



North Carolina Retirement
Systems

CEM Investment Benchmarking Report DB - 2022

November 15, 2023

Key Takeaways

Returns

- Your 5-year net total return was 4.4%. This was below both the U.S. Public median of 5.9% and the peer median of 6.4%.
- Your 5-year policy return was 3.9%. This was below both the U.S. Public median of 4.7% and the peer median of 4.9%.

Value added

- Your 5-year net value added was 0.5%. This was below both the U.S. Public median of 1.1% and the peer median of 1.4%.

Cost

- Your investment cost of 26.4 bps was below your benchmark cost of 32.8 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because it paid less than peers for similar services.
- Your costs decreased by 8.6 bps, from 35.0 bps in 2018 to 26.4 bps in 2022, primarily because you had a lower cost asset mix.

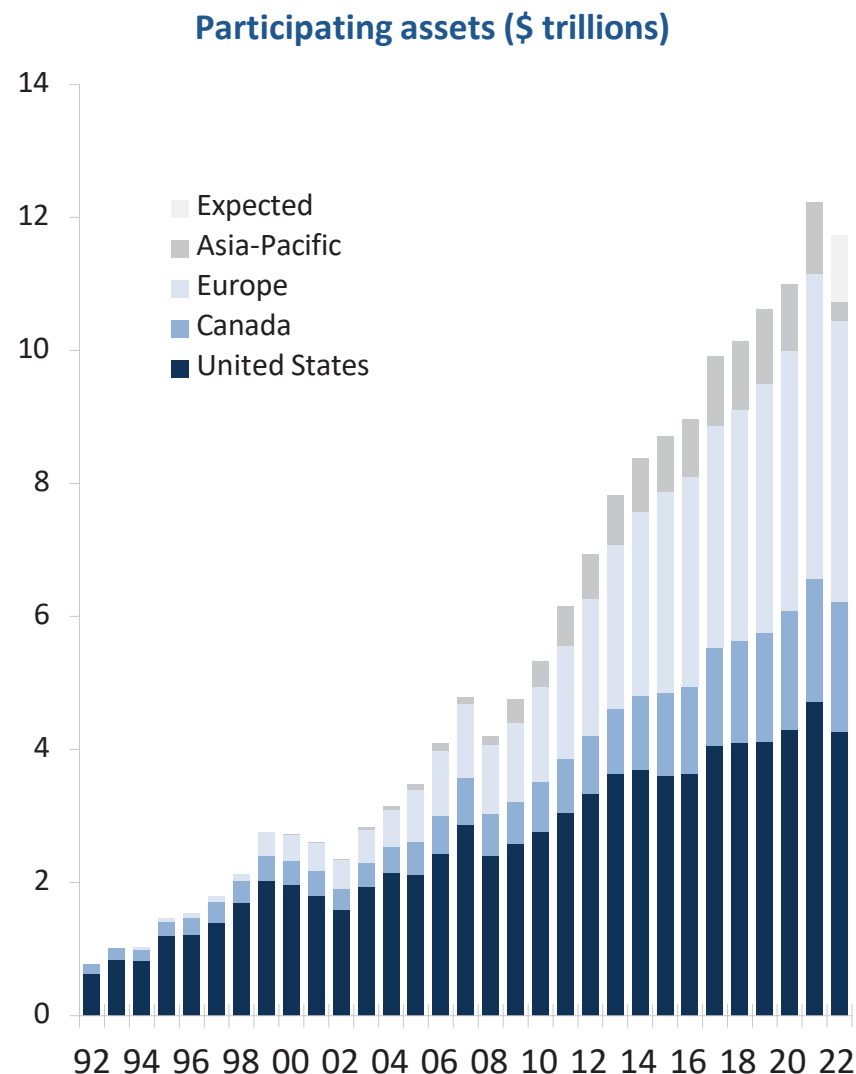
Risk

- Your asset risk of 9.6% was below the U.S. Public median of 11.5%.

This benchmarking report compares your cost and return performance to the 265 funds in CEM's extensive pension database.

- 146 U.S. pension funds participate. The median U.S. fund had assets of \$8.7 billion and the average U.S. fund had assets of \$29.2 billion. Total participating U.S. assets were \$4.3 trillion.
- 68 Canadian funds participate with assets totaling \$2.0 trillion.
- 46 European funds participate with aggregate assets of \$4.2 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.
- 4 Asia-Pacific funds participate with aggregate assets of \$276.0 billion. Included are funds from Australia, New Zealand, China and South Korea.
- 1 funds from other regions participate.

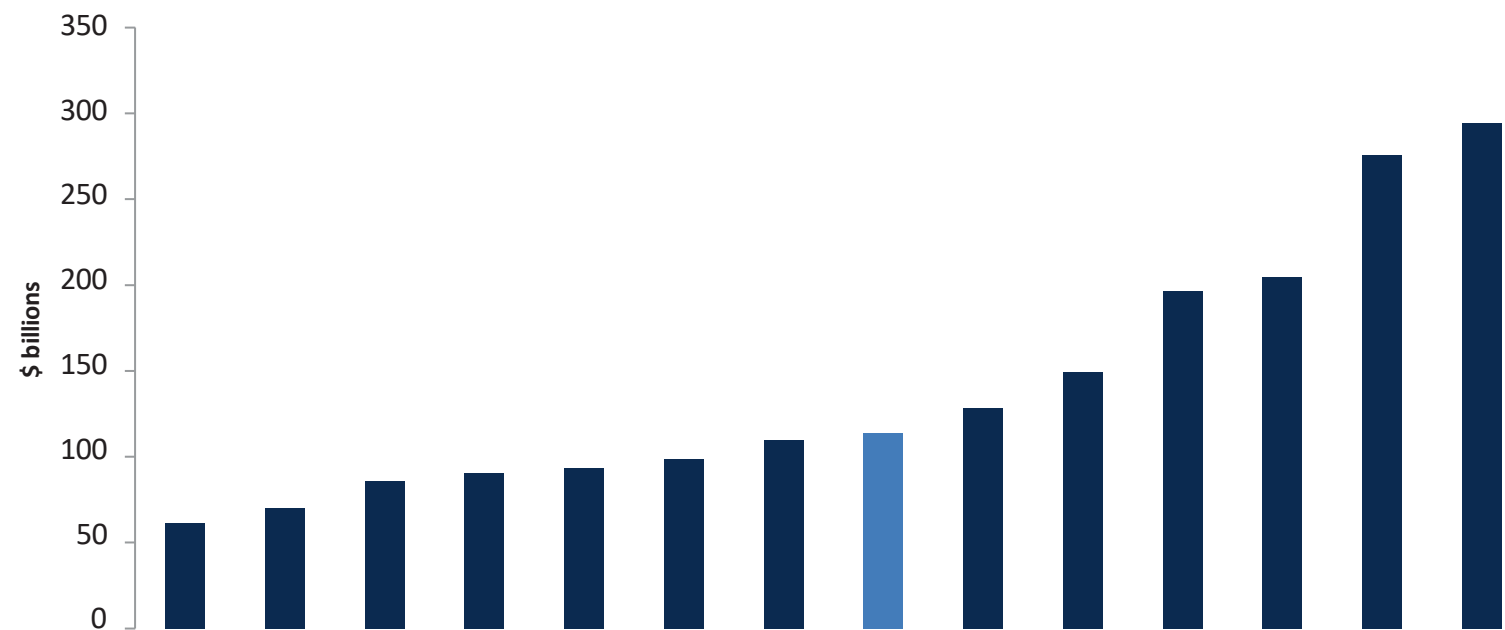
The most meaningful comparisons for your returns and value added are to the U.S. Public universe, which consists of 41 funds.



