

Montana Board of Investments
Investment Benchmarking Analysis - Summary of Results
For the 5 year period ending December 31, 2023



Key Takeaways

Returns

- Your 5-year net total return was 9.4%. This was above both the U.S. Public median of 8.9% and the peer median of 8.6%.
- Your 5-year policy return was 8.5%. This was above both the U.S. Public median of 7.7% and the peer median of 7.5%.

Implementation impact

- Your 5-year implementation impact was 0.9%. This was below both the U.S. Public median of 1.2% and the peer median of 1.3%.

Cost

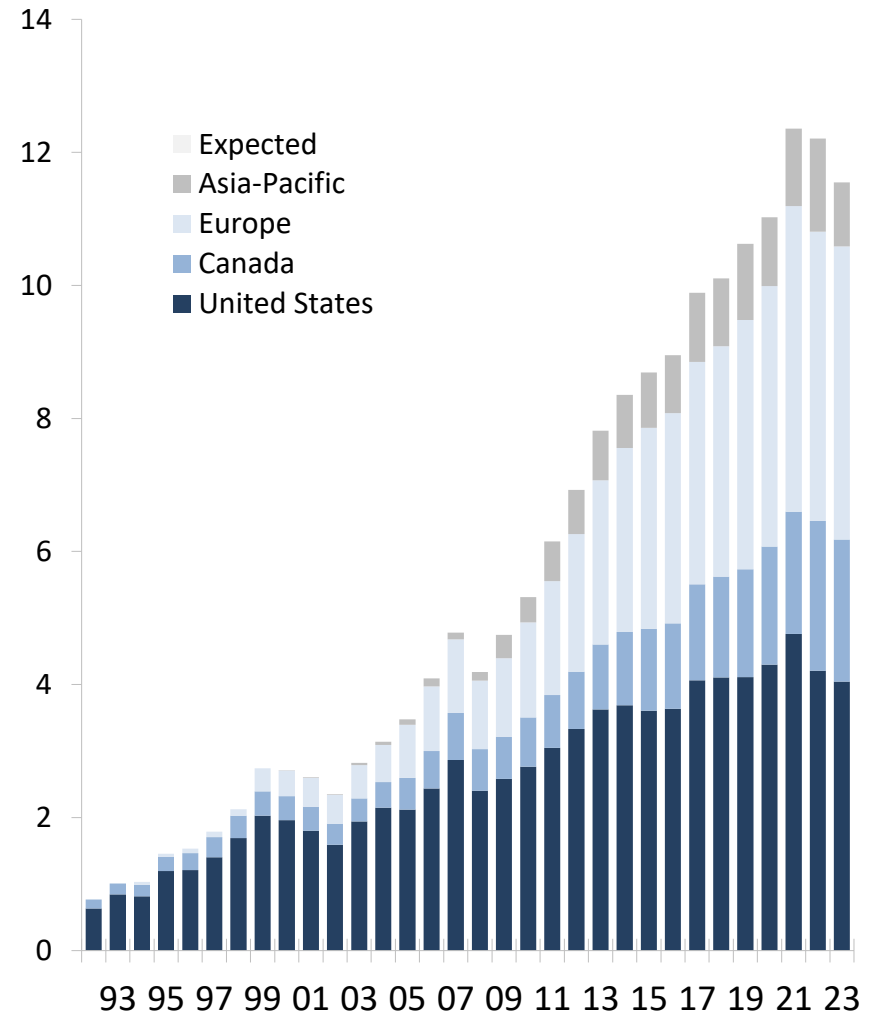
- Your investment cost of 49.6 bps was above your benchmark cost of 44.8 bps.
- Your fund was above benchmark cost because it paid more than peers for some services.
- Despite being 4.8 bps above benchmark cost, you delivered a five-year implementation impact of 86.4 bps.

This benchmarking report compares your cost and performance to the 269 funds in CEM's extensive pension database.

