

February 25, 2020



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

Fourth Quarter 2019

Executive Summary

---

**Thomas H. Shingler**  
Senior Vice President

**Bud Pellecchia**  
Senior Vice President

**Britton M. Murdoch**  
Vice President

Callan

---

**Market Environment**

## Does Strong 2019 Spell Problems for 2020 and Beyond?

Fed rate cuts, solid corporate fundamentals, and even lower unemployment propelled U.S. equity markets in Q4.

Equity markets around the globe surged in Q4, and closed the year with outsized returns.

- S&P 500 Index was up 31.5%, MSCI World ex USA Index was up 22.5%, and MSCI Emerging Markets Index was up 18.4%. One-year results look particularly strong thanks to the sharp drop in Q4 2018 - lower starting point.

Prospect of a trade deal helped boost global ex-U.S. markets.

- Economic weakness, trade concerns remain for developed ex-U.S. and EM equities.

Fixed income markets enjoyed an “outlier” year.

- Bloomberg Aggregate Index was up 8.7%, contrary to all forecasts.
- Investment grade credit the strongest performer in the U.S. The Bloomberg Long Credit Index was up 23.4%.
- Yield curve shifted lower across maturities; inverted from 90-day to 10-year in April, then from 2- to 10-year in August, but ended the year no longer inverted.

### Returns for Periods ended December 31, 2019

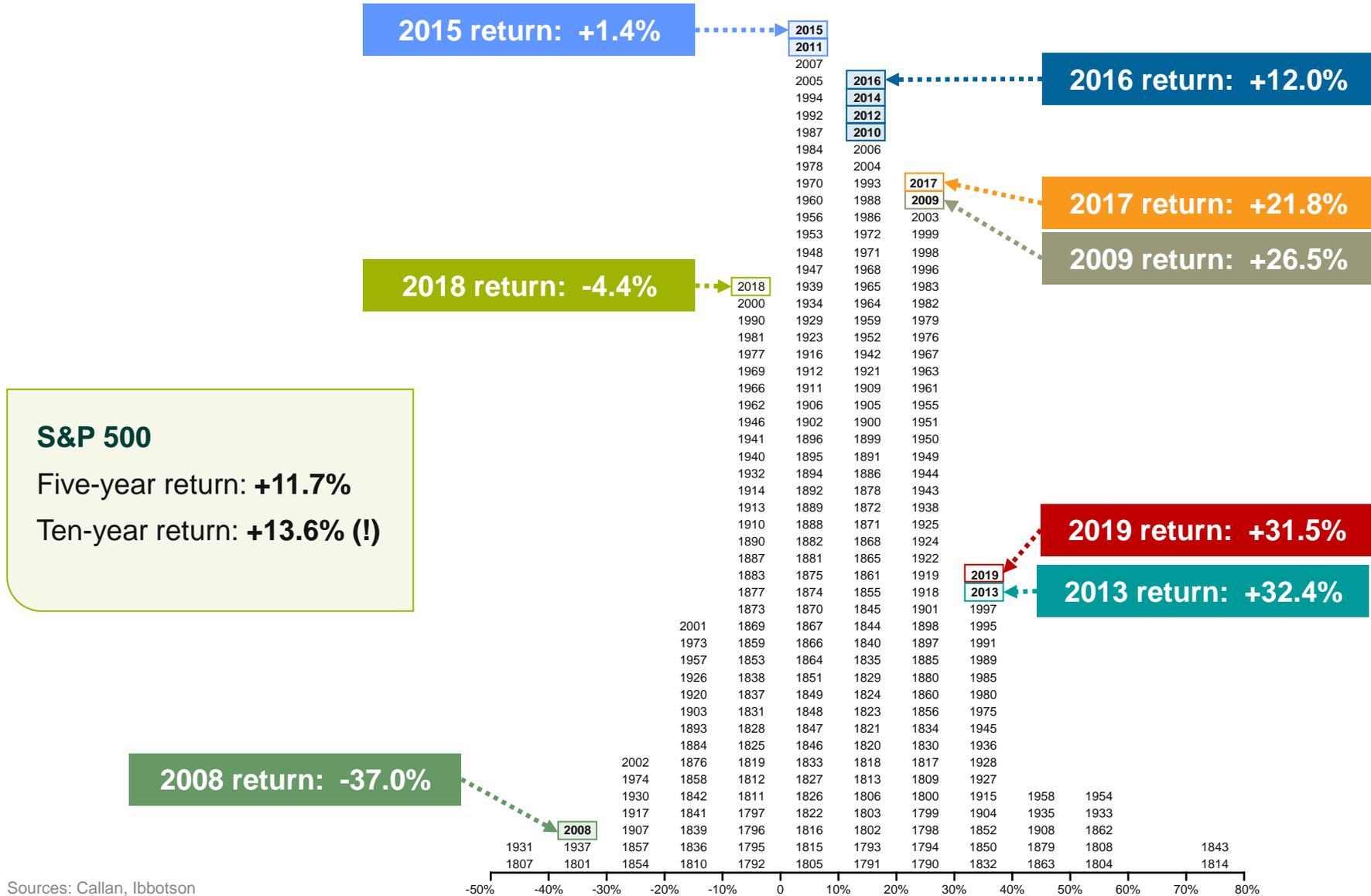
	1 Quarter	1 Year	5 Years	10 Years	25 Years
<b>U.S. Equity</b>					
Russell 3000	9.10	31.02	11.24	13.42	10.21
S&P 500	9.07	31.49	11.70	13.56	10.22
Russell 2000	9.94	25.52	8.23	11.83	9.35
<b>Global ex-U.S. Equity</b>					
MSCI World ex USA	7.86	22.49	5.42	5.32	5.31
MSCI Emerging Markets	11.84	18.44	5.61	3.68	--
MSCI ACWI ex USA Small Cap	11.01	22.42	7.04	6.92	5.93
<b>Fixed Income</b>					
Bloomberg Barclays Aggregate	0.18	8.72	3.05	3.75	5.56
90-day T-Bill	0.46	2.28	1.07	0.58	2.47
Bloomberg Barclays Long Gov/Credit	-1.12	19.59	5.42	7.59	7.90
Bloomberg Barclays Global Agg ex-US	0.67	5.09	1.62	1.50	4.38
<b>Real Estate</b>					
NCREIF Property	1.55	6.42	8.25	10.17	9.34
FTSE Nareit Equity	-0.76	26.00	7.21	11.94	10.64
<b>Alternatives</b>					
CS Hedge Fund	2.44	9.31	2.65	4.25	7.84
Cambridge Private Equity*	0.90	9.50	12.37	13.75	15.30
Bloomberg Commodity	4.42	7.69	-3.92	-4.73	1.70
Gold Spot Price	3.41	18.87	5.16	3.34	5.66
<b>Inflation - CPI-U</b>	0.08	2.29	1.82	1.75	2.18

\*Cambridge PE data through September 30, 2019.

Source: Callan

# Stock Market Returns by Calendar Year

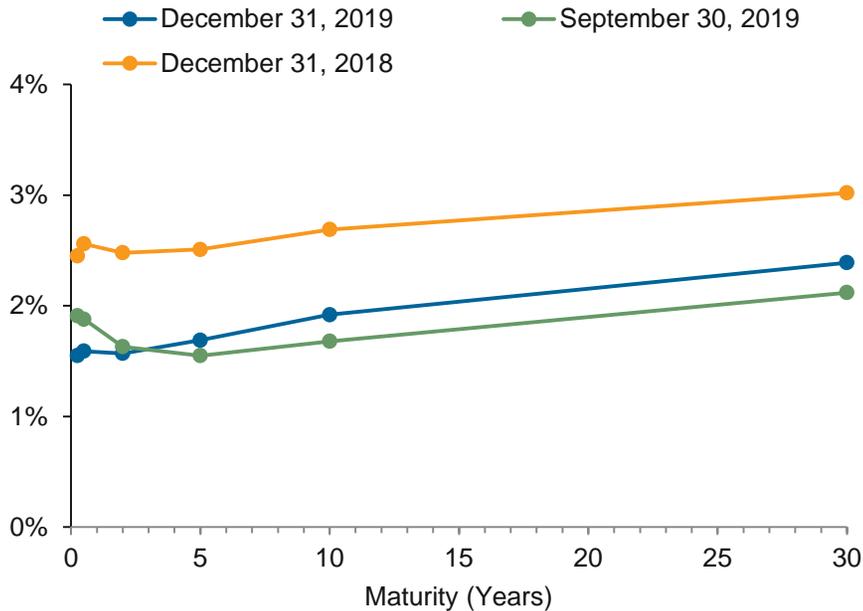
2019 performance in perspective: History of the U.S. stock market (230 years of returns)



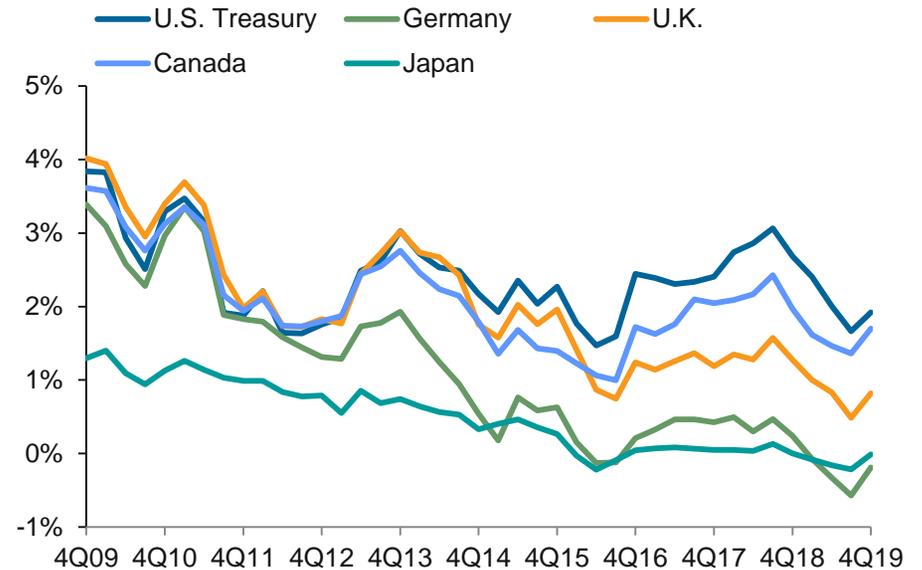
Sources: Callan, Ibbotson

# Yield Curve Flattens While Global Rates Diverge

## U.S. Treasury Yield Curves



## 10-Year Global Government Bond Yields



**Treasury yield curve has inverted from 90-day T-bill through the 10-year T-note.**

- Yields have fallen more than 100 bps on the long end from one year ago.
- Inverted yield curve has presaged most recessions in past 70 years.
- Yield curve inverted from 2- to 10-year notes in August, but has wavered through the end of September.

**U.S. yields diverged further in 2017 as monetary policies fell out of sync.**

- U.S. tightened for two years while euro zone waited.
- U.S. has now paused and has reversed course with three rate cuts in 2019, two in Q3 and one in Q4.
- Euro zone will skip tightening entirely in this cycle; U.S. spread remains very wide.

Source: Bloomberg

# Repo Market

## Fed intervention and potential plan moving forward

- Rates have since normalized after Fed injected ~\$400bn into banking system via TOMO since Sept. 2019. However, only a fraction of that liquidity increased non-liability reserves as the Fed reported TGA and RRP absorbed most of the availability.
- TOMO is an effective stabilizing tool—the existence as a backstop provides confidence even as primary dealers have not drawn upon available liquidity.
- However, some researchers point to current regulations, stress tests, and market structure as limiters constraining banks' willingness to lend to non-bank affiliates.
- Fixed Income Clearing Corp.'s (FICC) sponsored repo program is gaining traction in which FICC intermediates trades between sponsoring dealers and non-dealer counterparties.
- Combination of TOMO or permanent facility and sponsored repo program may eventually suppress these intense bouts of short-term rate dislocations.

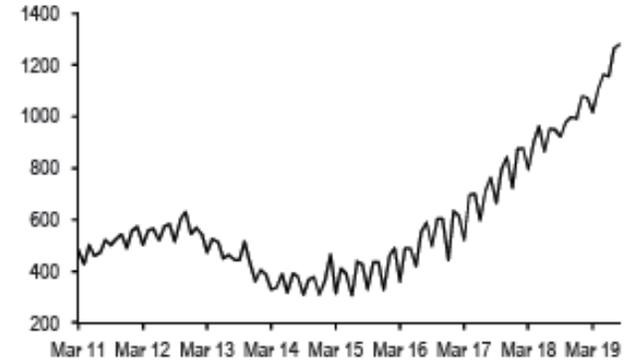
The move in repo was magnified by elevated dealer Treasury positions

Primary dealer Treasury positions (\$bn)



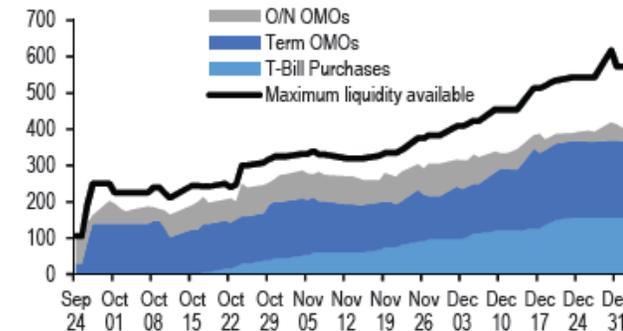
MMFs now finance \$1.28tn of dealer collateral, an increase of \$332bn year over year

Dealer repo with MMFs (\$bn)



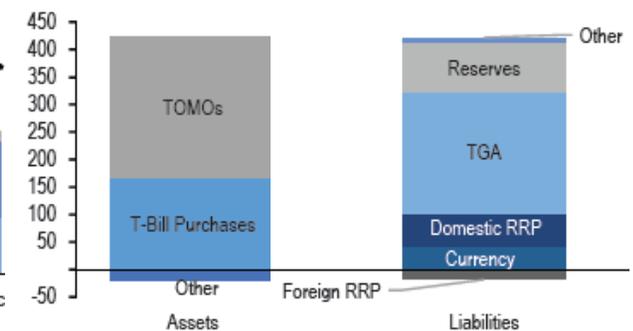
In total, the Fed injected ~\$400bn of liquidity into the banking system at the end of 2019

Liquidity used under TOMOs and bill purchases vs. maximum liquidity available (\$bn)



In spite of the Fed injecting ~\$400bn of liquidity into the banking system, aggregate reserves only increased \$91bn as non-reserve liabilities grew

Change in Fed assets and liabilities from Sept. 11, 2019, to Jan. 1, 2020 (\$bn)



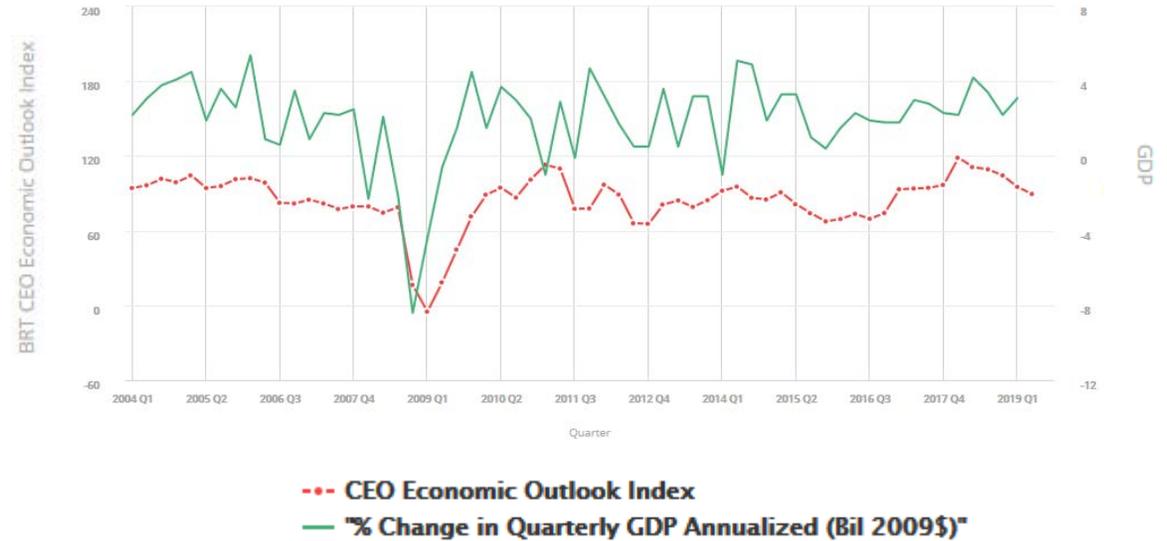
Sources: N.Y. Fed, JPMorgan Chase, Crane Data, Federal Reserve