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 sponsors from \$61.6 billion to \$294.4 billion
- Median size of \$111.9 billion versus your \$113.9 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. For some of the peers, 2021 cost data was used as a proxy for 2022.

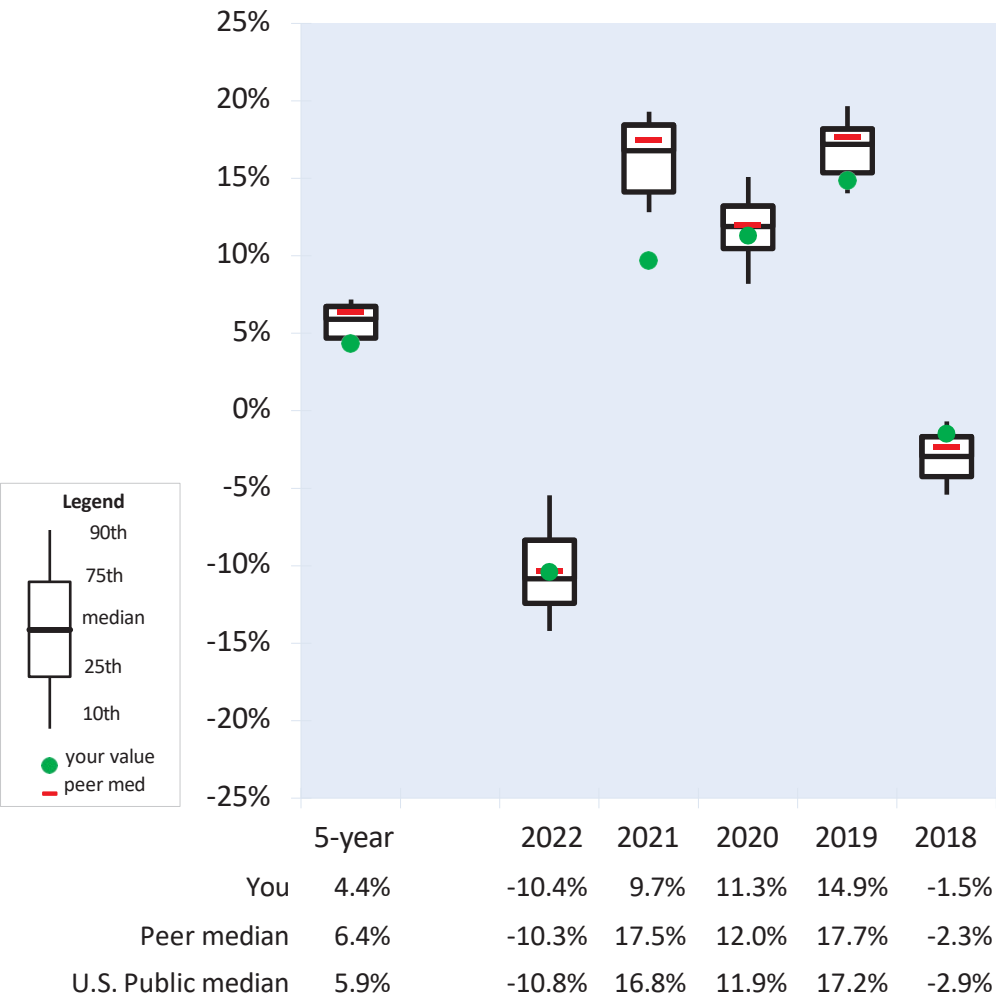
Your 5-year net total return of 4.4% was below both the U.S. Public median of 5.9% and the peer median of 6.4%.

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	4.4%
- Policy return	3.9%
= Net value added	0.5%

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).

U.S. Public net total returns - quartile rankings



Your 5-year policy return of 3.9% was below both the U.S. Public median of 4.7% and the peer median of 4.9%.

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

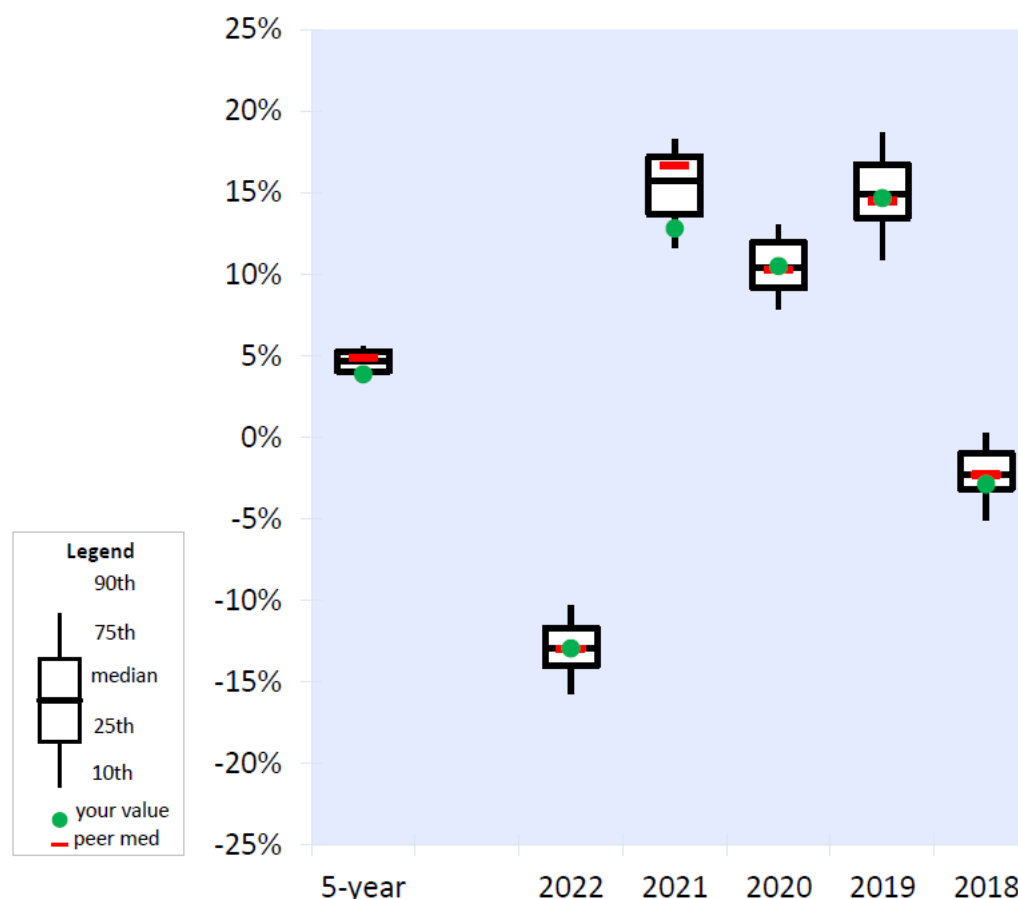
Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- 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, including your fund, were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Prior to this adjustment, your 5-year policy return was 4.2%, 0.3% higher than your adjusted 5-year policy return of 3.9%. Mirroring this, your 5-year total fund net value added would be 0.3% lower.

