

North Carolina Retirement Systems Investment Benchmarking Results

For the 5 year period ending December 2013



Key takeaways

Returns

- Your 5-year net total return was 10.5%. This was below the U.S. Public median of 12.1% and below the peer median of 12.1%.
- Your 5-year policy return was 10.4%. This was below the U.S. Public median of 12.0% and below the peer median of 11.2%.

Value added

- Your 5-year net value added was 0.1%. This was equal to the U.S. Public median of 0.1% and equal to the peer median of 0.1%.

Cost and cost effectiveness

- Your total investment cost of 45.9 bps was below the peer median of 58.8 bps.
- Your investment cost of 45.9 bps was above your benchmark cost of 43.3 bps. This suggests that your fund was slightly high cost compared to your peers.
- Your fund was slightly high cost because you had a higher cost implementation style.
- Your 2013 performance placed in the positive value added, high cost quadrant of the cost effectiveness chart.

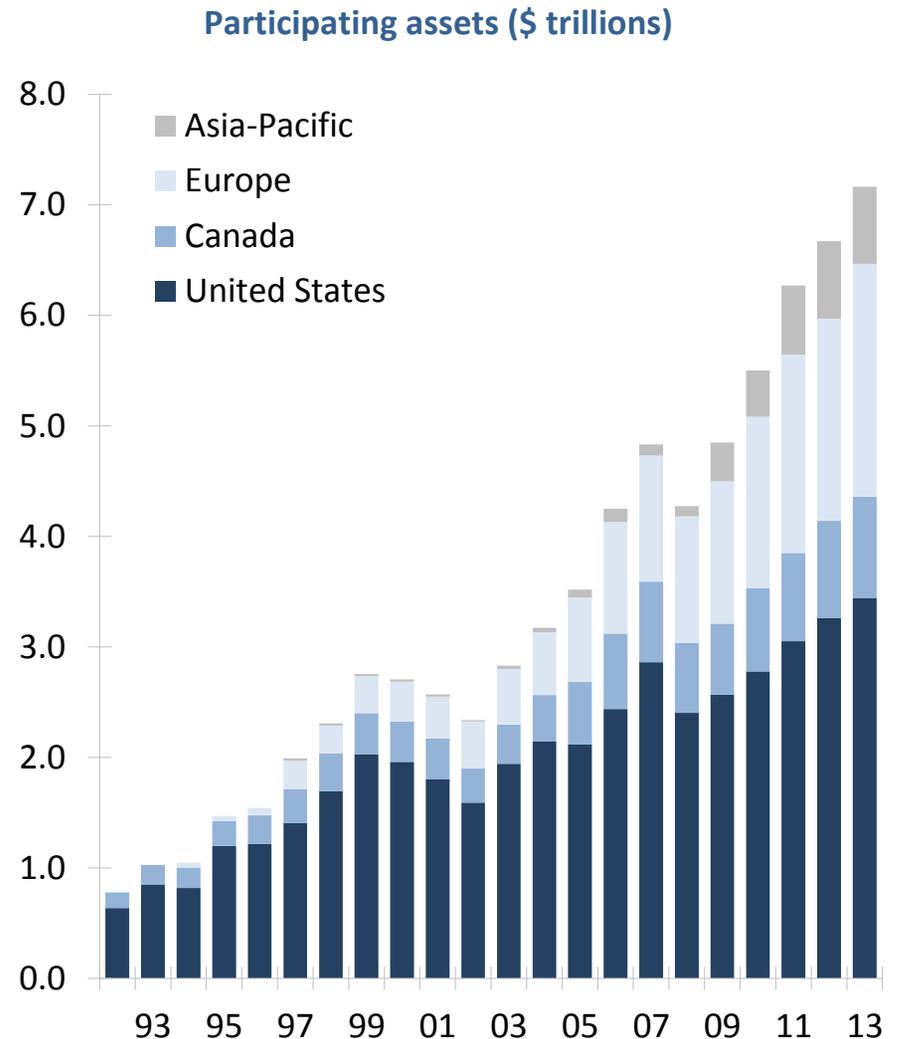
Risk

- Your asset risk of 9.7% was below the U.S. Public median of 10.5%.

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

- 186 U.S. pension funds participate. The median U.S. fund had assets of \$6.4 billion and the average U.S. fund had assets of \$18.5 billion. Total participating U.S. assets were \$3.4 trillion.
- 87 Canadian funds participate with assets totaling \$915 billion.
- 79 European funds participate with aggregate assets of \$2.1 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.

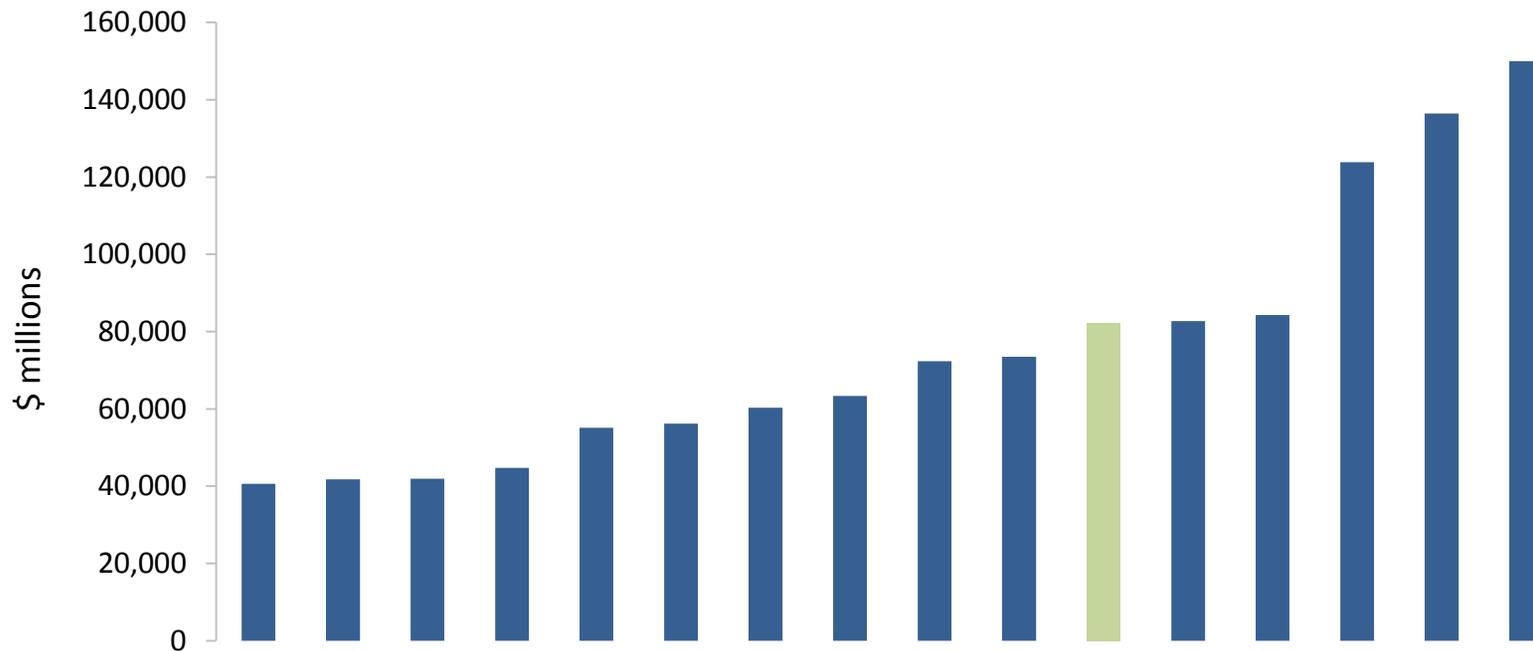
The most meaningful comparisons for your returns and value added are to the U.S. Public universe which consists of 59 funds.



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

Peer group for North Carolina Retirement Systems

- 16 U.S. public sponsors from \$41 billion to \$150 billion
- Median size of \$68 billion versus your \$82 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? What was the impact of your policy mix decisions versus implementation decisions?

2. Net value added

Are your implementation decisions (i.e., the amount of active versus passive management) adding value?

3. Costs

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

4. Cost effectiveness

Net implementation value added versus excess cost. Does paying more get you more?

5. Risk

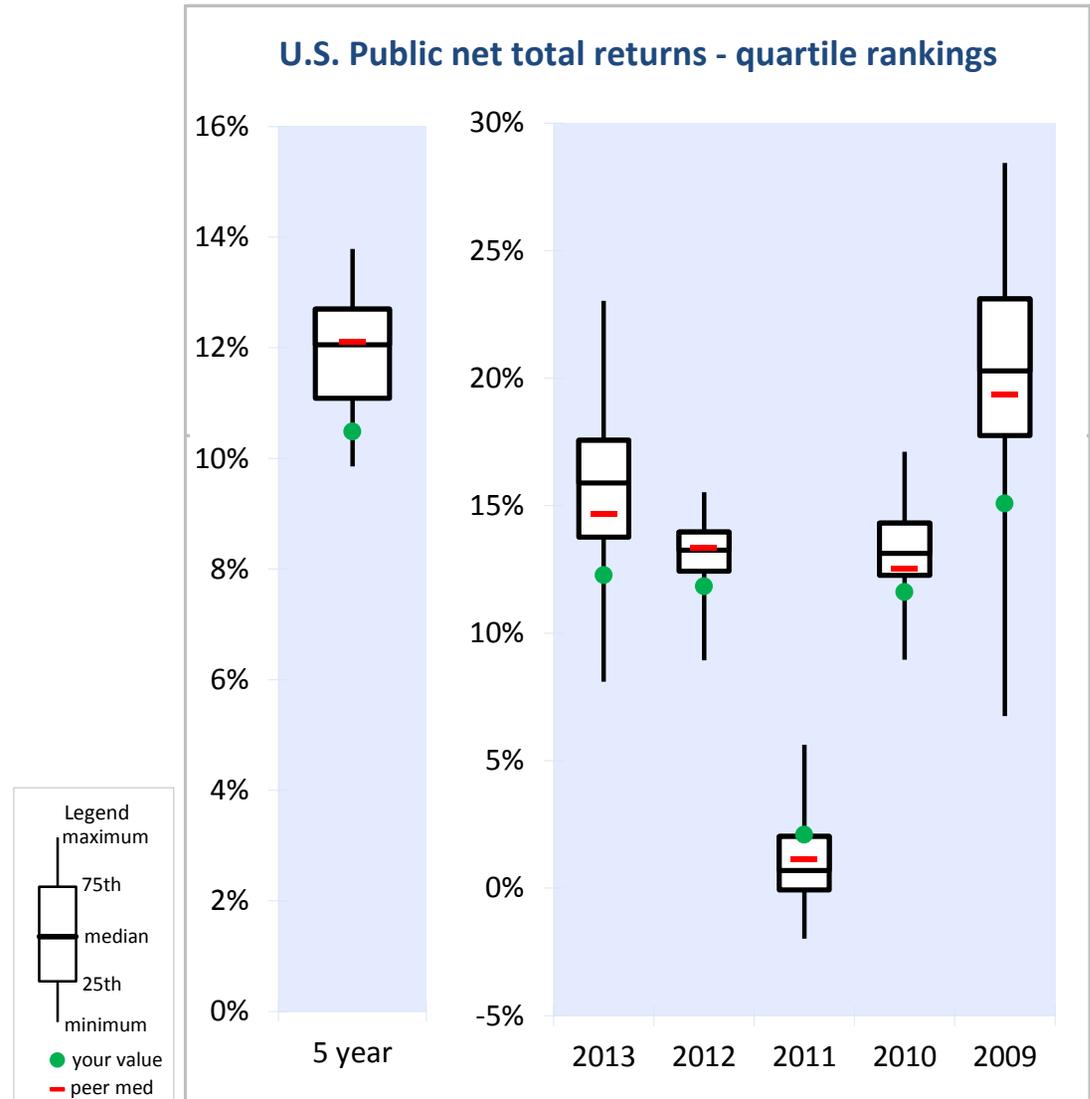
What is the risk of your policy mix?

Your 5-year net total return of 10.5% was below both the U.S. Public median of 12.1% and the peer median of 12.1%.

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	10.5%
- Policy return	10.4%
= Net value added	0.1%

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).