# Trade War Plague, the Good and the Bad

## Good

- Phase one of U.S.-China trade agreement announced December 2019 with intent to sign into action January 2020.
- Of the \$35 billion Chinese export losses in U.S. market, ~\$21 billion (or 63%) was diverted to other countries, while remainder was either lost or captured by U.S. producers.
  - Taiwan: +\$4.2 billion
  - Mexico: +\$3.5 billion
  - European Union: +\$2.7 billion
  - Korea, Canada & India: range from +\$0.9 to +\$1.5 billion
  - Remainder of benefits advantaged Southeast Asian countries

## CEO Economic Outlook



Source: Business Roundtable

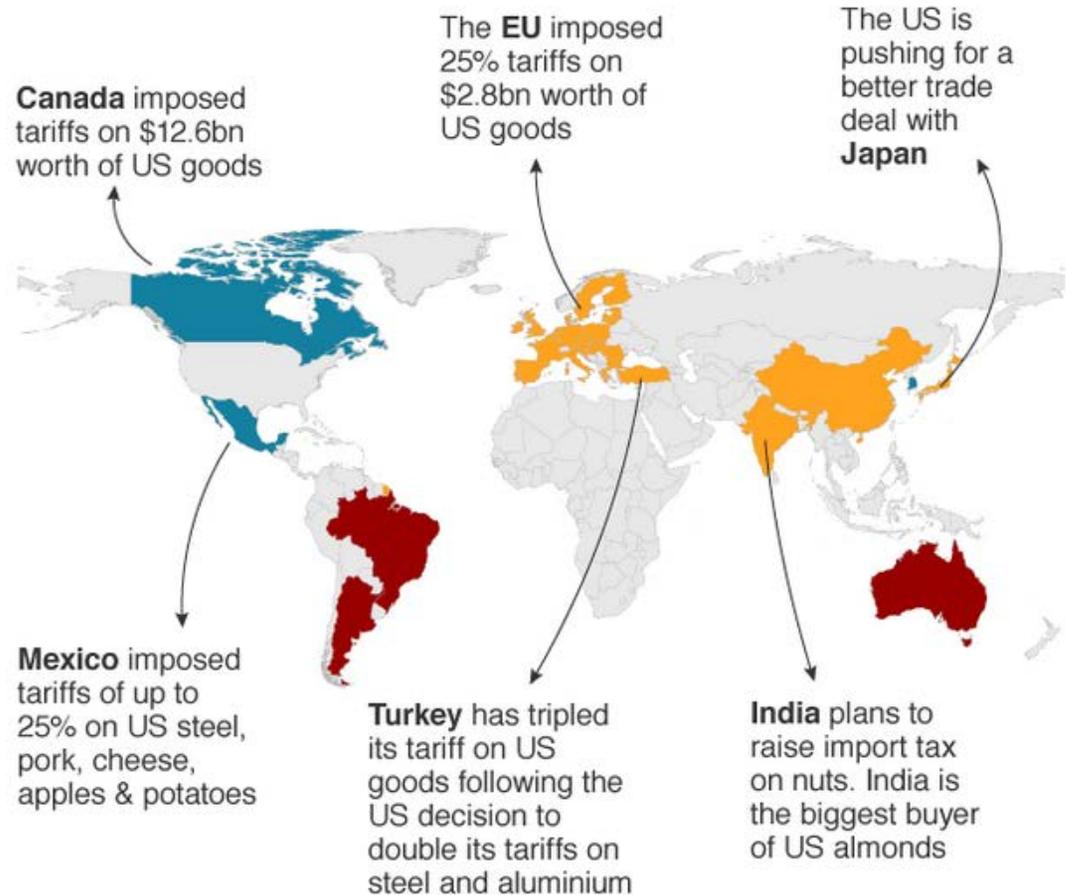
# Trade War Plague, the Good and the Bad (cont.)

## Bad

- U.S. considering imposing tariffs up to 100% on European items such as whiskey, cognac, Spanish olive oil, French cheese, German knives, and Portuguese fish filets.
- This is all in response to EU failing to curb subsidies to Airbus (European aircraft), which U.S. argues hurts Boeing (American aircraft).
- Despite a brief sigh of relief in equity markets post phase-one announcement, additional trade battles continue to create economic uncertainty.

## Other Trade Battles Since Trump Took Office

Trade disputes    Renegotiated trade deals    Trade exemption granted



Source: BBC Research



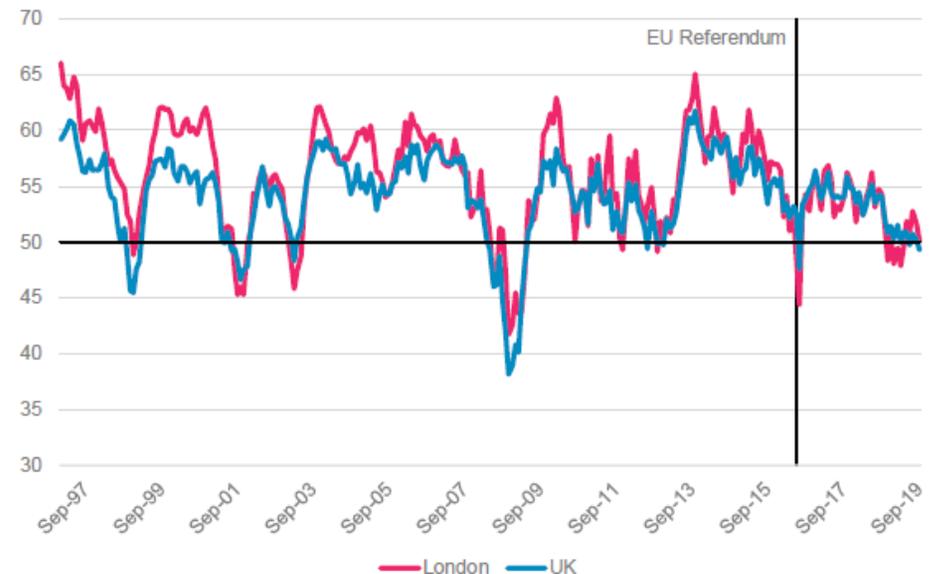
# Brexit Clarity ≠ An Easy Road Ahead

- In December 2019, U.K. Prime Minister Boris Johnson won the election, increasing Conservative Party seats by 47 for an 80-seat majority and paving the way for a Jan. 31, 2020, Brexit.
- Since the 2016 Brexit vote, pound has declined precipitously.
- Uncertainty surrounding Brexit has slowed U.K. growth from 2.4% in 2015 to 1.5% in 2018, with the U.K. government projecting 6.7% slower growth over the next 15 years.
- In U.K.'s London financial center, growth in 2018 was only 1.4% and close to zero in 2019. Brexit has also reduced business investment by 11%.
- International companies are increasingly no longer using London as an English-speaking entry into the EU economy. Goldman Sachs, J.P. Morgan, and Morgan Stanley have already switched 10% of their clients. Bank of America has transferred 100 bankers to its Dublin office and 400 to Paris.
- Anti-immigration parties are gaining steam in Europe, creating the potential for additional EU countries to defect.

### British Pound vs. U.S. Dollar



### Business Activity Index, London and the U.K.



Source: IHS Markit Purchasing Managers' Index; Trading Economics

# The Callan Periodic Table of Investment Returns

## Annual Returns for Key Indices Ranked in Order of Performance

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Real Estate Funds	U.S. Fixed	Non-U.S. Fixed	Emerging Markets	U.S. Fixed	Emerging Markets	Small Cap	Real Estate Funds	Emerging Markets	Small Cap	Large Cap	Real Estate Funds	Small Cap	Emerging Markets	Real Estate Funds	Large Cap				
13.19%	8.43%	22.37%	55.82%	25.55%	34.00%	32.17%	39.38%	5.24%	78.51%	26.85%	14.96%	18.23%	38.82%	13.69%	13.95%	21.31%	37.28%	7.36%	31.49%
U.S. Fixed	High Yield	U.S. Fixed	Small Cap	Non-U.S. Equity	Real Estate Funds	Non-U.S. Equity	Real Estate Funds	Non-U.S. Fixed	High Yield	Emerging Markets	U.S. Fixed	Non-U.S. Equity	Large Cap	Real Estate Funds	Large Cap	High Yield	Non-U.S. Equity	Cash Equivalent	Small Cap
11.63%	5.28%	10.26%	47.25%	20.38%	20.15%	25.71%	14.84%	4.39%	58.21%	18.88%	7.84%	16.41%	32.39%	11.46%	1.38%	17.13%	24.21%	1.87%	25.52%
Cash Equivalent	Real Estate Funds	Real Estate Funds	Non-U.S. Equity	Small Cap	Non-U.S. Equity	Small Cap	Hedge Funds	Cash Equivalent	Non-U.S. Equity	Real Estate Funds	High Yield	Small Cap	Non-U.S. Equity	U.S. Fixed	U.S. Fixed	Large Cap	Large Cap	U.S. Fixed	Non-U.S. Equity
6.19%	4.64%	4.57%	39.42%	18.33%	14.47%	18.37%	12.56%	2.06%	33.67%	15.26%	4.98%	16.35%	21.02%	5.97%	0.55%	11.96%	21.83%	0.01%	22.49%
Hedge Funds	Cash Equivalent	Hedge Funds	High Yield	Non-U.S. Fixed	Hedge Funds	Large Cap	Non-U.S. Equity	Real Estate Funds	Small Cap	High Yield	Non-U.S. Fixed	Large Cap	Real Estate Funds	Small Cap	Cash Equivalent	Emerging Markets	Small Cap	High Yield	Emerging Markets
4.85%	4.42%	3.04%	28.97%	12.54%	7.61%	15.79%	12.44%	-10.70%	27.17%	15.12%	4.36%	16.00%	12.90%	4.89%	0.05%	11.19%	14.65%	-2.08%	18.44%
Small Cap	Hedge Funds	Cash Equivalent	Large Cap	Real Estate Funds	Large Cap	Real Estate Funds	Non-U.S. Fixed	Hedge Funds	Large Cap	Large Cap	Large Cap	High Yield	Hedge Funds	Hedge Funds	Hedge Funds	Real Estate Funds	Non-U.S. Fixed	Non-U.S. Fixed	High Yield
-3.02%	4.42%	1.78%	28.68%	12.00%	4.91%	15.27%	11.03%	-19.07%	26.47%	15.06%	2.11%	15.81%	9.73%	4.13%	-0.71%	7.79%	10.51%	-2.15%	14.32%
Non-U.S. Fixed	Small Cap	High Yield	Non-U.S. Fixed	High Yield	Small Cap	Hedge Funds	U.S. Fixed	High Yield	Hedge Funds	Hedge Funds	Cash Equivalent	Real Estate Funds	High Yield	High Yield	Non-U.S. Equity	Non-U.S. Equity	High Yield	Hedge Funds	Hedge Funds
-3.91%	2.49%	-1.37%	19.36%	11.13%	4.55%	13.86%	6.97%	-26.16%	18.57%	10.95%	0.10%	9.79%	7.44%	2.45%	-3.04%	2.75%	7.50%	-3.19%	9.31%
High Yield	Emerging Markets	Emerging Markets	Hedge Funds	Large Cap	Cash Equivalent	High Yield	Large Cap	Small Cap	Non-U.S. Fixed	Non-U.S. Equity	Hedge Funds	Hedge Funds	Cash Equivalent	Cash Equivalent	Small Cap	U.S. Fixed	Hedge Funds	Large Cap	U.S. Fixed
-5.86%	-2.61%	-6.16%	15.44%	10.88%	3.06%	11.85%	5.49%	-33.79%	7.53%	8.95%	-2.52%	7.67%	0.07%	0.04%	-4.41%	2.65%	7.12%	-4.38%	8.72%
Large Cap	Non-U.S. Fixed	Non-U.S. Equity	Real Estate Funds	Hedge Funds	High Yield	Non-U.S. Fixed	Cash Equivalent	Large Cap	U.S. Fixed	U.S. Fixed	Small Cap	U.S. Fixed	U.S. Fixed	Emerging Markets	High Yield	Non-U.S. Fixed	Real Estate Funds	Small Cap	Non-U.S. Fixed
-9.11%	-3.75%	-15.80%	8.28%	9.64%	2.74%	8.16%	5.00%	-37.00%	5.93%	6.54%	-4.18%	4.21%	-2.02%	-2.19%	-4.47%	1.49%	6.66%	-11.01%	5.09%
Non-U.S. Equity	Large Cap	Small Cap	U.S. Fixed	U.S. Fixed	U.S. Fixed	Cash Equivalent	High Yield	Non-U.S. Equity	Cash Equivalent	Non-U.S. Fixed	Non-U.S. Equity	Non-U.S. Fixed	Emerging Markets	Non-U.S. Fixed	Non-U.S. Fixed	Hedge Funds	U.S. Fixed	Non-U.S. Equity	Real Estate Funds
-13.37%	-11.89%	-20.48%	4.10%	4.34%	2.43%	4.86%	1.87%	-43.56%	0.21%	4.95%	-12.21%	4.09%	-2.60%	-3.09%	-6.02%	1.25%	3.54%	-14.09%	4.39%
	Large Cap	Cash Equivalent	Cash Equivalent	Non-U.S. Fixed	U.S. Fixed	Small Cap	Emerging Markets	Real Estate Funds	Cash Equivalent	Emerging Markets	Cash Equivalent	Cash Equivalent	Non-U.S. Fixed	Non-U.S. Equity	Emerging Markets	Cash Equivalent	Cash Equivalent	Emerging Markets	Cash Equivalent
	-22.10%	1.15%	1.33%	-8.65%	4.33%	-1.57%	-53.33%	-30.40%	0.13%	-18.42%	0.11%	-3.08%	-4.32%	-14.92%	0.33%	0.86%	-14.57%	2.28%	

- Bloomberg Barclays Corp High Yield ● Bloomberg Barclays Global Aggregate ex US ● Bloomberg Barclays US Aggregate
- Credit Suisse Hedge Fund ● ICE BofAML US 3-Month Treasury Bill ● MSCI Emerging Markets ● MSCI World ex USA
- NFI-ODCE (value-weighted net) ● Russell 2000 ● S&P 500

