

September 24, 2019



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

Second Quarter 2019

Executive Summary

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**Thomas H. Shingler**  
Senior Vice President

**Bud Pellecchia**  
Senior Vice President

**Britton M. Murdoch**  
Vice President

Callan

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**Market Environment**

# Does Strong First Half Spell Problems for Second Half of 2019 and 2020?

## Central bank policy front and center

- Fed adopted dovish tone in January, a sharp reversal in stance. Rates held constant through Q2; rate cuts now expected in Q3 or Q4 2019.

## However, U.S. economy remains strong, labor market very tight, reaching the limits of full employment

- Solid Q1 GDP growth (3.2%) moderated in Q2 (2.1%), will soften further in face of slowing global economy, trade uncertainty.
- Policy reversal simultaneously stoked fears of coming slowdown and fed a rally in bonds.

## The slowdown in Europe and China weighing on global growth

- China suffering dramatic slowdown in growth: industrial output, retail sales, implied GDP.

## Inflation remains stuck below 2% in U.S., weaker overseas

- Wage pressures building in U.S. have yet to translate into headline inflation.

## Returns for Periods ended June 30, 2019

	1 Quarter	1 Year	5 Years	10 Years	25 Years
<b>U.S. Equity</b>					
Russell 3000	4.10	8.98	10.19	14.67	9.98
S&P 500	4.30	10.42	10.71	14.70	9.97
Russell 2000	2.10	-3.31	7.06	13.45	9.26
<b>Non-U.S. Equity</b>					
MSCI World ex USA	3.79	1.29	2.04	6.75	5.01
MSCI Emerging Markets	0.61	1.22	2.49	5.81	--
MSCI ACWI ex USA Small Cap	1.21	-5.94	2.77	8.48	5.32
<b>Fixed Income</b>					
Bloomberg Barclays Aggregate	3.08	7.87	2.95	3.90	5.50
3-Month T-Bill	0.64	2.31	0.87	0.49	2.52
Bloomberg Barclays Long Gov/Credit	6.59	13.82	5.68	7.62	7.73
Bloomberg Barclays Global Agg ex-US	3.42	4.10	-0.12	2.10	4.49
<b>Real Estate</b>					
NCREIF Property	1.51	6.51	8.83	9.25	9.36
FTSE NAREIT Equity	1.24	11.21	7.92	15.46	10.25
<b>Alternatives</b>					
CS Hedge Fund	2.35	2.46	2.36	5.03	7.84
Cambridge Private Equity*	4.86	12.71	12.30	14.83	15.32
Bloomberg Commodity	-1.19	-6.75	-9.15	-3.74	1.69
Gold Spot Price	8.87	12.69	1.35	4.31	5.32
<b>Inflation - CPI-U</b>	0.76	1.65	1.45	1.73	2.22

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

Source: Callan

# Fed Pauses in 2019 After 9 Interest Rate Hikes

Fed projections now more in line with market expectations

## Median of 2019 projections (2.4%) signals no more rate hikes this year

- June median is the same as March, and down from 2.9% projected in December.
- Longer term, median expectation is settled around 2.6%.

## Fed called rate hikes into question at January 2019 FOMC meeting, and articulated the pause in March and June

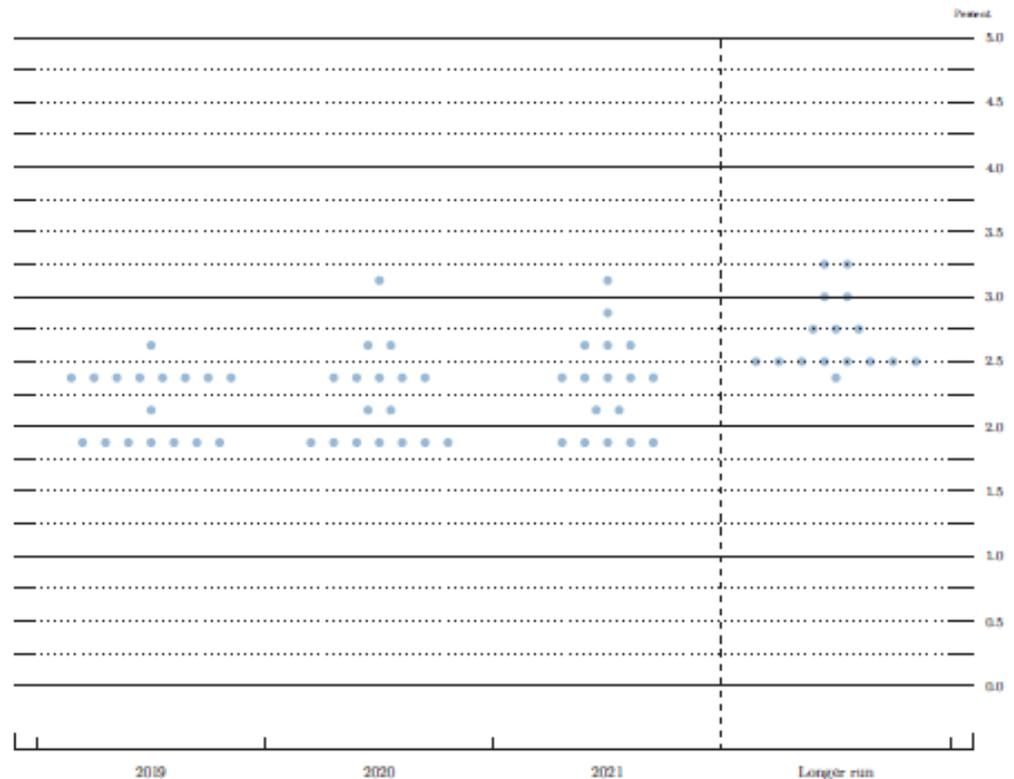
- 8 out of 10 board members suggested a rate cut before end of 2019; bond market priced in a 100% probability of at least one cut this year.

## The Fed proceeded with a widely anticipated (and clearly signaled) interest rate cut in July, describing it as “a mid-cycle adjustment to policy.”

- Rate pause and cut represents a shift from traditional Fed policy of price stabilization and employment; Fed has now fully articulated market growth and stability as a goal.
- Fed stated further rate hikes will be “data driven,” but strong economic results have been used to justify the pause: “...a downturn must be coming...”

## Federal Reserve Dot Plot— June 2019

FOMC participants’ assessments of appropriate monetary policy: Midpoint of target range or target level for the federal funds rate



Source: Federal Reserve

# Trade War With China

Substantial impact on trade, but small impact on U.S. GDP

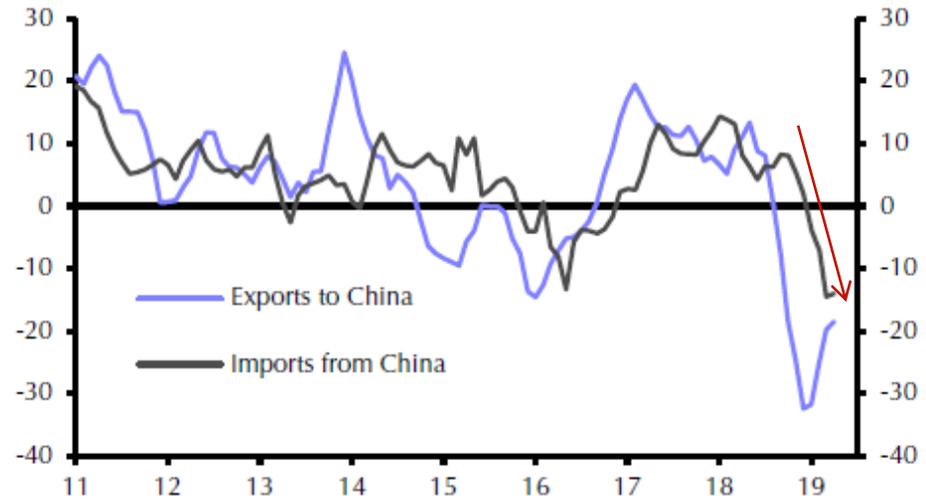
**Exports to China have fallen by 20%, imports are down by more than 10% (top chart)**

- However, decline in exports subtracted less than 0.1% from U.S. GDP in Q1 2019.

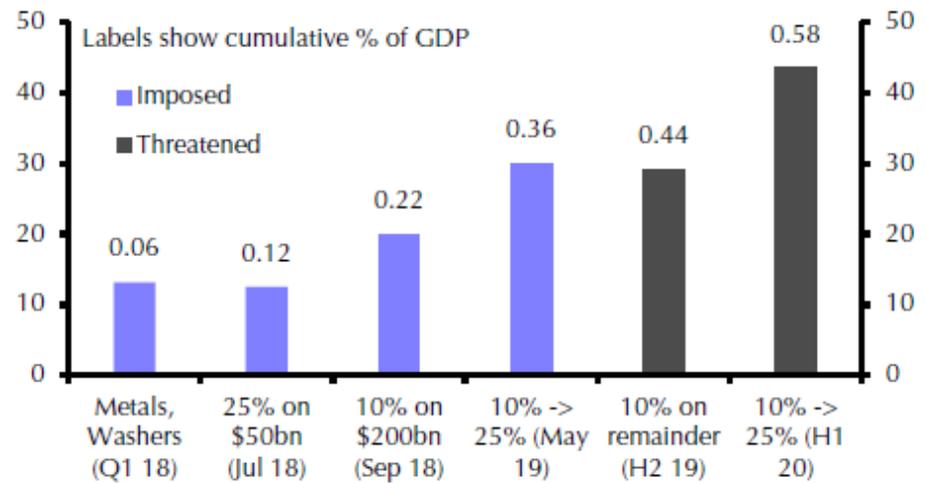
**Threatened tariffs could reduce GDP by 0.2% in second half of 2019 and another 0.2% in first half of 2020**

- Analysis assumes 10% tariff in 2019, rising to 25% in 2020.
- Chart depicts cumulative impact on GDP growth through Q2 2020 is less than 1%.
- Larger impact is on business confidence and investor sentiment.

**U.S. Bilateral Trade With China (3 month average, % change y/y)**



**U.S. Tariffs on China (\$B and % of GDP)**

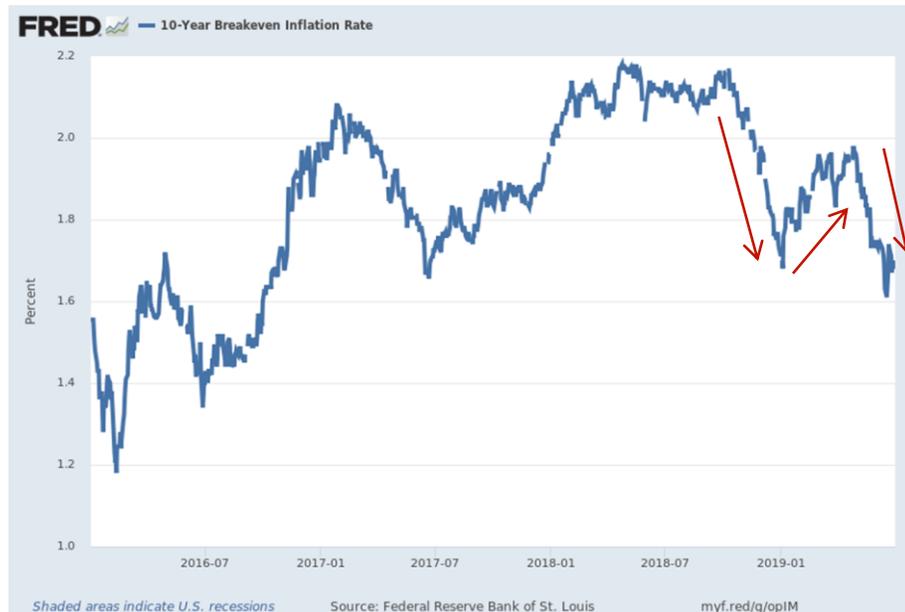


Sources: Capital Economics; IHS Markit

# Broad-Based Inflation Measures Still Benign in the U.S.

Expectations have fallen again and are low relative to long-term history

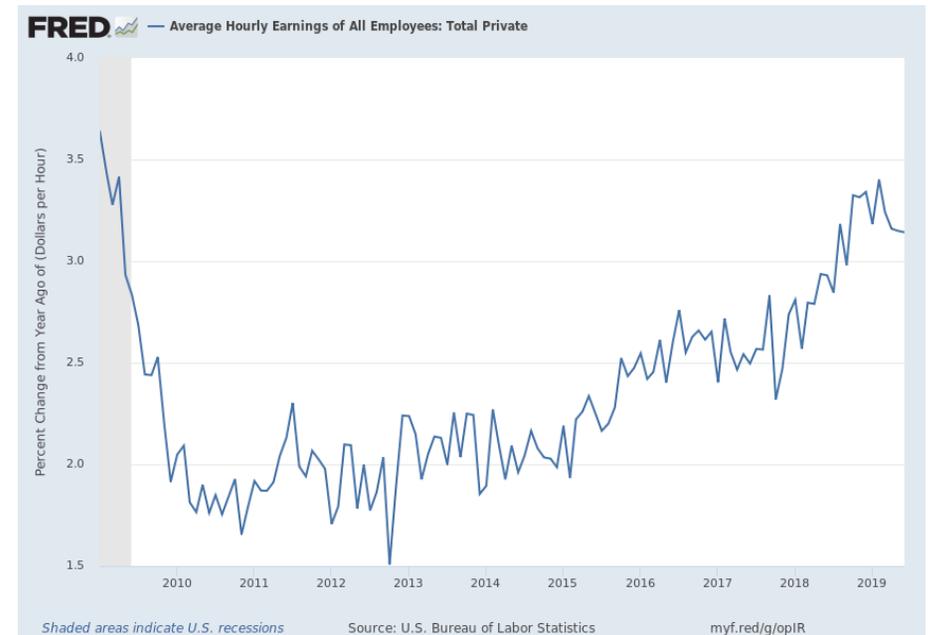
## 10-Year Breakeven Inflation Rate



**U.S. breakeven rate recovered somewhat in Q1 2019, only to plunge again in Q2**

- Breakeven rate (TIPS vs nominal Treasury yields) had recovered with oil prices, but expectations weakened as the Fed changed its policy stance.

