

# Montana Board of Investments

## CEM Benchmarking Results

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

- 140 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 \$20.0 billion. Total participating U.S. assets were \$2.8 trillion.

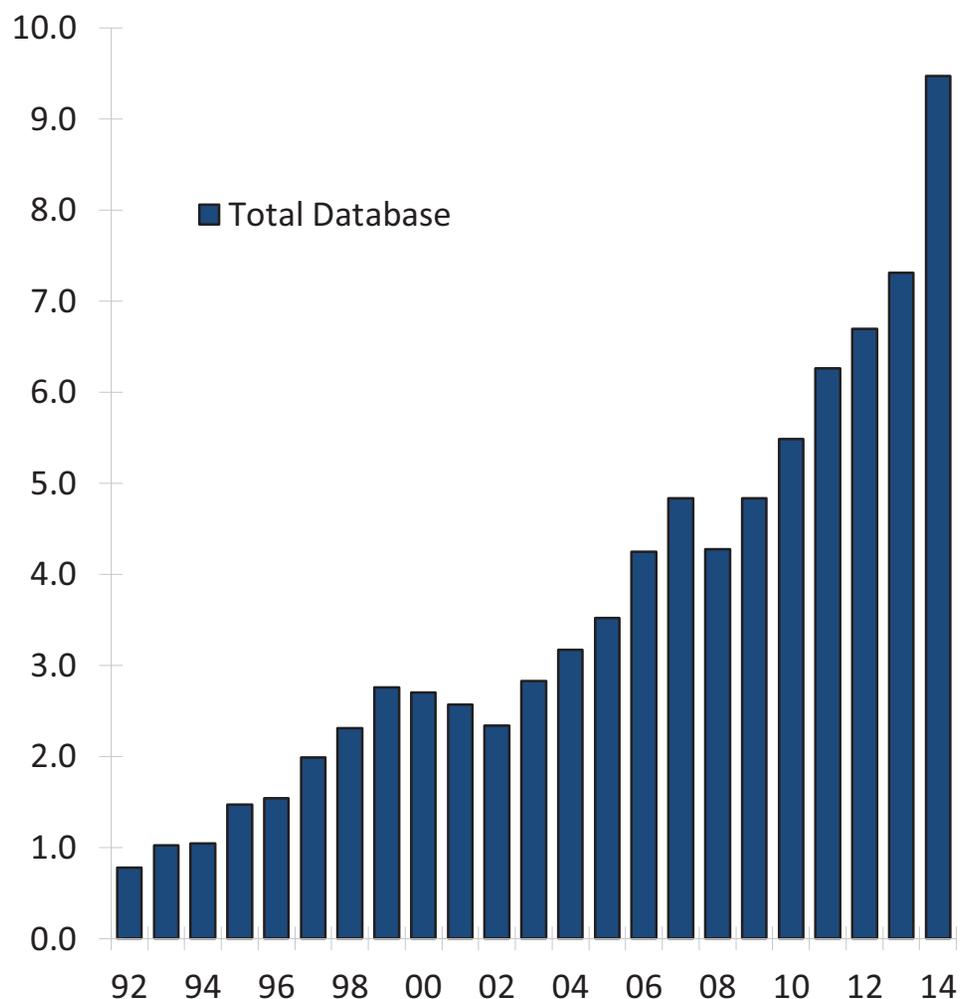
- 73 Canadian funds participate with assets totaling \$622 billion.

- 36 European funds participate with aggregate assets of \$1.8 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 \$697 billion. 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)

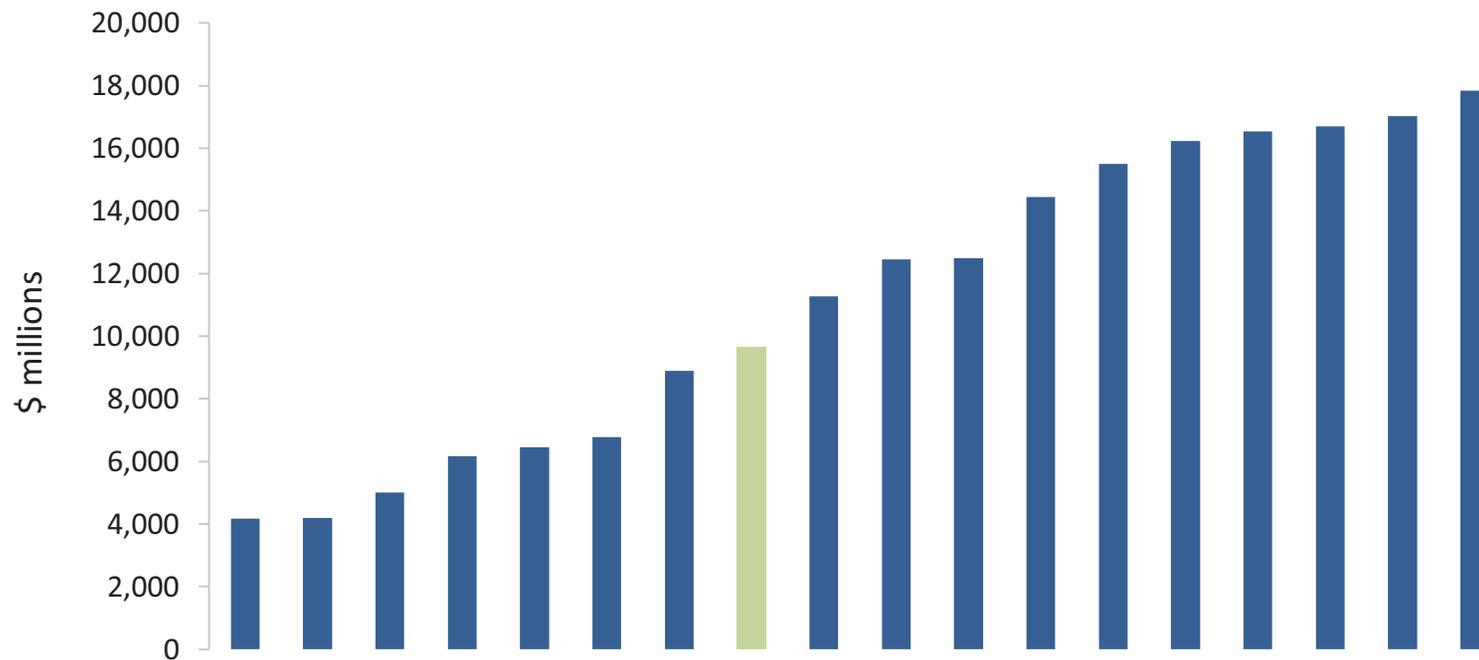


\* 2014 reflects both received and expected data.

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

## Peer group for Montana Board of Investments

- 18 U.S. public sponsors from \$4.2 billion to \$17.8 billion
- Median size of \$11.9 billion versus your \$9.6 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? Asset mix is the most important driver of total returns. What was the impact of your policy asset mix decisions?

## 2. Implementation impact

How does your implementation impact your total returns?