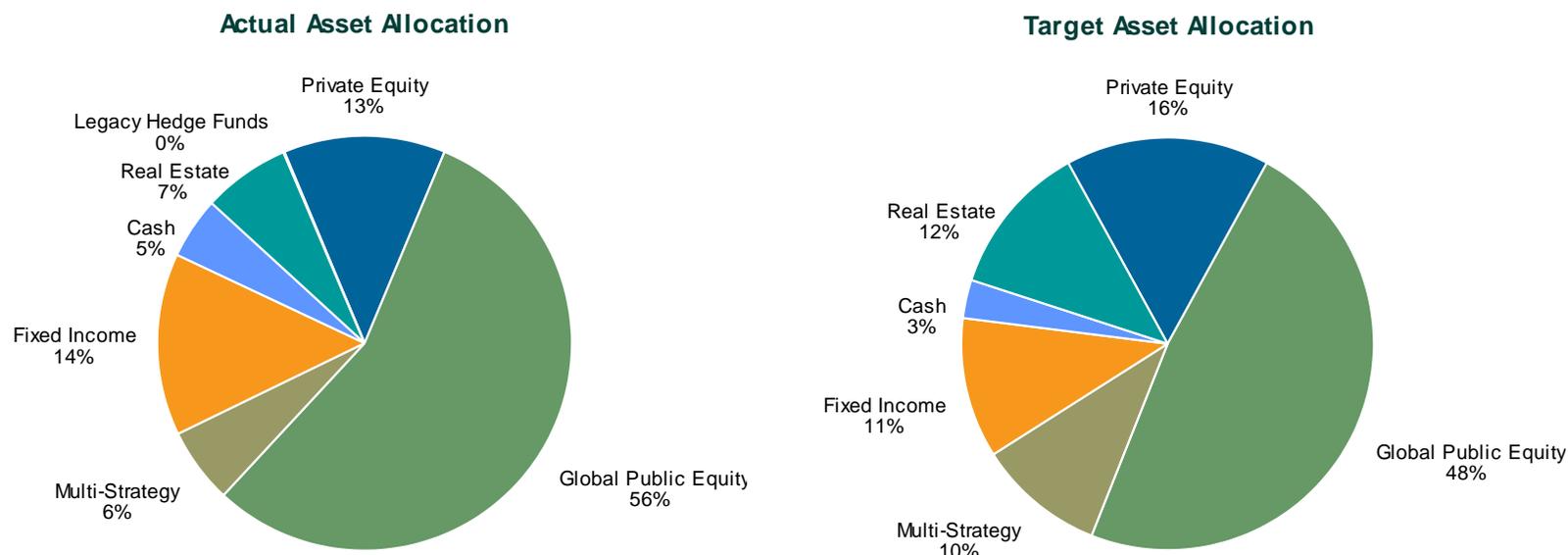
Callan

---

**PA SERS Defined Benefit Plan  
Performance Review**

# Total Fund

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



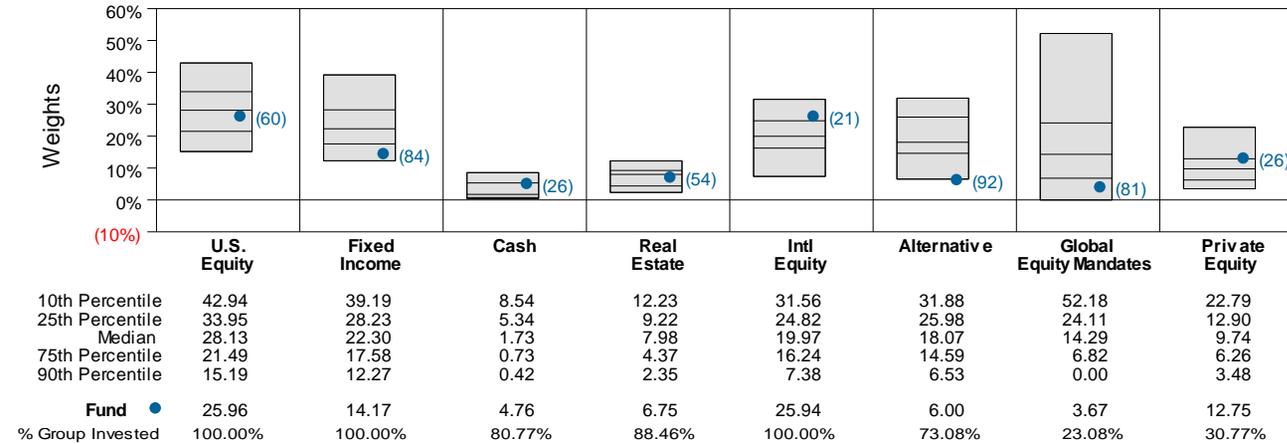
Asset Class	\$000s Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Private Equity	3,936,535	12.7%	16.0%	(3.3%)	(1,005,246)
Global Public Equity	17,164,048	55.6%	48.0%	7.6%	2,338,707
Multi-Strategy	1,816,976	5.9%	10.0%	(4.1%)	(1,271,637)
Fixed Income	4,375,547	14.2%	11.0%	3.2%	978,073
Cash	1,471,400	4.8%	3.0%	1.8%	544,816
Real Estate	2,085,504	6.8%	12.0%	(5.2%)	(1,620,831)
Legacy Hedge Funds	36,118	0.1%	0.0%	0.1%	36,118
<b>Total</b>	<b>30,886,127</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.

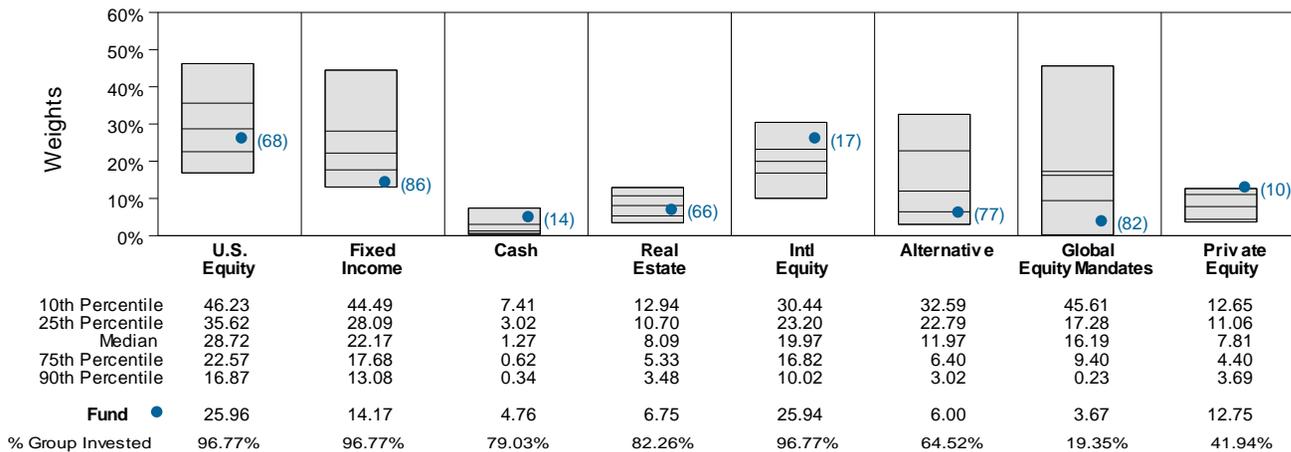
# Total Fund

## Actual Asset Allocation versus Very Large Public DB Plan (>\$10B) Peers and Large Public DB Plan (>\$1B) Peers as of December 31, 2019

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



Asset Class Weights vs Callan Public Fund Spons - Large (>1B)



\* 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

### One Quarter Attribution Analysis versus Target – Net of Fees as of December 31, 2019

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

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Fixed Income	15%	11%	0.56%	0.18%	0.06%	(0.18%)	(0.12%)
Real Estate	7%	12%	1.57%	1.81%	(0.02%)	0.17%	0.15%
Multi-Strategy	6%	10%	2.69%	1.73%	0.06%	0.14%	0.20%
Global Public Equity	55%	48%	9.22%	9.05%	0.09%	0.26%	0.35%
Legacy Hedge Funds	0%	0%	3.09%	3.01%	0.00%	(0.00%)	(0.00%)
Private Equity	13%	16%	2.23%	2.23%	0.00%	0.08%	0.08%
Cash	5%	3%	0.48%	0.46%	0.00%	(0.10%)	(0.10%)
<b>Total</b>			<b>5.64%</b>	<b>5.08%</b>	<b>+ 0.19%</b>	<b>+ 0.37%</b>	<b>0.56%</b>

- **What helped relative attribution?**

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

- **What hurt relative attribution?**

- An overweight to Fixed Income and Cash (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

## One Year Attribution Analysis versus Target – Net of Fees as of December 31, 2019

### One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Fixed Income	15%	11%	9.51%	8.72%	0.12%	(0.34%)	(0.22%)
Real Estate	7%	12%	10.98%	6.59%	0.31%	0.50%	0.80%
Multi-Strategy	7%	10%	14.71%	8.64%	0.47%	0.24%	0.71%
Global Public Equity	54%	48%	27.00%	26.35%	0.33%	0.41%	0.73%
Legacy Hedge Funds	0%	0%	(1.49%)	8.32%	(0.02%)	(0.01%)	(0.03%)
Private Equity	13%	16%	9.55%	9.55%	0.00%	0.13%	0.13%
Cash	4%	3%	2.31%	2.28%	0.00%	(0.12%)	(0.12%)
<b>Total</b>			<b>18.76%</b>	<b>= 16.75%</b>	<b>+ 1.21%</b>	<b>+ 0.80%</b>	<b>2.01%</b>

### • What helped relative attribution?

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

### • What hurt relative attribution?

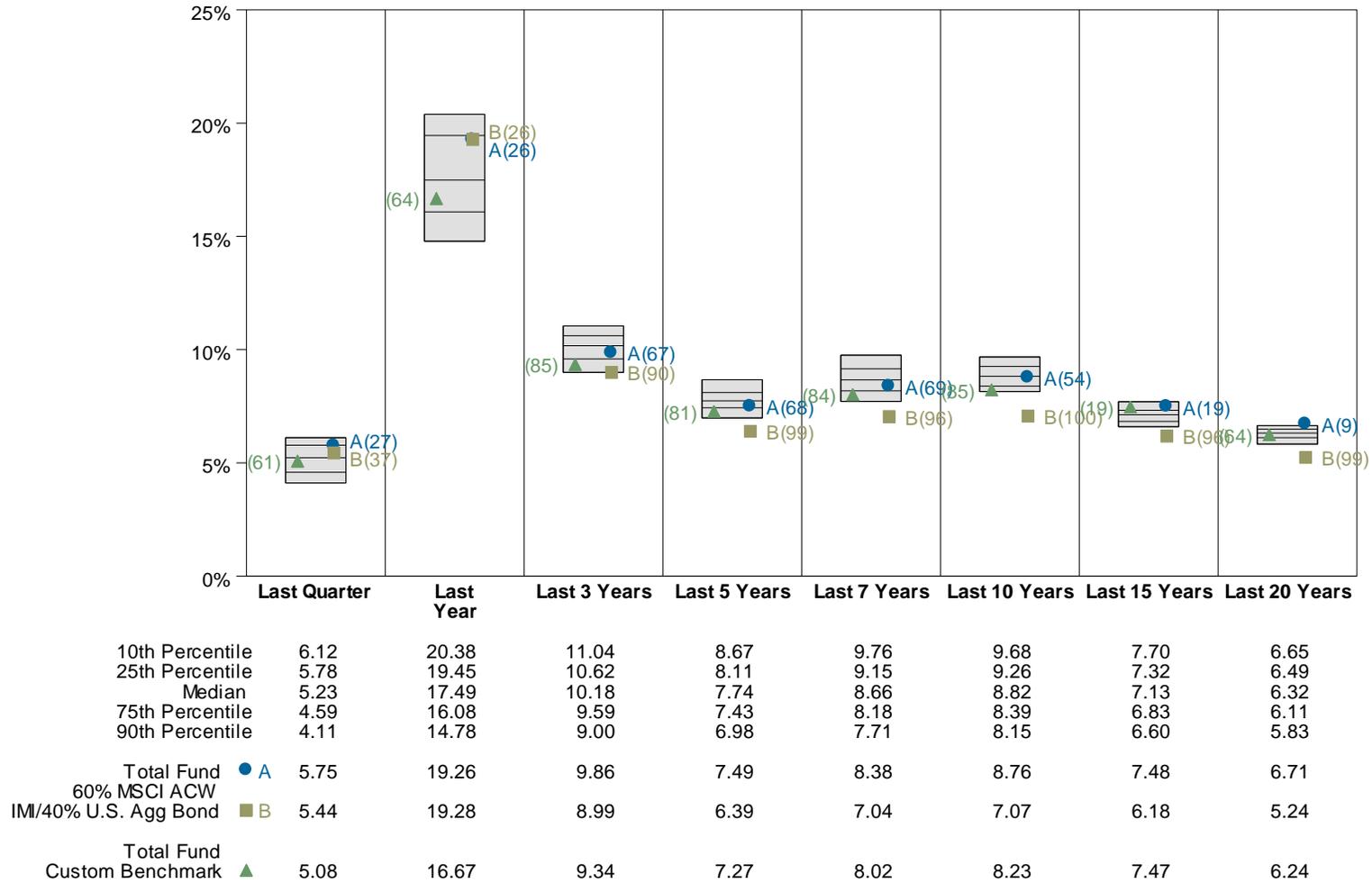
- An overweight to Fixed Income and Cash (attribution based on target return)

\* 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 Very Large Public DB Plan (>\$10B) Peers and Benchmark (As of December 31, 2019)

Performance vs Callan Public Fund Spons- V Lg DB (>10B) (Gross)

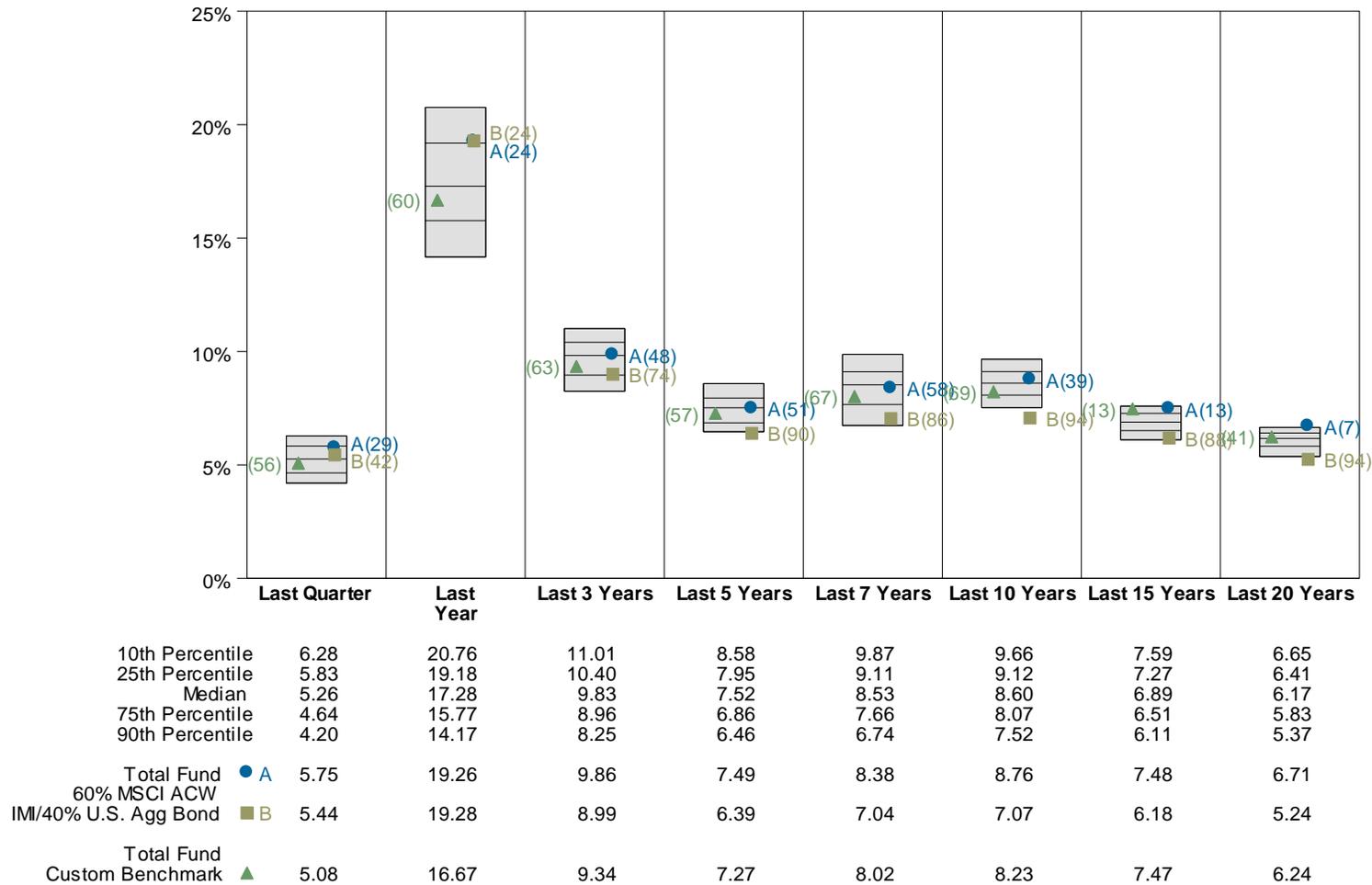


\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

## Gross of Fee Performance versus Large Public DB Plan (>\$1B) Peers and Benchmark (As of December 31, 2019)

Performance vs Callan Public Fund Spons - Large (>1B) (Gross)



