

North Carolina Retirement Systems

Investment Cost Effectiveness Analysis - Summary of Results

For the 5 year period ending December 31, 2018



Key takeaways

Returns

- Your 5-year net total return was 4.8%. This was below the U.S. Public median of 5.4% and below the peer median of 5.7%.
- Your 5-year policy return was 4.1%. 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 0.7%. This was above the U.S. Public median of 0.0% and above the peer median of 0.1%.

Cost

- Your investment cost of 35.0 bps was below your benchmark cost of 45.3 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 similar services.

Risk

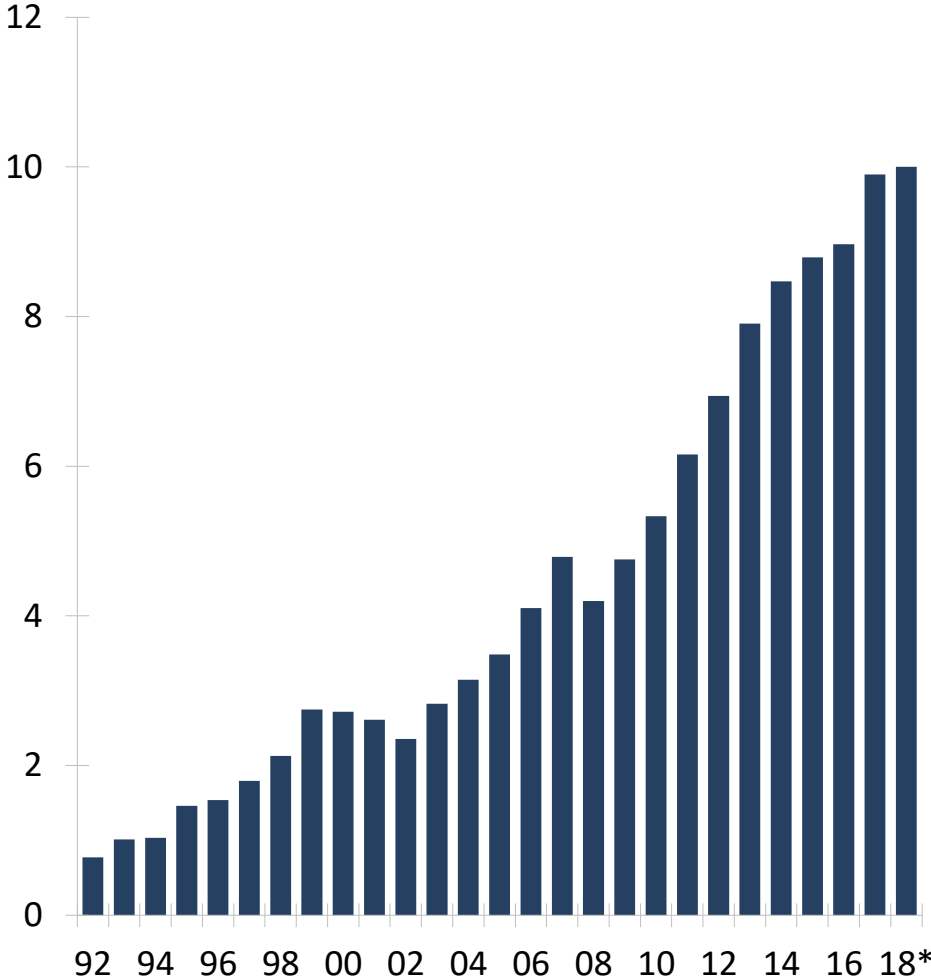
- Your asset risk of 9.2% was below the U.S. Public median of 10.5%.

This benchmarking report compares your cost and return performance to the 314 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 trillion. Included are funds from Australia, New Zealand, China and South Korea.

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)

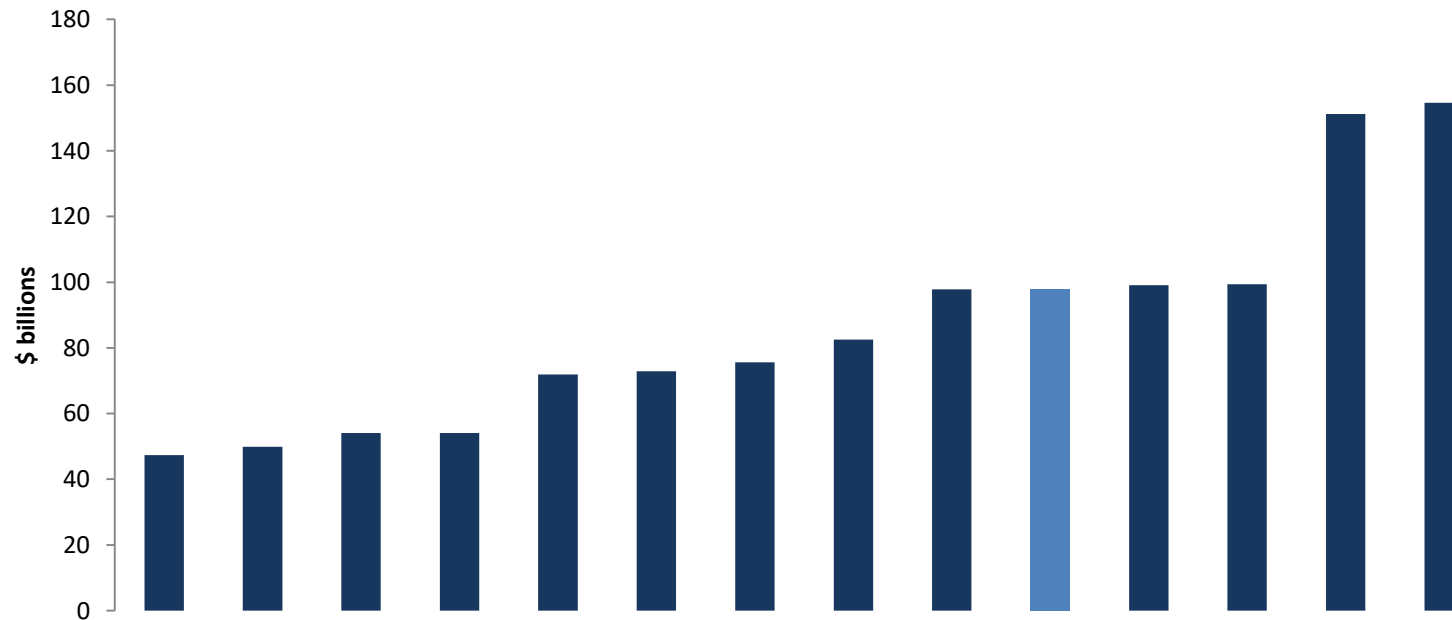


*2018 assets includes both received and expected data.

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

Peer group for North Carolina Retirement Systems

- 14 U.S. Public public sponsors from \$47.4 billion to \$154.6 billion
- Median size of \$79.1 billion versus your \$98.0 billion



