

# CEM Investment Benchmarking Analysis for: Pennsylvania Public School Employees' Retirement System (for the 5-year period ending Dec. 31, 2021)

# Key Takeaways

## Returns

- Your 5-year net total return was 10.6%. This was below both the U.S. Public median of 11.2% and the peer median of 11.3%.
- Your 5-year policy return was 9.5%. This was below both the U.S. Public median of 10.7% and the peer median of 10.7%.

## Value added

- Your 5-year net value added was 1.2%. This was above both the U.S. Public median of 0.7% and the peer median of 0.8%.

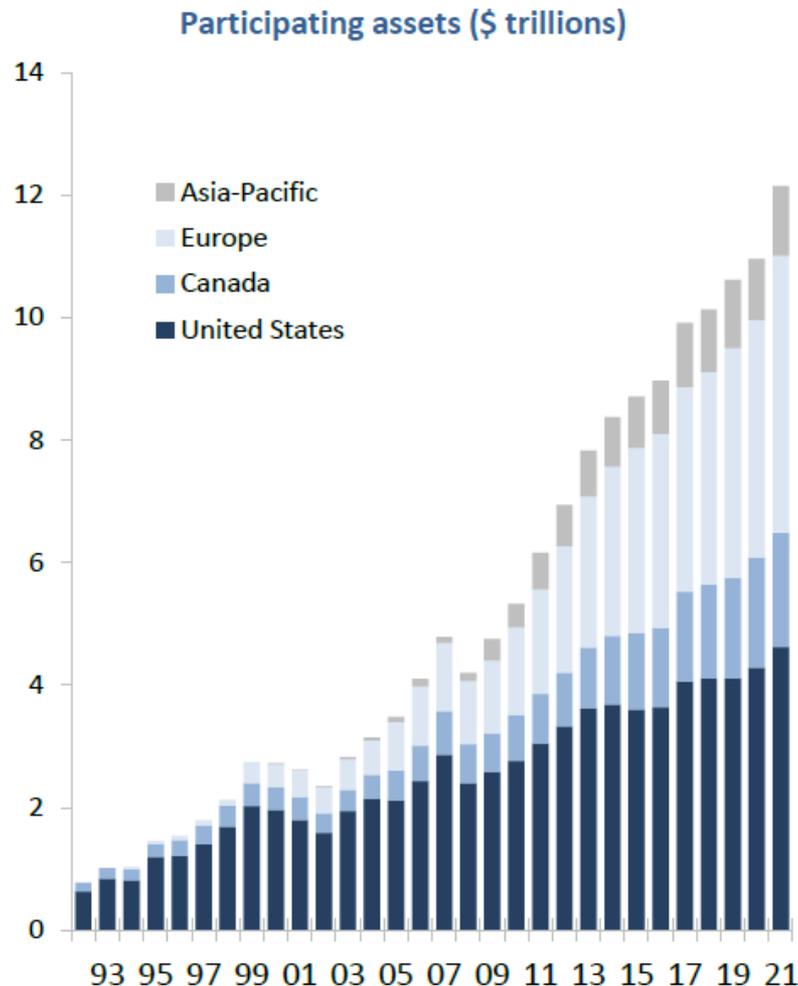
## Cost

- Your investment cost of 92.9 bps was above your benchmark cost of 78.6 bps.
- Your fund was above benchmark cost primarily because it paid more than peers for some services, most notably higher performance fees in Stock ACWI ex US and Emerging Markets equity asset classes.
- Your costs decreased by 7.6 bps, from 100.5 bps in 2017 to 92.9 bps in 2021, because you had a lower cost asset mix and had a lower cost implementation style. This was partly offset by paying more in total for similar investment styles.

## This benchmarking report compares your cost and return performance to the 290 funds in CEM's extensive pension database.

- 147 U.S. pension funds participate. The median U.S. fund had assets of \$13.2 billion and the average U.S. fund had assets of \$31.4 billion. Total participating U.S. assets were \$4.6 trillion.
- 68 Canadian funds participate with assets totaling \$1.9 trillion.
- 66 European funds participate with aggregate assets of \$4.5 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.
- 6 Asia-Pacific funds participate with aggregate assets of \$1.1 trillion. Included are funds from Australia, New Zealand, China and South Korea.
- 3 funds from other regions participate.