## U.S. Average Hourly Earnings, %Year over Year



**Wage growth topped 3% annually in the second half of 2018, continued into Q1 and Q2 2019**

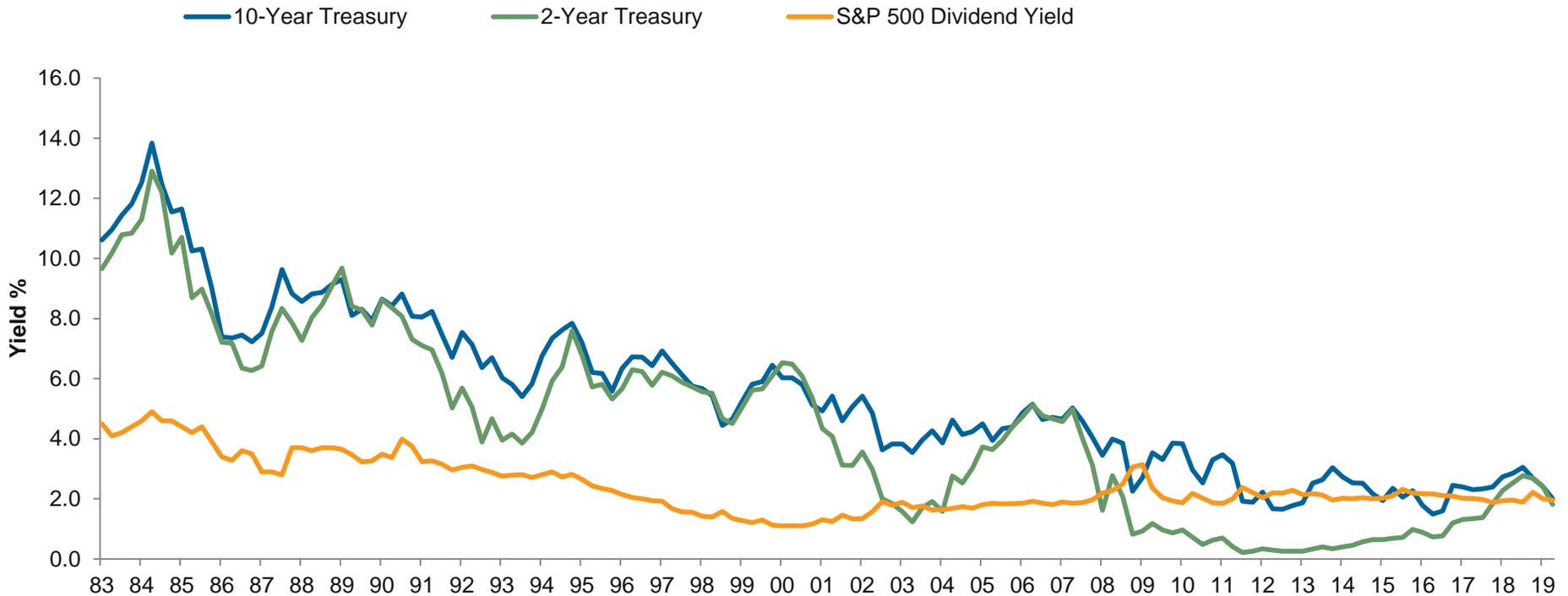
- Steady rise of 2017 has been shrugged off.
- Tight labor markets finally pushing up wages; good news for workers and consumer spending

**However, wage pressure yet to show as headline inflation**

Sources: Federal Reserve, U.S. Department of Labor

# Long Period of Zero Interest Rate Policy Skews Memories of 'Normal Markets'

Yields on 2- and 10-year Treasury notes now back at level of the S&P dividend

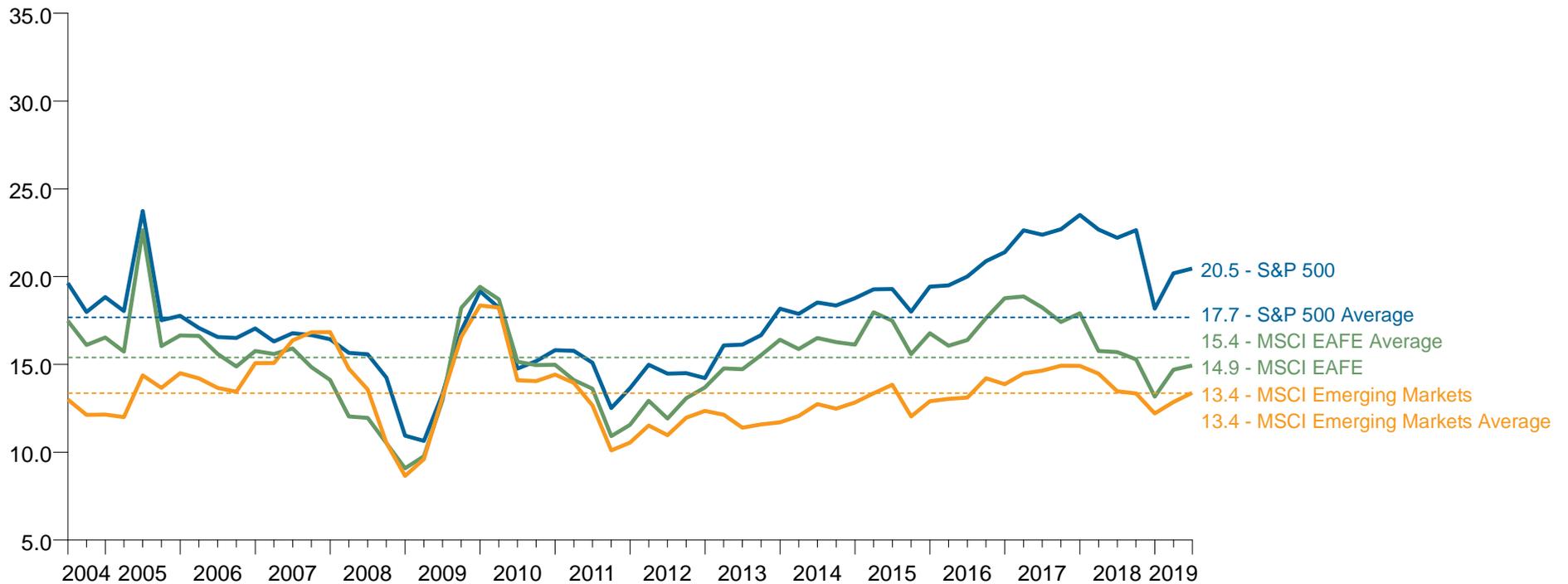


- Long-term historical relationship between bond yields and dividends has been distorted by 10 years of extreme policy intervention
- After Fed rate hikes starting in 2017, 2-year Treasury yields rose above dividends. Both 2- and 10-year Treasury yields fell back to the level of stock dividends in Q2 2019

Source: Callan

# Global Equity Valuations—Historical Data

## Price/Earnings Ratio (exc neg) for 15 Years ended June 30, 2019



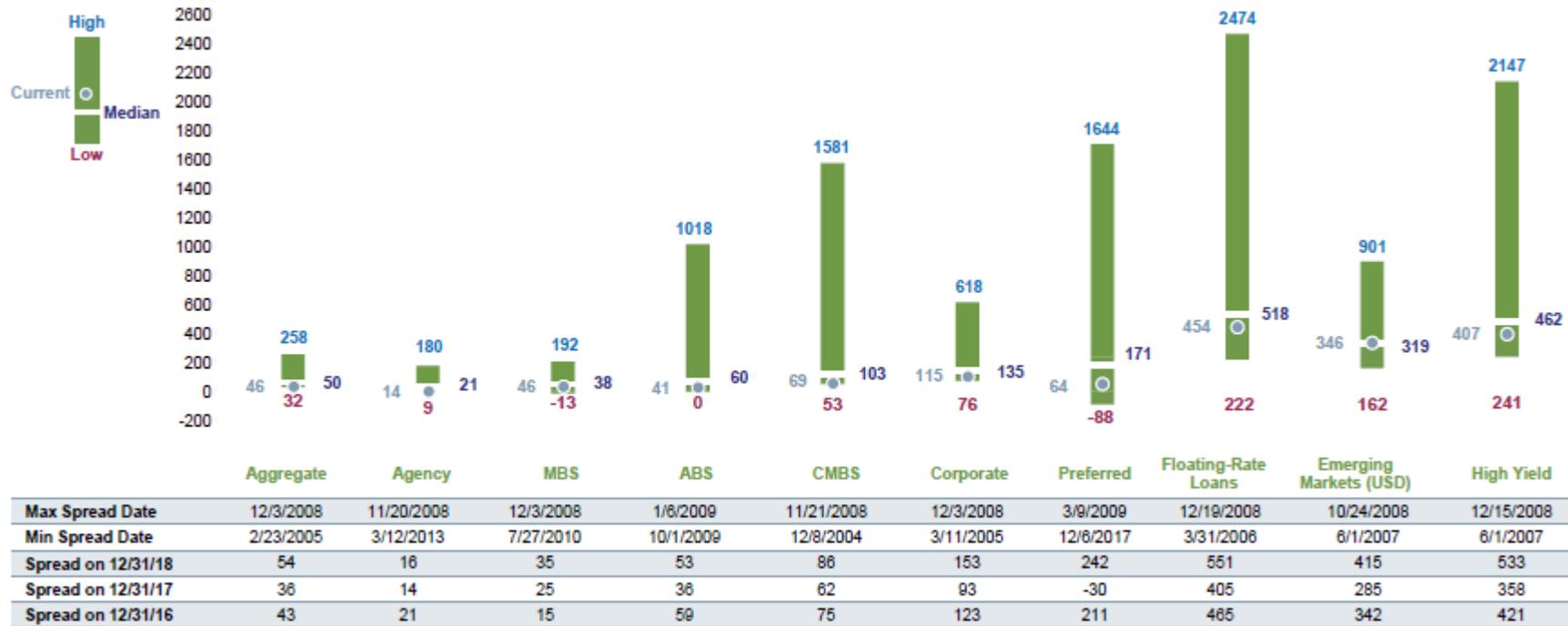
## U.S. equity valuations plummeted in Q4 to their historical average, but popped back up in Q1 and Q2 2019

- U.S. remains higher than non-U.S. developed and emerging market equity valuations relative to the 15-year average for each index.
- Despite reasonable relative valuations, both political and economic risks remain in non-U.S. markets.

## Forward valuations dropped during 2018, but June 2019 reading of 17.1 for S&P 500 is back above the 25-year average

Sources: MSCI, Standard & Poor's, Callan

# Fixed Income Valuations Back Below Historical Median Levels



Source: Eaton Vance

## Spreads widened during 2018 relative to Treasuries on a 15-year basis

However, spreads narrowed again in Q1 2019, and held steady through Q2 2019. Spreads are below median for all sectors except EMD

- Below-investment grade sectors such as high yield and bank loans still maintain a yield advantage over other spread sectors.

Source: Factset as of 06/30/19. Spread history measures past 15 years. Data provided is for informational use only. Past performance is no guarantee of future results. All fixed-income spreads are in basis points and measure option-adjusted yield spread relative to comparable maturity U.S. Treasuries using daily data. Loan Index spread represents the three-year discounted spread over LIBOR. Aggregate represented by Bloomberg Barclays US Aggregate Index. Agency represented by Bloomberg Barclays US Agency Index. MBS represented by Bloomberg Barclays US Mortgage Backed Securities (MBS) Index. ABS represented by Bloomberg Barclays US Asset Backed Securities (ABS) Index. CMBS represented by Bloomberg Barclays US CMBS Investment Grade Index. Corporate represented by Bloomberg Barclays US Corporate Investment Grade Index. Preferred represented by ICE BofAML Fixed Rate Preferred Securities Index. Floating-Rate Loans represented by S&P/LSTA Leveraged Loan Index. Emerging Markets(USD) represented by JPMorgan Emerging Markets Bond Index (EMBI) Global Diversified. High Yield represented by ICE BofAML US High Yield Index.

# Negative Yielding Debt – How Low Can You Go?

## Negative-yielding bonds rose to \$12.9 trillion globally as of June 30, 2019

- Beating the former high water mark set in 2016
- Japanese and German 10-year yields declined to -0.16% and -0.33% in the second quarter, respectively, the lowest since 2016.

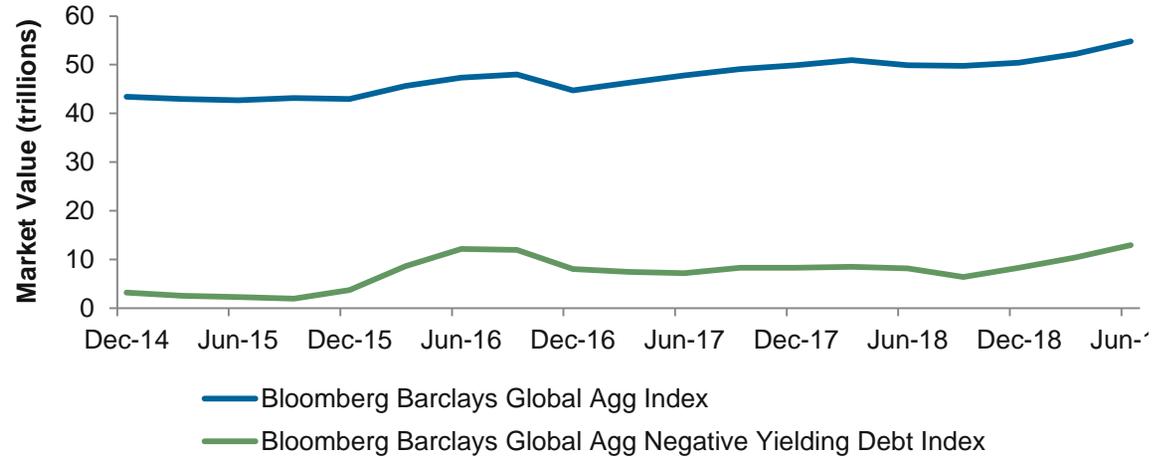
## Central banks' monetary policy tools have evolved in order to stimulate inflation

- Interest rate cutting has produced limited success in lifting inflation.
- Quantitative-easing measures such as bond purchasing programs have become more commonplace, but may continue to depress bond yields in the near future.

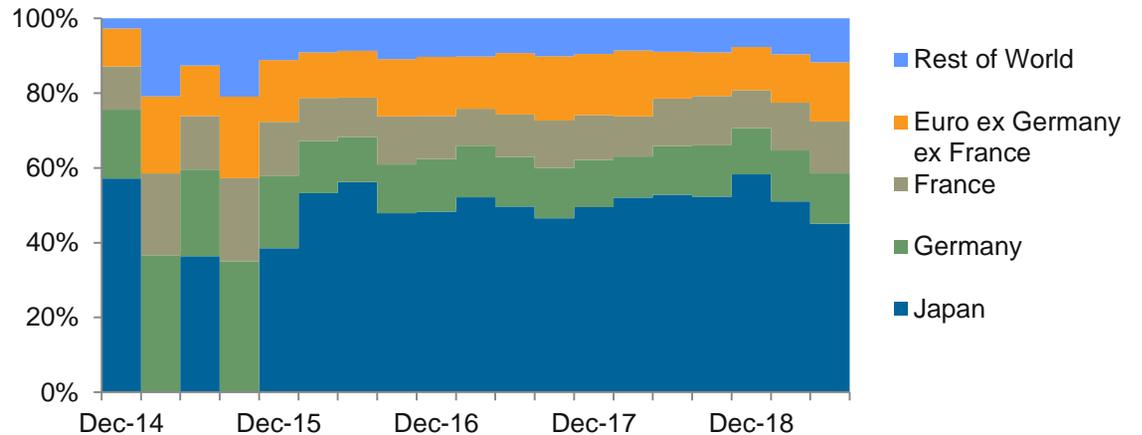
## The new normal?

