

# North Carolina Retirement Systems

## Investment Cost Effectiveness Analysis - Summary of Results

For the 5 year period ending December 31, 2014



# Key takeaways

## Returns

- Your 5-year net total return was 8.7%. This was below the U.S. Public median of 9.8% and below the peer median of 9.9%.
- Your 5-year policy return was 8.2%. This was below the U.S. Public median of 9.7% and below the peer median of 9.7%.

## Value added

- Your 5-year net value added was 0.5%. This was above the U.S. Public median of 0.0% and above the peer median of 0.3%.

## Cost and cost effectiveness

- Your investment cost of 49.9 bps was close to your benchmark cost of 51.4 bps. This suggests that your fund was normal cost compared to your peers.
- Your fund was normal cost because the impact of paying less for similar services was partly offset by your higher cost implementation style.
- Your fund achieved 5-year net value added of 53.2 bps and excess cost of 1.7 bps on the cost effectiveness chart.

## Risk

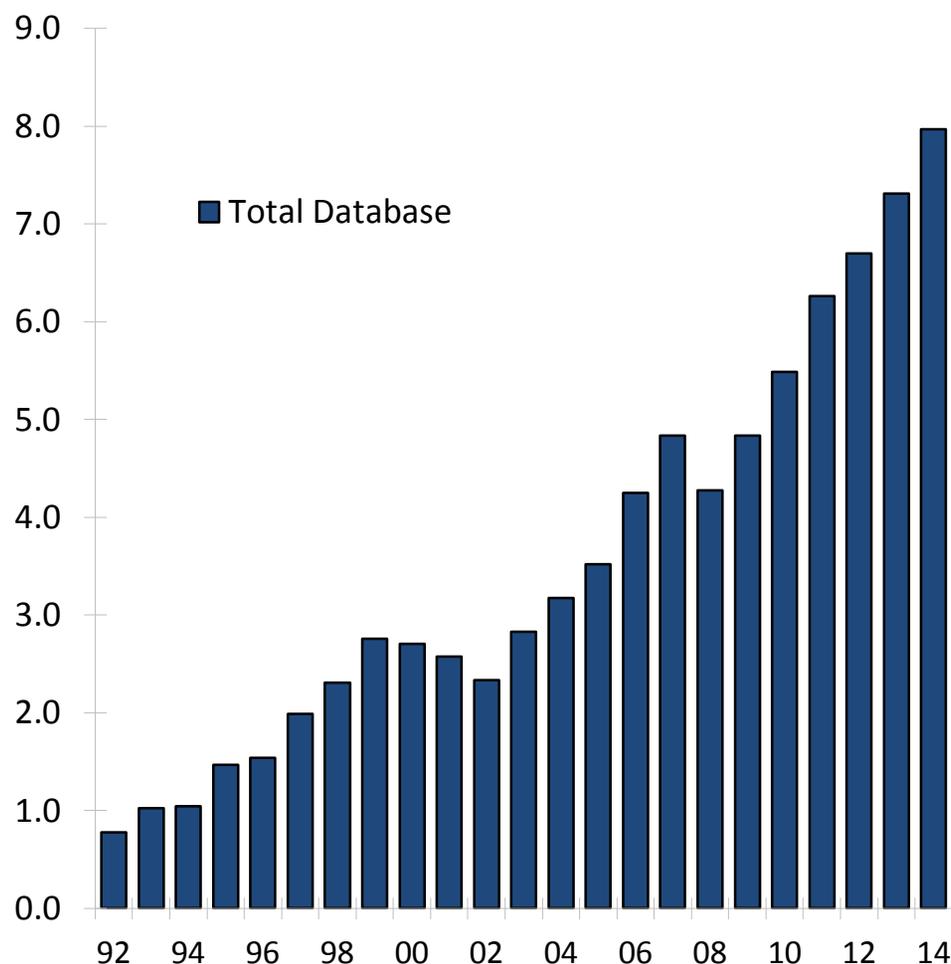
- Your asset risk of 9.3% was below the U.S. median of 9.7%.

## 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 \$9.6 billion and the average U.S. fund had assets of \$22.6 billion. Total participating U.S. assets were \$3.4 trillion.
- 76 Canadian funds participate with assets totaling \$1,028 billion.
- 49 European funds participate with aggregate assets of \$2.3 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 \$286 billion. Included are funds from Australia, New Zealand, China and South Korea.
- 2 Gulf region funds participate.

The most meaningful comparisons for your returns and value added are to the U.S. Public universe which consists of 57 funds.

Participating assets (\$ trillions)

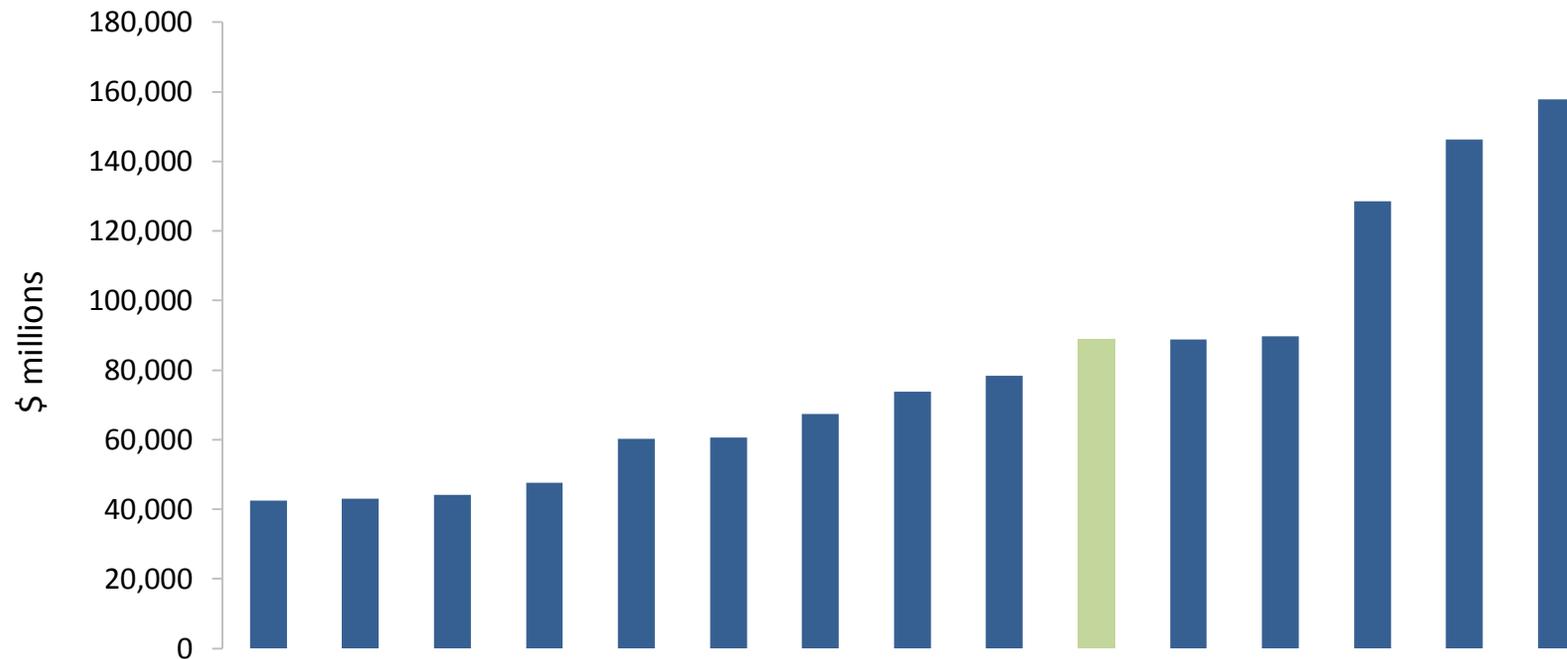


\* 2014 reflects both received and expected data.

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

## Peer group for North Carolina Retirement Systems

- 15 U.S. public sponsors from \$42 billion to \$158 billion
- Median size of \$74 billion versus your \$89 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

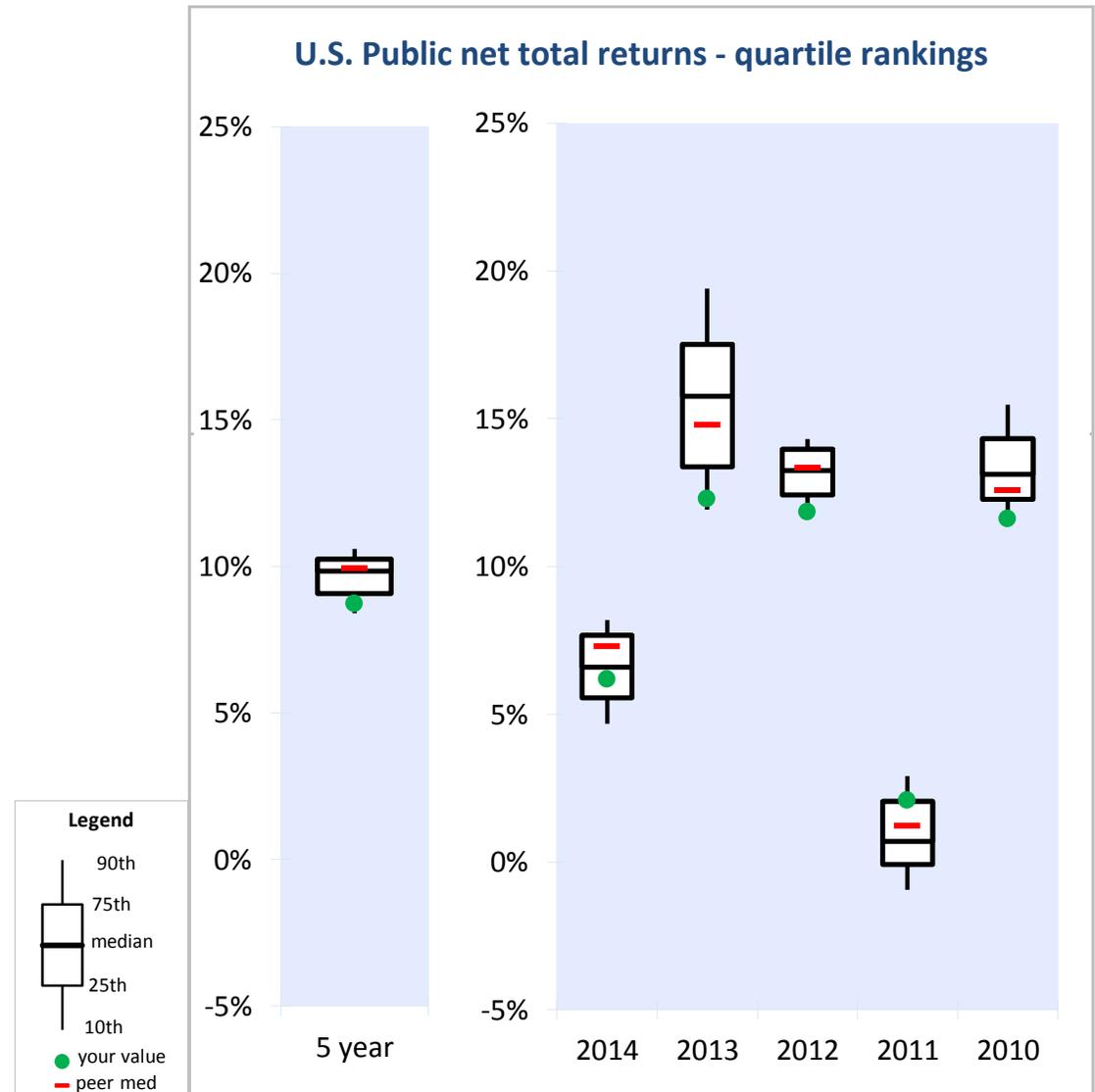
How much risk was taken to obtain your value added?  
What is the risk of your policy mix?

## Your 5-year net total return of 8.7% was below both the U.S. Public median of 9.8% and the peer median of 9.9%.

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	8.7%
- Policy return	8.2%
= Net value added	0.5%

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).