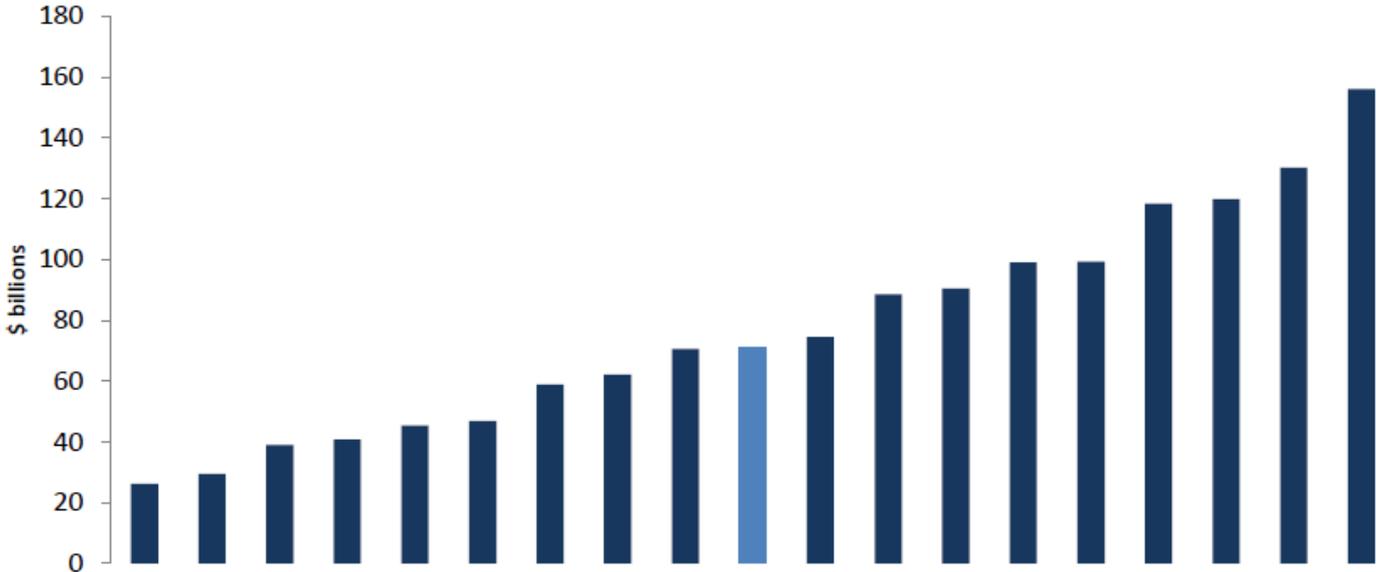
The most meaningful comparisons for your returns and value added are to the U.S. Public universe, which consists of 46 funds.



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

## Peer group for Pennsylvania Public School Employees Retirement System

- 19 U.S. Public sponsors from \$26.2 billion to \$156.1 billion
- Median size of \$70.9 billion versus your \$70.9 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.

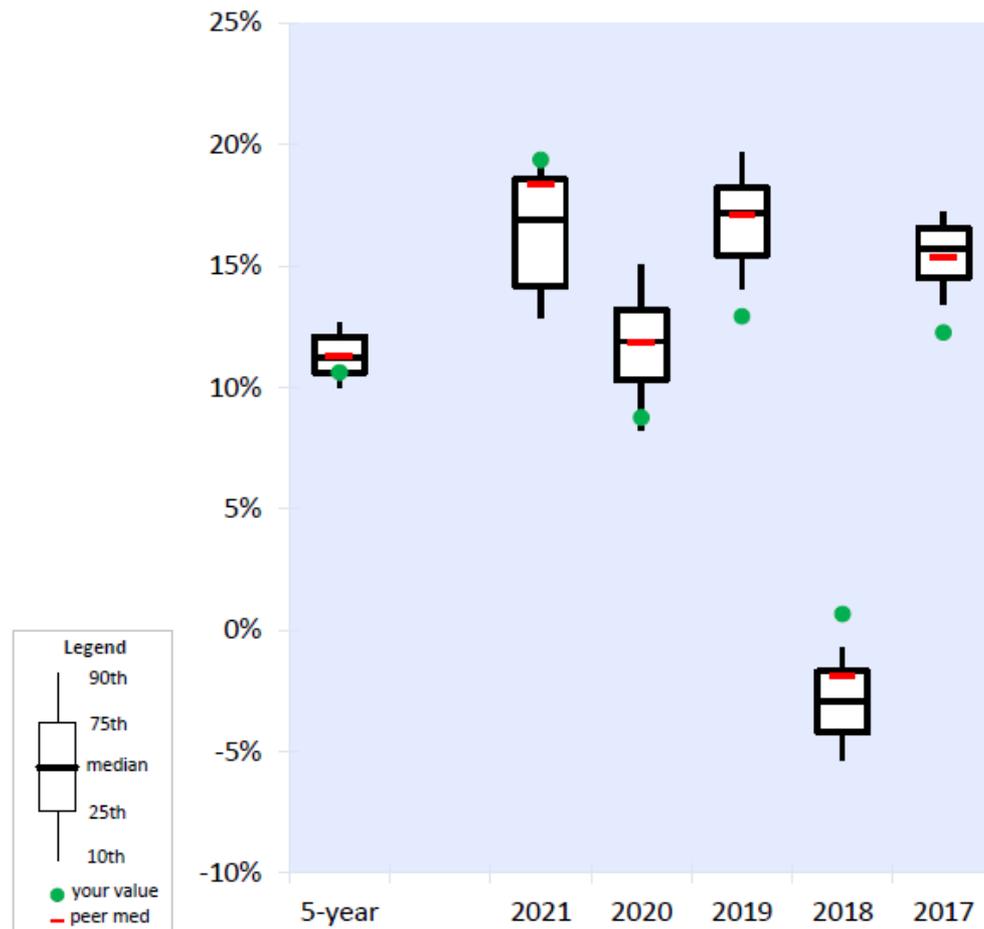
## Your 5-year net total return of 10.6% was below both the U.S. Public median of 11.2% and the peer median of 11.3%.

