Montana Board of Investments

CEM Benchmarking Results

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CEM Benchmarking
What gets measured gets managed

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

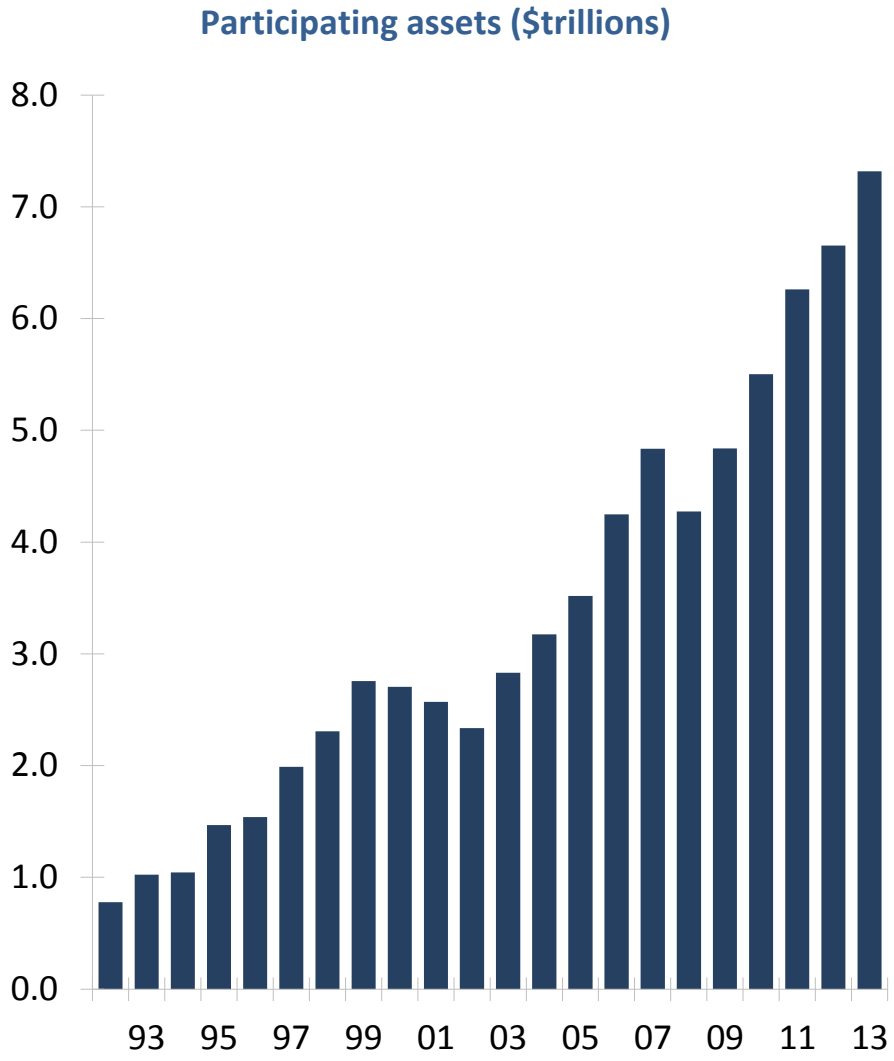
• 149 U.S. pension funds participate. The median U.S. fund had assets of $6.2 billion and the average U.S. fund had assets of $14.3 billion. Total participating U.S. assets were $2.1 trillion.

• 75 Canadian funds participate with assets totaling $339 billion.

• 37 European funds participate with aggregate assets of $1.4 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.

• 1 Asia-Pacific funds participate with aggregate assets of $770 billion. Included are funds from Australia, New Zealand, China and South Korea.

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

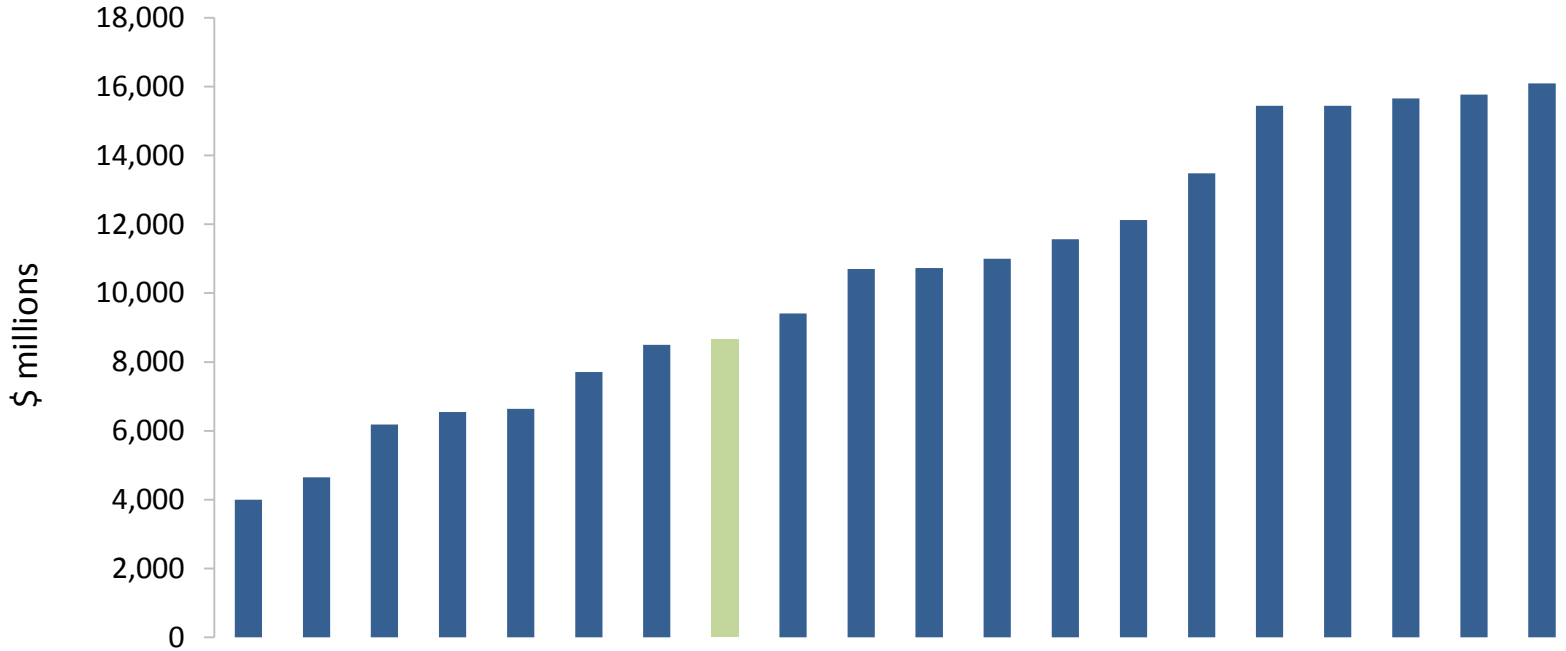


* The graph for 2013 reflects both received and expected data.

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

Peer group for Montana Board of Investments

- 20 U.S. public sponsors from $4.0 billion to $16.1 billion
- Median size of $10.7 billion versus your $8.7 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 impacts	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?