U.S. Public policy returns - quartile rankings



	5-year	2022	2021	2020	2019	2018
You	3.9%	-12.9%	12.8%	10.5%	14.7%	-2.9%
Peer median	4.9%	-13.0%	16.7%	10.3%	14.5%	-2.3%
U.S. Public median	4.7%	-13.0%	15.7%	10.4%	14.9%	-2.3%

Your 5-year policy return of 3.9% was below the U.S. Public median of 4.7% primarily because of:

- The negative impact of your higher weight for Fixed Income, which was one of the poorer performing asset classes over the past 5 years.
- This was partially offset by the positive impact of your higher weight for U.S. Stock, which was one of the better performing asset classes over the past 5 years.

	5-year average policy mix ¹			5-year benchmark return	
	Your Fund	U.S. Publ Avg.	More/ Less	Your Fund	U.S. Publ Avg.
Stock - U.S.	21%	17%	4%	8.7%	8.6%
Stock - EAFE	0%	5%	-5%	1.5%	1.8%
Stock - ACWI x U.S.	20%	5%	14%	0.8%	1.7%
Stock - Global	0%	14%	-14%	n/a ³	5.3%
Other Stock ²	0%	4%	-4%	n/a ³	n/a ³
Total Stock	41%	46%	-5%	4.8%	5.4%
Fixed Income - U.S.	25%	17%	8%	-0.5%	0.2%
Fixed Inc. - Inflation indexed	2%	3%	-1%	2.5%	1.6%
Cash	5%	-1%	6%	1.2%	1.2%
Other Fixed Income ²	0%	7%	-7%	n/a ³	n/a ³
Total Fixed Income	32%	26%	6%	0.4%	0.3%
Global TAA	2%	1%	1%	1.0%	3.9%
Hedge funds	3%	3%	0%	3.5%	4.2%
Commodities	1%	1%	0%	6.4%	3.6%
Natural resources	3%	1%	3%	3.6%	5.5%
REITs	1%	1%	0%	-0.1%	2.6%
Real estate ex-REITs	7%	9%	-2%	8.3%	8.3%
Other Real Assets ²	0%	2%	-2%	n/a ³	n/a ³
Private equity	6%	10%	-4%	6.5%	6.5%
Private debt	4%	2%	2%	3.5%	4.1%
Total	100%	100%			

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

2. Other stock includes Emerging. Other fixed income includes Long Bonds. Other real assets include Infrastructure.

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

Net value added is the component of total return from active management. Your 5- year net value added was 0.5%.

Net value added equals total net return minus policy return.

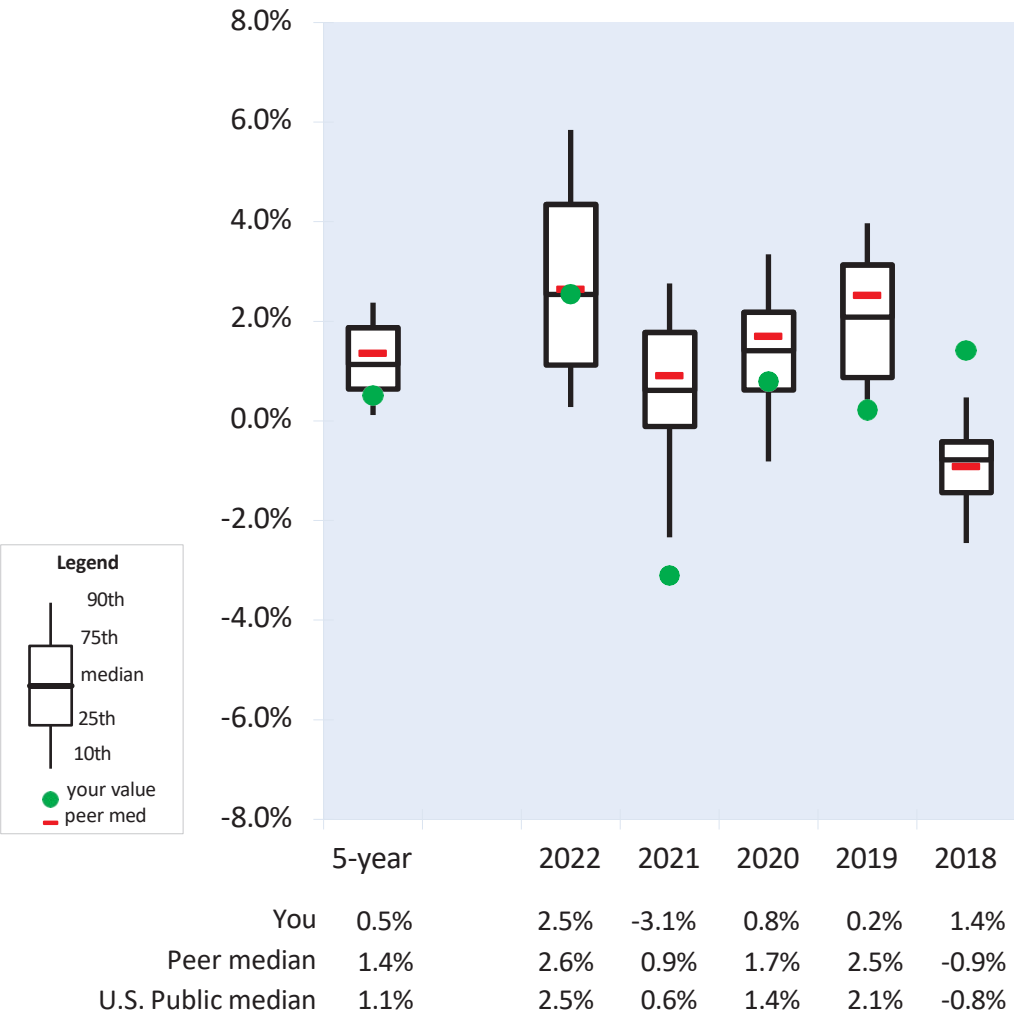
Value added for North Carolina Retirement Systems

Year	Net return	Policy return	Net value added
2022	-10.4%	-12.9%	2.5%
2021	9.7%	12.8%	-3.1%
2020	11.3%	10.5%	0.8%
2019	14.9%	14.7%	0.2%
2018	-1.5%	-2.9%	1.4%
5-Year	4.4%	3.9%	0.5%

Your 5-year net value added of 0.5% compares to a median of 1.4% for your peers and 1.1% for the U.S. Public universe.