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	10.6%
- Policy return	9.5%
= Net value added	1.2%

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).

### U.S. Public net total returns - quartile rankings



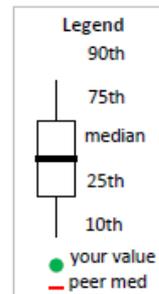
## Your 5-year policy return of 9.5% was below both the U.S. Public median of 10.7% and the peer median of 10.7%.

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

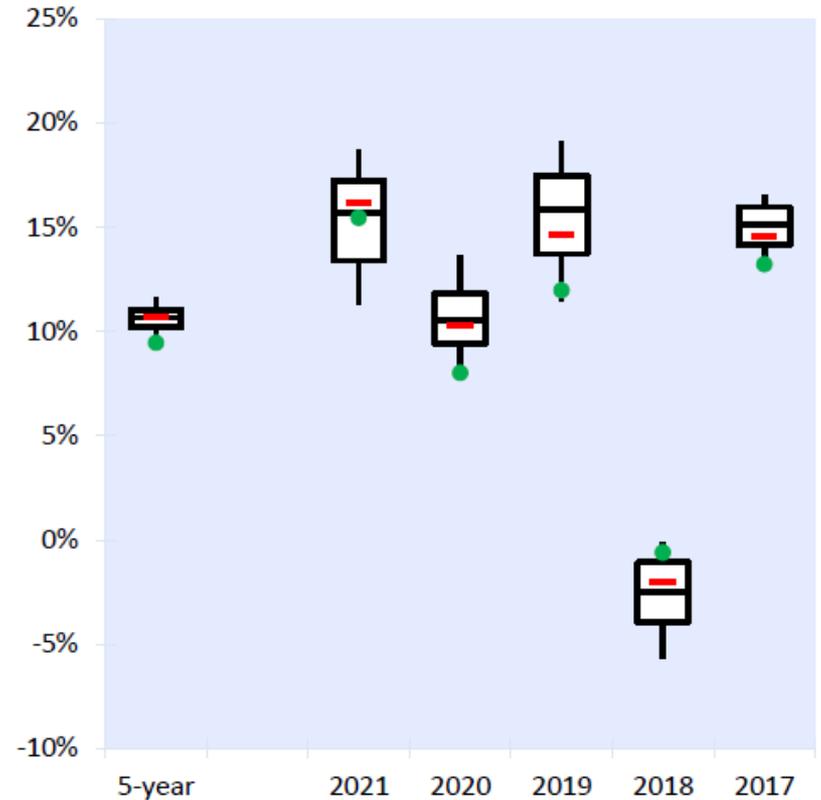
Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- 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.



### U.S. Public policy returns - quartile rankings



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 10.2%, 0.7% higher than your adjusted 5-year policy return of 9.5%. Mirroring this, your 5-year total fund net value added would be 0.7% lower.

## Your 5-year policy return of 9.5% was below the U.S. Public median of 10.7% primarily because of:

- The negative impact of your lower relative weight in Stocks, one of the better performing asset classes of the past 5 years (your 18% average weight versus 47% for the U.S. Public universe).

	5-year average policy mix <sup>1</sup>			5-year benchmark return	
	Your Fund	U.S. Publ Avg.	More/ Less	Your Fund	U.S. Publ Avg.
Stock - U.S.	7%	19%	-12%	17.5%	17.5%
Stock - EAFE	0%	5%	-5%	n/a <sup>3</sup>	9.8%
Stock - Emerging	1%	2%	-1%	10.1%	10.2%
Stock - ACWI x U.S.	10%	7%	3%	9.9%	10.0%
Stock - Global	0%	12%	-12%	n/a <sup>3</sup>	14.5%
Other Stock	0%	3%	-3%	n/a <sup>3</sup>	n/a <sup>3</sup>
<b>Total Stock</b>	<b>18%</b>	<b>47%</b>	<b>-28%</b>	<b>12.5%</b>	<b>14.2%</b>
Fixed income - U.S.	4%	17%	-14%	3.6%	3.6%
Fixed income - Long bonds	6%	2%	4%	6.5%	6.6%
Fixed inc. - Inflation indexed	12%	3%	9%	5.9%	5.3%
Other Fixed Income <sup>2</sup>	6%	5%	1%	n/a <sup>3</sup>	n/a <sup>3</sup>
<b>Total Fixed Income</b>	<b>27%</b>	<b>28%</b>	<b>-1%</b>	<b>5.4%</b>	<b>4.2%</b>
Cash	-10%	-1%	-9%	1.2%	1.2%
Hedge funds	10%	3%	7%	6.9%	4.8%
Risk parity	5%	1%	4%	n/a <sup>3</sup>	9.5%
Commodities	9%	1%	8%	4.0%	3.4%
Infrastructure	2%	1%	1%	9.1%	8.5%
Real estate incl. REITs	10%	9%	2%	9.2%	7.5%
Other Real Assets <sup>2</sup>	4%	1%	3%	n/a <sup>3</sup>	n/a <sup>3</sup>
Private equity	15%	9%	6%	13.6%	14.3%
Private debt	10%	2%	8%	5.7%	6.2%
<b>Total</b>	<b>100%</b>	<b>100%</b>			