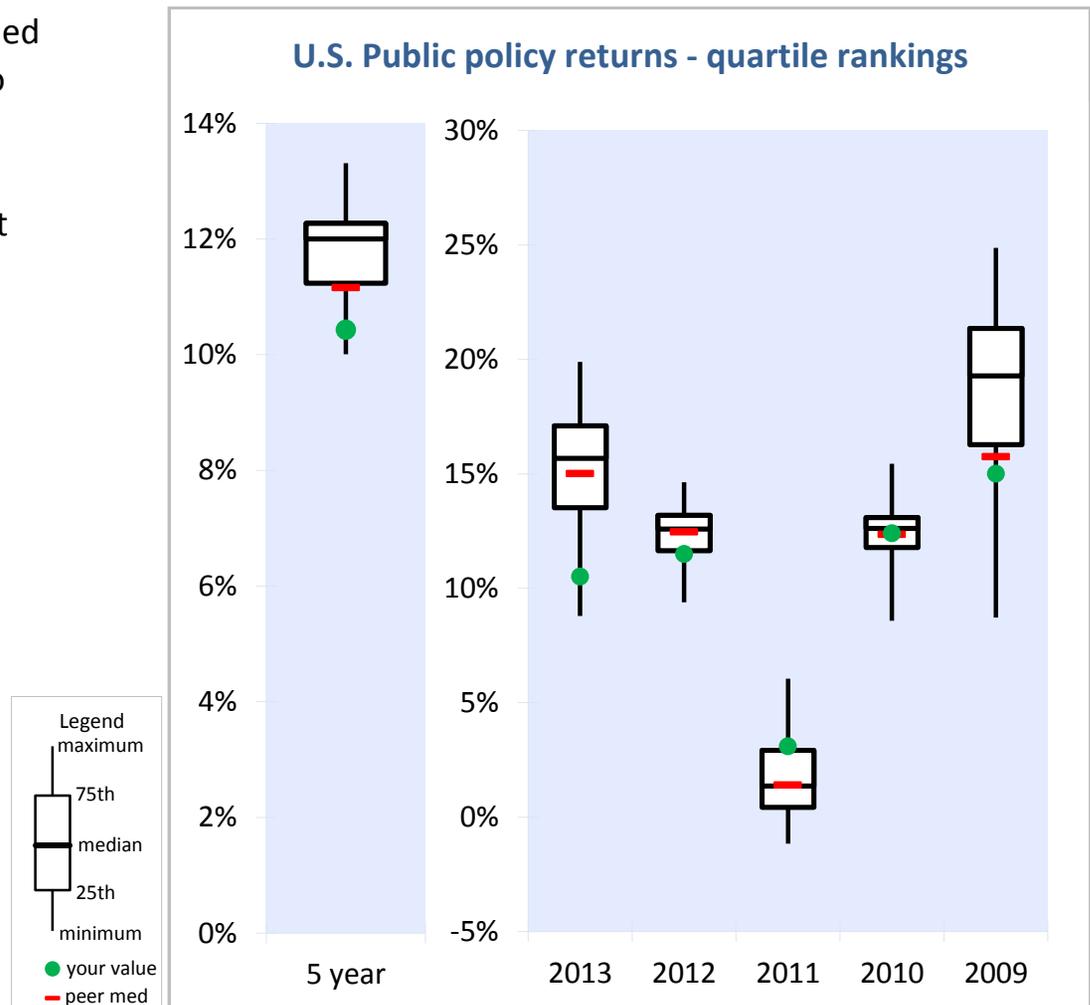
Your 5-year policy return of 10.4% was below both the U.S. Public median of 12.0% and the peer median of 11.2%.

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

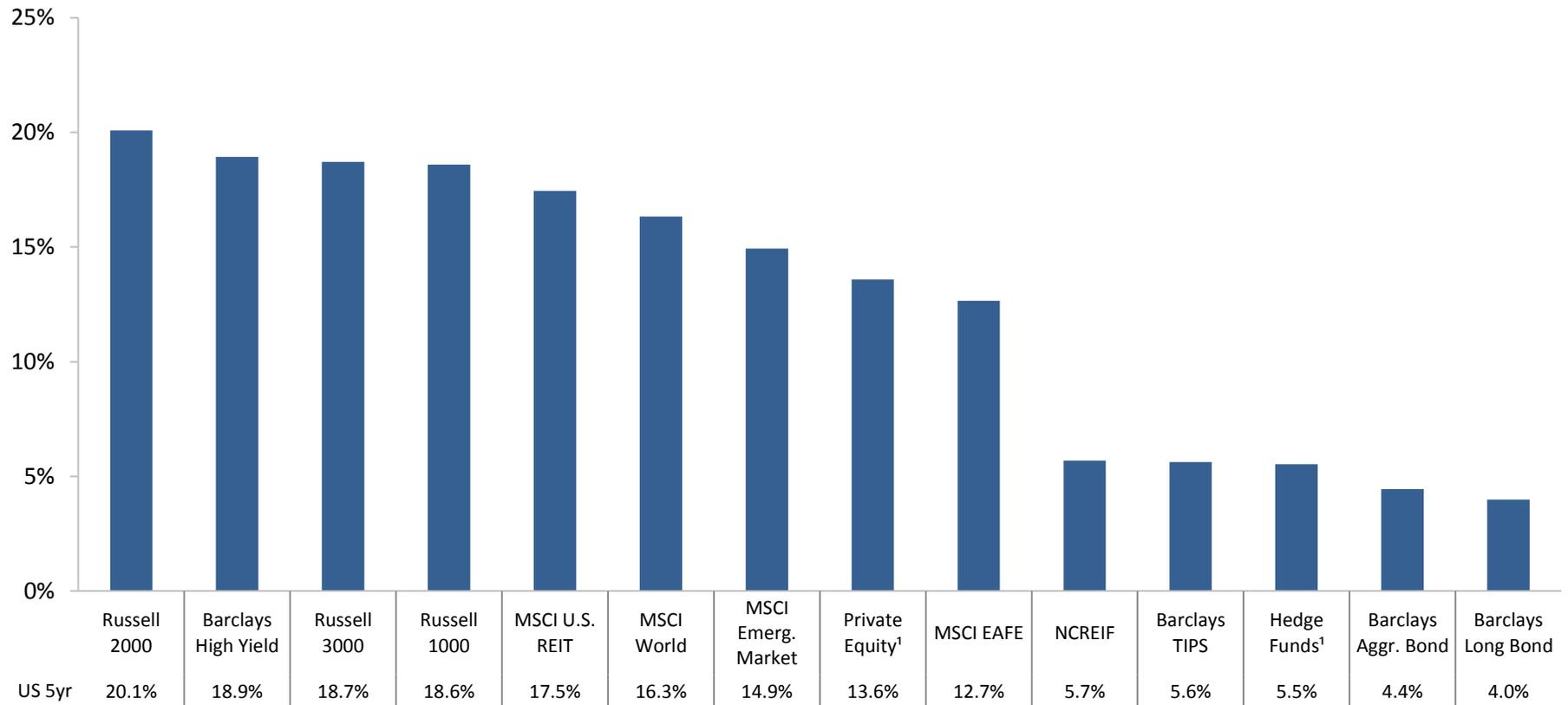
Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.



To enable fairer comparisons, the policy returns of all participants with policy weight in private equity were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Refer to the Research section pages 6-7 for details.

Differences in policy returns are caused by differences in benchmarks and policy mix. The two best performing asset classes for the 5 years ending 2013 were small cap stock (Russell 2000) and high yield bonds.

5-Year returns for frequently used benchmark indices



1. The hedge fund benchmark is the average benchmark return reported by U.S. participants. The private equity benchmark is the average of the default private equity benchmark returns applied to U.S. participants.

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

- The negative impact of your higher weight in one of the poorer performing asset classes of the past 5 years: U.S. Bonds (your 35% 5-year average weight versus a U.S. public fund average of 20%).
- The negative impact of your lower weight in one of the better performing asset classes of the past 5 years: Stock (your 46% 5-year average weight versus a U.S. public fund average of 52%).

5-Year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	25%	23%	27%
EAFE Stock	9%	9%	7%
Emerging Market Stock	3%	3%	2%
ACWIxUS Stock	7%	6%	9%
Global Stock	3%	8%	6%
Other Stock	1%	1%	1%
Total Stock	46%	50%	52%
U.S. Bonds	35%	18%	20%
Cash	0%	1%	1%
Other Fixed Income ¹	1%	9%	7%
Total Fixed Income	37%	27%	28%
Hedge Funds	2%	3%	3%
Commodities	1%	1%	1%
Natural Resources	1%	0%	0%
Real Estate incl. REITS	7%	9%	7%
Other Real Assets	0%	0%	1%
Private Equity	6%	10%	7%
Total	100%	100%	100%

1. Other fixed income includes Inflation Indexed, High Yield and Global bonds.

Your policy asset mix has changed over the past 5 years. At the end of 2013 your policy mix compared to your peers and the U.S. Public universe as follows:

Policy asset mix

Asset class	Your fund		Peer avg.	U.S. Public avg.
	2009	2013	2013	2013
U.S. Stock	33%	20%	19%	24%
EAFE Stock	10%	15%	11%	7%
Emerging Market Stock	2%	4%	4%	2%
ACWIxUS Stock	3%	0%	3%	8%
Global Stock	2%	0%	9%	8%
Other Stock	0%	2%	1%	2%
Total Stock	51%	40%	47%	51%
U.S. Bonds	35%	36%	15%	19%
Cash	1%	0%	1%	0%
Other Fixed Income ¹	2%	0%	10%	8%
Total Fixed Income	38%	36%	26%	27%
Hedge Funds	1%	3%	4%	4%
Commodities	0%	1%	1%	1%
Natural Resources	0%	3%	1%	1%
Real Estate incl. REITS	5%	8%	10%	7%
Other Real Assets	0%	0%	1%	1%
Private Equity	5%	8%	11%	8%
Total	100%	100%	100%	100%

1. Other fixed income includes Inflation Indexed, High Yield and and Global bonds.

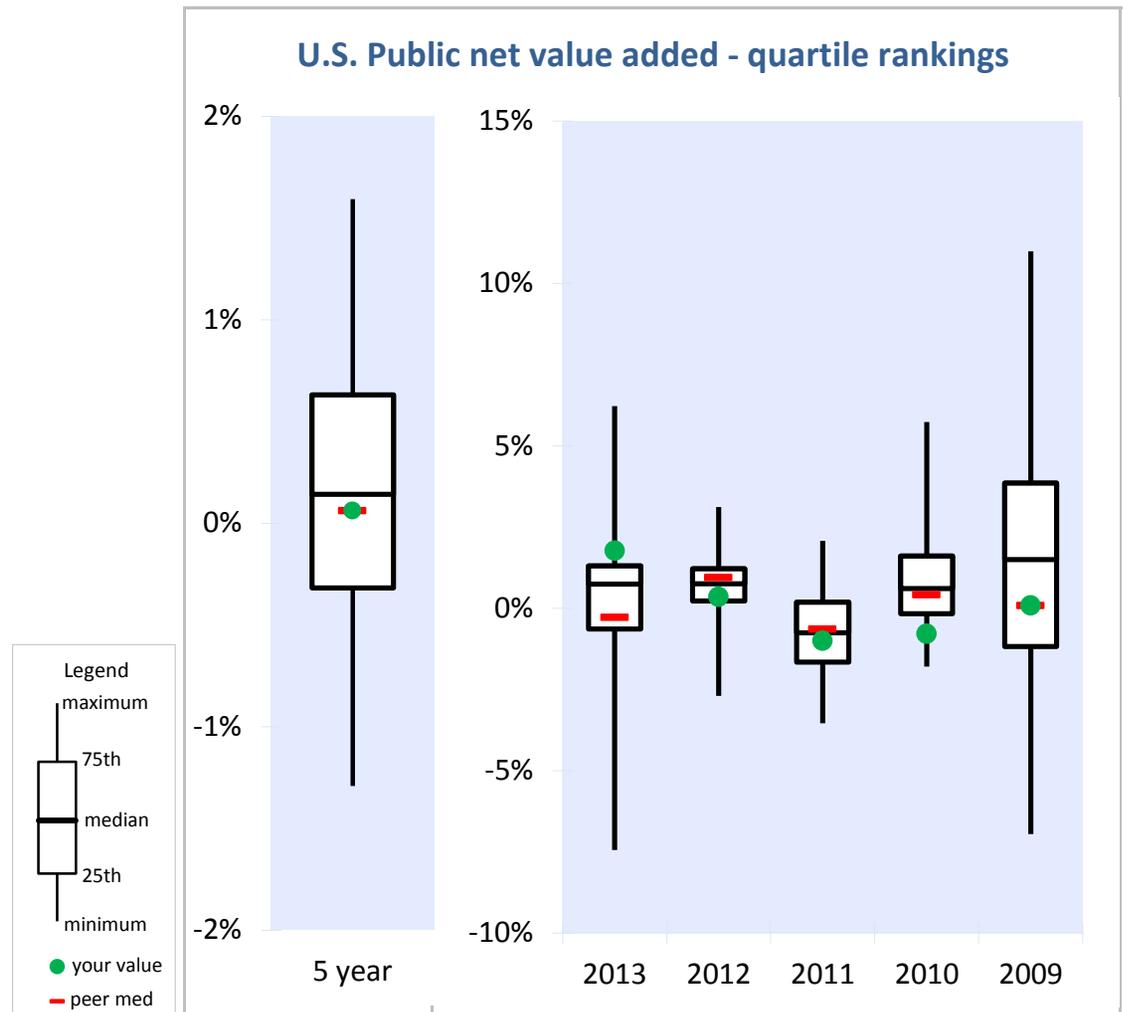
Net value added is the component of total return from active management. Your 5-year net value added was 0.1%.