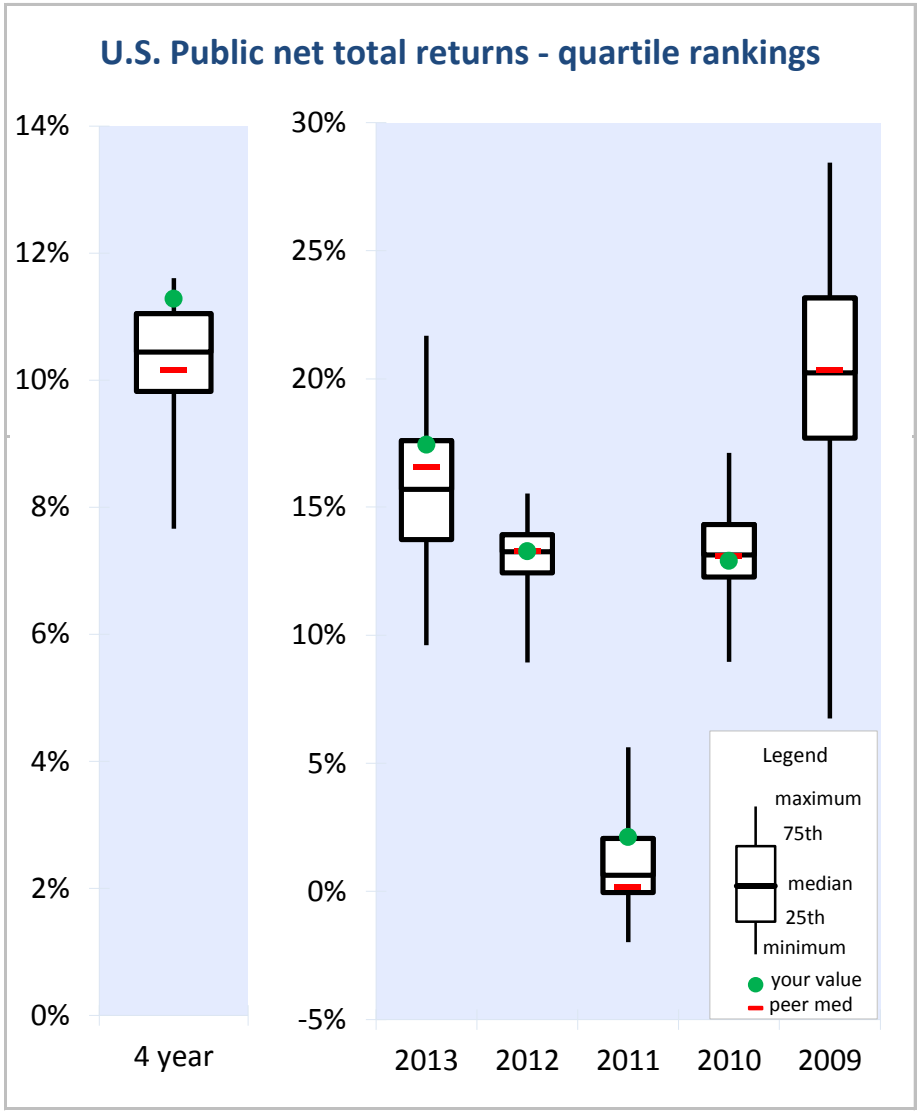
Your 4-year net return of 11.3% was above the U.S. Public median of 10.4% and above the peer median of 10.2%.

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 4-year
Net total fund return	11.3%
- Policy return	11.5%
= Implementation impacts	-0.2%

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.

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.



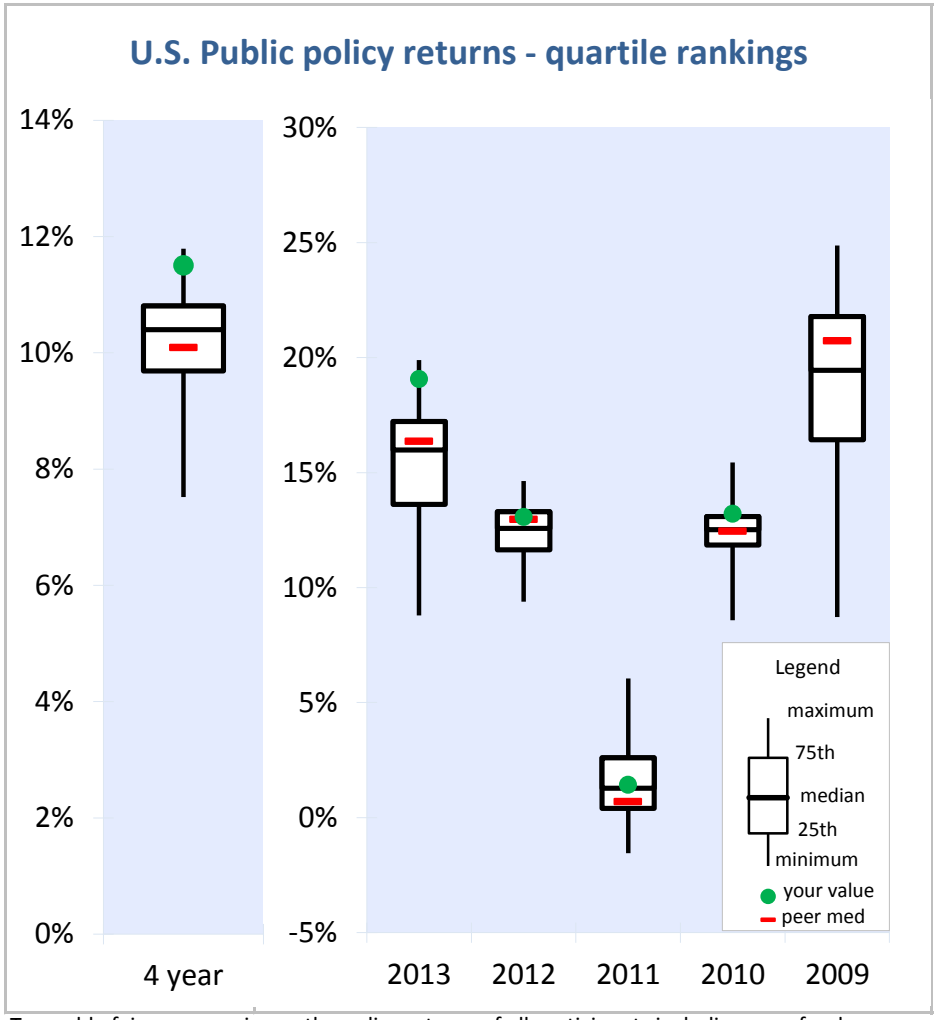
Your 4-year policy return of 11.5% was above the U.S. Public median of 10.4% and above the peer median of 10.1%.

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

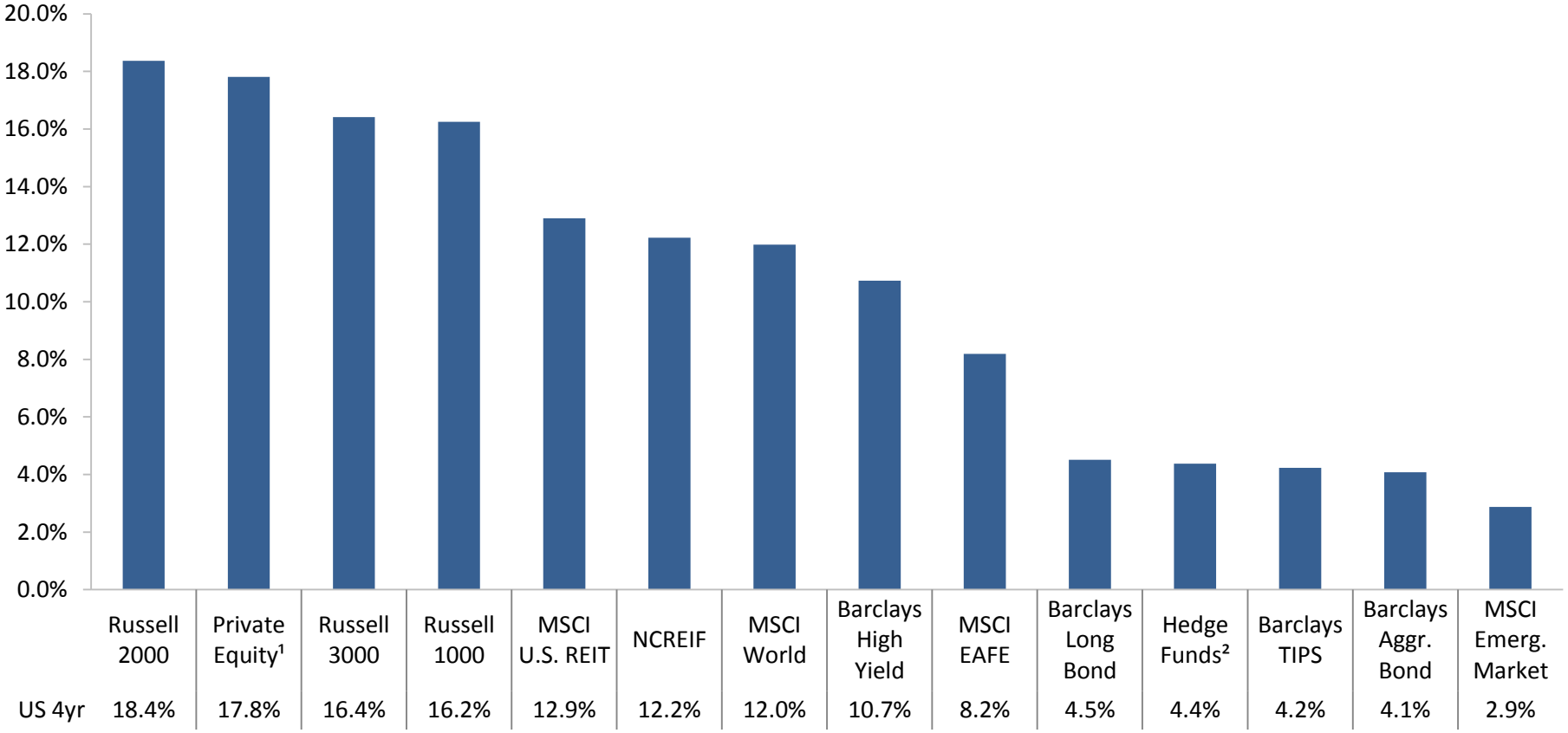
Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.