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

2. Other fixed income includes: Fixed income - U.S. gov't and Fixed income - High yield. Other real assets include: Natural resources.

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 1.2%.

Net value added equals total net return minus policy return.

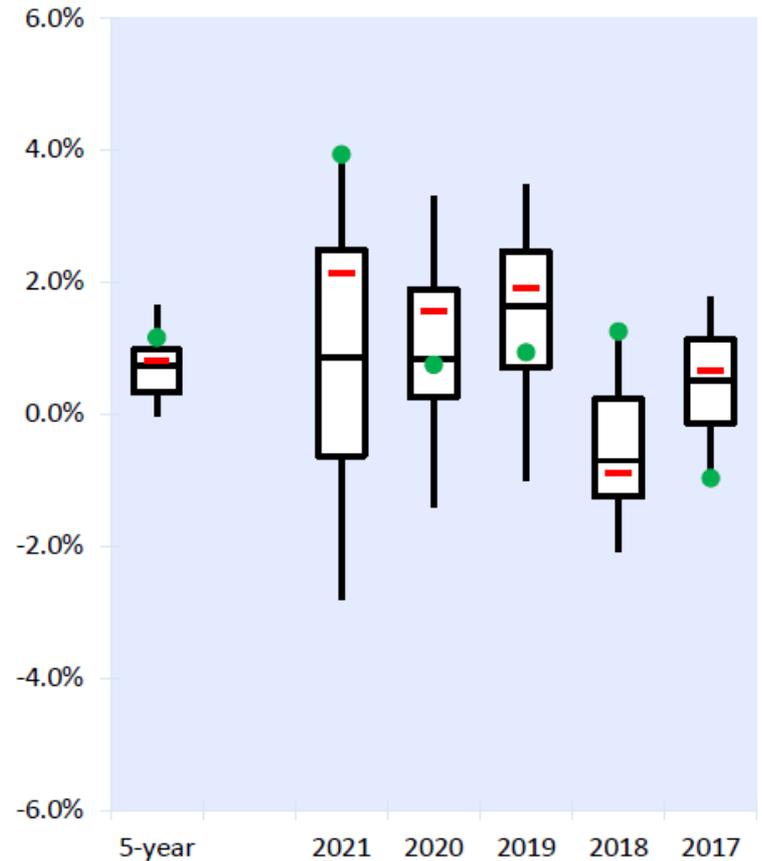
### Value added for Pennsylvania Public School Employees Retirement System

Year	Net return	Policy return	Net value added
2021	19.4%	15.4%	3.9%
2020	8.8%	8.0%	0.7%
2019	12.9%	12.0%	0.9%
2018	0.7%	-0.6%	1.3%
2017	12.3%	13.2%	-1.0%
5-Year	10.6%	9.5%	1.2%

Your 5-year net value added of 1.2% compares to a median of 0.8% for your peers and 0.7% for the U.S. Public universe.

Your 1.2% 5-year value added translates into approximately \$4.1 billion of cumulative value added over 5 years.

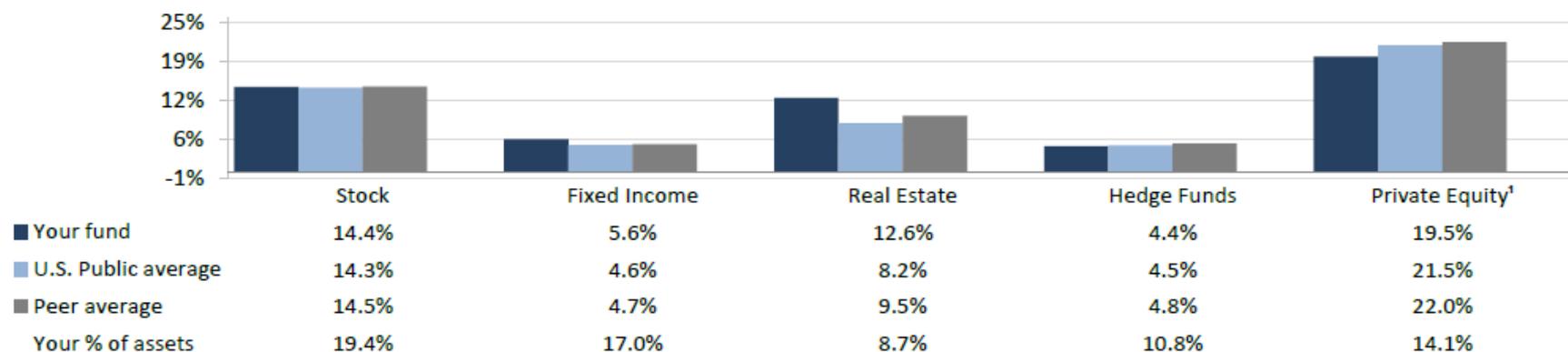
### U.S. Public net value added - quartile rankings