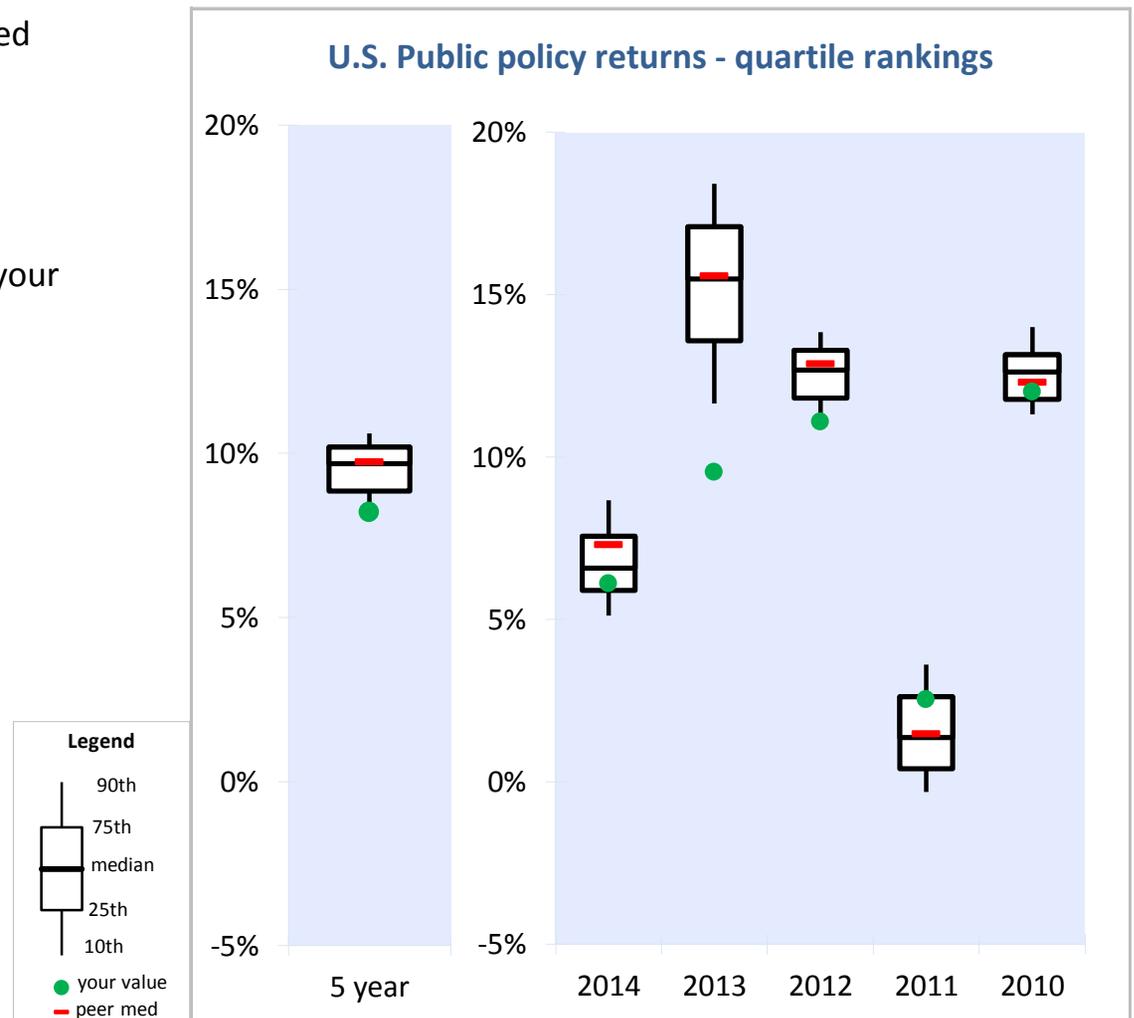
## Your 5-year policy return of 8.2% was below both the U.S. Public median of 9.7% and the peer median of 9.7%.

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

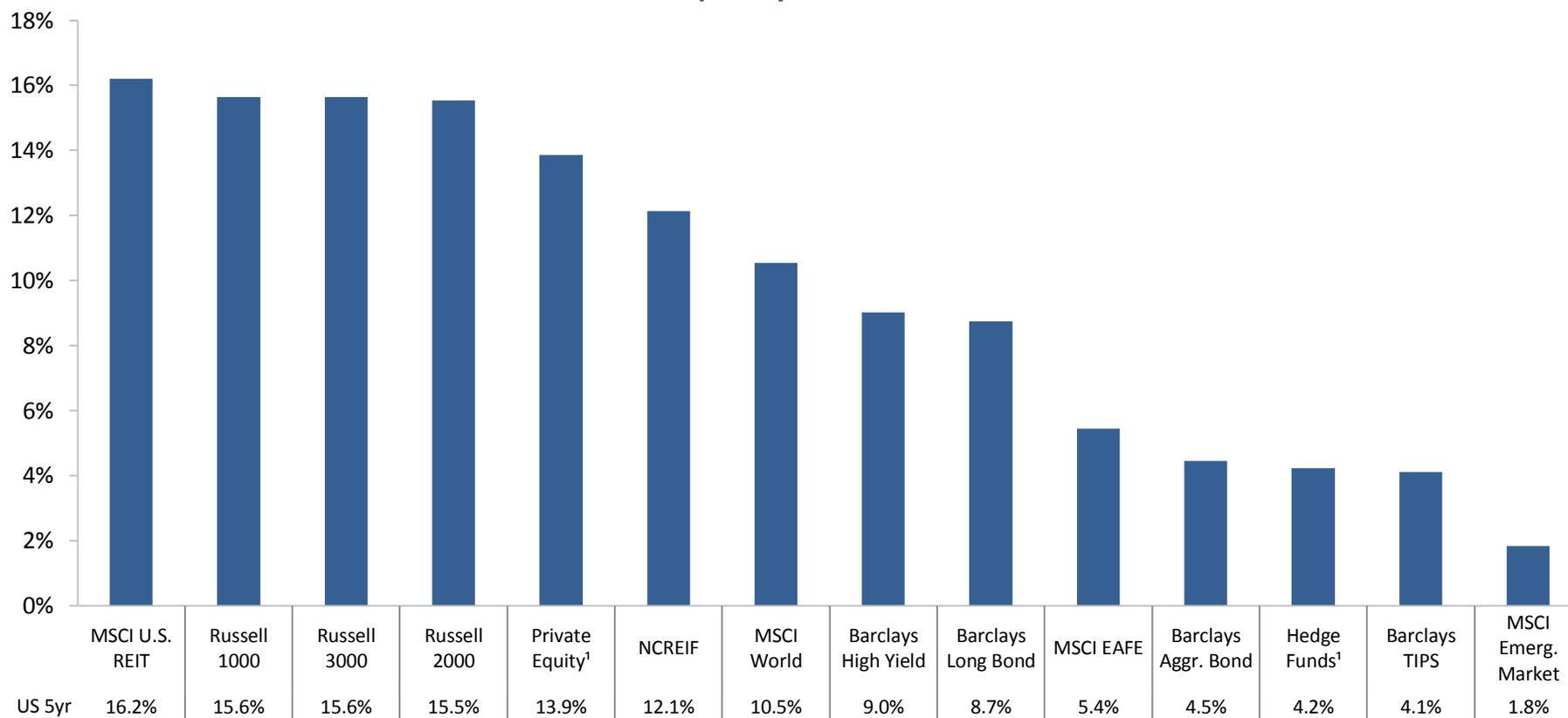
Each of these three factors is different across funds. Therefore, it is not surprising that policy returns often vary widely between funds.



To enable fairer comparisons, the policy returns of all participants except your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. If CEM used this same adjustment for your fund, your 5-year policy return would be 8.5%, 0.3% higher than your actual 5-year policy return of 8.2%. Mirroring this, your 5-year total fund net value added would be 0.3% lower. 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 2014 were REITS and large cap stock (Russell 1000).

5-Year returns for frequently used benchmark indices



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

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

- The negative impact of your lower weight in one of the better performing asset classes of the past 5 years: U.S. Stock (your 22% 5-year average weight versus a U.S. average of 25%).
- The negative impact of your higher weight in one of the poorer performing asset classes of the past 5 years: U.S. Bonds (your 33% 5-year average weight versus a U.S. average of 19%).

### 5-Year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	22%	22%	25%
EAFE Stock	7%	8%	7%
Emerging Market Stock	2%	3%	2%
ACWIxUS Stock	10%	6%	9%
Global Stock	2%	9%	7%
Other Stock	1%	0%	0%
<b>Total Stock</b>	<b>44%</b>	<b>48%</b>	<b>50%</b>
U.S. Bonds	33%	17%	19%
Inflation Indexed Bonds	0%	2%	2%
High Yield Bonds	0%	2%	2%
Global Bonds	0%	2%	2%
Cash	1%	1%	0%
Other Fixed Income	1%	2%	2%
<b>Total Fixed Income</b>	<b>35%</b>	<b>27%</b>	<b>27%</b>
Global TAA	0%	1%	2%
Hedge Funds	3%	3%	4%
Commodities	1%	1%	1%
Natural Resources	2%	0%	0%
Real Estate incl. REITS	7%	9%	7%
Other Real Assets	0%	1%	1%
Private Equity	7%	10%	8%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Your policy asset mix has changed over the past 5 years. At the end of 2014 your policy mix compared to your peers and the U.S. universe as follows:**

Asset class	Your fund		Peer avg.	U.S. Public avg.
	2010	2014	2014	2014
U.S. Stock	31%	20%	19%	23%
EAFE Stock	7%	0%	8%	6%
Emerging Market Stock	2%	0%	3%	2%
ACWIXUS Stock	8%	19%	6%	9%
Global Stock	3%	0%	10%	8%
Other Stock	0%	3%	0%	0%
<b>Total Stock</b>	<b>51%</b>	<b>42%</b>	<b>46%</b>	<b>49%</b>
U.S. Bonds	34%	25%	15%	16%
Inflation Indexed Bonds	0%	2%	2%	3%
High Yield Bonds	0%	0%	2%	2%
Global Bonds	0%	0%	3%	2%
Cash	0%	4%	1%	-1%
Other Fixed Income	2%	0%	3%	3%
<b>Total Fixed Income</b>	<b>36%</b>	<b>31%</b>	<b>25%</b>	<b>25%</b>
Global TAA	0%	2%	1%	3%
Hedge Funds	1%	3%	5%	4%
Commodities	0%	1%	1%	1%
Natural Resources	0%	3%	1%	1%
Real Estate incl. REITS	6%	8%	10%	8%
Other Real Assets	0%	0%	0%	1%
Private Equity	6%	10%	12%	9%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

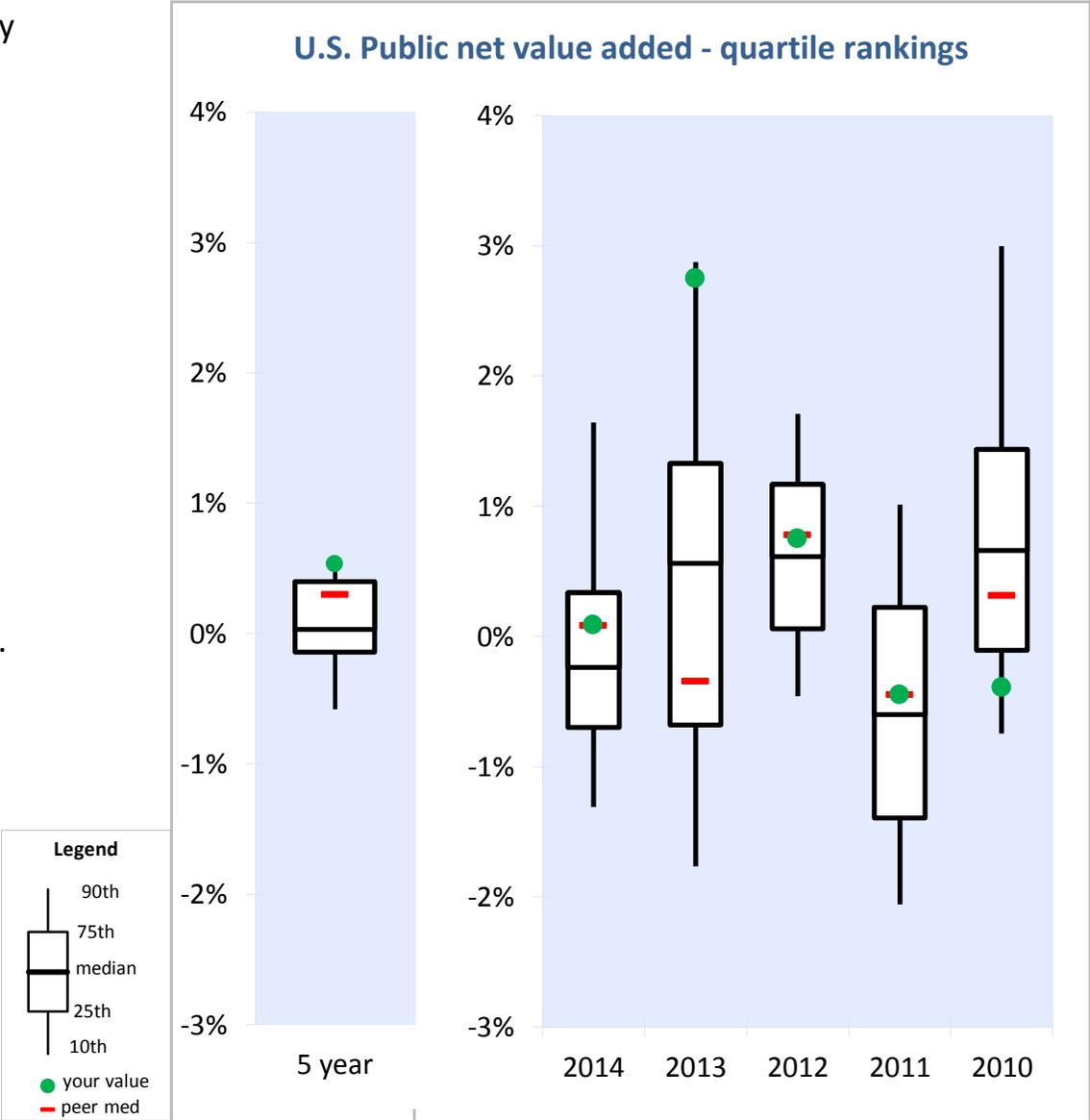
# Net value added is the component of total return from active management. Your 5-year net value added was 0.5%.