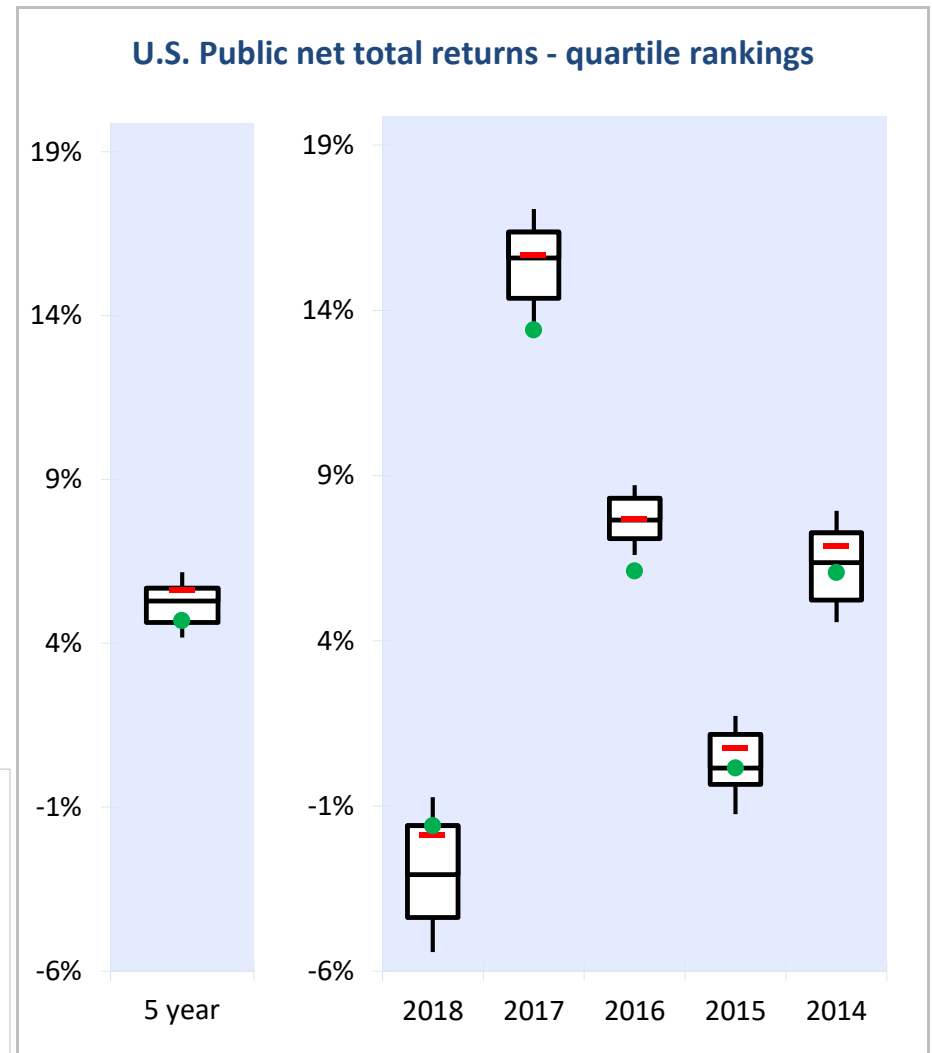
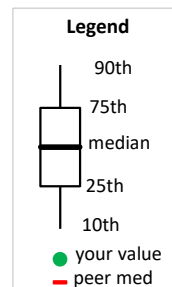
To preserve client confidentiality, given potential access to documents as permitted by the Freedom of Information Act, we do not disclose your peers' names in this document.

Your 5-year net total return of 4.8% was below both the U.S. Public median of 5.4% and the peer median of 5.7%.

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	4.8%
- Policy return	4.1%
= Net value added	0.7%

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).



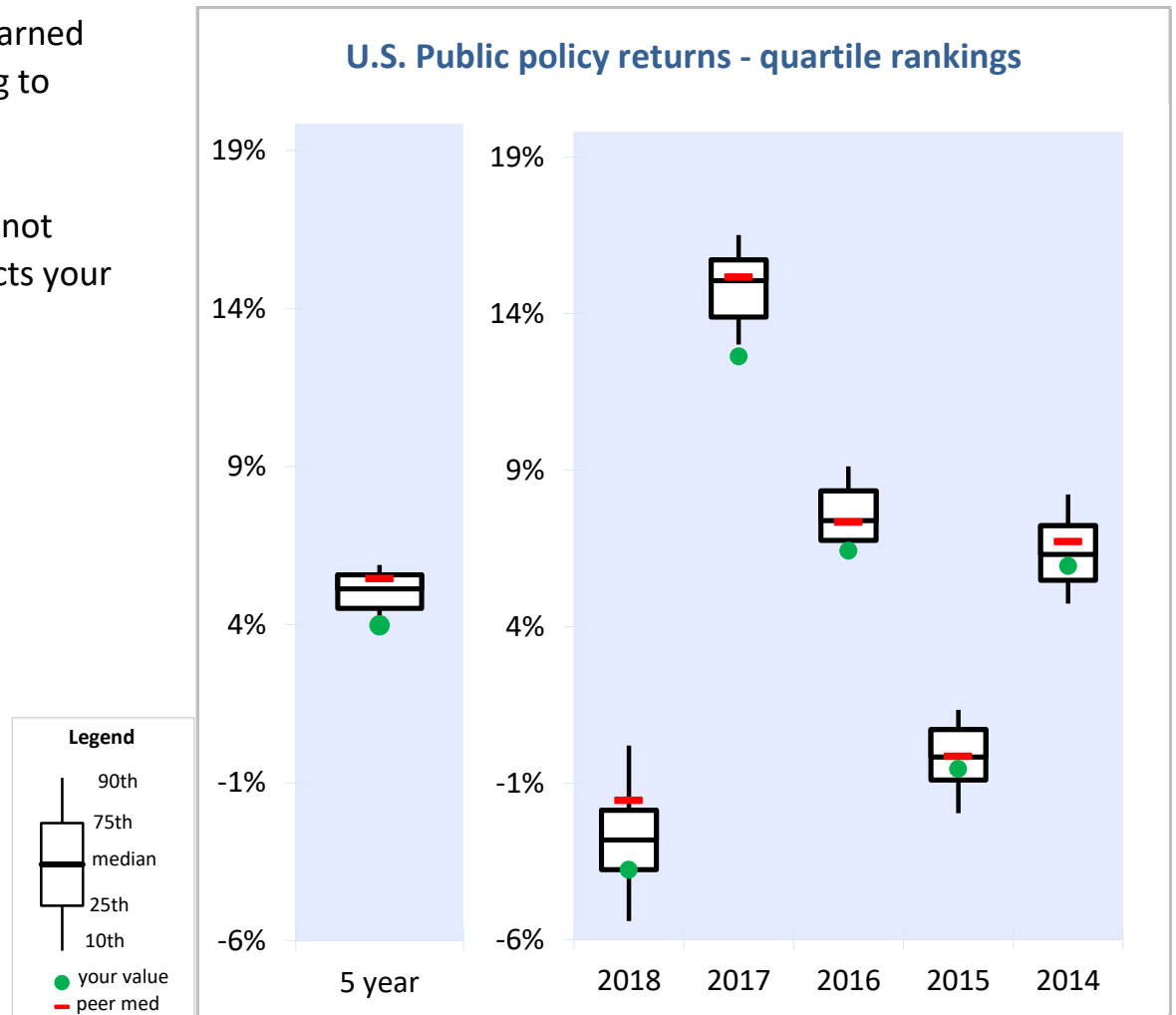
Your 5-year policy return of 4.1% was below both the U.S. Public median of 5.3% and the peer median of 5.6%.

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 4.3%, 0.2% higher than your actual 5-year policy return of 4.1%. Mirroring this, your 5-year total fund net value added would be 0.2% lower.

Your 5-year policy return of 4.1% was below the U.S. Public median of 5.3% primarily because of:

- The negative impact of your higher weight to U.S. bonds, which was one of the worse performing asset classes over the past 5 years. You had 25% allocated to U.S. bonds while the U.S. public universe had 16% weight on average.
- The negative impact of your benchmark returns for some assets. Your total stock, private real estate, and private equity benchmarks had worse performance than the U.S. public average over the past 5 years.