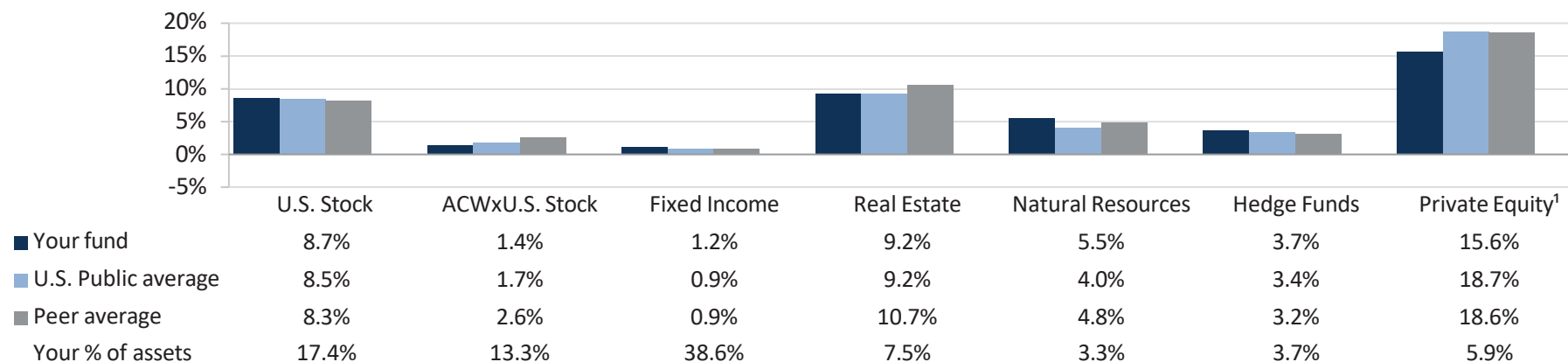
To enable fairer comparisons, the value added for each participant including your fund was adjusted to reflect private equity benchmarks based on lagged, investable public market indices. Prior to this adjustment, your fund’s 5-year total fund net value added was 0.2%.

U.S. Public net value added - quartile rankings

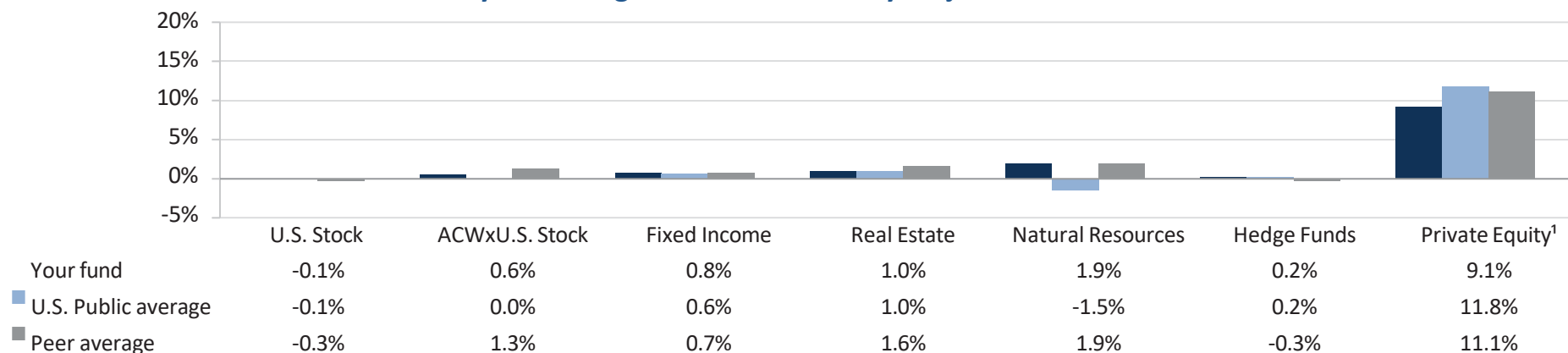


Comparisons of your 5-year net return and net value added by major asset class:

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, including your fund were adjusted to reflect lagged, investable, public-market indices. Prior to this adjustment, your fund's 5-year private equity net value added was 2.4%.

Your investment costs, excluding private asset performance fees, were \$300.3 million or 26.4 basis points in 2022.

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			115		4,490		4,605
Stock - U.S. large cap	145	19					164
Stock - U.S. mid cap	20		102		5,921		6,043
Stock - U.S. small cap			99		5,354		5,453
Stock - EAFE			256		8,396		8,653
Stock - Emerging			65		1,589		1,654
Stock - ACWI x U.S.			826	1,255	23,928		26,009
Stock - Other			1	356			357
Fixed income - U.S.		1,348					1,348
Fixed income - Inflation indexed			125	19	4,408		4,552
Cash		891					891
Commodities			27		179		206
REITs			108		2,477		2,585
Infrastructure - LP ¹			82		6,504	4,724	6,586
Natural resources - LP ¹			250		20,508	38,068	20,759
Natural resources - Co-invest. ¹			18		276	3,755	294
Real estate ex-REITs ¹			701		33,661	9,845	34,363
Real estate ex-REITs - LP ¹			264		25,622	54,688	25,886
Real estate ex-REITs - Co-invest. ¹			54		1,867		1,922
Real estate ex-REITs - FoFs ¹			15		2,153	30	2,167
Global TAA			144		2,000		2,144
Hedge funds - External active			207		29,034	20,120	49,360
Hedge funds - FoFs			31		7,267		7,298
Private equity - Diversified - FoFs ¹			70		8,920	1,467	8,989
LBO - LP ¹			225		21,894	29,100	22,120
Venture capital - LP ¹			138		11,444	9,634	11,582
Venture capital - Co-invest. ¹			12			9,009	12
Private credit - LP ¹			248		23,334	11,826	23,581
Private credit - Co-invest. ¹			29		2,183		2,212
Private equity - Other - LP ¹			213		14,561	1,046	14,774
Private equity - Other - Co-invest. ¹			3		73		76
Total excluding private asset performance fees							296,643 26.0bp