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 4-year policy return was 11.90%, 0.4% higher than your adjusted 4-year policy return of 11.50%. Mirroring this, without adjustment your 4-year total fund implementation impact would be 0.4% lower. Refer to the Research section page 6 for details.

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

4-Year returns for frequently used benchmark indices



	Russell 2000	Private Equity[1]	Russell 3000	Russell 1000	MSCI U.S. REIT	NCREIF	MSCI World	Barclays High Yield	MSCI EAFE	Barclays Long Bond	Hedge Funds[2]	Barclays TIPS	Barclays Aggr. Bond	MSCI Emerg. Market
US 4yr	18.4%	17.8%	16.4%	16.2%	12.9%	12.2%	12.0%	10.7%	8.2%	4.5%	4.4%	4.2%	4.1%	2.9%

1. 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 return reflect the average benchmark of all U.S. participants.

Your 4-year policy return was above the U.S. Public median.

Your 4-year policy return was above the U.S. Public median primarily because of the positive impact of your higher policy weight in:

• Private Equity, one of the better performing asset classes of the past 4 years. Your 4-year average policy weight of 12% compares to a U.S. Public average of 8%.

• U.S. Stock, one of the better performing asset classes of the past 4 years. Your 4-year average policy weight of 36% compares to a U.S. Public average of 26%.

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

4-Year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	36%	25%	26%
EAFE/Global/Emerging	18%	27%	25%
Total Stock	54%	53%	52%
U.S. Bonds	22%	19%	20%
High Yield Bonds	3%	2%	2%
Other Fixed Income	1%	6%	6%
Total Fixed Income	26%	27%	28%
Hedge Funds	0%	4%	4%
Real Estate incl. REITS	8%	6%	7%
Other Real Assets[1]	0%	2%	2%
Private Equity	12%	8%	8%
Total	100%	100%	100%

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

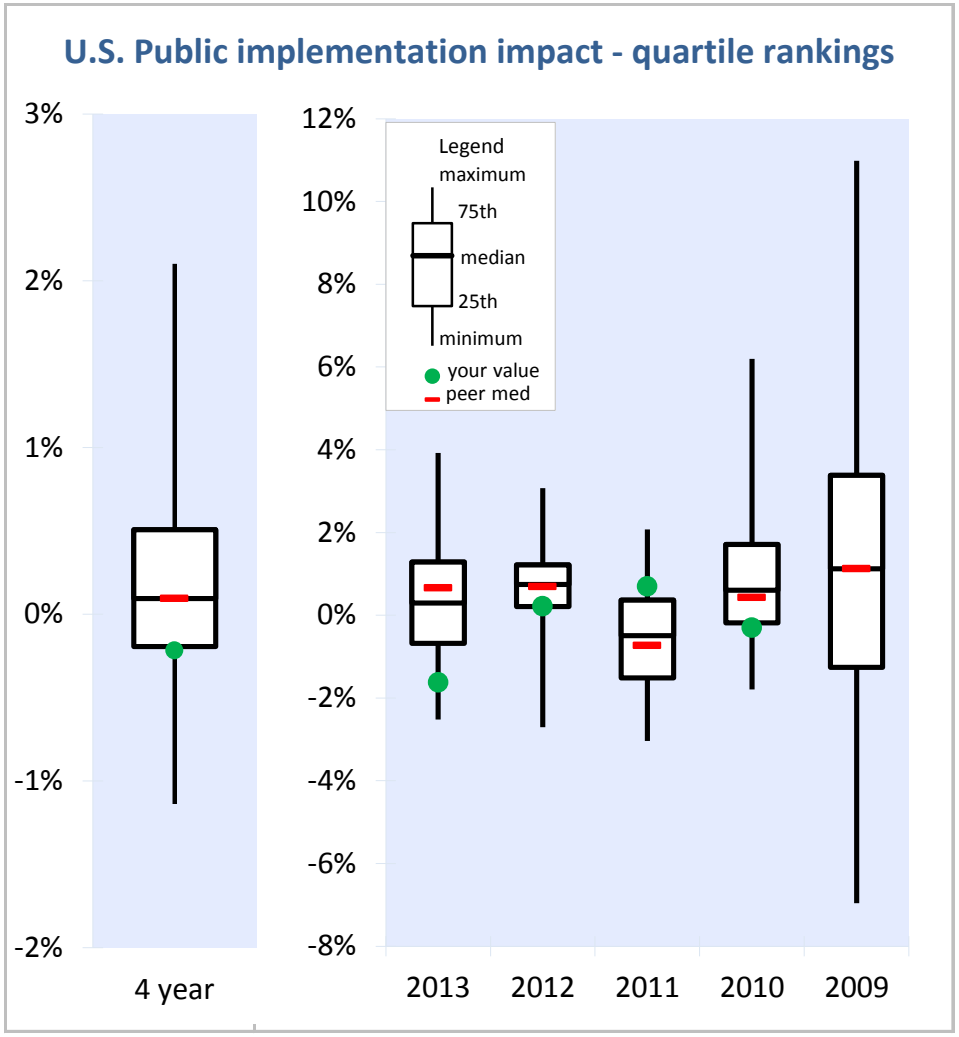
Implementation impact is the difference between total net return and policy return. Your 4-year implementation impact was -0.2%.

Implementation impact for Montana Board of Investments

Year	Net Return	Policy Return	Impl. Impact
2013	17.4%	19.1%	(1.6%)
2012	13.3%	13.1%	0.2%
2011	2.1%	1.4%	0.7%
2010	12.9%	13.2%	(0.3%)
4-year	11.3%	11.5%	(0.2%)

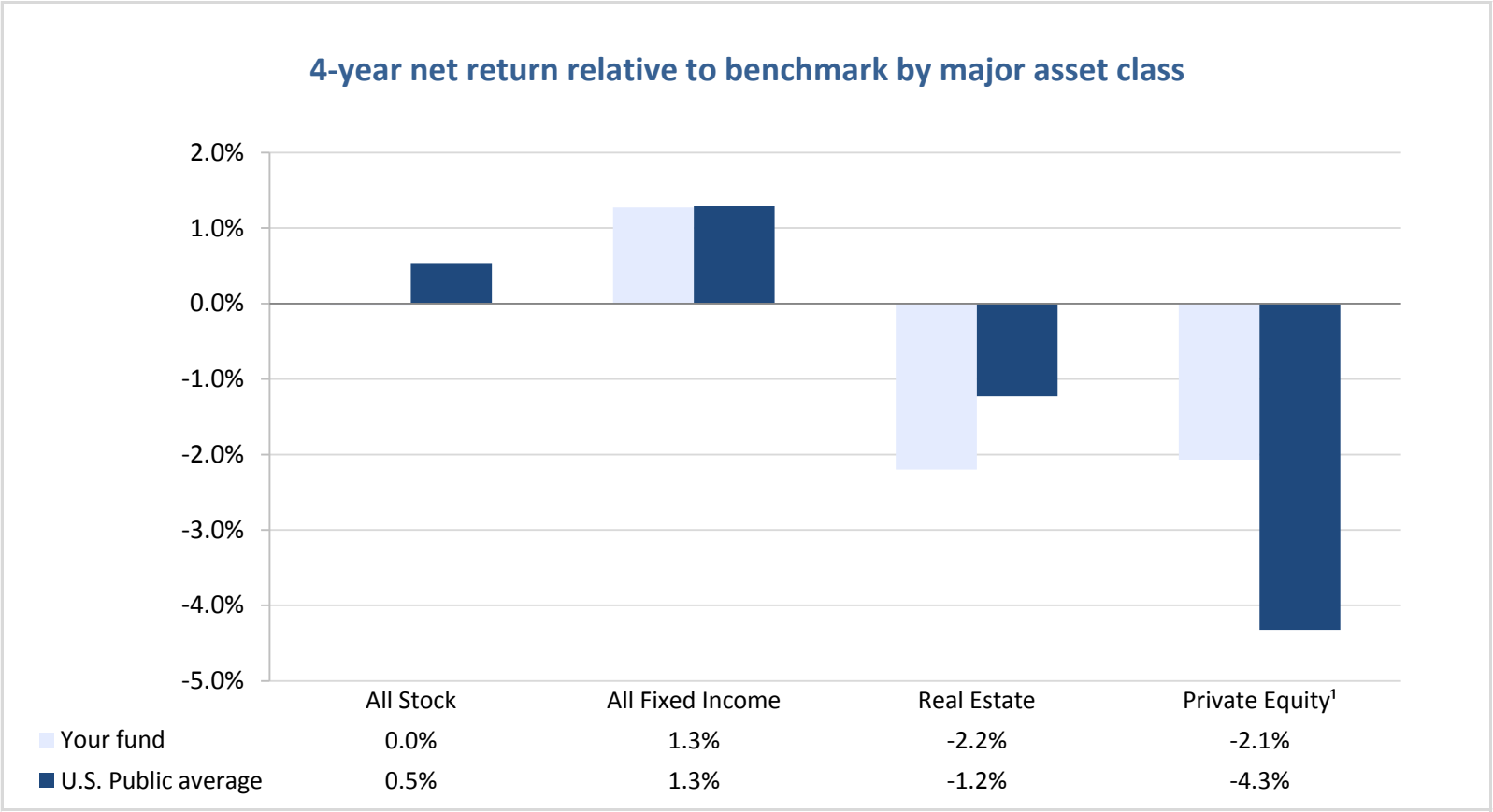
Implementation typically has a modest impact on total fund returns. Implementation impacts are mainly due to:

