	-	-	0.67%	6.05%	6.65%	8.90%
CPI +3% (Qtr lag)	-	-	0.27%	4.91%	5.03%	4.52%
<b>Core/Core Plus Real Estate Funds</b>	<b>\$524</b>	<b>29.45%</b>	<b>1.05%</b>	<b>7.92%</b>	<b>7.40%</b>	<b>9.22%</b>
NCREIF ODCE Index (Qtr lag)	-	-	1.39%	7.30%	7.53%	9.60%
<b>Value Add/Opp. Real Estate</b>	<b>\$989</b>	<b>55.60%</b>	<b>3.50%</b>	<b>(5.31%)</b>	<b>0.10%</b>	<b>3.94%</b>
Real Estate Separate Accounts	598	33.61%	4.80%	(10.82%)	(3.18%)	1.77%
Non-Core Closed End Funds	391	21.99%	1.34%	7.27%	7.49%	8.69%
NCREIF ODCE Index (Qtr lag)	-	-	1.39%	7.30%	7.53%	9.60%
<b>Natural Resources/Infrastructure</b>	<b>\$6</b>	<b>0.31%</b>	<b>(1.37%)</b>	<b>(7.69%)</b>	<b>(4.57%)</b>	<b>(1.97%)</b>
CPI +3% (Qtr lag)	-	-	0.27%	4.91%	5.03%	4.52%
<b>REITS</b>	<b>\$260</b>	<b>14.63%</b>	<b>16.40%</b>	<b>9.09%</b>	<b>5.21%</b>	<b>6.56%</b>
FTSE NAREIT US Index (Qtr lag)	-	-	(6.00%)	(3.87%)	2.42%	7.62%

\*Market values may not sum as a result of accounts funded within the quarter or accounts in the process of liquidation. The market values and performance of such accounts are included within their relevant composites.

# Investment Manager Returns

As of March 31, 2019

	Last 7 Years	Last 10 Years
<b>Net Performance - Real Estate</b>		
<b>Real Estate</b>	<b>6.90%</b>	<b>4.54%</b>
Real Estate Custom Benchmark	9.91%	6.73%
CPI +3% (Qtr lag)	4.55%	4.80%
<b>Core/Core Plus Real Estate Funds</b>	<b>10.24%</b>	<b>7.67%</b>
NCREIF ODCE Index (Qtr lag)	10.04%	5.92%
<b>Value Add/Opp. Real Estate</b>	<b>6.19%</b>	<b>3.03%</b>
Real Estate Separate Accounts	3.88%	0.86%
Non-Core Closed End Funds	10.68%	6.72%
NCREIF ODCE Index (Qtr lag)	10.04%	5.92%
<b>Natural Resources/Infrastructure</b>	<b>(0.78%)</b>	<b>(2.11%)</b>
CPI +3% (Qtr lag)	4.55%	4.80%
<b>REITS</b>	<b>9.02%</b>	<b>11.30%</b>
FTSE NAREIT US Index (Qtr lag)	8.28%	11.97%

# Investment Manager Returns

As of March 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Private Equity</b>						
<b>Private Equity</b>	<b>\$3,871</b>	<b>100.00%</b>	<b>0.62%</b>	<b>9.11%</b>	<b>10.01%</b>	<b>8.92%</b>
Burgiss Private Eqty Idx (Qtr Lag)	-	-	(0.73%)	10.15%	12.61%	11.44%
Russell 3000 + 3% (Qtr Lag)	-	-	(12.95%)	(1.76%)	12.25%	11.16%
<b>Buyouts</b>	<b>\$1,784</b>	<b>46.08%</b>	<b>(0.62%)</b>	<b>8.54%</b>	<b>12.22%</b>	<b>10.97%</b>
Burgiss Buy out Index (Qtr Lag)	-	-	(1.71%)	7.49%	13.84%	11.44%
<b>Special Situations</b>	<b>\$561</b>	<b>14.49%</b>	<b>5.30%</b>	<b>11.88%</b>	<b>10.72%</b>	<b>7.12%</b>
Burgiss Special Sits Idx (Qtr Lag)	-	-	(1.28%)	3.63%	8.00%	6.69%
<b>Venture Capital</b>	<b>\$593</b>	<b>15.32%</b>	<b>4.73%</b>	<b>23.49%</b>	<b>9.05%</b>	<b>7.82%</b>
Burgiss Venture Cap Idx (Qtr Lag)	-	-	0.36%	18.51%	10.96%	14.18%
<b>Keystone Legacy (Qtr Lag) (1)</b>	<b>\$933</b>	<b>24.12%</b>	<b>(2.10%)</b>	-	-	-