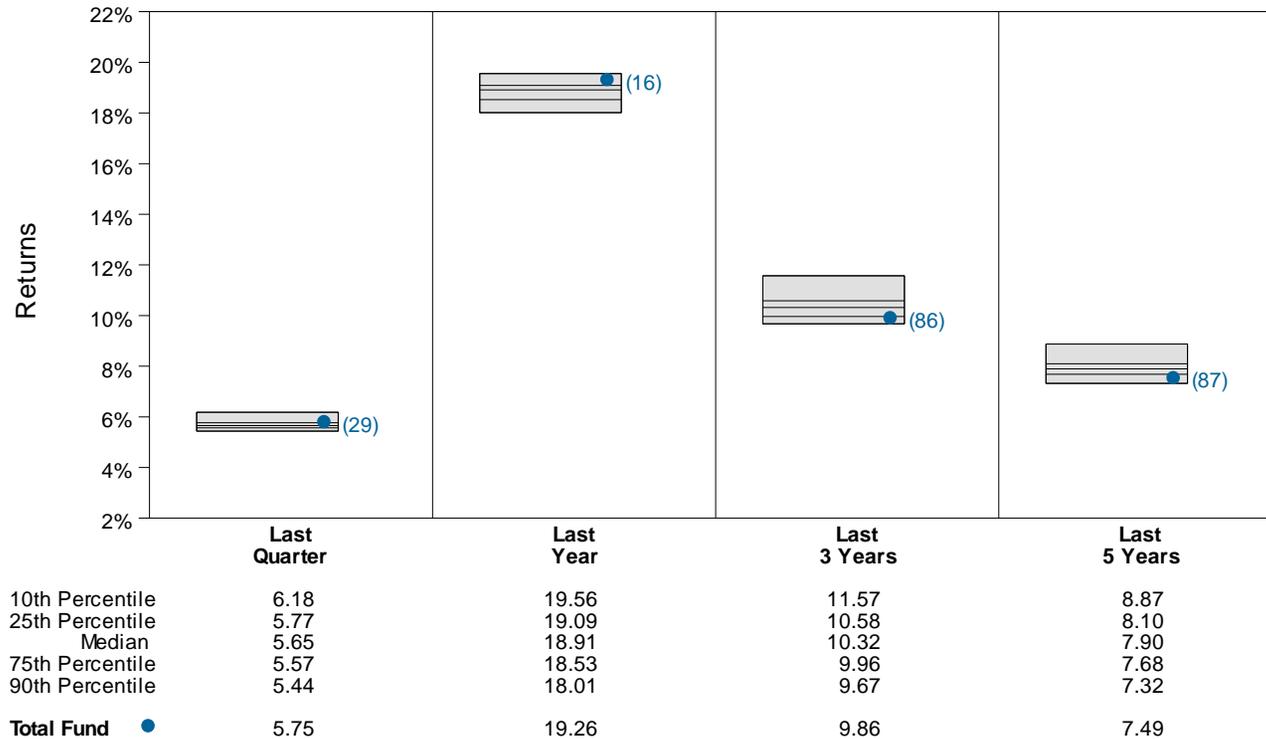
\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

## Asset Allocation-Adjusted Gross of Fee Performance versus Very Large Public DB Plan (>\$10B) Peers as of December 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



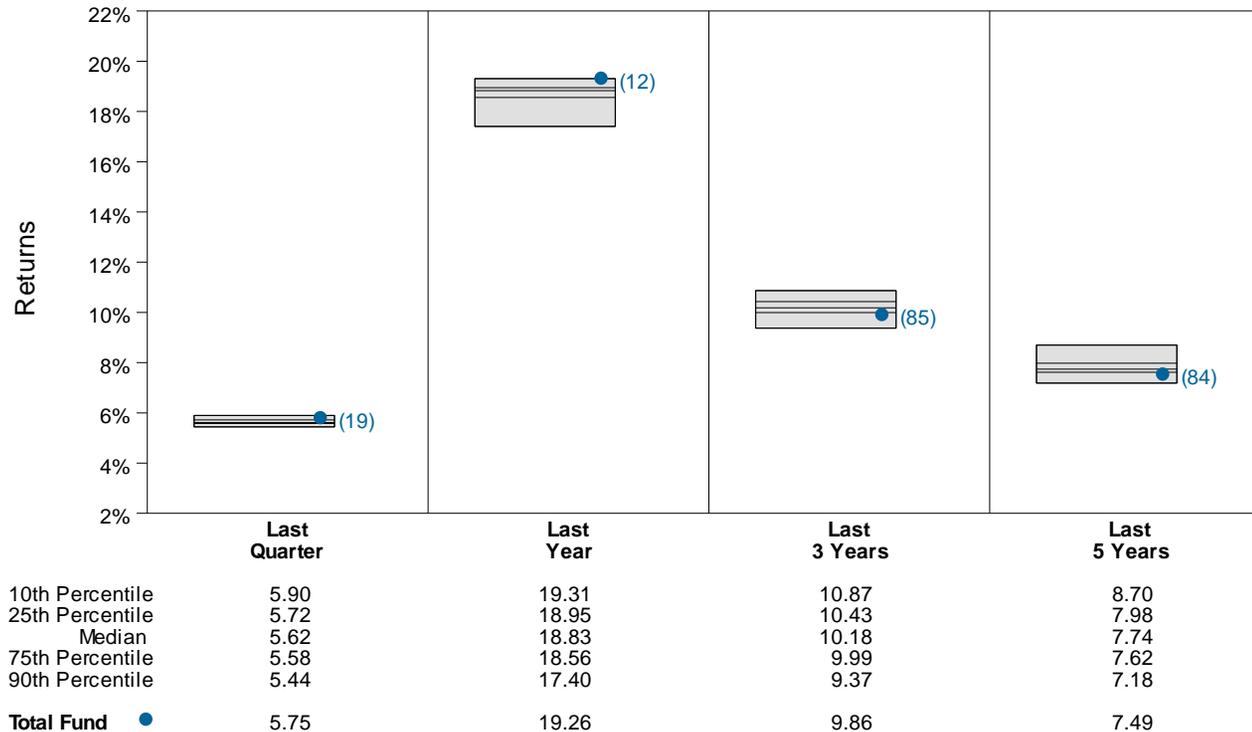
\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

## Asset Allocation-Adjusted Gross of Fee Performance versus Large Public DB Plan (>\$1B) Peers as of December 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



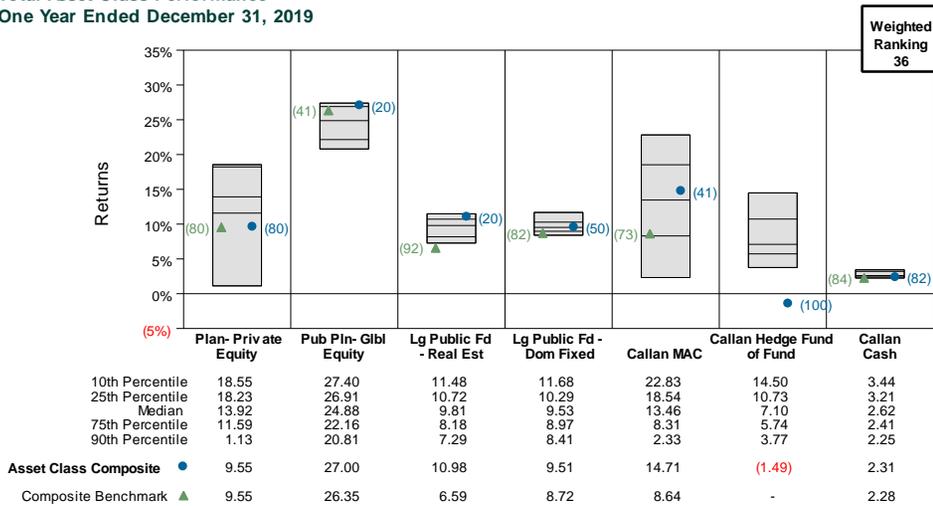
\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

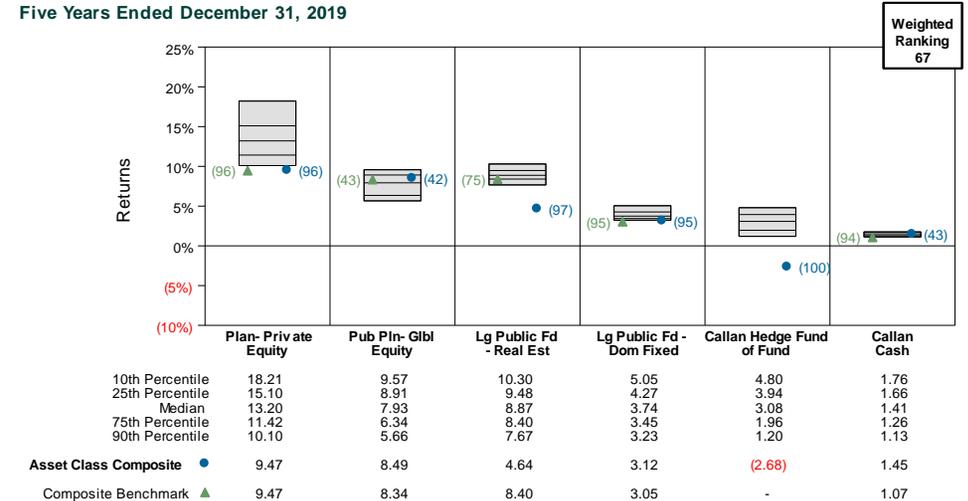
## Asset Class Rankings – Net of Fee Peer Performance as of December 31, 2019

- For this comparison, each asset class component of peers is compared to the asset class returns of the Pennsylvania SERS Plan. In the upper right corner of each graph is the weighted average of the rankings across the different asset classes. The weights of the Plan's actual asset allocation are used to make this calculation. The weighted average ranking can be viewed as a measure of the Plan's overall success in picking managers and structuring asset classes.

**Total Asset Class Performance**  
One Year Ended December 31, 2019



**Total Asset Class Performance**  
Five Years Ended December 31, 2019

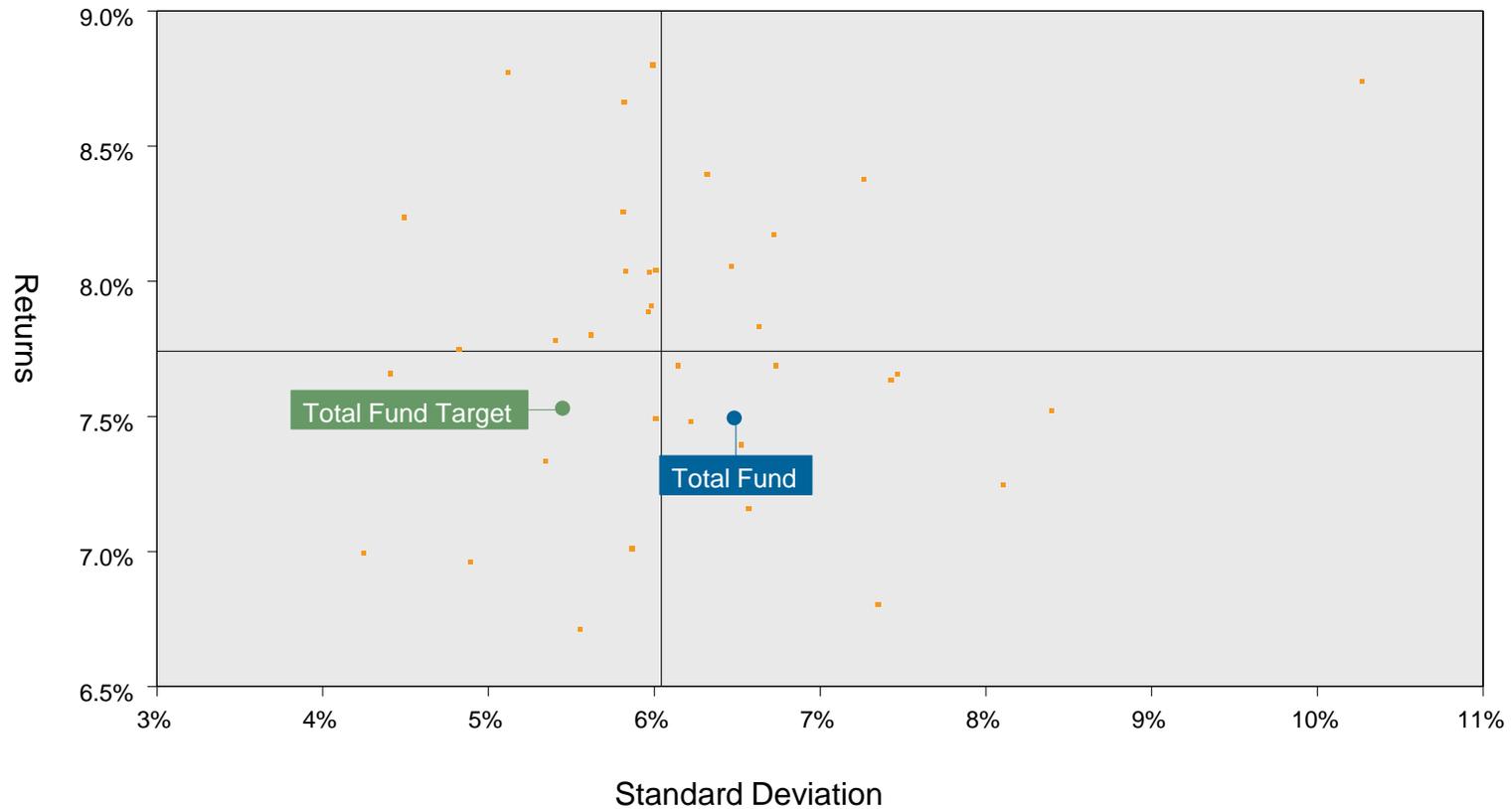


\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

Risk vs. Return versus Very Large Public DB Plan (>\$10B) Peers (As of December 31, 2019)

## Five Year Annualized Risk vs Return



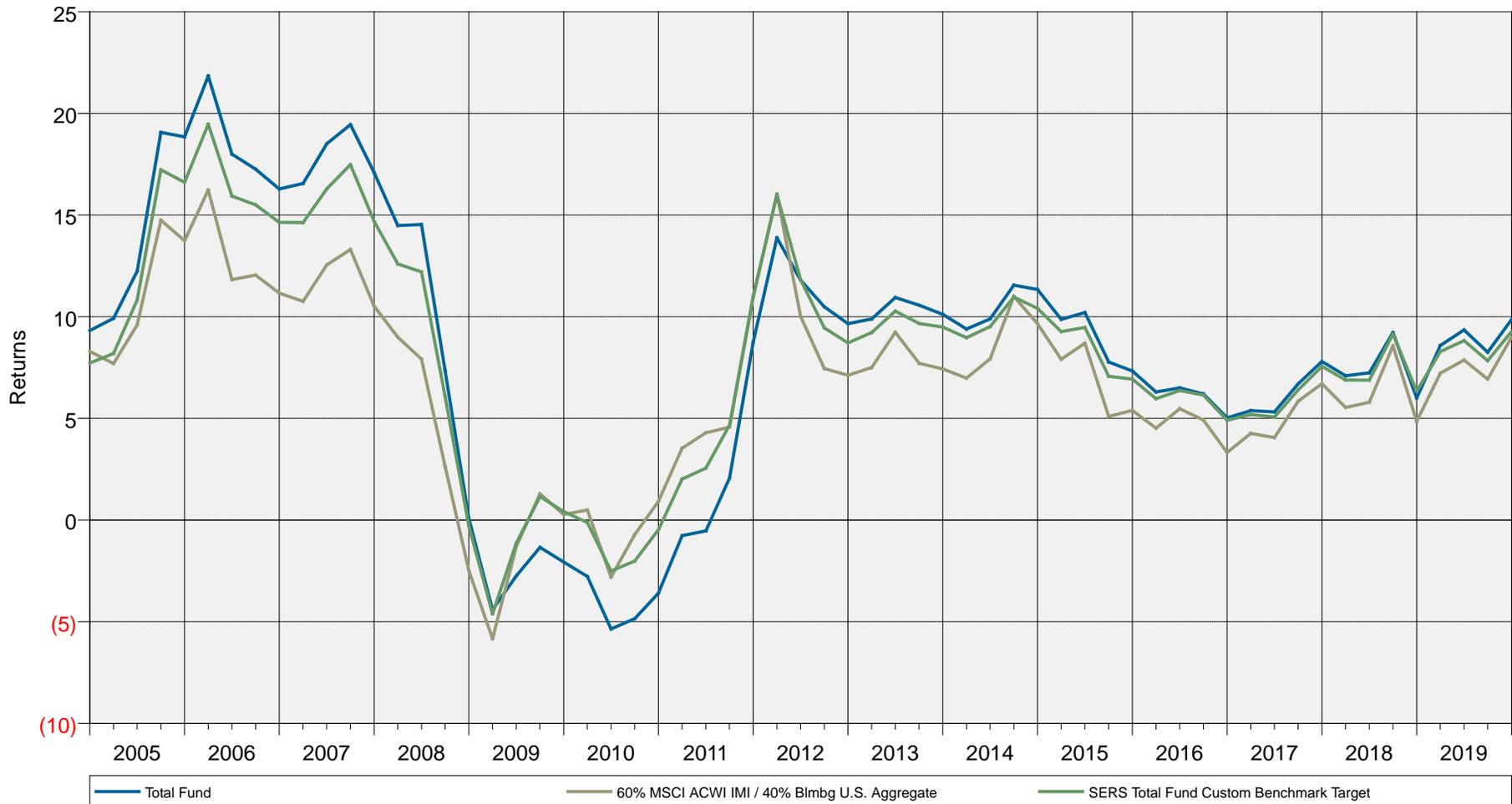
\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