	5-year average policy mix ¹			5-year bmk. return	
	Your Fund	U.S. Publ Avg.	More/ Less	Your Fund	U.S. Publ Avg.
U.S. Stock	21%	22%	-1%	7.9%	7.8%
EAFE Stock	0%	5%	-5%	0.5%	0.9%
Emerging Market Stock	0%	2%	-2%	1.6%	1.7%
ACWIxUS Stock	20%	8%	12%	0.8%	1.0%
Global Stock	0%	10%	-10%	n/a ³	4.2%
Other Stock	1%	2%	0%	n/a ³	n/a ³
Total Stock	42%	49%	-7%	4.5%	4.9%
U.S. Bonds	25%	16%	9%	3.6%	2.6%
Inflation Indexed Bonds	2%	3%	-1%	0.4%	1.9%
Cash	4%	-1%	5%	0.6%	0.7%
Other Fixed Income	0%	7%	-7%	n/a ³	n/a ³
Total Fixed Income	31%	25%	6%	3.0%	3.0%
Global TAA	2%	1%	1%	2.4%	3.8%
Hedge Funds	3%	4%	-1%	0.9%	2.5%
Commodities	1%	1%	0%	-8.8%	-9.3%
Natural Resources	3%	1%	2%	2.8%	4.1%
Real Estate ex-REITs	7%	8%	0%	8.9%	9.6%
Other Real Assets ²	1%	2%	-1%	n/a ³	n/a ³
Private Equity	8%	8%	0%	11.1%	13.2%
Private Debt	2%	1%	0%	n/a ³	4.2%
Total	100%	100%	0%		

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

2. Other real assets includes infrastructure and REITs.

3. 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.

Differences in policy return are caused by differences in policy mix and benchmarks. 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	2015	2016	2017	2018	2018	2018
U.S. Stock	20%	20%	22%	21%	21%	13%	20%
EAFE Stock	0%	0%	0%	0%	0%	5%	5%
Emerging Market Stock	0%	0%	0%	0%	0%	3%	3%
ACWIxUS Stock	19%	19%	20%	21%	21%	3%	7%
Global Stock	0%	0%	0%	0%	0%	16%	10%
Other Stock	3%	3%	0%	0%	0%	1%	2%
Total Stock	42%	42%	42%	42%	42%	42%	47%
U.S. Bonds	25%	25%	25%	25%	25%	15%	16%
Inflation Indexed Bonds	2%	2%	2%	2%	2%	3%	3%
Cash	4%	4%	4%	4%	4%	-1%	-1%
Other Fixed Income	0%	0%	0%	0%	0%	6%	7%
Total Fixed Income	31%	31%	31%	31%	31%	24%	24%
Global TAA	2%	2%	2%	2%	2%	1%	1%
Hedge Funds	3%	3%	3%	3%	3%	5%	5%
Commodities	1%	1%	1%	1%	1%	1%	1%
Natural Resources	3%	3%	3%	3%	3%	1%	1%
Real Estate ex-REITs	7%	7%	7%	7%	7%	10%	8%
Other Real Assets ¹	1%	1%	1%	1%	1%	2%	2%
Private Equity	10%	10%	10%	6%	6%	12%	8%
Private Debt	0%	0%	0%	4%	4%	2%	2%
Total	100%	100%	100%	100%	100%	100%	100%

1. Other real assets includes infrastructure and REITS.

Net value added is the component of total return from active management. Your 5-year net value added was 0.7%.

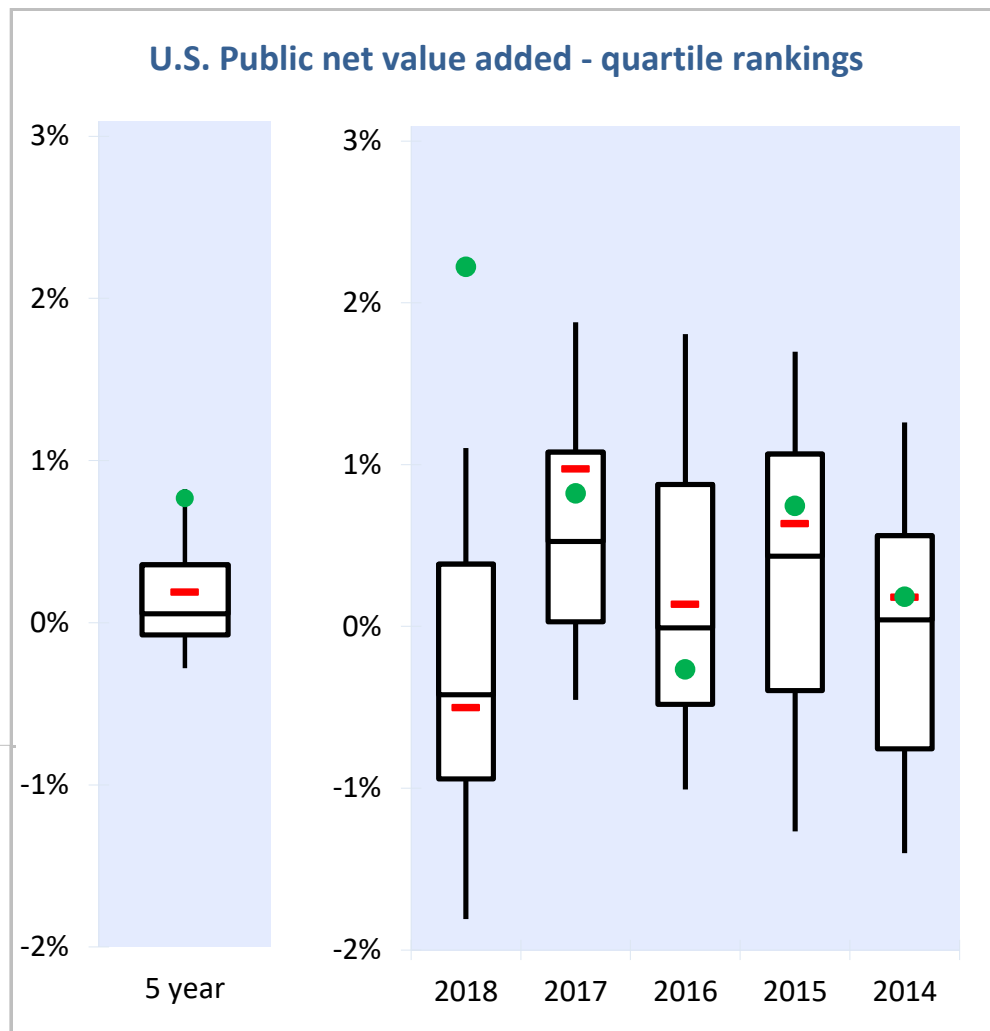
Net value added equals total net return minus policy return.

Value added for North Carolina Retirement Systems

Year	Net Return	Policy Return	Net value Added
2018	-1.5%	-3.6%	2.1%
2017	13.5%	12.8%	0.7%
2016	6.2%	6.6%	-0.4%
2015	0.3%	-0.4%	0.7%
2014	6.2%	6.1%	0.1%
5-Year	4.8%	4.1%	0.7%

Your 5-year net value added of 0.7% compares to a median of 0.1% for your peers and 0.0% for the U.S. Public universe.

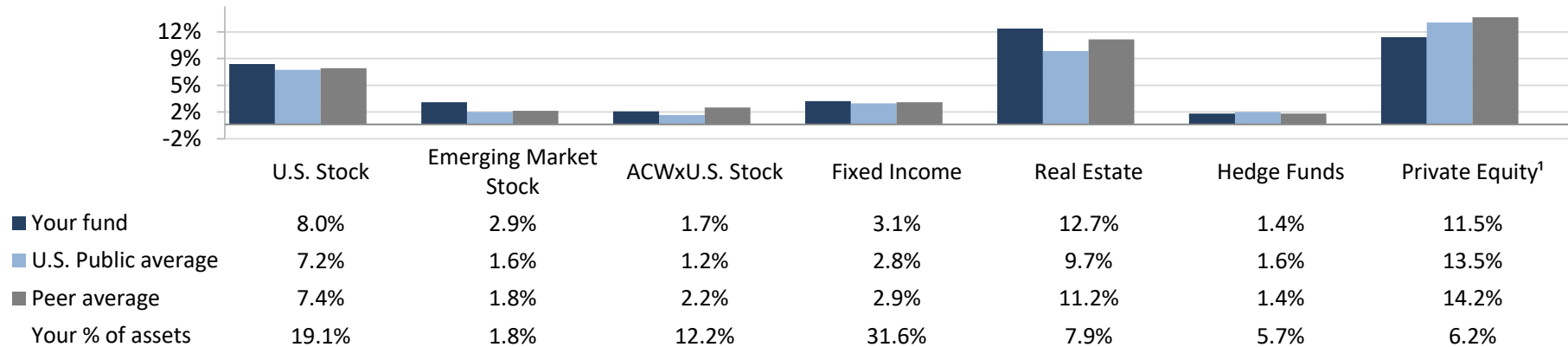
Your 0.7% 5-year value added translates into approximately \$3.2 billion of cumulative value added over 5 years, or \$3.4 billion more than if you had earned the U.S. Public median of 0.0%.