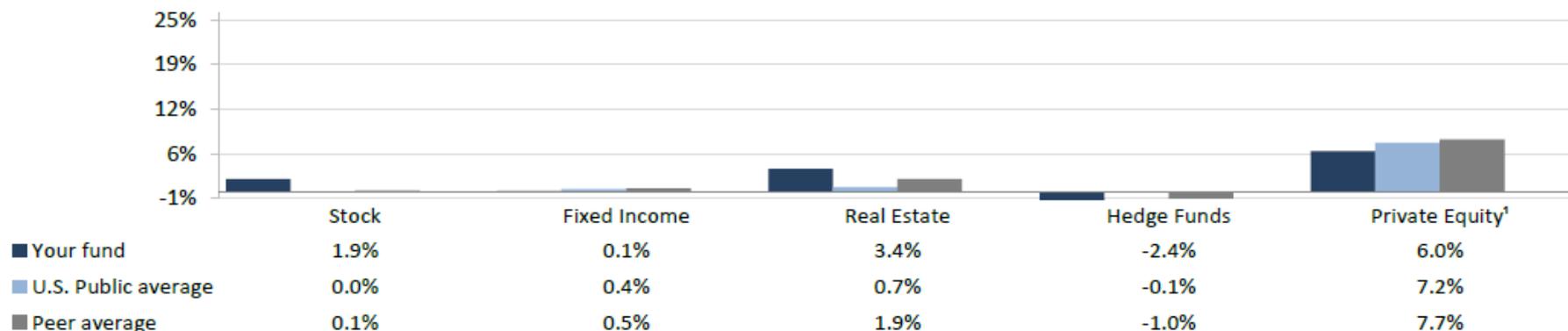
To enable fairer comparisons, the value added for each participant including your fund was adjusted to reflect private equity benchmarks based on lagged, investable public market indices. Prior to this adjustment, your fund's 5-year total fund net value added was 0.4%.