Net value added equals total net return minus policy return.

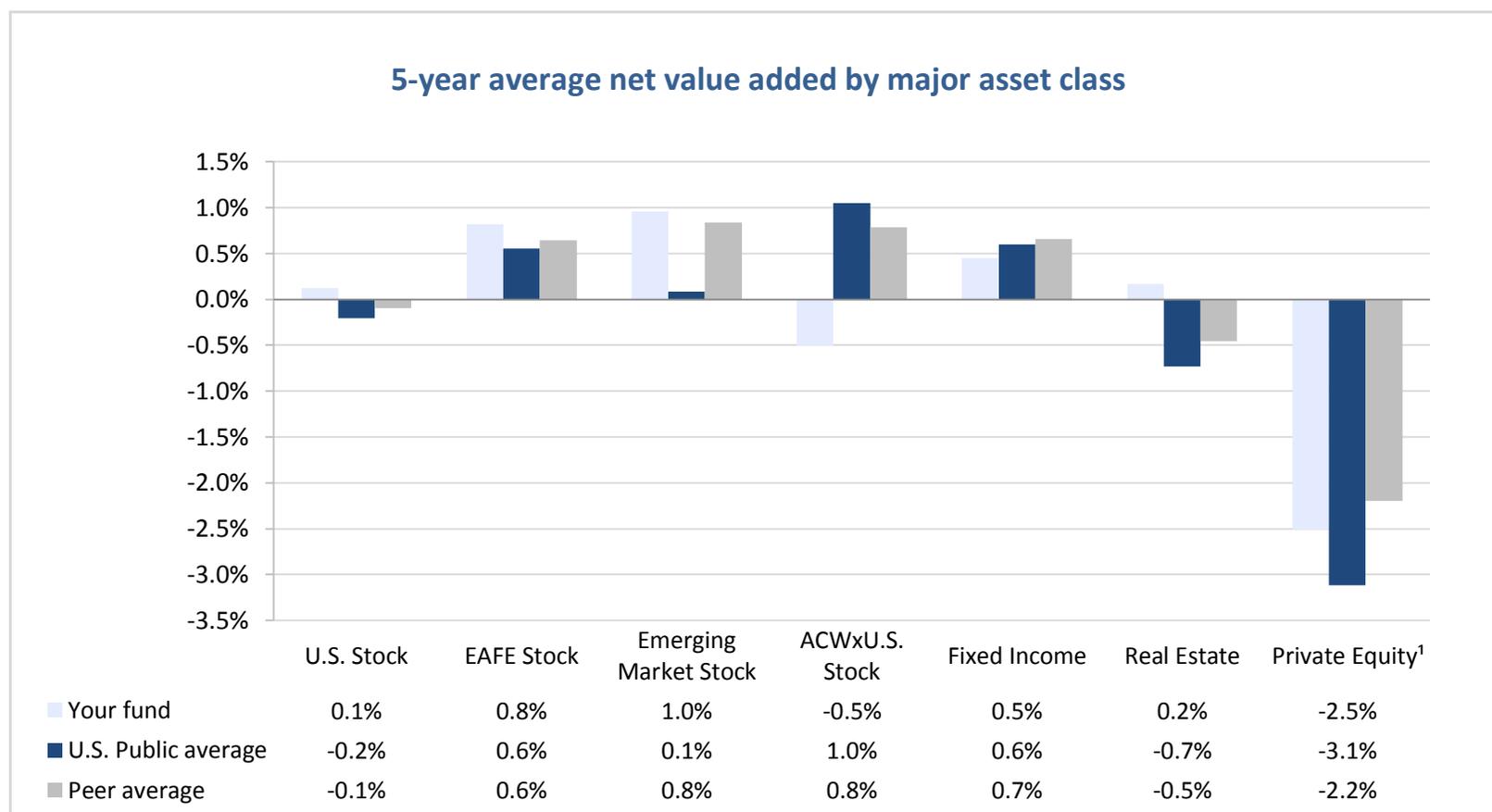
### Value added for North Carolina Retirement Systems

Year	Net Return	Policy Return	Net value Added
2014	6.2%	6.1%	0.1%
2013	12.3%	9.5%	2.8%
2012	11.8%	11.1%	0.8%
2011	2.1%	2.5%	(0.4%)
2010	11.6%	12.0%	(0.4%)
5-year	8.7%	8.2%	0.5%

Your 5-year net value added of 0.5% compares to a median of 0.3% for your peers and 0.0% for the U.S. Public universe.

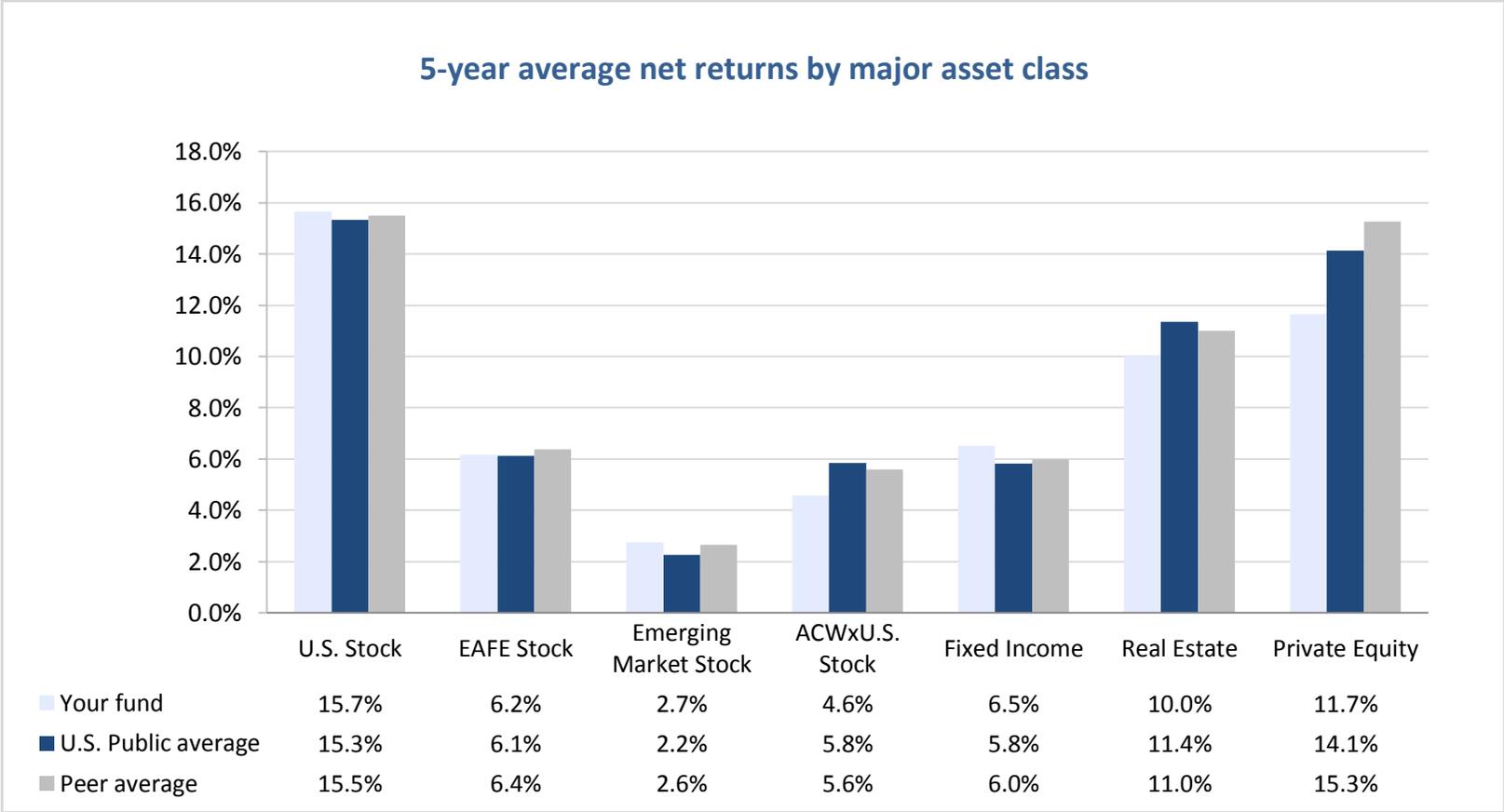


## You had positive 5-year value added in U.S. Stock, EAFE Stock, Emerging Market Stock, Fixed Income and Real Estate.



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 suggested by CEM, your fund's 5-year private equity net value added would have been -5.8%. 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 11.7% for private equity was below the U.S. average of 14.1%.

# You had higher 5-year net returns in U.S. Stock, EAFE Stock, Emerging Market Stock and Fixed Income relative to the U.S. Public average.



## Your investment costs were \$442.7 million or 49.9 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		1,236	700	30,282	3,631	35,849	
U.S. Stock - Mid Cap		164	67	6,084		6,314	
U.S. Stock - Small Cap		105		7,869		7,974	
Stock - EAFE		462	373	12,531		13,366	
Stock - Emerging		172		12,500		12,672	
Stock - ACWIxU.S.		831	1,164	21,627		23,622	
Stock - Global		216		11,344		11,560	
Stock - Other		130	168			297	
Fixed Income - U.S.	1,024					1,024	
Fixed Income - Other		31		336	3,951	4,318	
Cash	203					203	
Global TAA		491		1,962		2,453	
Hedge Funds - Direct		707		38,139	21,418	60,264	
Hedge Funds - Fund of Funds		319		24,674 <sup>2</sup>	10,649 <sup>2</sup>	35,642	
Commodities		572		5,303	3,374	9,249	
REITs		161		2,683		2,844	
Real Estate		760		16,040	892 <sup>1</sup>	16,800	
Real Estate - LPs		1,234		58,141	61,119 <sup>1</sup>	59,375	
Infrastructure - LPs		35		3,948		3,983	
Natural Resources - LPs		763		31,943	3,370 <sup>1</sup>	32,706	
Diversified Private Equity - Co-investment		583		24,619	50,468 <sup>1</sup>	25,202	
Diversified Priv. Eq.- Fund of Funds		367		26,092		26,459	
LBO		544		32,029	16,849 <sup>1</sup>	32,573	
Venture Capital		254		14,445	10,705 <sup>1</sup>	14,699	
Total asset management costs excluding private asset performance fees						439,447	49.5bp
<b>Oversight, custodial and other costs<sup>3</sup></b>							
Oversight of the fund						1,489	
Trustee & custodial						1,800	
Total oversight, custodial & other costs						3,289	0.4bp
Total investment cost (excluding transaction and private asset performance fees)						442,735	49.9bp

### 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> Includes underlying fees provided by you of \$26,060. The split of these underlying fees between base and performance fees was estimated.