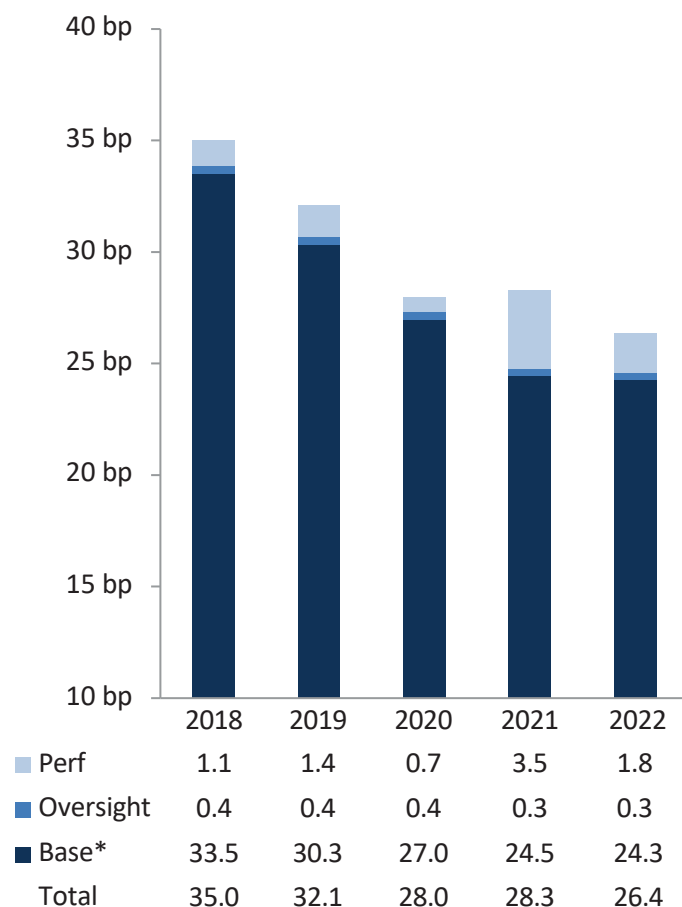
Oversight, custodial and other costs ²		
Oversight of the fund	2,065	
Trustee & custodial	1,550	
Consulting and performance measurement	0	
Audit	78	
Other	0	
Total oversight, custodial & other costs	3,693	0.3bp
Total investment costs (excl. transaction costs & private asset performance fees)	300,337	26.4bp

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 by 8.6 bps, from 35.0 bps in 2018 to 26.4 bps in 2022, primarily because you had a lower cost asset mix.

Trend in cost

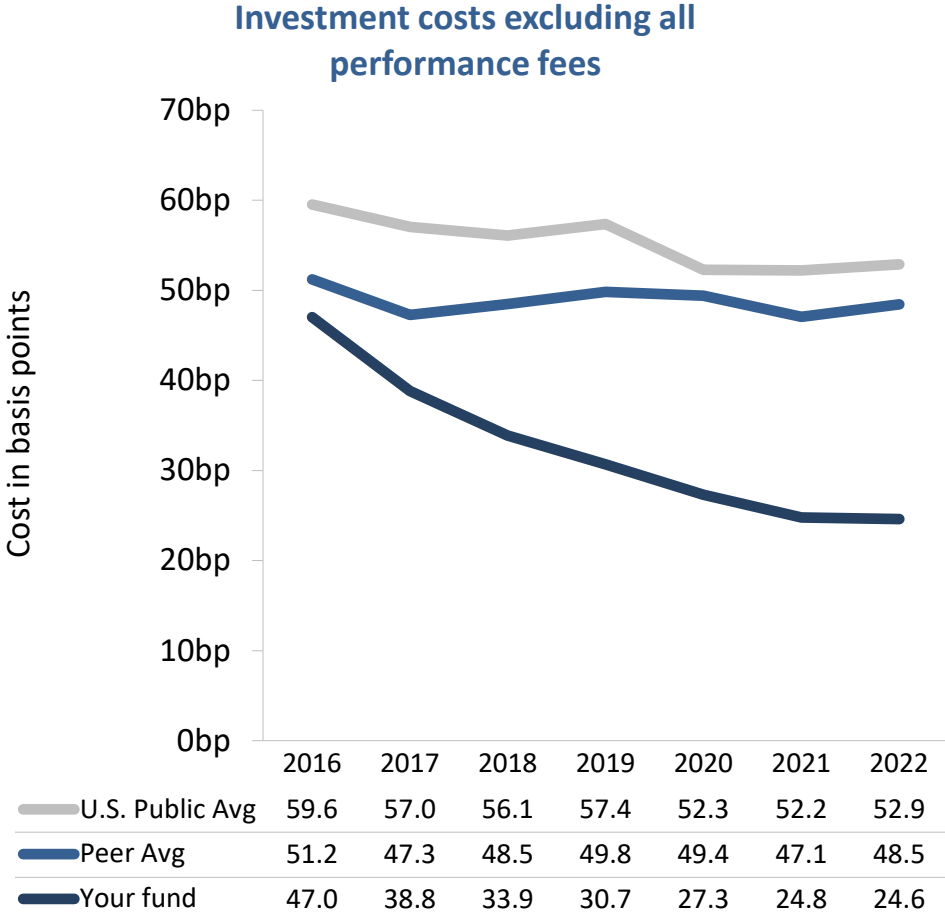
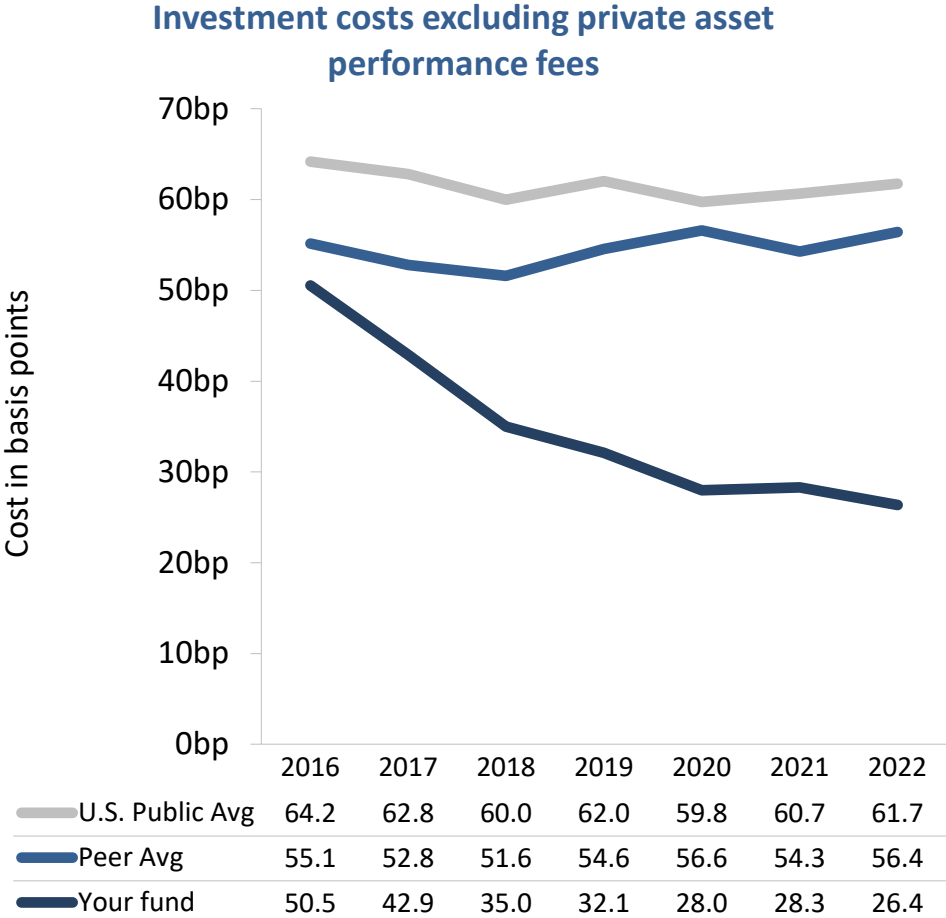