# 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 0.5%.

## Your investment costs, excluding private asset performance fees, were \$658.7 million or 92.9 basis points in 2021.

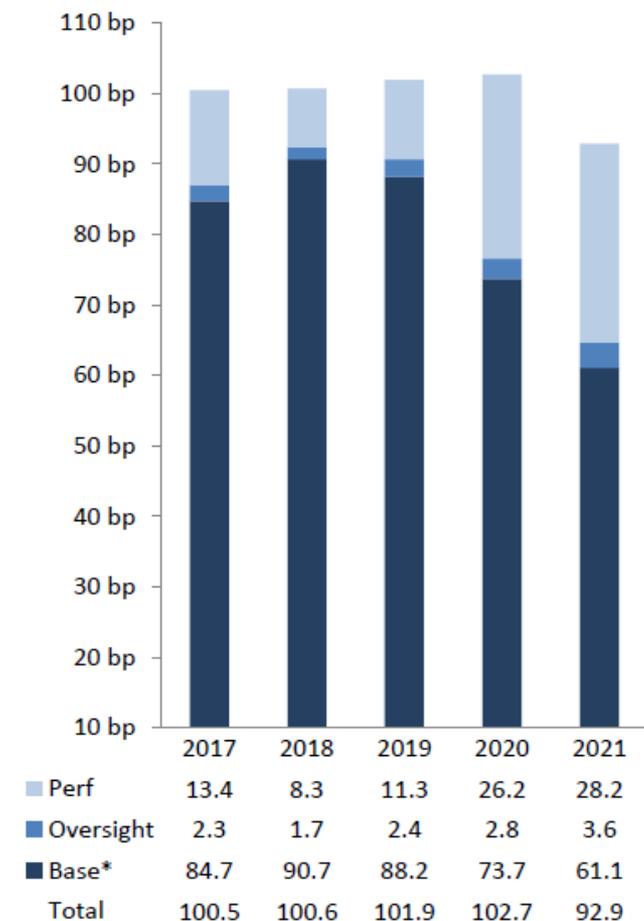
Asset management costs by asset class and style (\$000s)	Internal Management			External Management			Total
	Passive	Active	Overseeing of external	Passive fees	Active base fees	Perform. fees <sup>2</sup>	
Stock - U.S. large cap	481						481
Stock - U.S. mid cap	98						98
Stock - U.S. small cap	100						100
Stock - Emerging <sup>1</sup>	199		110	304	2,580	20,929	24,122
Stock - ACWI x U.S.	392		350		23,974	81,657	106,374
Stock - Other			46				46
Fixed income - U.S.		321					321
Fixed income - Emerging			46		2,092		2,138
Fixed income - Inflation indexed	292	164					456
Fixed income - High yield		104	59		4,398	10,415	14,976
Fixed income - Long bonds	345						345
Fixed income - Other			46		23,268		23,314
Cash		350	46		517	807	1,720
Commodities			233		8,288	20,311	28,833
REITs			46		2,123		2,169
Infrastructure - LP <sup>2</sup>			201		10,854		11,055
Infrastructure - Co-invest. <sup>2</sup>			35				35
Natural resources - LP <sup>2</sup>			166		5,202		5,368
Other listed real assets <sup>2</sup>		176					176
Other real assets <sup>2</sup>			71		662		733
Real estate ex-REITs - LP <sup>2</sup>			1,089		51,053		52,142
Real estate ex-REITs - Co-invest. <sup>2</sup>			15				15
Hedge funds - External active			649		83,190	65,973	149,813
Private equity - Diversified - LP <sup>2</sup>			1,450		139,537		140,987
Private equity - Diversified - Co-invest. <sup>2</sup>			180				180
Private credit - LP <sup>2</sup>			714		64,528		65,242
Private credit - Co-invest. <sup>2</sup>			161				161
Derivatives/Overlays	199	335	136	984			1,654
<b>Total excluding private asset performance fees</b>							<b>633,308</b>
							<b>89.3bp</b>
<b>Oversight, custodial and other costs <sup>3</sup></b>							
Oversight of the fund							11,301
Trustee & custodial							2,073
Consulting and performance measurement							3,810
Audit							117
Other							8,132
<b>Total oversight, custodial &amp; other costs</b>							<b>25,432</b>
							<b>3.6bp</b>
<b>Total investment costs (excl. transaction costs &amp; private asset performance fees)</b>							<b>658,740</b>
							<b>92.9bp</b>

### Footnotes

1. Default base fees were added: Emerging - External passive 7 bp. 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 by 7.6 bps, from 100.5 bps in 2017 to 92.9 bps in 2021, because you had a lower cost asset mix and had a lower cost implementation style. This was partly offset by paying more in total for similar investment styles.

Trend in cost



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

Reasons why your costs decreased by 7.6 bps

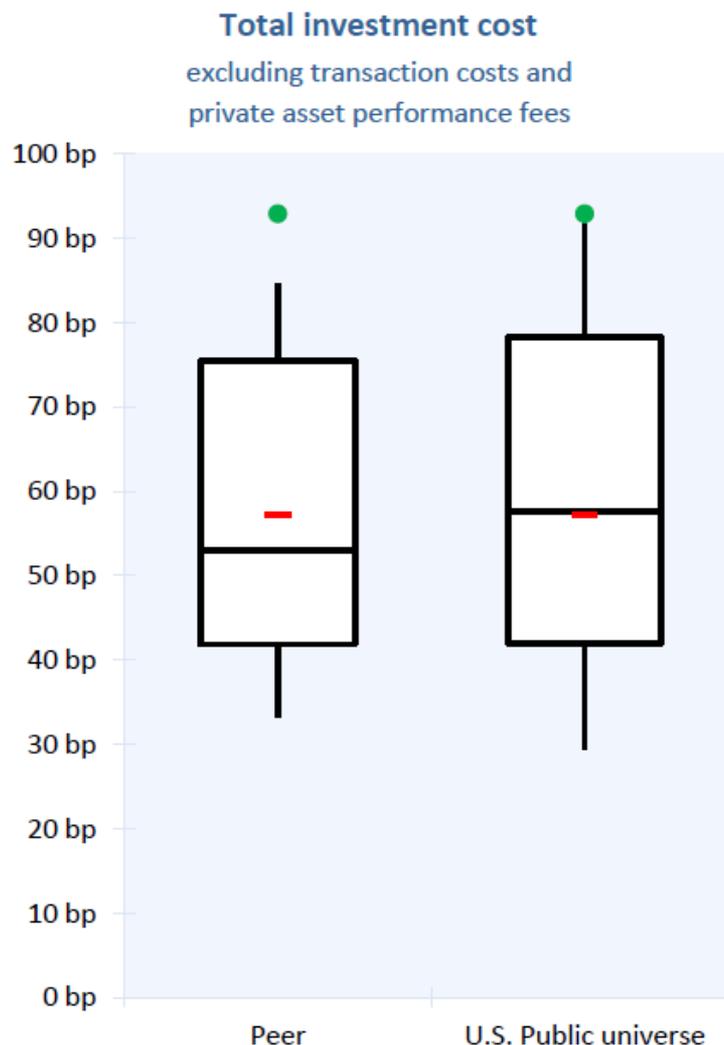
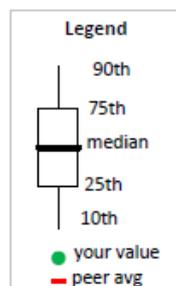
	Impact in bps		
<b>1. Lower cost asset mix</b>			
• More Stock: 2017 24% vs 2021 26%		1.3	
• Mix of Fixed income		(2.7)	
• Less REITs, Commodities, Infra., Nat. res., Other real assets: 2017 11% vs 2021 8%		(1.3)	
• Less Hedge funds & multi-asset: 2017 21% vs 2021 8%		(12.8)	
• Less Private equity: 2017 18% vs 2021 17%		(2.1)	
• Less Private debt: 2017 9% vs 2021 9%		(1.0)	
• All other mix changes		0.1	
		<b>(18.5)</b>	
<b>2. Lower cost implementation style</b>			
• Less passive, more active		0.5	
• More internal as a % of active		(4.0)	
• Less evergreen, more LP & FoF		0.5	
• More co-investment as a % of LP/Co		(1.4)	
		<b>(4.5)</b>	
<b>3. Paid more in total for similar investment styles</b>			
	<u>2017 cost</u>	<u>2021 cost</u>	
• Higher external active ACWI X U.S. Stock costs	62.3 bp	204.3 bp	10.4
• Lower Private Equity LP base fees	154.3 bp	126.9 bp	(4.3)
• Lower Private Credit base fees	145.4 bp	110.2 bp	(2.9)
• Higher external active Emerging Stock costs	90.0 bp	410.9 bp	2.6
• Higher Hedge Funds performance fees	66.5 bp	120.2 bp	4.2
• Lower internal investment management costs			(0.5)
• Higher oversight, custodial & other costs	2.3 bp	3.6 bp	1.3
• All other differences			4.7
			<b>15.4</b>
<b>Total decrease</b>			<b>(7.6)</b>