- Global bond market has entered its 3rd year with more than \$7 trillion in negative-yielding bonds.
- With economic growth and inflation remaining benign in developed markets, negative-yielding debt may remain range-bound.

## Rise in Negative Yielding Debt



## Country Breakdown of Negative Yielding Debt



Source: (Top, Bottom) Barclays Live

# Callan Periodic Table of Investment Returns

Returns Ranked in Order of Performance (as of June 30, 2019)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2 Qtrs. 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%	Large Cap Equity 18.54%
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 16.98%
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%	Non-U.S. Equity 14.64%
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%	Real Estate 14.51%
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 10.59%
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 9.94%
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 6.11%
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 4.99%
	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 1.24%

Callan

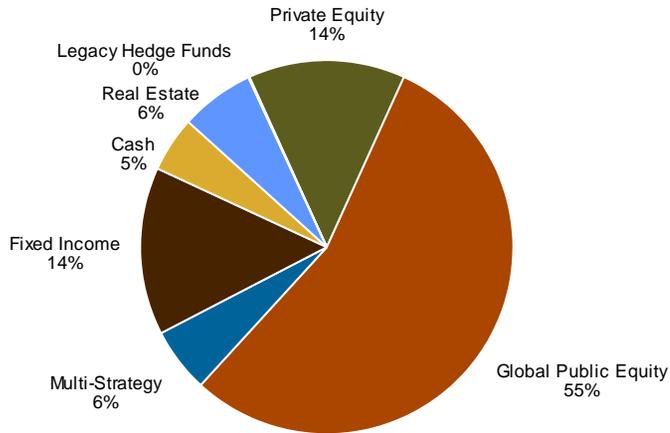
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**PA SERS Defined Benefit Plan  
Performance Review**

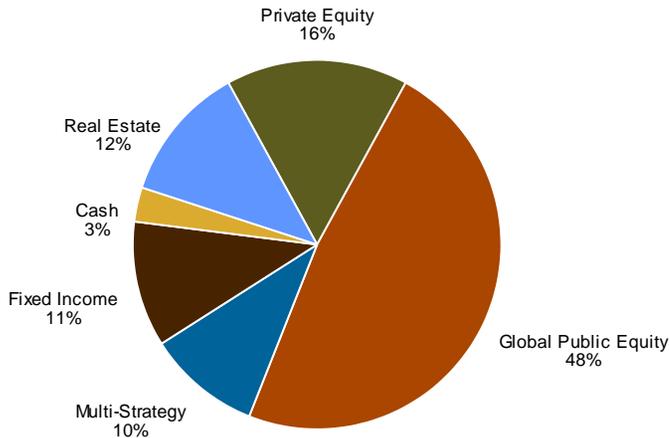
# Total Fund

## Actual Asset Allocation versus Target as of June 30, 2019

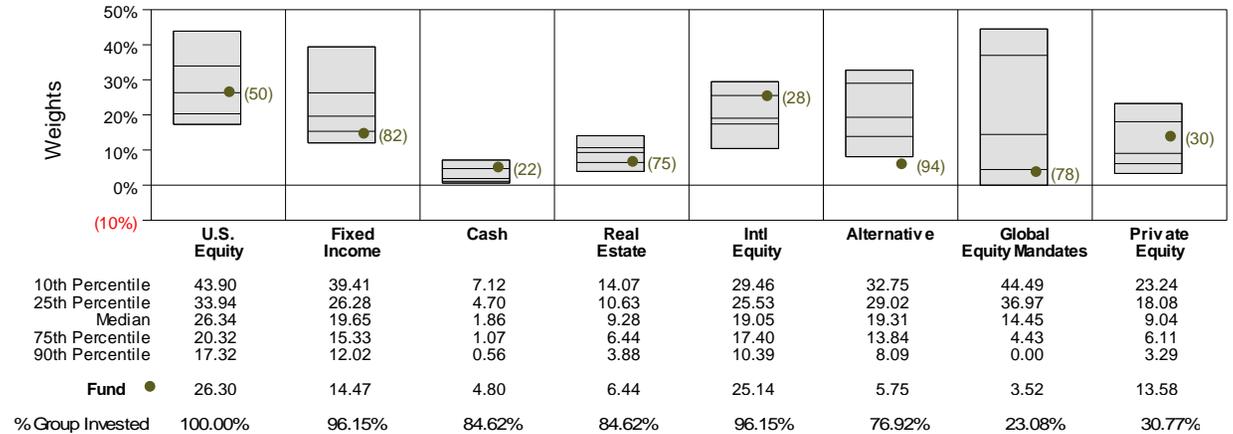
**Actual Asset Allocation**



**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	4,009,894	13.6%	16.0%	(2.4%)	(715,527)
Global Public Equity	16,231,877	55.0%	48.0%	7.0%	2,055,612
Multi-Strategy	1,661,163	5.6%	10.0%	(4.4%)	(1,292,226)
Fixed Income	4,273,494	14.5%	11.0%	3.5%	1,024,767
Cash	1,416,982	4.8%	3.0%	1.8%	530,965
Real Estate	1,902,498	6.4%	12.0%	(5.6%)	(1,641,568)
Legacy Hedge Funds	37,978	0.1%	0.0%	0.1%	37,978
<b>Total</b>	<b>29,533,887</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 June 30, 2019

#### Relative Attribution Effects for Quarter ended June 30, 2019

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Fixed Income	14%	11%	3.20%	3.08%	0.02%	(0.03%)	(0.01%)
Real Estate	6%	12%	2.15%	2.89%	(0.04%)	0.01%	(0.03%)
Multi-Strategy	7%	10%	3.67%	1.68%	0.12%	0.07%	0.18%
Global Public Equity	54%	48%	3.48%	3.37%	0.06%	(0.04%)	0.02%
Legacy Hedge Funds	0%	0%	(3.88%)	1.48%	(0.01%)	(0.00%)	(0.01%)
Private Equity	13%	16%	4.99%	4.99%	0.00%	(0.05%)	(0.05%)
Cash	5%	3%	0.61%	0.64%	(0.00%)	(0.03%)	(0.04%)
<b>Total</b>			<b>3.45%</b>	<b>= 3.38%</b>	<b>+ 0.14%</b>	<b>+ (0.08%)</b>	<b>0.07%</b>

#### • What helped relative attribution?

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

#### • What hurt relative attribution?

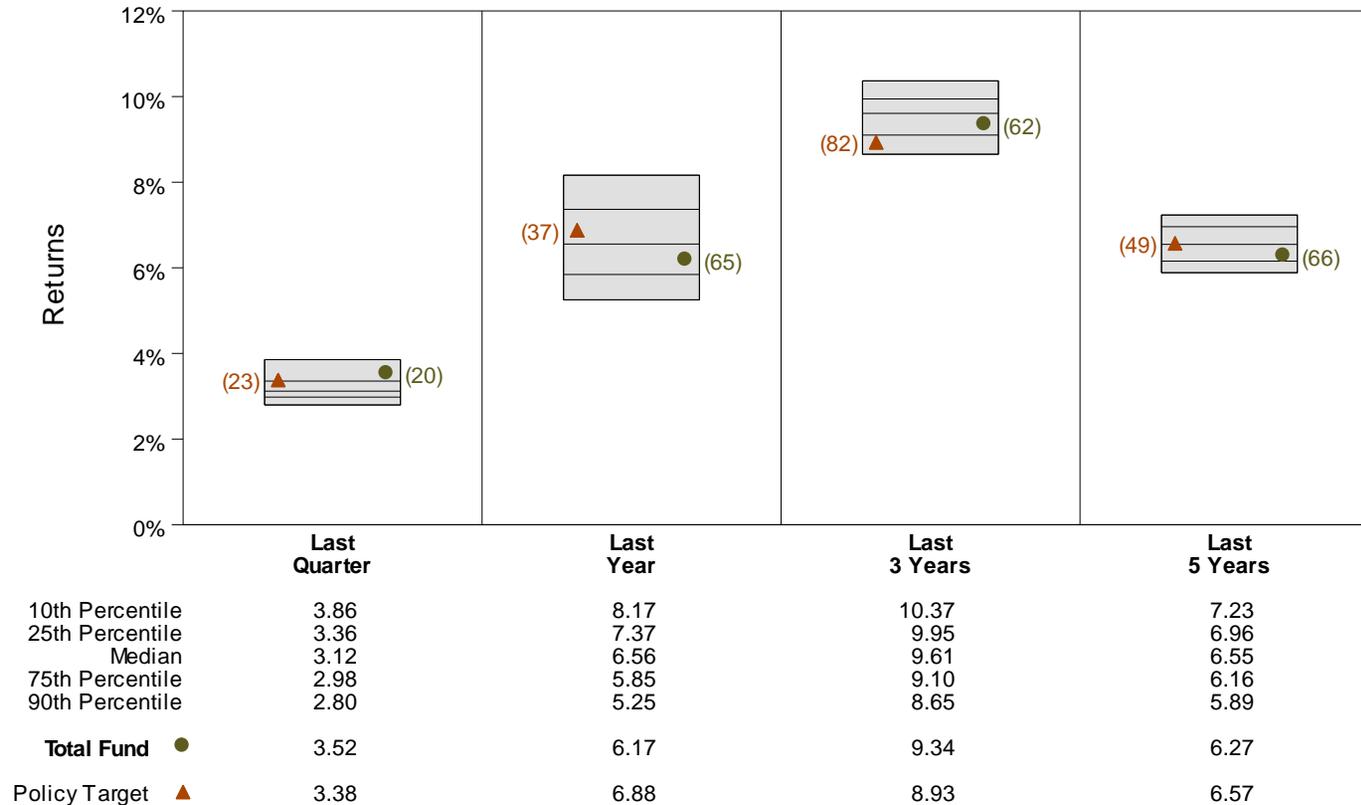
- An underweight to Private Equity (attribution based on target return)
- An overweight to Global Public Equity, Cash, and Fixed Income (attribution based on target return)
- Underperformance relative to target from Real Estate Managers

\* 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 June 30, 2019)

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



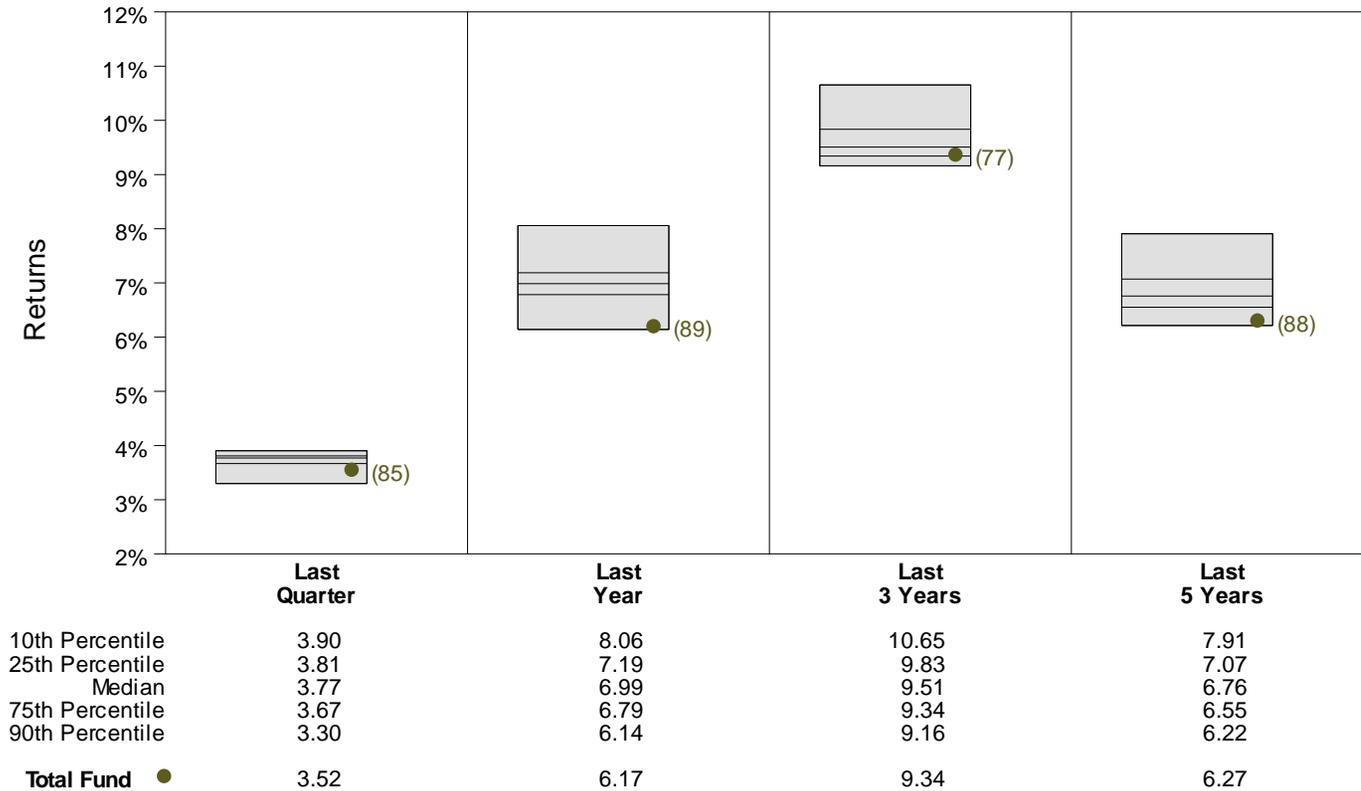
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# Total Fund

## Asset Allocation-Adjusted Gross of Fee Peer Performance Comparison as of June 30, 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

