

**Investment**  
**Cost Effectiveness Analysis**  
(for the 5-year period ending December 31, 2018)

**South Carolina Retirement System**  
**Investment Commission**



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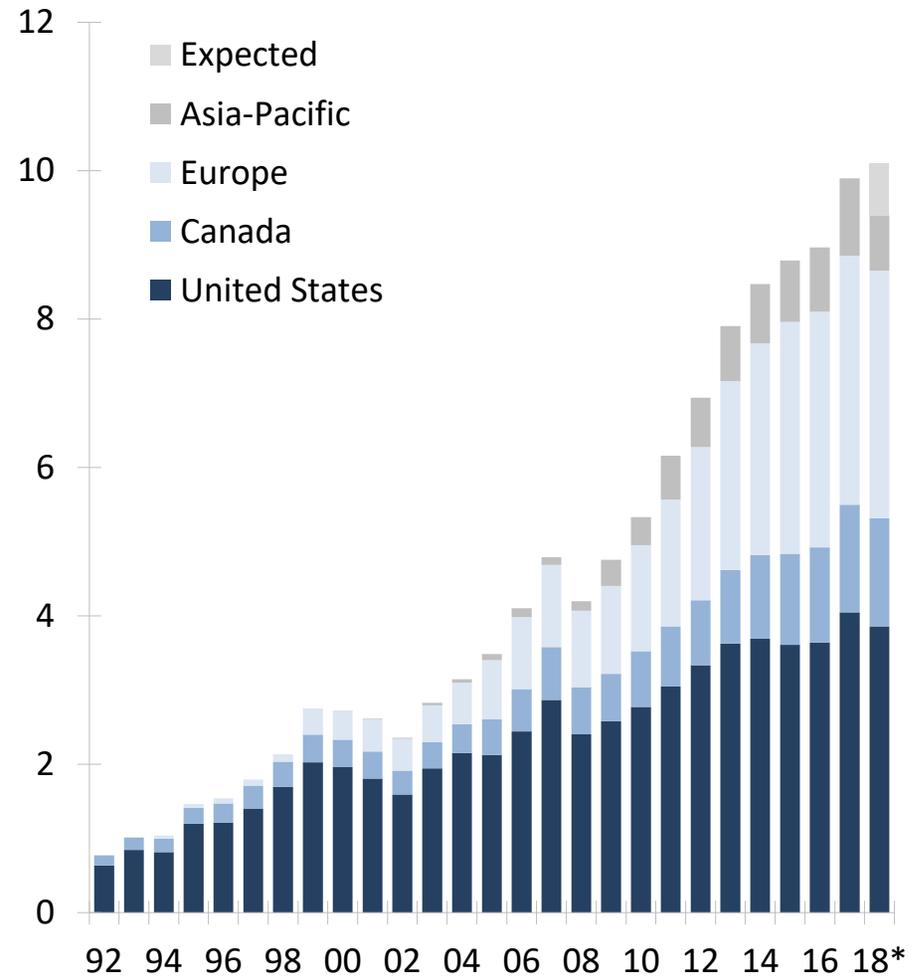
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## This benchmarking report compares your cost and return performance to the funds in CEM's extensive pension database.

- 161 U.S. pension funds participate. The median U.S. fund had assets of \$8.6 billion and the average U.S. fund had assets of \$23.9 billion. Total participating U.S. assets were \$3.9 trillion.
- 76 Canadian funds participate with assets totaling \$1.5 trillion.
- 70 European funds participate with aggregate assets of \$3.3 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.
- 5 Asia-Pacific funds participate with aggregate assets of \$746.4 billion. Included are funds from Australia, New Zealand, China and South Korea.
- 2 Gulf region funds participate.

The most meaningful comparisons for your returns and value added are to the U.S. Public universe which consists of 53 funds.

Participating assets (\$ trillions)

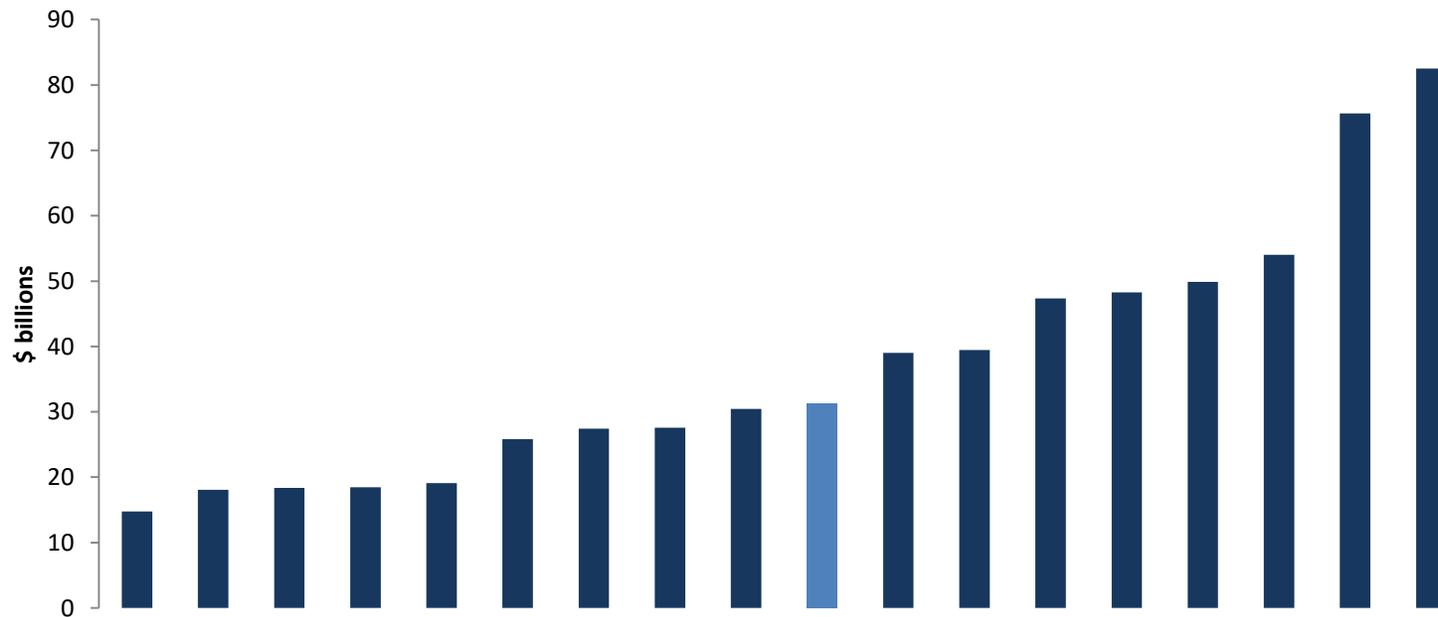


\*2018 assets includes both received and expected data.

# The most valuable comparisons for cost performance are to your custom peer group because size impacts costs.

## Peer group for South Carolina Retirement System Investment Commission

- 18 U.S. Public public sponsors from \$14.8 billion to \$82.5 billion
- Median size of \$30.9 billion versus your \$31.3 billion



To preserve client confidentiality, given potential access to documents as permitted by the Freedom of Information Act, we do not disclose your peers' names in this document.

## What gets measured gets managed, so it is critical that you measure and compare the right things:

### 1. Returns

Why do total returns differ from other funds? What was the impact of your policy mix decisions versus implementation decisions?

### 2. Net value added

Are your implementation decisions adding value (i.e., mostly the effectiveness of active management, as well as the amount of active management versus passive management)?

### 3. Costs

Are your costs reasonable? Costs matter and can be managed.

### 4. Cost effectiveness

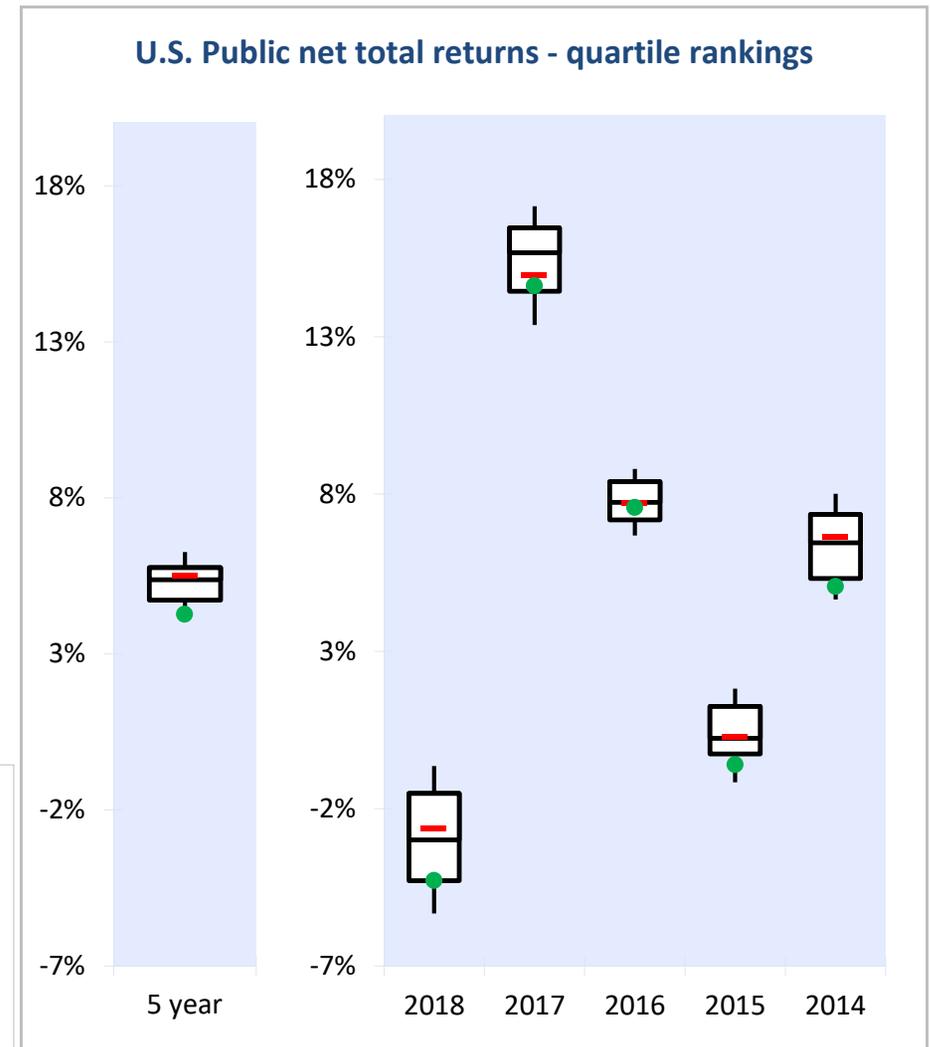
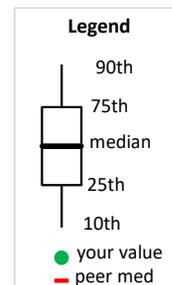
Net implementation value added versus excess cost.

## Your 5-year net total return of 4.3% was below both the U.S. Public median of 5.4% and the peer median of 5.5%.

Total returns, by themselves, provide little insight into the reasons behind relative performance. Therefore, we separate total return into its more meaningful components: policy return and value added.

	Your 5-year
Net total fund return	4.3%
- Policy return	4.5%
= Net value added	-0.2%

This approach enables you to understand the contribution from both policy mix decisions (which tend to be the board's responsibility) and implementation decisions (which tend to be management's responsibility).



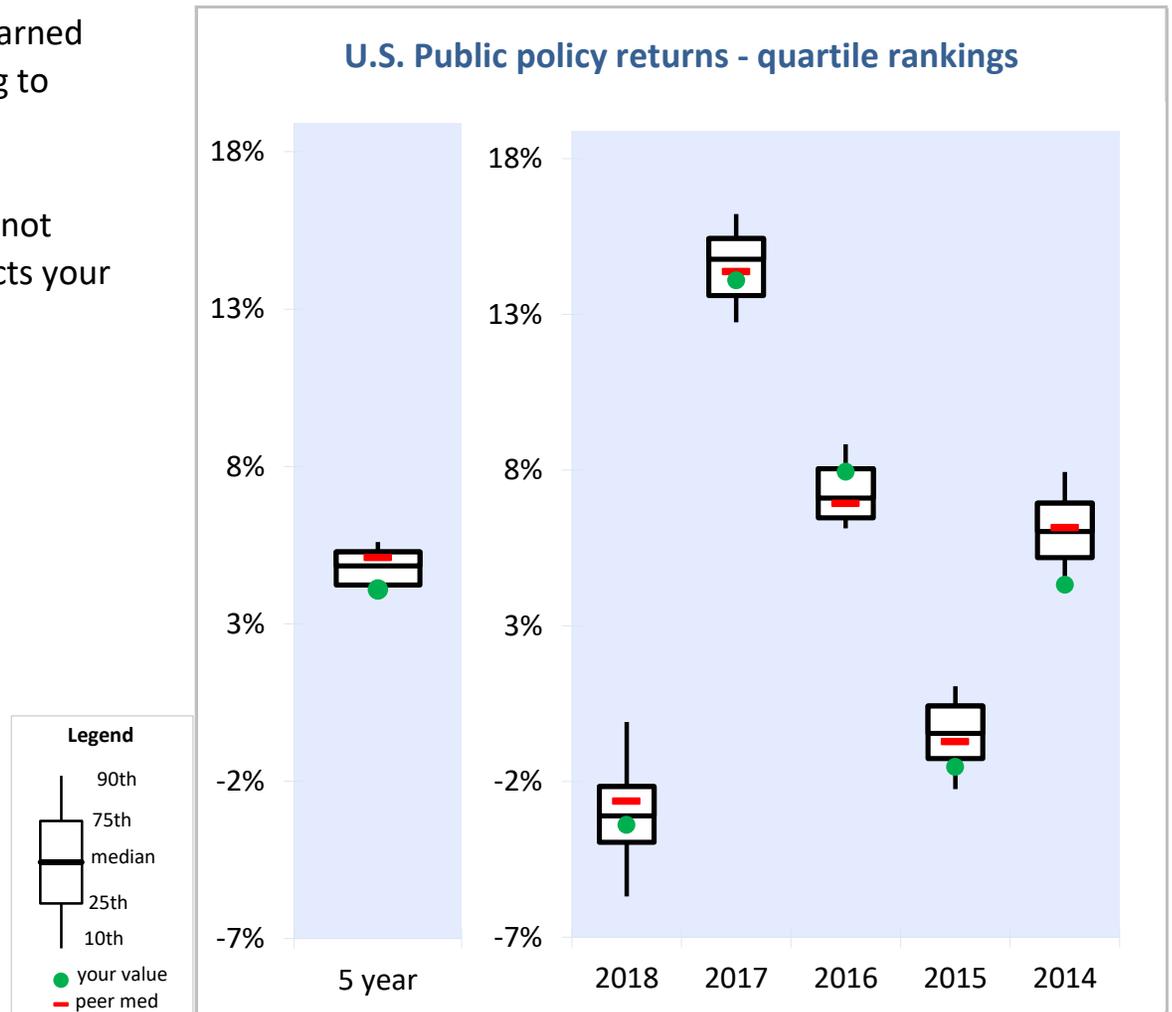
## Your 5-year policy return of 4.5% was below both the U.S. Public median of 5.3% and the peer median of 5.6%.

Your policy return is the return you could have earned passively by indexing your investments according to your policy mix.

Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- Long term capital market expectations
- Liabilities
- Appetite for risk

Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 4.4%, 0.1% lower than your actual 5-year policy return of 4.5%. Mirroring this, your 5-year total fund net value added would be 0.1% higher.

## Your 5-year policy return of 4.5% was below the U.S. Public median of 5.3% primarily because of:

- The negative impact of your lower benchmark returns in public stock and fixed income. Your total stock benchmark returned 4.4% versus the U.S. average of 4.9%, while your total fixed income benchmark returned 2.7% versus the U.S. average of 3.0%.
- Your higher weight in global TAA, which was one of the poorer performing asset classes over the past 5 years. You had 9% versus the U.S. public universe average of 1%.

	5-year average policy mix <sup>1</sup>			5-year bmk. return	
	Your Fund	U.S. Publ Avg.	More/ Less	Your Fund	U.S. Publ Avg.
Aggregated Stock*	37%	49%	-11%		
Total Stock	37%	49%	-11%	4.4%	4.9%
U.S. Bonds	10%	16%	-6%	2.8%	2.6%
High Yield Bonds	6%	2%	4%	3.8%	3.7%
Fixed Income - Emerging	5%	1%	4%	2.0%	2.3%
Global Bonds	1%	1%	-1%	n/a <sup>4</sup>	2.3%
Cash	3%	-1%	4%	0.7%	0.7%
Other Fixed Income	0%	6%	-6%	n/a <sup>4</sup>	n/a <sup>4</sup>
Total Fixed Income	24%	25%	-1%	2.7%	3.0%
Global TAA	9%	1%	8%	2.7%	3.8%
Hedge Funds <sup>2</sup>	5%	4%	1%	2.1%	2.5%
Commodities	1%	1%	0%	n/a <sup>4</sup>	-9.3%
REITs	1%	1%	0%	n/a <sup>4</sup>	6.8%
Real Estate ex-REITs	6%	8%	-2%	11.3%	9.6%
Other Real Assets <sup>3</sup>	1%	2%	-1%	n/a <sup>4</sup>	n/a <sup>4</sup>
Private Equity	8%	8%	0%	14.6%	13.3%
Private Debt	6%	1%	5%	5.6%	4.2%
Total	100%	100%	0%		

\* Policy benchmark switched to a single global equity index for public equities in 2013.

1. 5-year weights are based only on plans with 5 years of continuous data.

2. Does not include Absolute Return hedge fund investments used in Portable Alpha implementation.

3. Other real assets includes natural resources and infrastructure.

4. A value of 'n/a' is shown if asset class return are not available for the full 5 years or if they are broad and incomparable.

## Your policy mix has changed over the past 5 -years. At the end of 2018 your policy mix compared to your peers and the U.S. Public universe as follows:

### Policy asset mix

Asset class	Your fund		Peer avg.	U.S. Publ avg.
	2014	2018	2018	2018
U.S. Stock	0%	16%	23%	20%
Emerging Market Stock	0%	6%	2%	3%
ACWIxUS Stock	0%	4%	11%	7%
Global Stock	31%	18%	6%	10%
<b>Total Stock*</b>	<b>31%</b>	<b>44%</b>	<b>47%</b>	<b>47%</b>
U.S. Bonds	7%	13%	19%	16%
High Yield Bonds	6%	5%	1%	2%
Fixed Income - Emerging	6%	4%	1%	1%
Global Bonds	3%	0%	1%	2%
Cash	5%	1%	1%	-1%
Other Fixed Income	0%	0%	2%	5%
<b>Total Fixed Income</b>	<b>27%</b>	<b>23%</b>	<b>26%</b>	<b>24%</b>
Global TAA	10%	7%	1%	1%
Hedge Funds <sup>1</sup>	8%	1%	3%	5%
Commodities	3%	0%	1%	1%
REITs	0%	3%	1%	1%
Real Estate ex-REITs	5%	6%	8%	8%
Other Real Assets <sup>2</sup>	0%	3%	2%	2%
Private Equity	9%	7%	9%	8%
Private Debt	7%	6%	3%	2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

\* Policy benchmark provided by detailed asset class targets starting 2017.

1. Does not include Absolute Return hedge fund investments used in Portable Alpha implementation.

2. Other real assets includes natural resources and infrastructure.

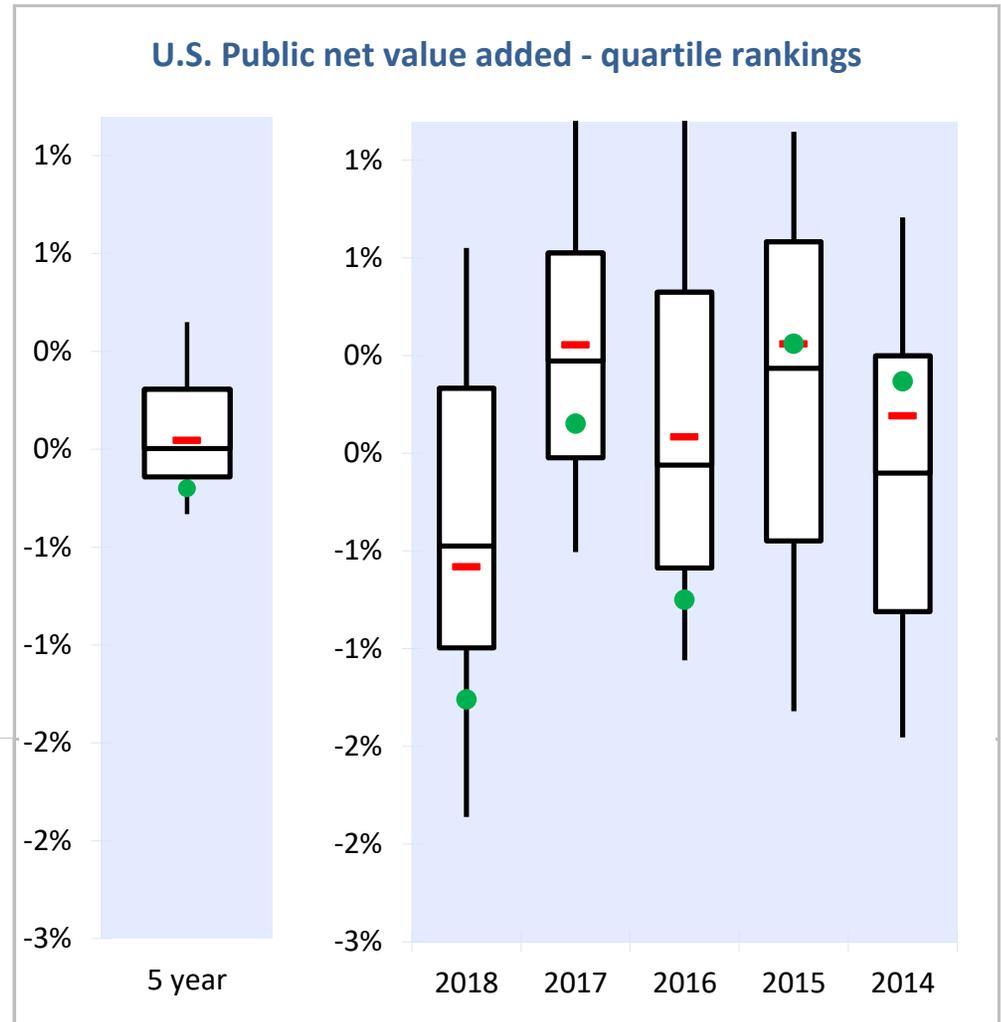
# Net value added is the component of total return from active management. Your 5-year net value added was -0.2%.

Net value added equals total net return minus policy return.

## Value added for South Carolina Retirement System Investment Commission

Year	Net Return	Policy Return	Net value Added
2018	-4.2%	-2.9%	-1.3%
2017	14.7%	14.6%	0.1%
2016	7.6%	8.4%	-0.8%
2015	-0.6%	-1.1%	0.5%
2014	5.1%	4.8%	0.3%
5-Year	4.3%	4.5%	-0.2%

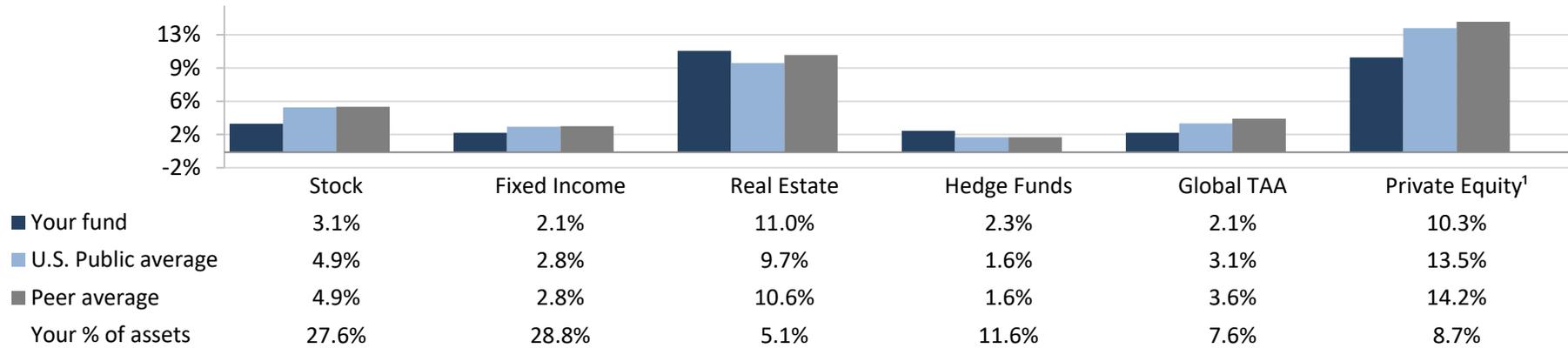
Your 5-year net value added of -0.2% compares to a median of 0.0% for your peers and 0.0% for the U.S. Public universe.



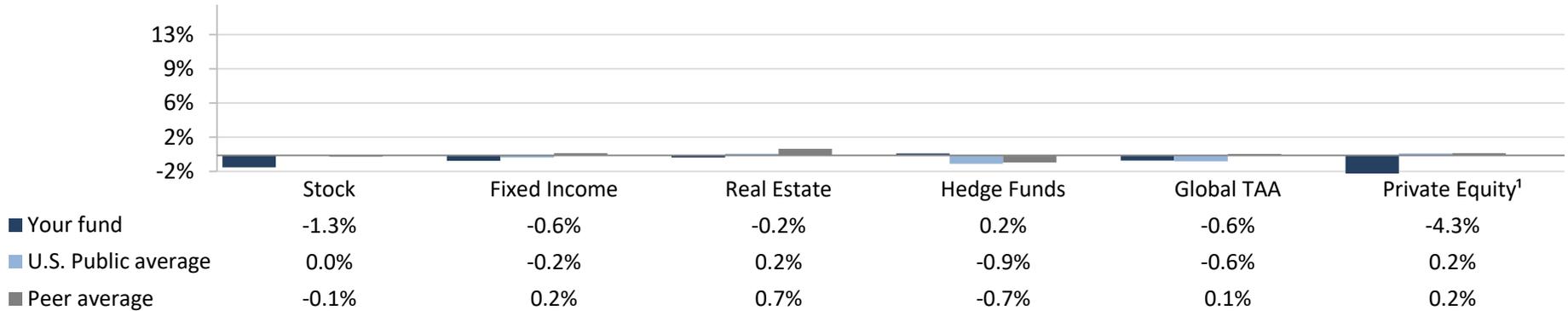
Your value added was impacted by your choice of benchmarks for private equity. CEM suggests using lagged, investable benchmarks for private equity. If your fund used the private equity benchmark suggested by CEM, your 5-year total fund value added would have been 0.1% higher.

# Comparisons of your 5-year net return and net value added by major asset class.

## 5-year average net return by major asset class



## 5-year average net value added by major asset class



1. To enable fairer comparisons, the private equity benchmarks of all participants, except your fund, were adjusted to reflect lagged, investable, public-market indices. If your fund used the private equity benchmark suggested by CEM, your fund's 5-year private equity net value added would have been -2.8%.

## Your investment costs were \$209.6 million or 67.0 basis points in 2018.

Asset management costs by asset class and style (\$000s)	Internal Mgmt		External Management			Total
	Active	Overseeing of external	Passive fees	Active base fees	Perform. fees <sup>2</sup>	
Stock - U.S. Broad/All		823		10,281		11,104
Stock - Emerging		548		9,331		9,879
Stock - Global		1,544	503	5,525		7,572
Stock - ACWI x U.S.				4,697		4,697
Fixed Income - U.S.	10	253		1,533		1,796
Fixed Income - Emerging		440		5,667		6,107
Fixed Income - High Yield		451		5,396		5,847
Cash	447	206		705		1,358
REITs		237		1,759		1,996
Global TAA		885		6,445	4,503	11,833
Hedge Fund - External Active		576		21,960	21,963	44,499
Hedge Fund - FoFs		450		13,552	5,721	19,724
Real Estate ex-REITs - LP <sup>1 2</sup>		578		19,266	16,742	19,845
Real Estate ex-REITs - Co-Invest. <sup>2</sup>		0				0
Infrastructure <sup>2</sup>		191		2,898		3,089
Diversified Private Equity - LP <sup>1 2</sup>		445		27,451	19,305	27,896
Diversified Private Equity - Co-Invest. <sup>2</sup>		120		3,264		3,384
Diversified Private Equity - FoFs <sup>2</sup>		143		4,874	4,159	5,017
Private Credit - LP <sup>1 2</sup>		555		18,769	12,110	19,324
Private Credit - Co-Invest. <sup>2</sup>		0		0		0
Derivatives/Overlays		241	717			958
<b>Total excluding private asset performance fees</b>						205,926 65.9bp
<b>Oversight, custodial and other costs <sup>3</sup></b>						
Oversight of the fund						1,251
Trustee & custodial						1,152
Consulting and performance measurement						764
Audit						102
Other						363
<b>Total oversight, custodial &amp; other costs</b>						3,633 1.2bp
<b>Total investment costs (excl. transaction costs &amp; private asset performance fees)</b>						209,559 67.0bp

### Footnotes

1. Fees are the weighted average management cost calculated using the detailed limited partnership survey provided.

Refer to Appendix A for full details regarding defaults.

2. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.

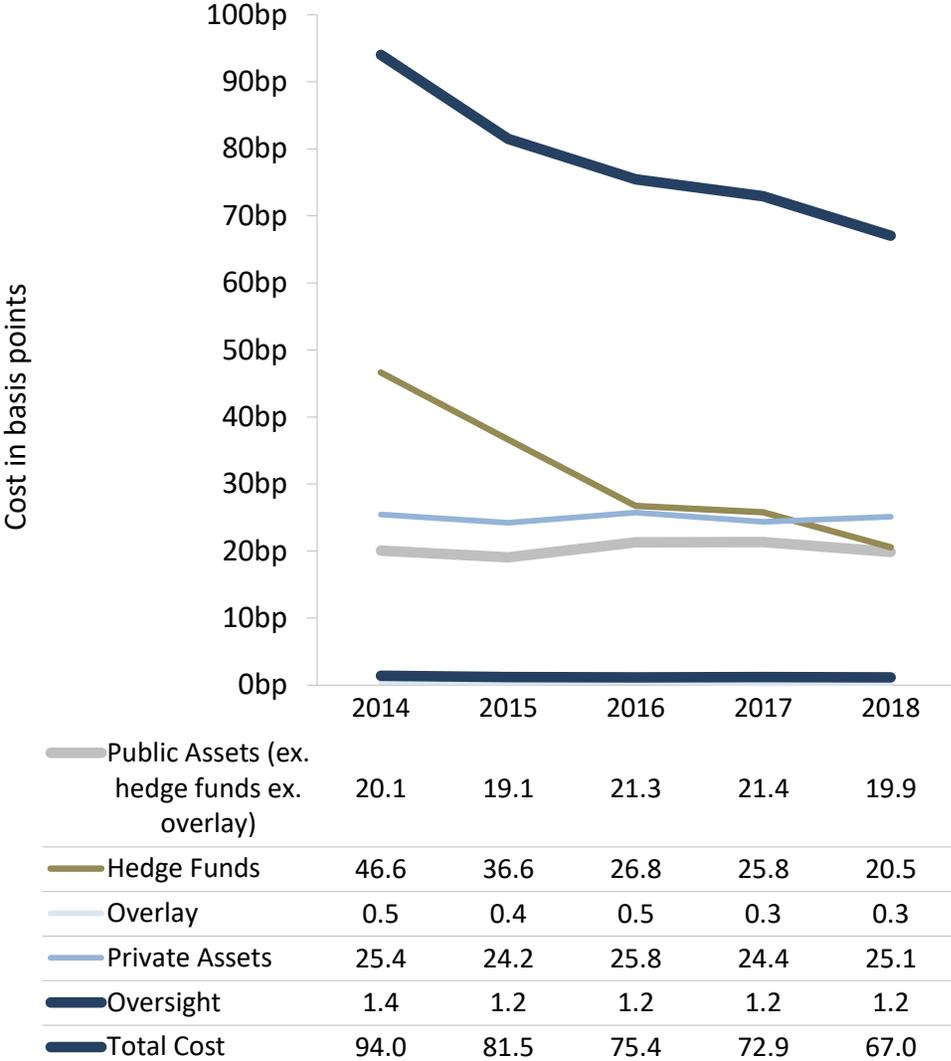
3. Excludes non-investment costs, such as benefit insurance premiums and preparing cheques for retirees.

# Your costs decreased between 2014 and 2018 primarily because of lower hedge fund costs.

Your costs decreased primarily because:

- You decreased your use of funds of funds from 36% of hedge funds, private real assets and private equity in 2014 to 24% in 2018. Funds of funds are higher cost than direct funds.
- You are paying less for hedge funds, partly driven by lower fund of fund usage, and largely driven by paying lower base and performance fees compared to 2014.

Trend in your investment costs



# Your total investment cost of 67.0 bps was above the peer median of 59.9 bps and the U.S. Public median of 58.7 bps.

Differences in total investment cost are often caused by two factors that are often outside of management's control:

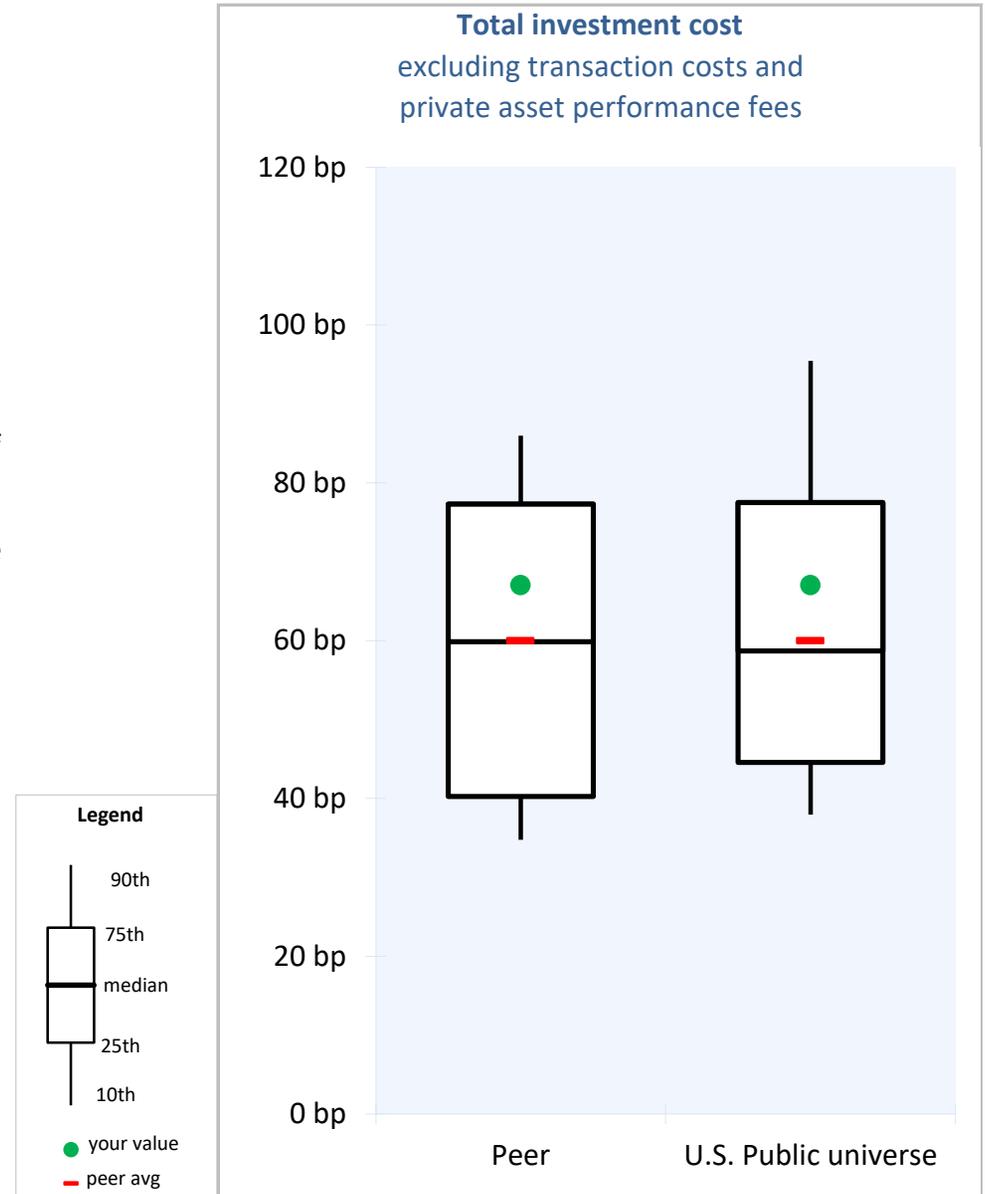
- Asset mix, particularly holdings of the highest cost asset classes: real estate (excl. REITS), infrastructure, hedge funds and private equity. These high cost assets equaled 27% of your funds assets at the end of 2018 versus a peer average of 23%.
- Fund size. Bigger funds have advantages of scale.

Asset mix is set by policy and may include high cost asset classes. Peers who do not have high cost asset classes in their policy mix will have lower total costs. Therefore, policy asset mix is a major driver of total cost.

Fund size is also a major driver of cost because funds with a larger size have scale advantages and are often able to negotiate lower fees.

A total cost comparison to peers which is not adjusted for asset mix and fund size will not be an appropriate measure because of these factors. Used out of context, a total cost comparison could be misleading and lead to the wrong conclusion.

In order to provide plan sponsors with accurate feedback regarding reasonableness of costs, CEM takes asset mix and overall fund size into consideration. CEM calculates a benchmark cost for your fund that considers your unique asset mix and style. This analysis is shown on the following page.



## Benchmark cost analysis suggests that, after adjusting for fund size and asset mix, your fund was low cost by 9.6 basis points in 2018.

Your benchmark cost is an estimate of what your cost would be given your actual asset mix and the median costs that your peers pay for similar services. It represents the cost your peers would incur if they had your actual asset mix.

Your total cost of 67.0 bp was below your benchmark cost of 76.7 bp. Thus, your cost savings were 9.6 bp.

### Your cost versus benchmark

	\$000s	basis points
Your total investment cost	209,559	67.0 bp
Your benchmark cost	239,704	76.7 bp
Your excess cost	(30,146)	(9.6) bp

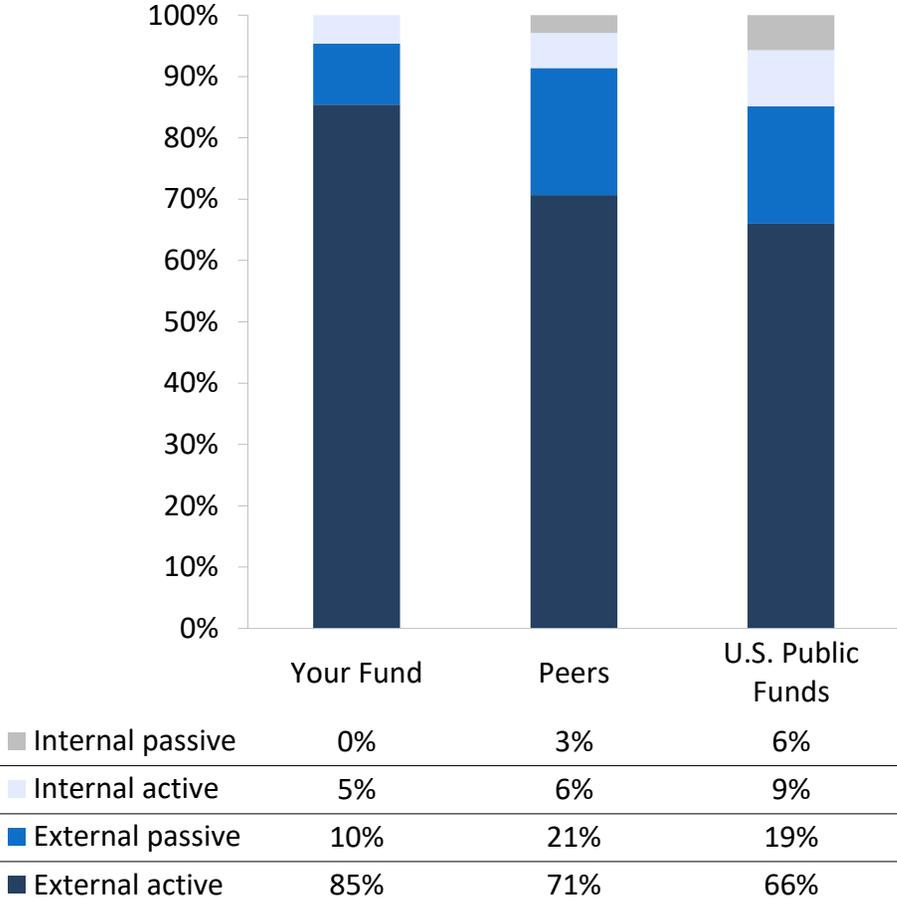
# Differences in cost performance are often caused by differences in implementation style.

Implementation style is defined as the way in which your fund implements asset allocation. It includes internal, external, active, passive and fund of funds styles.

The greatest cost impact is usually caused by differences in the use of:

- External active management because it tends to be much more expensive than internal or passive management. You used more external active management than your peers (your 85% versus 71% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had more in fund of funds. Your 24% of hedge funds, real estate and private equity in fund of funds compared to 11% for your peers.

Implementation style<sup>1</sup>



1. The graph above does not take into consideration the impact of derivatives. The values in the graph above are calculated using average holdings.

## Differences in implementation style and their impacts are shown below.

### Calculation of the cost impact of differences in implementation style

Asset class by implementation choice*	Assets by style (\$mils)	Style %			Benchmark cost		More/ (less) <sup>1</sup>	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)					
	A			B			C		
	Total assets	Passive % of total assets			Passive	Active	More/ (less)	A X B X C	
<u>Passive vs. Active</u>									
Stock - U.S. Broad/All	2,725	0.0%	63.5%	(63.5%)	1.0 bp	36.0 bp	(34.9) bp	6,040	
Stock - Emerging	1,814	0.0%	16.4%	(16.4%)	6.8 bp	61.7 bp	(54.8) bp	1,634	
Stock - Global	5,112	45.5%	12.6%	32.8%	7.6 bp	38.9 bp	(31.3) bp	(5,251)	
Stock - ACWI x U.S.	1,058	0.0%	17.5%	(17.5%)	4.4 bp	41.4 bp	(37.0) bp	687	
Fixed Income - U.S.	870	0.0%	11.6%	(11.6%)	2.1 bp	13.4 bp	(11.3) bp	114	
REITs	784	0.0%	33.5%	(33.5%)	6.9 bp	45.9 bp	(39.0) bp	1,023	
Less passive								4,248	1.4 bp
	Active assets	Internal active % of active assets			Internal active	External active	More/ (less)		
<u>Internal active vs. external active</u>									
Stock - Emerging	1,814	0.0%	1.5%	(1.5%)	11.3 bp	62.5 bp	(51.1) bp	143	
Fixed Income - U.S.	870	3.6%	26.1%	(22.5%)	3.3 bp	17.0 bp	(13.8) bp	270	
REITs	784	0.0%	6.9%	(6.9%)	5.7 bp	48.9 bp	(43.2) bp	234	
Real Estate ex-REITs	1,967	0.0%	1.4%	(1.4%)	27.1 bp	100.5 bp	(73.4) bp	201	
Diversified Private Equity	2,666	0.0%	0.0%	(0.0%)	38.7 bp	160.3 bp	(121.6) bp	0	
Less int. active as % of total active								848	0.3 bp
Total impact of differences in active vs. passive implementation styles								5,096	1.6 bp

\* Implementation styles where you are exactly the same as your peers (i.e. style impact is zero) are not shown.

1. The 'style premium' is calculated as the difference between the style-weighted peer-median cost of the two styles being compared.

## Differences in implementation style and their impacts are shown below.

### Calculation of the cost impact of differences in implementation style

Asset class by implementation choice*	Assets by style (\$mils) <sup>1</sup>	Style %			Benchmark cost		More/ (less) <sup>2</sup>	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)	Internal active	External active			
	A			B			C		
	Active assets	Internal active % of active assets			Internal active	External active	More/ (less)	A X B X C	
<u>Internal active vs. external active</u>									
Stock - Emerging	1,814	0.0%	1.5%	(1.5%)	11.3 bp	62.5 bp	(51.1) bp	143	
Fixed Income - U.S.	870	3.6%	26.1%	(22.5%)	3.3 bp	17.0 bp	(13.8) bp	270	
REITs	784	0.0%	6.9%	(6.9%)	5.7 bp	48.9 bp	(43.2) bp	234	
Real Estate ex-REITs	1,967	0.0%	1.4%	(1.4%)	27.1 bp	100.5 bp	(73.4) bp	201	
Diversified Private Equity	2,666	0.0%	0.0%	(0.0%)	38.7 bp	160.3 bp	(121.6) bp	0	
Less int. active as % of total active								848	0.3 bp
	External assets	Evergreen fund % of external			Ever-green	LP/Co/ FoF	More/ (less)		
<u>Evergreen vs. LP/Co/FoF</u>									
Real Estate ex-REITs	1,967	0.0%	50.4%	(50.4%)	75.9 bp	125.5 bp	(49.6) bp	4,915	
Infrastructure	831	100.0%	42.3%	57.7%	57.8 bp	143.0 bp	(85.2) bp	(4,084)	
Private Credit	2,570	0.0%	31.6%	(31.6%)	89.2 bp	139.7 bp	(50.5) bp	4,097	
Less evergreen % of external								4,928	1.6 bp
<b>Total impact of differences in implementation style on this page</b>								<b>5,776</b>	<b>1.8 bp</b>

\* Implementation styles where you are exactly the same as your peers (i.e. style impact is zero) are not shown.

1. 'Amount fees are based on' is the basis for calculating costs for private assets.

2. The 'style premium' is calculated as the difference between the style-weighted peer-median cost of the two styles being compared.

## Differences in implementation style and their impacts are shown below.

### Calculation of the cost impact of differences in implementation style

Asset class by implementation choice*	Assets by style (\$mils) <sup>1</sup>	Style %			Benchmark cost		More/ (less) <sup>2</sup>	Cost/ (savings) in \$000s A X B X C	bps
		Your fund	Peer average	More/ (less)	LP/Co	FoF			
	A	B			C				
	LP/Co/ FoF assets	LP and Co % of LP/Co/Fund of funds			LP/Co	FoF	More/ (less)		
<u>LP/Co vs. Fund of funds</u>									
Real Estate ex-REITs	1,967	100.0%	98.1%	1.9%	124.2 bp	196.7 bp	(72.5) bp	(266)	
Hedge Funds	3,399	56.1%	81.6%	(25.5%)	131.3 bp	182.4 bp	(51.1) bp	4,425	
Perf. fees (on NAV)	3,399	56.1%	81.6%	(25.5%)	41.7 bp	107.0 bp	(65.3) bp	5,658	
Diversified Private Equity	2,666	83.9%	86.1%	(2.2%)	151.0 bp	218.0 bp	(67.0) bp	390	
Less fund of funds % of LP/Co/FoF								10,207	3.3 bp
	LP/Co assets	Co-investment % of limited partnerships			Co-invest.	Limited Partner.	More/ (less)		
<u>Co-investment vs. LP</u>									
Real Estate ex-REITs	1,967	0.1%	0.4%	(0.3%)	3.4 bp	124.7 bp	(121.3) bp	75	
Diversified Private Equity	2,238	17.7%	3.5%	14.2%	6.9 bp	156.3 bp	(149.4) bp	(4,740)	
Private Credit	2,570	0.0%	0.0%	0.0%	3.2 bp	139.7 bp	(136.5) bp	(3)	
More co-investment % of LP/Co								(4,667)	(1.5) bp
		<u>Overlays</u>							
Impact of higher use of portfolio level overlays								(27)	(0.0) bp
Total impact of differences in implementation style on this page								5,513	1.8 bp

\* Implementation styles where you are exactly the same as your peers (i.e. style impact is zero) are not shown.

1. 'Amount fees are based on' is the basis for calculating costs for private assets.

2. The 'style premium' is calculated as the difference between the style-weighted peer-median cost of the two styles being compared.

# The net impact of paying more/less for external asset management costs saved 15.6 bps.

## Cost impact of paying more/(less) for external asset management

Style	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) \$000s (A X B)
		Your Fund	Peer median	More/ (less)	
<b>External asset management</b>	(A)			(B)	
Stock - U.S. Broad/All	2,725	40.8	36.0	4.8	1,305
Stock - Emerging	1,814	54.5	62.5	(8.0)	(1,452)
Stock - Global*	2,325	5.2	7.6	(2.4)	(564)
Stock - Global	2,787	22.8	38.9	(16.0)	(4,471)
Stock - ACWI x U.S.	1,058	44.4	41.4	3.0	320
Fixed Income - U.S.	839	21.3	17.0	4.2	357
Fixed Income - Emerging	1,457	41.9	37.2	4.7	682
Fixed Income - High Yield	1,493	39.2	33.6	5.6	837
REITs	784	25.5 <sup>1</sup>	48.9	(23.4)	(1,836)
Real Estate ex-REITs	2	3.0	3.4	(0.3)	(0)
Real Estate ex-REITs	1,966	101.0	124.7	(23.7)	(4,658)
Infrastructure	831	37.2	57.8	(20.7)	(1,717)
Hedge Funds	1,907	118.2	131.3	(13.1)	(2,505)
Hedge Funds	1,492	23.6	53.4	(29.8)	(4,447)
Underlying base fees	1,492	70.3	129.0	(58.7)	(8,754)
Global TAA	2,931	40.4 <sup>1</sup>	51.5	(11.1)	(3,265)
Diversified Private Equity	428	35.4	62.0	(26.5)	(1,136)
Underlying base fees	428	81.7	156.0	(74.3)	(3,180)
Diversified Private Equity	397	85.3	6.9	78.4	3,109
Diversified Private Equity	1,841	151.5	156.3	(4.8)	(882)
Private Credit*	0	3.2	3.2	0.0	0
Private Credit	2,569	75.2	139.7	(64.5)	(16,572)
Total impact of paying more/less for external management					(48,829)
Total in bps					(15.6) bp

Footnotes:  
1. You paid performance fees in these asset classes. 'Excluded' indicates that the asset class was excluded from this analysis due to comparability concerns with peers.  
\*Universe median used as peer data was insufficient.  
2. 'Amount fees are based on' is the basis for calculating costs for private assets.

## The net impact of paying more/less for hedge fund performance fees added 1.2 bps.

### Cost impact of paying more/(less) for hedge fund performance fees

	Style	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) \$000s
			Your Fund	Peer median	More/ (less)	
<b><i>Performance fees</i></b>		(A)			(B)	(A X B)
Hedge Funds	active	1,907	115.1	41.7	73.5	14,017
Hedge Funds	FoF	1,492	6.8	24.0	(17.2)	(2,567)
Hedge Funds	FoF	1,492	31.6	83.0	(51.4)	(7,672)
Total for private asset performance fees						3,778
Total in bps						1.2 bp

# The net impact of differences in oversight, custodial & other costs saved 0.2 bps.

## Cost impact of differences in oversight, custodial & other costs

	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) \$000s (A X B)
		Your Fund	Peer median	More/ (less) (B)	
Oversight	31,258	0.4	0.5	(0.1)	
Consulting	31,258	0.2	0.2	0.0	
Custodial	31,258	0.4	0.4	(0.1)	
Audit	31,258	0.0	0.0	(0.0)	
Other	31,258	0.1	0.1	0.0	
<b>Total for oversight, custodial, other<sup>1 2</sup></b>		<b>1.2</b>	<b>1.4</b>	<b>(0.2)</b>	<b>(631)</b>
<b>Total in bps</b>					<b>(0.2) bp</b>

1. Oversight, custodial, and other costs are benchmarked using the peer median cost for the total of the pieces. The individual line items are shown for comparison but not used in the benchmark.