Squares represent membership of the Callan Public Fund Spons- V Lg DB (>10B); Crosshair represents peer group median

# Total Fund

## Rolling 3-year Gross of Fee Performance versus Peers and Benchmark (As of December 31, 2019)

Rolling 12 Quarter Gross of Fee Returns  
for 15 Years Ended December 31, 2019

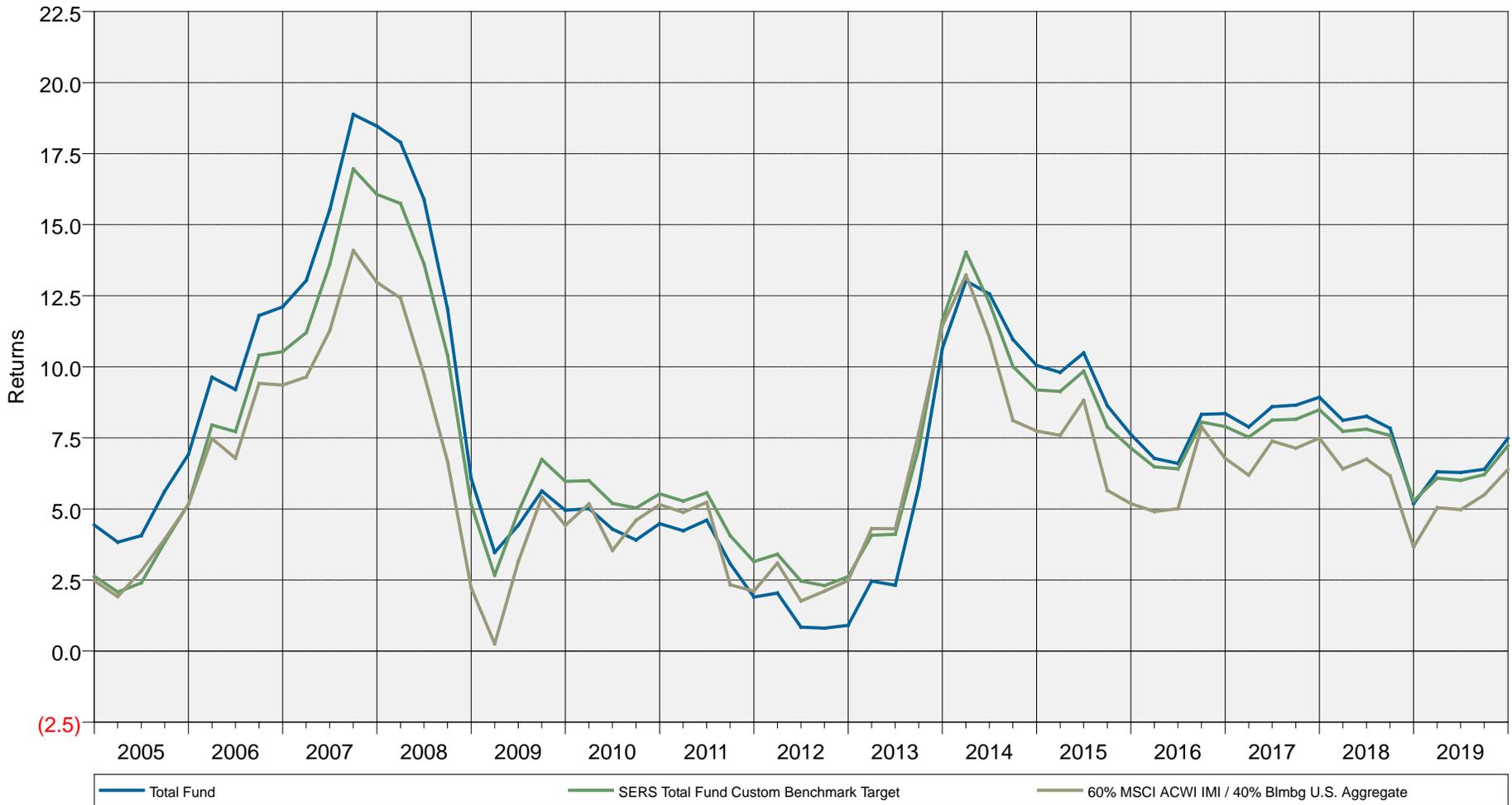


\* Current Target = 48.0% MSCI ACWI IMI, 16.0% Private Equity, 12.0% Real Estate Custom Benchmark, 11.0% Blmbg Aggregate, 10.0% S&P/LSTA, Leveraged Loan, 3.0% 3-month Treasury Bill and 0.0% Hedge Fund Custom Benchmark.

# Total Fund

## Rolling 5-year Gross of Fee Performance versus Peers and Benchmark (As of December 31, 2019)

Rolling 20 Quarter Gross of Fee Returns  
for 15 Years Ended December 31, 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.

# Asset Class Returns

As of December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance</b>						
<b>Total Fund</b>	<b>\$30,886</b>	<b>100.00%</b>	<b>5.64%</b>	<b>18.76%</b>	<b>9.27%</b>	<b>6.88%</b>
Total Fund Custom Benchmark(1)	-	-	5.08%	16.67%	9.34%	7.27%
Public Market Equiv Benchmark(2)	-	-	4.93%	16.28%	10.14%	7.82%
60/40 Index(3)	-	-	5.44%	19.28%	8.99%	6.39%
<b>Global Public Equity</b>	<b>\$17,164</b>	<b>55.57%</b>	<b>9.22%</b>	<b>27.00%</b>	<b>12.20%</b>	<b>8.49%</b>
MSCI ACWI IMI	-	-	9.05%	26.35%	12.09%	8.34%
<b>Fixed Income</b>	<b>\$4,376</b>	<b>14.17%</b>	<b>0.56%</b>	<b>9.51%</b>	<b>4.31%</b>	<b>3.12%</b>
Bimbg Aggregate	-	-	0.18%	8.72%	4.03%	3.05%
<b>Multi-Strategy</b>	<b>\$1,817</b>	<b>5.88%</b>	<b>2.69%</b>	<b>14.71%</b>	<b>-</b>	<b>-</b>
S&P/LSTA Leveraged Loan	-	-	1.73%	8.64%	4.35%	4.45%
Russell 3000 Index	-	-	9.10%	31.02%	14.57%	11.24%
<b>Real Estate</b>	<b>\$2,086</b>	<b>6.75%</b>	<b>1.57%</b>	<b>10.98%</b>	<b>3.41%</b>	<b>4.64%</b>
Real Estate Custom Benchmark	-	-	1.81%	6.47%	6.44%	8.38%
CPI +3% (Qtr lag)	-	-	0.98%	4.71%	5.07%	4.53%
<b>Private Equity</b>	<b>\$3,937</b>	<b>12.75%</b>	<b>2.23%</b>	<b>9.55%</b>	<b>11.42%</b>	<b>9.47%</b>
Burgiss Private Equity Custom Index	-	-	0.85%	7.20%	13.09%	11.27%
Russell 3000 +3% (Qtr lag)	-	-	1.89%	6.65%	16.16%	13.74%
<b>Cash</b>	<b>\$1,471</b>	<b>4.76%</b>	<b>0.48%</b>	<b>2.31%</b>	<b>1.97%</b>	<b>1.45%</b>
3-month Treasury Bill	-	-	0.46%	2.28%	1.67%	1.07%

(1) Total Fund Custom Benchmark returns provided by RVK prior to 12/31/2018. 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 prior to 12/31/2018. 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 December 31, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance</b>					
<b>Total Fund</b>	<b>8.05%</b>	<b>6.69%</b>	<b>5.95%</b>	<b>8.44%</b>	<b>9.55%</b> (1/81)
Total Fund Custom Benchmark(1)	8.23%	7.47%	6.24%	8.62%	-
Public Market Equiv Benchmark(2)	8.93%	7.94%	6.59%	8.90%	-
60/40 Index(3)	7.07%	6.18%	5.24%	6.89%	-
<b>Global Public Equity</b>	<b>9.49%</b>	<b>6.70%</b>	-	-	<b>7.07%</b> (1/02)
MSCI ACWI IMI	8.91%	7.02%	4.84%	7.24%	7.37% (1/02)
<b>Fixed Income</b>	<b>4.77%</b>	<b>5.00%</b>	<b>5.75%</b>	<b>6.41%</b>	<b>8.40%</b> (1/81)
Blmbg Aggregate	3.75%	4.15%	5.03%	5.56%	7.63% (1/81)
<b>Multi-Strategy</b>	-	-	-	-	<b>7.41%</b> (10/17)
S&P/LSTA Leveraged Loan	5.00%	4.74%	4.86%	-	4.47% (10/17)
Russell 3000 Index	13.42%	9.03%	6.39%	10.21%	13.14% (10/17)
<b>Real Estate</b>	<b>6.99%</b>	<b>5.81%</b>	<b>6.80%</b>	<b>7.78%</b>	<b>8.39%</b> (3/84)
Real Estate Custom Benchmark	9.86%	7.21%	7.80%	-	-
CPI +3% (Qtr lag)	4.75%	5.03%	5.15%	5.19%	5.63% (3/84)
<b>Private Equity</b>	<b>11.35%</b>	<b>11.54%</b>	<b>9.65%</b>	<b>13.69%</b>	<b>10.91%</b> (1/86)
Burgiss Private Equity Custom Index	13.02%	12.90%	11.30%	15.10%	16.84% (1/86)
Russell 3000 +3% (Qtr lag)	16.40%	12.57%	10.22%	13.31%	14.51% (1/86)
<b>Cash</b>	<b>0.87%</b>	<b>1.69%</b>	<b>2.31%</b>	<b>2.83%</b>	<b>3.63%</b> (1/87)
3-month Treasury Bill	0.58%	1.39%	1.78%	2.47%	3.27% (1/87)

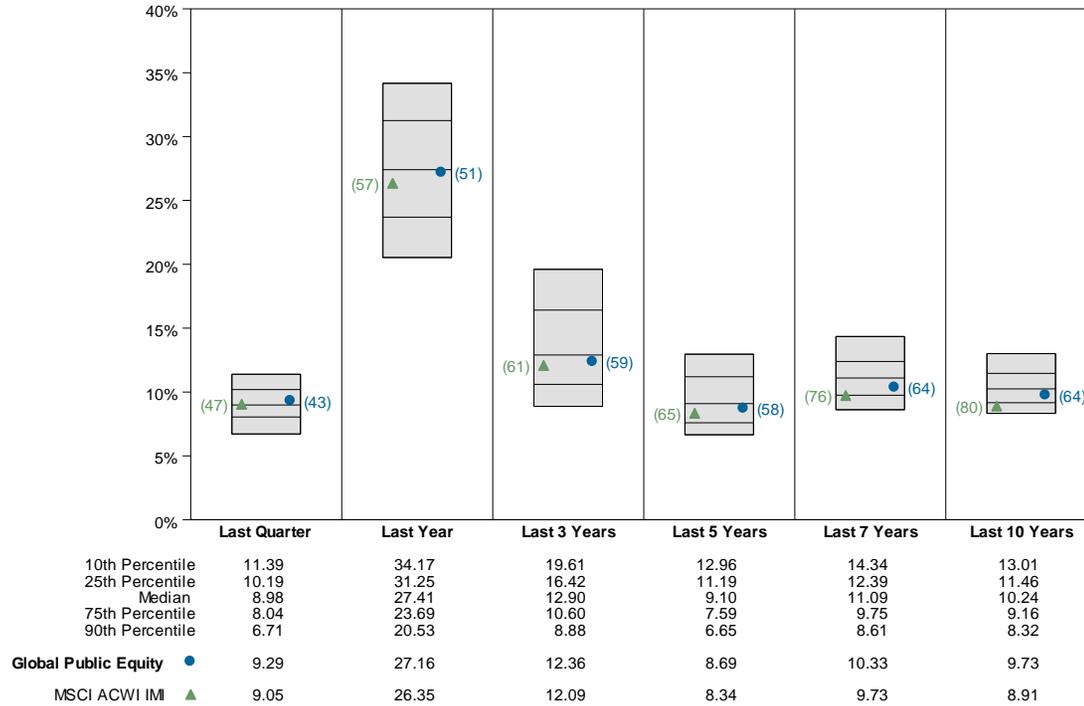
(1) Total Fund Custom Benchmark returns provided by RVK prior to 12/31/2018. Benchmark consists of: 16% SERS Private Equity Composite, 48% MSCI ACW IM Index, 12% Real Estate Custom Benchmark, 10% S&P/LSTA Leveraged Loan Index, 11% Bloomberg US Agg Bond Index, 3% ICE BofAML 3 Mo US T-Bill Index

(2) Public Market Equivalent Benchmark returns provided by RVK prior to 12/31/2018. 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

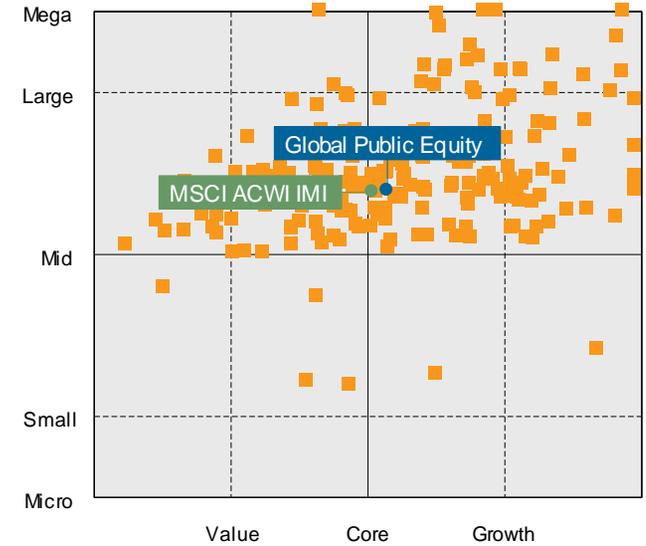
(3) Benchmark consists of 60% MSCI ACWI IMI Index, 40% Bloomberg U.S. Aggregate Index.