- 140 U.S. pension funds participate. The median U.S. fund had assets of \$9.3 billion and the average U.S. fund had assets of \$28.9 billion. Total participating U.S. assets were \$4.0 trillion.
- 63 Canadian funds participate with assets totaling \$2.1 trillion.
- 58 European funds participate with aggregate assets of \$4.4 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the UK.
- 4 Asia-Pacific funds participate with aggregate assets of \$960.4 billion. Included are funds from Australia, New Zealand, China and South Korea.
- 4 funds from other regions participate.

The most meaningful comparisons for your returns and implementation impacts are to the U.S. Public universe, which consists of 38 funds. The U.S. Public universe assets totaled \$2.8 trillion and the median fund had assets of \$32.9 billion.

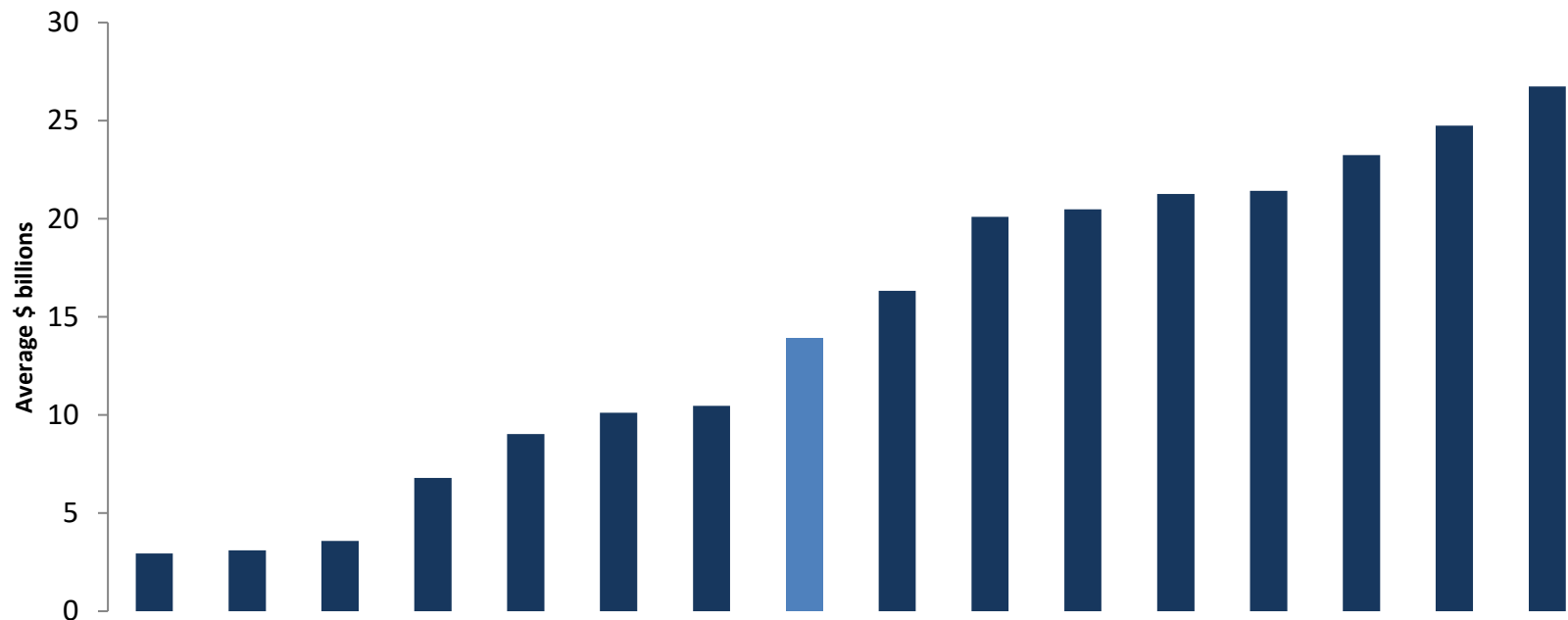
Participating assets (\$ trillions)



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

Peer group for Montana Board of Investments

- 16 U.S. sponsors from \$2.9 billion to \$26.7 billion
- Median size of \$15.1 billion versus your \$13.9 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, 2022 cost data was used as a proxy for 2023.

Your 5-year net total return of 9.4% was above both the U.S. Public median of 8.9% and the peer median of 8.6%.