2. Oversight of the fund includes staff salaries, direct expenses (travel, fees paid to directors, director's insurance, etc.). Staff responsible for overseeing a single asset class category (i.e. private equity, stock, etc.) have their costs included with that asset category.

The table below provides a summary of why you are high/low cost relative to the peer-median by asset class.

Why are you high/(low) cost by asset class?

Asset class/category	Impl. style \$000s	Paying more/(less) \$000s	Total \$000s	Total bps
Stock - U.S. Broad/All	6,040	1,305	7,346	27.0 bp
Stock - Emerging	1,778	(1,452)	325	1.8 bp
Stock - Global	(5,251)	(5,035)	(10,286)	(20.1) bp
Stock - ACWI x U.S.	687	320	1,008	9.5 bp
Fixed Income - U.S.	384	356	740	8.5 bp
Fixed Income - Emerging	0	682	682	4.7 bp
Fixed Income - High Yield	0	837	837	5.6 bp
Cash	--	--	Excluded	Excluded
REITs	1,257	(1,836)	(579)	(7.4) bp
Real Estate ex-REITs	4,925	(4,658)	267	1.4 bp
Infrastructure	(4,084)	(1,717)	(5,801)	(69.8) bp
Hedge Funds	10,083	(11,928)	(1,845)	(5.4) bp
Global TAA	0	(3,265)	(3,265)	(11.1) bp
Diversified Private Equity	(4,349)	(2,090)	(6,439)	(24.2) bp
Private Credit	4,094	(16,572)	(12,477)	(48.6) bp
Derivatives and overlays	(27)	0	(27)	(0.0) bp
Oversight, custodial & other	n/a	(631)	(631)	(0.2) bp
<b>Total</b>	<b>15,537</b>	<b>(45,683)</b>	<b>(30,146)</b>	<b>(9.6) bp</b>

**In summary, your fund was low cost because you paid less than peers for external investment management. These savings were slightly offset by your higher cost implementation style.**

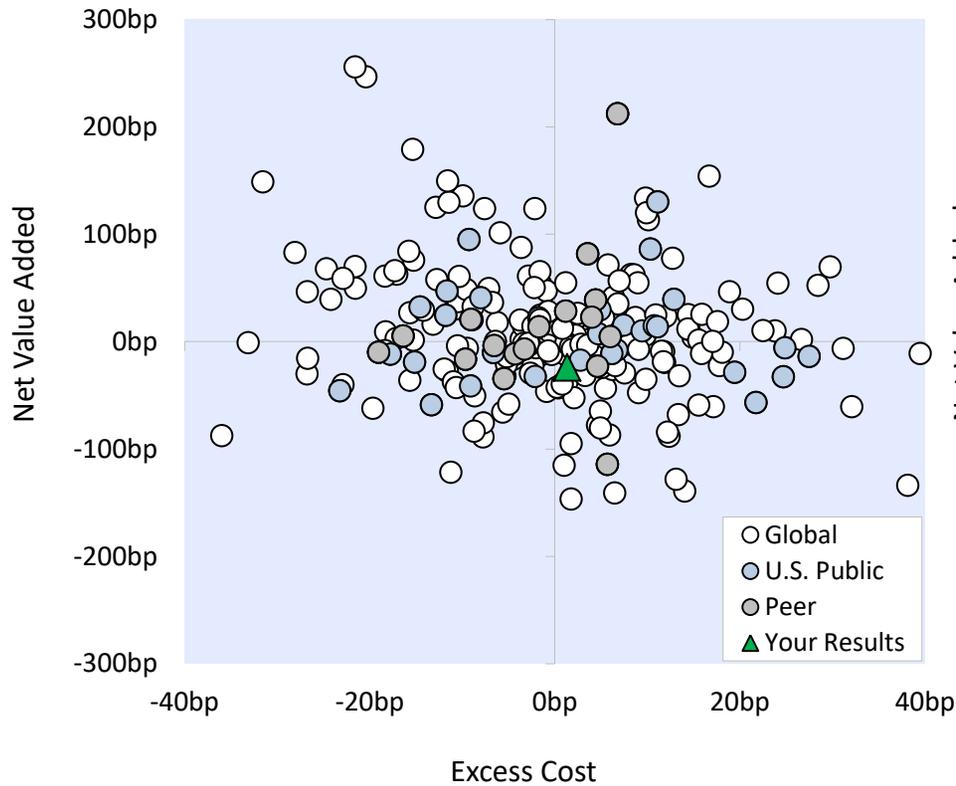
### Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
<b>1. Higher cost implementation style</b>		
• More active management, less lower cost passive	4,248	1.4
• More external management vs. lower cost internal	848	0.3
• More partnerships as a percentage of external	4,928	1.6
• More fund of funds	10,207	3.3
• More co-investment as a percentage of LP/Co	(4,667)	(1.5)
• Less overlays	(27)	(0.0)
	<u>15,537</u>	<u>5.0</u>
<b>2. Paying less than peers for similar services</b>		
• External investment management costs	(48,829)	(15.6)
• Private asset performance fees	3,778	1.2
• Internal investment management costs	(0)	(0.0)
• Oversight, custodial & other costs	(631)	(0.2)
	<u>(45,683)</u>	<u>(14.6)</u>
<b>Total savings</b>	<b>(30,146)</b>	<b>(9.6)</b>

# Your 5-year and 10-year cost effectiveness positions are shown below.

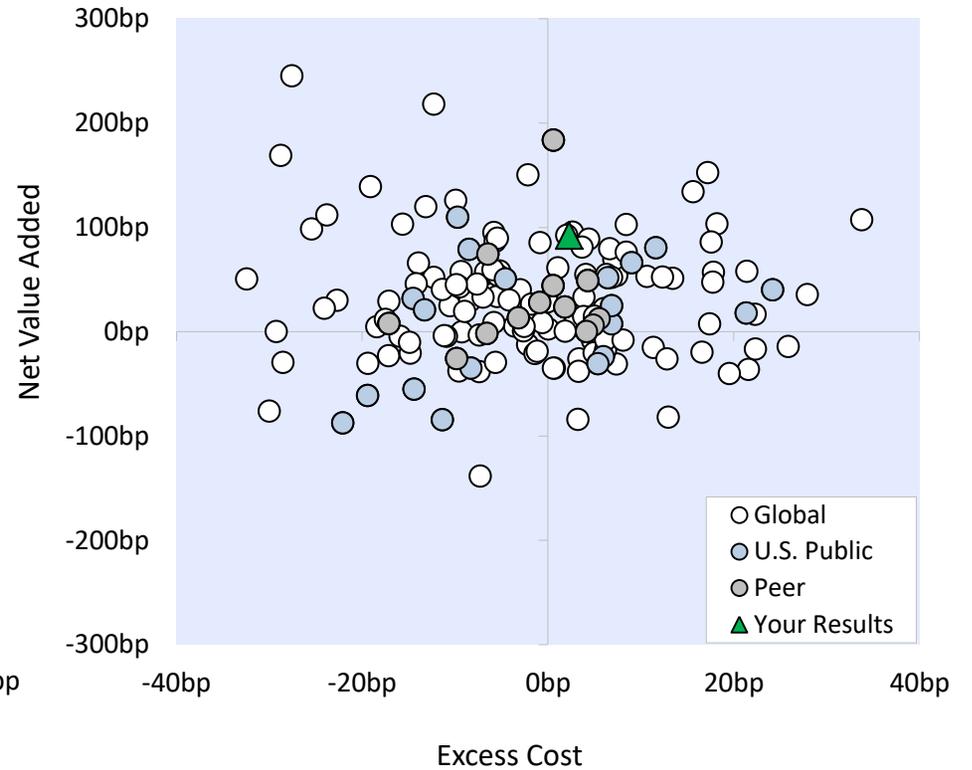
## 5-Year net value added versus excess cost

(Your 5-year: net value added -24 bps, excess cost 1 bps)



## 10-Year net value added versus excess cost

(Your 10-year: net value added 92 bps, excess cost 2 bps<sup>1</sup>)



1. Your 10-year excess cost of 2 basis points is the average of your excess cost for the past 10 years. 2009-2011 excess costs are calculated using regression analysis.

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	10-year
Net value added	-130.1bp	11.1bp	-79.0bp	52.0bp	32.8bp	142.0bp	171.5bp	7.5bp	129.6bp	683.3bp	92.2bp
Excess Cost	-9.6bp	-1.5bp	-1.0bp	5.1bp	13.8bp	2.4bp	-0.5bp	-6.9bp	9.9bp	11.5bp	2.3bp

# Summary of key takeaways

## Returns

- Your 5-year net total return was 4.3%. This was below the U.S. Public median of 5.4% and below the peer median of 5.5%.
- Your 5-year policy return was 4.5%. This was below the U.S. Public median of 5.3% and below the peer median of 5.6%.

## Value added

- Your 5-year net value added was -0.2%. This was slightly below the U.S. Public median of 0.0% and slightly below the peer median of 0.0%.

## Cost and cost effectiveness

- Your investment cost of 67.0 bps was below your benchmark cost of 76.7 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because you paid less than peers for external investment management. These savings were slightly offset by your higher cost implementation style.

# 2

## Description of peer group and universe

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## Peer group

Your peer group is comprised of 18 U.S. Public funds, with assets ranging from \$14.8 billion to \$82.5 billion versus your \$31.3 billion. The median size is \$30.9 billion.

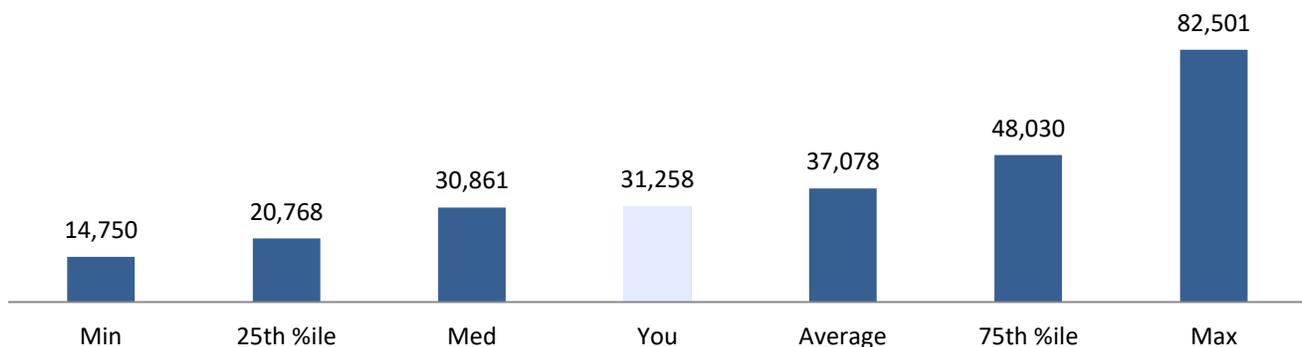
In order to preserve client confidentiality, we do not disclose your peers' names in this document due to the Freedom of Information Act. Your peer group consist of plans with the following characteristics:

### Peer Group Characteristics - 2018

	Your Plan	Peers	U.S. Public
<u>Plan Assets (\$ billions)</u>			
Range	31.3	14.8 - 82.5	0.6 - 326.4
Median		30.9	24.2
<u># of Plans</u>			
Corporate		0	0
Public	1	18	53
Other		0	0
Total		18	53
<u>Implementation style</u>			
% External active	85.4	70.7	66.0
% External passive	10.0	20.7	19.2
% Internal active	4.6	5.7	9.1
% Internal passive	0.0	2.9	5.7
<u>Asset mix</u>			
% Stock	34.3	45.1	45.4
% Fixed Income	18.9	24.7	25.5
% Real Assets	10.7	11.2	10.9
% Private Equity	7.5	9.7	8.5
% Hedge Funds & Other	22.8	6.3	7.7

Your peer group is selected such that your fund size is usually close to the median of your peer group. Size is the primary criteria for choosing your peer group, because size greatly impacts how much you pay for services. Generally, the larger your fund, the smaller your unit operating costs (i.e., the economies of scale impact).

### Total fund assets (\$ millions) - you versus peers

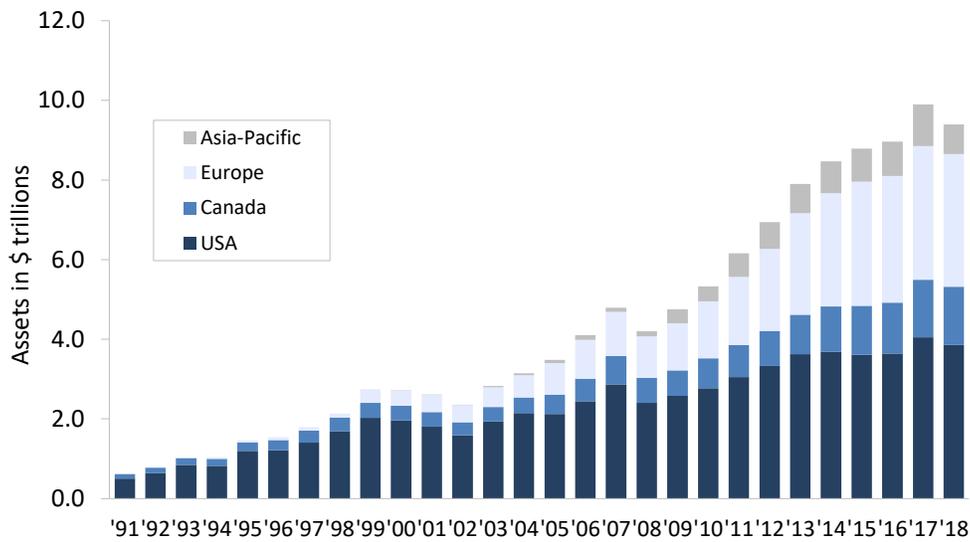


## CEM global universe

CEM has been providing investment benchmarking solutions since 1991. The 2018 survey universe is comprised of 314 funds representing \$9.4 trillion in assets. The breakdown by region is as follows:

- 161 U.S. pension funds with aggregate assets of \$3.9 trillion.
- 76 Canadian pension funds with aggregate assets of \$1.5 trillion.
- 70 European pension funds with aggregate assets of \$3.3 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Denmark, UK, and Ireland.
- 5 Asia-Pacific pension funds with aggregate assets of \$0.7 trillion.

CEM global universe



## Universe subsets

CEM's global survey universe is comprised of 314 funds with total assets of \$9.4 trillion. Your fund's returns and costs are compared to the following two subsets of the global universe:

- Peers - Your peer group is comprised of 18 U.S. Public funds ranging in size from \$14.8 - \$82.5 billion. The peer median of \$30.9 billion compares to your \$31.3 billion.
- U.S. Public - The U.S. Public universe is comprised of 53 funds ranging in size from \$0.6 - \$326.4 billion. The median fund is \$24.2 billion.

### Universe subsets by number of funds and assets

Peer group <sup>1</sup>	Global by type				Global by Country					
	Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total	
<b># of funds</b>										
2018	18	140	131	43	314	161	76	70	7	314
2017	19	151	151	47	349	167	79	90	13	349
2016	19	154	145	47	346	170	80	84	12	346
2015	19	161	148	55	364	176	80	95	13	364
2014	19	164	208	55	427	178	89	147	13	427
<b># of funds with uninterrupted data for:</b>										
1 yr	18	140	131	43	314	161	76	70	7	314
2 yrs	18	129	124	38	291	149	67	68	7	291
3 yrs	18	118	118	37	273	139	63	65	6	273
4 yrs	18	107	110	35	252	130	54	62	6	252
5 yrs	18	99	110	34	243	126	52	59	6	243
<b>Total assets (\$ billions)</b>										
2018	667	1,455	6,165	1,803	9,422	3,855	1,462	3,335	770	9,422
2017	715	1,523	6,709	1,981	10,213	4,047	1,448	3,358	1,360	10,213
2016	645	1,473	5,889	1,861	9,223	3,637	1,284	3,177	1,125	9,223
2015	620	1,445	5,869	1,844	9,159	3,609	1,228	3,122	1,200	9,159
2014	619	1,495	5,643	1,656	8,794	3,689	1,132	2,850	1,123	8,794
<b>2018 asset distribution (\$ billions)</b>										
Avg	37.1	10.4	47.1	41.9	30.0	23.9	19.2	47.6	110.1	30.0
Max	82.5	68.9	1,206.8	588.6	1,206.8	326.4	272.1	1,206.8	569.5	1,206.8
75th %ile	48.0	13.2	38.1	36.4	22.0	24.2	10.9	33.1	73.4	22.0
Median	30.9	4.6	10.9	8.9	7.1	8.6	4.4	9.1	27.1	7.1
25th %ile	20.8	1.9	3.3	2.2	2.5	2.5	1.6	3.6	12.0	2.5
Min	14.8	0.2	0.2	0.0	0.0	0.2	0.0	0.6	3.1	0.0

1. Peer group statistics are for your 2018 peer group only as your peer group may have included different funds in prior years.

## Implementation style, actual mix and policy mix by universe subset

### Implementation style, actual mix and policy mix - 2018 (as a % of year-end assets)

	Your fund <sup>1</sup>	Peer group	Global by type				Global by Country				
			Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
<b>Implementation style</b>											
External Active	79.1	68.5	70.4	56.6	62.8	63.6	70.0	64.8	49.8	41.7	63.6
Fund of funds	6.3	2.2	2.4	3.0	3.0	2.8	2.7	1.9	3.9	1.9	2.8
External passive	10.0	20.7	18.7	18.2	17.1	18.3	18.5	10.9	25.3	22.6	18.3
Internal Active	4.6	5.7	6.3	16.8	12.3	11.5	5.3	17.7	18.3	20.5	11.5
Internal Passive	<u>0.0</u>	<u>2.9</u>	<u>2.2</u>	<u>5.3</u>	<u>4.8</u>	<u>3.8</u>	<u>3.5</u>	<u>4.8</u>	<u>2.7</u>	<u>13.3</u>	<u>3.8</u>
Total	100	100	100	100	100	100	100	100	100	100	100
<b>Actual asset mix</b>											
Stock	34.3	45.1	31.6	47.3	42.7	39.6	36.9	40.6	44.2	46.9	39.6
Fixed Income	21.5	25.1	51.9	26.6	35.0	39.0	42.5	35.9	35.3	31.3	39.0
Global TAA	9.4	0.7	0.8	1.3	0.2	0.9	1.1	0.7	0.8	0.2	0.9
Real Assets	10.7	11.2	6.5	12.5	12.2	9.8	7.2	14.8	10.1	11.8	9.8
Hedge Funds	10.9	4.5	3.7	3.3	2.1	3.3	4.4	2.2	1.9	3.6	3.3
Balanced Funds	0.0	0.0	0.0	0.8	0.0	0.3	0.0	0.0	1.6	0.0	0.3
Risk Parity	0.0	0.7	0.4	0.5	0.7	0.5	0.8	0.2	0.1	0.4	0.5
Private Credit	5.9	3.0	1.4	1.7	3.5	1.8	1.2	2.2	2.7	0.5	1.8
Private Equity	<u>7.5</u>	<u>9.7</u>	<u>3.7</u>	<u>6.1</u>	<u>3.7</u>	<u>4.7</u>	<u>5.8</u>	<u>3.4</u>	<u>3.4</u>	<u>5.3</u>	<u>4.7</u>
Total	100	100	100	100	100	100	100	100	100	100	100
<b>Policy asset mix</b>											
Stock	44.1	46.4	32.0	48.2	43.2	40.3	38.2	40.3	43.7	54.0	40.3
Fixed Income	23.2	25.6	51.7	26.4	35.5	38.9	41.4	37.0	36.3	30.3	38.9
Global TAA	7.0	0.6	0.8	1.4	0.1	0.9	1.0	0.9	0.8	0.1	0.9
Real Assets	12.0	11.8	6.6	13.0	12.0	10.0	7.6	14.7	10.5	9.9	10.0
Hedge funds	1.0	2.8	3.5	2.8	2.1	3.0	4.1	1.8	1.8	1.7	3.0
Balanced Funds	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.5	0.0	0.1
Risk Parity	0.0	0.7	0.3	0.4	0.8	0.4	0.6	0.2	0.2	0.5	0.4
Private Credit	5.8	3.4	1.3	1.8	3.0	1.7	1.2	2.2	2.6	0.2	1.7
Private Equity	<u>7.0</u>	<u>8.8</u>	<u>3.9</u>	<u>5.9</u>	<u>3.4</u>	<u>4.6</u>	<u>6.0</u>	<u>3.0</u>	<u>3.5</u>	<u>3.4</u>	<u>4.6</u>
Total	100	100	100	100	100	100	100	100	100	100	100

1. Since your fund provided average assets, the above tables show your implementation style and asset mix using average assets rather than year-end.

## Implementation style, actual mix and policy mix trends

### Implementation style, actual mix and policy mix - 2014 to 2018 (as a % of year-end assets)

	Your fund <sup>1</sup>					Peer average <sup>2</sup>					U.S. Public average <sup>2</sup>				
	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014
<b>Implementation style</b>															
External active	79.1	76.5	72.4	65.4	64.9	68.5	67.8	67.5	66.5	66.5	62.7	62.3	62.6	63.3	64.1
Fund of funds	6.3	7.8	9.3	9.9	9.3	2.2	2.5	2.5	2.4	2.3	3.0	3.0	3.0	3.0	2.7
External passive	10.0	11.1	12.3	17.8	14.2	20.7	21.0	21.5	22.3	21.7	19.7	20.0	20.0	19.4	18.7
Internal active	4.6	4.6	6.0	7.0	11.5	5.7	6.2	6.1	6.7	7.2	8.5	8.8	8.7	8.6	8.3
Internal passive	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>2.9</u>	<u>2.5</u>	<u>2.5</u>	<u>2.2</u>	<u>2.4</u>	<u>6.1</u>	<u>5.8</u>	<u>5.7</u>	<u>5.6</u>	<u>6.1</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<b>Actual asset mix</b>															
Stock	34.3	32.4	27.5	25.7	18.5	45.1	47.4	46.6	46.5	47.9	45.7	48.4	47.7	48.0	49.5
Fixed income	21.5	26.9	31.7	36.5	42.4	25.1	25.4	26.5	28.9	29.5	25.9	25.4	25.7	26.6	26.7
Global TAA	9.4	6.8	7.0	7.5	7.5	0.7	0.6	0.6	0.7	0.8	1.3	1.0	1.6	1.4	1.7
Real assets	10.7	9.1	6.9	4.2	3.8	11.2	10.7	10.8	9.8	9.2	10.9	10.3	10.6	9.8	9.0
Hedge funds	10.9	11.0	11.5	11.8	12.8	4.5	4.3	4.5	4.4	3.7	4.7	4.4	4.7	5.2	4.7
Balanced Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.6	0.6	0.6	0.9	1.1	0.5	0.5	0.4
Private credit	5.9	5.8	5.8	5.5	5.7	3.0	2.3	2.0	1.3	0.9	2.0	1.7	1.5	1.2	1.1
Private equity	<u>7.5</u>	<u>8.0</u>	<u>9.7</u>	<u>8.9</u>	<u>9.3</u>	<u>9.7</u>	<u>8.6</u>	<u>8.4</u>	<u>7.8</u>	<u>7.4</u>	<u>8.6</u>	<u>7.6</u>	<u>7.7</u>	<u>7.3</u>	<u>6.9</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<b>Policy asset mix</b>															
Stock	44.1	39.8	37.2	34.0	31.0	46.4	47.1	47.4	47.9	48.3	46.6	47.9	48.0	48.6	48.6
Fixed income	23.2	25.0	24.3	22.0	27.0	25.6	26.6	27.1	28.6	29.1	24.3	25.0	25.3	25.5	26.2
Global TAA	7.0	10.0	10.3	10.0	10.0	0.6	0.8	0.9	0.9	0.9	1.0	1.0	1.6	1.4	1.5
Real assets	12.0	10.0	8.2	8.0	8.0	11.8	11.4	11.0	10.2	10.1	11.9	11.4	11.1	10.5	10.2
Hedge funds	1.0	2.0	4.1	10.0	8.0	2.8	2.6	2.6	2.5	2.1	4.3	3.8	4.0	4.3	4.2
Balanced Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Risk Parity	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.6	0.8	1.0	0.6	0.6	0.5
Private credit	5.8	6.0	6.6	7.0	7.0	3.4	2.2	1.9	1.2	1.0	2.3	1.5	1.4	0.9	0.9
Private equity	<u>7.0</u>	<u>7.2</u>	<u>9.2</u>	<u>9.0</u>	<u>9.0</u>	<u>8.8</u>	<u>8.6</u>	<u>8.3</u>	<u>7.9</u>	<u>7.9</u>	<u>8.7</u>	<u>8.3</u>	<u>8.0</u>	<u>8.1</u>	<u>8.0</u>
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

1. Due to the fact that your fund provided average assets, the above tables show your trend in implementation style and asset mix using average assets rather than year-end.

2. Trends are based on the 47 U.S. Public and 18 peer funds with 5 or more consecutive years of data ending 2018.

## Implementation style by asset class

Implementation style impacts your costs, because external active management tends to be more expensive than internal or passive (or indexed) management and fund-of-funds usage is more expensive than direct fund investment.

### Implementation style by asset class - 2018 (as a % of average assets)

	Your fund %						Peer average %						U.S. Public average %					
	External			Internal			External			Internal			External			Internal		
	Active	FOFs	Index	Active	FOFs	Index	Active	FOFs	Index	Active	FOFs	Index	Active	FOFs	Index	Active	FOFs	Index
Stock - U.S. Broad/All	100.0		0.0	0.0	0.0		35.0		61.0	0.0	4.0	29.2		55.0	1.7	14.1		
Stock - U.S. Large Cap							38.9		31.3	14.9	14.9	28.6		42.7	7.0	21.7		
Stock - U.S. Mid Cap							70.1		0.0	17.6	12.3	42.7		24.1	7.8	25.4		
Stock - U.S. Small Cap							86.9		2.3	4.1	6.7	82.4		6.7	7.4	3.4		
Stock - EAFE							42.7		50.6	6.2	0.4	57.6		29.2	5.8	7.5		
Stock - Global	54.5		45.5	0.0	0.0		87.3		12.7	0.0	0.0	64.8		19.5	15.3	0.4		
Stock - Other							87.7		0.0	0.1	12.1	90.4		0.0	6.0	3.6		
Stock - Emerging	100.0		0.0	0.0	0.0		82.6		8.9	1.3	7.2	79.1		12.6	4.1	4.2		
Stock - ACWI x U.S.	100.0		0.0	0.0	0.0		81.0		18.4	0.0	0.6	68.4		28.8	1.1	1.7		
Stock - Aggregate	78.3		21.7	0.0	0.0		56.3		34.2	4.2	5.4	51.4		32.3	5.9	10.4		
Fixed Income - U.S.	96.4		0.0	3.6	0.0		65.0		11.6	23.0	0.4	56.4		16.8	25.5	1.3		
Fixed Income - U.S. Gov't							9.8		72.3	0.0	18.0	24.6		62.0	1.8	11.6		
Fixed Income - U.S. Credits							100.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0		
Fixed Income - EAFE							0.0		0.0	0.0	0.0	93.4		0.0	6.6	0.0		
Fixed Income - Global							70.0		30.0	0.0	0.0	66.4		5.8	27.8	0.0		
Fixed Income - Other							100.0		0.0	0.0	0.0	96.8		0.0	3.2	0.0		
Fixed Income - Long Bonds							100.0		0.0	0.0	0.0	63.1		13.4	7.2	16.3		
Fixed Income - Emerging	100.0		0.0	0.0	0.0		100.0		0.0	0.0	0.0	98.2		1.1	0.7	0.0		
Fixed Income - Inflation Indexed							22.7		74.3	3.0	0.0	31.4		46.9	7.7	14.1		
Fixed Income - High Yield	100.0		0.0	0.0	0.0		100.0		0.0	0.0	0.0	94.1		1.1	4.2	0.5		
Fixed Income - Absolute Return Bond:							0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0		
Fixed Income - Bundled LDI							0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0		
Fixed Income - Convertibles							100.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0		
Cash	32.6			67.4			65.0			35.0		35.2			64.8			
Fixed Income - Aggregate	75.7		0.0	24.3	0.0		64.8		18.8	14.7	1.7	58.9		15.7	22.3	3.0		
Commodities							78.1		21.9	0.0	0.0	76.0		8.3	7.8	7.9		
Infrastructure	100.0	0.0		0.0			93.9	3.0		0.0		82.4	10.0		5.8			
Natural Resources							98.2	0.0		0.0		93.2	0.0		0.2			
REITs	100.0		0.0	0.0	0.0		61.9		33.4	4.7	0.0	70.3		21.1	1.8	6.9		
Real Estate ex-REITs	99.9	0.0		0.0			97.8	0.4		1.6		94.1	0.4		3.9			
Other Real Assets							100.0			0.0		94.5			5.5			
Real Assets	100.0	0.0	0.0	0.0	0.0		93.9	0.4	3.8	1.5	0.0	90.9	0.7	1.9	3.8	0.9		
Hedge Funds	56.1	43.9					85.1	14.9				76.8	23.2					
Global TAA	100.0			0.0			100.0			0.0		94.9			5.1			
Risk Parity							100.0			0.0		88.1			11.9			
Private Credit	100.0	0.0		0.0			100.0	0.0		0.0		99.1	0.0		0.5			
Mortgages							100.0			0.0		27.8			72.2			
Diversified Private Equity	62.9	20.2		0.0			78.6	17.3		0.0		72.9	23.9		0.0			
Venture Capital							53.1	46.9		0.0		59.5	35.4		4.5			
LBO							92.3	2.5		0.0		92.2	3.6		0.0			
Other Private Equity							100.0			0.0		87.3			4.5			
Private Equity	62.9	20.2		0.0			80.6	15.3		0.0		76.0	20.3		0.3			
Total Fund - Avg. Holdings	77.8	6.3	10.0	4.6	0.0		68.0	2.2	20.7	5.7	2.9	62.6	2.9	19.2	9.1	5.7		

## Actual mix

### Actual asset mix - 2014 to 2018 (as a % of total average assets)

	Your fund <sup>1</sup>					Peer average %					U.S. Public average %				
	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014
Stock - U.S. Broad/All	8.7	8.9	6.5	5.8	8.1	12.3	10.7	9.0	9.5	9.8	7.2	7.5	7.2	6.7	6.6
Stock - U.S. Large Cap						9.0	10.3	12.3	12.0	12.7	11.4	11.8	13.4	14.5	15.3
Stock - U.S. Mid Cap						0.7	0.7	0.9	0.8	0.8	1.1	0.8	0.8	0.9	0.8
Stock - U.S. Small Cap						1.4	1.6	1.9	2.2	2.4	2.2	2.2	2.4	2.9	3.2
Stock - EAFE					2.5	5.2	5.4	5.2	5.4	5.7	7.3	6.6	6.4	6.8	7.3
Stock - Global	16.4	16.1	16.1	16.6	4.5	3.3	5.2	4.8	4.9	4.6	5.2	6.7	5.2	4.2	3.8
Stock - Other						0.9	0.8	0.7	0.2	0.3	1.0	1.0	0.9	1.1	1.2
Stock - Emerging	5.8	4.6	3.4	3.2	3.4	3.2	3.1	2.7	2.2	2.4	3.8	3.6	3.0	2.9	3.3
Stock - ACWI x U.S.	3.4	2.8	1.5			9.0	9.3	8.6	8.5	8.7	6.2	7.0	7.5	7.9	7.7
Stock - Aggregate	34.3	32.4	27.5	25.7	18.5	45.1	47.0	46.1	45.9	47.4	45.4	47.3	46.8	48.0	49.3
Fixed Income - U.S.	2.8	4.6	7.1	9.2	8.8	12.8	12.1	13.1	15.2	17.2	12.9	12.4	13.3	14.5	14.1
Fixed Income - U.S. Gov't						2.1	2.2	2.2	1.9	0.4	1.1	1.4	0.9	0.6	0.3
Fixed Income - U.S. Credits						0.7	0.6	0.8	0.1	0.2	0.2	0.2	0.2	0.3	0.1
Fixed Income - EAFE											0.2	0.1	0.1	0.1	0.1
Fixed Income - Global				3.0	3.7	1.0	0.9	1.1	1.5	1.5	1.7	1.7	2.0	1.7	1.9
Fixed Income - Other						0.9	1.2	1.6	1.7	1.6	0.7	0.7	0.9	0.9	1.0
Fixed Income - Long Bonds						0.5	0.4	0.4	0.4	0.4	1.2	1.3	0.9	1.0	1.0
Fixed Income - Emerging	4.7	5.2	5.5	4.7	4.0	1.6	1.6	1.5	1.3	1.1	1.2	1.3	1.0	0.9	0.9
Fixed Income - Inflation Indexed						1.8	2.0	2.2	2.9	2.8	1.9	1.9	1.8	1.9	1.8
Fixed Income - High Yield	4.8	6.7	6.8	5.2	4.0	1.5	1.5	1.2	1.3	1.2	2.0	1.7	1.5	1.5	1.6
Fixed Income - Absolute Return Bonds															
Fixed Income - Bundled LDI															
Fixed Income - Convertibles						0.2	0.2				0.1	0.1			
Cash	6.7	7.3	9.5	12.1	17.9	1.8	2.1	1.8	2.0	2.3	2.4	2.3	2.1	2.0	2.0
Fixed Income - Aggregate	18.9	23.8	28.9	34.2	38.4	24.7	24.8	25.8	28.3	28.7	25.5	25.0	24.7	25.3	24.8
Commodities						0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.5	0.6
Infrastructure	2.0	1.4	0.6			0.4	0.4	0.3	0.2	0.2	0.4	0.6	0.4	0.3	0.3
Natural Resources						0.5	0.7	0.7	0.6	0.5	0.7	1.2	0.9	0.6	0.5
REITs	2.5	1.6	1.0			0.9	0.8	0.9	0.9	1.0	0.8	0.9	0.8	0.8	0.9
Real Estate ex-REITs	6.1	6.0	5.3	4.2	3.8	8.3	7.7	8.0	7.6	6.7	8.0	7.0	7.8	7.3	6.5
Other Real Assets						0.4	0.5	0.4	0.3	0.3	0.4	0.6	0.7	0.7	0.5
Real Assets	10.7	9.1	6.9	4.2	3.8	11.2	10.9	11.0	10.1	9.4	10.9	10.9	11.2	10.2	9.3
Hedge Funds	10.9	11.0	11.5	11.8	12.8	4.5	4.8	5.0	5.0	4.4	4.9	4.9	5.2	5.5	5.4
Global TAA	9.4	6.8	7.0	7.5	7.5	0.7	0.6	0.5	0.6	0.8	1.3	0.9	1.5	1.3	2.1
Risk Parity						0.7	0.6	0.6	0.5	0.5	1.1	1.0	0.7	0.3	0.3
Mortgages						0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Private Credit	5.9	5.8	5.8	5.5	5.7	3.0	2.2	1.9	1.3	0.9	1.8	1.4	1.2	1.0	0.7
Diversified Private Equity	7.5	8.0	9.7	8.9	9.3	7.3	6.6	6.6	6.2	5.9	6.3	5.6	6.2	5.5	5.5
Venture Capital						0.4	0.4	0.4	0.4	0.3	0.5	0.4	0.4	0.5	0.4
LBO						1.9	1.7	1.6	1.4	1.4	1.6	1.5	1.3	1.6	1.4
Other Private Equity						0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2
Private Equity	7.5	8.0	9.7	8.9	9.3	9.7	8.8	8.6	8.1	7.6	8.5	7.7	8.1	7.9	7.6
Derivatives/Overlays Mkt Value	2.6	3.1	2.9	2.2	4.1	0.4	0.4	0.4	0.3	0.3	0.5	0.8	0.5	0.4	0.4
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	18	19	19	19	19	53	60	60	64	68
Median Assets (\$ billions)	31.3	30.5	28.0	29.4	29.2	30.9	31.9	29.0	27.7	28.0	24.2	22.9	17.2	16.6	16.4

1. Your asset mix is based on average assets rather than year-end.

## Policy mix

### Policy asset mix - 2014 to 2018 (as a % of total assets)

	Your fund %					Peer average %					U.S. Public average %				
	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014	2018	2017	2016	2015	2014
Stock - U.S. Broad/All	16.4	14.6				16.3	15.9	14.0	16.0	15.0	10.3	10.3	10.1	10.2	9.5
Stock - U.S. Large Cap						5.5	5.2	6.7	5.5	6.7	7.6	8.2	9.6	9.9	11.1
Stock - U.S. Mid Cap						0.6	0.6	0.5	0.3	0.3	0.7	0.4	0.4	0.4	0.3
Stock - U.S. Small Cap						0.4	0.3	0.3	0.4	0.5	1.3	1.2	1.5	1.6	1.6
Stock - EAFE						3.6	3.3	3.4	4.0	4.2	5.2	4.4	5.1	5.2	5.9
Stock - Global	17.7	17.3	37.2	34.0	31.0	6.5	8.5	9.5	10.1	9.8	10.4	10.9	9.0	9.0	7.8
Stock - Other						0.7	0.2	0.8	0.2	0.2	0.8	0.7	0.8	0.9	0.7
Stock - Emerging	6.3	4.9				1.9	1.8	1.4	1.0	0.8	2.8	2.4	2.2	2.2	2.2
Stock - ACWI x U.S.	3.7	3.0				11.0	10.8	10.3	10.1	10.3	7.3	7.9	8.1	8.8	8.9
Stock - Aggregate	44.1	39.8	37.2	34.0	31.0	46.4	46.7	47.0	47.5	47.8	46.4	46.5	46.7	48.2	48.0
Fixed Income - U.S.	13.0	10.0	10.3	10.0	7.0	16.5	16.2	16.4	18.8	19.3	14.5	14.4	14.7	15.8	15.7
Fixed Income - U.S. Gov't						1.6	1.6	1.6	1.6		0.9	1.1	0.7	0.5	0.4
Fixed Income - U.S. Credits						0.8	0.8	1.0			0.3	0.2	0.3	0.2	
Fixed Income - EAFE											0.2	0.1	0.1	0.1	0.1
Fixed Income - Global					3.0	0.7	0.8	0.8	0.6	1.6	1.5	1.7	1.8	1.5	1.9
Fixed Income - Other						0.3	0.9	1.2	1.4	0.9	0.4	0.6	0.6	0.5	0.6
Fixed Income - Long Bonds						0.4	0.4	0.4	0.4	0.4	1.9	2.1	1.7	1.5	1.5
Fixed Income - Emerging	4.0	5.0	5.2	5.0	6.0	1.3	1.3	1.3	1.1	0.9	1.1	1.1	0.9	0.9	0.9
Fixed Income - Inflation Indexed						1.5	1.8	2.1	2.2	2.7	2.9	2.7	2.7	2.6	2.6
Fixed Income - High Yield	5.2	7.0	6.8	5.0	6.0	1.5	1.6	1.3	1.3	1.9	1.8	2.0	1.9	1.8	1.8
Fixed Income - Absolute Return Bonds															
Fixed Income - Bundled LDI															
Fixed Income - Convertibles						0.2	0.2				0.1	0.1			
Cash	1.0	3.0	2.1	2.0	5.0	0.9	0.8	0.7	0.7	1.0	-1.2	-1.0	-0.9	-0.9	-0.7
Fixed Income - Aggregate	23.2	25.0	24.3	22.0	27.0	25.6	26.3	26.7	28.2	28.7	24.4	25.1	24.5	24.5	24.7
Commodities				3.0	3.0	0.7	0.7	0.8	1.0	1.1	1.1	1.0	1.3	1.0	1.1
Infrastructure	3.0	2.0	1.0			0.4	0.4	0.3	0.2	0.2	0.6	0.7	0.6	0.3	0.4
Natural Resources						0.5	0.5	0.7	0.5	0.4	0.7	1.1	1.0	0.7	0.5
REITs	3.1	2.3	0.7			0.9	0.8	0.7	0.5	0.8	0.7	0.8	0.6	0.6	0.6
Real Estate ex-REITs	5.9	5.7	6.5	5.0	5.0	8.5	8.4	7.9	7.6	7.1	8.3	7.7	7.7	7.4	7.5
Other Real Assets						0.8	0.7	0.8	0.4	0.6	0.7	0.6	0.9	0.8	0.7
Real Assets	12.0	10.0	8.2	8.0	8.0	11.8	11.6	11.3	10.3	10.2	12.1	12.0	12.1	10.9	10.8
Hedge Funds	1.0	2.0	4.1	10.0	8.0	2.8	3.3	3.3	3.4	3.0	4.5	4.6	4.6	4.9	5.1
Global TAA	7.0	10.0	10.3	10.0	10.0	0.6	0.7	0.9	0.9	0.9	1.1	1.0	1.5	1.4	1.7
Risk Parity						0.7	0.7	0.6	0.6	0.5	0.9	0.9	0.6	0.4	0.4
Mortgages						0.2					0.1	0.0	0.1	0.1	0.0
Private Credit	5.8	6.0	6.6	7.0	7.0	3.2	2.1	1.8	1.2	0.9	2.0	1.5	1.2	0.9	0.7
Diversified Private Equity	7.0	7.2	9.2	9.0	9.0	7.5	7.5	6.7	6.5	6.9	6.7	7.1	7.0	7.0	7.4
Venture Capital						0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.3
LBO						0.9	0.9	1.3	1.3	0.9	1.4	0.9	1.2	1.5	0.9
Other Private Equity						0.1	0.0	0.0	0.0		0.1	0.2	0.2	0.1	0.1
Private Equity	7.0	7.2	9.2	9.0	9.0	8.8	8.6	8.3	8.0	7.9	8.5	8.4	8.7	8.8	8.7
Total Fund	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count	1	1	1	1	1	18	19	19	19	19	53	60	60	64	68

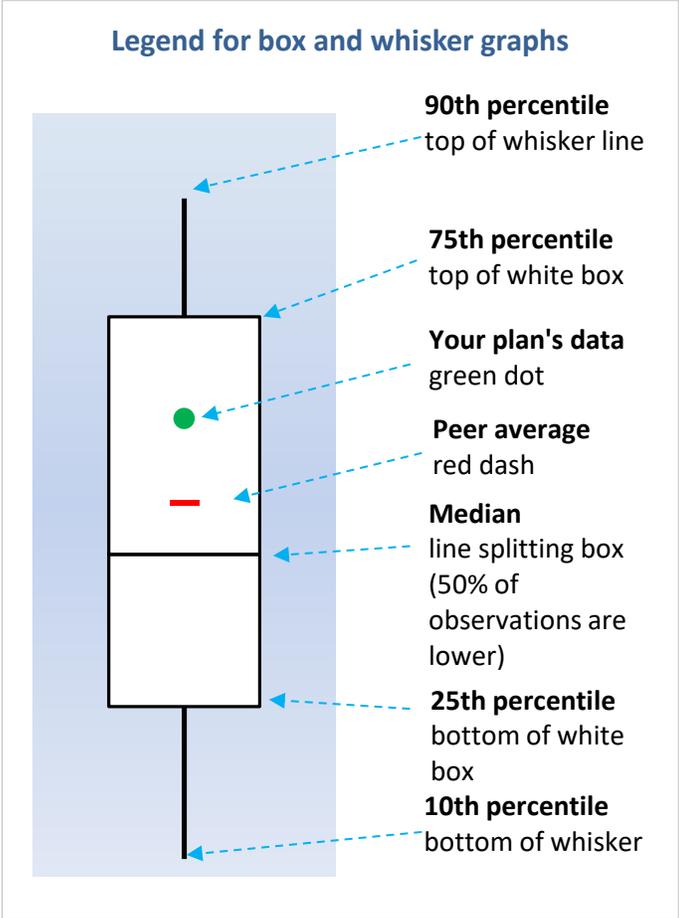
# 3

## Returns, Benchmarks and Value Added

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Appendix - CEM's Private equity benchmark	12

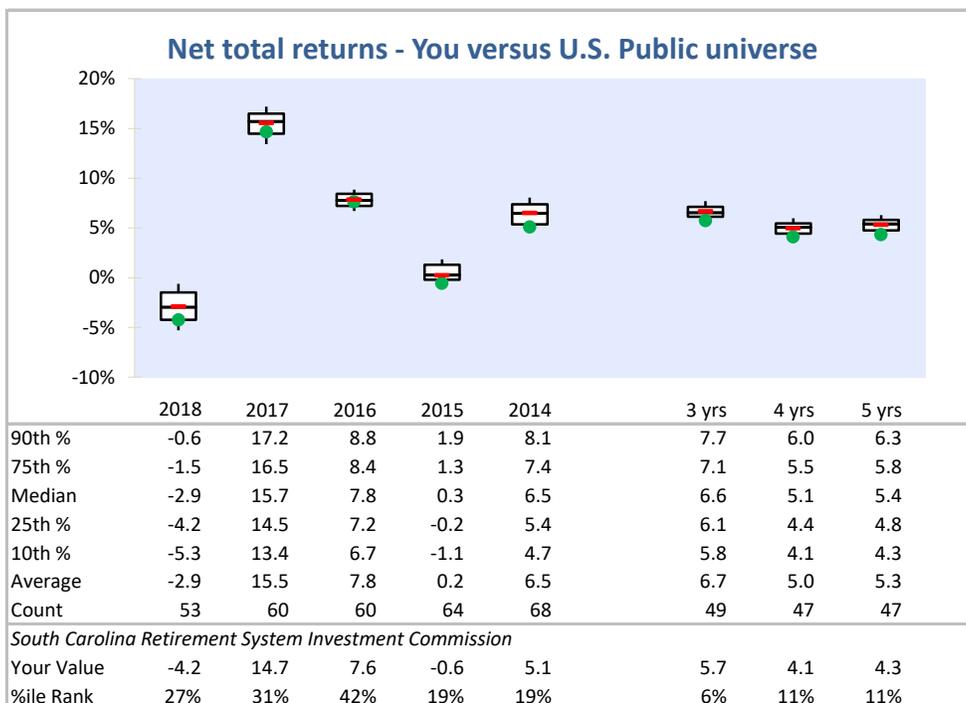
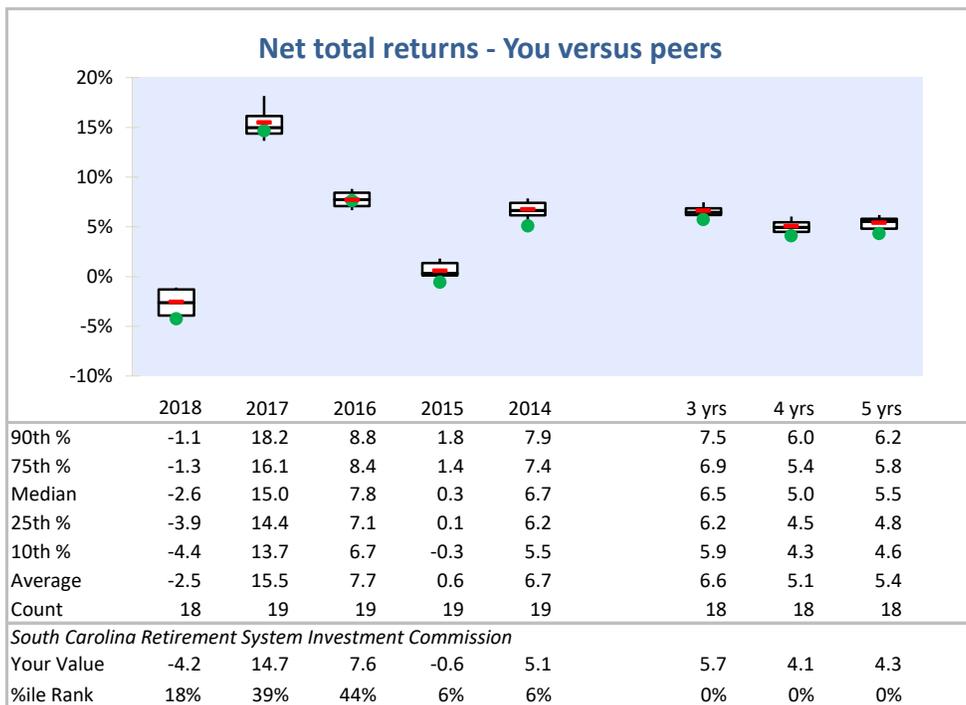
# Interpreting box and whisker graphs

Box and whisker graphs are used extensively in this report because they show visually where you rank relative to all observations. At a glance you can see which quartile your data falls in.



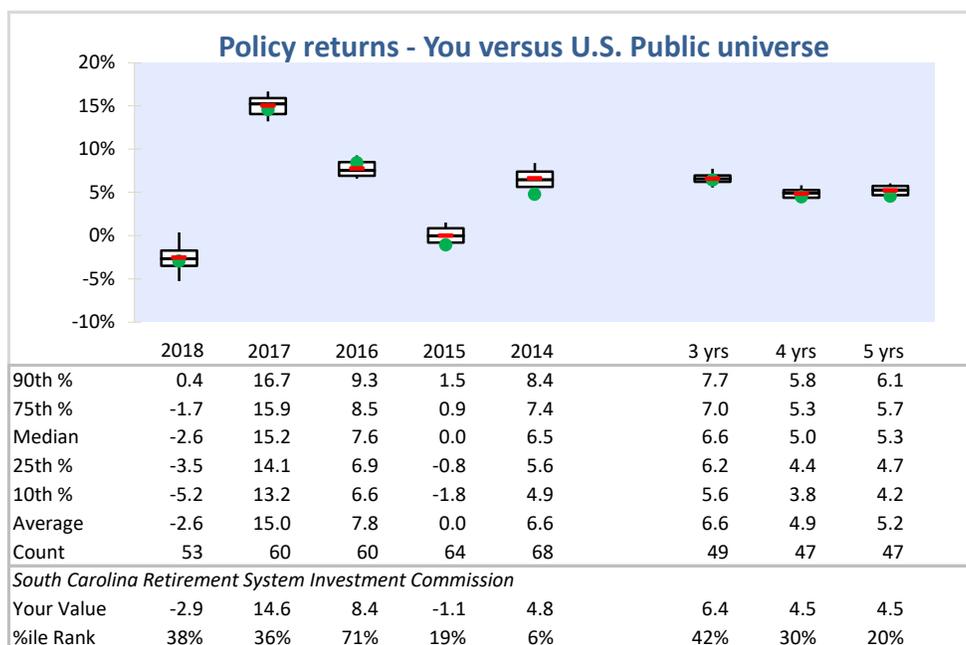
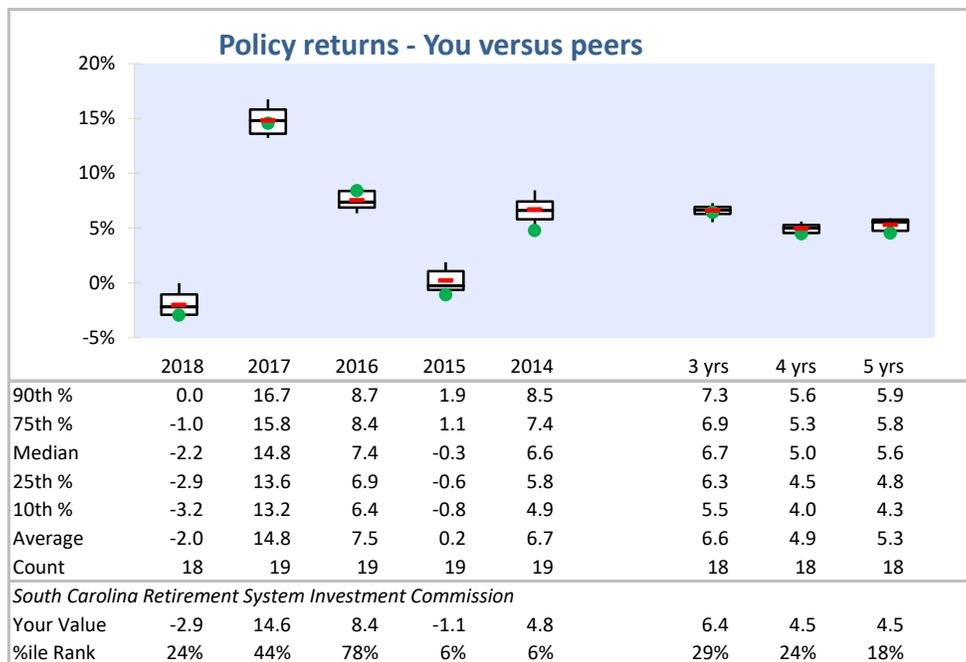
## Net total returns

Your 5-year net total return of 4.3% was below the peer median and below the median of the U.S. Public universe. Comparisons of total return do not help you understand the reasons behind relative performance. To understand the relative contributions from policy asset mix decisions and implementation decisions we separate total return into its more meaningful components - policy return and implementation value added.