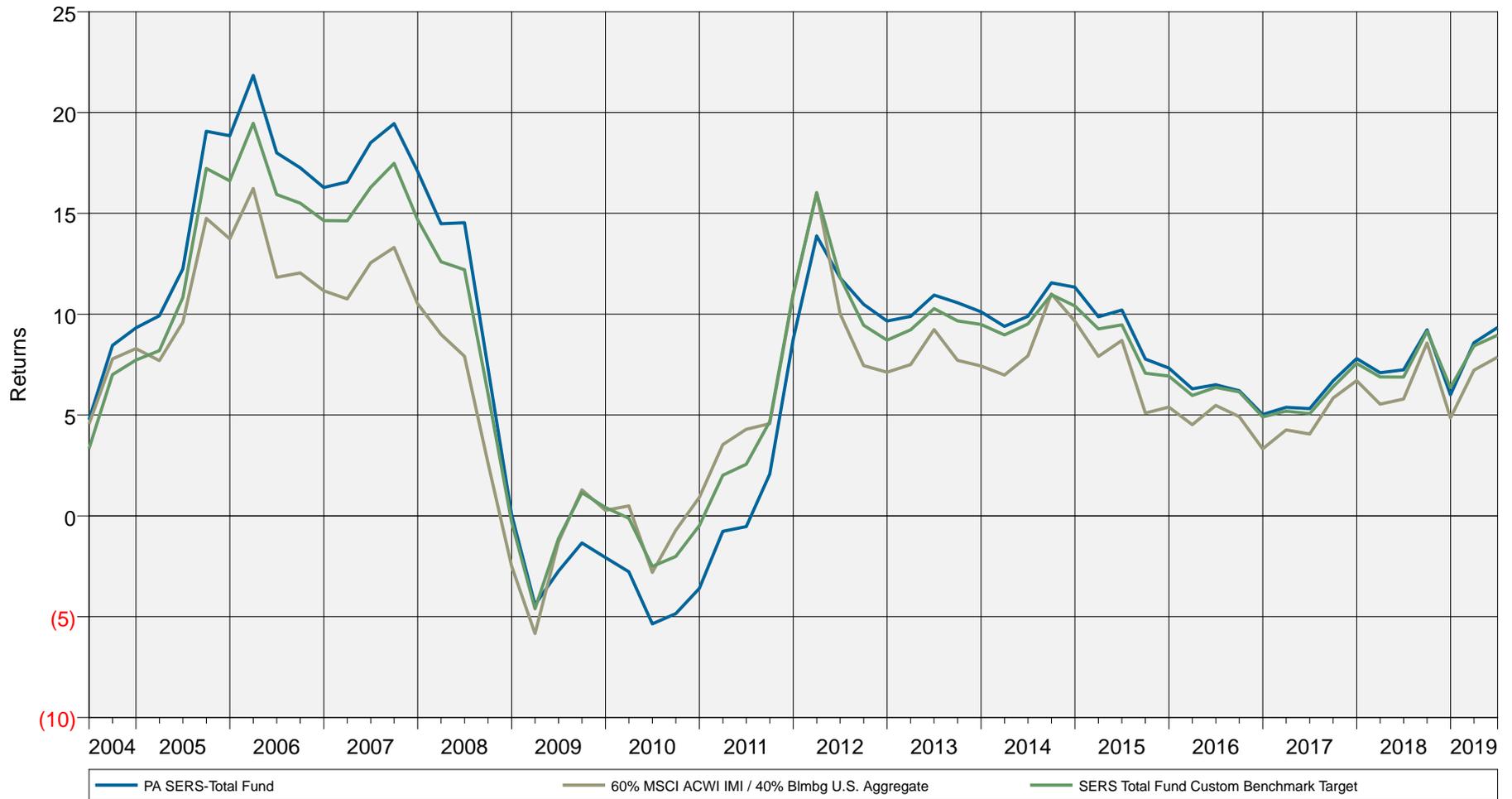


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# Total Fund

## Rolling 3-year Gross of Fee Performance versus Peers and Benchmark (As of June 30, 2019)

Rolling 12 Quarter Gross of Fee Returns  
for 15 Years Ended June 30, 2019

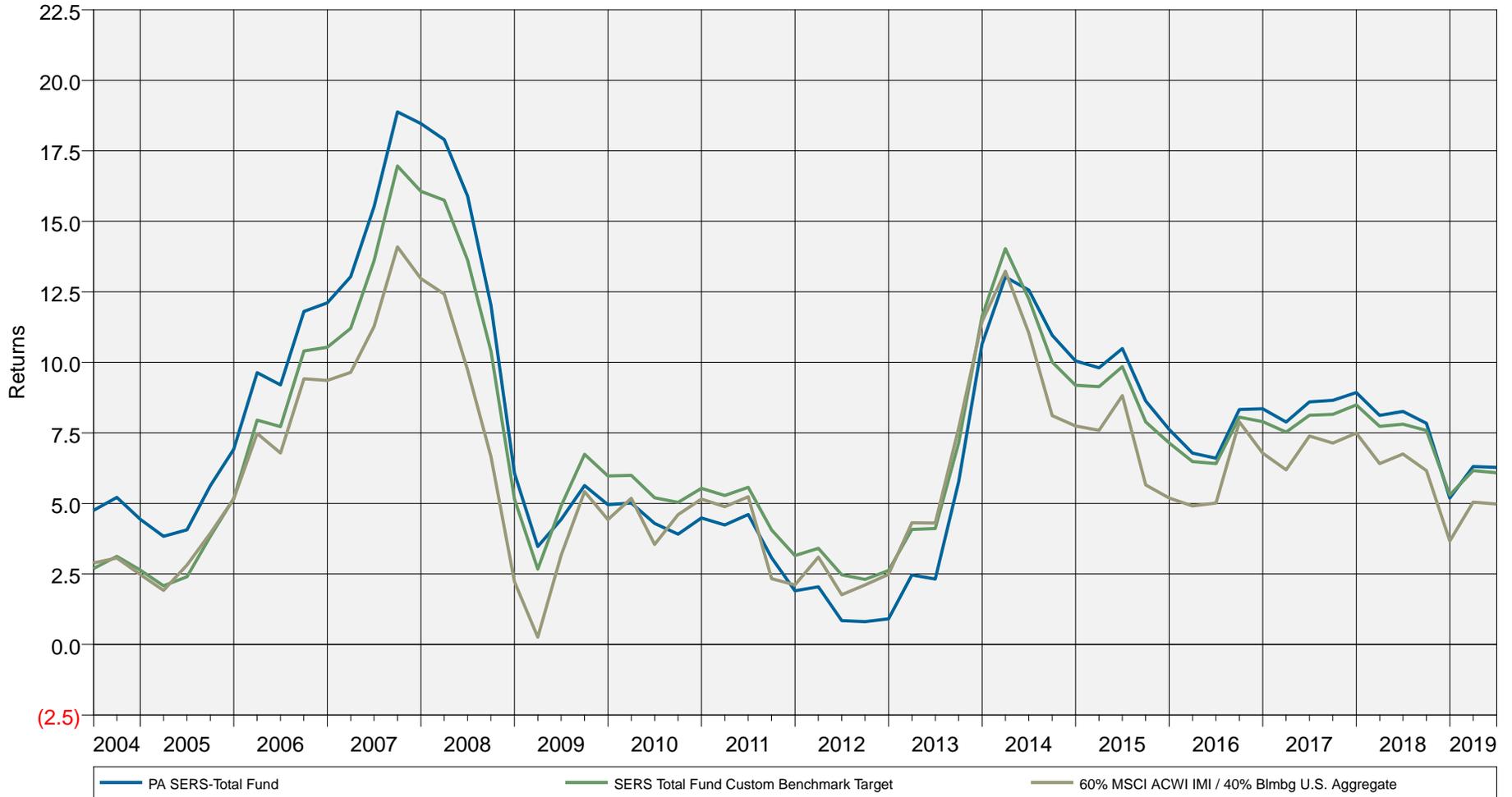


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# Total Fund

## Rolling 5-year Gross of Fee Performance versus Peers and Benchmark (As of June 30, 2019)

Rolling 20 Quarter Gross of Fee Returns  
for 15 Years Ended June 30, 2019



\* 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.

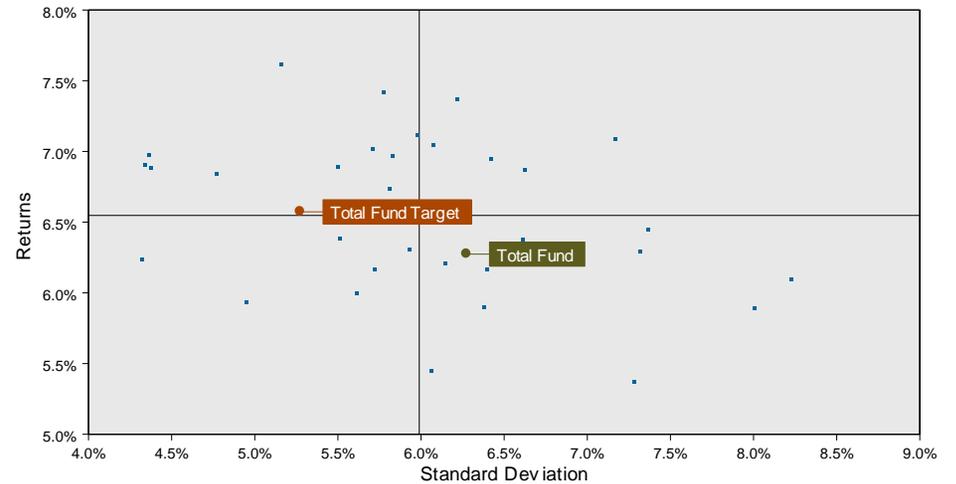
# Total Fund

## Performance versus Total Fund Target as of June 30, 2019

Cumulative Returns Actual vs Target



Five Year Annualized Risk vs Return



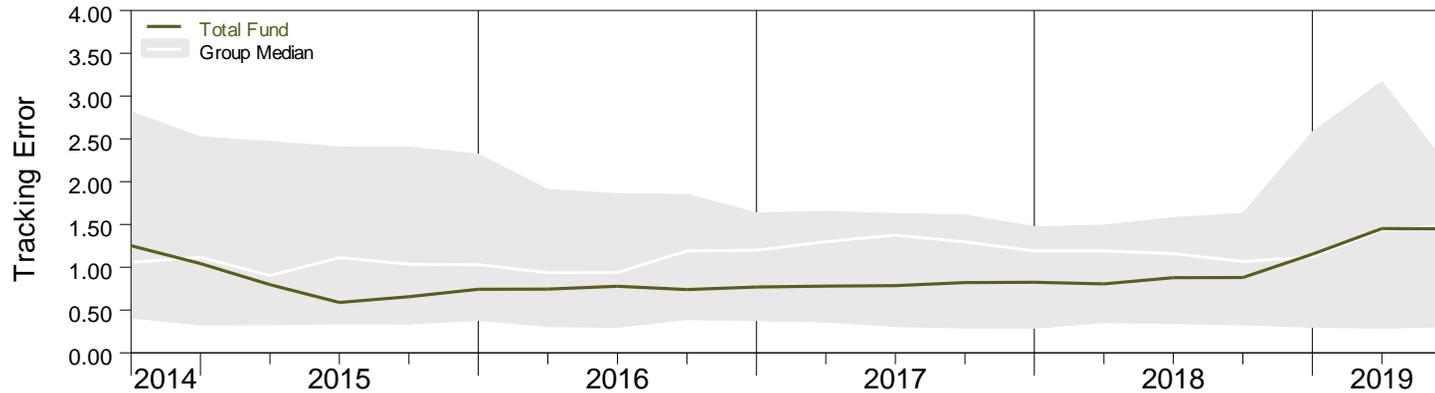
Squares represent membership of the Callan Public Fund Spons- V Lg DB (>10B)

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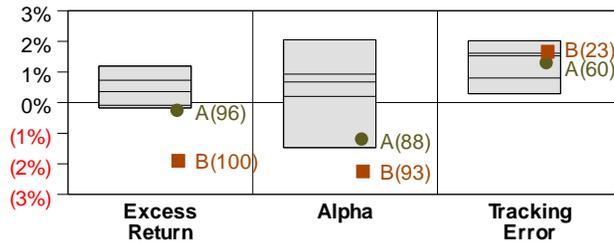
# Total Fund

## Risk Statistics versus Peers as of June 30, 2019

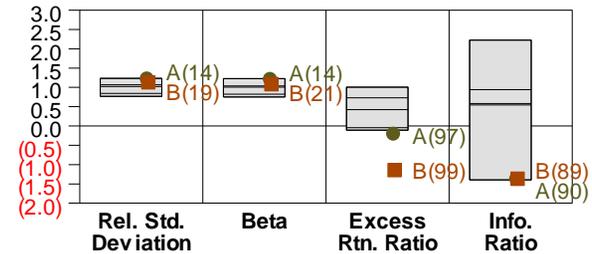
Rolling 12 Quarter Tracking Error vs Targets Compared to Callan Public Fund Spons- V Lg DB (>10B)



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



	Excess Return	Alpha	Tracking Error
10th Percentile	1.19	2.05	2.01
25th Percentile	0.73	0.93	1.62
Median	0.36	0.67	1.53
75th Percentile	(0.09)	0.21	0.80
90th Percentile	(0.17)	(1.47)	0.29
Total Fund	● A (0.30)	(1.23)	1.26
60% MSCI ACW	■ B (1.90)	(2.25)	1.66



	Rel. Std. Deviation	Beta	Excess Rtn. Ratio	Info. Ratio
10th Percentile	1.24	1.23	1.00	2.23
25th Percentile	1.07	1.04	0.73	0.94
Median	1.02	1.01	0.42	0.58
75th Percentile	0.84	0.82	(0.04)	0.55
90th Percentile	0.77	0.75	(0.11)	(1.40)
Total Fund	● A 1.19	1.18	(0.24)	(1.41)
60% MSCI ACW	■ B 1.13	1.08	(1.14)	(1.37)

\* 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 June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance</b>							
<b>Total Fund</b>	<b>\$29,534</b>	<b>100.00%</b>	<b>3.45%</b>	<b>12.02%</b>	<b>5.67%</b>	<b>8.73%</b>	<b>5.66%</b>
Total Fund Custom Benchmark(1)	-	-	3.38%	10.46%	6.85%	8.95%	6.08%
Public Market Equiv Benchmark(2)	-	-	4.77%	9.40%	6.67%	9.55%	6.68%
60/40 Index(3)	-	-	3.35%	11.19%	6.60%	6.96%	4.68%
<b>Global Public Equity</b>	<b>\$16,232</b>	<b>54.96%</b>	<b>3.48%</b>	<b>16.82%</b>	<b>4.33%</b>	<b>11.76%</b>	<b>6.31%</b>
MSCI ACWI IMI	-	-	3.37%	16.08%	4.56%	11.42%	6.03%
<b>Fixed Income</b>	<b>\$4,273</b>	<b>14.47%</b>	<b>3.20%</b>	<b>6.98%</b>	<b>7.55%</b>	<b>3.40%</b>	<b>2.65%</b>
Blmbg Aggregate	-	-	3.08%	6.11%	7.87%	2.31%	2.95%
<b>Multi-Strategy</b>	<b>\$1,661</b>	<b>5.62%</b>	<b>3.67%</b>	<b>11.07%</b>	<b>6.69%</b>	-	-
S&P/LSTA Leveraged Loan	-	-	1.68%	5.74%	3.97%	5.24%	3.68%
Russell 3000 Index	-	-	4.10%	18.71%	8.98%	14.02%	10.19%
<b>Real Estate</b>	<b>\$1,902</b>	<b>6.44%</b>	<b>2.15%</b>	<b>6.56%</b>	<b>0.12%</b>	<b>2.13%</b>	<b>4.92%</b>
Real Estate Custom Benchmark	-	-	2.89%	3.58%	8.00%	6.83%	8.94%
CPI +3% (Qtr lag)	-	-	1.90%	2.18%	4.86%	5.20%	4.47%
<b>Private Equity</b>	<b>\$4,010</b>	<b>13.58%</b>	<b>4.99%</b>	<b>6.13%</b>	<b>12.83%</b>	<b>12.28%</b>	<b>9.45%</b>
Burgiss Private Equity Custom Index	-	-	3.63%	2.87%	10.69%	13.77%	11.51%
Russell 3000 +3% (Qtr lag)	-	-	14.57%	(0.26%)	12.35%	16.75%	13.62%
<b>Cash</b>	<b>\$1,417</b>	<b>4.80%</b>	<b>0.61%</b>	<b>1.24%</b>	<b>2.43%</b>	<b>1.73%</b>	<b>1.27%</b>
3-month Treasury Bill	-	-	0.64%	1.24%	2.31%	1.38%	0.87%

(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

(3) Benchmark consists of 60% MSCI ACWI IMI Index, 40% Bloomberg U.S. Aggregate Index.

