

**Investment**  
**Cost Effectiveness Analysis**  
(for the 5 years ending December 31, 2014)

**Kentucky Retirement Systems**



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Prepared August 21, 2015. Although the information in this report has been based upon and obtained from sources we believe to be reliable, Cost Effectiveness Measurement Inc. ("CEM") does not guarantee its accuracy or completeness. The information contained herein is proprietary and confidential and may not be disclosed to third parties without the express written mutual consent of both CEM and Kentucky Retirement Systems.

# Key takeaways

## Returns

- Your 5-year net total return was 8.2%. This was below the U.S. Public median of 9.8% and below the peer median of 9.7%.
- Your 5-year policy return was 9.2%. This was below the U.S. Public median of 9.7% and close to the peer median of 9.3%.

## Value added

- Your 5-year net value added was -1.0%. This was below the U.S. Public median of 0.0% and below the peer median of 0.1%.

## Long term performance

- Your 20-year net return of 8.3% was close to the U.S. Public median of 8.4% and equal to the peer median of 8.3%.

## Cost and cost effectiveness

- Your investment cost of 81.9 bps was above your benchmark cost of 74.8 bps. This suggests that your fund was high cost compared to your peers.
- Your fund was high cost because you had a higher cost implementation style and you paid more than peers for some services.
- Your 2014 performance placed in the negative value added, high cost quadrant of the cost effectiveness chart.

## Risk

- Your asset risk of 9.2% was below the U.S. median of 9.8%. Your asset-liability risk of 13.7% was above the U.S. median of 13.3%.

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

- 145 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 \$22.9 billion. Total participating U.S. assets were \$3.3 trillion.

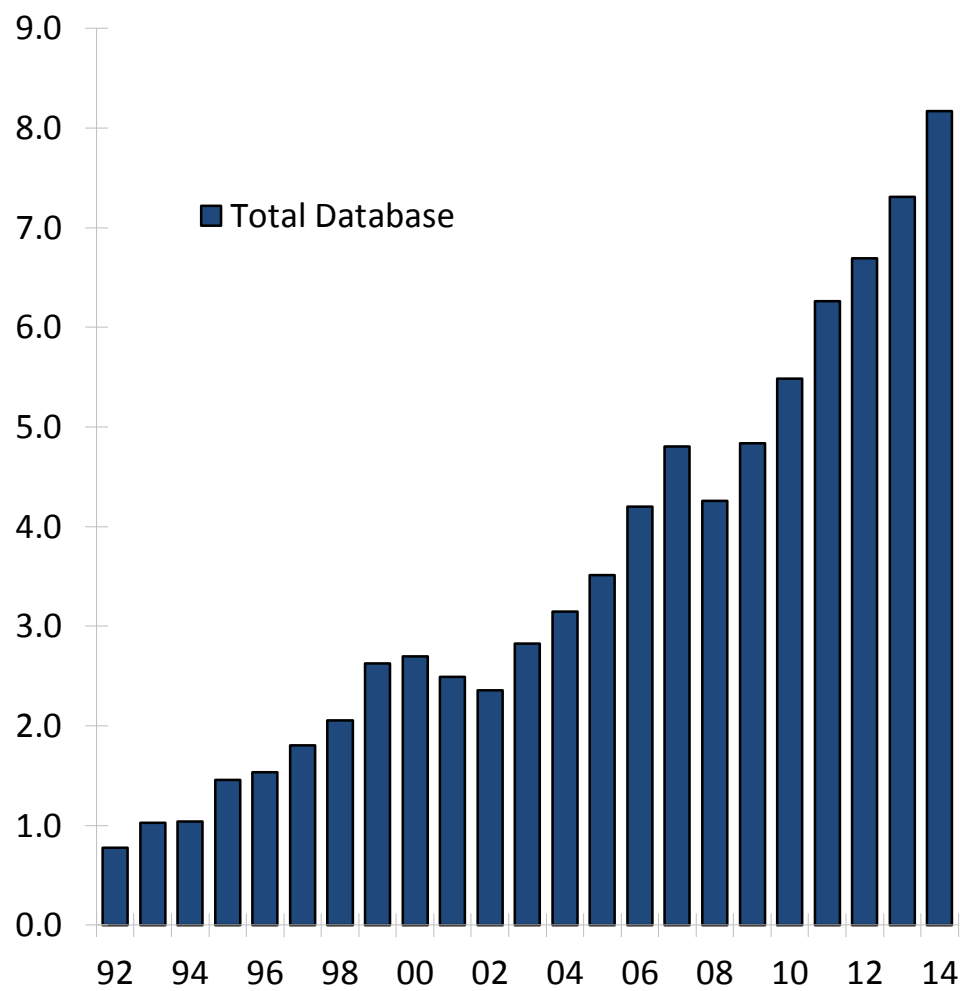
- 74 Canadian funds participate with assets totaling \$782 billion.

- 41 European funds participate with aggregate assets of \$1.8 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.

- 6 Asia-Pacific funds participate with aggregate assets of \$273 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 57 funds.

Participating assets (\$ trillions)

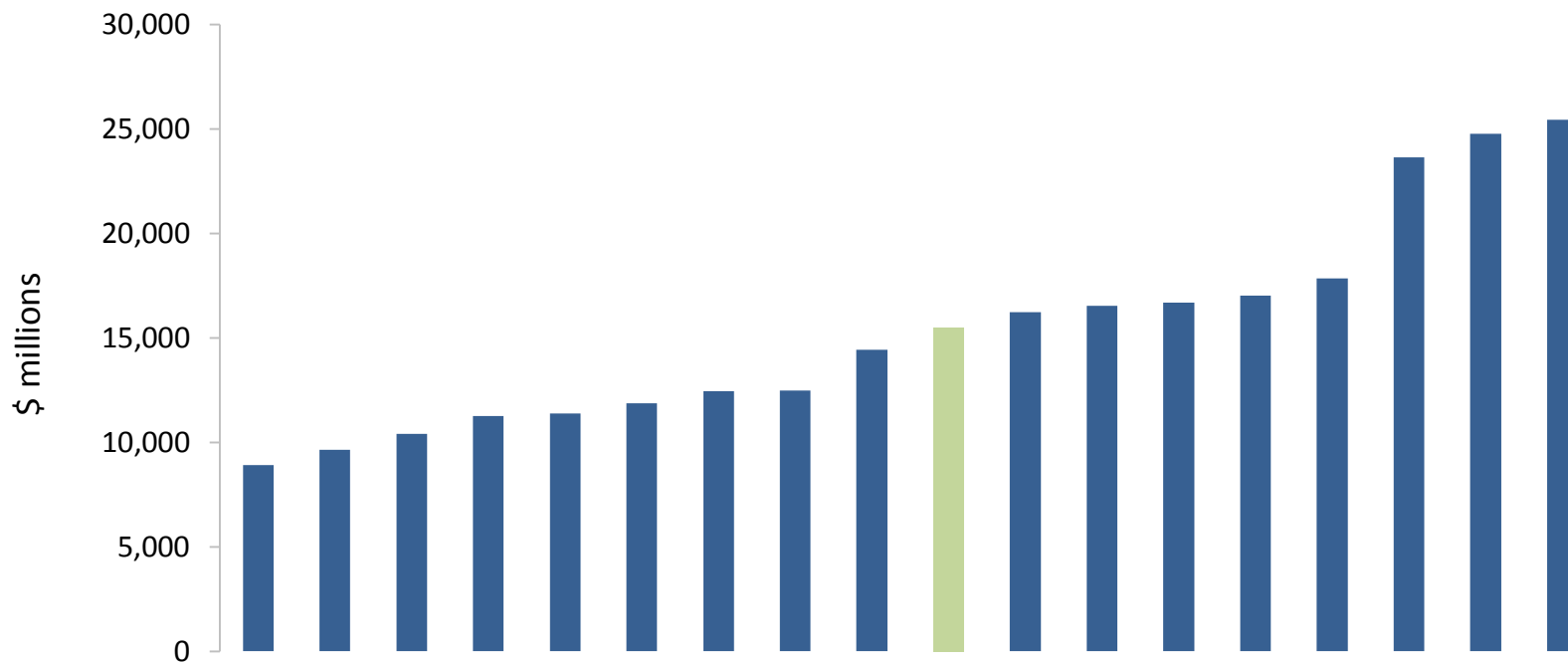


\* 2014 reflects both received and expected data.

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

## Peer group for Kentucky Retirement Systems

- 18 U.S. public sponsors from \$8.9 billion to \$25.5 billion
- Median size of \$15.0 billion versus your \$15.5 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

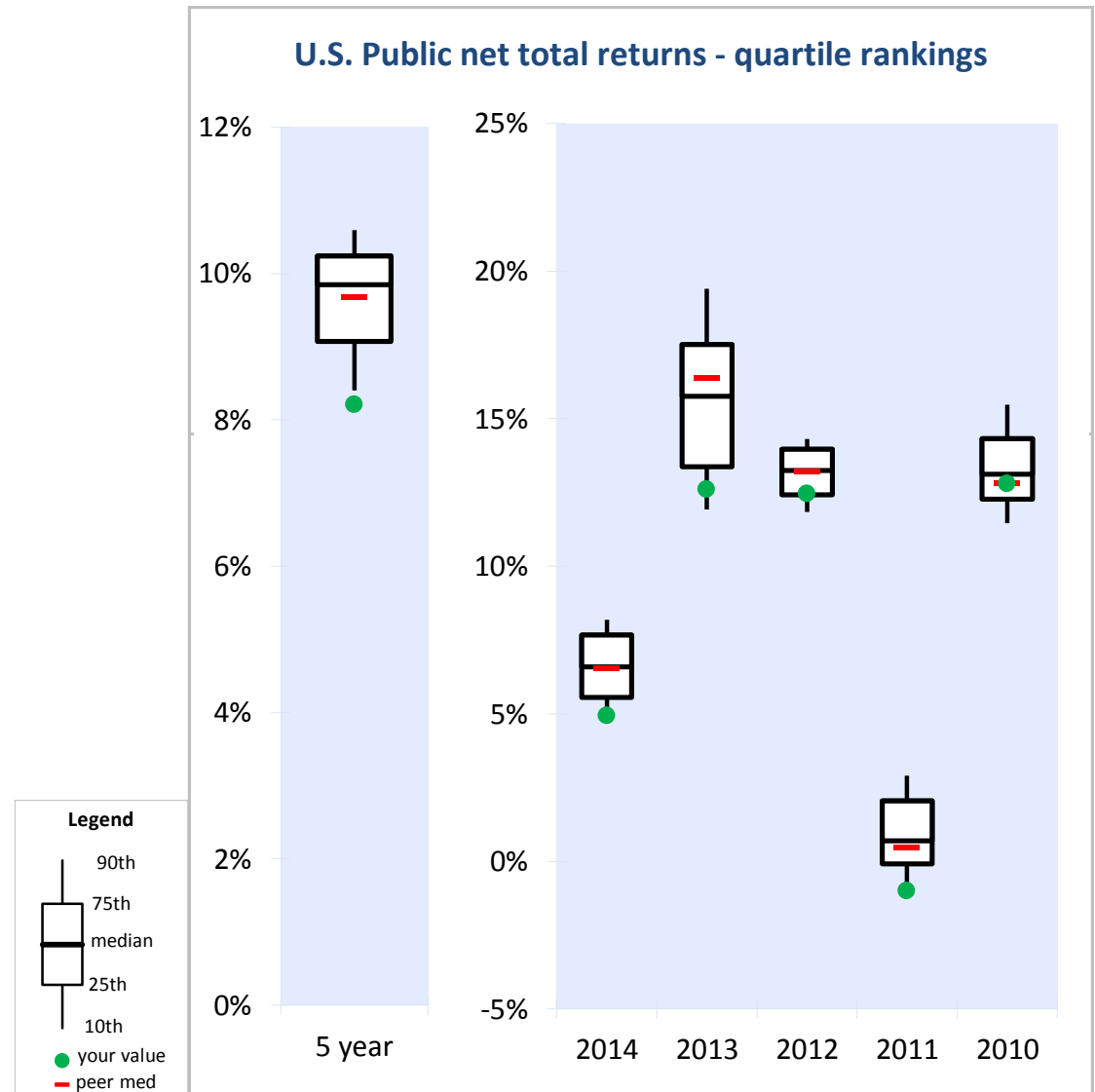
How much risk was taken to obtain your value added?  
What is the risk of your policy mix? What is the risk of the mismatch between your assets and liabilities?

## Your 5-year net total return of 8.2% was below both the U.S. Public median of 9.8% and the peer median of 9.7%.

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	8.2%
- Policy return	9.2%
= Net value added	-1.0%

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).



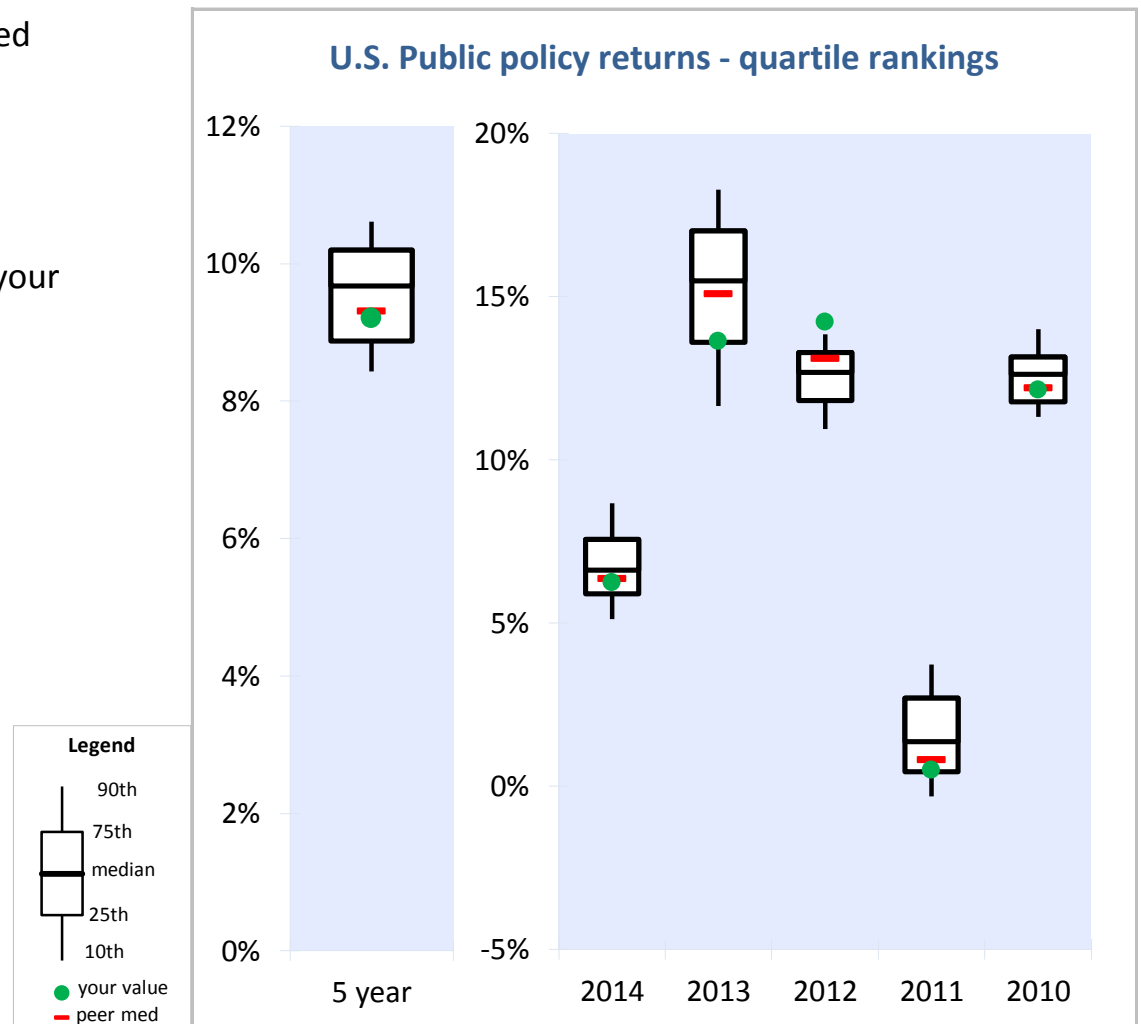
## Your 5-year policy return of 9.2% was below the U.S. Public median of 9.7% and close to the peer median of 9.3%.

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

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

- Long term capital market expectations
- Liabilities
- Appetite for risk

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

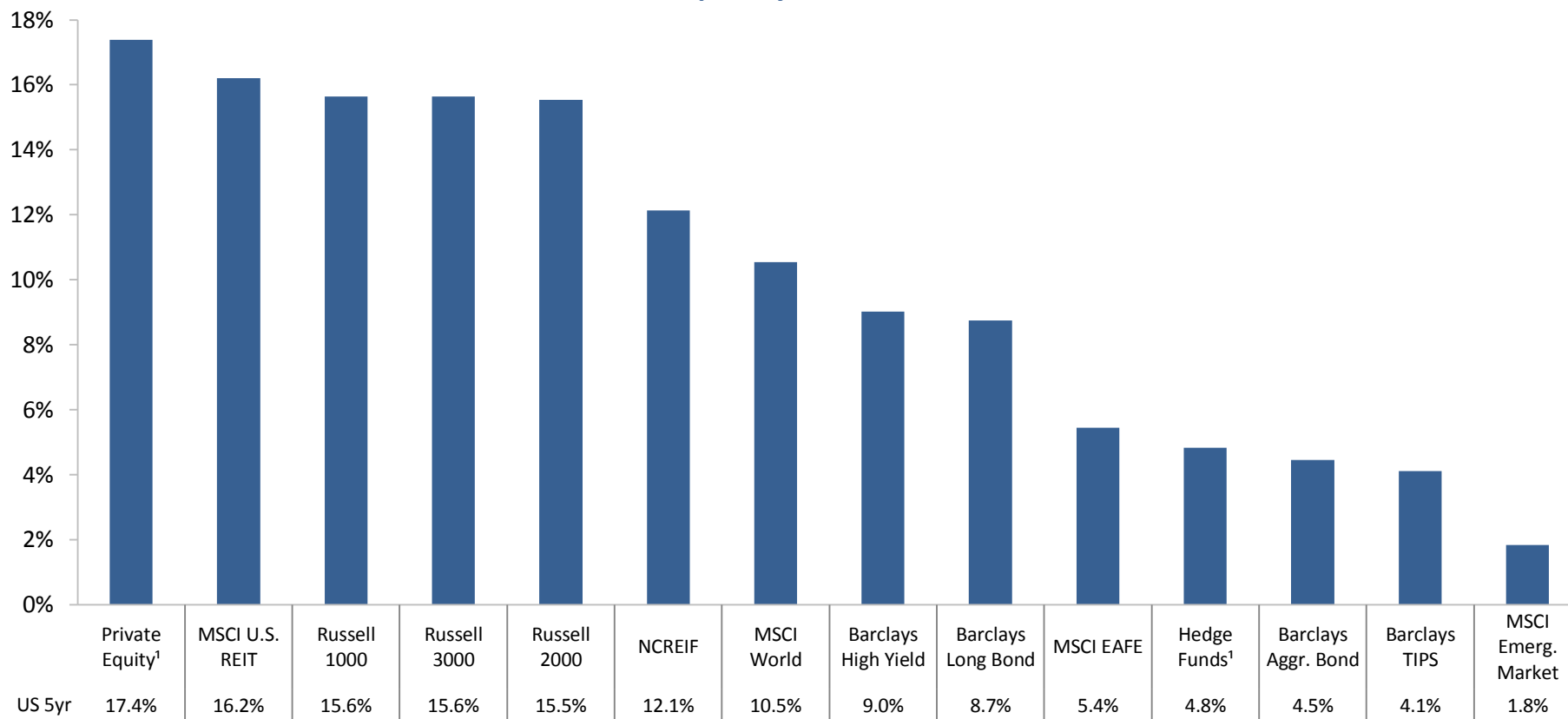


To enable fairer comparisons, the policy returns of all participants including your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Prior to this adjustment, your 5-year policy return was 8.7%, 0.5% lower than your adjusted 5-year policy return of 9.2%. Mirroring this, without adjustment your 5-year total fund net value added would be 0.5% higher. Refer to the Research section pages 6-7 for details.



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

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:

- Your lower policy allocation to Stock, one of the better performing asset classes, had a negative impact. Your 5-year average weight of 45% compares to a U.S. Public average of 52%.
- Your higher policy allocation to Inflation Indexed Bonds, among the poorer performing asset classes, had a negative impact. Your 5-year average weight of 7% compares to a U.S. Public average of 2%.
- Your higher policy allocation to Hedge Funds, among the poorer performing asset classes, had a negative impact as well. Your 5-year average weight of 8% compares to a U.S. Public average of 4%.

Partially offsetting these negatives is the positive impact of your higher allocation to Private Equity.

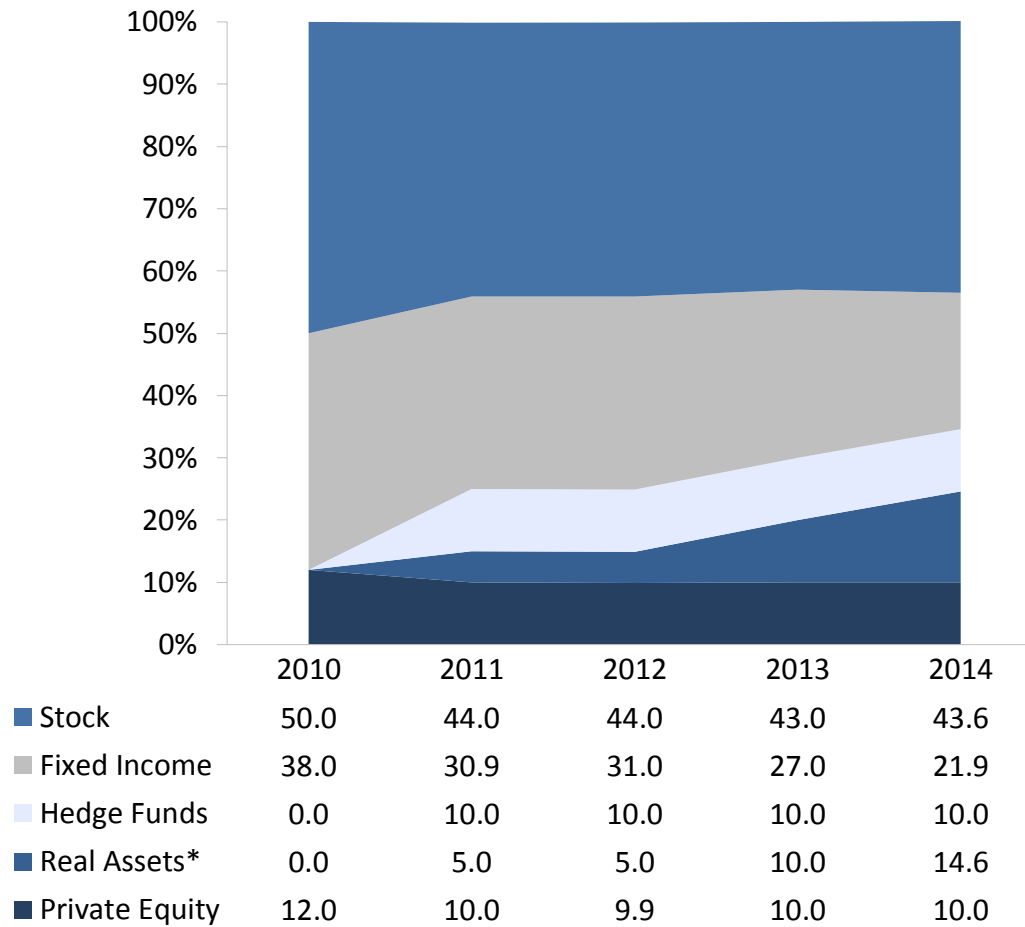
### 5-Year average policy mix

	Your Fund	Peer Avg.	U.S. Public Avg.
U.S. Stock	22%	25%	25%
EAFE Stock	0%	4%	7%
Emerging Market Stock	3%	1%	2%
ACWIxUS Stock	20%	13%	9%
Other Stock	0%	9%	9%
<b>Total Stock</b>	<b>45%</b>	<b>52%</b>	<b>52%</b>
U.S. Bonds	14%	21%	19%
Inflation Indexed Bonds	7%	4%	2%
High Yield Bonds	2%	3%	2%
Fixed Income - Emerging	1%	1%	1%
Global Bonds	4%	1%	2%
Cash	2%	-1%	0%
Other Fixed Income	0%	1%	1%
<b>Total Fixed Income</b>	<b>30%</b>	<b>29%</b>	<b>27%</b>
Hedge Funds	8%	2%	4%
Real Assets <sup>1</sup>	7%	9%	10%
Private Equity	10%	7%	8%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

1. Real assets includes commodities, natural resources, infrastructure, REITS and real estate.

# Over the last 5 years your policy mix changed.

Trend in your policy asset mix



\* Includes real estate and other real assets.

# Net value added is the component of total return from active management.

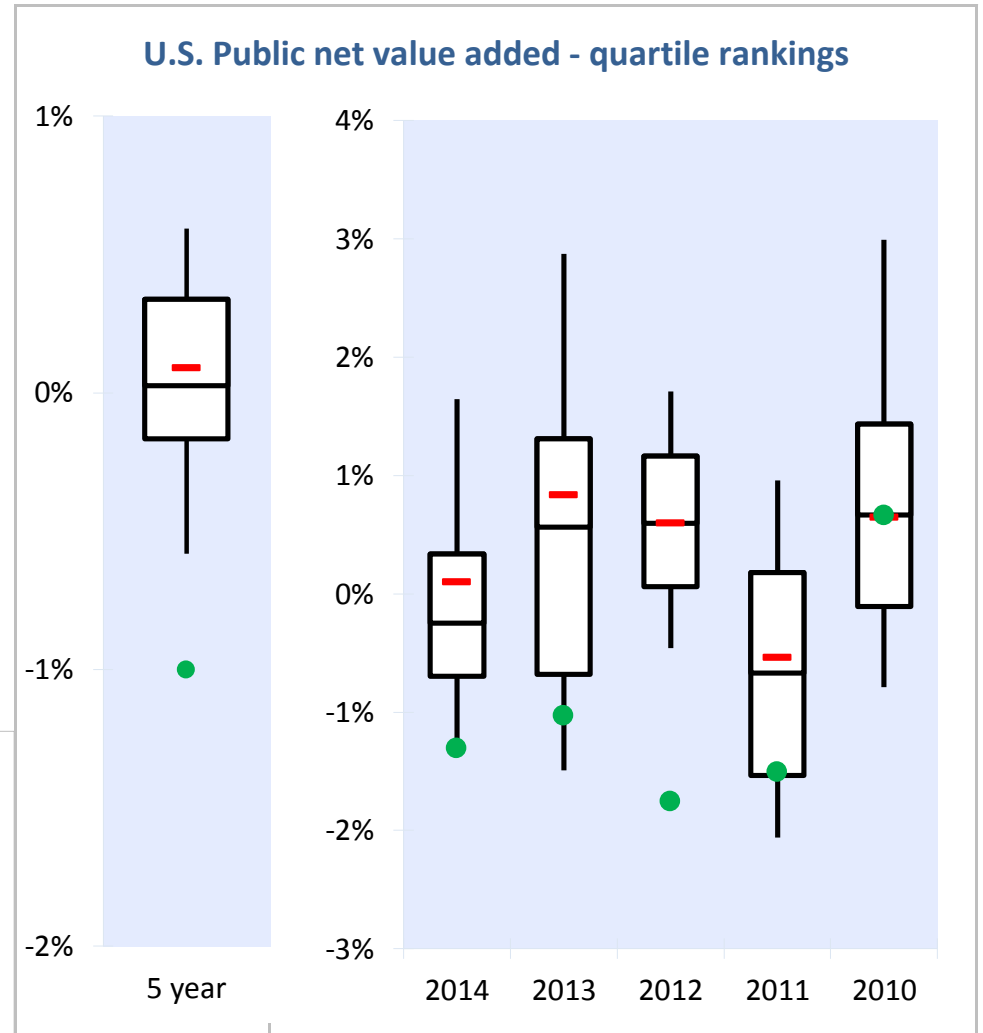
## Your 5-year net value added was -1.0%.

Net value added equals total net return minus policy return.

### Value added for Kentucky Retirement Systems

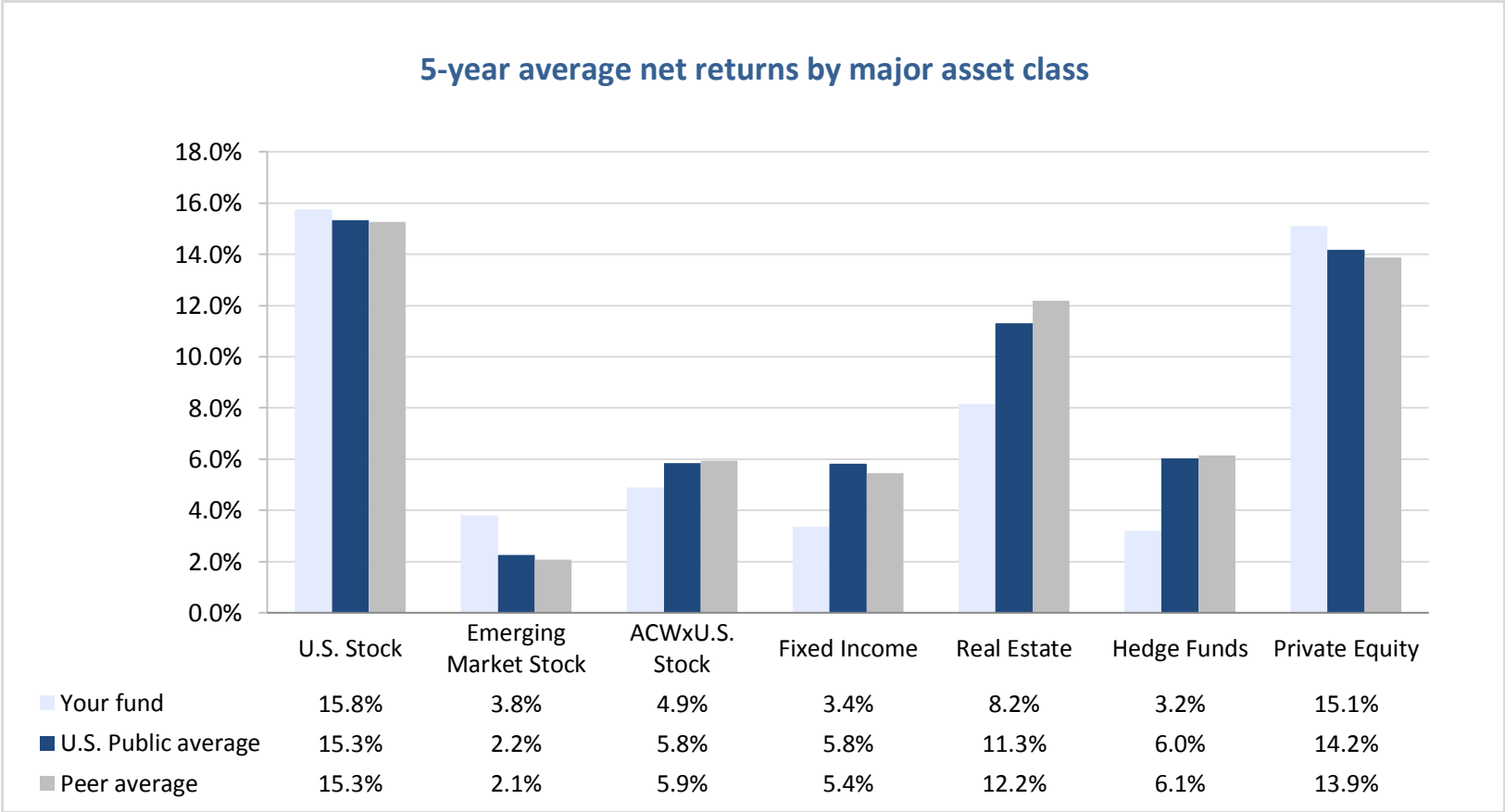
Year	Net Return	Policy Return	Net value Added
2014	4.9%	6.2%	(1.3%)
2013	12.6%	13.6%	(1.0%)
2012	12.5%	14.2%	(1.8%)
2011	(1.0%)	0.5%	(1.5%)
2010	12.8%	12.1%	0.7%
5-year	8.2%	9.2%	(1.0%)

Your 5-year net value added of -1.0% compares to a median of 0.1% for your peers and 0.0% for the U.S. Public universe.



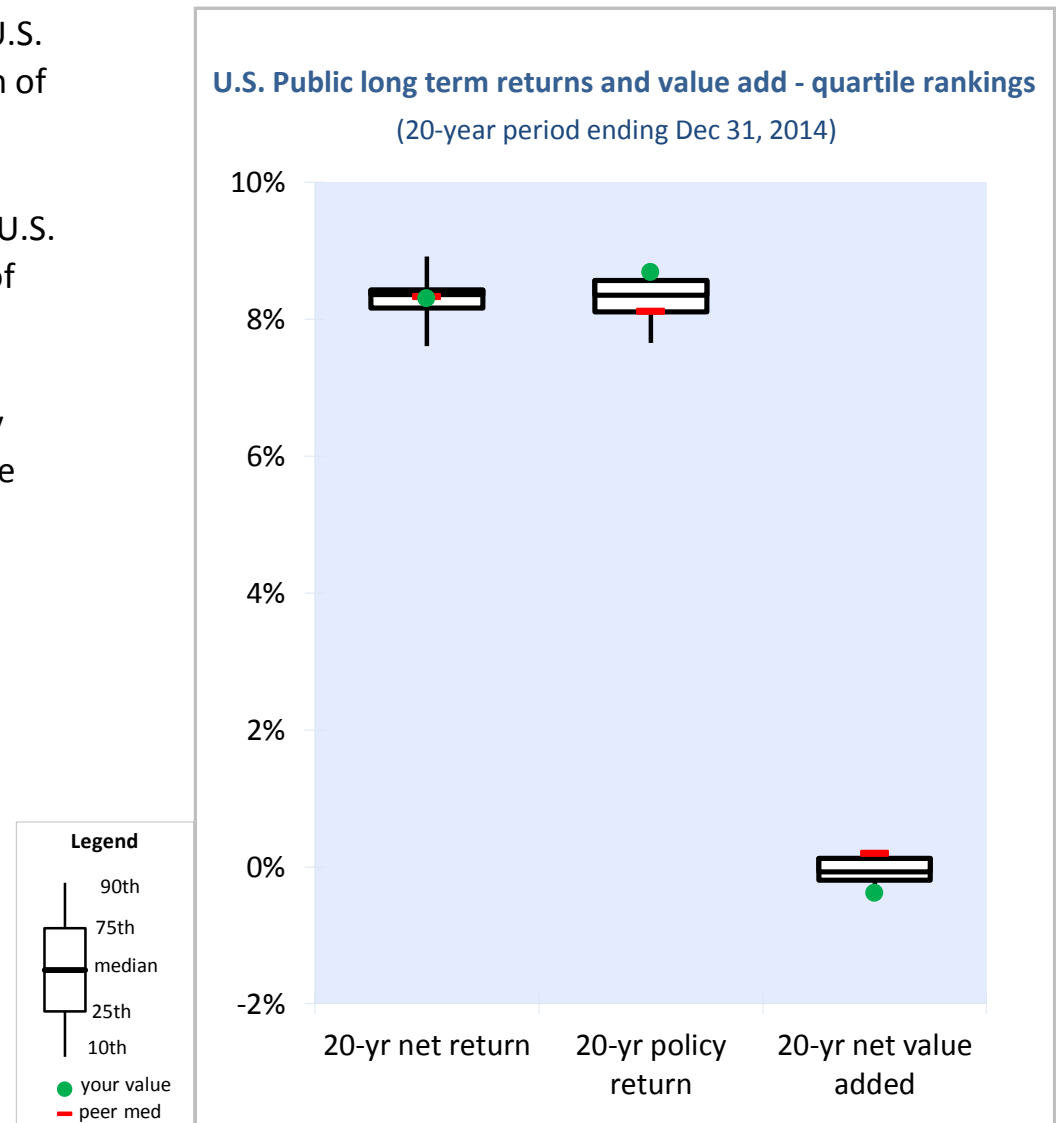
To enable fairer comparisons, the value added for each participant including your fund was adjusted to reflect private equity benchmarks based on investable public market indices. Prior to this adjustment, your fund's 5-year total fund net value added was -0.5%. Refer to the Research section, pages 6-7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

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

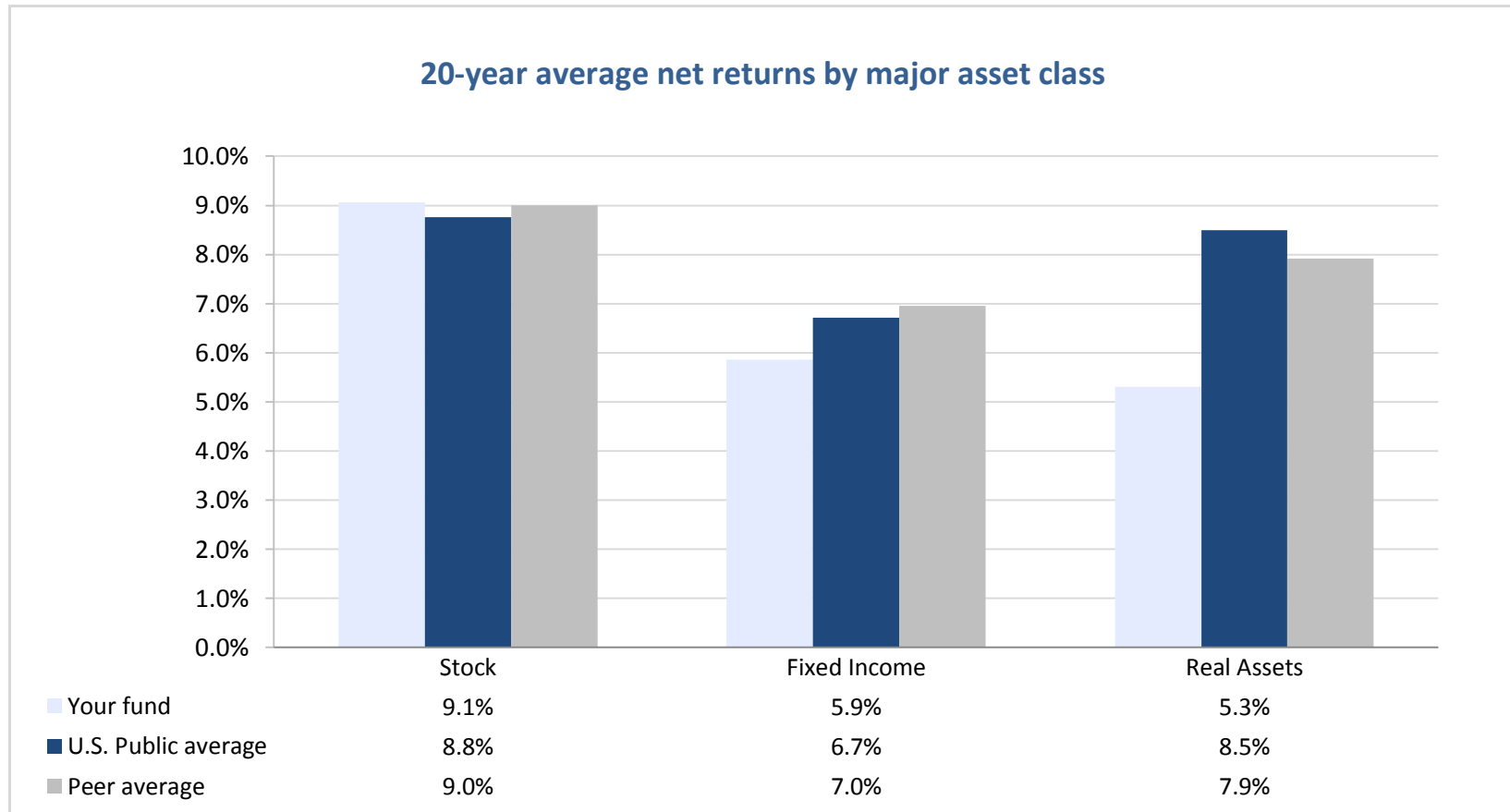


## Your long-term net return of 8.3% was close to the U.S. Public median of 8.4% and equal to the peer median of 8.3%.

- Your 20-year net return of 8.3% was close to the U.S. Public median of 8.4% and equal to the peer median of 8.3%.
- Your 20-year policy return of 8.7% was above the U.S. Public median of 8.4% and above the peer median of 8.1%.
- Your 20-year net value added of -0.4% was slightly below the U.S. Public median of -0.1% and below the peer median of 0.2%.



# You had positive 20-year net returns in Stock, Fixed Income and Real Assets.



## The following cost types are included in the calculation of your total investment cost.

Asset class	Internal		External			
	In-house total cost	Transaction costs	Manager base fees	Monitoring & other costs	Perform. fees (active only)	Transaction costs
<u>Public</u> (Stock, Fixed income, commodities, REITs)	✓	✗	✓	✓	✓	✗
Derivatives/Overlays	✓	✗	✓	✓	✓	✗
<u>Hedge funds &amp; Global TAA</u>						
<i>Hedge Funds</i>	--	--	✓	✓	✓	✗
<i>Global TAA</i>	✓	✗	✓	✓	✓	✗
<u>Private equity</u> (Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗
<u>Private real assets</u> (Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓	✓	✗	✗

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

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



## Your investment costs were \$126.6 million or 81.9 basis points in 2014.

Asset management costs by asset class and style (\$000s)	Internal Mgmt		External Management			Total
	Passive	Overseeing of external	Passive fees	Active base fees	Perform. fees <sup>3</sup>	
U.S. Stock - Broad/All				2,035		2,035
U.S. Stock - Large Cap	90			276		366
U.S. Stock - Mid Cap				1,488		1,488
U.S. Stock - Small Cap			458			458
Stock - Emerging			207	2,582		2,789
Stock - ACWIxU.S.			854	5,852		6,707
Fixed Income - U.S.				3,022		3,022
Fixed Income - Emerging				626		626
Fixed Income - Global				1,776		1,776
Fixed Income - Inflation Indexed	60			184		244
Fixed Income - High Yield				3,720	1,160	4,880
Hedge Funds - Direct				886	940 <sup>3</sup>	1,827
Hedge Funds - Fund of Funds				30,691 <sup>2</sup>	26,021 <sup>3</sup>	56,713
Real Estate - LPs				7,336	1,997 <sup>3</sup>	7,336
Other Real Assets				3,210	3,702	3,210
Diversified Private Equity		320		3,137 <sup>1</sup>	-294	3,457
LBO		5,028		13,841	18,105	18,869
Venture Capital		340		5,368	12,604	5,708
Total asset management costs excluding private asset performance fees						121,510 78.6bp
<b>Oversight, custodial and other costs <sup>4</sup></b>						
Oversight of the fund						786
Trustee & custodial						2,038
Consulting and performance measurement						1,490
Audit						76
Other						720
Total oversight, custodial & other costs						5,110 3.3bp
Total investment cost (excluding transaction and private asset performance fees)						126,620 81.9bp

### Footnotes

<sup>1</sup> CEM used a default cost because detailed costs by partnership were not provided for Private Equity. Without the details, we were unable to show your actual costs on the same (gross) basis as peers. The default for Diversified Private Equity was 165 bps.

<sup>2</sup> Default underlying costs added to provided top-layer costs.

Refer to Appendix A for full details.

<sup>3</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.

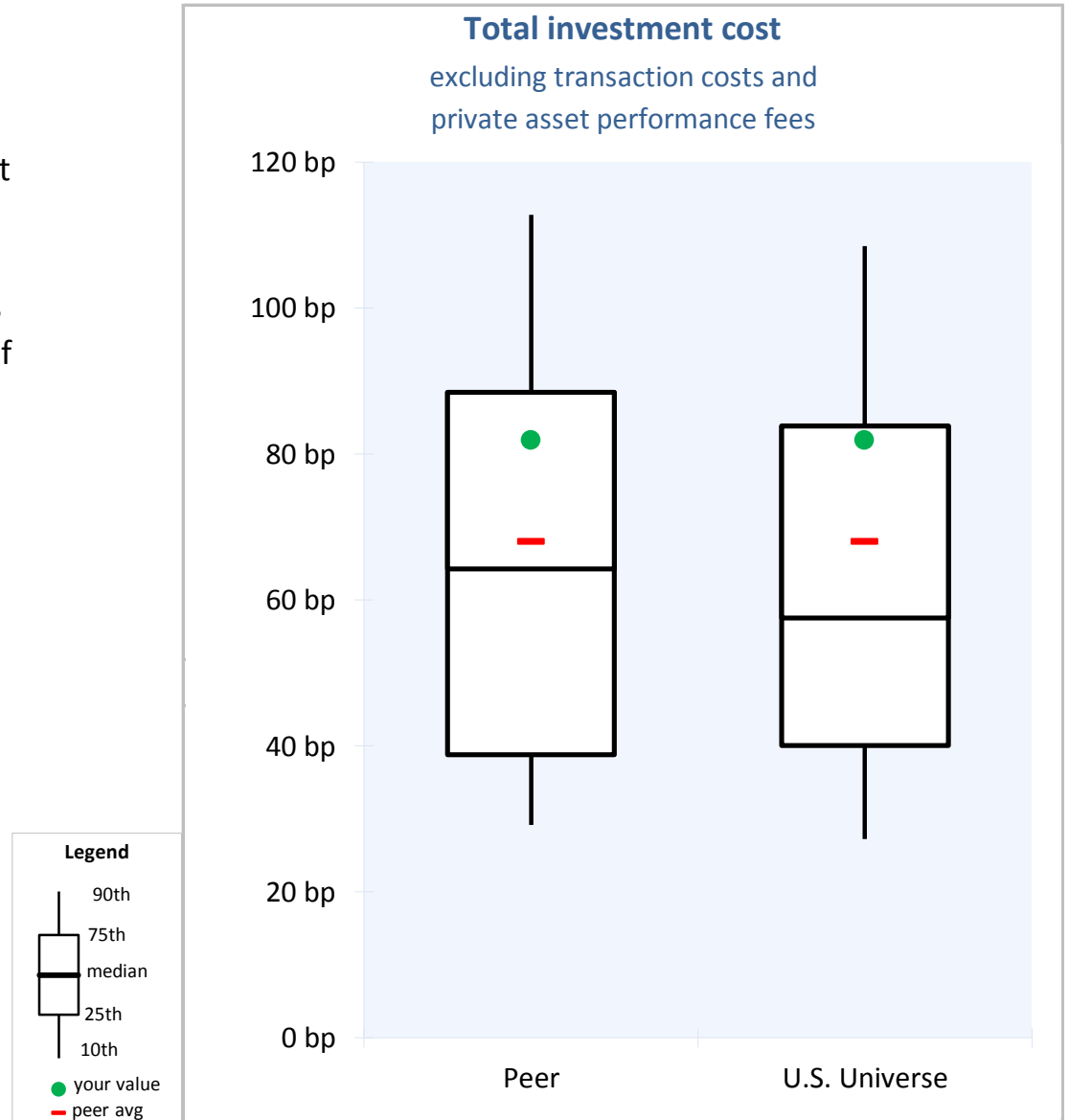
<sup>4</sup> Excludes non-investment costs, such as PBGC premiums and preparing checks for retirees.

## Your total investment cost of 81.9 bps was above the peer median of 64.3 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 25% of your funds assets at the end of 2014 versus a peer average of 20%.
- 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 high cost by 7.1 basis points in 2014.

Your benchmark cost is an estimate of what your cost would be given your actual asset mix and the median costs that your peers pay for similar services. It represents the cost your peers would incur if they had your actual asset mix.

Your total cost of 81.9 bp was slightly above your benchmark cost of 74.8 bp. Thus, your excess cost was 7.1 bp.

### Your cost versus benchmark

	\$000s	basis points
Your total investment cost	126,620	81.9 bp
Your benchmark cost	115,668	74.8 bp
Your excess cost	10,952	7.1 bp

## Your fund was high cost because you had a higher cost implementation style and you paid more than peers for some services.

### Explanation of your cost status

	Excess Cost/ (Savings)	
	\$000s	bps
1. Higher cost implementation style		
• Use of external active management (vs. lower cost passive and internal)	(1,356)	(0.9)
• More fund of funds	10,052	6.5
• Less overlays	(640)	(0.4)
• Other style differences	(150)	(0.1)
	<u>7,907</u>	<u>5.1</u>
2. Paying more than peers for some services		
• External investment management costs	1,361	0.9
• Internal investment management costs	38	0.0
• Oversight, custodial & other costs	1,646	1.1
	<u>3,045</u>	<u>2.0</u>
<b>Total excess cost</b>	<b>10,952</b>	<b>7.1</b>

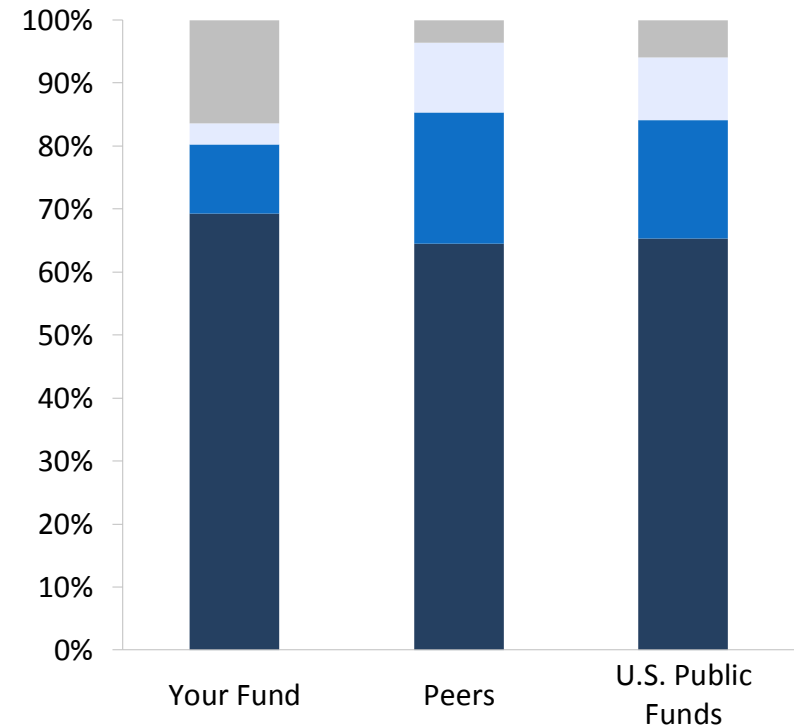
## Differences in cost performance are often caused by differences in implementation style.

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 more external active management than your peers (your 69% versus 65% 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 39% of hedge funds, real estate and private equity in fund of funds compared to 18% for your peers.

Implementation style<sup>1</sup>



■ Internal passive	16%	4%	6%
■ Internal active	3%	11%	10%
■ External passive	11%	21%	19%
■ External active	69%	65%	65%

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

# Differences in implementation style cost you 5.1 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 - Broad/All	374	100.0%	26.9%	73.1%	38.4 bp	1,050	
U.S. Stock - Large Cap	2,216	10.5%	36.2%	(25.7%)	26.7 bp	(1,519)	
U.S. Stock - Mid Cap	495	68.6%	72.8%	(4.3%)	46.7 bp	(99)	
U.S. Stock - Small Cap	335	0.0%	73.1%	(73.1%)	56.8 bp	(1,390)	
Stock - Emerging	495	66.7%	85.3%	(18.6%)	48.8 bp	(450)	
Stock - ACWIxU.S.	3,017	60.0%	60.5%	(0.5%)	30.4 bp	(43)	
Fixed Income - U.S.	1,367	100.0%	67.0%	33.0%	15.0 bp	676	
Fixed Income - Emerging	147	100.0%	97.1%	2.9%	Insufficient <sup>2</sup>	0	
Fixed Income - Global	574	100.0%	100.0%	0.0%		0	
Fixed Income - Inflation Indexed	762	35.9%	57.1%	(21.2%)	12.9 bp	(208)	
Fixed Income - High Yield	724	100.0%	93.9%	6.1%	Insufficient <sup>2</sup>	0	
Real Estate ex-REITs	636	100.0%	98.5%	1.5%	Insufficient <sup>2</sup>	0	
of which Ltd Partnerships represent:		100.0%	70.7%	29.3%	33.6 bp	627	
Other Real Assets	713	100.0%	100.0%	0.0%		0	
Diversified Private Equity	190	100.0%	100.0%	0.0%		0	
LBO	1,146	100.0%	100.0%	0.0%		0	
Venture Capital	347	100.0%	98.7%	1.3%	Insufficient <sup>2</sup>	0	
Impact of less/more external active vs. lower cost styles						(1,356)	(0.9) bp
		<u>Fund of funds % of LPs</u>			<u>vs. direct LP<sup>1</sup></u>		
Hedge Funds	1,617	95.3%	28.2%	67.1%	123.0 bp	13,344	
Real Estate ex-REITs - LPs	636	0.0%	1.1%	(1.1%)	Insufficient <sup>2</sup>	0	
Diversified Private Equity - LPs	190	0.0%	26.6%	(26.6%)	73.4 bp	(371)	
LBO - LPs	1,146	0.0%	26.7%	(26.7%)	73.4 bp	(2,243)	
Venture Capital - LPs	347	0.0%	26.7%	(26.7%)	73.4 bp	(678)	
Impact of less/more fund of funds vs. direct LPs						10,052	6.5 bp
<u>Overlays and other</u>							
Impact of lower use of portfolio level overlays						(640)	(0.4) bp
Impact of mix of internal passive, internal active, and external passive <sup>3</sup>						(150)	(0.1) bp
Total impact of differences in implementation style						7,907	5.1 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 0.9 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 - Broad/All - Active	374	54.4	40.9	13.5	506
U.S. Stock - Large Cap - Active	232	11.9	27.4	(15.5)	(360)
U.S. Stock - Mid Cap - Active	339	43.9	47.7	(3.8)	(128)
U.S. Stock - Small Cap - Passive	335	13.7	4.4*	9.3	312
Stock - Emerging - Passive	165	12.5	12.5*	0.0	0
Stock - Emerging - Active	330	78.1	61.4	16.8	554
Stock - ACWIxU.S. - Passive	1,206	7.1	5.8	1.3	152
Stock - ACWIxU.S. - Active	1,811	32.3	36.2	(3.9)	(704)
Fixed Income - U.S. - Active	1,367	22.1	17.2	4.9	674
Fixed Income - Emerging - Active	147	42.4	48.5	(6.1)	(90)
Fixed Income - Global - Active	574	30.9	26.3	4.6	262
Fixed Income - Inflation Indexed - Active	274	6.7	14.8	(8.1)	(222)
Fixed Income - High Yield - Active	724	67.4 <sup>1</sup>	52.2	15.2	1,098
Hedge Funds - Active	77	238.8	239.5	(0.7)	(6)
Hedge Funds - Fund of Fund	1,540	368.3	362.5	5.7	881
Real Estate ex-REITs - Limited Partnership	636	115.4	115.4	0.0	0
Other Real Assets - Active	713	45.0	48.8	(3.8)	(269)
Diversified Private Equity - Active	190	181.8	165.8	16.0	304
LBO - Active	1,146	164.6	164.6	0.0	0
Venture Capital - Active	347	164.7	211.0	(46.3)	(1,603)
<b>Total impact of paying more/less for external management</b>					<b>1,361</b>
<b>Total in bps</b>					<b>0.9 bp</b>

\*Universe median used as peer data was insufficient.