## Policy returns

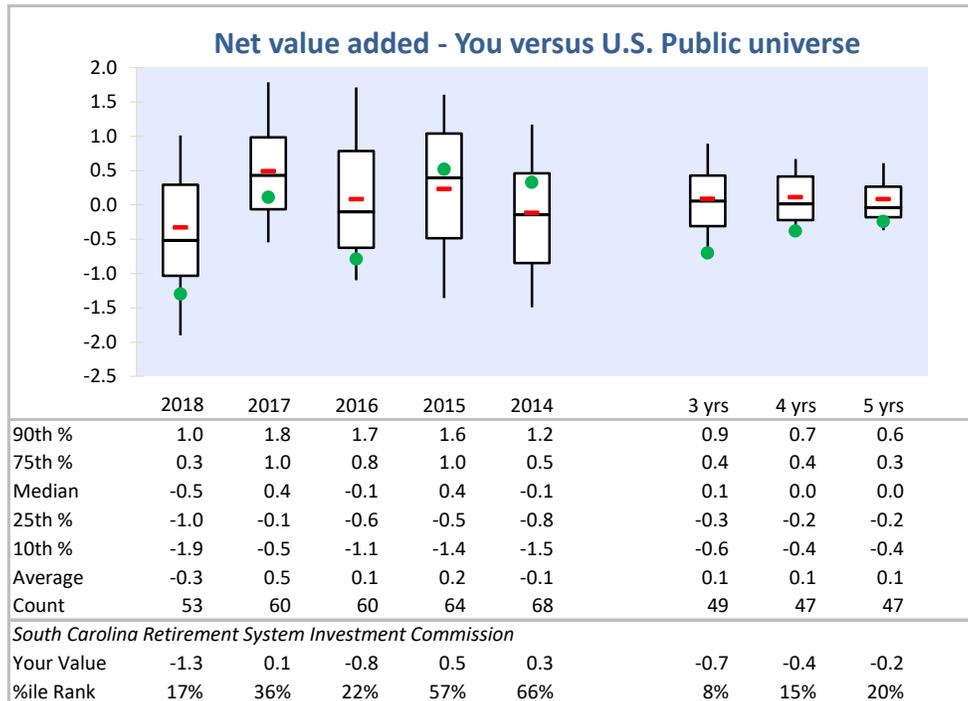
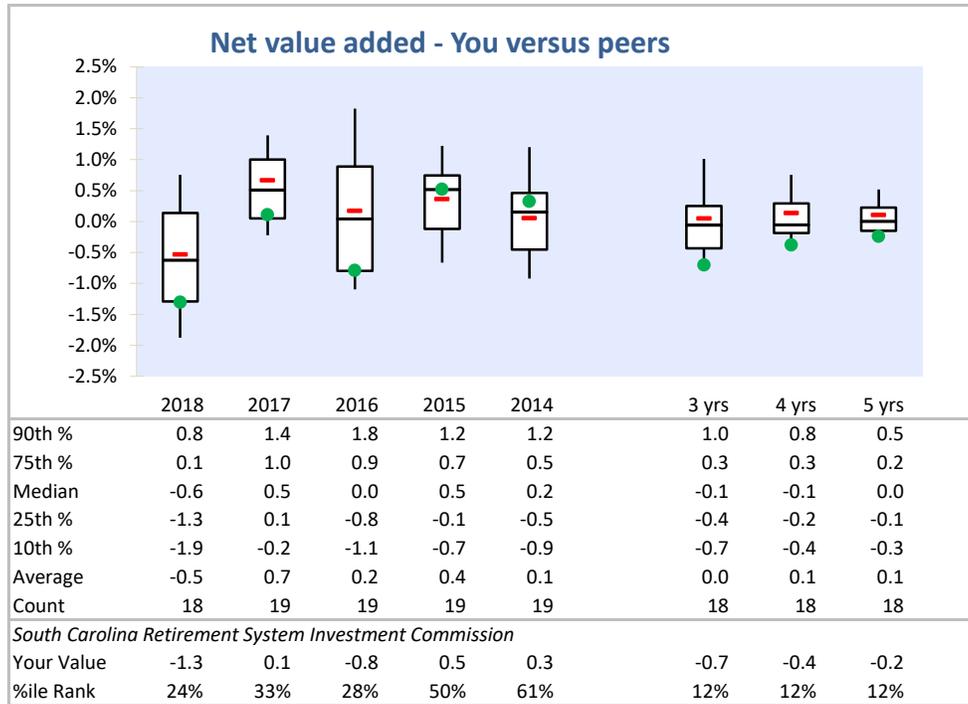
Your 5-year policy return of 4.5% was below the peer median and below the median of the U.S. Public universe. Policy return is the return you would have earned had you passively implemented your policy asset mix decision through your benchmark portfolios.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 4.4%, 0.1% lower than your actual 5-year policy return of 4.5%. Mirroring this, your 5-year total fund net value added would be 0.1% higher. Refer to the appendix of this section for details.

## Net value added

Your 5-year net value added of -0.2% was below the peer median and below the median of the U.S. Public universe. Net value added is the difference between your net total return and your policy return.



## Net returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>
Stock - U.S. Broad/All	-7.9	14.3	9.5	-14.0	8.6	1.5	-5.3	20.5	9.7	-0.7	10.5	6.5	-5.4	20.2	11.1	-0.4	11.0	7.0
Stock - U.S. Large Cap							-5.5	22.1	11.2	1.2	13.2	8.0	-4.6	22.2	11.2	0.9	12.7	8.0
Stock - U.S. Mid Cap							-10.3	18.3	16.5	-3.1	10.0	5.7	-9.2	18.5	13.0	-2.7	8.7	5.3
Stock - U.S. Small Cap							-9.6	15.1	17.9	-3.4	5.1	4.5	-10.6	15.7	18.4	-3.7	5.0	4.7
Stock - EAFE					-5.1		-13.8	25.5	3.0	0.2	-2.1	1.8	-13.8	25.7	2.9	0.0	-3.5	1.6
Stock - Global	-9.0	24.1	6.1	-0.4			-7.9	24.7	7.8	-0.6	5.4	5.6	-9.0	29.5	7.3	-0.9	3.7	5.1
Stock - Other							-13.0	16.2	10.8	-9.6	-2.1	1.0	-11.1	13.4	11.4	-7.4	3.9	1.3
Stock - Emerging	-16.6	37.6	10.1	-15.9	-0.3	1.1	-15.5	36.0	12.4	-15.0	-2.0	1.5	-15.5	36.6	10.6	-13.6	-1.3	1.6
Stock - ACWI x U.S.	-18.6	31.1	5.1				-14.9	29.9	3.8	-2.4	-3.6	1.5	-14.5	28.4	3.6	-2.7	-3.7	1.2
Stock - Aggregate	-11.0	23.9	7.4	-5.4	4.0	3.1	-9.8	24.4	8.9	-1.3	5.4	4.9	-9.9	24.6	9.0	-1.7	5.2	4.9
Fixed Income - U.S.	-0.4	5.0	3.8	0.5	5.1	2.8	-0.2	4.8	3.9	0.4	6.2	3.0	-0.1	4.3	3.8	0.2	5.8	2.8
Fixed Income - U.S. Gov't							0.6	2.5	0.8	0.9	1.0	0.5	-0.3	4.5	1.2	1.0	4.5	0.5
Fixed Income - U.S. Credits							-0.3	4.5	4.4	-1.8	4.4	2.8	1.1	4.5	4.4	-2.2	6.5	2.8
Fixed Income - EAFE													-2.5	9.6	3.8	-8.1	-1.3	0.0
Fixed Income - Global				-0.6	2.7		1.4	5.1	3.2	0.1	6.2	3.0	-1.9	12.7	5.8	-2.0	3.7	4.1
Fixed Income - Other							2.1	5.6	8.3	-0.8	4.7	4.0	0.9	28.3	16.0	0.3	5.6	12.6
Fixed Income - Long Bonds							-3.5	10.5	7.1	-3.9	20.0	5.7	-3.6	9.8	3.4	-3.8	22.3	5.5
Fixed Income - Emerging	-6.6	13.7	11.7	-6.4	0.1	2.1	-5.2	12.5	10.8	-5.7	-0.1	2.7	-5.6	12.3	10.7	-5.3	-0.8	2.3
Fixed Income - Inflation Indexed							-1.5	3.9	5.6	-1.8	4.8	2.1	-1.2	3.6	5.7	-1.7	4.6	2.1
Fixed Income - High Yield	0.5	6.1	8.9	-1.3	1.2	3.0	-1.8	6.9	11.4	-2.7	2.0	3.3	-1.3	7.0	12.5	-3.2	3.3	3.5
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI																		
Fixed Income - Convertibles							-1.9	12.4					-0.7	10.9				
Cash	1.2	0.6	0.4	0.1	0.2	0.5	2.0	0.9	0.8	0.4	0.2	0.9	1.7	0.9	1.3	0.0	0.4	0.8
Fixed Income - Aggregate	-1.2	5.9	5.4	-1.0	1.6	2.1	-0.5	5.1	4.6	-0.3	5.3	2.8	-0.6	5.1	4.7	-0.6	5.3	2.8
Commodities							-10.6	0.7	11.3	-26.1	-17.3	-9.1	-12.5	6.7	12.4	-26.5	-16.6	-9.5
Infrastructure	-6.7	15.0	-5.7				4.7	10.5	5.7	-2.3	13.9	7.0	4.7	12.2	9.0	4.3	15.8	9.0
Natural Resources							1.4	8.5	7.8	-2.9	10.2	4.5	4.5	6.9	6.4	-5.4	11.7	4.3
REITs	-5.2	7.9	-5.0				-4.6	9.8	2.9	1.9	19.3	5.8	-4.6	8.7	4.8	2.2	20.2	6.3
Real Estate ex-REITs	9.9	9.7	1.4	15.5	19.4	11.0	8.7	8.9	8.8	13.9	13.2	10.6	7.4	8.5	8.2	12.8	12.6	9.7
Other Real Assets							-2.8	4.9	14.4	-22.4	6.3	-2.0	-2.5	3.4	12.5	-12.3	3.9	-1.9
Real Assets	3.2	10.2	-0.1	15.5	19.4	9.4	5.0	8.6	8.0	8.2	12.0	8.2	4.4	8.0	8.1	7.3	11.3	7.8
Hedge Funds	2.5	6.0	0.2	0.0	3.0	2.3	-1.8	4.7	1.9	0.1	3.7	1.6	-1.1	5.8	1.5	-0.6	4.1	1.6
Global TAA	-6.9	11.3	7.8	-5.2	4.8	2.1	-4.4	15.1	8.0	-5.3	5.8	3.6	-4.9	12.6	7.3	-3.6	5.3	3.1
Risk Parity							-7.0	12.4	11.8	-8.1	6.8	2.8	-7.6	13.7	12.2	-9.5	7.9	3.2
Mortgages							4.2	10.1	2.3	2.2	5.5		2.5	5.7	2.6	3.7	7.5	4.8
Private Credit	3.3	6.9	8.8	0.6	10.5	6.0	6.0	10.2	8.9	3.1	9.5	6.9	6.4	8.7	7.7	3.6	9.0	5.9
Diversified Private Equity	6.6	13.8	10.6	4.0	17.0	10.3	19.2	17.4	8.8	8.0	17.0	13.7	16.3	17.0	8.9	8.3	15.6	13.0
Venture Capital							21.8	13.7	1.2	13.4	16.0	12.6	19.5	11.4	4.4	14.3	18.7	13.0
LBO							19.2	18.2	11.7	6.7	14.9	15.7	17.4	19.8	14.2	10.2	14.7	13.6
Other Private Equity							5.8	10.4	6.6	2.6	8.7	6.8	23.1	8.8	9.1	8.3	16.4	14.4
Private Equity	6.6	13.8	10.6	4.0	17.0	10.3	19.7	17.9	9.2	8.6	17.3	14.2	17.1	17.4	9.1	9.2	15.7	13.5
Total Fund Return	-4.2	14.7	7.6	-0.6	5.1	4.3	-2.5	15.5	7.7	0.6	6.7	5.4	-2.9	15.5	7.8	0.2	6.5	5.3

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The composite calculation only uses those components with a full year return.

1. The 5-year return number only includes funds with continuous data over the last 5 years.

## Benchmark returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>
Stock - U.S. Broad/All	-5.7	20.6	11.8	0.5	12.6	7.5	-5.1	21.8	12.3	0.9	12.7	8.1	-5.1	21.7	12.4	0.7	12.7	8.0
Stock - U.S. Large Cap							-4.7	21.6	12.2	1.1	13.3	8.3	-4.6	21.5	12.4	1.0	13.2	8.3
Stock - U.S. Mid Cap							-7.5	19.9	13.7	-1.8	11.2	6.6	-8.0	18.8	12.5	-2.0	10.8	6.0
Stock - U.S. Small Cap							-9.8	15.9	19.7	-3.5	5.9	5.1	-9.9	15.2	20.1	-3.4	6.0	5.0
Stock - EAFE					-4.9		-13.8	24.9	2.4	-0.7	-4.1	1.0	-13.7	25.0	2.3	-1.1	-4.2	0.9
Stock - Global	-8.7	22.4	8.2	-2.4	4.2	4.2	-8.9	23.9	8.1	-1.9	4.6	4.6	-9.8	24.2	7.9	-1.7	3.4	4.2
Stock - Other							-10.1	16.4	11.3	-10.2	-2.0	0.8	-9.3	15.2	9.0	-8.3	1.3	0.6
Stock - Emerging	-14.6	36.8	11.2	-14.9	-2.2	1.6	-14.7	37.0	11.3	-15.0	-2.1	1.6	-14.5	37.2	10.9	-14.5	-1.9	1.7
Stock - ACWI x U.S.	-14.2	22.4	4.5				-13.9	27.9	4.4	-5.0	-3.8	1.0	-13.7	27.5	4.5	-4.8	-3.7	1.0
Stock - Aggregate	-8.9	23.5	8.2	-2.4	4.2	4.4	-8.9	23.9	9.3	-1.6	5.5	5.1	-9.3	23.8	9.4	-2.0	5.1	4.9
Fixed Income - U.S.	0.0	5.0	2.7	0.6	6.0	2.8	-0.3	3.9	3.0	0.4	6.1	2.6	-0.1	3.8	2.8	0.4	6.1	2.6
Fixed Income - U.S. Gov't							0.6	2.3	-0.2	0.7	0.8	0.6	-0.2	4.3	0.8	0.8	4.5	0.6
Fixed Income - U.S. Credits							-0.3	3.6	3.2	0.2	5.8	2.5	-0.2	3.6	3.2	-0.7	6.3	2.5
Fixed Income - EAFE													-2.2	8.4	6.1	-6.0	-3.0	-0.1
Fixed Income - Global				1.0	7.6		1.6	3.3	3.7	0.4	4.9	2.4	-0.3	5.2	4.8	-0.9	3.7	2.3
Fixed Income - Other							0.7	4.2	7.8	-1.2	5.9	2.7	0.2	4.5	7.0	0.4	5.8	2.9
Fixed Income - Long Bonds							-4.3	10.4	5.8	-2.8	20.5	5.5	-3.3	8.9	3.2	-1.9	20.1	5.1
Fixed Income - Emerging	-5.2	12.7	10.2	-7.1	0.7	2.0	-4.6	11.6	10.1	-4.0	0.0	2.5	-5.0	11.5	9.8	-4.9	0.2	2.3
Fixed Income - Inflation Indexed							-1.9	3.5	5.4	-1.9	5.0	1.9	-1.3	3.2	5.6	-1.7	4.7	1.9
Fixed Income - High Yield	-0.8	5.8	12.3	-1.2	3.4	3.8	-1.8	7.0	15.5	-3.7	2.6	3.7	-1.6	6.9	15.4	-3.9	2.3	3.7
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI							0.2	13.7					0.3	17.1				
Fixed Income - Convertibles																		
Cash	1.9	0.9	0.3	0.1	0.5	0.7	1.7	0.8	0.3	0.0	0.1	0.6	1.6	1.0	0.4	0.1	0.2	0.7
Fixed Income - Aggregate	-1.0	6.3	6.7	-1.6	3.4	2.7	-0.5	4.5	4.1	-0.3	5.5	2.6	-1.9	5.3	4.8	-0.3	7.2	3.0
Commodities				-24.7	-17.0		-11.9	2.4	10.4	-20.6	-15.0	-7.1	-11.6	3.0	10.9	-22.8	-16.6	-9.3
Infrastructure	-7.9	15.8	12.5				3.2	8.9	7.8	3.3	5.5	5.7	4.2	9.1	6.9	5.0	6.4	6.6
Natural Resources							3.5	7.5	6.6	0.2	5.1	4.2	3.1	6.5	6.8	-0.5	7.0	4.1
REITs	-4.6	5.2	8.5				-3.1	8.9	7.0	3.7	23.4	7.0	-4.0	8.2	6.7	2.9	21.1	6.8
Real Estate ex-REITs	8.4	8.4	10.8	15.7	13.2	11.3	7.5	7.2	9.0	13.5	11.4	9.9	6.8	6.6	8.5	13.7	11.8	9.6
Other Real Assets							0.4	1.0	11.8	-14.3	6.8	1.2	-2.3	1.5	12.5	-8.7	4.7	1.7
Real Assets	0.9	9.2	10.8	0.6	1.8	4.6	4.4	6.6	8.9	8.3	8.8	7.3	3.9	6.2	8.8	7.5	9.1	7.1
Hedge Funds	-6.4	12.6	3.3	-1.1	3.0	2.1	0.7	7.0	3.8	2.2	4.2	2.7	-0.5	7.0	3.2	1.3	4.0	2.5
Global TAA	-6.4	12.6	7.9	-2.0	2.3	2.7	-4.1	10.7	7.5	1.9	4.0	3.5	-3.5	12.6	5.9	1.3	5.0	3.8
Risk Parity							-5.3	12.4	11.8	-8.1	6.8	3.2	-5.8	14.4	9.8	-3.7	6.3	3.5
Mortgages							0.6		2.3	2.2	6.1		0.6	2.9	2.9	2.0	4.4	2.6
Private Credit	6.7	6.8	7.0	2.4	5.4	5.6	2.6	8.9	12.4	-0.1	5.9	5.3	3.0	7.3	11.1	-0.6	4.3	4.3
Diversified Private Equity	17.5	21.9	16.3	0.9	18.0	14.6	21.3	19.7	7.1	3.6	20.0	14.0	20.4	19.2	8.4	3.8	16.4	13.4
Venture Capital							20.6	18.6	5.7	5.2	18.2	13.5	19.4	19.8	7.6	4.2	15.6	13.0
LBO							21.8	18.2	6.9	4.4	18.2	13.5	19.3	19.7	7.8	4.3	15.4	12.7
Other Private Equity							22.6	17.2	9.4	4.6	12.4	13.4	19.5	20.3	8.2	3.6	13.6	12.3
Private Equity	17.5	21.9	16.3	0.9	18.0	14.6	21.5	19.4	7.4	3.7	19.6	14.0	20.4	19.3	8.3	3.8	16.4	13.3
Total Policy Return	-2.9	14.6	8.4	-1.1	4.8	4.5	-2.0	14.8	7.5	0.2	6.7	5.3	-2.6	15.0	7.8	0.0	6.6	5.2

1. The 5-year return number only includes funds with continuous data over the last 5 years.

2. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 4.4%, 0.1% lower than your actual 5-year policy return of 4.5%. Mirroring this, your 5-year total fund net value added would be 0.1% higher. Refer to the appendix of this section for details.

## Net value added by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>	2018	2017	2016	2015	2014	5-yr <sup>1</sup>
Stock - U.S. Broad/All	-2.2	-6.3	-2.3	-14.5	-3.9	-6.0	-0.1	-1.3	-2.5	-1.7	-2.1	-1.6	-0.2	-1.6	-1.2	-1.2	-1.7	-1.0
Stock - U.S. Large Cap							-0.8	0.5	-0.9	0.1	-0.1	-0.3	0.0	0.7	-1.2	-0.1	-0.5	-0.3
Stock - U.S. Mid Cap							-2.8	-1.6	2.8	-1.3	-1.2	-0.9	-1.3	-0.3	0.5	-0.7	-2.2	-0.7
Stock - U.S. Small Cap							0.1	-0.8	-1.8	0.1	-0.8	-0.6	-0.4	0.4	-1.6	-0.3	-1.0	-0.3
Stock - EAFE						-0.2	0.1	0.6	0.7	0.9	0.6	0.6	-0.1	0.6	0.5	1.3	0.3	0.6
Stock - Global	-0.3	1.7	-2.1	1.9			1.0	0.8	-0.3	1.3	0.8	0.9	0.7	5.1	-0.4	0.6	0.5	0.9
Stock - Other							-1.5	0.3	-0.5	0.7	-0.1	0.2	-0.5	-1.8	1.6	0.9	2.8	1.5
Stock - Emerging	-2.1	0.7	-1.1	-1.0	1.9	-0.5	-0.8	-1.0	1.2	0.0	0.1	-0.1	-1.0	-0.5	-0.6	0.8	0.6	-0.1
Stock - ACWI x U.S.	-4.4	8.7	0.6				-1.0	1.8	-0.4	2.8	0.1	0.5	-0.8	0.8	-0.9	2.2	0.0	0.2
Stock - Aggregate	-2.1	0.4	-0.9	-3.1	-0.2	-1.3	-0.9	0.5	-0.3	0.3	-0.1	-0.1	-0.6	0.8	-0.4	0.3	0.1	0.0
Fixed Income - U.S.	-0.4	0.0	1.1	0.0	-0.9	0.0	0.0	0.8	0.9	-0.1	0.2	0.4	0.0	0.5	1.0	-0.2	-0.3	0.2
Fixed Income - U.S. Gov't							0.0	-0.5	-0.2	0.1	0.2	-0.2	-0.1	0.3	-0.1	0.2	0.0	-0.2
Fixed Income - U.S. Credits							0.0	0.9	1.3	-2.0	-1.4	0.2	1.3	0.9	1.3	-1.4	0.2	0.2
Fixed Income - EAFE													-0.3	1.2	-2.3	-2.1	1.7	0.1
Fixed Income - Global				-1.7	-4.9		-0.2	1.8	-0.5	-0.3	0.5	0.6	-1.6	7.5	1.0	-1.2	-0.3	1.8
Fixed Income - Other							1.8	1.4	1.0	-0.5	-0.3	1.4	0.7	23.8	9.7	-0.8	0.2	11.6
Fixed Income - Long Bonds							0.8	0.1	1.3	-1.1	-0.4	0.1	-0.3	0.9	-0.6	-1.8	3.3	0.5
Fixed Income - Emerging	-1.5	0.9	1.6	0.7	-0.6	0.2	-0.6	0.8	0.7	-1.0	-0.1	0.2	-0.9	0.8	0.9	-0.1	-1.0	0.0
Fixed Income - Inflation Indexed							0.4	0.4	0.2	0.1	-0.3	0.2	0.1	0.4	0.1	0.0	-0.3	0.1
Fixed Income - High Yield	1.3	0.3	-3.4	-0.1	-2.2	-0.8	0.0	-0.1	-4.1	0.8	-0.6	-0.5	0.3	0.1	-3.1	0.9	0.7	-0.1
Fixed Income - Absolute Return Bonds																		
Fixed Income - Bundled LDI							-2.1	-1.3					-1.1	-6.1				
Fixed Income - Convertibles																		
Cash	-0.7	-0.2	0.1	0.0	-0.3	-0.2	0.1	0.1	0.5	0.3	0.2	0.3	0.0	-0.2	0.9	0.0	0.1	0.2
Fixed Income - Aggregate	-0.2	-0.4	-1.4	0.7	-1.8	-0.6	0.0	0.7	0.5	0.0	-0.1	0.2	1.3	-0.2	-0.2	-0.4	-1.9	-0.2
Commodities							1.3	-1.6	-1.7	0.0	2.1	0.8	-0.9	3.4	1.1	-3.5	1.5	0.0
Infrastructure	1.2	-0.8	-18.3				1.5	1.6	-2.1	-5.6	8.3	1.3	-0.2	3.1	2.1	-0.7	8.7	2.4
Natural Resources							-2.1	1.0	1.2	-3.1	5.2	0.3	1.4	0.5	-0.5	-4.5	4.7	0.4
REITs	-0.6	2.7	-13.5				-1.5	0.9	-4.0	-1.8	-4.1	-1.3	-0.6	0.5	-1.8	-0.8	-1.0	-0.6
Real Estate ex-REITs	1.5	1.3	-9.4	-0.1	6.3	-0.2	1.2	1.7	-0.1	0.5	1.9	0.7	0.5	1.9	-0.3	-0.8	0.8	0.2
Other Real Assets							-3.1	4.0	2.6	-8.1	-0.5	-3.2	-0.3	1.9	-0.4	-3.6	-0.3	-1.8
Real Assets	2.2	1.1	-10.9	15.0	17.6	4.8	0.5	1.9	-0.9	-0.2	3.2	0.9	0.4	1.7	-0.7	-0.2	2.3	0.7
Hedge Funds	8.9	-6.6	-3.1	1.1	0.0	0.2	-2.0	-2.0	-1.9	-2.1	-0.9	-0.7	-0.5	-1.2	-1.7	-1.9	0.0	-0.9
Global TAA	-0.6	-1.3	-0.1	-3.2	2.6	-0.6	-0.3	4.4	0.5	-7.2	1.8	0.1	-2.0	-0.3	1.3	-4.9	0.3	-0.6
Risk Parity							-1.7	0.0	0.0	0.0	0.0	-0.4	-1.7	-0.6	2.7	-7.0	0.6	-0.2
Mortgages							3.6		0.0	0.0	-0.6		1.9	1.5	-0.5	1.7	3.4	1.9
Private Credit	-3.4	0.1	1.9	-1.8	5.1	0.3	3.5	1.3	-3.0	5.2	3.7	2.4	3.4	1.2	-3.2	4.6	4.3	2.0
Diversified Private Equity	-10.9	-8.0	-5.7	3.2	-1.0	-4.3	-3.3	-2.6	2.5	4.1	-3.1	-0.4	-4.4	-2.3	0.8	4.3	-0.9	-0.4
Venture Capital							2.5	-5.7	-1.8	6.6	-1.8	-0.6	0.4	-8.6	-2.9	9.3	3.8	0.3
LBO							-2.0	-0.7	6.5	1.2	-2.9	2.5	-1.6	-0.1	7.3	5.4	-0.1	1.2
Other Private Equity							-14.9	-8.5	0.7	-7.2	-3.7	-6.6	4.2	-12.0	1.6	4.4	3.4	2.2
Private Equity	-10.9	-8.0	-5.7	3.2	-1.0	-4.3	-1.7	-1.7	2.2	4.5	-2.4	0.2	-3.1	-2.1	0.9	5.1	-0.8	0.2
Total Fund Return	-1.3	0.1	-0.8	0.5	0.3	-0.2	-0.5	0.7	0.2	0.4	0.1	0.1	-0.3	0.5	0.1	0.2	-0.1	0.1

Total net value add is determined by both actual and policy allocation. It is the outcome of total net return (page 6) minus total benchmark return (page 7). Aggregate net returns are an asset weighted average of all categories that the fund has an actual allocation to. Aggregate benchmark returns are a policy weighted average and includes only those categories that are part of your policy fund's mix.

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The composite calculation only uses those components with a full year return.

1. The 5-year return number only includes funds with continuous data over the last 5 years.

2. To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 4.4%, 0.1% lower than your actual 5-year policy return of 4.5%. Mirroring this, your 5-year total fund net value added would be 0.1% higher. Refer to the appendix of this section for details.

## Your policy return and value added calculation - 2018

### 2018 Policy Return and Value Added

Asset class	Policy weight	Benchmark Description	Return	Net return	Value added
Stock - U.S. Broad/All	16.4%	MSCI US IMI Net	-5.7%	-7.9%	-2.2%
Stock - Global	17.7%	MSCI World Net Dividend	-8.7%	-9.0%	-0.3%
Stock - Emerging	6.3%	MSCI Emerging Market IMI Net	-14.6%	-16.6%	-2.1%
Stock - ACWI x U.S.	3.7%	MSCI ACWI x/US Net	-14.2%	-18.6%	-4.4%
Fixed Income - U.S.	13.0%	Barclays US Aggregate	0.0%	-0.4%	-0.4%
Fixed Income - Emerging	4.0%	50% JPM EMBI Global Diversified/50% JPM-GBI-I	-5.2%	-6.6%	-1.5%
Fixed Income - High Yield	5.2%	50%Bar U.S. High Yield 2% / 50%S&P LSTA Lever:	-0.8%	0.5%	1.3%
Cash	1.0%	BofA Merrill Lynch 3 Month US Treasury Bill G00	1.9%	1.2%	-0.7%
Infrastructure	3.0%	Dow Jones Brookfield Global Infrastructure Net I	-7.9%	-6.7%	1.2%
REITs	3.1%	Your REIT benchmark	-4.6%	-5.2%	-0.6%
Real Estate ex-REITs	5.9%	NCREIF ODCE Index + 100 bps	8.4%	9.9%	1.5%
Hedge Funds	1.0%	50% MSCI World Net/50% Barclays US Aggregate	-6.4%	2.5%	8.9%
Global TAA	7.0%	50% MSCI World Net/50% Barclays US Aggregate	-6.4%	-6.9%	-0.6%
Private Credit	5.8%	S&P/LSTA + 150 Bps 3 Month Lag	6.7%	3.3%	-3.4%
Diversified Private Equity	7.0%	80% Russell 3000 / 20% MSCI EAFE Lagged + 300	17.5%	6.6%	-10.9%
<b>Total</b>	<b>100.0%</b>				
Net Actual Return (reported by you)					-4.2%
Calculated Policy Return = sum of (policy weights X benchmark returns)				-2.9%	
Adjustment to reflect rebalancing and overlay impacts				<u>0.0%</u>	
Policy Return (reported by you)					<u>-2.9%</u>
Net Value Added (Net Return - Policy Return)					-1.3%

## Your policy return and value added calculations - 2014 to 2017

### 2017 Policy Return and Value Added

Asset class	Policy	Benchmark		Net return	Value added
	weight	Description	Return		
Stock - U.S. Broad/All	14.6%	MSCI US IMI Ne	20.6%	14.3%	-6.3%
Stock - Global	17.3%	MSCI World Net	22.4%	24.1%	1.7%
Stock - Emerging	4.9%	MSCI Emerging I	36.8%	37.6%	0.7%
Stock - ACWI x U.S.	3.0%	MSCI ACWI x/U:	22.4%	31.1%	8.7%
Fixed Income - U.S.	10.0%	Barclays US Agg	5.0%	5.0%	0.0%
Fixed Income - Emerging	5.0%	50% JPM EMBI (	12.7%	13.7%	0.9%
Fixed Income - High Yield	7.0%	50%Bar U.S. Hig	5.8%	6.1%	0.3%
Cash	3.0%	Bofa Merrill Lyn	0.9%	0.6%	-0.2%
Infrastructure	2.0%	Dow Jones Broo	15.8%	15.0%	-0.8%
REITs	2.3%	Your REIT bench	5.2%	7.9%	2.7%
Real Estate ex-REITs	5.7%	NCREIF ODCE In	8.4%	9.7%	1.3%
Hedge Funds	2.0%	50% MSCI Work	12.6%	6.0%	-6.6%
Global TAA	10.0%	50% MSCI Work	12.6%	11.3%	-1.3%
Private Credit	6.0%	S&P/LSTA + 150	6.8%	6.9%	0.1%
Diversified Private Equity	7.2%	80% Russell 300	21.9%	13.8%	-8.0%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					14.7%
Calculated policy return (sum: Policy weights x benchmarks)				15.3%	
Adjustment to reflect rebalancing and overlay impacts				-0.8%	
Policy return (reported by you)					<u>14.6%</u>
Net Value Added (Net Return - Policy Return)					0.1%

### 2015 Policy Return and Value Added

Asset class	Policy	Benchmark		Net return	Value added
	weight	Description	Return		
Stock - U.S. Broad/All		Russell 3000	0.5%	-14.0%	-14.5%
Stock - EAFE					
Stock - Global	34.0%	MSCI All Countr	-2.4%	-0.4%	1.9%
Stock - Emerging		MSCI Emerging I	-14.9%	-15.9%	-1.0%
Fixed Income - U.S.	10.0%	Barclays US Agg	0.6%	0.5%	0.0%
Fixed Income - Global		Barclays Global	1.0%	-0.6%	-1.7%
Fixed Income - Emerging	5.0%	50% JPM EMBI (	-7.1%	-6.4%	0.7%
Fixed Income - High Yield	5.0%	33%Bar U.S. Hig	-1.2%	-1.3%	-0.1%
Cash	2.0%	Bofa Merrill Lyn	0.1%	0.1%	0.0%
Commodities	3.0%	Bloomberg Com	-24.7%		
Real Estate ex-REITs	5.0%	NCREIF ODCE In	15.7%	15.5%	-0.1%
Hedge Funds	10.0%	HFRI Fund Weig	-1.1%	0.0%	1.1%
Global TAA	10.0%	50% MSCI Work	-2.0%	-5.2%	-3.2%
Private Credit	7.0%	S&P/LSTA + 150	2.4%	0.6%	-1.8%
Diversified Private Equity	9.0%	80% Russell 300	0.9%	4.0%	3.2%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					-0.6%
Calculated policy return (sum: Policy weights x benchmarks)				-1.2%	
Adjustment to reflect rebalancing and overlay impacts				0.1%	
Policy return (reported by you)					<u>-1.1%</u>
Net Value Added (Net Return - Policy Return)					0.5%

### 2016 Policy Return and Value Added

Asset class	Policy	Benchmark		Net return	Value added
	weight	Description	Return		
Stock - U.S. Broad/All		MSCI US Net & I	11.8%	9.5%	-2.3%
Stock - Global	37.2%	MSCI ACWI Net	8.2%	6.1%	-2.1%
Stock - Emerging		MSCI Emerging I	11.2%	10.1%	-1.1%
Stock - ACWI x U.S.		MSCI ACWI x/U:	4.5%	5.1%	0.6%
Fixed Income - U.S.	10.3%	Barclays US Agg	2.7%	3.8%	1.1%
Fixed Income - Emerging	5.2%	50% JPM EMBI (	10.2%	11.7%	1.6%
Fixed Income - High Yield	6.8%	50%Bar U.S. Hig	12.3%	8.9%	-3.4%
Cash	2.1%	Bofa Merrill Lyn	0.3%	0.4%	0.1%
Infrastructure	1.0%	Dow Jones Broo	12.5%	-5.7%	-18.3%
REITs	0.7%	Your REIT bench	8.5%	-5.0%	-13.5%
Real Estate ex-REITs	6.5%	NCREIF ODCE In	10.8%	1.4%	-9.4%
Hedge Funds	4.1%	HFRI Fund Weig	3.3%	0.2%	-3.1%
Global TAA	10.3%	50% MSCI Work	7.9%	7.8%	-0.1%
Private Credit	6.6%	S&P/LSTA + 150	7.0%	8.8%	1.9%
Diversified Private Equity	9.2%	80% Russell 300	16.3%	10.6%	-5.7%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					7.6%
Calculated policy return (sum: Policy weights x benchmarks)				8.5%	
Adjustment to reflect rebalancing and overlay impacts				-0.1%	
Policy return (reported by you)					<u>8.4%</u>
Net Value Added (Net Return - Policy Return)					-0.8%

### 2014 Policy Return and Value Added

Asset class	Policy	Benchmark		Net return	Value added
	weight	Description	Return		
Stock - U.S. Broad/All		Russell 3000 (de	12.6%	8.6%	-3.9%
Stock - EAFE		MSCI EAFE net (	-4.9%	-5.1%	-0.2%
Stock - Global	31.0%	MSCI ACWI Net	4.2%		
Stock - Emerging		MSCI Emerging I	-2.2%	-0.3%	1.9%
Fixed Income - U.S.	7.0%	Barclays US Agg	6.0%	5.1%	-0.9%
Fixed Income - Global	3.0%	Barclays Global	7.6%	2.7%	-4.9%
Fixed Income - Emerging	6.0%	50% JPM EMBI (	0.7%	0.1%	-0.6%
Fixed Income - High Yield	6.0%	33%BarCapUS C	3.4%	1.2%	-2.2%
Cash	5.0%	90 D T-Bill / Bart	0.5%	0.2%	-0.3%
Commodities	3.0%	Bloomberg Com	-17.0%		
Real Estate ex-REITs	5.0%	NCREIF ODCE In	13.2%	19.4%	6.3%
Hedge Funds	8.0%	HFRI Fund Weig	3.0%	3.0%	0.0%
Global TAA	10.0%	50% MSCI Work	2.3%	4.8%	2.6%
Private Credit	7.0%	S&P/LSTA + 150	5.4%	10.5%	5.1%
Diversified Private Equity	9.0%	80% Russell 300	18.0%	17.0%	-1.0%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					5.1%
Calculated policy return (sum: Policy weights x benchmarks)				4.8%	
Adjustment to reflect rebalancing and overlay impacts				0.0%	
Policy return (reported by you)					<u>4.8%</u>
Net Value Added (Net Return - Policy Return)					0.3%

## Profit/Loss on overlay programs

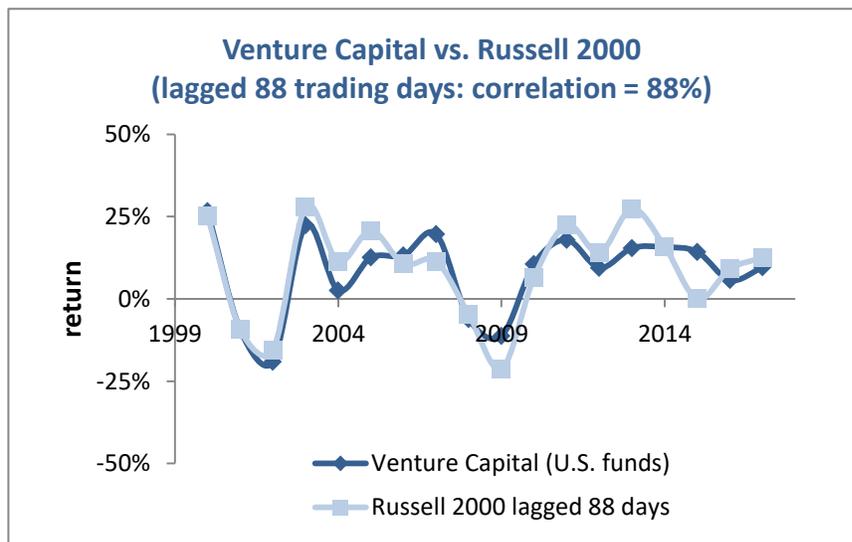
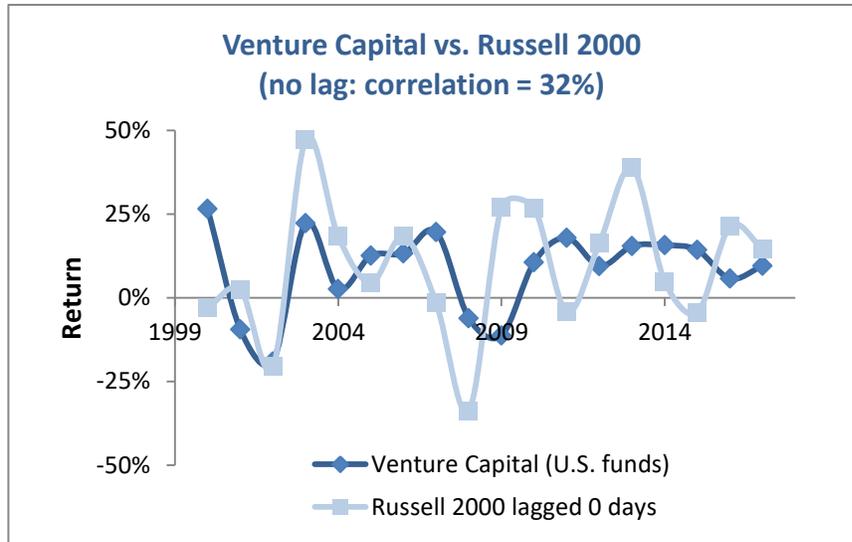
Overlay type	Your fund		Peer median				U.S. Public median			
	2018	2017	2018		2017		2018		2017	
	bps	bps	bps	#	bps	#	bps	#	bps	#
Int. Discretionary Currency							-3.4	1	-4.8	1
Ext. Discretionary Currency			5.7	1			0.1	3	0.0	2
Internal Global TAA									0.0	1
External Global TAA										
Internal PolicyTilt TAA										
External PolicyTilt TAA										
Internal Commodities										
External Commodities			-1.9	1	0.1	1	-1.9	1	0.1	1
Internal Long/Short										
External Long/Short										
Internal Other							0.0	1	0.0	1
External Other					0.0	1	-7.1	3	20.3	4

Profit/loss in basis points was calculated using total fund average holdings. This was done to measure the impact of the program at the total fund level.

## Appendix - Private equity benchmarks used by most funds are flawed.

A high proportion of the benchmarks used for illiquid assets by participants in the CEM universe are flawed. Flaws include:

- Timing mismatches due to lagged reporting. For example, as the graphs on the right demonstrate, reported venture capital returns clearly lag the returns of stock indices. Yet most funds that use stock indices to benchmark their private equity do not use lagged benchmarks. The result is substantial noise when interpreting performance. For example, for 2008 the Russell 2000 index return was -33.8% versus -4.8% if lagged 88 trading days. Thus if a fund earned the average reported venture capital return for 2008 of -6.1%, they would have mistakenly believed that their value added from venture capital was 27.7% using the un-lagged benchmarks versus -1.3% using the same benchmark lagged to match the average 88 day reporting lag of venture capital funds.



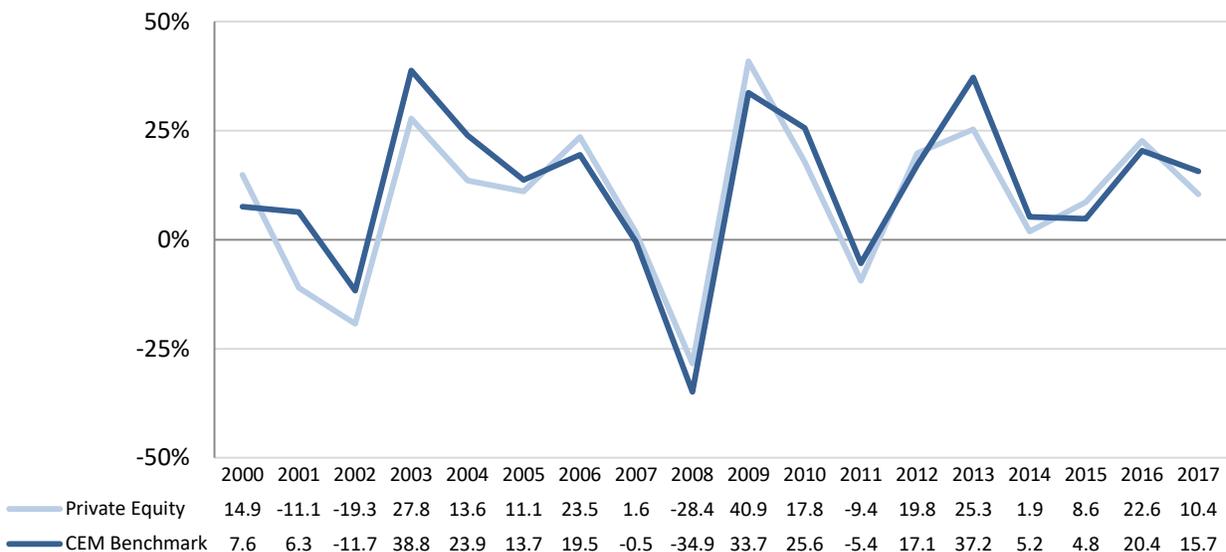
- Un-investable peer-based benchmarks. Peer based benchmarks reflect the reporting lags in peer portfolios so they have much better correlations than un-lagged investable benchmarks. But their relationship statistics are not as good as for lagged investable benchmarks.
- Aspirational premiums (i.e., benchmark + 2%). Premiums cannot be achieved passively, and evidence suggests that a fund has to be substantially better than average to attain them. More importantly, when comparing performance to other funds, they need to be excluded to ensure a level playing field.

## To enable fairer comparisons, CEM uses default private equity benchmarks.

Benchmarks used for private equity by most participants in the CEM universe are flawed (see previous page). So to enable fairer comparisons, CEM replaced the reported private equity benchmarks of all funds except yours with defaults. The defaults are:

- Investable. They are comprised of lagged small cap benchmarks.
- Custom lagged for each participant. Your default benchmark had a lag of 77 trading days. Different portfolios had different lags. CEM estimated the lag on private equity portfolios with multi-year histories by comparing annual private equity returns to public market proxies with 1 day of lag, 2 days of lag, 3 days of lag, etc. At some number of days lag, correlation between the two series is maximized. The median lag was 85 trading days (i.e., approximately 119 calendar days or 3.9 calendar months)
- Regional mix adjusted based on the average estimated mix of regions in private equity portfolios for a given country.
- The result is the default benchmarks are superior to most self-reported benchmarks. Correlations improve to a median of 82% for the default benchmarks versus 44% for self-reported benchmarks. Other statistics such as volatility were also much better.

### Private equity returns versus reported and default benchmark returns - Global median



1. To enable better comparison between lagged returns and lagged benchmarks, lags have been removed from both. See "Asset allocation and fund performance of defined benefit pension funds in the United States, 1998-2014" by Alexander D. Beath and Chris Flynn for details.

# 4

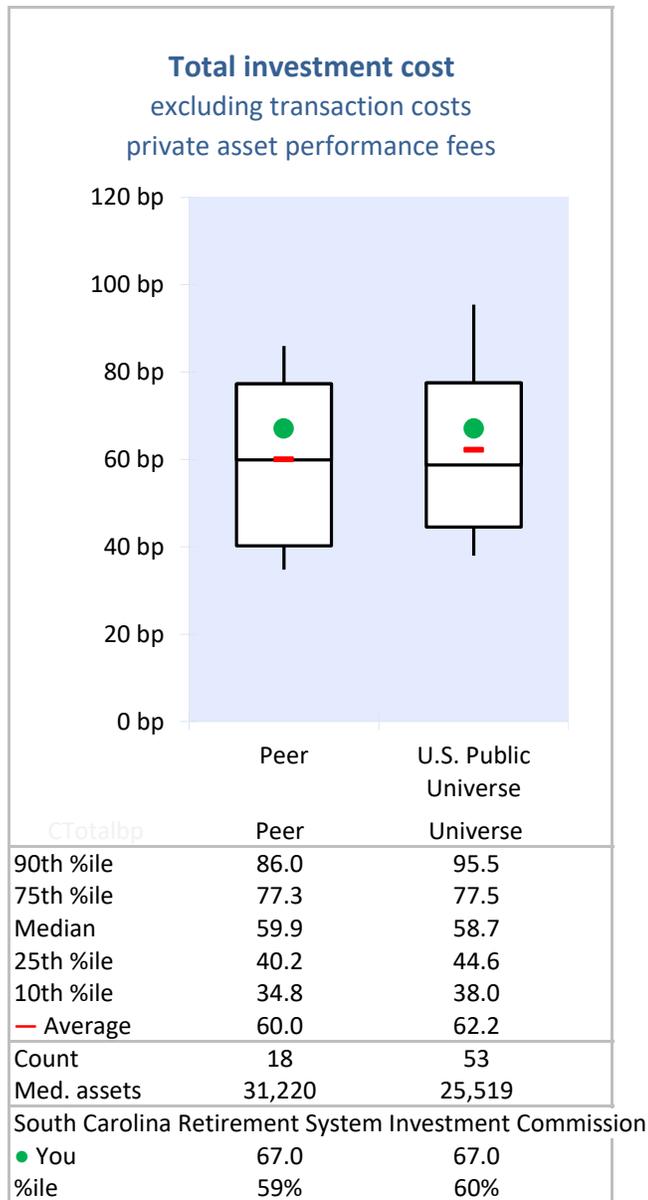
## Total cost and benchmark cost

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## Comparisons of total investment cost

Your total investment cost, excluding transaction costs and private asset performance fees, of 67.0 bps was above the peer median of 59.9 bps.

Differences in total investment cost are often caused by two factors that are usually outside of management's control: asset mix and fund size. Therefore, to assess whether your fund's total investment cost is high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. Benchmark cost analysis begins on page 7 of this section.

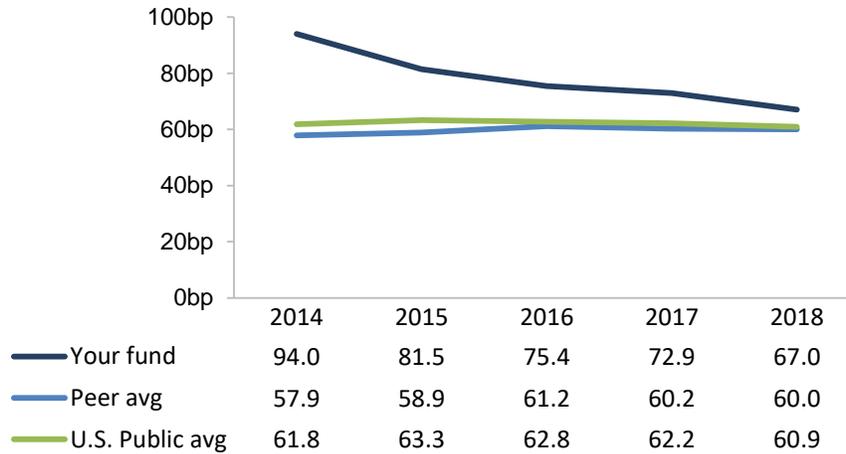


## Trend in total investment cost

Your total investment cost, excluding transaction costs and private asset performance fees, decreased from 94.0 bps in 2014 to 67.0 bps in 2018.

### Trend in total investment cost

(excluding transaction costs and private asset performance fees)



Trend analysis is based on 47 U.S. Public funds and 18 peer funds with 5 or more consecutive years of data.

## Types of costs included in your total investment cost

The table below outlines the types of costs included in your total investment cost.

Asset class	Internal		External			
	In-house total cost	Transaction costs	Manager base fees	Monitoring & other costs	Perform. fees (active only)	Transaction costs
<u>Public</u> (Stock, Fixed income, commodities, REITs)	✓	✗	✓	✓	✓	✗
Derivatives/Overlays	✓	✗	✓	✓	✓	✗
<u>Hedge funds &amp; Global TAA</u>						
Hedge Funds	n/a	n/a	✓	✓	✓	✗
Global TAA	✓	✗	✓	✓	✓	✗
<u>Private real assets</u> (Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓	✓	✗	✗
<u>Private equity</u> (Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗

\*External manager base fees represent gross contractual management fees.