# Asset Class Returns

As of June 30, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance</b>					
<b>Total Fund</b>	<b>8.64%</b>	<b>6.90%</b>	<b>6.19%</b>	<b>8.30%</b>	<b>9.52%</b> (1/81)
Total Fund Custom Benchmark(1)	9.12%	7.70%	6.42%	8.51%	-
Public Market Equiv Benchmark(2)	9.75%	8.11%	6.73%	8.76%	-
60/40 Index(3)	7.33%	6.05%	5.44%	6.53%	-
<b>Global Public Equity</b>	<b>10.91%</b>	<b>6.90%</b>	-	-	<b>6.77%</b> (1/02)
MSCI ACWI IMI	10.32%	7.21%	5.27%	6.91%	7.07% (1/02)
<b>Fixed Income</b>	<b>6.10%</b>	<b>5.32%</b>	<b>5.69%</b>	<b>6.38%</b>	<b>8.45%</b> (1/81)
Blmbg Aggregate	3.90%	4.27%	4.93%	5.50%	7.67% (1/81)
<b>Multi-Strategy</b>					
S&P/LSTA Leveraged Loan	6.16%	4.71%	4.79%	-	-
Russell 3000 Index	14.67%	8.88%	6.30%	9.98%	11.01% (1/81)
<b>Real Estate</b>	<b>5.44%</b>	<b>5.84%</b>	<b>6.98%</b>	<b>7.73%</b>	<b>8.39%</b> (3/84)
Real Estate Custom Benchmark	8.80%	7.41%	7.90%	-	-
CPI +3% (Qtr lag)	4.80%	5.06%	5.18%	5.21%	5.64% (3/84)
<b>Private Equity</b>	<b>12.44%</b>	<b>11.67%</b>	<b>11.00%</b>	<b>14.03%</b>	<b>10.97%</b> (1/86)
Burgiss Private Equity Custom Index	13.97%	13.11%	12.39%	15.05%	16.97% (1/86)
Russell 3000 +3% (Qtr lag)	19.33%	12.14%	9.97%	13.28%	14.51% (1/86)
<b>Cash</b>	<b>0.78%</b>	<b>1.67%</b>	<b>2.28%</b>	<b>2.88%</b>	<b>3.65%</b> (1/87)
3-month Treasury Bill	0.49%	1.38%	1.85%	2.52%	3.28% (1/87)

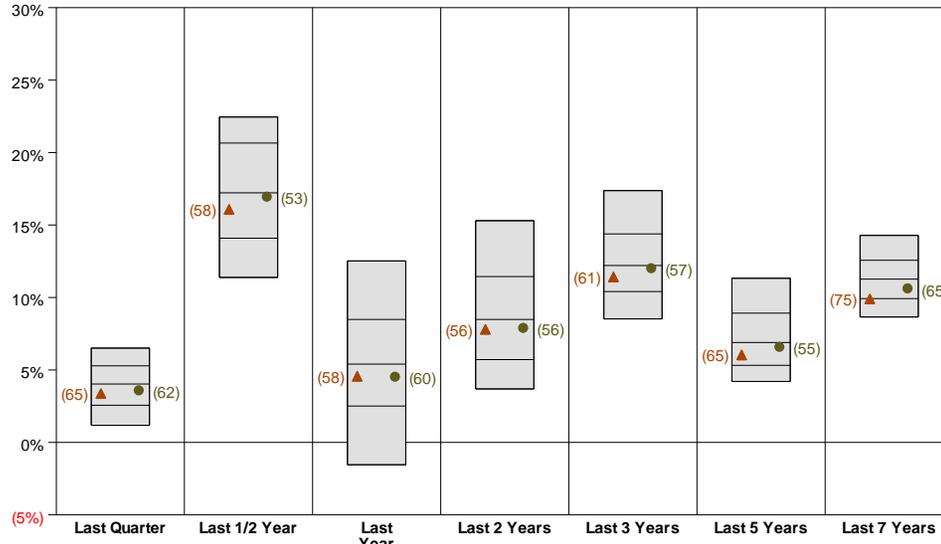
(1) Total Fund Custom Benchmark returns provided by RVK. Benchmark consists of: 16% SERS Private Equity Composite, 48% MSCI ACW IM Index, 12% Real Estate Custom Benchmark, 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

(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

(3) Benchmark consists of 60% MSCI ACWI IMI Index, 40% Bloomberg U.S. Aggregate Index.

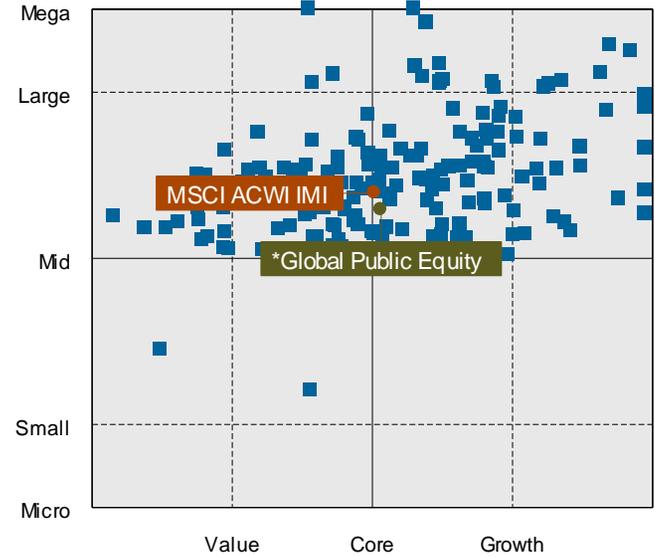
# Global Equity as of June 30, 2019

## Performance vs Callan Global Equity (Gross)

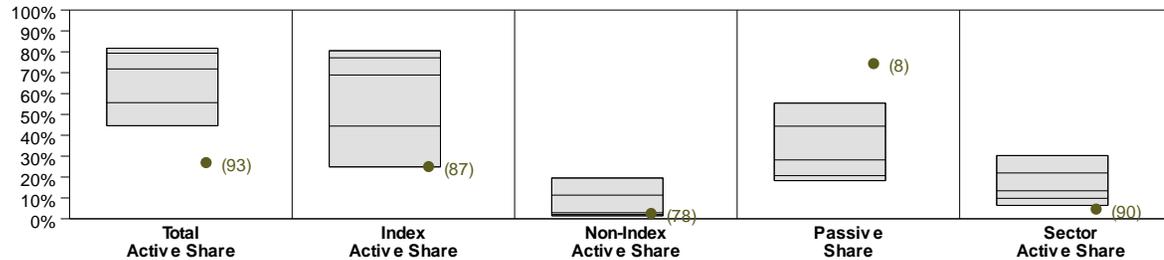


10th Percentile	6.51	22.45	12.52	15.29	17.37	11.33	14.28
25th Percentile	5.29	20.66	8.48	11.44	14.38	8.92	12.57
Median	4.03	17.22	5.40	8.48	12.21	6.89	11.26
75th Percentile	2.56	14.09	2.51	5.71	10.41	5.31	9.92
90th Percentile	1.17	11.38	(1.55)	3.68	8.52	4.20	8.65
<b>Global Public Equity</b> ●	3.52	16.88	4.46	7.83	11.94	6.52	10.55
<b>MSCI ACWI IMI</b> ▲	3.37	16.08	4.56	7.80	11.42	6.03	9.90

## Style Map vs Callan Global Equity Holdings as of June 30, 2019



## Active Share vs. Pub Pln- Gbl Equity

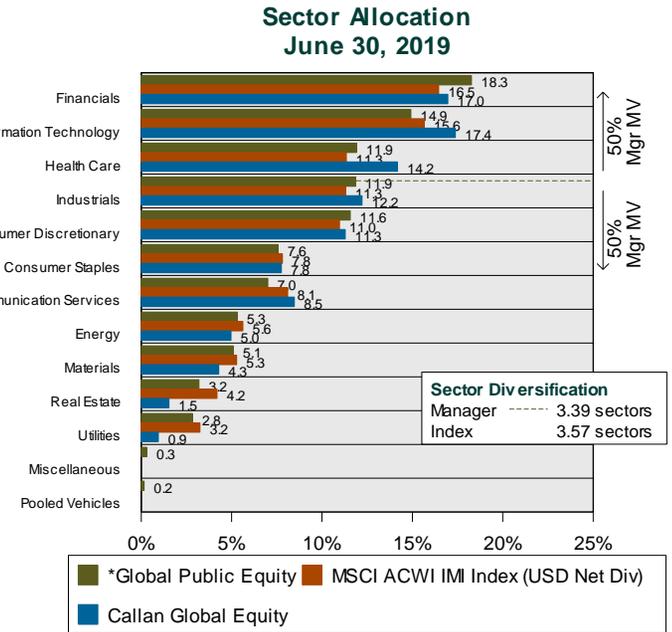
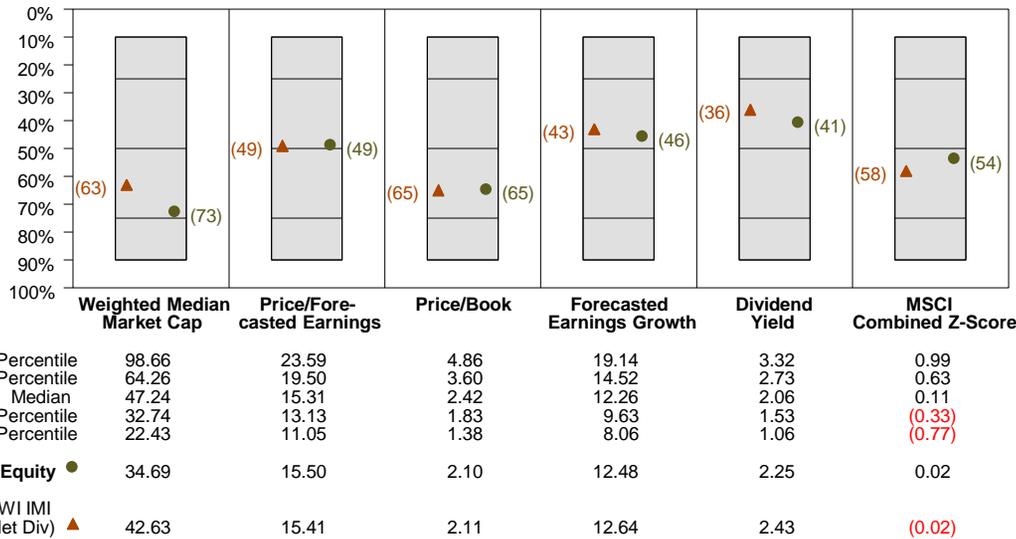


10th Percentile	81.72	80.48	19.53	55.39	30.27
25th Percentile	79.32	77.13	11.33	44.36	21.99
Median	71.79	68.85	2.95	28.21	13.46
75th Percentile	55.64	44.40	2.09	20.68	9.81
90th Percentile	44.61	24.90	1.43	18.28	6.43
<b>Global Public Equity</b> ●	26.31	24.35	1.97	73.69	3.99

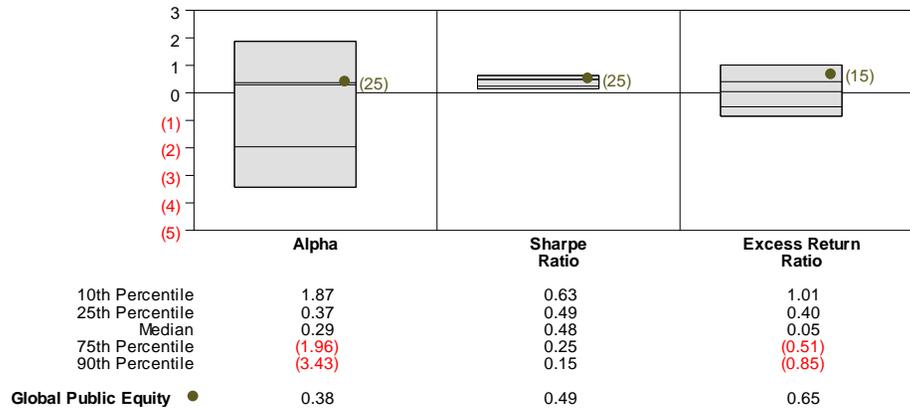
# Global Equity

As of June 30, 2019

Portfolio Characteristics Percentile Rankings  
Rankings Against Callan Global Equity  
as of June 30, 2019



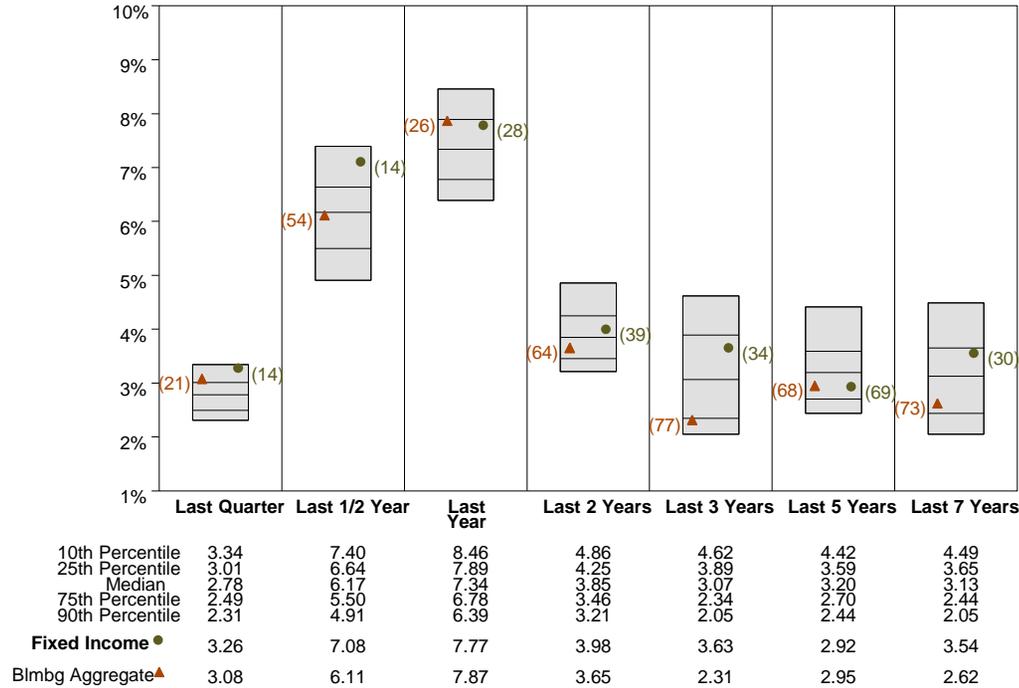
Risk Adjusted Return Measures vs MSCI ACWI IMI  
Rankings Against Public Fund - Global Equity (Gross)  
Five Years Ended June 30, 2019