Net value added equals total net return minus policy return.

Value added for North Carolina Retirement Systems

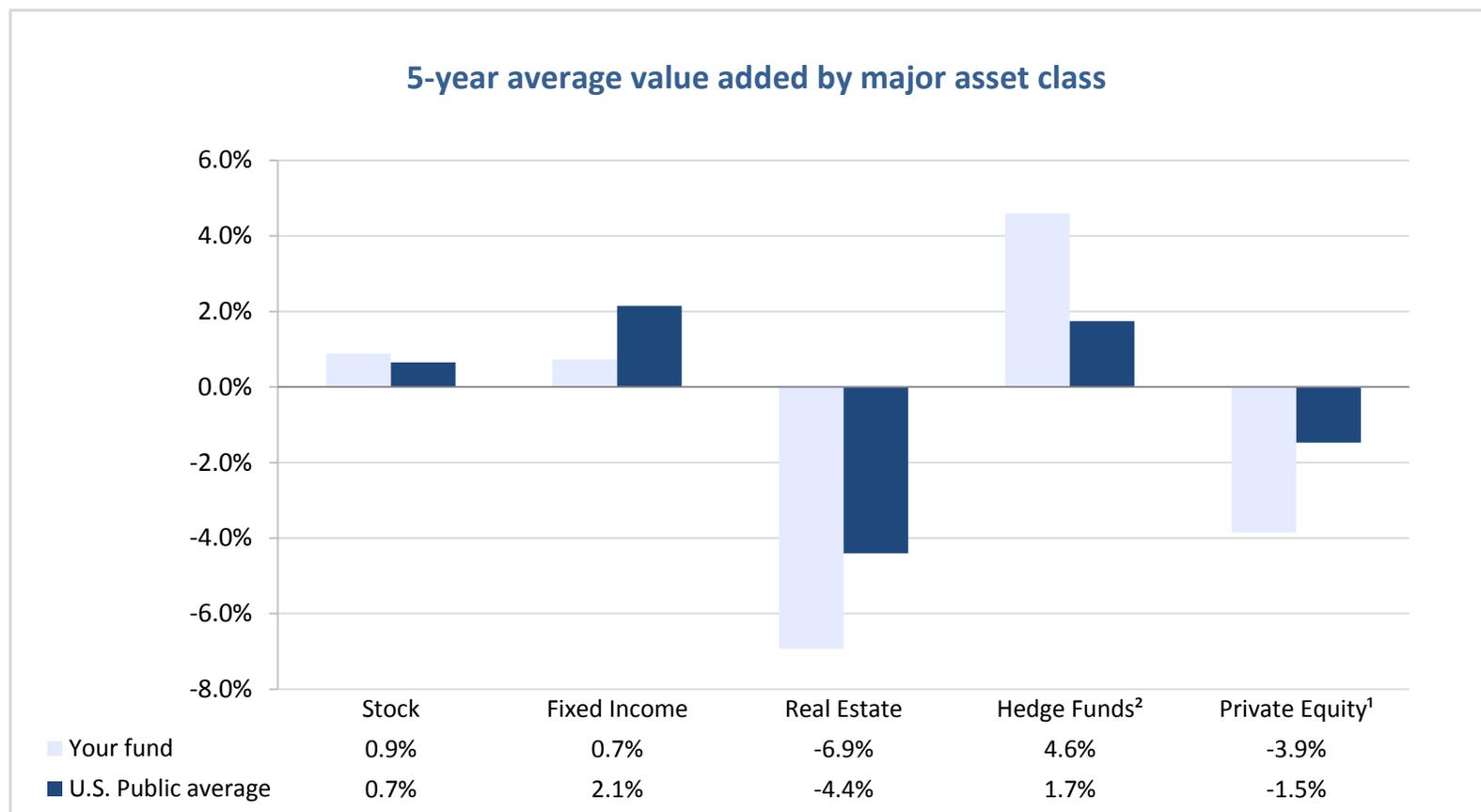
Year	Net Return	Policy Return	Net value Added
2013	12.3%	10.5%	1.8%
2012	11.8%	11.5%	0.3%
2011	2.1%	3.1%	(1.0%)
2010	11.6%	12.4%	(0.8%)
2009	15.1%	15.0%	0.1%
5-year	10.5%	10.4%	0.1%

Your 5-year net value added of 0.1% compares to a median of 0.1% for your peers and 0.1% for the U.S. Public universe.



To enable fairer comparisons, the value added for each participant was adjusted to reflect private equity benchmarks based on investable public market indices. Refer to the Research section, pages 6-7 for details as to why this adjustment makes for better comparisons.

You had positive 5-year value added in Stock, Fixed Income and Hedge Funds.



1. To enable fairer comparisons, the private equity benchmarks of all participants, except your fund, were adjusted to reflect lagged, investable, public-market indices. If your fund used the private equity benchmark recommended by CEM, your fund's 5-year private equity net value added would have been -2.2%. Refer to the Research section, pages 6-7, for details as to why this adjustment makes for better comparisons. It is also useful to compare total returns. Your 5-year total return of 7.0% for private equity was below the U.S. average of 9.1%.

2. It is also useful to compare total returns for hedge funds. Your 5-year return of 7.7% for hedge funds was equal to the U.S. average of 7.7%.

Your investment costs were \$377.8 million or 45.9 basis points in 2013.

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 ¹	
U.S. Stock - Large Cap		607	733	26,588		27,928
U.S. Stock - Small/Mid Cap		137	159	13,768		14,063
Stock - EAFE		247	493	13,229		13,969
Stock - Emerging		87		11,223		11,310
Stock - ACWixU.S.		444	1,979	20,359		22,781
Stock - Global		98		9,700		9,798
Stock - Other		132	259	4,288	1,654	6,332
Fixed Income - U.S.	1,842					1,842
Fixed Income - Other		108		400	7,845	8,353
Cash	170					170
Hedge Funds - Direct		441		31,720	54,786 ¹	32,160
Hedge Funds - Fund of Funds		276		18,457	36,096 ¹	18,733
Commodities		494		4,475	3,307	8,276
REITs		122		2,466		2,588
Real Estate		575		20,143	9,455 ¹	20,718
Real Estate - LPs		934		60,042	16,328 ¹	60,976
Natural Resources - LPs		283		20,029	15,409 ¹	20,312
Diversified Private Equity	890					890
Diversified Priv. Eq.- Fund of Funds		401		26,092	1,986 ¹	26,492
LBO		563		33,835	7,063 ¹	34,398
Venture Capital		251		13,791	7,093 ¹	14,042
Other Private Equity		469		17,958	46,494 ¹	18,427
Total asset management costs excluding private asset performance fees						374,560 45.5bp
Oversight, custodial and other costs ²						
Oversight of the fund						1,474
Trustee & custodial						1,800
Consulting and performance measurement						
Total oversight, custodial & other costs						3,274 0.4bp
Total investment cost (excluding transaction and private asset performance fees)						377,834 45.9bp

Footnotes

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.

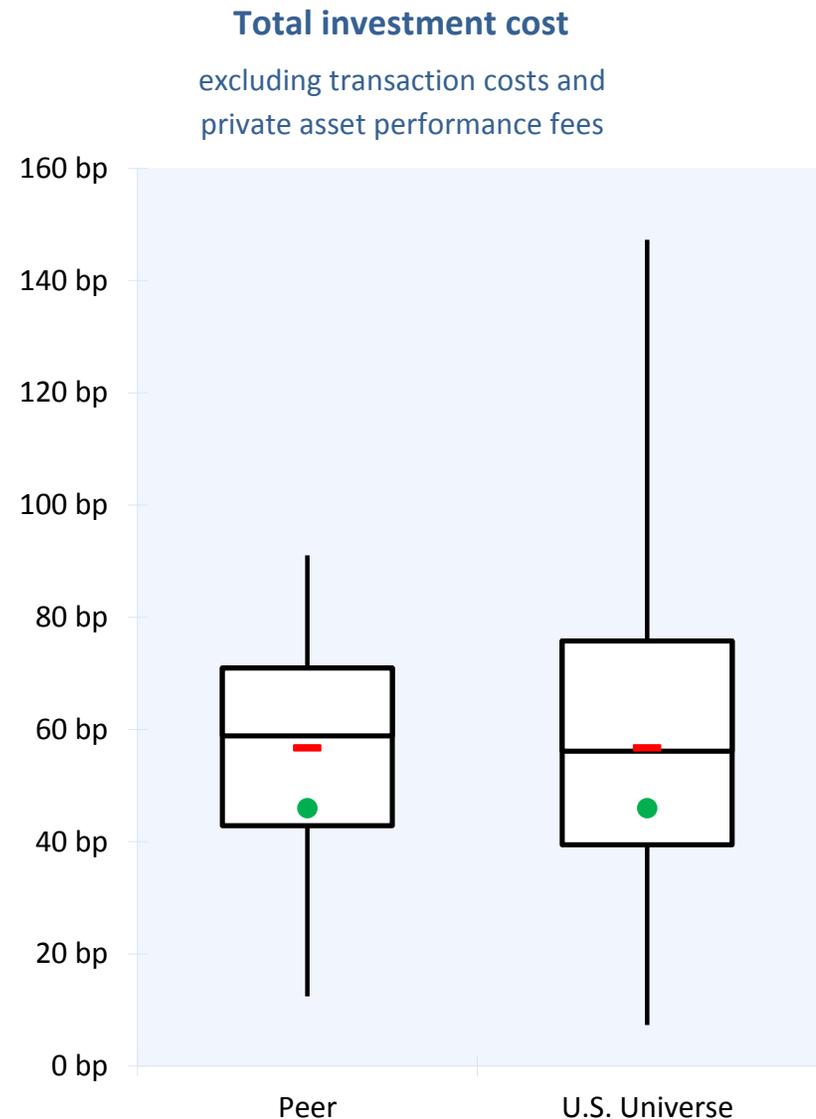
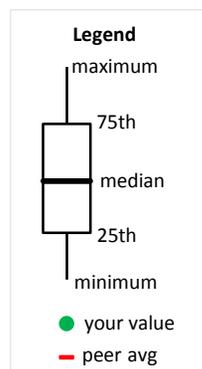
² Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

Your total investment cost of 45.9 bps was below the peer median of 58.8 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 and private equity. These high cost assets equaled 17% of your funds assets at the end of 2013 versus a peer average of 24%.
- 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 high cost by 2.6 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 45.9 bp was slightly above your benchmark cost of 43.3 bp. Thus, your excess cost was 2.6 bp.

Your cost versus benchmark

	\$000s	basis points
Your total investment cost	377,834	45.9 bp
Your benchmark cost	356,583	43.3 bp
Your excess cost	21,251	2.6 bp

Your fund was slightly high cost because you had a higher cost implementation style.