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 implementation impact.

	Your 5-year
Net total fund return	9.4%
- Policy return	8.5%
= Implementation impact	0.9%

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 8.5% was above both the U.S. Public median of 7.7% and the peer median of 7.5%.

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

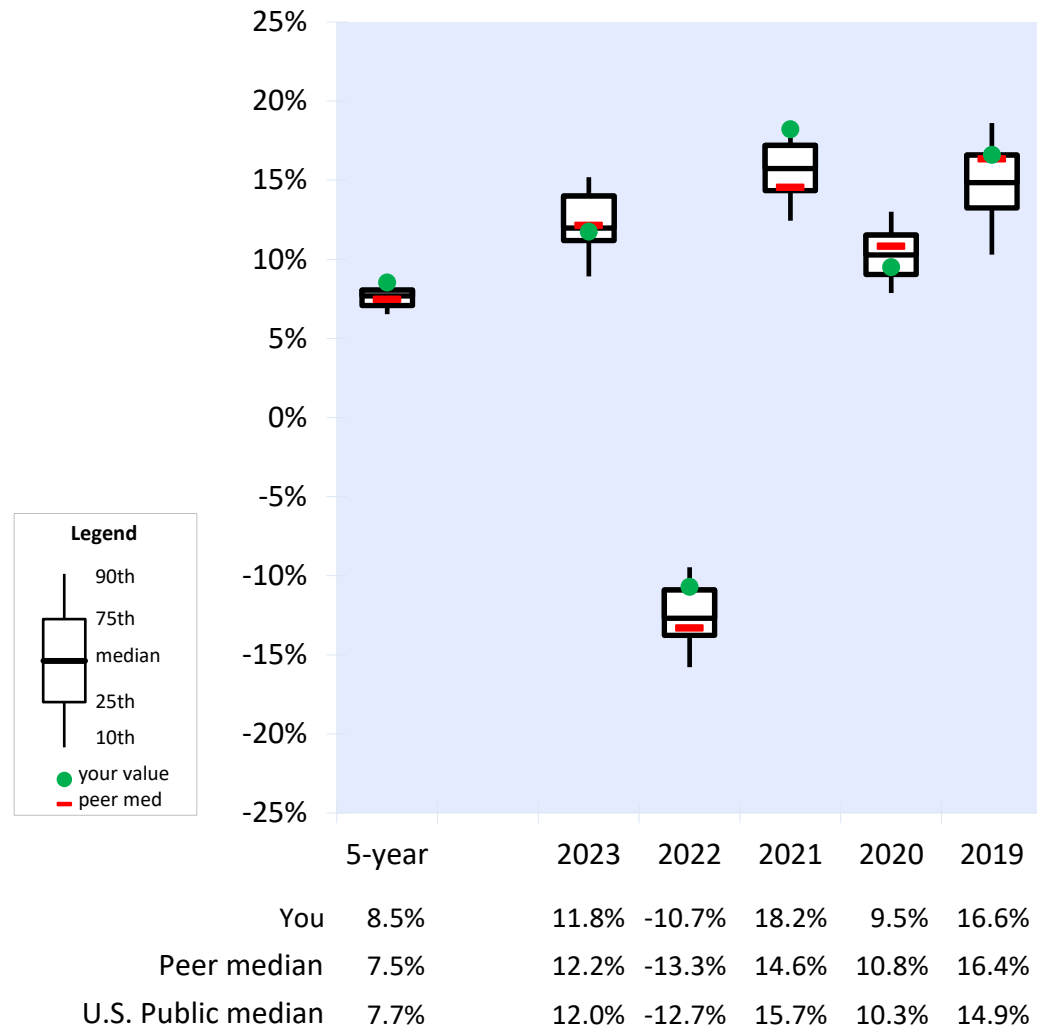
Having a higher or lower relative policy return is not necessarily good or bad. Your policy return reflects your investment policy, which should reflect your:

- 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 9.2%, 0.7% higher than your adjusted 5-year policy return of 8.5%. Mirroring this, your 5-year total fund implementation impact would be 0.7% lower.