## 3. Costs

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

## 4. Cost effectiveness

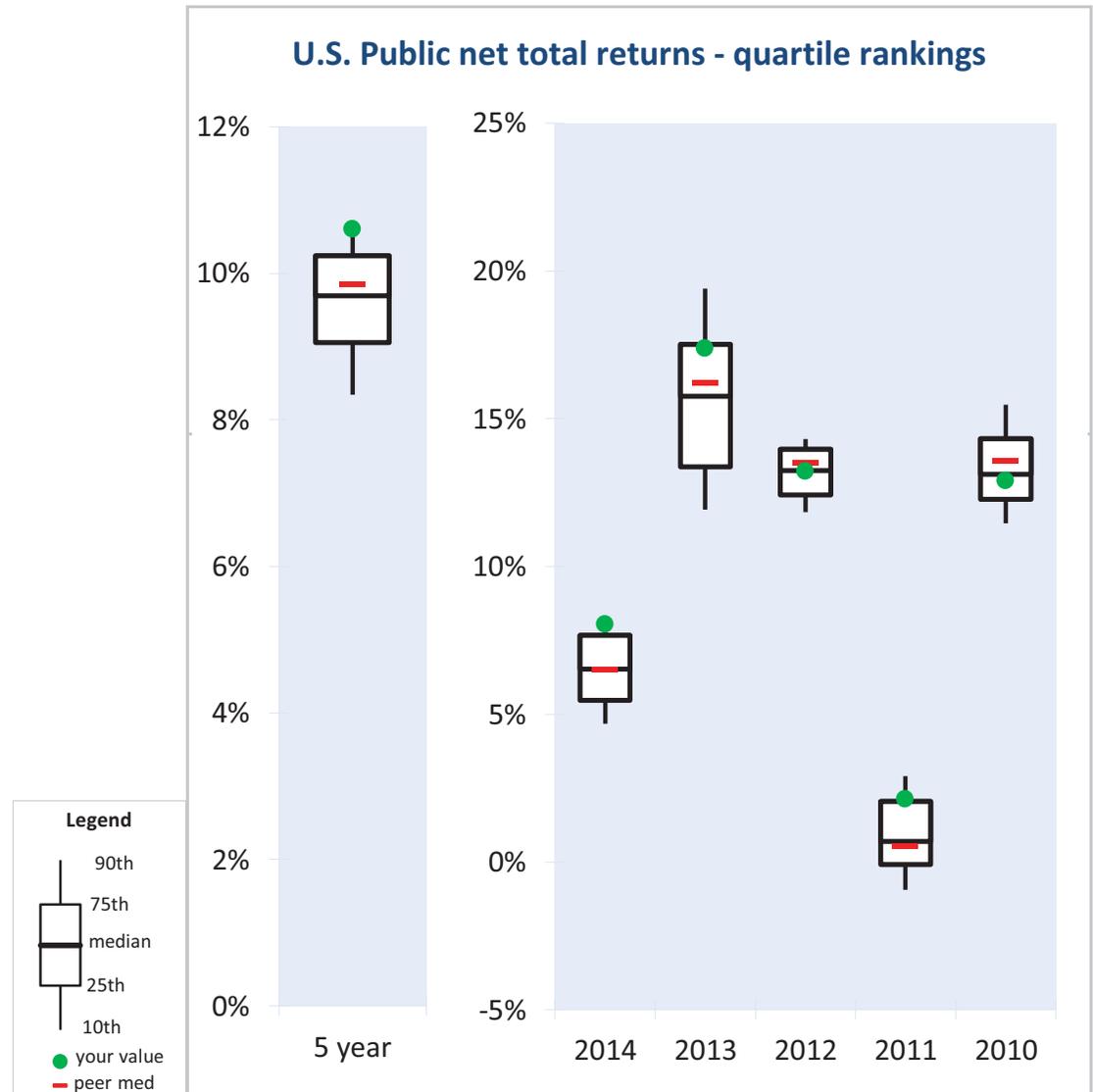
Implementation impact versus excess cost. Does paying more get you more?

## Your 5-year net total return of 10.6% was above both the U.S. Public median of 9.7% and the peer median of 9.8%.

Total returns, by themselves, provide little insight into the reasons behind relative performance. Therefore, we separate total return into two components: policy return and implementation impacts.

	Your 5-year
Net total fund return	10.6%
- Policy return	10.6%
= Implementation impacts	0.0%

This approach enables you to understand the contribution from both policy mix decisions (by far the most important driver of total return) and implementation impacts.



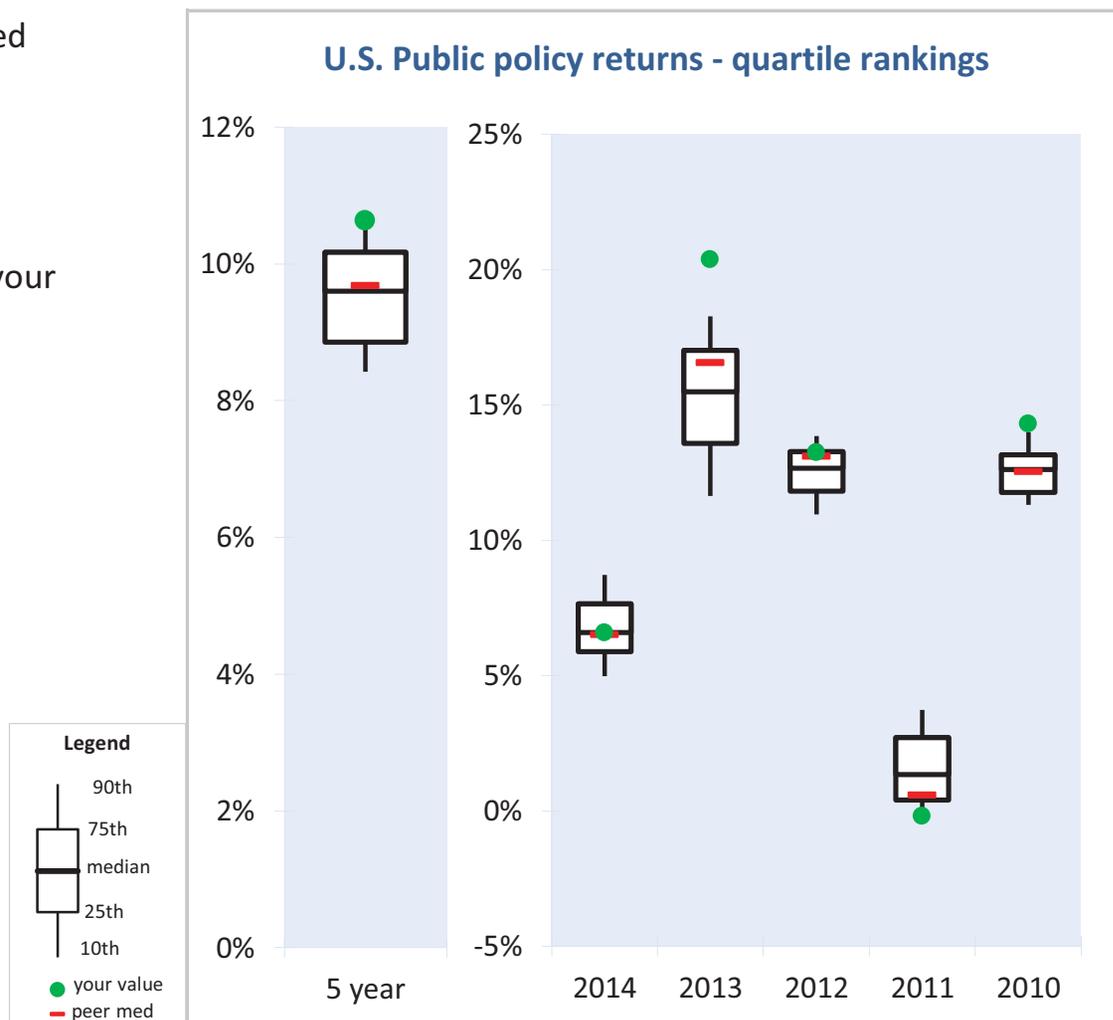
## Your 5-year policy return of 10.6% was above both the U.S. Public median of 9.6% and the peer median of 9.7%.

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

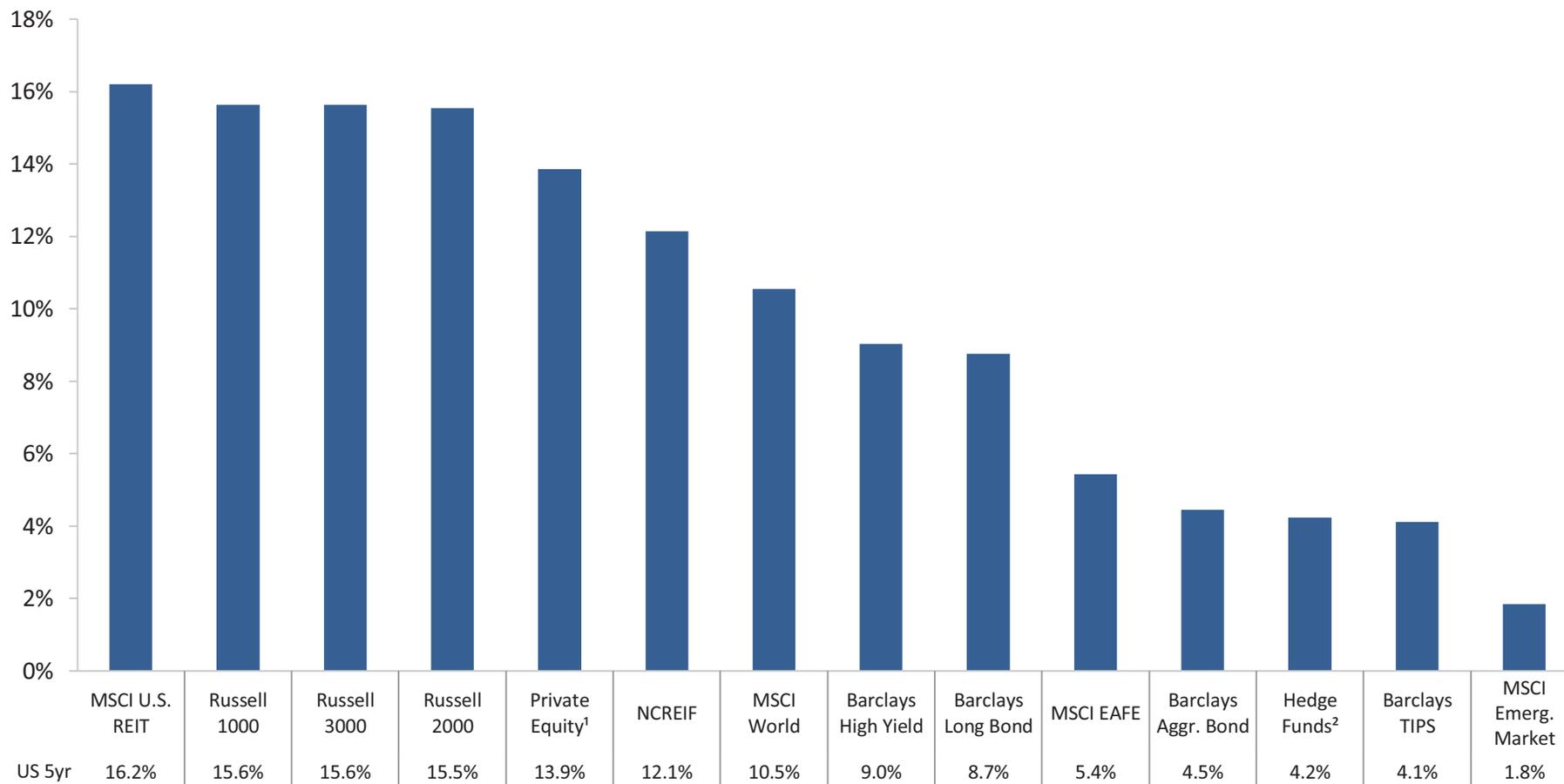
Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.