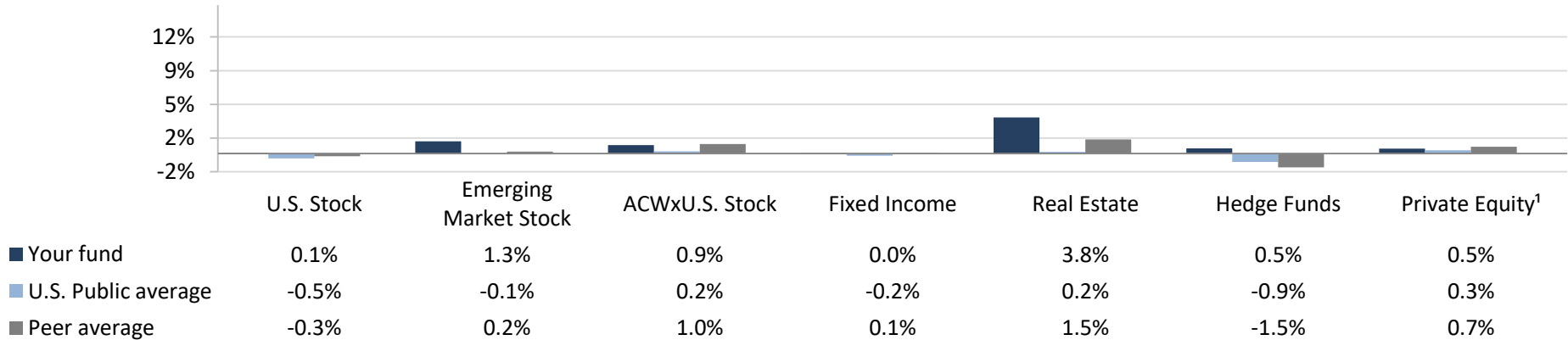
Your value added was impacted by your choice of benchmarks for private equity. CEM suggests using lagged, investable benchmarks for private equity. If your fund used the private equity benchmark suggested by CEM, your 5-year total fund value added would have been 0.2% lower.

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 -2.6%.

Your investment costs were \$343.0 million or 35.0 basis points in 2018.

Asset management costs by asset class and style (\$000s)	Internal Management			External Management			Total	
	Passive	Active	Overseeing of external	Passive fees	Active base fees	Perform. fees ¹		
Stock - U.S. Broad/All			185		5,401		5,586	
Stock - U.S. Large Cap	274		130	380			784	
Stock - U.S. Mid Cap	75		158	3	6,288		6,524	
Stock - U.S. Small Cap			160		6,310		6,470	
Stock - EAFE			355	195	7,777		8,327	
Stock - Emerging			91		1,507		1,598	
Stock - ACWI x U.S.			926	1,788	21,155		23,869	
Stock - Other			1		155		156	
Fixed Income - U.S.		1,954					1,954	
Fixed Income - Inflation Indexed			64	17	3,386		3,467	
Cash		545					545	
Commodities			16		228		244	
REITs			86	64	1,115		1,265	
Global TAA			255		2,000		2,255	
Hedge Fund - External Active			487		39,205	8,635	48,327	
Hedge Fund - FoFs			40		6,749	2,476	9,264	
Real Estate ex-REITs ¹			492		29,028	29,140	29,520	
Real Estate ex-REITs - LP ¹			259		42,778	98,781	43,037	
Real Estate ex-REITs - Co-Invest. ¹			84		2,947		3,031	
Real Estate ex-REITs - FoFs ¹			122		2,198	1	2,320	
Infrastructure - LP ¹			42		5,697	3,259	5,739	
Natural Resources - LP ¹			256		34,661	9,406	34,917	
Natural Resources - Co-Invest. ¹			29		794		823	
Diversified Private Equity - FoFs ¹			153		13,853	7,750	14,006	
LBO - LP ¹			404		25,949	45,120	26,353	
Venture Capital - LP ¹			226		18,901	32,571	19,127	
Venture Capital - Co-Invest. ¹			7				7	
Private Credit - LP ¹			224		19,214	19,303	19,438	
Private Credit - Co-Invest. ¹			25		1,599		1,624	
Other Private Equity - LP ¹			171		18,058	3,789	18,230	
Other Private Equity - Co-Invest. ¹			9		586		595	
Total excluding private asset performance fees							339,401	34.6bp
Oversight, custodial and other costs ²								
Oversight of the fund							1,906	
Trustee & custodial							1,550	
Consulting and performance measurement							0	
Audit							117	
Other							0	
Total oversight, custodial & other costs							3,573	0.4bp
Total investment costs (excl. transaction costs & private asset performance fees)							342,973	35.0bp

Footnotes

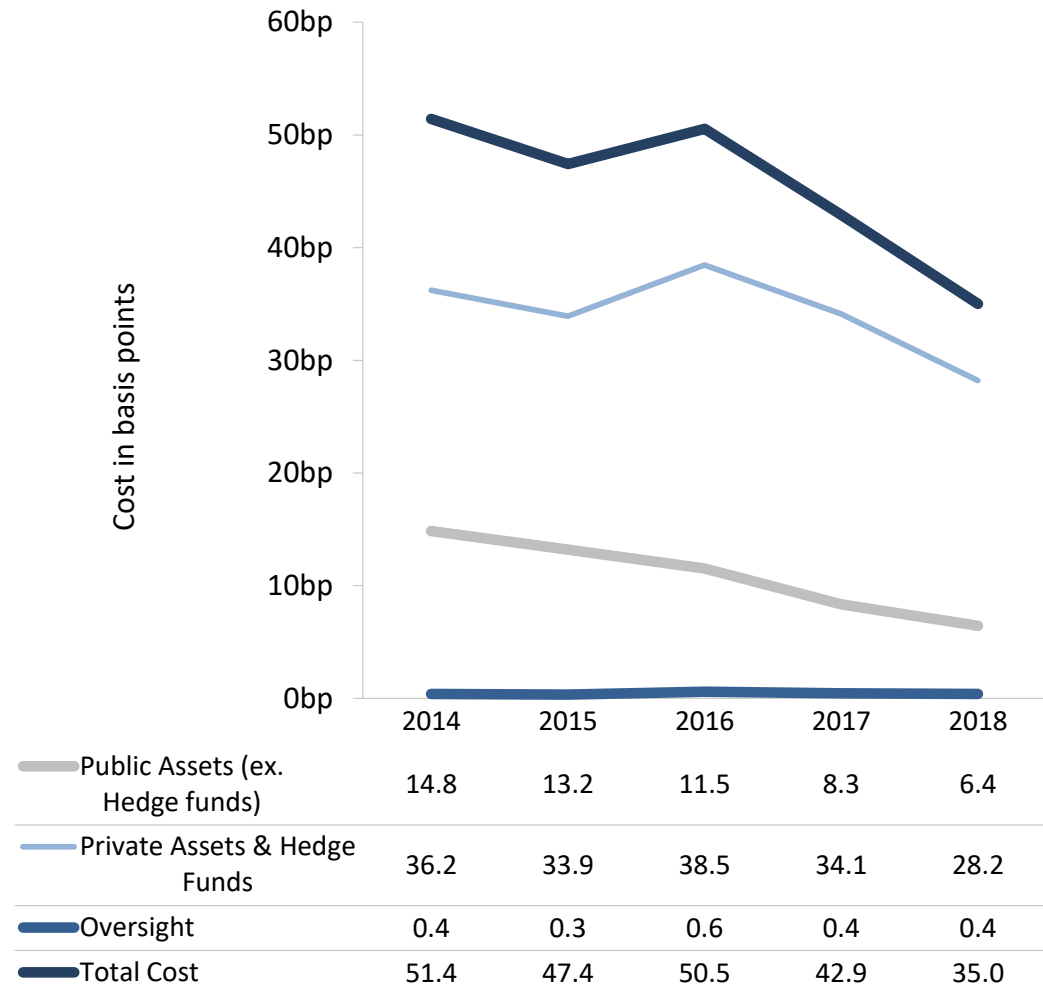
1. Total cost excludes carry/performance fees for real estate, infrastructure, natural resources and private equity. Performance fees are included for the public market asset classes and hedge funds.
2. Excludes non-investment costs, such as benefit insurance premiums and preparing cheques for retirees.