## Your total investment cost of 92.9 bps was above the peer median of 53.1 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 40% of your assets at the end of 2021 versus a peer average of 30%.
- 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 above benchmark cost by 14.3 basis points in 2021.

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 92.9 bp was above your benchmark cost of 78.6 bp. Thus, your excess cost was 14.3 bp.

### Your cost versus benchmark

	\$000s	basis points
Your total investment cost	658,740	92.9 bp
Your benchmark cost	557,472	78.6 bp
Your excess cost	101,268	14.3 bp

**Your fund was above benchmark cost primarily because it paid more than peers for some services, most notably higher performance fees in Stock ACWI ex US and Emerging Markets equity asset classes.**

### Explanation of your cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• Less active management, more lower cost passive	(11,387)	(1.6)
• Less external management, more lower cost internal	(1,796)	(0.3)
• More LPs as a percentage of external	25,367	3.6
• Less fund of funds	(6,660)	(0.9)
• Less co-investment as a percentage of LP/Co	2,054	0.3
• Less overlays	(2,723)	(0.4)
	<u>4,856</u>	<u>0.7</u>
2. Paying more than peers for some services		
• ACWI x U.S. & Emerging equities*	108,338	15.3
• Other external investment management costs	(27,720)	(3.9)
• Internal investment management costs	(2,282)	(0.3)
• Oversight, custodial & other costs	18,076	2.5
	<u>96,412</u>	<u>13.6</u>
<b>Total excess cost</b>	<b>101,268</b>	<b>14.3</b>