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 11.2%, 0.5% higher than your adjusted 5-year policy return of 10.6%. Mirroring this, without adjustment your 5-year total fund implementation impact would be 0.5% lower. Refer to the Research section pages 6-7 for details.

## Differences in policy returns and implementation impacts are caused by differences in benchmarks and policy mix.

5-Year returns for frequently used benchmark indices



1. The private equity benchmark returns of all participants were adjusted to reflect investable private equity benchmarks, based on lagged, small-cap stock.
2. The hedge fund benchmark is the average benchmark return reported by U.S. participants.

## Your 5-year policy return was above the U.S. Public median.

Your 5-year policy return was above the U.S. Public median primarily because of the positive impact of your higher policy weight in:

- U.S. Stock, one of the better performing asset classes of the past 5 years. Your 5-year average policy weight of 36% compares to a U.S. Public average of 25%.
- Private Equity, one of the better performing asset classes of the past 5 years. Your 5-year average policy weight of 12% compares to a U.S. Public average of 8%.

The fact that you had no policy allocation to hedge funds also had a positive impact. The 5-year U.S. Public average allocation to hedge funds was 4%.

### 5-Year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	36%	26%	25%
EAFE/Global/Emerging	18%	28%	26%
<b>Total Stock</b>	<b>54%</b>	<b>54%</b>	<b>52%</b>
U.S. Bonds	22%	18%	19%
High Yield Bonds	3%	3%	2%
Other Fixed Income	1%	6%	6%
<b>Total Fixed Income</b>	<b>26%</b>	<b>26%</b>	<b>27%</b>
Hedge Funds	0%	4%	4%
Real Estate incl. REITS	8%	6%	7%
Other Real Assets <sup>1</sup>	0%	2%	2%
Private Equity	12%	8%	8%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

1. Other real assets includes commodities, natural resources and infrastructure.

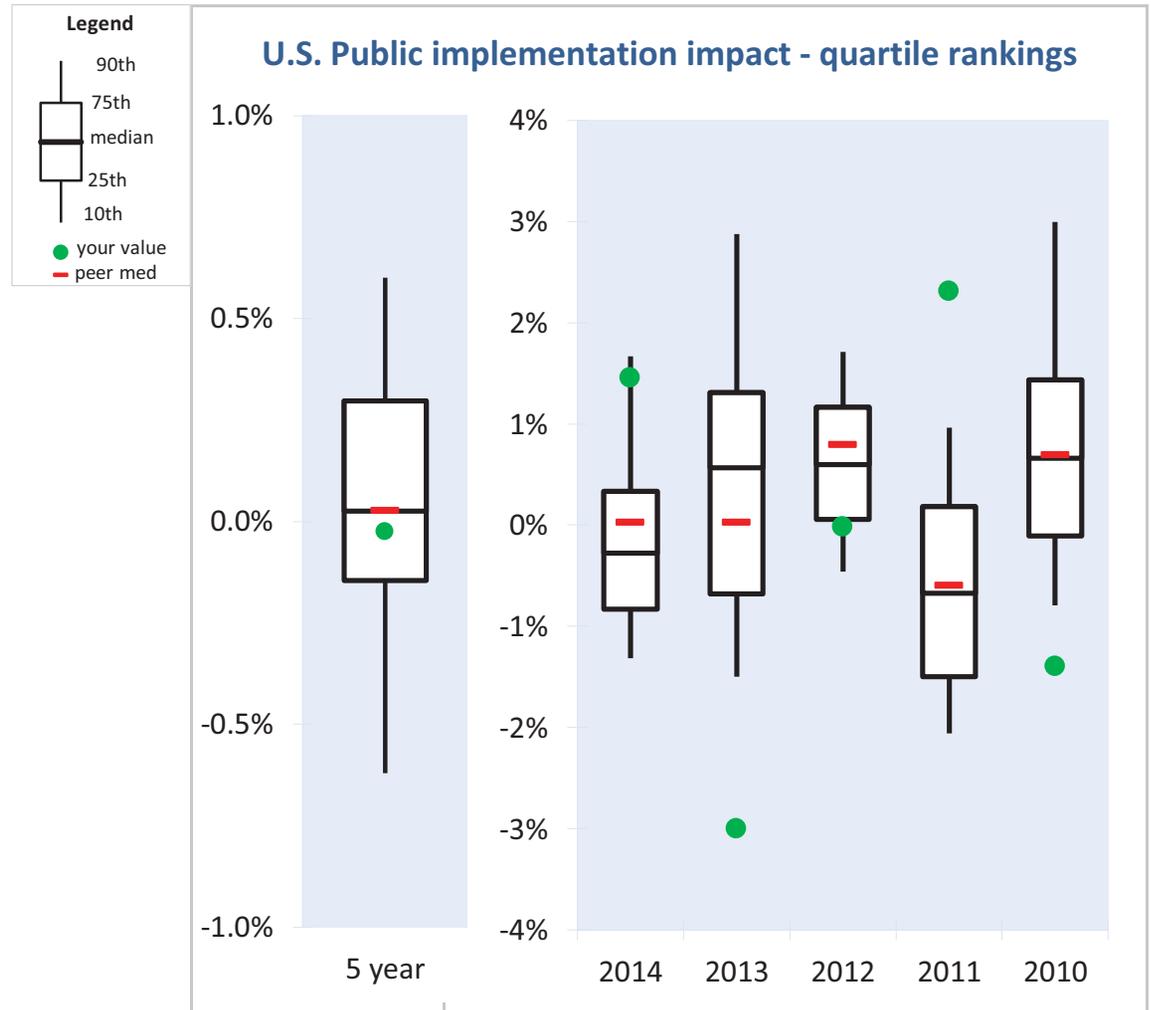
**Implementation impact is the difference between total net return and policy return. Your 5-year implementation impact was 0.0%. This was equal to the U.S. Public median of 0.0% and equal to the peer median of 0.0%.**

**Implementation impact for Montana Board of Investments**

Year	Net Return	Policy Return	Impl. Impact
2014	8.0%	6.6%	1.5%
2013	17.4%	20.4%	(3.0%)
2012	13.2%	13.2%	(0.0%)
2011	2.1%	(0.2%)	2.3%
2010	12.9%	14.3%	(1.4%)
5-year	10.6%	10.6%	(0.0%)