- ✓ indicates cost is included.
- ✗ indicates cost is excluded.
- Green shading indicates that the cost type has been newly added for the 2014 data year.
- CEM currently excludes external private asset performance fees and all transaction costs from your total cost because only a limited number of participants are currently able to provide complete data.

## Detailed breakdown of your total investment cost

Your 2018 total investment cost, excluding transaction costs and private asset performance fees, was 67.0 bp or \$209.6 million.

### Your investment costs

	Internal		External Passive		External Active			Total <sup>1</sup>		
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees	Monitor. & Other	\$000s	bps	% of Total
<b>Asset management</b>										
Stock - U.S. Broad/All					10,281		823	11,104		5%
Stock - Emerging					9,331		548	9,879		5%
Stock - Global			503	702	5,525		842	7,572		4%
Stock - ACWI x U.S.					4,697			4,697		2%
Fixed Income - U.S.		10			1,533		253	1,796		1%
Fixed Income - Emerging					5,667		440	6,107		3%
Fixed Income - Global										
Fixed Income - High Yield					5,396		451	5,847		3%
Cash		447			705		206	1,358		1%
REITs					1,759	0	237	1,996		1%
Real Estate ex-REITs <sup>1</sup>										
Real Estate ex-REITs - LP <sup>12</sup>					19,266	16,742	578	19,845		9%
Real Estate ex-REITs - Co-Invest. <sup>1</sup>					0		0	0		0%
Infrastructure <sup>1</sup>					2,898	0	191	3,089		1%
Hedge Funds					21,960	21,963	576	44,499		21%
Hedge Fund - FoFs					3,065	1,013	450	4,528		2%
Underlying FoF Fees					10,487	4,709		15,196		7%
Global TAA					6,445	4,503	885	11,833		6%
Diversified Private Equity - LP <sup>12</sup>					27,451	19,305	445	27,896		13%
Diversified Private Equity - FoFs <sup>1</sup>					1,375	0	143	1,518		1%
Underlying FoF Fees <sup>1</sup>					3,500	4,159		3,500		2%
Diversified Private Equity - Co-Invest. <sup>1</sup>					3,264		120	3,384		2%
Private Credit - LP <sup>12</sup>					18,769	12,110	555	19,324		9%
Private Credit - Co-Invest. <sup>1</sup>					0		0	0		0%
Derivatives/Overlays			717	241				958		0%
Total asset management costs excluding private asset performance fees								205,926	65.9bp	98%
<b>Oversight, custodial &amp; other asset related costs</b>										
Oversight of the Fund								1,251		1%
Trustee & Custodial								1,152		1%
Consulting and Performance Measurement								764		0%
Audit								102		0%
Other								363		0%
Total oversight, custodial & other costs								3,633	1.2bp	2%
Total investment costs excluding transaction costs and private asset performance fees								209,559	67.0bp	100%

1. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.

2. Default costs added. Refer to Appendix A.

## Changes in your investment costs

The table below shows how your investment costs have changed from year to year by asset class.

### Change in your investment costs (2018 - 2014)

	Investment costs (\$000s)					Change (\$000s)				Change (%)			
	2018	2017	2016	2015	2014	2018	2017	2016	2015	2018	2017	2016	2015
<b>Asset management</b>													
Stock - U.S. Broad/All	11,104	11,150	8,849	8,242	10,355	-46	2,301	607	-2,113	0%	26%	7%	-20%
Stock - Emerging	9,879	10,017	7,464	7,908	8,342	-138	2,553	-444	-433	-1%	34%	-6%	-5%
Stock - Global	7,572	6,509	7,365	7,498	589	1,064	-856	-133	6,909	16%	-12%	-2%	1174%
Stock - ACWI x U.S.	4,697	4,036	2,571			660	1,466			16%	57%		
Fixed Income - U.S.	1,796	3,492	3,070	3,886	4,675	-1,696	422	-816	-790	-49%	14%	-21%	-17%
Fixed Income - Emerging	6,107	7,849	6,644	3,402	3,240	-1,742	1,205	3,242	162	-22%	18%	95%	5%
Fixed Income - Global				1,594	3,452				-1,858				-54%
Fixed Income - High Yield	5,847	8,433	8,619	7,488	6,894	-2,586	-186	1,131	593	-31%	-2%	15%	9%
Cash	1,358	1,958	2,532	3,314	2,779	-600	-574	-781	535	-31%	-23%	-24%	19%
REITs	1,996	1,821	917			174	904			10%	99%		
Real Estate ex-REITs <sup>1</sup>	0	0	0	7	8			-7	-1			-100%	-11%
Real Estate ex-REITs - LP <sup>12</sup>	19,845	16,612	17,099	16,205	15,007	3,233	-487	894	1,198	19%	-3%	6%	8%
Real Estate ex-REITs - Co-Invest. <sup>1</sup>	0	6	52			-6	-46			-93%	-88%		
Infrastructure <sup>1</sup>	3,089	2,182	811			907	1,372			42%	169%		
Hedge Funds	44,499	44,592	41,703	59,180	56,964	-93	2,889	-17,477	2,215	0%	7%	-30%	4%
Hedge Fund - FoFs	4,528	3,830	5,957	4,322	10,167	698	-2,126	1,635	-5,845	18%	-36%	38%	-57%
Underlying FoF Fees	15,196	30,162	27,322	44,079	69,151	-14,966	2,839	-16,757	-25,072	-50%	10%	-38%	-36%
Global TAA	11,833	9,859	11,613	12,684	13,017	1,974	-1,753	-1,072	-332	20%	-15%	-8%	-3%
Diversified Private Equity - LP <sup>12</sup>	27,896	19,492	22,454	19,242	24,296	8,404	-2,962	3,212	-5,053	43%	-13%	17%	-21%
Diversified Private Equity - FoFs <sup>1</sup>	1,518	2,996	4,255	6,301	3,187	-1,479	-1,259	-2,046	3,114	-49%	-30%	-32%	98%
Underlying FoF Fees <sup>1</sup>	3,500	4,780	6,593	10,231	5,632	-1,280	-1,813	-3,639	4,600	-27%	-27%	-36%	82%
Diversified Private Equity - Co-Invest. <sup>1</sup>	3,384	3,634	3,446	1,543	1,827	-250	188	1,902	-284	-7%	5%	123%	-16%
Private Credit - LP <sup>12</sup>	19,324	24,584	17,466	17,606	24,377	-5,260	7,118	-140	-6,771	-21%	41%	-1%	-28%
Private Credit - Co-Invest. <sup>1</sup>	0	9	17	46	4	-9	-7	-29	42	-99%	-43%	-64%	1018%
Derivatives/Overlays	958	810	1,308	1,037	1,414	148	-498	270	-376	18%	-38%	26%	-27%
Total excl. private asset perf. fees	205,926	218,815	208,125	235,815	270,685	-12,889	10,690	-27,690	-34,869	-6%	5%	-12%	-13%
<b>Oversight, custodial &amp; other asset related costs</b>													
Oversight of the Fund	1,251	1,089	1,056	1,201	1,478	162	33	-145	-277	15%	3%	-12%	-19%
Trustee & Custodial	1,152	1,131	925	766	426	22	205	160	340	2%	22%	21%	80%
Consulting and Performance Measurement	764	1,070	940	1,030	998	-306	130	-90	32	-29%	14%	-9%	3%
Audit	102	17	99	201	816	86	-83	-102	-615	510%	-83%	-51%	-75%
Other	363	321	267	345	287	42	54	-78	59	13%	20%	-23%	20%
Total oversight, custodial & other	3,633	3,627	3,288	3,543	4,005	5	339	-255	-462	0%	10%	-7%	-12%
Total investment costs <sup>1</sup>	209,559	222,442	211,413	239,358	274,690	-12,883	11,029	-27,945	-35,331	-6%	5%	-12%	-13%
Total in basis points	67.0bp	72.9bp	75.4bp	81.5bp	94.0bp								

1. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.

2. Default costs added. Refer to Appendix A.

## Total cost versus benchmark cost

Your fund's total investment cost, excluding transaction costs and private asset performance fees, was 9.6 bps below your benchmark cost of 76.7 bps. This implies that your fund was low cost by 9.6 bps compared to the peer median, after adjusting for your fund's asset mix.

### Your cost versus benchmark

	\$000s	bps
Your fund's total investment cost excluding transaction costs and illiquid asset performance fees	209,559	67.0 bp
- Your fund's benchmark	239,704	76.7 bp
= Your fund's cost savings	-30,146	-9.6 bp

Your benchmark cost is an estimate of your total costs assuming that you paid the peer median cost for each of your investment mandates and fund oversight. The calculation of your benchmark cost is shown on the following page.

The reasons why your fund's total cost was below your benchmark are summarized in the table below. Details of each of the impacts below are provided on pages 9 to 11.

### Reasons why your fund was low cost

	Cost/-Savings impact	
	\$000s	bps
<u>Differences in implementation style:</u>		
Less passive	4,248	1.4 bp
Less int. active % of total active	848	0.3 bp
Less evergreen % of external	4,928	1.6 bp
More fund of funds	10,207	3.3 bp
More co-investment	-4,667	-1.5 bp
Less overlays and unfunded strategies	-27	0.0 bp
Total style impact	15,537	5.0 bp
<u>Paying more/-less for similar services:</u>		
External investment management	-45,051	-14.4 bp
Internal investment management	0	0.0 bp
Oversight, custodial and other	-631	-0.2 bp
Total impact of paying more /-less	-45,683	-14.6 bp
Total savings	-30,146	-9.6 bp

## Benchmark cost calculation

Your 2018 benchmark cost was 76.7 basis points or 239.7 million. It equals your holdings for each asset class multiplied by the peer median cost for the asset class. The peer median cost is the style weighted average for all implementation styles (i.e., internal passive, internal active, external passive, external active).

Asset class	Your average assets (A)	Weighted peer median cost <sup>1</sup> (B)	Benchmark \$000s (A X B)
<b>Asset management costs</b>			
Stock - U.S. Broad/All	2,725	13.8 bp	3,759
Stock - Emerging	1,814	52.7 bp	9,554
Stock - Global	5,112	34.9 bp	17,858
Stock - ACWI x U.S.	1,058	34.9 bp	3,689
Fixed Income - U.S.	870	12.1 bp	1,056
Fixed Income - Emerging	1,457	37.2 bp	5,425
Fixed Income - High Yield	1,493	33.6 bp	5,009
Cash	2,089	6.5 bp	1,358
REITs	784	32.8 bp	2,574
Real Estate ex-REITs	1,967	99.5 bp	19,578
Infrastructure	831	107.0 bp	8,890
Hedge Funds	3,399	140.7 bp	47,821
Perf. fees (on NAV)	3,399	53.7 bp	18,248
Global TAA	2,931	51.5 bp	15,099
Diversified Private Equity	2,666	160.3 bp	42,736
Private Credit	2,570	123.8 bp	31,801
Overlay Programs <sup>2</sup>	31,258	0.3 bp	985
Benchmark for asset management	31,258	75.3 bp	235,440
<b>Oversight, custody and other costs<sup>3</sup></b>			
Oversight	31,258	0.5 bp	
Trustee & Custodial	31,258	0.4 bp	
Consulting	31,258	0.2 bp	
Audit	31,258	0.0 bp	
Other	31,258	0.1 bp	
Benchmark for oversight, custody & other	31,258	1.4 bp	4,264
<b>Total benchmark cost</b>		<b>76.7 bp</b>	<b>239,704</b>

1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). The style weights by asset class for your fund and the peers are shown on page 15 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

3. Benchmarks for oversight total and individual lines are based on peer medians. Sum of the lines may be different from the total.

## Cost impact of differences in implementation style

Differences in implementation style (passive vs. active, internal vs. external, etc.) relative to your peers cost you 5.0 bps.

Implementation choices	Assets by style	Peer benchmark cost			Style 1 %			Cost/ -Savings	
		Style 1	Style 2	Style 1 -Savings	Your	Peer average	More/ -Less	\$000s	bps
	a	b	c	d = b - c			e	a x d x e	
<u>Passive vs active</u>	Total assets	Passive	Active		Passive % of total assets				
Stock - U.S. Broad/All	2,725	1 bp	36 bp	-35 bp	0%	63%	-63%	6,040	
Stock - Emerging	1,814	7 bp	62 bp	-55 bp	0%	16%	-16%	1,634	
Stock - Global	5,112	8 bp	39 bp	-31 bp	45%	13%	33%	-5,251	
Stock - ACWI x U.S.	1,058	4 bp	41 bp	-37 bp	0%	18%	-18%	687	
Fixed Income - U.S.	870	2 bp	13 bp	-11 bp	0%	12%	-12%	114	
REITs	784	7 bp	46 bp	-39 bp	0%	33%	-33%	1,023	
Less passive								4,248	1.4 bp
<u>Internal active vs external active</u>	Active assets	Internal active	External active		Internal active % of active				
Stock - Emerging	1,814	11 bp	62 bp	-51 bp	0%	2%	-2%	143	
Fixed Income - U.S.	870	3 bp	17 bp	-14 bp	4%	26%	-23%	270	
REITs	784	6 bp	49 bp	-43 bp	0%	7%	-7%	234	
Real Estate ex-REITs	1,967	27 bp	101 bp	-73 bp	0%	1%	-1%	201	
Diversified Private Equity	2,666	39 bp	160 bp	-122 bp	0%	0%	0%	0	
Less int. active % of total active								848	0.3 bp
<u>Evergreen vs LP/Co &amp; fund of funds</u>	External assets	Ever- green	LP/Co & FoF		Evergreen fund % of external				
Real Estate ex-REITs	1,967	76 bp	126 bp	-50 bp	0%	50%	-50%	4,915	
Infrastructure	831	58 bp	143 bp	-85 bp	100%	42%	58%	-4,084	
Private Credit	2,570	89 bp	140 bp	-50 bp	0%	32%	-32%	4,097	
Less evergreen % of external								4,928	1.6 bp
<u>LP/Co vs fund of funds</u>	LP/Co & Fund of F.	LP/Co	Fund of funds		LP/Co % of LP/Co & Fund of F.				
Real Estate ex-REITs	1,967	124 bp	197 bp	-72 bp	100%	98%	2%	-266	
Hedge Funds	3,399	131 bp	182 bp	-51 bp	56%	82%	-25%	4,425	
Perf. fees (on NAV)	3,399	42 bp	107 bp	-65 bp	56%	82%	-25%	5,658	
Diversified Private Equity	2,666	151 bp	218 bp	-67 bp	84%	86%	-2%	390	
More fund of funds								10,207	3.3 bp
<u>Co-investment vs LP</u>	LP/Co	Co-invest	LP		Co-invest % of LP/Co				
Real Estate ex-REITs	1,967	3 bp	125 bp	-121 bp	0%	0%	0%	75	
Diversified Private Equity	2,238	7 bp	156 bp	-149 bp	18%	4%	14%	-4,740	
Private Credit	2,570	3 bp	140 bp	-136 bp	0%	0%	0%	-3	
More co-investment								-4,667	-1.5 bp
Less overlays and unfunded strategies								-27	0.0 bp
Total impact of differences in implementation style								15,537	5.0 bp

## Cost impact of overlays

As summarized on the previous page, the style impact of overlays saved you 0.0 bps. If you use more overlays than your peers, or more expensive types of overlays, then it increases your relative cost.

	Your average total holdings (mils)	Cost as % of total holdings		Cost/-Savings Impact (000s)
		You	Peer avg.	
	(A)	(B)	(C)	A X (B - C)
<b>Internal Overlays</b>				
Currency - Hedge	31,258	NA	0.00 bp	-11
Rebalancing / Passive Beta - Hedge	31,258	NA	0.00 bp	-3
Duration Management - Hedge	31,258	NA	0.00 bp	-1
Other Overlay - Discretionary	31,258	NA	0.00 bp	-3
<b>External Overlays</b>				
Currency - Hedge	31,258	NA	0.08 bp	-236
Currency - Discretionary	31,258	NA	0.13 bp	-396
Rebalancing / Passive Beta - Hedge	31,258	0.31 bp	0.03 bp	855
Commodity Futures - Discretionary	31,258	NA	0.05 bp	-164
Long/Short - Discretionary	31,258	NA	0.01 bp	-36
Other Overlay - Discretionary	31,258	NA	0.01 bp	-33
Total impact in 000s				-27
Total impact in basis points				0.0 bp

## Cost impact of paying more/-less for similar services

Differences in what you paid relative to your peers for similar asset management and related oversight and support services saved you 14.6 bps.

Style	Your avg holdings (mils)	Cost in bps			Cost/-Savings		
		Your	Peer median	More/-less	\$000s	bps	
<b>External asset management</b>		(A)		(B)	(A X B)		
Stock - U.S. Broad/All	active	2,725	40.8	36.0	4.8	1,305	
Stock - Emerging	active	1,814	54.5	62.5	-8.0	-1,452	
Stock - Global <sup>1</sup>	passive	2,325	5.2	7.6	-2.4	-564	
Stock - Global	active	2,787	22.8	38.9	-16.0	-4,471	
Stock - ACWI x U.S.	active	1,058	44.4	41.4	3.0	320	
Fixed Income - U.S.	active	839	21.3	17.0	4.2	357	
Fixed Income - Emerging	active	1,457	41.9	37.2	4.7	682	
Fixed Income - High Yield	active	1,493	39.2	33.6	5.6	837	
Cash <sup>2</sup>	active	681	13.4	13.4	0.0	0	
REITs	active	784	25.5	48.9	-23.4	-1,836	
Real Estate ex-REITs	CO	2	3.0	3.4	-0.3	0	
Real Estate ex-REITs	LP	1,966	101.0	124.7	-23.7	-4,658	
Infrastructure	active	831	37.2	57.8	-20.7	-1,717	
Hedge Funds	active	1,907	118.2	131.3	-13.1	-2,505	
Top layer perf. fees (on NAV)	active	1,907	115.1	41.7	73.5	14,017	
Hedge Funds	FoF	1,492	23.6	53.4	-29.8	-4,447	
Top layer perf. fees (on NAV)	FoF	1,492	6.8	24.0	-17.2	-2,567	
Underlying base fees	FoF	1,492	70.3	129.0	-58.7	-8,754	
Underlying perf. fees (on NAV)	FoF	1,492	31.6	83.0	-51.4	-7,672	
Global TAA	active	2,931	40.4	51.5	-11.1	-3,265	
Diversified Private Equity	FoF	428	35.4	62.0	-26.5	-1,136	
Underlying base fees	FoF	428	81.7	156.0	-74.3	-3,180	
Diversified Private Equity	CO	397	85.3	6.9	78.4	3,109	
Diversified Private Equity	LP	1,841	151.5	156.3	-4.8	-882	
Private Credit <sup>1</sup>	CO	0	3.2	3.2	0.0	0	
Private Credit	LP	2,569	75.2	139.7	-64.5	-16,572	
Total for external management						-45,051	-14.4 bp
<b>Internal asset management</b>		(A)		(B)	(A X B)		
Fixed Income - U.S.	active	31	3.2	3.3	-0.1	0	
Cash <sup>2</sup>	active	1,407	3.2	3.2	0.0	0	
Total for internal management						0	0.0 bp
<b>Oversight, custodial, other<sup>3</sup></b>							
Oversight			0.4	0.5	-0.1		
Trustee & Custodial			0.4	0.4	-0.1		
Consulting			0.2	0.2	0.0		
Audit			0.0	0.0	0.0		
Other			0.1	0.1	0.0		
Total for oversight, custodial, other						-631	-0.2 bp
Total						-45,683	-14.6 bp

1. Universe median used because peer data was insufficient.

2. The impact of this line is neutralized by setting the benchmark cost to You.

3. The benchmark for 'oversight, custodial and other costs' is based on the total costs for these activities.

## Summary of why you are high or low cost by asset class

The table below summarizes where you are high and low cost by asset class. It also quantifies how much is due to differences in implementation style (i.e., differences in the mix of external active, external passive, internal active, internal passive and fund of fund usage) and how much is due to paying more or less for similar services (i.e., same asset class and style).

	Your cost <sup>1</sup>	Benchmark = peer weighted median cost <sup>1</sup>	More/-less	Your average assets (or fee basis)	More/-less in \$000s		
					Total More/-less	Due to Impl. style	Due to paying more/less
<b>Asset management costs</b>	(A)	(B)	(C = A - B)	(D)	(C X D)		
Stock - U.S. Broad/All	40.8 bp	13.8 bp	27.0 bp	2,725	7,346	6,040	1,305
Stock - Emerging	54.5 bp	52.7 bp	1.8 bp	1,814	325	1,778	-1,452
Stock - Global	14.8 bp	34.9 bp	-20.1 bp	5,112	-10,286	-5,251	-5,035
Stock - ACWI x U.S.	44.4 bp	34.9 bp	9.5 bp	1,058	1,008	687	320
Fixed Income - U.S.	20.6 bp	12.1 bp	8.5 bp	870	740	384	356
Fixed Income - Emerging	41.9 bp	37.2 bp	4.7 bp	1,457	682	0	682
Fixed Income - High Yield	39.2 bp	33.6 bp	5.6 bp	1,493	837	0	837
Cash	6.5 bp	6.5 bp	0.0 bp	2,089	0	0	0
REITs	25.5 bp	32.8 bp	-7.4 bp	784	-579	1,257	-1,836
Real Estate ex-REITs	100.9 bp	99.5 bp	1.4 bp	1,967	267	4,925	-4,658
Infrastructure	37.2 bp	107.0 bp	-69.8 bp	831	-5,801	-4,084	-1,717
Hedge Funds	107.5 bp	140.7 bp	-33.2 bp	3,399	-11,282	4,425	-15,706
Perf. fees (on NAV)	81.4 bp	53.7 bp	27.8 bp	3,399	9,437	5,658	3,778
Global TAA	40.4 bp	51.5 bp	-11.1 bp	2,931	-3,265	0	-3,265
Diversified Private Equity	136.1 bp	160.3 bp	-24.2 bp	2,666	-6,439	-4,349	-2,090
Private Credit	75.2 bp	123.8 bp	-48.6 bp	2,570	-12,477	4,094	-16,572
Overlay Programs <sup>2</sup>	0.3 bp	0.3 bp	0.0 bp	31,258	-27	-27	0
<b>Total asset management</b>	<b>65.9 bp</b>	<b>75.3 bp</b>	<b>-9.4 bp</b>	<b>31,258</b>	<b>-29,514</b>	<b>15,537</b>	<b>-45,051</b>
<b>Oversight, custody and other costs<sup>3</sup></b>							
Oversight of the Fund	0.4 bp	0.5 bp	-0.1 bp				
Trustee & Custodial	0.4 bp	0.4 bp	-0.1 bp				
Consulting	0.2 bp	0.2 bp	0.0 bp				
Audit	0.0 bp	0.0 bp	0.0 bp				
Other	0.1 bp	0.1 bp	0.0 bp				
<b>Total oversight, custody &amp; other</b>	<b>1.2 bp</b>	<b>1.4 bp</b>	<b>-0.2 bp</b>	<b>31,258</b>	<b>-631</b>	<b>n/a</b>	<b>-631</b>
<b>Total</b>	<b>67.0 bp</b>	<b>76.7 bp</b>	<b>-9.6 bp</b>	<b>31,258</b>	<b>-30,146</b>	<b>15,537</b>	<b>-45,683</b>

1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 15 of this section.

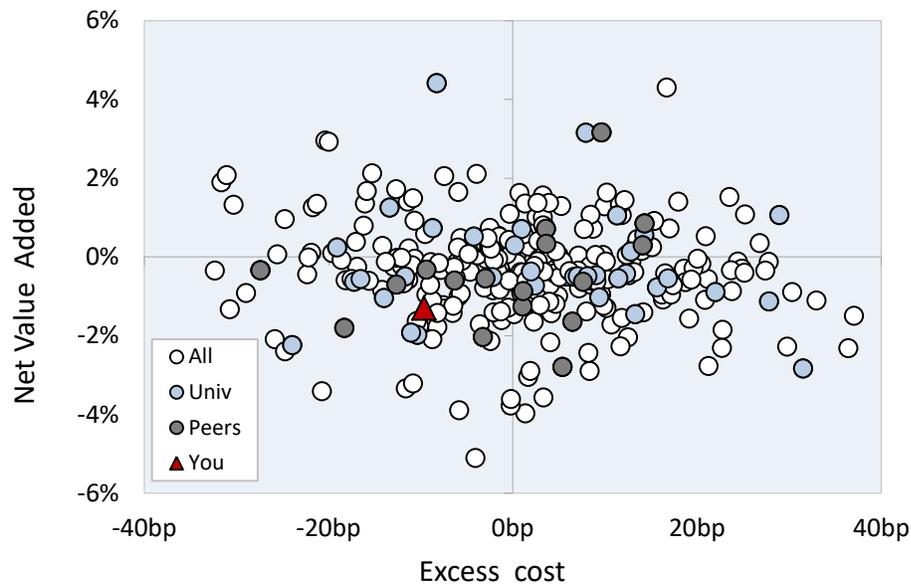
2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

3. Benchmarks for oversight total and individual lines are based on peer medians. Sum of the lines may be different from the total.

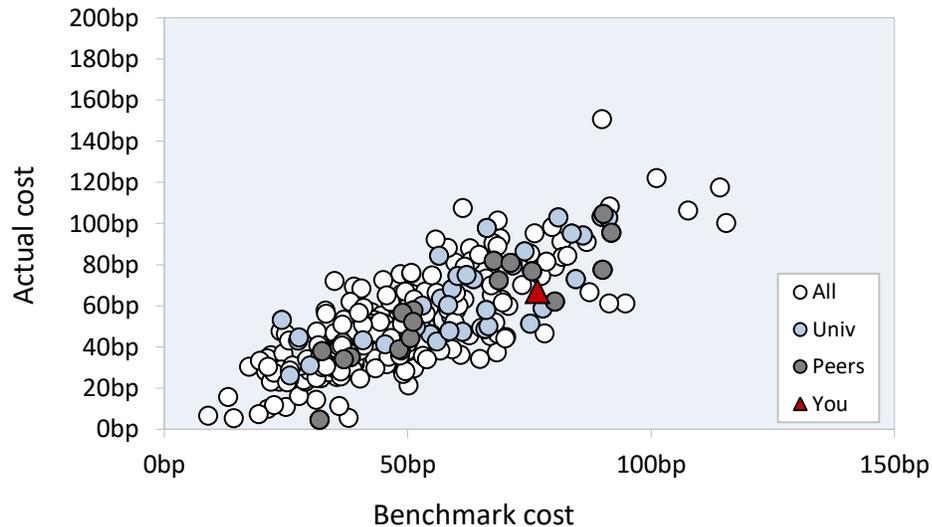
## Your cost effectiveness ranking

Being high or low cost is neither good nor bad. More important is whether you are receiving sufficient value for your excess cost. At the total fund level, we provide insight into this question by combining your value added and excess cost to create a snapshot of your cost effectiveness performance relative to that of the global universe. In 2018, your fund ranked in the negative value added, low cost quadrant.

**Your 2018 Net value added -1.3%, Excess cost -10 bps**



**Your 2018 Actual cost 67.0 bps, Benchmark cost 76.7 bps**



For all funds except your fund, benchmark cost equals the sum of group median costs x fund's average holdings by asset class plus group median cost of derivatives/overlays plus group median cost of oversight/support. Group is peer if the fund is in the peer group, universe - if the fund is part of the universe, and global/database otherwise. Your fund's benchmark cost is calculated using peer-based methodology per page 7 of this section.

## Appendix A: Benchmarking methodology formulas and data

### a) Formulas

Example calculations for 'Stock - U.S. Broad/All'

Asset class peer cost = weighted average by peer average style of peer median costs  
= (4% x 1.6 bp) + (0% x 0.0 bp) + (59% x 1.0 bp) + (37% x 36.0 bp) = 13.8 bp

Your cost versus benchmark (-savings/+excess) = asset class your cost - asset class peer cost  
= 40.8 bp - 13.8 bp = 27.0 bp

Attribution of 'your cost versus benchmark' to impact of style mix and impact of cost/paying more

Cost impact of differences in implementation style (-savings/+excess)

= cost impacts of passive vs active (A), internal passive vs external passive (B), internal active vs external active (C)  
= 22.2 bp + 0.0 bp + 0.0 bp = 22.2 bp

A) Impact of Passive vs Active management (-savings/+excess)  
= (peer average passive cost - peer average active cost) x  
(passive % of asset, you - passive % of asset, peer average)  
= (1.0 bp - 36.0 bp) x (0% - 63%) = 22.2 bp

Peer average passive cost = weighted average by peer average style of peer median costs for  
internal passive and external passive management  
= [(4% x 1.6 bp) + (59% x 1.0 bp)] / (4% + 59%) = 1.0 bp

Peer average active cost = weighted average by peer average style of peer median costs for  
internal active and external active management  
= [(0% x 0.0 bp) + (37% x 36.0 bp)] / (0% + 37%) = 36.0 bp

B) Impact of Internal Passive vs External Passive management (-savings/+excess)  
= (peer average internal passive cost - peer average external passive cost) x  
(internal passive % of passive, you - internal passive % of passive, peer average) x passive % of asset, you  
= (1.6 bp - 1.0 bp) x (0% - 0%) x 0% = 0.0 bp

C) Impact of Internal Active vs External Active management (-savings/+excess)  
= (peer average internal active cost - peer average external active cost) x  
(internal passive % of active, you - internal active % of active, peer avg) x active % of asset, you  
= (0.0 bp - 36.0 bp) x (0% - 0%) x 100% = 0.0 bp

Cost impact of paying more/-less

= (cost internal passive, you - cost internal passive, peer) x internal passive % of asset, you +  
(cost internal active, you - cost internal active, peer) x internal active % of asset, you +  
(cost external passive, you - cost external passive, peer) x external passive % of asset, you +  
(cost external active, you - cost external active, peer) x external active % of asset, you  
= (0.0 bp - 1.6 bp) \* 0% + (0.0 bp - 0.0 bp) \* 0% + (0.0 bp - 1.0 bp) \* 0% + (40.8 bp - 36.0 bp) \* 100% = 4.8 bp

Your cost versus benchmark (-savings/+excess)

= cost impact of differences in implementation style + cost impact of paying more/-less  
= 22.2 bp + 4.8 bp = 27.0 bp

## Appendix A: Benchmarking methodology formulas and data (page 2 of 2)

### b) 2018 cost data used to calculate weighted peer median costs and impact of mix differences.

Asset Class	Your costs (basis points)							Peer median costs (basis points)							Weighted Median
	Internal Passive	Internal Active	External Passive	External Active	Co-invest	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Co-invest	Limited Partner.	Fund of Funds	
Stock - U.S. Broad/All				40.8				1.6		1.0	36.0				13.8
Stock - Emerging				54.5				4.5	11.3	8.7	62.5				52.7
Stock - Global			5.2	22.8						7.6	38.9				34.9
Stock - ACWI x U.S.				44.4				3.4		4.4	41.4				34.9
Fixed Income - U.S.		3.2		21.3				1.3	3.3	2.1	17.0				12.1
Fixed Income - Emerging				41.9							37.2				37.2
Fixed Income - High Yield				39.2							33.6				33.6
Cash		3.2		13.4					3.2		13.4				6.5
REITs				25.5					5.7	6.9	48.9				32.8
Real Estate ex-REITs					3.0	101.0		27.1			75.9	3.4	124.7	72.7	98.4
Underlying base fees														124.0	1.1
Infrastructure				37.2							57.8	6.1	146.6	66.0	104.3
Underlying base fees														127.0	2.6
Hedge Funds				118.2			23.6				131.3			53.4	116.9
Perf. fees (on NAV)				115.1			6.8				41.7			24.0	38.4
Underlying base fees							70.3							129.0	23.7
Underlying perf. fees (on NAV)							31.6							83.0	15.3
Global TAA				40.4							51.5				51.5
Diversified Private Equity					85.3	151.5	35.4		38.7			6.9	156.3	62.0	138.7
Underlying base fees							81.7							156.0	21.6
Private Credit					3.2	75.2					89.2	3.2	139.7		123.8
Underlying base fees															0.0

### c) 2018 Style weights used to calculate the weighted peer median costs and impact of mix differences.

Style Weights	You (%)							Peer average (%)						
	Internal Passive	Internal Active	External Passive	External Active	Co-invest	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Co-invest	Limited Partner.	Fund of Funds
Stock - U.S. Broad/All	0.0%		0.0%	100.0%				4.0%		59.4%	36.5%			
Stock - Emerging	0.0%	0.0%	0.0%	100.0%				7.2%	1.3%	9.2%	82.3%			
Stock - Global			45.5%	54.5%						12.6%	87.4%			
Stock - ACWI x U.S.	0.0%		0.0%	100.0%				0.5%		17.0%	82.5%			
Fixed Income - U.S.	0.0%	3.6%	0.0%	96.4%				0.4%	23.1%	11.2%	65.4%			
Fixed Income - Emerging				100.0%							100.0%			
Fixed Income - High Yield				100.0%							100.0%			
Cash		67.4%		32.6%					67.4%		32.6%			
REITs		0.0%	0.0%	100.0%					4.6%	33.5%	61.9%			
Real Estate ex-REITs		0.0%		0.0%	0.1%	99.9%	0.0%		1.4%		49.7%	0.2%	47.8%	0.9%
Underlying base fees		0.0%		0.0%	0.1%	99.9%	0.0%		1.4%		49.7%	0.2%	47.8%	0.9%
Infrastructure				100.0%	0.0%	0.0%	0.0%				42.3%	2.2%	53.4%	2.1%
Underlying base fees				100.0%	0.0%	0.0%	0.0%				42.3%	2.2%	53.4%	2.1%
Hedge Funds				56.1%			43.9%				81.6%			18.4%
Perf. fees (on NAV)				56.1%			43.9%				81.6%			18.4%
Underlying base fees				56.1%			43.9%				81.6%			18.4%
Underlying perf. fees (on NAV)				56.1%			43.9%				81.6%			18.4%
Global TAA				100.0%							100.0%			
Diversified Private Equity		0.0%			14.9%	69.1%	16.1%		0.0%			3.1%	83.1%	13.9%
Underlying base fees		0.0%			14.9%	69.1%	16.1%		0.0%			3.1%	83.1%	13.9%
Private Credit				0.0%	0.0%	100.0%					31.6%	0.0%	68.4%	
Underlying base fees				0.0%	0.0%	100.0%					31.6%	0.0%	68.4%	

The above data was adjusted when there were insufficient peers, or for other reasons where direct comparisons were inappropriate.

# 5

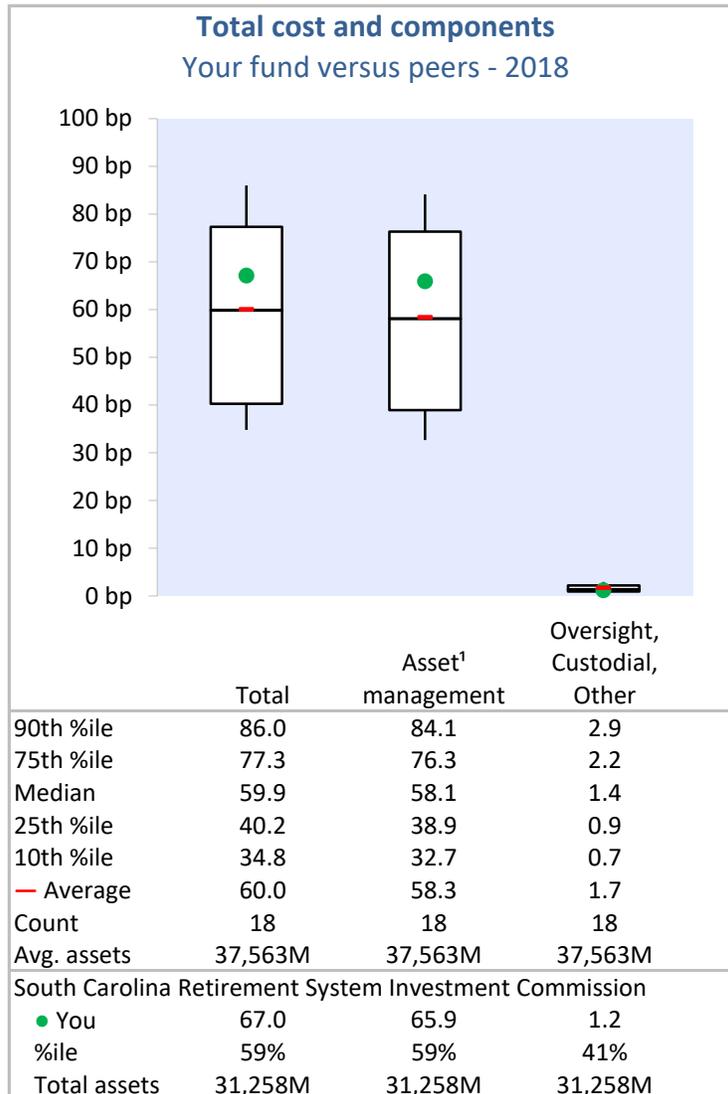
## Cost comparisons

Total fund cost	2
Governance, operations & support	3
Public asset classes	
- Stock	4
- Fixed Income	13
- Commodities	27
- REITs	28
Real asset classes	
- Real estate ex-REITs	29
- Infrastructure	30
- Natural resources	31
- Other real assets	32
Private equity	
- Diversified private equity	33
- LBO	34
- Venture capital	35
- Private credit	36
- Other private equity	38
Global TAA	39
RiskParity	40
Hedge Funds	41
Overlays	42

## Total fund cost

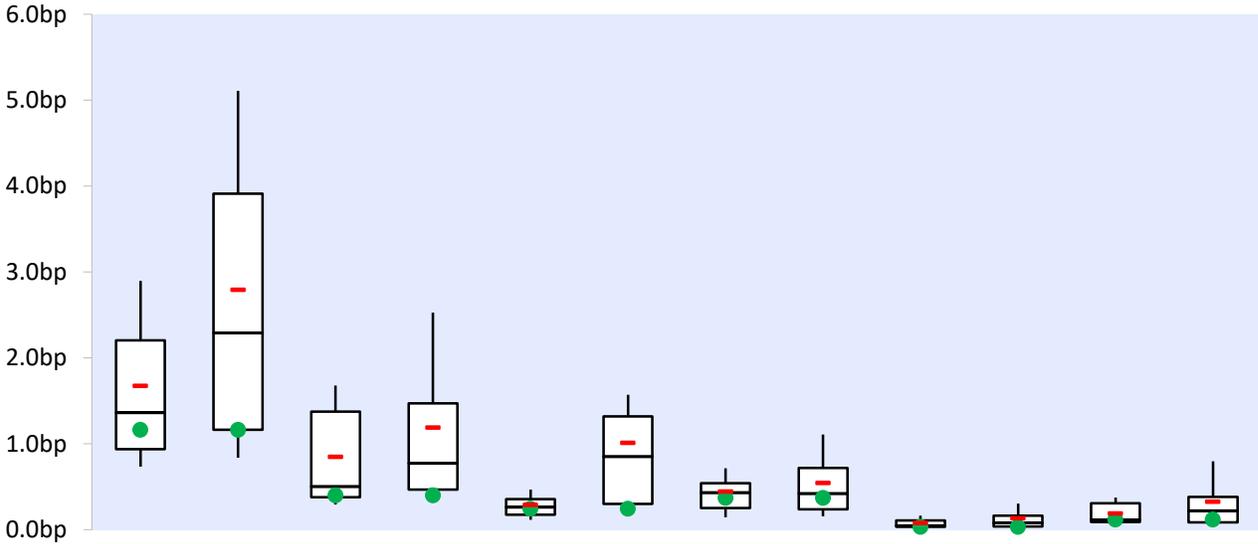
Total costs are benchmarked in the previous section. In this section, your fund's costs are compared on a line-item basis to your peers. This enables you to understand better why you may be a high or low cost fund and it also identifies and quantifies major cost differences that may warrant further investigation.

The 25th to 75th percentile range is the most relevant since higher and lower values may include outliers caused by unusual circumstances, such as performance-based fees. Count refers to the number of funds in your peer group that have costs in this category. It enables you to gauge the statistical significance.



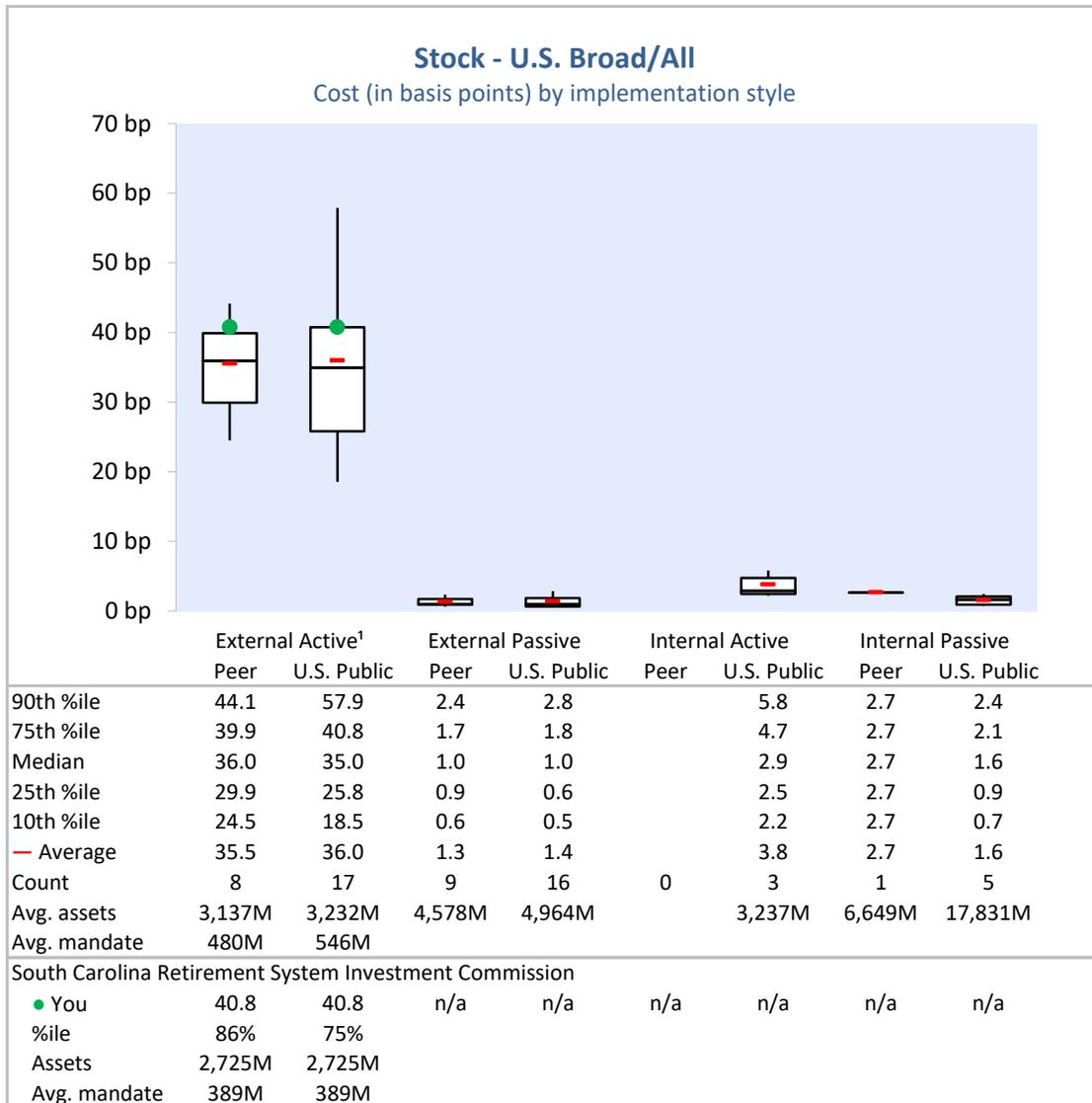
## Governance, operations & support

Cost as a % of total plan assets



	<u>Total</u>		<u>Oversight<sup>1</sup></u>		<u>Consulting &amp; Perf. Meas.</u>		<u>Custody</u>		<u>Audit</u>		<u>Other</u>	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	2.9	5.1	1.7	2.5	0.5	1.6	0.7	1.1	0.2	0.3	0.4	0.8
75th %ile	2.2	3.9	1.4	1.5	0.4	1.3	0.5	0.7	0.1	0.2	0.3	0.4
Median	1.4	2.3	0.5	0.8	0.3	0.9	0.4	0.4	0.0	0.1	0.1	0.2
25th %ile	0.9	1.2	0.4	0.5	0.2	0.3	0.3	0.2	0.0	0.0	0.1	0.1
10th %ile	0.7	0.8	0.3	0.3	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0
— Average	1.7	2.8	0.8	1.2	0.3	1.0	0.4	0.5	0.1	0.1	0.2	0.3
Count	18	53	18	53	13	38	17	51	15	47	13	39
Avg. assets	37,563M	50,164M	37,563M	50,164M	37,563M	50,164M	37,563M	50,164M	37,563M	50,164M	37,563M	50,164M
South Carolina Retirement System Investment Commission												
● You	1.2	1.2	0.4	0.4	0.2	0.2	0.4	0.4	0.0	0.0	0.1	0.1
%ile	41%	25%	35%	21%	33%	14%	38%	40%	29%	17%	50%	37%
Plan assets	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M	31,258M

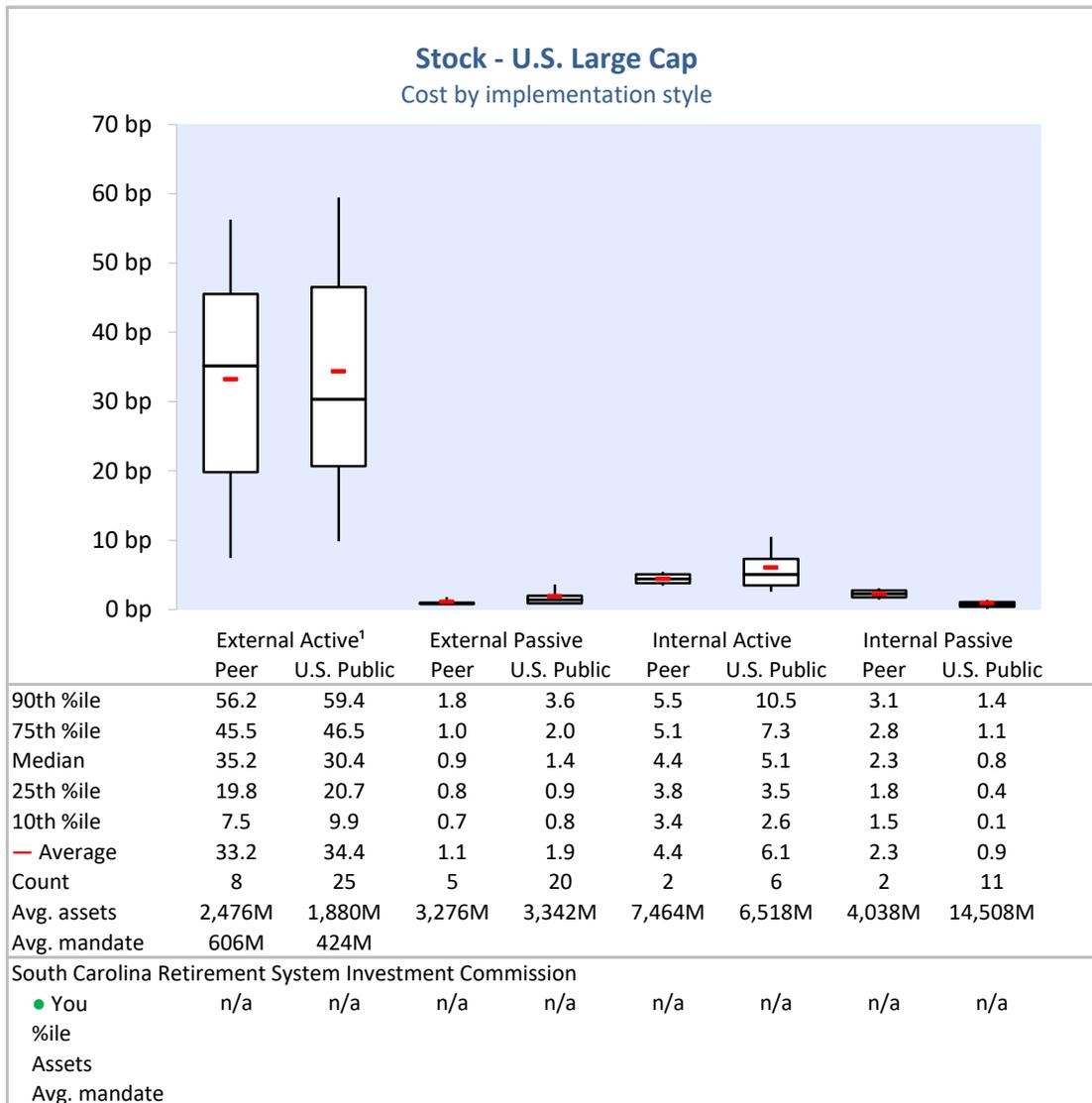
1. Oversight costs include the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees/salaries of the Board or Investment Committee. All costs associated with the above including fees/salaries, travel, director's insurance and attributed overhead are included. Given fiduciary obligations, having the lowest oversight costs is not necessarily optimal. Some sponsors with lower-than-average executive and administration costs compensate by having-higher-than average consulting costs.