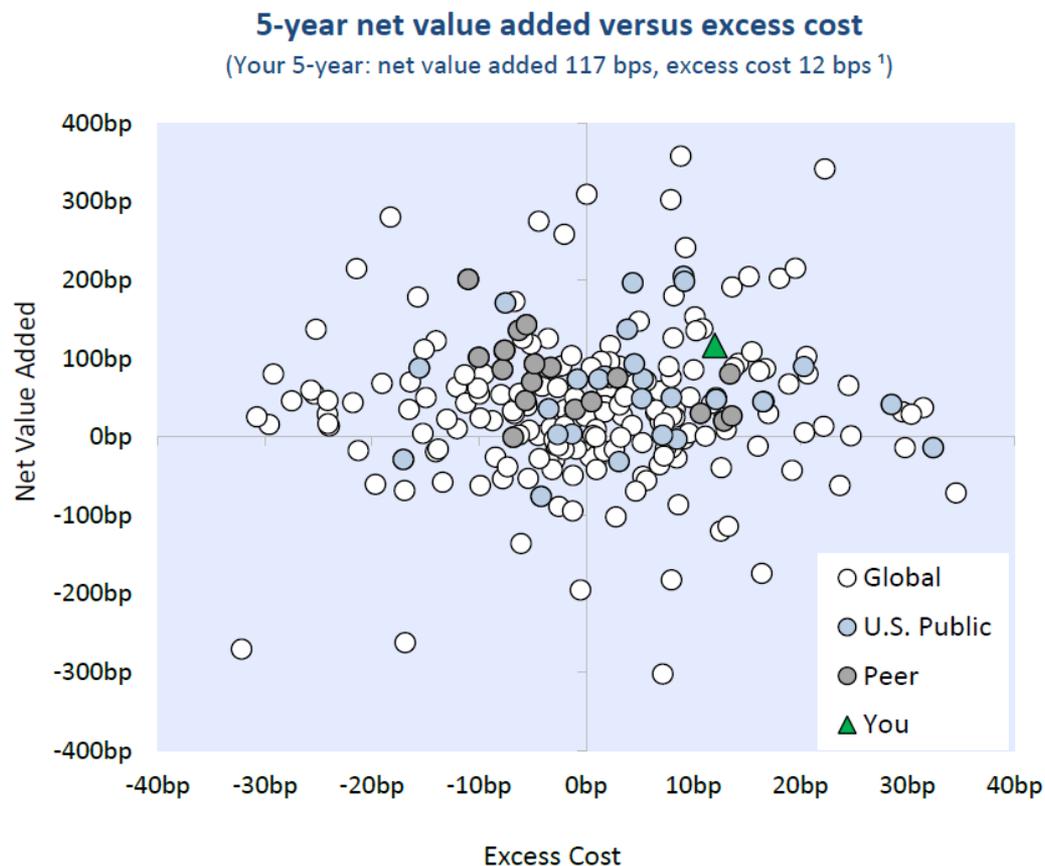
\*You pay performance fees on these public equity asset classes, most of your peers do not. Your 5-year NVA for ACWI x U.S. and Emerging equities were 3.0% and 6.8%, compared to the peer medians of 0.8% and 0.0%.

## The table below summarizes why your fund is 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	2021 Holding %	5-year Net value added
Stock - U.S. large cap	(1,501)	61	(1,440)	(3.0) bp	7%	(40) bp
Stock - U.S. mid cap	(916)	34	(882)	(10.8) bp	1%	(231) bp
Stock - U.S. small cap	(2,680)	(46)	(2,726)	(32.8) bp	1%	(219) bp
Stock - Emerging	(1,878)	20,169	18,291	129.5 bp	2%	683 bp
Stock - ACWI x U.S.	(2,511)	86,797	84,286	94.8 bp	13%	296 bp
Stock - Other	--	--	Excluded	Excluded	0%	--
Fixed income - U.S.	(232)	80	(153)	(2.1) bp	1%	55 bp
Fixed income - Emerging	195	746	941	22.3 bp	1%	197 bp
Fixed income - Inflation indexed	(549)	(233)	(782)	(1.7) bp	6%	(70) bp
Fixed income - High yield	(20)	10,553	10,533	68.1 bp	2%	64 bp
Fixed income - Long bonds	(2,603)	(150)	(2,753)	(6.2) bp	6%	(128) bp
Fixed income - Other	--	--	Excluded	Excluded	2%	61 bp
Commodities	1,529	22,792	24,320	185.7 bp	2%	256 bp
REITs	333	1,259	1,592	68.5 bp	0%	248 bp
Other listed real assets	(5,120)	(596)	(5,716)	(37.1) bp	2%	--
Real estate ex-REITs	26,424	(26,046)	378	0.6 bp	7%	341 bp
Infrastructure	4,995	(10,756)	(5,761)	(37.1) bp	1%	244 bp
Natural resources	897	92	989	26.4 bp	0%	--
Other real assets	--	--	Excluded	Excluded	1%	(205) bp
Hedge funds	(6,535)	12,890	6,355	11.6 bp	8%	(245) bp
Private equity - Diversified	(9,546)	(31,551)	(41,096)	(33.3) bp	17%	547 bp
Private credit	7,297	(7,759)	(462)	(0.8) bp	7%	273 bp
Derivatives and overlays	(2,723)	0	(2,723)	(0.4) bp	6%	--
Oversight, custodial & other	n/a	18,076	18,076	2.5 bp	--	--
<b>Total</b>	<b>4,856</b>	<b>96,412</b>	<b>101,268</b>	<b>14.3 bp</b>	<b>100%</b>	<b>117 bp</b>

Your fund achieved a 5-year net value added of 117 bps and excess cost of 12 bps on the cost effectiveness chart.



1. Your 5-year excess cost of 12.0 basis points is the average of your peer-based excess cost for the past 5 years.

	2021	2020	2019	2018	2017	5-year
Net value added	393.3bp	74.7bp	93.9bp	139.0bp	(107.9) bp	116.8bp
Excess cost	14.3bp	20.6bp	8.6bp	11.9bp	4.7bp	12.0bp