- 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.



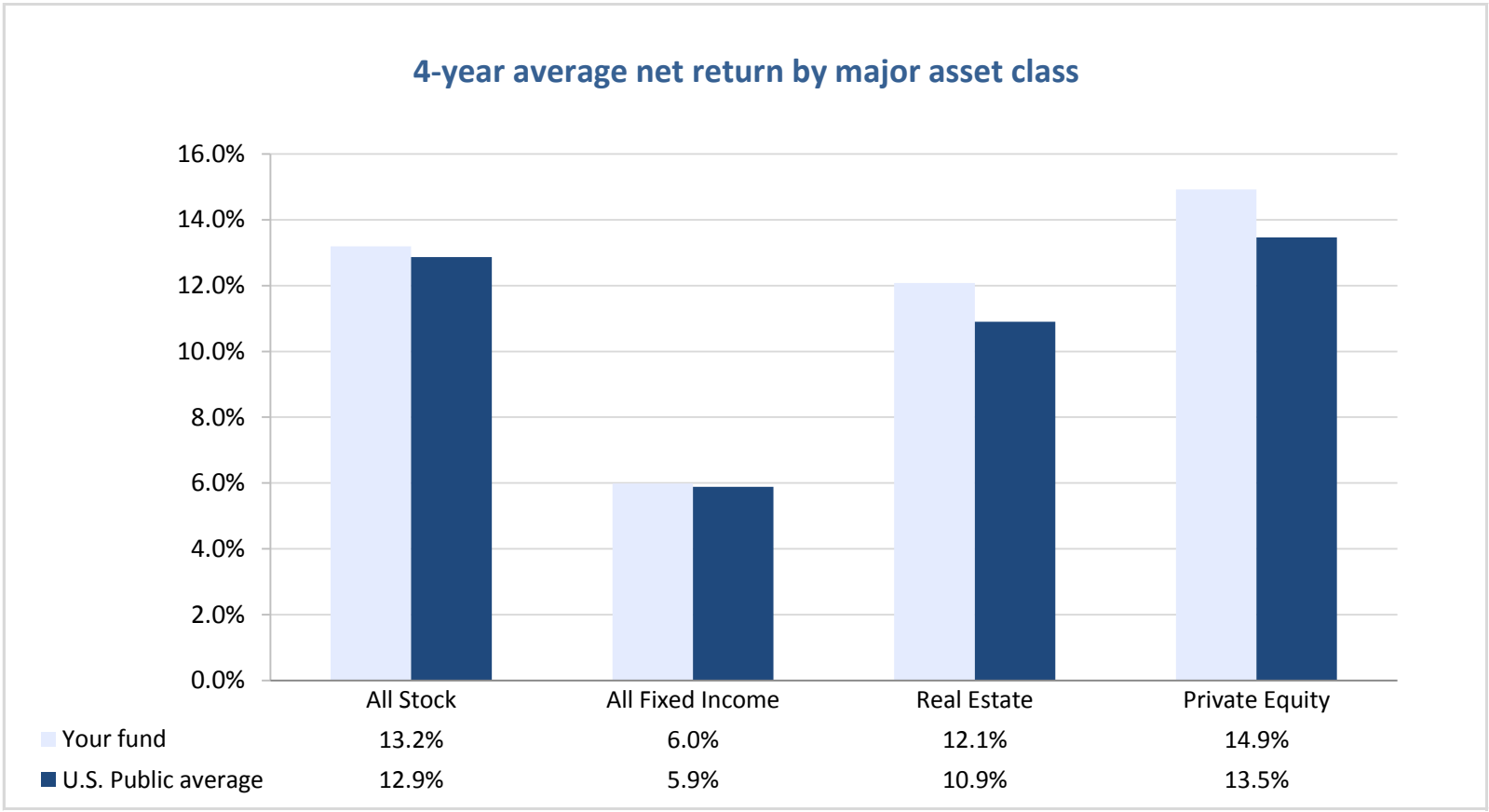
To enable fairer comparisons, the implementation impact for each participant including your fund was adjusted to reflect private equity benchmarks based on investable public market indices. Prior to this adjustment, your fund's 4-year total fund implementation impact was -0.6%.

Your 4-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 4-year private equity return relative to benchmark was -5.4%.

You had better 4-year net returns relative to the U.S. Public average in Stock, Fixed Income, Real Estate and Private Equity.



Your investment costs were $49.1 million or 56.7 basis points in 2013.

Asset management costs by asset class and style ($000s)

	Internal Mgmt		External Mgmt			
	Active	Overseeing of external	Active base fees	Perform. fees [1]	Total	
U.S. Stock - Large Cap		301	3,802		4,271	
U.S. Stock - Small/Mid Cap		70	3,598		3,740	
Stock - ACWIxU.S.		315	2,174		3,378	
Fixed Income - U.S.	339	84	672		1,094	
Fixed Income - High Yield		42	865		907	
Cash	17				17	
Real Estate		142	2,738	excluded [1]	2,880	
Real Estate - LPs		221	7,128	excluded [1]	7,350	
Diversified Private Equity		520	16,060	excluded [1]	16,580	
Diversified Priv. Eq.- Fund of Funds		145	6,783	excluded [1]	6,929	
Total asset management costs					47,145	54.5bp

Oversight, custodial and other costs [2]

Oversight of the fund	645
Trustee & custodial	1,023
Consulting and performance measurement	242
Audit	41
Total oversight, custodial & other costs	1,950 2.3bp
Total investment costs	49,096 56.7bp

[1] Total cost excludes carry/performance fees for real estate, infrastructure, hedge funds and private equity. Performance fees are included for the public market asset classes.