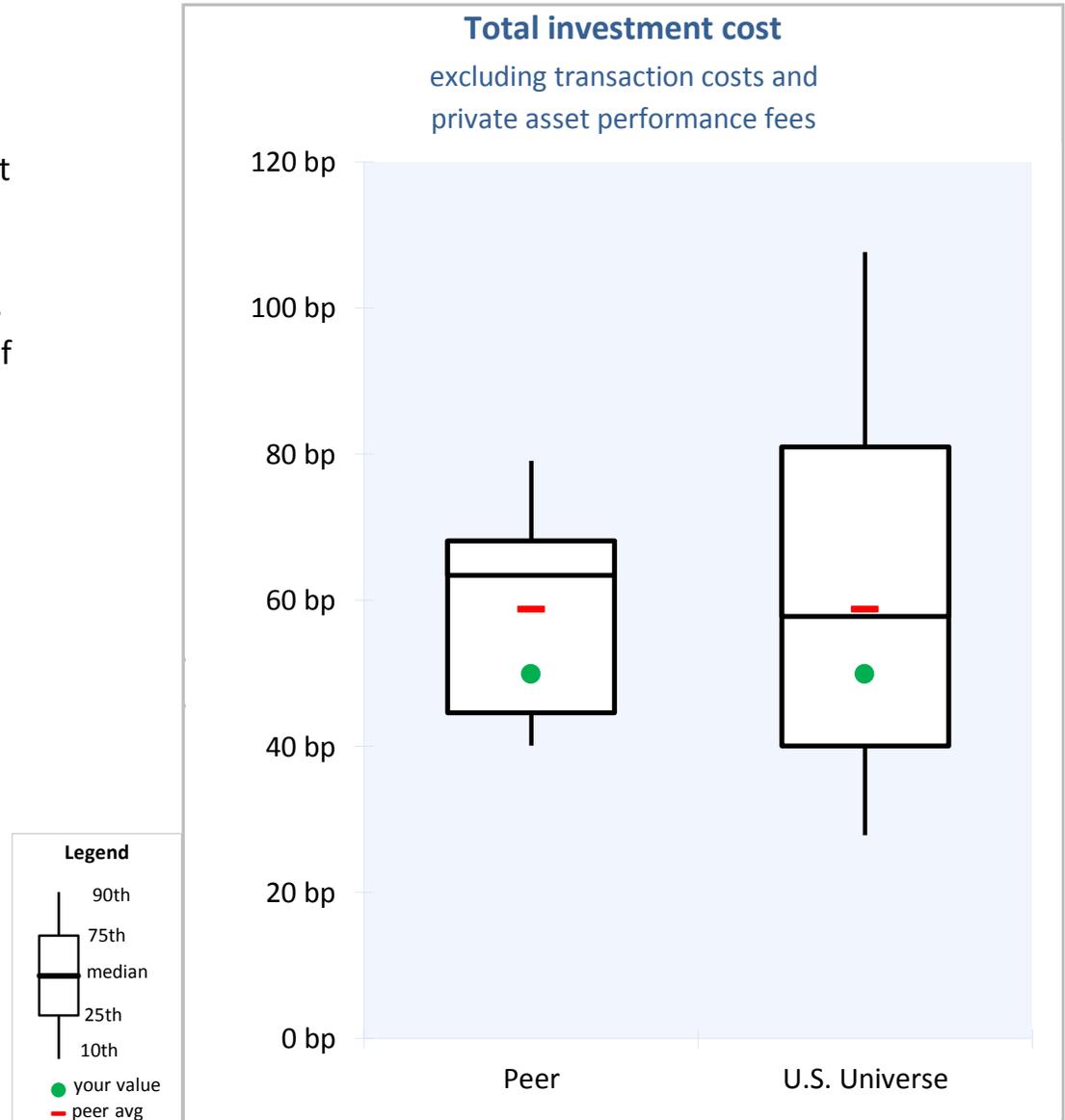
<sup>3</sup> Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

## Your total investment cost of 49.9 bps was below the peer median of 63.4 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 20% of your funds assets at the end of 2014 versus a peer average of 25%.
- 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 normal cost 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 49.9 bp was close to your benchmark cost of 51.4 bp. Thus, your cost savings was 1.5 bp.

### Your cost versus benchmark

	\$000s	basis points
Your total investment cost	442,735	49.9 bp
Your benchmark cost	456,236	51.4 bp
Your excess cost	(13,501)	(1.5) bp

**Your fund was normal cost because the impact of paying less for similar services was partly offset by your higher cost implementation style.**

### Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• More fund of funds	9,895	1.1
• Use of external active management (vs. lower cost passive and internal)	15,405	1.7
• Less overlays	(782)	(0.1)
• Other style differences	(1,109)	(0.1)
	<u>23,409</u>	<u>2.6</u>
2. Paying less than peers for similar services		
• External investment management costs	(20,487)	(2.3)
• Internal investment management costs	(7,373)	(0.8)
• Oversight, custodial & other costs	(9,049)	(1.0)
	<u>(36,909)</u>	<u>(4.2)</u>
<b>Total savings</b>	<b>(13,501)</b>	<b>(1.5)</b>

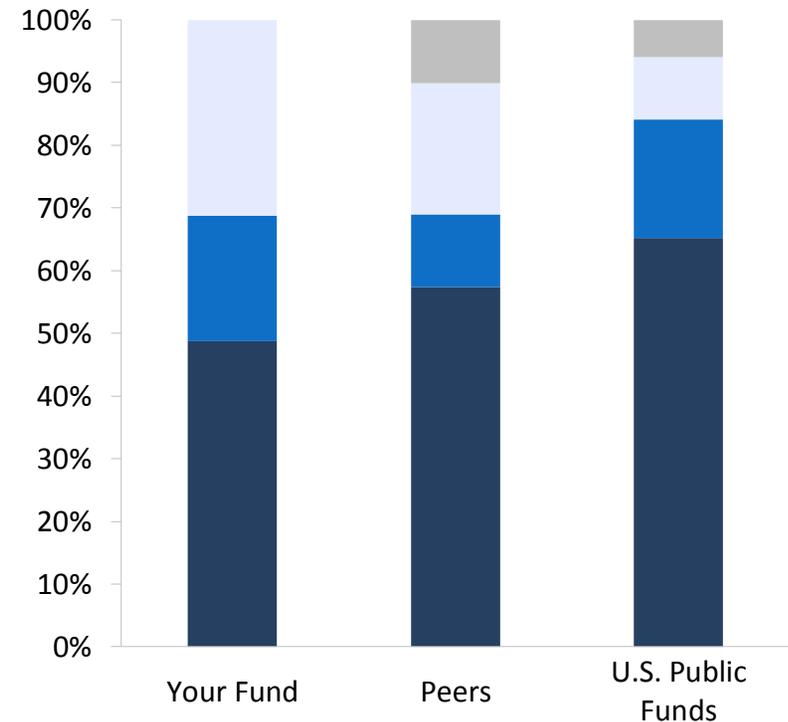
## Differences in cost performance are often caused by differences in implementation style.

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 49% versus 57% 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 12% of hedge funds, real estate and private equity in fund of funds compared to 4% for your peers.

Implementation style<sup>1</sup>



■ Internal passive	0%	10%	6%
■ Internal active	31%	21%	10%
■ External passive	20%	12%	19%
■ External active	49%	57%	65%

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

# Differences in implementation style cost you 2.6 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	14,758	39.0%	12.6%	26.4%	25.9 bp	10,081	
U.S. Stock - Mid Cap	1,909	52.6%	54.3%	(1.7%)	56.2 bp	(181)	
U.S. Stock - Small Cap	1,250	100.0%	59.6%	40.4%	61.8 bp	3,122	
Stock - EAFE	5,518	72.8%	51.4%	21.4%	33.7 bp	3,980	
Stock - Emerging	2,054	100.0%	72.5%	27.5%	54.9 bp	3,105	
Stock - ACWIxU.S.	9,926	51.8%	73.7%	(21.8%)	36.2 bp	(7,845)	
Stock - Global	2,584	100.0%	77.2%	22.8%	32.3 bp	1,907	
Stock - Other	1,549	0.0%	0.0%	0.0%		0	
Fixed Income - U.S.	25,697	0.0%	31.1%	(31.1%)	9.7 bp	(7,725)	
Fixed Income - Other	307	100.0%	96.2%	3.8%	Insufficient <sup>2</sup>	0	
Global TAA	1,405	100.0%	92.3%	7.7%	Insufficient <sup>2</sup>	0	
Commodities	1,558	100.0%	86.7%	13.3%	Insufficient <sup>2</sup>	0	
REITs	557	100.0%	83.2%	16.8%	41.6 bp	389	
Infrastructure*	300	100.0%	100.0%	0.0%		0	
of which Ltd Partnerships represent:		100.0%	79.5%	20.5%	Insufficient <sup>2</sup>	0	
Real Estate ex-REITs*	7,822	100.0%	87.3%	12.7%	48.9 bp	4,873	
of which Ltd Partnerships represent:		69.3%	56.5%	12.8%	40.6 bp	4,055	
Natural Resources*	4,307	100.0%	100.0%	0.0%		0	
of which Ltd Partnerships represent:		100.0%	79.8%	20.2%	-4.1 bp	(357)	
Diversified Private Equity*	3,731	100.0%	99.9%	0.1%	Insufficient <sup>2</sup>	0	
LBO*	2,243	100.0%	100.0%	0.0%		0	
Venture Capital*	897	100.0%	100.0%	0.0%		0	
Impact of less/more external active vs. lower cost styles						15,405	1.7 bp
		<u>Fund of funds % of LPs</u>			<u>vs. direct LP<sup>1</sup></u>		
Hedge Funds	3,857	28.8%	10.7%	18.1%	57.7 bp	4,035	
Infrastructure - LPs*	300	0.0%	15.0%	(15.0%)	Insufficient <sup>2</sup>	0	
Real Estate ex-REITs - LPs*	5,417	0.0%	0.0%	(0.0%)	Insufficient <sup>2</sup>	0	
Natural Resources - LPs*	4,307	0.0%	0.0%	0.0%		0	
Diversified Private Equity - LPs*	3,731	30.0%	3.9%	26.0%	69.3 bp	6,728	
LBO - LPs*	2,243	0.0%	4.0%	(4.0%)	69.3 bp	(620)	
Venture Capital - LPs*	897	0.0%	4.0%	(4.0%)	69.3 bp	(248)	
Impact of less/more fund of funds vs. direct LPs						9,895	1.1 bp
		<u>Overlays and other</u>					
Impact of lower use of portfolio level overlays						(782)	(0.1) bp
Impact of mix of internal passive, internal active, and external passive <sup>3</sup>						(1,109)	(0.1) bp
Total impact of differences in implementation style						23,409	2.6 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 amount fees are based on is used for this asset class and not the NAV.

# The net impact of paying more/less for external asset management costs saved 2.3 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	9,006	1.6	1.2	0.4	333
U.S. Stock - Large Cap - Active	5,751	59.8 <sup>1</sup>	28.8	31.0	17,851
U.S. Stock - Mid Cap - Passive	905	1.6	4.3*	(2.7)	(240)
U.S. Stock - Mid Cap - Active	1,003	61.5	60.5*	1.0	97
U.S. Stock - Small Cap - Active	1,250	63.8	64.4	(0.6)	(80)
Stock - EAFE - Passive	1,499	3.3	2.7	0.6	86
Stock - EAFE - Active	4,019	32.0	36.7	(4.6)	(1,861)
Stock - Emerging - Active	2,054	61.7	61.7	0.0	0
Stock - ACWIxU.S. - Passive	4,780	3.3	4.4	(1.1)	(540)
Stock - ACWIxU.S. - Active	5,146	42.9	40.6	2.2	1,146
Stock - Global - Active	2,584	44.7	37.6	7.1	1,839
Stock - Other - Passive	1,549	1.9	9.7*	(7.8)	(1,206)
Fixed Income - Other - Active	307	140.7 <sup>1</sup>	49.5	91.2	2,799
Global TAA - Active	1,405	17.5	38.0	(20.6)	(2,894)
Hedge Funds - Active	2,746	219.5 <sup>1</sup>	228.3	(8.8)	(2,421)
Hedge Funds - Fund of Fund	1,111	320.9 <sup>1</sup>	286.0	34.8	3,870
Commodities - Active	1,558	59.4 <sup>1</sup>	89.3	(29.9)	(4,662)
Infrastructure - Limited Partnership*	300	132.8	165.8	(33.1)	(992)
REITs - Active	557	51.1	43.7	7.4	409
Real Estate ex-REITs - Active*	2,405	69.9	68.5	1.4	327
Real Estate ex-REITs - Limited Partnership*	5,417	109.6	109.1	0.5	255
Natural Resources - Limited Partnership*	4,307	75.9	104.2	(28.2)	(12,163)
Diversified Private Equity - Active	2,564	96.4	165.0	(68.6)	(17,917)
Diversified Private Equity - Fund of Fund*	1,118	236.6	234.3	2.4	264
LBO - Active*	2,243	145.2	158.8	(13.6)	(3,051)
Venture Capital - Active*	897	163.9	183.2	(19.4)	(1,737)
Total impact of paying more/less for external management					(20,487)
Total in bps					(2.3) bp

### Footnotes:

<sup>1</sup> You paid performance fees in these asset classes.

\*Universe median used as peer data was insufficient.

\*\* The amount fees are based on is used for this asset class and not the NAV.