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	37.7	30.7	29.9
Performance fees*	n/a	3.7	4.3
Internal and other	<u>3.0</u>	<u>1.2</u>	<u>1.7</u>
Total	40.8	35.5	36.0

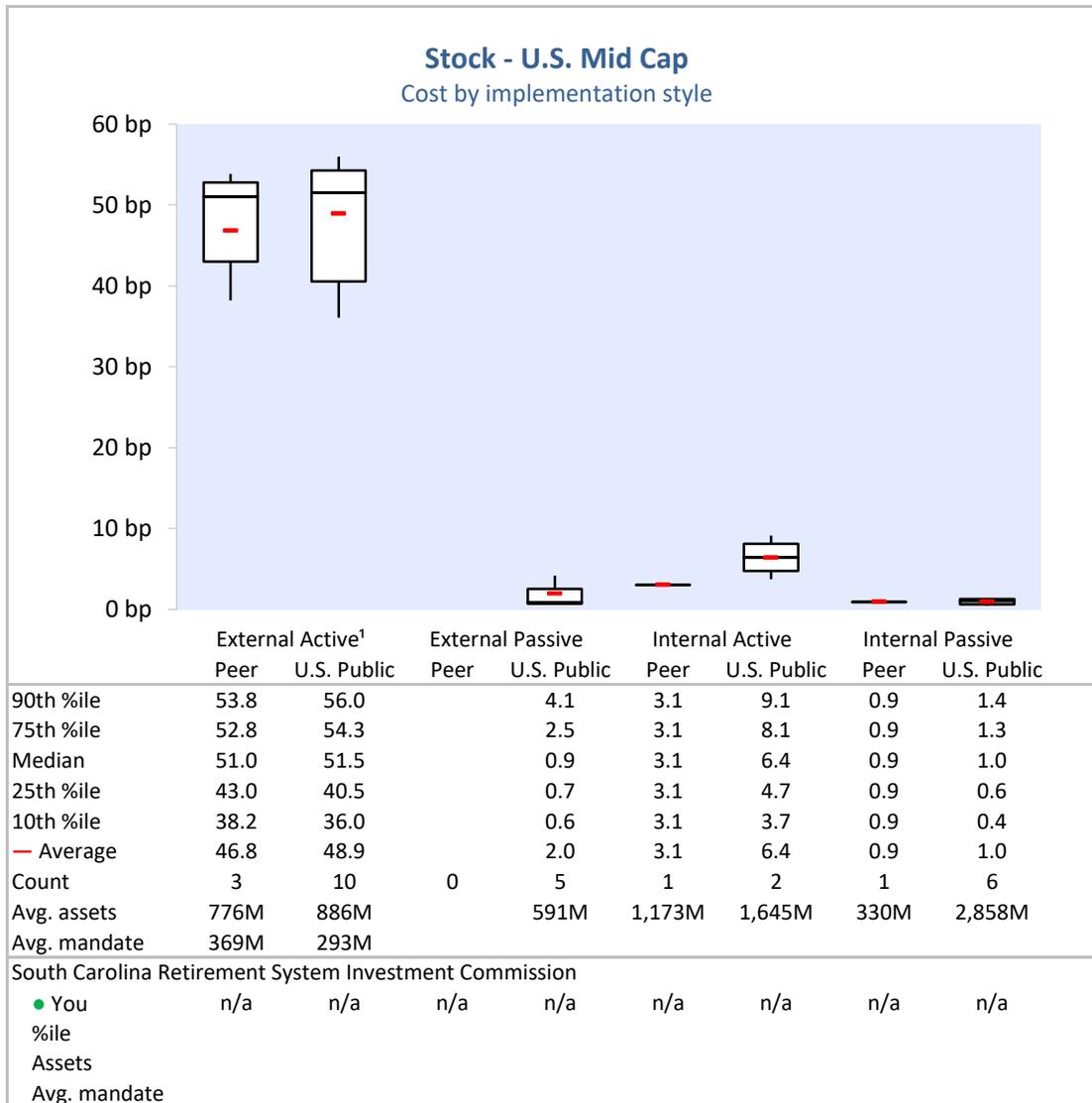
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 3.0 bps for peers (29 funds) and 12.3 bps for U.S. Public participants (6 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	28.1	27.1
Performance fees*	n/a	4.9	6.9
Internal and other	<u>n/a</u>	<u>0.2</u>	<u>0.4</u>
Total	n/a	33.2	34.4

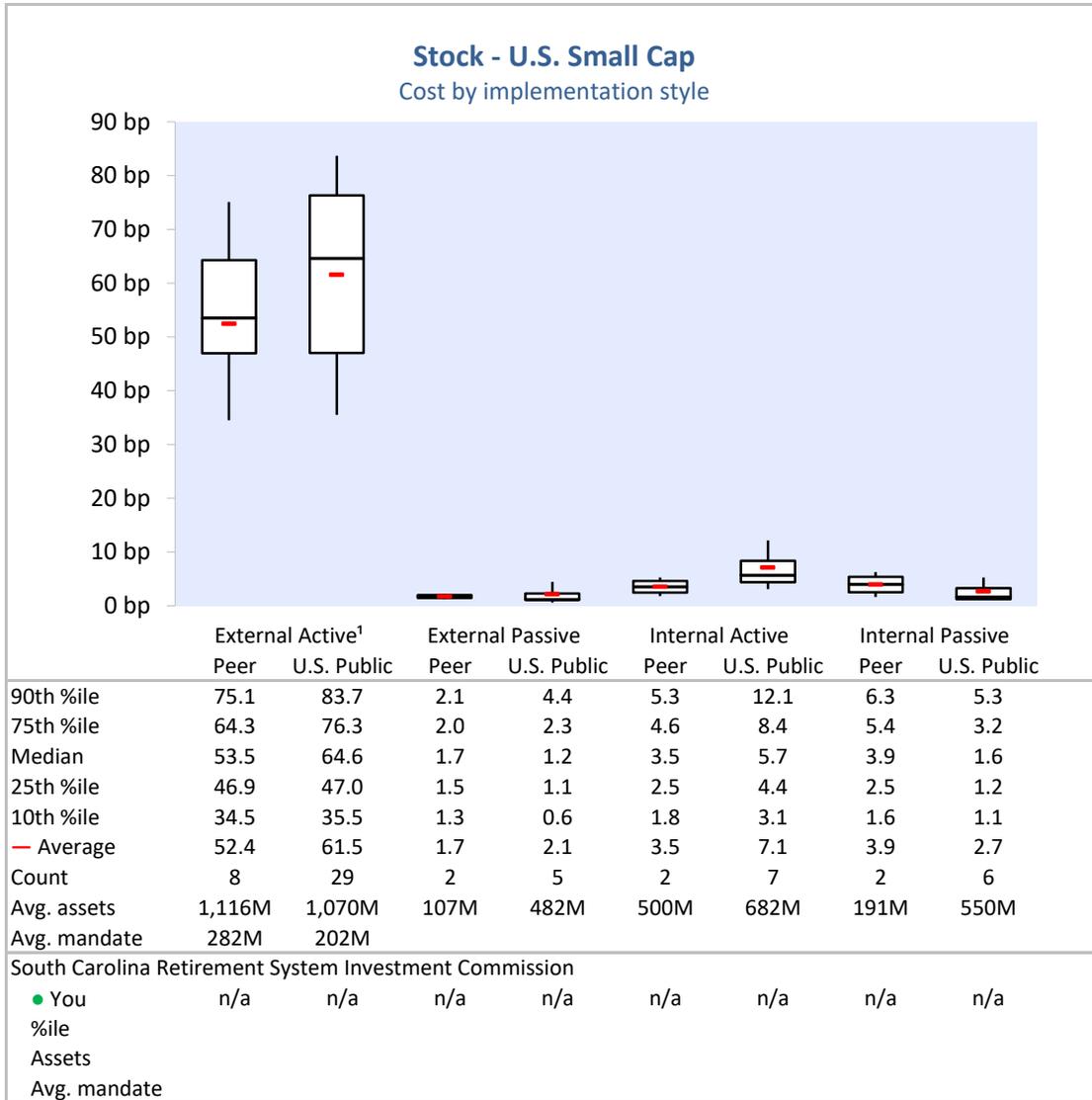
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 13.1 bps for peers (3 funds) and 21.5 bps for U.S. Public participants (8 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	46.6	48.4
Performance fees*	n/a	n/a	n/a
Internal and other	<u>n/a</u>	<u>0.2</u>	<u>0.5</u>
Total	n/a	46.8	48.9

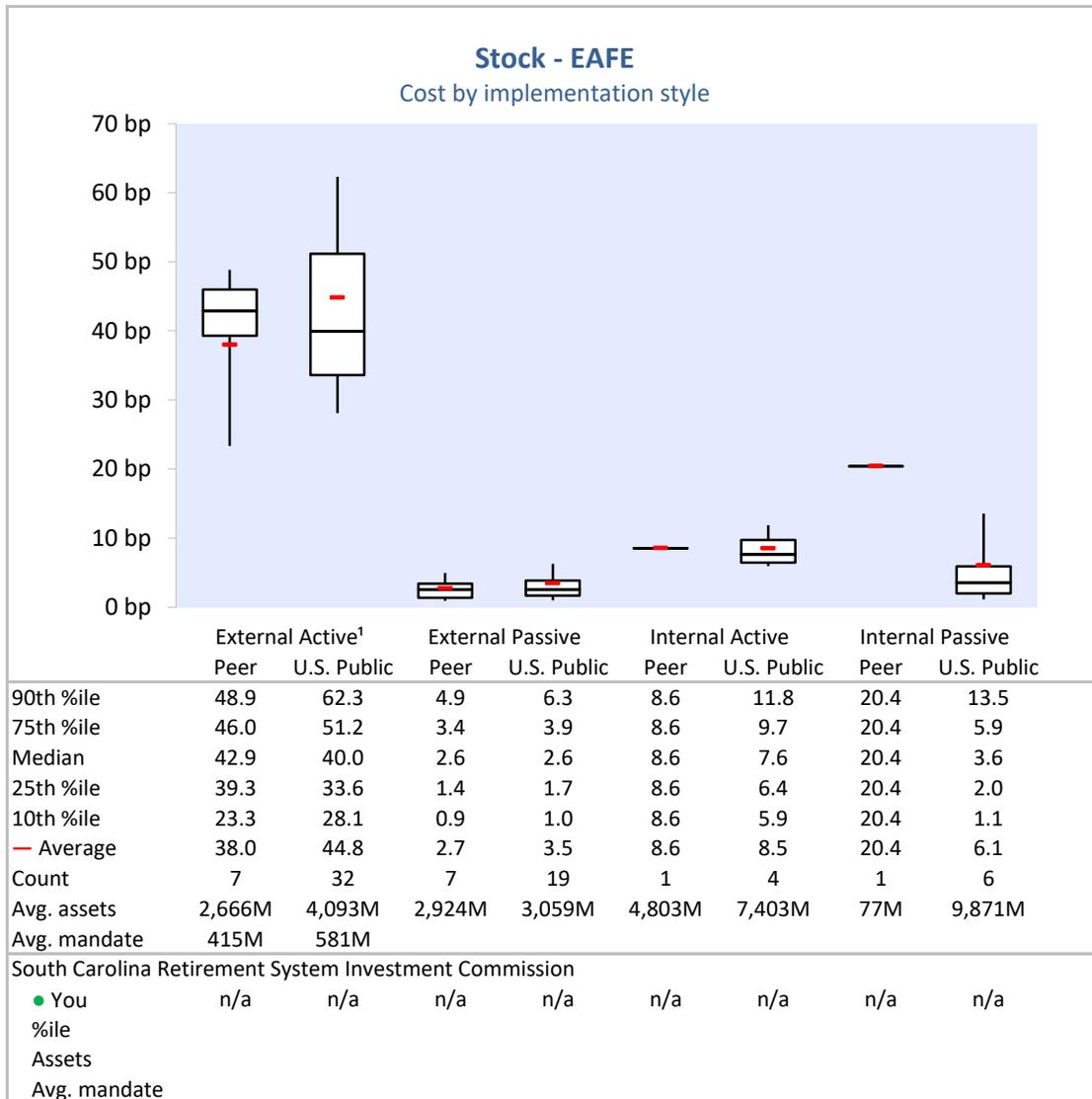
No funds reported a performance fee.



1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	52.2	60.6
Performance fees*	n/a	0.0	0.5
Internal and other	<u>n/a</u>	<u>0.3</u>	<u>0.4</u>
Total	n/a	52.4	61.5

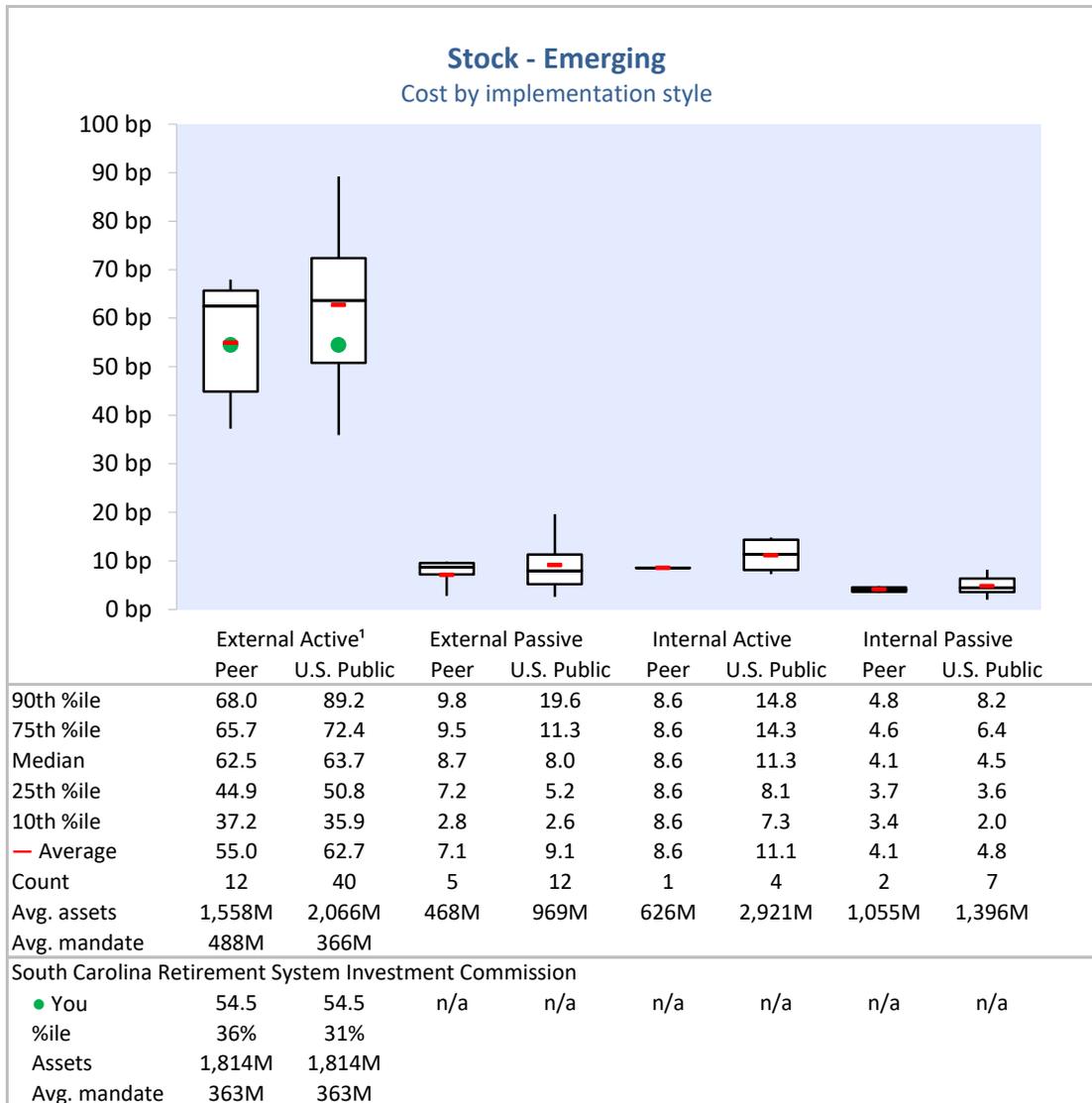
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is -0.1 bps for peers (3 funds) and 3.0 bps for U.S. Public participants (5 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	37.6	41.9
Performance fees*	n/a	0.2	2.7
Internal and other	<u>n/a</u>	<u>0.2</u>	<u>0.3</u>
Total	n/a	38.0	44.8

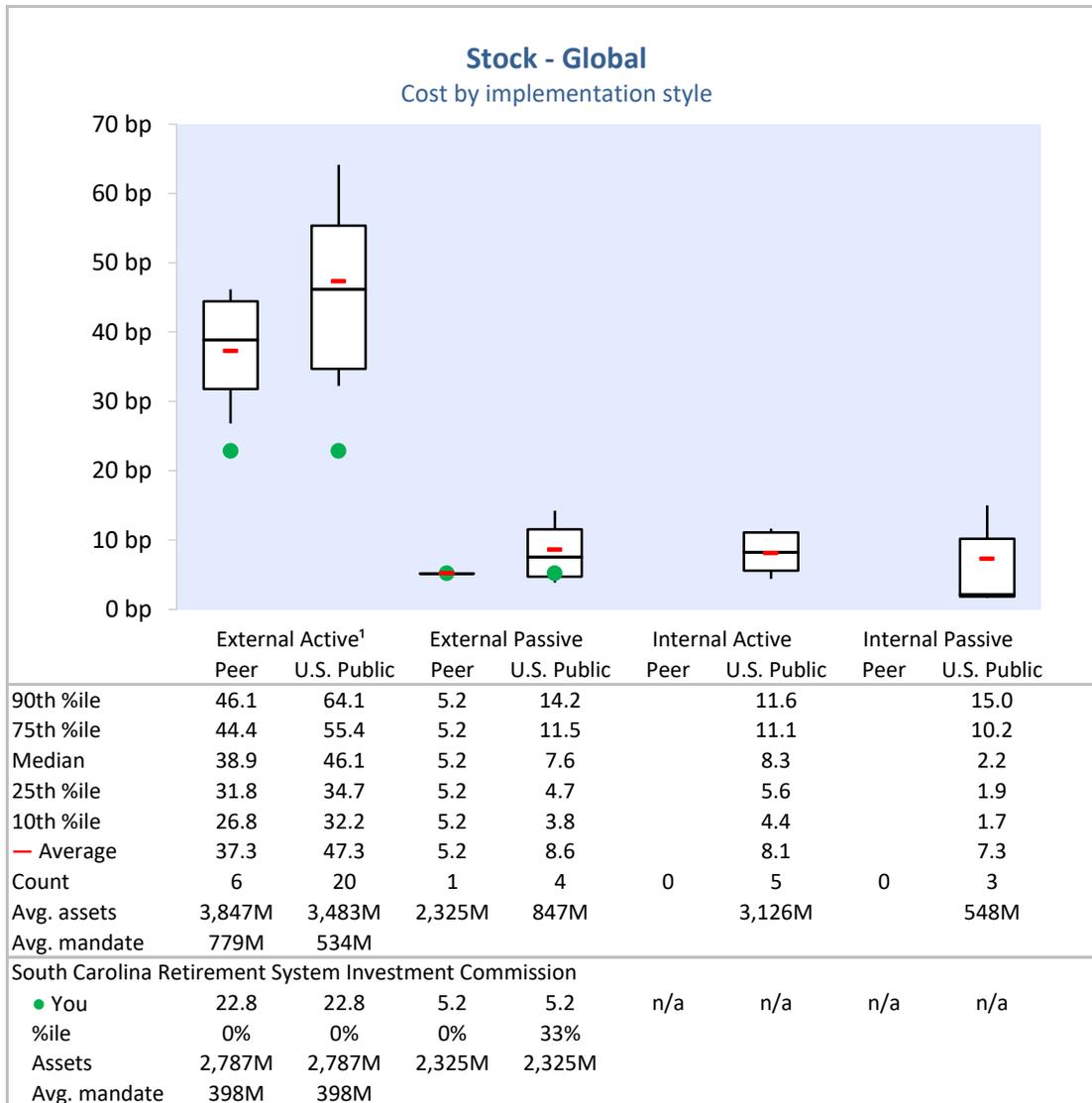
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.7 bps for peers (2 funds) and 14.1 bps for U.S. Public participants (6 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	51.4	54.2	61.4
Performance fees*	n/a	0.0	0.5
Internal and other	3.0	0.8	0.8
Total	54.5	55.0	62.7

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for peers (3 funds) and 3.0 bps for U.S. Public participants (7 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	19.8	35.4	40.7
Performance fees*	n/a	0.6	5.8
Internal and other	3.0	1.2	0.8
Total	22.8	37.3	47.3

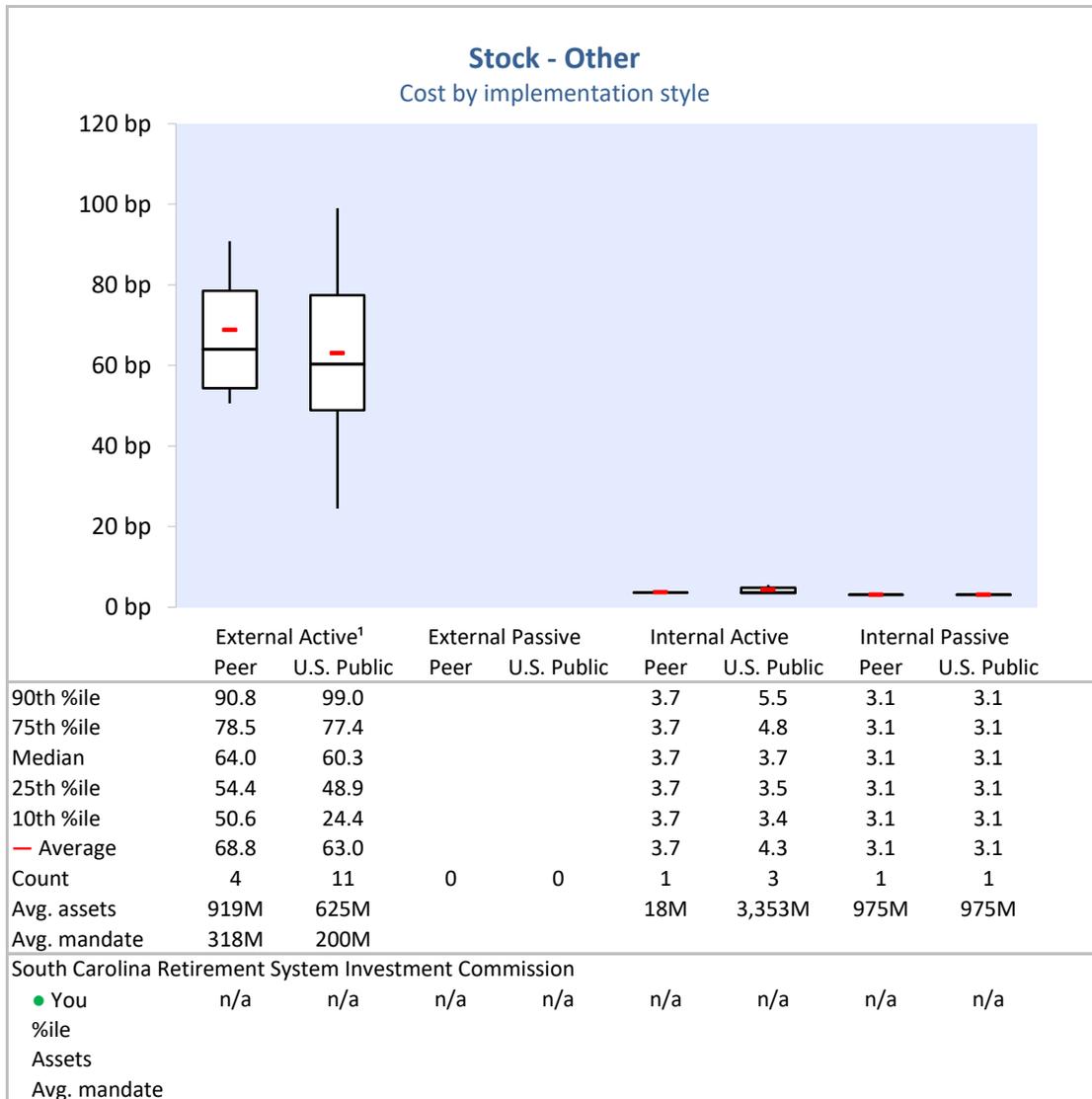
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 1.9 bps for peers (2 funds) and 14.5 bps for U.S. Public participants (8 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	44.4	38.1	41.6
Performance fees*	n/a	0.6	0.8
Internal and other	<u>n/a</u>	<u>0.2</u>	<u>0.3</u>
Total	44.4	38.9	42.7

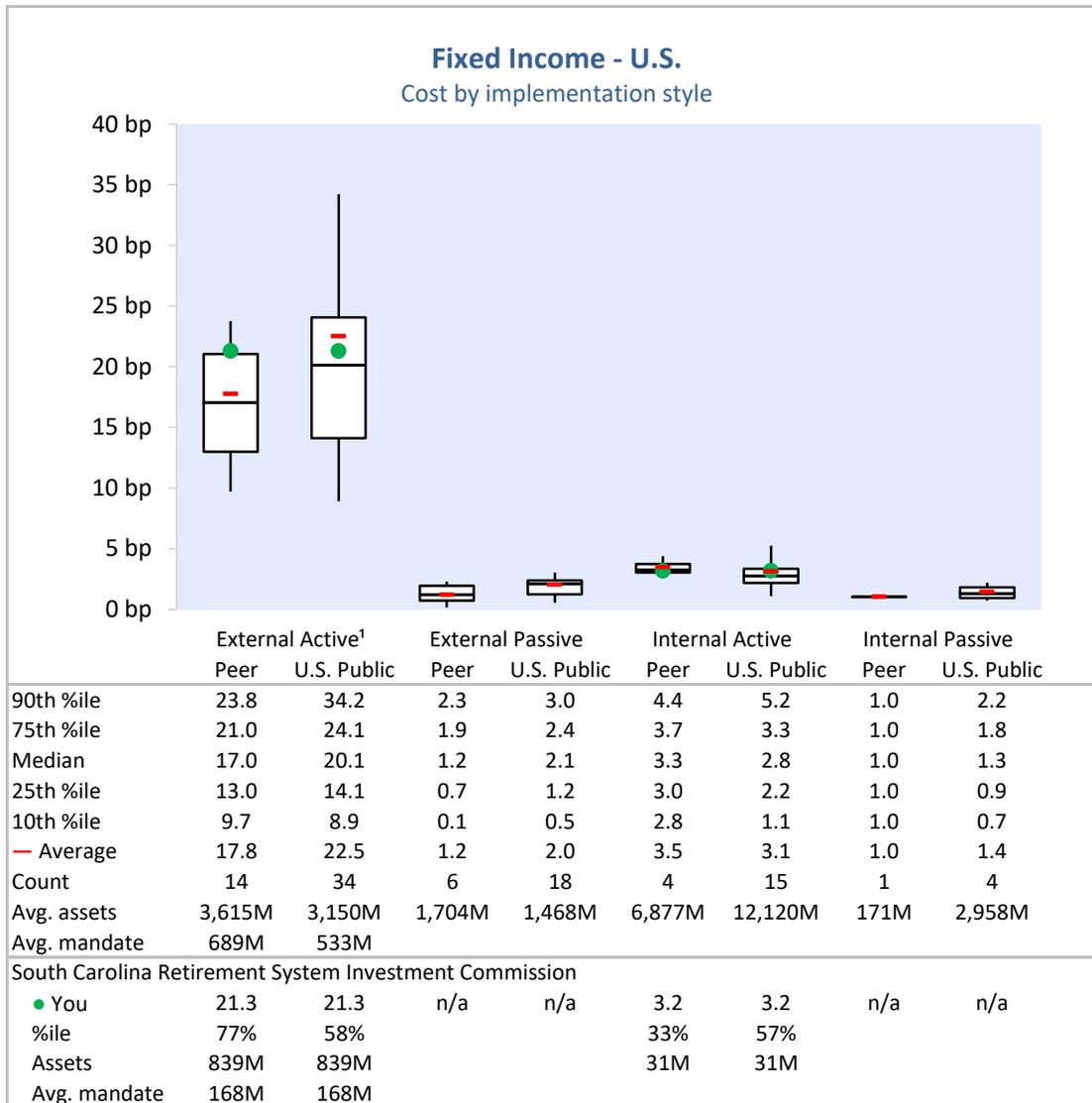
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 1.9 bps for peers (4 funds) and 3.0 bps for U.S. Public participants (6 funds).



1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	68.8	62.6
Performance fees*	n/a	n/a	0.0
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.4</u>
Total	n/a	68.8	63.0

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for U.S. Public participants (1 fund).

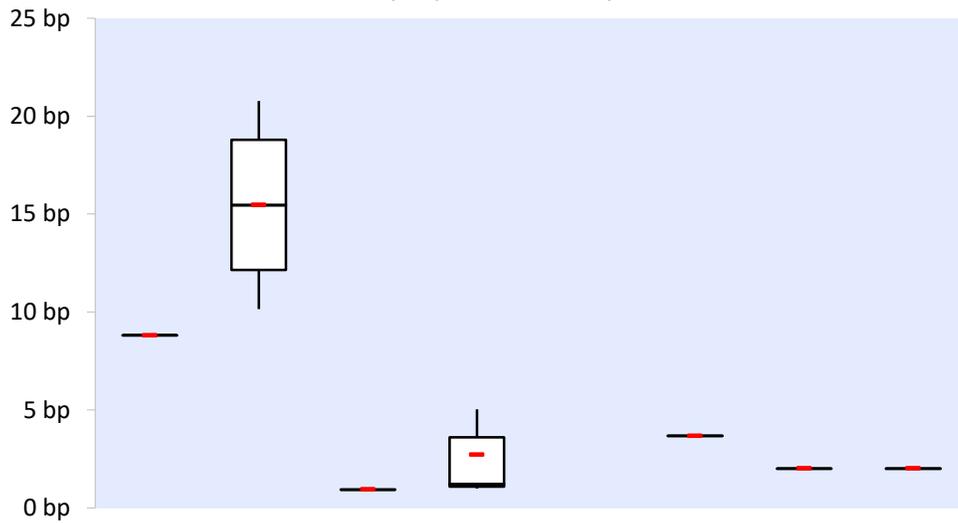


#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	18.3	16.4	18.3
Performance fees*	n/a	0.7	3.7
Internal and other	3.0	0.7	0.5
Total	21.3	17.8	22.5

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 2.5 bps for peers (4 funds) and 11.5 bps for U.S. Public participants (11 funds).

### Fixed Income - U.S. Gov't Cost by implementation style



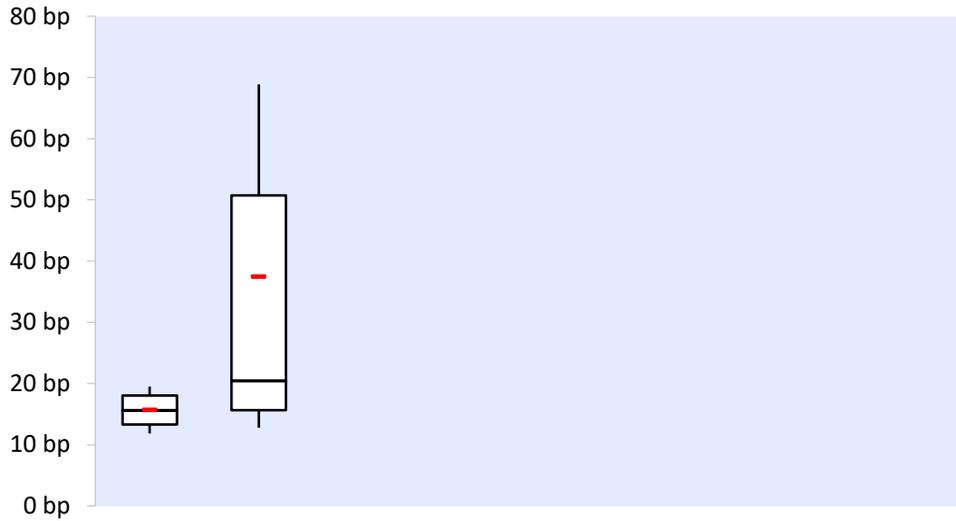
	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	8.8	20.8	0.9	5.0		3.7	2.0	2.0
75th %ile	8.8	18.8	0.9	3.6		3.7	2.0	2.0
Median	8.8	15.5	0.9	1.2		3.7	2.0	2.0
25th %ile	8.8	12.1	0.9	1.1		3.7	2.0	2.0
10th %ile	8.8	10.1	0.9	1.0		3.7	2.0	2.0
— Average	8.8	15.5	0.9	2.7		3.7	2.0	2.0
Count	1	2	1	3	0	1	1	1
Avg. assets	1,345M	704M	11,509M	4,366M		1,008M	5,118M	5,118M
Avg. mandate		64M						
South Carolina Retirement System Investment Commission								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	7.3	14.7
Performance fees*	n/a	n/a	n/a
Internal and other	<u>n/a</u>	<u>1.5</u>	<u>0.7</u>
Total	n/a	8.8	15.5

No funds reported a performance fee.

### Fixed Income - U.S. Credits Cost by implementation style

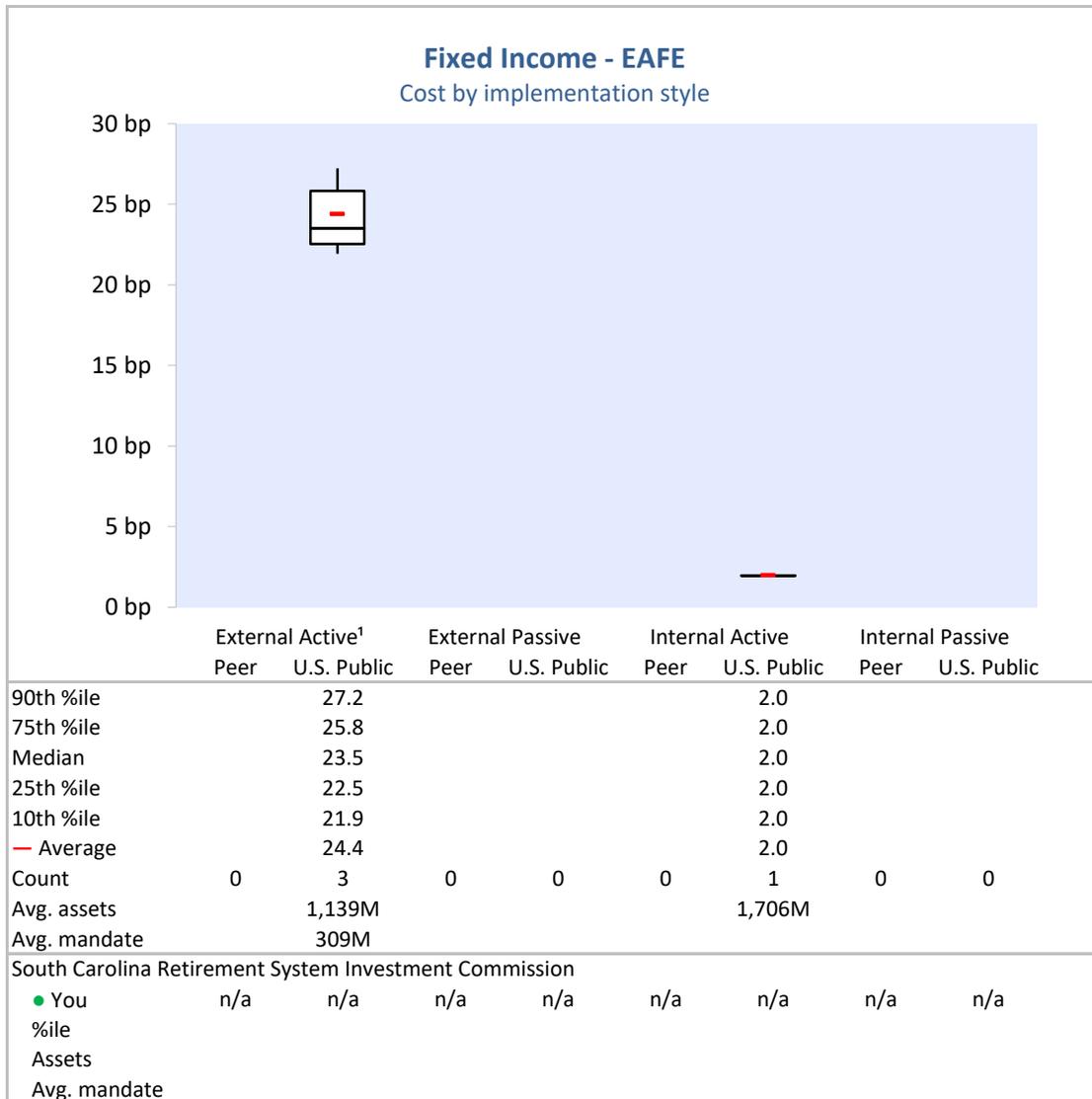


	External Active <sup>1</sup> Peer	External Active <sup>1</sup> U.S. Public	External Passive Peer	External Passive U.S. Public	Internal Active Peer	Internal Active U.S. Public	Internal Passive Peer	Internal Passive U.S. Public
90th %ile	19.5	68.9						
75th %ile	18.0	50.7						
Median	15.7	20.4						
25th %ile	13.3	15.7						
10th %ile	11.9	12.8						
— Average	15.7	37.4						
Count	2	3	0	0	0	0	0	0
Avg. assets	1,648M	1,157M						
Avg. mandate	901M	620M						
South Carolina Retirement System Investment Commission								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	15.0	37.0
Performance fees*	n/a	0.0	0.0
Internal and other	<u>n/a</u>	<u>0.6</u>	<u>0.4</u>
Total	n/a	15.7	37.4

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for peers (1 fund) and 0.0 bps for U.S. Public participants (1 fund).

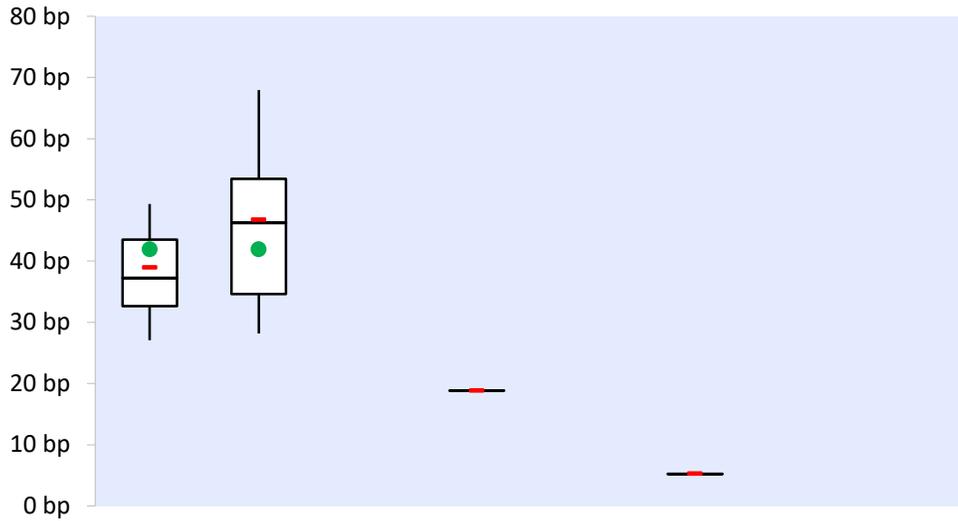


#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	n/a	19.2
Performance fees*	n/a	n/a	4.8
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.4</u>
Total	n/a	n/a	24.4

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 14.5 bps for U.S. Public participants (1 fund).

### Fixed Income - Emerging Cost by implementation style

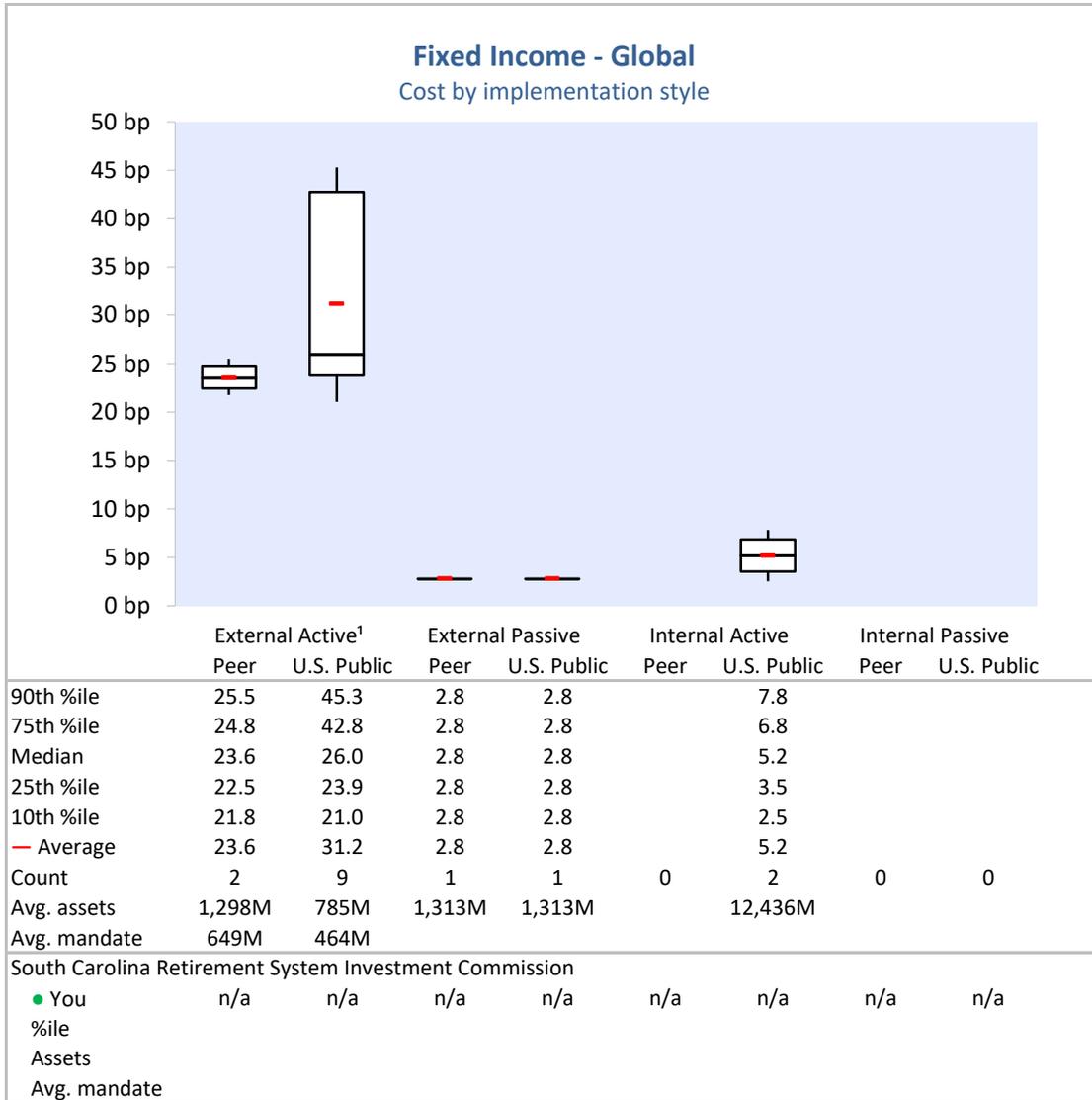


	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	49.3	67.9		18.8		5.2		
75th %ile	43.5	53.4		18.8		5.2		
Median	37.2	46.3		18.8		5.2		
25th %ile	32.7	34.6		18.8		5.2		
10th %ile	27.1	28.2		18.8		5.2		
— Average	38.9	46.8		18.8		5.2		
Count	12	25	0	1	0	1	0	0
Avg. assets	883M	904M		18M		1,546M		
Avg. mandate	398M	323M						
South Carolina Retirement System Investment Commission								
● You	41.9	41.9	n/a	n/a	n/a	n/a	n/a	n/a
%ile	73%	46%						
Assets	1,457M	1,457M						
Avg. mandate	243M	243M						

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	38.9	37.4	45.9
Performance fees*	n/a	0.9	0.3
Internal and other	3.0	0.6	0.6
Total	41.9	38.9	46.8

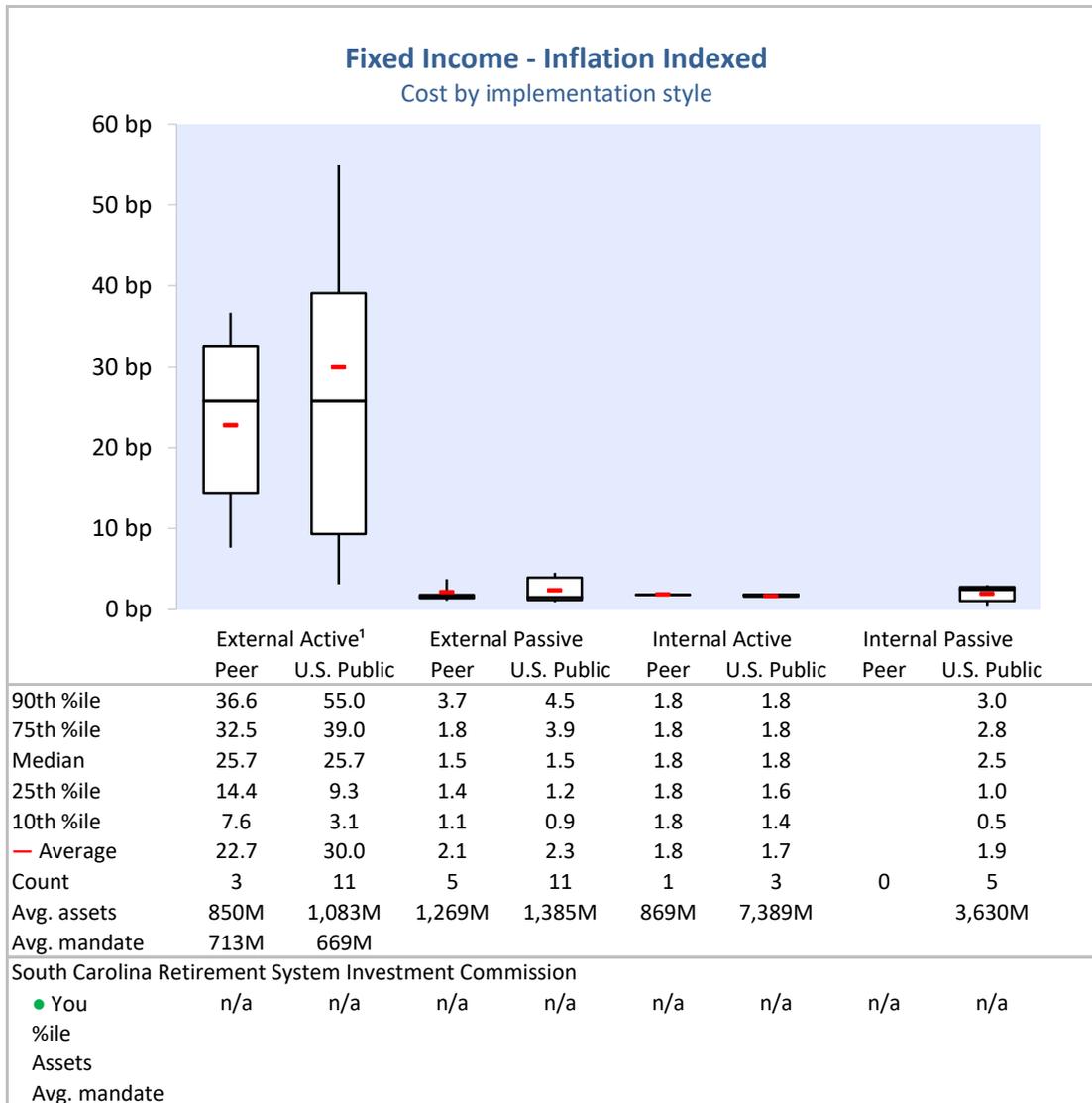
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 3.6 bps for peers (3 funds) and 1.1 bps for U.S. Public participants (6 funds).



1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	23.6	29.7
Performance fees*	n/a	n/a	1.2
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.2</u>
Total	n/a	23.6	31.2

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 5.3 bps for U.S. Public participants (2 funds).

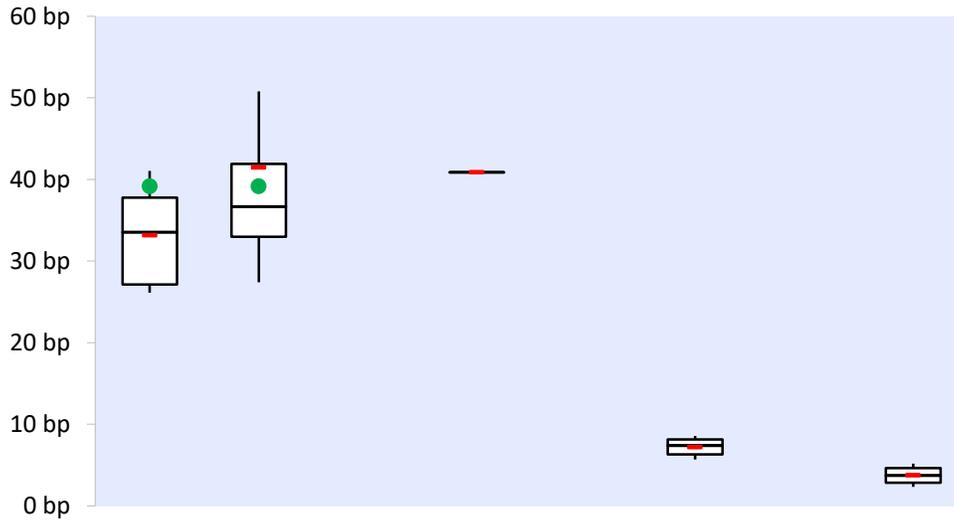


#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	22.4	28.2
Performance fees*	n/a	0.0	1.3
Internal and other	<u>n/a</u>	<u>0.4</u>	<u>0.5</u>
Total	n/a	22.7	30.0

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for peers (2 funds) and 2.9 bps for U.S. Public participants (5 funds).

### Fixed Income - High Yield Cost by implementation style



	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	41.0	50.8		40.9		8.6		5.2
75th %ile	37.8	41.9		40.9		8.1		4.6
Median	33.6	36.7		40.9		7.4		3.7
25th %ile	27.1	33.0		40.9		6.3		2.9
10th %ile	26.1	27.4		40.9		5.7		2.3
— Average	33.2	41.5		40.9		7.2		3.7
Count	11	29	0	1	0	3	0	2
Avg. assets	802M	1,251M		61M		646M		296M
Avg. mandate	373M	303M						
South Carolina Retirement System Investment Commission								
● You	39.2	39.2	n/a	n/a	n/a	n/a	n/a	n/a
%ile	80%	54%						
Assets	1,493M	1,493M						
Avg. mandate	299M	299M						

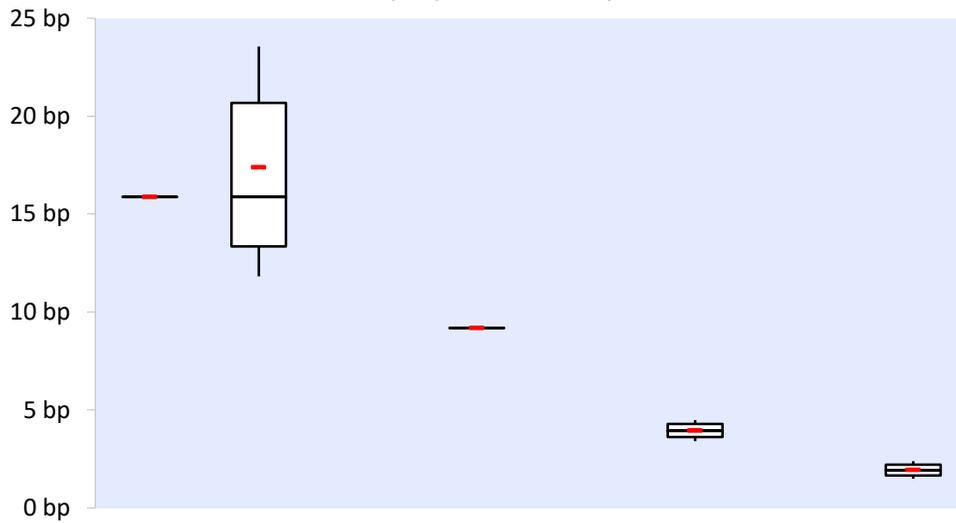
#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	36.2	32.3	39.4
Performance fees*	n/a	0.3	0.9
Internal and other	3.0	0.6	1.2
Total	39.2	33.2	41.5

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 1.5 bps for peers (2 funds) and 4.4 bps for U.S. Public participants (6 funds).