U.S. Public policy returns - quartile rankings



Your 5-year policy return of 8.5% was above the U.S. Public median of 7.7% primarily because of:

- The positive impact of your higher weight and better benchmark return in U.S. Stock, one of the better performing asset classes of the past five years (your 30% 5-year average weight versus a U.S. Public average of 18%).
- Your higher benchmark returns in total fixed income, primarily driven by your higher allocation to high yield (your 4% 5-year average weight versus a U.S. Public average of 2%).

	5-year average policy mix ¹			5-year benchmark return	
	Your Fund	U.S. Publ Avg.	More/ Less	Your Fund	U.S. Publ Avg.
U.S. Stock	30%	18%	12%	15.4%	15.0%
EAFE/Global/Emerging	17%	29%	-11%	n/a ³	n/a ³
Total Stock	47%	47%	1%	12.3%	11.7%
U.S. Bonds	17%	16%	0%	1.1%	1.3%
Inflation Indexed Bonds	1%	3%	-3%	n/a ³	2.6%
High Yield Bonds	4%	2%	2%	5.4%	5.0%
Fixed income - Emerging	1%	1%	0%	n/a ³	1.5%
Fixed income - Global	0%	1%	-1%	n/a ³	2.2%
Cash	3%	-1%	4%	1.9%	1.9%
Other Fixed Income ²	0%	2%	-2%	n/a ³	n/a ³
Total Fixed Income	25%	25%	0%	2.0%	1.5%
Hedge funds	0%	3%	-3%	n/a ³	4.1%
Real estate incl. REITs	9%	9%	0%	5.1%	5.2%
Other Real Assets ²	5%	3%	1%	n/a ³	n/a ³
Private equity	12%	11%	1%	4.0%	4.0%
Private debt	3%	2%	0%	n/a ³	6.6%
Total	100%	100%			

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

2. Other fixed income includes: fixed income - long bonds. Other real assets include: Commodities, Natural resources and 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.

Implementation impact is the difference between total net return and policy return. Your 5-year implementation impact of 0.9% compares to a peer median of 1.3% and a U.S. Public median of 1.2%.

Implementation impact for Montana Board of Investments

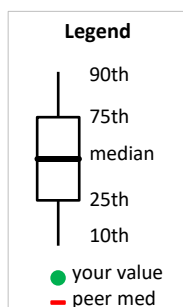
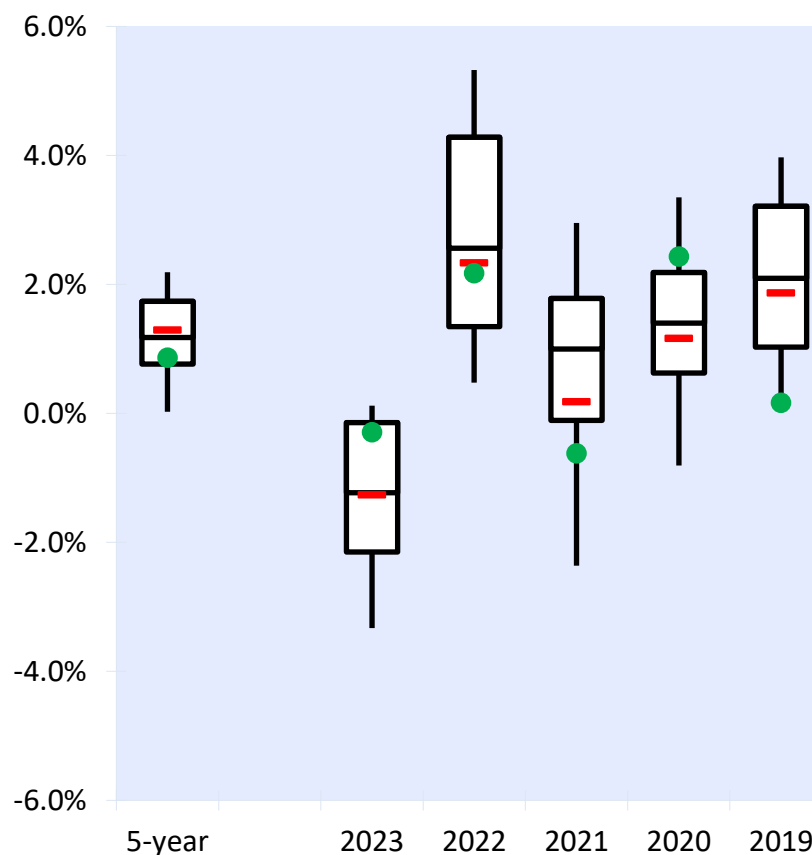
Year	Net return	Policy return	Impl. impact
2023	11.5%	11.8%	-0.3%
2022	-8.5%	-10.7%	2.2%
2021	17.6%	18.2%	-0.6%
2020	11.9%	9.5%	2.4%
2019	16.8%	16.6%	0.2%
5-Year	9.4%	8.5%	0.9%