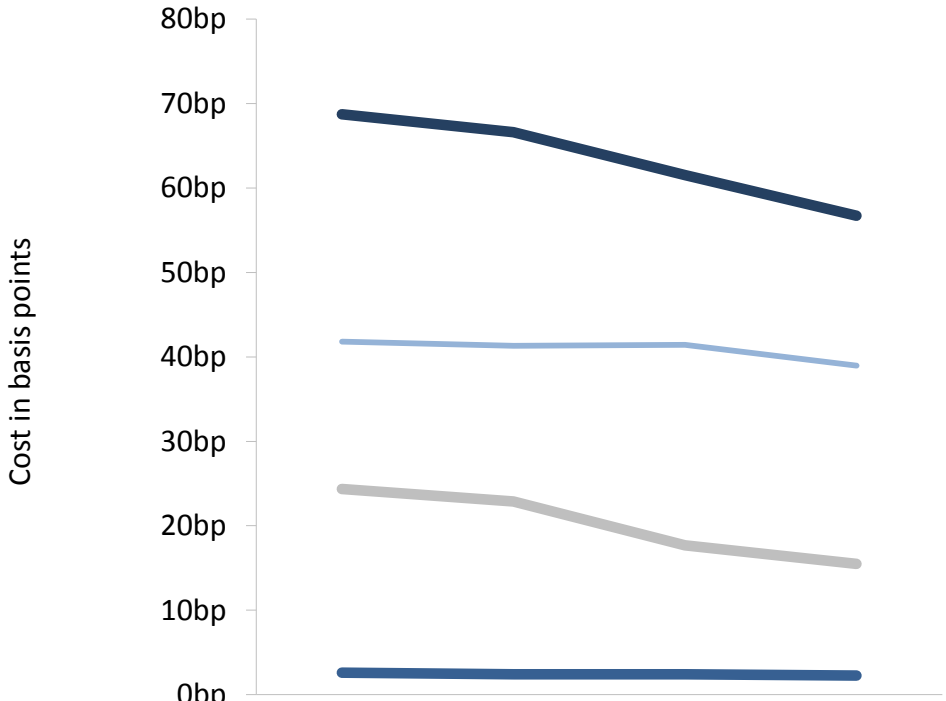
[2] Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

Your costs decreased between 2010 and 2013.

Your costs decreased primarily because:

- You increased your use of lower cost passive management from 14% of assets in 2010 to 34% in 2013. Specifically, you moved some U.S. Stock and ACWIxUS Stock from active to passive management.

Trend in your investment costs



	2010	2011	2012	2013
Public Assets	24.3	22.9	17.7	15.5
Private Assets	41.8	41.3	41.4	39.0
Oversight	2.6	2.4	2.4	2.3
Total Cost	68.7	66.6	61.5	56.7

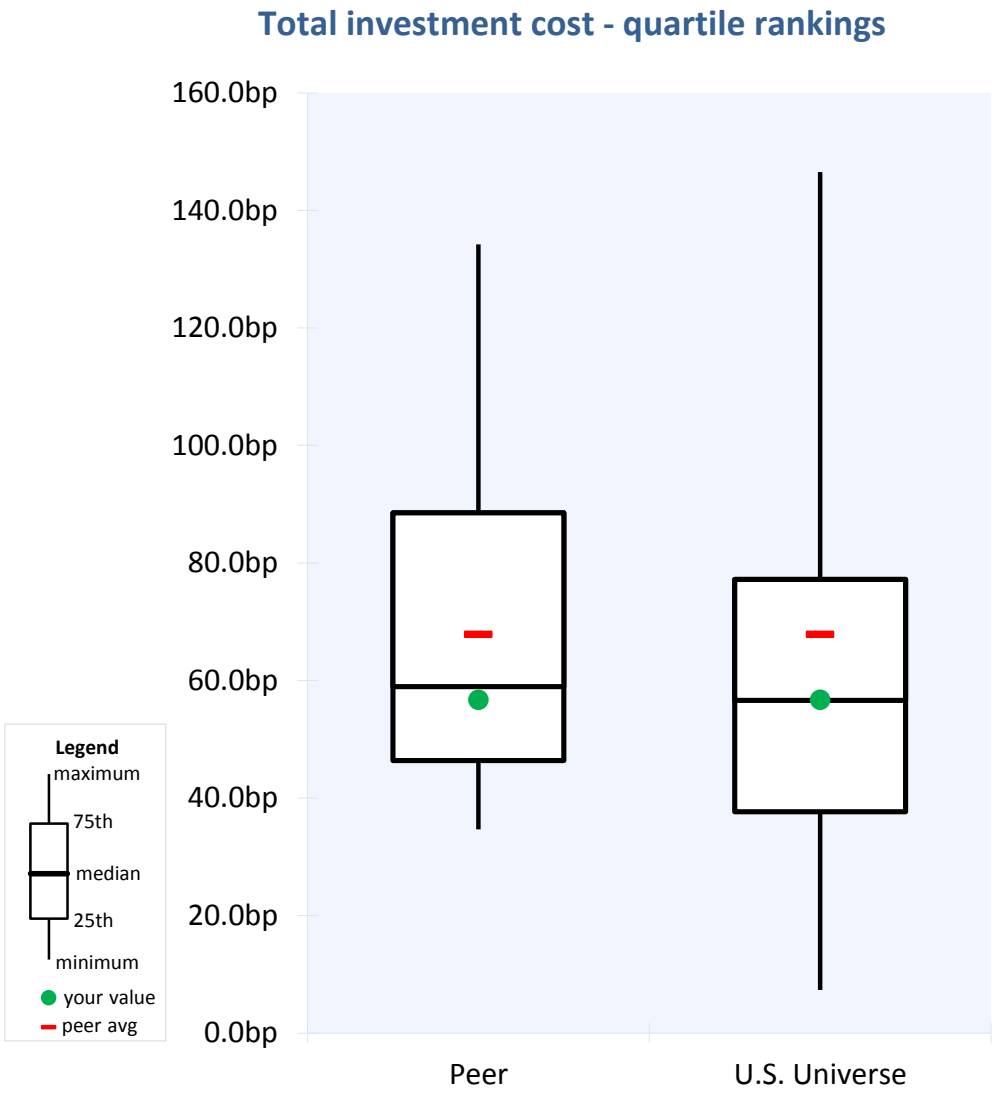
* 2011 Total cost has changed from 64.9 bps in your 2011 report to 66.6 bps as reported here due to a change in Private Equity holdings for 2011.

Your total investment cost of 56.7 bps was below the peer average of 67.9 bps.

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

- asset mix and
- fund size.

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 6.5 basis points in 2013.

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 56.7 bp was below your benchmark cost of 63.2 bp. Thus, your cost savings was 6.5 bp.

Your cost versus benchmark

	$000s	basis points
Your total investment cost	49,096	56.7 bp
Your benchmark cost	54,718	63.2 bp
Your excess cost	(5,622)	(6.5) bp

Your fund was slightly low cost because you had a lower cost implementation style and you paid less than peers for similar mandates.

Reasons for your low cost status

	Excess Cost/ (Savings) $000s	bps
1. Lower cost implementation style		
• Less fund of funds	(272)	(0.3)
• Less external active management (vs. lower cost passive and internal)	(3,274)	(3.8)
• Less overlays	(652)	(0.8)
• Other style differences	39	0.0
	(4,159)	(4.8)
2. Paying less than peers for similar mandates		
• External investment management costs	(512)	(0.6)
• Internal investment management costs	(33)	(0.0)
• Oversight, custodial & other costs	(919)	(1.1)
	(1,463)	(1.7)
Total savings	(5,622)	(6.5)

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

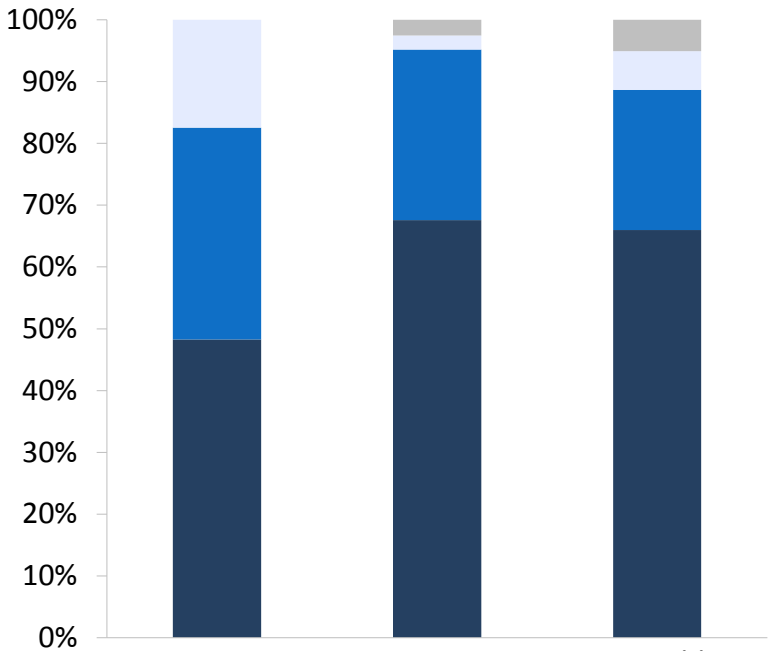
Implementation style is defined as the way in which your fund implements asset allocation. It includes internal, external, active, passive and fund of funds styles.