Your costs decreased between 2014 and 2018.

Your costs decreased primarily because:

- Base fees for both public market and private market asset classes have come down over the past 5 years.
- You decreased your use of funds of funds from 12% of hedge funds, private real assets and private equity in 2014 to 6% in 2018. Funds of funds are higher cost than direct funds.
- You increased your use of lower cost passive and internal management from 51% of assets in 2014 to 56% in 2018.

Trend in your investment costs

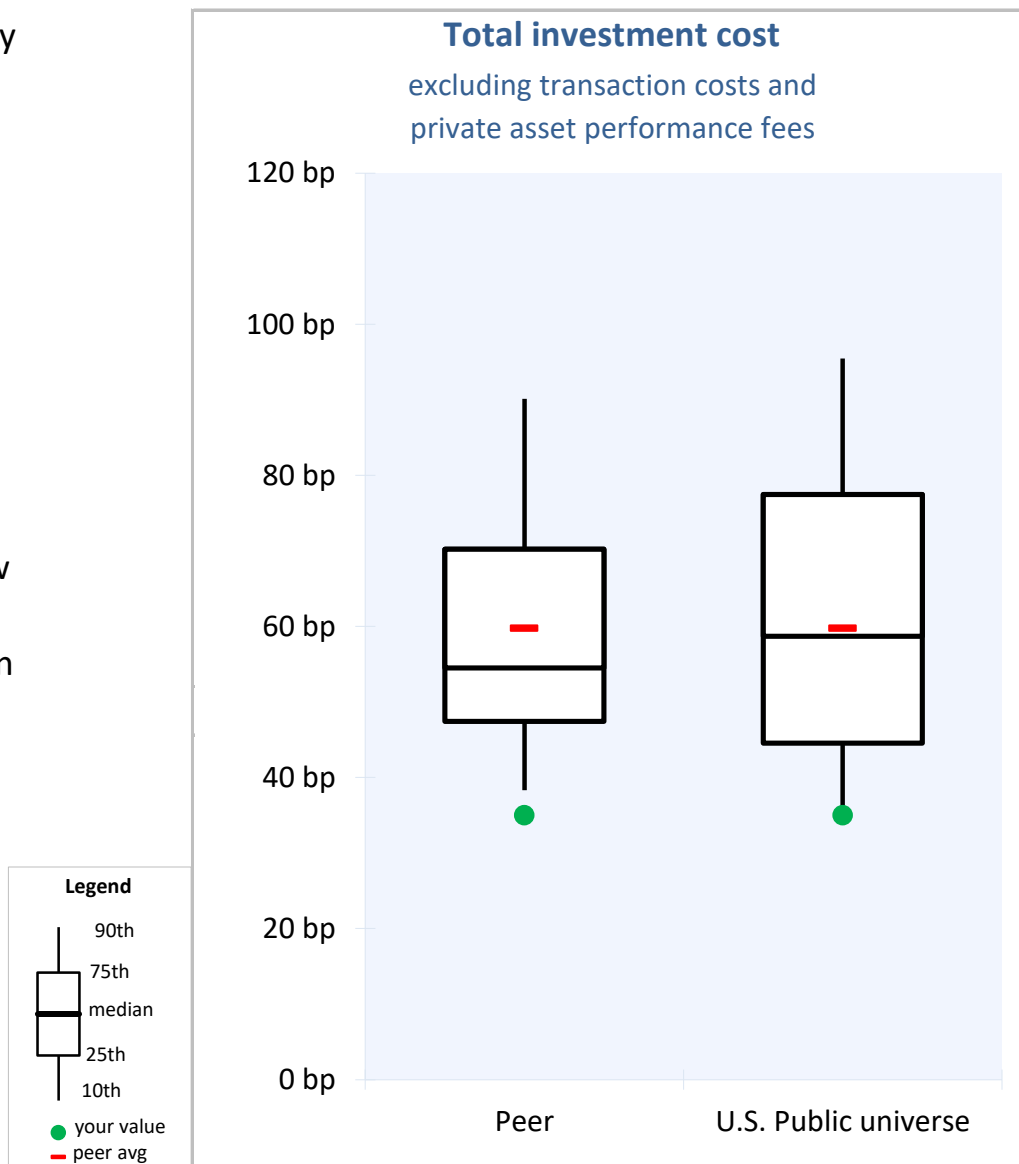


Your total investment cost of 35.0 bps was among the lowest of the peers and was substantially below the peer median of 54.5 bps.

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 24% of your funds assets at the end of 2018 versus a peer average of 29%.
- Fund size. Bigger funds have advantages of scale.

Therefore, to assess whether your costs are high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. 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 10.3 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 35.0 bp was below your benchmark cost of 45.3 bp. Thus, your cost savings were 10.3 bp.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	342,973	35.0 bp
Your benchmark cost	443,407	45.3 bp
Your excess cost	(100,434)	(10.3) bp

Your fund was low cost because you paid less than peers for similar services.

Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• Less active management, more lower cost passive	(9,436)	(1.0)
• Use of external management vs. lower cost internal	11,277	1.2
• More partnerships as a percentage of external	12,705	1.3
• More fund of funds	8,247	0.8
• Less co-investment as a percentage of LP/Co	4,735	0.5
• Less overlays	(2,874)	(0.3)
	<u>24,655</u>	<u>2.5</u>
2. Paying less than peers for similar services		
• External investment management costs	(111,176)	(11.3)
• Internal investment management costs	(5,997)	(0.6)
• Oversight, custodial & other costs	(7,917)	(0.8)
	<u>(125,089)</u>	<u>(12.8)</u>
Total savings	(100,434)	(10.3)

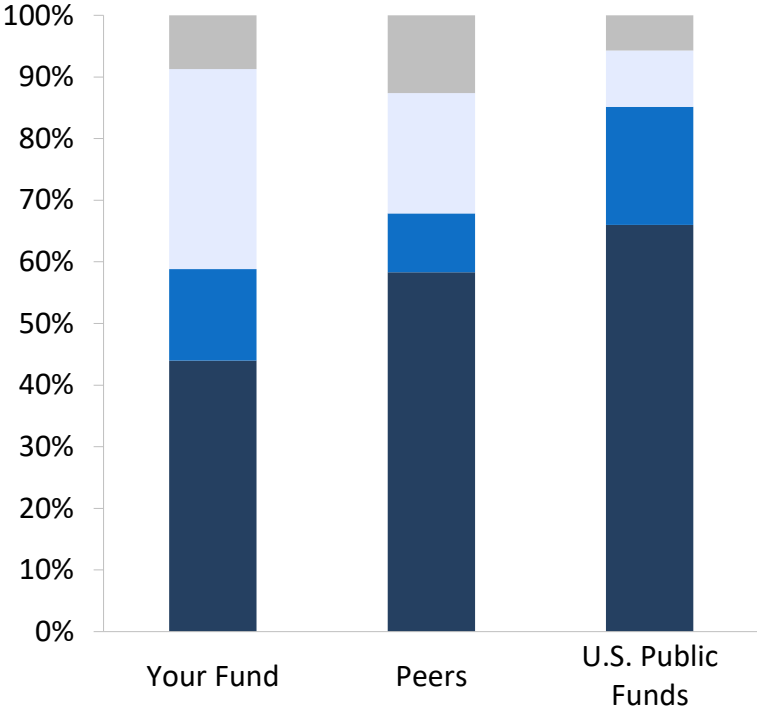
Differences in cost performance are often caused by differences in implementation style.