\*Market values may not sum as a result of accounts funded within the quarter or accounts in the process of liquidation. The market values and performance of such accounts are included within their relevant composites.

# Investment Manager Returns

As of March 31, 2019

	Last 7 Years	Last 10 Years
<b>Net Performance - Private Equity</b>		
<b>Private Equity</b>	<b>10.25%</b>	<b>11.35%</b>
Burgiss Private Equity Index (Qtr Lag)	12.85%	13.09%
Russell 3000 + 3% (Qtr Lag)	15.70%	16.57%
<b>Buyouts</b>	<b>13.06%</b>	<b>13.47%</b>
Burgiss Buyout Index (Qtr Lag)	12.86%	13.19%
<b>Special Situations</b>	<b>9.54%</b>	<b>12.48%</b>
Burgiss Special Sits Index (Qtr Lag)	9.27%	11.01%
<b>Venture Capital</b>	<b>7.97%</b>	<b>8.10%</b>
Burgiss Venture Capital Index (Qtr Lag)	14.70%	13.40%

Callan

---

**Appendix II – Callan’s Capital Market  
Projections**

---

# Setting Capital Market Expectations in an Uncertain Environment

## One challenge to creating forecasts is a volatile market environment

- Where do you start?
- Time horizon?
- Does valuation matter?
- What interest rate?
- Shouldn't a downturn in the economy and cycles in the capital markets be expected?
- Discipline in the face of uncertainty is difficult

## Market volatility since September 2018 is important, but we question how much should it impact a 10-year outlook used to guide investment policy

- Equity market peaked in September, then plummeted through December, then surged again through the first quarter.
- Interest rates rose through Q3 2018, then retreated sharply in the Q4 market decline, anticipating trouble.
  - Does a “September” forecast suggest weak equity returns and stronger fixed income results, while a “December” forecast suggest the opposite?
- Over-reliance on data at a specific starting date assigns outsized impact of current valuations on a 10-year forecast.
  - Long-term forecast should not be moving month to month, suggests a level of precision and market timing that is not practical.

---

## 2019 Capital Market Projections – 10-Year Time Horizon

### Subdued expectations across the range of capital markets

- Annual GDP growth of 2% to 2.5% for the U.S.
- 1.5% to 2% for non-U.S. developed markets
- 4% to 5% for emerging markets
- All below long-term averages

The path to this longer-term growth will include cycles with recessions.

### Broad equity and bond returns are below long-term averages

- U.S. equity = 7.15%
- Non-U.S. equity = 7.25% (includes emerging markets)
- Broad U.S. fixed income = 3.75%

### The intent of Callan's capital market projections is long-term strategic planning

- We believe investors will be rewarded for taking on capital market risk over the forecast horizon, and assign a premium for stocks over bonds.
  - Ratcheted down expectations over recent years to reflect a lower growth environment with lower expected returns.
  - Raised U.S. fixed income expectations 75 bps, reflecting the fulfilment of rate increases in 2018, and expectations for 2019 and beyond. We believe the current flattening is part of the capital market cycle and the curve will steepen over the 10 year forecast.
  - We lowered public equity expectations (both U.S. equity and non-U.S. equity) 50 bps in 2017. In 2019, we reduced the equity risk premium (the spread of equity over fixed income) 50 bps from projections set in 2018.
  - Continue to support 10-year S&P 500 equity forecast of 4.75% in annualized real terms. Forecast reflects more subdued prospects for U.S. economic growth relative to history.