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

The net impact of paying more/less for internal asset management costs was immaterial.

**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)	
U.S. Stock - Large Cap - Passive	1,984	0.5	0.4	0.1	13
U.S. Stock - Mid Cap - Passive	156	0.0	1.0*	(1.0)	(16)
Fixed Income - Inflation Indexed - Passive	488	1.2	0.4*	0.8	41
Total impact of paying more/less for internal management					38
Total in bps					0.0 bp



## The net impact of differences in oversight, custodial & other costs added 1.1 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	15,468	0.5	1.1	(0.6)	(941)
Consulting	15,468	1.0	0.6	0.4	610
Custodial*	15,468	1.3	0.4	0.9	1,436
Audit	15,468	0.0	0.1	(0.0)	(18)
Other	15,468	0.5	0.1	0.4	559
<b>Total</b>					<b>1,646</b>
<b>Total in bps</b>					<b>1.1 bp</b>

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

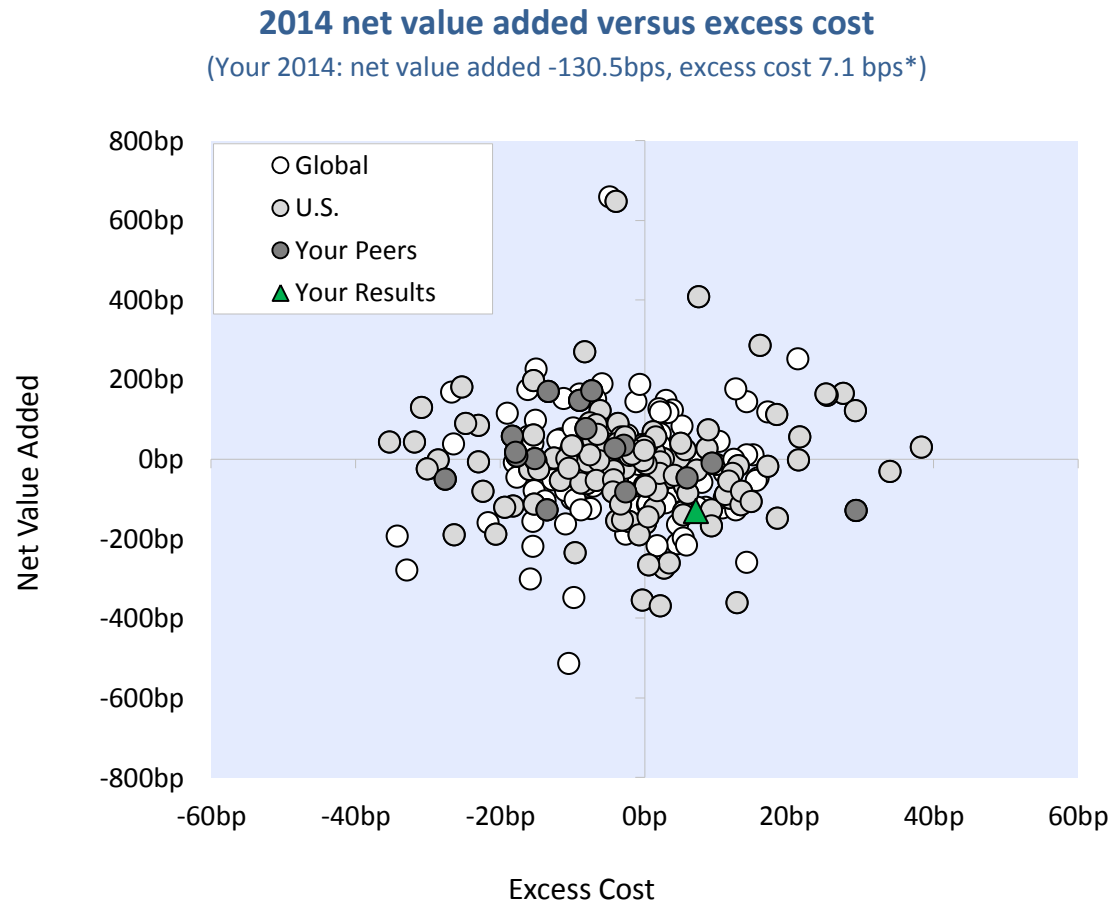
1. The peer median of 0.4 bps is unusually low. The U.S. universe median custodial cost was 0.9 bps. (See page 3 in Section 6).

**In summary, your fund was high cost because you had a higher cost implementation style and you paid more than peers for some services.**

### Explanation of your cost status

	Excess Cost/ (Savings)	
	\$000s	bps
<b>1. Higher cost implementation style</b>		
• Use of external active management (vs. lower cost passive and internal)	(1,356)	(0.9)
• More fund of funds	10,052	6.5
• Less overlays	(640)	(0.4)
• Other style differences	(150)	(0.1)
	<u>7,907</u>	<u>5.1</u>
<b>2. Paying more than peers for similar services</b>		
• External investment management costs	1,361	0.9
• Internal investment management costs	38	0.0
• Oversight, custodial & other costs	1,646	1.1
	<u>3,045</u>	<u>2.0</u>
<b>Total excess cost</b>	<b>10,952</b>	<b>7.1</b>

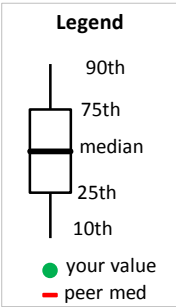
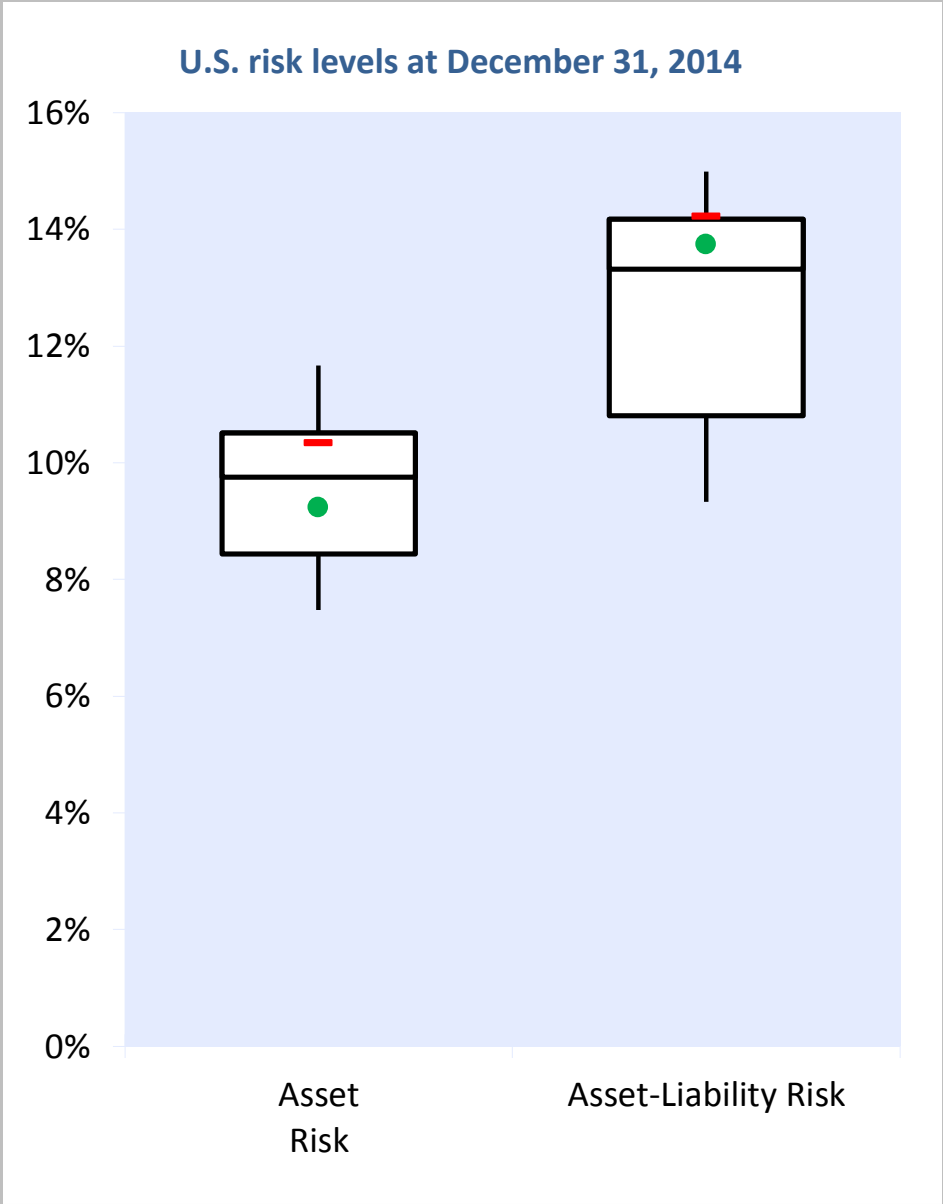
Your 2014 performance placed in the negative value added, high cost quadrant of the cost effectiveness chart.



# Comparison of risk levels

Your asset risk of 9.2% 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.

Your asset-liability risk of 13.7% was above the U.S. median of 13.3%. 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.

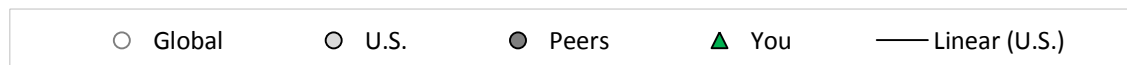
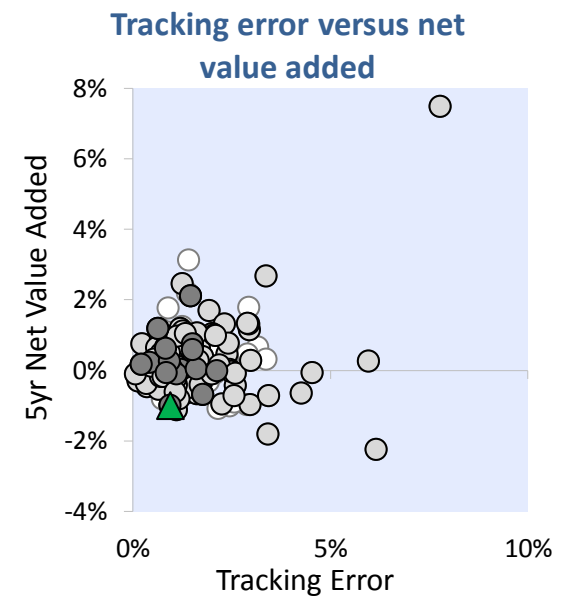
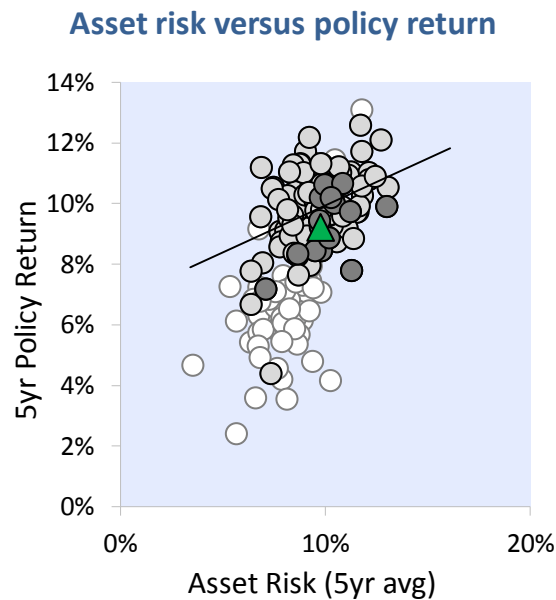
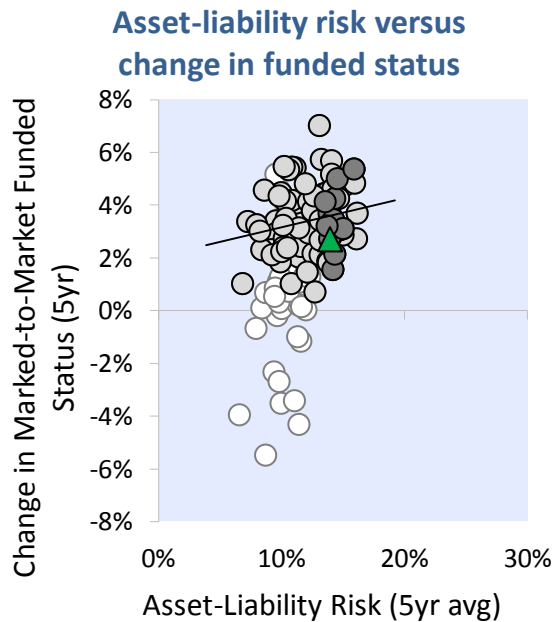


# During the 5-year period ending 2014, U.S. funds were rewarded for taking risk. More risk resulted in better performance.

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.



# Key takeaways

## Returns

- Your 5-year net total return was 8.2%. This was below the U.S. Public median of 9.8% and below the peer median of 9.7%.
- Your 5-year policy return was 9.2%. This was below the U.S. Public median of 9.7% and close to the peer median of 9.3%.

## Value added

- Your 5-year net value added was -1.0%. This was below the U.S. Public median of 0.0% and below the peer median of 0.1%.

## Long term performance

- Your 20-year net return of 8.3% was close to the U.S. Public median of 8.4% and equal to the peer median of 8.3%.

## Cost and cost effectiveness

- Your investment cost of 81.9 bps was above your benchmark cost of 74.8 bps. This suggests that your fund was high cost compared to your peers.
- Your fund was high cost because you had a higher cost implementation style and you paid more than peers for some services.
- Your 2014 performance placed in the negative value added, high cost quadrant of the cost effectiveness chart.

## Risk

- Your asset risk of 9.2% was below the U.S. median of 9.8%. Your asset-liability risk of 13.7% was above the U.S. median of 13.3%.

# 2

## Research and Trends

Net value added	
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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%	7.70%	7.98%
- Policy return	9.11%	9.28%	9.00%	6.97%	7.80%
<u>- Costs</u>	<u>0.42%</u>	<u>0.47%</u>	<u>0.37%</u>	<u>0.30%</u>	<u>0.49%</u>
= Net value added	0.17%	0.19%	0.14%	0.43%	-0.31%
# of annual observations	7,065	4,032	2,262	647	109
Median fund size (\$ billion)	6.3	9.6	1.9	8.8	18.0

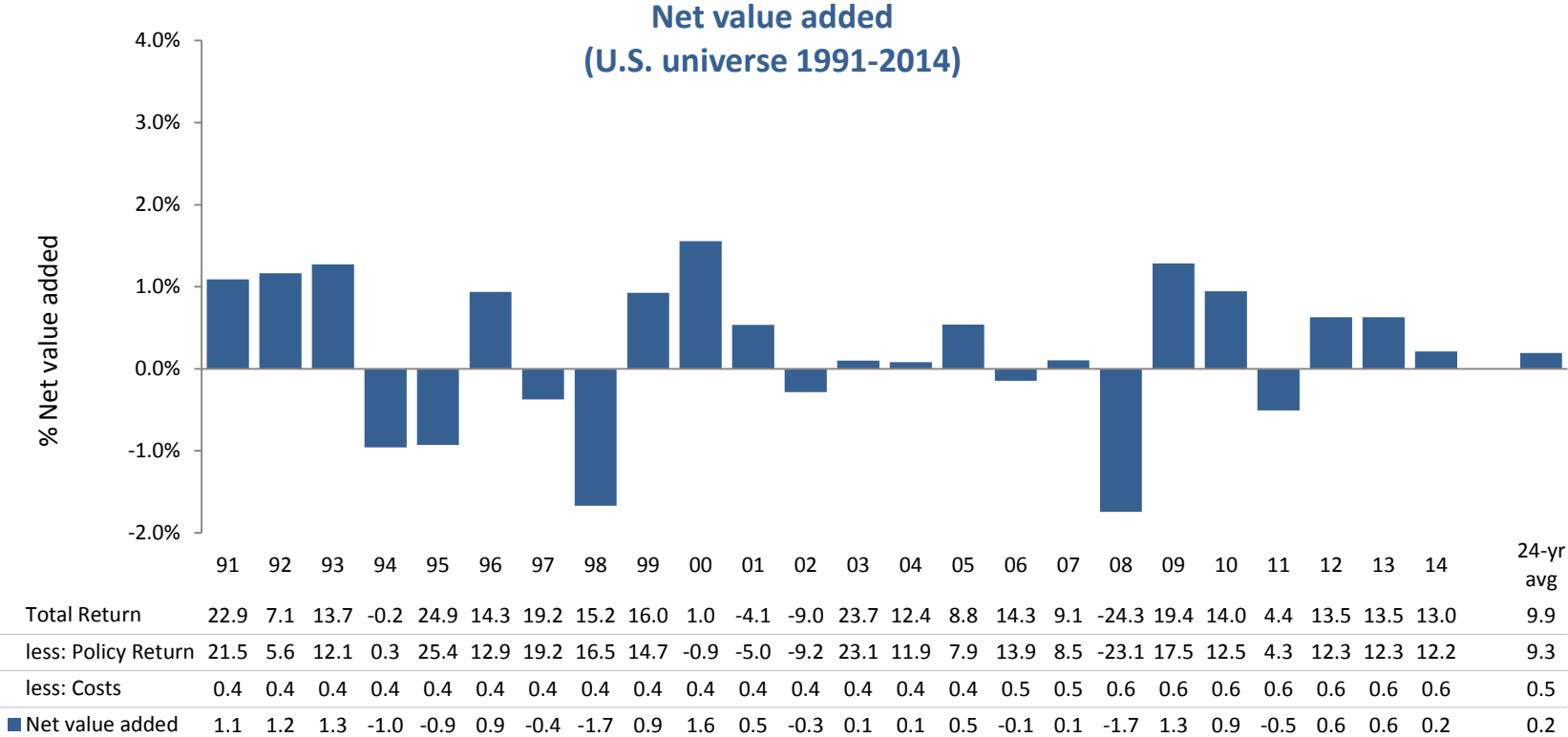
1. Only regions with more than four participating funds are separately disclosed. Funds from regions with fewer than four participating funds are included in Global/ All Funds.

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.



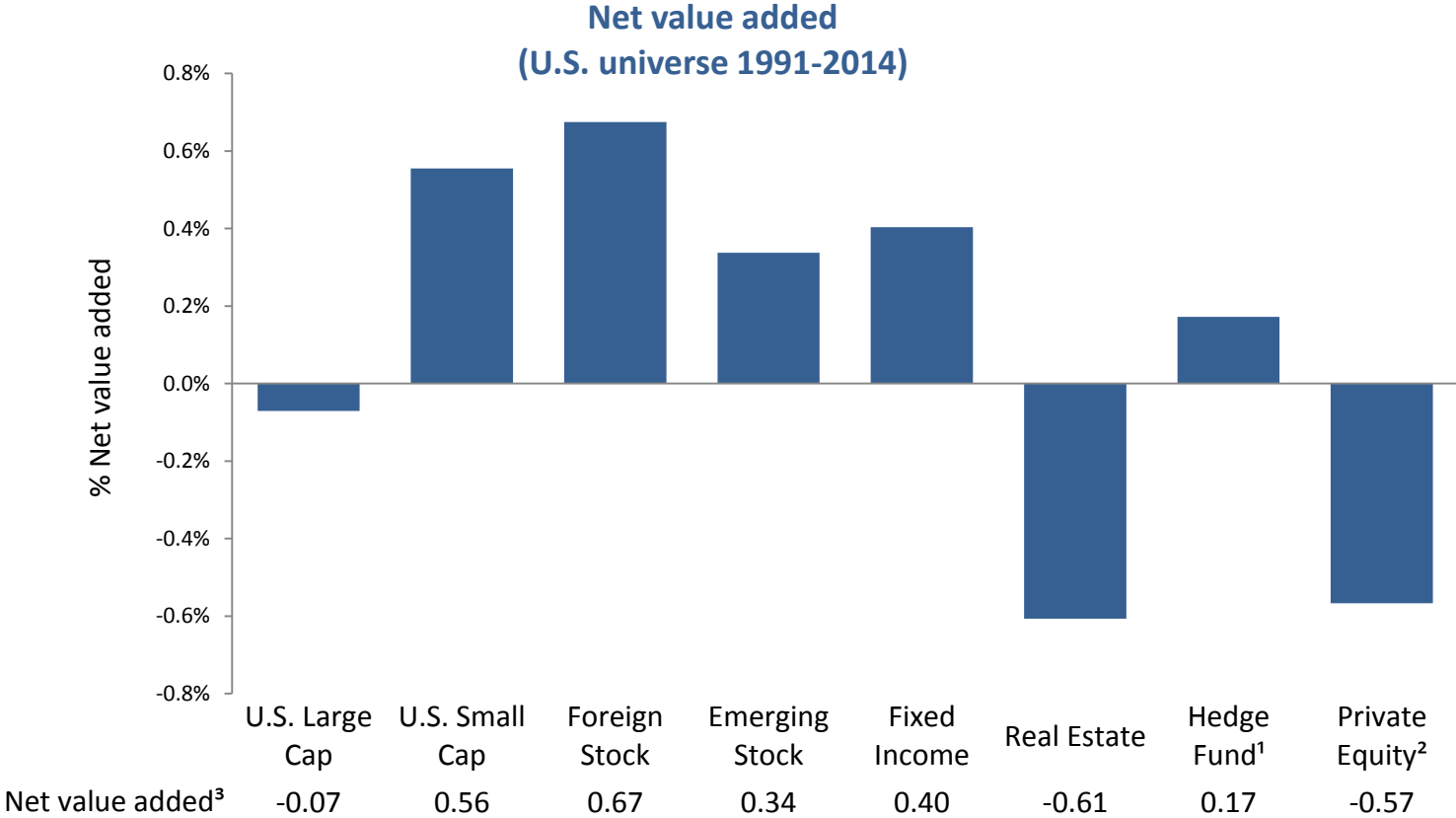
# In the U.S., net value added averaged 0.2% over the past 24 years ending 2014.



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 4,032 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.

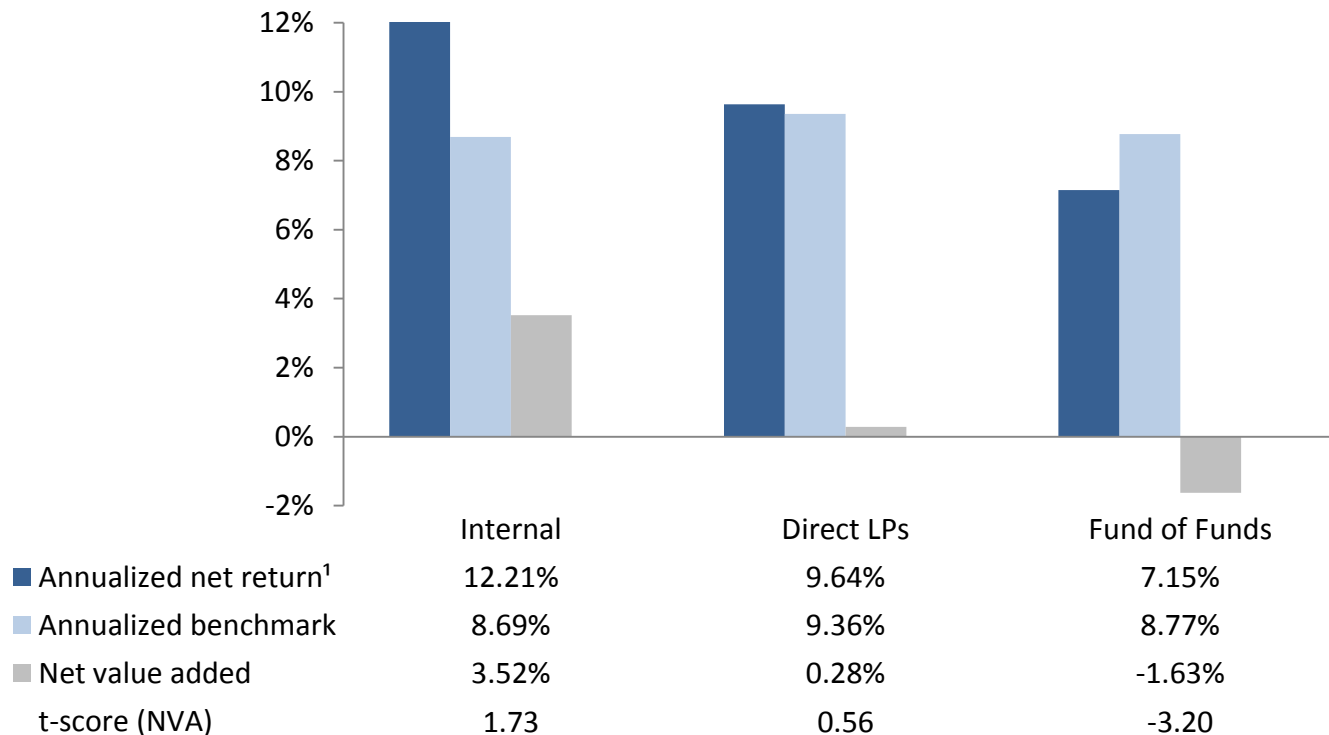
# The asset class that had the highest net value added in the U.S. universe over the past 24 years was Foreign Stock.



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 4,032 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)

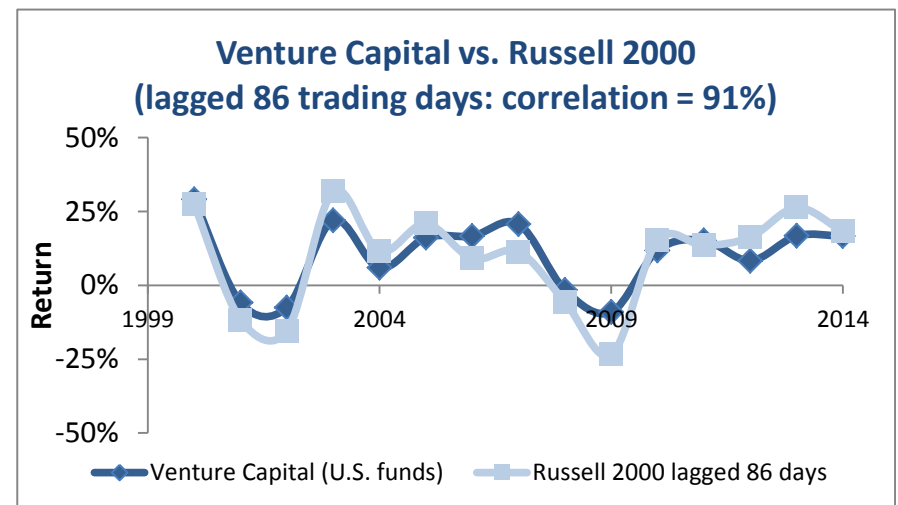
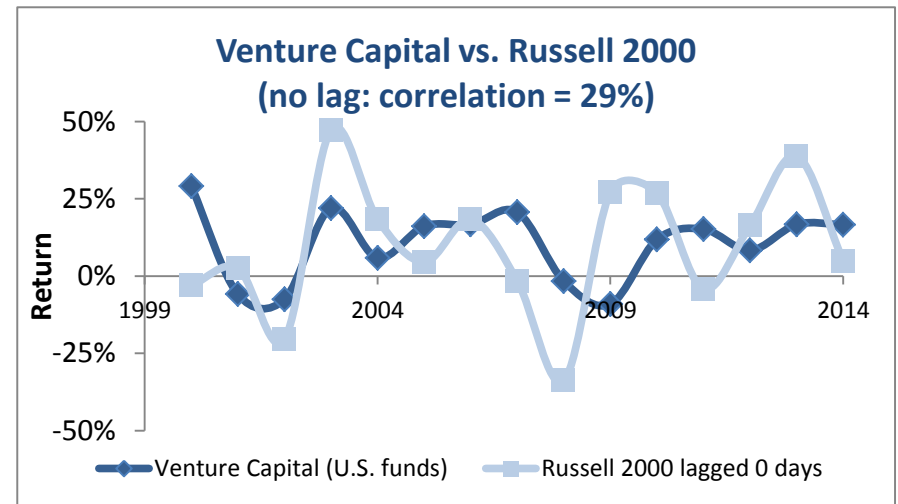


1. To compare the performance of private equity implementation styles over long periods, Monte Carlo simulations were used to capture differences in risk between styles. For details, see "How Implementation Style and Costs Affect Private Equity Performance", Alex Beath, Chris Flynn, and Jody MacIntosh,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



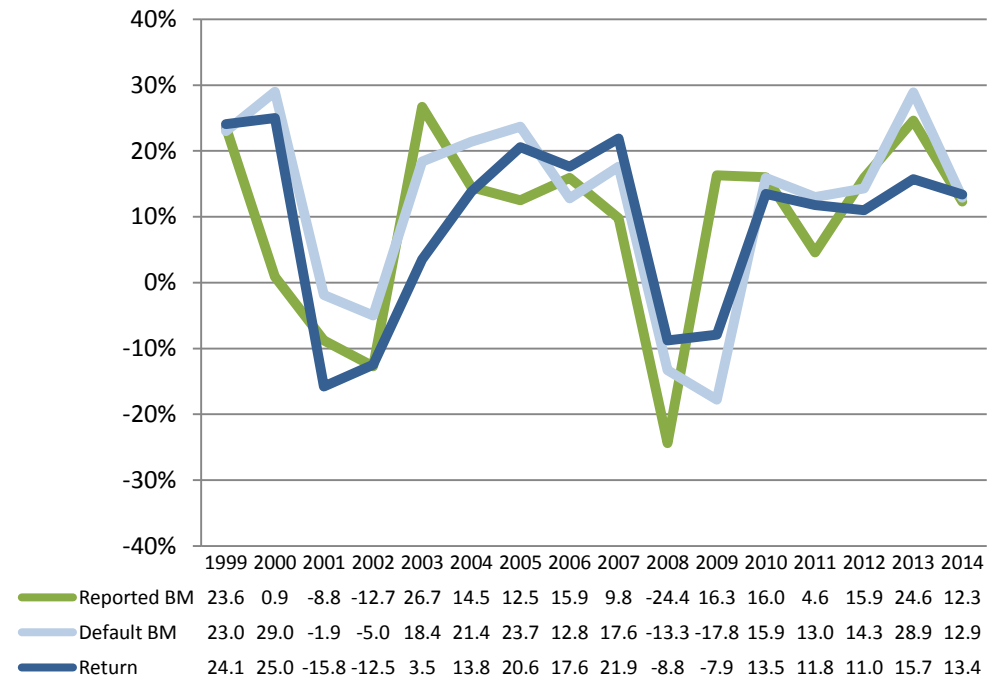
## To enable fairer comparisons, CEM uses default private equity benchmarks.

Benchmarks used for private equity by most participants in the CEM universe are flawed (see previous page). So to enable fairer comparisons, CEM replaced reported private equity benchmarks 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 90 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 region mix of your default benchmark was 20% Europe ex-UK , 10% Global , 70% U.S.

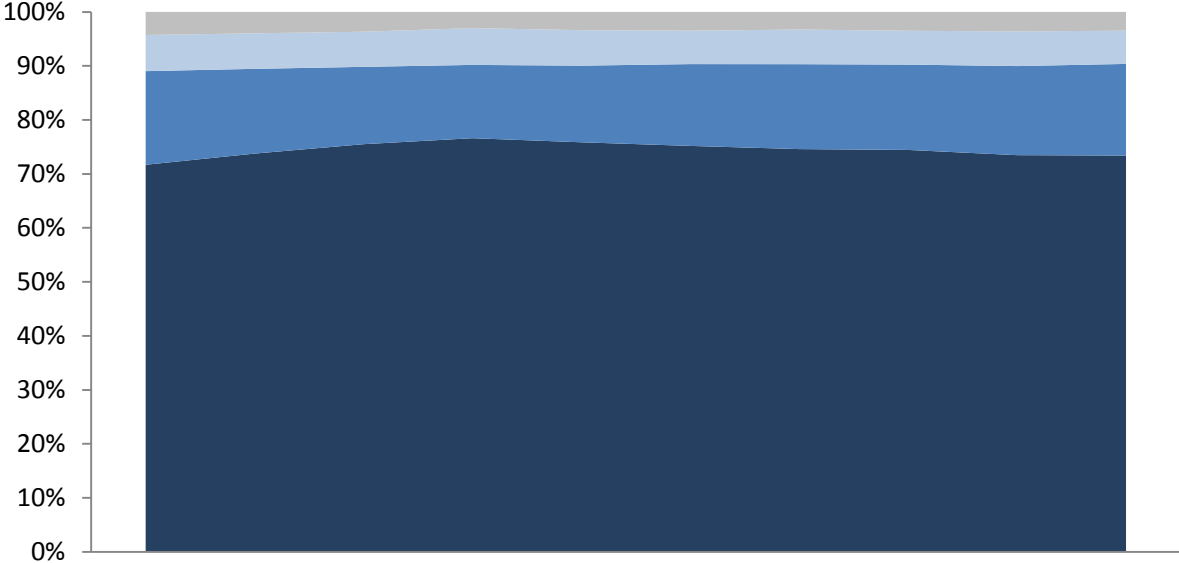
The result is the default benchmarks are superior to most self-reported benchmarks. Correlations improve to a median of 82% for the default benchmarks versus 43% for self-reported benchmarks. Other statistics such as volatility were also much better.

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.**

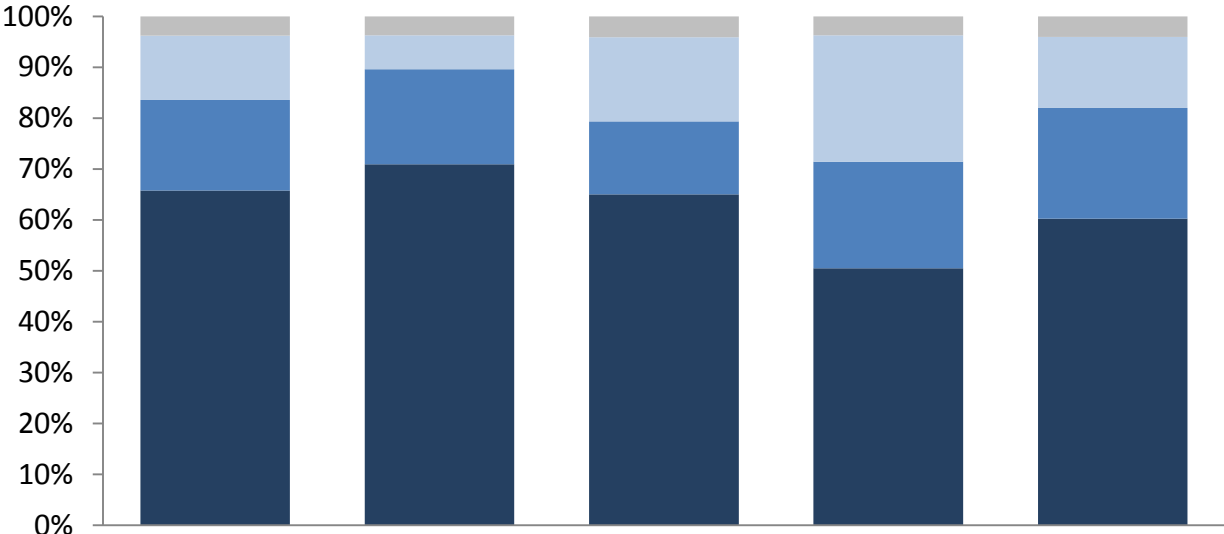


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ % Internal passive	4%	4%	4%	3%	3%	3%	3%	3%	4%	3%
■ % Internal active	7%	7%	7%	7%	7%	6%	6%	6%	6%	6%
■ % External passive	17%	16%	14%	14%	14%	15%	16%	16%	17%	17%
■ % External active	72%	74%	76%	77%	76%	75%	75%	74%	73%	73%

• 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.

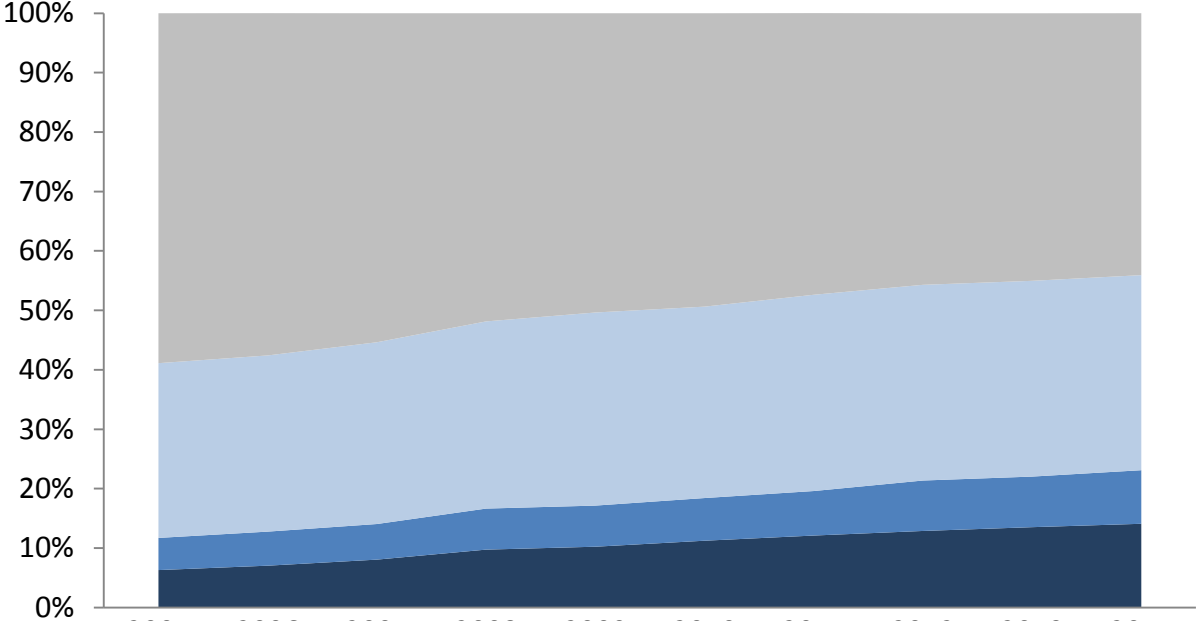
Implementation style by region - 2014 average



■ % Internal passive	4%	4%	4%	4%	4%
■ % Internal active	13%	7%	17%	25%	14%
■ % External passive	18%	19%	14%	21%	22%
■ % External active	66%	71%	65%	50%	60%
Number of funds	266	145	74	41	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.**



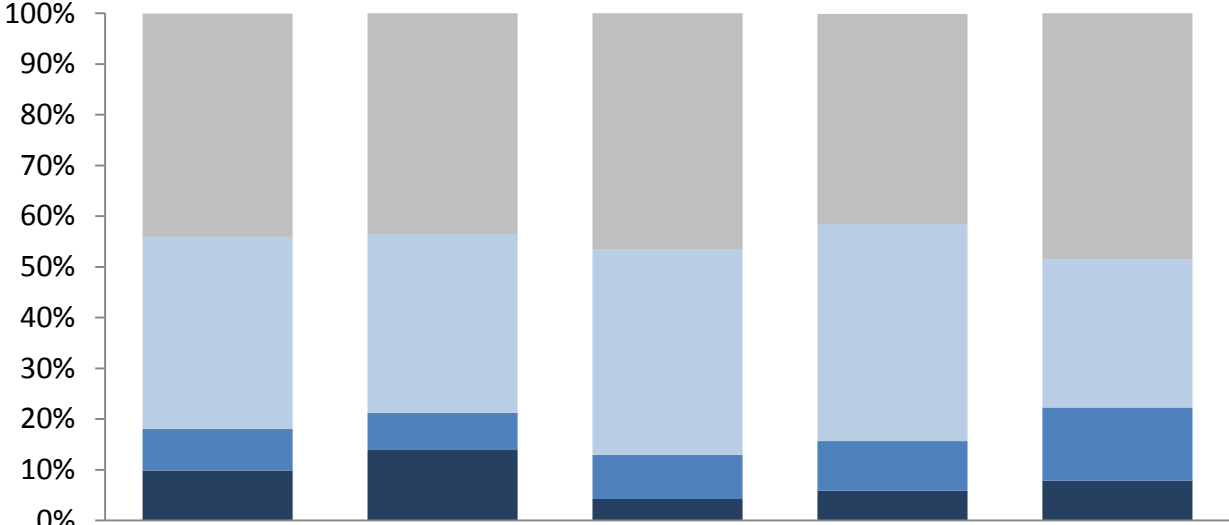
■ Stock	59%	58%	55%	52%	50%	49%	47%	46%	45%	44%
■ Fixed Income	29%	30%	31%	31%	32%	32%	33%	33%	33%	33%
■ Real Assets	5%	6%	6%	7%	7%	7%	7%	8%	9%	9%
■ Priv. Equity & Hedge Funds	6%	7%	8%	10%	10%	11%	12%	13%	14%	14%

• 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	44%	44%	47%	41%	49%
Fixed Income	38%	35%	40%	43%	29%
Real Assets	8%	7%	9%	10%	14%
Priv. Equity & Hedge Funds	10%	14%	4%	6%	8%
Number of funds	266	145	74	41	5
Median fund in \$ billions	6.3	9.6	1.9	8.8	18.0

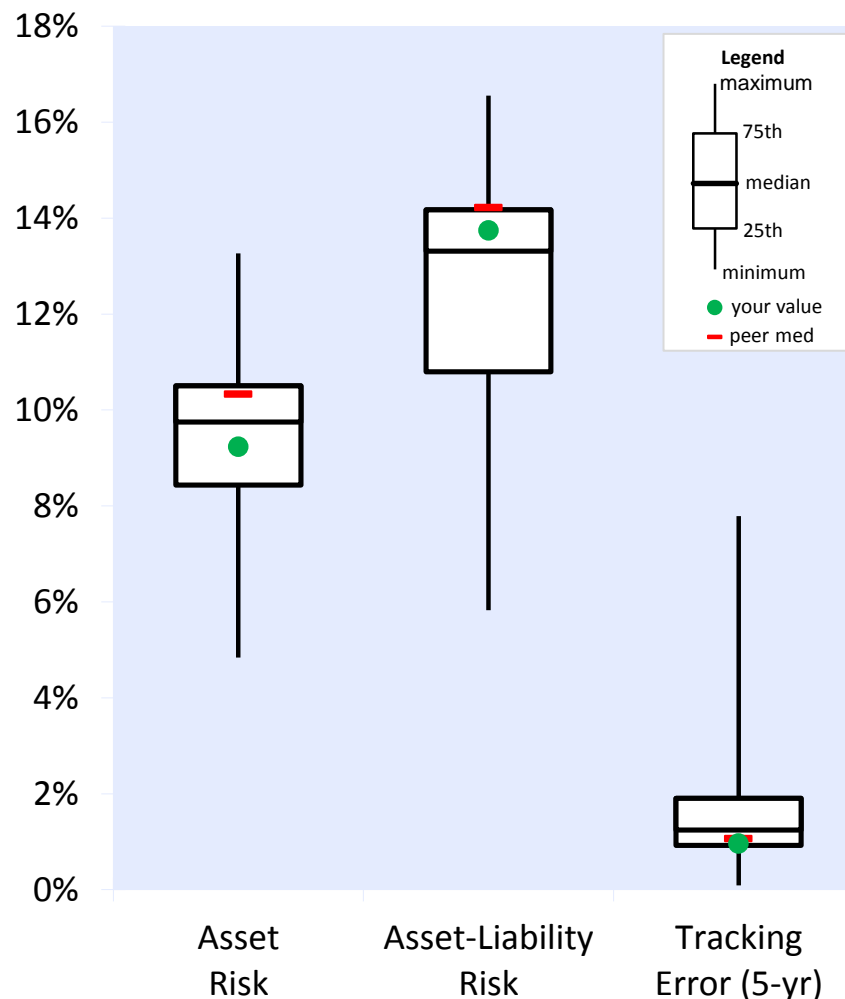
## Risk by type

Your asset risk of 9.2% 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 1.0% was below the U.S. median of 1.2%. 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

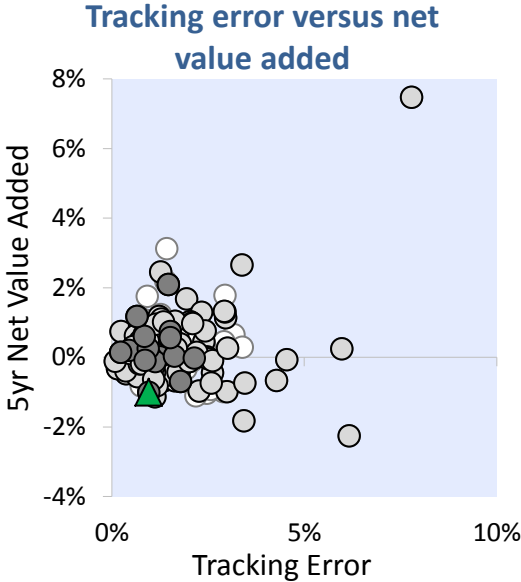
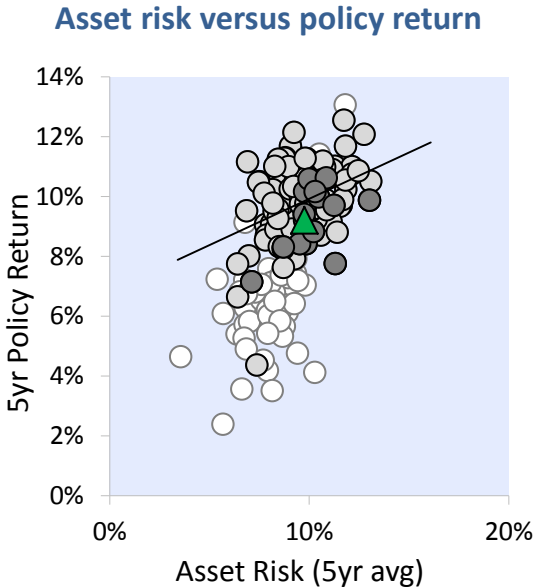
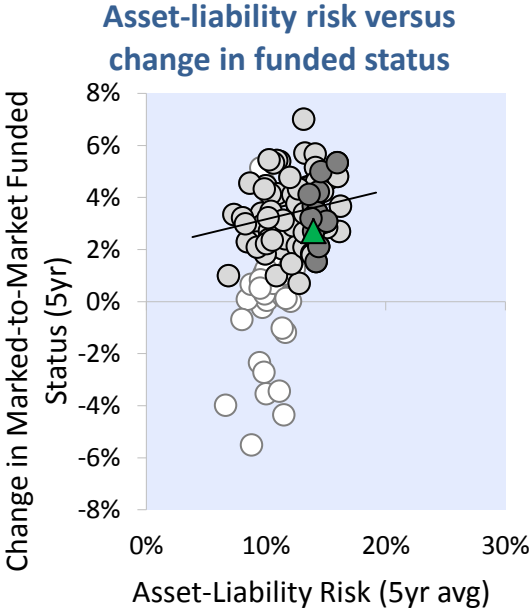


# Risk versus return

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

Higher asset risk was associated with higher policy returns.

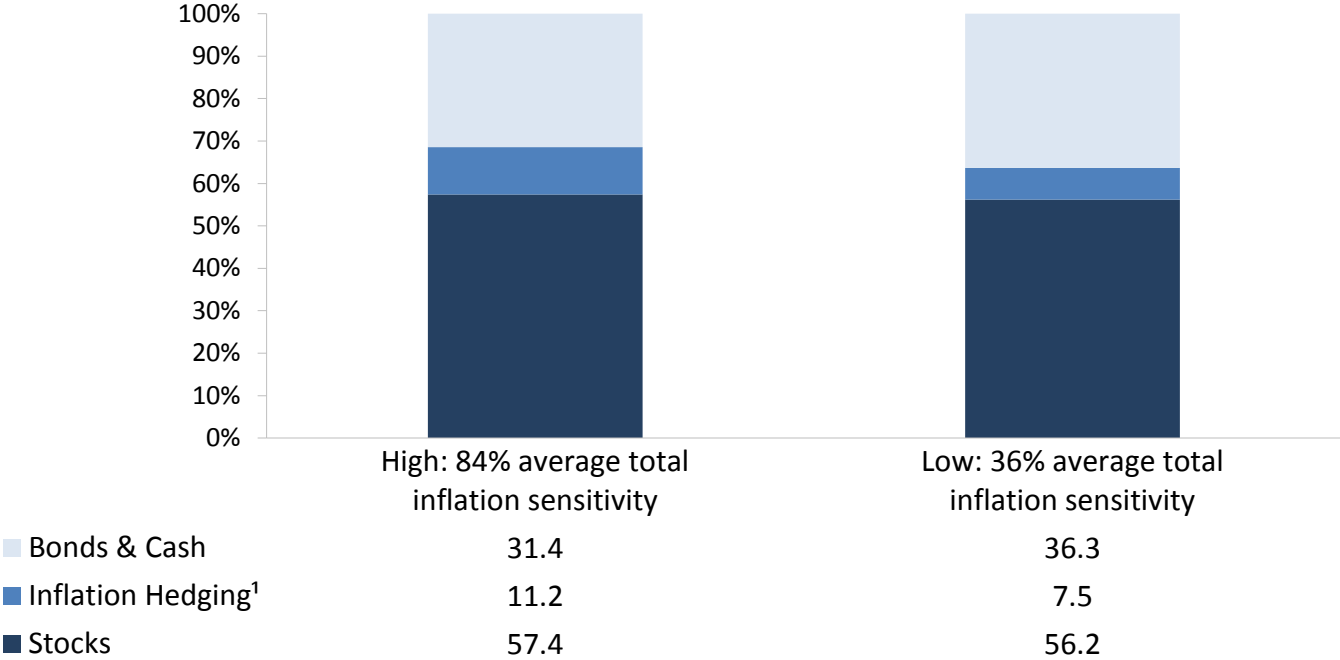
There was no meaningful relationship between tracking error and net value added.



# 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 11.2% of assets at plans with high inflation sensitivity versus 7.5% at plans with lower inflation sensitivity.

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

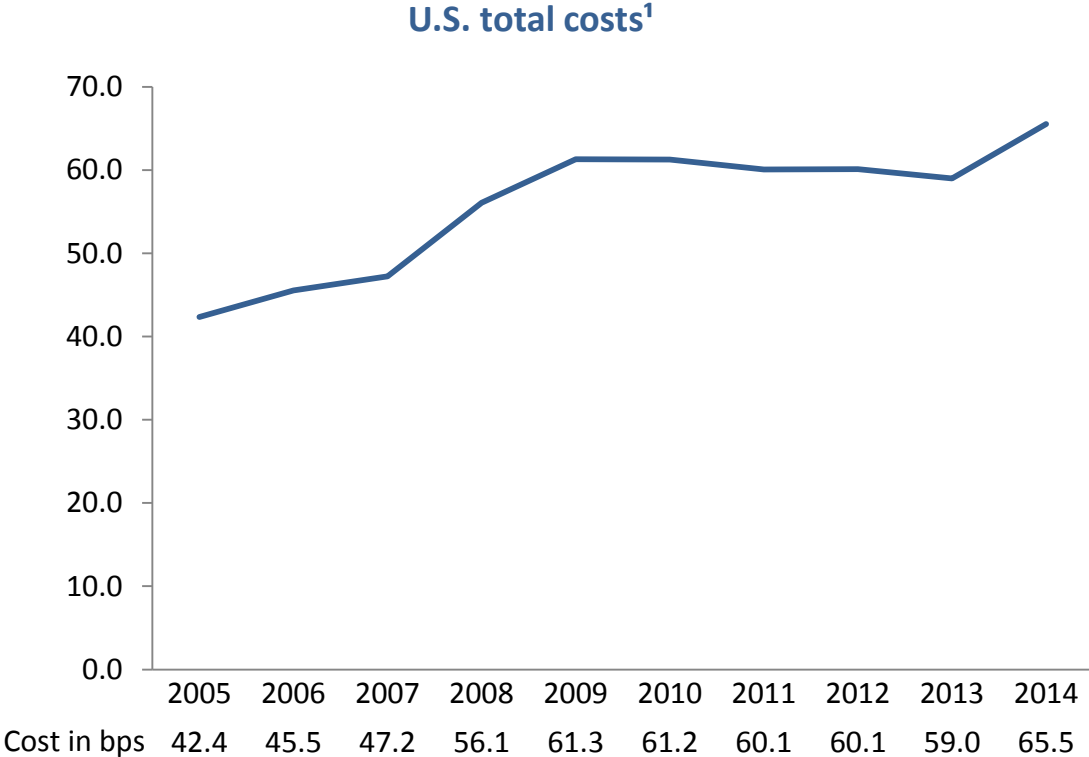


1. Inflation hedge assets include inflation-indexed bonds, commodities, real estate & REITs, infrastructure and natural resources.

# 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	0.49%	0.40%	0.09%
= Net value added	0.08%	0.01%	0.07%
Number of observations	3,207	2,143	

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

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

Asset class (Ranked by returns)	Asset mix <sup>3</sup>		Returns <sup>4</sup>	
	DB	DC	DB	DC
Private Equity	4%	n/a	11.1%	n/a
Real Assets	5%	n/a	9.5%	n/a
Small Cap Stock	6%	8%	8.8%	9.8%
Employer Stock	0%	20%	n/a	8.6%
Fixed Income	31%	10%	7.5%	6.1%
Hedge Funds	2%	n/a	7.6%	n/a
Stock U.S. Large Cap or Broad	26%	30%	6.4%	7.9%
Stock Non U.S. or Global	23%	8%	4.5%	6.6%
Stable Value/GICs	n/a	17%	n/a	4.6%
Cash	2%	8%	2.6%	2.9%
Total	100%	100%	8.0%	6.9%
Number of observations	3,207	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.