## Fixed Income - Long Bonds

### Cost by implementation style

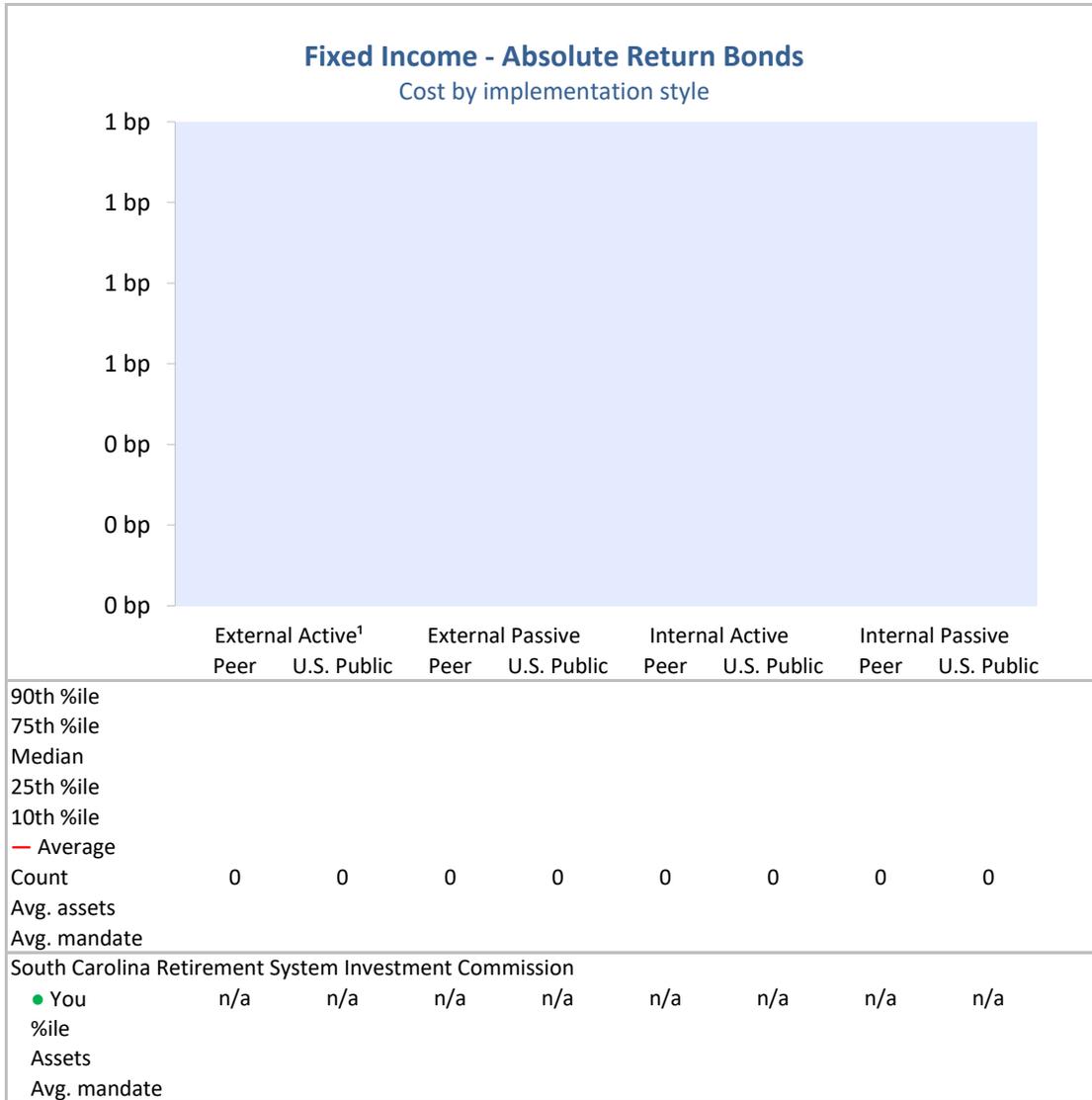


	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	15.9	23.5	0	9.2	0	4.5	0	2.4
75th %ile	15.9	20.7	0	9.2	0	4.3	0	2.2
Median	15.9	15.9	0	9.2	0	3.9	0	1.9
25th %ile	15.9	13.3	0	9.2	0	3.6	0	1.7
10th %ile	15.9	11.8	0	9.2	0	3.4	0	1.5
— Average	15.9	17.4	0	9.2	0	3.9	0	1.9
Count	1	3	0	1	0	2	0	2
Avg. assets	2,211M	2,221M		600M		5,838M		7,516M
Avg. mandate		881M						
South Carolina Retirement System Investment Commission								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	15.4	14.3
Performance fees*	n/a	n/a	2.6
Internal and other	<u>n/a</u>	<u>0.5</u>	<u>0.5</u>
Total	n/a	15.9	17.4

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 7.7 bps for U.S. Public participants (1 fund).

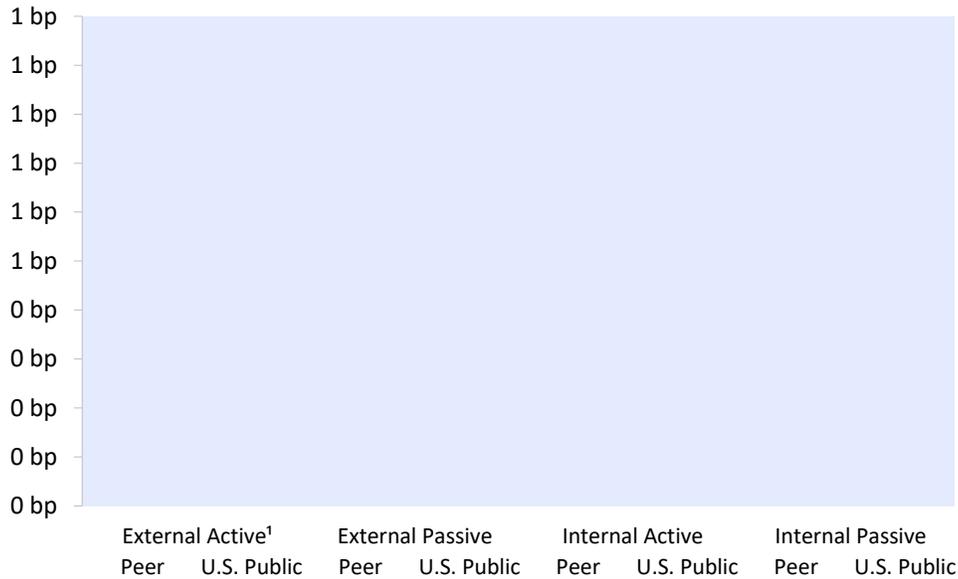


1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	n/a	n/a
Performance fees*	n/a	n/a	n/a
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>
Total	n/a	n/a	n/a

No funds reported a performance fee.

### Fixed Income - Bundled LDI Cost by implementation style



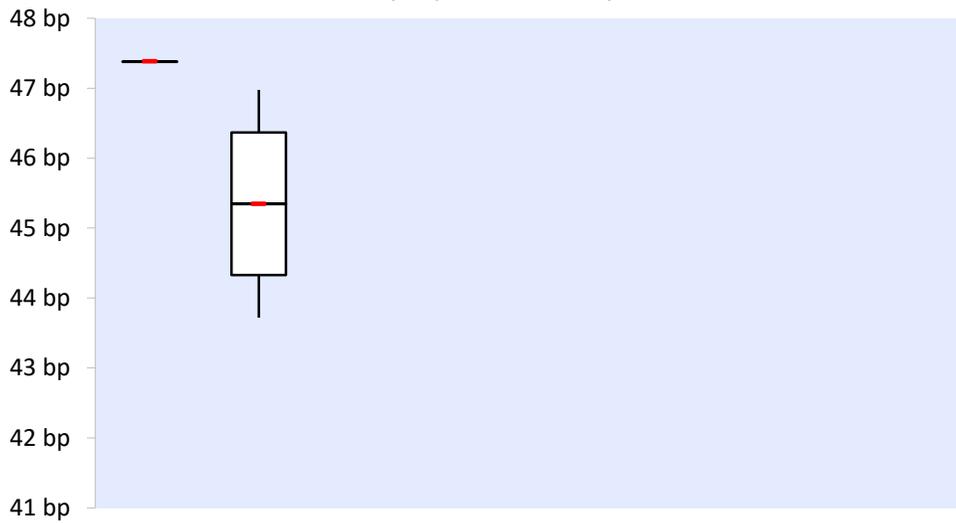
90th %ile								
75th %ile								
Median								
25th %ile								
10th %ile								
— Average								
Count	0	0	0	0	0	0	0	0
Avg. assets								
Avg. mandate								
South Carolina Retirement System Investment Commission								
● You	n/a							
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	n/a	n/a
Performance fees*	n/a	n/a	n/a
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>
Total	n/a	n/a	n/a

No funds reported a performance fee.

### Fixed Income - Convertibles Cost by implementation style

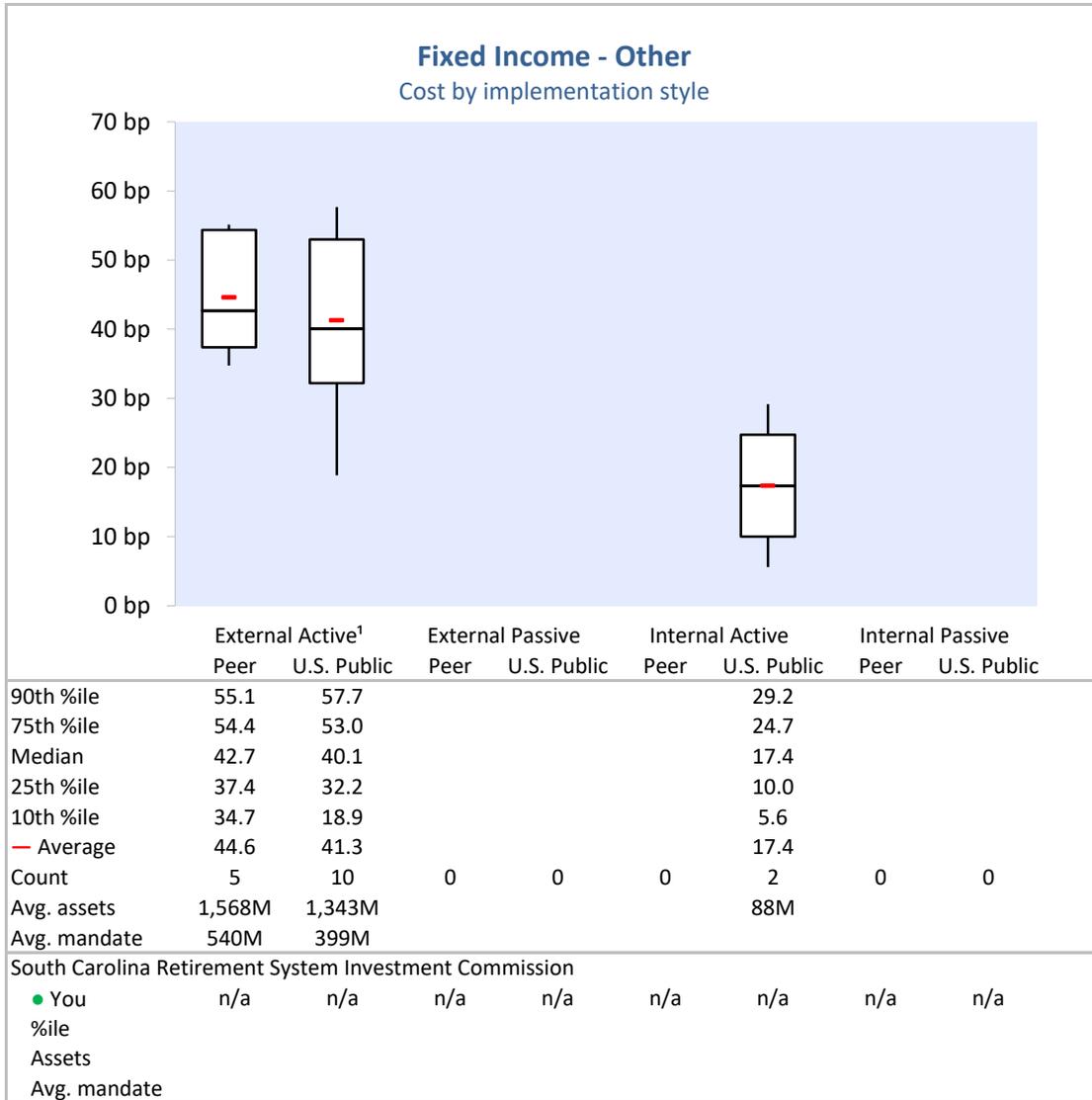


	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	47.4	47.0						
75th %ile	47.4	46.4						
Median	47.4	45.3						
25th %ile	47.4	44.3						
10th %ile	47.4	43.7						
— Average	47.4	45.3						
Count	1	2	0	0	0	0	0	0
Avg. assets	2,280M	2,077M						
Avg. mandate	570M	570M						
South Carolina Retirement System Investment Commission								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	46.3	44.8
Performance fees*	n/a	n/a	n/a
Internal and other	<u>n/a</u>	<u>1.1</u>	<u>0.6</u>
Total	n/a	47.4	45.3

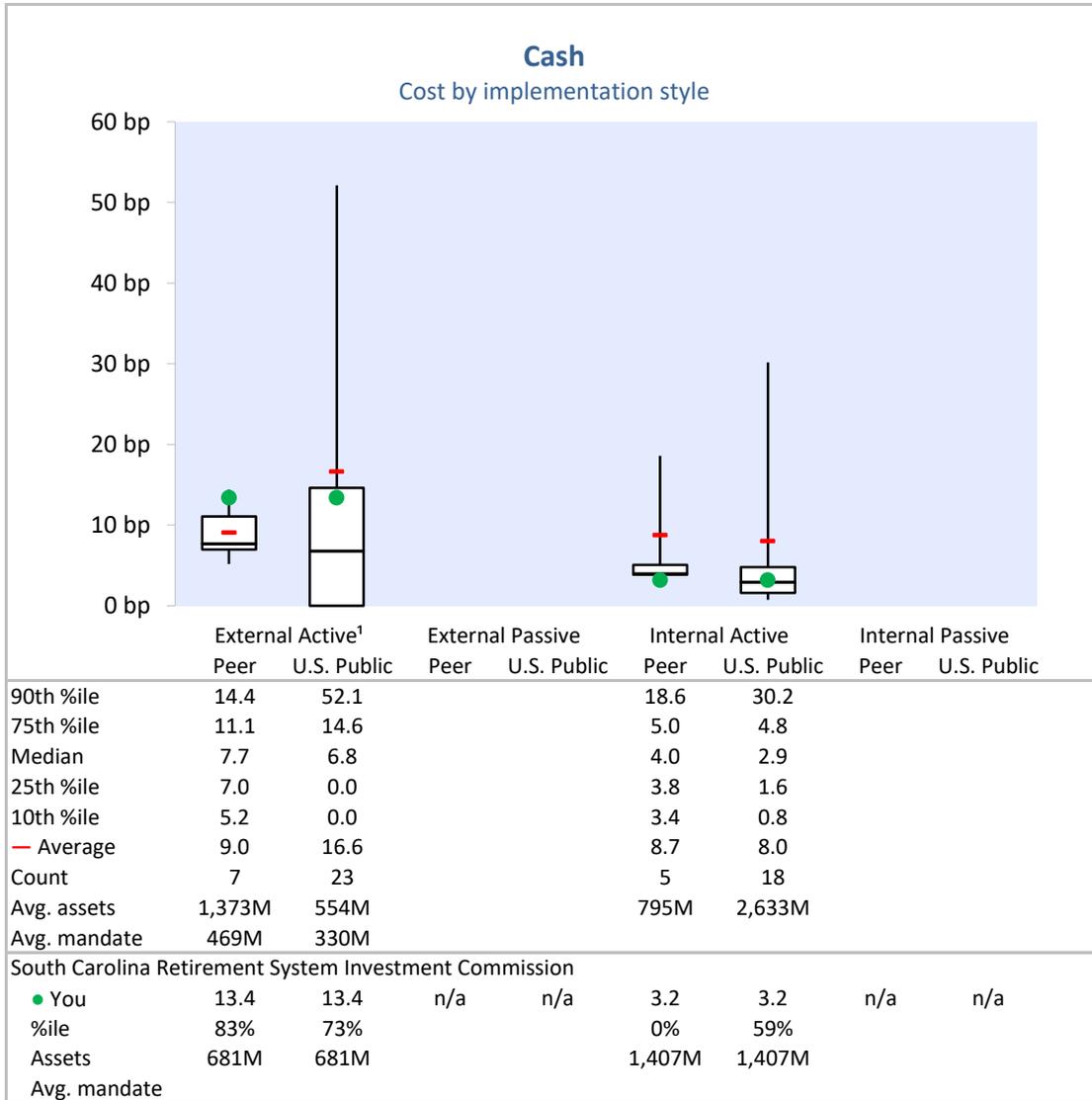
No funds reported a performance fee.



1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	42.9	40.3
Performance fees*	n/a	0.0	0.0
Internal and other	<u>n/a</u>	<u>1.7</u>	<u>1.0</u>
Total	n/a	44.6	41.3

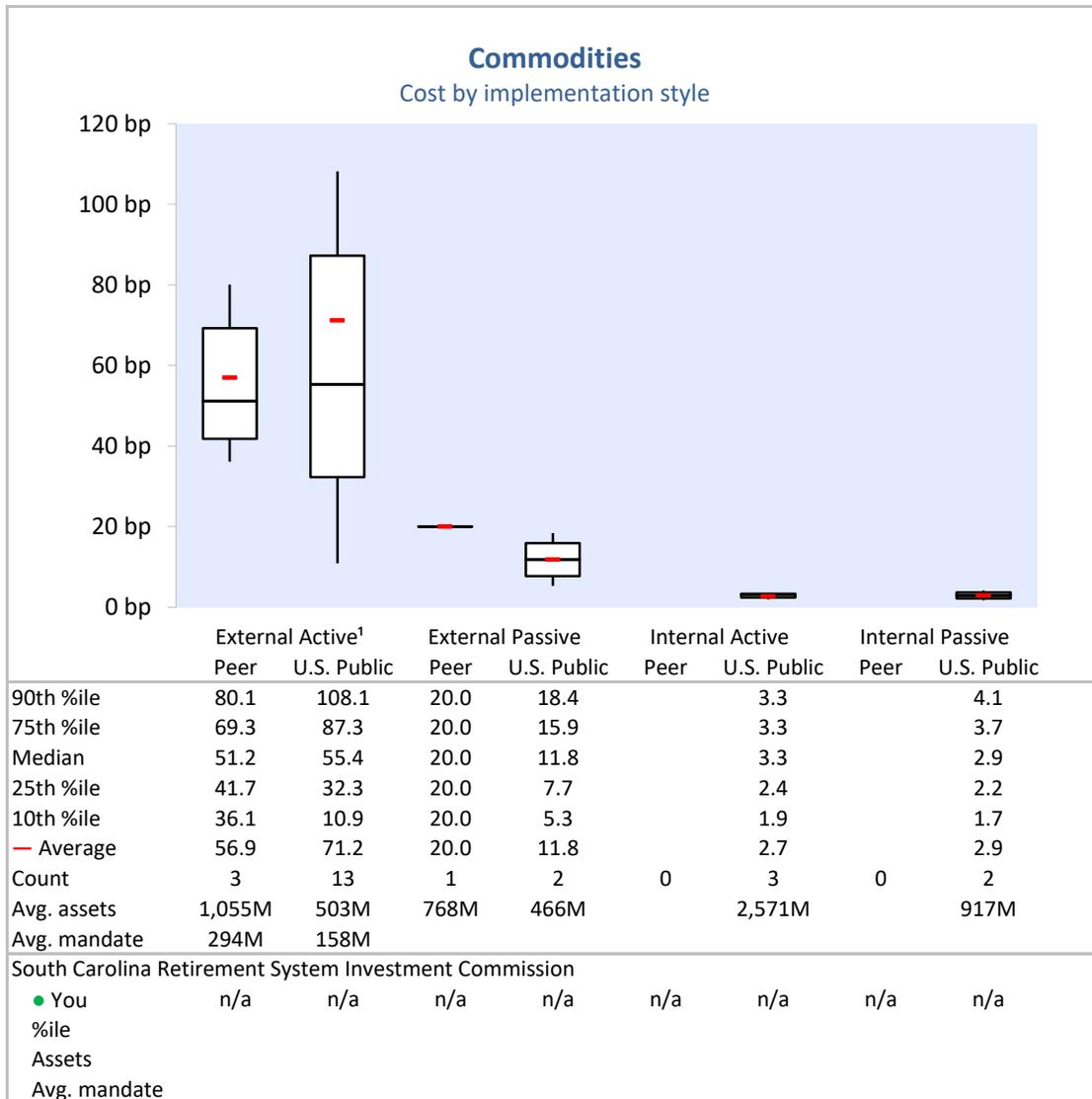
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for peers (1 fund) and 0.0 bps for U.S. Public participants (1 fund).



1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	10.4	8.6	15.7
Performance fees*	n/a	0.0	0.7
Internal and other	3.0	0.5	0.2
Total	13.4	9.0	16.6

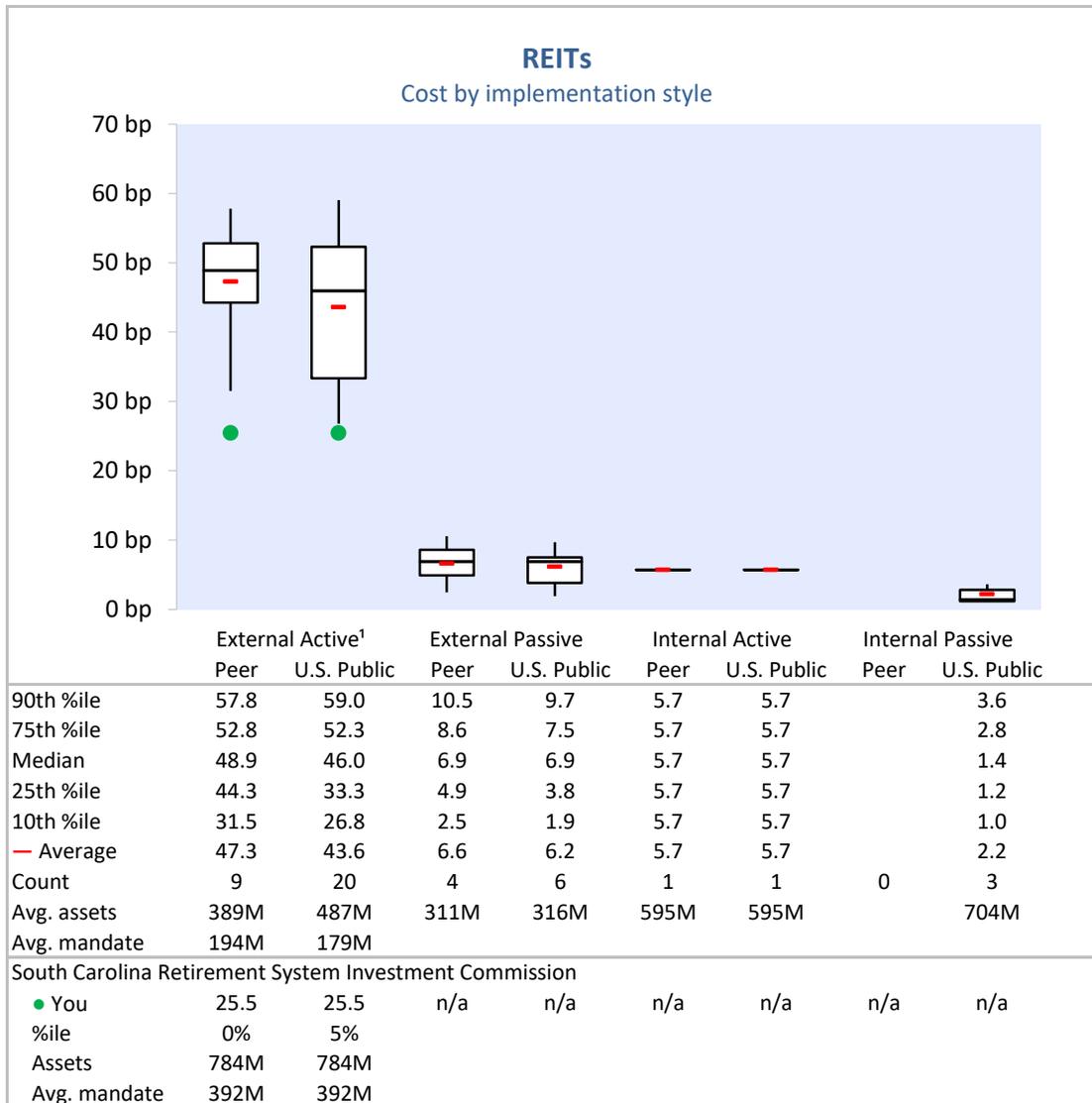
\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 0.0 bps for peers (2 funds) and 5.4 bps for U.S. Public participants (3 funds).



#### 1. Breakdown of external active fees

	You	Peer Average	U.S. Public Average
Base fees	n/a	56.7	65.0
Performance fees*	n/a	n/a	4.3
Internal and other	<u>n/a</u>	<u>0.3</u>	<u>1.9</u>
Total	n/a	56.9	71.2

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 11.1 bps for U.S. Public participants (5 funds).



1. Breakdown of external active fees

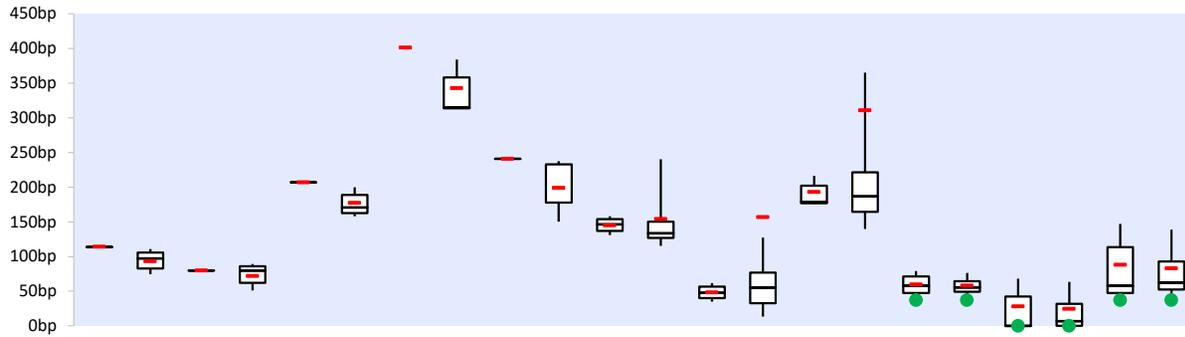
	You	Peer Average	U.S. Public Average
Base fees	22.4	42.9	40.3
Performance fees*	0.0	3.2	2.5
Internal and other	3.0	1.2	0.8
Total	25.5	47.3	43.6

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 9.6 bps for peers (3 funds) and 7.2 bps for U.S. Public participants (7 funds).

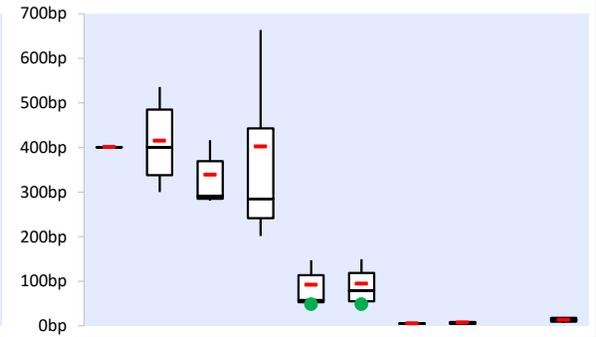


## Infrastructure

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV

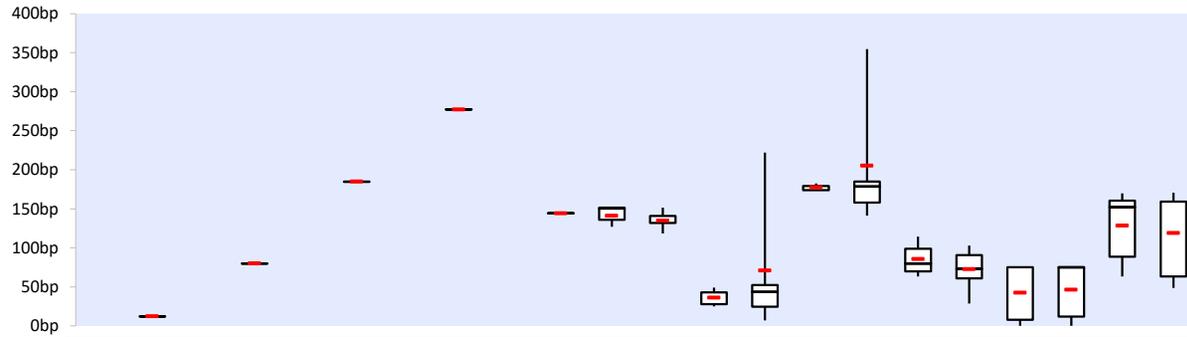


	Fund of Funds										Direct LP						Evergreen						Fund of Funds		Direct LP		Evergreen		Co-Inv.		Internal	
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total		Total		Total		Total	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	114.0	110.7	80.0	89.3	207.0	199.8	401.0	383.8	241.0	237.7	158.1	240.3	61.6	127.4	216.5	365.3	79.2	76.5	68.0	63.7	147.2	138.9	401.0	535.7	416.4	663.8	147.2	149.2	6.0	10.4	20.6	
75th %ile	114.0	105.7	80.0	85.8	207.0	188.9	401.0	358.0	241.0	232.7	153.8	150.1	56.5	76.7	202.3	221.2	71.2	64.5	42.5	31.8	113.7	93.0	401.0	485.2	369.6	442.6	113.7	118.7	5.8	8.8	18.0	
Median	114.0	97.4	80.0	80.0	207.0	170.8	401.0	315.0	241.0	224.4	146.6	133.8	48.0	55.1	178.5	186.9	57.8	55.7	0.0	7.0	57.8	62.7	401.0	401.0	291.5	284.8	57.8	79.8	5.5	6.1	13.7	
25th %ile	114.0	83.0	80.0	61.9	207.0	162.7	401.0	313.5	241.0	178.0	136.8	127.0	40.0	32.8	176.8	164.6	47.5	49.4	0.0	0.0	47.5	52.7	401.0	337.9	284.8	241.6	53.4	55.6	5.3	5.5	9.4	
10th %ile	114.0	74.4	80.0	51.1	207.0	157.9	401.0	312.6	241.0	150.2	130.9	115.3	35.1	13.6	175.7	139.7	41.3	42.1	0.0	0.0	41.3	43.4	401.0	300.1	280.9	201.4	50.7	51.6	5.1	5.2	6.9	
Average	114.0	93.4	80.0	71.8	207.0	177.5	401.0	342.7	241.0	199.0	144.9	154.1	48.3	156.6	193.2	310.8	59.8	58.2	28.3	24.8	88.2	83.0	401.0	415.1	339.1	402.6	92.1	94.5	5.5	7.5	13.7	
Count	1	3	1	3	1	3	1	3	1	3	3	14	3	14	3	14	3	4	3	4	3	4	1	3	3	14	3	4	2	3	0	2
Avg. assets	197M	101M	197M	101M	197M	101M	197M	101M	197M	101M	652M	677M	652M	677M	652M	677M	571M	1,002M	571M	1,002M	571M	1,002M	197M	96M	417M	532M	504M	759M	59M	169M		898M
South Carolina Retirement System Investment Commission																																
You %ile Assets	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	37.2	37.2	0.0	0.0	37.2	37.2	n/a	n/a	n/a	n/a	48.9	48.9	n/a	n/a	n/a	n/a
																	831M	831M	831M	831M	831M	831M	0M	0M	631M	631M	0M	0M	0M	0M	0M	0M

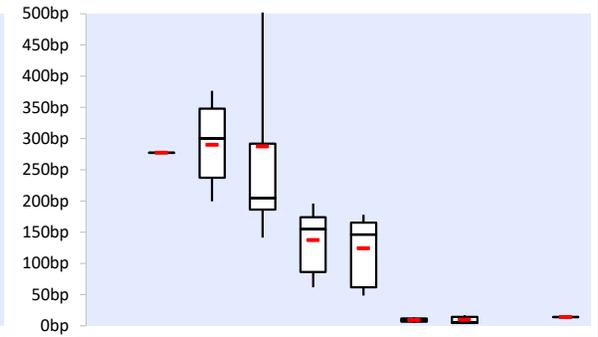
1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.  
 2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 127 bps (on amount fees are based on) for underlying management fees and 80 bps (on NAV) for underlying performance fees were used.  
 3. The total cost also includes the internal cost of monitoring and selecting infrastructure investments. Your cost of monitoring and selecting was 2.3 bps for external (not LPs). The peer average cost of monitoring and selecting was 2.8 bps for fund of funds, 3.2 bps for LPs and 2.8 bps for external (not LPs).

## Natural Resources

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV

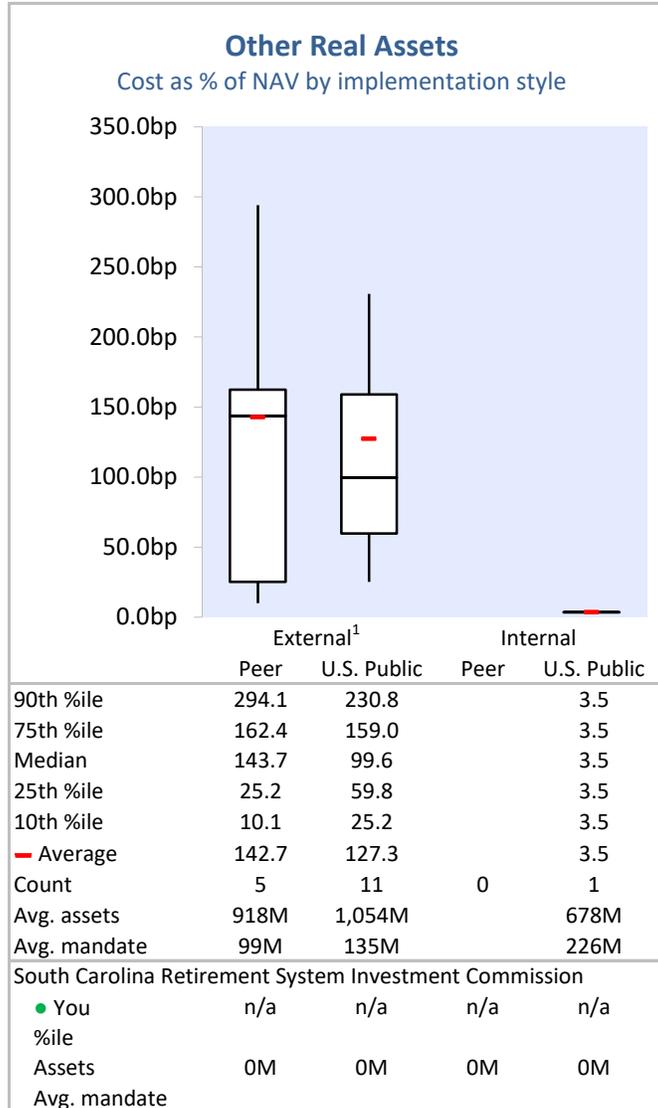


	Fund of Funds						Direct LP						Evergreen									
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile		12.3		80.0		185.0		277.3		144.3	151.7	151.4	48.9	222.2	182.4	354.4	114.2	103.0	75.0	76.0	170.0	170.8
75th %ile		12.3		80.0		185.0		277.3		144.3	151.3	140.8	42.8	52.5	179.2	184.9	99.0	90.8	75.0	75.0	160.5	159.1
Median		12.3		80.0		185.0		277.3		144.3	150.7	132.8	32.5	43.7	174.0	178.8	80.1	73.3	52.9	75.0	152.3	148.3
25th %ile		12.3		80.0		185.0		277.3		144.3	135.9	132.0	27.9	24.7	174.0	158.0	70.0	60.8	7.7	12.1	88.8	63.3
10th %ile		12.3		80.0		185.0		277.3		144.3	127.0	118.5	25.2	6.9	174.0	141.3	63.3	28.5	0.0	0.0	63.3	48.8
— Average		12.3		80.0		185.0		277.3		144.3	141.2	134.7	36.3	70.8	177.5	205.5	85.9	72.9	42.6	46.3	128.5	119.1
Count	0	1	0	1	0	1	0	1	0	1	3	14	3	14	3	14	6	11	6	11	6	11
Avg. assets		24M		24M		24M		24M		24M	504M	1,365M	504M	1,365M	504M	1,365M	465M	575M	465M	575M	465M	575M
South Carolina Retirement System Investment Commission																						
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile																						
Assets																						

	Fund of Funds		Direct LP		Evergreen		Co-Inv.		Internal	
	Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total incl. perf.		Total	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
	277.3	376.3	587.3	195.9	178.0	13.3	17.1		14.4	
	277.3	347.9	291.9	174.0	165.2	11.8	14.3		14.4	
	277.3	300.5	205.3	155.1	146.6	9.3	5.7		14.4	
	277.3	237.3	186.0	86.5	61.8	6.9	4.6		14.4	
	277.3	199.3	141.2	61.8	48.8	5.4	4.5		14.4	
	277.3	289.9	287.5	137.6	124.2	9.3	9.6		14.4	
0	1	3	14	6	11	2	5	0	1	
	24M	286M	939M	414M	543M	46M	647M		131M	
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of n/a bps (on amount fees are based on) for underlying management fees and n/a bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting natural resource investments. The peer average cost of monitoring and selecting was 1.3 bps for LPs and 2.4 bps for external (not LPs).



#### 1. Breakdown of external fees

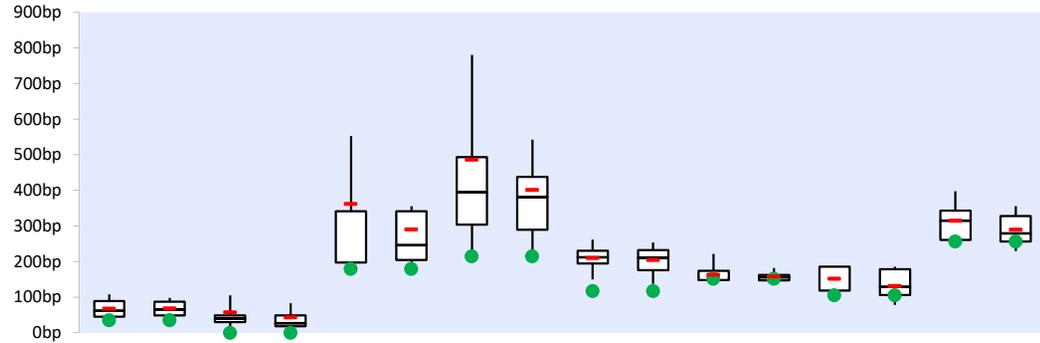
	Your Plan	Peer Average	U.S. Public Average
Base fees	n/a	138.2	122.5
Internal and other	<u>n/a</u>	<u>7.4</u>	<u>7.7</u>
Total*	n/a	142.7	127.3
Performance fees**	n/a	50.7	44.9

\* Total cost excludes performance fees because most participants did not provide performance fees for other real assets.

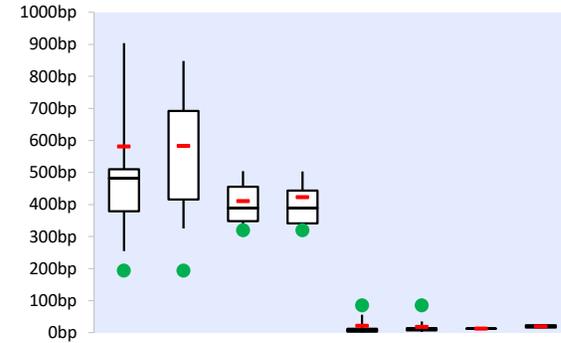
\*\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for only those funds that reported a performance fee is 50.7 bps for peers (5 funds) and 44.9 bps for Global participants (11 funds).

## Diversified Private Equity

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



	Fund of Funds										Direct LP					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	107.3	97.4	104.9	82.2	552.2	355.7	780.6	542.3	261.7	253.3	220.9	182.0	185.0	185.0	397.6	355.7
75th %ile	88.6	86.7	49.0	49.0	341.0	341.0	492.7	437.8	229.8	231.9	173.8	162.1	185.0	178.0	342.8	327.5
Median	62.0	65.5	40.3	27.2	303.9	245.8	394.7	381.3	212.6	210.3	156.3	156.0	166.1	129.3	315.2	279.1
25th %ile	45.2	49.0	29.4	18.6	197.4	203.9	303.7	289.1	194.1	175.8	147.5	147.2	118.4	105.4	260.9	256.4
10th %ile	26.9	32.3	3.7	5.4	177.9	172.9	206.4	232.0	149.3	136.9	137.1	137.0	102.4	78.1	248.7	229.7
Average	67.5	68.4	57.1	42.7	361.6	290.2	486.2	401.3	210.2	204.5	162.9	158.3	151.8	131.2	314.7	289.5
Count	8	27	8	27	8	27	8	27	8	27	15	37	15	37	15	37
Avg. assets	1,098M	985M	1,098M	985M	1,098M	985M	1,098M	985M	1,098M	985M	4,498M	5,288M	4,498M	5,288M	4,498M	5,288M
South Carolina Retirement System Investment Commission																
You	35.4	35.4	0.0	0.0	178.9	178.9	214.3	214.3	117.2	117.2	151.5	151.5	104.9	104.9	256.4	256.4
%ile	14%	12%	0%	0%	14%	19%	14%	8%	0%	4%	29%	28%	14%	22%	14%	22%
Assets	428M	428M	428M	428M	428M	428M	428M	428M	428M	428M	1,841M	1,841M	1,841M	1,841M	1,841M	1,841M

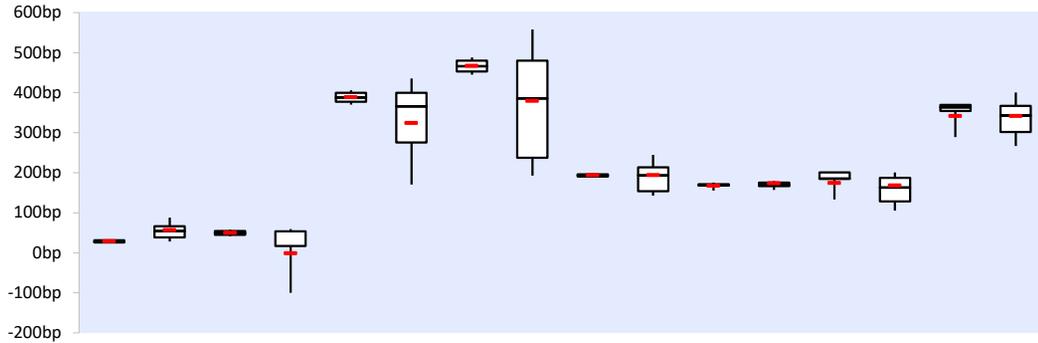
  

	Fund of Funds		Direct LP		Co-Investment		Internal	
	Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total		Total	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	903.8	848.3	504.5	503.4	56.1	35.4	13.1	24.9
75th %ile	510.0	692.5	455.1	443.8	12.2	14.4	13.1	22.9
Median	482.5	506.7	389.5	389.6	6.9	9.8	13.1	19.6
25th %ile	379.0	416.2	348.3	341.0	3.5	6.9	13.1	16.3
10th %ile	254.7	325.0	328.5	318.5	1.4	2.8	13.1	14.4
Average	581.2	583.1	411.2	423.4	21.6	18.2	13.1	19.6
Count	8	27	15	37	5	9	1	2
Avg. assets	906M	736M	3,143M	3,947M	527M	1,233M	1M	41M
You	193.9	193.9	320.2	320.2	85.3	85.3	n/a	n/a
%ile	0%	0%	7%	11%	100%	100%	n/a	n/a
Assets	473M	473M	1,474M	1,474M	397M	397M	0M	0M

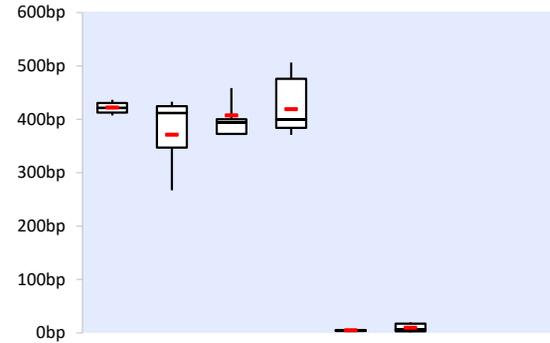
1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 156 bps (on amount fees are based on) for underlying management fees and 185 bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting private equity investments. Your cost of monitoring and selecting was 3.3 bps for fund of funds. The peer average cost of monitoring and selecting was 4.7 bps for fund of funds.

## LBO

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV

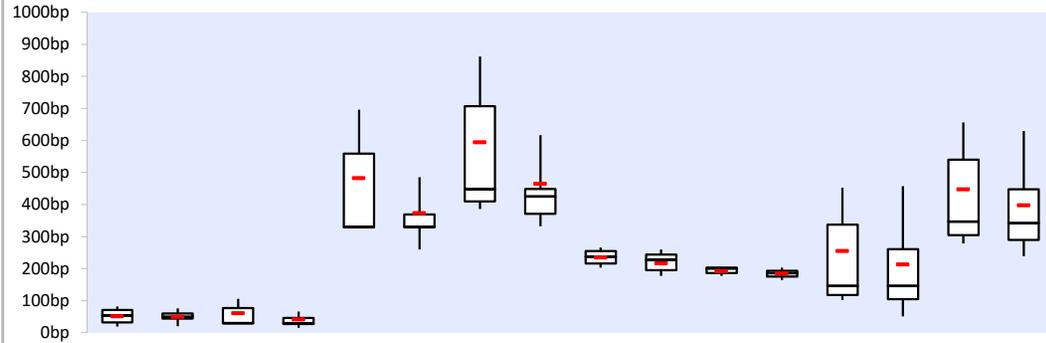


	Fund of Funds										Direct LP					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	32.8	88.0	57.3	58.9	406.1	435.0	487.6	558.2	197.8	244.3	175.7	179.7	201.0	201.0	371.3	400.4
75th %ile	31.2	66.7	54.4	53.9	399.4	399.4	479.6	479.6	196.2	213.2	171.5	175.0	201.0	187.0	369.6	366.7
Median	28.5	54.2	49.6	35.8	388.3	366.0	466.4	385.9	193.5	193.5	169.2	168.7	185.4	163.3	363.9	343.1
25th %ile	25.8	38.7	44.8	17.1	377.1	275.2	453.2	237.8	190.8	154.1	168.6	166.8	184.7	128.1	354.0	301.7
10th %ile	24.2	28.5	41.9	-100.2	370.5	170.5	445.2	192.6	189.2	142.4	155.4	157.4	133.4	105.1	289.1	267.1
Average	28.5	56.9	49.6	-1.8	388.3	323.8	466.4	378.9	193.5	193.4	166.9	173.7	174.3	167.6	341.2	341.3
Count	2	6	2	6	2	6	2	6	2	6	5	15	5	15	5	15
Avg. assets	75M	521M	75M	521M	75M	521M	75M	521M	75M	521M	2,317M	4,767M	2,317M	4,767M	2,317M	4,767M
South Carolina Retirement System Investment Commission																
● You %ile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Assets	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M

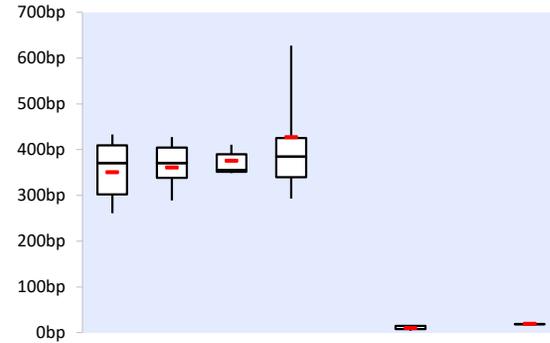
1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 165 bps (on amount fees are based on) for underlying management fees and 201 bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting private equity investments. The peer average cost of monitoring and selecting was 7.4 bps for fund of funds.

## Venture Capital

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV

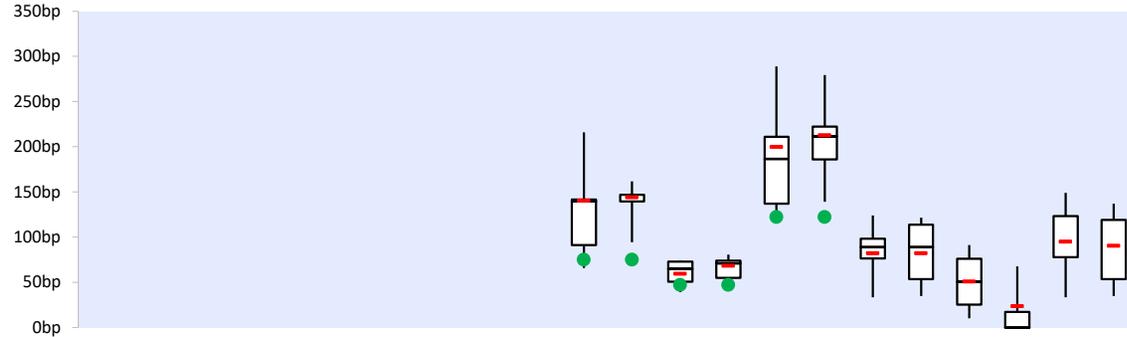


	Fund of Funds										Direct LP					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	81.4	76.0	105.2	65.6	696.1	485.7	862.1	616.8	265.4	260.0	203.7	203.4	452.4	457.4	656.1	630.0
75th %ile	71.1	59.6	77.0	46.5	558.8	369.5	706.9	448.3	255.1	243.6	202.8	193.3	337.5	260.7	540.2	448.1
Median	53.9	50.0	30.0	30.0	330.0	330.0	448.3	426.1	237.9	227.8	201.1	186.2	146.0	146.0	347.1	342.2
25th %ile	32.4	43.8	30.0	27.1	330.0	330.0	409.5	370.8	216.4	194.8	186.4	174.8	118.0	105.0	304.5	289.7
10th %ile	19.4	20.3	30.0	15.0	330.0	259.6	386.3	332.2	203.4	177.1	177.6	164.8	101.3	51.4	278.9	238.6
Average	51.0	49.9	61.3	41.9	482.5	373.2	594.9	465.0	235.0	216.8	192.4	184.7	255.0	213.1	447.4	397.8
Count	3	9	3	9	3	9	3	9	3	9	3	14	3	14	3	14
Avg. assets	164M	372M	164M	372M	164M	372M	164M	372M	164M	372M	375M	848M	375M	848M	375M	848M
South Carolina Retirement System Investment Commission																
● You %ile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Assets	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 184 bps (on amount fees are based on) for underlying management fees and 146 bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting private equity investments. The peer average cost of monitoring and selecting was 6.4 bps for fund of funds.