# 2019 Callan Capital Market Projections

## Risk and Return: 2019–2028

Asset Class	Index	PROJECTED RETURN			PROJECTED RISK		2018 - 2027	
		1-Year Arithmetic	10-Year Geometric*	Real	Standard Deviation	Projected Yield	10-Year Geometric*	Standard Deviation
<b>Equities</b>								
Broad U.S. Equity	Russell 3000	8.50%	7.15%	4.90%	17.95%	2.00%	6.85%	18.25%
Large Cap	S&P 500	8.25%	7.00%	4.75%	17.10%	2.10%	6.75%	17.40%
Small/Mid Cap	Russell 2500	9.55%	7.25%	5.00%	22.65%	1.55%	7.00%	22.60%
Global ex-U.S. Equity	MSCI ACWI ex USA	9.20%	7.25%	5.00%	21.10%	3.10%	7.00%	21.00%
Non-U.S. Equity	MSCI World ex USA	8.70%	7.00%	4.75%	19.75%	3.25%	6.75%	19.70%
Emerging Markets Equity	MSCI Emerging Markets	10.70%	7.25%	5.00%	27.45%	2.65%	7.00%	27.45%
<b>Fixed Income</b>								
Short Duration	Bloomberg Barclays 1-3 Yr G/C	3.40%	3.40%	1.15%	2.10%	3.25%	2.60%	2.10%
U.S. Fixed	Bloomberg Barclays Aggregate	3.75%	3.75%	1.50%	3.75%	3.50%	3.00%	3.75%
Long Duration	Bloomberg Barclays Long G/C	4.25%	3.75%	1.50%	10.65%	4.80%	3.00%	10.95%
TIPS	Bloomberg Barclays TIPS	3.80%	3.75%	1.50%	5.05%	3.90%	3.00%	5.25%
High Yield	Bloomberg Barclays High Yield	5.75%	5.35%	3.10%	10.35%	7.75%	4.75%	10.35%
Non-U.S. Fixed	Bloomberg Barclays Gbl Agg ex US	1.80%	1.40%	-0.85%	9.20%	2.50%	1.40%	9.20%
Emerging Market Debt	J.P. Morgan EMBI Global Diversified	5.40%	5.05%	2.80%	9.50%	6.00%	4.50%	9.60%
<b>Other</b>								
Real Estate	NFI-ODCE	7.30%	6.25%	4.00%	15.70%	4.75%	5.75%	16.35%
Private Equity	Cambridge Private Equity	12.40%	8.50%	6.25%	29.30%	0.00%	7.35%	32.90%
Hedge Funds	Callan Hedge FOF Database	5.75%	5.50%	3.25%	8.85%	2.25%	5.05%	9.15%
Commodities	Bloomberg Commodity	4.75%	3.20%	0.95%	18.00%	2.50%	2.65%	18.30%
Cash Equivalents	90-Day T-Bill	2.50%	2.50%	0.25%	0.90%	2.50%	2.25%	0.90%
<b>Inflation</b>	CPI-U		2.25%		1.50%		2.25%	1.50%

Note that return projections for public markets assume index returns with no premium for active management.

\* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Source: Callan





## 2019 Callan Capital Market Projections – Efficient Mixes

### Subdued returns even for higher risk portfolios

- A portfolio with approximately 40% fixed income is expected to earn 6% over the next ten years.
- The fixed income allocation has to fall below 20% to earn more than 7.0%.
- Total alternatives allocations in excess of 15% are common for diversified asset mixes.
- Private equity is constrained to be no more than 25% of the total public equity exposure. The purpose of the constraint is to hold private equity to a relative share of total equity that is appropriate at each place along the efficient frontier. The assumed premium for private equity would cause an unconstrained optimization to allocate a disproportionate amount to private equity that would be neither prudent nor implementable.