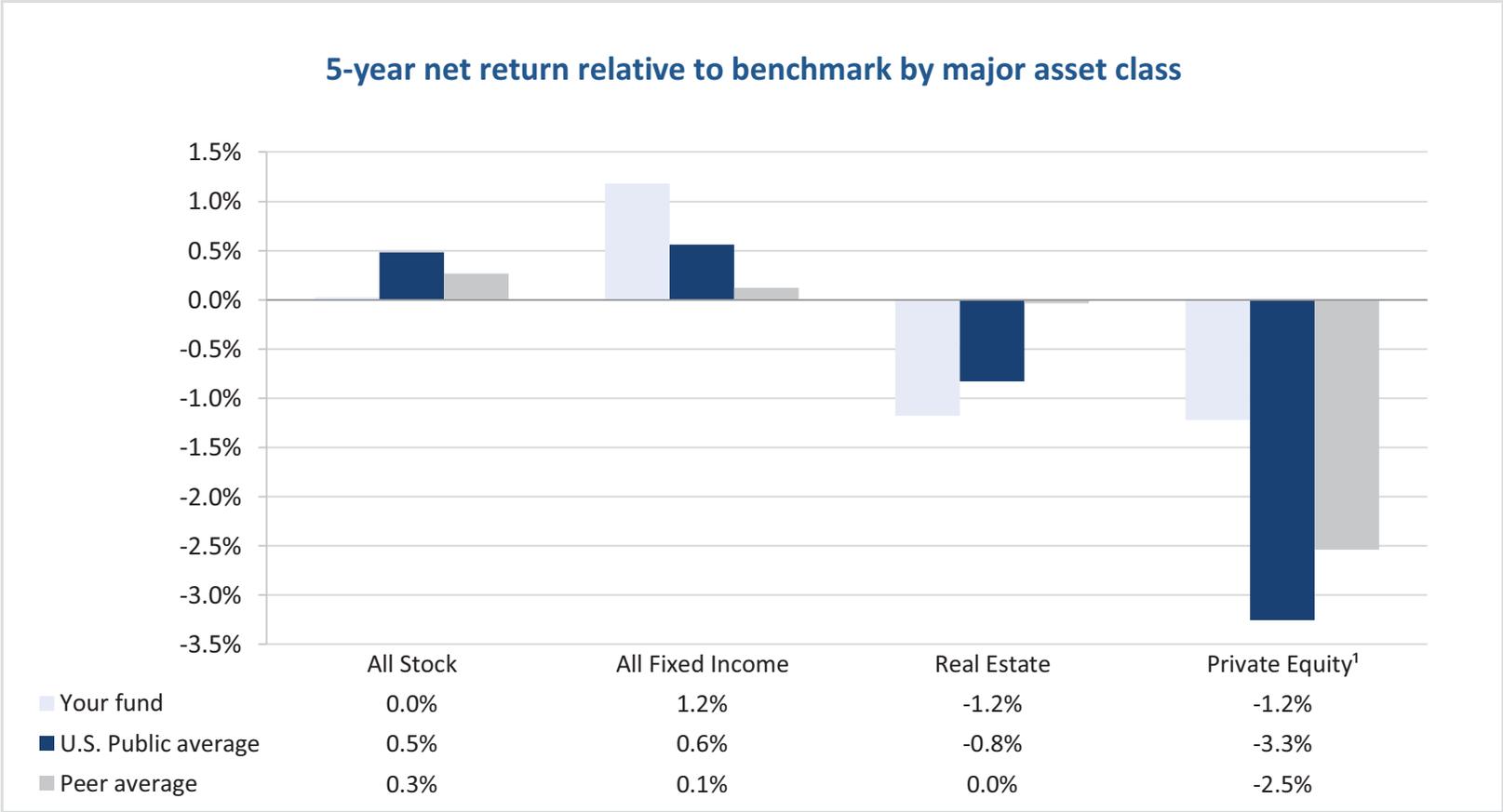
Implementation typically has a modest impact on total fund returns. Implementation impacts are mainly due to:

- 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.



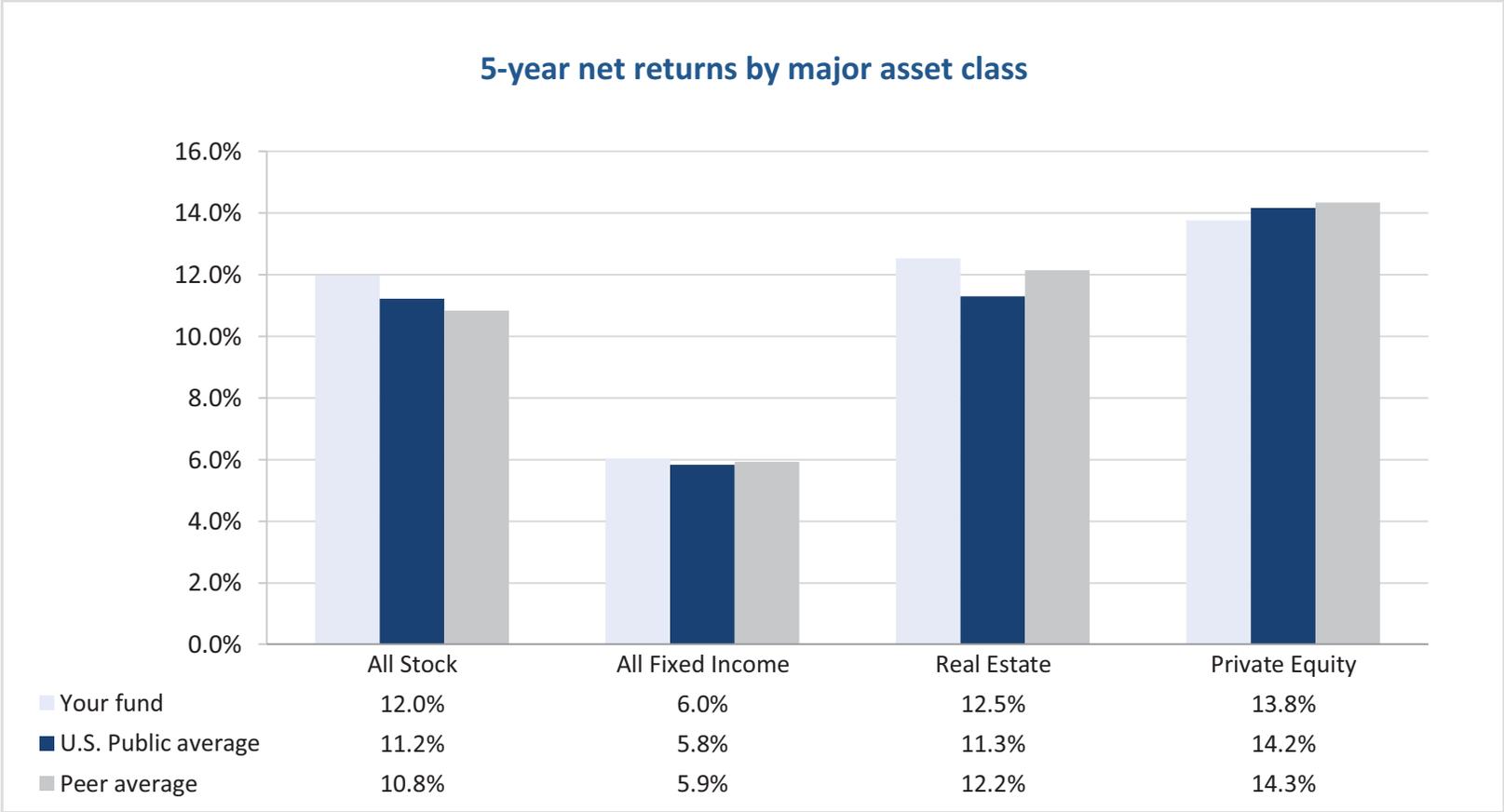
To enable fairer comparisons, the implementation impact for each participant including your fund was adjusted to reflect private equity benchmarks based on investable public market indices. Prior to this adjustment, your fund's 5-year total fund implementation impact was -0.5%. Refer to the Research section, pages 6-7 for details as to why this adjustment may improve comparisons.

**You 5-year total net returns by major asset class compare to your benchmark returns as follows. For the U.S. Public universe, the difference shown is between their average net return and their average benchmark return.**



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 return relative to benchmark was -5.9%. It is also useful to compare total returns. Your 5-year total return of 13.8% for private equity was below the U.S. average of 14.2%.

# You had higher 5-year net returns in All Stock, All Fixed Income and Real Estate relative to the U.S. Public average.



## The following cost types are included in the calculation of 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>						
<i>Hedge Funds</i>	--	--	✓	✓	✓	✗
<i>Global TAA</i>	✓	✗	✓	✓	✓	✗
<u>Private equity</u> (Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗
<u>Private real assets</u> (Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓	✓	✗	✗

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

- "--" indicates that the cost type is not applicable.
- Green shading indicates that the cost type has been newly added for the 2014 data year.
- CEM currently excludes external private asset performance fees as well as all transaction costs from your total cost because only a limited number of participants are able to provide complete data.