Reasons why your costs decreased by 8.6 bps

			Impact in bps
1. Lower cost asset mix			
• Less Real estate ex-REITs: 2018 9% vs 2022 6%			(2.4)
• Less REITs & Commodities & Infrastructure & Natural resources: 2018 7% vs 2022 4%			(2.0)
• Less Hedge funds & multi-asset: 2018 7% vs 2022 4%			(2.7)
• Less Private equity: 2018 7% vs 2022 5%			(2.3)
• All other mix changes			(1.0)
			<u>(10.4)</u>
2. Higher cost implementation style			0.6
3. Paid more in total for similar investment styles			
	<u>2018 cost</u>	<u>2022 cost</u>	
• Lower Private Equity - Other base fees	86.9 bp	51.1 bp	(0.9)
• Higher Hedge Funds base fees	83.9 bp	101.8 bp	0.5
• Higher LBO base fees	110.1 bp	130.7 bp	0.3
• Higher Private Credit base fees	68.5 bp	80.3 bp	0.3
• Higher Hedge Funds performance fees	18.3 bp	70.1 bp	1.3
• Lower internal investment management costs			(0.2)
• All other differences			(0.2)
			<u>1.1</u>
Total decrease			<u>(8.6)</u>

*Includes fees for managing internal assets and internal costs of monitoring external programs, where allocated.

Your investment cost excluding all performance fees has declined every year since 2016.

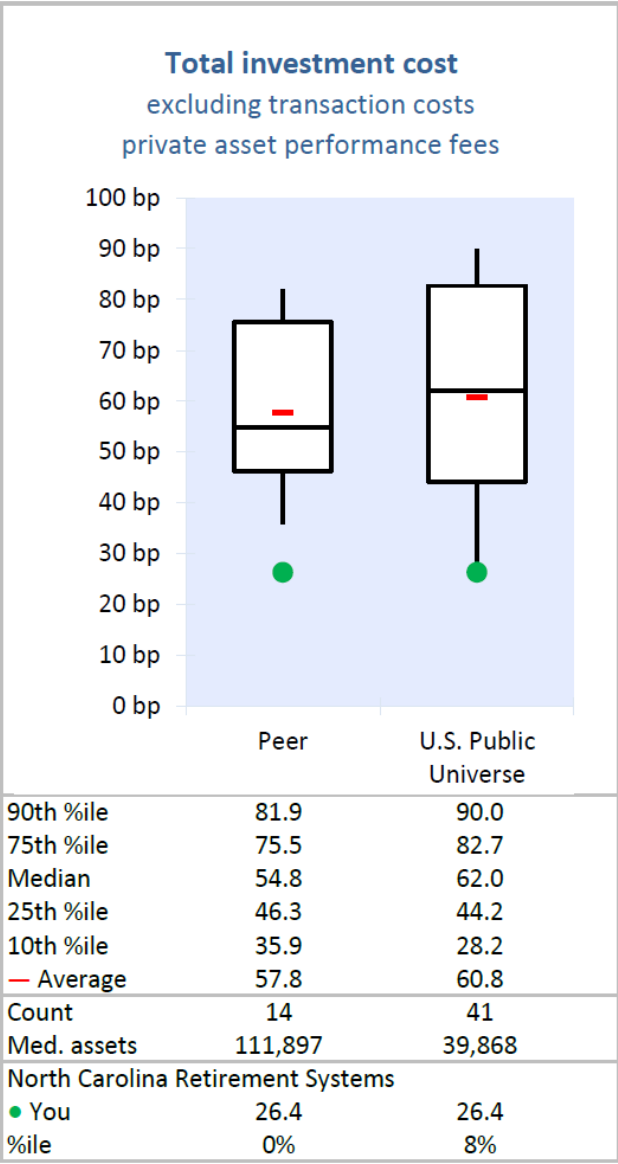
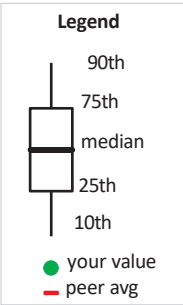


Your total investment cost of 26.4 bps was the lowest of the peers and was substantially below the peer median of 54.8 bps.

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, private equity and private credit. These high cost assets equaled 23% of your assets at the end of 2022 versus a peer average of 35%.
- 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 6.4 basis points in 2022.

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 26.4 bp was below your benchmark cost of 32.8 bp. Thus, your cost savings were 6.4 bp.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	300,337	26.4 bp
Your benchmark cost	373,252	32.8 bp
Your excess cost	(72,916)	(6.4) bp

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

Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• Use of active management vs. lower cost passive	(4,288)	(0.4)
• Use of external management vs. lower cost internal	16,215	1.4
• More LPs as a percentage of external	17,626	1.5
• More fund of funds	3,351	0.3
• Less co-investment as a percentage of LP/Co	8,635	0.8
• Less overlays	(2,433)	(0.2)
	39,105	3.4
2. Paying less than peers for similar services		
• External investment management costs	(97,718)	(8.6)
• Internal investment management costs	(6,106)	(0.5)
• Oversight, custodial & other costs	(8,197)	(0.7)
	(112,021)	(9.8)
Total savings	(72,916)	(6.4)

Your implementation style was 3.4 bps higher cost than the peer average.

Implementation style is the way in which your fund implements asset allocation. Each implementation choice has a cost. Your first choice is how much to implement passively or actively. The table below summarizes your aggregate choices versus peers and their cost impact.

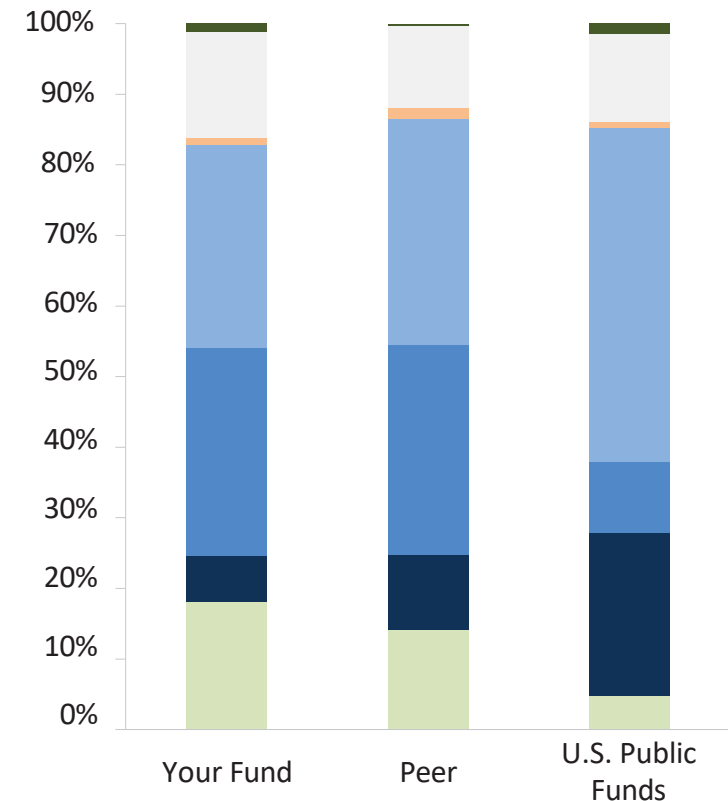
Implementation choices	Impact
Less passive, more active	(0.4) bp ²
More internal as a % of passive	(0.1) bp
More internal as a % of active	1.5 bp ²
Less evergreen % in private assets, excl. PE	1.5 bp
More fund of funds	0.3 bp
Less co-investment as a percentage of LP/Co	0.8 bp
Less overlays	(0.2) bp
Total impact	3.4 bp

1. Implementation style is shown as a % of total fund fee basis because the fee basis is the primary driver of cost for private assets (e.g., new private equity LP commitments increase costs before LP NAV increases). Style weights are based on average holdings. Cash and derivatives are excluded.