# 3

## Description of peer group and universe

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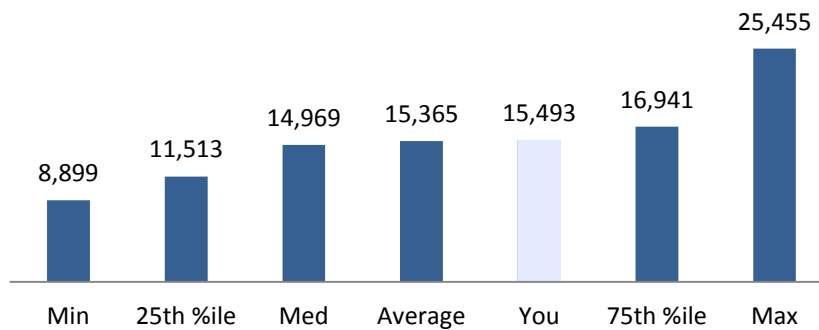
## Peer group

Your peer group is comprised of 18 U.S. public funds, with assets ranging from \$8.9 billion to \$25.5 billion versus your \$15.5 billion. The median size is \$15.0 billion.

Your peer group is selected such that your fund size is usually close to the median of your peer group. Size is the primary criteria for choosing your peer group, because size greatly impacts how much you pay for services. Generally, the larger your fund, the smaller your unit operating costs (i.e., the economies of scale impact).

In order to preserve client confidentiality, we do not disclose your peers' names in this document due to the Freedom of Information Act.

**Total fund assets (\$ millions) - you versus peers**

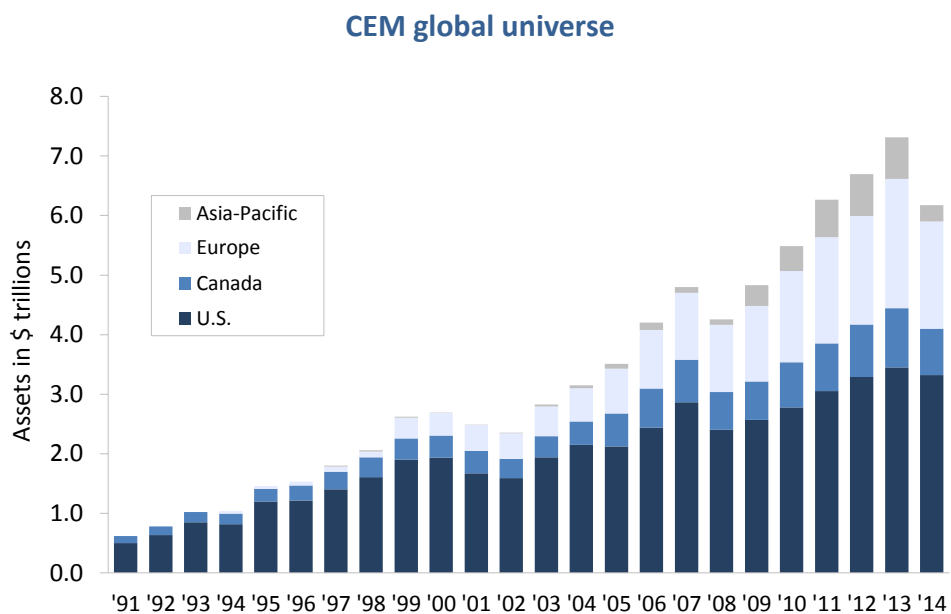




## CEM global universe

CEM has been providing investment benchmarking solutions since 1991. The 2014 survey universe is comprised of 266 funds representing \$6.2 trillion in assets. The breakdown by region is as follows:

- 145 U.S. pension funds with aggregate assets of \$3.3 trillion.
- 74 Canadian pension funds with aggregate assets of \$782 billion.
- 41 European pension funds with aggregate assets of \$1.8 trillion. Included are funds from The Netherlands, Norway, Sweden, Finland, Denmark, UK, and Ireland.
- 6 Asia-Pacific pension funds with aggregate assets of \$273 billion.



## Universe subsets

CEM's global survey universe is comprised of 266 funds with total assets of \$6.2 trillion. Your fund's returns and costs are compared to the following two subsets of the global universe:

- Peers - Your peer group is comprised of 18 U.S. public funds ranging in size from \$8.9 - \$25.5 billion. The peer median of \$15.0 billion compares to your \$15.5 billion.
- U.S. Public - The U.S. Public universe is comprised of 57 funds ranging in size from \$0.9 - \$295.0 billion. The median fund is \$16.5 billion.

### Universe subsets by number of funds and assets

	Peer group <sup>1</sup>	U.S. by type				Global by Country				
		Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
<u># of funds</u>										
2014	18	79	57	8	145	145	74	41	6	266
2013	17	115	62	12	191	191	91	85	7	374
2012	17	122	67	13	202	202	90	78	12	382
2011	18	125	67	12	204	204	89	76	12	381
2010	17	123	72	12	207	207	97	55	9	368
<u># of funds with uninterrupted data for:</u>										
1 yr	18	79	57	8	144	145	74	41	6	266
2 yrs	17	77	50	7	134	134	70	34	4	242
3 yrs	16	73	49	7	129	129	65	26	4	224
4 yrs	16	73	47	6	126	126	57	17	4	204
5 yrs	16	70	43	5	118	118	56	15	2	191
6 yrs	14	70	39	4	113	113	52	11	2	178
<u>Total assets (\$ billions)</u>										
2014	277	885	2,334	99	3,321	3,321	782	1,796	273	6,172
2013	254	1,054	2,236	104	3,450	3,450	995	2,168	697	7,311
2012	229	1,010	2,236	95	3,288	3,288	883	1,822	700	6,694
2011	217	965	2,025	63	3,053	3,053	802	1,784	625	6,264
2010	210	910	1,804	63	2,777	2,777	758	1,530	419	5,484
<u>2014 asset distribution (\$ billions)</u>										
Avg	15.4	11.2	40.9	12.4	22.9	22.9	10.6	43.8	45.6	23.2
Max	25.5		295.0		295.0	295.0				
75th %ile	16.9		47.6		22.8	22.8				
Median	15.0		16.5		9.6	9.6				
25th %ile	11.5		6.2		2.9	2.9				
Min	8.9		0.9		0.4	0.4				

1. Peer group statistics are for your 2014 peer group only as your peer group may have included different funds in prior years.

## Implementation style, actual mix and policy mix by universe subset

### Implementation style, actual mix and policy mix - 2014 (as a % of year-end assets)

	Your fund	Peer group	U.S. by type				Global by Country				
			Corp.	Public	Other	Total	U.S.	Canada	Europe	Asia-Pacific	Total
<u>Implementation style</u>											
External active	57.6	62.0	70.1	62.6	70.6	67.2	67.2	63.8	46.8	52.1	62.8
Fund of funds	9.8	3.0	4.6	2.6	2.3	3.7	3.7	1.2	3.7	2.6	3.0
External passive	12.4	20.5	18.0	18.8	24.4	18.7	18.7	14.3	21.0	18.1	17.8
Internal active	3.4	11.0	5.1	10.0	0.3	6.7	6.7	16.5	24.8	23.9	12.6
Internal passive	<u>16.9</u>	<u>3.5</u>	<u>2.3</u>	<u>5.9</u>	<u>2.4</u>	<u>3.7</u>	<u>3.7</u>	<u>4.1</u>	<u>3.7</u>	<u>3.4</u>	<u>3.8</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>Actual asset mix</u>											
Stock	45.2	49.2	38.6	50.0	44.3	43.5	43.5	47.7	42.3	40.3	44.4
Fixed income	25.2	27.1	43.7	25.9	33.1	36.0	36.0	39.4	43.4	38.8	38.2
Global TAA	0.0	1.9	2.8	2.2	3.6	2.6	2.6	0.8	0.9	2.5	1.8
Real assets	9.5	9.9	4.6	9.3	10.3	6.8	6.8	8.1	8.8	10.9	7.6
Hedge funds	10.7	5.3	6.0	5.0	4.4	5.5	5.5	1.7	2.2	4.1	3.9
Private equity	<u>9.4</u>	<u>6.7</u>	<u>4.3</u>	<u>7.6</u>	<u>4.2</u>	<u>5.6</u>	<u>5.6</u>	<u>2.4</u>	<u>2.4</u>	<u>3.4</u>	<u>4.1</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>Policy asset mix</u>											
Stock	43.6	48.7	39.4	48.7	44.5	43.5	43.5	46.6	41.4	45.9	44.1
Fixed income	21.9	26.5	42.9	25.4	32.0	35.3	35.3	40.5	42.8	32.3	37.8
Global TAA	0.0	2.5	2.6	2.5	3.5	2.6	2.6	0.9	0.9	2.5	1.9
Real assets	14.6	12.0	4.4	10.6	12.2	7.3	7.3	8.7	9.8	12.8	8.2
Hedge funds	10.0	2.5	5.9	4.2	3.8	5.1	5.1	1.1	2.5	2.5	3.5
Private equity	<u>10.0</u>	<u>7.8</u>	<u>4.7</u>	<u>8.6</u>	<u>4.0</u>	<u>6.2</u>	<u>6.2</u>	<u>2.3</u>	<u>2.4</u>	<u>4.0</u>	<u>4.5</u>
Total	100.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0	100.0

## Implementation style, actual mix and policy mix trends

### Implementation style, actual mix and policy mix - 2010 to 2014 (as a % of year-end assets)

	Your fund					Peer average <sup>1</sup>					U.S. Public average <sup>1</sup>				
	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010
<b>Implementation style</b>															
External active	67.4	71.2	74.3	74.6	63.9	66.5	65.5	67.4	67.9	68.6	62.9	63.0	63.7	64.4	64.5
External passive	12.4	9.5	5.5	6.8	6.4	22.9	23.7	22.1	21.0	19.5	21.3	21.1	20.5	19.4	19.1
Internal active	3.4	3.4	3.0	3.9	3.5	8.0	7.9	6.9	7.4	7.3	10.3	10.2	10.1	10.6	10.5
Internal passive	<u>16.9</u>	<u>16.0</u>	<u>17.2</u>	<u>14.7</u>	<u>26.2</u>	<u>2.7</u>	<u>2.9</u>	<u>3.7</u>	<u>3.7</u>	<u>4.6</u>	<u>5.6</u>	<u>5.7</u>	<u>5.7</u>	<u>5.6</u>	<u>5.9</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Actual asset mix</b>															
Stock	45.2	46.5	44.5	41.9	57.4	50.3	52.5	51.1	50.9	53.8	49.9	51.7	50.0	50.3	53.7
Fixed income	25.2	26.6	32.4	35.9	28.7	26.3	26.6	29.6	31.6	30.5	26.0	26.2	28.5	29.6	29.1
Global TAA	0.0	0.0	0.0	0.0	0.0	1.5	1.3	0.6	0.2	0.4	1.7	1.5	1.4	1.2	1.1
Real assets	9.5	7.9	2.5	1.5	0.6	9.8	8.7	7.8	6.9	5.6	9.6	8.7	8.4	7.7	6.4
Hedge funds	10.7	10.1	10.4	10.0	0.7	5.7	5.0	5.1	5.3	4.3	5.2	4.6	4.1	3.8	2.9
Private equity	<u>9.4</u>	<u>8.9</u>	<u>10.3</u>	<u>10.7</u>	<u>12.7</u>	<u>6.5</u>	<u>5.9</u>	<u>5.9</u>	<u>5.2</u>	<u>5.3</u>	<u>7.6</u>	<u>7.2</u>	<u>7.7</u>	<u>7.4</u>	<u>6.9</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Policy asset mix</b>															
Stock	43.6	43.0	44.0	44.0	50.0	48.9	50.3	51.3	52.7	53.2	48.5	49.2	50.1	50.9	52.3
Fixed income	21.9	27.0	31.0	30.9	38.0	26.2	27.1	29.1	30.9	32.3	25.5	26.9	27.8	28.8	29.6
Global TAA	0.0	0.0	0.0	0.0	0.0	2.2	2.3	0.7	0.2	0.1	2.0	2.0	1.4	1.2	1.0
Real assets	14.6	10.0	5.0	5.0	0.0	11.8	10.2	9.2	7.9	6.9	10.8	9.9	9.4	8.5	7.8
Hedge funds	10.0	10.0	10.0	10.0	0.0	2.8	2.4	2.8	2.5	2.1	4.3	3.4	3.4	3.1	2.2
Private equity	<u>10.0</u>	<u>10.0</u>	<u>9.9</u>	<u>10.0</u>	<u>12.0</u>	<u>8.1</u>	<u>7.7</u>	<u>6.9</u>	<u>5.8</u>	<u>5.4</u>	<u>8.9</u>	<u>8.6</u>	<u>8.0</u>	<u>7.5</u>	<u>7.1</u>
Total	100.1	100.0	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1. Trends are based on the 43 U.S. Public and 16 peer funds with 5 consecutive years of data ending 2014.

## Implementation style by asset class

Implementation style impacts your costs, because external active management tends to be more expensive than internal or passive (or indexed) management and fund-of-funds usage is more expensive than direct fund investment.

### Implementation style by asset class - 2014 (as a % of average assets)

	Your fund %					Peer average %					U.S. Public average %				
	External			Internal		External			Internal		External			Internal	
	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index	Active	FOFs	Index	Active	Index
U.S. Stock - Broad/All	100.0		0.0	0.0	0.0	26.9		73.1	0.0	0.0	26.3		55.5	4.4	13.8
U.S. Stock - Large Cap	10.5		0.0	0.0	89.5	36.2		37.6	4.6	21.6	41.6		33.6	7.4	17.4
U.S. Stock - Mid Cap	68.6		0.0	0.0	31.4	72.8		4.3	7.2	15.7	69.2		5.2	10.6	15.1
U.S. Stock - Small Cap	0.0		100.0	0.0	0.0	73.1		4.9	16.4	5.6	84.3		4.5	7.8	3.4
Stock - EAFE						73.8		25.7	0.0	0.5	58.0		28.8	5.3	7.9
Stock - ACWIxU.S.	60.0		40.0	0.0	0.0	60.5		39.5	0.0	0.0	68.1		31.1	0.8	0.0
Stock - Emerging	66.7		33.3	0.0	0.0	85.3		8.9	5.8	0.0	76.0		15.3	5.1	3.6
Stock - Global						26.7		0.0	73.3	0.0	53.5		17.5	24.8	4.1
Stock - Other						73.2		22.7	4.1	0.0	58.7		24.8	7.5	9.0
<b>Total Stock</b>	<b>44.5</b>		<b>24.6</b>	<b>0.0</b>	<b>30.9</b>	<b>48.9</b>		<b>35.6</b>	<b>8.8</b>	<b>6.7</b>	<b>53.0</b>		<b>30.5</b>	<b>7.1</b>	<b>9.4</b>
Fixed Income - U.S.	100.0		0.0	0.0	0.0	67.0		11.0	21.6	0.4	55.4		17.0	24.1	3.5
Fixed Income - U.S. Gov't						0.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0
Fixed Income - U.S. Credit						0.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0
Fixed Income - Long Bonds						0.0		0.0	0.0	0.0	77.6		0.0	0.9	21.5
Fixed Income - EAFE						100.0		0.0	0.0	0.0	90.6		0.0	9.4	0.0
Fixed Income - Emerging	100.0		0.0	0.0	0.0	97.1		0.0	2.9	0.0	98.2		1.1	0.7	0.0
Fixed Income - Global	100.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0	76.0		0.0	24.0	0.0
Fixed Income - Inflation Indexed	35.9		0.0	0.0	64.1	57.1		33.8	0.0	9.1	40.0		30.0	11.0	19.0
Fixed Income - High Yield	100.0		0.0	0.0	0.0	93.9		0.0	6.1	0.0	94.2		2.4	3.5	0.0
Fixed Income - Mortgages						100.0		0.0	0.0	0.0	48.3		1.5	46.2	4.0
Fixed Income - Private Debt						100.0		0.0	0.0	0.0	88.5		0.0	11.5	0.0
Fixed Income - Other						100.0		0.0	0.0	0.0	93.8		0.0	4.2	2.0
Cash	0.0		0.0	100.0	0.0	12.7		0.0	87.3	0.0	31.6		0.0	68.4	0.0
<b>Total Fixed Income</b>	<b>75.4</b>		<b>0.0</b>	<b>12.7</b>	<b>11.9</b>	<b>66.7</b>		<b>8.9</b>	<b>23.5</b>	<b>0.9</b>	<b>60.4</b>		<b>12.2</b>	<b>23.1</b>	<b>4.3</b>
Commodities						100.0		0.0	0.0	0.0	92.0		0.0	3.9	4.1
Infrastructure			n/a		n/a	98.4	0.0	n/a	1.6	n/a	95.8	2.1	n/a	2.2	n/a
Natural Resources			n/a		n/a	99.4	0.0	n/a	0.6	n/a	99.8	0.0	n/a	0.2	n/a
REITs						64.5	0.0	16.5	12.0	7.0	73.2	0.0	15.1	7.1	4.5
Real Estate ex-REITs	100.0	0.0	n/a	0.0	n/a	97.7	0.5	n/a	1.8	0.0	94.4	0.4	n/a	5.1	0.0
Other Real Assets	100.0	0.0	n/a	0.0	n/a	100.0	0.0	n/a	0.0	n/a	100.0	0.0	n/a	0.0	n/a
<b>Total Real Assets</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>94.7</b>	<b>0.0</b>	<b>1.8</b>	<b>2.7</b>	<b>0.8</b>	<b>93.4</b>	<b>0.0</b>	<b>1.4</b>	<b>4.6</b>	<b>0.6</b>
Hedge Funds	4.7	95.3	n/a	0.0	n/a	71.8	28.2	n/a	0.0	n/a	74.7	25.3	n/a	0.0	n/a
Global TAA			n/a		n/a	100.0	0.0	n/a	0.0	n/a	99.1	0.0	n/a	0.9	n/a
Diversified Private Equity	100.0	0.0	n/a	0.0	n/a	69.2	30.8	n/a	0.0	n/a	77.2	22.8	n/a	0.1	n/a
Venture Capital	100.0	0.0	n/a	0.0	n/a	81.7	16.5	n/a	1.8	n/a	84.3	15.3	n/a	0.5	n/a
LBO	100.0	0.0	n/a	0.0	n/a	98.6	1.4	n/a	0.0	n/a	99.0	1.0	n/a	0.0	n/a
Other Private Equity			n/a		n/a	100.0	0.0	n/a	0.0	n/a	92.7	0.0	n/a	7.3	n/a
<b>Total Private Equity</b>	<b>100.0</b>	<b>0.0</b>	<b>n/a</b>	<b>0.0</b>	<b>n/a</b>	<b>82.7</b>	<b>17.3</b>	<b>n/a</b>	<b>0.0</b>	<b>n/a</b>	<b>84.7</b>	<b>14.9</b>	<b>n/a</b>	<b>0.4</b>	<b>n/a</b>
<b>Total Fund - Avg. Holdings</b>	<b>59.3</b>	<b>10.0</b>	<b>10.9</b>	<b>3.4</b>	<b>16.4</b>	<b>61.7</b>	<b>2.8</b>	<b>20.9</b>	<b>11.0</b>	<b>3.6</b>	<b>62.7</b>	<b>2.6</b>	<b>18.8</b>	<b>9.9</b>	<b>6.0</b>
<b>Total Fund - Yr.-End Holdings</b>	<b>57.6</b>	<b>9.8</b>	<b>12.4</b>	<b>3.4</b>	<b>16.9</b>	<b>62.0</b>	<b>3.0</b>	<b>20.5</b>	<b>11.0</b>	<b>3.5</b>	<b>62.6</b>	<b>2.6</b>	<b>18.8</b>	<b>10.0</b>	<b>5.9</b>

## Actual mix

### Actual asset mix - 2010 to 2014 (as a % of year-end assets)

	Your fund %					Peer average %					U.S. Public average %				
	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010
Employer Stock															
U.S. Stock - Broad/All	2.4	2.5	12.8	11.7	21.4	8.5	10.6	10.3	10.4	12.0	7.3	10.1	7.5	7.2	11.0
U.S. Stock - Large Cap	14.5	14.2	1.4	1.7	5.3	14.2	12.4	12.9	12.6	12.2	14.8	13.4	14.7	14.6	14.9
U.S. Stock - Mid Cap	4.3					1.2	0.3	0.2	0.2	0.2	0.7	0.1	0.1	0.1	0.1
U.S. Stock - Small Cap	2.2	6.4	5.6	6.9	7.8	2.3	3.6	3.5	3.6	3.8	3.4	4.1	4.4	4.6	5.0
Stock - EAFE						4.6	4.4	4.9	4.7	6.1	6.9	7.3	7.0	7.7	9.0
Stock - ACWIXU.S.	18.6	20.4	20.7	18.0	19.2	10.8	13.5	12.5	11.2	11.6	8.2	9.2	8.3	6.4	7.4
Stock - Emerging	3.2	3.0	4.1	3.5	3.6	2.8	2.5	3.1	2.1	1.8	3.2	3.0	3.4	2.9	2.6
Stock - Global						3.9	4.8	2.6	5.4	5.9	4.7	3.8	3.8	4.3	4.2
Stock - Other						0.9	0.8	0.4	0.1	0.1	0.9	0.8	0.6	0.5	0.2
<b>Total Stock</b>	<b>45.2</b>	<b>46.5</b>	<b>44.5</b>	<b>41.9</b>	<b>57.4</b>	<b>49.2</b>	<b>52.8</b>	<b>50.4</b>	<b>50.3</b>	<b>53.8</b>	<b>50.0</b>	<b>51.8</b>	<b>49.7</b>	<b>48.2</b>	<b>54.3</b>
Fixed Income - U.S.	9.0	8.7	9.9	14.5	15.5	15.5	16.4	19.6	21.5	21.5	14.5	15.9	17.5	18.4	19.4
Fixed Income - U.S. Gov't											0.1				
Fixed Income - U.S. Credit											0.0				
Fixed Income - Long Bonds								0.0	0.0	0.1	1.0	0.0	0.2	0.3	0.3
Fixed Income - EAFE						0.1	0.2	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.3
Fixed Income - Emerging	1.0	0.9	1.1	1.1	0.3	0.6	0.5	0.6	0.4	0.1	0.8	0.8	0.7	0.6	0.4
Fixed Income - Global	3.8	3.6	4.1			1.1	0.9	0.9	0.4	0.4	2.0	1.9	2.2	2.0	1.9
Fixed Income - Inflation Indexed	3.7	5.0	8.4	10.6	7.6	1.8	2.2	3.2	3.8	3.4	1.8	1.7	2.0	2.2	1.7
Fixed Income - High Yield	4.4	4.9	5.9	5.9	1.9	3.3	2.1	3.1	2.7	2.1	2.2	1.6	2.0	2.2	1.8
Fixed Income - Mortgages						0.0	0.0	0.1	0.3	0.3	0.2	0.2	0.2	0.3	0.2
Fixed Income - Private Debt						0.0	0.0				0.2	0.1	0.2	0.0	
Fixed Income - Other						0.8	0.8	0.3	0.4	0.4	0.7	0.7	0.6	0.7	0.5
Cash	3.4	3.4	2.9	3.9	3.4	3.8	3.0	1.7	1.4	1.3	2.2	2.7	1.9	1.9	1.7
<b>Total Fixed Income</b>	<b>25.2</b>	<b>26.6</b>	<b>32.4</b>	<b>35.9</b>	<b>28.7</b>	<b>27.1</b>	<b>26.1</b>	<b>29.8</b>	<b>31.2</b>	<b>29.9</b>	<b>25.9</b>	<b>25.9</b>	<b>27.8</b>	<b>28.8</b>	<b>28.3</b>
Commodities						0.1	0.1	0.2	0.2	0.3	0.5	0.5	0.6	0.6	0.6
Infrastructure						0.5	0.4	0.4	0.3	0.1	0.3	0.2	0.4	0.5	0.3
Natural Resources						0.7	0.6	0.4	0.3	0.2	0.6	0.4	0.4	0.3	0.2
REITs						1.1	0.9	1.1	1.0	1.0	0.9	0.7	0.7	0.8	0.7
Real Estate ex-REITs	4.7	3.5	2.4	1.5	0.5	6.9	6.4	5.4	5.2	4.2	6.6	6.2	6.3	6.2	5.1
Other Real Assets	4.8	4.4	0.1	0.1	0.1	0.6	0.6	0.3	0.3	0.3	0.5	0.4	0.3	0.3	0.1
<b>Total Real Assets</b>	<b>9.5</b>	<b>7.9</b>	<b>2.5</b>	<b>1.5</b>	<b>0.6</b>	<b>9.9</b>	<b>9.0</b>	<b>7.8</b>	<b>7.3</b>	<b>6.1</b>	<b>9.3</b>	<b>8.5</b>	<b>8.6</b>	<b>8.6</b>	<b>7.0</b>
Hedge Funds	10.7	10.1	10.4	10.0	0.7	5.3	4.7	5.1	5.1	4.1	5.0	5.2	4.8	5.2	3.3
Global TAA						1.9	1.3	0.9	0.5	0.5	2.2	1.2	1.4	1.4	1.1
Div. Private Equity	0.8	1.4	1.8	2.0	3.9	4.4	4.2	3.9	3.8	3.6	5.7	5.6	6.0	5.9	4.5
Venture Capital	2.2	2.0	2.3	2.4	1.9	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.2
LBO	6.4	5.5	6.3	6.2	6.9	1.8	1.4	1.5	1.4	1.7	1.3	1.1	1.1	1.2	1.0
Other Private Equity						0.3	0.3	0.3	0.3	0.2	0.4	0.4	0.4	0.5	0.3
<b>Total Private Equity</b>	<b>9.4</b>	<b>8.9</b>	<b>10.3</b>	<b>10.7</b>	<b>12.7</b>	<b>6.7</b>	<b>6.1</b>	<b>5.9</b>	<b>5.6</b>	<b>5.7</b>	<b>7.6</b>	<b>7.4</b>	<b>7.8</b>	<b>7.8</b>	<b>6.0</b>
<b>Total Fund</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Count	1	1	1	1	1	18	17	17	18	17	57	62	67	67	72
Median Assets (\$ billions)	15.5	15.4	14.0	13.4	14.3	15.0	15.4	13.8	12.0	12.1	16.5	15.6	14.0	12.8	10.4

## Policy mix

### Policy asset mix - 2010 to 2014 (as a % of average assets)

	Your fund %					Peer average %					U.S. Public average %				
	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010	2014	2013	2012	2011	2010
Employer Stock															
U.S. Stock - Broad/All	20.4	5.6	3.3	6.6	20.0	12.6	13.9	15.0	15.1	16.5	10.5	13.1	12.5	12.0	14.2
U.S. Stock - Large Cap		6.7	6.7	6.7	6.0	8.9	8.1	9.8	8.8	9.4	10.4	9.4	11.0	10.1	10.8
U.S. Stock - Mid Cap						0.4	0.3	0.2	0.2	0.2	0.3	0.1	0.0	0.0	0.0
U.S. Stock - Small Cap		6.7	10.0	6.7	4.0	0.8	1.0	1.1	1.3	1.7	1.8	2.1	2.6	3.0	3.3
Stock - EAFE						3.5	3.5	4.4	3.6	5.6	5.7	6.4	6.6	6.4	7.6
Stock - ACWixU.S.	20.0	20.0	20.0	20.0	18.0	11.9	13.1	14.3	14.9	12.1	9.1	8.1	9.0	9.2	8.7
Stock - Emerging	3.2	4.0	4.0	4.0	2.0	1.8	1.4	1.6	1.2	0.9	2.2	2.0	2.0	2.2	1.6
Stock - Global						8.1	8.8	3.9	7.2	7.1	8.3	8.4	6.3	6.3	5.9
Stock - Other						0.6	0.6	0.3			0.4	0.5	0.2	0.1	0.0
<b>Total Stock</b>	<b>43.6</b>	<b>43.0</b>	<b>44.0</b>	<b>44.0</b>	<b>50.0</b>	<b>48.7</b>	<b>50.6</b>	<b>50.7</b>	<b>52.3</b>	<b>53.4</b>	<b>48.7</b>	<b>50.0</b>	<b>50.3</b>	<b>49.2</b>	<b>52.2</b>
Fixed Income - U.S.		13.0	10.0	19.9	25.0	17.3	19.4	21.7	22.8	24.9	16.5	18.5	19.0	20.2	21.6
Fixed Income - U.S. Gov't															
Fixed Income - U.S. Credit															
Fixed Income - Long Bonds						2.1	1.5				1.6	0.4	0.2	0.6	0.3
Fixed Income - EAFE						0.1	0.2	0.2	0.3	0.3	0.1	0.2	0.1	0.2	0.4
Fixed Income - Emerging		0.5	5.0	0.0		0.4	0.4	1.2	0.6		0.7	0.7	0.8	0.7	0.3
Fixed Income - Global	19.5	1.5				1.3	0.3	0.2	0.3	0.4	2.0	1.4	2.0	1.4	1.7
Fixed Income - Inflation Indexed		5.0	10.0	10.0	10.0	5.0	4.5	2.1	3.3	3.2	2.8	2.6	1.8	2.2	1.7
Fixed Income - High Yield		5.0	5.0	0.0		3.8	3.3	2.9	2.7	2.1	2.3	2.1	1.8	1.9	1.4
Fixed Income - Mortgages								0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Fixed Income - Private Debt											0.1	0.1	0.0		
Fixed Income - Other						0.6	0.4	0.5	0.1	0.3	0.4	0.7	0.7	0.4	0.3
Cash	2.4	2.0	1.0	1.0	3.0	-4.1	-2.8	0.5	0.8	0.7	-1.0	-0.2	0.7	0.9	1.0
<b>Total Fixed Income</b>	<b>21.9</b>	<b>27.0</b>	<b>31.0</b>	<b>30.9</b>	<b>38.0</b>	<b>26.5</b>	<b>27.2</b>	<b>29.4</b>	<b>31.0</b>	<b>31.9</b>	<b>25.4</b>	<b>26.4</b>	<b>27.2</b>	<b>28.5</b>	<b>28.8</b>
Commodities						1.2	0.9	0.2	0.3	0.4	0.9	0.9	0.7	0.7	0.6
Infrastructure						1.0	0.6	0.8	0.2	0.1	0.4	0.5	0.6	0.5	0.5
Natural Resources						0.8	0.8	0.6	0.7	0.2	0.6	0.7	0.4	0.5	0.2
REITs						0.7	0.6	1.1	0.7	0.5	0.6	0.7	0.7	0.5	0.5
Real Estate ex-REITs	4.6	5.0	5.0	5.0		6.9	6.5	5.9	5.7	5.5	7.2	6.6	6.4	6.8	6.5
Other Real Assets	10.0	5.0				1.4	0.8	0.6	0.3	0.4	0.9	0.5	0.6	0.3	0.2
<b>Total Real Assets</b>	<b>14.6</b>	<b>10.0</b>	<b>5.0</b>	<b>5.0</b>		<b>12.0</b>	<b>10.2</b>	<b>9.1</b>	<b>7.9</b>	<b>7.0</b>	<b>10.6</b>	<b>9.8</b>	<b>9.4</b>	<b>9.3</b>	<b>8.3</b>
Hedge Funds	10.0	10.0	10.0	10.0		2.5	2.3	3.1	2.6	2.0	4.2	3.8	3.9	4.1	2.8
Global TAA						2.5	2.2	0.9	0.4	0.4	2.5	1.6	1.3	1.2	1.0
Div. Private Equity	10.0	3.3	3.3	5.9	12.0	6.7	6.1	5.3	4.5	4.3	7.3	6.8	6.6	6.4	6.0
Venture Capital		3.3	3.3	1.9		0.1	0.3	0.3	0.1		0.3	0.2	0.2	0.1	0.0
LBO		3.4	3.3	2.2		0.6	0.8	0.8	0.7	0.6	0.7	0.8	0.8	0.7	0.4
Other Private Equity						0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3
<b>Total Private Equity</b>	<b>10.0</b>	<b>10.0</b>	<b>9.9</b>	<b>10.0</b>	<b>12.0</b>	<b>7.8</b>	<b>7.7</b>	<b>6.8</b>	<b>5.7</b>	<b>5.4</b>	<b>8.6</b>	<b>8.3</b>	<b>7.8</b>	<b>7.6</b>	<b>6.9</b>
<b>Total Fund</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Count	1	1	1	1	1	18	17	17	18	17	57	62	67	67	72

# 4

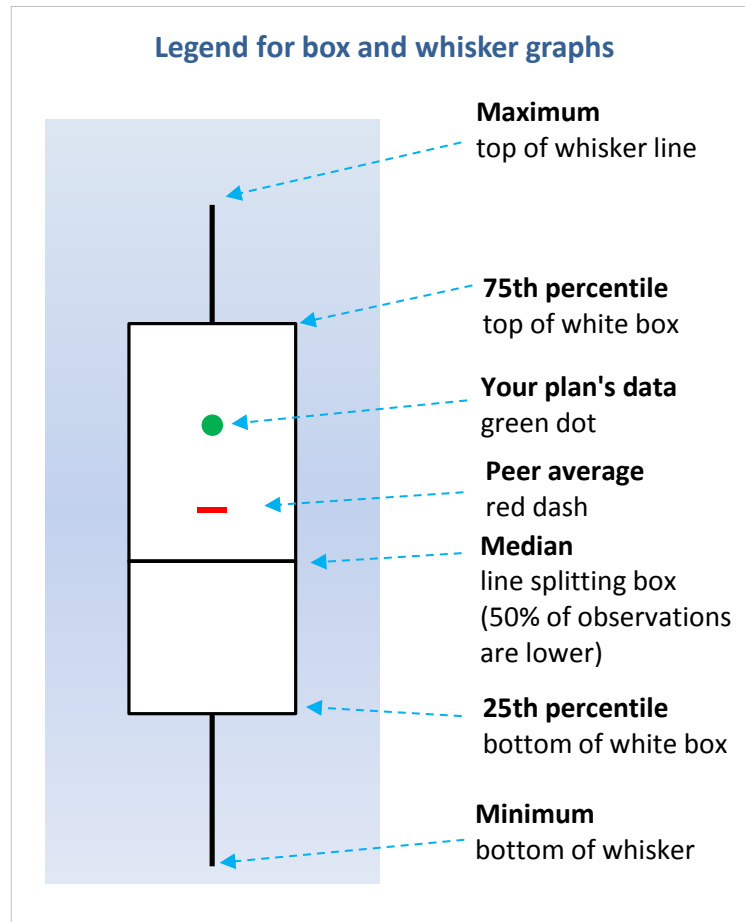
## Returns, Benchmarks and Value Added

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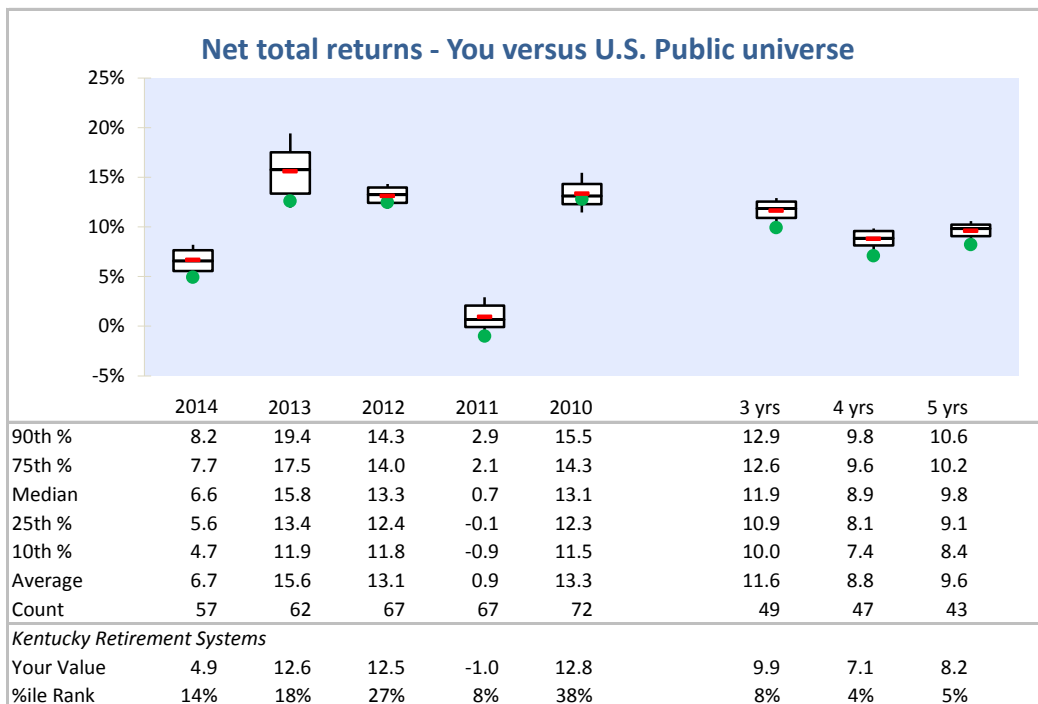
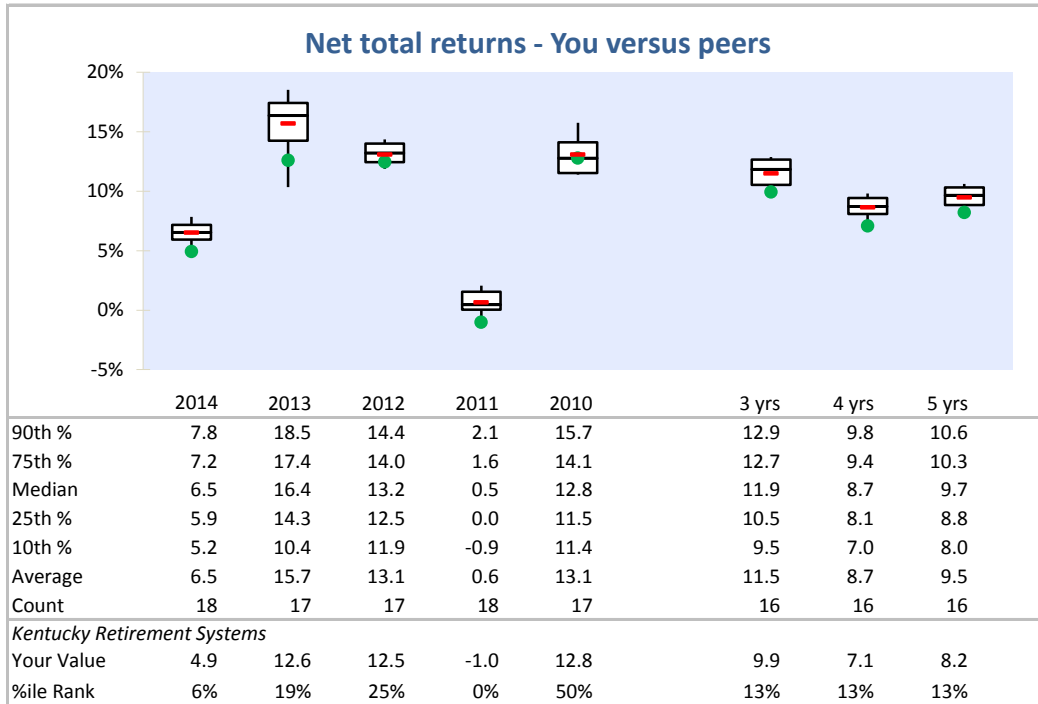
## Interpreting box and whisker graphs

Box and whisker graphs are used extensively in this report because they show visually where you rank relative to all observations. At a glance you can see which quartile your data falls in.



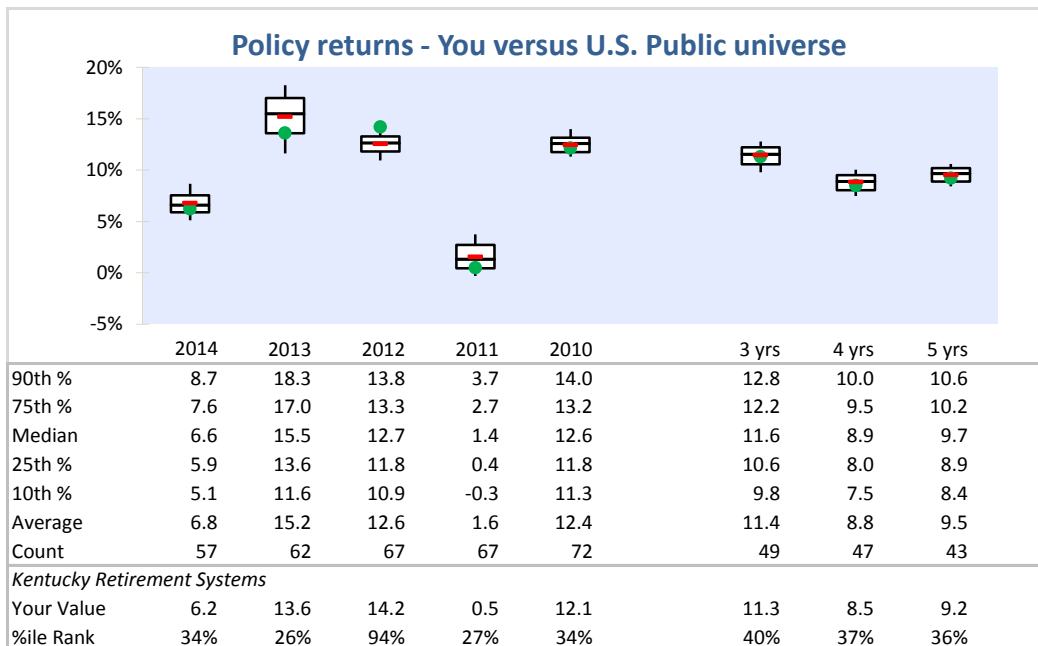
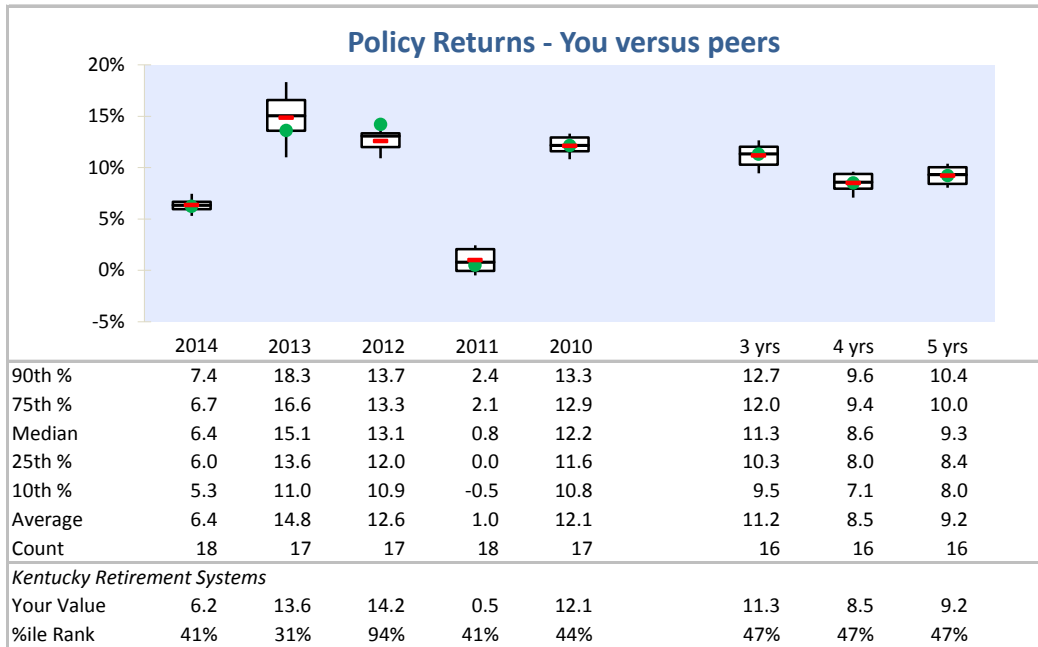
## Net total returns

Your 5-year net total return of 8.2% was below the peer median and below the median of the U.S. Public universe. Comparisons of total return do not help you understand the reasons behind relative performance. To understand the relative contributions from policy asset mix decisions and implementation decisions we separate total return into its more meaningful components - policy return and implementation value added.



## Policy returns

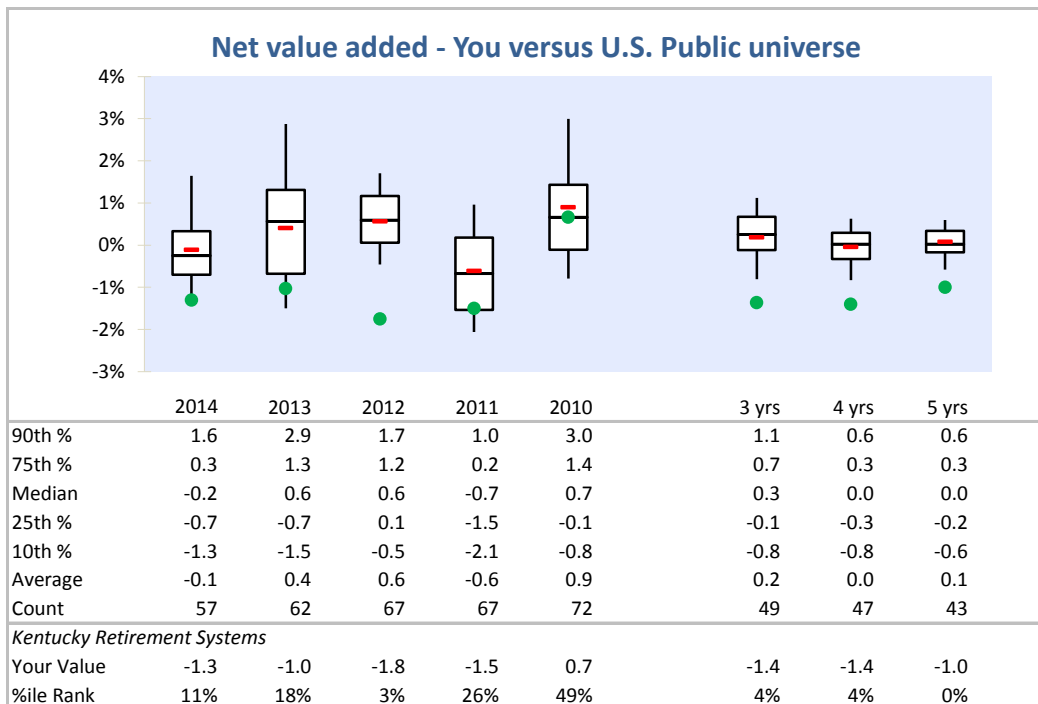
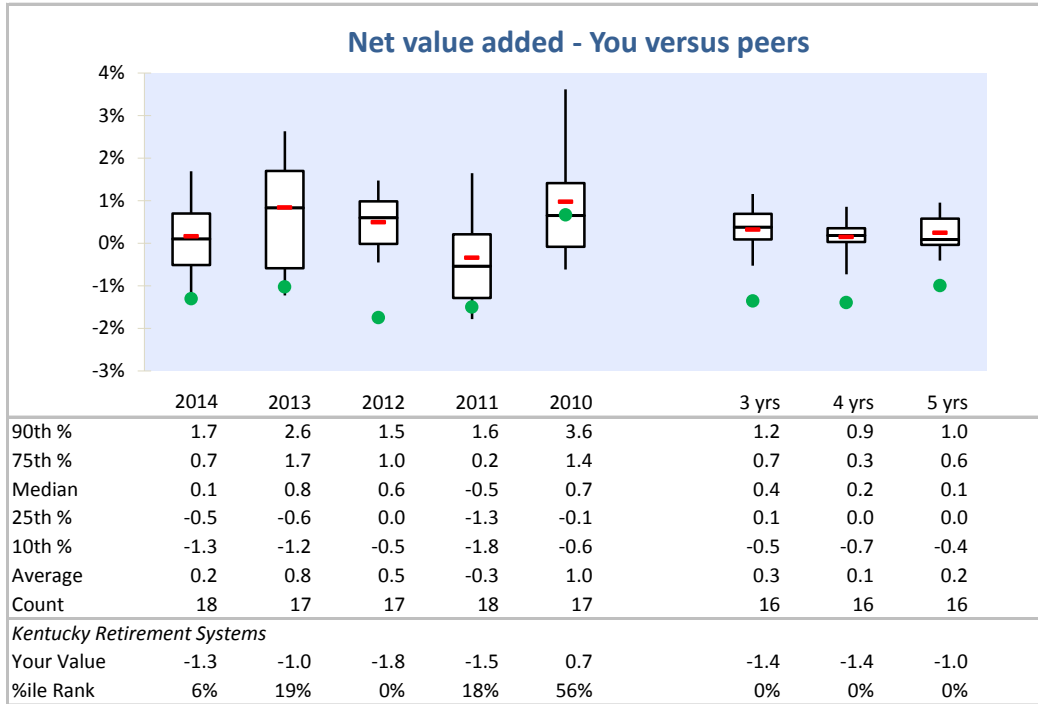
Your 5-year policy return of 9.2% was close to the peer median and below the median of the U.S. Public universe. Policy return is the return you would have earned had you passively implemented your policy asset mix decision through your benchmark portfolios.



To enable fairer comparisons, the policy returns of all participants including your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Prior to this adjustment, your 5-year policy return was 8.7%, 0.5% lower than your adjusted 5-year policy return of 9.2%. Mirroring this, without adjustment your 5-year total fund net value added would be 0.5% higher. Refer to the Research section pages 6-7 for details.

## Net value added

Your 5-year net value added of -1.0% was below the peer median and below the median of the U.S. Public universe. Net value added is the difference between your net total return and your policy return.



## Net returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr
U.S. Stock - Broad/All	11.5	35.6	16.1	2.9	16.0	15.9	11.3	34.1	16.3	1.2	17.7	15.6	11.2	32.8	16.2	0.7	17.5	15.2
U.S. Stock - Large Cap	13.6	32.8	16.8	0.1	11.1	14.4	13.4	33.3	16.1	1.5	14.8	15.4	12.7	33.6	16.2	1.4	15.2	15.4
U.S. Stock - Mid Cap	6.5						8.4	37.2	16.3	1.3	18.0	15.6	8.6	37.2	16.3	1.3	18.0	15.7
U.S. Stock - Small Cap	6.3	34.4	16.3	0.4	29.1	16.6	5.3	39.0	16.7	-3.0	24.0	15.5	5.1	39.0	16.0	-3.4	26.7	15.7
Stock - EAFE							-3.2	24.4	17.2	-11.8	8.5	6.2	-4.0	23.2	16.8	-11.7	10.3	6.1
Stock - Emerging	-3.3	-3.1	23.3	-15.2	23.0	3.8	-0.9	-1.3	18.6	-20.0	19.5	2.1	-1.2	-1.1	18.7	-19.4	19.5	2.2
Stock - ACWIxU.S.	-3.8	17.7	15.7	-12.1	10.2	4.9	-3.9	18.6	18.1	-11.6	12.0	5.9	-3.4	18.6	17.8	-12.3	12.2	5.8
Stock - Global							4.6	27.2	16.4	-5.0	13.0	10.7	4.2	23.3	15.1	-7.2	12.9	9.1
Stock - Other							8.3	20.2	9.0	-5.6	27.4	11.3	5.1	19.3	11.7	-6.7	21.2	9.6
Stock - Total	3.8	22.8	16.7	-4.6	15.3	10.3	5.1	26.7	16.9	-4.9	15.2	11.3	5.1	26.3	16.7	-5.1	15.8	11.2
Fixed Income - U.S.	3.9	-2.7	5.7	1.3	6.8	3.0	5.1	-1.5	6.6	7.0	8.3	5.1	5.8	-1.5	6.8	8.4	8.7	5.6
Fixed Income - U.S. Gov't													1.0					
Fixed Income - U.S. Credit													6.6					
Fixed Income - EAFE							-1.1	-4.1	1.5	5.8	4.2	1.2	-2.6	-3.1	0.9	6.4	7.0	1.6
Fixed Income - Emerging	3.1	-9.4	17.0	-0.3	11.7	4.0	-0.1	-7.9	16.6	1.5	11.8	4.0	-0.5	-7.4	15.8	1.0	13.3	4.1
Fixed Income - Global	2.6	-2.4	-0.6				3.8	-1.7	5.3	7.9	9.7	4.9	3.5	-0.4	8.0	5.2	8.4	4.9
Fixed Income - Long Bonds									4.6	28.8	12.1		23.0	4.7	10.2	28.3	12.2	15.4
Fixed Income - Inflation Indexed	3.2	-8.2	9.1	5.7	6.4	3.1	6.1	-7.7	8.6	14.1	7.5	5.5	4.6	-6.6	7.9	13.2	6.8	5.0
Fixed Income - High Yield	5.4	7.2	15.6	0.6	14.7	8.5	3.8	7.5	15.4	3.6	14.3	8.8	3.9	7.1	15.7	3.7	14.2	8.8
Fixed Income - Mortgages							4.2	6.2	24.3	1.1	22.9	11.3	6.4	5.0	11.9	3.6	13.8	8.0
Fixed Income - Private Debt							-7.3	11.5					0.0	6.8	7.5	3.5		
Fixed Income - Other							9.1	9.1	21.0	-0.9	18.1	11.0	5.4	7.8	13.1	1.9	19.5	9.4
Cash	0.2	0.5	0.4	0.3	0.5	0.4	0.1	-0.1	0.2	0.2	0.4	0.2	0.3	0.4	0.9	1.3	0.7	0.7
Fixed Income - Total	3.3	-2.1	7.8	2.3	5.9	3.4	4.6	-1.0	8.0	7.3	8.7	5.4	5.7	-0.9	8.0	7.4	9.2	5.8
Commodities							-16.2	-10.2	1.8	-5.7	13.4	-3.9	-16.4	-4.4	0.9	-7.8	15.0	-3.1
Infrastructure							9.7	12.4	6.1	8.6	1.9	7.7	13.0	9.7	6.3	1.8	6.3	7.3
REITs							18.9	3.9	18.5	1.5	24.2	13.1	19.8	4.5	20.9	2.0	23.6	13.8
Natural Resources							9.7	6.4	3.5	0.6	2.2	4.4	11.1	6.6	1.8	3.0	2.4	4.9
Real Estate ex-REITs	8.0	8.3	7.7	8.2	8.6	8.2	13.1	13.8	9.7	12.8	11.6	12.2	12.5	12.4	10.4	13.4	7.9	11.3
Other Real Assets	3.6	2.1	0.0	0.0	0.0	1.1	4.8	8.4	3.9	-2.2	2.2	3.3	7.9	10.1	4.0	2.7	6.5	6.2
Real Assets - Total	5.7	5.6	7.5	7.6	6.6	6.6	13.2	11.8	10.6	9.8	12.9	11.7	11.5	10.3	10.1	10.0	10.0	10.4
Hedge Funds	4.5	11.4	6.6	-3.2	-2.5	3.2	3.4	9.6	6.4	3.2	8.3	6.1	4.5	9.8	6.5	0.6	9.0	6.0
Global TAA							5.3	3.7	5.8	12.6	5.5	6.6	5.7	0.6	10.5	4.9	14.1	7.1
Diversified Private Equity	8.9	18.4	21.2	8.2	16.3	14.5	15.5	17.3	13.2	10.8	12.0	13.7	16.3	17.8	13.1	11.1	13.8	14.4
LBO	10.7	18.1	20.8	18.0	18.2	17.1	15.1	22.8	15.3	14.4	16.6	16.8	14.3	18.4	13.8	11.6	13.2	14.2
Venture Capital	6.9	13.2	-3.6	26.3	13.4	10.8	4.8	13.4	2.9	36.9	14.5	13.9	16.2	17.4	9.0	18.9	12.3	14.7
Other Private Equity							16.7	11.3	14.9	14.1	6.2	12.6	14.3	18.0	8.5	2.1	17.1	11.8
Private Equity - Total	9.6	17.0	15.5	17.0	16.6	15.1	15.6	16.9	12.8	11.7	12.4	13.9	15.7	17.7	12.8	11.2	13.7	14.2
Total Fund Return	4.9	12.6	12.5	-1.0	12.8	8.2	6.5	15.7	13.1	0.6	13.1	9.7	6.7	15.6	13.1	0.9	13.3	9.8

You were not able to provide full year returns for all of the components of returns shown in italics. The default is to set the unavailable return equal to the benchmark return.