## Your investment costs were \$54.6 million or 56.6 basis points in 2014.

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>1</sup>	
U.S. Stock - Large Cap		347	202	4,366		4,915
U.S. Stock - Mid Cap		54	71	2,683		2,808
U.S. Stock - Small Cap		30	8	1,778		1,816
Stock - ACWIxU.S.		348	957	3,247		4,552
Fixed Income - U.S.	371	79		672		1,122
Fixed Income - High Yield		40		878		919
Cash	27					27
Real Estate		159		3,168		3,327
Real Estate - LPs		252		7,086		7,338
Diversified Private Equity		575		18,011		18,586
Diversified Priv. Eq.- Fund of Funds		176		6,805		6,981
Total asset management costs excluding private asset performance fees						52,390 54.3bp
<b>Oversight, custodial and other costs <sup>2</sup></b>						
Oversight of the fund						864
Trustee & custodial						1,076
Consulting and performance measurement						244
Audit						38
Total oversight, custodial & other costs						2,222 2.3bp
Total investment cost (excluding transaction and private asset performance fees)						54,613 56.6bp

### Footnotes

<sup>1</sup> 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.

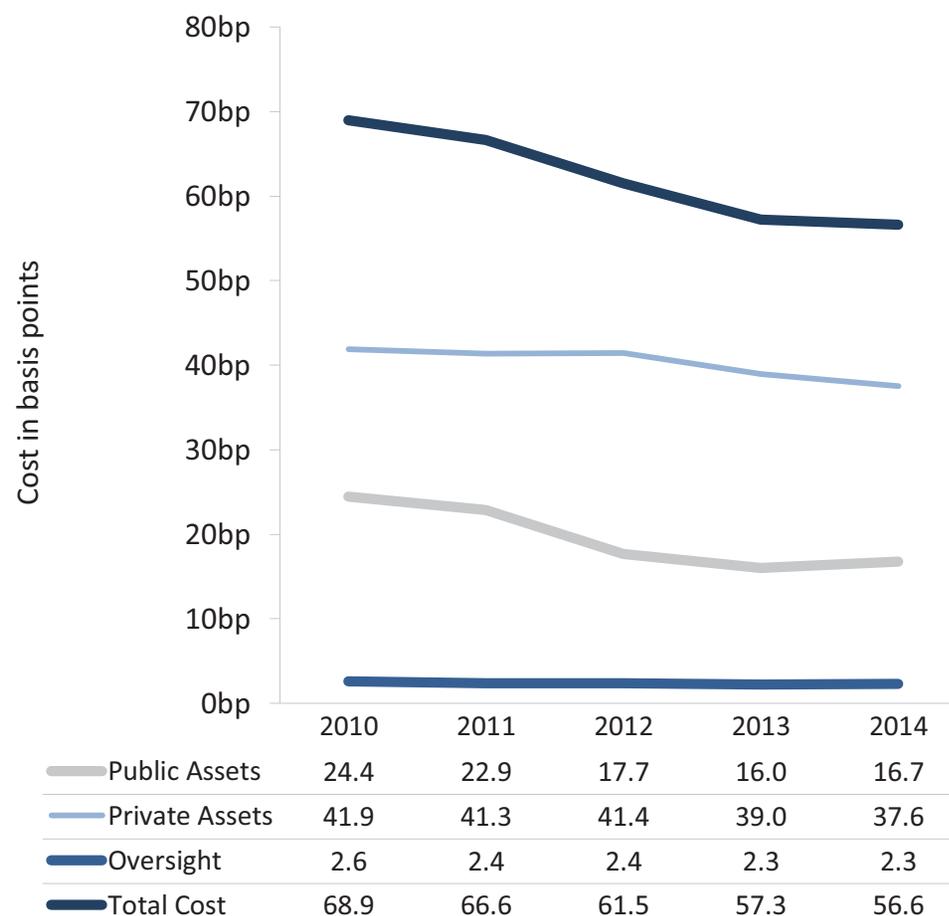
<sup>2</sup> Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

## Your costs decreased between 2010 and 2014.

Your costs decreased primarily because:

- You increased your use of lower cost passive and internal management from 36% of assets in 2010 to 53% in 2014.
- You decreased your allocation to higher cost private equity. In 2010 you had 12.8% of your assets invested in Private Equity compared to 10.7% in 2014.

Trend in your investment costs



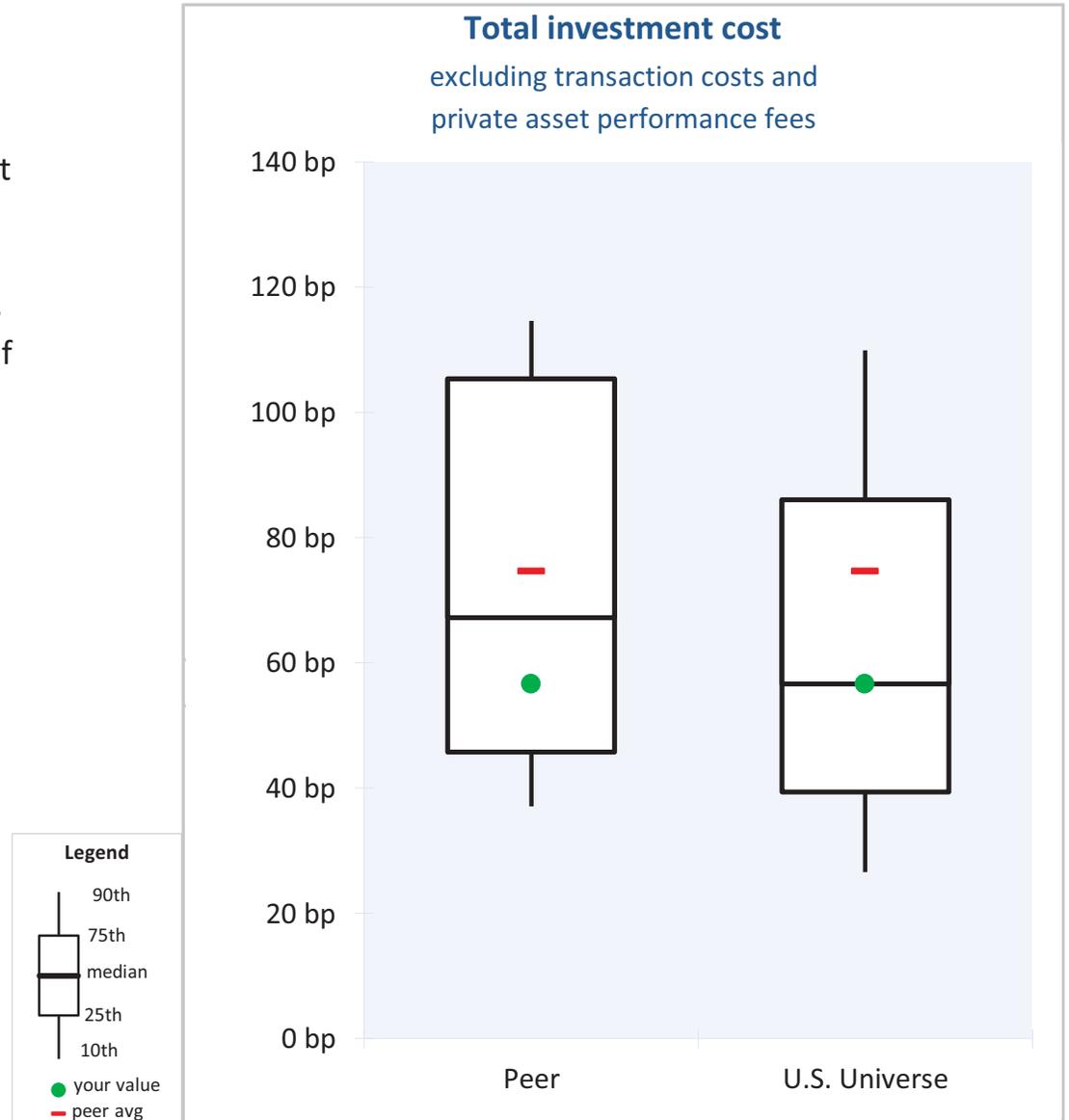
\* 2013 Total costs changed from 56.7 bps in your 2013 report to 57.3 bps as reported here due to a change in passive investment fees. Private assets costs for 2010 changed slightly as well, as a result of an adjustment to your reported costs and assets.

## Your total investment cost of 56.6 bps was below the peer median of 67.2 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 19% of your funds assets at the end of 2014 versus a peer average of 21%.
- 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 slightly low cost by 3.4 basis points in 2014.

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 56.6 bp was slightly below your benchmark cost of 60.0 bp. Thus, your cost savings was 3.4 bp.