## The net impact of paying more/less for internal asset management costs saved 0.8 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	25,697	0.4	3.3	(2.9)	(7,373)
Total impact of paying more/less for internal management					(7,373)
Total in bps					(0.8) bp

## The net impact of differences in oversight, custodial & other costs saved 1.0 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	88,767	0.2	0.5	(0.4)	(3,169)
Consulting	88,767	0.0	0.5	(0.5)	(4,253)
Custodial	88,767	0.2	0.3	(0.1)	(525)
Audit	88,767	0.0	0.0	(0.0)	(252)
Other	88,767	0.0	0.1	(0.1)	(849)
Total					(9,049)
Total in bps					(1.0) bp

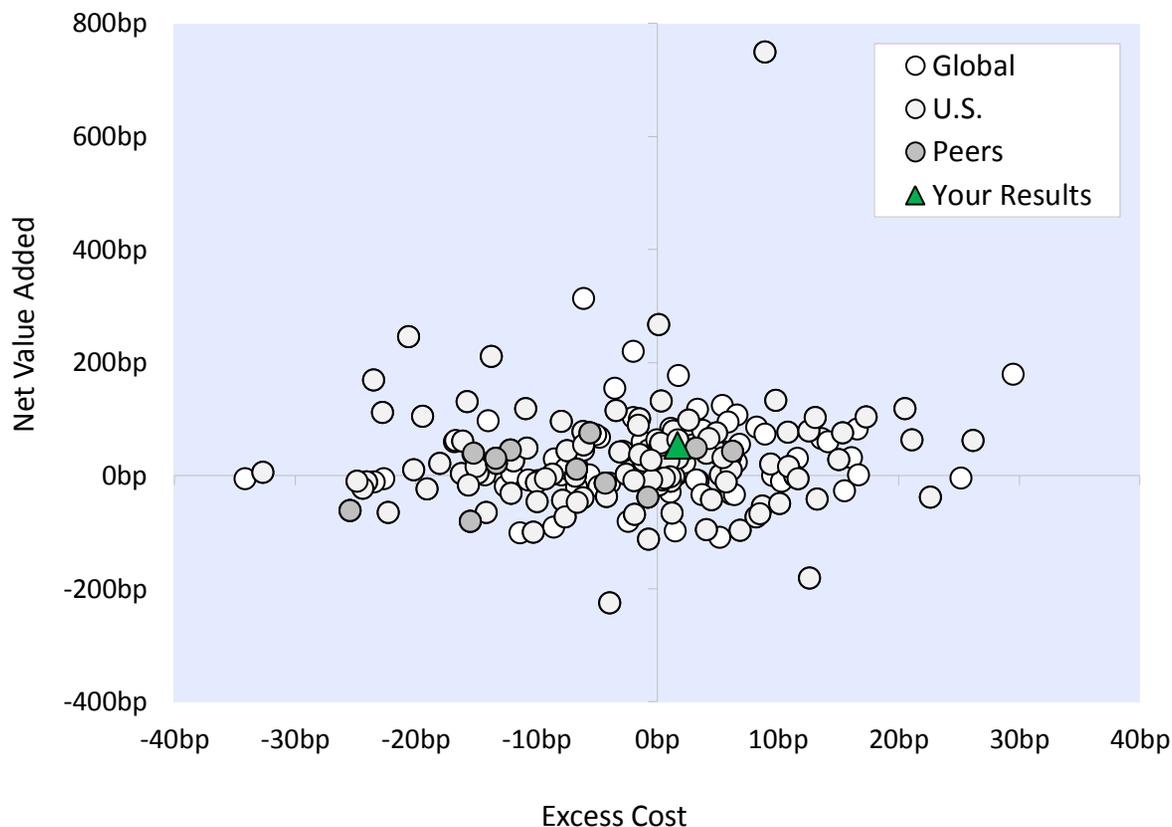
**In summary, your fund was normal cost because the impact of paying less for similar services was partly offset by your higher cost implementation style.**

### Reasons for your low cost status

	Excess Cost/ (Savings)	
	\$000s	bps
<b>1. Higher cost implementation style</b>		
• More fund of funds	9,895	1.1
• Use of external active management (vs. lower cost passive and internal)	15,405	1.7
• Less overlays	(782)	(0.1)
• Other style differences	(1,109)	(0.1)
	<u>23,409</u>	<u>2.6</u>
<b>2. Paying less than peers for similar services</b>		
• External investment management costs	(20,487)	(2.3)
• Internal investment management costs	(7,373)	(0.8)
• Oversight, custodial & other costs	(9,049)	(1.0)
	<u>(36,909)</u>	<u>(4.2)</u>
<b>Total savings</b>	<b>(13,501)</b>	<b>(1.5)</b>

# Your fund achieved 5-year net value added of 53.2 bps and excess cost of 1.7 bps on the cost effectiveness chart.

**5-Year net value added versus excess cost**  
 (Your 5-year: net value added 53.2 bps, excess cost 1.7 bps\*)



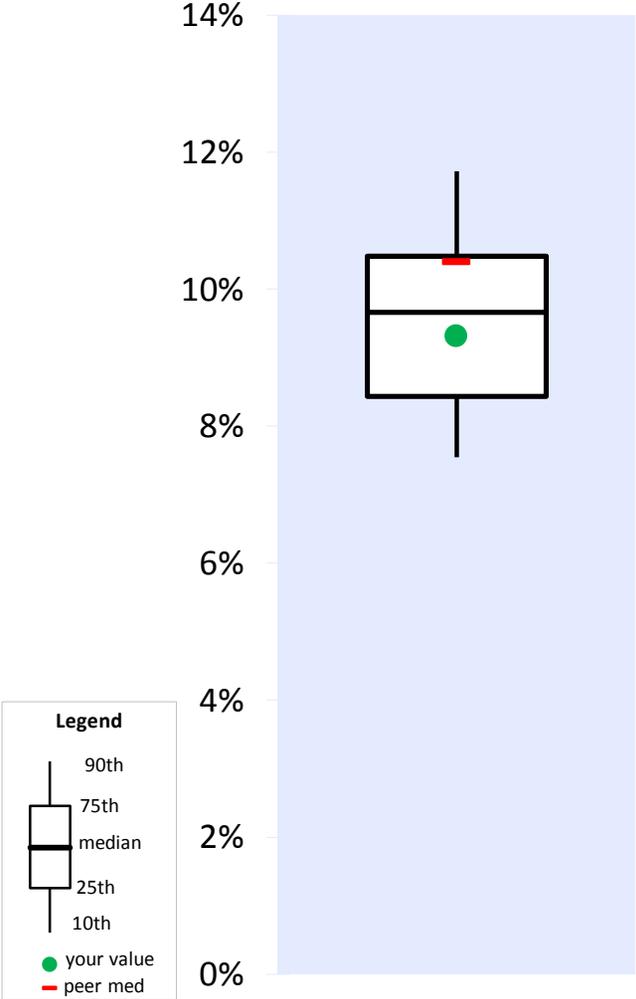
	2014	2013	2012	2011	2010	5-year
Net value add	0.1%	2.8%	0.8%	(0.4%)	(0.4%)	0.5%
Excess Cost	-1.5	2.6	4.0	n/a*	n/a*	1.7

\*Your 5-year excess cost of 2.9 basis points is the average of your excess cost for the past 3 years because peer-based benchmarks were not calculated for your fund in 2011 and 2010.

# Your asset risk of 9.3% was below the U.S. median of 9.7%.

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. asset risk at December 31, 2014



# Summary of key takeaways

## Returns

- Your 5-year net total return was 8.7%. This was below the U.S. Public median of 9.8% and below the peer median of 9.9%.
- Your 5-year policy return was 8.2%. This was below the U.S. Public median of 9.7% and below the peer median of 9.7%.

## Value added

- Your 5-year net value added was 0.5%. This was above the U.S. Public median of 0.0% and above the peer median of 0.3%.

## Cost and cost effectiveness

- Your investment cost of 49.9 bps was close to your benchmark cost of 51.4 bps. This suggests that your fund was normal cost compared to your peers.
- Your fund was normal cost because the impact of paying less for similar services was partly offset by your higher cost implementation style.
- Your fund achieved 5-year net value added of 53.2 bps and excess cost of 1.7 bps on the cost effectiveness chart.

## Risk

- Your asset risk of 9.3% was below the U.S. median of 9.7%.

# 2

## Research and Trends

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

### Value added by region<sup>1</sup> (period ending December 31, 2014)

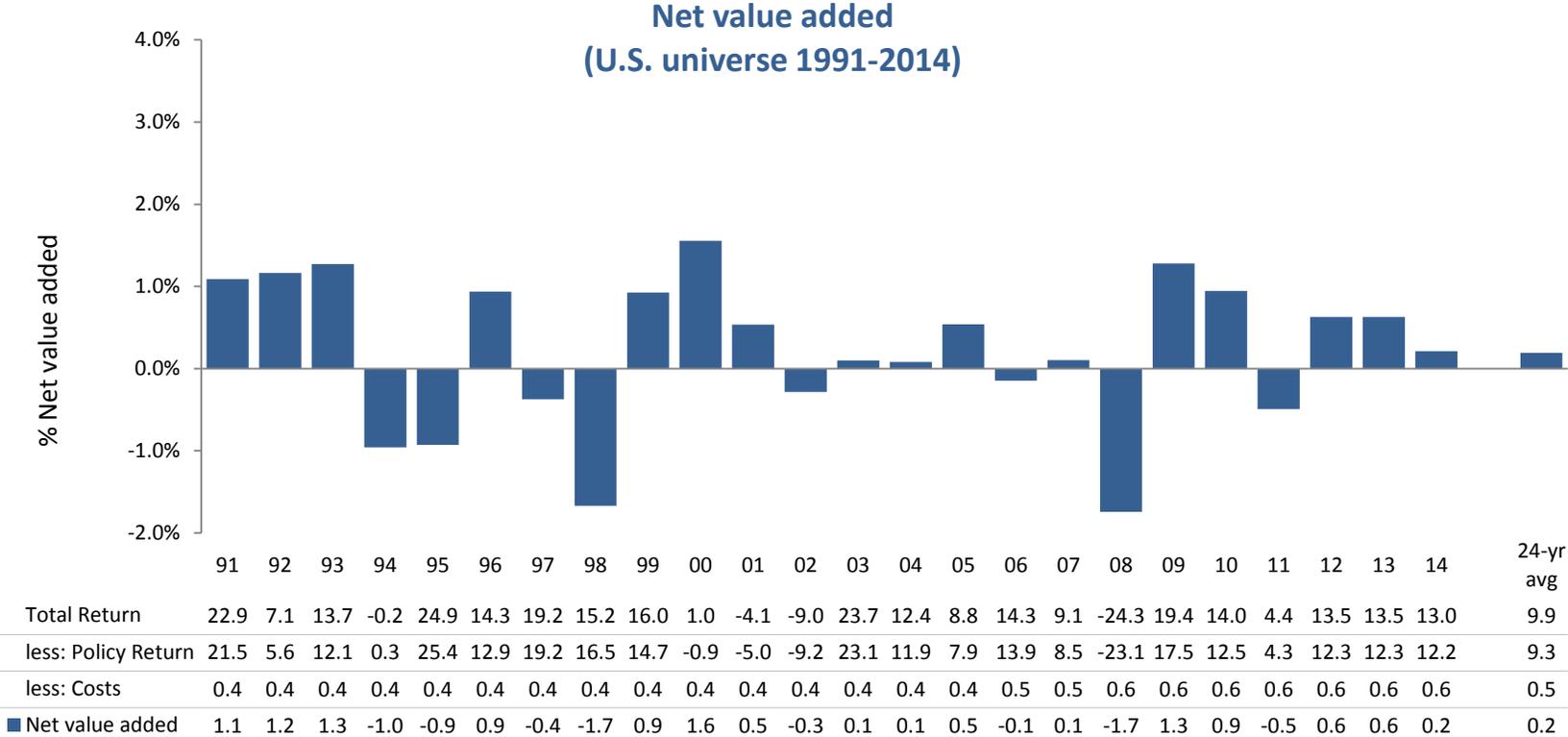
	All funds	U.S. funds	Canadian funds	European funds	Asia-Pacific funds
	24-year average <sup>3</sup>	24-year average <sup>3</sup>	24-year average <sup>3</sup>	21-year <sup>2</sup> average <sup>3</sup>	15-year <sup>2</sup> average <sup>3</sup>
Total return	9.70%	9.94%	9.51%	7.72%	7.98%
- Policy return	9.11%	9.28%	8.99%	7.00%	7.80%
- <u>Costs</u>	<u>0.42%</u>	<u>0.46%</u>	<u>0.37%</u>	<u>0.29%</u>	<u>0.49%</u>
= Net value added	0.17%	0.19%	0.14%	0.43%	-0.31%
# of annual observations	7,079	4,036	2,264	655	109
Median fund size (\$ billion)	6.3	9.6	1.9	8.8	18.0

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.