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 48% versus 68% 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 17% of hedge funds, real estate and private equity in fund of funds compared to 18% for your peers.

Implementation style[1]



	Your Fund	Peers	U.S. Public Funds
Internal passive	0%	3%	5%
Internal active	17%	2%	6%
External passive	34%	28%	23%
External active	48%	68%	66%

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

Differences in implementation style saved you 4.8 bp relative to your peers.

Calculation of the cost impact of differences in implementation style

Asset class	Your avg holdings in $mils	% External active: You	% External active: Peer average	% External active: More/ (less)	Premium vs passive & internal[1]	Cost/ (savings) $000s	Cost/ (savings) bps
	(A)			(B)	(C)	(A X B X C)	
U.S. Stock - Large Cap	2,650	29.4%	34.9%	(5.4%)	36.9 bp	(531)	
U.S. Stock - Small/Mid Cap	615	84.4%	96.6%	(12.1%)	55.6 bp	(415)	
Stock - ACWIxU.S.	1,494	33.1%	54.5%	(21.4%)	46.3 bp	(1,479)	
Fixed Income - U.S.	1,731	19.8%	72.6%	(52.8%)	15.5 bp	(1,415)	
Fixed Income - High Yield	173	100.0%	100.0%	0.0%		0	
Real Estate ex-REITs	961	100.0%	100.0%	0.0%		0	
of which Ltd Partnerships represent:		67.9%	37.4%	30.5%	19.3 bp	567	
Diversified Private Equity	1,631	100.0%	100.0%	0.0%		0	
Impact of less/more external active vs. lower cost styles						(3,274)	(3.8) bp
		Fund of funds % of LPs			Premium vs. direct LP[1]		
Real Estate ex-REITs - LPs	652	0.0%	2.2%	(2.2%)	Insufficient[2]	0	
Diversified Private Equity - LPs	1,631	27.8%	30.5%	(2.7%)	60.9 bp	(272)	
Impact of less/more fund of funds vs. direct LPs						(272)	(0.3) bp
		Overlays and other					
Impact of lower use of portfolio level overlays						(652)	(0.8) bp
Impact of mix of internal passive, internal active, and external passive[3]						39	0.0 bp
Total impact of differences in implementation style						(4,159)	(4.8) 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 saved you 0.6 bps.

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

	Your avg holdings in $mils	Cost in bps			Cost/ (savings) in $000s
		Your Fund	Peer median	More/ (less)	
	(A)			(B)	(A X B)
U.S. Stock - Large Cap - Passive	1,870	0.9	1.2	(0.3)	(62)
U.S. Stock - Large Cap - Active	780	52.6	38.2	14.4	1,126
U.S. Stock - Small/Mid Cap - Passive	96	7.6	4.2*	3.4	33
U.S. Stock - Small/Mid Cap - Active	519	70.6	59.8	10.8	563
Stock - ACWIxU.S. - Passive	999	8.9	3.8	5.1	507
Stock - ACWIxU.S. - Active	495	50.3	50.1	0.2	9
Fixed Income - U.S. - Active	343	22.0	17.9	4.1	142
Fixed Income - High Yield - Active	173	52.5	40.9	11.6	201
Real Estate ex-REITs - Active	309	93.3	93.3	0.0	0
Real Estate ex-REITs - Limited Partnership	652	112.7	112.7	0.0	0
Diversified Private Equity - Active	1,177	140.8	165.0	(24.2)	(2,848)
Diversified Private Equity - Fund of Fund[1]	453	56.9	60.9	(4.0)	(183)
Total impact of paying more/less for external management					(512)
Total in bps					(0.6) 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 was 0.0 bps.

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

	Your avg holdings in $mils	Cost in bps			Cost/ (savings) in $000s
		Your Fund	Peer median	More/ (less)	
	(A)			(B)	(A X B)
Fixed Income - U.S. - Active	1,388	2.4	2.7*	(0.2)	(33)
Total impact of paying more/less for internal management					(33)
Total in bps					(0.0) bp

*Universe median used as peer data was insufficient.

The net impact of differences in oversight, custodial & other costs saved 1.1 bps.

Cost impact of differences in oversight, custodial & other costs

	Your avg holdings in $mils	Cost in bps			Cost/ (savings) in $000s
		Your fund	Peer median	More/ (less)	
	(A)			(B)	(A X B)
Oversight	8,657	0.7	1.3	(0.6)	(491)
Custodial*	8,657	1.2	0.5	0.7	597
Consulting	8,657	0.3	1.0	(0.7)	(582)
Audit	8,657	0.0	0.1	(0.0)	(38)
Other	8,657	0.0	0.5	(0.5)	(405)
Total					(919)
Total in bps					(1.1) bp

* Important additional information about your custodial cost relative to peers:
1. The peer median cost of 0.5 bps is unusually low. The U.S. Universe median custodial cost was 1.1 bps (See page 36 of Section 6).
2. You have a more complex structure than your peers. (You have 9 plans on your platform, 10 peers have only 1 plan, and the peer average is 2.5 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 and you paid less than peers for similar mandates.

Reasons for your low cost status

	Excess Cost/ (Savings) $000s	bps
1. Lower cost implementation style		
• Less fund of funds	(272)	(0.3)
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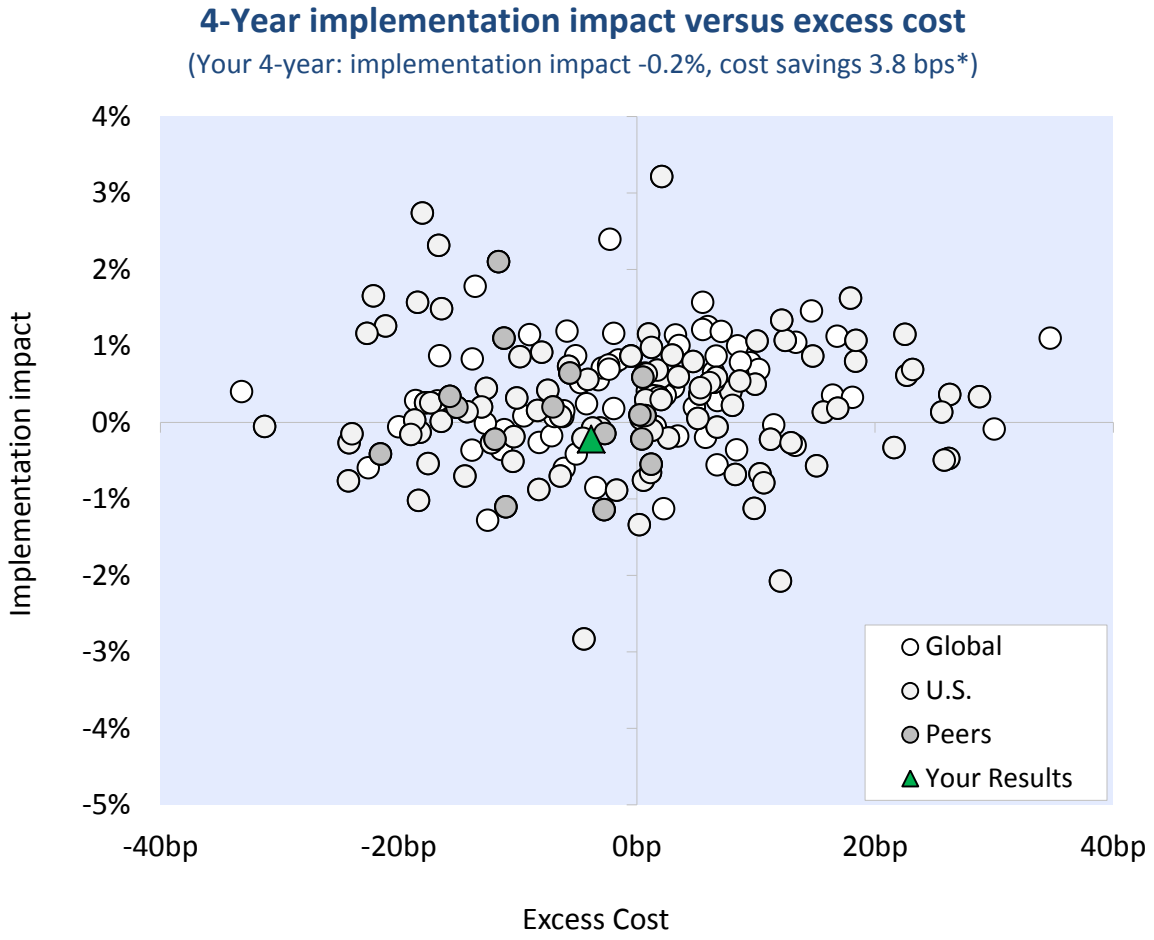
• Oversight, custodial & other costs	(919)	(1.1)
	(1,463)	(1.7)
Total savings	(5,622)	(6.5)

Your fund had a 4-year implementation impact of -0.2% and cost savings of 3.8 bps on the cost effectiveness chart.