### Your cost versus benchmark

	\$000s	basis points
Your total investment cost	54,613	56.6 bp
Your benchmark cost	57,861	60.0 bp
Your excess cost	(3,248)	(3.4) bp

## Your fund was slightly low cost because you had a lower cost implementation style.

### Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• Impact of fund of funds usage	(911)	(0.9)
• Less external active management (more lower cost passive and internal)	(3,192)	(3.3)
• Less overlays	(480)	(0.5)
• Other style differences	166	0.2
	<u>(4,417)</u>	<u>(4.6)</u>
2. Paying more than peers for some services		
• External investment management costs	2,037	2.1
• Internal investment management costs	(150)	(0.2)
• Oversight, custodial & other costs	(719)	(0.7)
	<u>1,169</u>	<u>1.2</u>
<b>Total savings</b>	<b>(3,248)</b>	<b>(3.4)</b>

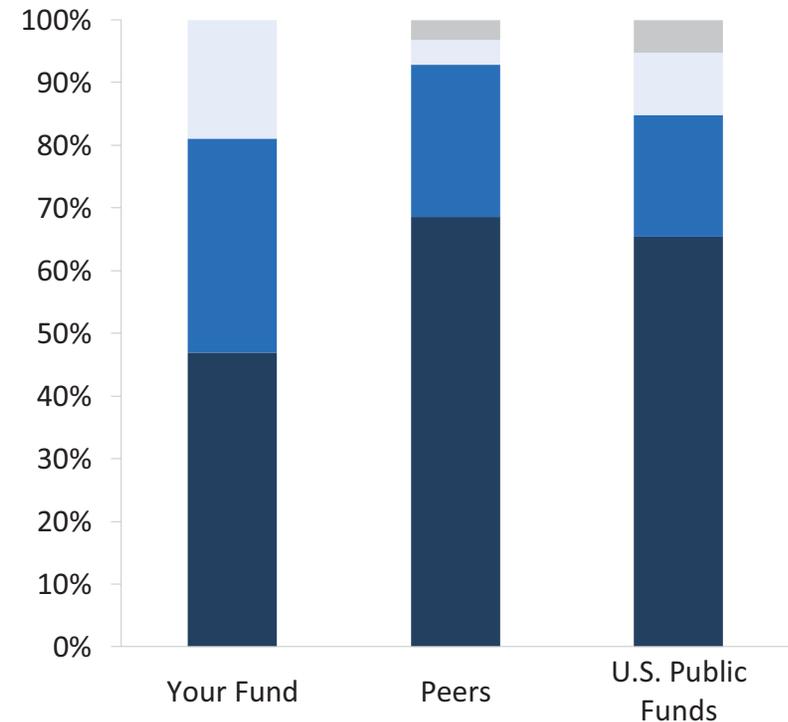
## Differences in cost performance are often caused by differences in implementation style.

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 47% versus 69% for your peers).

Implementation style<sup>1</sup>



■ Internal passive	0%	3%	5%
■ Internal active	19%	4%	10%
■ External passive	34%	24%	19%
■ External active	47%	69%	65%

1. The graph above does not take into consideration the impact of derivatives.

# Differences in implementation style saved you 4.6 bp relative to your peers.

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

Asset class	Your avg holdings in \$mils (A)	% External active			Premium vs passive & internal <sup>1</sup> (C)	Cost/ (savings) \$000s bps (A X B X C)	
		You	Peer average	More/ (less) (B)			
U.S. Stock - Large Cap	3,026	29.8%	37.9%	(8.1%)	29.1 bp	(717)	
U.S. Stock - Mid Cap	467	82.1%	66.4%	15.7%	54.0 bp	395	
U.S. Stock - Small Cap	261	97.7%	90.8%	7.0%	52.1 bp	95	
Stock - ACWIxU.S.	1,676	35.7%	59.3%	(23.6%)	39.1 bp	(1,546)	
Fixed Income - U.S.	1,963	17.5%	63.6%	(46.1%)	16.0 bp	(1,448)	
Fixed Income - High Yield	176	100.0%	94.6%	5.4%	Insufficient <sup>2</sup>	0	
Real Estate ex-REITs	949	100.0%	98.3%	1.7%	Insufficient <sup>2</sup>	0	
of which Ltd Partnerships represent:		65.8%	64.8%	1.1%	30.0 bp	30	
Diversified Private Equity	1,705	100.0%	100.0%	0.0%		0	
Impact of less/more external active vs. lower cost styles						(3,192)	(3.3) bp
					Premium vs. direct LP <sup>1</sup>		
Real Estate ex-REITs - LPs	624	0.0%	1.4%	(1.4%)	Insufficient <sup>2</sup>	0	
Diversified Private Equity - LPs	1,705	26.6%	33.8%	(7.2%)	73.9 bp	(911)	
Impact of less/more fund of funds vs. direct LPs						(911)	(0.9) bp
<u>Overlays and other</u>							
Impact of lower use of portfolio level overlays						(480)	(0.5) bp
Impact of mix of internal passive, internal active, and external passive <sup>3</sup>						166	0.2 bp
Total impact of differences in implementation style						(4,417)	(4.6) bp

1. The cost premium is the additional cost of external active management relative to the average of other lower cost implementation styles - internal passive, internal active and external passive.

2. A cost premium listed as 'Insufficient' indicates that there was not enough peer data to calculate the premium.

3. The 'Impact of mix of internal passive, internal active and external passive' quantifies the net cost impact of differences in cost between, and your relative use of, these 'low-cost' styles.

## The net impact of paying more/less for external asset management costs added 2.1 bps.

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

	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) in \$000s (A X B)
		Your Fund	Peer median	More/ (less) (B)	
U.S. Stock - Large Cap - Passive	2,125	1.0	1.2	(0.2)	(51)
U.S. Stock - Large Cap - Active	901	52.3	30.1	22.3	2,005
U.S. Stock - Mid Cap - Passive	84	8.5	4.3*	4.2	35
U.S. Stock - Mid Cap - Active	383	71.5	58.2*	13.2	506
U.S. Stock - Small Cap - Passive	6	14.0	4.8*	9.2	5
U.S. Stock - Small Cap - Active	255	70.8	56.9	14.0	356
Stock - ACWIxU.S. - Passive	1,078	8.9	6.2	2.7	293
Stock - ACWIxU.S. - Active	599	60.1	45.2	14.8	887
Fixed Income - U.S. - Active	343	21.9	18.5	3.4	117
Fixed Income - High Yield - Active	176	52.1	54.3	(2.1)	(37)
Real Estate ex-REITs - Active	324	102.6	85.0	17.6	571
Real Estate ex-REITs - Limited Partnership	624	117.5	115.0	2.5	158
Diversified Private Equity - Active	1,252	148.5	165.3	(16.8)	(2,106)
Diversified Private Equity - Fund of Fund <sup>1</sup>	453	58.4	73.9	(15.5)	(702)
Total impact of paying more/less for external management					2,037
Total in bps					2.1 bp

\*Universe median used as peer data was insufficient.

1. The cost comparison for fund of fund private equity is only based on the top-layer fees. The underlying fees were excluded because we could not confirm they were gross partnership costs.

## The net impact of paying more/less for internal asset management costs saved 0.2 bps.

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

	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) in \$000s (A X B)
		Your Fund	Peer median	More/ (less) (B)	
Fixed Income - U.S. - Active	1,620	2.3	3.2*	(0.9)	(150)
Total impact of paying more/less for internal management					(150)
Total in bps					(0.2) bp

\*Universe median used as peer data was insufficient.

## The net impact of differences in oversight, custodial & other costs saved 0.7 bps.

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

	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) in \$000s (A X B)
		Your fund	Peer median	More/ (less) (B)	
Oversight	9,647	0.9	1.3	(0.4)	(383)
Custodial*	9,647	1.1	0.6	0.6	532
Consulting	9,647	0.3	0.8	(0.6)	(544)
Audit	9,647	0.0	0.1	(0.0)	(22)
Other	9,647	0.0	0.3	(0.3)	(301)
<b>Total</b>					<b>(719)</b>
<b>Total in bps</b>					<b>(0.7) bp</b>

\* Important additional information about your custodial fees relative to peers:

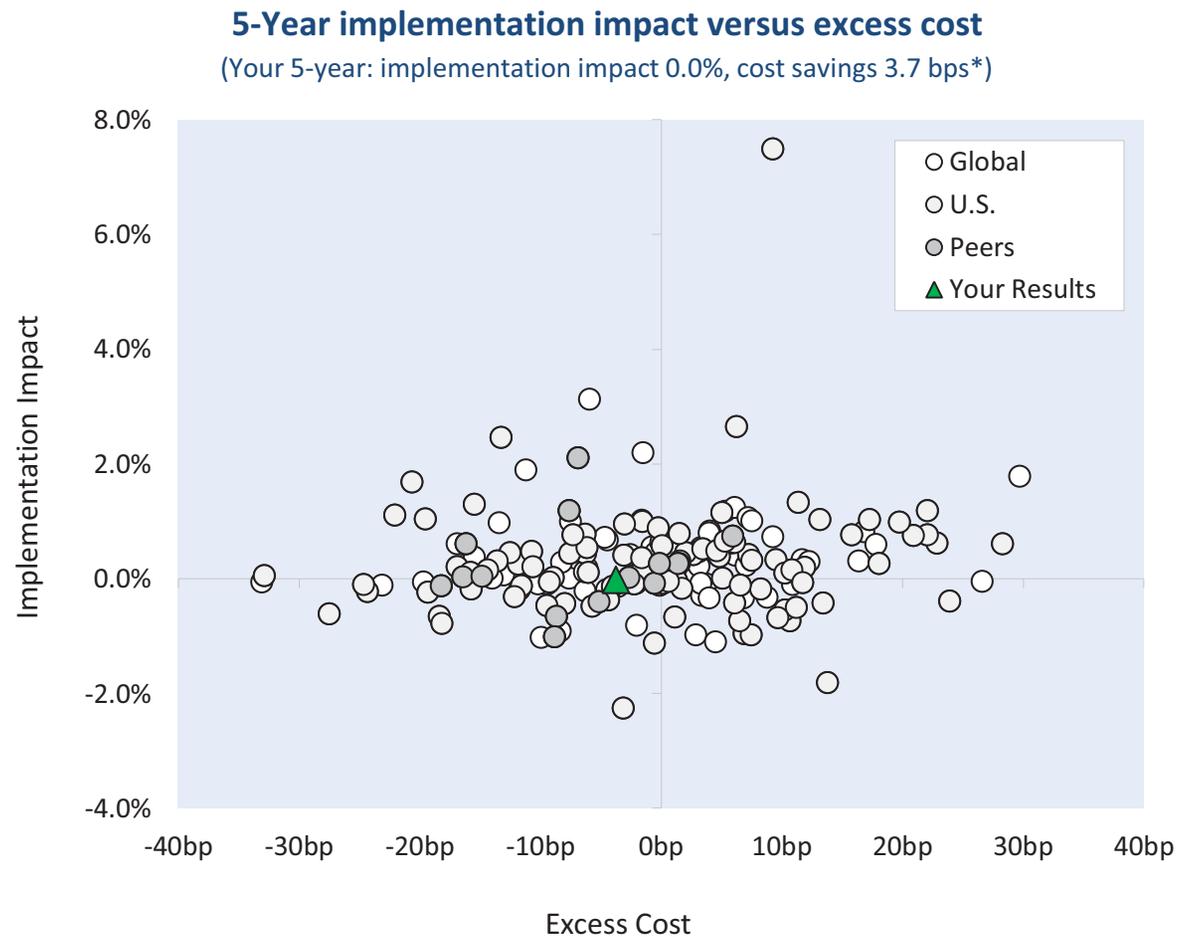
1. The peer median of 0.6 bps is unusually low. The U.S. universe median custodial cost was 0.9 bps. (See page 3 in Section 6).
2. You have a more complex structure than your peers. You have 9 plans on your platform, most peers have less than 2 plans.
3. Specific services provided by custodians for funds vary somewhat. CEM does not collect detailed data related to specific custodial arrangements.

**In summary, your fund was slightly low cost because you had a lower cost implementation style.**

### Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• Impact of fund of funds usage	(911)	(0.9)
• Less external active management (more lower cost passive and internal)	(3,192)	(3.3)
• Less overlays	(480)	(0.5)
• Other style differences	166	0.2
	<u>(4,417)</u>	<u>(4.6)</u>
2. Paying more than peers for similar services		
• External investment management costs	2,037	2.1
• Internal investment management costs	(150)	(0.2)
• Oversight, custodial & other costs	(719)	(0.7)
	<u>1,169</u>	<u>1.2</u>
<b>Total savings</b>	<b>(3,248)</b>	<b>(3.4)</b>

**Your fund achieved 5-year implementation impact of 0.0 % and cost savings of 3.7 bps on the cost effectiveness chart.**



# Key takeaways

## Returns

- Your 5-year net total return was 10.6%. This was above the U.S. Public median of 9.7% and above the peer median of 9.8%.
- Your 5-year policy return was 10.6%. This was above the U.S. Public median of 9.6% and above the peer median of 9.7%.

## Implementation impact

- Your 5-year implementation impact was 0.0%. This was equal to the U.S. Public median of 0.0% and equal to the peer median of 0.0%.

## Cost and cost effectiveness

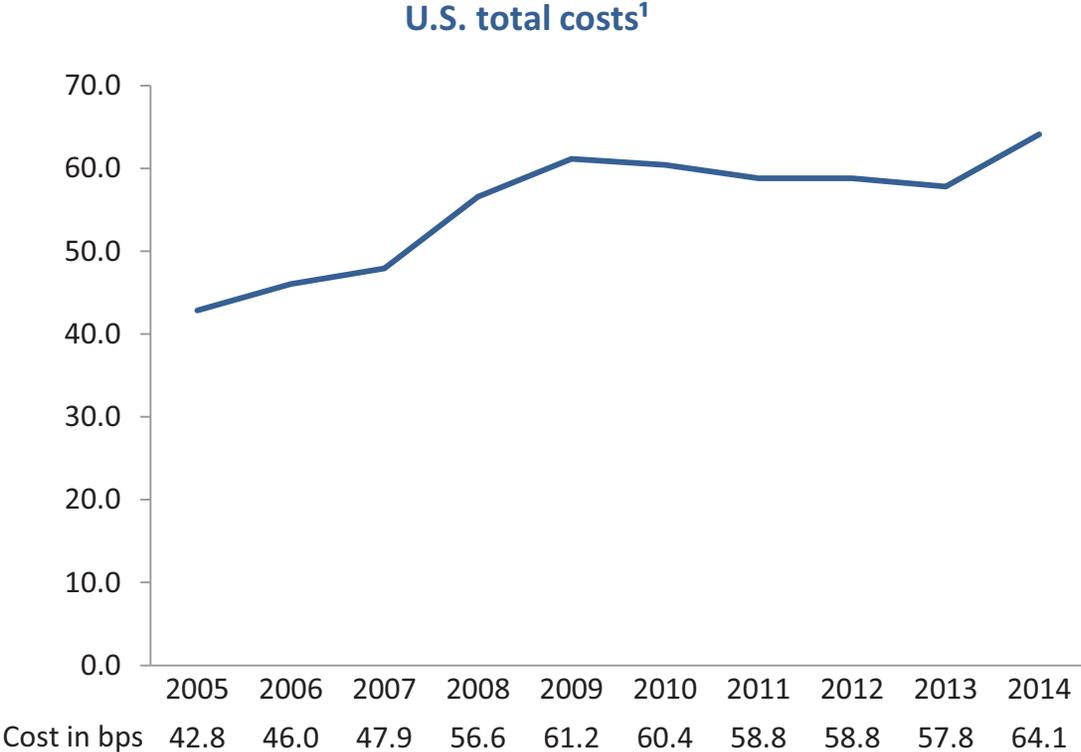
- Your investment cost of 56.6 bps was below your benchmark cost of 60.0 bps. This suggests that your fund was slightly low cost compared to your peers.
- Your fund was slightly low cost because you had a lower cost implementation style.
- Your fund achieved 5-year implementation impact of 0.0 % and cost savings of 3.7 bps on the cost effectiveness chart.

# Key Trends and Research Insights from the CEM Investment Benchmarking Database

# U.S. fund costs have grown by 21 basis points on average over the last 10 years.

Reasons for the increase in costs include:

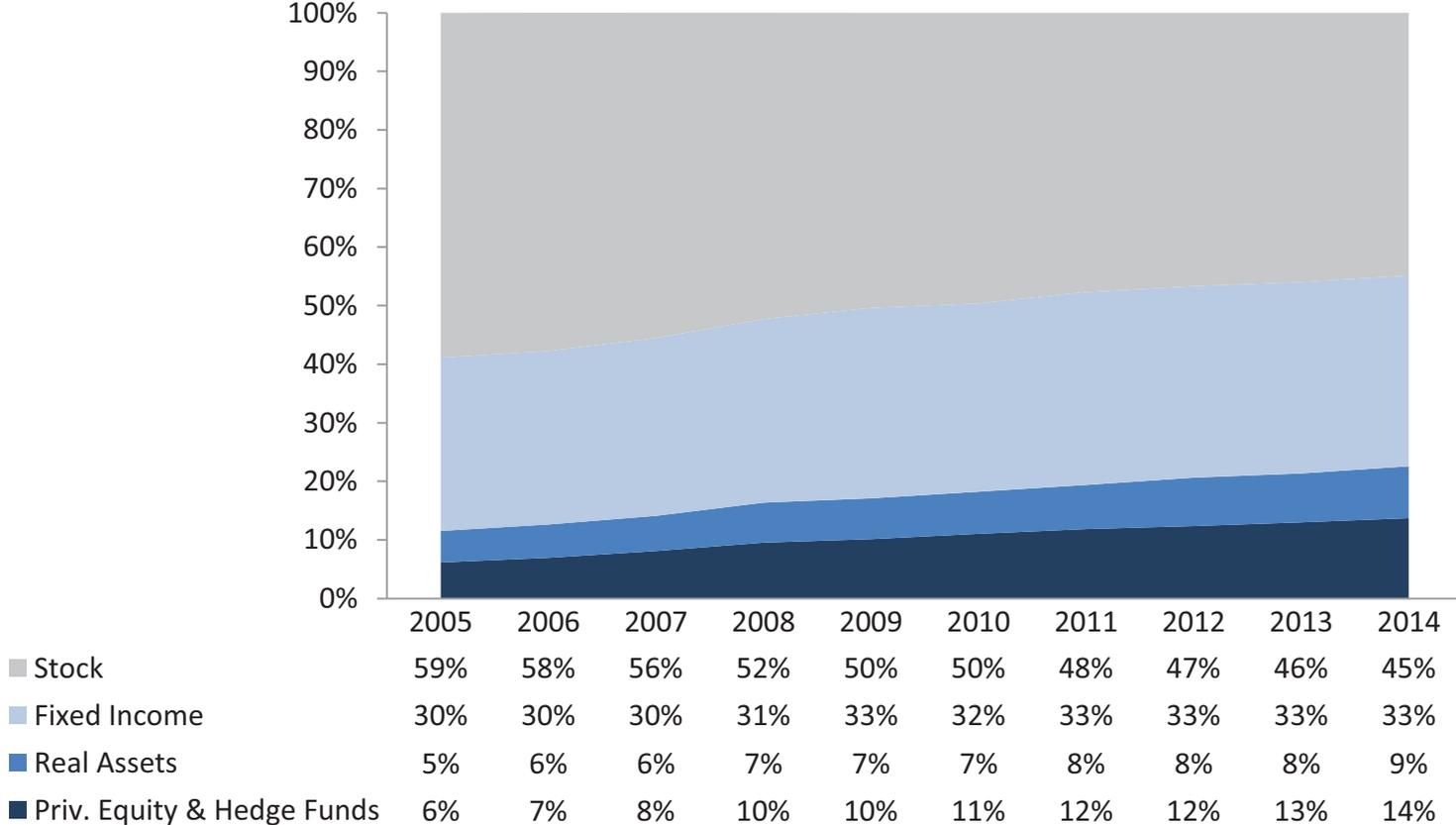
- Allocation to the more expensive asset classes - hedge funds, real assets and private equity- increased from 6% to 12% on average.
- Use of the most expensive implementation style, external active management, increased from 72% to 73% on average.



1. This analysis is based on 63 U.S. funds with 10 consecutive years of data.

**For U.S. plans, combined policy weights for real assets, private equity and hedge funds increased from 11.5% in 2005 to 22.6% in 2014.**

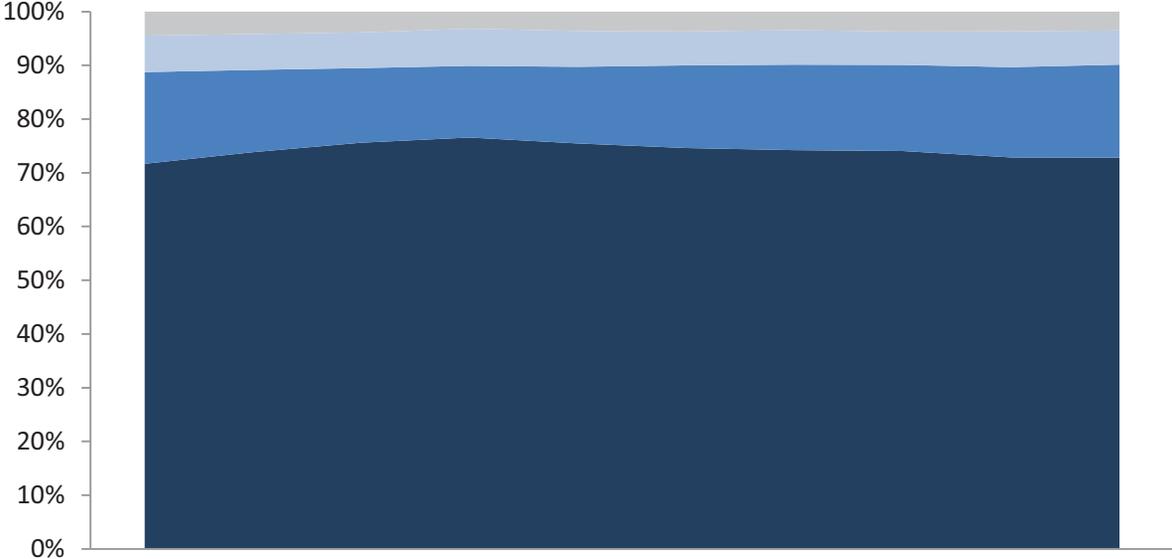
**Policy mix by year - U.S.**



• This analysis is based on 63 U.S. funds with 10 consecutive years of data.

**For U.S. plans, external active management increased from 72% to 73% over the past 10 years.**

**Implementation style by year - U.S.**



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ % Internal passive	4%	4%	4%	3%	4%	4%	3%	4%	4%	4%
■ % Internal active	7%	7%	7%	7%	7%	6%	6%	6%	7%	6%
■ % External passive	17%	15%	14%	13%	14%	15%	16%	16%	17%	17%
■ % External active	72%	74%	76%	77%	75%	75%	74%	74%	73%	73%

• This analysis is based on 63 U.S. funds with 10 consecutive years of data.

# Key U.S. pension fund performance results:

- Policy returns (from asset mix) are by far the biggest component of total returns.
- U.S. pension funds in the CEM database generated 19 basis points of positive value added from implementation after costs.

## U.S. Funds

(24-year average, ending Dec. 31, 2014)

Total Return	9.70%
- Policy Return	9.09%
- <u>Costs</u>	<u>0.42%</u>
= Net Value Added	0.19%

# Characteristics associated with higher implementation value added over the past 24 years:

- Three factors were associated with superior NVA:
  1. Active management: active management outperformed passive by 38 bps at the total fund level.
  2. Internal management: internal management outperformed external by 22 bps net of costs. There was no difference in gross returns. Use of Internal management increases with size. Funds under \$10 billion manage 8% of assets internally on average. Funds over \$50 billion manage 51% of assets internally.
  3. Fund size: a \$10 billion fund achieved 7.6 bps more net value added than a \$1 billion fund, beyond any advantages from internal management.
- Managing costs is important: Cost has consumed about three quarters of gross value added.

## U.S. defined benefit plans have outperformed defined contribution plans.

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### DB versus DC return and value added - U.S.

	18-yr average ending 2014 <sup>2</sup>		
	DB	DC	Difference
Total return	7.99%	6.88%	1.11%
- Policy return <sup>1</sup>	7.43%	6.46%	0.97%
- Costs	0.49%	0.40%	0.09%
= Net value added	0.08%	0.01%	0.07%
Number of observations	3,200	2,143	

Differences in asset mix have been the primary reason for the outperformance of U.S. defined benefit plans.

### DB versus DC asset mix - U.S.

Asset class (Ranked by returns)	Asset mix <sup>3</sup>		Returns <sup>4</sup>	
	DB	DC	DB	DC
Private Equity	4%	n/a	11.1%	n/a
Real Assets	5%	n/a	9.5%	n/a
Small Cap Stock	6%	8%	8.8%	9.8%
Employer Stock	0%	20%	n/a	8.6%
Fixed Income	31%	10%	7.5%	6.1%
Hedge Funds	2%	n/a	7.6%	n/a
Stock U.S. Large Cap or Broad	26%	30%	6.4%	7.9%
Stock Non U.S. or Global	23%	8%	4.5%	6.6%
Stable Value/GICs	n/a	17%	n/a	4.6%
Cash	2%	8%	2.6%	2.9%
Total	100%	100%	8.0%	6.9%
Number of observations	3,200	2,143		

1. DC policy return = weights of holdings X benchmarks

2. Returns are the geometric average of annual averages.

3. 18 years ending 2014. Equals arithmetic average of annual asset mix weights.

4. 18 years from 1997 to 2014. Returns are the geometric average of the annual averages for each asset class. Hedge funds were not treated as a separate asset class until 2000, so 60% stock, 40% bond returns were used as a proxy for 1997-1999.

n/a= insufficient data.