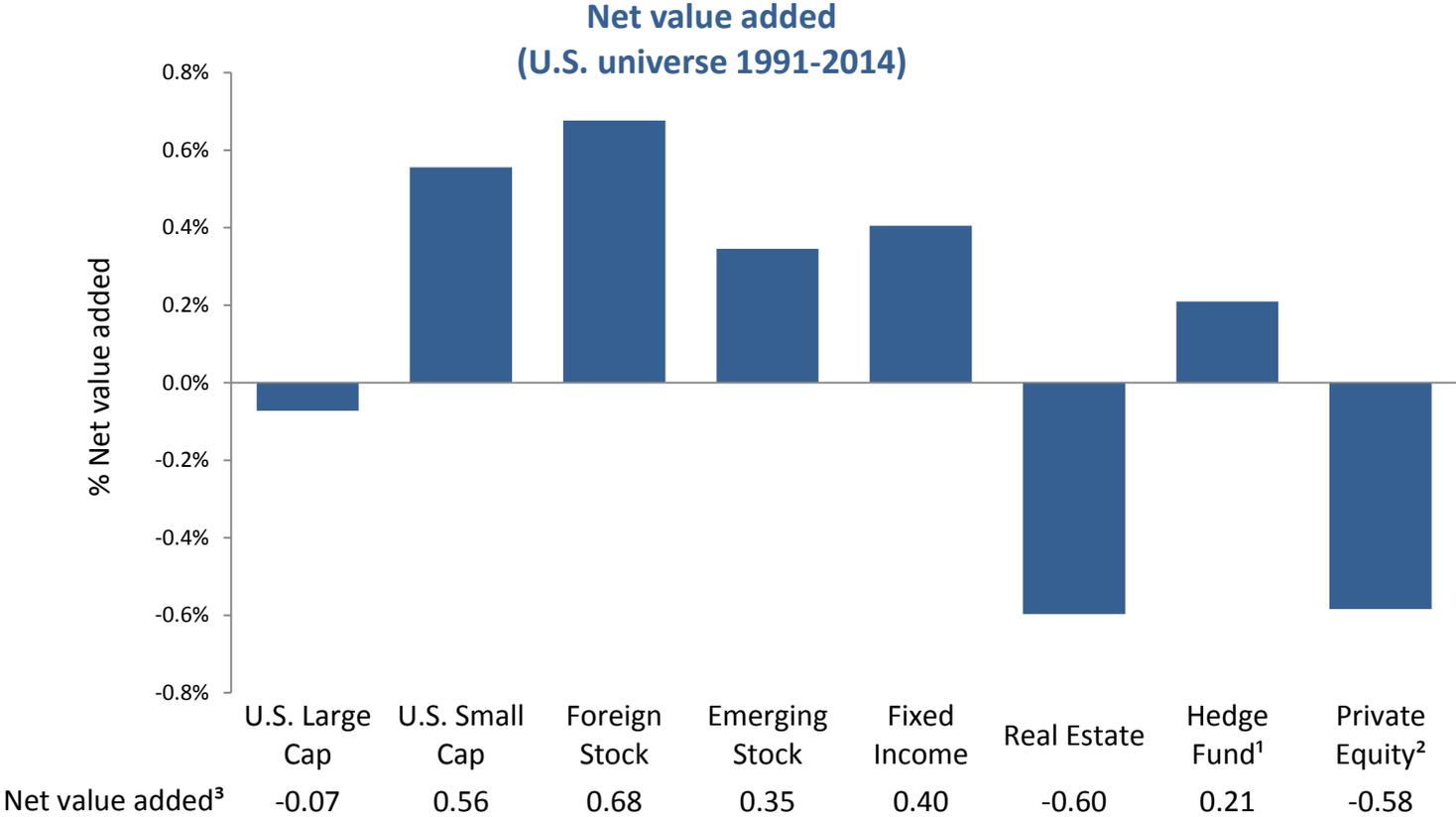
# In the U.S., net value added averaged 0.2% over the past 24 years ending 2014.



Total Return	22.9	7.1	13.7	-0.2	24.9	14.3	19.2	15.2	16.0	1.0	-4.1	-9.0	23.7	12.4	8.8	14.3	9.1	-24.3	19.4	14.0	4.4	13.5	13.5	13.0	9.9
less: Policy Return	21.5	5.6	12.1	0.3	25.4	12.9	19.2	16.5	14.7	-0.9	-5.0	-9.2	23.1	11.9	7.9	13.9	8.5	-23.1	17.5	12.5	4.3	12.3	12.3	12.2	9.3
less: Costs	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5
■ Net value added	1.1	1.2	1.3	-1.0	-0.9	0.9	-0.4	-1.7	0.9	1.6	0.5	-0.3	0.1	0.1	0.5	-0.1	0.1	-1.7	1.3	0.9	-0.5	0.6	0.6	0.2	0.2

Value added analysis is based on 4,036 annual fund total performance observations from the CEM U.S. universe for the 24-year period ending 2014. The 24-year average is an arithmetic average of the annual averages.

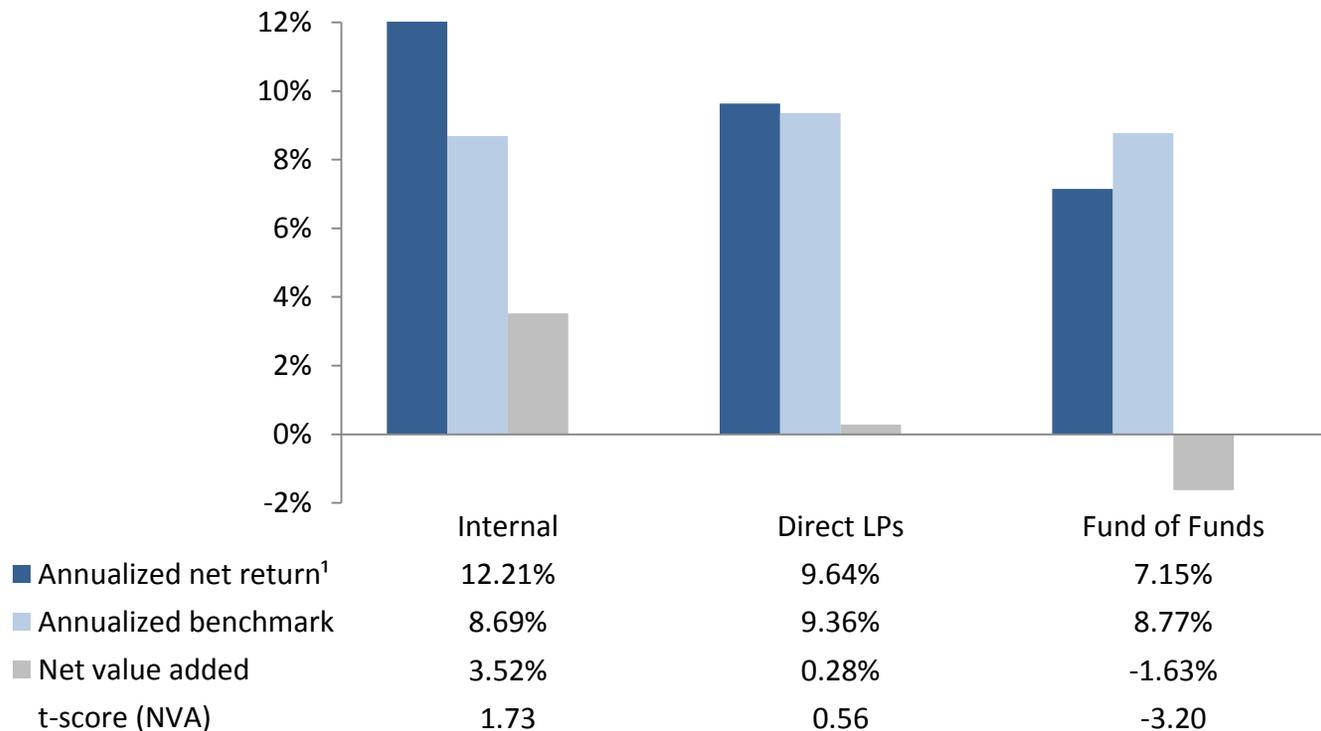
# The asset class that had the highest net value added in the U.S. universe over the past 24 years was Foreign Stock.



1. Hedge Fund gross value added performance reflect data for the 15 year period from 2000 to 2014.  
 2. The net value added calculation for private equity uses the average benchmark of all U.S. participants.  
 3. Value added analysis is from 4,036 annual fund performance observations from the CEM U.S. universe for the 24-year period ending 2014. 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)

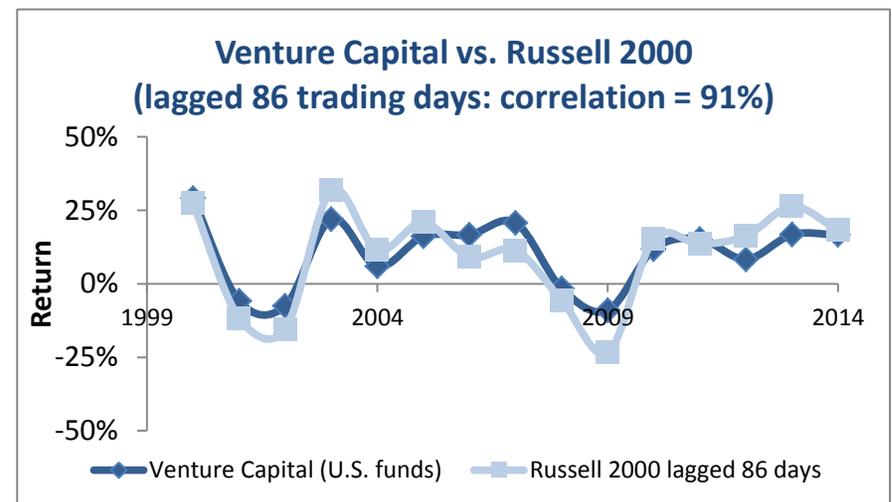
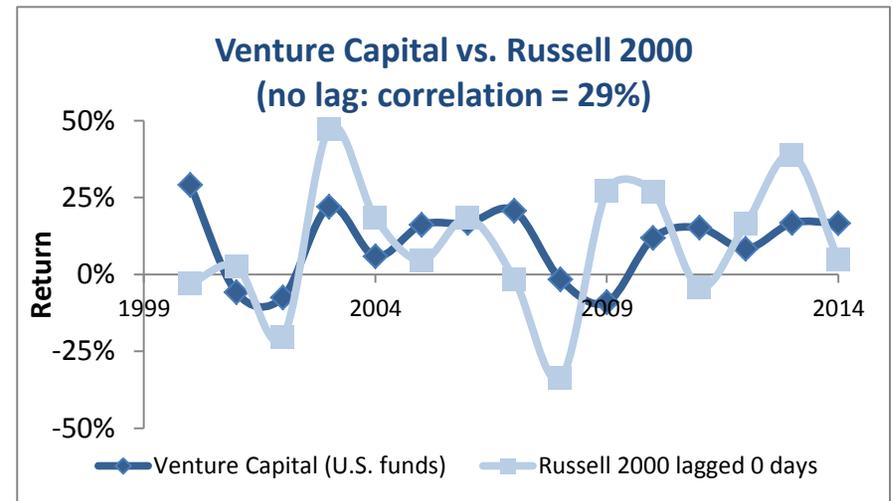


1. To compare the performance of private equity implementation styles over long periods, Monte Carlo simulations were used to capture differences in risk between styles. For details, see "How Implementation Style and Costs Affect Private Equity Performance", Alex Beath, Chris Flynn, and Jody MacIntosh, 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 -5.6% if lagged 86 trading days. Thus if a fund earned the average reported venture capital return for 2008 of -1.6%, they would have mistakenly believed that their value added from venture capital was 32.2% using the un-lagged benchmarks versus 4.0% using the same benchmark lagged to match the average 86 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.