The peer and universe style was adjusted to match your asset mix. It equals their average style for each asset class weighted by your fee basis for the asset class. It shows how the average peer would implement your asset mix.

2. Typically, less passive is higher cost. But your mix of passive versus active by asset class decreased your cost. Typically, more internal as a % of active is lower cost. But your mix of internal by asset class increased your cost.

Implementation style¹



Fund of funds	1.2%	0.3%	1.5%
LP	14.9%	11.7%	12.5%
Co-investment	1.1%	1.5%	0.8%
External active	28.7%	32.0%	47.3%
Internal active	29.4%	29.7%	10.1%
External passive	6.6%	10.7%	23.0%
Internal passive	18.1%	14.1%	4.8%

Details of your \$97.718 million savings from paying less for similar services

Cost impact of paying more/-less for similar services

		Your avg holdings (mils)	Cost in bps			Cost/ -Savings
	Style		Your	Peer median	More/ -less	\$000s bps
External asset management		(A)			(B)	(A X B)
Stock - U.S. broad/all ¹	active	1,430	32.2	26.8	5.4	771
Stock - U.S. mid cap	active	1,265	47.6	56.8	-9.1	-1,156
Stock - U.S. small cap	active	1,234	44.2	62.2	-18.0	-2,225
Stock - EAFE	active	3,188	27.1	39.5	-12.4	-3,946
Stock - Emerging	active	807	20.5	53.8	-33.3	-2,686
Stock - ACWI x U.S. ¹	passive	6,057	2.5	3.8	-1.3	-803
Stock - ACWI x U.S.	active	7,360	33.3	37.1	-3.8	-2,789
Stock - Other ³	passive	15	241.7	241.7	0.0	0
Fixed income - Inflation indexed	passive	64	3.9	1.0	2.9	19
Fixed income - Inflation indexed ²	active	1,282	35.3	12.7	22.7	2,904
Commodities ¹	active	288	7.1	42.4	-35.3	-1,015
REITs	active	857	30.2	30.2	0.0	0
Real estate ex-REITs	active	4,273	80.4	77.3	3.1	1,344
Real estate ex-REITs	CO	323	59.4	76.0	-16.5	-535
Real estate ex-REITs	LP	2,368	109.3	133.5	-24.2	-5,738
Real estate ex-REITs	FoF	105	72.7	59.7	13.0	136
Underlying base fees	FoF	105	133.3	129.0	4.3	46
Infrastructure	LP	637	103.4	137.6	-34.3	-2,183
Natural resources	CO	133	22.1	5.4	16.7	222
Natural resources	LP	2,607	79.6	137.6	-58.0	-15,124
Hedge funds	active	2,872	101.8	97.9	3.9	1,111
Top layer perf. fees	active	2,872	70.1	170.0	-99.9	-28,702
Hedge funds	FoF	434	88.9	75.0	14.0	607
Top layer perf. fees ²	FoF	434	0.0	19.0	-19.0	-825
Underlying base fees	FoF	434	79.1	129.0	-49.9	-2,167
Underlying perf. fees	FoF	434	0.0	170.0	-170.0	-7,383
Global TAA ²	active	1,774	12.1	64.3	-52.3	-9,274
Private equity - Diversified	FoF	543	47.0	55.1	-8.1	-439
Underlying base fees	FoF	543	118.5	154.0	-35.5	-1,931
Venture capital	CO	39	3.0	7.0	-4.0	-15
Venture capital	LP	695	166.6	178.9	-12.3	-853
LBO	LP	1,692	130.7	155.0	-24.3	-4,106
Private equity - Other ³	CO	55	13.8	13.8	0.0	0
Private equity - Other ³	LP	2,891	51.1	51.1	0.0	0
Private credit	CO	445	49.7	17.6	32.1	1,429
Private credit	LP	2,937	80.3	122.5	-42.2	-12,408
Total for external management						-97,718 -8.6 bps

Internal asset management

		(A)			(B)	(A X B)
Stock - U.S. large cap	passive	14,676	0.1	0.5	-0.4	-597
Stock - U.S. large cap	active	241	0.8	3.6	-2.8	-67
Stock - U.S. mid cap ¹	passive	2,053	0.1	0.7	-0.6	-117
Fixed income - U.S.	active	27,002	0.5	2.5	-2.0	-5,325
Cash ³	active	17,852	0.5	0.5	0.0	0
Total for internal management						-6,106 -0.5 bp
Oversight, custody and other costs⁴						
Oversight			0.2	0.4	-0.2	
Trustee & custodial			0.1	0.2	0.0	
Consulting			0.0	0.0	0.0	
Audit			0.0	0.0	0.0	
Other			0.0	0.1	-0.1	
Benchmark for oversight, custody, other		113,906	0.3	1.0	-0.7	-8,197 -0.7 bp
Total						-112,021 -9.8 bp

1. Universe median used because peer data was insufficient.

2. Database median are used because peer and universe data were insufficient.

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

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

If your internally managed assets were managed externally and you paid the peer median costs, your costs would have been higher by approximately \$30.4 million or 2.7 bps.