## Benchmark returns by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr
U.S. Stock - Broad/All	12.6	33.6	16.4	1.0	16.4	15.5	12.6	33.5	16.4	1.1	17.0	15.6	12.7	32.7	16.3	1.2	16.8	15.5
U.S. Stock - Large Cap	13.7	32.4	16.4	1.0	15.1	15.3	13.4	32.7	16.2	1.7	15.6	15.5	13.2	32.9	16.2	1.6	15.8	15.5
U.S. Stock - Mid Cap	8.2						10.1	33.5	17.9	-1.7	26.6	16.6	10.7	33.5	17.9	-1.7	26.6	16.7
U.S. Stock - Small Cap	4.9	38.8	16.4	1.0	26.9	16.8	6.2	37.9	16.5	-2.5	24.2	15.6	6.2	37.9	16.9	-3.2	25.8	15.8
Stock - EAFE							-4.0	21.9	17.4	-12.0	8.3	5.5	-4.3	21.8	17.2	-12.4	9.4	5.6
Stock - Emerging	-1.8	-2.3	18.6	-18.2	19.2	2.1	-1.4	-0.7	17.9	-18.3	19.1	2.4	-1.7	-1.3	18.2	-18.5	19.1	2.2
Stock - ACWIxU.S.	-3.4	15.8	16.8	-13.3	12.4	4.9	-3.7	15.6	17.0	-13.6	11.3	4.6	-3.7	16.3	17.0	-13.8	11.7	4.8
Stock - Global							4.9	24.7	16.0	-6.2	12.5	9.9	3.5	21.5	15.1	-7.3	12.9	8.7
Stock - Other							5.1	20.2	11.7	-5.9	18.8	9.5	2.9	18.3	11.8	-8.2	15.8	7.6
Stock - Total	4.2	22.6	16.8	-7.2	15.7	9.9	5.5	25.2	16.6	-5.5	14.3	10.7	5.3	25.2	16.6	-5.5	14.8	10.8
Fixed Income - U.S.	6.0	-2.0	4.2	8.1	6.5	4.5	5.8	-1.9	4.4	7.8	6.7	4.5	6.2	-2.1	4.9	8.1	6.7	4.7
Fixed Income - U.S. Gov't													0.8					
Fixed Income - U.S. Credit													5.8					
Fixed Income - EAFE							-0.3	-1.6	3.5	4.7	-0.8	1.1	-3.1	-3.8	2.0	5.1	5.3	1.0
Fixed Income - Emerging		-5.3	17.4	8.1	12.3		-2.0	-6.2	16.9	5.6	12.2	5.0	0.0	-6.4	16.8	3.8	12.5	5.0
Fixed Income - Global	5.6	-2.2					4.9	-1.6	5.0	6.3	9.9	4.8	3.8	-1.4	4.3	6.5	5.9	3.8
Fixed Income - Long Bonds							24.9	-12.8	3.4	33.8	9.4	10.5	20.0	-6.4	4.6	25.4	9.4	10.0
Fixed Income - Inflation Indexed	2.6	-8.6	7.0	5.7	6.3	2.4	5.4	-6.7	7.7	13.3	6.3	5.0	4.5	-5.8	7.4	12.7	6.1	4.8
Fixed Income - High Yield	2.5	7.4	15.8	8.1	15.1	9.7	2.4	7.0	14.7	5.3	15.2	8.8	2.8	6.7	13.8	5.2	14.3	8.5
Fixed Income - Mortgages							3.8	-1.2	7.9	6.0	7.1	4.7	4.1	0.2	7.7	4.9	6.1	4.6
Fixed Income - Private Debt							4.2	15.3					4.6	7.2	6.1	3.9		
Fixed Income - Other							8.6	9.8	12.5	3.0	11.0	8.9	5.9	5.2	9.2	3.4	15.7	7.8
Cash	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.2	0.3
Fixed Income - Total	5.0	-1.4	9.0	7.1	6.0	5.1	8.7	-3.3	6.3	7.9	7.2	5.3	7.6	-2.2	6.0	8.1	7.0	5.2
Commodities							-20.0	-5.4	-0.3	-5.2	11.6	-4.4	-18.0	-4.2	1.3	-7.2	13.7	-3.4
Infrastructure							7.3	5.1	7.1	8.9	8.3	7.3	6.8	6.8	7.1	8.1	7.9	7.3
REITs							20.6	4.0	22.3	3.8	25.3	14.8	21.9	3.6	22.4	3.8	24.4	14.8
Natural Resources							6.4	8.6	7.9	6.1	2.8	6.4	6.8	7.9	7.2	4.9	3.5	6.0
Real Estate ex-REITs	11.4	12.0	10.9	15.3	13.1	12.5	13.0	10.3	11.2	14.9	10.6	12.0	12.0	11.6	11.1	15.1	10.8	12.1
Other Real Assets	2.9	2.3	0.0	0.0	0.0	1.0	5.9	6.4	5.3	7.5	4.3	5.9	7.5	9.9	5.6	9.2	5.7	7.6
Real Assets - Total	5.6	7.1	10.9	15.3	11.3	10.0	8.4	8.7	11.6	12.2	11.3	10.4	9.3	9.3	10.4	11.7	11.7	10.5
Hedge Funds	4.7	8.5	3.1	-2.5	5.3	3.8	4.1	5.9	4.2	1.1	5.9	4.2	4.0	9.0	6.1	-0.2	5.5	4.8
Global TAA							5.4	4.7	7.9	1.7	4.8	4.9	5.3	9.3	9.3	2.5	8.0	6.9
Diversified Private Equity <sup>1</sup>	18.2	29.2	18.8	7.8	12.2	17.0	15.2	31.3	15.4	11.6	13.2	17.2	16.2	30.4	13.6	11.9	15.6	17.4
LBO <sup>1</sup>		29.2	18.8	7.8	12.2		9.3	32.5	17.3	6.9	13.3	15.5	12.3	30.9	15.1	8.9	12.9	15.8
Venture Capital <sup>1</sup>		29.2	18.8	7.8	12.2		9.9	32.2	17.3	6.9	13.3	15.6	12.9	31.5	16.0	8.5	15.9	16.7
Other Private Equity <sup>1</sup>							8.3	32.1	19.1	6.7	13.7	15.6	13.7	30.9	15.3	8.7	12.7	16.0
Private Equity <sup>1</sup> - Total	18.2	29.2	18.8	7.8	12.2	17.0	15.1	31.5	15.3	11.4	13.4	17.1	16.1	30.4	13.5	11.9	15.5	17.3
Total Policy Return	6.2	13.6	14.2	0.5	12.1	9.2	6.4	14.8	12.6	1.0	12.1	9.3	6.8	15.2	12.6	1.6	12.4	9.6

1. To enable fairer comparisons, the policy returns of all participants including your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Prior to this adjustment, your 5-year policy return was 8.7%, 0.5% lower than your adjusted 5-year policy return of 9.2%. Mirroring this, without adjustment your 5-year total fund net value added would be 0.5% higher. Refer to the Research section pages 6-7 for details.

## Net value added by asset class

Asset class	Your fund %						Peer average %						U.S. Public average %					
	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr	2014	2013	2012	2011	2010	5-yr
U.S. Stock - Broad/All	-1.1	2.0	-0.3	1.9	-0.4	0.4	-1.2	0.7	0.0	0.1	0.7	0.0	-1.6	0.1	-0.1	-0.5	0.7	-0.3
U.S. Stock - Large Cap	-0.1	0.4	0.4	-0.9	-4.0	-0.9	0.1	0.6	-0.1	-0.2	-0.8	-0.1	-0.5	0.7	-0.1	-0.2	-0.3	-0.2
U.S. Stock - Mid Cap	-1.7						-1.8	3.7	-1.6	3.0	-8.6	-1.0	-2.1	3.7	-1.6	3.0	-8.6	-1.1
U.S. Stock - Small Cap	1.4	-4.4	-0.1	-0.6	2.2	-0.2	-1.0	1.0	0.2	-0.5	-0.2	-0.2	-1.1	1.1	-0.8	-0.2	0.9	-0.1
Stock - EAFE							0.8	2.6	-0.2	0.2	0.2	0.7	0.3	1.4	0.1	0.4	1.1	0.6
Stock - Emerging	-1.4	-0.8	4.7	3.0	3.8	1.7	0.5	-0.7	0.8	-1.8	0.3	-0.3	0.5	0.2	0.6	-0.9	0.3	0.1
Stock - ACWIxU.S.	-0.4	1.9	-1.1	1.1	-2.2	-0.1	-0.1	3.1	1.1	2.0	0.7	1.3	0.3	2.3	0.7	1.5	0.8	1.0
Stock - Global							-0.5	2.1	0.4	1.2	0.6	0.8	0.7	2.0	0.0	0.1	0.0	0.5
Stock - Other							3.2	0.0	-4.9	0.3	8.6	1.7	2.2	0.4	-0.7	1.6	3.7	2.0
Stock - Total	-0.3	0.2	-0.1	2.7	-0.5	0.5	-0.4	1.5	0.3	0.6	0.9	0.5	-0.2	1.1	0.1	0.4	1.0	0.5
Fixed Income - U.S.	-2.0	-0.7	1.4	-6.8	0.3	-1.5	-0.7	0.4	2.2	-0.8	1.5	0.5	-0.3	0.5	2.0	0.3	2.0	0.9
Fixed Income - U.S. Gov't													0.2					
Fixed Income - U.S. Credit													0.8					
Fixed Income - EAFE							-0.7	-2.5	-2.0	1.2	5.0	0.2	0.4	0.7	-1.1	1.0	1.7	0.6
Fixed Income - Emerging		-4.1	-0.4	-8.4	-0.6		1.4	-1.7	-0.3	-4.0	-0.5	-1.0	-0.7	-1.0	-0.2	-3.0	0.8	-0.9
Fixed Income - Global	-3.0	-0.2					-0.2	0.0	3.3	1.5	-0.2	0.1	-0.1	1.1	4.6	-1.3	3.0	1.1
Fixed Income - Long Bonds									1.2	-5.0	2.7		4.6	4.8	5.6	0.2	2.9	5.3
Fixed Income - Inflation Indexed	0.6	0.4	2.1	-0.1	0.1	0.6	0.3	-1.3	0.9	0.7	1.2	0.5	-0.1	-1.0	0.5	0.5	0.7	0.2
Fixed Income - High Yield	2.9	-0.3	-0.2	-7.5	-0.4	-1.1	1.4	0.6	0.6	-1.7	-0.8	0.0	1.1	0.5	1.6	-1.6	0.0	0.3
Fixed Income - Mortgages							4.5	7.4	16.4	-4.9	15.8	6.7	3.3	4.8	4.1	-1.6	7.1	3.5
Fixed Income - Private Debt							-18.5	-3.8					-4.5	-0.4	2.5	-0.4		
Fixed Income - Other							0.5	-0.7	8.5	-4.0	7.0	2.1	-0.4	2.2	3.2	-1.6	5.0	1.6
Cash	0.2	0.5	0.3	0.2	0.5	0.3	0.1	-0.2	0.1	0.1	0.3	0.1	0.2	0.1	0.4	1.1	0.5	0.4
Fixed Income - Total	-1.7	-0.7	-1.2	-4.8	-0.1	-1.7	-4.2	2.3	1.8	-0.6	1.4	0.2	-1.9	1.2	2.2	-0.7	2.2	0.6
Commodities							0.8	-0.7	2.1	-0.5	1.8	0.5	1.2	-0.5	-0.3	-0.9	1.4	0.4
Infrastructure							2.4	7.3	-1.0	-0.4	-6.4	0.3	6.2	2.9	-0.8	-6.3	-1.6	0.0
REITs							-1.7	-0.1	-1.9	-2.2	-1.0	-1.7	-2.1	0.9	-0.8	-1.9	-0.8	-1.0
Natural Resources							3.2	-3.1	-4.5	-5.5	-0.7	-2.0	4.3	-1.6	-5.4	-1.8	-1.1	-1.1
Real Estate ex-REITs	-3.4	-3.7	-3.2	-7.0	-4.6	-4.4	0.1	3.4	-1.5	-2.1	1.0	0.2	0.5	0.8	-0.8	-1.7	-2.8	-0.8
Other Real Assets	0.7	-0.2	0.0	0.0	0.0	0.1	-1.2	1.9	-1.5	-8.0	2.3	-2.6	0.3	-1.1	-2.0	-4.2	2.3	-1.4
Real Assets - Total	0.1	-1.6	-3.5	-7.6	-4.8	-3.4	4.9	3.1	-1.0	-2.4	1.6	1.2	2.2	1.0	-0.2	-1.6	-1.7	-0.1
Hedge Funds	-0.2	2.8	3.5	-0.7	-7.8	-0.6	-0.7	3.7	2.2	2.1	2.6	1.9	0.4	0.8	0.5	0.8	3.7	1.2
Global TAA							-0.1	-1.1	-2.1	11.0	0.7	1.7	0.4	-8.7	1.2	2.4	6.1	0.2
Diversified Private Equity <sup>1</sup>	-9.3	-10.8	2.4	0.4	4.0	-2.5	0.3	-14.0	-2.2	-0.9	-1.2	-3.4	0.1	-12.5	-0.5	-0.8	-1.8	-3.0
LBO <sup>1</sup>		-11.1	2.0	10.3	6.0		6.7	-9.7	-2.0	7.4	3.9	1.3	2.3	-12.6	-1.3	2.7	0.7	-1.6
Venture Capital <sup>1</sup>		-16.0	-22.4	18.6	1.2		-5.7	-18.7	-14.4	29.9	3.4	-1.7	4.0	-14.1	-6.9	10.5	-3.0	-2.0
Other Private Equity <sup>1</sup>							8.4	-20.9	-4.1	11.3	-9.5	-3.0	0.6	-13.0	-6.8	-6.2	3.5	-4.2
Private Equity <sup>1</sup> - Total	-8.6	-12.2	-3.3	9.3	4.4	-1.9	0.5	-14.5	-2.5	0.3	-1.0	-3.3	-0.4	-12.8	-0.7	-0.7	-1.8	-3.1
Total fund	-1.3	-1.0	-1.8	-1.5	0.7	-1.0	0.2	0.8	0.5	-0.3	1.0	0.4	-0.1	0.4	0.6	-0.6	0.9	0.2

Total net value add is determined by both actual and policy allocation. It is the outcome of total net return (page 6) minus total benchmark return (page 7). Aggregate net returns are an asset weighted average of all categories that the fund has an actual allocation to. Aggregate benchmark returns are a policy weighted average and includes only those categories that are part of your policy fund's mix.

You were not able to provide full year returns for all of the components of returns of asset classes with values shown in italics. The default is to set the unavailable return equal to the benchmark return.

1. To enable fairer comparisons, the policy returns of all participants including your fund were adjusted to reflect private equity benchmarks based on lagged, investable, public-market indices. Prior to this adjustment, your 5-year policy return was 8.7%, 0.5% lower than your adjusted 5-year policy return of 9.2%. Mirroring this, without adjustment your 5-year total fund net value added would be 0.5% higher. Refer to the Research section pages 6-7 for details.

## Most frequently used benchmarks by asset class - 2014 - Stock

How many of your peers use the most frequently used benchmarks by universe

Benchmark Description	Return <sup>1</sup>	# Using	
		Peers	U.S. Public
<u>U.S. Stock - Broad/All</u>			
Russell 3000	12.6	6	41
S&P 500	13.7		4
Wilshire 5000	12.7	1	4
DJ US Total Stock Market	12.5		2
Other	13.1	2	14
Total	12.8	9	65
<u>U.S. Stock - Large Cap</u>			
S&P 500	13.7	4	32
Russell 1000	13.2	2	29
Russell 3000	12.6	1	9
Custom	13.2		4
Other	12.8	3	23
Total	13.2	10	97
<u>U.S. Stock - Small Cap</u>			
Russell 2000	4.9	6	52
RUSSELL 2500	7.0	1	10
Custom	7.3		6
Russell 3000	12.6	1	3
Other	6.5	4	25
Total	5.9	12	96
<u>Stock - EAFE</u>			
MSCI EAFE Net	-4.9	4	35
Custom	-3.5		8
MSCI EAFE	-4.0		4
MSCI EAFE gross	-4.5	1	4
Other	-3.3	3	37
Total	-4.1	8	88
<u>Stock - Europe</u>			
MSCI ACWI	4.8		1
Total	4.8		1

Benchmark Description	Return <sup>1</sup>	# Using	
		Peers	U.S. Public
<u>Stock - Emerging</u>			
MSCI Emerging Market net	-2.2	5	43
MSCI Emerging Market gross	-1.9	2	10
MSCI Emerging Markets	-2.0		8
Custom	-0.4	1	7
Other		3	35
Total	-1.3	11	103
<u>Stock - ACWIxU.S.</u>			
MSCI ACWI xUS net	-3.9	5	25
MSCI ACWI xUS gross	-3.5	1	6
MSCI ACWI xUS IMI net	-3.9	1	3
MSCI ACWI ex US IMI	-3.6		2
Other	-3.4	5	35
Total	-3.6	12	71
<u>Stock - Global</u>			
MSCI World Net	4.8	2	13
MSCI ACWI net	4.2	2	10
Custom	2.3	1	7
MSCI ACWI IMI	3.8		4
Other	4.8	1	32
Total	4.4	6	66
<u>Stock - Asia-Pacific</u>			
MSCI ACWI	4.8		1
Total	4.8		1

1. Return reflects the average return provided to CEM for the described benchmark. Often, different returns for the same described benchmark are provided due to revisions (particularly for real estate benchmarks), rounding and differences in calculation methodology (particularly for hedged returns).



## Most frequently used benchmarks by asset class - 2014 - Fixed Income

Benchmark Description	Return <sup>1</sup>	# Using U.S.	
		Peers	Public
<u>Fixed Income - U.S.</u>			
Barclays US Aggregate	6.0	11	50
Custom	8.9		9
Barclays US Universal	6.2	2	5
Barclays aggregate	6.0		2
Other	6.7	4	34
Total	6.5	17	100
<u>Fixed Income - EAFE</u>			
Barclays Global Aggregate ex US	-3.4		1
CalPERS Barclays International Fixe	-5.4		1
Citigroup Non-U.S. World Governr	-0.3	1	1
Custom	9.1		1
Total	0.0	1	4
<u>Fixed Income - Global</u>			
Barclays US Aggregate	6.0	1	7
Barclays Global Aggregate	4.1	1	4
77% Barclays Aggregate/23% Citigr	4.5		1
Barclays Aggregate	5.6		1
Other	1.7	2	14
Total	3.4	4	27
<u>Fixed Income - Emerging</u>			
Custom	0.1		3
JP Morgan EMBI Global Diversified	7.4		3
JPM EMBI Global Diversified	6.0		3
JPMorgan GBI-EM Global Diversifie	-5.7	1	3
Other	1.3	6	27
Total	1.5	7	39

Benchmark Description	Return <sup>1</sup>	# Using U.S.	
		Peers	Public
<u>Fixed Income - High Yield</u>			
Barclays US Corp High Yield		1	8
Custom			7
Barclays US Corp High Yield 2% Cap		1	4
Citigroup High Yield Bond		1	3
Other		7	41
Total		10	63
<u>Fixed Income - Inflation Indexed</u>			
Barclays US TIPS		5	18
Barclays Global Inflation Linked			2
50% BC Global Inflat Linked:US TIP:			1
67% Barclays Global Inflation-Linke			1
Other		5	16
Total		10	38
<u>Fixed Income - Mortgages</u>			
Barclays Mortgage Index			2
Custom			2
95% BC US Agg x-Tobacco x-firearn			1
Actual			1
Other		1	8
Total		1	14
<u>Fixed Income - Long Bonds</u>			
Custom			17
Barclays US Long G/C			11
Barclays Long Corporate			3
Barclays US Long Credit			3
Other		1	34
Total		1	68

## Most frequently used benchmarks by asset class - 2014 - Hedge Funds and Real Assets<sup>2</sup>

Benchmark Description	Return <sup>1</sup>	# Using U.S.	
		Peers	Public
<u>Global TAA</u>			
Custom	4.3	1	12
3 Month LIBOR + 200 bps	2.2		2
20% S&P 500; 40% Barclays Treasu	4.7		1
35.72% Russell 3000, 28.56% Barcl	4.6		1
Other	5.8	3	20
Total	5.0	4	36
<u>Hedge Funds</u>			
Custom	4.6	4	29
HFRI Fund of Funds Composite Ind	3.5		5
3 Month LIBOR + 200 bps	2.2		2
HFRI Equity Hedge Index	0.3		2
Other	3.5	7	53
Total	3.7	11	91
<u>Commodities</u>			
Dow Jones UBS Commodity Index	-17.0	1	13
Custom	-6.9		3
Bloomberg Commodity Index	-17.0		2
Goldman Sachs Commodities Index	-33.1		2
Other	-21.7	4	18
Total	-19.3	5	38
<u>REITs</u>			
Your REIT benchmark	18.0	6	21
Custom	17.0		6
Wilshire REIT	31.8	1	4
DJ Select Real Estate Securities	31.8		1
Other	23.4	3	14
Total	21.0	10	46

Benchmark Description	Return <sup>1</sup>	# Using U.S.	
		Peers	Public
<u>Infrastructure</u>			
Custom	7.6	2	7
CPI + 5%	6.0	1	4
Actual return	0.0		1
Alerian MLP Index	4.8		1
Other	6.9	4	18
Total	6.6	7	31
<u>Natural Resources</u>			
Custom	7.4		9
CPI + 5%	5.7	1	4
NCREIF TIMBERLAND	10.5	1	3
18% NCREIF Timberland + 27% NCI	4.8	1	1
Other	5.9	7	24
Total	6.5	10	41
<u>Real Estate ex-REITs</u>			
Custom	10.6		19
NCREIF	11.8	3	17
NCREIF qtr lag	11.3	1	10
NCREIF ODCE	10.9	2	7
Other	11.7	12	63
Total	11.4	18	116

2. In order to eliminate the substantial noise caused by inconsistent and often inappropriate private equity benchmarks (see Research section page 6), the private equity benchmarks of all participants were adjusted to reflect investable private equity benchmarks based on lagged, small-cap stock. As a result of this adjustment, the most commonly used private equity benchmarks are not shown.

## Your policy return and value added calculation - 2014

### 2014 Policy Return and Value Added

Asset class	Policy weight	Description	Benchmark	Return	Net return	Value added
U.S. Stock - Broad/All	20.4%	Russell 3000		12.6%	11.5%	-1.1%
U.S. Stock - Large Cap		S&P 500 Total Return		13.7%	13.6%	-0.1%
U.S. Stock - Mid Cap		S&P Mid Cap Index		8.2%	6.5%	-1.7%
U.S. Stock - Small Cap		Russell 2000		4.9%	6.3%	1.4%
Stock - Emerging	3.2%	MSCI Emerging Market		-1.8%	-3.3%	-1.4%
Stock - ACWIxU.S.	20.0%	MSCI ACWI xUS		-3.4%	-3.8%	-0.4%
Fixed Income - U.S.		Barclays US Aggregate		6.0%	3.9%	-2.0%
Fixed Income - Emerging					3.1%	
Fixed Income - Global	19.5%	Barclay's Universal		5.6%	2.6%	-3.0%
Fixed Income - Inflation Indexed		Barclays US TIPS		2.6%	3.2%	0.6%
Fixed Income - High Yield		Barclays Corp High Yield		2.5%	5.4%	2.9%
Cash	2.4%	Citi Group3 Month T bill		0.0%	0.2%	0.2%
Real Estate ex-REITs	4.6%	NCREIF NFI-ODCE		11.4%	8.0%	-3.4%
Other Real Assets	10.0%	Custom CPI +300 bps		2.9%	3.6%	0.7%
Hedge Funds	10.0%	HFRI Diversified Fund of Funds		4.7%	4.5%	-0.2%
Diversified Private Equity	10.0%	Default (see section 2)		18.2%	8.9%	-9.3%
LBO					10.7%	
Venture Capital					6.9%	
<b>Total</b>	<b>100.0%</b>					
Net Actual Return (reported by you)						4.9%
Calculated Policy Return = sum of (policy weights X benchmark returns)					6.0%	
Adjustment to reflect rebalancing and overlay impacts					<u>0.2%</u>	
Policy Return (adjusted for CEM default private equity benchmark)						<u>6.2%</u>
Net Value Added (Net Return - Policy Return)						-1.3%

# Your policy return and value added calculations - 2010 to 2013

## 2013 Policy Return and Value Added

Asset class	Policy weight	Benchmark		Net return	Value added
		Description	Return		
U.S. Stock	5.6%	Russell 3000	33.6%	35.6%	2.0%
U.S. Stock - Large Cap	6.7%	S&P 500 Total Re	32.4%	32.8%	0.4%
U.S. Stock - Mid Cap	6.7%	Russell 2000	38.8%	34.4%	-4.4%
U.S. Stock - Small Cap	6.7%	Russell 2000	38.8%	34.4%	-4.4%
Stock - Emerging	4.0%	MSCI Emerging M	-2.3%	-3.1%	-0.8%
Stock - ACWIxU.S.	20.0%	MSCI ACWI xUS	15.8%	17.7%	1.9%
Fixed Income - U.S.	13.0%	Barclays US Aggr	-2.0%	-2.7%	-0.7%
Fixed Income - Emerging	0.5%	JP Morgan EMBI	-5.3%	-9.4%	-4.1%
Fixed Income - Global	1.5%	Barclays Multiver	-2.2%	-2.4%	-0.2%
Fixed Income - Inflation Indexed	5.0%	Barclays US TIPS	-8.6%	-8.2%	0.4%
Fixed Income - High Yield	10.0%	Barclays US Corp	7.4%	7.2%	-0.3%
Cash	2.0%	3 Month T bill	0.1%	0.5%	0.5%
Real Estate ex-REITs	5.0%	Custom (NCREIF I	12.0%	8.3%	-3.7%
Other Real Assets	5.0%	Custom (actual)	2.3%	2.1%	-0.2%
Hedge Funds	10.0%	HFR FOF Diversifi	8.5%	11.4%	2.8%
Diversified Private Equity	3.3%	Russell 3000 + 40	29.2%	18.4%	-10.8%
LBO	3.4%	Russell 3000 + 40	29.2%	18.1%	-11.1%
Venture Capital	3.3%	Russell 3000 + 40	29.2%	13.2%	-16.0%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					12.6%
Calculated policy return (sum: Policy weights x benchmarks)				16.4%	
Adjustment to reflect rebalancing and overlay impacts				-2.8%	
Policy Return					13.6%
Net Value Added (Net Return - Policy Return)					-1.0%

## 2011 Policy Return and Value Added

Asset class	Policy weight	Benchmark		Net return	Value added
		Description	Return		
U.S. Stock	6.6%	Russell 3000	1.0%	2.9%	1.9%
U.S. Stock - Large Cap	6.7%	Russell 3000	1.0%	0.1%	-0.9%
U.S. Stock - Mid Cap	6.7%	Russell 3000	1.0%	0.4%	-0.6%
U.S. Stock - Small Cap	6.7%	Russell 3000	1.0%	0.4%	-0.6%
Stock - Emerging	4.0%	MSCI Emerging m	-18.2%	-15.2%	3.0%
Stock - ACWIxU.S.	20.0%	MSCI ACWI xUS g	-13.3%	-12.1%	1.1%
Fixed Income - U.S.	19.9%	Barclays US Aggr	8.1%	1.3%	-6.8%
Fixed Income - Emerging	0.0%	Barclays Univers	8.1%	-0.3%	-8.4%
Fixed Income - Inflation Indexed	10.0%	CPI + 300 bps	5.7%	5.7%	-0.1%
Fixed Income - High Yield	0.0%	Barclays Univers	8.1%	0.6%	-7.5%
Cash	1.0%	3 Month T bill	0.1%	0.3%	0.2%
Real Estate ex-REITs	5.0%	NCREIF ODCE	15.3%	8.2%	-7.0%
Other Real Assets		Custom (Actual)	0.0%	0.0%	0.0%
Hedge Funds	10.0%	HFR FOF Diversifi	-2.5%	-3.2%	-0.7%
Diversified Private Equity	5.9%	Russell 3000 + 40	7.8%	8.2%	0.4%
LBO	2.2%	Russell 3000 + 40	7.8%	18.0%	10.3%
Venture Capital	1.9%	Russell 3000 + 40	7.8%	26.3%	18.6%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					-1.0%
Calculated policy return (sum: Policy weights x benchmarks)				0.4%	
Adjustment to reflect rebalancing and overlay impacts				0.1%	
Policy Return					0.5%
Net Value Added (Net Return - Policy Return)					-1.5%

## 2012 Policy Return and Value Added

Asset class	Policy weight	Benchmark		Net return	Value added
		Description	Return		
U.S. Stock	3.3%	Russell 3000	16.4%	16.1%	-0.3%
U.S. Stock - Large Cap	6.7%	Russell 3000	16.4%	16.8%	0.4%
U.S. Stock - Mid Cap	10.0%	Russell 3000	16.4%	16.3%	-0.1%
U.S. Stock - Small Cap	10.0%	Russell 3000	16.4%	16.3%	-0.1%
Stock - Emerging	4.0%	MSCI Emerging M	18.6%	23.3%	4.7%
Stock - ACWIxU.S.	20.0%	MSCI ACWI xUS n	16.8%	15.7%	-1.1%
Fixed Income - U.S.	10.0%	Barclays US Aggr	4.2%	5.7%	1.4%
Fixed Income - Emerging	5.0%	JP Morgan EMBI	17.4%	17.0%	-0.4%
Fixed Income - Global					-0.6%
Fixed Income - Inflation Indexed	10.0%	Barclays US TIPS	7.0%	9.1%	2.1%
Fixed Income - High Yield	5.0%	Barclays US Corp	15.8%	15.6%	-0.2%
Cash	1.0%	3 Month T bill	0.1%	0.4%	0.3%
Real Estate ex-REITs	5.0%	Custom (NCREIF I	10.9%	7.7%	-3.2%
Other Real Assets		Custom (actual)	0.0%	0.0%	0.0%
Hedge Funds	10.0%	HFR FOF Diversifi	3.1%	6.6%	3.5%
Diversified Private Equity	3.3%	Russell 3000 + 40	18.8%	21.2%	2.4%
LBO	3.3%	Russell 3000 + 40	18.8%	20.8%	2.0%
Venture Capital	3.3%	Russell 3000 + 40	18.8%	-3.6%	-22.4%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					12.5%
Calculated policy return (sum: Policy weights x benchmarks)				14.5%	
Adjustment to reflect rebalancing and overlay impacts				-0.3%	
Policy Return					14.2%
Net Value Added (Net Return - Policy Return)					-1.8%

## 2010 Policy Return and Value Added

Asset class	Policy weight	Benchmark		Net return	Value added
		Description	Return		
U.S. Stock	20.0%	S&P 1500	16.4%	16.0%	-0.4%
U.S. Stock - Large Cap	6.0%	S&P 500	15.1%	11.1%	-4.0%
U.S. Stock - Mid Cap	4.0%	Russell 2000	26.9%	29.1%	2.2%
U.S. Stock - Small Cap	4.0%	Russell 2000	26.9%	29.1%	2.2%
Stock - Emerging	2.0%	MSCI Emerging M	19.2%	23.0%	3.8%
Stock - ACWIxU.S.	18.0%	Custom (MSCI W	12.4%	10.2%	-2.2%
Fixed Income - U.S.	25.0%	Barclays US Aggr	6.5%	6.8%	0.3%
Fixed Income - Emerging		JP Morgan Emerg	12.3%	11.7%	-0.6%
Fixed Income - Inflation Indexed	10.0%	Barclays US TIPS	6.3%	6.4%	0.1%
Fixed Income - High Yield		Barclays US Corp	15.1%	14.7%	-0.4%
Cash	3.0%	Citigroup 3 montl	0.0%	0.5%	0.5%
Real Estate ex-REITs		NCREIF Property I	13.1%	8.6%	-4.6%
Other Real Assets		Custom (actual)	0.0%	0.0%	0.0%
Hedge Funds		Labor +500 bps	5.3%	-2.5%	-7.8%
Diversified Private Equity	12.0%	Custom (Alternat	12.2%	16.3%	4.0%
LBO		Custom (Alternat	12.2%	18.2%	6.0%
Venture Capital		Custom (Alternat	12.2%	13.4%	1.2%
<b>Total</b>	<b>100.0%</b>				
Net Return (reported by you)					12.8%
Calculated policy return (sum: Policy weights x benchmarks)				12.7%	
Adjustment to reflect rebalancing and overlay impacts				-0.5%	
Policy Return					12.1%
Net Value Added (Net Return - Policy Return)					0.7%

## Profit/Loss on overlay programs

Overlay type	Your fund		Peer median				U.S. Public median			
	2014	2013	2014		2013		2014		2013	
	bps	bps	bps	#	bps	#	bps	#	bps	#
Int. Discretionary Currency							3	2	0	2
Ext. Discretionary Currency					-1	1	2	2	0	2
Internal Global TAA							0	1		
External Global TAA										
Internal PolicyTilt TAA										
External PolicyTilt TAA										
Internal Commodities										
External Commodities			-1	1	-54	1	0	2	-54	1
Internal Long/Short										
External Long/Short										
Internal Other							0	1	0	1
External Other					0	1	5	2	0	5
Total Profit/Loss			-1	1	-1	3	1	7	0	9

Profit/loss in basis points was calculated using total fund average holdings. This was done to measure the impact of the program at the total fund level.

# 5

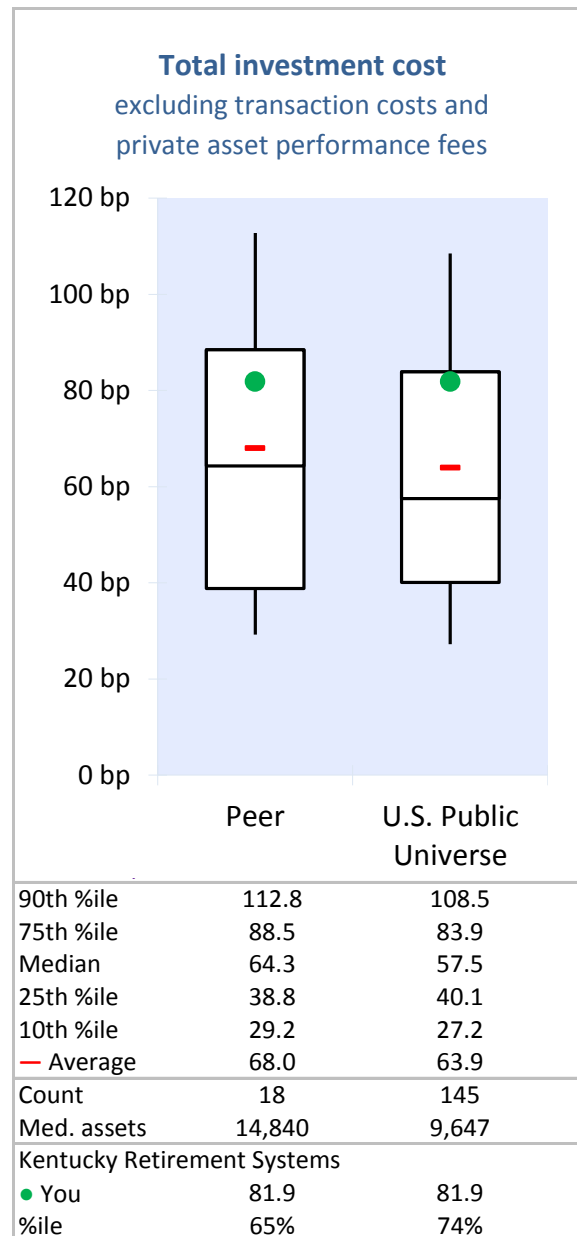
## Total cost and benchmark cost

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## Comparisons of total investment cost

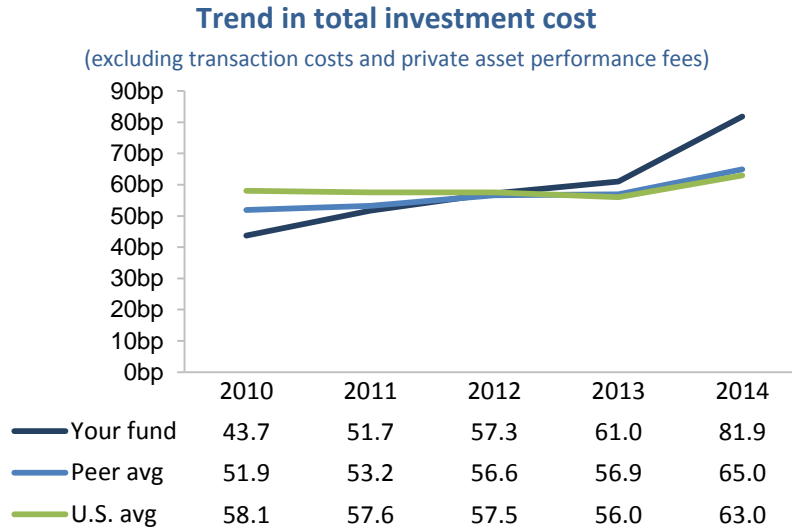
Your total investment cost, excluding transaction costs and private asset performance fees, of 81.9 bps was above the peer median of 64.3 bps.

Differences in total investment cost are often caused by two factors that are usually outside of management's control: asset mix and fund size. Therefore, to assess whether your fund's total investment cost is high or low given your unique asset mix and size, CEM calculates a benchmark cost for your fund. Benchmark cost analysis begins on page 7 of this section.



## Trend in total investment cost

Your total investment cost, excluding transaction costs and private asset performance fees, increased from 43.7 bps in 2010 to 81.9 bps in 2014.



*Trend analysis is based on the 118 U.S. funds and the 16 peer funds with 5 or more consecutive years of data.*



## Types of costs included in your total investment cost

The table below outlines the types of costs included in your total investment cost.

Asset class	Internal		External			
	In-house total cost	Transaction costs	Manager base fees	Monitoring & other costs	Perform. fees (active only)	Transaction costs
<u>Public</u> (Stock, Fixed income, commodities, REITs)	✓	✗	✓	✓	✓	✗
Derivatives/Overlays	✓	✗	✓	✓	✓	✗
<u>Hedge funds &amp; Global TAA</u>						
<i>Hedge Funds</i>	--	--	✓	✓	✓	✗
<i>Global TAA</i>	✓	✗	✓	✓	✓	✗
<u>Private real assets</u> (Infrastructure, natural resources, real estate ex-REITs, other real assets)	✓	✗	✓	✓	✗	✗
<u>Private equity</u> (Diversified private equity, venture capital, LBO, other private equity)	✓	✗	✓*	✓	✗	✗

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

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

## Detailed breakdown of your total investment cost

Your 2014 total investment cost, excluding transaction costs and private asset performance fees, was 81.9 bp or \$126.6 million.

### Your investment costs

	Internal		External Passive		External Active			Total		
	Passive	Active	Fees	Monitoring & Other	Base Fees	Perform. Fees <sup>1</sup>	Monitoring & Other	\$000s	bps	% of Total
<b>Asset management</b>										
U.S. Stock - Broad/All					2,035			2,035		2%
U.S. Stock - Large Cap	90				276			366		0%
U.S. Stock - Mid Cap					1,488			1,488		1%
U.S. Stock - Small Cap			458					458		0%
Stock - Emerging			207		2,582			2,789		2%
Stock - ACWIxU.S.			854		5,852			6,707		5%
Fixed Income - U.S.					3,022			3,022		2%
Fixed Income - Emerging					626			626		0%
Fixed Income - Global					1,776			1,776		1%
Fixed Income - Inflation Indexed	60				184			244		0%
Fixed Income - High Yield					3,720	1,160		4,880		4%
Real Estate ex-REITs - LPs					7,336	1,997 <sup>1</sup>		9,333		7%
Other Real Assets					3,210	3,702 <sup>1</sup>		6,912		5%
Hedge Funds					886	940		1,827		1%
Hedge Funds - Fund of Funds					8,993	10,379		19,372		15%
Underlying Fund of Fund Fees <sup>2</sup>					21,699	15,642		37,340		29%
Diversified Private Equity <sup>2</sup>					3,137	-294 <sup>1</sup>	320	3,163		2%
LBO					13,841	18,105 <sup>1</sup>	5,028	36,974		29%
Venture Capital					5,368	12,604 <sup>1</sup>	340	18,312		14%
Total asset management costs excluding private asset performance fees								121,510	78.6bp	96%
<b>Oversight, custodial &amp; other asset related costs</b>										
Oversight of the Fund								786		1%
Trustee & Custodial								2,038		2%
Consulting and Performance Measurement								1,490		1%
Audit								76		0%
Other								720		1%
Total oversight, custodial & other costs								5,110	3.3bp	4%
Total investment costs excluding transaction costs and private asset performance fees								126,620	81.9bp	100%

<sup>1</sup> For cost benchmarking purposes, all transaction costs and performance fees on real estate, infrastructure, natural resources and private equity have been excluded.

<sup>2</sup> Default costs added. Refer to Appendix A.

## Changes in your investment costs

The table below shows how your investment costs have changed from year to year by asset class.

### Change in your investment costs (2014 - 2010)

	Investment costs (\$'000s)					Change (\$'000s)				Change (%)			
	2014	2013	2012	2011	2010	2014	2013	2012	2011	2014	2013	2012	2011
<b>Asset management</b>													
U.S. Stock - Broad/All	2,035	2,076	1,991	914	204	-41	85	1,077	710	-2%	4%	118%	349%
U.S. Stock - Large Cap	366	383	263	803	849	-16	120	-540	-46	-4%	46%	-67%	-5%
U.S. Stock - Mid Cap	1,488	0	0	0	0	1,488							
U.S. Stock - Small Cap	458	3,554	533	2,137	1,327	-3,096	3,021	-1,604	810	-87%	567%	-75%	61%
Stock - Emerging	2,789	2,710	3,747	3,654	3,092	79	-1,038	94	561	3%	-28%	3%	18%
Stock - ACWixU.S.	6,707	5,849	6,010	6,914	6,770	858	-161	-905	145	15%	-3%	-13%	2%
Fixed Income - U.S.	3,022	2,896	2,922	3,727	3,627	126	-26	-805	100	4%	-1%	-22%	3%
Fixed Income - Emerging	626	805	629	592	150	-179	176	37	442	-22%	28%	6%	295%
Fixed Income - Global	1,776	2,036	1,874	0	0	-261	162	1,874		-13%	9%		
Fixed Income - Inflation Indexed	244	302	317	386	318	-59	-15	-69	68	-19%	-5%	-18%	21%
Fixed Income - High Yield	4,880	3,188	3,575	1,369	904	1,692	-387	2,206	465	53%	-11%	161%	51%
Real Estate ex-REITs - LPs	7,336	3,498	1,986	1,007	486	3,839	1,512	979	521	110%	76%	97%	107%
Other Real Assets	3,210	4,438	0	0	0	-1,228	4,438			-28%			
Hedge Funds	1,827	0	0	1,484	739	1,827		-1,484	745			-100%	101%
Hedge Funds - Fund of Funds	19,372	10,177	8,753	6,207	0	9,195	1,424	2,546	6,207	90%	16%	41%	
Underlying Fund of Fund Fees <sup>2</sup>	37,340	21,223	18,938	8,746	0	16,118	2,285	10,192	8,746	76%	12%	117%	
Diversified Private Equity <sup>2</sup>	3,457	3,781	4,274	6,808	25,307	-324	-494	-2,534	-18,499	-9%	-12%	-37%	-73%
LBO	18,869	14,219	14,096	15,007	8,117	4,650	123	-911	6,890	33%	1%	-6%	85%
Venture Capital	5,708	6,259	6,325	5,926	2,748	-551	-66	399	3,178	-9%	-1%	7%	116%
Total excl. private asset perf. fees	121,510	87,392	76,233	69,736	58,692	34,118	11,159	6,497	11,044	39%	15%	9%	19%
<b>Oversight, custodial &amp; other asset related costs</b>													
Oversight of the Fund	786	590	580	528	461	196	10	52	67	33%	2%	10%	15%
Trustee & Custodial	2,038	516	250	250	250	1,522	266			295%	106%	0%	0%
Consulting and Performance Mea:	1,490	997	997	945	945	493		52		49%	0%	6%	0%
Audit	76	0	0	0	58	76			-58				-100%
Other	720	225	225	0	0	495		225		220%	0%		
Total oversight, custodial & other	5,110	2,330	2,054	1,724	1,715	2,780	276	329	9	119%	13%	19%	1%
Total investment costs <sup>1</sup>	126,620	89,781	78,342	71,511	60,449	36,839	11,439	6,831	11,061	41%	15%	10%	18%
Total in basis points	81.9bp	61.0bp	57.3bp	51.7bp	43.7bp								

<sup>1</sup> For cost benchmarking purposes, all transaction costs and performance fees on real estate, infrastructure, natural resources and private equity have been excluded.

<sup>2</sup> Default costs added. Refer to Appendix A.

## Total cost versus benchmark cost

Your fund's total investment cost, excluding transaction costs and private asset performance fees, was 7.1 bps above your benchmark cost of 74.8 bps. This implies that your fund was high cost by 7.1 bps compared to the peer median, after adjusting for your fund's asset mix.

### Your cost versus benchmark

	\$000s	bps
Your fund's total cost	126,620	81.9 bp
- Your fund's benchmark	115,668	74.8 bp
= Your fund's excess cost	10,952	7.1 bp

Your benchmark cost is an estimate of your total costs assuming that you paid the peer median cost for each of your investment mandates and fund oversight. The calculation of your benchmark cost is shown on the following page.

The reasons why your fund's total cost was above your benchmark are summarized in the table below. Details of each of the impacts below are provided on pages 9 to 12.

### Reasons why your fund was high cost

	Cost/-Savings impact	
	\$000s	bps
<u>Differences in implementation style:</u>		
External active vs. low cost styles	-1,356	-0.9 bp
Fund of funds vs. external direct	10,052	6.5 bp
Mix of internal and passive styles	-150	-0.1 bp
Style impact of overlays	-640	-0.4 bp
Total style impact	7,907	5.1 bp
<u>Paying more/-less for similar services:</u>		
External investment management	1,361	0.9 bp
Internal investment management	38	0.0 bp
Oversight, custodial and other	1,646	1.1 bp
Total impact of paying more /-less	3,045	2.0 bp
Total excess cost	10,952	7.1 bp

## Benchmark cost calculation

Your 2014 benchmark cost was 74.8 basis points or \$115.7 million. It equals your holdings for each asset class multiplied by the peer median cost for the asset class. The peer median cost is the style weighted average for all implementation styles (i.e., internal passive, internal active, external passive, external active).

### Calculation of your 2014 benchmark cost

Asset class	Your average assets (A)	Weighted peer median cost <sup>1</sup> (B)	Benchmark \$000s (A X B)
<b>Asset management costs</b>			
U.S. Stock - Broad/All	374	12.8 bp	479
U.S. Stock - Large Cap	2,216	10.4 bp	2,306
U.S. Stock - Mid Cap	495	35.0 bp	1,730
U.S. Stock - Small Cap	335	45.9 bp	1,537
Stock - EAFE			
Stock - Emerging	495	54.2 bp	2,684
Stock - ACWIxU.S.	3,017	24.2 bp	7,302
Fixed Income - U.S.	1,367	12.2 bp	1,672
Fixed Income - Emerging	147	48.5 bp	716
Fixed Income - Global	574	26.3 bp	1,514
Fixed Income - Inflation Indexed	762	9.3 bp	709
Fixed Income - High Yield	724	52.2 bp	3,782
Cash	520	0.0 bp	0
Real Estate ex-REITs	636	105.5 bp	6,709
Other Real Assets	713	48.8 bp	3,480
Hedge Funds (External)	1,617	274.2 bp	44,320
Diversified Private Equity	190	185.3 bp	3,524
LBO	1,146	184.2 bp	21,112
Venture Capital	347	230.6 bp	7,989
Overlay Programs <sup>2</sup>	15,468	0.4 bp	640
Benchmark for asset management	15,468	72.5 bp	112,204
<b>Oversight, custody and other costs</b>			
Oversight of the Fund	15,468	1.1 bp	1,727
Trustee & Custodial	15,468	0.4 bp	602
Consulting	15,468	0.6 bp	880
Audit	15,468	0.1 bp	94
Other	15,468	0.1 bp	161
Benchmark for oversight, custody & other		2.2 bp	3,464
<b>Total benchmark cost</b>		<b>74.8 bp</b>	<b>115,668</b>

1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

## Cost impact of differences in implementation style

Differences in implementation style (i.e., external active management versus lower cost indexed and internal management, fund of funds versus lower cost direct LPs, and overlay usage) relative to your peers cost you 5.1 bps.

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

	Your avg holdings (mils)	% External active			Premium vs. internal and passive <sup>1 2</sup>	Cost/ -Savings <sup>3</sup>
	(A)	You	Peer average	More/ -Less	(C)	\$000s bps
	(A)	(B)			(C)	(A X B X C)
U.S. Stock - Broad/All	374	100%	27%	73%	38 bp	1,050
U.S. Stock - Large Cap	2,216	10%	36%	-26%	27 bp	-1,519
U.S. Stock - Mid Cap	495	69%	73%	-4%	47 bp	-99
U.S. Stock - Small Cap	335	0%	73%	-73%	57 bp	-1,390
Stock - Emerging	495	67%	85%	-19%	49 bp	-450
Stock - ACWIxU.S.	3,017	60%	61%	0%	30 bp	-43
Fixed Income - U.S.	1,367	100%	67%	33%	15 bp	676
Fixed Income - Emerging	147	100%	97%	3%	Insufficient	0
Fixed Income - Global	574	100%	100%	0%		0
Fixed Income - Inflation Indexed	762	36%	57%	-21%	13 bp	-208
Fixed Income - High Yield	724	100%	94%	6%	Insufficient	0
Real Estate ex-REITs	636	100%	98%	2%	Insufficient	0
of which Partnerships represent:		100%	71%	29%	34 bp	627
Other Real Assets	713	100%	100%	0%		0
Hedge Funds	1,617	100%	100%	0%		0
Diversified Private Equity	190	100%	100%	0%		0
LBO	1,146	100%	100%	0%		0
Venture Capital	347	100%	99%	1%	Insufficient	0
Total impact of differences in external active management usage						-1,356 -0.9 bp
		<i>Fund of fund % of external LPs</i>			<i>Premium vs. direct LPs<sup>1 2</sup></i>	
Hedge Funds LPs	1,617	95%	28%	67%	123 bp	13,344
Diversified Private Equity LPs	190	0%	27%	-27%	73 bp	-371
LBO LPs	1,146	0%	27%	-27%	73 bp	-2,243
Venture Capital LPs	347	0%	27%	-27%	73 bp	-678
Total impact of differences in fund of fund usage						10,052 6.5 bp
		<i>Overlay usage</i>				
Impact of lower use of portfolio level overlays (see page 10)						-640 -0.4 bp
		<i>Mix of low cost styles</i>				
Impact of mix of internal indexed, internal active, external indexed (see page 11)						-150 -0.1 bp
Total						7,907 5.1 bp

1. The external active cost 'premium vs internal and passive' is the additional cost of external active management and fund of funds relative to the average of the other lower cost implementation styles: internal passive, internal active and external passive. These calculations are specific to your peer group. The fund-of-funds 'premium vs. direct LPs' is the peer-median cost of fund-of-funds minus the peer median cost for direct external active management.

2. 'Insufficient' indicates there is insufficient peer data to determine the cost premium.

## Cost impact of overlays

As summarized on the previous page, the style impact of overlays saved you 0.4 bps. If you use more overlays than your peers, or more expensive types of overlays, then it increases your relative cost.