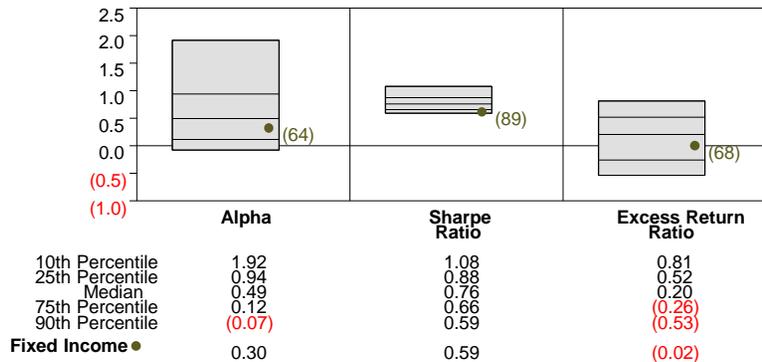
# Fixed Income

As of June 30, 2019

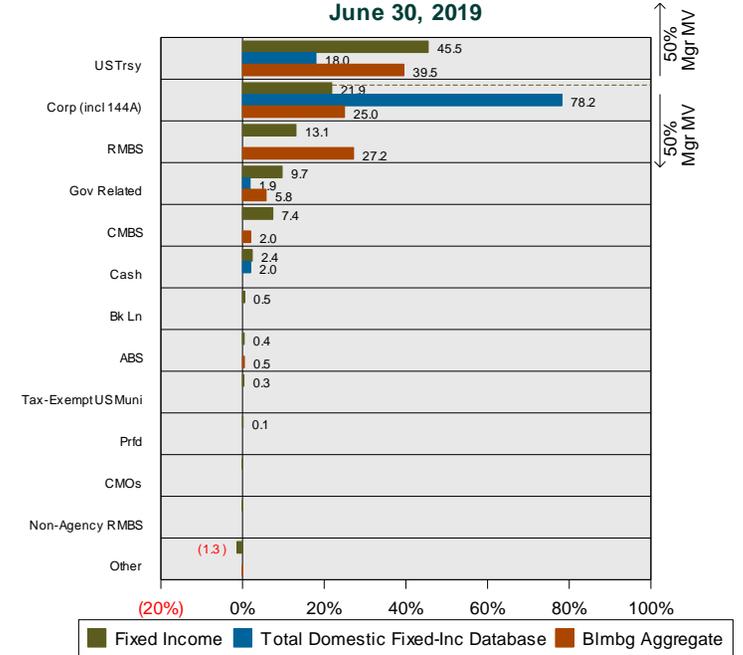
## Performance vs Public Fund - Domestic Fixed (Gross)



## Risk Adjusted Return Measures vs Blmbg Aggregate Rankings Against Public Fund - Domestic Fixed (Gross) Five Years Ended June 30, 2019



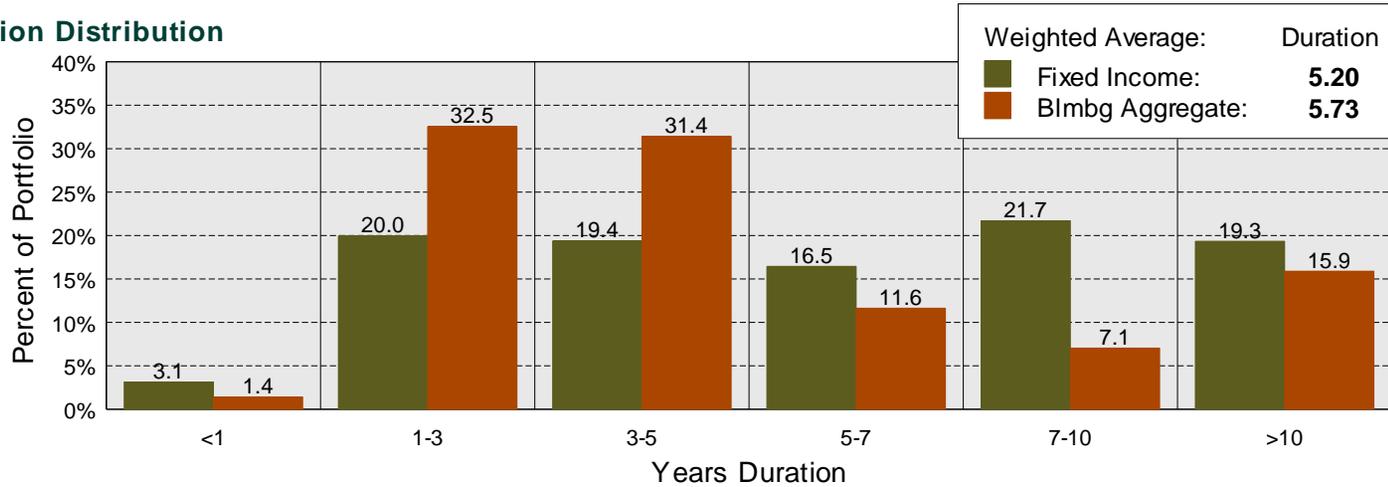
## Sector Allocation June 30, 2019



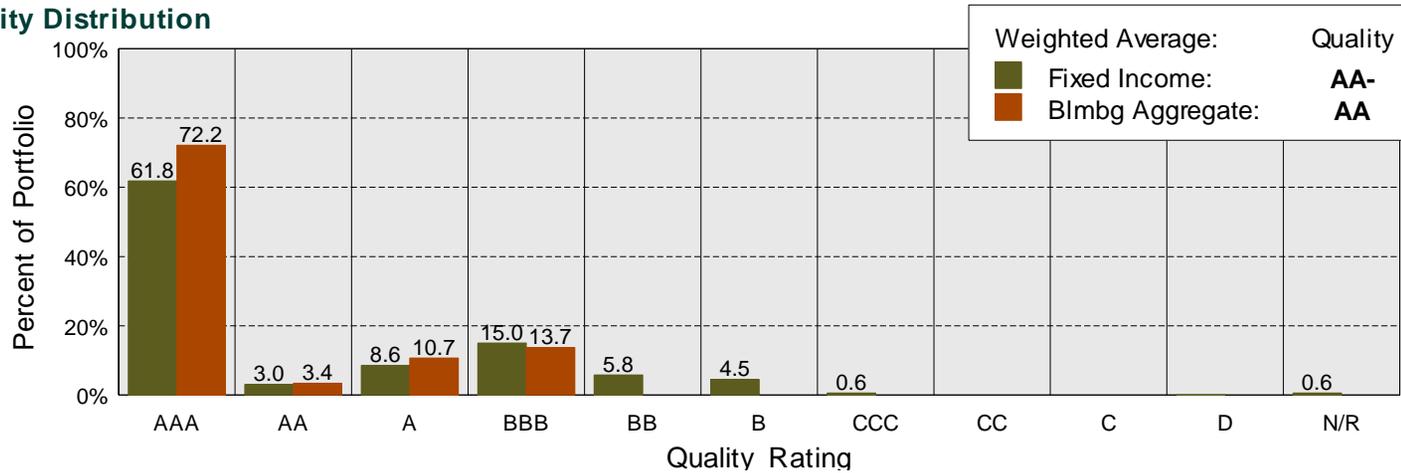
# Fixed Income

As of June 30, 2019

**Duration Distribution**



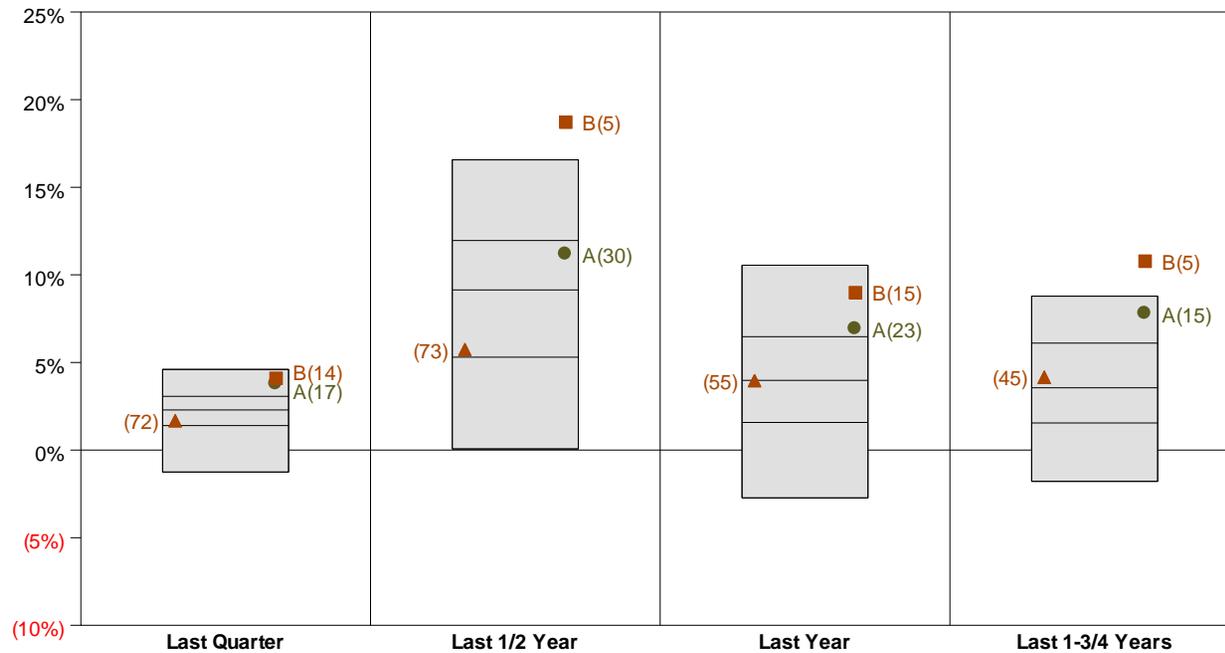
**Quality Distribution**



# Multi-Strategy

As of June 30, 2019

Performance vs Callan Multi-Asset Database (Gross)



	Last Quarter	Last 1/2 Year	Last Year	Last 1-3/4 Years
10th Percentile	4.60	16.56	10.55	8.78
25th Percentile	3.07	11.97	6.47	6.11
Median	2.29	9.14	3.98	3.56
75th Percentile	1.40	5.30	1.57	1.55
90th Percentile	(1.25)	0.07	(2.73)	(1.78)
Multi-Strategy ● A	3.76	11.16	6.90	7.79
Russell 3000 Index ■ B	4.10	18.71	8.98	10.78
S&P/LSTA Leveraged Loan ▲	1.68	5.74	3.97	4.16

Callan

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**Appendix I – Investment Manager Returns**

# Investment Manager Returns

As of June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance- Equity</b>							
<b>Global Public Equity</b>	<b>\$16,232</b>	<b>100.00%</b>	<b>3.48%</b>	<b>16.82%</b>	<b>4.33%</b>	<b>11.76%</b>	<b>6.31%</b>
MSCI ACWI IMI	-	-	3.37%	16.08%	4.56%	11.42%	6.03%
<b>Global Mandates</b>	<b>\$1,041</b>	<b>6.41%</b>	<b>4.10%</b>	<b>20.21%</b>	<b>13.97%</b>	<b>15.61%</b>	<b>10.71%</b>
Walter Scott & Prtnsr Gbl Gr Eq	1,041	6.41%	4.10%	20.21%	13.97%	15.61%	10.71%
MSCI World	-	-	4.00%	16.98%	6.33%	11.77%	6.60%
<b>U.S. Equity</b>	<b>\$7,766</b>	<b>47.85%</b>	<b>3.70%</b>	<b>19.00%</b>	<b>6.54%</b>	<b>12.78%</b>	<b>9.01%</b>
Russell 3000 Index(1)	-	-	4.10%	18.71%	8.98%	14.02%	10.19%
<b>U.S. Mid/Large Cap Equity</b>	<b>\$6,157</b>	<b>37.93%</b>	<b>3.98%</b>	<b>18.93%</b>	<b>8.74%</b>	<b>13.64%</b>	<b>9.79%</b>
MCM Russell 1000 Index	5,709	35.17%	4.24%	18.81%	10.03%	14.17%	10.49%
Russell 1000 Index	-	-	4.25%	18.84%	10.02%	14.15%	10.45%
Iridian Asset Mgmt MCV	448	2.76%	0.82%	20.54%	(5.80%)	6.53%	3.16%
Russell MidCap Index	-	-	4.13%	21.35%	7.83%	12.16%	8.63%
Russell MidCap Value Idx	-	-	3.19%	18.02%	3.68%	8.95%	6.72%
<b>U.S. Small Cap Equity</b>	<b>\$1,609</b>	<b>9.92%</b>	<b>2.63%</b>	<b>19.24%</b>	<b>(1.25%)</b>	<b>9.18%</b>	<b>5.25%</b>
Russell 2000 Index(1)	-	-	2.10%	16.98%	(3.31%)	10.51%	6.61%
S&P 600 Small Cap Index	-	-	1.87%	13.69%	(4.88%)	11.97%	8.41%
MCM Russell 2000 Core Index	324	2.00%	2.05%	16.93%	(3.33%)	-	-
Russell 2000 Index	-	-	2.10%	16.98%	(3.31%)	12.30%	7.06%
MCM Russell 2000 Val Index	576	3.55%	1.36%	13.40%	(6.25%)	-	-
Russell 2000 Value Index	-	-	1.38%	13.47%	(6.24%)	-	5.39%
Emerald Adv Div Sm Cap Grth	709	4.37%	3.94%	25.60%	4.28%	9.81%	-
Russell 2000 Growth Index	-	-	2.75%	20.36%	(0.49%)	14.69%	8.63%
<b>Non-U.S. Equity</b>	<b>\$7,423</b>	<b>45.73%</b>	<b>3.17%</b>	<b>14.19%</b>	<b>0.62%</b>	<b>10.08%</b>	<b>2.66%</b>
MSCI ACWI ex US IMI(1)	-	-	2.74%	13.33%	0.26%	9.17%	2.25%
<b>Non-U.S. Developed Markets Equity</b>	<b>\$5,568</b>	<b>34.30%</b>	<b>4.15%</b>	<b>15.28%</b>	<b>0.76%</b>	<b>10.15%</b>	<b>2.91%</b>
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>\$4,801</b>	<b>29.58%</b>	<b>4.03%</b>	<b>14.95%</b>	<b>1.61%</b>	<b>10.98%</b>	<b>3.37%</b>
BlackRock MSCI World Ex US Index	4,791	29.52%	4.04%	14.99%	1.64%	-	-
MSCI World ex US	-	-	3.79%	14.64%	1.29%	9.01%	2.04%
<b>Non-U.S. Dev Small Cap Equity</b>	<b>\$767</b>	<b>4.72%</b>	<b>4.81%</b>	<b>17.36%</b>	<b>(5.22%)</b>	<b>9.02%</b>	<b>2.24%</b>
FIS Group Non-U.S. Small Cap	195	1.20%	2.74%	11.71%	-	-	-
MSCI ACWI ex US Small Cap	-	-	1.21%	11.60%	(5.94%)	7.76%	2.77%
Harris Assoc Int'l SCV	572	3.52%	5.54%	19.41%	(5.31%)	8.99%	2.22%
MSCI World ex US Sm Cap	-	-	1.76%	12.88%	(6.17%)	8.38%	3.39%
<b>Emerging Mkts Equity</b>	<b>\$1,855</b>	<b>11.43%</b>	<b>0.37%</b>	<b>11.08%</b>	<b>0.37%</b>	<b>11.56%</b>	<b>2.81%</b>
BlackRock Emg Mkts Index	689	4.24%	0.53%	10.42%	1.02%	-	-
Leading Edge Emg Mkts Fund	220	1.35%	1.65%	13.27%	-	-	-
Macquarie Emg Mkts Equity	416	2.56%	(1.32%)	7.94%	(0.08%)	11.88%	2.37%
Martin Currie Emg Mkts Equity	436	2.69%	1.06%	13.21%	(0.94%)	13.45%	4.27%
MSCI EM	-	-	0.61%	10.59%	1.22%	10.66%	2.49%
GlobeFlex Emerging Small Cap	95	0.58%	2.37%	12.75%	(4.12%)	10.44%	1.88%
MSCI EM Small Cap	-	-	(0.98%)	6.71%	(5.11%)	5.47%	0.53%
Northern Trust Equity Transition	1	0.01%	1.79%	0.16%	(14.57%)	-	-

\*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.