# Global Equity as of December 31, 2019

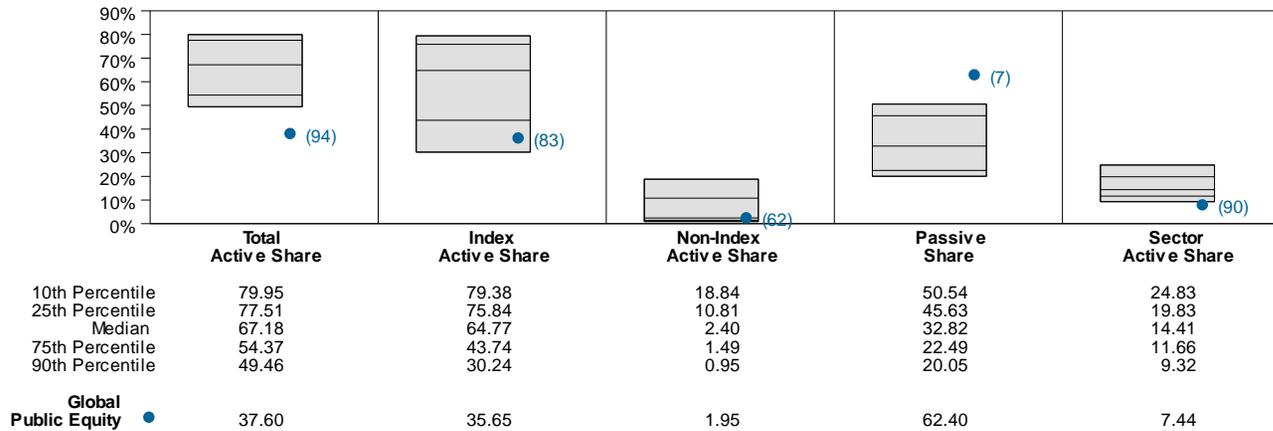
Performance vs Callan Global Equity (Gross)



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



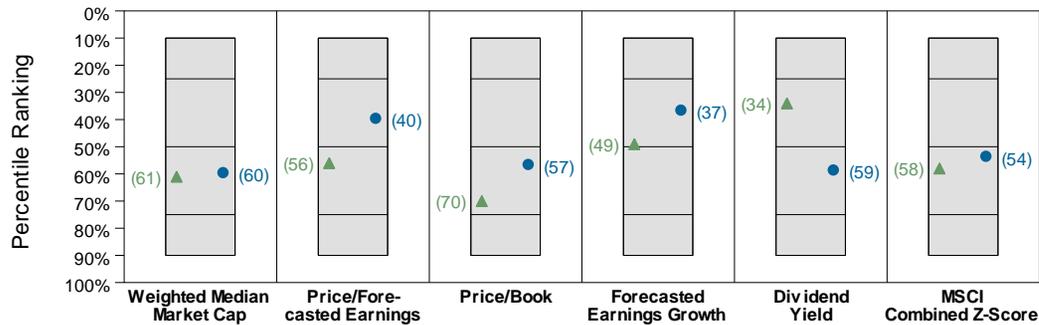
Active Share vs. Pub Pln- Gbl Equity



# Global Equity

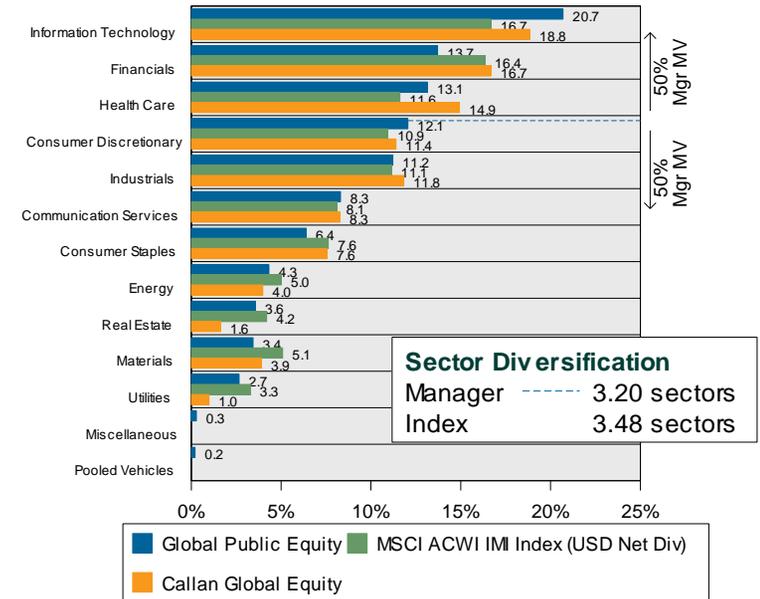
As of December 31, 2019

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

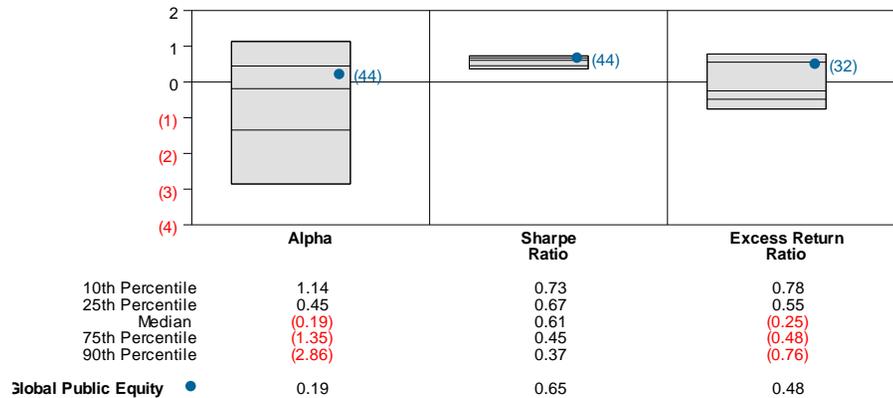


	Weighted Median Market Cap	Price/Forecasted Earnings	Price/Book	Forecasted Earnings Growth	Dividend Yield	MSCI Combined Z-Score
10th Percentile	110.35	25.55	5.07	16.06	3.16	1.03
25th Percentile	73.03	22.17	4.03	12.74	2.54	0.71
Median	52.82	17.19	2.85	10.44	1.94	0.17
75th Percentile	38.22	14.53	2.06	8.52	1.36	(0.26)
90th Percentile	22.96	12.46	1.55	6.94	0.95	(0.61)
<b>Global Public Equity</b>	48.48	18.69	2.64	11.36	1.78	0.11
<b>MSCI ACWI IMI Index (USD Net Div)</b>	47.65	16.63	2.19	10.48	2.28	0.03

## Sector Allocation December 31, 2019

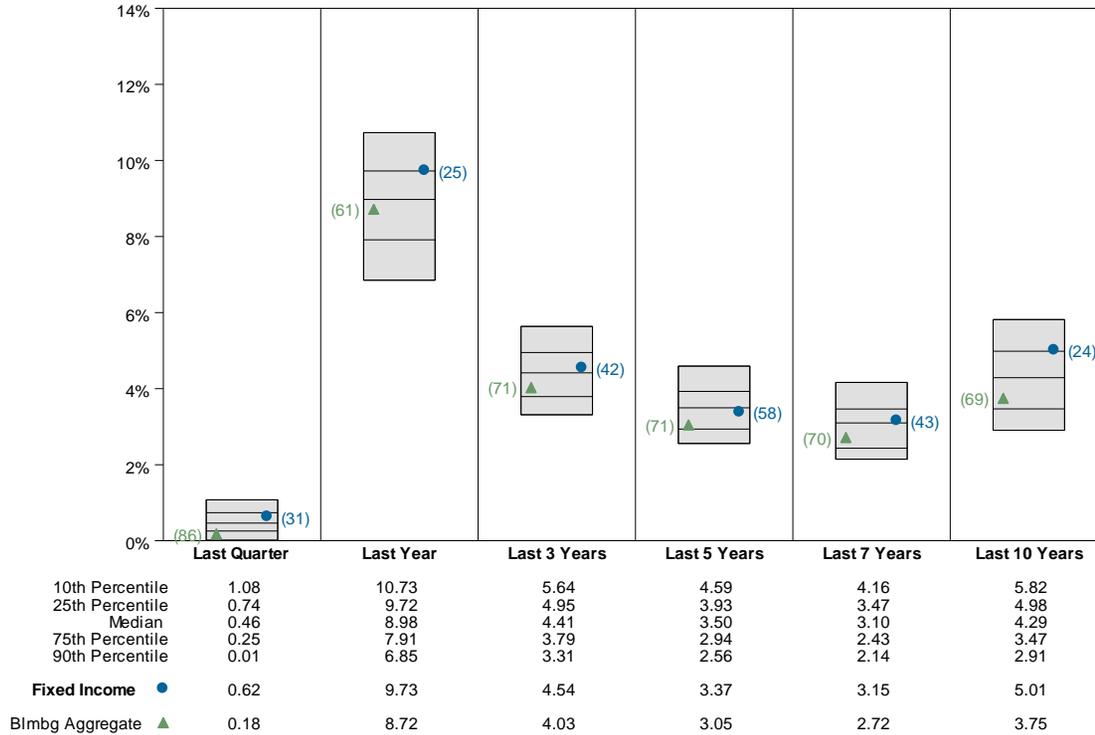


## Risk Adjusted Return Measures vs MSCI ACWI IMI Rankings Against Public Fund - Global Equity (Gross) Five Years Ended December 31, 2019

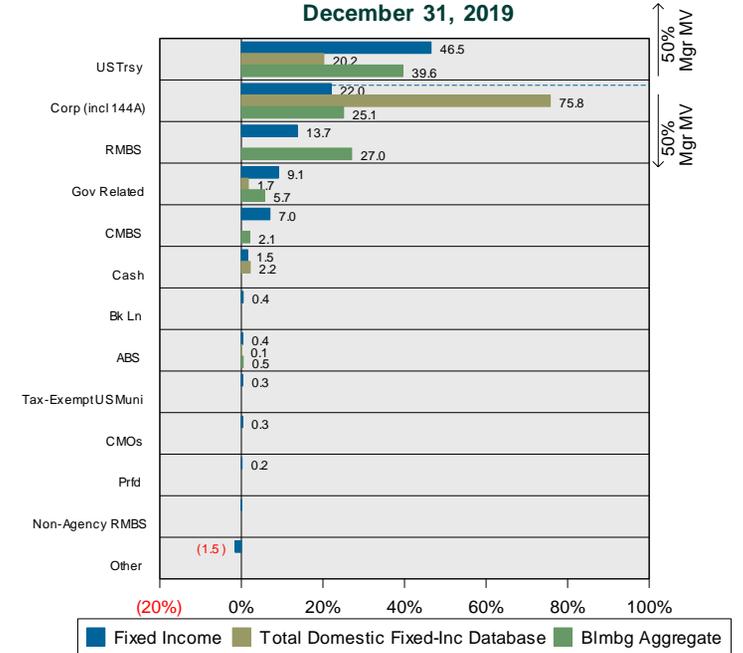


# Fixed Income As of December 31, 2019

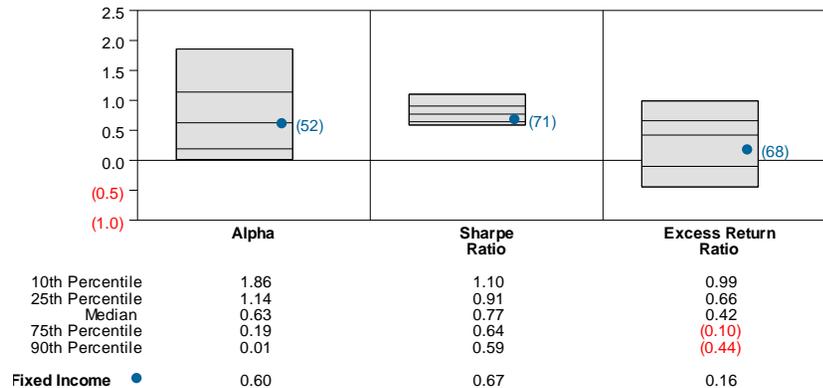
## Performance vs Public Fund - Domestic Fixed (Gross)



## Sector Allocation December 31, 2019



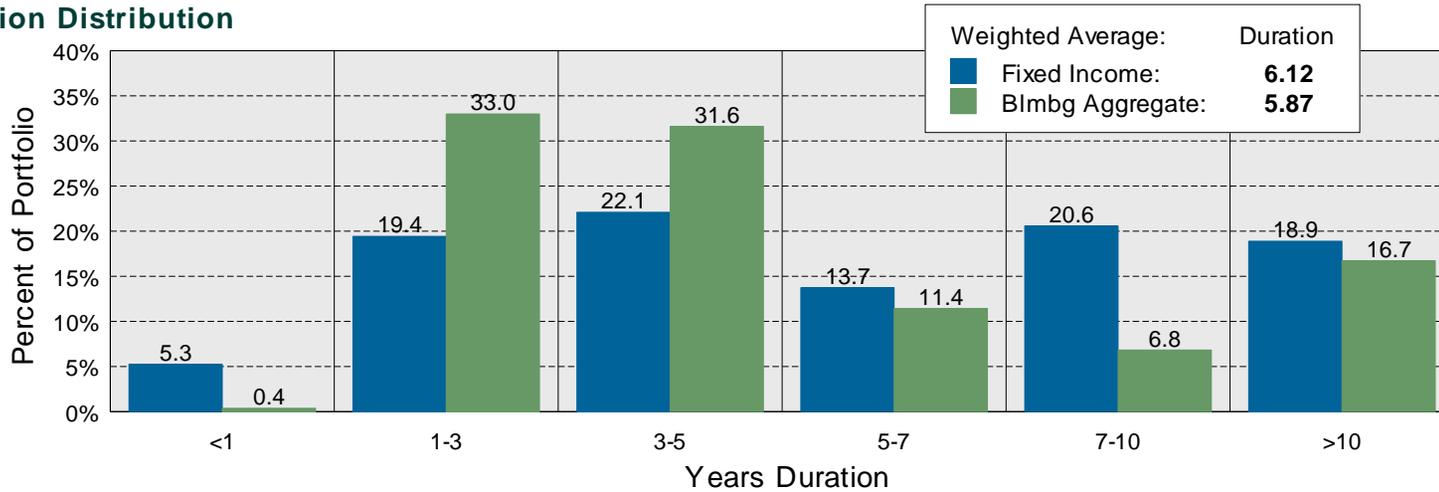
## Risk Adjusted Return Measures vs Blmbg Aggregate Rankings Against Public Fund - Domestic Fixed (Gross) Five Years Ended December 31, 2019



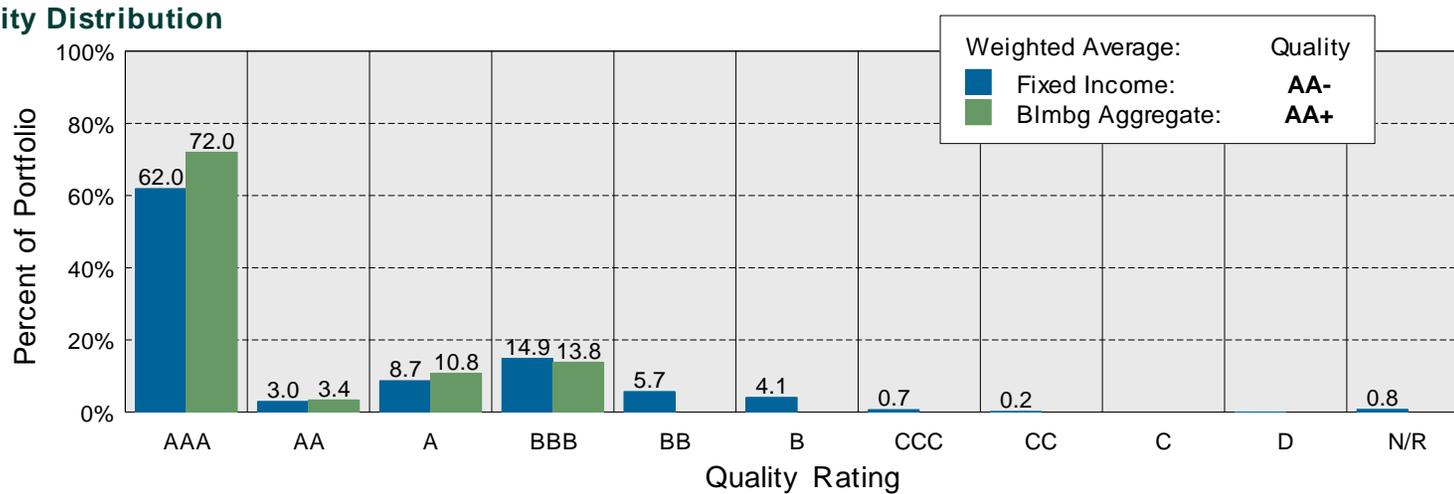
# Fixed Income

As of December 31, 2019

**Duration Distribution**



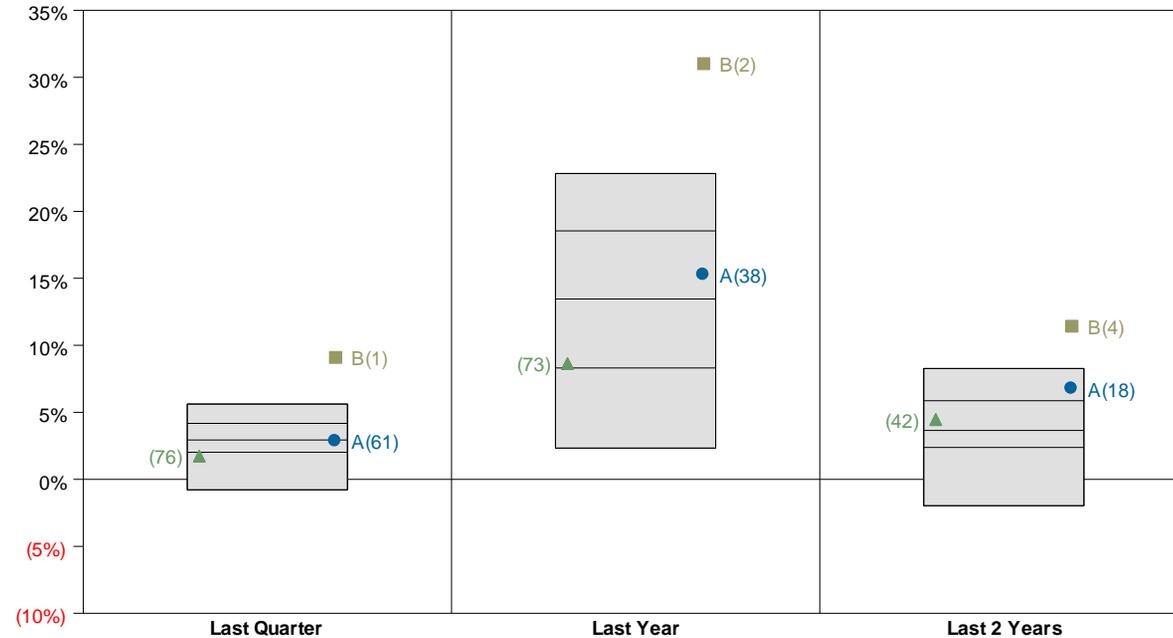
**Quality Distribution**



# Multi-Strategy

As of December 31, 2019

Performance vs Callan Multi-Asset Database (Gross)