Implementation typically has a modest impact on total fund returns. Implementation impacts are mainly due to:

- Differences in asset class benchmarks across funds.
- Differences between actual holdings and policy weights for asset classes. These differences may be due to tactical asset allocation or rebalancing policies.
- Net return relative to benchmark returns within asset classes.

To enable fairer comparisons, the implementation impact 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 implementation impact was 0.2%.

U.S. Public implementation impact - quartile rankings



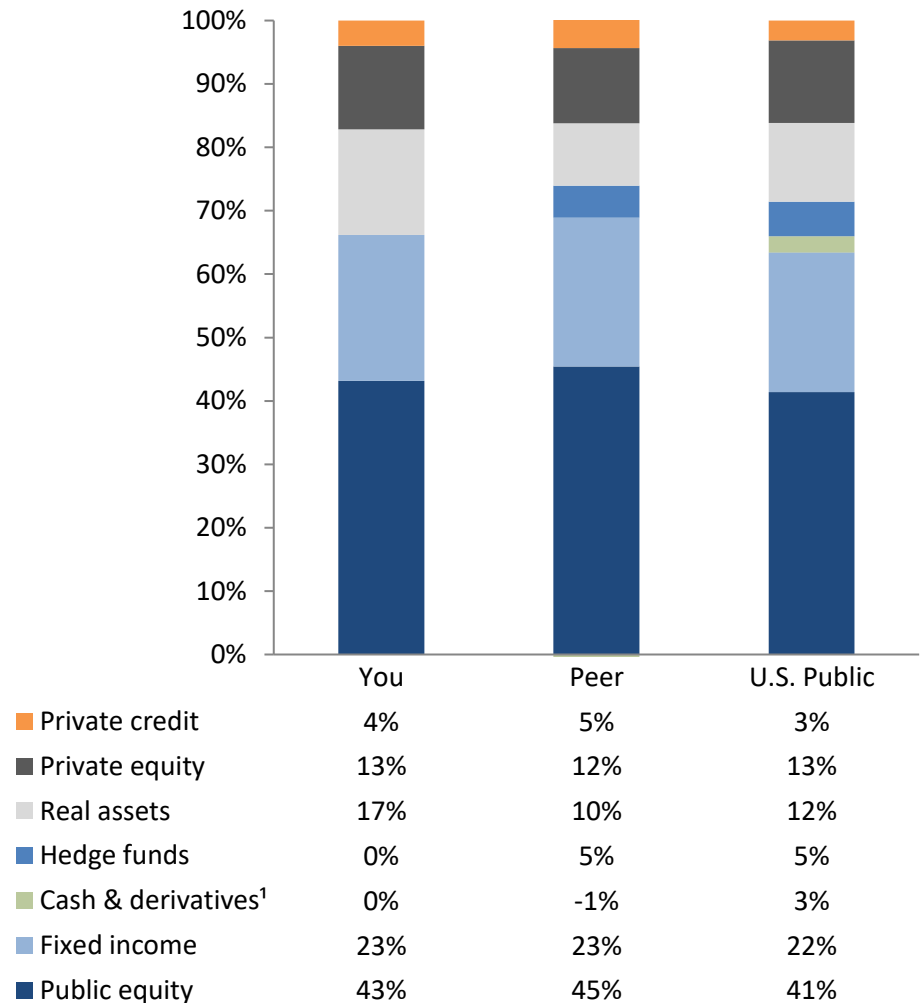
You	0.9%	-0.3%	2.2%	-0.6%	2.4%	0.2%
Peer median	1.3%	-1.3%	2.3%	0.2%	1.2%	1.9%
U.S. Public median	1.2%	-1.2%	2.6%	1.0%	1.4%	2.1%

High-cost assets equaled 34% of your assets at the end of 2023 versus a peer average of 32%.