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 less external active management than your peers (your 44% versus 58% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had similar amounts in fund of funds. Your 6% of hedge funds, real estate and private equity in fund of funds compared to 4% for your peers.

Implementation style¹



Internal passive	9%	13%	6%
Internal active	32%	20%	9%
External passive	15%	10%	19%
External active	44%	58%	66%

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

In total, differences in implementation style cost you 2.5 bp relative to your peers.

Calculation of the cost impact of differences in implementation style

Asset class by implementation choice*	Assets by style (\$mils)	Style %			Benchmark cost		More/ (less) ¹	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)	Passive	Active			
	A			B			C		
	Total assets						More/ (less)	A X B X C	
<u>Passive vs. Active</u>		Passive % of total assets			Passive	Active			
Stock - U.S. Broad/All	1,533	0.0%	65.1%	(65.1%)	1.6 bp	25.8 bp	(24.2) bp	2,412	
Stock - U.S. Large Cap	12,367	100.0%	64.2%	35.8%	0.9 bp	11.2 bp	(10.3) bp	(4,538)	
Stock - U.S. Mid Cap	3,206	59.6%	42.5%	17.1%	2.8 bp	27.4 bp	(24.6) bp	(1,347)	
Stock - U.S. Small Cap	1,327	0.0%	9.7%	(9.7%)	1.6 bp	42.8 bp	(41.2) bp	528	
Stock - EAFE	3,617	23.0%	29.6%	(6.7%)	3.0 bp	31.5 bp	(28.5) bp	689	
Stock - Emerging	757	0.0%	17.8%	(17.8%)	6.7 bp	53.1 bp	(46.4) bp	624	
Stock - ACWI x U.S.	13,835	54.9%	30.0%	24.9%	4.2 bp	34.0 bp	(29.8) bp	(10,266)	
Stock - Other	31	0.0%	60.0%	(60.0%)	1.0 bp	26.0 bp	(25.0) bp	47	
Fixed Income - U.S.	24,854	0.0%	13.9%	(13.9%)	2.0 bp	6.5 bp	(4.5) bp	1,562	
Fixed Income - Inflation Indexed	946	5.9%	62.8%	(56.9%)	2.1 bp	21.7 bp	(19.6) bp	1,055	
Commodities	240	0.0%	33.5%	(33.5%)	3.6 bp	32.0 bp	(28.4) bp	229	
REITs	708	51.1%	33.7%	17.4%	2.7 bp	37.7 bp	(35.0) bp	(431)	
More passive								(9,436)	(1.0) bp
<u>Internal passive vs. external passive</u>	Passive assets	Internal passive % of passive assets			Internal passive	External passive	More/ less		
Stock - U.S. Large Cap	12,367	54.3%	75.3%	(21.0%)	0.7 bp	1.4 bp	(0.7) bp	172	
Stock - U.S. Mid Cap	1,911	96.5%	54.3%	42.2%	1.2 bp	4.7 bp	(3.5) bp	(285)	
Stock - EAFE	831	0.0%	30.6%	(30.6%)	3.8 bp	2.6 bp	1.2 bp	(32)	
Stock - ACWI x U.S.	7,595	0.0%	41.3%	(41.3%)	2.6 bp	5.4 bp	(2.8) bp	882	
Fixed Income - Inflation Indexed	56	0.0%	56.1%	(56.1%)	2.6 bp	1.4 bp	1.2 bp	(4)	
REITs	361	0.0%	76.8%	(76.8%)	1.4 bp	6.9 bp	(5.5) bp	152	
Less int. passive as % of total passive								886	0.1 bp
Total impact of differences in implementation style on this page								(8,550)	(0.9) 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)	Style %			Benchmark cost		More/ (less) ¹	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)	Internal active	External active			
	A			B			C		A X B X C
	Active assets		Internal active % of active assets		Internal active	External active	More/ (less)		
<u>Internal active vs. external active</u>									
Stock - U.S. Broad/All	1,533	0.0%	18.4%	(18.4%)	5.4 bp	30.4 bp	(25.0) bp	706	
Stock - U.S. Mid Cap	1,295	0.0%	57.8%	(57.8%)	9.8 bp	51.5 bp	(41.7) bp	3,127	
Stock - U.S. Small Cap	1,327	0.0%	32.4%	(32.4%)	5.7 bp	60.6 bp	(54.9) bp	2,358	
Stock - EAFE	2,786	0.0%	20.5%	(20.5%)	8.6 bp	37.4 bp	(28.8) bp	1,647	
Stock - Emerging	757	0.0%	13.2%	(13.2%)	14.1 bp	59.0 bp	(44.9) bp	449	
Stock - ACWI x U.S.	6,240	0.0%	12.7%	(12.7%)	10.0 bp	37.5 bp	(27.5) bp	2,179	
Stock - Other	31	0.0%	54.4%	(54.4%)	6.6 bp	49.1 bp	(42.5) bp	73	
Fixed Income - U.S.	24,854	100.0%	68.1%	31.9%	3.1 bp	13.8 bp	(10.7) bp	(8,495)	
Fixed Income - Inflation Indexed	889	0.0%	16.9%	(16.9%)	1.8 bp	25.7 bp	(23.9) bp	360	
Commodities	240	0.0%	0.8%	(0.8%)	3.3 bp	32.3 bp	(29.0) bp	5	
REITs	346	0.0%	10.5%	(10.5%)	5.7 bp	41.5 bp	(35.7) bp	129	
Real Estate ex-REITs	8,763	0.0%	9.6%	(9.6%)	36.1 bp	90.9 bp	(54.8) bp	4,592	
Infrastructure	550	0.0%	15.7%	(15.7%)	28.0 bp	112.5 bp	(84.5) bp	730	
Natural Resources	5,101	0.0%	0.4%	(0.4%)	17.1 bp	100.1 bp	(82.9) bp	165	
Global TAA	1,563	0.0%	37.8%	(37.8%)	14.4 bp	45.5 bp	(31.1) bp	1,838	
Diversified Private Equity	833	0.0%	0.0%	(0.0%)	38.7 bp	149.5 bp	(110.8) bp	2	
Venture Capital	1,304	0.0%	0.5%	(0.5%)	30.0 bp	178.6 bp	(148.6) bp	99	
Other Private Equity	2,144	0.0%	0.2%	(0.2%)	6.7 bp	119.9 bp	(113.2) bp	37	
Private Credit	3,127	0.0%	1.9%	(1.9%)	22.7 bp	87.2 bp	(64.4) bp	389	
Mix of int. active vs. int. active								10,391	1.1 bp
Total impact of differences in implementation style on this page								10,391	1.1 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) ¹	Style %			Benchmark cost		More/ (less) ²	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)					
	A	B			C			A X B X C	
	External assets	Evergreen fund % of external			Ever-green	LP/Co/ FoF	More/ (less)		
<u>Evergreen vs. LP/Co/FoF</u>									
Real Estate ex-REITs	8,763	45.1%	49.0%	(3.9%)	64.1 bp	116.7 bp	(52.6) bp	1,797	
Infrastructure	550	0.0%	14.2%	(14.2%)	55.7 bp	122.0 bp	(66.3) bp	519	
Natural Resources	5,101	0.0%	32.3%	(32.3%)	76.2 bp	111.5 bp	(35.3) bp	5,808	
Private Credit	3,127	0.0%	66.8%	(66.8%)	79.9 bp	101.8 bp	(21.9) bp	4,580	
Less evergreen % of external								12,705	1.3 bp
	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	4,809	97.9%	98.1%	(0.2%)	115.1 bp	196.7 bp	(81.6) bp	65	
Infrastructure	550	100.0%	92.8%	7.2%	116.5 bp	193.0 bp	(76.5) bp	(302)	
Natural Resources	5,101	100.0%	99.9%	0.1%	111.4 bp	195.0 bp	(83.6) bp	(44)	
Hedge Funds	5,186	91.2%	94.7%	(3.5%)	115.9 bp	201.0 bp	(85.1) bp	1,534	
Perf. fees (on NAV)	5,186	91.2%	94.7%	(3.5%)	36.0 bp	86.2 bp	(50.2) bp	906	
Diversified Private Equity	833	0.0%	94.8%	(94.8%)	145.0 bp	232.6 bp	(87.6) bp	6,926	
Venture Capital	1,304	100.0%	94.8%	5.2%	177.7 bp	194.0 bp	(16.3) bp	(110)	
LBO	2,394	100.0%	94.8%	5.2%	160.4 bp	219.2 bp	(58.8) bp	(727)	
Less fund of funds % of LP/Co/FoF								8,247	0.8 bp
Total impact of differences in implementation style on this page								20,953	2.1 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.