	Last Quarter	Last Year	Last 2 Years
10th Percentile	5.62	22.83	8.27
25th Percentile	4.18	18.54	5.87
Median	2.94	13.46	3.65
75th Percentile	2.02	8.31	2.38
90th Percentile	(0.79)	2.33	(1.97)
Multi-Strategy ● A	2.84	15.24	6.75
Russell 3000 Index ■ B	9.10	31.02	11.42
S&P:LSTA Lev Loan ▲	1.73	8.64	4.46

Callan

---

**Appendix I – Investment Manager Returns**

# Investment Manager Returns

As of December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance- Equity</b>						
<b>Global Public Equity</b>	<b>\$17,164</b>	<b>100.00%</b>	<b>9.22%</b>	<b>27.00%</b>	<b>12.20%</b>	<b>8.49%</b>
MSCI ACWI IMI	-	-	9.05%	26.35%	12.09%	8.34%
<b>Global Mandates</b>	<b>\$1,135</b>	<b>6.61%</b>	<b>8.47%</b>	<b>31.07%</b>	<b>18.28%</b>	<b>12.49%</b>
MSCI World	-	-	8.56%	27.67%	12.57%	8.74%
Walter Scott & Prtnrs Gbl Gr Eq	1,135	6.61%	8.47%	31.07%	18.28%	12.49%
MSCI World	-	-	8.56%	27.67%	12.57%	8.74%
<b>U.S. Equity</b>	<b>\$8,017</b>	<b>46.71%</b>	<b>9.20%</b>	<b>30.37%</b>	<b>13.29%</b>	<b>9.96%</b>
Russell 3000 Index(1)	-	-	9.10%	31.02%	14.57%	11.24%
<b>U.S. Mid/Large Cap Equity</b>	<b>\$6,312</b>	<b>36.77%</b>	<b>8.99%</b>	<b>31.43%</b>	<b>14.48%</b>	<b>10.82%</b>
Russell 1000 Index	-	-	9.04%	31.43%	15.05%	11.48%
MCM Russell 1000 Index	6,312	36.77%	9.02%	31.37%	15.07%	11.52%
Russell 1000 Index	-	-	9.04%	31.43%	15.05%	11.48%
<b>U.S. Small Cap Equity</b>	<b>\$1,705</b>	<b>9.93%</b>	<b>10.02%</b>	<b>26.28%</b>	<b>8.98%</b>	<b>6.16%</b>
Russell 2000 Index(1)	-	-	9.94%	25.52%	8.59%	7.89%
S&P 600 Small Cap Index	-	-	8.21%	22.78%	8.36%	9.56%
MCM Russell 2000 Core Index	348	2.03%	9.97%	25.51%	8.57%	-
Russell 2000 Index	-	-	9.94%	25.52%	8.59%	8.23%
MCM Russell 2000 Val Index	622	3.62%	8.49%	22.35%	4.73%	-
Russell 2000 Value Index	-	-	8.49%	22.39%	4.77%	6.99%
Emerald Adv Div Sm Cap Grth	735	4.28%	11.38%	30.17%	13.41%	-
Russell 2000 Growth Index	-	-	11.39%	28.48%	12.49%	9.34%

\*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 December 31, 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>9.49%</b>	<b>6.70%</b>	-	-	<b>7.07%</b> (1/02)
MSCI ACWI IMI	8.91%	7.02%	4.84%	7.24%	7.37% (1/02)
<b>Global Mandates</b>	<b>11.77%</b>	-	-	-	<b>8.98%</b> (11/06)
MSCI World	9.47%	6.92%	4.50%	7.39%	6.06% (11/06)
Walter Scott & Prtnrs Gbl Gr Eq	11.43%	-	-	-	9.53% (10/06)
MSCI World	9.47%	6.92%	4.50%	7.39%	6.31% (10/06)
<b>U.S. Equity</b>	<b>12.98%</b>	<b>7.95%</b>	<b>6.10%</b>	<b>9.79%</b>	<b>10.73%</b> (1/81)
Russell 3000 Index(1)	13.42%	9.03%	6.39%	10.14%	11.04% (1/81)
<b>U.S. Mid/Large Cap Equity</b>	<b>13.51%</b>	<b>8.57%</b>	<b>6.12%</b>	<b>10.09%</b>	<b>9.72%</b> (1/94)
Russell 1000 Index	13.54%	9.12%	6.29%	10.33%	9.93% (1/94)
MCM Russell 1000 Index	-	-	-	-	14.80% (1/12)
Russell 1000 Index	13.54%	9.12%	6.29%	10.33%	14.82% (1/12)
<b>U.S. Small Cap Equity</b>	<b>10.49%</b>	<b>6.84%</b>	<b>7.02%</b>	<b>9.85%</b>	<b>9.23%</b> (1/94)
Russell 2000 Index(1)	12.05%	8.44%	8.42%	10.92%	10.37% (1/94)
S&P 600 Small Cap Index	13.35%	9.20%	9.80%	11.21%	10.55% (1/94)
MCM Russell 2000 Core Index	-	-	-	-	9.31% (12/16)
Russell 2000 Index	11.83%	7.92%	7.59%	9.35%	9.33% (12/16)
MCM Russell 2000 Val Index	-	-	-	-	5.97% (12/16)
Russell 2000 Value Index	10.56%	6.92%	9.41%	10.15%	6.02% (12/16)
Emerald Adv Div Sm Cap Grth	-	-	-	-	13.52% (12/16)
Russell 2000 Growth Index	13.01%	8.81%	5.57%	8.13%	12.63% (12/16)

\*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 December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance- Equity</b>						
<b>Non-U.S. Equity</b>	<b>\$8,011</b>	<b>36.40%</b>	<b>9.51%</b>	<b>23.24%</b>	<b>10.96%</b>	<b>6.29%</b>
MSCI ACWI ex US IMI(1)	-	-	9.20%	21.63%	9.84%	5.71%
<b>Non-U.S. Developed Markets Equity</b>	<b>\$5,984</b>	<b>27.19%</b>	<b>8.50%</b>	<b>23.90%</b>	<b>10.86%</b>	<b>6.41%</b>
MSCI ACWI ex US IMI	-	-	9.20%	21.63%	9.84%	5.71%
MSCI World ex US	-	-	7.86%	22.49%	9.34%	5.42%
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>\$5,134</b>	<b>23.33%</b>	<b>7.92%</b>	<b>22.94%</b>	<b>11.78%</b>	<b>6.68%</b>
MSCI World ex US	-	-	7.86%	22.49%	9.34%	5.42%
BlackRock MSCI World Ex US Index	5,125	23.29%	7.92%	23.00%	-	-
MSCI World ex US	-	-	7.86%	22.49%	9.34%	5.42%
<b>Non-U.S. Dev Small Cap Equity</b>	<b>\$850</b>	<b>3.86%</b>	<b>12.16%</b>	<b>30.13%</b>	<b>8.92%</b>	<b>6.96%</b>
MSCI World ex US Sm Cap	-	-	11.40%	25.41%	10.42%	8.17%
FIS Group Non-U.S. Small Cap	214	0.97%	12.46%	22.83%	-	-
MSCI ACWI ex US Small Cap	-	-	11.01%	22.42%	9.65%	7.04%
Harris Assoc Int'l SCV	636	2.89%	12.06%	32.78%	8.98%	7.00%
MSCI World ex US Sm Cap	-	-	11.40%	25.41%	10.42%	8.17%
<b>Emerging Mkts Equity</b>	<b>\$2,027</b>	<b>9.21%</b>	<b>12.59%</b>	<b>21.32%</b>	<b>13.02%</b>	<b>6.89%</b>
MSCI EM	-	-	11.84%	18.44%	11.58%	5.61%
BlackRock Emg Mkts Index	737	3.35%	11.72%	18.11%	-	-
MSCI EM	-	-	11.84%	18.44%	11.58%	5.61%
Leading Edge Emg Mkts Fund	236	1.07%	11.34%	21.84%	-	-
MSCI EM	-	-	11.84%	18.44%	11.58%	5.61%
Macquarie Emg Mkts Equity	468	2.12%	14.23%	21.24%	14.14%	7.31%
MSCI EM	-	-	11.84%	18.44%	11.58%	5.61%
Martin Currie Emg Mkts Equity	489	2.22%	13.45%	26.98%	16.17%	8.91%
MSCI EM	-	-	11.84%	18.44%	11.58%	5.61%
GlobeFlex Emerging Small Cap	97	0.44%	10.27%	15.17%	9.26%	3.71%
MSCI EM Small Cap	-	-	9.52%	11.51%	6.71%	2.97%
Northern Trust Equity Transition	1	0.01%	2.99%	3.69%	20.22%	-

\*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 December 31, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance- Equity</b>					
<b>Non-U.S. Equity</b>	<b>5.80%</b>	<b>4.95%</b>	<b>4.30%</b>	-	<b>6.43%</b> (11/95)
MSCI ACWI ex US IMI(1)	5.19%	5.62%	4.54%	5.72%	5.78% (11/95)
<b>Non-U.S. Developed Markets Equity</b>	<b>6.60%</b>	<b>4.99%</b>	-	-	<b>6.40%</b> (1/02)
MSCI ACWI ex US IMI	5.21%	5.48%	3.96%	5.33%	6.97% (1/02)
MSCI World ex US	5.32%	4.90%	3.45%	5.31%	6.09% (1/02)
<b>Non-U.S. Dev Mid/Large Cap Equity</b>	<b>6.63%</b>	<b>4.53%</b>	-	-	<b>5.87%</b> (1/02)
MSCI World ex US	5.32%	4.90%	3.45%	5.31%	6.09% (1/02)
BlackRock MSCI World Ex US Index	-	-	-	-	6.36% (6/17)
MSCI World ex US	5.32%	4.90%	3.45%	5.31%	5.90% (6/17)
<b>Non-U.S. Dev Small Cap Equity</b>	<b>7.49%</b>	<b>7.15%</b>	<b>5.97%</b>	<b>7.35%</b>	<b>7.14%</b> (10/93)
MSCI World ex US Sm Cap	8.04%	6.64%	-	-	-
FIS Group Non-U.S. Small Cap	-	-	-	-	5.46% (10/18)
MSCI ACWI ex US Small Cap	6.92%	6.93%	6.72%	5.93%	3.79% (10/18)
Harris Assoc Int'l SCV	7.87%	8.17%	-	-	11.00% (7/03)
MSCI World ex US Sm Cap	8.04%	6.64%	-	-	9.57% (7/03)
<b>Emerging Mkts Equity</b>	<b>3.24%</b>	<b>5.11%</b>	-	-	<b>7.53%</b> (1/02)
MSCI EM	3.68%	7.48%	-	-	9.84% (1/02)
BlackRock Emg Mkts Index	-	-	-	-	6.35% (7/17)
MSCI EM	3.68%	7.48%	-	-	6.59% (7/17)
Leading Edge Emg Mkts Fund	-	-	-	-	17.09% (11/18)
MSCI EM	3.68%	7.48%	-	-	16.96% (11/18)
Macquarie Emg Mkts Equity	-	-	-	-	5.17% (5/13)
MSCI EM	3.68%	7.48%	-	-	3.56% (5/13)
Martin Currie Emg Mkts Equity	-	-	-	-	6.12% (1/14)
MSCI EM	3.68%	7.48%	-	-	4.27% (1/14)
GlobeFlex Emerging Small Cap	-	-	-	-	4.33% (8/13)
MSCI EM Small Cap	2.95%	7.51%	6.83%	4.05%	3.13% (8/13)

\*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 December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance - Fixed Income</b>						
<b>Fixed Income</b>	<b>\$4,376</b>	<b>100.00%</b>	<b>0.56%</b>	<b>9.51%</b>	<b>4.31%</b>	<b>3.12%</b>
Blmbg Aggregate	-	-	0.18%	8.72%	4.03%	3.05%
<b>Core Fixed Income</b>	<b>\$1,994</b>	<b>45.57%</b>	<b>0.54%</b>	<b>9.64%</b>	<b>4.38%</b>	<b>3.32%</b>
Blmbg Aggregate	-	-	0.18%	8.72%	4.03%	3.05%
MCM Bond Index	1,118	25.56%	0.15%	8.64%	4.00%	3.00%
Blmbg Aggregate(1)	-	-	0.18%	8.72%	4.03%	3.05%
PIMCO Core Bond Fund	671	15.33%	0.88%	9.80%	4.57%	3.45%
Blmbg Agg ex Treasury	-	-	0.82%	9.93%	4.48%	3.47%
Taplin, Canida & Habacht Corp FI	205	4.68%	1.61%	14.84%	5.90%	4.34%
Blmbg Credit	-	-	1.05%	13.80%	5.75%	4.39%
<b>Core-Plus Fixed Income</b>	<b>\$911</b>	<b>20.83%</b>	<b>2.01%</b>	<b>10.84%</b>	<b>4.95%</b>	<b>3.28%</b>
Brandywine Global Opp	204	4.67%	4.17%	9.41%	5.46%	2.43%
FTSE WGBI	-	-	(0.35%)	5.90%	4.12%	2.03%
Pyramis Gbl Adv HY CMBS	341	7.79%	0.29%	8.11%	5.73%	4.84%
Blmbg US Univ CMBS ex Aaa	-	-	(0.66%)	10.39%	6.10%	4.56%
Stone Harbor Gbl HY	197	4.51%	2.07%	14.00%	5.42%	4.98%
FTSE US High Yield	-	-	2.83%	14.09%	6.13%	5.87%
Stone Harbor EMD	169	3.86%	2.94%	14.68%	5.66%	6.03%
JPM EMBI Global	-	-	2.09%	14.42%	6.06%	5.88%
<b>Global TIPS</b>	<b>\$873</b>	<b>19.95%</b>	<b>0.61%</b>	<b>8.36%</b>	<b>3.42%</b>	<b>2.61%</b>
Blmbg US TIPS	-	-	0.79%	8.43%	3.32%	2.62%
Brown Brothers TIPS	232	5.29%	0.64%	8.41%	3.24%	2.69%
Blmbg US TIPS	-	-	0.79%	8.43%	3.32%	2.62%
NISA Inv Adv TIPS	521	11.91%	0.81%	8.34%	3.31%	2.63%
Blmbg US TIPS(1)	-	-	0.79%	8.43%	3.32%	2.62%
New Century Global TIPS	120	2.75%	(0.26%)	8.32%	4.26%	2.40%
Blmbg Wld Gov I-L Undhdg	-	-	0.02%	8.21%	4.05%	2.23%
<b>Nominal U.S. Treasuries</b>	<b>\$597</b>	<b>13.64%</b>	<b>(1.59%)</b>	<b>8.78%</b>	<b>3.87%</b>	<b>2.65%</b>
Blmbg US Treas Bell 10Y	-	-	(1.77%)	8.90%	3.61%	2.31%
PIMCO US Treasuries	597	13.64%	(1.59%)	8.78%	4.03%	2.94%
Blmbg US Treas Bell 10Y	-	-	(1.77%)	8.90%	3.61%	2.31%