### Calculation of the cost impact of differences in the use of portfolio level overlays

	Your avg total holdings (mils)	Overlay notional amounts as a % of avg total holdings			Median cost as a % of notional	Your cost as a % of total holdings <sup>1</sup>	Average cost as a % of total holdings	Cost/-Savings Impact (000s)
		You	Peer Average	More/-Less				
	(A)	(B)			(C)			(A X B X C)
<b>External Overlays</b>								
Currency - Hedge	15,468	0.0%	0.1%	-0.1%	2.4 bp			-4
Currency - Discretionary	15,468	0.0%	0.3%	-0.3%	15.9 bp			-86
Passive Beta - Hedge	15,468	0.0%	5.2%	-5.2%	5.9 bp			-480
Duration - Hedge	15,468	0.0%	0.0%	0.0%	5.8 bp			0
Dur. Mgmt Swaption - Hedge	15,468	0.0%	0.0%	0.0%	3.4 bp			0
Global TAA - Discretionary	15,468	0.0%	0.0%	0.0%	N/A			0
Policy Tilt TAA - Discretionary	15,468	0.0%	0.0%	0.0%	21.7 bp			0
Commodity Futures - Discretionary	15,468	0.0%	0.7%	-0.7%	4.7 bp			-50
Long/Short - Discretionary	15,468	0.0%	0.1%	-0.1%	9.3 bp			-15
Other - Discretionary	15,468	0.0%	0.1%	-0.1%	7.0 bp			-6
Total impact in 000s								-640
Total impact in basis points								-0.4 bp

1. For overlay programs (primarily certain internal, profit seeking programs) where no clear notional value is defined or provided, these types of overlays are compared in terms of cost relative to total holdings.

## Cost impact of lower cost styles

As summarized on page 9, your mix of 'lower-cost' internal and passive styles saved you 0.1 bps. Details are shown below.

### Cost impact of differences in your mix of 'lower-cost' implementation styles

	Your non-external active holdings (mils)	Percent holdings (of non-external-active)						Cost/-Savings <sup>1</sup> (000s)
		Internal passive		Internal active		External passive		
		You	Peers	You	Peers	You	Peers	
U.S. Stock - Large Cap	1,984	100%	34%	0%	7%	0%	59%	-73
U.S. Stock - Mid Cap	156	100%	58%	0%	26%	0%	16%	0
U.S. Stock - Small Cap	335	0%	21%	0%	61%	100%	18%	0
Stock - Emerging	165	0%	0%	0%	40%	100%	60%	0
Stock - ACWIxU.S.	1,206	0%	0%	0%	0%	100%	100%	0
Fixed Income - Inflation Indexed	488	100%	21%	0%	0%	0%	79%	-76
Cash	520	0%	Excluded	100%	Excluded	0%	Excluded	0
Hedge Funds	0							0
Total impact in 000s								-150
Total impact in basis points								-0.1 bp

1. Cost/-savings for each asset class equals non-external active holdings within each asset class X cumulative impact from the three lower cost styles. By formula: [ (peer median cost for the style - peer weighted average cost of lower cost styles) X (your weight for the style - peer weight for the style) ]. Peer median costs for each style are shown on page 18.



## Cost impact of paying more/-less for similar services

Differences in what you paid relative to your peers for similar asset management and related oversight and support services cost you 2.0 bps.

### Calculation of the cost impact of paying more/-less

	Style	Your avg holdings (mils) (A)	Cost in bps			Cost/ -Savings \$000s bps (A X B)
			Your	Peer median	More/ -less (B)	
<b>External asset management</b>						
U.S. Stock - Broad/All	active	374	54.4	40.9	13.5	506
U.S. Stock - Large Cap	active	232	11.9	27.4	-15.5	-360
U.S. Stock - Mid Cap	active	339	43.9	47.7	-3.8	-128
U.S. Stock - Small Cap	passive	335	13.7	4.4*	9.3	312
Stock - Emerging	passive	165	12.5	12.5*	0.0	0
Stock - Emerging	active	330	78.1	61.4	16.8	554
Stock - ACWIxU.S.	passive	1,206	7.1	5.8	1.3	152
Stock - ACWIxU.S.	active	1,811	32.3	36.2	-3.9	-704
Fixed Income - U.S.	active	1,367	22.1	17.2	4.9	674
Fixed Income - Emerging	active	147	42.4	48.5	-6.1	-90
Fixed Income - Global	active	574	30.9	26.3	4.6	262
Fixed Income - Inflation Indexed	active	274	6.7	14.8	-8.1	-222
Fixed Income - High Yield	active	724	67.4	52.2	15.2	1,098
Real Estate ex-REITs	LP	636	115.4	115.4	0.0	0
Other Real Assets	active	713	45.0	48.8	-3.8	-269
Hedge Funds	active	77	238.8	239.5	-0.7	-6
Hedge Funds - Fund of Funds	F. of F.	1,540	368.3	362.5	5.7	881
Diversified Private Equity	active	190	181.8	165.8	16.0	304
LBO	active	1,146	164.6	164.6	0.0	0
Venture Capital	active	347	164.7	211.0	-46.3	-1,603
Total for external management						1,361 0.9 bp
<b>Internal asset management</b>						
U.S. Stock - Large Cap	passive	1,984	0.5	0.4	0.1	13
U.S. Stock - Mid Cap	passive	156	0.0	1.0*	-1.0	-16
Fixed Income - Inflation Indexed	passive	488	1.2	0.4*	0.8	41
Total for internal asset management						38 0.0 bp
<b>Oversight, custodial, other</b>						
Oversight of the Fund		15,468	0.5	1.1	-0.6	-941
Consulting and Performance Measurement		15,468	1.0	0.6	0.4	610
Trustee & Custodial		15,468	1.3	0.4	0.9	1,436
Audit		15,468	0.0	0.1	0.0	-18
Other		15,468	0.5	0.1	0.4	559
Total for oversight, custodial, other						1,646 1.1 bp
Total						3,045 2.0 bp

\*Universe median used as peer data was insufficient.

## Summary of why you are high or low cost by asset class

The table below summarizes where you are high and low cost by asset class. It also quantifies how much is due to differences in implementation style (i.e., differences in the mix of external active, external passive, internal active, internal passive and fund of fund usage) and how much is due to paying more or less for similar services (i.e., same asset class and style).

### Summary of why you are high or low cost by asset class

	Benchmark = peer			Your average assets	More/ -less (\$000s)	Due to Impl. style (\$000s)	Due to paying more/less (\$000s)
	Your cost <sup>1</sup>	weighted median cost <sup>1</sup>	More/ -less				
	(A)	(B)	(C = A - B)	(D)	(C X D)		
<b>Asset management costs</b>							
U.S. Stock - Broad/All	54.4 bp	12.8 bp	41.6 bp	374	1,556	1,050	506
U.S. Stock - Large Cap	1.7 bp	10.4 bp	-8.8 bp	2,216	-1,939	-1,592	-347
U.S. Stock - Mid Cap	30.1 bp	35.0 bp	-4.9 bp	495	-243	-99	-144
U.S. Stock - Small Cap	13.7 bp	45.9 bp	-32.2 bp	335	-1,078	-1,390	312
Stock - Emerging	56.3 bp	54.2 bp	2.1 bp	495	105	-450	554
Stock - ACWIxU.S.	22.2 bp	24.2 bp	-2.0 bp	3,017	-595	-43	-552
Fixed Income - U.S.	22.1 bp	12.2 bp	9.9 bp	1,367	1,350	676	674
Fixed Income - Emerging	42.4 bp	48.5 bp	-6.1 bp	147	-90	0	-90
Fixed Income - Global	30.9 bp	26.3 bp	4.6 bp	574	262	0	262
Fixed Income - Inflation Indexed	3.2 bp	9.3 bp	-6.1 bp	762	-465	-284	-181
Fixed Income - High Yield	67.4 bp	52.2 bp	15.2 bp	724	1,098	0	1,098
Cash	0.0 bp	0.0 bp	0.0 bp	520	0	0	0
Real Estate ex-REITs	115.4 bp	105.5 bp	9.9 bp	636	627	627	0
Other Real Assets	45.0 bp	48.8 bp	-3.8 bp	713	-269	0	-269
Hedge Funds (External)	362.1 bp	274.2 bp	88.0 bp	1,617	14,219	13,344	876
Diversified Private Equity	181.8 bp	185.3 bp	-3.5 bp	190	-67	-371	304
LBO	164.6 bp	184.2 bp	-19.6 bp	1,146	-2,243	-2,243	0
Venture Capital	164.7 bp	230.6 bp	-65.8 bp	347	-2,281	-678	-1,603
Overlay Programs <sup>2</sup>	0.0 bp	0.4 bp	-0.4 bp	15,468	-640	-640	0
<b>Total asset management</b>	<b>78.6 bp</b>	<b>72.5 bp</b>	<b>6.0 bp</b>	<b>15,468</b>	<b>9,306</b>	<b>7,907</b>	<b>1,400</b>
<b>Oversight, custody and other costs</b>							
Oversight of the Fund	0.5 bp	1.1 bp	-0.6 bp	15,468	-941	n/a	-941
Trustee & Custodial	1.3 bp	0.4 bp	0.9 bp	15,468	1,436	n/a	1,436
Consulting	1.0 bp	0.6 bp	0.4 bp	15,468	610	n/a	610
Audit	0.0 bp	0.1 bp	0.0 bp	15,468	-18	n/a	-18
Other	0.5 bp	0.1 bp	0.4 bp	15,468	559	n/a	559
<b>Total oversight, custody &amp; other</b>	<b>3.3 bp</b>	<b>2.2 bp</b>	<b>1.1 bp</b>	<b>15,468</b>	<b>1,646</b>	<b>n/a</b>	<b>1,646</b>
<b>Total</b>	<b>81.9 bp</b>	<b>74.8 bp</b>	<b>7.1 bp</b>	<b>15,468</b>	<b>10,952</b>	<b>7,907</b>	<b>3,045</b>

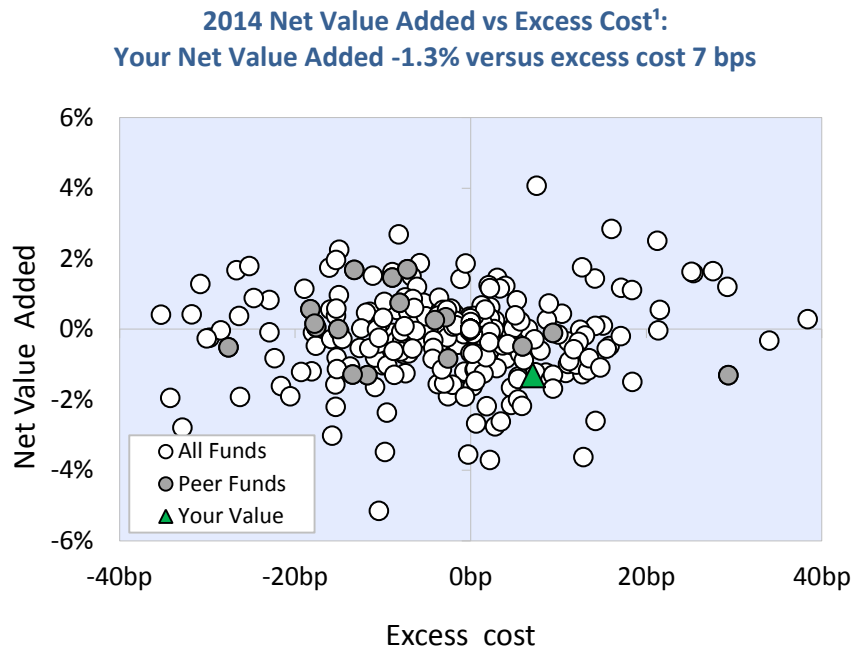
1. The weighted peer median cost for asset management is the style-weighted average of the peer median costs for all implementation styles (i.e., internal passive, internal active, external passive, external active, fund of fund). It excludes performance fees on private assets. The style weights by asset class for your fund and the peers are shown on page 17 of this section.

2. Total fund average holdings is used as the base when calculating the relative cost impact of the overlay programs.

## Your cost effectiveness ranking

Being high or low cost is neither good nor bad. The more important question is, are you receiving sufficient value for your excess cost? At the total fund level, we provide insight into this question by combining your value added and your excess cost to create a snapshot your cost effectiveness performance relative to that of the survey universe.

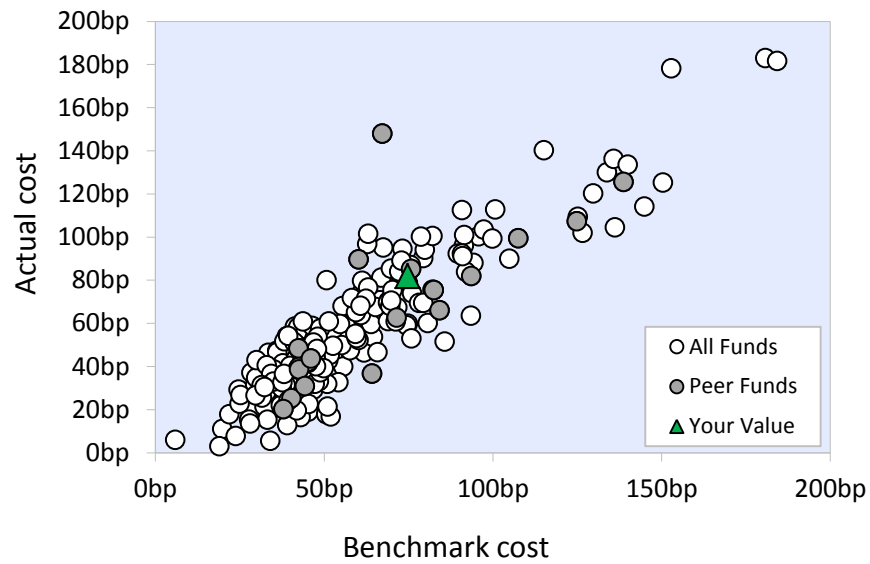
For the 2014 year, your fund ranked in the negative value added, high cost quadrant.



<sup>1</sup> Benchmark cost and excess cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

## Actual cost versus benchmark cost

**2014 Actual Cost vs Benchmark Cost<sup>1</sup>: Your actual cost was 81.9 bps and your benchmark cost was 74.8 bps**



<sup>1</sup> Benchmark cost calculations are based on regression analysis (see Appendix B in this section) for all funds except your fund. Your fund's benchmark cost is based on peer-median costs (per page 7 of this section).

## Appendix A: Benchmarking methodology formulas and data

### a) Formulas

Example calculations are for U.S. Stock - Broad/All unless otherwise indicated.

Asset class peer cost

$$\begin{aligned} &= \text{Weighted average by peer average style of peer median costs for asset class} \\ &= [(0.00 \times 0.0\text{bp}) + (0.00 \times 0.0\text{bp}) + (0.73 \times 2.5\text{bp}) + (0.27 \times 40.9\text{bp})] / (0.00 + 0.00 + 0.73 + 0.27) = 12.8\text{bp} \end{aligned}$$

Peer average low cost (by asset class)

$$\begin{aligned} &= \text{Weighted average by peer average style of peer median costs for internal passive, internal active and external passive management for asset class} \\ &= [(0.00 \times 0.0\text{bp}) + (0.00 \times 0.0\text{bp}) + (0.73 \times 2.5\text{bp})] / (0.00 + 0.00 + 0.73) = 2.5\text{bp} \end{aligned}$$

External active cost premium (by asset class)

$$\begin{aligned} &= \text{Peer median external active cost - peer average low cost} \\ &= 40.9\text{bp} - 2.5\text{bp} = 38.4\text{bp} \end{aligned}$$

Fund of funds premium (by asset class)

$$\begin{aligned} &= \text{Peer median fund-of-funds cost - peer median external active cost} \\ &= (\text{For private equity}) 239.2\text{bp} - 165.8\text{bp} = 73.4\text{bp} \end{aligned}$$

Impact from other differences in implementation style (by Asset Class)=

$$\begin{aligned} &= [ (\text{Your int. pass. \% - average peer int. pass. \%}) \times (\text{peer median int. pass. cost - peer average low cost}) \\ &\quad + (\text{your int. act. \% - peer average int. act. \%}) \times (\text{peer median int. act. cost - peer average low cost}) \\ &\quad + (\text{your ext. pass. \% - average peer ext. pass. \%}) \times (\text{median peer ext. pass. cost - peer average low cost}) ] \\ &\quad \times \text{your average holdings} \end{aligned}$$

### b) Insufficient peer data

All peer data is adjusted to ensure comparisons are made only when sufficient data is available. When too few peers have the asset class or style in question, peer costs are replaced with your fund's cost, neutralizing the effect of your cost. Major implementation styles (external active, fund of funds and combined "low cost") that you do not hold are ignored if they have insufficient data to draw major style impact conclusions. Throughout this section, 'peer median' and 'average peer style' always refer to these adjusted values. The following page shows the adjusted data used in this section.

## Appendix A: Benchmarking methodology formulas and data (page 2 of 2)

### c) 2014 cost data used to calculate weighted peer median costs and impact of mix differences.

Asset Class	Your costs (basis points)						Peer median costs (basis points)						
	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	Weighted Median
U.S. Stock - Broad/All									2.5	40.9			12.8
U.S. Stock - Large Cap	0.5						0.4	0.8	1.0	27.4			10.4
U.S. Stock - Mid Cap	0.0						1.0 bp <sup>1</sup>	1.0	1.0	47.7			35.0
U.S. Stock - Small Cap							4.4	4.4	4.4 bp <sup>1</sup>	61.2			45.9
Stock - Emerging								12.5	12.5 bp <sup>1</sup>	61.4			54.2
Stock - ACWixU.S.									5.8	36.2			24.2
Stock - Other													
Fixed Income - U.S.							2.2	2.4	1.7	17.2			12.2
Fixed Income - Emerging								48.5		48.5			48.5
Fixed Income - Global										26.3			26.3
Fixed Income - Inflation Indexed	1.2						0.4 bp <sup>1</sup>		2.4	14.8			9.3
Fixed Income - High Yield								52.2		52.2			52.2
Real Estate ex-REITs						115.4		105.5		81.8	115.4	115.4	105.5
Other Real Assets						45.0				48.8			48.8
Hedge Funds						238.8				239.5		362.5	274.2
Diversified Private Equity						181.8				165.8		239.2	185.3
LBO						164.6				164.6		238.0	184.2
Venture Capital						164.7		230.6		211.0		284.4	230.6

<sup>1</sup>Universe median used as peer data was insufficient.

### d) 2014 Style weights used to calculate the weighted peer median costs and impact of mix differences.

Style Weights	You (%)						Peer average (%)						
	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	Internal Passive	Internal Active	External Passive	External Active	Limited Partner.	Fund of Funds	
U.S. Stock - Broad/All	0.0%	0.0%	0.0%	100.0%			0.0%	0.0%	73.1%	26.9%			
U.S. Stock - Large Cap	89.5%	0.0%	0.0%	10.5%			21.6%	4.6%	37.6%	36.2%			
U.S. Stock - Mid Cap	31.4%	0.0%	0.0%	68.6%			15.7%	7.2%	4.3%	72.8%			
U.S. Stock - Small Cap	0.0%	0.0%	100.0%	0.0%			5.6%	16.4%	4.9%	73.1%			
Stock - Emerging	0.0%	0.0%	33.3%	66.7%			0.0%	5.8%	8.9%	85.3%			
Stock - ACWixU.S.	0.0%	0.0%	40.0%	60.0%			0.0%	0.0%	39.5%	60.5%			
Fixed Income - U.S.	0.0%	0.0%	0.0%	100.0%			0.4%	21.6%	11.0%	67.0%			
Fixed Income - Emerging	0.0%	0.0%	0.0%	100.0%			0.0%	2.9%	0.0%	97.1%			
Fixed Income - Global	0.0%	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%	100.0%			
Fixed Income - Inflation Indexed	64.1%	0.0%	0.0%	35.9%			9.1%	0.0%	33.8%	57.1%			
Fixed Income - High Yield	0.0%	0.0%	0.0%	100.0%			0.0%	6.1%	0.0%	93.9%			
Cash		100.0%		0.0%			Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	
Real Estate ex-REITs		0.0%		0.0%	100.0%	0.0%		1.5%		28.9%	68.8%	0.8%	
Other Real Assets		0.0%		100.0%				0.0%		100.0%			
Hedge Funds				4.7%		95.3%				71.8%		28.2%	
Diversified Private Equity		0.0%		100.0%		0.0%		0.0%		73.4%		26.6%	
LBO		0.0%		100.0%		0.0%		0.0%		73.3%		26.7%	
Venture Capital		0.0%		100.0%		0.0%		1.3%		72.4%		26.3%	

The above data was adjusted as noted when there were insufficient peers, or for other reasons where direct comparisons were inappropriate.

## Appendix B: Regression based benchmarks

### Regression Benchmark Cost Equations

	2014		2013		2012		2011		2010	
	Coeff.	"t"	Coeff.	"t"	Coeff.	"t"	Coeff.	"t"	Coeff.	"t"
Constant	80.1	18.8	76.8	18.2	73.2	18.9	72.5	18.8	65.1	14.4
Size in millions (Log 10)	-14.8	-14.0	-14.2	-13.3	-13.7	-13.8	-13.3	-13.8	-13.1	-11.6
<u>Percentage of assets in:</u>										
Stocks	15.7	3.7	19.6	4.5	19.0	4.6	14.8	3.6	n/a	
Domestic stocks	n/a		n/a		n/a		n/a		27.0	4.7
Foreign stocks	n/a		n/a		n/a		n/a		25.8	3.1
Real estate	62.8	4.2	56.9	3.8	55.1	4.2	50.8	3.9	46.5	3.1
Private equity & hedge funds	203.7	27.6	203.3	26.9	208.1	30.5	210.4	31.5	225.8	29.0
Country variable (1 if Cdn)	-6.4	-3.8	-8.1	-4.7	-6.4	-4.1	-4.9	-3.3	-5.2	-2.6
	All		All		All		All		All	
Standard error	14.1		14.6		13.1		13.2		15.5	
R-squared	68%		65%		71%		70%		67%	
F statistic	190.2		175.1		219.0		231.8		154.1	
Sample size	466		466		454		487		457	

In order to compare your fund's cost effectiveness to the survey universe, a benchmark cost for all participants is required.

The benchmark operating cost for all other funds is determined using regression analysis. The regression equation coefficients and "t statistics" are shown in the table above. An absolute "t" of greater than 2 indicates that the coefficient is statistically significant in predicting the dependent variable, in this case, the benchmark cost.

The benchmark equations have been remarkably robust. Although the coefficients change every year, primarily because of changes in the composition of the survey universe, they remain similar in relative magnitude and direction.

Most importantly, the R-squareds have been high. In 2014, the R-squared was 68% which means that fund size, asset mix and nationality explain more than 68% of the differences in costs between funds. This is good explanatory power.

Below is a description of the coefficients:

- Size = Log10 (fund size in millions)
- % Stocks = proportion in stocks (coefficient changed in 2011)
- % Domestic stocks = proportion in domestic stocks
- % Foreign stocks = proportion in foreign stocks.
- % Real estate = proportion directly invested in real estate and infrastructure.
- % Private equity = proportion in direct and fund-of-funds venture capital, other private equity and hedge funds.
- Country variable = 1 if your country of origin is Canada, otherwise 0.

# 6

## Cost comparisons

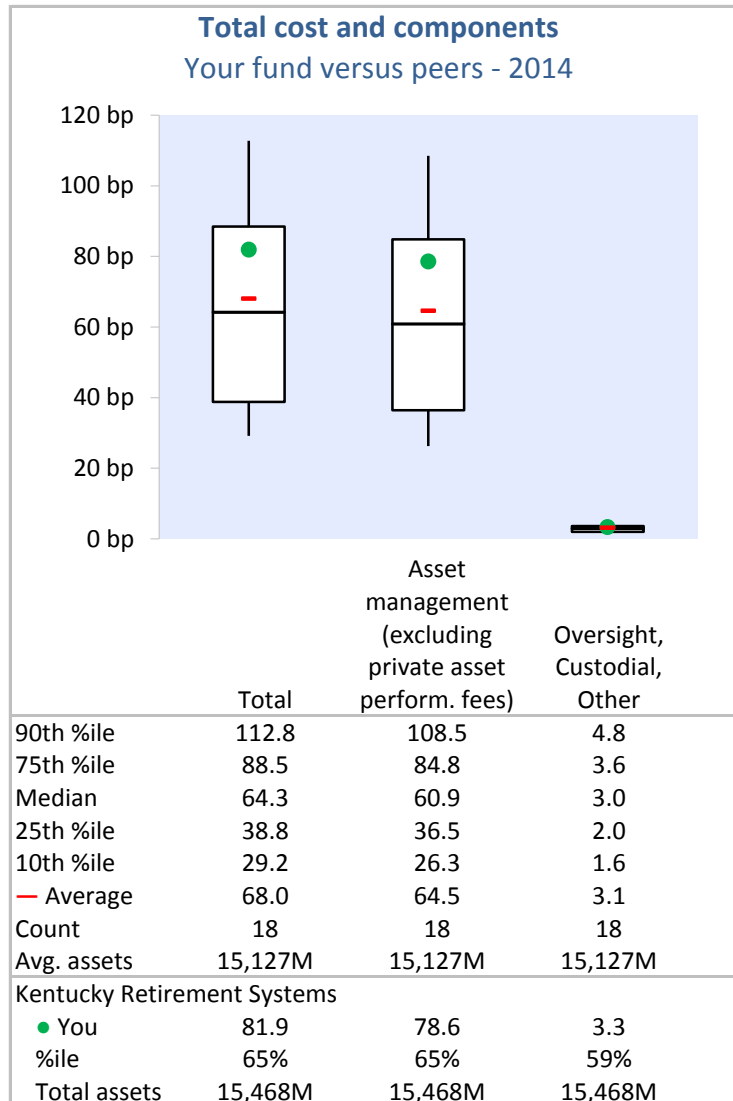
Total fund cost	2
Governance, operations & support	3
Public asset classes	
- Stock	4
- Fixed Income	13
- Commodities	25
- REITs	26
Real asset classes	
- Real estate ex-REITs	27
- Infrastructure	28
- Natural resources	29
- Other real assets	30
Private equity	
- Diversified private equity	31
- LBO	32
- Venture capital	33
- Other private equity	34
Global TAA	35
Hedge Funds	36
Overlays	37



## Total fund cost

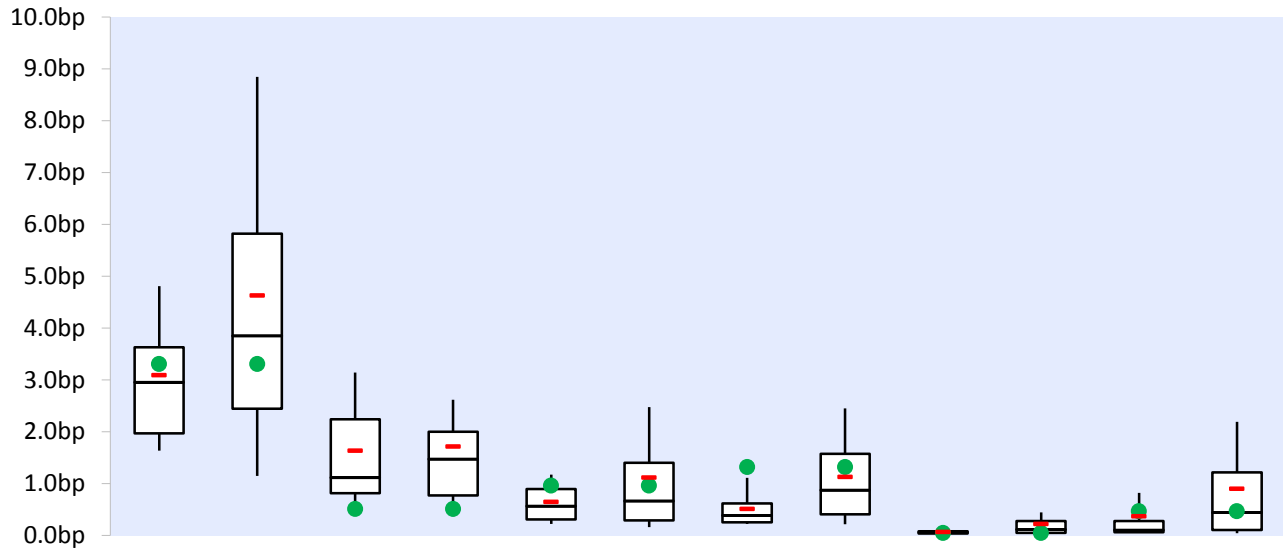
Total costs are benchmarked in the previous section. In this section, your fund's costs are compared on a line-item basis to your peers. This enables you to understand better why you may be a high or low cost fund and it also identifies and quantifies major cost differences that may warrant further investigation.

The 25th to 75th percentile range is the most relevant since higher and lower values may include outliers caused by unusual circumstances, such as performance-based fees. Count refers to the number of funds in your peer group that have costs in this category. It enables you to gauge the statistical significance.



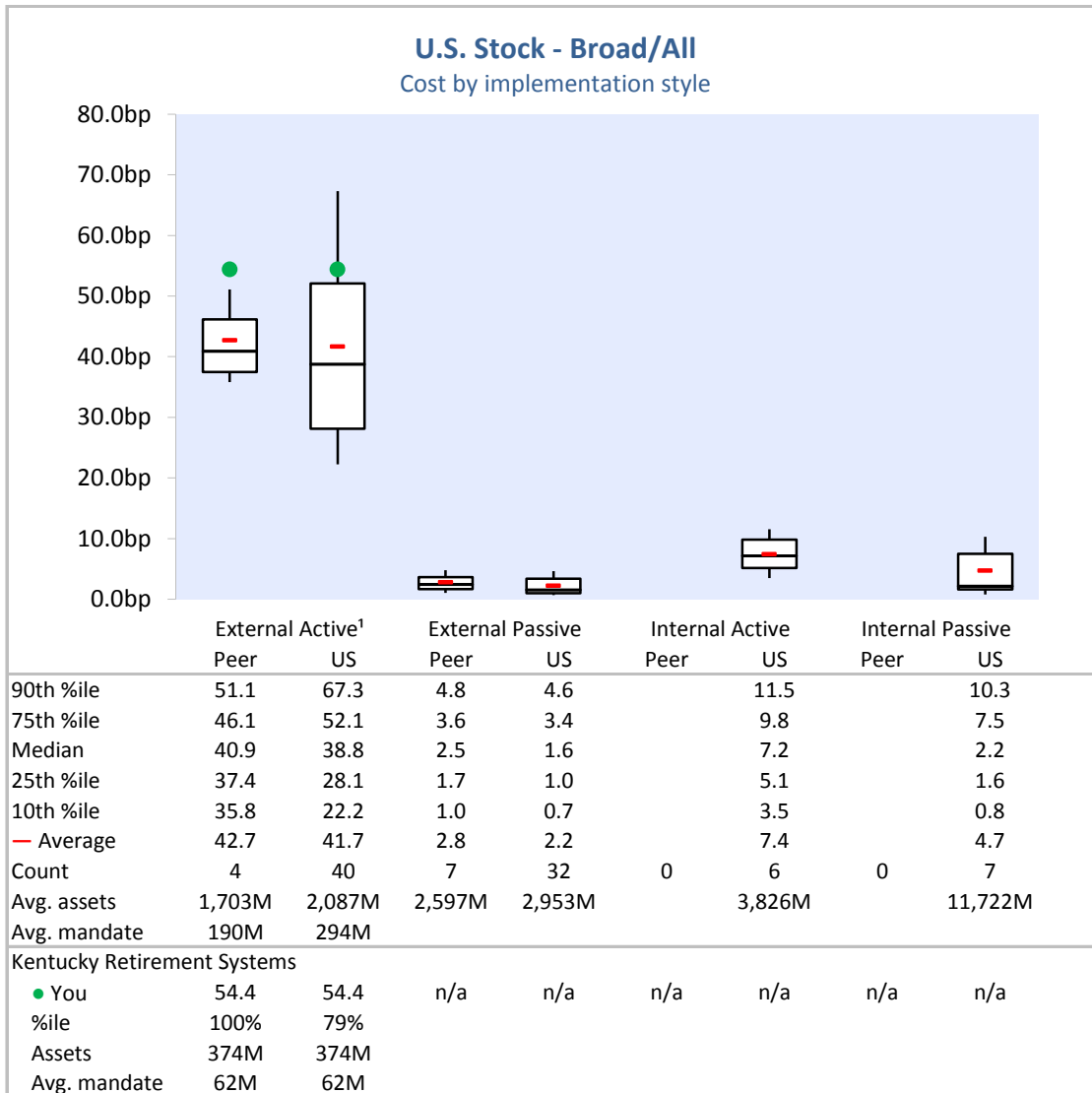
## Governance, operations & support

Cost as a % of total plan assets



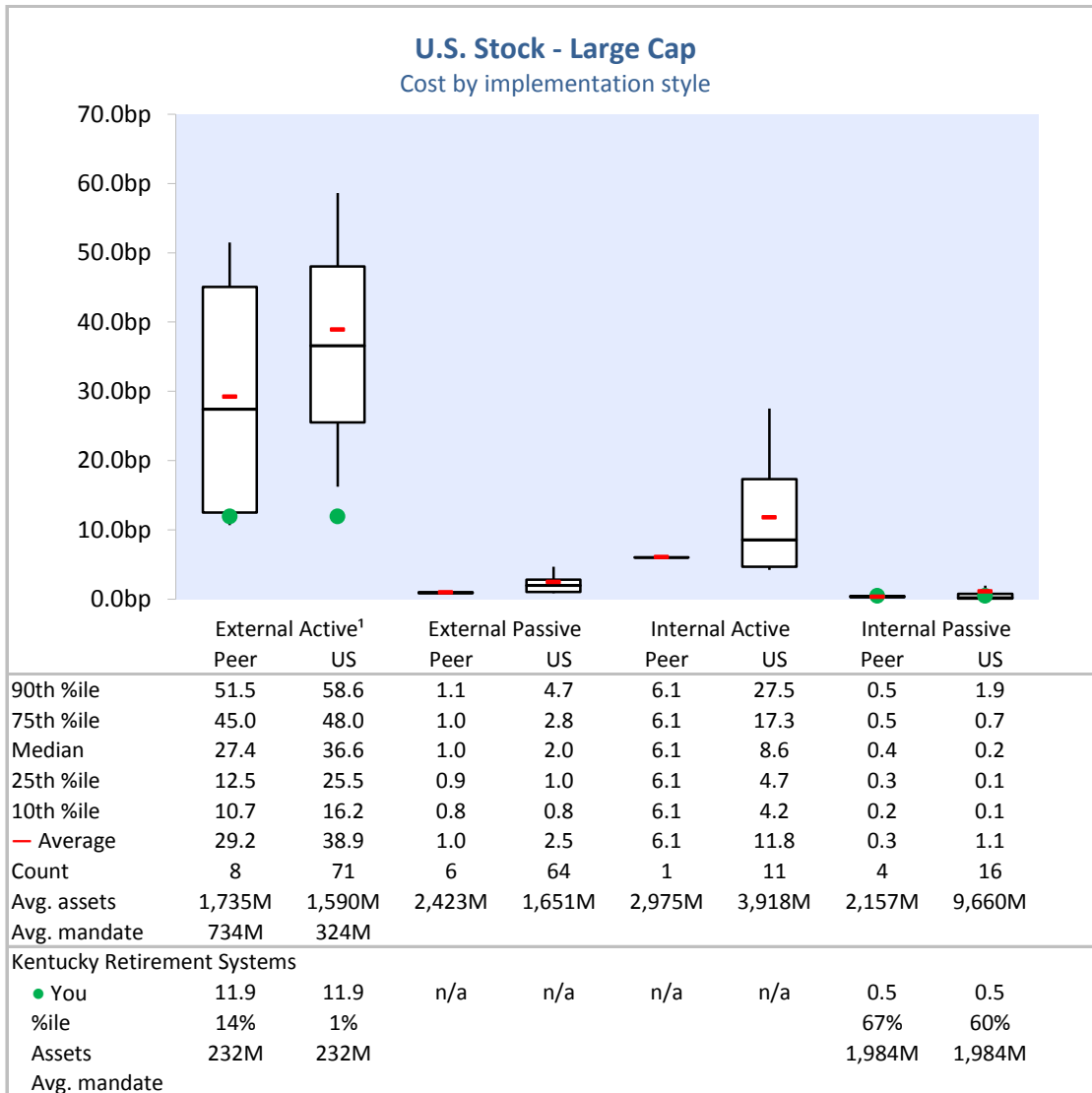
	<u>Total</u>		<u>Oversight<sup>1</sup></u>		<u>Consulting &amp; Perf. Meas.</u>		<u>Custody</u>		<u>Audit</u>		<u>Other</u>	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	4.8	8.8	3.1	2.6	1.2	2.5	1.1	2.5	0.1	0.4	0.8	2.2
75th %ile	3.6	5.8	2.2	2.0	0.9	1.4	0.6	1.6	0.1	0.3	0.3	1.2
Median	3.0	3.9	1.1	1.5	0.6	0.7	0.4	0.9	0.1	0.1	0.1	0.4
25th %ile	2.0	2.4	0.8	0.8	0.3	0.3	0.3	0.4	0.0	0.1	0.1	0.1
10th %ile	1.6	1.2	0.5	0.4	0.2	0.2	0.2	0.2	0.0	0.0	0.1	0.0
— Average	3.1	4.6	1.6	1.7	0.6	1.1	0.5	1.1	0.1	0.2	0.4	0.9
Count	18	145	18	145	18	129	18	141	15	128	12	102
Avg. assets	15,127M	22,604M	15,127M	22,604M	15,127M	22,604M	15,127M	22,604M	15,127M	22,604M	15,127M	22,604M
Kentucky Retirement Systems												
● You	3.3	3.3	0.5	0.5	1.0	1.0	1.3	1.3	0.0	0.0	0.5	0.5
%ile	59%	37%	6%	15%	82%	63%	100%	70%	36%	22%	82%	52%
Plan assets	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M	15,468M

1. Oversight costs include the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees/salaries of the Board or Investment Committee. All costs associated with the above including fees/salaries, travel, director's insurance and attributed overhead are included. Given fiduciary obligations, having the lowest oversight costs is not necessarily optimal. Some sponsors with lower-than-average executive and administration costs compensate by having-higher-than average consulting costs.



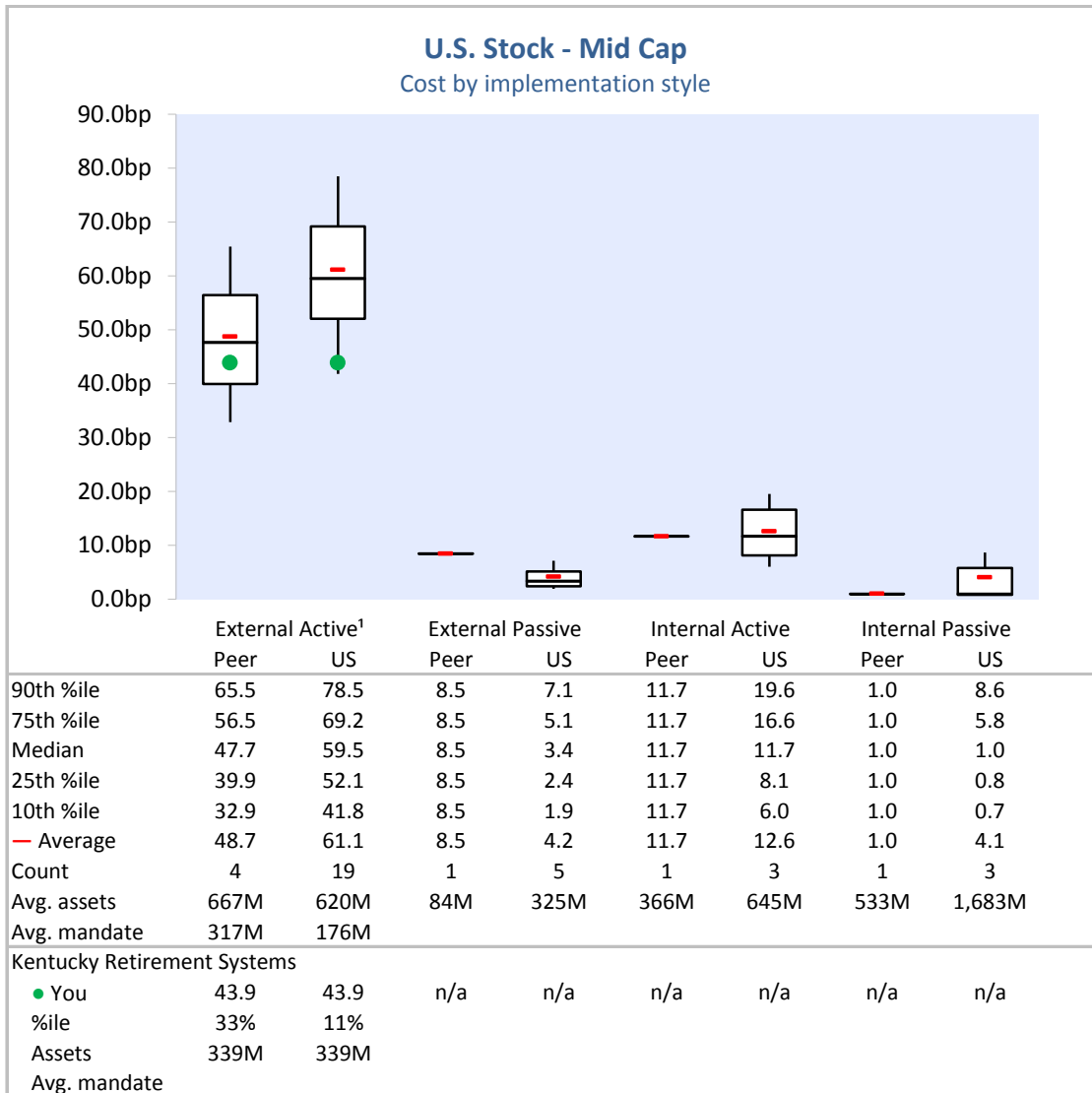
#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	54.4	39.5	35.7
Performance fees	0.0	2.9	5.7
Internal and other	<u>0.0</u>	<u>0.4</u>	<u>0.3</u>
Total	54.4	42.7	41.7



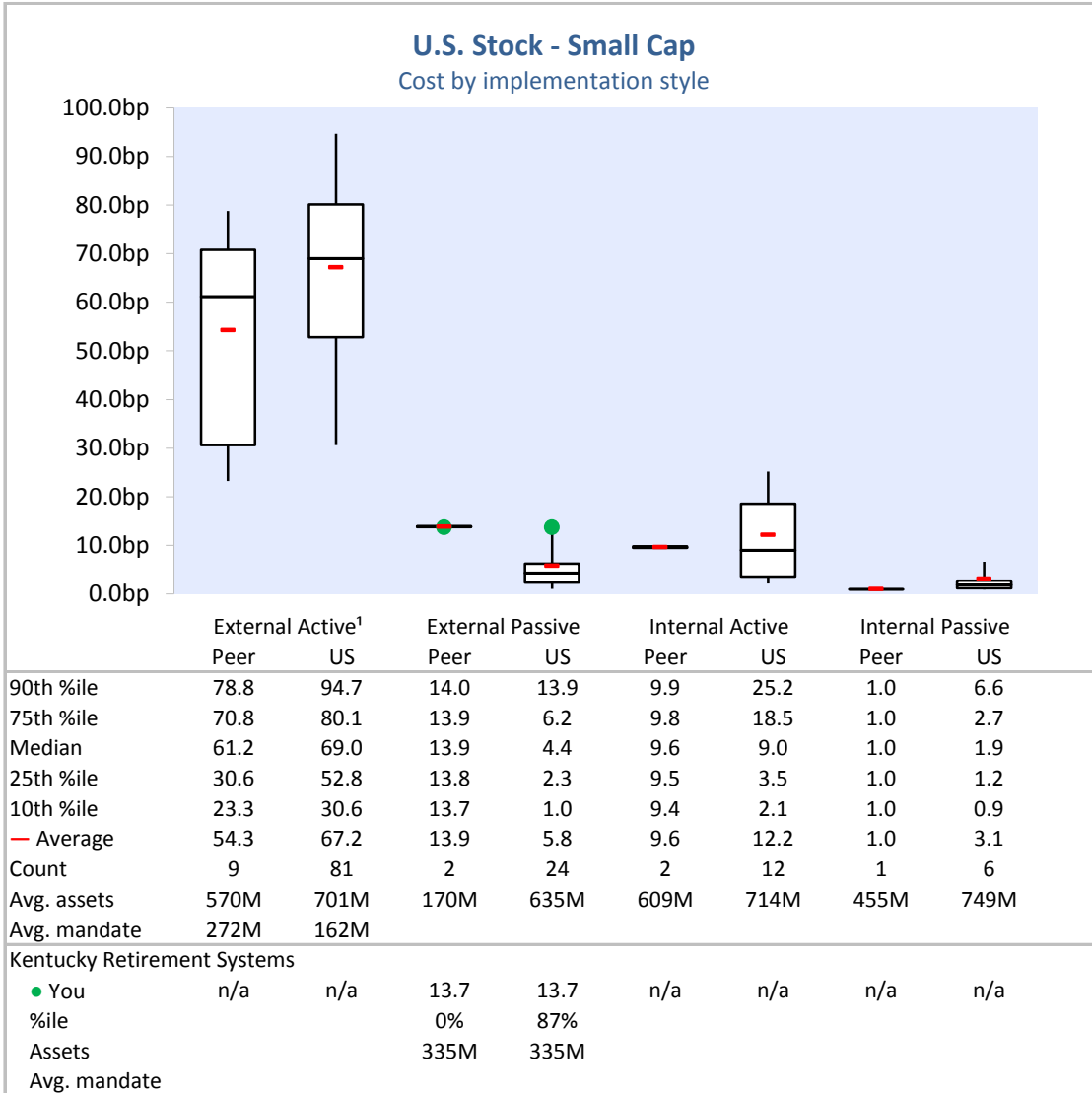
1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	11.9	28.4	34.9
Performance fees	0.0	0.4	3.7
Internal and other	<u>0.0</u>	<u>0.5</u>	<u>0.3</u>
Total	11.9	29.2	38.9



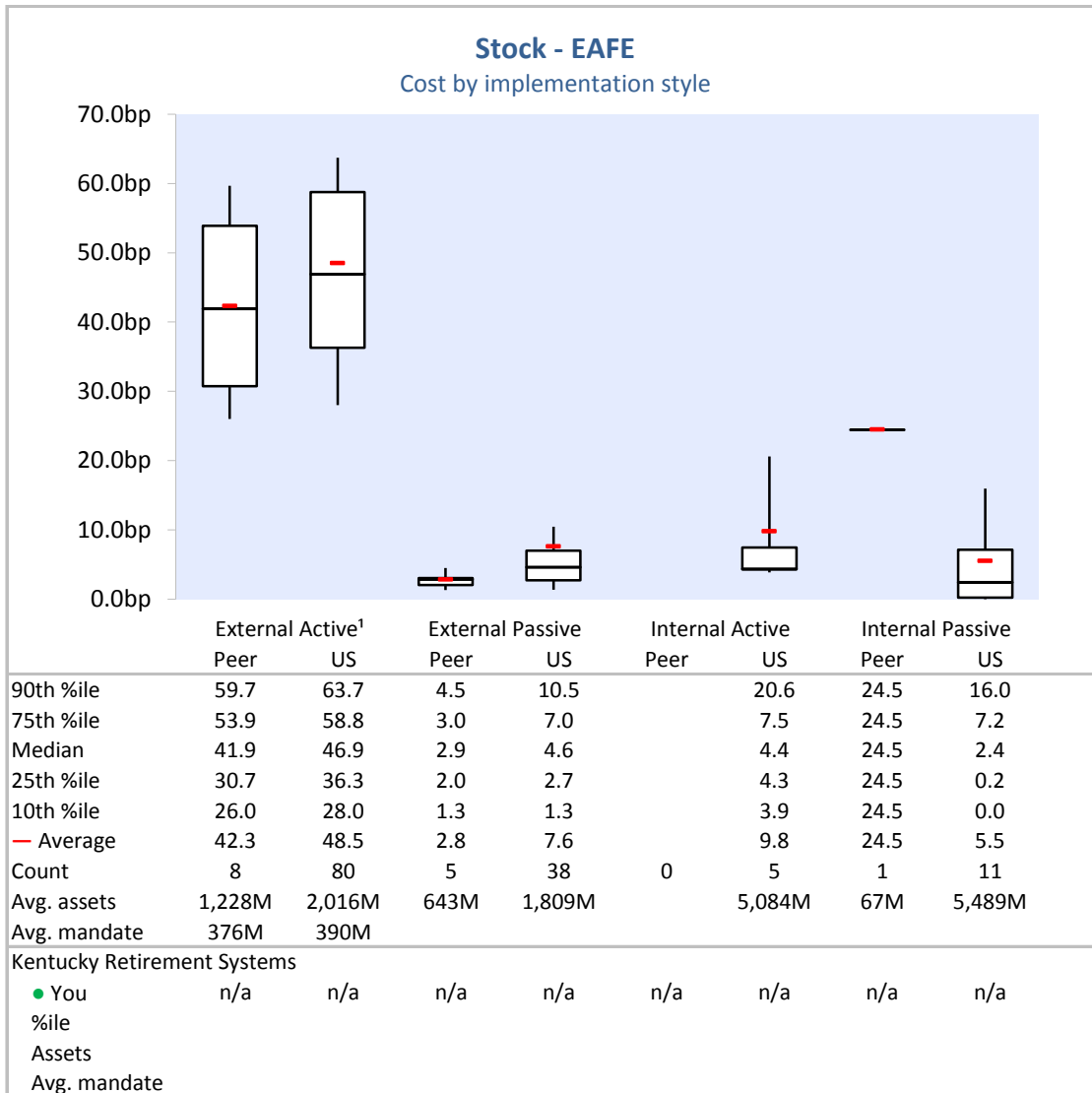
1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	43.9	48.4	57.0
Performance fees	0.0	0.0	3.9
Internal and other	<u>0.0</u>	<u>0.4</u>	<u>0.3</u>
Total	43.9	48.7	61.1



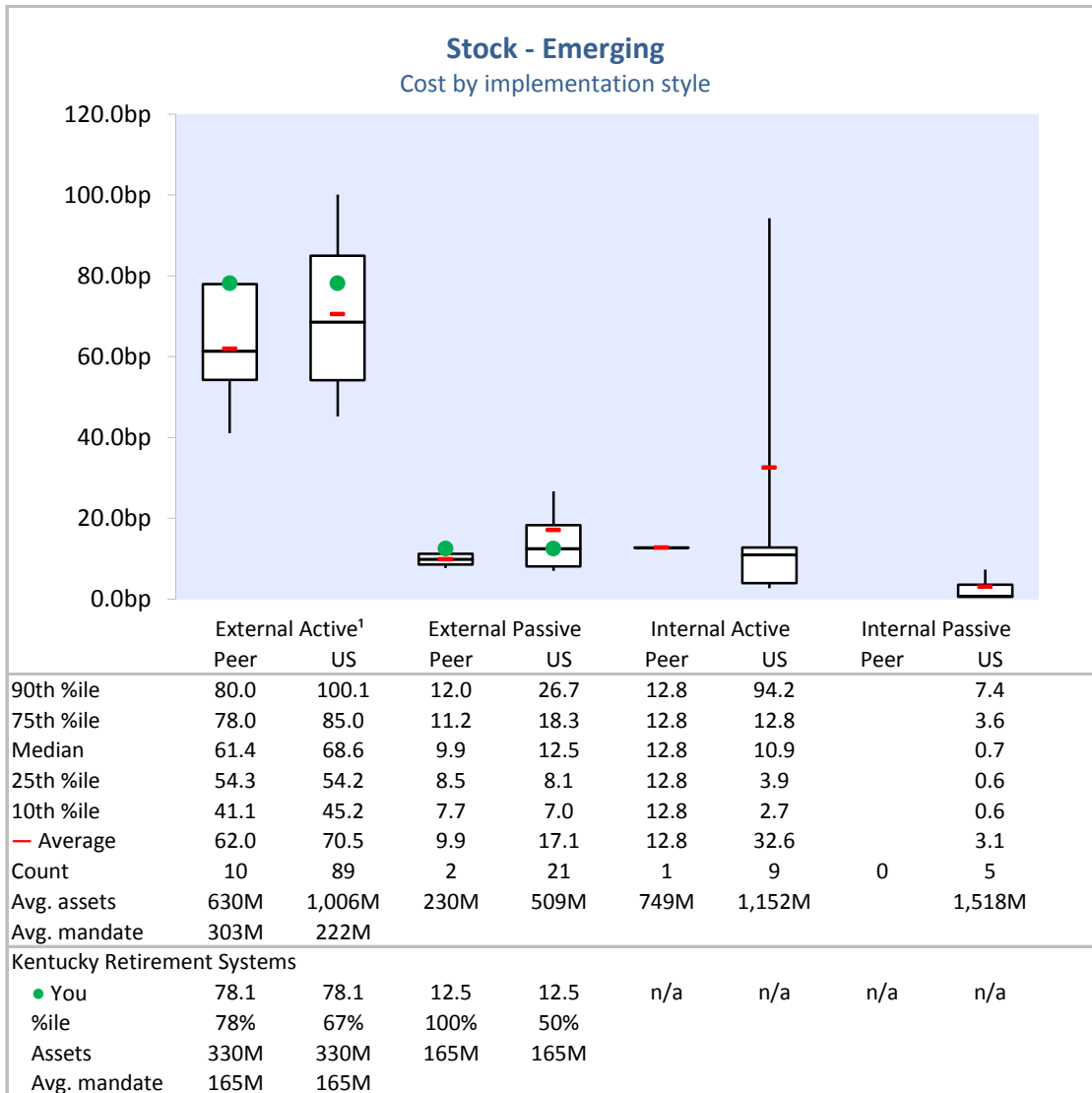
1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	52.2	65.2
Performance fees	n/a	2.0	1.9
Internal and other	<u>n/a</u>	<u>0.1</u>	<u>0.1</u>
Total	n/a	54.3	67.2