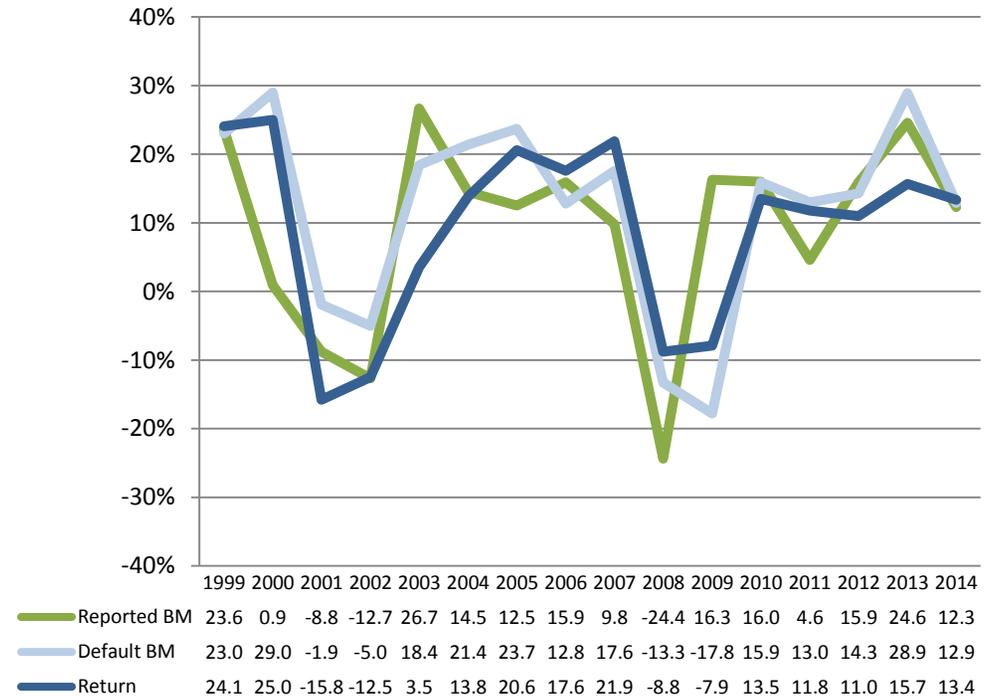
## To enable fairer comparisons, CEM uses default private equity benchmarks.

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 defaults. The defaults are:

- Investable. They are comprised of lagged small cap benchmarks.
- Custom lagged for each participant. Your default benchmark had a lag of 87 trading days. Different portfolios had different lags. CEM estimated the lag on private equity portfolios with multi-year histories 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 93 trading days (i.e., approximately 131 calendar days or 4.3 calendar months)
- Regional mix adjusted based on the average estimated mix of regions in private equity portfolios for a given country.

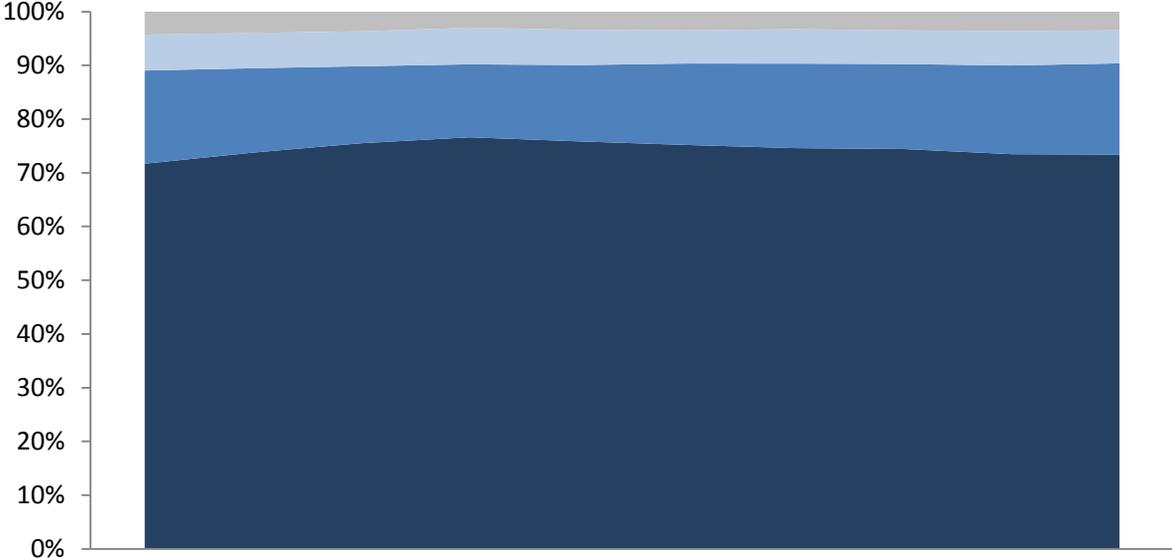
The result is the default benchmarks are superior to most self-reported benchmarks. Correlations improve to a median of 83% for the default benchmarks versus 43% for self-reported benchmarks. Other statistics such as volatility were also much better.

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



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

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

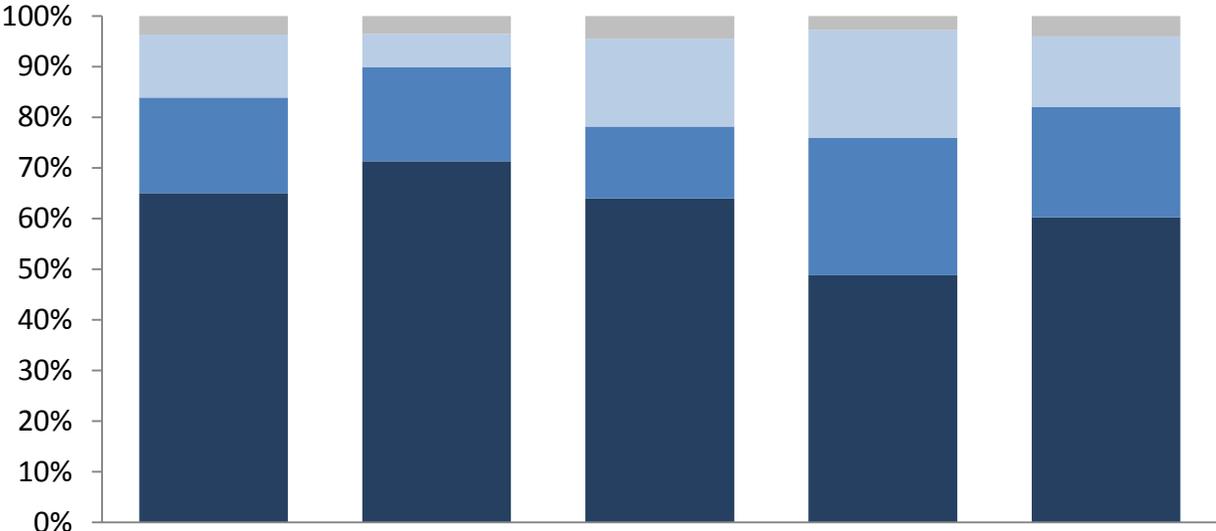


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ % Internal passive	4%	4%	4%	3%	3%	3%	3%	3%	4%	3%
■ % Internal active	7%	7%	7%	7%	7%	6%	6%	6%	6%	6%
■ % External passive	17%	16%	14%	14%	14%	15%	16%	16%	17%	17%
■ % External active	72%	74%	76%	77%	76%	75%	75%	74%	73%	73%

• This analysis is based on 68 U.S. funds with 10 consecutive years of data.

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

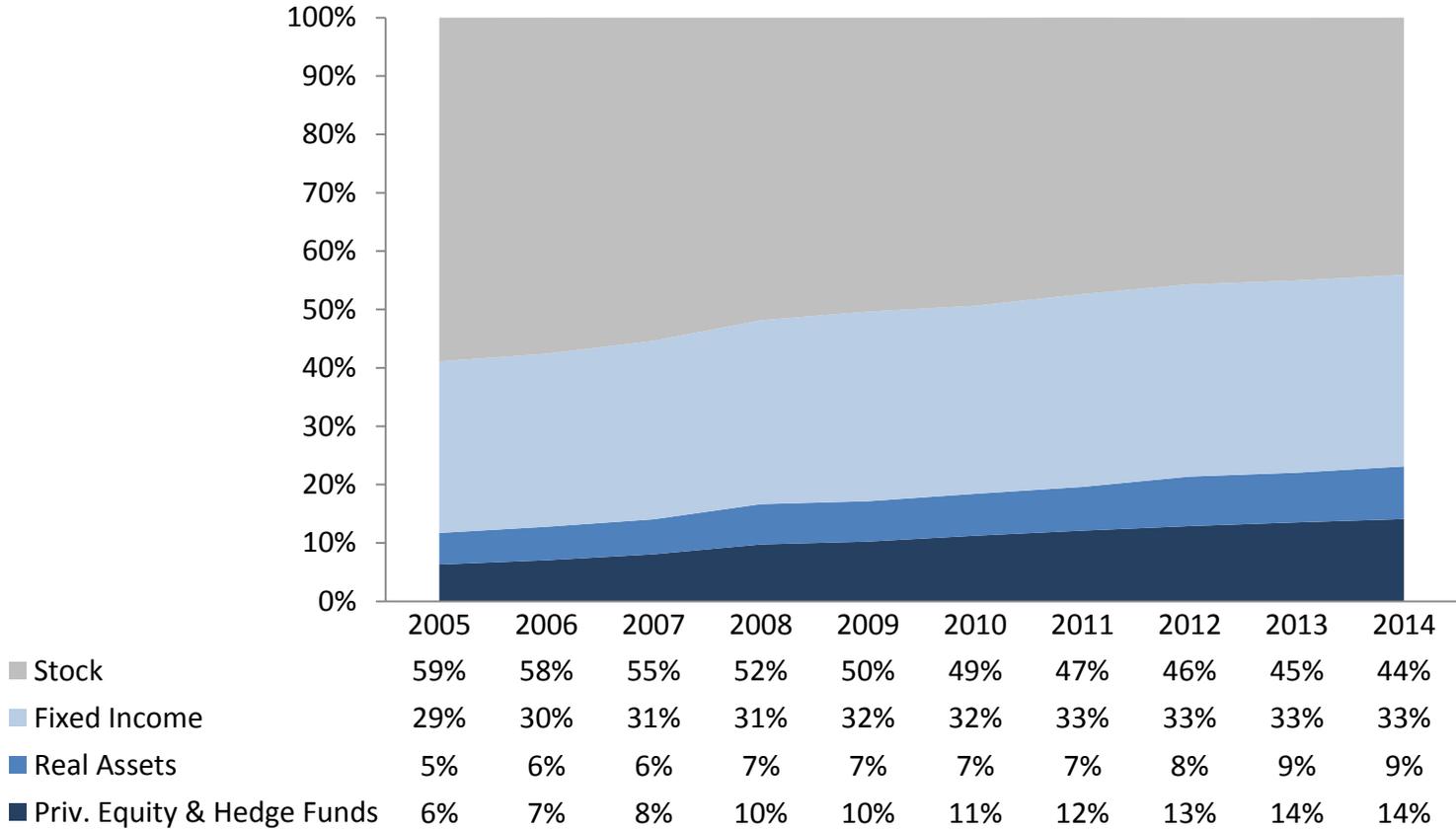
Implementation style by region - 2014 average



■ % Internal passive	4%	4%	4%	3%	4%
■ % Internal active	12%	7%	17%	21%	14%
■ % External passive	19%	19%	14%	27%	22%
■ % External active	65%	71%	64%	49%	60%
Number of funds	280	149	76	49	5
Median fund in \$ billions	6.3	9.6	1.9	8.8	18.0

**For U.S. plans, combined policy weights for real assets, private equity and hedge funds increased from 11.7% in 2005 to 23.1% in 2014.**

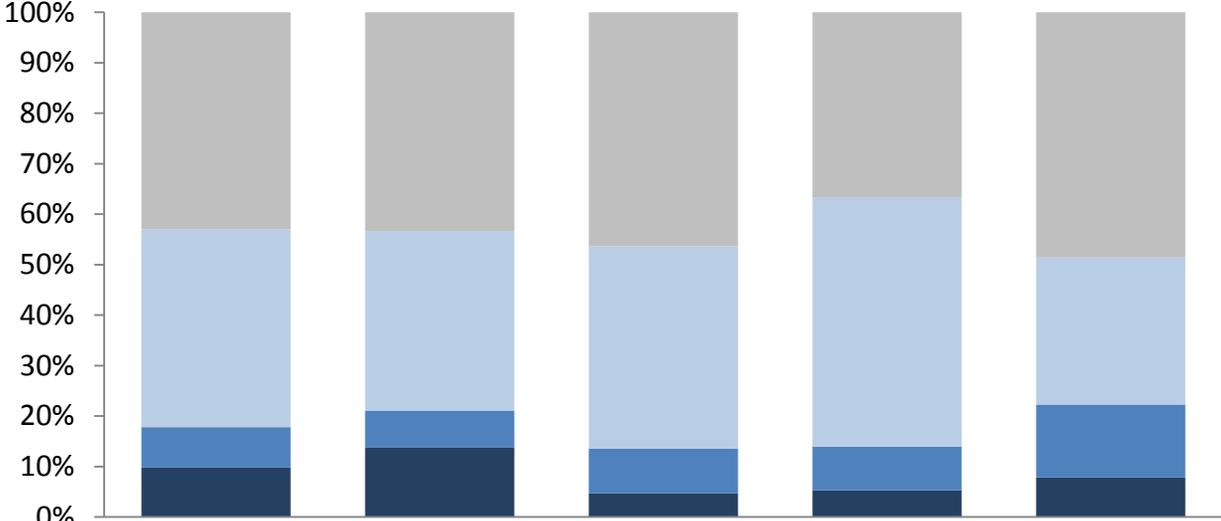
**Policy mix by year - U.S.**



• This analysis is based on 68 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 - 2014 average