Alternative asset classes, such as, real estate (excl. REITs), infrastructure, hedge funds, private equity and private credit are typically higher cost asset classes than public asset classes such as public equity and fixed income. You had a combined public market allocation of 66% at the end of 2023 versus a peer average of 70%.

Your alternative asset classes represent 34% of your assets, but 78% of your total costs.

2023 Actual asset allocation



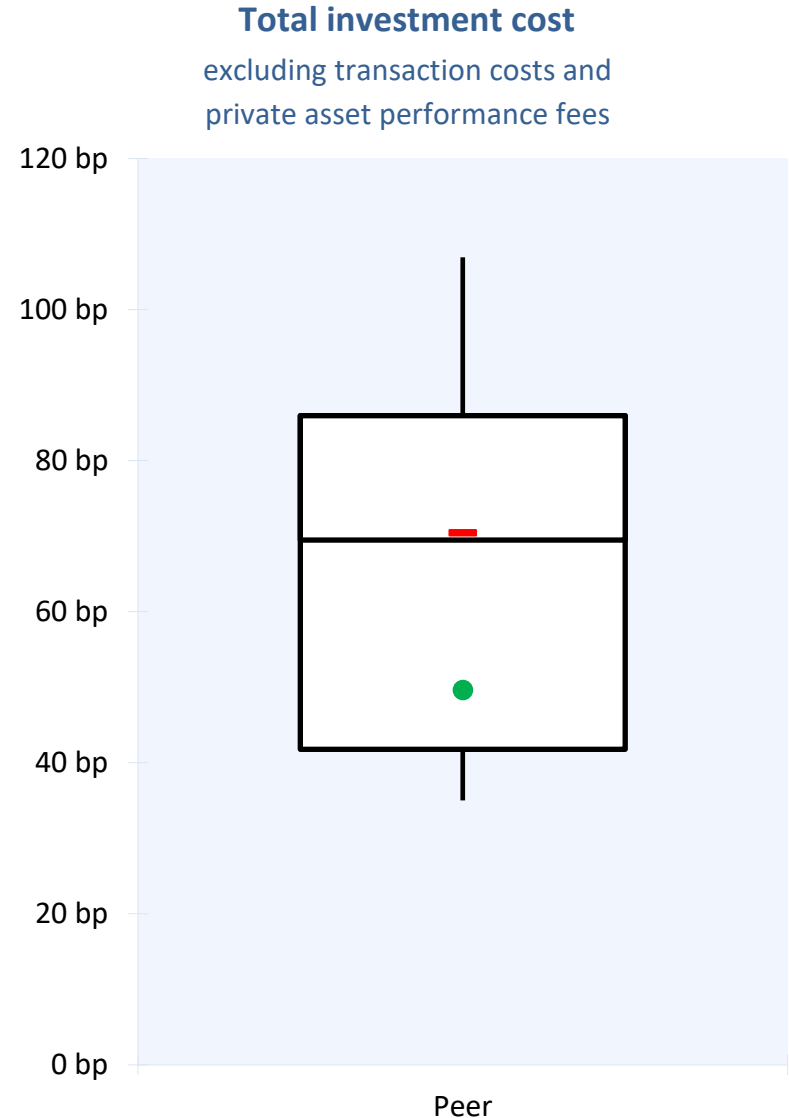
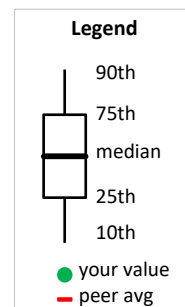
1. Negative allocation indicates the use of leverage.

Before adjusting for asset mix differences, your total investment cost of 49.6 bps was below the peer median of 69.5 bps.