Explanation of your cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• More fund of funds	7,946	1.0
• Use of external active management (vs. lower cost passive and internal)	17,921	2.2
• Less overlays	(683)	(0.1)
• Other style differences	(747)	(0.1)
	<u>24,437</u>	<u>3.0</u>
2. Paying less than peers for similar services		
• External investment management costs	9,429	1.1
• Internal investment management costs	(5,447)	(0.7)
• Oversight, custodial & other costs	(7,170)	(0.9)
	<u>(3,187)</u>	<u>(0.4)</u>
Total excess cost	21,251	2.6

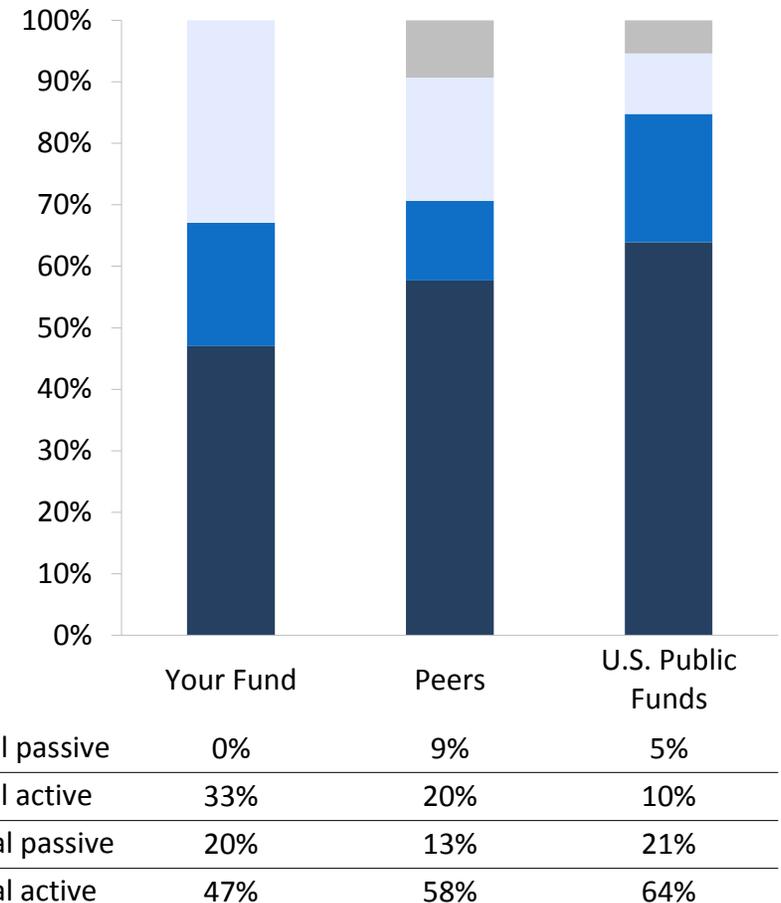
Differences in cost performance are often caused by differences in implementation style.

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 58% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had more in fund of funds. Your 13% of hedge funds, real estate and private equity in fund of funds compared to 7% for your peers.

Implementation style¹



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

Differences in implementation style cost you 3.0 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 ¹ (C)	Cost/ (savings) \$000s bps (A X B X C)	
		You	Peer average	More/ (less) (B)			
U.S. Stock - Large Cap	13,403	38.6%	16.6%	22.0%	27.9 bp	8,244	
U.S. Stock - Small/Mid Cap	3,016	73.7%	57.3%	16.5%	60.5 bp	3,001	
Stock - EAFE	5,435	76.5%	52.2%	24.3%	33.0 bp	4,361	
Stock - Emerging	1,921	100.0%	71.9%	28.1%	52.4 bp	2,832	
Stock - ACWIxU.S.	9,803	50.7%	77.5%	(26.8%)	35.4 bp	(9,289)	
Stock - Global	2,164	100.0%	80.1%	19.9%	30.3 bp	1,309	
Stock - Other	2,907	54.3%	26.4%	27.9%	50.9 bp	4,127	
Fixed Income - U.S.	26,445	0.0%	33.6%	(33.6%)	11.0 bp	(9,817)	
Fixed Income - Other	386	100.0%	95.8%	4.2%	Insufficient ²	0	
Commodities	1,579	100.0%	86.3%	13.7%	Insufficient ²	0	
REITs	482	100.0%	82.5%	17.5%	42.7 bp	359	
Real Estate ex-REITs	7,528	100.0%	88.6%	11.4%	59.7 bp	5,141	
of which Ltd Partnerships represent:		70.1%	52.2%	17.9%	42.8 bp	5,765	
Natural Resources	1,924	100.0%	100.0%	0.0%		0	
of which Ltd Partnerships represent:		100.0%	67.5%	32.5%	41.8 bp	2,618	
Diversified Private Equity	1,181	95.2%	99.6%	(4.5%)	138.7 bp	(732)	
LBO	2,142	100.0%	100.0%	0.0%		0	
Venture Capital	872	100.0%	100.0%	0.0%		0	
Other private equity	1,747	100.0%	87.5%	12.5%	Insufficient ²	0	
Impact of less/more external active vs. lower cost styles						17,921	2.2 bp
		<u>Fund of funds % of LPs</u>			<u>vs. direct LP¹</u>		
Hedge Funds	2,709	34.4%	25.7%	8.8%	60.9 bp	1,443	
Real Estate ex-REITs - LPs	5,273	0.0%	0.1%	(0.1%)	Insufficient ²	0	
Natural Resources - LPs	1,924	0.0%	25.4%	(25.4%)	Insufficient ²	0	
Diversified Private Equity - LPs	1,124	100.0%	4.3%	95.7%	68.9 bp	7,401	
LBO - LPs	2,142	0.0%	4.3%	(4.3%)	68.9 bp	(638)	
Venture Capital - LPs	872	0.0%	4.3%	(4.3%)	68.9 bp	(260)	
Impact of less/more fund of funds vs. direct LPs						7,946	1.0 bp
<u>Overlays and other</u>							
Impact of lower use of portfolio level overlays						(683)	(0.1) bp
Impact of mix of internal passive, internal active, and external passive ³						(747)	(0.1) bp
Total impact of differences in implementation style						24,437	3.0 bp

Footnotes

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 1.1 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	8,227	1.3	1.2	0.2	127
U.S. Stock - Large Cap - Active	5,175	51.8	30.2	21.6	11,198
U.S. Stock - Small/Mid Cap - Passive	792	2.5	1.1	1.4	107
U.S. Stock - Small/Mid Cap - Active	2,224	62.4	62.8	(0.4)	(87)
Stock - EAFE - Passive	1,276	4.3	1.9	2.4	309
Stock - EAFE - Active	4,159	32.3	36.5	(4.2)	(1,748)
Stock - Emerging - Active	1,921	58.9	60.3	(1.4)	(278)
Stock - ACWIXU.S. - Passive	4,828	4.6	4.6	0.0	0
Stock - ACWIXU.S. - Active	4,974	41.4	39.9	1.5	729
Stock - Global - Active	2,164	45.3	37.8	7.4	1,607
Stock - Other - Passive	1,328	2.4	9.1*	(6.7)	(892)
Stock - Other - Active	1,579	38.1 ¹	60.1*	(22.0)	(3,469)
Fixed Income - Other - Active	386	216.5 ¹	47.4	169.1	6,524
Hedge Funds - Active	1,777	181.0	157.4	23.6	4,191
Hedge Funds - Fund of Fund	932	201.0	218.3	(17.3)	(1,610)
Commodities - Active	1,579	52.4 ¹	87.8	(35.4)	(5,583)
REITs - Active	482	53.7	47.0	6.7	323
Real Estate ex-REITs - Active	2,254	91.9	70.9	21.0	4,732
Real Estate ex-REITs - Limited Partnership	5,273	115.6	113.8	1.9	991
Natural Resources - Limited Partnership	1,924	105.6	128.6	(23.0)	(4,423)
Diversified Private Equity - Fund of Fund	1,124	235.8	233.9	1.9	217
LBO - Active	2,142	160.6	165.0	(4.4)	(943)
Venture Capital - Active	872	161.1	190.9	(29.8)	(2,594)
Other Private Equity - Active	1,747	105.5	105.5	0.0	0
Total impact of paying more/less for external management					9,429
Total in bps					1.1 bp

*Universe median used as peer data was insufficient.

¹ You paid performance fees in these asset classes.

The net impact of paying more/less for internal asset management costs saved 0.7 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	26,445	0.7	3.0	(2.3)	(6,169)
Diversified Private Equity - Active	57	155.8	29.3	126.5	722
Total impact of paying more/less for internal management					(5,447)
Total in bps					(0.7) bp

The net impact of differences in oversight, custodial & other costs saved 0.9 bps.

Cost impact of differences in oversight, custodial & other costs

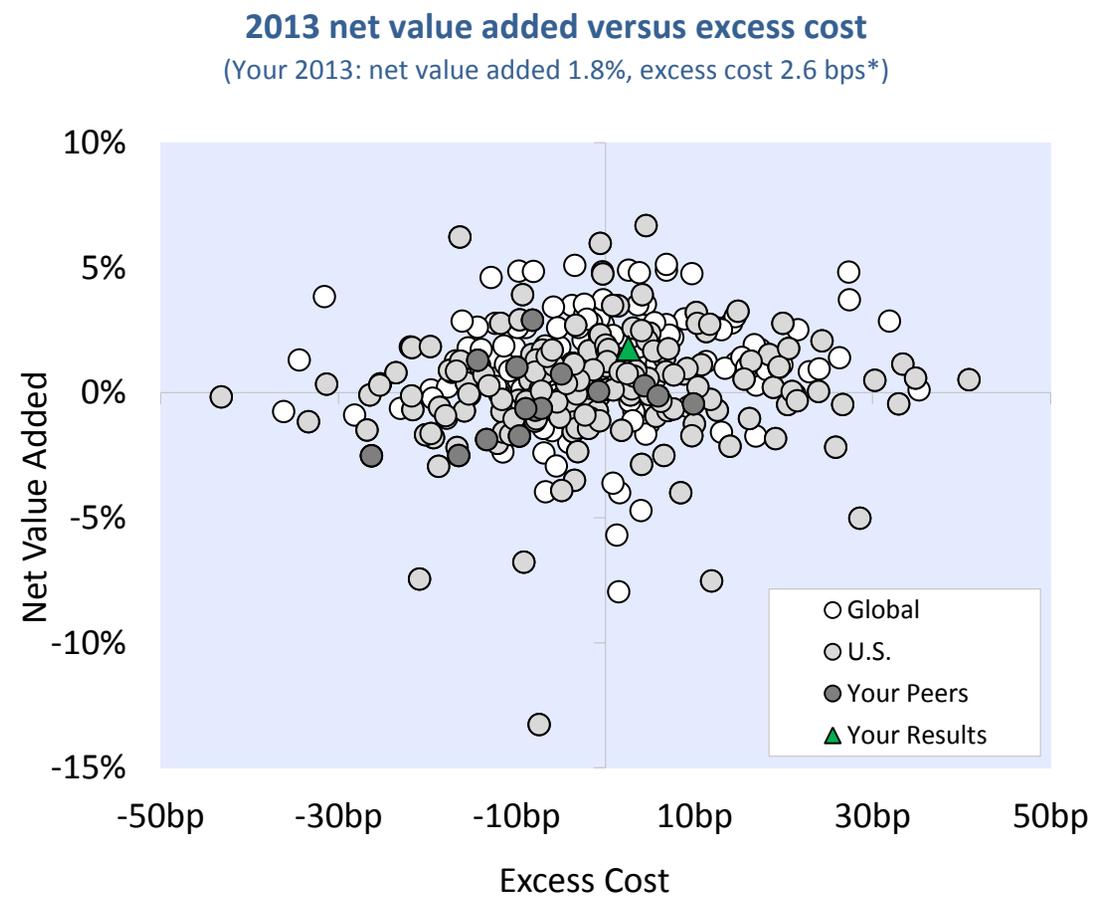
	Your avg holdings in \$mils (A)	Cost in bps			Cost/ (savings) in \$000s (A X B)
		Your fund	Peer median	More/ (less) (B)	
Oversight	82,257	0.2	0.6	(0.4)	(3,573)
Custodial	82,257	0.2	0.3	(0.1)	(579)
Consulting	82,257	0.0	0.3	(0.3)	(2,097)
Audit	82,257	0.0	0.0	(0.0)	(309)
Other	82,257	0.0	0.1	(0.1)	(612)
Total					(7,170)
Total in bps					(0.9) bp

In summary, your fund was slightly high cost because you had a higher cost implementation style.

Explanation of your cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• More fund of funds	7,946	1.0
• Use of external active management (vs. lower cost passive and internal)	17,921	2.2
• Less overlays	(683)	(0.1)
• Other style differences	(747)	(0.1)
	<u>24,437</u>	<u>3.0</u>
2. Paying less than peers for similar services		
• External investment management costs	9,429	1.1
• Internal investment management costs	(5,447)	(0.7)
• Oversight, custodial & other costs	(7,170)	(0.9)
	<u>(3,187)</u>	<u>(0.4)</u>
Total excess cost	21,251	2.6

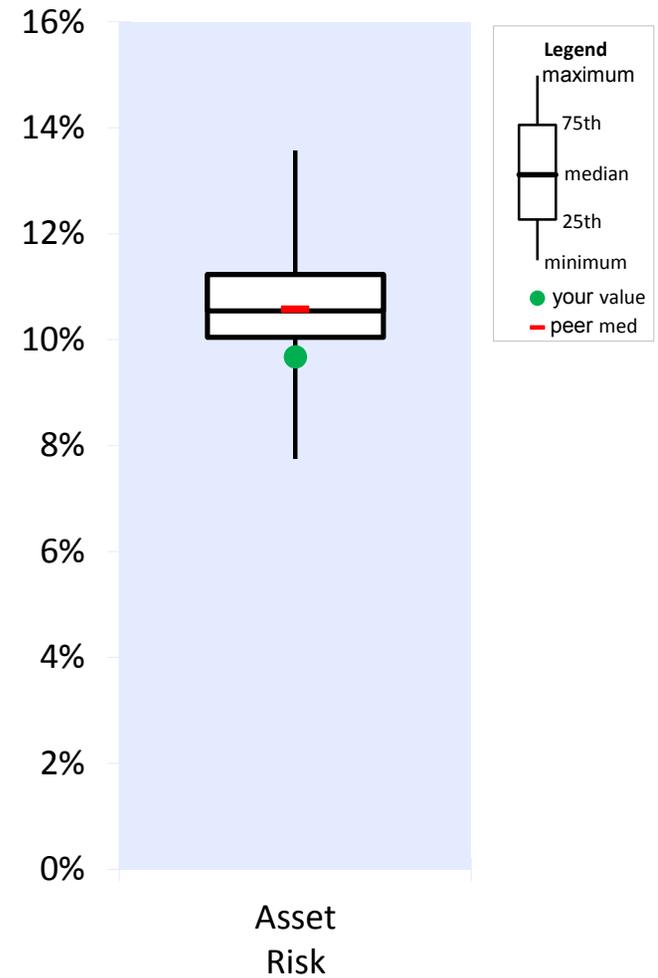
Your 2013 performance placed in the positive value added, high cost quadrant of the cost effectiveness chart.