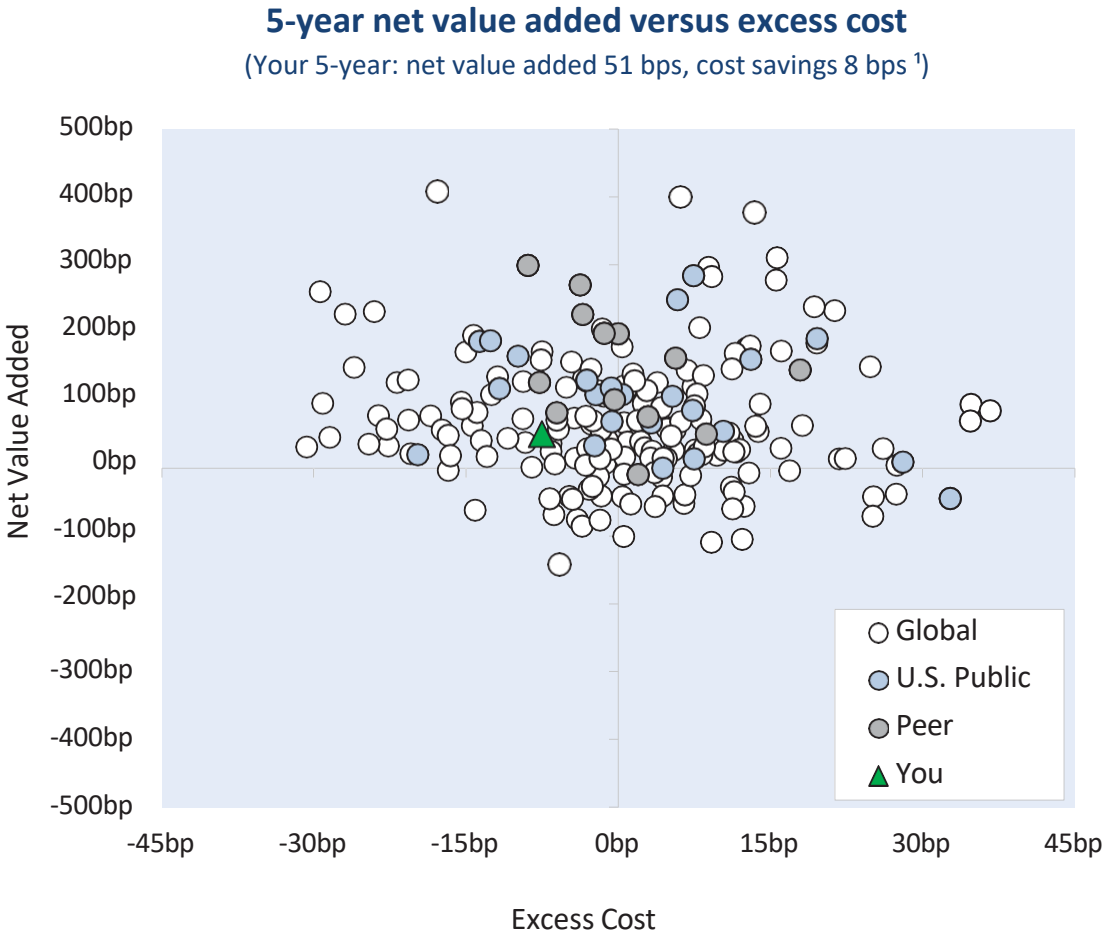
Additional external investment management costs: assuming North Carolina no longer had internal holdings and paid peer median external costs

		North Carolina RS		Peer median external cost (bps)	Cost savings	
	Style	Avg holdings in \$mils	Internal cost (bps)		(bps)	\$000s
		(A)			(B)	(A X B)
Stock - U.S. large cap	passive	14,676	0.1	0.2	(0.1)	(165)
Stock - U.S. large cap	active	241	0.8	28.3	(27.5)	(664)
Stock - U.S. mid cap*	passive	2,053	0.1	1.9	(1.8)	(360)
Fixed income - U.S.	active	27,002	0.5	11.3	(10.8)	(29,250)
Cash	active	17,852	0.5	Excluded	--	--
Total for internal management					(2.7) bp	(30,439)

'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.

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

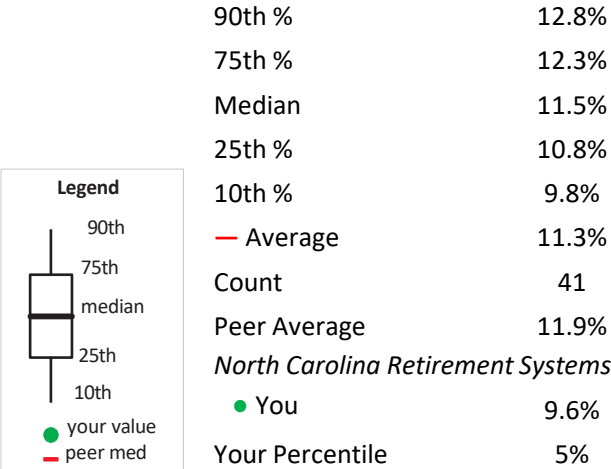


1. Your 5-year savings of 7.5 basis points is the average of your peer-based savings for the past 5 years.

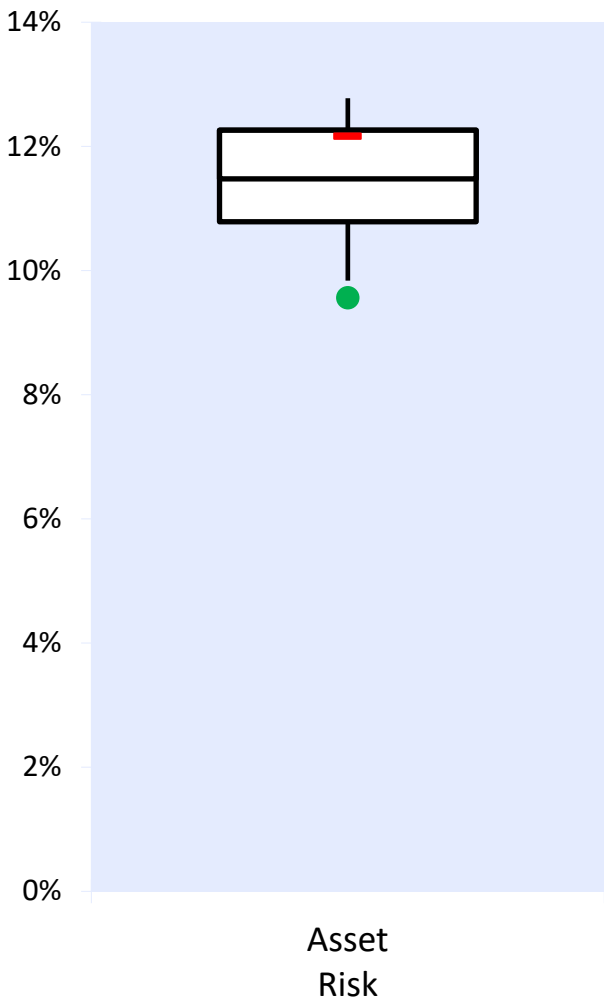
	2022	2021	2020	2019	2018	5-year
Net value added	254.5bp	(310.5) bp	79.5bp	22.0bp	141.0bp	50.8bp
Excess cost	(6.4) bp	(5.0) bp	(7.9) bp	(8.0) bp	(10.3) bp	(7.5) bp

Comparison of risk levels:

Your asset risk of 9.6% was below the U.S. Public median of 11.5%. 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, 2022



Key Takeaways

Returns

- Your 5-year net total return was 4.4%. This was below both the U.S. Public median of 5.9% and the peer median of 6.4%.
- Your 5-year policy return was 3.9%. This was below both the U.S. Public median of 4.7% and the peer median of 4.9%.

Value added

- Your 5-year net value added was 0.5%. This was below both the U.S. Public median of 1.1% and the peer median of 1.4%.

Cost

- Your investment cost of 26.4 bps was below your benchmark cost of 32.8 bps. This suggests that your fund was low cost compared to your peers.
- Your fund was low cost because it paid less than peers for similar services.
- Your costs decreased by 8.6 bps, from 35.0 bps in 2018 to 26.4 bps in 2022, primarily because you had a lower cost asset mix.

Risk

- Your asset risk of 9.6% was below the U.S. Public median of 11.5%.

Thank you



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