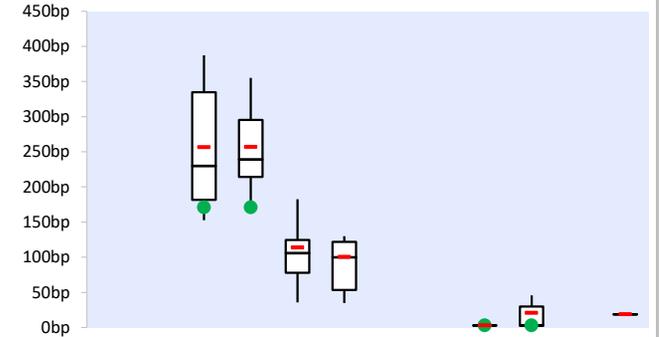
## Private Credit

Cost as a % of the amount fees are based on<sup>1</sup>



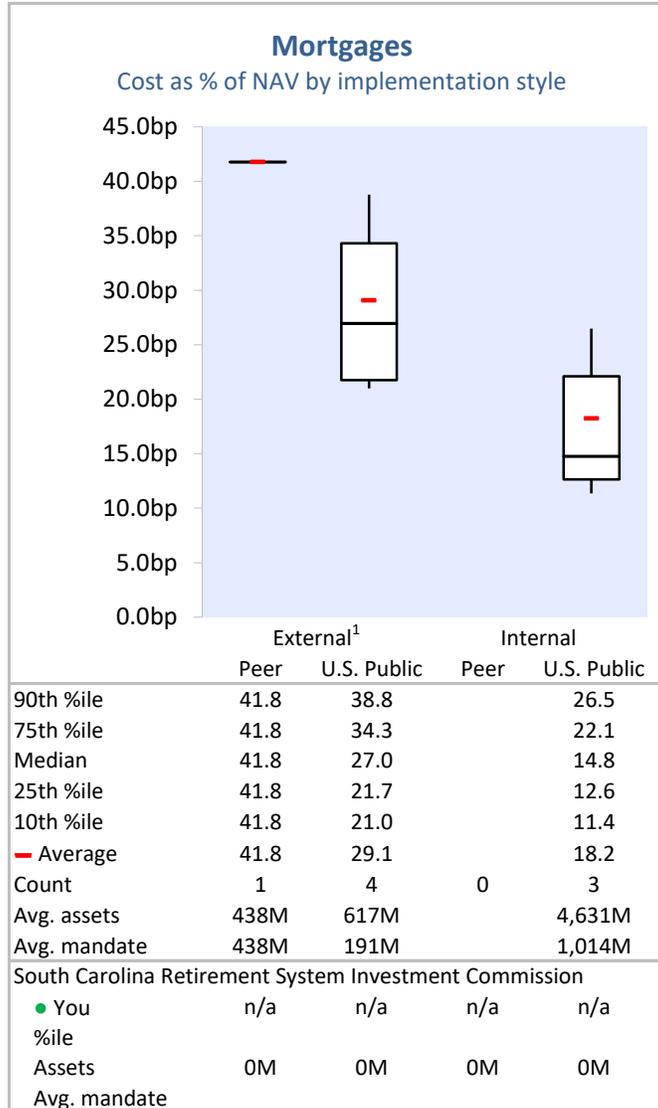
	Fund of Funds										Direct LP						Evergreen						
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	
90th %ile																							
75th %ile																							
Median																							
25th %ile																							
10th %ile																							
Average																							
Count	0	0	0	0	0	0	0	0	0	0	6	14	6	14	6	14	8	14	2	5	8	14	
Avg. assets											2,134M	1,478M	2,134M	1,478M	2,134M	1,478M	1,114M	1,200M	4,457M	3,360M	1,114M	1,200M	
South Carolina Retirement System Investment Commission																							
You %ile	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	75.2	75.2	47.1	47.1	122.3	122.3	n/a	n/a	n/a	n/a	n/a	n/a	
Assets											2,569M	2,569M	2,569M	2,569M	2,569M	2,569M							

Cost as a % of NAV



	Fund of Funds		Direct LP		Evergreen		Oper. Sub.		Co-Inv.		Internal	
	Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total		Total		Total	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile			387.1	355.3	182.7	130.2			3.2	45.8	18.9	
75th %ile			334.5	295.1	124.6	122.0			3.2	29.8	18.9	
Median			230.1	239.3	106.0	100.0			3.2	3.2	18.9	
25th %ile			181.8	214.0	77.9	53.5			3.2	2.9	18.9	
10th %ile			152.7	178.4	35.6	34.7			3.2	2.7	18.9	
Average			256.7	257.0	113.9	100.3			3.2	20.7	18.9	
Count	0	0	6	14	8	14	0	0	1	3	0	1
Avg. assets			1,623M	1,201M	1,009M	1,174M			0M	102M		501M
South Carolina Retirement System Investment Commission												
You %ile	n/a	n/a	171.1	171.1	n/a	n/a	n/a	n/a	3.2	3.2	n/a	n/a
Assets			1,837M	1,837M					0M	0M		

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of n/a bps (on amount fees are based on) for underlying management fees and n/a bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting real estate investments. Your cost of monitoring and selecting was 2.2 bps for LPs. The peer average cost of monitoring and selecting was 2.4 bps for LPs and 1.4 bps for external (not LPs).



#### 1. Breakdown of external fees

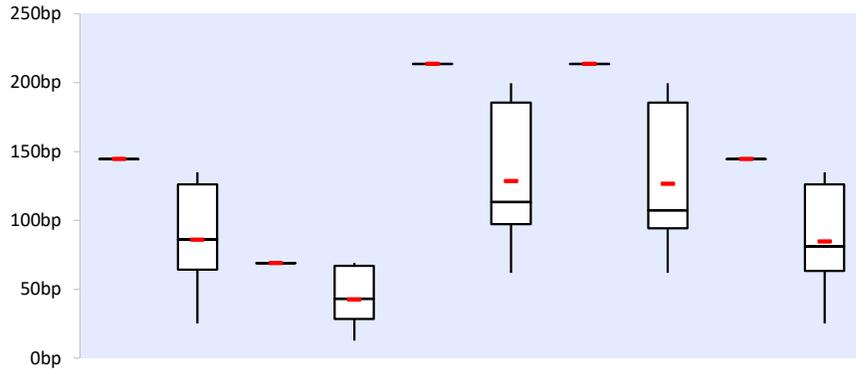
	Your Plan	Peer Average	U.S. Public Average
Base fees	n/a	40.0	28.2
Internal and other	<u>n/a</u>	<u>1.8</u>	<u>1.8</u>
Total*	n/a	41.8	29.1
Performance fees**	n/a	n/a	n/a

\* Total cost excludes performance fees because most participants did not provide performance fees for other real assets.

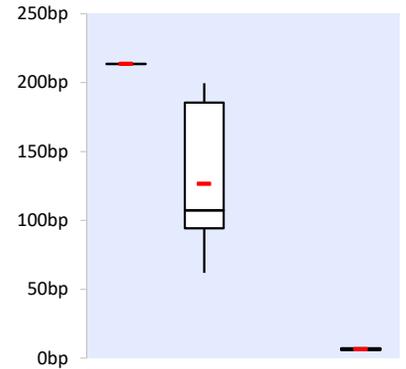
\*\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for only those funds that reported a performance fee is 50.7 bps for peers (5 funds) and 44.9 bps for Global participants (11 funds).

## Other Private Equity

Cost as a % of the amount fees are based on<sup>1</sup>

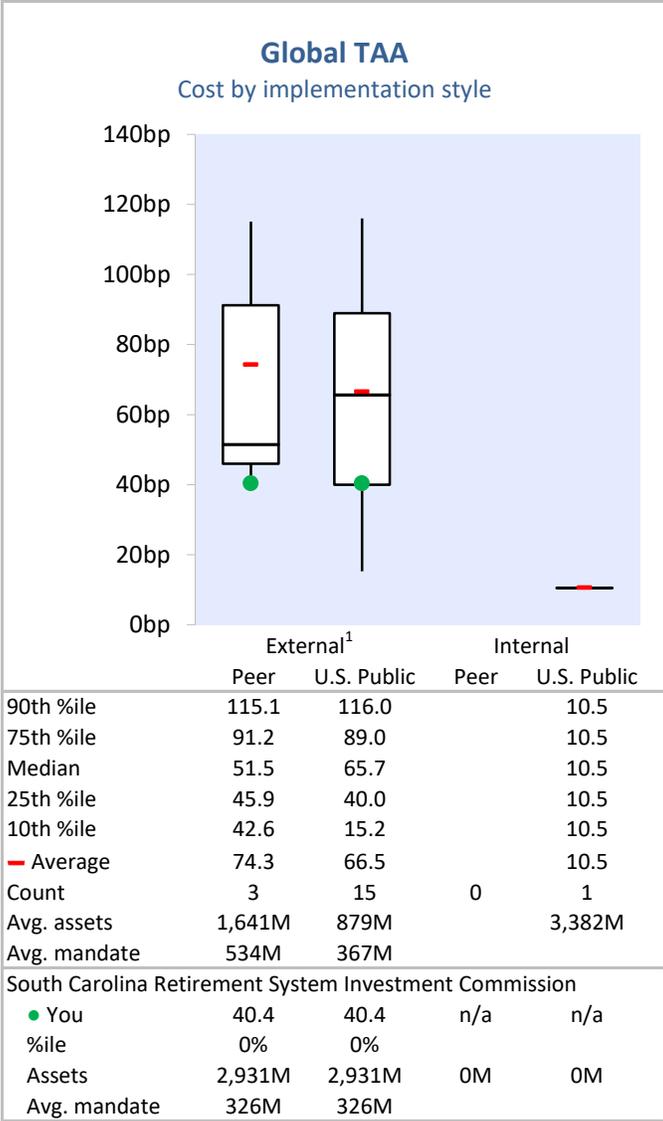


Cost as a % of NAV



	Direct LP						Direct LP & Co-Inv. <sup>3</sup>				Direct LP & Co-Inv. <sup>3</sup>		Internal	
	Mgmt fees		Perf. fees		Total <sup>2</sup> incl. perf.		Total <sup>2</sup> incl. perf.		Total <sup>2</sup> excl. perf.		Total <sup>2</sup> incl. perf.		Total	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	144.5	135.0	69.0	69.0	213.5	199.5	213.5	199.5	144.5	135.0	213.5	199.5		7.4
75th %ile	144.5	126.1	69.0	66.9	213.5	185.5	213.5	185.5	144.5	126.1	213.5	185.5		7.2
Median	144.5	86.2	69.0	43.2	213.5	113.5	213.5	107.5	144.5	81.4	213.5	107.5		6.7
25th %ile	144.5	64.3	69.0	28.5	213.5	97.4	213.5	94.2	144.5	63.3	213.5	94.2		5.9
10th %ile	144.5	25.1	69.0	12.6	213.5	61.8	213.5	61.8	144.5	25.1	213.5	61.8		5.3
— Average	144.5	86.0	69.0	42.6	213.5	128.6	213.5	126.6	144.5	84.6	213.5	126.6		6.4
Count	1	8	1	8	1	8	1	8	1	8	1	8	0	3
Avg. assets	1,710M	1,483M	1,710M	1,483M	1,710M	1,483M	1,710M	1,555M	1,710M	1,555M	1,710M	1,555M		102M
South Carolina Retirement System Investment Commission														
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile														
Assets	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M	0M

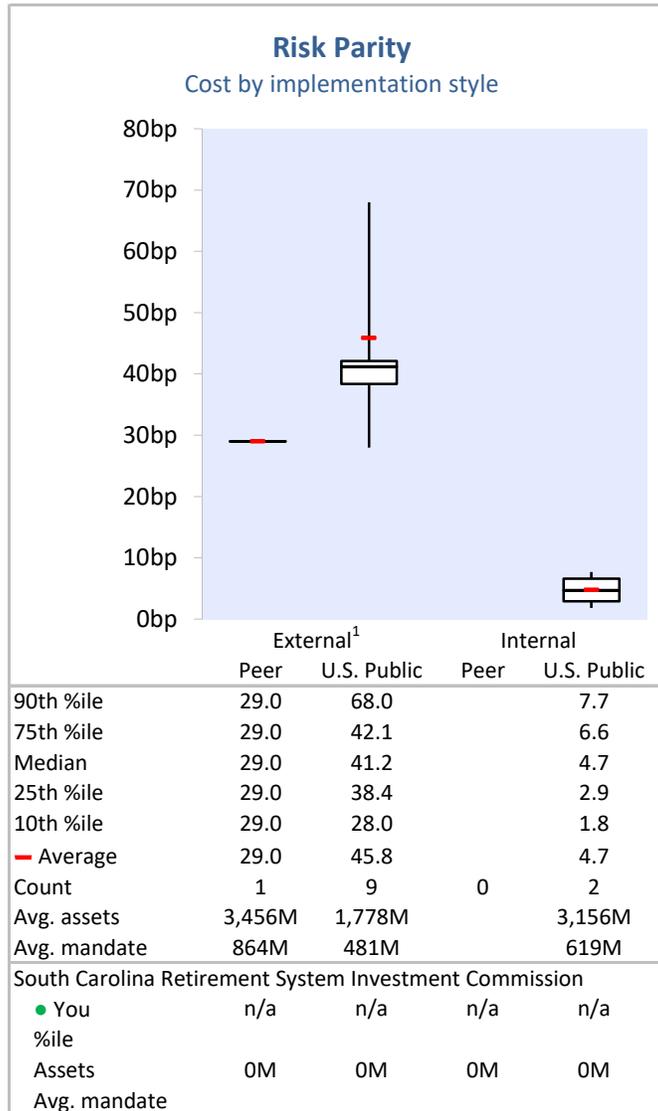
- The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
- The total cost also includes the internal cost of monitoring and selecting private equity investments.
- Co-investment is included with direct LPs because it can only be done alongside direct LPs. Co-investment is done by none of your peers and 2 of the U.S. Public funds.



1. Breakdown of external fees

	Your Plan	Peer Average	U.S. Public Average
Base fees	22.0	34.0	54.4
Internal and other	<u>3.0</u>	<u>4.2</u>	<u>4.6</u>
Performance fees	15.4	36.2	16.7
Total*	40.4	74.3	66.5

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 36.2 bps for peers (3 funds) and 16.7 bps for U.S. Public participants (9 funds).



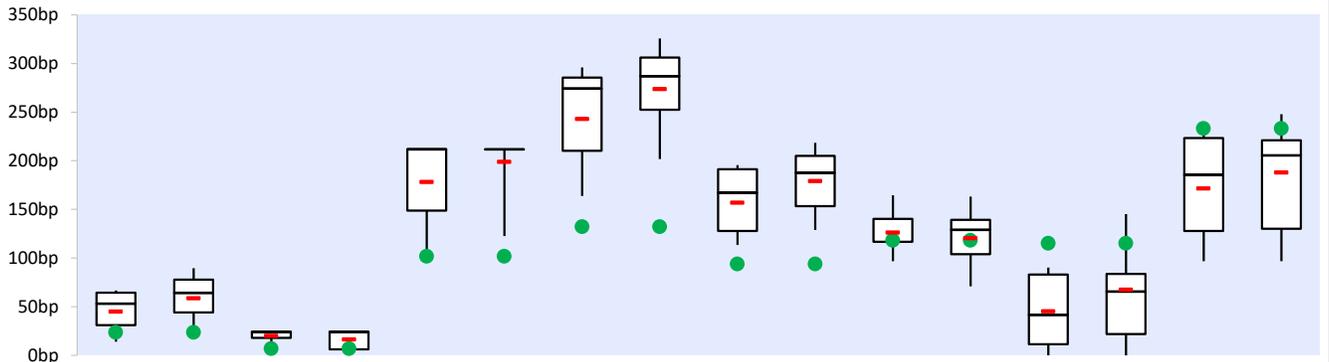
#### 1. Breakdown of external fees

	Your Plan	Peer Average	U.S. Public Average
Base fees	n/a	28.5	43.9
Internal and other	<u>n/a</u>	<u>0.5</u>	<u>1.5</u>
Performance fees	n/a	n/a	3.0
Total*	n/a	29.0	45.8

\* For funds that did not report a performance fee, a value of 'zero' was used. The average performance fee for those funds that reported a performance fee is 3.0 bps for U.S. Public participants (4 funds).

## Hedge Funds

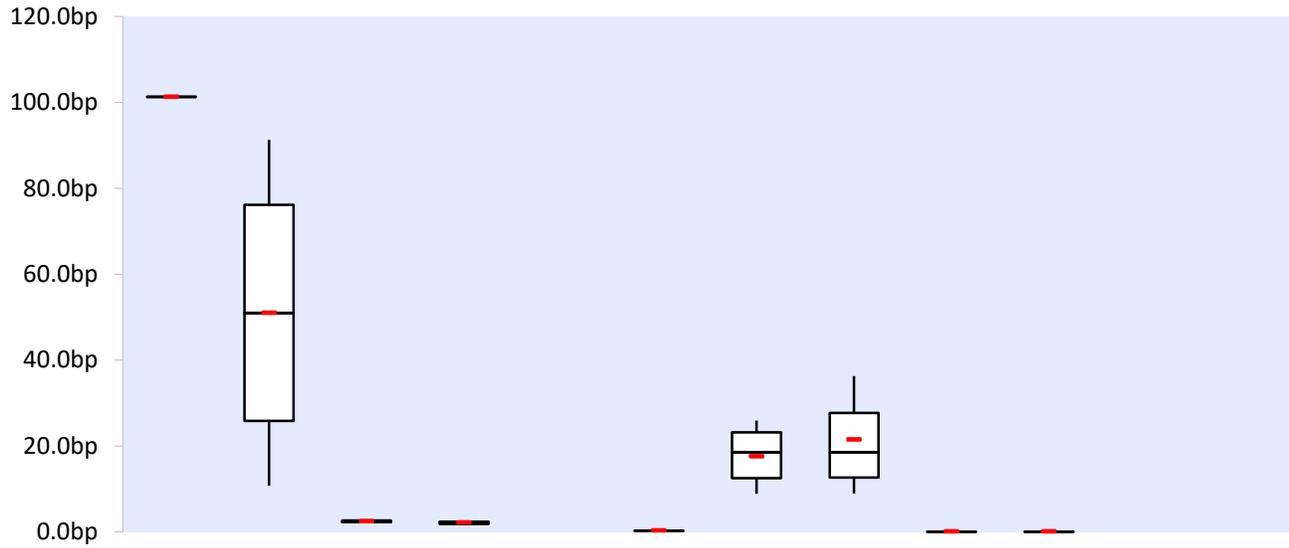
### Cost by implementation style



	Fund of Funds										External Direct					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. and perf. <sup>1</sup>		Total <sup>2</sup> incl. perf.		Total <sup>2</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>2</sup> incl. perf.	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	66.5	89.5	24.0	24.0	212.0	212.0	296.1	325.9	195.5	218.5	164.4	163.3	90.3	145.4	235.3	247.8
75th %ile	64.5	77.8	24.0	24.0	212.0	212.0	285.6	306.1	191.3	205.0	140.4	139.3	83.0	83.5	223.4	221.0
Median	53.4	64.5	24.0	24.0	212.0	212.0	274.5	287.1	167.5	187.8	131.3	129.0	41.7	65.6	185.6	205.7
25th %ile	31.0	44.0	17.9	6.2	148.7	212.0	210.4	252.4	127.8	153.5	116.6	104.0	11.3	21.8	128.0	130.1
10th %ile	14.1	21.2	9.8	0.0	105.2	122.5	163.8	201.8	113.5	128.8	96.7	70.8	0.0	0.0	96.7	96.8
— Average	44.8	58.6	19.8	16.3	178.2	198.8	242.8	273.7	156.8	179.1	126.2	120.2	45.1	67.5	171.4	187.7
Count	7	20	7	20	7	20	7	20	7	20	9	31	9	31	9	31
Avg. assets	654M	469M	654M	469M	654M	469M	654M	469M	654M	469M	3,067M	3,417M	3,067M	3,417M	3,067M	3,417M
South Carolina Retirement System Investment Commission																
● You	23.6	23.6	6.8	6.8	101.9	101.9	132.2	132.2	93.9	93.9	118.2	118.2	115.1	115.1	233.3	233.3
%ile	17%	11%	0%	26%	0%	0%	0%	0%	0%	0%	37%	40%	100%	87%	88%	80%
Assets	1,492M	1,492M	1,492M	1,492M	1,492M	1,492M	1,492M	1,492M	1,492M	1,492M	1,907M	1,907M	1,907M	1,907M	1,907M	1,907M

- The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 129 bps (on NAV) for underlying management fees and 83 bps (on NAV) for underlying performance fees were used.
- The total cost also includes the internal cost of monitoring and selecting real estate investments. The peer average cost of monitoring and selecting was 2.6 bps for fund of funds and 3.6 bps for LPs.

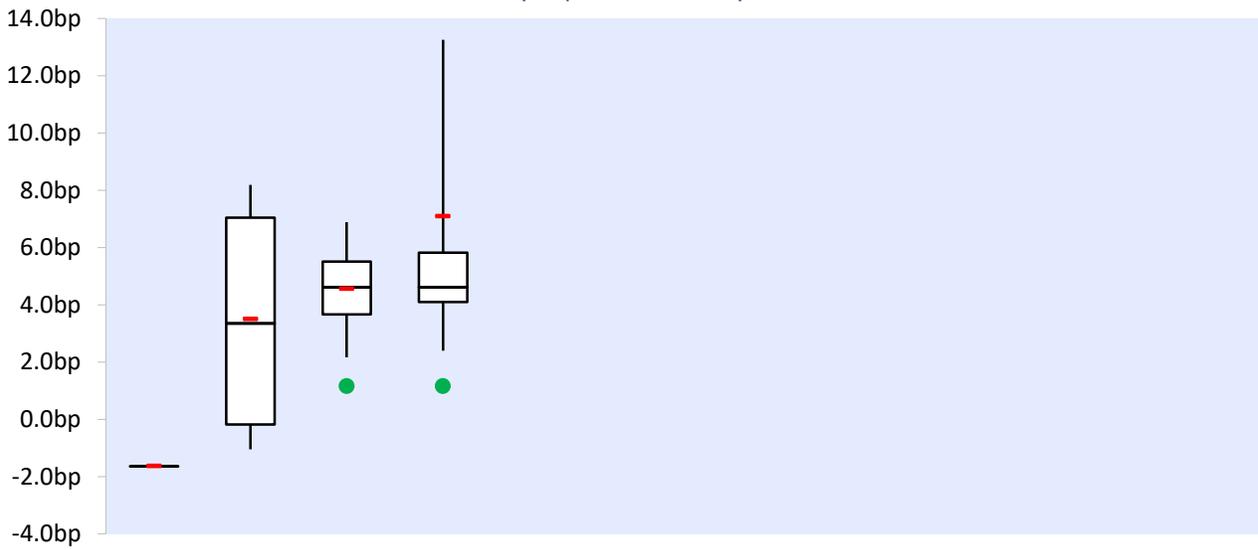
### Overlays: currency, duration Cost by implementation style



	Currency Hedge				Discretionary Currency				Duration Management			
	Internal		External		Internal		External		Internal		External	
	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	% of notional	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	101.3	91.3	2.8	2.7	0.3	25.9	36.3	0.1	0.1			
75th %ile	101.3	76.2	2.7	2.4	0.3	23.2	27.7	0.1	0.1			
Median	101.3	51.0	2.3	2.3	0.3	18.6	18.6	0.1	0.1			
25th %ile	101.3	25.8	2.3	1.9	0.3	12.6	12.7	0.1	0.1			
10th %ile	101.3	10.7	2.2	1.6	0.3	8.9	9.0	0.1	0.1			
— Average	101.3	51.0	2.5	2.2	0.3	17.6	21.5	0.1	0.1			
Count	1	2	3	6	0	1	3	5	1	1	0	0
Avg. notional	50M	2,405M	9,202M	5,525M		32,326M	1,623M	2,199M	1,505M	1,505M		
South Carolina Retirement System Investment Commission												
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile												
Avg. notional												

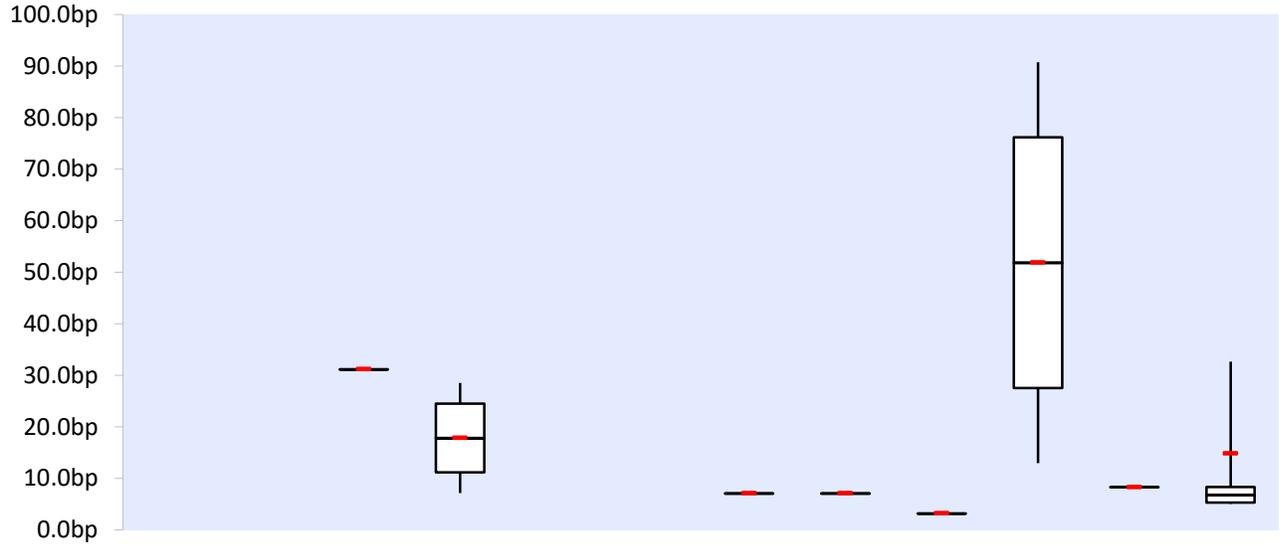
### Overlays: passive beta/rebalancing, global TAA, policy tilt TAA

Cost by implementation style



	Passive Beta/Rebalancing				Global TAA				Policy Tilt TAA			
	Internal		External		Internal		External		Internal		External	
	% of notional		% of notional		% of notional		% of notional		% of notional		% of notional	
	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public	Peer	U.S. Public
90th %ile	-1.6	8.2	6.9	13.3								
75th %ile	-1.6	7.0	5.5	5.8								
Median	-1.6	3.4	4.6	4.6								
25th %ile	-1.6	-0.2	3.7	4.1								
10th %ile	-1.6	-1.0	2.2	2.4								
— Average	-1.6	3.5	4.6	7.1								
Count	1	4	4	8	0	0	0	0	0	0	0	0
Avg. notional		4,878M	2,122M	3,621M								
South Carolina Retirement System Investment Commission												
● You	n/a	n/a	1.2	1.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile			0%	0%								
Avg. notional			6,156M	6,156M								

**Overlays: commodity, long/short, other**  
Cost by implementation style



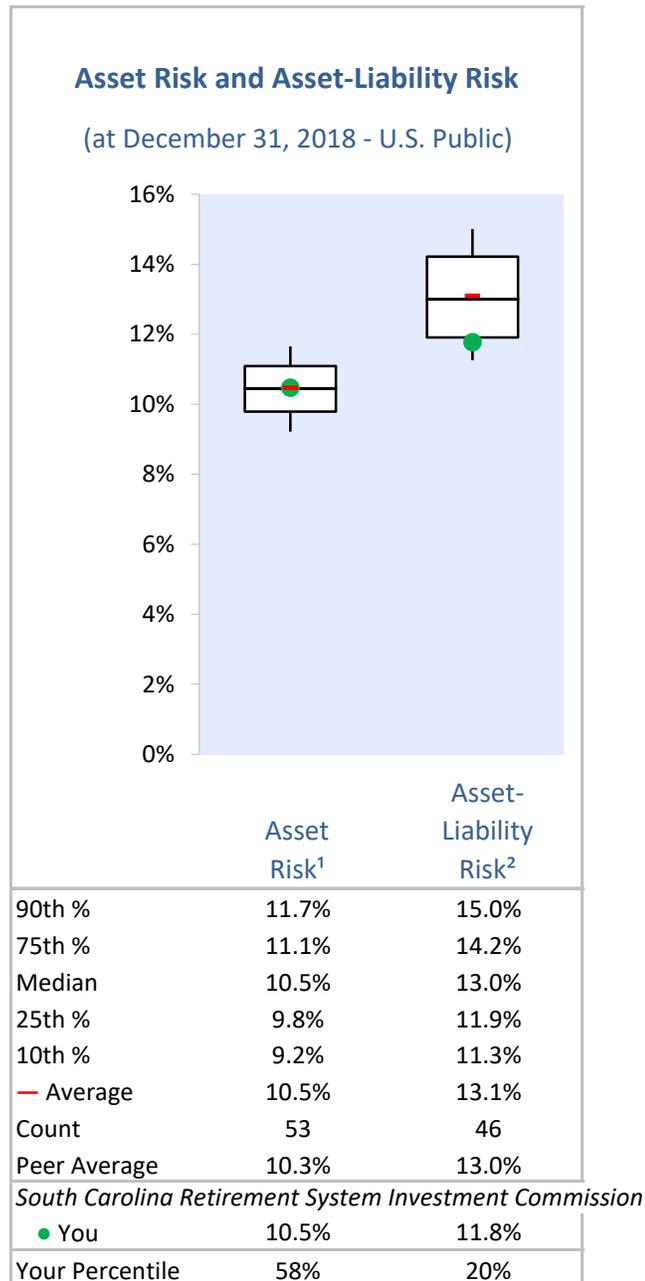
	Commodity				Long/ Short				Other			
	Internal		External		Internal		External		Internal		External	
	% of notional Peer	U.S. Public										
90th %ile			31.2	28.5			7.1	7.1	3.2	90.8	8.3	32.7
75th %ile			31.2	24.5			7.1	7.1	3.2	76.2	8.3	8.3
Median			31.2	17.9			7.1	7.1	3.2	51.9	8.3	6.8
25th %ile			31.2	11.2			7.1	7.1	3.2	27.6	8.3	5.3
10th %ile			31.2	7.2			7.1	7.1	3.2	13.0	8.3	5.1
— Average			31.2	17.9			7.1	7.1	3.2	51.9	8.3	14.9
Count	0	0	1	2	0	0	1	1	1	2	1	5
Avg. notional			475M	817M			539M	539M	256M	176M	436M	685M
South Carolina Retirement System Investment Commission												
● You	n/a	n/a										
%ile												
Avg. notional												

# 6

## Risk

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## Comparison of your risk levels to the U.S. Public universe



1. Asset risk is the expected volatility of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your asset mix policy. It is expressed as an annual standard deviation.

2. Asset-liability risk is the expected volatility of surplus returns. Surplus returns are the changes in a plan's marked-to-market funded status caused by market factors. Asset liability risk is a function of the volatility of policy returns (asset risk), the volatility of surplus returns (surplus risk) and the correlation between policy returns and surplus returns.

## Calculation of asset risk

Before considering the benefit of diversification, the weighted average risk of the asset classes in your asset mix policy was 12.8%.

### Calculation of your weighted asset class risk

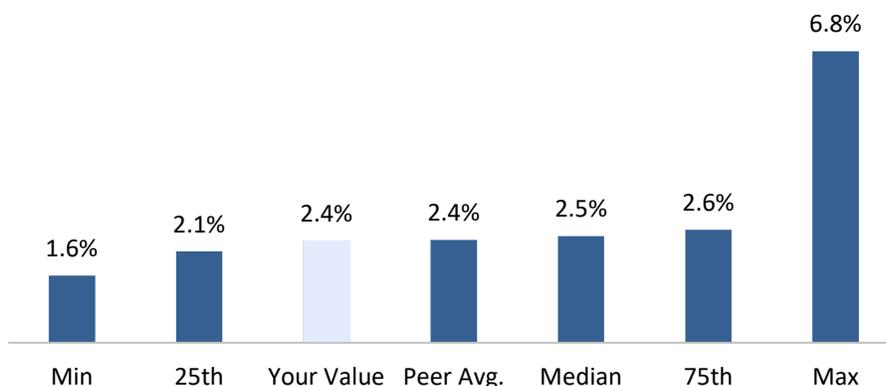
Asset Class	Policy weight (A)	Risk <sup>1</sup> (B)	Weighted risk (A X B)
Stock: U.S. Broad/All	16.4%	15%	2.5%
Stock: Emerging	6.3%	22%	1.4%
Stock: Global	17.7%	15%	2.6%
Stock: ACWI x U.S.	3.7%	17%	0.6%
Bonds: U.S.	13.0%	5%	0.7%
Bonds: Emerging	4.0%	12%	0.5%
Bonds: High Yield	5.2%	8%	0.4%
Bonds: Cash	1.0%	1%	0.0%
REITs	3.1%	20%	0.6%
Real Estate ex-REITs	5.9%	9%	0.6%
Infrastructure	3.0%	14%	0.4%
Hedge Fund	1.0%	7%	0.1%
Funded TAA	7.0%	7%	0.5%
Diversified Private Equity	7.0%	24%	1.7%
Private Credit	5.8%	6%	0.3%
<b>Weighted Total</b>			<b>12.8%</b>

1. Risk is the standard deviation of returns for the asset class based on standard benchmarks used by CEM.

## Reduction in asset risk due to diversification

Your asset risk is less than your weighted asset risk because of the benefit of diversification. Diversification reduces risk because when one asset class has a negative return, it might be offset by another asset class with a positive return. The lower the correlation between your policy asset classes, the greater the diversification benefit. The correlation between your policy asset classes is shown on page 15 of this section.

### Diversification benefit: U.S. Public universe



The benefit of diversification equals weighted asset risk minus asset risk.

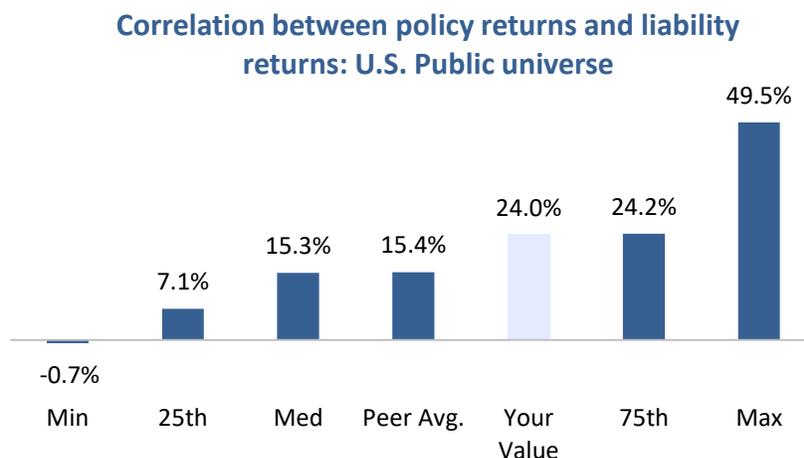
### Components of asset risk

	You	Peer median*	Peer average	U.S. Public median*	U.S. Public average
Weighted asset risk	12.8%	12.8%	12.7%	12.8%	13.0%
Benefit of diversification	2.4%	2.3%	2.4%	2.5%	2.5%
Asset risk	10.5%	10.4%	10.3%	10.5%	10.5%

\* Comparisons of components of asset risk should be interpreted with caution because it is not always possible to separate the diversification benefit from the weighted asset risk. For example, global stock as an asset class includes the diversification benefit of its geographic components within its asset risk.

## Asset-liability risk

Your plan would not have any asset-liability risk if your assets perfectly matched your liabilities. If they matched, then the correlation between asset returns and liability returns would be 100%. If liabilities increased, assets would increase by a like amount (and vice versa). Thus higher correlation between your asset returns and liability returns reduces your asset-liability risk.



In addition to the correlation between asset returns and liability returns, asset-liability risk is also a function of the volatility of asset returns (asset risk) and the volatility of liability returns<sup>1</sup> (liability risk =  $\sqrt{R_A^2 + R_L^2 - 2\rho_{AL}R_AR_L}$ ).

### Components of asset-liability risk

	You	Peer median	Peer average	U.S. Public median	U.S. Public average
Asset risk ( $R_A$ )	10.5%	10.4%	10.3%	10.5%	10.5%
Liability risk ( $R_L$ )	8.5%	9.9%	9.5%	9.7%	9.6%
Correlation between policy returns and liability returns ( $\rho_{AL}$ )	24.0%	16.2%	15.4%	15.3%	15.9%
Asset-liability risk	11.8%	12.6%	13.0%	13.0%	13.1%

1. Liability returns equal the changes in your marked-to-market liabilities caused by market factors. These are assumed to equal the return on your liability proxy portfolio (see next page).

## Liability proxy portfolio

Your liability proxy portfolio is the portfolio of nominal and inflation-indexed bonds that best matches the sensitivity of your liabilities to changes in real and nominal interest rates.

### Comparisons of liability proxy portfolio

	Your fund		Peer average		U.S. Public	
	Duration	% of Assets	Duration	% of Assets	Duration	% of Assets
Inflation Indexed Bonds	13.6	95%	11.7	54%	12.1	55%
Nominal Bonds	10.0	5%	12.9	46%	13.3	45%
Total		100%		100%		100%

Your liability proxy portfolio is a tool that:

- a) Helps you understand how the unsmoothed market value of your liabilities responds to changes in real and nominal interest rates.
- b) Helps you make better asset mix policy decisions by providing an understanding of which assets will decrease your asset-liability risk (i.e., assets that behave similarly to the neutral asset mix) and which assets will increase your risk.
- c) Helps you understand how your liabilities are different from your peers. Differences in liabilities mean that the same asset will have different risk / reward characteristics for different funds. For example, the risk of a nominal bond for a fund with 100% inflation sensitivity is much higher than it is for a fund with less than 100% inflation sensitivity.

Asset-liability risk could theoretically be eliminated if your actual asset mix matched the liability proxy portfolio. However, we recognize that this is neither an option nor a goal for most funds because:

- The supply of inflation-indexed assets is limited. These assets are required to match the obligations of pension liabilities.
- This low-risk strategy also has a lower expected return, implying either higher future funding costs or lower future benefits.

The methodology and formula used to determine your liability proxy portfolio are provided on pages 11-13 of this section.

# Liability risk

Differences in liability risk are due to differences in inflation sensitivity and member demographics.

A plan's inflation sensitivity depends on:

## a) The type of plan

Final and highest average plans have more inflation sensitivity than career average plans. Conversely, career average plans have more inflation sensitivity than flat benefit plans. Your plan type is final average.

Plan type	# of plans	% of Total
Flat Benefit	0	0%
Career Average	0	0%
Final/Highest/Best Avg	48	87%
Other	7	13%
<b>Total</b>	<b>55</b>	<b>100%</b>

## b) Contractual inflation protection for retired members

Your retired members get 100% contractual inflation protection. Your retiree inflation protection is subject to a cap of For SCRS and PORS, eligible retirees and surviving annuitants will receive an annual increase in their pension benefit equal to the lesser of 1% of their retirement allowance or

Retiree inflation protection	# of plans		
	Corporate	Public	Other
0%	0	26	0
>0% and <50%	0	0	0
50%	0	2	0
>50% and <100%	0	5	0
100%	0	18	0
<b>Total</b>	<b>0</b>	<b>51</b>	<b>0</b>

## c) Member demographics

Member demographics impacts both inflation sensitivity and the duration of plan liabilities. The survey asks for your plan's percentage of liabilities that relate to retired members from your actuarial reports. If you did not provide this number, then it is estimated (see page 12 of this section). Your percentage of liabilities that relate to retired members was 62%.

	Your fund	Peer Average	U.S. Public Average
Active Members	59%	57%	55%
Retired Members	41%	43%	45%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

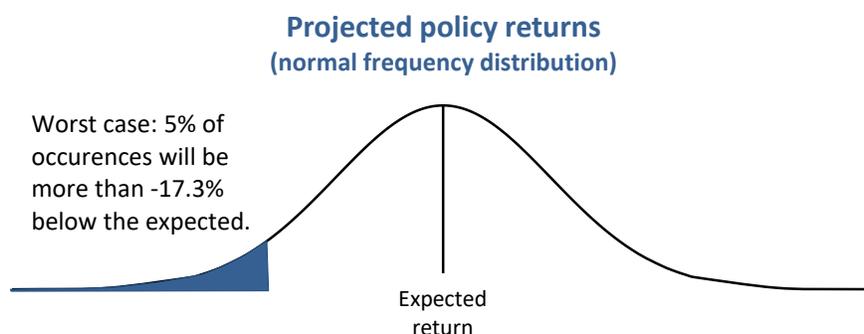
## Projected worst case scenarios

We can convert your asset risk and asset-liability risk into worst case outcomes for policy returns and funded status if we make the following simplifying assumptions:

- a) Returns are normally distributed.
- b) Historic return volatility and correlations will continue in the future.
- c) No change in your policy asset mix or liabilities.

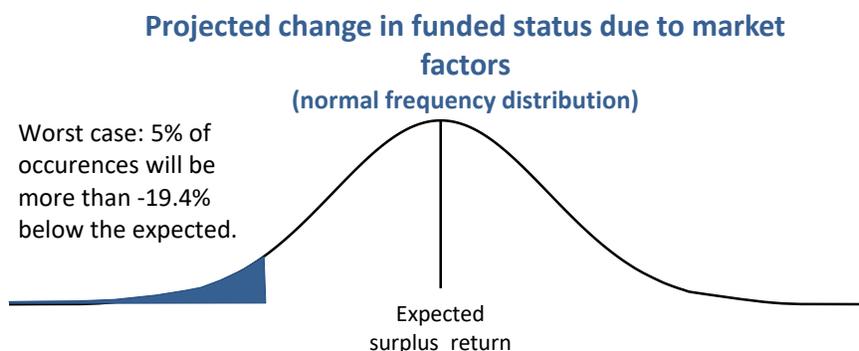
### a) Worst case policy returns

Every year there is a 5% probability that your policy return will be worse than your expected policy return by more than -17.3% (-17.3% equals -1.65 X your asset risk of 10.5%). -17.3% is the starting point of worst case outcomes. They could be much worse.



### b) Worst case impact on funded status

Every year, there is a 5% probability that changes in your mark-to-market funded status caused by market factors ("Surplus Returns") will be worse than expected by more than -19.4%. (-19.4% equals -1.65 X your asset-liability risk of 11.8%). -19.4% is the starting point of worst case outcomes. They could be much worse.



## Historic worst case scenarios during the past 5 years

### a) Historic worst case policy returns

During the past 5 years, your lowest policy return was -2.9% in 2018.

#### Historic policy returns - U.S. Public universe

	2018	2017	2016	2015	2014
90th %	0.4%	16.7%	9.3%	1.5%	8.4%
75th %	-1.7%	15.9%	8.5%	0.9%	7.4%
Median	-2.6%	15.2%	7.6%	0.0%	6.5%
25th %	-3.5%	14.1%	6.9%	-0.8%	5.6%
10th %	-5.2%	13.2%	6.6%	-1.8%	4.9%
Average	-2.6%	15.0%	7.8%	0.0%	6.6%
Count	53	60	60	64	68
Peer Avg	-2.0%	14.8%	7.5%	0.2%	6.7%
Your Value	-2.9%	14.6%	8.4%	-1.1%	4.8%

### b) Historic worst case changes in funded status

During the past 5 years, your worst change in marked-to-market funded status caused by market factors ("Surplus Returns") was -6.7% in 2014.

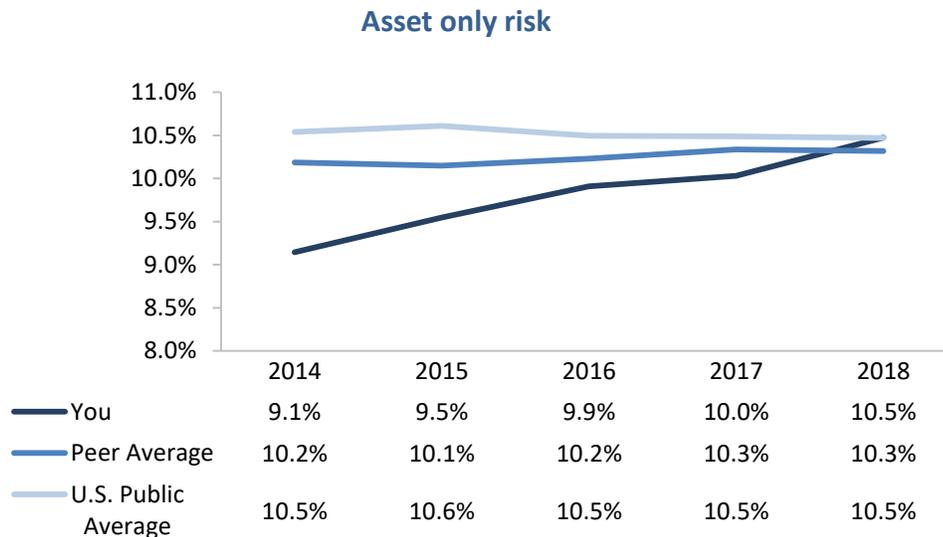
#### Historic changes in funded status caused by market factors - U.S. Public universe

	2018	2017	2016	2015	2014
90th %	2.5%	8.6%	4.9%	4.6%	-5.0%
75th %	0.9%	7.7%	4.4%	3.5%	-6.2%
Median	-0.3%	6.7%	2.8%	2.1%	-8.0%
25th %	-1.9%	5.0%	1.4%	0.8%	-9.8%
10th %	-3.3%	3.1%	0.1%	-0.5%	-11.3%
Average	-0.3%	6.4%	2.8%	2.1%	-8.1%
Count	47	53	55	59	63
Peer Avg	-0.2%	6.4%	2.8%	2.3%	-7.8%
Your Value	-0.9%	7.4%	1.1%	2.6%	-6.7%

## Risk Trends - 2014 to 2018

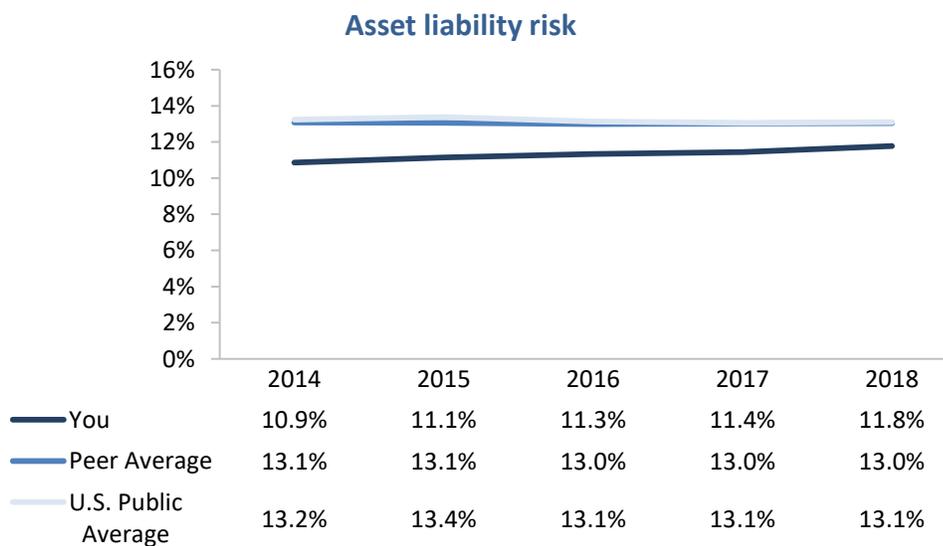
### a) Asset risk trends

Asset risk will only change if policy asset mix changes. Between 2014 and 2018 the asset risk for your fund increased from 9.1% to 10.5%.



### b) Asset-liability risk trends

Asset-liability risk will change if policy asset mix changes, or if the nature of your liabilities changes. Between 2014 and 2018 the asset-liability risk for your fund increased from 10.9% to 11.8%.



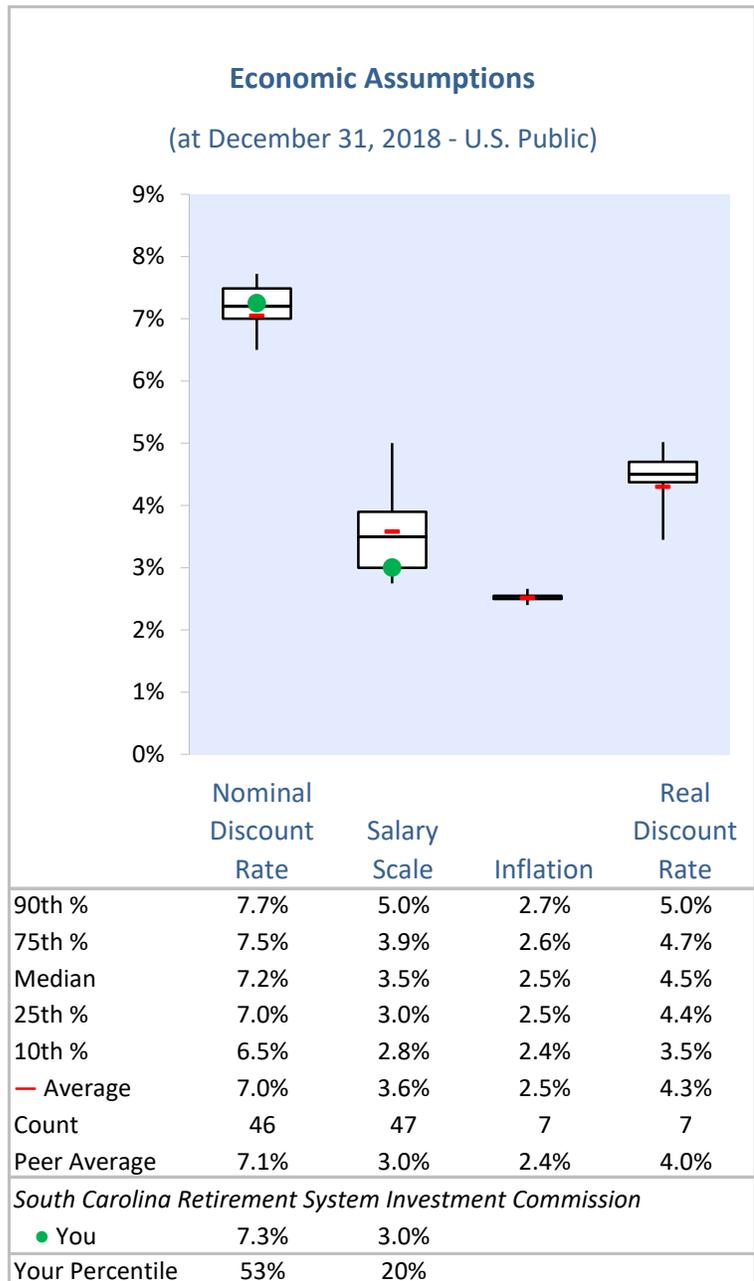
## Economic Assumptions used to determine the Accrued Actuarial Liability

The measurement of a plan's Accrued Actuarial Liability (AAL) is dependent on the actuarial assumptions used. The most important economic assumption used is the discount rate. For plans that provide contractual cost of living adjustments linked to CPI, the real discount rate (i.e. the nominal discount rate less assumed inflation) is the most important assumption.

For U.S. public pension plans, the nominal discount rate is intended to represent the expected future nominal return on plan assets and should take into account a fund's asset mix.

As a general rule of thumb, for every 1% reduction in discount rate, accrued actuarial liabilities will increase by 12% - 15%.

In recent years, many systems have reduced their discount rates in recognition of the low interest rate environment.

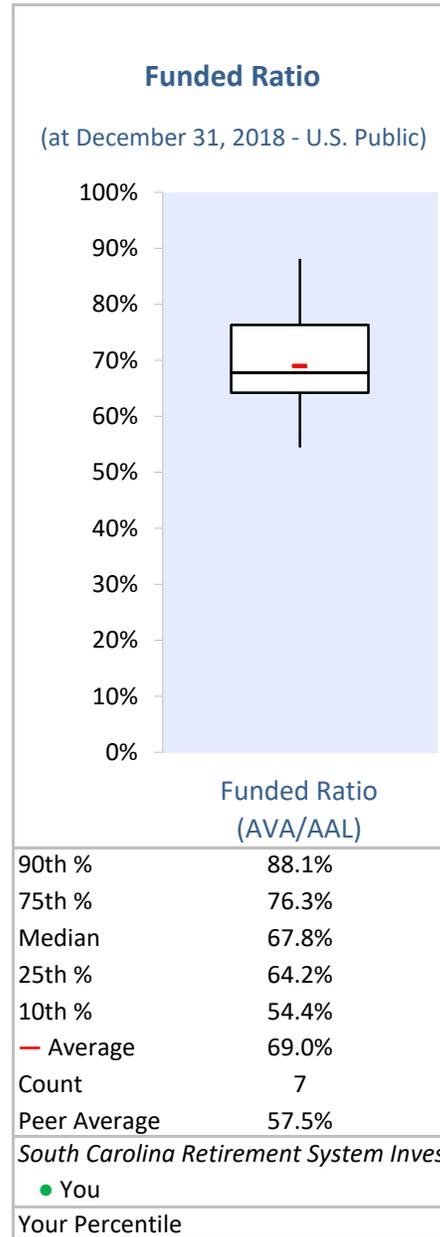


## Funded Ratio

For U.S. Public Pension Plans, the funded ratio most often represents the ratio of the Actuarial Value of Assets (AVA) to the Accrued Actuarial Liability (AAL). The AVA adjusts the Market Value of Assets by systematically recognizing investment gains/losses over time (usually 5 years). Market Value funded ratios provide better information, but few systems choose to disclose them.