Summary of key takeaways

Returns

- Your 4-year net total return was 11.3%. This was above the U.S. Public median of 10.4% and above the peer median of 10.2%.
- Your 4-year policy return was 11.5%. This was above the U.S. Public median of 10.4% and above the peer median of 10.1%.

Implementation impact

- Your 4-year implementation impact was -0.2%. This was below the U.S. Public median of 0.1% and below the peer median of 0.1%.

Cost and cost effectiveness

- Your investment cost of 56.7 bps was below your benchmark cost of 63.2 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 and you paid less than peers for similar mandates..
- Your fund had a 4-year implementation impact of -0.2% and cost savings of 3.8 bps on the cost effectiveness chart.

Key Trends and Research Insights from The CEM Global Investment Performance Database

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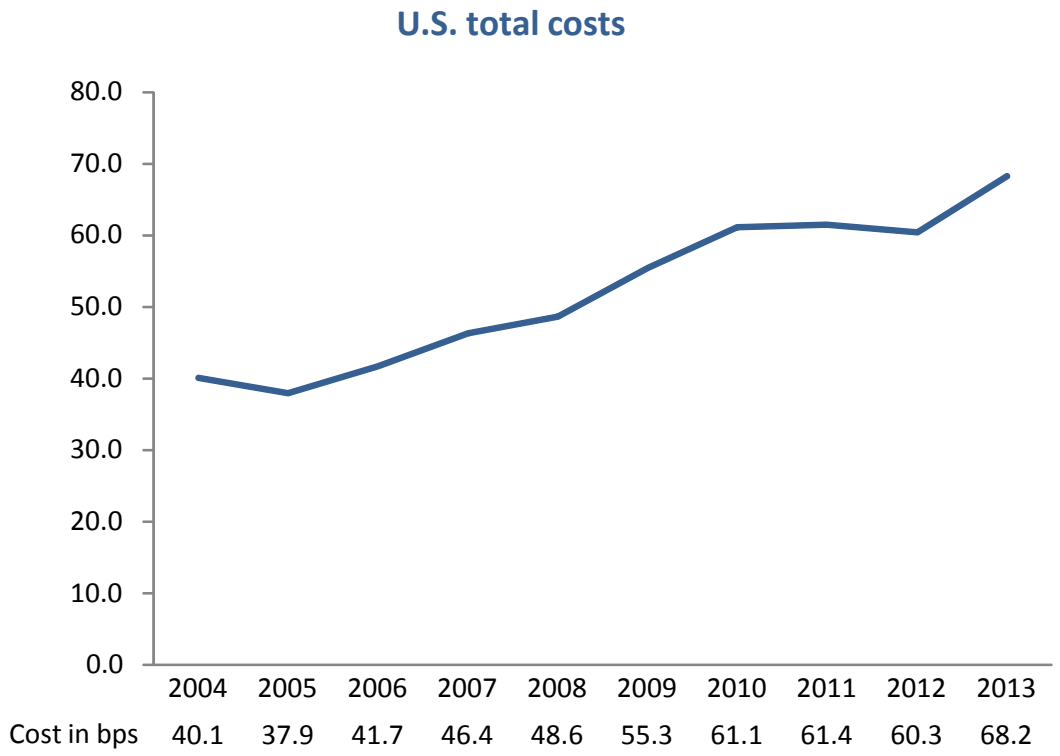
CEM Benchmarking
What gets measured gets managed

U.S. fund costs have grown by 28 basis points on average over the last 10 years.

Reasons for the increase in costs include:

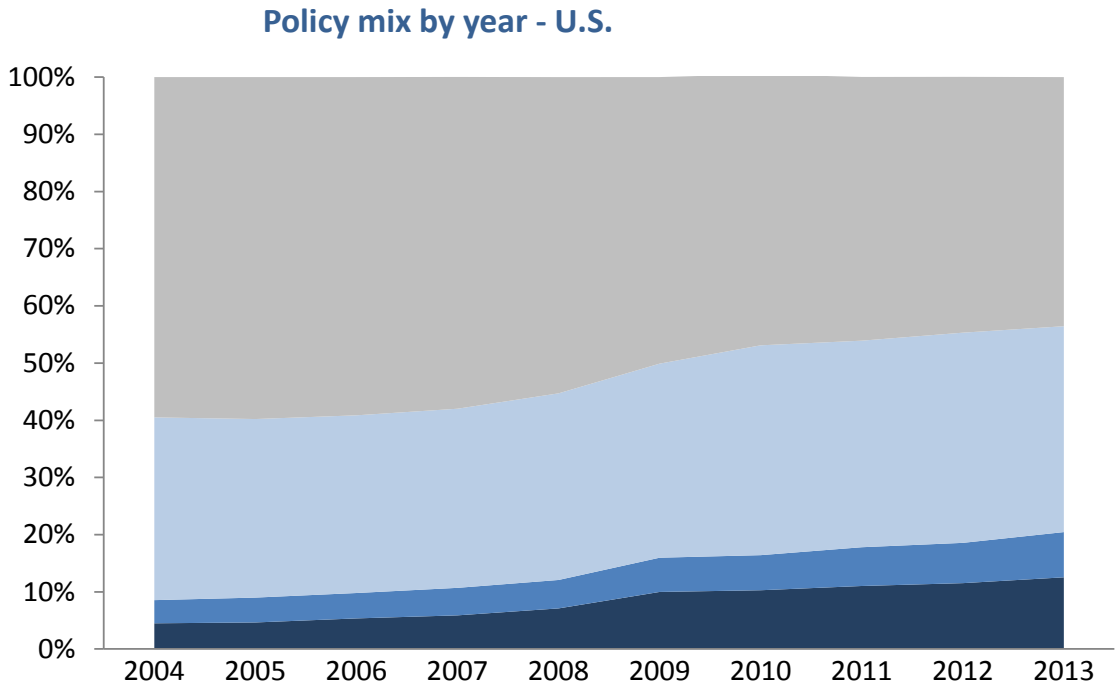
• Allocation to the more expensive asset classes - hedge funds, real assets and private equity- increased from 5% to 11% on average.

• Use of the most expensive implementation style, external active management, increased from 69% to 75% on average.



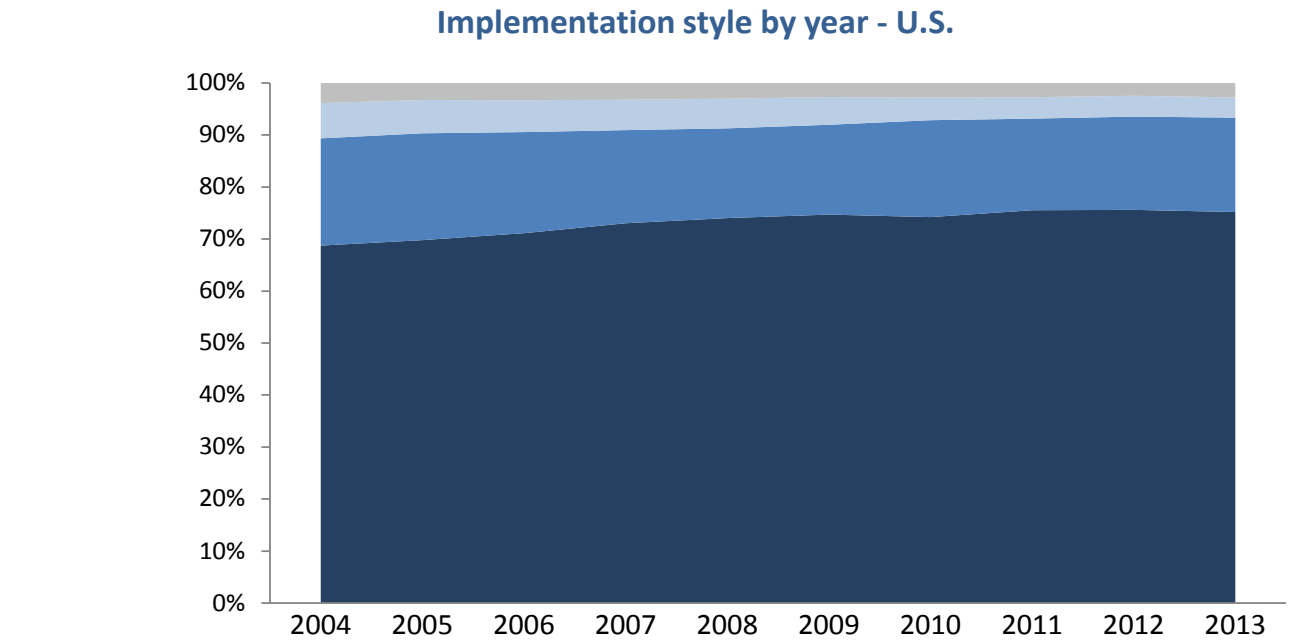
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cost in bps	40.1	37.9	41.7	46.4	48.6	55.3	61.1	61.4	60.3	68.2