1. Breakdown of external active fees

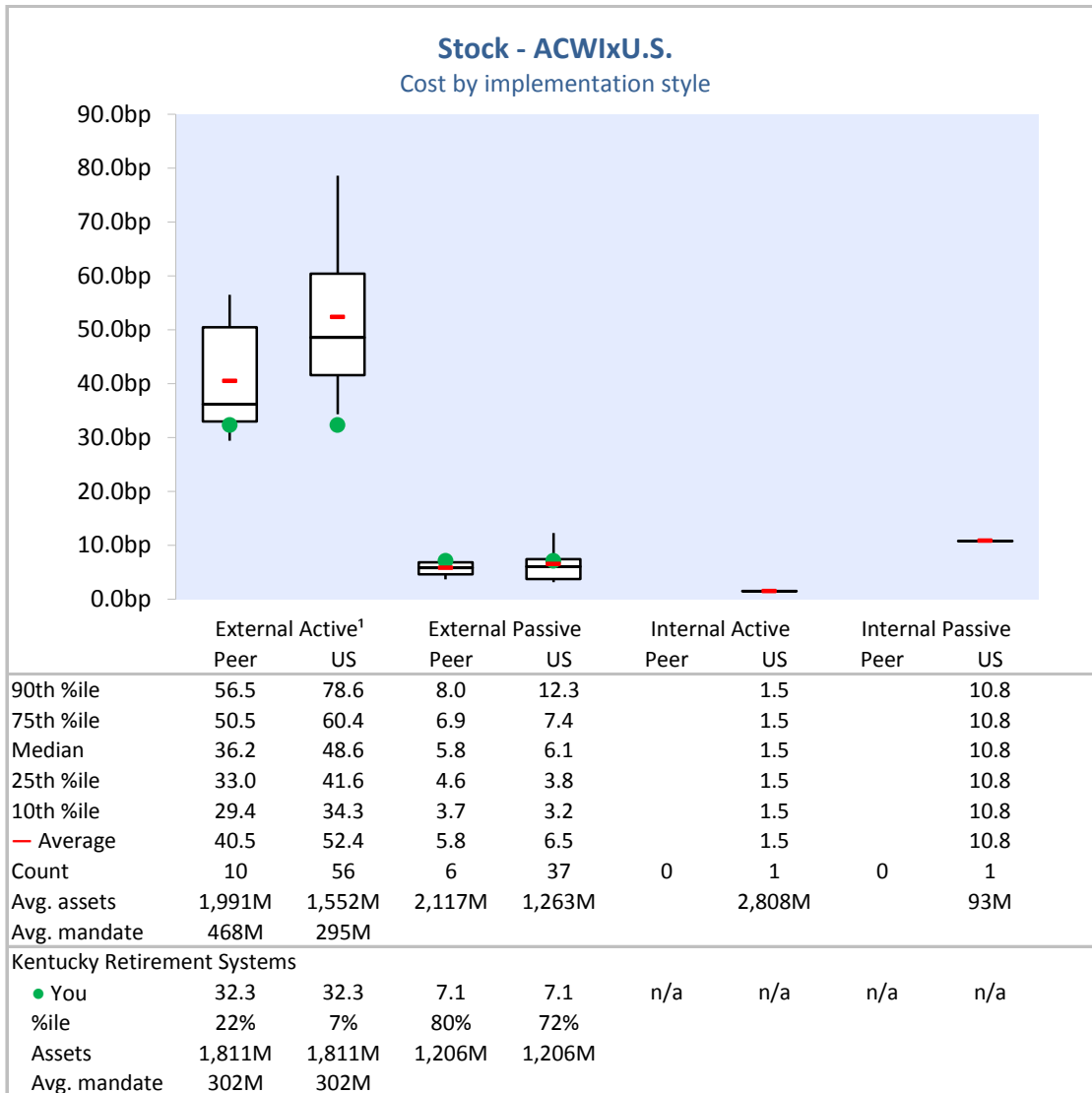
	You	Peer Average	US Average
Base fees	n/a	40.8	46.6
Performance fees	n/a	1.6	1.8
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.1</u>
Total	n/a	42.3	48.5



#### 1. Breakdown of external active fees

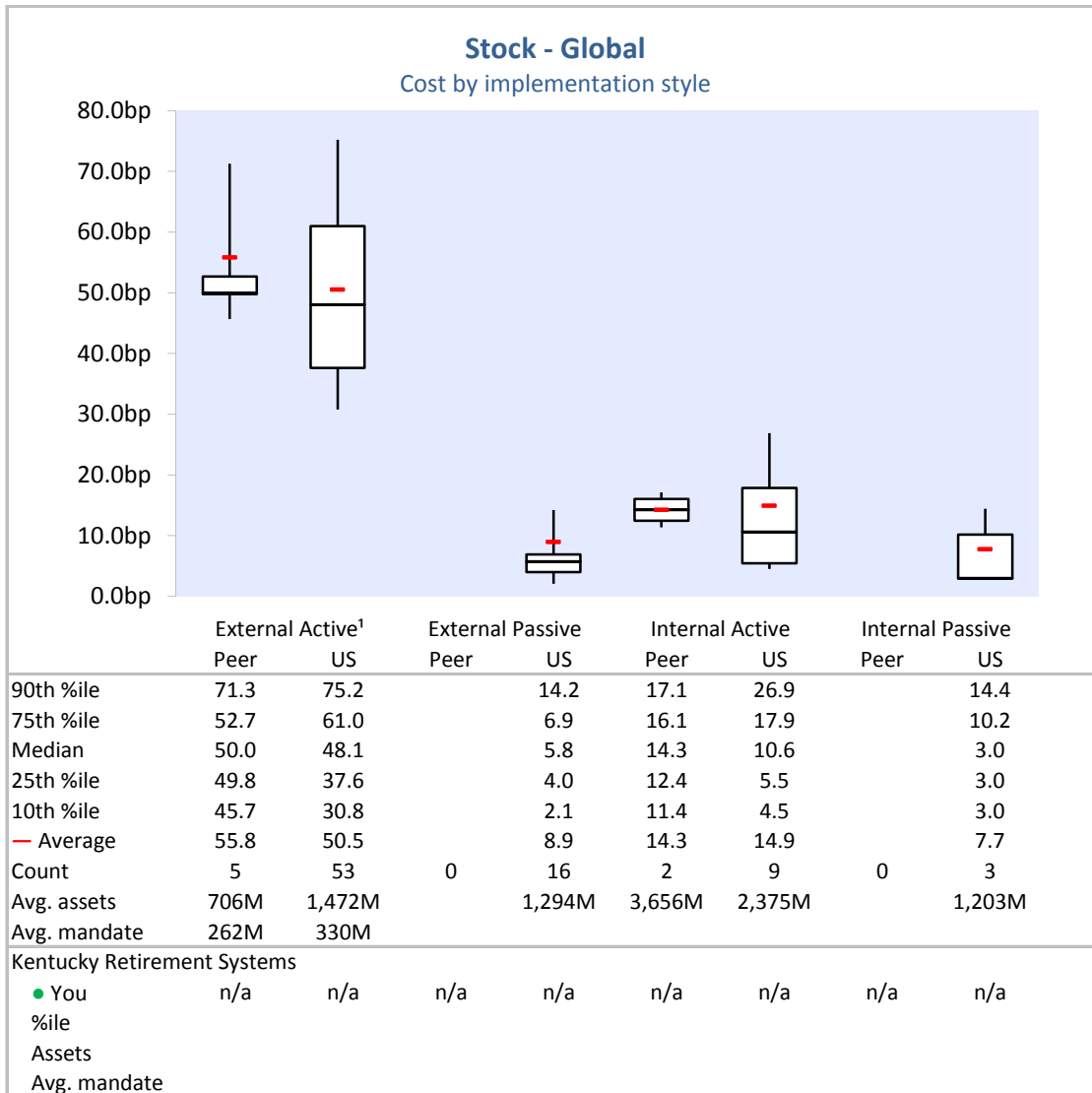
	You	Peer Average	US Average
Base fees	78.1	60.3	69.3
Performance fees	0.0	1.7	0.9
Internal and other	<u>0.0</u>	<u>0.0</u>	<u>0.3</u>
Total	78.1	62.0	70.5





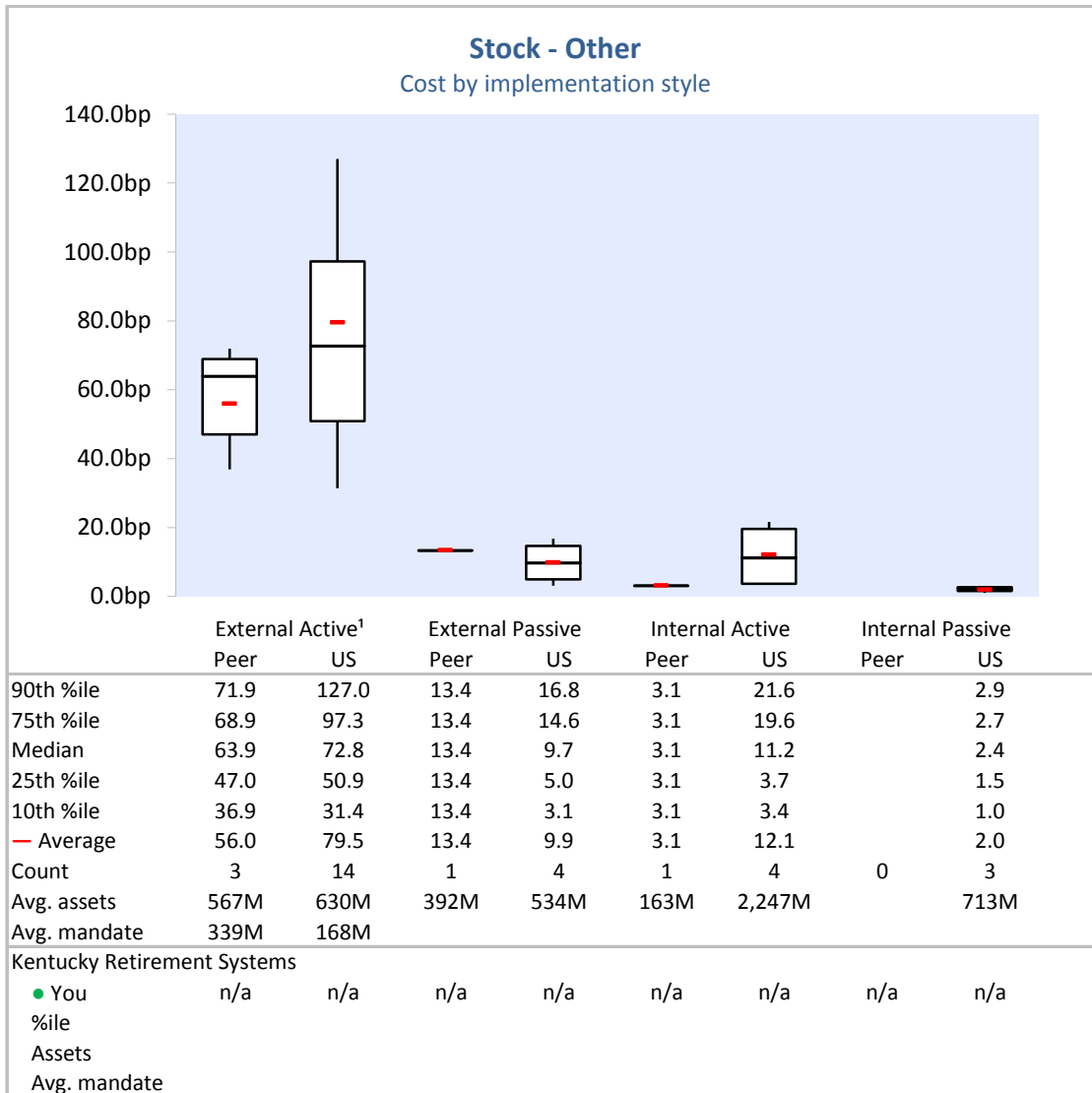
#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	32.3	37.1	50.7
Performance fees	0.0	2.7	1.3
Internal and other	<u>0.0</u>	<u>0.6</u>	<u>0.3</u>
Total	32.3	40.5	52.4



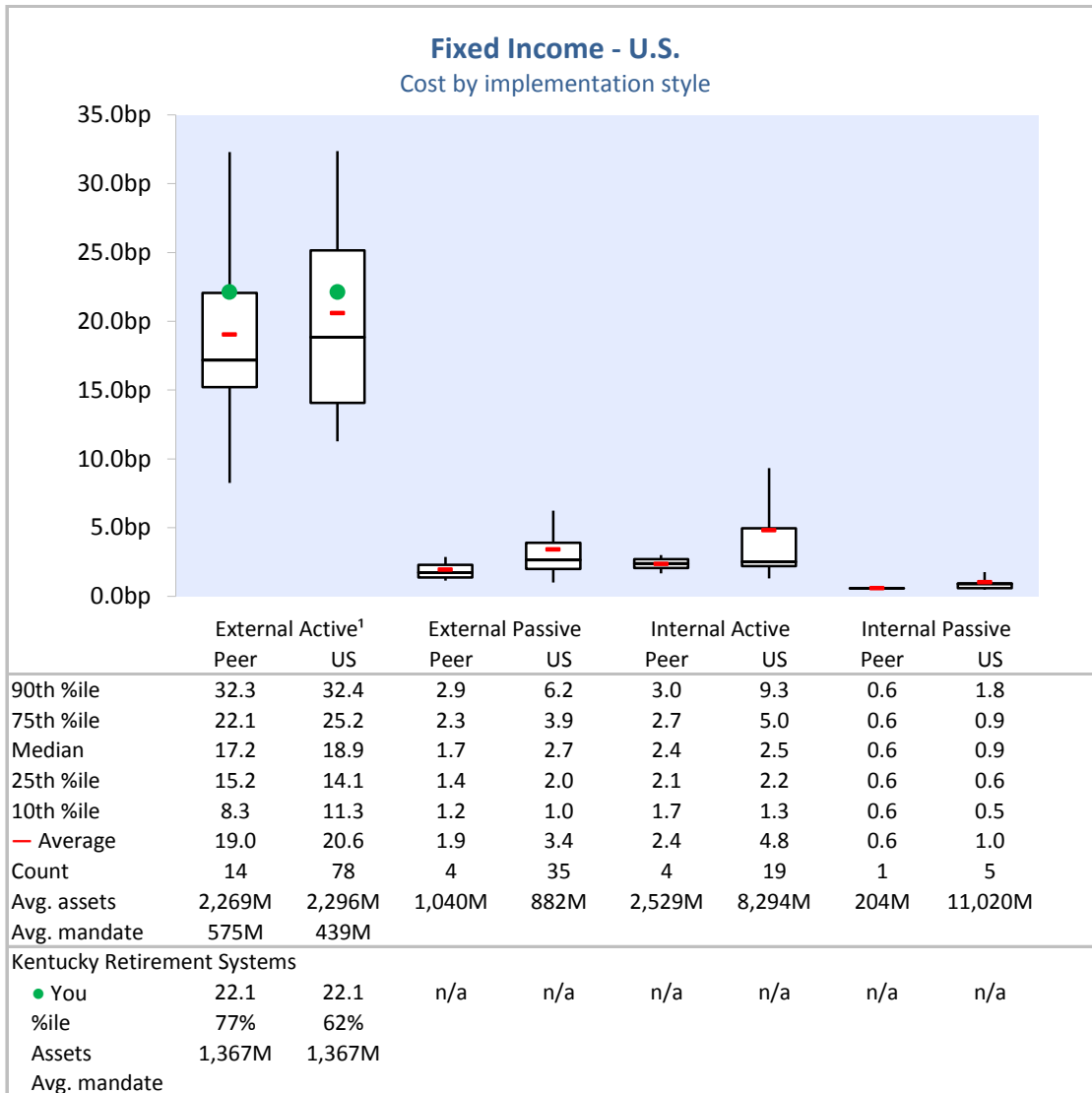
1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	54.3	47.1
Performance fees	n/a	1.6	3.3
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.1</u>
Total	n/a	55.8	50.5



1. Breakdown of external active fees

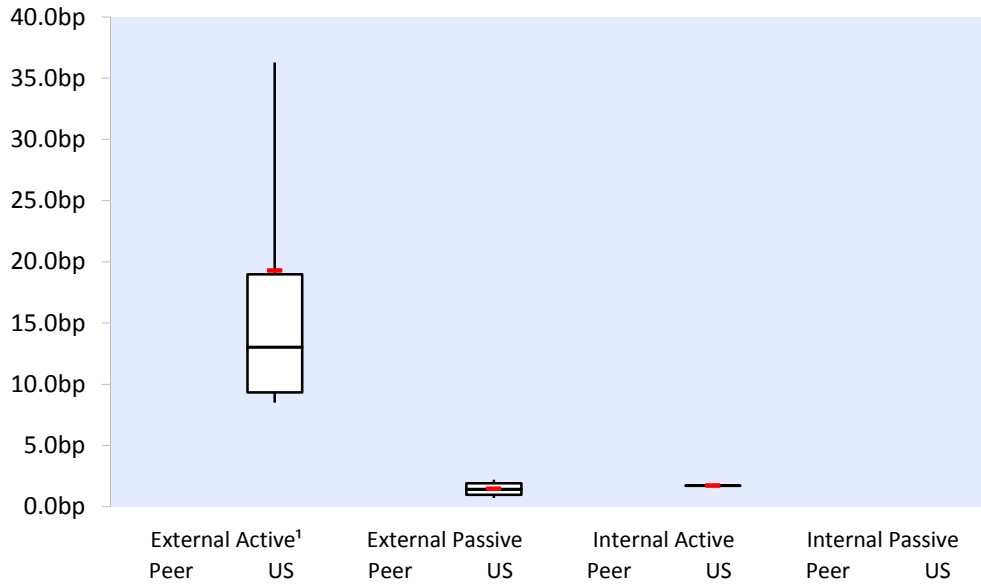
	You	Peer Average	US Average
Base fees	n/a	56.0	65.6
Performance fees	n/a	0.0	12.0
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>2.0</u>
Total	n/a	56.0	79.5



1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	22.1	18.1	20.0
Performance fees	0.0	0.6	0.4
Internal and other	<u>0.0</u>	<u>0.3</u>	<u>0.1</u>
Total	22.1	19.0	20.6

### Fixed Income - U.S. Gov't Cost by implementation style

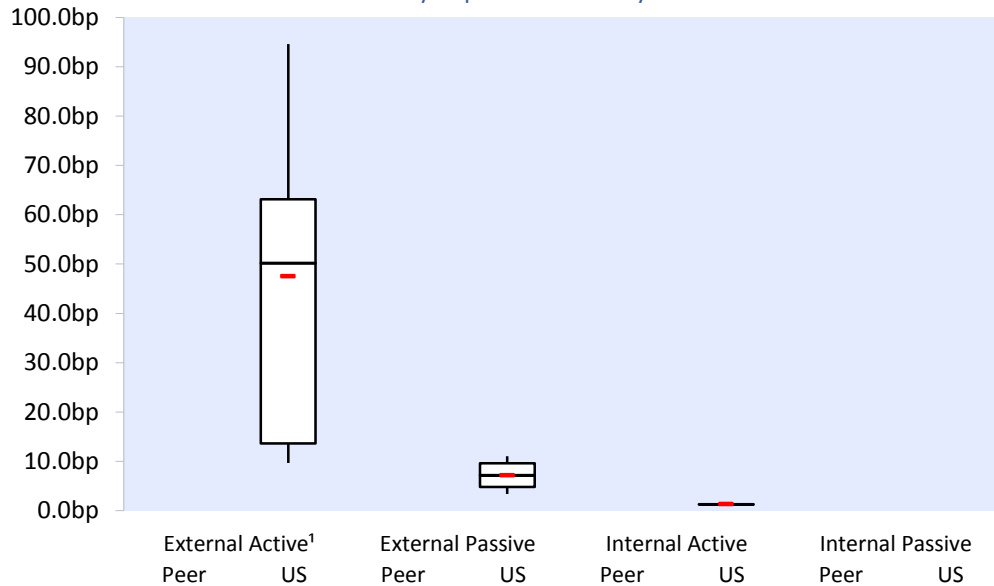


	External Active <sup>1</sup> Peer	US	External Passive Peer	US	Internal Active Peer	US	Internal Passive Peer	US
90th %ile		36.3		2.2		1.7		
75th %ile		19.0		1.9		1.7		
Median		13.0		1.5		1.7		
25th %ile		9.3		1.0		1.7		
10th %ile		8.5		0.7		1.7		
— Average		19.3		1.5		1.7		
Count	0	6	0	2	0	1	0	0
Avg. assets		2,054M		1,397M		290M		
Avg. mandate		593M						
Kentucky Retirement Systems								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	n/a	19.2
Performance fees	n/a	n/a	0.0
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.0</u>
Total	n/a	n/a	19.3

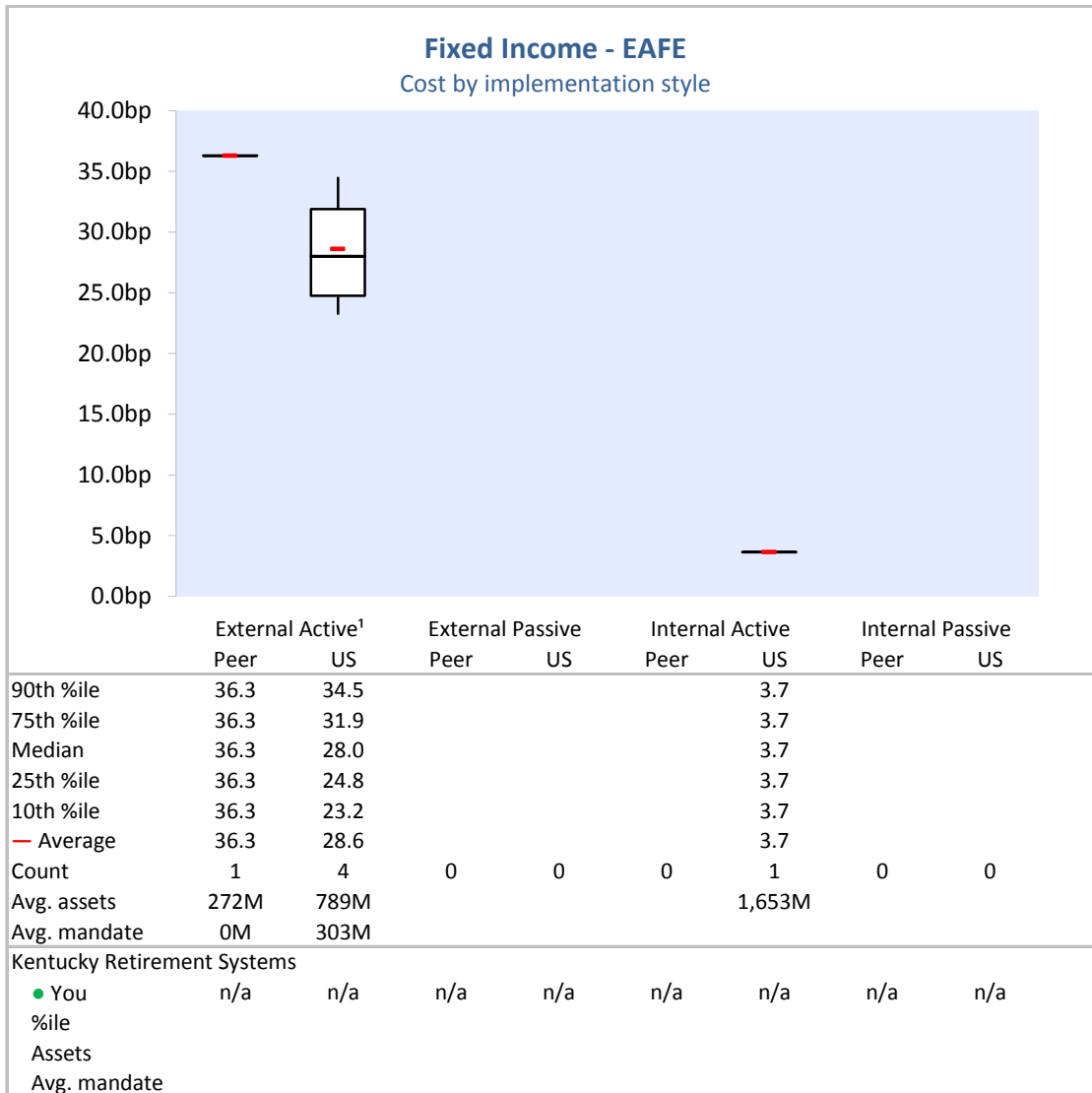
### Fixed Income - U.S. Credit Cost by implementation style



	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile		94.6		11.0		1.3		
75th %ile		63.2		9.6		1.3		
Median		50.2		7.2		1.3		
25th %ile		13.6		4.8		1.3		
10th %ile		9.7		3.4		1.3		
— Average		47.5		7.2		1.3		
Count	0	9	0	2	0	1	0	0
Avg. assets		942M		113M		933M		
Avg. mandate		213M						
Kentucky Retirement Systems								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

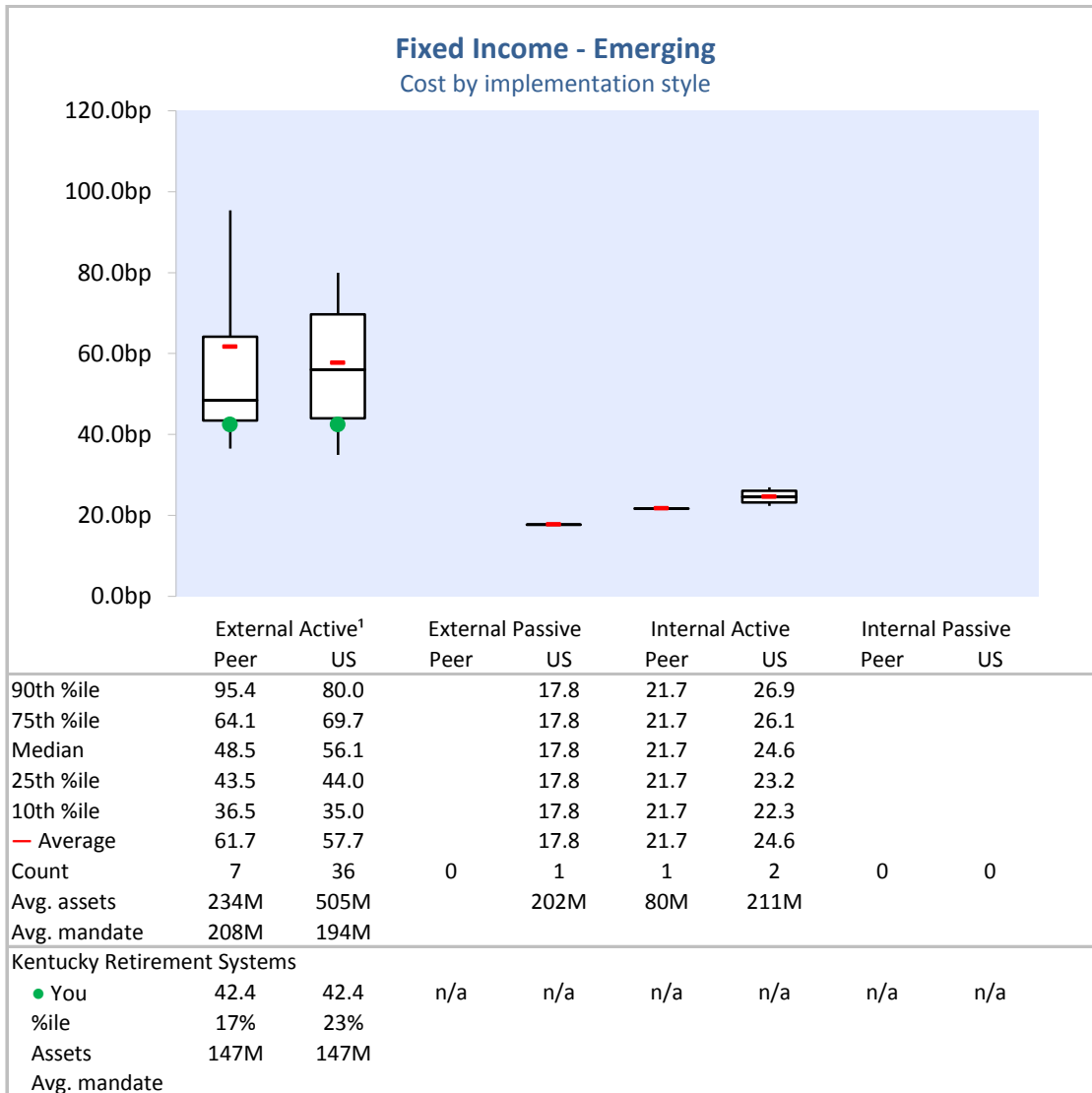
#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	n/a	47.5
Performance fees	n/a	n/a	0.0
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.0</u>
Total	n/a	n/a	47.5



1. Breakdown of external active fees

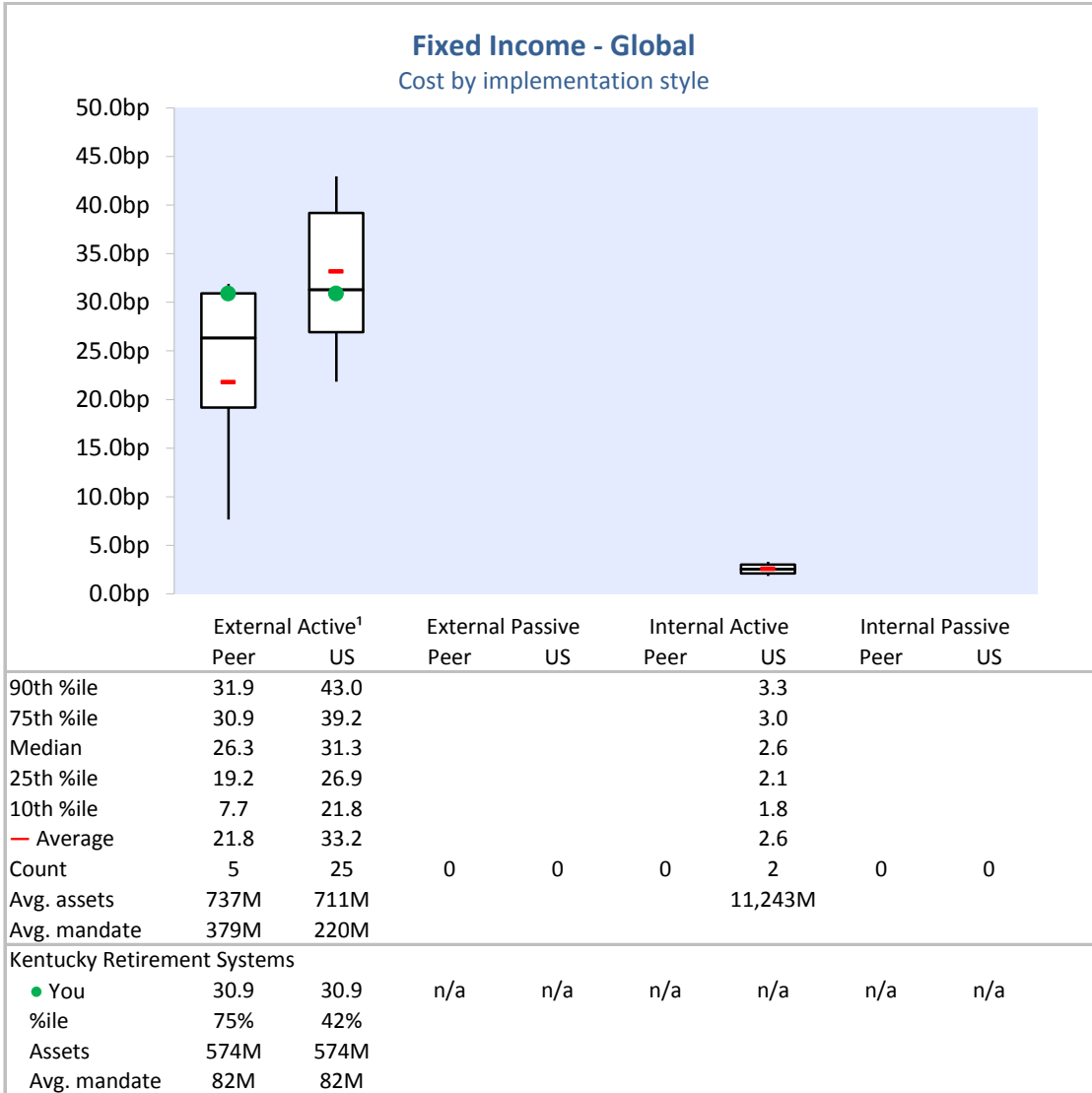
	You	Peer Average	US Average
Base fees	n/a	35.2	23.8
Performance fees	n/a	1.1	4.6
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.2</u>
Total	n/a	36.3	28.6



1. Breakdown of external active fees

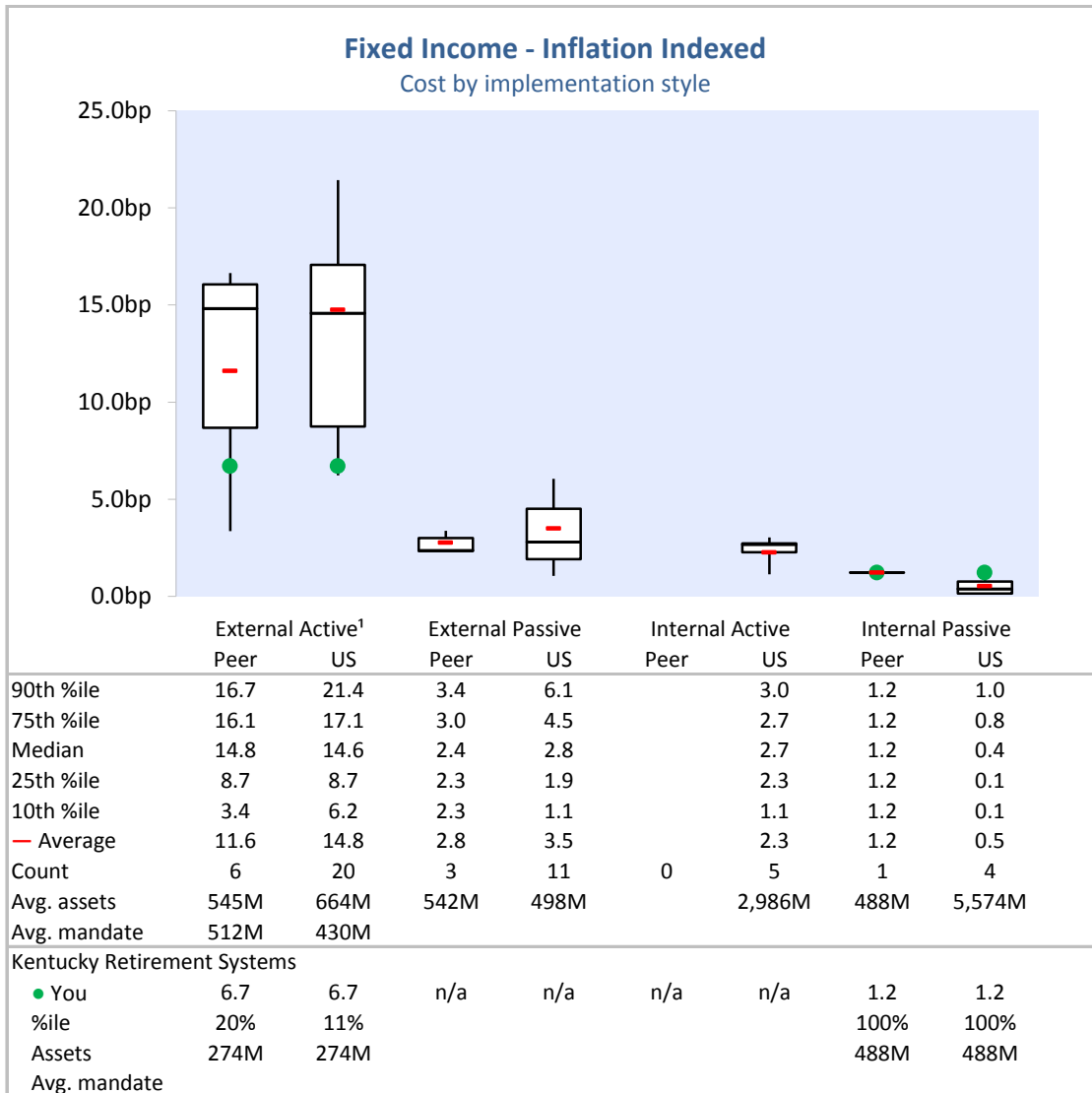
	You	Peer Average	US Average
Base fees	42.4	54.3	54.9
Performance fees	0.0	7.4	2.7
Internal and other	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>
Total	42.4	61.7	57.7





1. Breakdown of external active fees

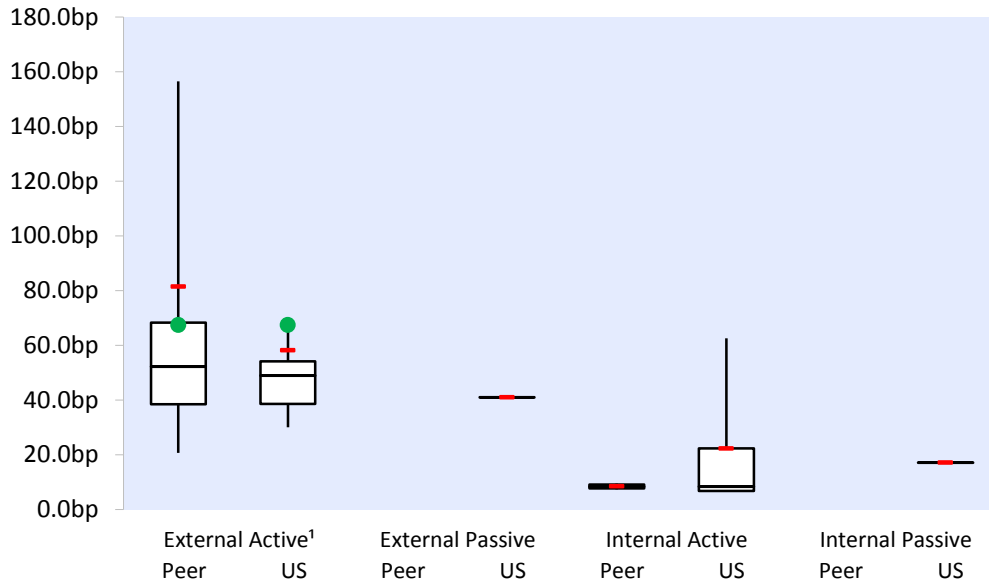
	You	Peer Average	US Average
Base fees	30.9	21.8	32.8
Performance fees	0.0	0.0	0.3
Internal and other	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>
Total	30.9	21.8	33.2



1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	6.7	11.6	14.4
Performance fees	0.0	0.0	0.3
Internal and other	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Total	6.7	11.6	14.8

### Fixed Income - High Yield Cost by implementation style

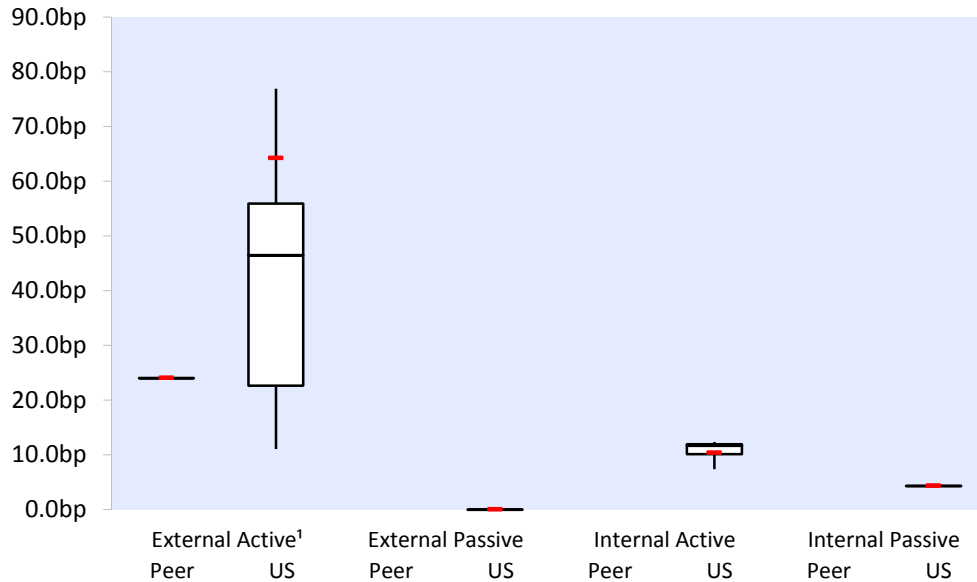


	External Active <sup>1</sup> Peer	US	External Passive Peer	US	Internal Active Peer	US	Internal Passive Peer	US
90th %ile	156.4	69.2		41.0	9.5	62.6		17.2
75th %ile	68.3	54.1		41.0	9.1	22.3		17.2
Median	52.2	49.0		41.0	8.4	8.4		17.2
25th %ile	38.5	38.6		41.0	7.8	6.8		17.2
10th %ile	20.7	30.1		41.0	7.4	6.7		17.2
— Average	81.4	58.2		41.0	8.4	22.2		17.2
Count	10	60	0	1	2	8	0	1
Avg. assets	682M	673M		119M	402M	502M		20M
Avg. mandate	210M	243M						
Kentucky Retirement Systems								
● You	67.4	67.4	n/a	n/a	n/a	n/a	n/a	n/a
%ile	67%	88%						
Assets	724M	724M						
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	51.4	55.6	46.3
Performance fees	16.0	25.6	11.5
Internal and other	<u>0.0</u>	<u>0.2</u>	<u>0.3</u>
Total	67.4	81.4	58.2

### Fixed Income - Mortgages Cost by implementation style

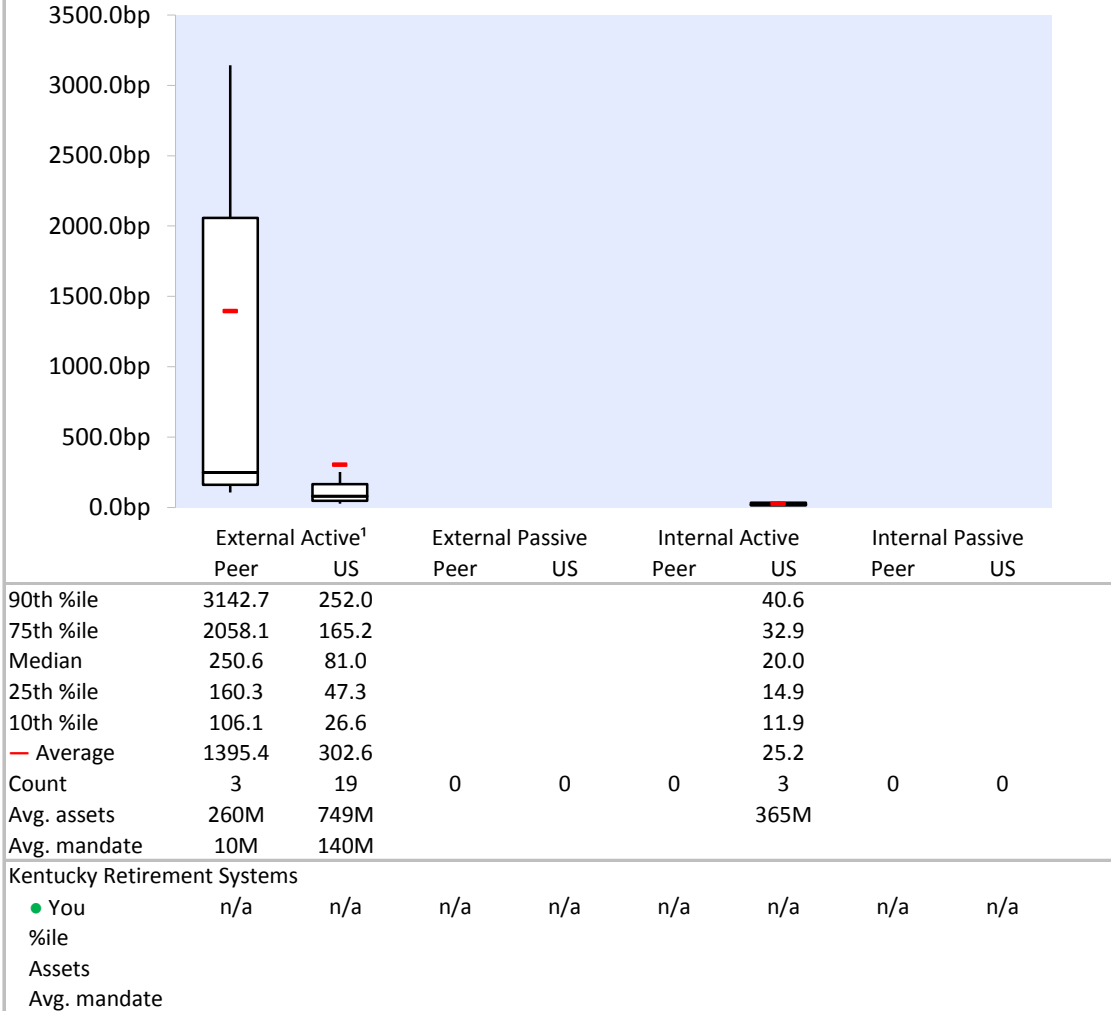


	External Active <sup>1</sup>		External Passive		Internal Active		Internal Passive	
	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	24.0	76.9		0.0		12.3		4.3
75th %ile	24.0	55.9		0.0		11.9		4.3
Median	24.0	46.5		0.0		11.7		4.3
25th %ile	24.0	22.6		0.0		10.1		4.3
10th %ile	24.0	11.0		0.0		7.4		4.3
— Average	24.0	64.2		0.0		10.4		4.3
Count	1	11	0	1	0	4	0	1
Avg. assets	138M	287M		81M		3,357M		856M
Avg. mandate	37M	161M						
Kentucky Retirement Systems								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	24.0	45.3
Performance fees	n/a	0.0	18.6
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.3</u>
Total	n/a	24.0	64.2

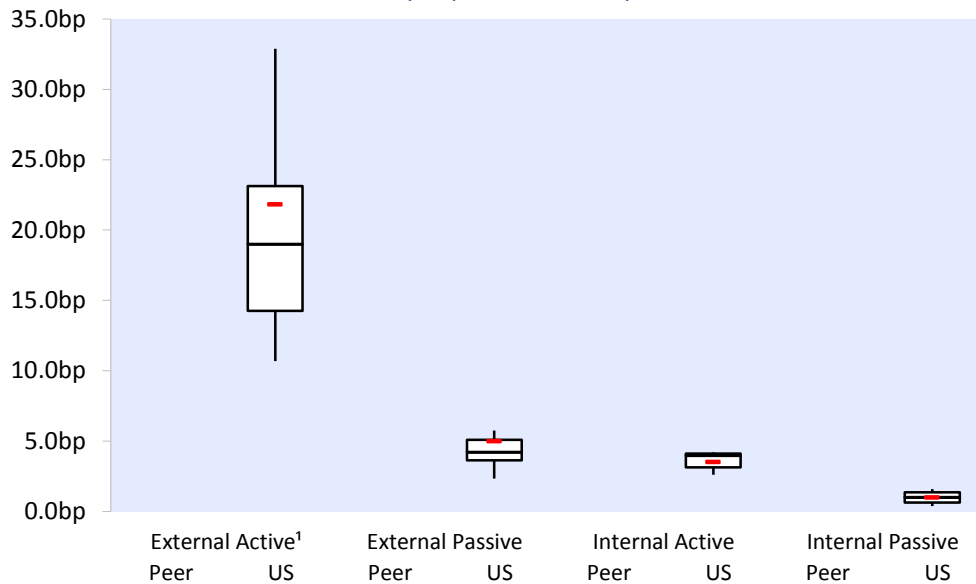
### Fixed Income - Private Debt Cost by implementation style



#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	1,395.0	294.6
Performance fees	n/a	0.0	7.6
Internal and other	<u>n/a</u>	<u>0.4</u>	<u>0.4</u>
Total	n/a	1,395.4	302.6

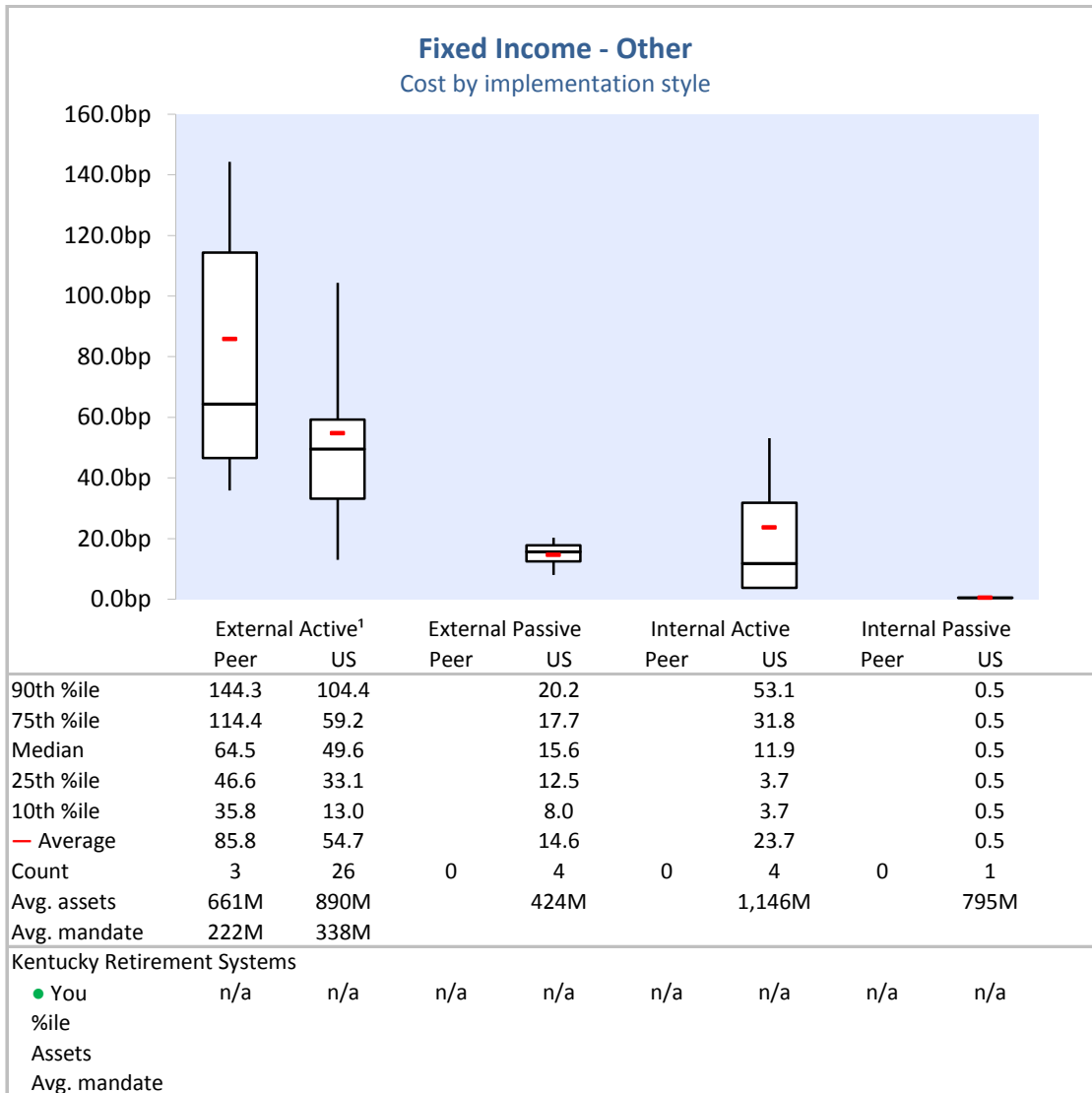
### Fixed Income - Long Bonds Cost by implementation style



	External Active <sup>1</sup> Peer	External Active <sup>1</sup> US	External Passive Peer	External Passive US	Internal Active Peer	Internal Active US	Internal Passive Peer	Internal Passive US
90th %ile		32.9		5.8		4.2		1.6
75th %ile		23.1		5.1		4.1		1.4
Median		19.0		4.2		4.0		1.0
25th %ile		14.3		3.6		3.1		0.6
10th %ile		10.7		2.3		2.6		0.4
— Average		21.8		5.0		3.5		1.0
Count	0	61	0	18	0	3	0	3
Avg. assets		3,831M		476M		1,159M		7,654M
Avg. mandate		641M						
Kentucky Retirement Systems								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile								
Assets								
Avg. mandate								

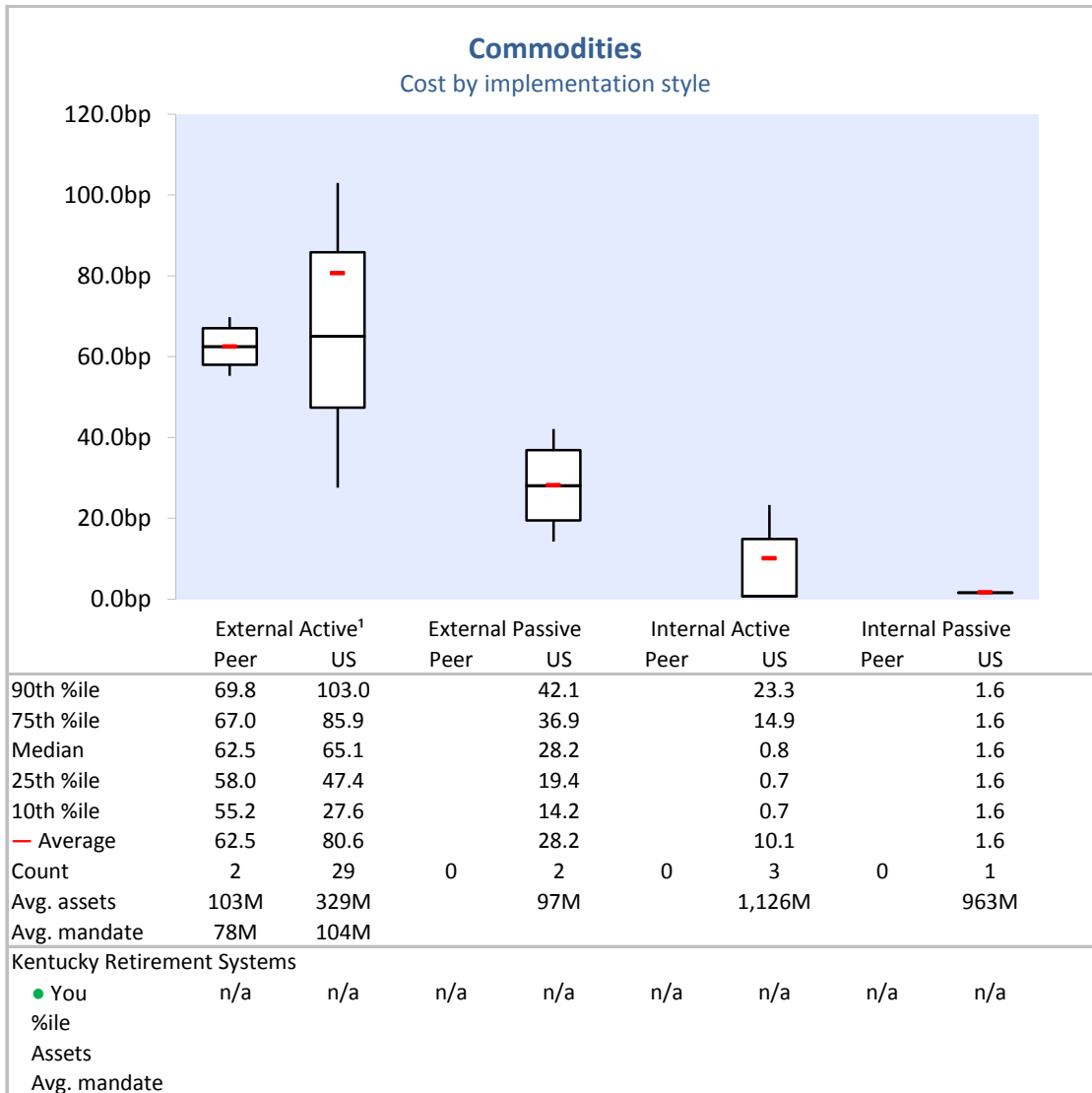
#### 1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	n/a	20.0
Performance fees	n/a	n/a	1.8
Internal and other	<u>n/a</u>	<u>n/a</u>	<u>0.0</u>
Total	n/a	n/a	21.8