Comparison of risk levels

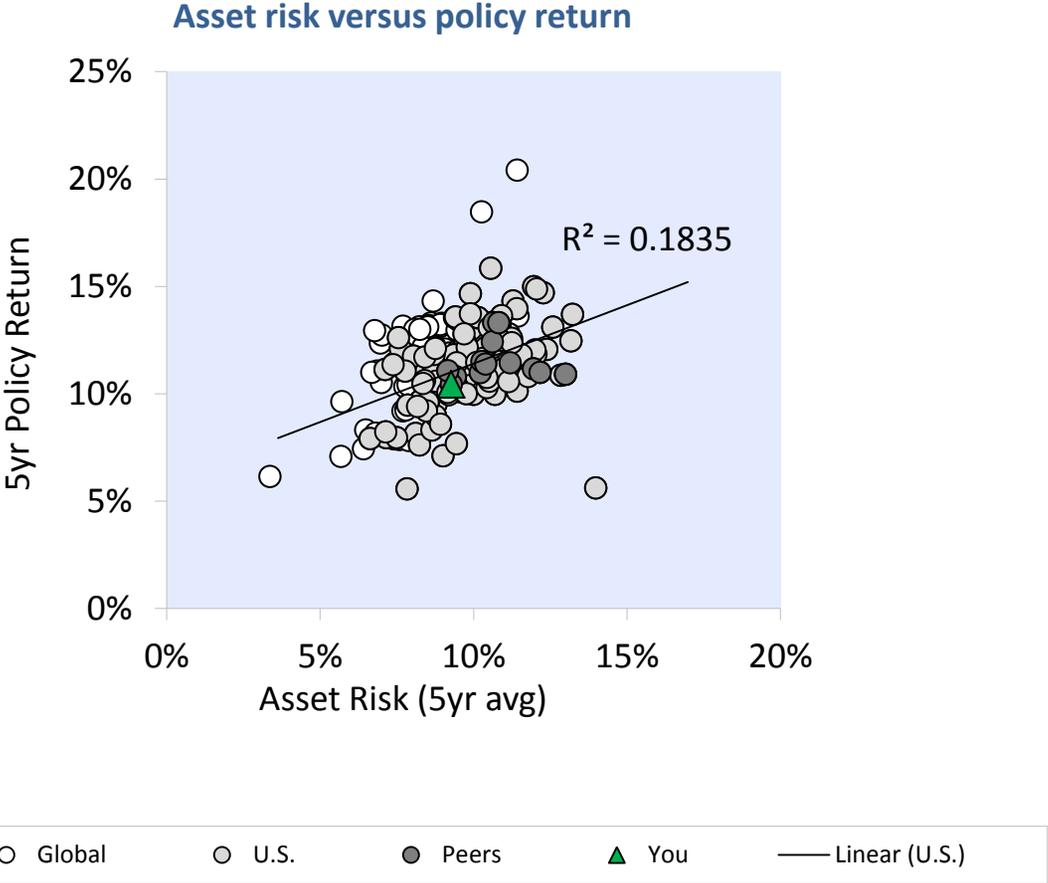
Your asset risk of 9.7% was below the U.S. Public median of 10.5%. Asset risk is the standard deviation of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your policy mix.

U.S. Public risk levels at December 31, 2013



During the 5-year period ending 2013, U.S. funds were rewarded for taking asset risk. More risk resulted in better performance.

Higher asset risk was associated with higher policy returns.



Summary of key takeaways

Returns

- Your 5-year net total return was 10.5%. This was below the U.S. Public median of 12.1% and below the peer median of 12.1%.
- Your 5-year policy return was 10.4%. This was below the U.S. Public median of 12.0% and below the peer median of 11.2%.

Value added

- Your 5-year net value added was 0.1%. This was equal to the U.S. Public median of 0.1% and equal to the peer median of 0.1%.

Cost and cost effectiveness

- Your total investment cost of 45.9 bps was below the peer median of 58.8 bps.
- Your investment cost of 45.9 bps was above your benchmark cost of 43.3 bps. This suggests that your fund was slightly high cost compared to your peers.
- Your fund was slightly high cost because you had a higher cost implementation style.
- Your 2013 performance placed in the positive value added, high cost quadrant of the cost effectiveness chart.

Risk

- Your asset risk of 9.7% was below the U.S. Public median of 10.5%.

2

Research and Trends

Net value added	
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The region with the highest net value added was Europe.

Value added by region¹ (period ending December 31, 2013)

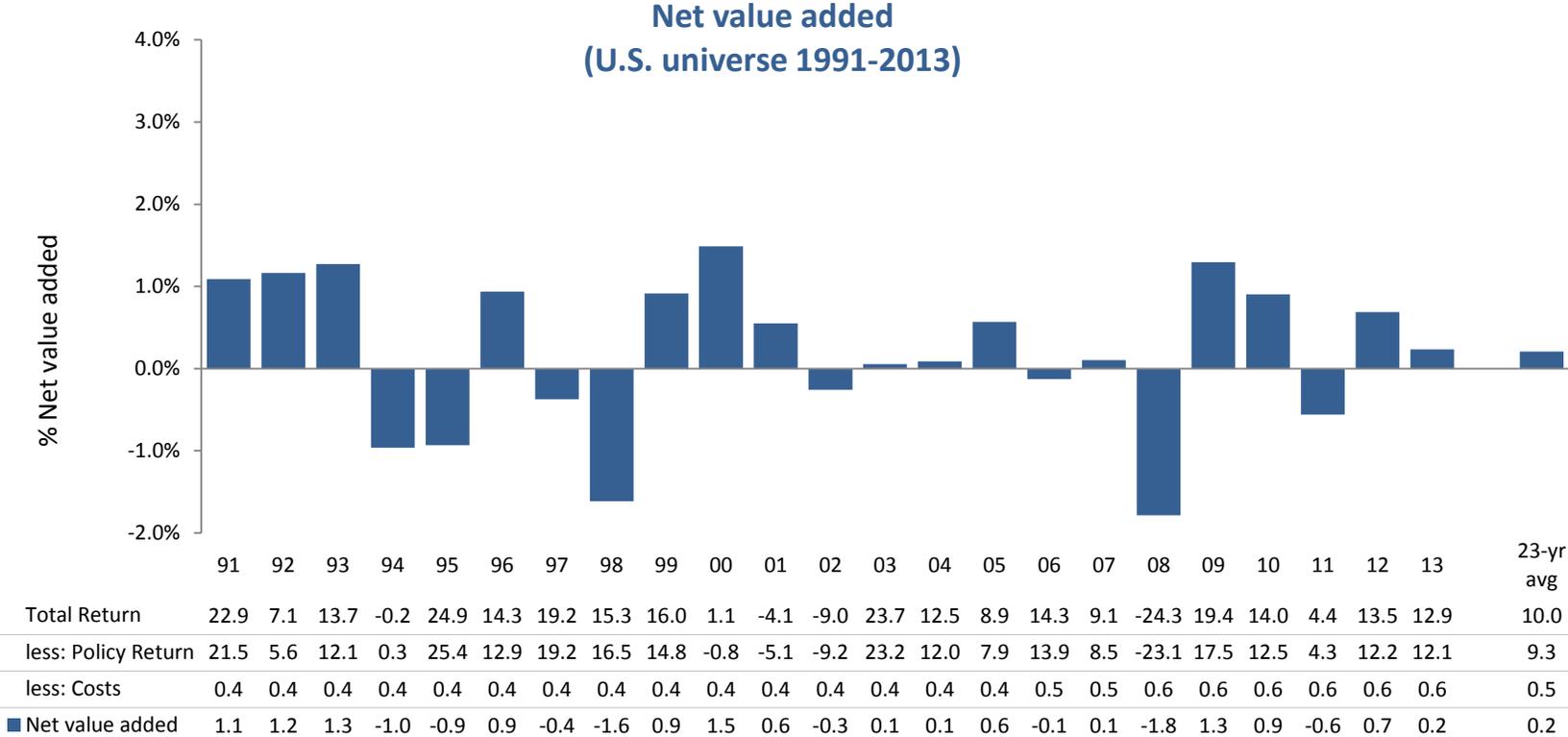
	All funds	U.S. funds	Canadian funds	European funds	Asia-Pacific funds
	23-year average ³	23-year average ³	23-year average ³	20-year ² average ³	14-year ² average ³
Total return	9.86%	9.97%	9.83%	8.02%	7.77%
- Policy return	9.26%	9.31%	9.28%	7.32%	7.66%
- <u>Costs</u>	<u>0.42%</u>	<u>0.46%</u>	<u>0.36%</u>	<u>0.29%</u>	<u>0.49%</u>
= Net value added	0.18%	0.21%	0.18%	0.41%	-0.38%
# of annual observations	6,813	3,913	2,181	610	104
Median fund size (\$ billion)	5.0	7.5	1.8	6.4	44.3

1. Only regions with more than four participating funds are separately disclosed. Funds from regions with fewer than four participating funds are included in Global/ All Funds.

2. The shorter time periods for European and Asia-Pacific funds reflect the dates that CEM started collecting data in those regions.

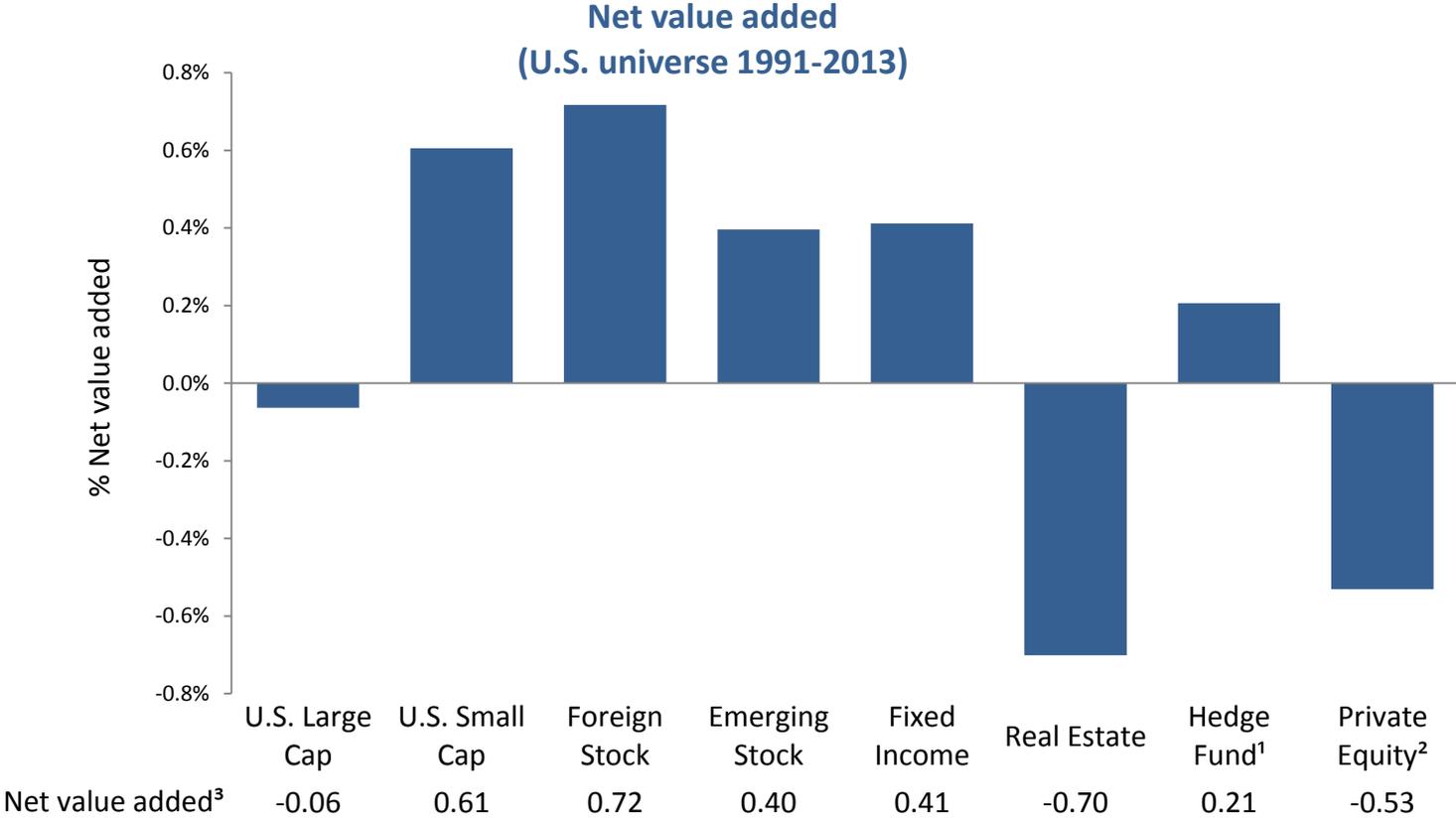
3. Averages are the arithmetic average of annual averages.