\*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 December 31, 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>4.77%</b>	<b>5.00%</b>	<b>5.75%</b>	<b>6.41%</b>	<b>8.40%</b> <sup>(1/81)</sup>
Blmbg Aggregate	3.75%	4.15%	5.03%	5.56%	7.63% <sup>(1/81)</sup>
<b>Core Fixed Income</b>	<b>4.50%</b>	<b>4.57%</b>	-	-	<b>4.86%</b> <sup>(1/02)</sup>
Blmbg Aggregate	3.75%	4.15%	5.03%	5.56%	4.49% <sup>(1/02)</sup>
MCM Bond Index	3.65%	4.04%	5.02%	5.66%	7.12% <sup>(4/84)</sup>
Blmbg Aggregate(1)	3.75%	4.15%	5.14%	5.74%	7.40% <sup>(4/84)</sup>
PIMCO Core Bond Fund	-	-	-	-	2.88% <sup>(1/13)</sup>
Blmbg Agg ex Treasury	4.11%	-	-	-	3.15% <sup>(1/13)</sup>
Taplin, Canida & Habacht Corp FI	5.52%	5.22%	-	-	5.92% <sup>(11/00)</sup>
Blmbg Credit	5.32%	5.10%	5.97%	6.41%	5.92% <sup>(11/00)</sup>
<b>Core-Plus Fixed Income</b>	-	-	-	-	<b>4.57%</b> <sup>(10/12)</sup>
Brandywine Global Opp	-	-	-	-	4.02% <sup>(2/11)</sup>
FTSE WGBI	1.85%	2.73%	4.21%	4.65%	1.50% <sup>(2/11)</sup>
Pyramis Gbl Adv HY CMBS	10.83%	6.65%	8.39%	-	8.56% <sup>(4/97)</sup>
Blmbg US Univ CMBS ex Aaa	8.37%	0.88%	-	-	-
Stone Harbor Gbl HY	6.44%	6.40%	-	-	7.55% <sup>(7/00)</sup>
FTSE US High Yield	7.27%	6.84%	6.93%	7.48%	7.20% <sup>(7/00)</sup>
Stone Harbor EMD	6.41%	-	-	-	7.48% <sup>(4/05)</sup>
JPM EMBI Global	6.57%	7.08%	8.53%	9.99%	7.30% <sup>(4/05)</sup>
<b>Global TIPS</b>	<b>2.50%</b>	<b>3.30%</b>	-	-	<b>3.26%</b> <sup>(2/03)</sup>
Blmbg US TIPS	3.36%	3.78%	5.51%	-	4.30% <sup>(2/03)</sup>
Brown Brothers TIPS	-	-	-	-	1.69% <sup>(2/12)</sup>
Blmbg US TIPS	3.36%	3.78%	5.51%	-	1.52% <sup>(2/12)</sup>
NISA Inv Adv TIPS	2.29%	-	-	-	3.15% <sup>(4/07)</sup>
Blmbg US TIPS(1)	2.29%	3.06%	4.96%	-	3.15% <sup>(4/07)</sup>
New Century Global TIPS	-	-	-	-	2.17% <sup>(2/12)</sup>
Blmbg Wld Gov I-L Undhdg	3.13%	3.55%	5.41%	-	1.82% <sup>(2/12)</sup>
<b>Nominal U.S. Treasuries</b>	-	-	-	-	<b>2.59%</b> <sup>(9/11)</sup>
Blmbg US Treas Bell 10Y	4.19%	4.20%	5.07%	5.52%	2.61% <sup>(9/11)</sup>
PIMCO US Treasuries	-	-	-	-	2.80% <sup>(9/11)</sup>
Blmbg US Treas Bell 10Y	4.19%	4.20%	5.07%	5.52%	2.61% <sup>(9/11)</sup>

\*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 December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance - Multi-Strategy</b>						
<b>Multi-Strategy</b>	<b>\$1,817</b>	<b>100.00%</b>	<b>2.69%</b>	<b>14.71%</b>	-	-
S&P/LSTA Leveraged Loan	-	-	1.73%	8.64%	4.35%	4.45%
Russell 3000 Index	-	-	9.10%	31.02%	14.57%	11.24%
<b>Credit Focused Strategies</b>	<b>\$970</b>	<b>53.37%</b>	<b>3.84%</b>	<b>11.18%</b>	-	-
Blackstone Keystone(1)	970	53.37%	3.84%	11.18%	6.15%	4.72%
HFRI Fund of Funds Compos	-	-	3.01%	8.32%	3.86%	2.35%
<b>Opp. Equity &amp; Fixed Income</b>	<b>\$549</b>	<b>30.21%</b>	<b>0.12%</b>	<b>15.58%</b>	-	-
SEI Str. Credit: HY Bank Loans(2)	336	18.47%	(2.40%)	0.19%	6.70%	6.13%
FTSE US High Yield	-	-	2.83%	14.09%	6.13%	5.87%
Eaton Vance GMARA	213	11.73%	4.36%	12.62%	-	-
3 month LIBOR + 6%	-	-	1.94%	8.35%	7.99%	7.40%
<b>Private Credit(3)</b>	<b>\$298</b>	<b>16.42%</b>	<b>3.83%</b>	<b>9.95%</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 December 31, 2019

	Last 10 Years	Last 15 Years	Last 20 Years	Last 25 Years	Since Inception
<b>Net Performance - Multi-Strategy</b>					
<b>Multi-Strategy</b>	-	-	-	-	<b>7.41%</b> (10/17)
S&P/LSTA Leveraged Loan	5.00%	4.74%	4.86%	-	4.47% (10/17)
Russell 3000 Index	13.42%	9.03%	6.39%	10.21%	13.14% (10/17)
<b>Credit Focused Strategies</b>	-	-	-	-	<b>5.33%</b> (10/17)
Blackstone Keystone(1)	-	-	-	-	7.60% (7/12)
HFRI Fund of Funds Compos	2.82%	2.81%	3.40%	5.09%	3.69% (7/12)
<b>Opp. Equity &amp; Fixed Income</b>	-	-	-	-	<b>8.18%</b> (10/17)
SEI Str. Credit: HY Bank Loans(2)	11.21%	-	-	-	11.75% (5/08)
FTSE US High Yield	7.27%	6.84%	6.93%	7.48%	7.36% (5/08)
Eaton Vance GMARA	-	-	-	-	4.13% (6/18)
3 month LIBOR + 6%	6.87%	7.79%	8.08%	8.79%	8.43% (6/18)
<b>Private Credit(3)</b>	-	-	-	-	<b>8.80%</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 December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance - Real Estate</b>						
<b>Real Estate</b>	<b>\$2,086</b>	<b>100.00%</b>	<b>1.57%</b>	<b>10.98%</b>	<b>3.41%</b>	<b>4.64%</b>
Real Estate Custom Benchmark	-	-	1.81%	6.47%	6.44%	8.38%
CPI +3% (Qtr lag)	-	-	0.98%	4.71%	5.07%	4.53%
<b>Core/Core Plus Real Estate Funds</b>	<b>\$735</b>	<b>35.22%</b>	<b>2.01%</b>	<b>4.00%</b>	<b>6.22%</b>	<b>8.12%</b>
NCREIF ODCE Index (Qtr lag)	-	-	1.18%	5.26%	6.69%	8.68%
<b>Value Add/Opp. Real Estate</b>	<b>\$1,061</b>	<b>50.89%</b>	<b>1.92%</b>	<b>11.64%</b>	<b>2.85%</b>	<b>3.88%</b>
NCREIF ODCE Index (Qtr lag)	-	-	1.18%	5.26%	6.69%	8.68%
Real Estate Separate Accounts	623	29.89%	2.76%	15.76%	1.06%	2.35%
NCREIF ODCE Index (Qtr lag)	-	-	1.18%	5.26%	6.69%	8.68%
Non-Core Closed End Funds	438	21.01%	0.75%	5.60%	7.53%	7.61%
NCREIF ODCE Index (Qtr lag)	-	-	1.18%	5.26%	6.69%	8.68%
<b>Natural Resources/Infrastructure</b>	<b>\$6</b>	<b>0.28%</b>	<b>9.85%</b>	<b>10.41%</b>	<b>(1.47%)</b>	<b>(0.10%)</b>
CPI +3% (Qtr lag)	-	-	0.98%	4.71%	5.07%	4.53%
<b>REITS</b>	<b>\$284</b>	<b>13.60%</b>	<b>(0.93%)</b>	<b>26.81%</b>	<b>5.24%</b>	<b>6.80%</b>
FTSE NAREIT US Index (Qtr lag)	-	-	7.59%	18.02%	6.58%	9.72%

\*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 December 31, 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>6.99%</b>	<b>5.81%</b>	<b>6.80%</b>	<b>7.78%</b>	<b>8.39%</b>	(3/84)
Real Estate Custom Benchmark	9.86%	7.21%	7.80%	-	-	
CPI +3% (Qtr lag)	4.75%	5.03%	5.15%	5.19%	5.63%	(3/84)
<b>Core/Core Plus Real Estate Funds</b>	<b>10.36%</b>	<b>7.53%</b>	<b>7.78%</b>	<b>8.87%</b>	<b>7.10%</b>	(9/86)
NCREIF ODCE Index (Qtr lag)	9.89%	6.78%	7.09%	7.81%	6.01%	(9/86)
<b>Value Add/Opp. Real Estate</b>	<b>6.64%</b>	<b>5.14%</b>	<b>6.09%</b>	<b>7.28%</b>	<b>6.71%</b>	(3/84)
NCREIF ODCE Index (Qtr lag)	9.89%	6.78%	7.09%	7.81%	6.27%	(3/84)
Real Estate Separate Accounts	4.90%	4.10%	4.88%	6.20%	5.17%	(6/88)
NCREIF ODCE Index (Qtr lag)	9.89%	6.78%	7.09%	7.81%	6.05%	(6/88)
Non-Core Closed End Funds	9.87%	6.68%	7.78%	8.82%	7.84%	(3/84)
NCREIF ODCE Index (Qtr lag)	9.89%	6.78%	7.09%	7.81%	6.27%	(3/84)
<b>Natural Resources/Infrastructure</b>	<b>(0.60%)</b>	<b>2.29%</b>	<b>2.72%</b>	<b>4.22%</b>	<b>4.44%</b>	(3/93)
CPI +3% (Qtr lag)	4.75%	5.03%	5.15%	5.19%	5.23%	(3/93)
<b>REITS</b>	<b>9.33%</b>	<b>8.43%</b>	<b>10.55%</b>	<b>-</b>	<b>9.99%</b>	(4/96)
FTSE NAREIT US Index (Qtr lag)	12.65%	8.72%	11.04%	11.07%	10.75%	(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 December 31, 2019

	Market Value \$(mm)	Ending Weight	Last Quarter	Year to Date	Last 3 Years	Last 5 Years
<b>Net Performance - Private Equity</b>						
<b>Private Equity</b>	<b>\$3,937</b>	<b>100.00%</b>	<b>2.23%</b>	<b>9.55%</b>	<b>11.42%</b>	<b>9.47%</b>
Burgiss Private Eqty Idx (Qtr Lag)	-	-	0.85%	7.20%	13.09%	11.27%
Russell 3000 + 3% (Qtr Lag)	-	-	1.89%	6.65%	16.16%	13.74%
<b>Buyouts</b>	<b>\$1,911</b>	<b>48.53%</b>	<b>2.58%</b>	<b>8.69%</b>	<b>12.32%</b>	<b>11.10%</b>
Burgiss Buyout Idx (Qtr Lag)	-	-	0.85%	5.48%	13.23%	11.31%
<b>Special Situations</b>	<b>\$515</b>	<b>13.07%</b>	<b>5.00%</b>	<b>17.28%</b>	<b>14.01%</b>	<b>8.79%</b>
Burgiss Special Sits Idx (Qtr Lag)	-	-	0.32%	2.36%	7.25%	6.17%
<b>Venture Capital</b>	<b>\$764</b>	<b>19.40%</b>	<b>5.05%</b>	<b>22.47%</b>	<b>16.43%</b>	<b>11.14%</b>
Burgiss Venture Cap Idx (Qtr Lag)	-	-	1.26%	14.70%	16.12%	14.63%
<b>Keystone Legacy (Qtr Lag) (1)</b>	<b>\$748</b>	<b>19.00%</b>	<b>(2.98%)</b>	<b>(1.97%)</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 December 31, 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>11.35%</b>	<b>11.54%</b>	<b>9.65%</b>	<b>13.69%</b>	<b>10.91%</b> (1/86)
Burgiss Private Eqty Idx (Qtr Lag)	13.02%	12.90%	11.30%	15.10%	16.84% (1/86)
Russell 3000 + 3% (Qtr Lag)	16.40%	12.57%	10.22%	13.31%	14.51% (1/86)
<b>Buyouts</b>	<b>13.43%</b>	<b>13.99%</b>	<b>11.65%</b>	<b>16.55%</b>	<b>13.12%</b> (4/86)
Burgiss Buyout Index (Qtr Lag)	13.15%	13.79%	11.88%	13.74%	19.50% (4/86)
<b>Special Situations</b>	<b>11.28%</b>	<b>12.33%</b>	<b>12.26%</b>	<b>12.40%</b>	<b>12.40%</b> (1/95)
Burgiss Special Sits Idx (Qtr Lag)	9.22%	8.85%	9.92%	10.41%	10.41% (1/95)
<b>Venture Capital</b>	<b>10.27%</b>	<b>7.23%</b>	<b>3.57%</b>	<b>8.11%</b>	<b>7.10%</b> (1/86)
Burgiss Venture Cap Idx (Qtr Lag)	14.97%	11.40%	7.90%	15.83%	13.64% (1/86)
<b>Keystone Legacy (Qtr Lag) (1)</b>	-	-	-	-	<b>(3.63%)</b> (7/18)

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

Callan

---

**Appendix II – Callan Update**

# Published Research Highlights from 4Q19

## Callan's 2019 Investment Management Fee Study



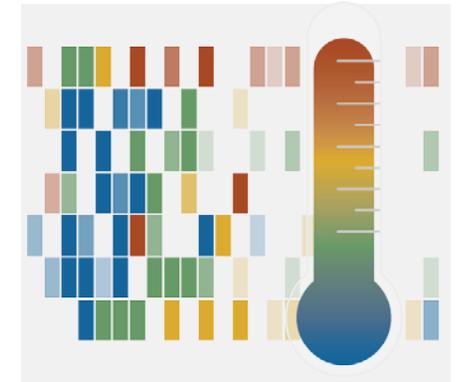
## Long-Dated Private Equity Funds: More Illiquidity Please



## Gold: Real Asset, Risk Mitigator, or Pet Rock?



## Real Estate Indicators: Too Hot to Touch or Cool Enough to Handle?



## Recent Blog Posts

**What You Need to Know About the SECURE Act**

James Veneruso

**ESG: What the Future May Hold**

Mike Stellato

**10 Questions to Address When Evaluating Infrastructure Managers**

Jan Mende

## 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

*Real Assets Reporter* quarterly newsletter

# Callan Institute Events

## Upcoming Conferences, Workshops, and Webinars

### “Callan College”

*These sessions provide institutional investors across the industry with basic- to intermediate-level instruction.*

#### Introduction to Investments

San Francisco, April 21–22, 2020

Chicago, July 21-22, 2020

Chicago, October 13-14, 2020

#### Introduction to Alternative Investments

San Francisco, June 16, 2020

Chicago, November 3, 2020

*All sessions qualify for continuing education credits*

**Register at [callan.com/callan-institute-events](https://www.callan.com/callan-institute-events)**

*“The Introduction to Alternative Investments sessions are 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



### 2020 DC Trends Webinar

**February 20, 2020, at 9:30 am (PST)**

During this webinar, Callan experts Jamie McAllister and Greg Ungerman will offer key insights from our *DC Trends Survey*. They will discuss in detail the SECURE Act, retirement income solutions, and plan leakage as well as other key findings. They will be joined by an industry specialist, Marla Kreindler, a partner at Morgan Lewis.

### Regional Workshops

San Francisco, June 23, 2020

Chicago, June 25, 2020

Atlanta, October 27, 2020

Portland, October 29, 2020

### On-Demand Webinars

**Visit our website for** On-Demand webinar options at <https://www.callan.com/on-demand-webinars/>

Our most recent webinar covered Callan’s Capital Market Assumptions.

## Callan Updates

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

**Total Associates: 194**

### Ownership

- 100% employees
- Broadly distributed across 93 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 55**

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

**AUA: more than \$2.5 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*