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

- Asset mix - private asset classes are generally more expensive than public asset classes.
- 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 4.8 basis points in 2023.

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 49.6 bp was above your benchmark cost of 44.8 bp. Thus, your excess cost was 4.8 bp.

In the U.S. public universe, roughly 34% are less than 10% different than their benchmark. Roughly 29% are 10-20% different than benchmark, and the remaining 37% are greater than 20% different than benchmark. You are roughly 10% higher cost than your benchmark.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	68,907	49.6 bp
Your benchmark cost	62,226	44.8 bp
Your excess cost	6,681	4.8 bp

Your fund was above benchmark cost because it paid more than peers for some services.

Explanation of your cost status

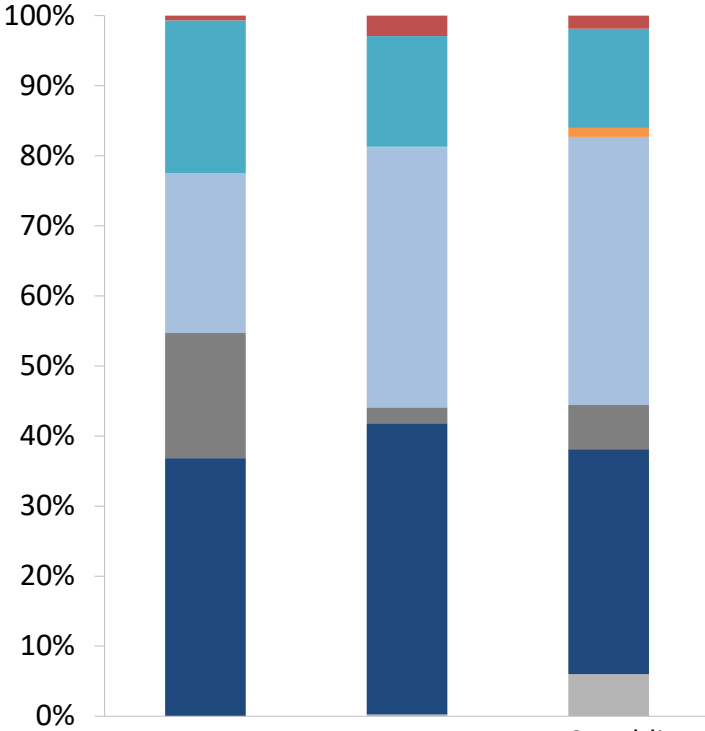
	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• More active management, less lower cost passive	361	0.3
• Less external management, more lower cost internal	(1,814)	(1.3)
• More LPs as a percentage of external	2,033	1.5
• Less fund of funds	(1,756)	(1.3)
• Less co-investment as a percentage of LP/Co	178	0.1
• Less overlays	(646)	(0.5)
	<u>(1,644)</u>	<u>(1.2)</u>
2. Paying more than peers for some services		
• External investment management costs	9,236	6.7
• Internal investment management costs	(198)	(0.1)
• Oversight, custodial & other costs	(714)	(0.5)
	<u>8,325</u>	<u>6.0</u>
Total excess cost	6,681	4.8

Your implementation style was 1.2 bps lower 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
More active, less passive	0.3 bp
Less internal as a % of passive	0.0 bp
More internal as a % of active	(1.3) bp
More LPs as a % of external	1.5 bp
Less fund of funds	(1.3) bp
Less co-investment as a percentage of LP/Co	0.1 bp
Less overlays	(0.5) bp
Total impact	(1.2) bp

Implementation style¹



	You	Peer	U.S. Public
Fund of funds	0.7%	2.9%	1.9%
LP/Value add	21.8%	15.8%	14.2%
Co-investment	0.0%	0.1%	1.3%
External active	22.9%	37.1%	38.3%
Internal active	17.8%	2.2%	6.3%
External passive	36.9%	41.6%	32.1%
Internal passive	0.0%	0.3%	6.0%

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.

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.

Key takeaways

Returns

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Implementation impact

- Your 5-year implementation impact was 0.9%. This was below both the U.S. Public median of 1.2% and the peer median of 1.3%.

Cost and cost effectiveness

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