The box and whiskers chart on the left shows a comparison of unadjusted funded ratios as reported by systems in the CAFR's. The AAL is dependent on the assumptions chosen. As shown on the previous page, these assumptions vary by system.

Funded ratios shown are based on information shown in CAFR's and are calculated at different dates. Thus, this data should be viewed as indicative only and not a direct comparison of like for like figures.

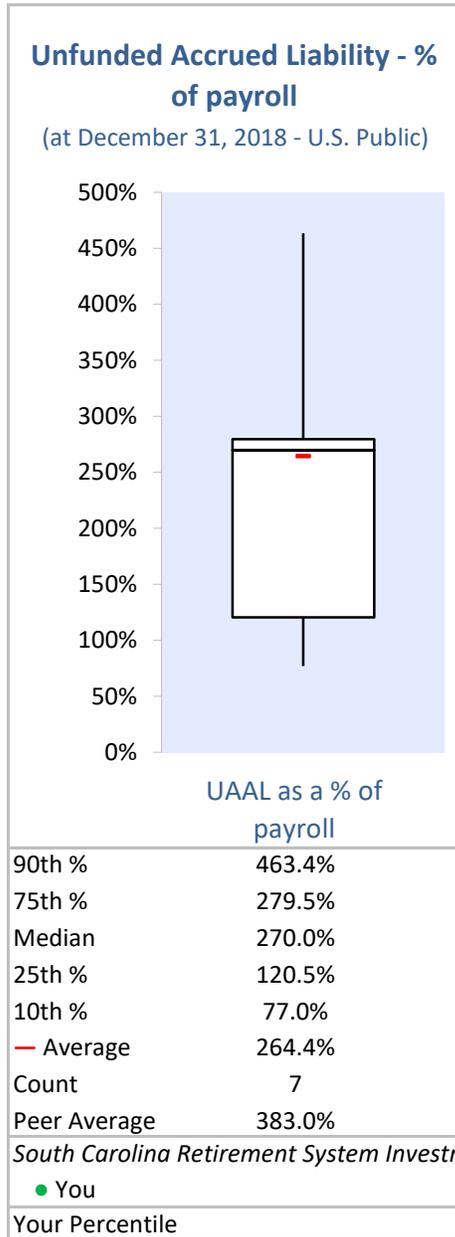


## Unfunded Accrued Liability - As a percentage of payroll

Benefit security is ultimately determined by a system sponsor's ability to pay off any funding deficiency, commonly referred to as the Unfunded Accrued Actuarial Liability (UAAL) in CAFR's. Funding deficiencies are liquidated by contributions from members and/or employers.

The size of the UAAL compared the active payroll is an indicator of the size of the funding deficiency relative to the sponsor. A lower ratio indicates that contributions required to liquidate the UAAL are more likely to be manageable for employees and employers.

For a system with an UAAL equal to 100% of payroll, contributions equal to 10% of member payroll would be required to liquidate the UAAL over a 10 year period. These contributions would be in addition to contributions required to pay for current service accruals.



## Appendix A - Methodology and formula used to calculate liability return and liability proxy portfolio

### Risk calculation descriptions

CEM would like to recognize and thank Malcolm Hamilton previously of Mercer for providing the key formulas used to calculate liability returns. We would also like to thank Stijn Oude Brunink previously of ORTEC Consultants in the Netherlands who provided the proofs and made adjustments to Mr. Hamilton's formulas. These formulas and this section use several simplifying assumptions that could cause your fund's individual results to differ from actual. We encourage you to pursue more precise calculations of your liability returns.

### Step 1 - Inflation sensitivity

The first step in estimating your liability return is to determine your liabilities' inflation sensitivity. The degree of total inflation sensitivity determines the proportion of inflation-indexed bonds versus nominal bonds that belong in your liability proxy portfolio.

#### **Total inflation sensitivity**

- = Inflation protection retirees X % liabilities relating to retirees
- + Inflation protection for active members X (1 - % liabilities relating to retirees)

#### **Inflation protection for retirees**

On the survey we asked for the amount of contractual inflation protection provided to retirees.

Ad hoc inflation protection is not considered because it is not a contractual liability. However, many funds are managed to maintain historic levels of ad hoc increases. If this is the case with your fund, then your inflation protection may have been understated. Please ask for CEM to make that adjustment for you.

#### **Inflation protection for active members**

We inferred inflation protection for your active members to be 86% based on your plan type of Final Average.

Final and highest average plans have less than 100% inflation protection because during the averaging period, inflation protection is only 50%, not 100%. This is a natural function of taking an average of more than one year's earnings. Thus the weighted average inflation protection for active members in a 5-year final average plan is around 86% and in a 3-year average plan, 93%. These weighted averages are lower than intuition might suggest because the active members associated with the largest liabilities (i.e., the highest weights) are the ones closest to retirement.

Flat Benefit and Career Average plans are assumed to have 77% inflation protection. Contractually, flat benefit plans have zero inflation protection but negotiated increases tend to closely track inflation. However, just as with Final Average plans, inflation protection between negotiated increases is less than full inflation.

## Step 2 - Proportion of liabilities relating to retirees

The second step is to determine how much of your liabilities relate to your retirees versus your active members. This number is used to weight the liability proxy portfolio's obligations to retirees and active members.

This ratio depends on several factors including the ratio of retired and active members, member demographics and the inflation sensitivity of the promise made to these two member groups. Deferred (also known as inactive) members are ignored because even if they are large in number they tend to represent only a very small fraction of the future liability.

**Equivalency Table**

Retirees as a % of Active + Retirees	Relating to Retirees
0%	0%
10%	22%
20%	35%
30%	45%
40%	55%
50%	63%
60%	71%
70%	79%
80%	86%
90%	93%
100%	100%

Most funds have provided the actual ratio from their actuarial reports (as requested on the survey). If the ratio is not provided, it is estimated based on the "Equivalency" table above.

Your percentage of liabilities that relates to retirees was 62%. The percentage of liability that relates to retirees is higher than the retirees as a percentage of active and retired members because retirees have accrued a higher benefit.

## Step 3 - Determining your duration relative to real and nominal yields

Duration enables you to determine the change in value of a cash flow, such as your pension liabilities, caused by a change in interest rates. The relationship between duration and cost of your pension liability is as follows.

$$\begin{aligned} &\text{Percentage change in pension liability cost} \\ &= (- \text{Modified duration relative to change in real yields} \times \text{change in real yields}) \\ &+ (- \text{Modified duration relative to change in nominal yields} \times \text{change in nominal yields}) \end{aligned}$$

The modified duration of your liabilities with respect to changes in real and nominal yields is determined by the following two formulas.

$$\begin{aligned} &\text{Modified duration relative to changes in real yields} \\ &= 10 \times [\text{Inflation protection for active members} \times (1 - \% \text{ of liabilities relating to retirees}) \\ &+ \text{Inflation protection for retirees} \times (1 - \% \text{ of liabilities relating to retirees}/4) \\ &+ (\text{Inflation protection for retirees}/10) \times (1.5 - 0.5 \times \% \text{ liabilities relating to retirees})] \end{aligned}$$

$$\begin{aligned} &\text{Modified duration relative to changes in nominal yields} \\ &= 10 \times [(2 - 5 \times \% \text{ Liabilities relating to retirees}/4 - \text{inflation protection for actives} \times \\ &(1 - \% \text{ liabilities relating to retirees}) \\ &- (\text{Inflation protection for retirees}/10) \times (8.5 - 2 \times \% \text{ liabilities relating to retirees}) \\ &- (\text{Inflation protection for retirees}/10) \times (1.5 - 0.5 \times \% \text{ liabilities relating to retirees})] \end{aligned}$$

## Step 4 - Determining the liability proxy portfolio

Knowing the sensitivity of your pension liabilities to real and nominal interest rates enables you to construct a liability proxy portfolio using a combination of nominal bonds and inflation-indexed bonds.

Duration of inflation-indexed bonds in your liability proxy portfolio =  
 Modified Duration Relative to Change in Real yields ÷ Proportion of inflation-indexed bonds in your liability proxy portfolio (this is the total inflation sensitivity)

Duration of nominal bonds in your liability proxy portfolio =  
 Modified Duration Relative to Change in Nominal Yields ÷ Proportion of nominal bonds in your liability proxy portfolio (this is 1 minus the total inflation sensitivity)

Proportion of inflation-indexed bonds in your liability proxy portfolio = total inflation sensitivity

Proportion of nominal bonds in your liability proxy portfolio = 1 - total inflation sensitivity

## Step 5 - Liability returns

The return earned on your liability proxy portfolio is the liability return and matches the change in your plan's liabilities in response to changes in market factors. It uses a true market valuation rather than a smoothed actuarial valuation. See page 15 for benchmark details.

### Liability Return

= Proportion indexed bonds in liability proxy portfolio X (CPI + average real yield)  
 + Proportion nominal bonds in liability proxy portfolio X average long bond yield  
 - Modified duration relative to change in real yields X change in real yields  
 - Modified duration relative to change in nominal yields X change long yields

	Long Nominal Bonds		Inflation Indexed Bonds		CPI
	Year end yield	Change in yield	Year end yield	Change in yield	
2018	2.69	0.28	1.21	0.51	2.44
2017	2.41	-0.65	0.71	-0.31	2.13
2016	3.06	0.08	1.02	-0.26	2.10
2015	2.98	0.15	1.28	0.39	0.70
2014	2.83	-1.07	0.89	-0.72	0.80

## Appendix B - Methodology used to calculate asset and asset-liability risk

### Asset mix

Your asset only mix is a function of your policy asset mix, your currency hedging policy and the presence of any duration overlays.

CEM does not use your specific policy benchmarks. Standard asset class proxies (shown on the next page) are used for each given asset class. Monthly, historical data is used to construct an asset class variance/covariance table. Your specific policy weights are then used to calculate an expected monthly volatility for your policy mix using the following formula, which takes current asset class variances and covariances as expected future variances and covariances.

$$\begin{aligned}\text{Expected monthly variance of policy mix} &= \sum \sum w_X w_Y \text{Cov}(X, Y) \\ &= \sum \sum w_X w_Y \sigma_X \sigma_Y \rho_{X,Y}\end{aligned}$$

where

$w_X$  = policy weight of asset class X

$\sigma_X$  = standard deviation of monthly returns for asset class X

$w_Y$  = policy weight of asset class Y

$\sigma_Y$  = standard deviation of monthly returns for asset class Y

$\text{Cov}(X, Y)$  = covariance of X and Y

$\rho_{X,Y}$  = Pearson's correlation of the returns for X and Y

Each sum is over all asset classes. Assuming normal distribution of returns, we then solve for expected annual standard deviation as:

$$\begin{aligned}\text{Expected annual standard deviation of policy mix} &= \\ &(\text{Expected monthly variance of policy mix})^{1/2} \times (12)^{1/2}\end{aligned}$$

Hedged and unhedged asset classes are treated as separate asset classes in the model. Funds with hedging policies between 0% and 100% have their policy weight allocated between the hedged and unhedged asset classes according to the proportion hedged.

Duration overlays are also treated as a separate asset class. Their weight is taken as notional value divided by total plan assets. For funds with duration overlays, the sum of weights will be greater than 100%. Rather than calculating a return for every possible duration, CEM's total variance/covariance matrix includes bonds with a continual duration of each whole number. A given fund's duration overlay is then represented by the two constant duration bonds closest to the duration of the overlay, with the total weight divided proportionately between them.

### Asset-liability risk

Asset-liability risk is calculated in exactly the same way as asset risk with the addition of a short position in the liability proxy portfolio. This portfolio will typically be represented by up to four bonds with continual duration whose summed weights will equal -100%, and whose real and nominal duration match the liability proxy portfolio.

## Appendix C - Correlation Matrix

	Stock: U.S. Broad/All	Stock: Emerging	Stock: Global	Stock: ACWI x U.S.	Bonds: U.S.	Bonds: Emerging	Bonds: High Yield	Bonds: Cash	Real Assets: REITs	Real Assets: Real Estate ex-REITs	Real Assets: Infrastructure	Hedge Fund	Funded TAA	Diversified Private Equity	Private Credit	Nominal Bond: Duration 10	Nominal Bond: Duration 9	Real Return Bond: Duration 13	Real Return Bond: Duration 14
Stock: U.S. Broad/All	1.00	0.68	0.89	0.75	0.19	0.52	0.60	0.03	0.58	0.54	0.66	0.78	0.78	0.88	0.46	-0.01	-0.01	0.11	0.10
Stock: Emerging	0.68	1.00	0.77	0.77	0.03	0.66	0.57	0.01	0.48	0.43	0.48	0.79	0.79	0.77	0.44	-0.11	-0.12	0.25	0.24
Stock: Global	0.89	0.77	1.00	0.96	0.10	0.55	0.60	-0.01	0.57	0.53	0.63	0.77	0.77	0.89	0.49	-0.07	-0.06	0.17	0.16
Stock: ACWI x U.S.	0.75	0.77	0.96	1.00	0.09	0.55	0.56	-0.03	0.54	0.50	0.56	0.73	0.73	0.86	0.50	-0.07	-0.07	0.20	0.20
Bonds: U.S.	0.19	0.03	0.10	0.09	1.00	0.37	0.26	0.29	0.18	0.39	0.06	0.09	0.09	0.04	-0.03	0.94	0.94	0.82	0.82
Bonds: Emerging	0.52	0.66	0.55	0.55	0.37	1.00	0.53	0.03	0.41	0.45	0.40	0.59	0.59	0.54	0.29	0.23	0.23	0.60	0.60
Bonds: High Yield	0.60	0.57	0.60	0.56	0.26	0.53	1.00	0.01	0.55	0.54	0.41	0.64	0.64	0.72	0.72	0.04	0.04	0.27	0.25
Bonds: Cash	0.03	0.01	-0.01	-0.03	0.29	0.03	0.01	1.00	-0.02	0.02	-0.10	0.13	0.13	-0.07	-0.09	0.17	0.18	0.02	0.02
Real Assets: REITs	0.58	0.48	0.57	0.54	0.18	0.41	0.55	-0.02	1.00	0.96	0.42	0.43	0.43	0.74	0.46	0.02	0.02	0.27	0.26
Real Assets: Real Estate ex-REITs	0.54	0.43	0.53	0.50	0.39	0.45	0.54	0.02	0.96	1.00	0.43	0.41	0.41	0.68	0.43	0.23	0.23	0.40	0.39
Real Assets: Infrastructure	0.66	0.48	0.63	0.56	0.06	0.40	0.41	-0.10	0.42	0.43	1.00	0.44	0.44	0.50	0.30	-0.04	-0.05	0.26	0.25
Hedge Fund	0.78	0.79	0.77	0.73	0.09	0.59	0.64	0.13	0.43	0.41	0.44	1.00	1.00	0.80	0.49	-0.08	-0.09	0.14	0.13
Funded TAA	0.78	0.79	0.77	0.73	0.09	0.59	0.64	0.13	0.43	0.41	0.44	1.00	1.00	0.80	0.49	-0.08	-0.09	0.14	0.13
Diversified Private Equity	0.88	0.77	0.89	0.86	0.04	0.54	0.72	-0.07	0.74	0.68	0.50	0.80	0.80	1.00	0.65	-0.19	-0.19	0.13	0.13
Private Credit	0.46	0.44	0.49	0.50	-0.03	0.29	0.72	-0.09	0.46	0.43	0.30	0.49	0.49	0.65	1.00	-0.25	-0.25	0.08	0.07
Nominal Bond: Duration 10	-0.01	-0.11	-0.07	-0.07	0.94	0.23	0.04	0.17	0.02	0.23	-0.04	-0.08	-0.08	-0.19	-0.25	1.00	1.00	0.76	0.76
Nominal Bond: Duration 9	-0.01	-0.12	-0.06	-0.07	0.94	0.23	0.04	0.18	0.02	0.23	-0.05	-0.09	-0.09	-0.19	-0.25	1.00	1.00	0.76	0.76
Real Return Bond: Duration 13	0.11	0.25	0.17	0.20	0.82	0.60	0.27	0.02	0.27	0.40	0.26	0.14	0.14	0.13	0.08	0.76	0.76	1.00	1.00
Real Return Bond: Duration 14	0.10	0.24	0.16	0.20	0.82	0.60	0.25	0.02	0.26	0.39	0.25	0.13	0.13	0.13	0.07	0.76	0.76	1.00	1.00

## Correlation Matrix of Common Asset Classes in U.S. Public universe

	Stock: U.S. Broad/All	Stock: U.S. Large Cap	Stock: U.S. Small Cap	Stock: EAFE	Stock: Emerging	Stock: Global	Stock: ACWI x U.S.	Bonds: U.S.	Bonds: Emerging	Bonds: High Yield	Bonds: Long Bonds	Bonds: Cash	Real Assets: REITs	Real Assets: Real Estate ex-REITs	Hedge Fund	Diversified Private Equity	Nominal Bond: Duration 10	Nominal Bond: Duration 14	Real Return Bond: Duration 10	Real Return Bond: Duration 11
Stock: U.S. Broad/All	1.00	0.99	0.89	0.67	0.68	0.89	0.75	0.19	0.52	0.60	0.17	0.03	0.58	0.54	0.78	0.88	-0.01	0.00	0.03	0.03
Stock: U.S. Large Cap	0.99	1.00	0.81	0.73	0.66	0.89	0.75	0.12	0.51	0.58	0.09	0.04	0.55	0.52	0.74	0.87	-0.03	-0.04	0.03	0.03
Stock: U.S. Small Cap	0.89	0.81	1.00	0.60	0.65	0.75	0.66	0.10	0.46	0.59	0.08	0.01	0.62	0.56	0.81	0.85	-0.11	-0.09	-0.01	-0.01
Stock: EAFE	0.67	0.73	0.60	1.00	0.70	0.95	0.99	0.15	0.50	0.51	0.15	0.03	0.53	0.49	0.69	0.86	-0.01	-0.02	0.13	0.12
Stock: Emerging	0.68	0.66	0.65	0.70	1.00	0.77	0.77	0.03	0.66	0.57	0.03	0.01	0.48	0.43	0.79	0.77	-0.11	-0.12	0.18	0.18
Stock: Global	0.89	0.89	0.75	0.95	0.77	1.00	0.96	0.10	0.55	0.60	0.08	-0.01	0.57	0.53	0.77	0.89	-0.07	-0.08	0.10	0.10
Stock: ACWI x U.S.	0.75	0.75	0.66	0.99	0.77	0.96	1.00	0.09	0.55	0.56	0.07	-0.03	0.54	0.50	0.73	0.86	-0.07	-0.08	0.15	0.15
Bonds: U.S.	0.19	0.12	0.10	0.15	0.03	0.10	0.09	1.00	0.37	0.26	0.93	0.29	0.18	0.39	0.09	0.04	0.94	0.90	0.81	0.81
Bonds: Emerging	0.52	0.51	0.46	0.50	0.66	0.55	0.55	0.37	1.00	0.53	0.34	0.03	0.41	0.45	0.59	0.54	0.23	0.22	0.53	0.53
Bonds: High Yield	0.60	0.58	0.59	0.51	0.57	0.60	0.56	0.26	0.53	1.00	0.24	0.01	0.55	0.54	0.64	0.72	0.04	0.02	0.23	0.22
Bonds: Long Bonds	0.17	0.09	0.08	0.15	0.03	0.08	0.07	0.93	0.34	0.24	1.00	0.15	0.19	0.39	0.06	-0.01	0.93	0.94	0.76	0.77
Bonds: Cash	0.03	0.04	0.01	0.03	0.01	-0.01	-0.03	0.29	0.03	0.01	0.15	1.00	-0.02	0.02	0.13	-0.07	0.17	0.14	0.09	0.08
Real Assets: REITs	0.58	0.55	0.62	0.53	0.48	0.57	0.54	0.18	0.41	0.55	0.19	-0.02	1.00	0.96	0.43	0.74	0.02	0.01	0.27	0.27
Real Assets: Real Estate ex-REITs	0.54	0.52	0.56	0.49	0.43	0.53	0.50	0.39	0.45	0.54	0.39	0.02	0.96	1.00	0.41	0.68	0.23	0.21	0.42	0.42
Hedge Fund	0.78	0.74	0.81	0.69	0.79	0.77	0.73	0.09	0.59	0.64	0.06	0.13	0.43	0.41	1.00	0.80	-0.08	-0.09	0.13	0.12
Diversified Private Equity	0.88	0.87	0.85	0.86	0.77	0.89	0.86	0.04	0.54	0.72	-0.01	-0.07	0.74	0.68	0.80	1.00	-0.19	-0.23	0.18	0.17
Nominal Bond: Duration 10	-0.01	-0.03	-0.11	-0.01	-0.11	-0.07	-0.07	0.94	0.23	0.04	0.93	0.17	0.02	0.23	-0.08	-0.19	1.00	0.98	0.76	0.76
Nominal Bond: Duration 14	0.00	-0.04	-0.09	-0.02	-0.12	-0.08	-0.08	0.90	0.22	0.02	0.94	0.14	0.01	0.21	-0.09	-0.23	0.98	1.00	0.72	0.73
Real Return Bond: Duration 10	0.03	0.03	-0.01	0.13	0.18	0.10	0.15	0.81	0.53	0.23	0.76	0.09	0.27	0.42	0.13	0.18	0.76	0.72	1.00	1.00
Real Return Bond: Duration 11	0.03	0.03	-0.01	0.12	0.18	0.10	0.15	0.81	0.53	0.22	0.77	0.08	0.27	0.42	0.12	0.17	0.76	0.73	1.00	1.00

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## Appendices

Appendix A - Data Summary

Appendix B - Data quality

Appendix C - Glossary of terms

## Appendix A - Data Summary

South Carolina Retirement System Investment Commission

Plan Info	2018	2017	2016	2015	2014
Contact	Jon Rychener	Jon Rychener	Jon Rychener	Jon Rychener	Jon Rychener
Type of fund (corporate, public, other)	Public	Public	Public	Public	Public
Total fund size (mils) as at December 31	29,259.8	31,801.4	28,771.1	27,797.3	29,053.6
Asset-class level holdings provided on survey are: year end or average?	Average	Average	Average	Average	Average
Total return for year ended	-4.20%	14.70%	7.61%	-0.56%	5.10%
Is the return net or gross?	Net of manager fees	Net of manager fees	Net of all investment costs	Net of all investment costs	Net of all investment costs
Total fund policy or benchmark return	-2.94%	14.55%	8.40%	-1.08%	4.77%

Ancillary Data	2018	2017	2016	2015	2014
What is your hedging policy for: Foreign Holdings	75%	75%	75%	75%	75%
What were your actuarial fees in 000s?	382	485	277	277	229
How many plan members/beneficiaries do you have:					
Active?	235,390	233,423	252,494	248,446	226,378
Active (no-accrual)?		6,630			
Retired?	166,126	156,901	158,492	154,639	156,660
Other?	202,146	193,988	183,796	178,086	175,089
What type of plan(s) do you have?	Final Average				
To what extent are your retired members' benefits indexed to inflation?					
Contractual %	100%	100%	100%	100%	100%
If the indexation is subject to a cap, describe the cap	For SCRS and PORS,				
What % of the plan's liabilities pertain to retired members?	62%	64%	65%	65%	64%
Actuarial valuation assumptions for funding purposes:					
Liability discount rate	7.3%	7.3%	7.5%	7.5%	7.5%
Salary progression rate	3.0%	3.0%	3.3%	3.5%	3.5%
What was your actuarial assumption for expected rate of return?	7.3%	7.3%	7.5%	7.5%	7.5%

## Appendix A - Data Summary: Policy Weights and Benchmarks

South Carolina Retirement System Investment Commission

Asset Class		Policy Weight	Benchmark	
			Description	Return
Stock - U.S. Broad/All	2018	16.4	MSCI US IMI Net	-5.7
	2017	14.6	MSCI US IMI Net	20.6
	2016		MSCI US Net & MSCI US IMI Net Mid-year Blend	11.8
	2015		Russell 3000	0.5
	2014		Russell 3000 (default)	12.6
Stock - EAFE	2018		MSCI EAFE net (default)	-4.9
Stock - Emerging	2018	6.3	MSCI Emerging Market IMI Net	-14.6
	2017	4.9	MSCI Emerging Market IMI Net	36.8
	2016		MSCI Emerging Market Net	11.2
	2015		MSCI Emerging Market Net	-14.9
Stock - ACWI x U.S.	2018	3.7	MSCI ACWI x/US Net	-14.2
	2017	3.0	MSCI ACWI x/US Net	22.4
	2016		MSCI ACWI x/US Net	4.5
	2015			
Stock - Global	2018	17.7	MSCI World Net Dividend	-8.7
	2017	17.3	MSCI World Net Dividend	22.4
	2016	37.2	MSCI ACWI Net & MSCI ACWI IMI Net Mid-year Blend	8.2
	2015	34.0	MSCI All Country World Net Index	-2.4
	2014	31.0	MSCI ACWI Net	4.2
Fixed Income - U.S.	2018	13.0	Barclays US Aggregate	0.0
	2017	10.0	Barclays US Aggregate	5.0
	2016	10.3	Barclays US Aggregate	2.7
	2015	10.0	Barclays US Aggregate	0.6
	2014	7.0	Barclays US Aggregate	6.0
Fixed Income - Emerging	2018	4.0	50% JPM EMBI Global Diversified/50% JPM-GBI-EM Global	-5.2
	2017	5.0	50% JPM EMBI Global Diversified/50% JPM-GBI-EM Global	12.7
	2016	5.2	50% JPM EMBI Global Diversified/50% JPM-GBI-EM Global	10.2
	2015	5.0	50% JPM EMBI Global Diversified/50% JPM-GBI-EM Global	-7.1
Fixed Income - High Yield	2018	6.0	50% JPM EMBI Global Diversified/50% JPM-GBI-EM Global	0.7
	2015		Barclays Global Aggregate (USDH)	1.0
	2014	3.0	Barclays Global Aggregate Hedged	7.6
	Fixed Income - High Yield	2018	5.2	50%Bar U.S. High Yield 2% / 50%S&P LSTA Leveraged Loan
2017		7.0	50%Bar U.S. High Yield 2% / 50%S&P LSTA Leveraged Loan	5.8
2016		6.8	50%Bar U.S. High Yield 2% / 50%S&P LSTA Leveraged Loan	12.3
2015		5.0	33%Bar U.S. High Yield 2% / 33%S&P LSTA Leveraged Loan / 33%Bar Mortgage-Backed Securities	-1.2
2014		6.0	33%BarCapUS Corp High Yield 2% / 33%S&P LSTA Leveraged Loan Index/33% BarCap MBS	3.4
Cash	2018	1.0	BofA Merrill Lynch 3 Month US Treasury Bill G001	1.9
	2017	3.0	BofA Merrill Lynch 3 Month US Treasury Bill G001	0.9
	2016	2.1	BofA Merrill Lynch 3 Month US Treasury Bill G001	0.3
	2015	2.0	BofA Merrill Lynch 3 Month US Treasury Bill G001	0.1
	2014	5.0	90 D T-Bill / BarCap 1-3 Gov Credit	0.5
Global TAA	2018	7.0	50% MSCI World Net/50% Barclays US Aggregate	-6.4
	2017	10.0	50% MSCI World Net/50% Barclays US Aggregate	12.6
	2016	10.3	50% MSCI World Net/50% Citi WGBI & 50% MSCI World Net/50% Barclays US Aggregate Mid-year Blend	7.9
	2015	10.0	50% MSCI World Net / 50% Citi WGBI	-2.0
	2014	10.0	50% MSCI World / 50% Citi WGBI	2.3
Hedge Funds	2018	1.0	50% MSCI World Net/50% Barclays US Aggregate	-6.4
	2017	2.0	50% MSCI World Net/50% Barclays US Aggregate	12.6
	2016	4.1	HFRI Fund Weighted Composite Index & 50% MSCI World Net/50% Barclays US Aggregate Mid-year Blend	3.3
	2015	10.0	HFRI Fund Weighted Composite Index	-1.1
	2014	8.0	HFRI Fund Weighted Composite Index	3.0
Commodities	2018			
	2015	3.0	Bloomberg Commodity Index Total Return	-24.7
	2014	3.0	Bloomberg Commodity Index	-17.0
REITs	2018	3.1	Your REIT benchmark	-4.6
	2017	2.3	Your REIT benchmark	5.2
	2016	0.7	Your REIT benchmark	8.5
	2015			
	2014			
Infrastructure	2018	3.0	Dow Jones Brookfield Global Infrastructure Net Index	-7.9
	2017	2.0	Dow Jones Brookfield Global Infrastructure Net Index	15.8
	2016	1.0	Dow Jones Brookfield Global Infrastructure Net Index	12.5
	2015			
Real Estate ex-REITs	2018	5.9	NCREIF ODCE Index + 100 bps	8.4
	2017	5.7	NCREIF ODCE Index + 75 bps	8.4
	2016	6.5	NCREIF ODCE Index + 75 bps	10.8
	2015	5.0	NCREIF ODCE Index + 75 bps	15.7
	2014	5.0	NCREIF ODCE Index + 75 bps	13.2
Private Credit	2018	5.8	S&P/LSTA + 150 Bps 3 Month Lag	6.7
	2017	6.0	S&P/LSTA + 150 Bps 3 Month Lag	6.8
	2016	6.6	S&P/LSTA + 150 Bps 3 Month Lag	7.0
	2015	7.0	S&P/LSTA + 150 Bps 3 Month Lag	2.4
	2014	7.0	S&P/LSTA + 150 Bps 3 Month Lagged	5.4
Diversified Private Equity	2018	7.0	80% Russell 3000 / 20% MSCI EAFE Lagged + 300 Bps	17.5
	2017	7.2	80% Russell 3000 / 20% MSCI EAFE Lagged + 300 Bps	21.9
	2016	9.2	80% Russell 3000 / 20% MSCI EAFE Lagged + 300 Bps	16.3
	2015	9.0	80% Russell 3000 / 20% MSCI EAFE Lagged + 300 Bps	0.9
	2014	9.0	80% Russell 3000 / 20% MSCI EAFE + 300 Bps Quarter Lag	18.0

## Appendix A Data Summary - Assets, Returns and Costs: Public Market

South Carolina Retirement System Investment Commission

Asset Class		Year	Asset (\$millions)	Return %	Cost (\$'000)				
					Internal & Other	Base Fees	Perf Fees	Total	Bps
Stock - U.S. Broad/All									
Internal Active	2018								
	2017								
	2016								
	2015	2.1	29.73	0.6			0.6	2.6	
	2014	2.4	-28.99	0.6			0.6	2.5	
External Active	2018	2,724.9	-7.90	822.9	10,281.2		11,104.1	40.8	
	2017	2,699.6	14.48	739.8	10,405.9		11,145.7	41.3	
	2016	1,818.6	9.97	522.1	8,327.1	-	8,849.2	48.7	
	2015	1,129.8	-2.66	299.8	7,430.9	-	7,730.6	68.4	
	2014	1,368.6	5.32	354.7	8,857.4		9,212.1	67.3	
External Passive	2018								
	2017	16.6	-15.01	4.6	-		4.6	2.7	
	2016	0.1	-33.37	0.0	-		0.0	2.5	
	2015	582.8	-34.74	154.6	356.0		510.7	8.8	
	2014	983.9	14.36	255.0	887.6		1,142.6	11.6	
Stock - EAFE									
External Active	2018								
	2017								
	2016								
	2015								
	2014	721.3	-4.33	186.9	5,120.9		5,307.8	73.6	
Stock - Emerging									
External Active	2018	1,813.7	-16.64	547.7	9,331.5		9,879.2	54.5	
	2017	1,391.8	37.58	381.4	9,635.5		10,016.9	72.0	
	2016	957.0	10.83	274.8	7,189.3	-	7,464.1	78.0	
	2015	943.2	-15.08	250.3	7,658.0	-	7,908.3	83.8	
	2014	1,007.2	0.49	261.1	8,080.4		8,341.5	82.8	
Stock - ACWI x U.S.									
External Active	2018	1,057.7	-18.55		4,696.7		4,696.7	44.4	
	2017	859.4	31.09	235.5	3,800.8		4,036.3	47.0	
	2016	423.7	5.75	121.7	2,449.0	-	2,570.6	60.7	
Stock - Global									
External Active	2018	2,787.4	-9.95	841.7	5,525.4		6,367.1	22.8	
	2017	2,486.0	25.26	681.2	4,801.4		5,482.7	22.1	
	2016	2,028.6	4.64	582.4	5,605.6	-	6,188.0	30.5	
	2015	1,749.9	-0.08	464.3	5,589.1	-	6,053.4	34.6	
	2014								
External Passive	2018	2,324.8	-7.93	702.0	503.1		1,205.1	5.2	
	2017	2,414.1	22.89	661.5	364.4		1,025.9	4.2	
	2016	2,469.9	7.66	709.1	467.9		1,177.0	4.8	
	2015	3,131.6	-0.36	830.9	613.5		1,444.4	4.6	
	2014	1,316.5		341.2	247.5		588.7	4.5	
Fixed Income - U.S.									
Internal Active	2018	31.3	3.81	9.9			9.9	3.2	
	2017	37.4	3.37	10.8			10.8	2.9	
	2016	202.0	5.51	52.9			52.9	2.6	
	2015	365.5	1.57	88.2			88.2	2.4	
	2014	239.0	4.11	44.0			44.0	1.8	
External Active	2018	839.1	-0.56	253.4	1,533.1		1,786.5	21.3	
	2017	1,367.0	5.02	374.6	3,107.0		3,481.6	25.5	
	2016	1,790.8	3.74	514.1	2,503.0	-	3,017.2	16.8	
	2015	2,336.9	0.53	620.0	2,972.3	205.0	3,797.4	16.3	
	2014	2,317.8	5.38	600.7	4,030.6		4,631.3	20.0	
Fixed Income - Emerging									

## Appendix A Data Summary - Assets, Returns and Costs: Public Market

South Carolina Retirement System Investment Commission

Asset Class		Year	Asset (\$millions)	Return %	Cost (\$'000)					
					Internal & Other	Base Fees	Perf Fees	Total	Bps	
Fixed Income - Global	External Active	2018	1,456.7	-6.63	439.9	5,667.3		6,107.2	41.9	
		2017	1,572.6	13.60	430.9	7,412.2		7,843.2	49.9	
		2016	1,354.1	12.70	388.8	6,184.8	-	6,573.6	48.5	
		2015	529.4	-10.93	140.5	2,429.1	-	2,569.6	48.5	
		2014	508.1	-2.37	131.7	2,628.8		2,760.5	54.3	
	External Passive	2018								
		2017	20.7	19.62	5.7	-		5.7	2.7	
		2016	178.2	8.01	51.2	18.9		70.1	3.9	
		2015	852.8	-3.19	226.3	606.0		832.3	9.8	
		2014	671.5	2.40	174.0	305.5		479.5	7.1	
Fixed Income - High Yield	External Active	2018								
		2017								
		2016								
		2015	884.5	-0.45	234.7	1,359.2	-	1,593.9	18.0	
		2014	1,080.1	3.04	279.9	3,172.4		3,452.3	32.0	
Cash	External Active	2018	1,492.5	0.48	450.7	5,395.8		5,846.5	39.2	
		2017	2,051.7	6.14	562.2	7,870.5		8,432.7	41.1	
		2016	1,893.1	9.35	543.5	8,075.2	-	8,618.7	45.5	
		2015	1,535.8	-0.81	407.5	7,080.1	-	7,487.6	48.8	
		2014	1,179.0	1.81	305.6	6,588.8		6,894.4	58.5	
	Global TAA	Internal Active	2018	1,407.4	1.71	447.1			447.1	3.2
			2017	1,366.3	1.06	396.2			396.2	2.9
			2016	1,473.8	0.70	386.1			386.1	2.6
			2015	1,656.3	0.58	399.9			399.9	2.4
			2014	3,082.0	0.51	567.9			567.9	1.8
External Active		2018	681.5	0.11	205.8	705.4		911.2	13.4	
		2017	856.7	-0.06	234.7	1,327.3		1,562.0	18.2	
		2016	1,199.7	0.29	344.4	1,590.6	211.3	2,146.4	17.9	
		2015	1,893.1	-0.21	502.3	2,411.4	-	2,913.7	15.4	
		2014	2,136.1	-0.23	553.6	1,657.1		2,210.7	10.3	
REITs	External Active	2018	2,931.3	-6.93	885.2	6,444.9	4,503.4	11,833.4	40.4	
		2017	2,077.6	11.30	569.3	6,125.3	3,164.8	9,859.4	47.5	
		2016	1,956.2	8.41	561.6	10,240.4	810.6	11,612.5	59.4	
		2015	2,196.2	-4.62	582.7	12,101.6	-	12,684.3	57.8	
		2014	2,186.4	5.42	566.7	12,449.9	-	13,016.6	59.5	

## Appendix A Data Summary - Assets, Returns and Costs: Private Market and Hedge Fund

South Carolina Retirement System Investment Commission  
(Default costs are highlighted with blue shading. See page 5 for more details)

Asset Class	Year	NAV (\$mils)	Fee		Cost (\$000)						
			Basis (\$mils)	Return	Internal & Other	Base Fees	Perf. Fees	Underlying Base Fees	Underlying Perf Fees	Total	Total bps
<b>Infrastructure</b>											
External Active	2018	631.2	831.2	-6.7	190.6	2,898.4				3,089.0	37.2
	2017	425.7	425.7	15.0	116.7	2,065.8				2,182.5	51.3
	2016	159.2	274.4	-5.2	45.7	764.9				810.6	29.5
<b>Real Estate ex-REITs</b>											
Internal Active	2018										
	2017										
	2016										
Co-Investment	2018	27.7	27.7	18.9	7.4					7.4	2.7
	2017	31.9	31.9	23.9	8.3					8.3	2.6
	2016	1.5	1.5	-59.7						0.5	3.0
LP	2018	7.5	7.5	-8.2		4.3				6.4	8.4
	2017	17.1	17.1	-15.3		47.0				52.0	30.3
	2016	1,914.6	1,965.5	9.9	578.2	19,266.4	16,742.4			19,844.5	101.0
LP	2017	1,830.5	1,736.6	9.8	501.6	16,110.3	20,114.4			16,611.9	95.7
	2016	1,475.4	1,597.0	3.0	423.6	16,675.4	10,588.5			17,098.9	107.1
	2015	1,197.0	1,410.6	16.8	317.6	15,887.0	34,048.0			16,204.6	114.9
LP	2014	1,078.1	1,168.7	20.8	279.4	14,727.1	44,655.6			15,006.5	128.4
	<b>Diversified Private Equity</b>										
	Co-Investment	2018	396.7	396.7	-29.2		3,263.9				3,383.7
2017		488.2	488.2	8.3		3,499.9				3,633.7	74.4
2016		741.5	741.5	10.4		3,232.8				3,445.6	46.5
2015		667.0	667.0	-5.7		1,366.3				1,543.3	23.1
2014		749.2	749.2	13.9		1,632.8				1,827.0	24.4
Fund of Funds	2018	473.3	428.2	15.7	142.9	1,374.8		3,499.5	4,158.9	5,017.3	117.2
	2017	546.9	415.1	10.4	149.9	2,846.4		4,779.8	1,577.0	7,776.1	187.3
	2016	629.5	503.8	4.2	180.7	4,074.3	1,017.1	6,592.6	-1,679.1	10,847.6	215.3
	2015	710.4	660.1	11.6	188.5	6,112.5	2,657.9	10,231.4	11,721.4	16,532.4	250.5
	2014	344.7	358.7	26.2	89.3	3,097.9	2,564.5	5,631.6	4,550.4	8,818.8	245.9
LP	2018	1,474.3	1,841.1	13.4	445.2	27,451.1	19,305.3			27,896.3	151.5
	2017	1,408.0	1,316.4	17.1	385.8	19,106.4	46,571.8			19,492.2	148.1
	2016	1,345.0	1,670.4	13.8	386.2	22,068.2	43,990.4			22,454.3	134.4
	2015	1,251.1	1,390.7	5.0	331.9	18,910.5	12,062.7			19,242.4	138.4
	2014	1,610.4	1,887.0	16.5	417.4	23,878.4	39,584.3			24,295.8	128.8
<b>Hedge Funds</b>											
External Active	2018	1,907.4	1,907.4	6.6	576.0	21,960.4	21,962.8			44,499.2	233.3
	2017	1,519.9	1,519.9	6.9	416.5	26,596.7	17,578.7			44,591.8	293.4
	2016	1,232.0	1,232.0	6.5	353.7	26,121.3	15,227.9			41,702.9	338.5
	2015	1,266.4	1,266.4	5.7	336.0	27,898.1	30,945.7			59,179.8	467.3
	2014	1,354.9	1,354.9	8.6	351.2	26,097.8	30,515.4			56,964.4	420.4
Fund of Funds	2018	1,491.6	1,491.6	-2.7	450.4	3,065.0	1,012.9	10,487.3	4,708.5	19,724.2	132.2
	2017	1,825.5	1,825.5	5.3	500.2	3,330.2		17,942.0	12,219.8	33,992.2	186.2
	2016	1,984.7	1,984.7	-0.1	569.8	2,608.4	2,778.6	22,329.5	4,993.0	33,279.3	167.7
	2015	2,187.8	2,187.8	1.6	580.5	3,741.7		30,215.2	13,864.2	48,401.6	221.2
	2014	2,380.7	2,380.7	5.6	617.1	9,071.3	479.0	36,965.6	32,185.9	79,318.8	333.2
<b>Private Credit</b>											
Co-Investment	2018	0.3	0.3	18.7		0.0				0.1	3.2
	2017	3.5	3.5	2.0		8.4				9.4	27.0
	2016	5.9	5.9	3.7		14.8				16.5	27.9
	2015	17.0	17.0	5.8		41.3				45.8	26.9
	2014	12.6	12.6	-2.9		0.8				4.1	3.2
LP	2018	1,836.9	2,569.5	3.3	554.7	18,768.9	12,110.3			19,323.6	75.2
	2017	1,779.0	2,292.7	6.9	487.5	24,096.4	15,638.8			24,583.9	107.2

## Appendix A Data Summary - Assets, Returns and Costs: Private Market and Hedge Fund

South Carolina Retirement System Investment Commission  
 (Default costs are highlighted with blue shading. See page 5 for more details)

Asset Class	Year	NAV (\$mils)	Fee		Cost (\$000)						
			Basis (\$mils)	Return	Internal & Other	Base Fees	Perf. Fees	Underlying Base Fees	Underlying Perf Fees	Total	Total bps
	2016	1,607.1	1,471.9	8.9	461.4	17,004.6	16,791.4			17,466.0	118.7
	2015	1,609.4	1,416.0	0.6	427.0	17,178.8	-247.6			17,605.8	124.3
	2014	1,665.2	1,966.0	10.6	431.6	23,945.1	30,833.1			24,376.7	124.0

## Appendix A - Data Summary: Oversight, Custodial and Other Costs

South Carolina Retirement System Investment Commission

Oversight, Custodial and Other Costs			
		000s	bps
Oversight of the fund assets <sup>1</sup>	2018	1,251.1	0.4bp
	2017	1,089.1	0.4bp
	2016	1,056.3	0.4bp
	2015	1,201.0	0.4bp
	2014	1,478.1	0.5bp
Custodial total	2018	1,152.4	0.4bp
	2017	1,130.5	0.4bp
	2016	925.3	0.3bp
	2015	765.8	0.3bp
	2014	425.6	0.1bp
Custodial foreign (if available)	2018	692.4	0.2bp
	2017	670.5	0.2bp
	2016	460.6	0.2bp
	2015	460.1	0.2bp
Custodial domestic (if available)	2018	460.0	0.1bp
	2017	460.0	0.2bp
	2016	464.7	0.2bp
	2015	305.6	0.1bp
Consulting / performance measurement	2018	763.7	0.2bp
	2017	1,070.0	0.4bp
	2016	940.0	0.3bp
	2015	1,029.9	0.4bp
Audit	2018	102.4	0.0bp
	2017	16.8	0.0bp
	2016	99.4	0.0bp
	2015	201.0	0.1bp
Other (legal etc)	2018	363.2	0.1bp
	2017	320.9	0.1bp
	2016	266.9	0.1bp
	2015	345.2	0.1bp
Total	2018	3,632.7	1.2bp
	2017	3,627.3	1.2bp
	2016	3,288.0	1.2bp
	2015	3,542.9	1.2bp
	2014	4,004.9	1.4bp

Summary of All Asset Management Costs			
		000s	bps
Investment Management Costs	2018	205,925.8	65.9bp
	2017	218,814.6	71.7bp
	2016	208,125.1	74.3bp
	2015	235,815.4	80.3bp
	2014	270,684.7	92.6bp
Oversight, Custodial & Other Costs	2018	3,632.7	1.2bp
	2017	3,627.3	1.2bp
	2016	3,288.0	1.2bp
	2015	3,542.9	1.2bp
	2014	4,004.9	1.4bp
Total	2018	209,558.6	67.0bp
	2017	222,441.9	72.9bp
	2016	211,413.0	75.4bp
	2015	239,358.3	81.5bp
	2014	274,689.6	94.0bp

1. Oversight includes the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees / salaries of the board or investment committee. All costs associated with the above including fees / salaries, travel, director's insurance and attributed overhead should be included.

## Appendix A - Data Summary: Overlays

South Carolina Retirement System Investment Commission

Overlays		Internal					External								
		Notional amount (mils)	Market value (mils)	Profit/Loss (000s)	Cost (000s)	% of Notion. (bps)	Duration (years)	Notional amount (mils)	Market value (mils)	Profit/Loss (000s)	Base fees (000s)	Perf. fees (000s)	Over-sight (000s)	Total (000s)	% of Notion. (bps)
Rebalancing/	2018						6,156.1	797.8		717.1		240.9	958.0		1.6
Passive Beta	2017						5,742.0	946.6		550.7		259.4	810.1		1.4

## Appendix A - Data Summary: Comments and defaults

As discussed with you during the data confirmation process, the following defaults and footnotes are applicable to your data:

- 2018 - Real Estate ex-REITs - LP: Lp base fee is the weighted average management fee of 98 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 87 bps (17.2 million).
- 2018 - Diversified Private Equity - LP: Lp base fee is the weighted average management fee of 149 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 102 bps (18.8 million).
- 2018 - Private Credit - LP: Lp base fee is the weighted average management fee of 73 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 72 bps (18.5 million).
- 2017 - Real Estate ex-REITs - LP: Lp base fee is the weighted average management fee of 93 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 108 bps (18.8 million).
- 2017 - Diversified Private Equity - LP: Lp base fee is the weighted average management fee of 145 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 145 bps (19 million).
- 2017 - Private Credit - LP: Lp base fee is the weighted average management fee of 105 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 73 bps (16.7 million).
- 2016 - Real Estate ex-REITs - LP: Lp base fee is the weighted average management fee of 104 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 123 bps (19.6 million).
- 2016 - Hedge Fund - FoFs: A default of 14 bps (on NAV) was applied to the fund of fund performance fee to enable comparisons of the total cost of different implementation styles.
- 2016 - Diversified Private Equity - LP: Lp base fee is the weighted average management fee of 132 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 132 bps (22.1 million).
- 2015 - Real Estate ex-REITs - LP: Lp base fee is the weighted average management fee of 113 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 109 bps (15.3 million).
- 2015 - Diversified Private Equity - LP: Lp base fee is the weighted average management fee of 136 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 156 bps (21.7 million).
- 2015 - Diversified Private Equity - FoFs: A default of 155 bps (on amount fees are based on) was applied to the fund of fund underlying base fee to enable comparisons of the total cost of different implementation styles.
- 2015 - Diversified Private Equity - FoFs: A default of 165 bps (on NAV) was applied to the fund of fund underlying performance fee to enable comparisons of the total cost of different implementation styles. This default is not included in your total fund cost or in benchmark analysis.
- 2015 - Private Credit - LP: Lp base fee is the weighted average management fee of 121 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 125 bps (17.7 million).
- 2014 - Real Estate ex-REITs - LP: Lp base fee is the weighted average management fee of 126 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 132 bps (15.4 million).
- 2014 - Diversified Private Equity - LP: Lp base fee is the weighted average management fee of 127 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 124 bps (23.5 million).
- 2014 - Diversified Private Equity - FoFs: A default of 157 bps (on amount fees are based on) was applied to the fund of fund underlying base fee to enable comparisons of the total cost of different implementation styles.

- 2014 - Diversified Private Equity - FoFs: A default of 132 bps (on NAV) was applied to the fund of fund underlying performance fee to enable comparisons of the total cost of different implementation styles. This default is not included in your total fund cost or in benchmark analysis.
- 2014 - Private Credit - LP: Lp base fee is the weighted average management fee of 122 bps per the partnership level detail provided by you. This replaces the cost on the main survey of 102 bps (20.1 million).

## Appendix B - Data quality

The value of the information contained in these reports is only as good as the quality of the data received. CEM's procedures for checking and improving the data include the following.

### **Improved survey clarity**

Twenty years of feedback from survey participants has led to improved definitions and survey clarity. In addition to immediate feedback from participants, CEM has hosted user workshops to solicit additional feedback and to resolve issues, such as trade-offs between more information and effort on the part of participants.

### **Computer and desktop verification**

Survey responses are compared to norms for the survey universe and to each sponsor's prior year data when available. This typically results in questions generated by our online survey engine as well as additional follow-up to clarify responses or with additional questions.

In addition to these procedures, data quality continues to improve for the following reasons:

### **Learning curve**

This is CEM's 28th year of gathering this data and experience is teaching the firm and the participants how to do a better job.

### **Growing universe**

As our universe of respondents continues to increase in size, so does our confidence in the results as unbiased errors tend to average themselves out.

Any suggestions on how to further improve data quality are welcome.

### **Currency Conversions**

For reports where either the peer group or report universe includes funds from multiple countries, we have converted the returns back to the base currency of the fund we prepared the report for. For example, for a Euro zone fund with peers from the U.S. we converted U.S. returns to Euro based on the currency return for the year using December 31 spot rates.

## Appendix C - Glossary of terms

### **Average cost**

- Calculated by dividing actual annual costs by the average of beginning and end-of-year holdings. If beginning-of-year holdings are not available, they are estimated using end-of-year holdings before the effect of this year's return on investment.

### **Benchmark return**

- Rate of return on a portfolio of investable assets (such as the S&P500) designated as the benchmark portfolio against which the fund measures its own performance for that asset class.

### **F statistics**

- Measure of the statistical significance of the regression coefficients taken as a group. Generally, regression equations with 5 coefficients and sample sizes greater than 20 are statistically significant if its F statistic is greater than 3.

### **Global TAA**

- Fully funded segregated asset pool dedicated to active asset allocation.

### **Impact coefficient**

- Estimate of the impact on the dependent variable in a regression of a change in the value of a given explanatory variable

### **Level of significance**

- Degree to which sample data explains the universe from which they are extracted.

### **N-year peers**

- Subset of peer group that have participated in our study for at least the consecutive n years.

### **Oversight of the fund**

- Resources devoted to the oversight of the fund.

### **Overlay**

- Derivative based program (unfunded other than margin requirements), designed to enhance total portfolio return (such as a tactical asset allocation program) or to achieve some specific mandate such as currency hedging.

### **Passive proportion**

- Proportion of assets managed passively, i.e., indexed to broad capital market benchmarks or dedicated to replicate market benchmarks.

### **Policy mix**

- Reflects long-term policy or target asset weights. Policy asset mix is often established by a fund's investment committee or board and is determined by such long term considerations as liability structure, risk tolerance and long term capital markets prospects.

### **Policy return**

- The return you would have earned if you had passively implemented your policy mix decision through your benchmark portfolios. Your policy return equals the sum of your policy weights multiplied by your asset class benchmarks for each asset class.

### **R squared (coefficient of determination)**

- The percentage of the differences in the dependent variable explained by the regression equation. For example, an R squared of 1 means 100% of the differences are explained and an R squared of 0 means that none of the differences are explained.

### **Value added**

- the difference between your total actual return and your policy return. It is a measure of actual value produced over what could have been earned passively.