1. Breakdown of external active fees

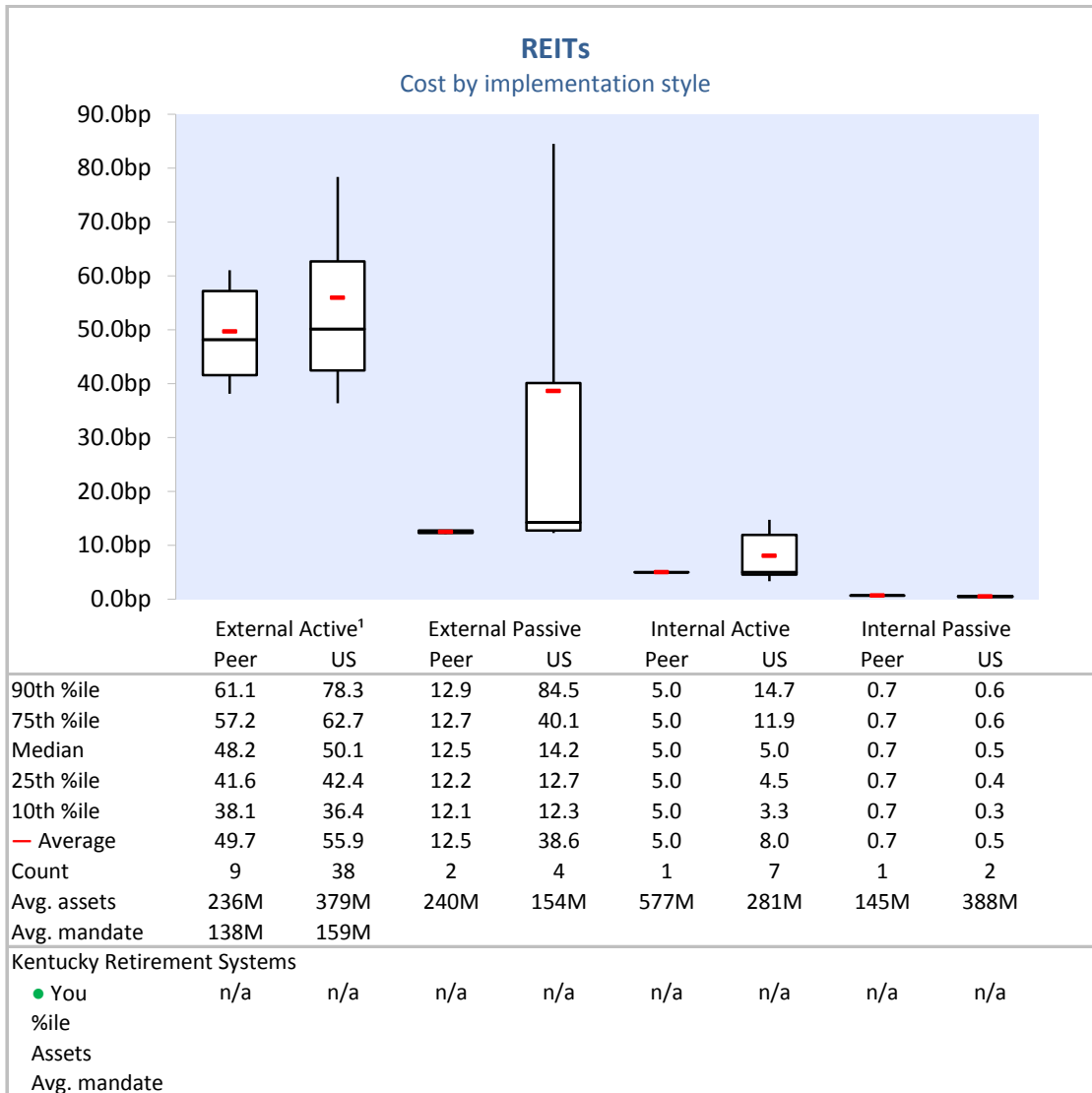
	You	Peer Average	US Average
Base fees	n/a	62.9	45.6
Performance fees	n/a	22.9	8.9
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.2</u>
Total	n/a	85.8	54.7



1. Breakdown of external active fees

	You	Peer Average	US Average
Base fees	n/a	62.0	78.6
Performance fees	n/a	0.5	1.6
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.4</u>
Total	n/a	62.5	80.6



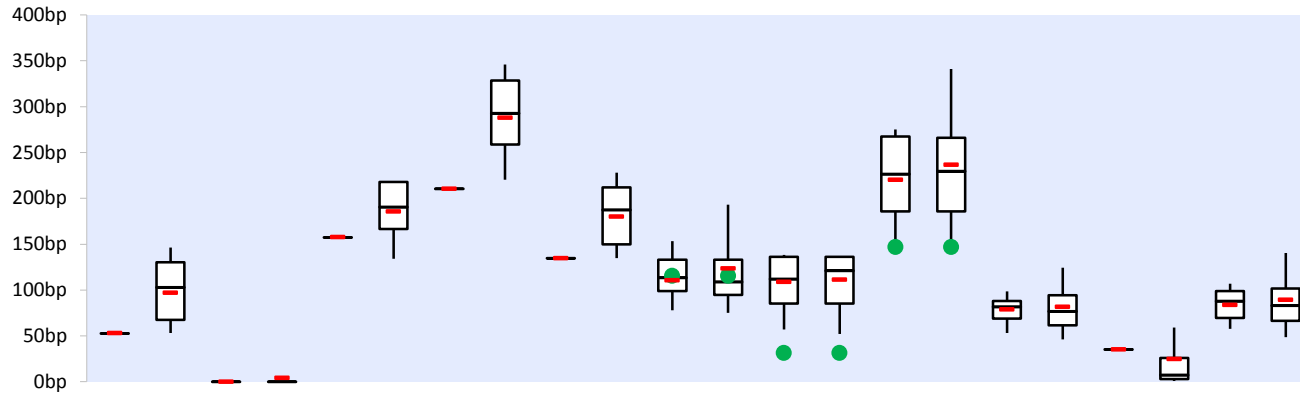


#### 1. Breakdown of external active fees

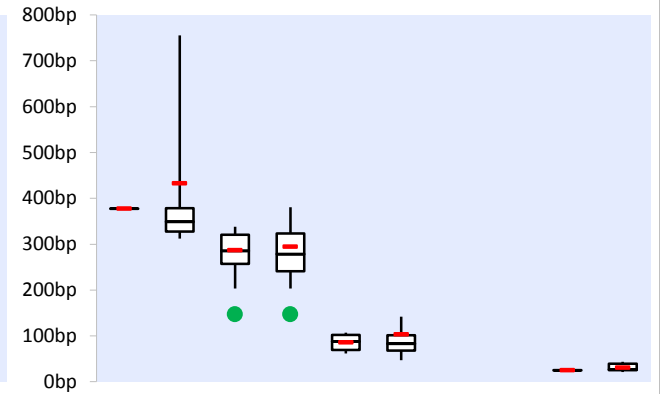
	You	Peer Average	US Average
Base fees	n/a	49.7	54.8
Performance fees	n/a	0.0	1.0
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>0.1</u>
Total	n/a	49.7	55.9

## Real Estate ex-REITs

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



	Fund of Funds										Direct LP						External (not LP)					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	52.9	146.3	0.0	0.0	157.6	217.9	210.5	345.8	134.7	228.1	153.5	193.0	138.4	136.8	275.2	340.9	98.4	124.5	35.3	58.9	106.7	140.3
75th %ile	52.9	130.2	0.0	0.0	157.6	217.9	210.5	328.5	134.7	212.0	133.3	133.3	136.1	136.1	267.6	266.1	88.2	94.2	35.3	25.9	99.0	101.5
Median	52.9	103.0	0.0	0.0	157.6	190.5	210.5	292.9	134.7	187.7	113.5	108.9	112.0	121.1	226.6	229.6	81.8	77.0	35.3	7.3	88.0	83.1
25th %ile	52.9	67.3	0.0	0.0	157.6	166.7	210.5	258.6	134.7	149.9	98.7	94.8	85.3	85.3	185.7	185.7	69.0	61.6	35.3	3.0	69.4	66.5
10th %ile	52.9	53.1	0.0	0.0	157.6	134.2	210.5	220.3	134.7	134.9	77.9	75.2	57.1	52.2	150.0	142.4	53.1	46.0	35.3	0.9	57.7	48.5
— Average	52.9	96.8	0.0	4.1	157.6	185.5	210.5	288.0	134.7	180.2	110.7	123.6	108.7	111.3	220.3	236.4	78.8	81.7	35.3	24.8	83.6	89.2
Count	1	13	1	13	1	13	1	13	1	13	17	65	17	65	17	65	10	76	1	19	10	76
Avg. assets	185M	161M	185M	161M	185M	161M	185M	161M	185M	161M	831M	1,897M	831M	1,897M	831M	1,897M	623M	1,302M	623M	1,302M	623M	1,302M
Kentucky Retirement Systems																						
• You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	115.4	115.4	31.4	31.4	146.8	146.8	n/a	n/a	n/a	n/a	n/a	n/a
%ile											56%	58%	0%	6%	6%	13%						
Assets											636M	636M	636M	636M	636M	636M						

Fund of Funds		Direct LP		External (not LP)		Oper. Sub.		Internal	
Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total		Total	
Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
377.7	755.3	338.0	380.8	106.8	141.8			25.0	43.8
377.7	378.7	320.7	323.5	102.0	101.5			25.0	39.1
377.7	349.6	285.6	278.8	88.0	83.2			25.0	26.9
377.7	327.6	256.9	241.0	69.4	68.2			25.0	25.0
377.7	312.1	203.3	203.5	61.6	47.2			25.0	21.3
377.7	432.8	286.5	294.6	85.4	103.4			25.0	30.7
1	13	17	65	10	76	0	0	1	6
103M	91M	618M	1,747M	7M	31M			382M	2,237M
n/a	n/a	146.8	146.8	n/a	n/a	n/a	n/a	n/a	n/a
		6%	6%						
		636M	636M						

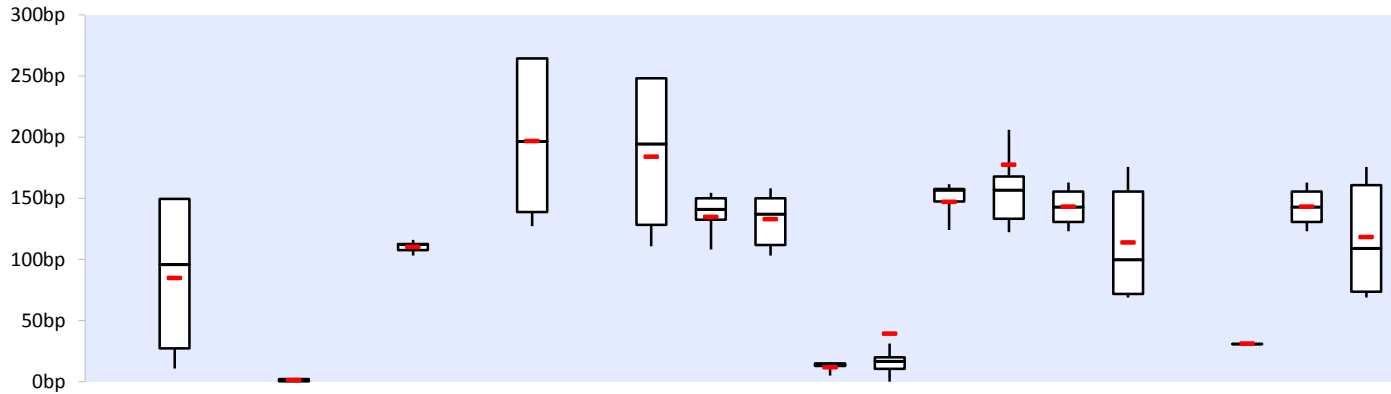
1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.

2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 82 bps (on amount fees are based on) for underlying management fees and 136 bps (on NAV) for underlying performance fees were used.

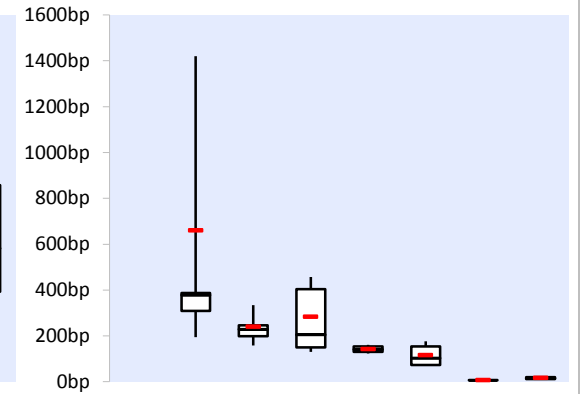
3. The total cost also includes the internal cost of monitoring and selecting real estate investments. Your cost of monitoring and selecting was 0.0 bps for LPs. The peer average cost of monitoring and selecting was 0.0 bps for fund of funds, 0.9 bps for LPs and 1.3 bps for external (not LPs).

## Infrastructure

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



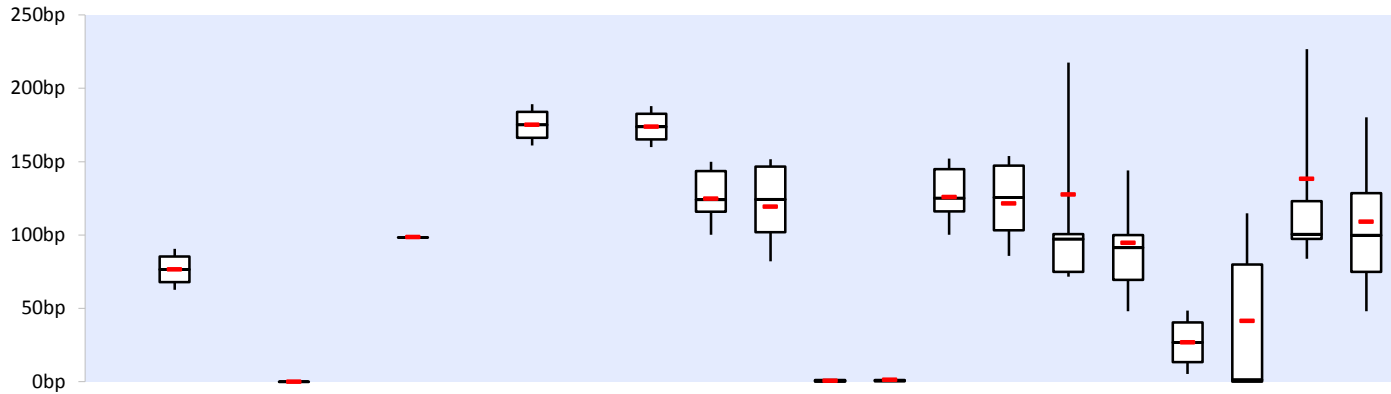
	Fund of Funds						Direct LP						External (not LP)									
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile		150.1		2.3		116.2		264.7		248.6		154.6		158.1		16.0		31.3		161.7		206.1
75th %ile		149.6		2.3		112.5		264.4		248.1		150.0		150.0		14.9		20.1		157.7		167.9
Median		96.0		1.5		112.2		196.7		194.5		141.3		137.2		14.3		16.7		156.8		156.8
25th %ile		27.4		0.3		107.6		138.9		128.4		132.5		111.9		12.8		10.6		147.4		133.4
10th %ile		10.9		0.1		103.3		127.2		110.9		108.3		103.2		5.1		0.0		124.3		122.3
Average		84.7		1.3		110.3		196.9		183.9		134.7		132.9		11.8		39.3		147.0		177.4
Count	0	5	0	5	0	5	0	5	0	5	5	19	5	19	5	19	2	10	0	1	2	10
Avg. assets		90M		90M		90M		90M		90M	345M	387M	345M	387M	345M	387M	34M	226M	34M	226M	34M	226M
Kentucky Retirement Systems																						
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile																						
Assets																						

Fund of Funds		Direct LP		External (not LP)		Internal	
Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total	
Peer	US	Peer	US	Peer	US	Peer	US
	1419.6	334.6	457.2	160.9	175.8	7.2	22.9
	387.5	245.6	403.3	153.8	153.8	7.2	20.3
	378.9	230.0	206.1	141.9	104.4	7.2	15.9
	308.7	198.1	149.3	130.1	73.7	7.2	11.6
	195.1	157.6	129.7	123.0	68.9	7.2	8.9
	660.4	239.6	283.6	141.9	115.0	7.2	15.9
0	5	5	19	2	10	1	2
	53M	224M	303M	34M	236M	22M	260M
	n/a	n/a	n/a	n/a	n/a	n/a	n/a

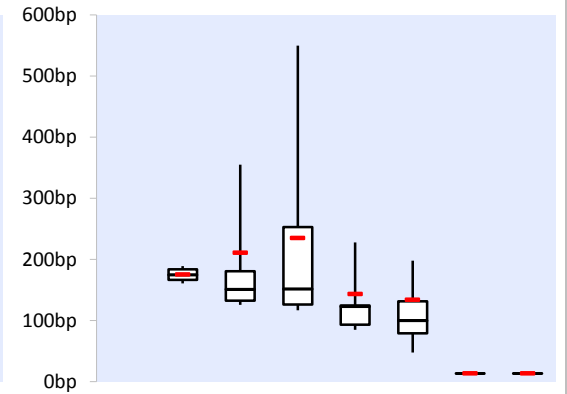
1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 99 bps (on amount fees are based on) for underlying management fees and 20 bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting infrastructure investments. The peer average cost of monitoring and selecting was 0.5 bps for LPs and 0.0 bps for external (not LPs).

## Natural Resources

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV

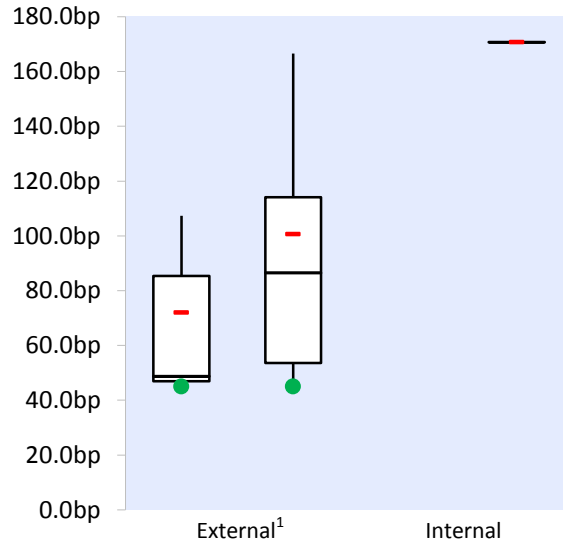


	Fund of Funds						Direct LP						External (not LP)											
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.			
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	90.6	0.0	98.5	189.1	187.9	150.0	151.7	1.2	1.2	152.2	153.9	217.6	144.1	48.4	114.9	226.6	180.1							
75th %ile	85.4	0.0	98.5	183.9	182.7	143.6	146.6	1.2	1.2	144.8	147.3	100.6	100.0	40.3	79.8	123.1	128.4							
Median	76.6	0.0	98.5	175.1	173.9	124.2	124.5	0.8	0.9	125.4	125.7	97.3	91.6	26.9	1.4	100.6	100.0							
25th %ile	67.9	0.0	98.5	166.4	165.2	115.8	102.0	0.1	0.4	116.1	103.2	74.8	69.3	13.4	0.0	97.3	74.8							
10th %ile	62.6	0.0	98.5	161.1	159.9	100.2	82.0	0.0	0.1	100.2	85.9	71.5	48.0	5.4	0.0	83.8	48.0							
— Average	76.6	0.0	98.5	175.1	173.9	124.8	119.3	0.7	1.2	125.9	121.4	127.5	94.6	26.9	41.4	138.3	109.0							
Count	0	2	0	2	0	2	0	2	0	2	0	2	6	17	6	17	6	17	5	25	2	7	5	25
Avg. assets	216M		216M		216M		216M		216M		216M		139M	791M	139M	791M	139M	791M	247M	256M	247M	256M	247M	256M
Kentucky Retirement Systems																								
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
%ile																								
Assets																								

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 97 bps (on amount fees are based on) for underlying management fees and 1 bps (on NAV) for underlying performance fees were used.
3. The total cost also includes the internal cost of monitoring and selecting natural resources investments. The peer average cost of monitoring and selecting was 0.5 bps for LPs and 0.0 bps for external (not LPs).

## Other Real Assets

Cost as % of NAV by implementation style



	External <sup>1</sup>		Internal	
	Peer	US	Peer	US
90th %ile	107.4	166.6		170.7
75th %ile	85.4	114.1		170.7
Median	48.8	86.5		170.7
25th %ile	46.9	53.6		170.7
10th %ile	45.8	46.5		170.7
— Average	72.0	100.6		170.7
Count	3	22	0	1
Avg. assets	476M	268M		57M
Avg. mandate	150M	106M		
Kentucky Retirement Systems				
● You	45.0	45.0	n/a	n/a
%ile	0%	5%		
Assets	713M	713M		
Avg. mandate	79M	79M		

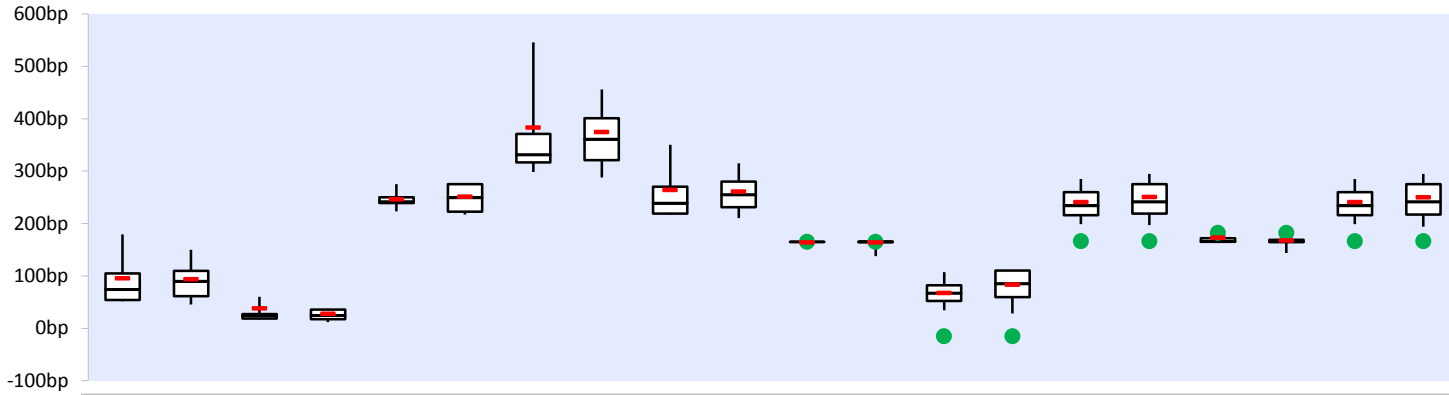
### 1. Breakdown of external fees

	Your Plan	Peer Average	US Average
Base fees	45.0	72.0	98.7
Internal and other	0.0	0.0	1.9
Total*	45.0	72.0	100.6
Performance fees	9.6	17.3	2.4

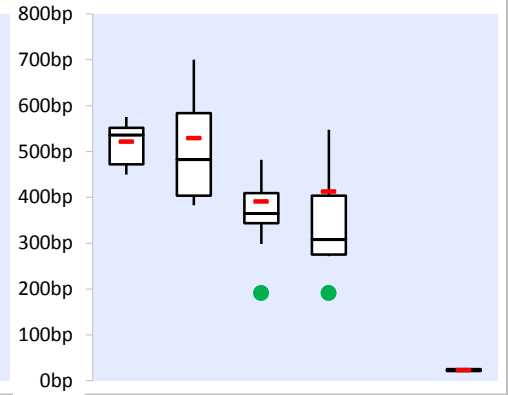
\* Total cost excludes performance fees because most participants did not provide performance fees for other real assets.

## Diversified Private Equity

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



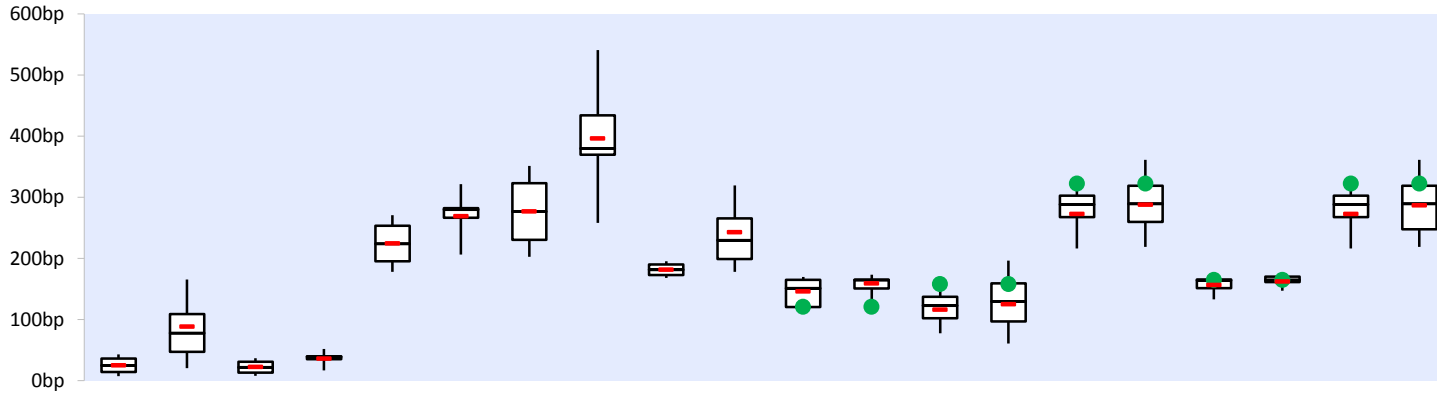
	Fund of Funds										Direct LP				Direct LP & Co-Inv. <sup>4</sup>				Fund of Funds		Direct LP & Co-Inv. <sup>4</sup>		Internal			
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> incl. perf.		Total			
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US		
90th %ile	179.2	150.0	60.2	36.9	275.4	275.9	545.9	455.8	350.3	315.0	171.4	172.4	107.4	110.4	284.7	294.8	181.0	184.3	284.7	294.8	575.3	700.2	482.0	547.4	25.3	
75th %ile	105.0	109.6	27.5	35.7	250.1	275.4	371.1	401.1	270.0	279.8	165.0	165.0	82.4	110.4	260.0	275.4	172.2	169.1	260.0	275.4	551.3	583.9	409.2	403.8	25.1	
Median	74.2	90.0	24.4	24.6	241.4	249.3	331.6	361.2	239.2	255.0	165.0	165.0	67.7	85.2	234.4	241.6	165.8	165.0	234.1	241.6	536.3	482.5	365.3	308.0	23.4	
25th %ile	53.9	61.7	19.0	17.7	239.1	222.9	316.9	321.1	218.9	231.1	165.0	164.9	52.3	59.9	216.1	219.3	165.0	165.0	216.1	217.2	472.3	403.6	343.7	275.4	21.5	
10th %ile	51.9	45.3	17.2	11.8	223.4	217.4	298.2	287.7	216.9	210.3	157.1	137.9	34.3	28.2	199.1	197.0	162.9	144.2	199.1	194.1	449.8	382.9	298.2	271.6	20.8	
— Average	95.2	93.6	38.2	27.6	246.0	251.0	383.1	374.2	264.0	260.6	163.6	163.8	67.3	83.1	240.8	250.5	173.2	167.2	240.4	249.8	521.2	528.8	391.0	412.2	23.1	
Count	9	60	9	60	9	60	9	60	9	60	14	80	14	80	14	80	14	81	14	80	9	60	14	80	0	4
Avg. assets	545M	611M	545M	611M	545M	611M	545M	611M	545M	611M	919M	3,014M	919M	3,014M	919M	3,014M	922M	3,026M	922M	3,026M	389M	441M	512M	2,313M	173M	
Kentucky Retirement Systems																										
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	165.0	165.0	-15.4	-15.4	166.4	166.4	181.8	181.8	166.4	166.4	n/a	n/a	191.0	191.0	n/a	n/a
%ile											23%	25%	0%	1%	0%	4%	92%	89%	0%	4%			0%	1%		
Assets											190M	190M	190M	190M	190M	190M	190M	190M	190M	190M			166M	166M		

- The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
- The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 165 bps (on amount fees are based on) for underlying management fees and 110 bps (on NAV) for underlying performance fees were used.
- The total cost also includes the internal cost of monitoring and selecting private equity investments. Your cost of monitoring and selecting was 16.8 bps for LPs. The peer average cost of monitoring and selecting was 3.8 bps for fund of funds and 9.9 bps for LPs.
- Co-investment is included with direct LPs because it can only be done alongside direct LPs. CEM uses this combined style in its benchmark cost analysis to ensure funds that reduce their costs by using co-investment receive benchmark credit. Co-investment is done by none of your peers and 4 of the U.S. funds.

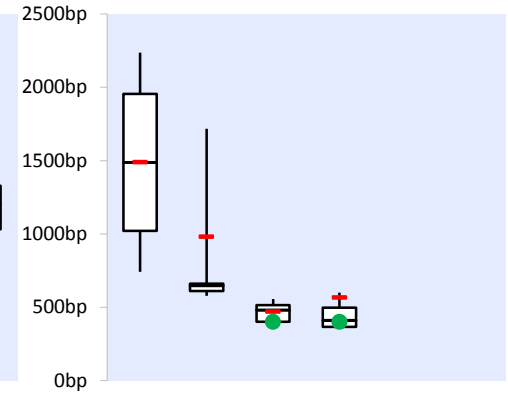
Diversified Private Equity Direct LPs: A default of 165 bps was used because you were unable to provide support for your unusually low cost of 141 bps (2.7 million).

## LBO

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



	Fund of Funds										Direct LP						Direct LP & Co-Inv. <sup>4</sup>				Fund of Funds		Direct LP & Co-Inv. <sup>4</sup>		Internal	
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Total excl. perf		Total <sup>3</sup> incl. perf.		incl. perf.		Total			
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	43.0	165.8	36.6	52.2	270.6	321.7	351.2	540.8	195.5	319.4	170.0	173.4	149.7	196.5	314.6	361.5	173.9	175.0	314.6	361.5	2235.6	1718.2	556.3	600.7		
75th %ile	36.3	109.1	31.2	40.1	253.3	282.2	323.4	434.2	190.4	265.8	165.0	165.0	137.3	159.1	302.6	318.7	165.4	170.5	302.6	318.7	1955.7	662.1	514.9	497.7		
Median	25.2	78.4	22.3	39.5	224.3	280.4	276.9	380.4	181.8	229.9	151.5	165.0	123.0	130.1	288.8	289.7	164.6	165.0	288.8	289.7	1489.1	649.1	483.5	412.3		
25th %ile	14.1	47.5	13.5	35.3	195.4	266.7	230.5	369.8	173.2	199.0	120.8	151.2	102.1	97.2	267.5	259.9	151.5	161.6	267.5	247.9	1022.5	611.8	401.2	367.2		
10th %ile	7.4	20.7	8.1	16.9	178.0	206.5	202.7	258.4	168.0	178.3	119.8	120.6	77.6	61.0	216.3	219.2	133.1	147.1	216.3	219.2	742.6	578.3	381.3	360.3		
— Average	25.2	88.3	22.3	36.0	224.3	268.8	276.9	396.1	181.8	242.9	146.0	158.8	116.3	125.1	272.7	287.7	156.4	162.3	272.7	286.9	1489.1	980.2	470.3	567.3		
Count	2	5	2	5	2	5	2	5	2	5	5	20	5	20	5	20	5	20	5	20	2	5	5	20	0	0
Avg. assets	46M	202M	46M	202M	46M	202M	46M	202M	46M	202M	1,784M	2,907M	1,784M	2,907M	1,784M	2,907M	1,817M	2,978M	1,817M	2,978M	20M	125M	867M	2,113M		
Kentucky Retirement Systems																										
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	120.8	120.8	158.0	158.0	322.6	322.6	164.6	164.6	322.6	322.6	n/a	n/a	401.2	401.2	n/a	n/a
%ile											25%	11%	100%	74%	100%	79%	50%	26%	100%	79%			25%	47%		
Assets											1,146M	1,146M	1,146M	1,146M	1,146M	1,146M	1,146M	1,146M	1,146M	1,146M			921M	921M		

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.

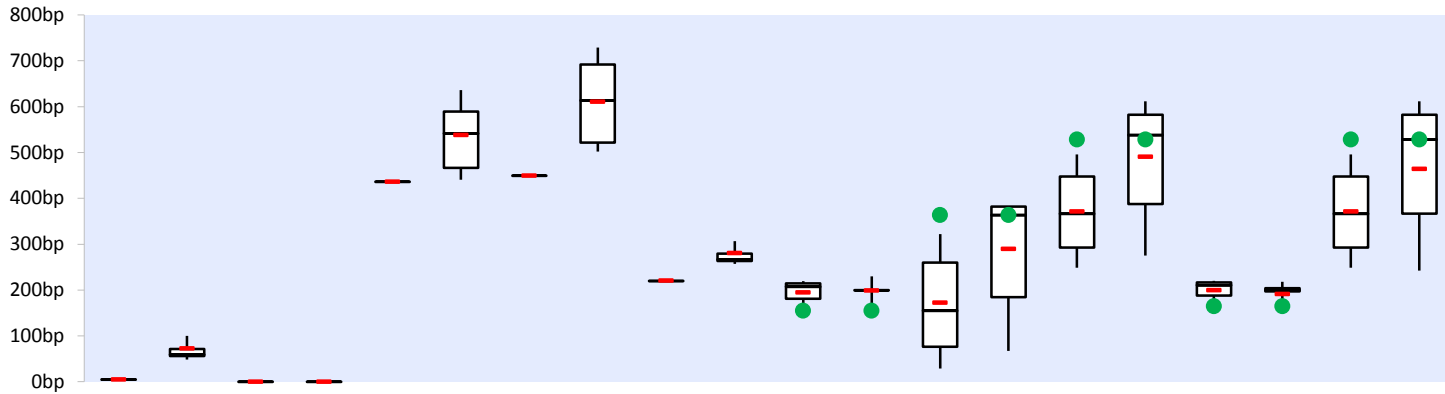
2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 152 bps (on amount fees are based on) for underlying management fees and 196 bps (on NAV) for underlying performance fees were used.

3. The total cost also includes the internal cost of monitoring and selecting private equity investments. Your cost of monitoring and selecting was 43.9 bps for LPs. The peer average cost of monitoring and selecting was 5.1 bps for fund of funds and 10.5 bps for LPs.

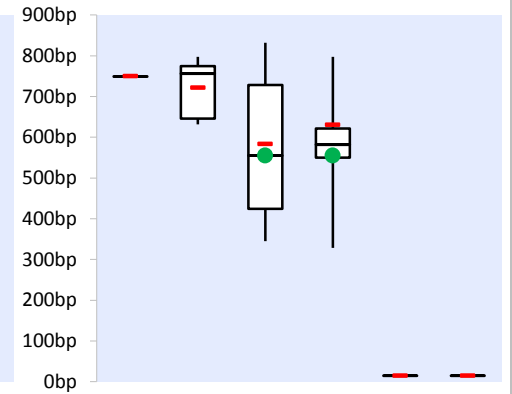
4. Co-investment is included with direct LPs because it can only be done alongside direct LPs. CEM uses this combined style in its benchmark cost analysis to ensure funds that reduce their costs by using co-investment receive benchmark credit. Co-investment is done by none of your peers and none of the U.S. funds.

## Venture Capital

Cost as a % of the amount fees are based on<sup>1</sup>



Cost as a % of NAV



	Fund of Funds										Direct LP				Direct LP & Co-Inv. <sup>4</sup>				Fund of Funds		Direct LP & Co-Inv. <sup>4</sup>		Internal			
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>2</sup>		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Total <sup>3</sup> incl. perf.		Total <sup>3</sup> excl. perf.		Total			
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US		
90th %ile	4.9	99.7	0.0	0.0	436.4	636.1	449.6	729.3	220.4	306.9	219.2	229.8	322.1	382.2	496.1	611.7	220.0	217.7	496.1	611.7	749.8	797.0	832.2	797.0	15.0	15.0
75th %ile	4.9	71.3	0.0	0.0	436.4	589.4	449.6	691.9	220.4	279.4	214.7	200.0	259.5	382.2	447.4	582.2	216.6	204.1	447.4	582.2	749.8	774.8	728.4	621.2	15.0	15.0
Median	4.9	59.5	0.0	0.0	436.4	541.8	449.6	613.9	220.4	266.7	207.2	200.0	155.3	363.7	366.3	538.3	211.0	200.0	366.3	528.5	749.8	756.7	555.3	582.2	15.0	15.0
25th %ile	4.9	56.3	0.0	0.0	436.4	466.2	449.6	522.0	220.4	263.5	181.1	200.0	76.1	184.7	292.7	387.7	187.9	196.8	292.7	366.3	749.8	646.0	424.0	550.1	15.0	15.0
10th %ile	4.9	48.6	0.0	0.0	436.4	440.6	449.6	502.3	220.4	257.1	165.4	163.7	28.6	67.2	248.6	275.3	174.0	165.4	248.6	242.6	749.8	631.4	345.1	328.1	15.0	15.0
— Average	4.9	72.2	0.0	0.0	436.4	537.7	449.6	610.9	220.4	280.4	194.8	199.0	172.0	289.8	371.3	490.8	199.3	191.2	371.3	464.0	749.8	721.6	583.1	630.1	15.0	15.0
Count	1	10	1	10	1	10	1	10	1	10	3	25	3	25	3	25	3	25	3	25	1	10	3	25	1	1
Avg. assets	161M	456M	161M	456M	161M	456M	161M	456M	161M	456M	208M	354M	208M	354M	208M	354M	208M	355M	208M	355M	96M	408M	150M	270M	11M	11M
Kentucky Retirement Systems																										
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	154.9	154.9	363.7	363.7	528.5	528.5	164.7	164.7	528.5	528.5	n/a	n/a	555.3	555.3	n/a	n/a
%ile											0%	4%	100%	50%	100%	46%	0%	8%	100%	50%			50%	33%		
Assets											347M	347M	347M	347M	347M	347M	347M	347M	347M	347M			330M	330M		

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.

2. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 207 bps (on amount fees are based on) for underlying management fees and 382 bps (on NAV) for underlying performance fees were used.

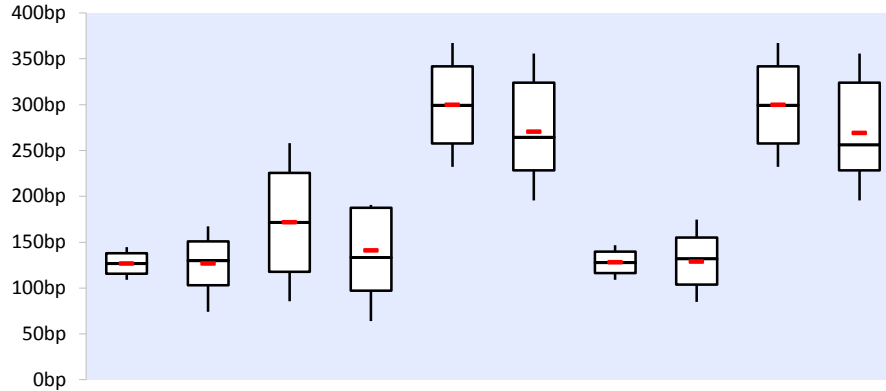
3. The total cost also includes the internal cost of monitoring and selecting private equity investments. Your cost of monitoring and selecting was 9.8 bps for LPs. The peer average cost of monitoring and selecting was 8.3 bps for fund of funds and 4.5 bps for LPs.

4. Co-investment is included with direct LPs because it can only be done alongside direct LPs. CEM uses this combined style in its benchmark cost analysis to ensure funds that reduce their costs by using co-investment receive benchmark credit. Co-investment is done by none of your peers and 2 of the U.S. funds.

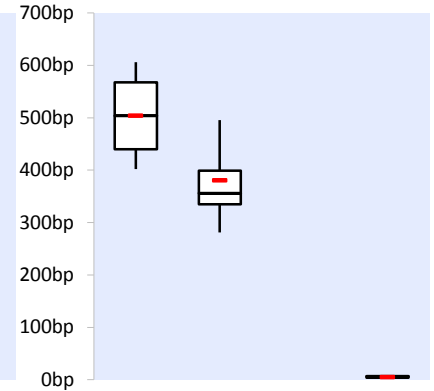


## Other Private Equity

Cost as a % of the amount fees are based on<sup>1</sup>

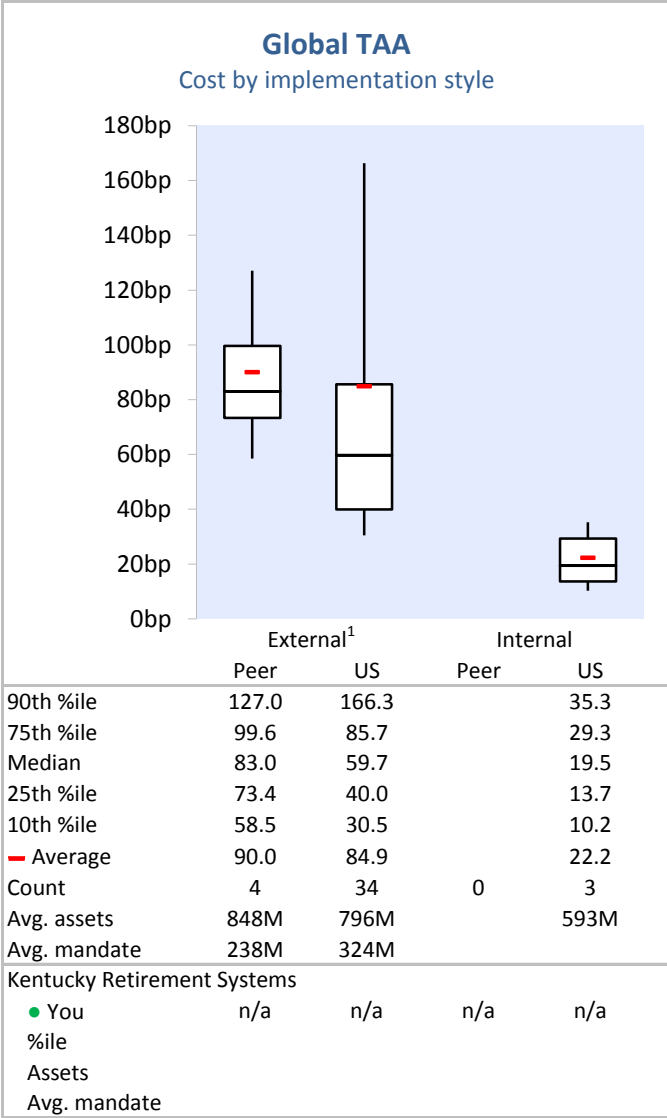


Cost as a % of NAV



	Direct LP						Direct LP & Co-Inv. <sup>3</sup>				Direct LP & Co-Inv. <sup>3</sup>		Internal		
	Mgmt fees		Perf. fees		Total <sup>2</sup> incl. perf.		Total excl. perf.		Total <sup>2</sup> incl. perf.		Total <sup>2</sup> incl. perf.		Total		
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	
90th %ile	144.6	167.3	258.0	190.6	367.1	355.6	146.8	174.7	367.1	355.6	606.0	495.6		7.1	
75th %ile	137.9	151.0	225.7	187.4	341.8	324.0	139.7	154.9	341.8	324.0	567.8	399.3		6.8	
Median	126.7	129.8	171.8	133.4	299.7	264.6	127.9	132.1	299.7	256.1	503.9	356.5		6.1	
25th %ile	115.5	103.0	117.9	97.2	257.6	228.2	116.2	103.9	257.6	228.2	440.1	335.0		3.7	
10th %ile	108.8	73.9	85.5	63.9	232.3	195.7	109.1	85.0	232.3	195.7	401.9	281.1		2.3	
— Average	126.7	126.7	171.8	140.8	299.7	270.5	127.9	128.9	299.7	269.0	503.9	380.2		4.9	
Count	2	20	2	20	2	20	2	20	2	20	2	20	0	3	
Avg. assets	1,084M	673M	1,084M	673M	1,084M	673M								393M	
Kentucky Retirement Systems															
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
%ile															
Assets															

1. The base for fees is usually the committed amount during the commitment period, and unreturned invested capital afterwards.
2. The total cost also includes the internal cost of monitoring and selecting private equity investments. The peer average cost of monitoring and selecting was 1.3 bps for
3. Co-investment is included with direct LPs in CEM's benchmark cost analysis because it reduces the cost of investing in direct LPs. Co-investment is done by none of your peers and 1 of the U.S. funds.

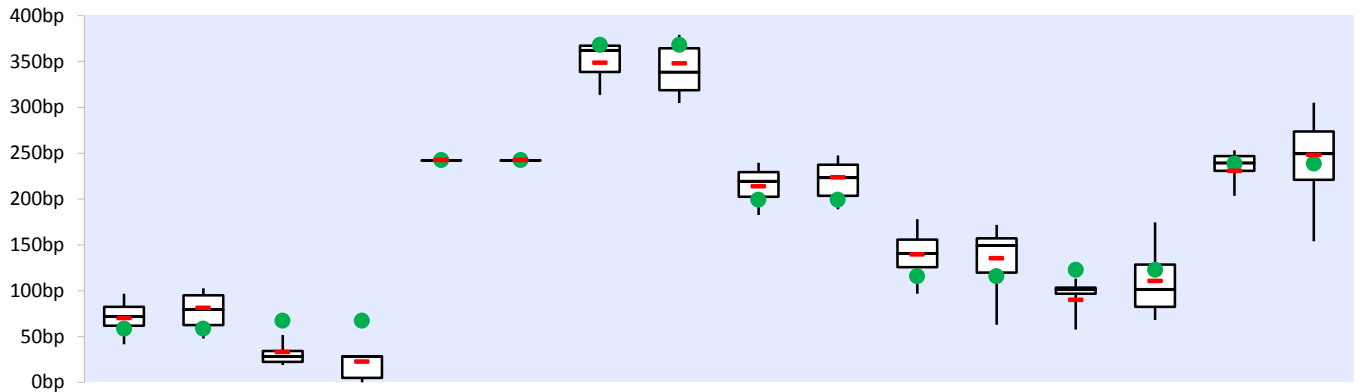


1. Breakdown of External fees

	Your Plan	Peer Average	US Average
Base fees	n/a	72.5	66.2
Performance fees	n/a	17.5	17.3
Internal and other	<u>n/a</u>	<u>0.0</u>	<u>1.4</u>
Total	n/a	90.0	84.9

## Hedge Funds

Cost by implementation style



	Fund of Funds										External direct					
	Mgmt fees (Top layer)		Perf. fees (Top layer)		Underlying mgmt. & perf. <sup>1</sup>		Total <sup>2</sup> incl. perf.		Total <sup>2</sup> excl. perf.		Mgmt fees		Perf. fees		Total <sup>2</sup> incl. perf.	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile	96.8	102.9	51.9	28.7	242.5	242.5	369.6	379.1	239.6	247.4	178.1	171.8	113.1	174.6	253.3	305.3
75th %ile	82.3	95.1	34.4	28.5	242.5	242.5	367.3	364.4	229.5	237.3	155.7	157.2	103.4	128.5	246.8	273.6
Median	72.0	79.7	28.5	28.5	242.5	242.5	362.5	338.7	219.6	223.5	140.9	149.3	101.6	101.6	239.5	249.7
25th %ile	61.7	62.6	22.6	5.1	242.5	242.5	338.6	318.9	202.6	203.5	125.6	119.9	96.8	82.5	230.7	220.9
10th %ile	41.6	47.9	18.9	0.0	242.5	242.5	313.6	304.8	182.5	188.8	96.8	63.0	57.6	68.1	203.7	154.2
— Average	70.1	81.4	33.1	22.6	242.5	242.5	348.6	347.7	213.9	223.5	139.6	135.4	90.0	110.5	230.5	248.2
Count	6	54	6	54	6	54	6	54	6	54	8	62	8	62	8	62
Avg. assets	582M	534M	582M	534M	582M	534M	582M	534M	582M	534M	1,032M	1,837M	1,032M	1,837M	1,032M	1,837M
Kentucky Retirement Systems																
● You	58.4	58.4	67.4	67.4	242.5	242.5	368.3	368.3	199.3	199.3	115.9	115.9	122.9	122.9	238.8	238.8
%ile	20%	19%	100%	98%	40%	36%	80%	77%	20%	19%	14%	21%	100%	70%	43%	34%
Assets	1,540M	1,540M	1,540M	1,540M	1,540M	1,540M	1,540M	1,540M	1,540M	1,540M	77M	77M	77M	77M	77M	77M

1. The fees of fund of funds include both the top layer fees paid to the fund of funds manager and the underlying fees paid to the 'underlying partnerships' held by the fund of funds. Most funds were unable to provide the underlying fees so defaults of 141 bps (on NAV) for underlying management fees and 102 bps (on NAV) for underlying performance fees were used.

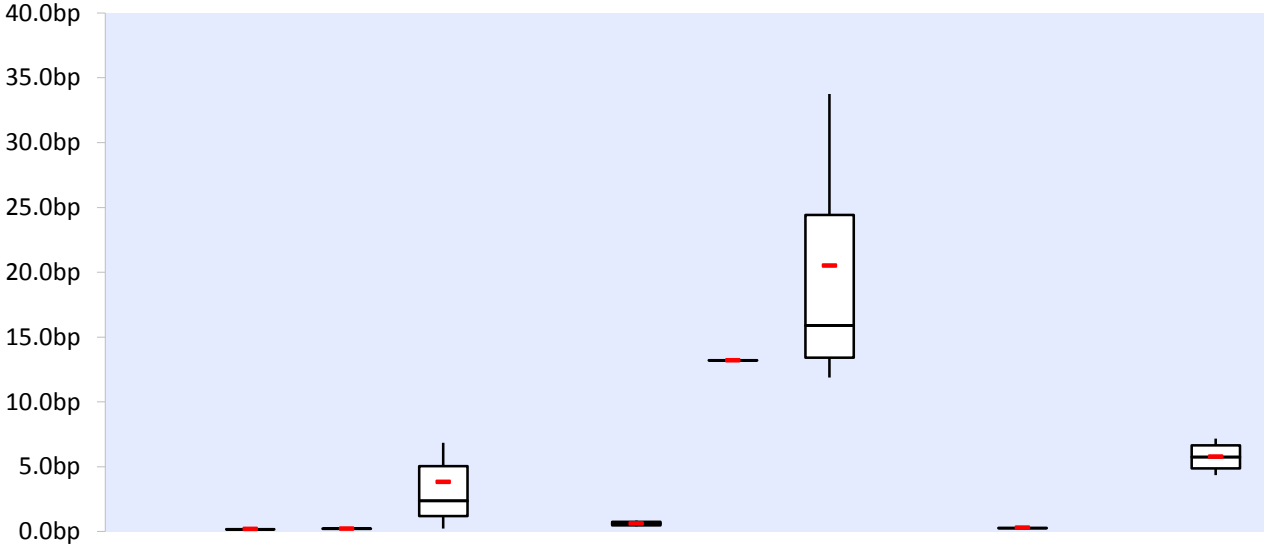
2. The total cost also includes the internal cost of monitoring and selecting hedge fund investments. Your cost of monitoring and selecting was 0.0 bps for fund of funds and 0.0 bps for external direct. The peer average cost of monitoring and selecting was 2.9 bps for fund of funds and 0.9 bps for external direct.

Hedge Funds - Fund of Funds ('bottom layer'): For comparability with other styles, a default for management fees paid to the 'bottom layer' underlying managers of 141 bps was used.

Hedge Funds - Fund of Funds ('bottom layer'): For comparability, a default for performance fees paid to the 'bottom layer' underlying managers of 102 bps (on NAV) was used.