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) ¹	Style %			Benchmark cost		More/ (less) ²	Cost/ (savings) in \$000s	bps
		Your fund	Peer average	More/ (less)	Co- invest.	Limited Partner.			
	A			B			C		A X B X C
	LP/Co assets	Co-investment % of limited partnerships			Co- invest.	Limited Partner.	More/ (less)		
<u>Co-investment vs. LP</u>									
Real Estate ex-REITs	4,708	13.2%	10.5%	2.7%	36.5 bp	124.3 bp	(87.7) bp	(1,115)	
Infrastructure	550	0.0%	2.8%	(2.8%)	6.1 bp	119.7 bp	(113.6) bp	175	
Natural Resources	5,101	8.5%	16.3%	(7.8%)	5.1 bp	132.0 bp	(126.9) bp	5,044	
Venture Capital	1,304	2.9%	4.2%	(1.3%)	14.4 bp	184.9 bp	(170.5) bp	295	
LBO	2,394	0.0%	4.2%	(4.2%)	6.6 bp	167.2 bp	(160.5) bp	1,621	
Other Private Equity	2,144	2.2%	4.2%	(2.0%)	16.6 bp	124.5 bp	(107.9) bp	469	
Private Credit	3,127	9.2%	3.7%	5.5%	3.2 bp	105.6 bp	(102.4) bp	(1,755)	
Less co-investment % of LP/Co								4,735	0.5 bp
<u>Overlays</u>									
Impact of higher use of portfolio level overlays								(2,874)	(0.3) bp
Total impact of differences in implementation style on this page								1,861	0.2 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 11.3 bps.

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

	Style	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) \$000s (A x B)
			Your Fund	Peer median	More/ (less) (B)	
External asset management						
Stock - U.S. Broad/All	active	1,533	36.4	30.4	6.1	928
Stock - U.S. Large Cap*	passive	5,655	0.9	1.4	(0.5)	(284)
Stock - U.S. Mid Cap	passive	67	0.7	4.7	(4.0)	(27)
Stock - U.S. Mid Cap*	active	1,295	49.8	51.5	(1.8)	(230)
Stock - U.S. Small Cap	active	1,327	48.8	60.6	(11.8)	(1,568)
Stock - EAFE*	passive	831	2.6	2.6	(0.0)	(1)
Stock - EAFE	active	2,786	29.1	37.4	(8.3)	(2,309)
Stock - Emerging	active	757	21.1	59.0	(37.9)	(2,869)
Stock - ACWI x U.S.*	passive	7,595	2.6	5.4	(2.8)	(2,117)
Stock - ACWI x U.S.	active	6,240	35.1	37.5	(2.4)	(1,499)
Stock - Other	active	31	49.7	49.1	0.6	2
Fixed Income - Inflation Indexed	passive	56	3.7	1.4	2.3	13
Fixed Income - Inflation Indexed*	active	889	38.7 ¹	25.7	13.0	1,156
Commodities	active	240	10.2 ¹	32.3	(22.1)	(530)
REITs*	passive	361	3.0	6.9	(3.9)	(141)
REITs	active	346	33.4 ¹	41.5	(8.0)	(278)
Real Estate ex-REITs	active	3,954	74.7	64.1	10.5	4,161
Real Estate ex-REITs*	FoF	101	86.1	72.7	13.5	136
Underlying base fees	FoF	101	143.1	124.0	19.1	193
Real Estate ex-REITs	CO	620	48.9	36.5	12.4	767
Real Estate ex-REITs	LP	4,088	105.3	124.3	(19.0)	(7,771)
Infrastructure	LP	550	104.4	119.7	(15.3)	(839)
Natural Resources	CO	432	19.0	5.1	13.9	601
Natural Resources	LP	4,669	74.8	132.0	(57.2)	(26,709)
Hedge Funds	active	4,731	83.9	115.9	(32.0)	(15,162)
Performance fees (on NAV)	active	4,731	18.3	36.0	(17.7)	(8,384)
Hedge Funds	FoF	455	79.5	74.3	5.2	238
Top layer perf. fees (on NAV)	FoF	455	0.0	12.0	(12.0)	(546)
Underlying base fees	FoF	455	69.7	126.8	(57.0)	(2,594)
Underlying perf. fees (on NAV)	FoF	455	54.4	74.2	(19.8)	(900)
Global TAA	active	1,563	14.4 ¹	45.5	(31.1)	(4,862)
Diversified Private Equity	FoF	833	69.7	76.6	(6.9)	(575)
Underlying base fees	FoF	833	98.4	156.0	(57.6)	(4,802)
Venture Capital*	CO	38	1.9	14.4	(12.6)	(47)
Venture Capital	LP	1,267	151.0	184.9	(33.9)	(4,295)
LBO	LP	2,394	110.1	167.2	(57.1)	(13,659)
Other Private Equity	CO	47	126.6	16.6	110.1	517
Other Private Equity	LP	2,097	86.9 ¹	124.5	(37.6)	(7,878)
Private Credit*	CO	288	56.4	3.2	53.2	1,532
Private Credit	LP	2,839	68.5	105.6	(37.1)	(10,547)
Total impact of paying more/less for external management						(111,176)
Total in bps						(11.3) bp

Footnotes:

1. You paid performance fees in these asset classes.
2. 'Amount fees are based on' is the basis for calculating costs for private assets.

*Universe median used as peer data was insufficient.

The net impact of paying more/less for internal asset management costs saved 0.6 bps.

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

	Style	Your avg holdings in \$mils	Cost in bps			Cost/ (savings) \$000s
			Your Fund	Peer median	More/ (less)	
<i>Internal asset management</i>		(A)			(B)	(A X B)
Stock - U.S. Large Cap	passive	6,713	0.4	0.7	(0.3)	(221)
Stock - U.S. Mid Cap	passive	1,844	0.4	1.2	(0.7)	(137)
Fixed Income - U.S.	active	24,854	0.8	3.1	(2.3)	(5,638)
Cash	active	6,934	0.8 Excluded		--	--
Total for internal management						(5,997)
Total in bps						(0.6) bp

'Excluded' indicates that the asset class was excluded from this analysis due to comparability concerns with peers.