■ Stock	43%	43%	46%	37%	49%
■ Fixed Income	39%	36%	40%	49%	29%
■ Real Assets	8%	7%	9%	9%	14%
■ Priv. Equity & Hedge Funds	10%	14%	5%	5%	8%
Number of funds	280	149	76	49	5
Median fund in \$ billions	6.3	9.6	1.9	8.8	18.0

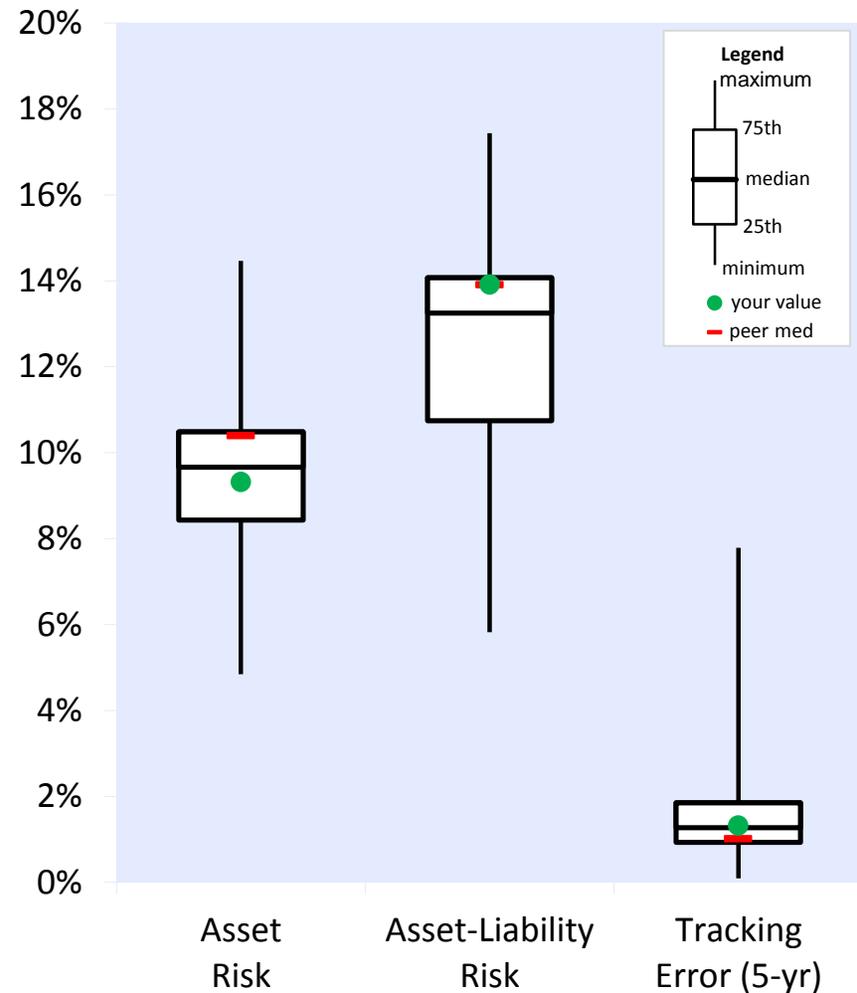
## Risk by type

Your asset risk of 9.3% was below the U.S. median of 9.7%. 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 1.3% was equal to the U.S. median of 1.3%. 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, 2014

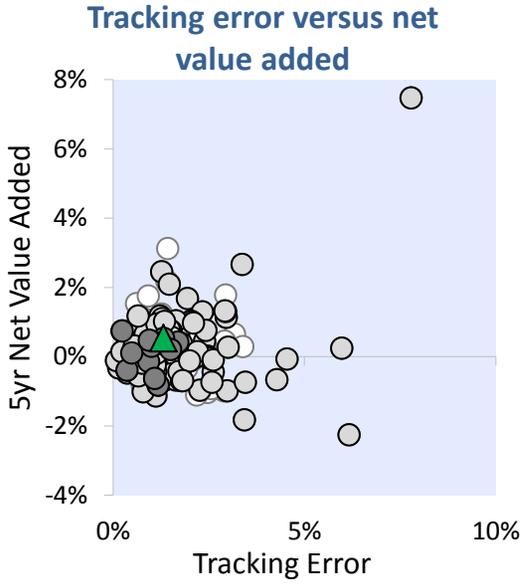
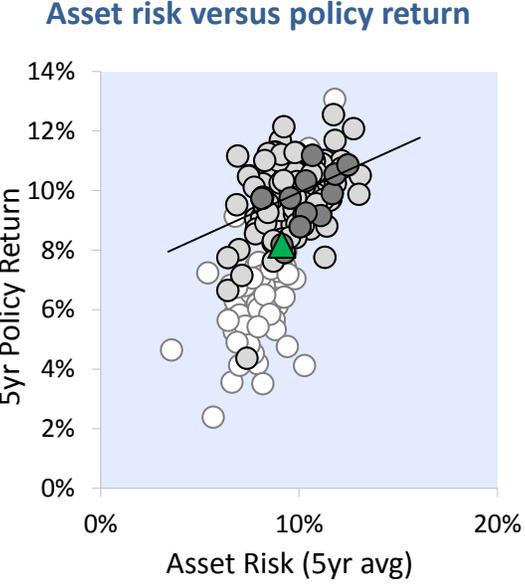
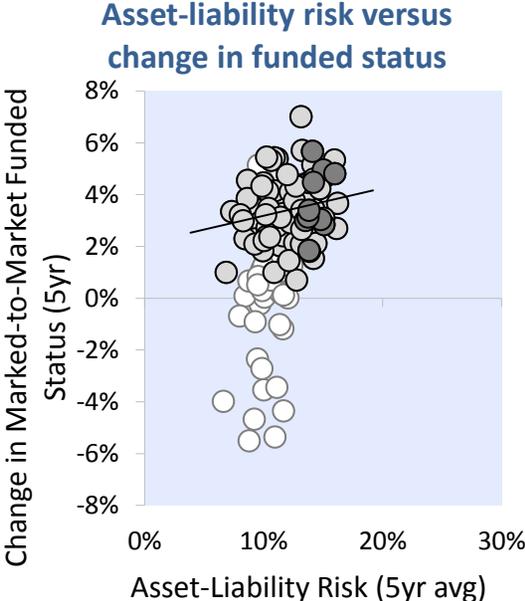


# Risk versus return

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.

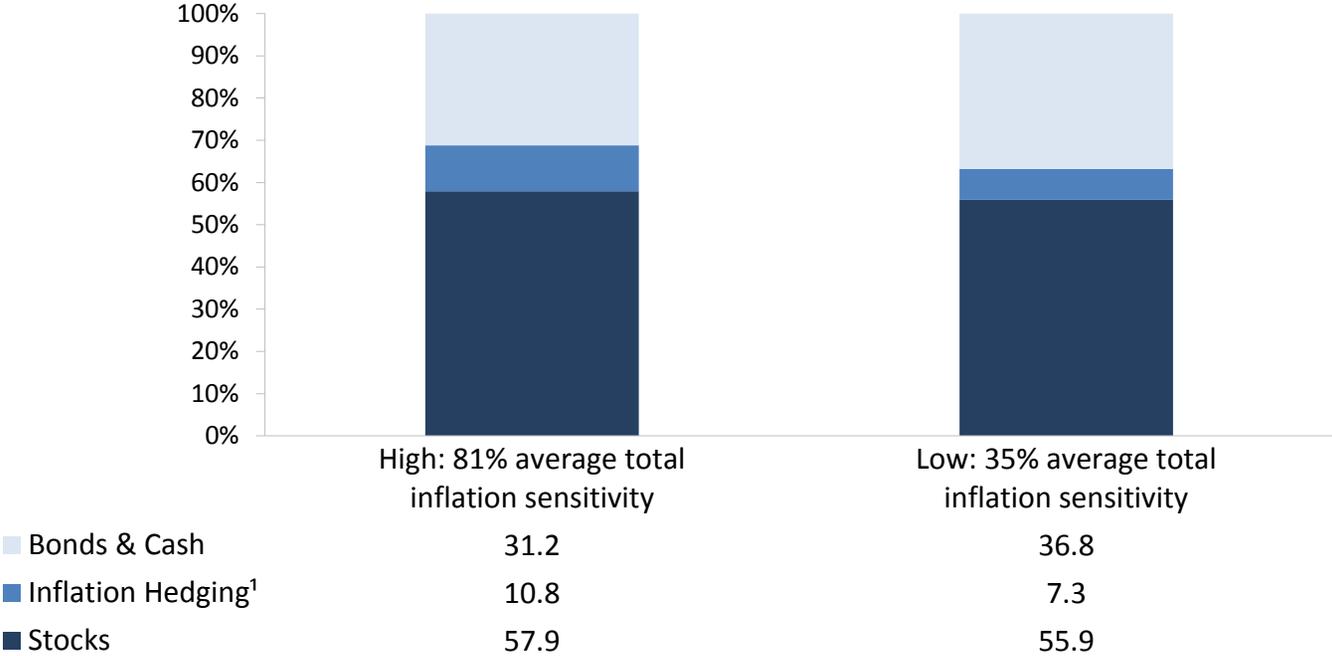


○ Global    ○ U.S.    ● Peers    ▲ You    — Linear (U.S.)

# 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 10.8% of assets at plans with high inflation sensitivity versus 7.3% at plans with lower inflation sensitivity.

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

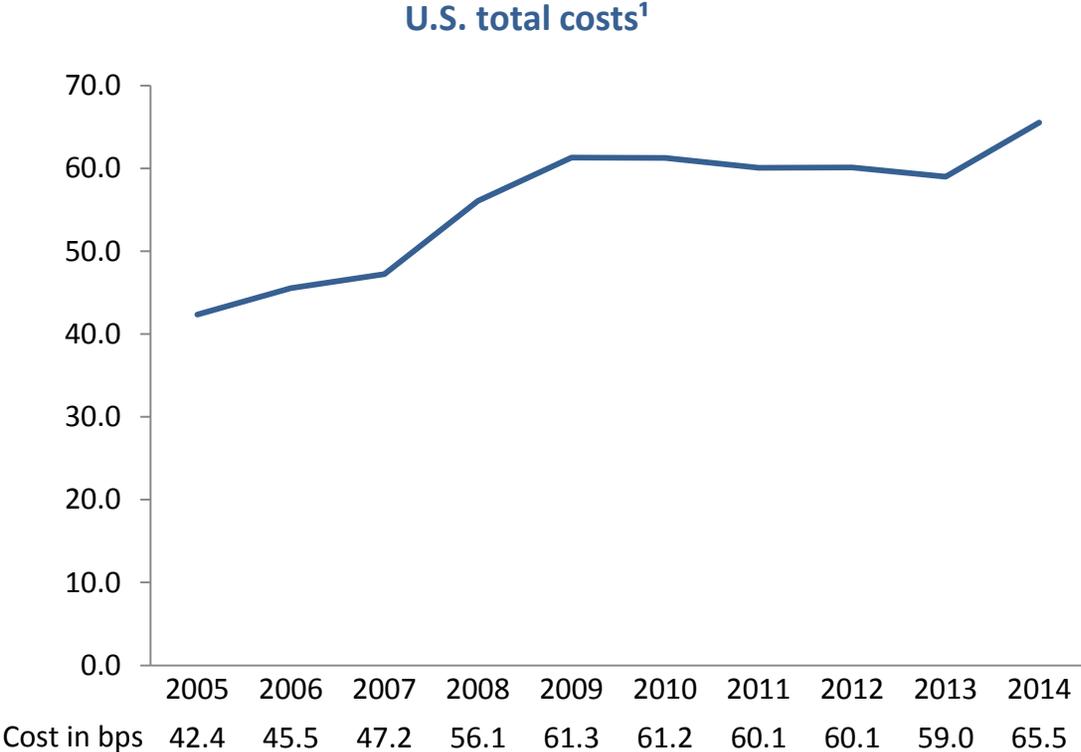


1. Inflation hedge assets include inflation-indexed bonds, commodities, real estate & REITs, infrastructure and natural resources.

# 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 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 68 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.

	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	0.48%	0.40%	0.08%
= Net value added	0.08%	0.01%	0.07%
Number of observations	3,211	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%	7.6%	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	3,211	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.