For U.S. plans, real asset, private equity & hedge fund policy weights grew from a total of 8.6% in 2004 to 20.4% in 2013.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Stock	59%	60%	59%	58%	55%	50%	47%	46%	45%	44%
Fixed Income	32%	31%	31%	31%	33%	34%	37%	36%	37%	36%
Real Assets	4%	4%	4%	5%	5%	6%	6%	7%	7%	8%
Priv. Equity & Hedge Funds	5%	5%	5%	6%	7%	10%	10%	11%	12%	13%

For U.S. plans, external active management increased from 69% to 75% over the past 10 years.



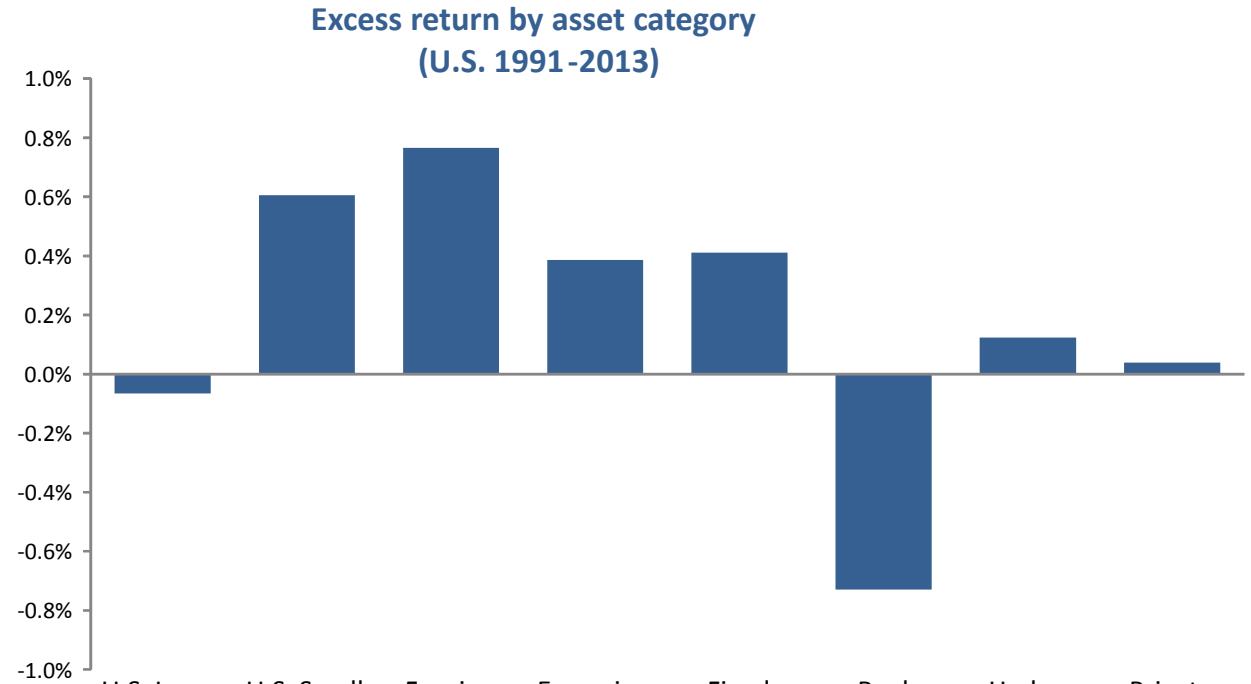
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
% Internal passive	4%	3%	3%	3%	3%	3%	3%	3%	2%	3%
% Internal active	7%	6%	6%	6%	6%	5%	4%	4%	4%	4%
% External passive	21%	21%	19%	18%	17%	17%	19%	18%	18%	18%
% External active	69%	70%	71%	73%	74%	75%	74%	76%	76%	75%

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 23 bps of value added from implementation after costs.

U.S. Funds (23-year average)	
Total Return	9.97%
- Policy Return	9.28%
- Costs	0.46%
= Value Added	0.23%

In the U.S., the asset class with the highest excess return relative to benchmarks over the past 23 years was Foreign Stock.



	U.S. Large Cap	U.S. Small Cap	Foreign Stock	Emerging Stock	Fixed Income	Real Estate	Hedge Fund[1]	Private Equity[2]
Excess return[3]	-0.07	0.60	0.77	0.39	0.41	-0.73	0.12	0.04

1. Hedge Fund excess return performance reflect data for the 14 year period from 2000 to 2013.
2. The excess return calculation for private equity uses the average benchmark of all U.S. participants.
3. Excess return analysis is from 3,873 annual fund performance observations from the CEM U.S. universe for the 23-year period ending 2013. Excess return reflects the asset weighted excess return of all mandates in each asset category including indexed holdings. Averages shown above are the simple average of the annual averages of all observations of funds with holdings in the asset category for each year.

Fund characteristics associated with higher implementation value added over the past 23 years:

1. More internal management was better.

2. Large funds did better than small funds.

More internal management was better.

A 10% increase in internal management was associated with 1.5 bps higher implementation value added.

- Internal management was better primarily because of lower costs.

- Internal management increases with fund size. Funds under $10 billion manage 8% of assets internally on average. Funds over $50 billion manage 51% of assets internally on average.

- Fixed income is the most likely asset class to be managed internally followed by public equity and real estate. A few very large funds manage some of their private equity program internally.

Large funds did better than small funds over the past 23 years.

For a ten-fold increase in size, implementation value added increased by 18 bps.

Larger funds outperform because of:

- Lower total costs from scale economies
- More internal management
- Higher holdings in asset classes where value added was higher like U.S. Small Cap Stock.
- Higher holdings and lower cost implementation in private equity and real estate.

DB plans have outperformed DC plans in the U.S.

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

	17-yr average ending 2013[2]		
	DB	DC	Difference
Total return	7.92%	6.85%	1.07%
- Policy return[1]	7.27%	6.42%	0.85%
- Costs	0.48%	0.40%	0.08%
= Implementation value added	0.16%	0.03%	0.13%
# of observations	3,048	1,995	

1. DC policy return = weights of holdings X benchmarks
2. Returns are the compound average of annual averages.

Asset mix differences have been the primary reason for the better performance of U.S. DB plans.

DB versus DC asset mix - U.S.

Asset class	Asset mix[1]		Returns[2]	
(Ranked by returns)	DB	DC	DB	DC
Private Equity	4%	n/a	11.8%	n/a
Real Assets	5%	n/a	9.4%	n/a
Small Cap Stock	6%	7%	10.2%	8.4%
Employer Stock	0%	21%	n/a	8.6%
Fixed Income	31%	10%	6.8%	6.7%
Hedge Funds	2%	n/a	7.7%	n/a
Stock U.S. Large Cap or Broad	26%	30%	6.9%	6.1%
Stock Non U.S. or Global	24%	7%	5.0%	6.5%
Stable Value/GICs	n/a	17%	n/a	4.9%
Cash	2%	8%	3.0%	3.2%
Total	100%	100%	7.9%	6.9%
# of observations	3,048	1,995		

1. 23 years ending 2013. Equals simple average of annual asset mix weights.
2. 23 years from 1997 to 2013. Returns are the compound 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.