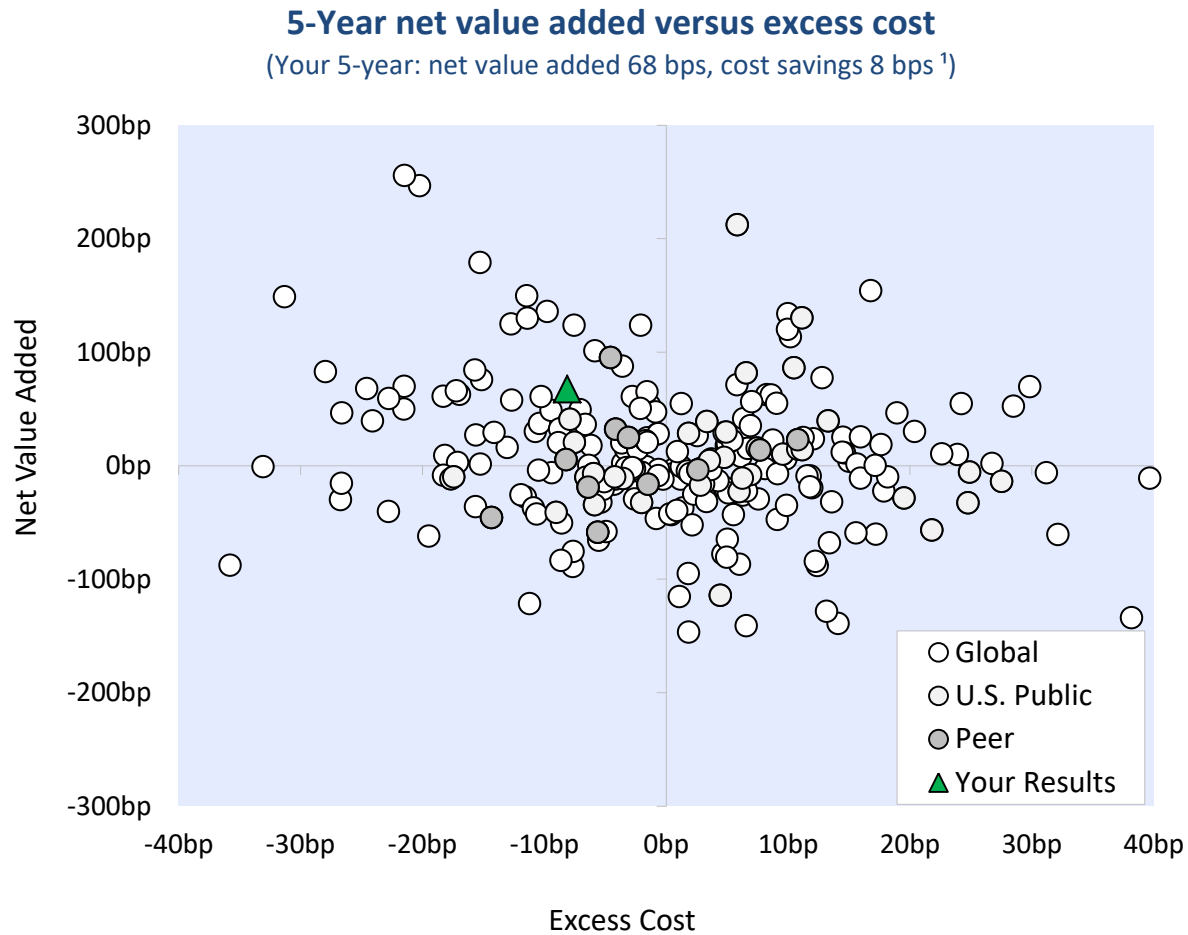
The net impact of differences in oversight, custodial & other costs saved 0.8 bps.

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	97,980	0.2	0.6	(0.4)	
Consulting	97,980	0.0	0.0	0.0	
Custodial	97,980	0.2	0.4	(0.2)	
Audit	97,980	0.0	0.0	(0.0)	
Other	97,980	0.0	0.1	(0.1)	
Total for oversight, custodial, other ¹		0.4	1.2	(0.8)	(7,917)
Total in bps					(0.8) bp

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.

Your 5-year performance placed in the positive value added, low cost quadrant of the cost effectiveness chart.



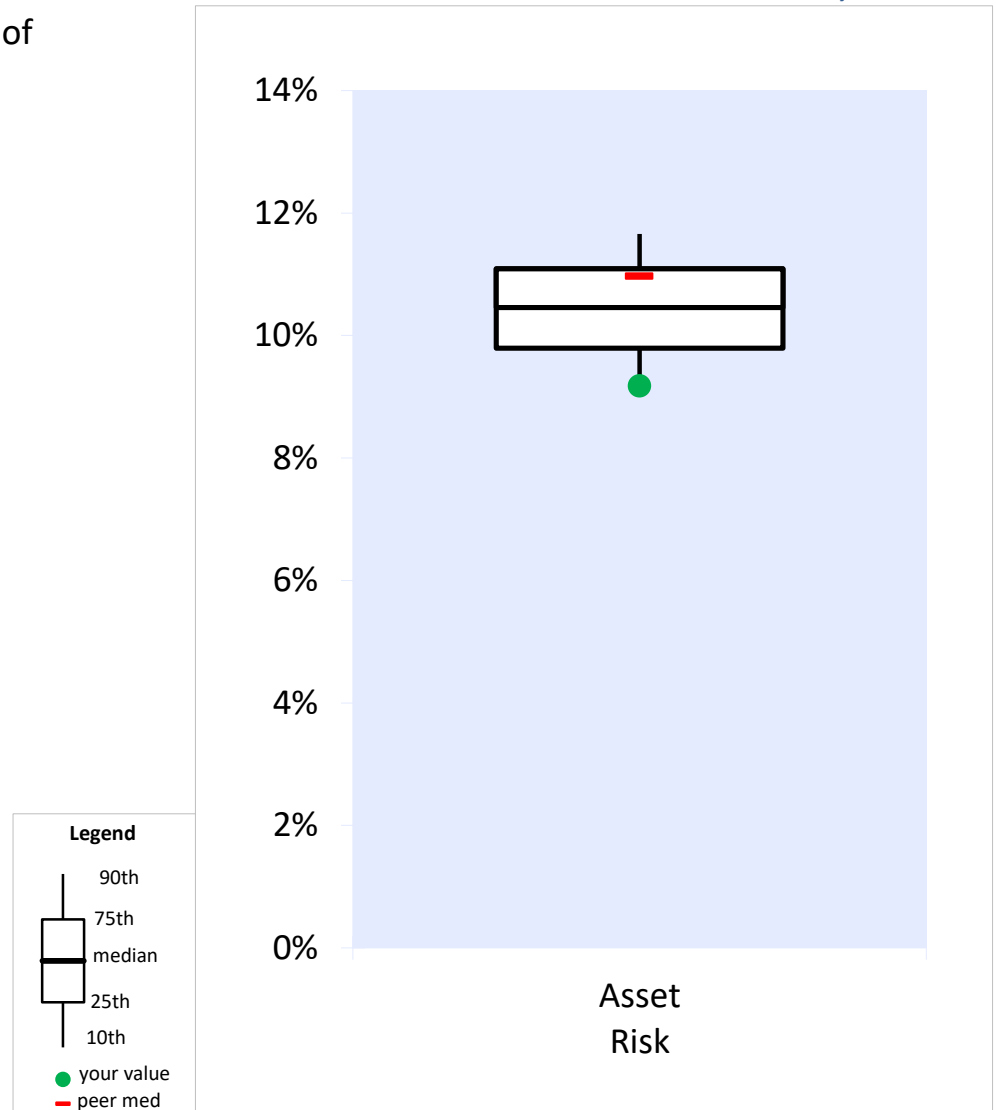
1. Your 5-year cost savings of 8 basis points is the average of your cost savings for the past 5 years.

	2018	2017	2016	2015	2014	5-year
Net value added	213.0bp	73.0bp	-35.8bp	65.1bp	9.0bp	67.5bp
Excess Cost	-10.3bp	-11.3bp	-7.0bp	-10.0bp	-2.0bp	-8.1bp

Comparison of risk levels

Your asset risk of 9.2% was below the U.S. Public median of 10.5%. Asset risk is the standard deviation of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your policy mix.

U.S. Public risk levels at December 31, 2018



Summary of key takeaways

Returns

- Your 5-year net total return was 4.8%. This was below the U.S. Public median of 5.4% and below the peer median of 5.7%.
- Your 5-year policy return was 4.1%. 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 0.7%. This was above the U.S. Public median of 0.0% and above the peer median of 0.1%.

Cost and cost effectiveness

- Your investment cost of 35.0 bps was below your benchmark cost of 45.3 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 similar services.

Risk

- Your asset risk of 9.2% was below the U.S. Public median of 10.5%.