In the U.S., net value added averaged 0.2% over the past 23 years ending 2013.



Value added analysis is based on 3,913 annual fund total performance observations from the CEM U.S. universe for the 23-year period ending 2013. The 23-year average is an arithmetic average of the annual averages.

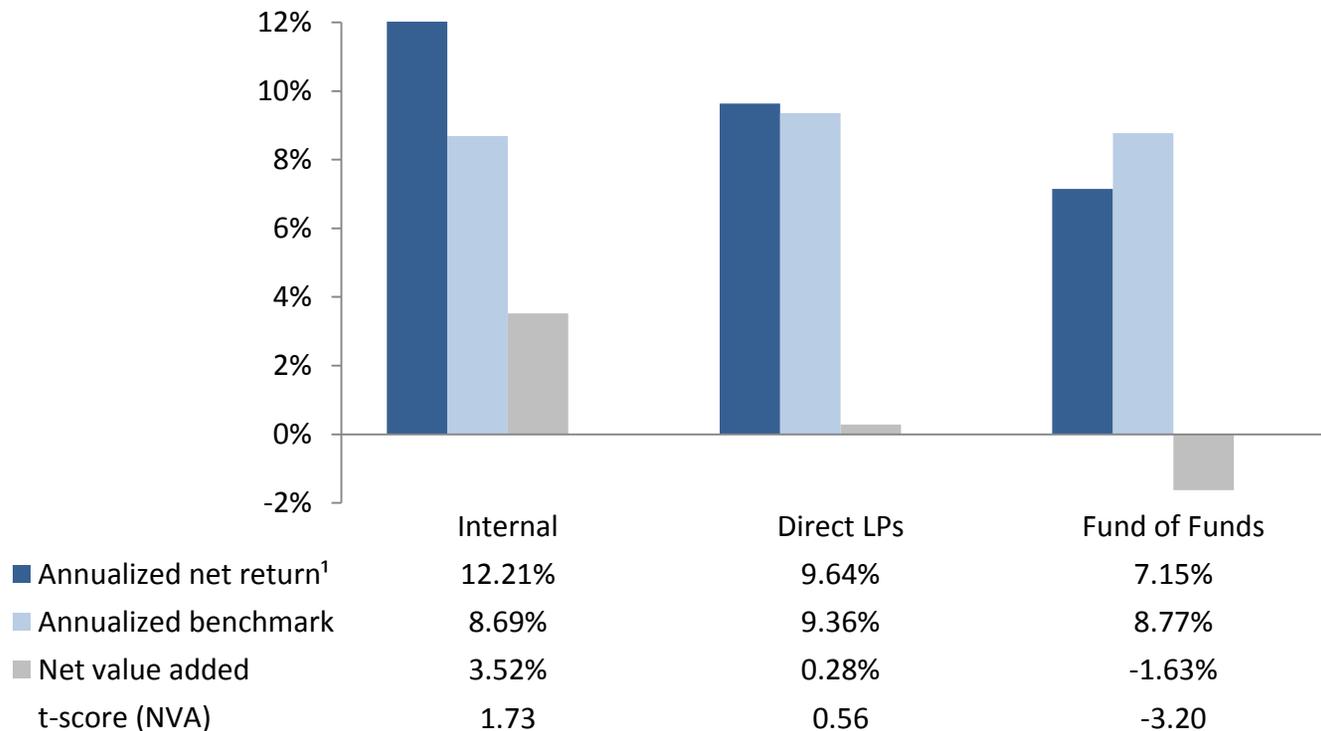
The asset class that had the highest net value added in the U.S. universe over the past 23 years was Foreign Stock.



1. Hedge Fund gross value added performance reflect data for the 14 year period from 2000 to 2013.
 2. The net value added calculation for private equity uses the average benchmark of all U.S. participants.
 3. Value added analysis is from 3,913 annual fund performance observations from the CEM U.S. universe for the 23-year period ending 2013. Value added reflects the asset weighted value added of all mandates in each asset category including indexed holdings. Averages shown above are the arithmetic average of the annual averages of all observations of funds with holdings in the asset category for each year.

Costs matter - Lower cost internal investment in private equity outperformed direct LPs. Direct LPs outperformed fund of funds.

Private equity net returns and value added (1996-2012)

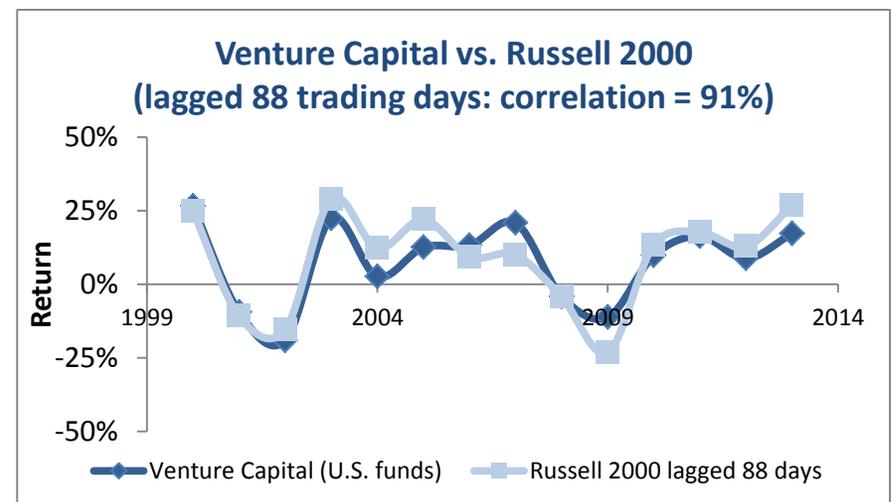
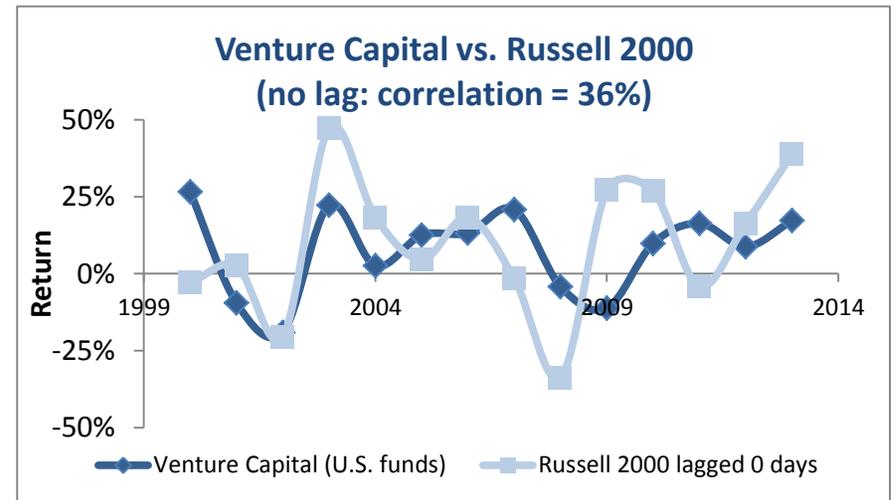


1. To compare the performance of private equity implementation styles over long periods, Monte Carlo simulations were used to capture differences in risk between styles. For details, see "How Implementation Style and Costs Affect Private Equity Performance", Alex Beath, Chris Flynn, and Jody MacIntosh, International Journal of Pension Management pp. 50, vol. 7, issue 1, Spring 2014.

Private equity benchmarks used by most funds are flawed.

A high proportion of the benchmarks used for illiquid assets by participants in the CEM universe are flawed. Flaws include:

- Timing mismatches due to lagged reporting. For example, as the graphs on the right demonstrate, reported venture capital returns clearly lag the returns of stock indices. Yet most funds that use stock indices to benchmark their private equity do not use lagged benchmarks. The result is substantial noise when interpreting performance. For example, for 2008 the Russell 2000 index return was -33.8% versus -4.3% if lagged 88 trading days. Thus if a fund earned the average reported venture capital return for 2008 of -4.2%, they would have mistakenly believed that their value added from venture capital was 29.6% using the un-lagged benchmarks versus 0.1% using the same benchmark lagged to match the average 88 day reporting lag of venture capital funds.
- Un-investable peer-based benchmarks. Peer based benchmarks reflect the reporting lags in peer portfolios so they have much better correlations than un-lagged investable benchmarks. But their relationship statistics are not as good as for lagged investable benchmarks.
- Aspirational premiums (i.e., benchmark + 2%). Premiums cannot be achieved passively, and evidence suggests that a fund has to be substantially better than average to attain them. More importantly, when comparing performance to other funds, they need to be excluded to ensure a level playing field.



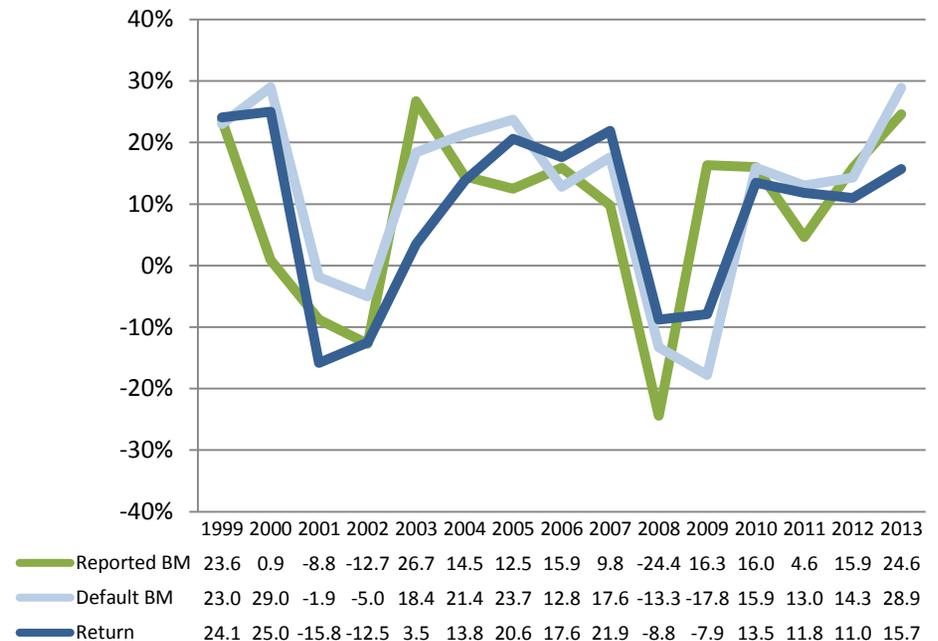
To enable fairer comparisons, CEM uses default private equity benchmarks.

Benchmarks used for private equity by most participants in the CEM universe are flawed (see previous page). So to enable fairer comparisons, CEM replaced the reported private equity benchmarks of all funds except yours with

- Investable. They are comprised of lagged small cap benchmarks.
- Custom lagged for each participant. Different portfolios had different lags. CEM estimated the lag on private equity portfolios by comparing annual private equity returns to public market proxies with 1 day of lag, 2 days of lag, 3 days of lag, etc. At some number of days lag, correlation between the two series is maximized. The median lag was 91 trading days (i.e., approximately 128 calendar days or 4.2 calendar months)
- Regional mix adjusted based on the average estimated mix of regions in private equity portfolios for a given country.