Asset Classes	Constraints		Optimal Mixes					
	Min	Max	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5	Mix 6
Broad U.S. Equity	0	100	9	13	18	23	30	38
Global ex U.S. Equity	0	100	6	9	12	16	20	26
U.S. Fixed	0	100	73	63	52	39	24	5
Real Estate	0	100	3	4	6	8	10	13
Hedge Funds	0	100	6	5	5	4	4	3
Private Equity	0	100	4	6	8	10	12	16
Totals			100	100	100	100	100	100
Projected Arithmetic Return			5.03	5.60	6.23	6.94	7.78	8.85
Projected Standard Deviation			4.96	6.62	8.68	11.13	14.09	17.93
10 Yr. Geometric Mean Return			5.00	5.50	6.00	6.50	7.00	7.50
Public Equity			15	22	30	39	50	64
Public Fixed Income			73	63	52	39	24	5
Alternatives			12	15	18	22	26	32

Source: Callan

Callan

---

**Appendix III – Callan Update**

# Published Research Highlights from 1Q19

## Callan's 2019–2028 Capital Market Projections

0.80	0.80	0.99	1.00						
0.86	0.86	0.94	0.88	1.00					
-0.22	-0.26	-0.25	-0.23	-0.28	1.00				
-0.10	-0.15	-0.14	-0.12	-0.17	0.88	1.00			
0.11	0.10	0.08	0.09	0.04	0.74	0.93	1		
-0.04	-0.08	-0.06	-0.05	-0.09	0.56	0.64	0		
0.63	0.62	0.63	0.61	0.62	-0.13	0.02	0		
0.01	0.00	0.07	0.05	0.10	0.48	0.53	0		
0.57	0.55	0.57	0.54	0.58	-0.04	0.10	0		
0.73	0.72	0.71	0.68	0.70	-0.13	-0.04	0		
0.92	0.88	0.88	0.86	0.86	-0.30	-0.23	-0		

## 2019 DC Trends Survey



## The Callan Periodic Table Collection: Year-End 2018

Large Funds	Real Estate Funds	Non-U.S.
13.13%	13.95%	2.7%
High Yield	Large Cap Equity	U.S.
2.45%	1.38%	2.6%
2014: 0.76%	2015: 0.73%	2016: 0.73%
Equivalent	U.S. Fixed	Non-U.S.
0.04%	0.55%	1.4%
Emerging Markets	Cash Equivalent	Hedge
2.19%	0.05%	1.2%
U.S. Fixed	Hedge Funds	Cash E
2.99%	0.71%	0.4%

## Two Questions to Help DC Plans Save on Litigation Costs



## Popular Blog Posts

**How DTS Helps Us Evaluate Bonds**  
Kevin Machiz

**Securities Lending 101**  
Kyle Fekete and Mark Kinoshita

**A Look at the New Communication Services Sector**  
Irina Sushch

**Additional Reading**

- Private Equity Trends* quarterly newsletter
- Active vs. Passive quarterly charts
- Capital Market Review* quarterly newsletter
- Monthly Updates to the Periodic Table
- Market Pulse Flipbook* quarterly markets update

# Callan Institute Events

## Upcoming Conferences, Workshops, and Webinars

### 2019 June Regional Workshops

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

### 2019 October Regional Workshops

- Denver, October 22, 2019
- Chicago, October 24, 2019

### “Callan College”—Ongoing fiduciary education

#### Introduction to Investments sessions

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

#### Alternative Investments session

- Chicago, October TBD

### Upcoming Webinar:

- Cobbler’s Shoes Webinar, June 18, 2019, 11am PST

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

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

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

**“Research is the foundation of all we do at Callan, and sharing our best thinking with the investment community is our way of helping to foster dialogue to raise the bar across the industry.”**

*— Greg Allen, CEO, Chief Research Officer*



# Callan Updates

Firm updates by the numbers, as of March 31, 2019

**Total Associates: 191**

## Ownership

- 100% employees
- Broadly distributed across more than 95 shareholders

## Leadership Changes

- No executive additions or departures
- Added Pete Keliuotis, head of Alternatives Consulting
- Executive Chairman Ron Peyton completes his 45th year at Callan

**Total General and Fund Sponsor Consultants: more than 45**

**Total Specialty and Research Consultants: more than 60**

**Total CFA/CAIA/FRMs: more than 50**

**Total Fund Sponsor Clients: more than 400**

**AUA: more than \$2.4 trillion**

**“The Callan culture that we have all built together over the years is the reason we like coming to work each day..... Our culture of supporting and caring about each other, of appreciating and respecting each other while still having some fun and good humor has been the key to our longevity and success. We never want to diminish it.”**

*— Ron Peyton, Executive Chairman*