(1) Benchmark history is a blend of current and past benchmark indices. History prior to 12/31/2018 provided by RVK.

# Investment Manager Returns

As of June 30, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance- Equity</b>					
<b>Global Public Equity</b>	<b>10.91%</b>	<b>6.90%</b>	-	-	<b>6.77%</b> (1/02)
MSCI ACWI IMI	10.32%	7.21%	5.27%	6.91%	7.07% (1/02)
<b>Global Mandates</b>	<b>13.21%</b>	-	-	-	<b>8.60%</b> (11/06)
Walter Scott & Prtnrs Gbl Gr Eq	12.50%	-	-	-	9.18% (10/06)
MSCI World	10.72%	7.03%	4.78%	7.07%	5.84% (10/06)
<b>U.S. Equity</b>	<b>14.22%</b>	<b>7.95%</b>	<b>6.07%</b>	<b>9.58%</b>	<b>10.62%</b> (1/81)
Russell 3000 Index(1)	14.67%	8.88%	6.30%	9.90%	10.91% (1/81)
<b>U.S. Mid/Large Cap Equity</b>	<b>14.68%</b>	<b>8.51%</b>	<b>5.99%</b>	<b>9.83%</b>	<b>9.49%</b> (1/94)
MCM Russell 1000 Index	-	-	-	-	14.32% (1/12)
Russell 1000 Index	14.77%	8.94%	6.19%	10.09%	14.34% (1/12)
Iridian Asset Mgmt MCV	13.50%	10.20%	9.38%	-	12.59% (3/95)
Russell MidCap Index	15.16%	9.83%	8.99%	11.28%	11.14% (3/95)
Russell MidCap Value Idx	14.56%	9.33%	9.15%	11.25%	11.17% (3/95)
<b>U.S. Small Cap Equity</b>	<b>11.97%</b>	<b>7.14%</b>	<b>7.44%</b>	<b>9.81%</b>	<b>9.17%</b> (1/94)
Russell 2000 Index(1)	13.87%	8.71%	8.65%	10.79%	10.28% (1/94)
S&P 600 Small Cap Index	14.99%	9.43%	9.75%	11.08%	10.43% (1/94)
MCM Russell 2000 Core Index	-	-	-	-	8.20% (12/16)
Russell 2000 Index	13.45%	8.15%	7.77%	9.26%	8.24% (12/16)
MCM Russell 2000 Val Index	-	-	-	-	4.06% (12/16)
Russell 2000 Value Index	12.40%	7.28%	8.64%	9.88%	4.13% (12/16)
Emerald Adv Div Sm Cap Grth	-	-	-	-	14.75% (12/16)
Russell 2000 Growth Index	14.41%	8.90%	6.49%	8.20%	12.38% (12/16)
<b>Non-U.S. Equity</b>	<b>7.37%</b>	<b>5.44%</b>	<b>5.03%</b>	-	<b>6.23%</b> (11/95)
MSCI ACWI ex US IMI(1)	6.76%	6.23%	5.03%	5.40%	5.59% (11/95)
<b>Non-U.S. Developed Markets Equity</b>	<b>8.13%</b>	<b>5.49%</b>	-	-	<b>6.15%</b> (1/02)
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>8.17%</b>	<b>5.05%</b>	-	-	<b>5.64%</b> (1/02)
BlackRock MSCI World Ex US Index	-	-	-	-	4.51% (6/17)
MSCI World ex US	6.75%	5.44%	4.16%	5.01%	4.00% (6/17)
<b>Non-U.S. Dev Small Cap Equity</b>	<b>8.96%</b>	<b>7.52%</b>	<b>7.21%</b>	<b>6.73%</b>	<b>6.85%</b> (10/93)
FIS Group Non-U.S. Small Cap	-	-	-	-	(2.80%) (10/18)
MSCI ACWI ex US Small Cap	8.48%	7.40%	6.89%	5.32%	(4.50%) (10/18)
Harris Assoc Int'l SCV	9.82%	8.71%	-	-	10.63% (7/03)
MSCI World ex US Sm Cap	9.19%	6.93%	-	-	9.16% (7/03)
<b>Emerging Mkts Equity</b>	<b>5.10%</b>	<b>6.06%</b>	-	-	<b>7.22%</b> (1/02)
BlackRock Emg Mkts Index	-	-	-	-	4.43% (7/17)
Leading Edge Emg Mkts Fund	-	-	-	-	11.75% (11/18)
Macquarie Emg Mkts Equity	-	-	-	-	3.63% (5/13)
Martin Currie Emg Mkts Equity	-	-	-	-	4.49% (1/14)
MSCI EM	5.81%	8.70%	-	-	3.37% (1/14)
GlobeFlex Emerging Small Cap	-	-	-	-	4.33% (8/13)
MSCI EM Small Cap	5.87%	9.06%	7.12%	4.47%	2.63% (8/13)

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(1) Benchmark history is a blend of current and past benchmark indices. History prior to 12/31/2018 provided by RVK.

# Investment Manager Returns

As of June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Fixed Income</b>							
<b>Fixed Income</b>	<b>\$4,273</b>	<b>100.00%</b>	<b>3.20%</b>	<b>6.98%</b>	<b>7.55%</b>	<b>3.40%</b>	<b>2.65%</b>
Blmbg Aggregate	-	-	3.08%	6.11%	7.87%	2.31%	2.95%
<b>Core Fixed Income</b>	<b>\$1,940</b>	<b>45.41%</b>	<b>3.11%</b>	<b>6.70%</b>	<b>8.03%</b>	<b>2.75%</b>	<b>3.10%</b>
Blmbg Aggregate	-	-	3.08%	6.11%	7.87%	2.31%	2.95%
MCM Bond Index	1,092	25.55%	3.06%	6.12%	7.87%	2.26%	2.90%
Blmbg Aggregate(1)	-	-	3.08%	6.11%	7.87%	2.31%	2.95%
PIMCO Core Bond Fund	653	15.27%	2.85%	6.82%	7.95%	2.97%	3.19%
Blmbg Agg ex Treasury	-	-	3.12%	6.71%	8.26%	2.88%	3.22%
Taplin, Canida & Habacht Corp FI	196	4.58%	4.25%	9.73%	9.30%	4.42%	3.57%
Blmbg Credit	-	-	4.27%	9.35%	10.34%	3.74%	3.92%
<b>Core-Plus Fixed Income</b>	<b>\$890</b>	<b>20.84%</b>	<b>3.27%</b>	<b>8.33%</b>	<b>7.83%</b>	<b>5.71%</b>	<b>2.40%</b>
Brandywine Global Opp	199	4.66%	3.57%	6.78%	4.32%	2.89%	1.47%
FTSE WGBI	-	-	3.57%	5.38%	5.48%	1.00%	0.85%
Pyramis Gbl Adv HY CMBS	334	7.81%	3.10%	5.84%	8.43%	5.42%	4.93%
Blmbg US Univ CMBS ex Aaa	-	-	3.77%	8.30%	10.40%	5.24%	4.34%
Stone Harbor Gbl HY	201	4.70%	2.94%	10.74%	8.16%	6.68%	3.44%
FTSE US High Yield	-	-	2.36%	9.89%	7.19%	7.37%	4.36%
Stone Harbor EMD	156	3.66%	3.60%	12.61%	10.41%	5.10%	3.97%
JPM EMBI Global	-	-	3.76%	10.60%	11.32%	4.65%	4.47%
<b>Global TIPS</b>	<b>\$856</b>	<b>20.02%</b>	<b>2.80%</b>	<b>6.18%</b>	<b>4.64%</b>	<b>2.15%</b>	<b>1.78%</b>
Brown Brothers TIPS	227	5.31%	2.98%	6.15%	4.82%	2.05%	1.89%
Blmbg US TIPS	-	-	2.86%	6.15%	4.84%	2.08%	1.76%
NISA Inv Adv TIPS	511	11.95%	2.80%	6.12%	4.75%	2.06%	1.76%
Blmbg US TIPS(1)	-	-	2.86%	6.15%	4.84%	2.08%	1.76%
New Century Global TIPS	118	2.77%	2.46%	6.51%	3.80%	2.73%	1.61%
Blmbg Wld Gov I-L Undhdg	-	-	2.28%	6.30%	3.70%	2.60%	1.41%
<b>Nominal U.S. Treasuries</b>	<b>\$587</b>	<b>13.74%</b>	<b>3.92%</b>	<b>6.96%</b>	<b>9.89%</b>	<b>0.81%</b>	<b>3.14%</b>
PIMCO US Treasuries	587	13.74%	3.92%	6.96%	9.89%	1.15%	3.39%
Blmbg US Treas Bell 10Y	-	-	4.22%	7.44%	10.38%	0.49%	2.90%

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 (1) Benchmark history is a blend of current and past benchmark indices. History prior to 12/31/2018 provided by RVK.

# Investment Manager Returns

As of June 30, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance - Fixed Income</b>					
<b>Fixed Income</b>	<b>6.10%</b>	<b>5.32%</b>	<b>5.69%</b>	<b>6.38%</b>	<b>8.45%</b> <sup>(1/81)</sup>
Blmbg Aggregate	3.90%	4.27%	4.93%	5.50%	7.67% <sup>(1/81)</sup>
<b>Core Fixed Income</b>	<b>4.96%</b>	<b>4.65%</b>	-	-	<b>4.84%</b> <sup>(1/02)</sup>
Blmbg Aggregate	3.90%	4.27%	4.93%	5.50%	4.48% <sup>(1/02)</sup>
MCM Bond Index	3.78%	4.16%	4.90%	5.61%	7.16% <sup>(4/84)</sup>
Blmbg Aggregate(1)	3.90%	4.27%	5.00%	5.68%	7.43% <sup>(4/84)</sup>
PIMCO Core Bond Fund	-	-	-	-	2.67% <sup>(1/13)</sup>
Blmbg Agg ex Treasury	4.32%	-	-	-	2.92% <sup>(1/13)</sup>
Taplin, Canida & Habacht Corp FI	6.09%	5.25%	-	-	5.82% <sup>(11/00)</sup>
Blmbg Credit	5.77%	5.20%	5.78%	6.29%	5.86% <sup>(11/00)</sup>
<b>Core-Plus Fixed Income</b>	-	-	-	-	<b>4.56%</b> <sup>(10/12)</sup>
Brandywine Global Opp	-	-	-	-	3.97% <sup>(2/11)</sup>
FTSE WGBI	2.21%	3.48%	4.35%	4.70%	1.53% <sup>(2/11)</sup>
Pyramis Gbl Adv HY CMBS	13.02%	7.25%	8.38%	-	8.66% <sup>(4/97)</sup>
Blmbg US Univ CMBS ex Aaa	10.15%	1.09%	-	-	-
Stone Harbor Gbl HY	8.14%	6.88%	-	-	7.60% <sup>(7/00)</sup>
FTSE US High Yield	8.90%	7.22%	6.73%	7.38%	7.18% <sup>(7/00)</sup>
Stone Harbor EMD	8.08%	-	-	-	7.62% <sup>(4/05)</sup>
JPM EMBI Global	7.41%	7.80%	9.00%	9.97%	7.31% <sup>(4/05)</sup>
<b>Global TIPS</b>	<b>2.81%</b>	<b>3.34%</b>	-	-	<b>3.23%</b> <sup>(2/03)</sup>
Brown Brothers TIPS	-	-	-	-	1.51% <sup>(2/12)</sup>
Blmbg US TIPS	3.64%	4.07%	5.42%	-	1.34% <sup>(2/12)</sup>
NISA Inv Adv TIPS	2.59%	-	-	-	3.11% <sup>(4/07)</sup>
Blmbg US TIPS(1)	2.59%	-	-	-	-
New Century Global TIPS	-	-	-	-	2.09% <sup>(2/12)</sup>
Blmbg Wld Gov I-L Undhdg	3.54%	4.20%	5.44%	-	1.70% <sup>(2/12)</sup>
<b>Nominal U.S. Treasuries</b>	-	-	-	-	<b>2.54%</b> <sup>(9/11)</sup>
PIMCO US Treasuries	-	-	-	-	2.76% <sup>(9/11)</sup>
Blmbg US Treas Bell 10Y	3.93%	4.47%	4.88%	5.46%	2.60% <sup>(9/11)</sup>

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(1) Benchmark history is a blend of current and past benchmark indices. History prior to 12/31/2018 provided by RVK.