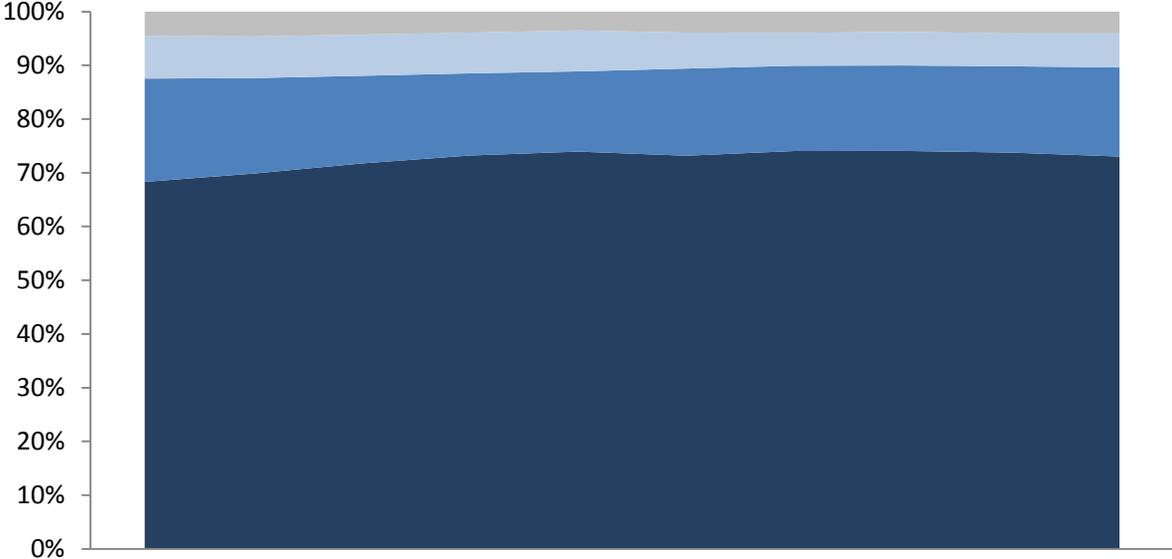
The result is the default benchmarks are superior to most self-reported benchmarks. Correlations improve to a median of 81% for the default benchmarks versus 43% for self-reported benchmarks. Other statistics such as volatility were also much better.

Private equity returns versus reported and default benchmark returns - Global median



For U.S. plans, external active management increased from 68% to 73% over the past 10 years.

Implementation style by year - U.S.

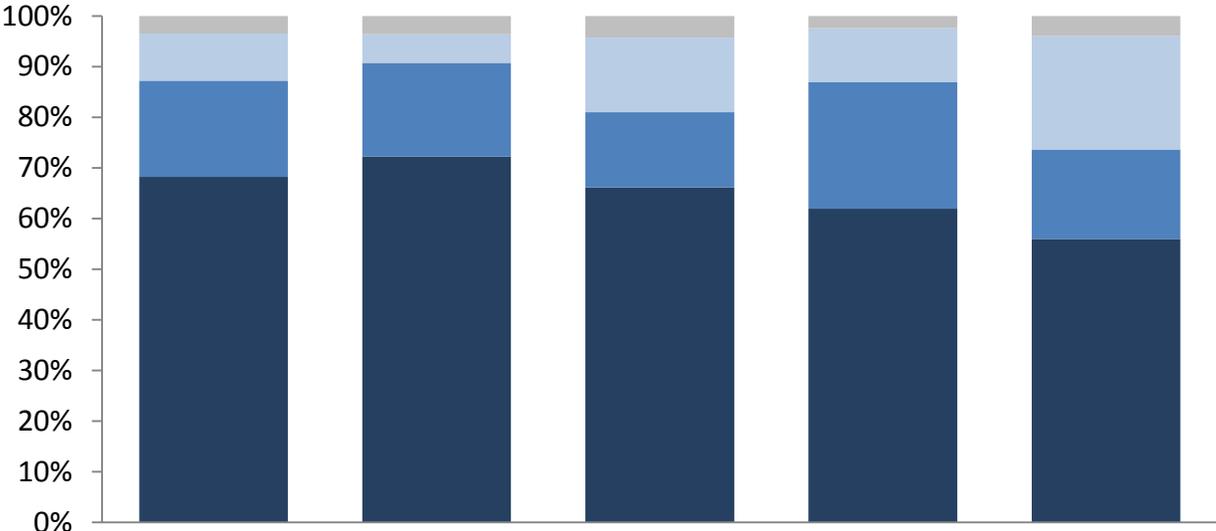


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
■ % Internal passive	5%	5%	4%	4%	3%	4%	4%	4%	4%	4%
■ % Internal active	8%	8%	8%	8%	8%	7%	6%	6%	6%	6%
■ % External passive	19%	18%	16%	15%	15%	16%	16%	16%	16%	17%
■ % External active	68%	70%	72%	73%	74%	73%	74%	74%	74%	73%

• This analysis is based on 70 U.S. funds with 10 consecutive years of data.

U.S. funds have more externally managed active assets than funds in most other regions.

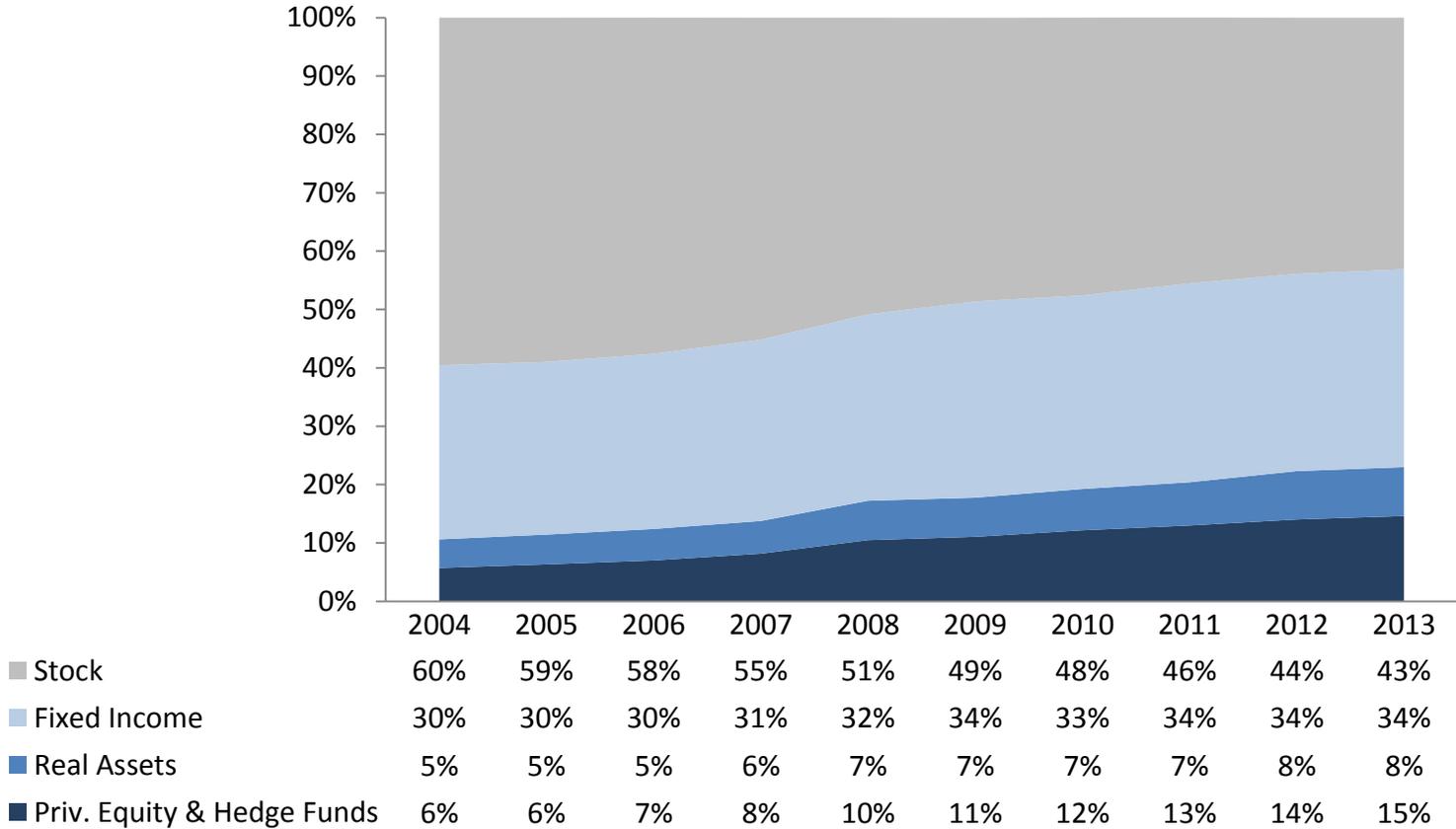
Implementation style by region - 2013 average



■ % Internal passive	4%	4%	4%	2%	4%
■ % Internal active	9%	6%	15%	11%	22%
■ % External passive	19%	18%	15%	25%	18%
■ % External active	68%	72%	66%	62%	56%
Number of funds	358	186	87	79	6
Median fund in \$ billions	5.0	7.5	1.8	6.4	44.3

For U.S. plans, combined policy weights for real assets, private equity and hedge funds increased from 10.6% in 2004 to 23.0% in 2013.

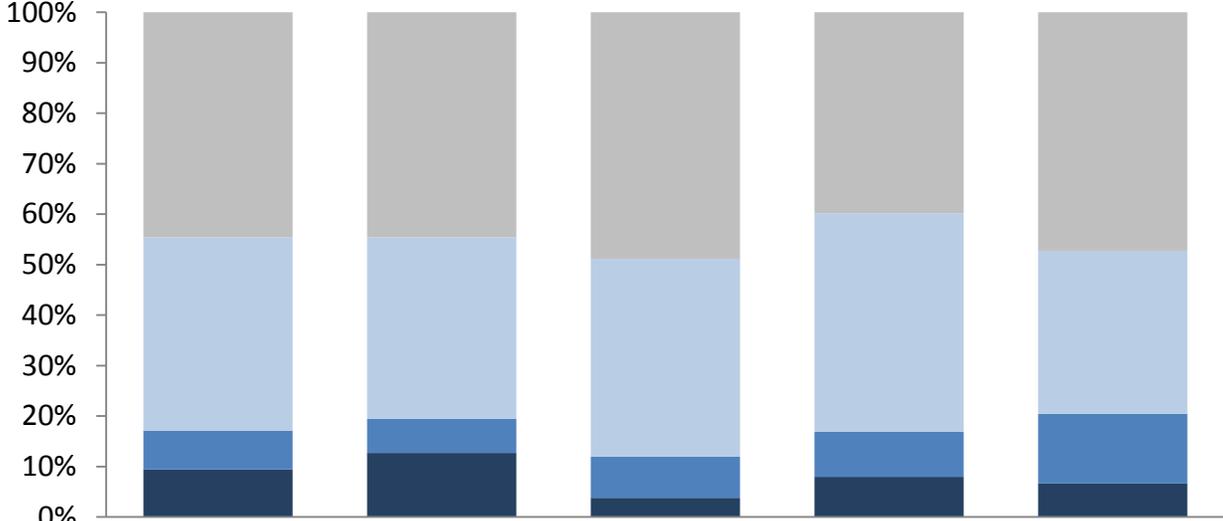
Policy mix by year - U.S.



• This analysis is based on 70 U.S. funds with 10 consecutive years of data.

U.S. funds have less fixed income but more private equity than funds in other regions.