# Investment Manager Returns

As of June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Multi-Strategy</b>							
<b>Multi-Strategy</b>	<b>\$1,661</b>	<b>100.00%</b>	<b>3.67%</b>	<b>11.07%</b>	<b>6.69%</b>	-	-
S&P/LSTA Leveraged Loan	-	-	1.68%	5.74%	3.97%	5.24%	3.68%
Russell 3000 Index	-	-	4.10%	18.71%	8.98%	14.02%	10.19%
<b>Credit Focused Strategies</b>	<b>\$926</b>	<b>55.76%</b>	<b>1.66%</b>	<b>6.18%</b>	<b>4.22%</b>	-	-
Blackstone Keystone(1)	926	55.76%	1.66%	6.18%	4.22%	6.54%	4.40%
HFRI Fund of Funds Compos	-	-	1.48%	6.14%	1.14%	4.24%	2.19%
<b>Opp. Equity &amp; Fixed Income</b>	<b>\$545</b>	<b>32.83%</b>	<b>5.55%</b>	<b>15.14%</b>	<b>8.60%</b>	-	-
SEI Str. Credit: HY Bank Loans(2)	347	20.87%	3.88%	3.92%	4.58%	13.18%	7.36%
FTSE US High Yield	-	-	2.36%	9.89%	7.19%	7.37%	4.36%
Eaton Vance GMARA	199	11.96%	2.78%	4.90%	0.59%	-	-
3 month LIBOR + 6%	-	-	2.07%	4.21%	8.61%	7.78%	7.21%
MCM Russell 3000 Index(3)	0	0.01%	4.36%	18.99%	9.25%	-	-
Russell 3000 Index	-	-	4.10%	18.71%	8.98%	14.02%	10.19%
<b>Private Credit(4)</b>	<b>\$190</b>	<b>11.41%</b>	<b>3.02%</b>	<b>5.74%</b>	<b>14.59%</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 Credit performance has a 1 Qtr lag.

# Investment Manager Returns

As of June 30, 2019

	Market Value \$(mm)	Ending Weight	Last 7 Years	Last 10 Years	Last 15 Years	Last 20 Years	Since Inception
<b>Net Performance - Multi-Strategy</b>							
<b>Multi-Strategy</b>	<b>\$1,661</b>	<b>100.00%</b>	-	-	-	-	<b>7.62%</b> (10/17)
S&P/LSTA Leveraged Loan	-	-	4.46%	6.16%	4.71%	4.79%	4.16% (10/17)
Russell 3000 Index	-	-	13.79%	14.67%	8.88%	6.30%	10.78% (10/17)
<b>Credit Focused Strategies</b>	<b>\$926</b>	<b>55.76%</b>	-	-	-	-	<b>4.13%</b> (10/17)
Blackstone Keystone(1)	926	55.76%	-	-	-	-	7.45% (7/12)
HFRI Fund of Funds Compos	-	-	3.66%	3.21%	3.01%	3.99%	3.66% (7/12)
<b>Opp. Equity &amp; Fixed Income</b>	<b>\$545</b>	<b>32.83%</b>	-	-	-	-	<b>10.39%</b> (10/17)
SEI Str. Credit: HY Bank Loans(2)	347	20.87%	8.77%	22.60%	-	-	12.68% (5/08)
FTSE US High Yield	-	-	6.00%	8.90%	7.22%	6.73%	7.34% (5/08)
Eaton Vance GMARA	199	11.96%	-	-	-	-	(0.64%) (6/18)
3 month LIBOR + 6%	-	-	6.95%	6.78%	7.78%	8.17%	8.59% (6/18)
MCM Russell 3000 Index(3)	0	0.01%	-	-	-	-	12.02% (6/17)
Russell 3000 Index	-	-	13.79%	14.67%	8.88%	6.30%	11.82% (6/17)
<b>Private Credit(4)</b>	<b>\$190</b>	<b>11.41%</b>	-	-	-	-	<b>9.01%</b> (12/17)

(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 Credit performance has a 1 Qtr lag.

# Investment Manager Returns

As of June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Real Estate</b>							
<b>Real Estate</b>	<b>\$1,902</b>	<b>100.00%</b>	<b>2.15%</b>	<b>6.56%</b>	<b>0.12%</b>	<b>2.13%</b>	<b>4.92%</b>
Real Estate Custom Benchmark	-	-	2.89%	3.58%	8.00%	6.83%	8.94%
CPI +3% (Qtr lag)	-	-	1.90%	2.18%	4.86%	5.20%	4.47%
<b>Core/Core Plus Real Estate Funds</b>	<b>\$619</b>	<b>32.55%</b>	<b>0.96%</b>	<b>2.02%</b>	<b>6.83%</b>	<b>6.94%</b>	<b>8.94%</b>
NCREIF ODCE Index (Qtr lag)	-	-	1.48%	2.89%	6.80%	7.26%	9.42%
<b>Value Add/Opp. Real Estate</b>	<b>\$1,013</b>	<b>53.23%</b>	<b>2.94%</b>	<b>6.52%</b>	<b>(5.21%)</b>	<b>0.86%</b>	<b>4.12%</b>
Real Estate Separate Accounts	612	32.16%	4.11%	9.11%	(10.06%)	(2.12%)	2.29%
Non-Core Closed End Funds	401	21.07%	1.20%	2.56%	6.46%	7.79%	8.35%
NCREIF ODCE Index (Qtr lag)	-	-	1.48%	2.89%	6.80%	7.26%	9.42%
<b>Natural Resources/Infrastructure</b>	<b>\$6</b>	<b>0.29%</b>	<b>(0.84%)</b>	<b>(2.20%)</b>	<b>(4.12%)</b>	<b>(5.04%)</b>	<b>(2.23%)</b>
CPI +3% (Qtr lag)	-	-	1.90%	2.18%	4.86%	5.20%	4.47%
<b>REITS</b>	<b>\$265</b>	<b>13.93%</b>	<b>1.81%</b>	<b>18.47%</b>	<b>20.22%</b>	<b>4.10%</b>	<b>6.06%</b>
FTSE NAREIT US Index (Qtr lag)	-	-	15.88%	8.94%	20.80%	5.63%	8.72%

\*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 June 30, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance - Real Estate</b>					
<b>Real Estate</b>	<b>5.44%</b>	<b>5.84%</b>	<b>6.98%</b>	<b>7.73%</b>	<b>8.39%</b> (3/84)
Real Estate Custom Benchmark	8.80%	7.41%	7.90%	-	-
CPI +3% (Qtr lag)	4.80%	5.06%	5.18%	5.21%	5.64% (3/84)
<b>Core/Core Plus Real Estate Funds</b>	<b>8.73%</b>	<b>7.77%</b>	<b>7.92%</b>	<b>9.00%</b>	<b>7.15%</b> (9/86)
NCREIF ODCE Index (Qtr lag)	7.52%	7.00%	7.25%	7.84%	6.03% (9/86)
<b>Value Add/Opp. Real Estate</b>	<b>3.73%</b>	<b>5.29%</b>	<b>6.27%</b>	<b>7.20%</b>	<b>6.67%</b> (3/84)
Real Estate Separate Accounts	1.59%	4.09%	5.13%	6.05%	5.06% (6/88)
Non-Core Closed End Funds	7.47%	7.03%	7.84%	8.84%	7.87% (3/84)
NCREIF ODCE Index (Qtr lag)	7.52%	7.00%	7.25%	7.84%	6.29% (3/84)
<b>Natural Resources/Infrastructure</b>	<b>(2.15%)</b>	<b>1.47%</b>	<b>2.67%</b>	<b>3.49%</b>	<b>4.05%</b> (3/93)
CPI +3% (Qtr lag)	4.80%	5.06%	5.18%	5.21%	5.24% (3/93)
<b>REITS</b>	<b>14.42%</b>	<b>7.90%</b>	<b>10.28%</b>	<b>-</b>	<b>9.89%</b> (4/96)
FTSE NAREIT US Index (Qtr lag)	18.29%	8.32%	10.57%	10.87%	10.61% (4/96)

\*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 June 30, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last Year	Last 3 Years	Last 5 Years
<b>Net Performance - Private Equity</b>							
<b>Private Equity</b>	<b>\$4,010</b>	<b>100.00%</b>	<b>4.99%</b>	<b>6.13%</b>	<b>12.83%</b>	<b>12.28%</b>	<b>9.45%</b>
Burgiss Private Eqty Idx (Qtr Lag)	-	-	3.63%	2.87%	10.69%	13.77%	11.51%
Russell 3000 + 3% (Qtr Lag)	-	-	14.57%	(0.26%)	12.35%	16.75%	13.62%
<b>Buyouts</b>	<b>\$1,780</b>	<b>44.38%</b>	<b>4.33%</b>	<b>3.68%</b>	<b>10.29%</b>	<b>13.21%</b>	<b>10.98%</b>
Burgiss Buyout Index (Qtr Lag)	-	-	3.55%	1.78%	8.67%	14.51%	11.53%
<b>Special Situations</b>	<b>\$550</b>	<b>13.71%</b>	<b>2.10%</b>	<b>7.52%</b>	<b>14.50%</b>	<b>10.99%</b>	<b>7.24%</b>
Burgiss Special Sits Idx (Qtr Lag)	-	-	1.81%	0.80%	4.03%	8.56%	6.72%
<b>Venture Capital</b>	<b>\$802</b>	<b>20.01%</b>	<b>11.77%</b>	<b>20.79%</b>	<b>41.24%</b>	<b>17.77%</b>	<b>11.08%</b>
Burgiss Venture Cap Idx (Qtr Lag)	-	-	5.16%	7.60%	21.51%	15.10%	14.96%
<b>Keystone Legacy (Qtr Lag) (1)</b>	<b>\$878</b>	<b>21.90%</b>	<b>2.50%</b>	<b>0.35%</b>	-	-	-

(1) As of 7/31/2018, Keystone Legacy SPV consists of 163 non-core funds, prior performance in previous sub-asset classes

# Investment Manager Returns

As of June 30, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance - Private Equity</b>					
<b>Private Equity</b>	<b>12.44%</b>	<b>11.67%</b>	<b>11.00%</b>	<b>14.03%</b>	<b>10.97%</b> <sup>(1/86)</sup>
Burgiss Private Eqty Idx (Qtr Lag)	13.97%	13.11%	12.39%	15.05%	16.97% <sup>(1/86)</sup>
Russell 3000 + 3% (Qtr Lag)	19.33%	12.14%	9.97%	13.28%	14.51% <sup>(1/86)</sup>
<b>Buyouts</b>	<b>14.37%</b>	<b>14.15%</b>	<b>13.04%</b>	<b>16.40%</b>	<b>13.17%</b> <sup>(4/86)</sup>
Burgiss Buyout Index (Qtr Lag)	14.15%	14.09%	12.34%	13.52%	19.69% <sup>(4/86)</sup>
<b>Special Situations</b>	<b>13.31%</b>	<b>12.06%</b>	<b>12.35%</b>	-	<b>12.27%</b> <sup>(1/95)</sup>
Burgiss Special Sits Idx (Qtr Lag)	11.62%	9.14%	10.22%	-	10.57% <sup>(1/95)</sup>
<b>Venture Capital</b>	<b>10.36%</b>	<b>7.06%</b>	<b>5.08%</b>	<b>8.70%</b>	<b>7.16%</b> <sup>(1/86)</sup>
Burgiss Venture Cap Idx (Qtr Lag)	14.59%	11.35%	10.76%	15.84%	13.64% <sup>(1/86)</sup>
<b>Keystone Legacy (Qtr Lag) (1)</b>	-	-	-	-	<b>(3.17%)</b> <sup>(10/18)</sup>

(1) As of 7/31/2018, Keystone Legacy SPV consists of 163 non-core funds, prior performance in previous sub-asset classes

Callan

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**Appendix II – Callan Update**

# Published Research Highlights from 2Q19

## The Cobbler's Shoes: How Asset Managers Run Their Own 401(k) Plans

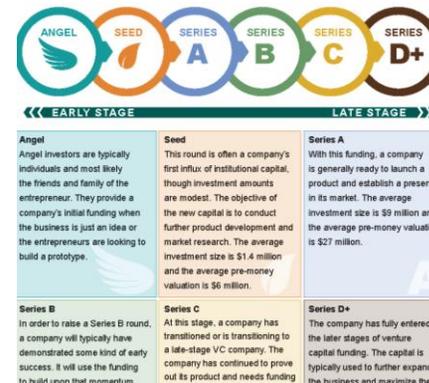


## Callan's Periodic Table Explained

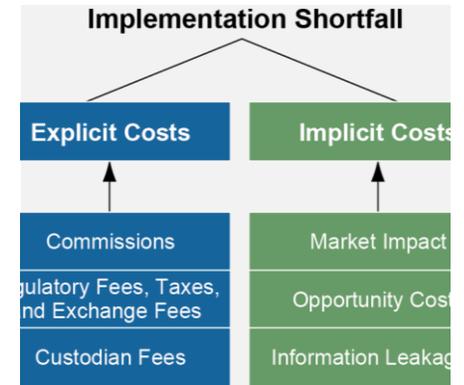
2013	2014	2015	2016	2017	2018
Small Cap Equity	Real Estate	Large Cap Equity	Small Cap Equity	Emerging Market Equity	Cash Equivalent
3.1%	1.38%	1.38%	21.31%	37.28%	1.87%
Non-U.S. Fixed Income	U.S. Fixed Income	High Yield	Non-U.S. Equity	U.S. Fixed Income	U.S. Fixed Income
3.2%	0.55%	17.13%	24.21%	0.01%	0.01%
Non-brokered Equity	Cash Equivalent	Large Cap Equity	Large Cap Equity	High Yield	High Yield
21.02%	5.97%	11.96%	21.83%	-2.08%	-2.08%
High Yield	Real Estate	Small Cap Equity	Emerging Market Equity	Small Cap Equity	Non-U.S. Fixed Income
7.44%	4.89%	11.19%	14.65%	-2.15%	-2.15%

Explainer Video

## How to Distinguish Between Growth Equity and Late-Stage VC



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



## Recent Blog Posts

**How STRIPS Can Help Corporate DB Plans**  
Sweta Vaidya

**A Primer on Interval Funds**  
Kristin Bradbury and David Welsch

**Legislative Fixes for the Student Debt Tsunami**  
Jana Steele

**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

### “Callan College” on Alternative Investments

October 29-30, 2019 in Chicago

#### Dive into Alternatives!

Alternative investments like private equity, hedge funds, and real estate can play a key role in any portfolio. In this one-and-a-half-day session, learn about the importance of allocations to alternatives, and how to consider integrating, evaluating, and monitoring them.

#### 3 Reasons You Should Attend

- 1 Enhance** your knowledge to maximize your plan’s long term returns
- 2 Learn** about new opportunities for greater diversification
- 3 Prepare** your plan’s portfolio for market ups and downs

*“This is a great opportunity for investors of all types to get a thorough introduction to alternative investments and meet the Callan team.”*

— Pete Keliuotis, Executive Vice President



### Upcoming Webinar

ESG

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

### Regional Workshops

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

### 40<sup>th</sup> National Conference

January 27–29, 2020  
The Palace Hotel  
San Francisco, CA

### “Callan College” Introduction to Investments

Atlanta, October 8–9, 2019  
Chicago, October 29-30, 2019

## Callan Updates

Firm updates by the numbers, as of June 30, 2019

**Total Associates: 194**

### Ownership

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

### Leadership Changes

- No executive additions or departures
- No leadership changes this quarter

**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*