Policy asset mix by region - 2013 average



Stock	45%	45%	49%	40%	47%
Fixed Income	38%	36%	39%	43%	32%
Real Assets	8%	7%	8%	9%	14%
Priv. Equity & Hedge Funds	9%	13%	4%	8%	7%
Number of funds	358	186	87	79	6
Median fund in \$ billions	5.0	7.5	1.8	6.4	44.3

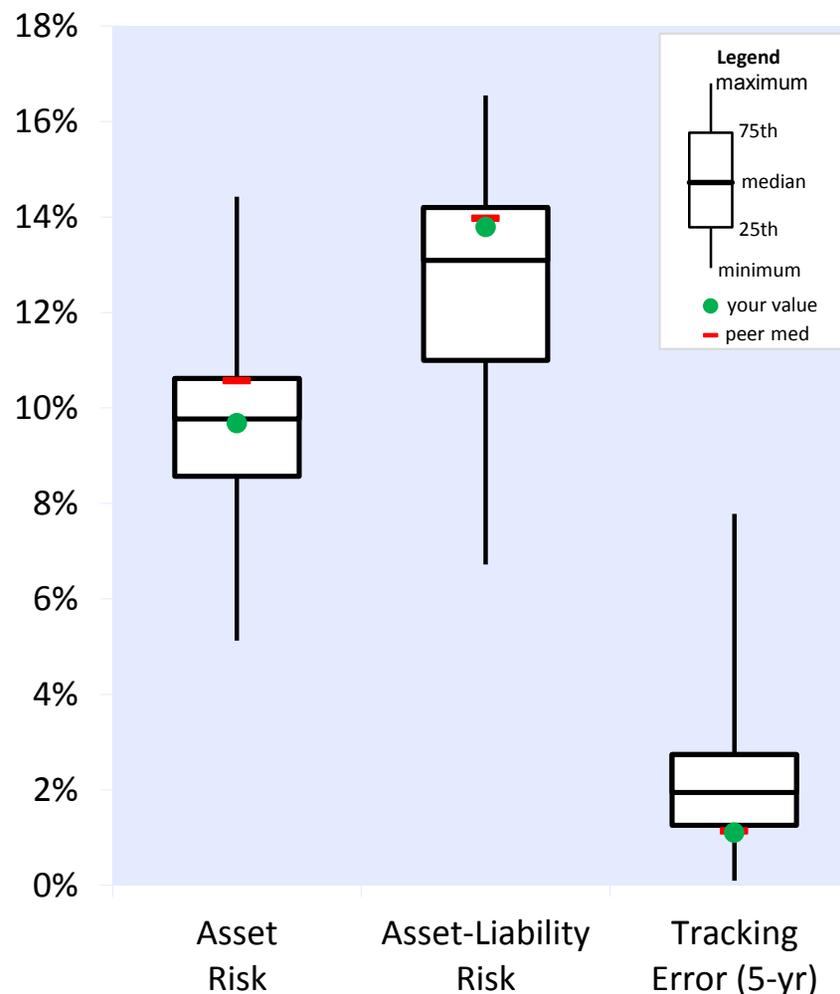
Risk by type

Your asset risk of 9.7% was below the U.S. median of 9.8%. 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.

Asset-liability risk is the standard deviation of funded status caused by market factors. It is a function of the standard deviations of your asset risk, your marked-to-market liabilities and the correlation between the two.

Your tracking error of 1.1% was below the U.S. median of 1.9%. Tracking error is the risk of active management. It equals the standard deviation of your annual net value added.

U.S. risk levels at December 31, 2013

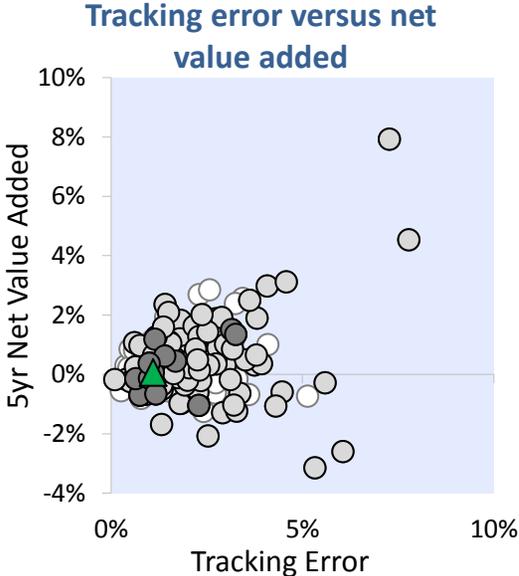
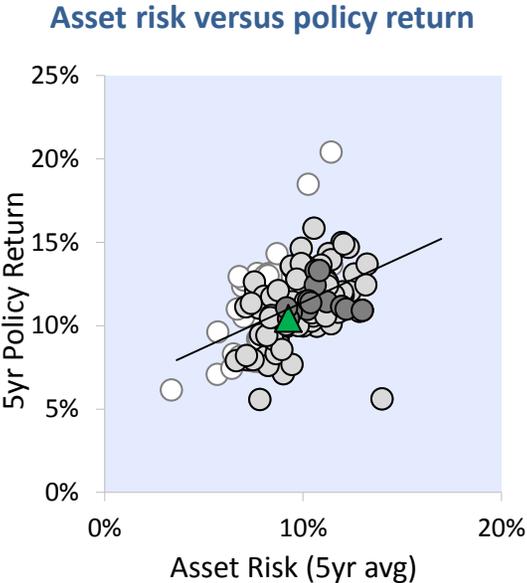
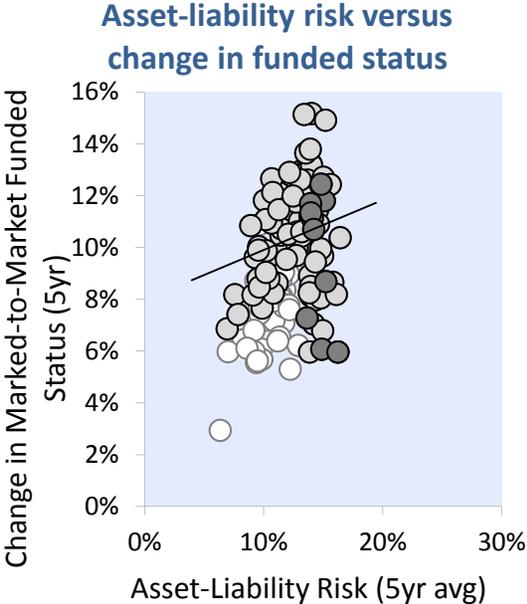


Risk versus return

Higher asset-liability risk was associated with positive changes in marked-to-market funded status.

Higher asset risk was associated with higher policy returns.

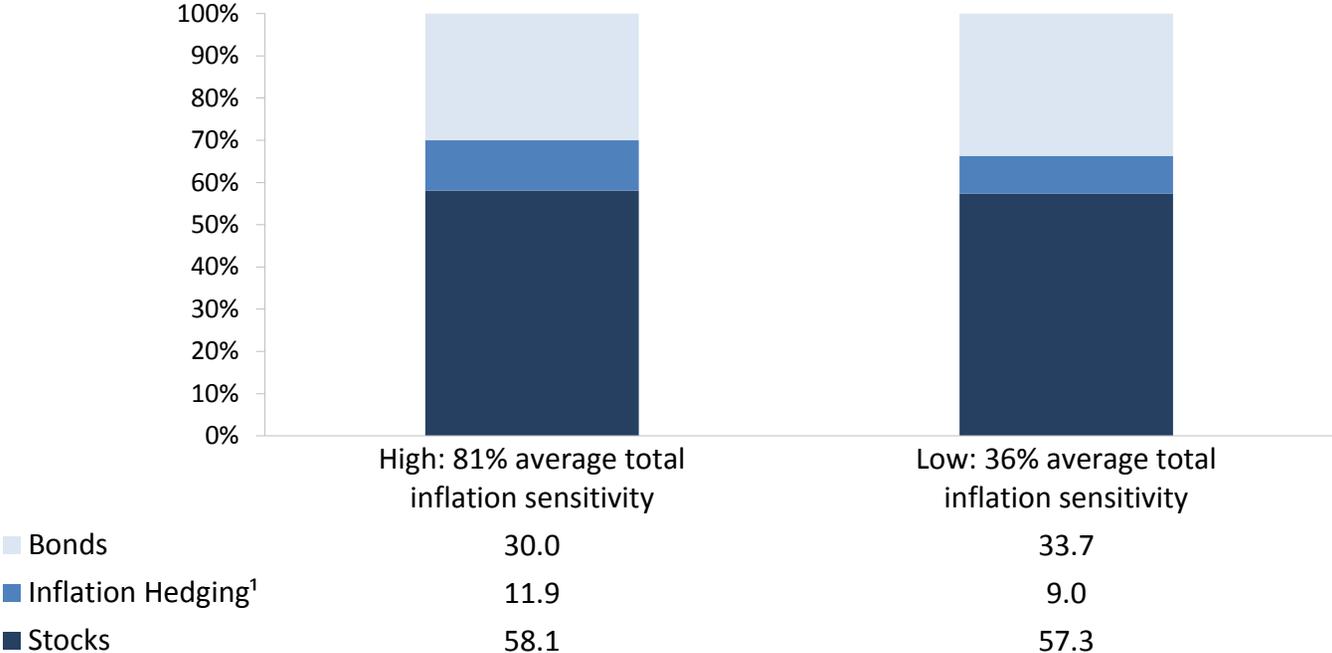
There was no meaningful relationship between tracking error and net value added.



Impact of inflation sensitivity on policy asset mix decisions

One would expect plans with more inflation sensitivity to have more inflation hedging assets and fewer nominal bonds than plans with less inflation sensitivity. Although this is true, the difference is small: inflation hedging assets represent 11.9% of assets at plans with high inflation sensitivity versus 9.0% at plans with lower inflation sensitivity.

**Average policy asset mix:
Plans with above vs. below average inflation sensitivity**

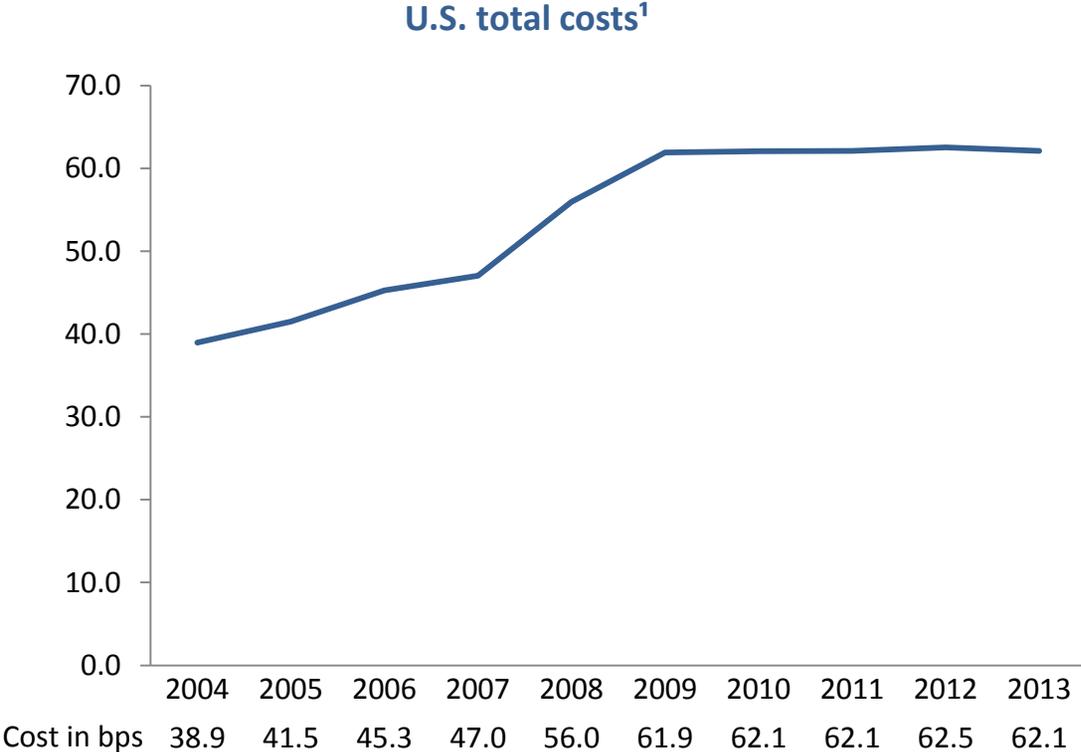


1. Inflation hedge assets include inflation-indexed bonds, real estate and cash.

U.S. fund costs have grown by 23 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 13% on average.
- Use of the most expensive implementation style, external active management, increased from 68% to 73% on average.



1. This analysis is based on 70 U.S. funds with 10 consecutive years of data.

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

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

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	7.36%	6.42%	0.94%
- Costs	0.48%	0.40%	0.08%
= Net value added	0.09%	0.03%	0.06%
Number of observations	3,088	1,995	

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 ³		Returns ⁴	
	DB	DC	DB	DC
Private Equity	4%	n/a	12.4%	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	7.8%	n/a
Stock U.S. Large Cap or Broad	26%	30%	6.8%	6.1%
Stock Non U.S. or Global	23%	7%	6.8%	6.5%
Stable Value/GICs	n/a	17%	n/a	4.9%
Cash	2%	8%	2.9%	3.2%
Total	100%	100%	7.9%	6.9%
Number of observations	3,088	1,995		

1. DC policy return = weights of holdings X benchmarks

2. Returns are the geometric average of annual averages.

3. 17 years ending 2013. Equals arithmetic average of annual asset mix weights.

4. 17 years from 1997 to 2013. 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.