### Overlays: currency, duration

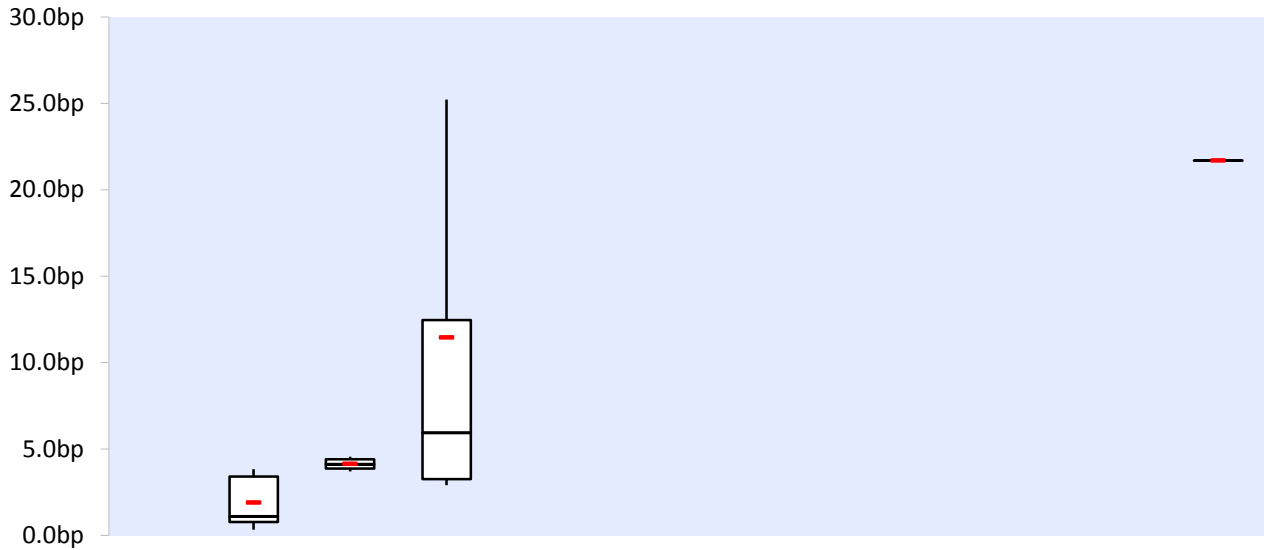
Cost by implementation style



	Currency Hedge				Discretionary Currency				Duration Management			
	Internal		External		Internal		External		Internal		External	
	% of notional		% of notional		% of notional		% of notional		% of notional		% of notional	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile		0.2	0.2	6.8		0.8	13.2	33.7		0.3		7.2
75th %ile		0.2	0.2	5.0		0.8	13.2	24.4		0.3		6.6
Median		0.2	0.2	2.4		0.6	13.2	15.9		0.3		5.8
25th %ile		0.2	0.2	1.2		0.5	13.2	13.4		0.3		4.9
10th %ile		0.2	0.2	0.2		0.4	13.2	11.9		0.3		4.4
— Average		0.2	0.2	3.8		0.6	13.2	20.5		0.3		5.8
Count	0	1	1	11	0	2	1	6	0	1	0	2
Avg. notional		4,225M	227M	2,464M		12,461M	1,000M	1,626M		1,800M		834M
Kentucky Retirement Systems												
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile												
Notional												

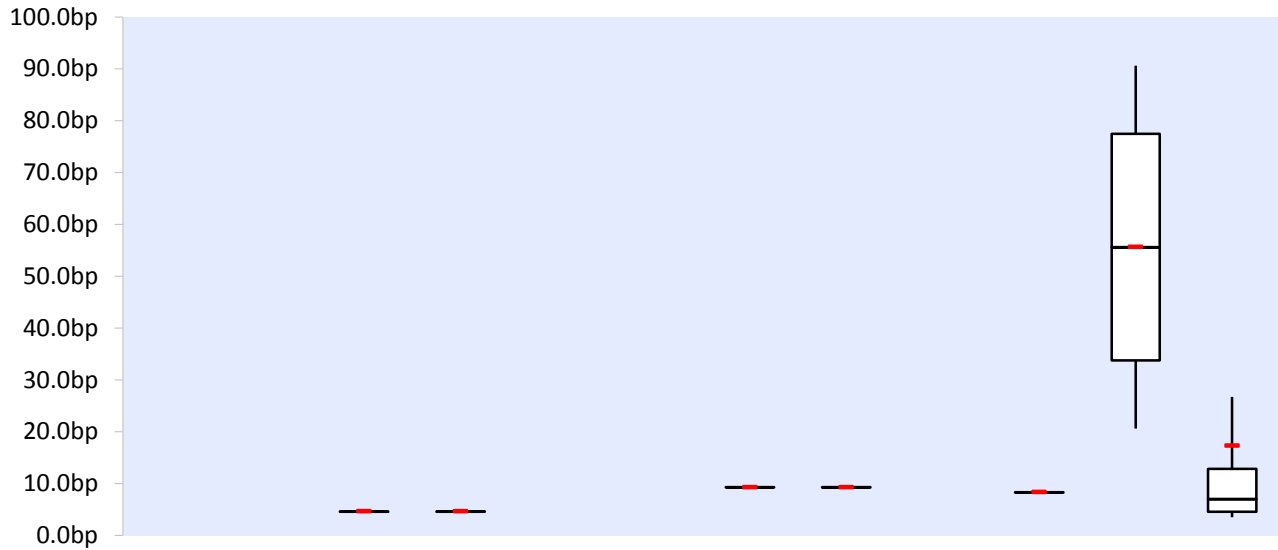
### Overlays: passive beta/rebalancing, global TAA, policy tilt TAA

Cost by implementation style



	Passive Beta/Rebalancing				Global TAA				Policy Tilt TAA			
	Internal		External		Internal		External		Internal		External	
	% of notional		% of notional		% of notional		% of notional		% of notional		% of notional	
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile		3.8	4.6	25.2								21.7
75th %ile		3.4	4.4	12.5								21.7
Median		1.1	4.1	5.9								21.7
25th %ile		0.8	3.9	3.3								21.7
10th %ile		0.3	3.7	2.9								21.7
— Average		1.9	4.1	11.5								21.7
Count	0	5	2	15	0	0	0	0	0	0	0	1
Avg. notional		974M	4,290M	1,482M								32M
Kentucky Retirement Systems												
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile												
Notional												

**Overlays: commodity, long/short, other**  
Cost by implementation style



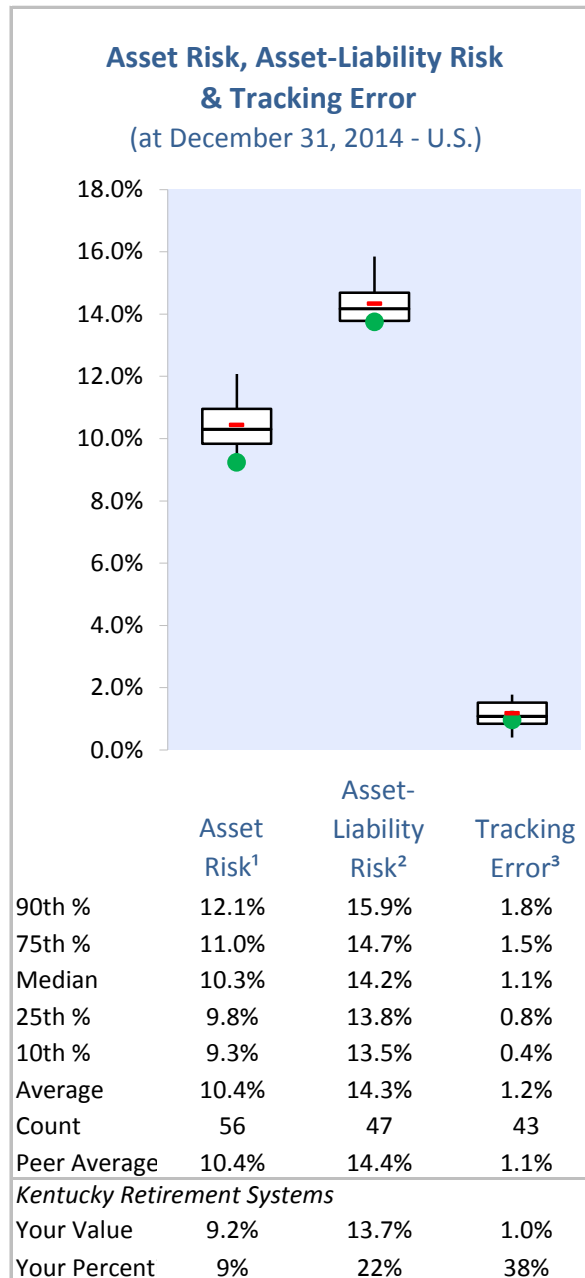
	<u>Commodity</u>				<u>Long/ Short</u>				<u>Other</u>			
	<u>Internal</u>		<u>External</u>		<u>Internal</u>		<u>External</u>		<u>Internal</u>		<u>External</u>	
	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>	<u>% of notional</u>
	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US	Peer	US
90th %ile			4.7	4.7			9.3	9.3		8.4	90.6	26.8
75th %ile			4.7	4.7			9.3	9.3		8.4	77.5	12.9
Median			4.7	4.7			9.3	9.3		8.4	55.6	7.0
25th %ile			4.7	4.7			9.3	9.3		8.4	33.8	4.6
10th %ile			4.7	4.7			9.3	9.3		8.4	20.6	3.5
— Average			4.7	4.7			9.3	9.3		8.4	55.6	17.3
Count	0	0	1	1	0	0	1	1	0	1	2	10
Avg. notional			1,076M	1,076M			298M	298M		77M	64M	653M
Kentucky Retirement Systems												
● You	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%ile												
Notional												

# 7

## Risk

Comparison of your risk levels to the U.S. Public universe	2
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Reduction in asset risk due to diversification	4
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Liability risk	7
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## Comparison of your risk levels to the U.S. Public universe



1 Asset risk is the expected volatility of your policy return. It is based on the historical variance of, and covariance between, the asset classes in your asset mix policy. It is expressed as an annual standard deviation.

2 Asset-liability risk is the expected volatility of surplus returns. Surplus returns are the changes in a plan's marked-to-market funded status caused by market factors. Asset liability risk is a function of the volatility of policy returns (asset risk), the volatility of surplus returns (surplus risk) and the correlation between policy returns and surplus returns.

3 Tracking error is the risk of active management. It equals the standard deviation of your annual net value added over 5-years.



## Calculation of asset risk

Before considering the benefit of diversification, the weighted average risk of the asset classes in your asset mix policy was 12.1%.

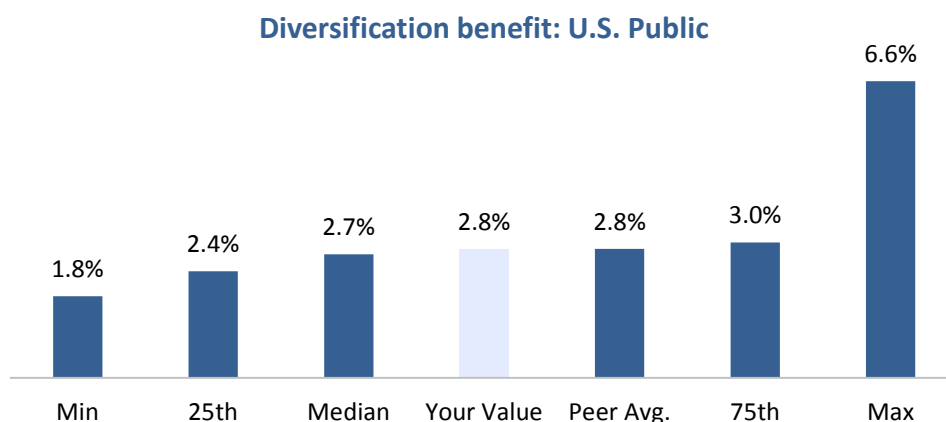
### Calculation of your weighted asset class risk

Asset Class	Policy weight	Risk <sup>1</sup>	Weighted risk
	(A)	(B)	(A X B)
Stock: U.S. Broad/All	20.4%	15%	3.1%
Stock: Emerging	3.2%	22%	0.7%
Stock: ACWI x U.S.	20.0%	14%	2.9%
Bonds: Global	19.5%	6%	1.1%
Bonds: Cash	2.4%	1%	0.0%
Real Estate	4.6%	15%	0.7%
Other	10.0%	6%	0.6%
Hedge Fund	10.0%	6%	0.6%
Private Equity: Diversified or All	10.0%	24%	2.4%
<b>Weighted Total</b>			<b>12.1%</b>

<sup>1</sup> Risk is the standard deviation of returns for the asset class based on standard benchmarks used by CEM. See page 15 of this section for benchmark details.

## Reduction in asset risk due to diversification

Your asset risk is less than your weighted asset risk because of the benefit of diversification. Diversification reduces risk because when one asset class has a negative return, it might be offset by another asset class with a positive return. The lower the correlation between your policy asset classes, the greater the diversification benefit. The correlation between your policy asset classes is shown on page 17 of this section.



The benefit of diversification equals weighted asset risk minus asset risk.

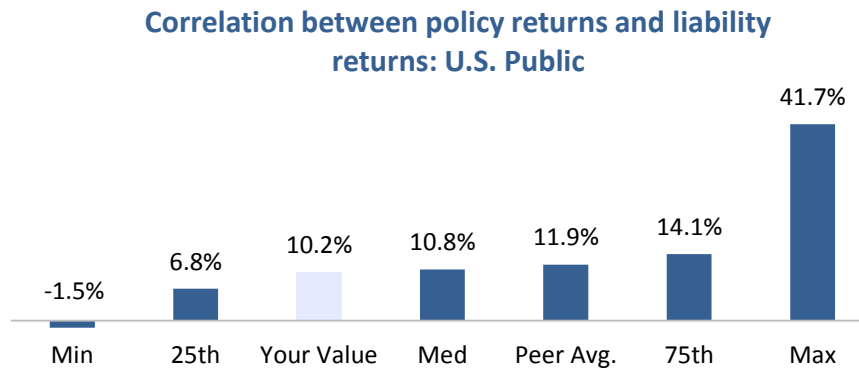
### Components of asset risk

	You	Peer median*	Peer average	U.S. Public median*	U.S. Public average
Weighted asset risk	12.1%	13.0%	13.3%	13.1%	13.2%
Benefit of diversification	2.8%	2.7%	2.8%	2.7%	2.8%
Asset risk	9.2%	10.3%	10.4%	10.3%	10.4%

\* Comparisons of components of asset risk should be interpreted with caution because it is not always possible to separate the diversification benefit from the weighted asset risk. For example, global stock as an asset class includes the diversification benefit of its geographic components within its asset risk.

## Asset-liability risk

Your plan would not have any asset-liability risk if your assets perfectly matched your liabilities. If they matched, then the correlation between asset returns and liability returns would be 100%. If liabilities increased, assets would increase by a like amount (and vice versa). Thus higher correlation between your asset returns and liability returns reduces your asset-liability risk.



In addition to the correlation between asset returns and liability returns, asset-liability risk is also a function of the volatility of asset returns (asset risk) and the volatility of liability returns<sup>1</sup> (liability risk =  $\sqrt{R_A^2 + R_L^2 - 2\rho_{AL}R_AR_L}$ ).

### Components of asset-liability risk

	You	Peer median	Peer average	U.S. Public median	U.S. Public average
Asset risk ( $R_A$ )	9.2%	10.3%	10.4%	10.3%	10.4%
Liability risk ( $R_L$ )	11.2%	11.1%	10.9%	11.2%	11.0%
Correlation between policy returns and liability returns ( $\rho_{AL}$ )	10.2%	10.8%	11.9%	10.8%	11.6%
Asset-liability risk	13.7%	14.2%	14.4%	14.2%	14.3%

1. Liability returns equal the changes in your marked-to-market liabilities caused by market factors. These are assumed to equal the return on your liability proxy portfolio (see next page).

## Liability proxy portfolio

Your liability proxy portfolio is the portfolio of nominal and inflation-indexed bonds that best matches the sensitivity of your liabilities to changes in real and nominal interest rates.

### Comparisons of liability proxy portfolio

	Your fund		Peer average		U.S. Public	
	Duration	% of Assets	Duration	% of Assets	Duration	% of Assets
Inflation Indexed Bonds	14.8	90%	12.3	68%	12.5	68%
Nominal Bonds	10.0	10%	13.7	32%	13.9	32%
Total		100%		100%		100%

Your liability proxy portfolio is a tool that:

- Helps you understand how the unsmoothed market value of your liabilities responds to changes in real and nominal interest rates.
- Helps you make better asset mix policy decisions by providing an understanding of which assets will decrease your asset-liability risk (i.e., assets that behave similarly to the neutral asset mix) and which assets will increase your risk.
- Helps you understand how your liabilities are different from your peers. Differences in liabilities mean that the same asset will have different risk / reward characteristics for different funds. For example, the risk of a nominal bond for a fund with 100% inflation sensitivity is much higher than it is for a fund with less than 100% inflation sensitivity.

Asset-liability risk could theoretically be eliminated if your actual asset mix matched the liability proxy portfolio. However, we recognize that this is neither an option nor a goal for most funds because:

- The supply of inflation-indexed assets is limited. These assets are required to match the obligations of pension liabilities.
- This low-risk strategy also has a lower expected return, implying either higher future funding costs or lower future benefits.

The methodology and formula used to determine your liability proxy portfolio are provided on pages 11-13 of this section.

## Liability risk

Differences in liability risk are due to differences in inflation sensitivity and member demographics.

A plan's inflation sensitivity depends on:

### a) The type of plan

Final and highest average plans have more inflation sensitivity than career average plans. Conversely, career average plans have more inflation sensitivity than flat benefit plans. Your plan type is flat benefit.

Plan type	# of plans	% of Total
Flat Benefit	1	2%
Career Average	-	0%
Final/Highest/Best Avg	49	89%
Other	5	9%
Total	55	100%

### b) Contractual inflation protection for retired members

Your retired members get 100% contractual inflation protection. Your retiree inflation protection is subject to a cap of Cap 5%.

Retiree inflation protection	# of plans		
	Corporate	Public	Other
0%	101	25	5
>0% and <50%	2	1	0
50%	0	2	0
>50% and <100%	2	5	0
100%	77	55	2
Total	182	88	7

### c) Member demographics

Member demographics impacts both inflation sensitivity and the duration of plan liabilities. The survey asks for your plan's percentage of liabilities that relate to retired members from your actuarial reports. If you did not provide this number, then it is estimated (see page 12 of this section). Your percentage of liabilities that relate to retired members was 55%.

	Your fund	Peer Average	U.S. Average
Active Members	59%	58%	59%
Retired Members	41%	42%	41%
Total	100%	100%	100%

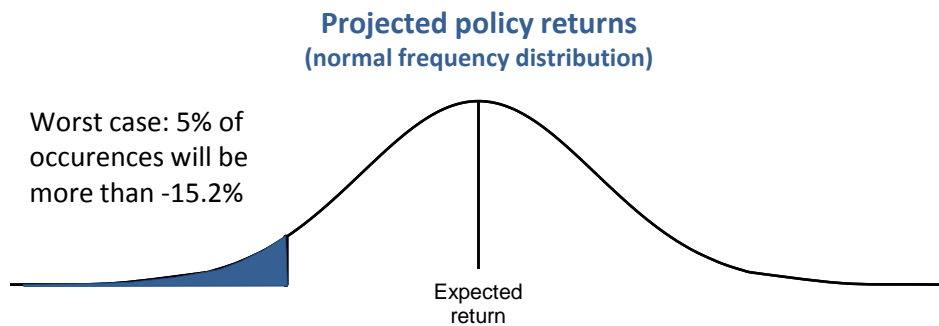
## Projected worst case scenarios

We can convert your asset risk and asset-liability risk into worst case outcomes for policy returns and funded status if we make the following simplifying assumptions:

- a) Returns are normally distributed.
- b) Historic return volatility and correlations will continue in the future.
- c) No change in your policy asset mix or liabilities.

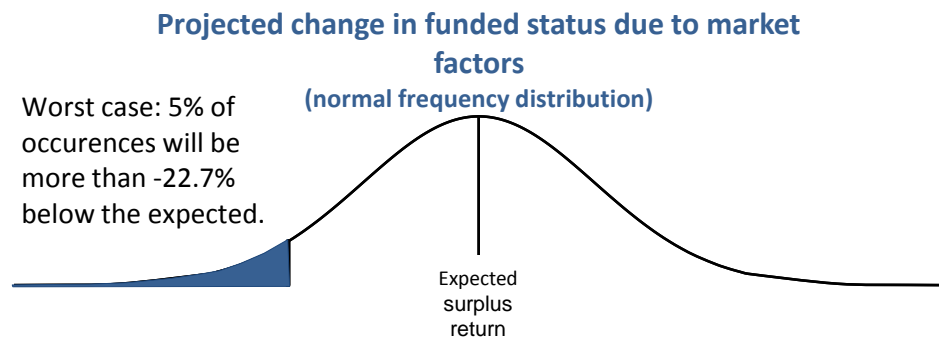
### a) Worst case policy returns

Every year there is a 5% probability that your policy return will be worse than your expected policy return by more than -15.2% (-15.2% equals  $-1.65 \times$  your asset risk of 9.2%). -15.2% is the starting point of worst case outcomes. They could be much worse.



### b) Worst case impact on funded status

Every year, there is a 5% probability that changes in your mark-to-market funded status caused by market factors ("Surplus Returns") will be worse than expected by more than -22.7%. (-22.7% equals  $-1.65 \times$  your asset-liability risk of 13.7%). -22.7% is the starting point of worst case outcomes. They could be much worse.



## Historic worst case scenarios during the past 5 years

### a) Historic worst case policy returns

During the past 5 years, your lowest policy return was 0.5% in 2011.

#### Historic policy returns - U.S.

	2014	2013	2012	2011	2010
90th %	8.7%	18.3%	13.8%	3.7%	14.0%
75th %	7.6%	17.0%	13.3%	2.7%	13.2%
Median	6.6%	15.5%	12.7%	1.4%	12.6%
25th %	5.9%	13.6%	11.8%	0.4%	11.8%
10th %	5.1%	11.6%	10.9%	-0.3%	11.3%
Average	6.8%	15.2%	12.6%	1.6%	12.4%
Count	57	62	67	67	72
Peer Avg	6.4%	14.8%	12.6%	1.0%	12.1%
Your Value	6.2%	13.6%	14.2%	0.5%	12.1%

### b) Historic worst case changes in funded status

During the past 5 years, your worst change in marked-to-market funded status caused by market factors ("Surplus Returns") was -21.1% in 2011.

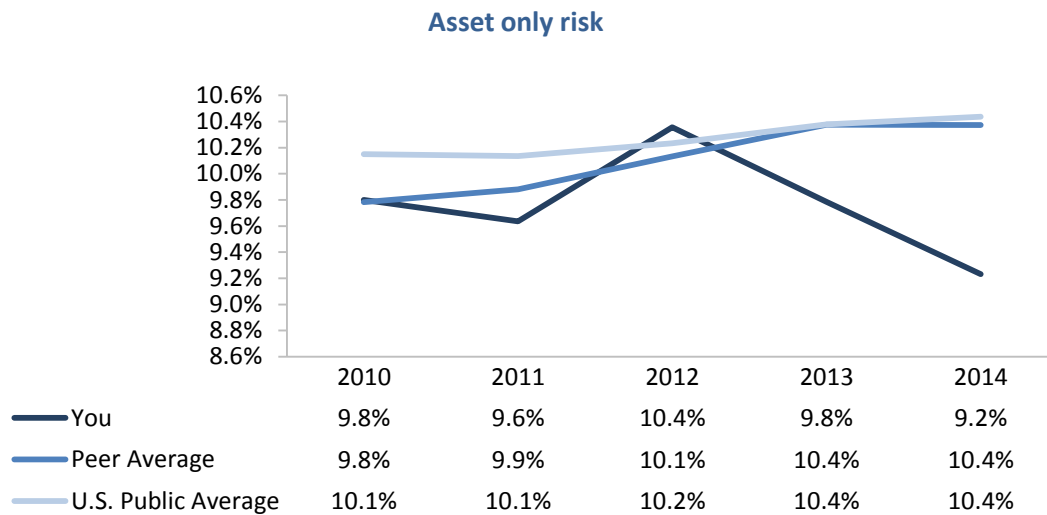
#### Historic changes in funded status caused by market factors - U.S.

	2014	2013	2012	2011	2010
90th %	-4.9%	36.9%	10.5%	-17.2%	6.6%
75th %	-6.2%	33.5%	9.7%	-18.7%	5.3%
Median	-7.6%	31.2%	7.7%	-20.1%	4.1%
25th %	-9.5%	27.4%	5.8%	-21.3%	2.9%
10th %	-11.1%	25.7%	5.0%	-23.2%	2.2%
Average	-7.7%	31.0%	7.8%	-20.2%	4.2%
Count	47	51	58	55	63
Peer Avg	-7.5%	31.5%	8.1%	-20.7%	4.4%
Your Value	-7.9%	30.6%	5.3%	-21.1%	3.1%

## Risk Trends - 2010 to 2014

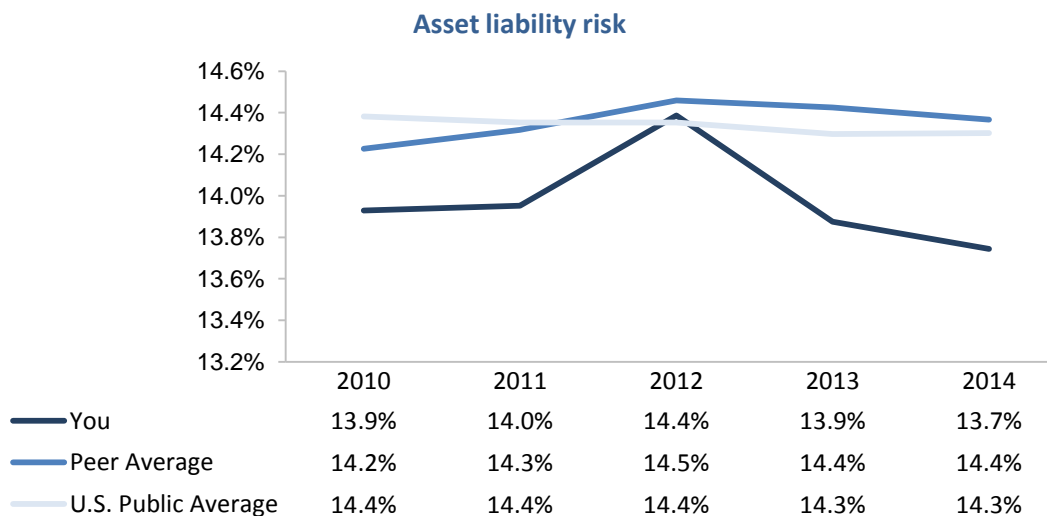
### a) Asset risk trends

Asset risk will only change if policy asset mix changes. Between 2010 and 2014 the asset risk for your fund decreased from 9.8% to 9.2%.



### b) Asset-liability risk trends

Asset-liability risk will change if policy asset mix changes, or if the nature of your liabilities changes. Between 2010 and 2014 the asset-liability risk for your fund decreased from 13.9% to 13.7%.





## Appendix A - Methodology and formula used to calculate liability return and liability proxy portfolio

### Risk calculation descriptions

CEM would like to recognize and thank Malcolm Hamilton previously of Mercer for providing the key formulas used to calculate liability returns. We would also like to thank Stijn Oude Brunink previously of ORTEC Consultants in the Netherlands who provided the proofs and made adjustments to Mr. Hamilton's formulas. These formulas and this section use several simplifying assumptions that could cause your fund's individual results to differ from actual. We encourage you to pursue more precise calculations of your liability returns.

### Step 1 - Inflation sensitivity

The first step in estimating your liability return is to determine your liabilities' inflation sensitivity. The degree of total inflation sensitivity determines the proportion of inflation-indexed bonds versus nominal bonds that belong in your liability proxy portfolio.

#### **Total inflation sensitivity**

- = Inflation protection retirees X % liabilities relating to retirees
- + Inflation protection for active members X (1 - % liabilities relating to retirees)

#### **Inflation protection for retirees**

On the survey we asked for the amount of contractual inflation protection provided to retirees.

Your response was 100% which compares to an average of 51% for your peers and 24% for U.S. funds.

Ad hoc inflation protection is not considered because it is not a contractual liability. However, many funds are managed to maintain historic levels of ad hoc increases. If this is the case with your fund, then your inflation protection may have been understated. Please ask for CEM to make that adjustment for you.

#### **Inflation protection for active members**

We inferred inflation protection for your active members to be 77% based on your plan type of Flat Benefit.

Final and highest average plans have less than 100% inflation protection because during the averaging period, inflation protection is only 50%, not 100%. This is a natural function of taking an average of more than one year's earnings. Thus the weighted average inflation protection for active members in a 5-year final average plan is around 86% and in a 3-year average plan, 93%. These weighted averages are lower than intuition might suggest because the active members associated with the largest liabilities (i.e., the highest weights) are the ones closest to retirement.

Flat Benefit and Career Average plans are assumed to have 77% inflation protection. Contractually, flat benefit plans have zero inflation protection but negotiated increases tend to closely track inflation. However, just as with Final Average plans, inflation protection between negotiated increases is less than full inflation.

## Step 2 - Proportion of liabilities relating to retirees

The second step is to determine how much of your liabilities relate to your retirees versus your active members. This number is used to weight the liability proxy portfolio's obligations to retirees and active members.

This ratio depends on several factors including the ratio of retired and active members, member demographics and the inflation sensitivity of the promise made to these two member groups. Deferred (also known as inactive) members are ignored because even if they are large in number they tend to represent only a very small fraction of the future liability.

### Equivalency Table

Retirees as a % of Active + Retirees	% Liabilities Relating to Retirees
0%	0%
10%	22%
20%	35%
30%	45%
40%	55%
50%	63%
60%	71%
70%	79%
80%	86%
90%	93%
100%	100%

Most funds have provided the actual ratio from their actuarial reports (as requested on the survey). If the ratio is not provided, it is estimated based on the "Equivalency" table above.

Your percentage of liabilities that relates to retirees was 55%. The percentage of liability that relates to retirees is higher than the retirees as a percentage of active and retired members because retirees have accrued a higher benefit.

## Step 3 - Determining your duration relative to real and nominal yields

Duration enables you to determine the change in value of a cash flow, such as your pension liabilities, caused by a change in interest rates. The relationship between duration and cost of your pension liability is as follows.

Percentage change in pension liability cost

$$= (- \text{Modified duration relative to change in real yields} \times \text{change in real yields}) \\ + (- \text{Modified duration relative to change in nominal yields} \times \text{change in nominal yields})$$

The modified duration of your liabilities with respect to changes in real and nominal yields is determined by the following two formulas.

Modified duration relative to changes in real yields

$$= 10 \times [\text{Inflation protection for active members} \times (1 - \% \text{ of liabilities relating to retirees}) \\ + \text{Inflation protection for retirees} \times (1 - \% \text{ of liabilities relating to retirees}/4) \\ + (\text{Inflation protection for retirees}/10) \times (1.5 - 0.5 \times \% \text{ liabilities relating to retirees})]$$

Modified duration relative to changes in nominal yields

$$= 10 \times [(2 - 5 \times \% \text{ Liabilities relating to retirees}/4 - \text{inflation protection for actives} \times \\ (1 - \% \text{ liabilities relating to retirees}) \\ - (\text{Inflation protection for retirees}/10) \times (8.5 - 2 \times \% \text{ liabilities relating to retirees}) \\ - (\text{Inflation protection for retirees}/10) \times (1.5 - 0.5 \times \% \text{ liabilities relating to retirees})]$$

#### Step 4 - Determining the liability proxy portfolio

Knowing the sensitivity of your pension liabilities to real and nominal interest rates enables you to construct a liability proxy portfolio using a combination of nominal bonds and inflation-indexed bonds.

Duration of inflation-indexed bonds in your liability proxy portfolio =  
Modified Duration Relative to Change in Real yields ÷ Proportion of inflation-indexed bonds in your liability proxy portfolio (this is the total inflation sensitivity)

Duration of nominal bonds in your liability proxy portfolio =  
Modified Duration Relative to Change in Nominal Yields ÷ Proportion of nominal bonds in your liability proxy portfolio (this is 1 minus the total inflation sensitivity)

Proportion of inflation-indexed bonds in your liability proxy portfolio = total inflation sensitivity

Proportion of nominal bonds in your liability proxy portfolio = 1 - total inflation sensitivity

#### Step 5 - Liability returns

The return earned on your liability proxy portfolio is the liability return and matches the change in your plan's liabilities in response to changes in market factors. It uses a true market valuation rather than a smoothed actuarial valuation. See page 17 for benchmark details.

##### Liability Return

- = Proportion indexed bonds in liability proxy portfolio X (CPI + average real yield)
- + Proportion nominal bonds in liability proxy portfolio X average long bond yield
- Modified duration relative to change in real yields X change in real yields
- Modified duration relative to change in nominal yields X change long yields

	Long Nominal Bonds		Inflation Indexed Bonds		CPI
	Year end yield	Change in yield	Year end yield	Change in yield	
2014	2.83	-1.06	0.89	-0.72	0.80
2013	3.89	0.94	1.61	1.46	1.50
2012	2.95	0.06	0.15	-0.38	1.70
2011	2.89	-1.45	0.53	-1.06	3.00
2010	4.34	-0.29	1.59	-0.44	1.50
2009	4.63	1.94	2.03	-0.13	2.70

## Appendix B - Methodology used to calculate asset and asset-liability risk

### Asset mix

Your asset only mix is a function of your policy asset mix, your currency hedging policy and the presence of any duration overlays.

CEM does not use your specific policy benchmarks. Standard asset class proxies (shown on the next page) are used for each given asset class. Monthly, historical data is used to construct an asset class variance/covariance table. Your specific policy weights are then used to calculate an expected monthly volatility for your policy mix using the following formula, which takes current asset class variances and covariances as expected future variances and covariances.

$$\begin{aligned}\text{Expected monthly variance of policy mix} &= \sum \sum w_x w_y \text{Cov}(X, Y) \\ &= \sum \sum w_x w_y \sigma_x \sigma_y \rho_{x,y}\end{aligned}$$

where

$w_x$  = policy weight of asset class X

$\sigma_x$  = standard deviation of monthly returns for asset class X

$w_y$  = policy weight of asset class Y

$\sigma_y$  = standard deviation of monthly returns for asset class Y

$\text{Cov}(X, Y)$  = covariance of X and Y

$\rho_{x,y}$  = Pearson's correlation of the returns for X and Y

Each sum is over all asset classes. Assuming normal distribution of returns, we then solve for expected annual standard deviation as:

$$\begin{aligned}\text{Expected annual standard deviation of policy mix} &= \\ &(\text{Expected monthly variance of policy mix})^{1/2} \times (12)^{1/2}\end{aligned}$$

Hedged and unhedged asset classes are treated as separate asset classes in the model. Funds with hedging policies between 0% and 100% have their policy weight allocated between the hedged and unhedged asset classes according to the proportion hedged.

Duration overlays are also treated as a separate asset class. Their weight is taken as notional value divided by total plan assets. For funds with duration overlays, the sum of weights will be greater than 100%. Rather than calculating a return for every possible duration, CEM's total variance/covariance matrix includes bonds with a continual duration of each whole number. A given fund's duration overlay is then represented by the two constant duration bonds closest to the duration of the overlay, with the total weight divided proportionately between them.

### Asset-liability risk

Asset-liability risk is calculated in exactly the same way as asset risk with the addition of a short position in the liability proxy portfolio. This portfolio will typically be represented by up to four bonds with continual duration whose summed weights will equal -100%, and whose real and nominal duration match the liability proxy portfolio.

## Appendix C - Asset class benchmarks used

CEM uses the same asset class proxy benchmarks for all participants in calculating risk. The benchmarks used for asset classes in your policy mix and liability proxy portfolio are shown below, along with the annualized standard deviation of monthly returns. Different asset classes have different histories - the start date after which monthly data was used for the given asset class is also shown.

Asset Class	Proxy Benchmark	Start Date	Standard deviation of monthly return - annualized ( $\sigma$ )
Stock: U.S. Broad/All	Russell 3000	Jan 1979	15.1%
Stock: Emerging	MSCI Emerging	Jan 1988	22.4%
Stock: ACWI x U.S.	MSCI ACWI ex US	Jan 1988	14.3%
Bonds: Global	Barclays Global Aggregate	Jan 1990	5.5%
Bonds: Cash	BofA ML U.S. T-BILL 3M	Feb 1978	0.5%
Real Estate	MSCI US REIT Deleveraged	Jan 1997	14.7%
Other	Barclay's TIPS* Modeled prior to 4/97	Apr 1997	6.0%
Hedge Fund	HFRI Fund Weighted Hedge Fund	Jan 1990	6.4%
Private Equity: Diversified or All	S&P Listed Private Equity	Dec 2003	24.1%
Liability: Real Return Bond Duration 14	Real Bond Duration 14	Jan 1989	12.1%
Liability: Real Return Bond Duration 15	Real Bond Duration 15	Dec 1994	12.0%
Liability: Nominal Bond Duration 10	Nominal Bond Duration 10	Dec 1985	9.2%

*See page 17 of this section for benchmark details.*

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Real Estate is proxied by the MSCI US REIT deleveraged by adding back in a return to debtholders of the Barclays CMBS Inv. Grade Commercial index. Average debt/total assets of REIT index before deleveraging is estimated to be 40%.

## Common asset class benchmarks used in United States

CEM uses the same asset class proxy benchmarks for all participants in calculating risk. Common benchmarks used for asset classes in your universe are shown below, along with the annualized standard deviation of monthly returns. Different asset classes have different histories - the start date after which monthly data was used for the given asset class is also shown.

Asset Class	Proxy Benchmark	Start Date	Standard deviation of monthly return - annualized ( $\sigma$ )
Stock: U.S. Broad/All	Russell 3000	Jan 1979	15.1%
Stock: U.S. Large Cap	S&P 500	Feb 1988	14.0%
Stock: U.S. Small Cap	Russell 2000	Jan 1979	19.2%
Stock: EAFE (Currency Hedged)	MSCI EAFE Hedged Exposure to Euro + Japan in (\$US)	Jan 1971	11.9%
Stock: EAFE	MSCI EAFE	Jan 1970	16.6%
Stock: Emerging	MSCI Emerging	Jan 1988	22.4%
Stock: Global	MSCI ACWI	Jan 1988	14.5%
Stock: ACWI x U.S.	MSCI ACWI ex US	Jan 1988	14.3%
Bonds: U.S.	Barclays US Aggregate	Feb 1976	5.6%
Bonds: High Yield	Barclays High Yield	Apr 1990	8.7%
Bonds: Long Bonds	Barclays U.S. Aggregate Long Government/Credit	Feb 1973	9.4%
Bonds: Cash	BofA ML U.S. T-BILL 3M	Feb 1978	0.5%
REITs	MSCI US REIT	Feb 1997	21.2%
Real Estate	MSCI US REIT Deleveraged	Jan 1997	14.7%
Hedge Fund	HFRI Fund Weighted Hedge Fund	Jan 1990	6.4%
Private Equity: Diversified or All	S&P Listed Private Equity	Dec 2003	24.1%
Liability: Real Return Bond Duration 10	Real Bond Duration 10	Aug 1984	9.4%
Liability: Real Return Bond Duration 11	Real Bond Duration 11	May 1985	10.3%
Liability: Nominal Bond Duration 10	Nominal Bond Duration 10	Dec 1985	9.2%
Liability: Nominal Bond Duration 14	Nominal US Bond Duration 14	Feb 1988	12.3%

### Source: Datastream

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Real Estate is proxied by the MSCI US REIT deleveraged by adding back in a return to debtholders of the Barclays CMBS Inv. Grade Commercial index. Average debt/total assets of REIT index before deleveraging is estimated to be 40%.

## Appendix D - Correlation Matrix

	Stock: U.S. Broad/All	Stock: Emerging	Stock: ACWI x U.S.	Bonds: Global	Bonds: Cash	Real Assets: Real Estate	Real Assets: Other	Hedge Fund	Private Equity: Diversified or All	Nominal Bond: Duration 10	Real Return Bond: Duration 14	Real Return Bond: Duration 15
Stock: U.S. Broad/All	1.00	0.70	0.79	-0.05	-0.03	0.58	0.05	0.78	0.81	-0.03	0.04	0.02
Stock: Emerging	0.70	1.00	0.77	-0.04	-0.08	0.48	0.11	0.81	0.74	-0.12	0.08	0.11
Stock: ACWI x U.S.	0.79	0.77	1.00	0.00	-0.03	0.49	-0.03	0.76	0.75	-0.11	0.00	-0.04
Bonds: Global	-0.05	-0.04	0.00	1.00	0.03	-0.15	-0.09	-0.07	-0.01	0.07	-0.04	-0.08
Bonds: Cash	-0.03	-0.08	-0.03	0.03	1.00	0.03	0.06	-0.03	-0.03	0.17	0.01	0.00
Real Assets: Real Estate	0.58	0.48	0.49	-0.15	0.03	1.00	0.28	0.43	0.73	0.00	0.14	0.15
Real Assets: Other	0.05	0.11	-0.03	-0.09	0.06	0.28	1.00	0.09	0.29	0.72	0.93	0.93
Hedge Fund	0.78	0.81	0.76	-0.07	-0.03	0.43	0.09	1.00	0.72	-0.07	0.09	0.07
Private Equity: Diversified or All	0.81	0.74	0.75	-0.01	-0.03	0.73	0.29	0.72	1.00	-0.11	0.13	0.14
Nominal Bond: Duration 10	-0.03	-0.12	-0.11	0.07	0.17	0.00	0.72	-0.07	-0.11	1.00	0.51	0.55
Real Return Bond: Duration 14	0.04	0.08	0.00	-0.04	0.01	0.14	0.93	0.09	0.13	0.51	1.00	0.98
Real Return Bond: Duration 15	0.02	0.11	-0.04	-0.08	0.00	0.15	0.93	0.07	0.14	0.55	0.98	1.00

## Correlation Matrix of Common Asset Classes in United States

	Stock: U.S. Broad/All	Stock: U.S. Large Cap	Stock: U.S. Small Cap	Stock: EAFE (Currency Hedged)	Stock: EAFE	Stock: Emerging	Stock: Global	Bonds: U.S.	Bonds: High Yield	Bonds: Cash	Real Assets: Commodities	Real Assets: REITs	Real Assets: Real Estate	Hedge Fund	Private Equity: Diversified or All	Stock: ACWI x U.S.	Bonds: Long Bonds	Real Return Bond: Duration 10	Real Return Bond: Duration 11	Nominal Bond: Duration 10	Nominal Bond: Duration 14
Stock: U.S. Broad/All	1.00	0.92	0.89	0.19	0.65	0.70	0.88	0.21	0.61	-0.03	0.18	0.03	0.58	0.78	0.81	0.79	0.21	0.10	0.09	-0.03	0.02
Stock: U.S. Large Cap	0.92	1.00	0.74	0.09	0.70	0.63	0.83	0.18	0.56	0.06	0.08	0.10	0.51	0.70	0.76	0.73	0.17	0.07	0.07	0.02	0.07
Stock: U.S. Small Cap	0.89	0.74	1.00	0.13	0.59	0.67	0.74	0.13	0.61	-0.08	0.19	0.03	0.61	0.82	0.79	0.70	0.13	0.06	0.04	-0.09	-0.06
Stock: EAFE (Currency Hedged)	0.19	0.09	0.13	1.00	0.15	0.13	0.23	0.09	0.07	0.05	0.13	-0.17	0.26	0.12	0.35	0.18	0.03	-0.02	0.01	-0.09	-0.07
Stock: EAFE	0.65	0.70	0.59	0.15	1.00	0.67	0.94	0.16	0.53	-0.07	0.12	0.07	0.56	0.66	0.82	0.87	0.19	0.13	0.12	-0.01	0.00
Stock: Emerging	0.70	0.63	0.67	0.13	0.67	1.00	0.77	0.01	0.62	-0.08	0.24	0.03	0.48	0.81	0.74	0.77	0.02	0.09	0.09	-0.12	-0.11
Stock: Global	0.88	0.83	0.74	0.23	0.94	0.77	1.00	0.14	0.61	0.00	0.21	0.03	0.58	0.77	0.82	0.91	0.12	0.09	0.09	-0.05	-0.02
Bonds: U.S.	0.21	0.18	0.13	0.09	0.16	0.01	0.14	1.00	0.19	0.38	-0.03	-0.16	0.22	0.07	0.14	0.04	0.95	0.59	0.60	0.88	0.88
Bonds: High Yield	0.61	0.56	0.61	0.07	0.53	0.62	0.61	0.19	1.00	-0.06	0.13	0.17	0.60	0.64	0.67	0.58	0.18	0.18	0.18	-0.06	-0.05
Bonds: Cash	-0.03	0.06	-0.08	0.05	-0.07	-0.08	0.00	0.38	-0.06	1.00	0.00	0.03	0.03	-0.03	-0.03	-0.03	0.27	0.07	0.09	0.17	0.09
Real Assets: Commodities	0.18	0.08	0.19	0.13	0.12	0.24	0.21	-0.03	0.13	0.00	1.00	0.15	0.21	0.30	0.41	0.16	-0.07	0.04	0.05	-0.06	-0.07
Real Assets: REITs	0.03	0.10	0.03	-0.17	0.07	0.03	0.03	-0.16	0.17	0.03	0.15	1.00	0.06	0.15	0.15	0.07	-0.14	-0.08	-0.08	-0.25	-0.24
Real Assets: Real Estate	0.58	0.51	0.61	0.26	0.56	0.48	0.58	0.22	0.60	0.03	0.21	0.06	1.00	0.43	0.73	0.49	0.22	0.13	0.13	0.00	-0.01
Hedge Fund	0.78	0.70	0.82	0.12	0.66	0.81	0.77	0.07	0.64	-0.03	0.30	0.15	0.43	1.00	0.72	0.76	0.08	0.08	0.08	-0.07	-0.05
Private Equity: Diversified or All	0.81	0.76	0.79	0.35	0.82	0.74	0.82	0.14	0.67	-0.03	0.41	0.15	0.73	0.72	1.00	0.75	0.08	0.12	0.11	-0.11	-0.13
Stock: ACWI x U.S.	0.79	0.73	0.70	0.18	0.87	0.77	0.91	0.04	0.58	-0.03	0.16	0.07	0.49	0.76	0.75	1.00	0.05	0.03	0.03	-0.11	-0.07
Bonds: Long Bonds	0.21	0.17	0.13	0.03	0.19	0.02	0.12	0.95	0.18	0.27	-0.07	-0.14	0.22	0.08	0.08	0.05	1.00	0.54	0.55	0.87	0.88
Real Return Bond: Duration 10	0.10	0.07	0.06	-0.02	0.13	0.09	0.09	0.59	0.18	0.07	0.04	-0.08	0.13	0.08	0.12	0.03	0.54	1.00	1.00	0.53	0.53
Real Return Bond: Duration 11	0.09	0.07	0.04	0.01	0.12	0.09	0.09	0.60	0.18	0.09	0.05	-0.08	0.13	0.08	0.11	0.03	0.55	1.00	1.00	0.52	0.52
Nominal Bond: Duration 10	-0.03	0.02	-0.09	-0.09	-0.01	-0.12	-0.05	0.88	-0.06	0.17	-0.06	-0.25	0.00	-0.07	-0.11	-0.11	0.87	0.53	0.52	1.00	0.96
Nominal Bond: Duration 14	0.02	0.07	-0.06	-0.07	0.00	-0.11	-0.02	0.88	-0.05	0.09	-0.07	-0.24	-0.01	-0.05	-0.13	-0.07	0.88	0.53	0.52	0.96	1.00



# 8

## Appendices

Appendix A - Data Summary

Appendix B - Data quality

Appendix C - Glossary of terms

## Appendix A - Data Summary

### Kentucky Retirement Systems

Plan Info	2014	2013	2012
Contact	David Peden	David Peden	TJ Carlson
Type of fund (corporate, public, other)	Public	Public	Public
Total fund size (mils) as at December 31	15,555.8	15,451.5	14,356.3
Asset-class level holdings provided on survey are: year end or average?	Year End	Year End	Year End
Total return for year ended	4.96%	12.61%	12.71%
Is the return net or gross?	Net of manager fees	Net of manager fees	Gross
Total fund policy or benchmark return	6.07%	13.33%	13.45%

Ancillary Data	2014	2013	2012
Do you lend securities?	Yes	Yes	Yes
If yes:			
% of income your custodian keeps for domestic lending?	15	15	15
% of income your custodian keeps for foreign lending?	15	15	15
Domestic net income in 000s			
Foreign net income in 000s			
Total net income (if breakdown not available) in 000s	5,079	3,550	3,449
Do you use any enhanced passive or tilt strategies?		Yes	No
What is your hedging policy for:			
Foreign Holdings	0%		
Do you participate in directed brokerage programs (i.e., commission recapture and/or soft dollar?)			No
If yes:			
Gross amount of directed commissions in 000s?			
Amount recaptured by the fund in 000s?			
Hard' cash value of invoices/services paid using soft dollars 000s?			
What were your actuarial fees in 000s?	521	250	250
How many plan members/beneficiaries do you have:			
Active?	137,148	137,368	139,352
Active (no-accrual)?			
Retired?	93,946	90,796	87,472
Other?	117,039	112,462	107,353
What type of plan(s) do you have?	Flat Benefit	Flat Benefit	Flat Benefit
To what extent are your retired members' benefits indexed to inflation?			
Contractual %	100	100	100
Ad hoc %			
If the indexation is subject to a cap, describe the cap	Cap 5%	Cap 5%	Cap 5%
What % of the plan's liabilities pertain to retired members?			
Actuarial valuation assumptions for funding purposes:			
Liability discount rate	3.3		
Salary progression rate	4.5	4.5	
What was your actuarial assumption for expected rate of return?	7.8	7.8	7.8

## Appendix A - Data Summary: Policy Weights and Benchmarks

### Kentucky Retirement Systems

Asset Class		Policy Weight	Benchmark	
			Description	Return
U.S. Stock - Broad/All	2014	20.4	Russell 3000	12.6
	2013	5.6	Russell 3000	33.6
	2012	3.3	Russell 3000	16.4
U.S. Stock - Large Cap	2014		S&P 500 Total Return	13.7
	2013	6.7	S&P 500 Total Return	32.4
	2012	6.7	Russell 3000	16.4
U.S. Stock - Mid Cap	2014		S&P Mid Cap Index	8.2
	2013			
	2012			
U.S. Stock - Small Cap	2014		Russell 2000	4.9
	2013	6.7	Russell 2000	38.8
	2012	10.0	Russell 3000	16.4
Stock - Emerging	2014	3.2	MSCI Emerging Market	-1.8
	2013	4.0	MSCI Emerging Market	-2.3
	2012	4.0	MSCI Emerging Market gross	18.6
Stock - ACWIxU.S.	2014	20.0	MSCI ACWI xUS	-3.4
	2013	20.0	MSCI ACWI xUS	15.8
	2012	20.0	MSCI ACWI xUS net	16.8
Fixed Income - U.S.	2014		Barclays US Aggregate	6.0
	2013	13.0	Barclays US Aggregate	-2.0
	2012	10.0	Barclays US Aggregate	4.2
Fixed Income - Emerging	2014			
	2013	0.5	JP Morgan EMBI Global Diversified	-5.3
	2012	5.0	JP Morgan EMBI Global Diversified	17.4
Fixed Income - Global	2014	19.5	Barclay's Universal	5.6
	2013	1.5	Barclays Multiverse Index	-2.2
	2012			
Fixed Income - Inflation Indexed	2014		Barclays US TIPS	2.6
	2013	5.0	Barclays US TIPS	-8.6
	2012	10.0	Barclays US TIPS	7.0
Fixed Income - High Yield	2014		Barclays Corp High Yield	2.5
	2013	5.0	Barclays US Corp High Yield	7.4
	2012	5.0	Barclays US Corp High Yield	15.8
Cash	2014	2.4	Citi Group3 Month T bill	0.0
	2013	2.0	3 Month T bill	0.1
	2012	1.0	3 Month T bill	0.1
Hedge Funds	2014	10.0	HFRI Diversified Fund of Funds	4.7
	2013	10.0	HFR FOF Diversified Lagged	8.5
	2012	10.0	HFR FOF Diversified Lagged	3.1
Real Estate ex-REITs	2014	4.6	NCREIF NFI-ODCE	11.4
	2013	5.0	Custom (NCREIF Blend)	12.0
	2012	5.0	Custom (NCREIF Blend)	10.9
Other Real Assets	2014	10.0	Custom CPI +300 bps	2.9
	2013	5.0	Custom (actual)	2.3
	2012		Custom (actual)	0.0
Diversified Private Equity	2014	10.0	Russell 3000+400 bps	16.6
	2013	3.3	Russell 3000 + 400 (lagged 1Q)	26.3
	2012	3.3	Russell 3000 + 400 (lagged 1Q)	11.2
LBO	2014			
	2013	3.4	Russell 3000 + 400 (lagged 1Q)	26.3
	2012	3.3	Russell 3000 + 400 (lagged 1Q)	11.0
Venture Capital	2014			
	2013	3.3	Russell 3000 + 400 (lagged 1Q)	26.3
	2012	3.3	Russell 3000 + 400 (lagged 1Q)	11.2

## Appendix A - Data Summary: Public Market Assets, Returns and Costs

Kentucky Retirement Systems

Asset Class		Assets (millions) and Annual Gross Returns										Investment Fees / Costs in 000s															
		Internally Managed					Externally Managed					Internally Managed					Externally Managed										
		Indexed		Active			Indexed		Active			# of mgrs	Indexed		Active			Indexed		Active							
		Assets	Return	Assets	Return	Assets	Return	Assets	Return	Assets	Return		000s	bps <sup>1</sup>	000s	bps <sup>1</sup>	Over-sight	Total	000s	bps <sup>1</sup>	Base Fees	Perform Fees	Internal & Other	Total	000s	bps <sup>1</sup>	
U.S. Stock - Broad/All	2014					367.8	12.0												2,034.9				2,034.9	54.4			
	2013					380.2	36.2												2,075.5				2,075.5	61.1			
	2012	1,484.0	15.9			299.0	17.9				118.6	0.9							1,872.1				1,872.1	59.1			
U.S. Stock - Large Cap	2014	2,007.7	13.6			232.7	13.2				90.0	0.5							276.4				276.4	11.9			
	2013	1,960.8	32.3			231.3	35.3				105.0	1.1							277.5				277.5	13.2			
	2012					189.0	17.0												262.5				262.5	12.6			
U.S. Stock - Mid Cap	2014	311.0	n/a			350.0	6.1												1,487.6				1,487.6	43.9			
	2013																										
	2012																										
U.S. Stock - Small Cap	2014				336.6	6.4									458.4	458.4	13.7										
	2013				332.8	39.3			663.1	33.0					459.3	459.3	16.1		3,094.7				3,094.7	42.6			
	2012							788.6	n/a	4									532.6				532.6	13.7			
Stock - Emerging	2014				178.9	-2.3	323.1	-2.9	2						206.9	206.9	12.5		2,581.8				2,581.8	78.1			
	2013				125.3	-2.3	337.8	-2.6	3						150.4	150.4	24.0		2,559.1				2,559.1	56.6			
	2012						567.0	24.0	2										3,747.4				3,747.4	72.2			
Stock - ACWIxU.S.	2014				1,407.1	-3.8	1,481.0	n/a	6						854.4	854.4	7.1		5,852.4				5,852.4	32.3			
	2013				1,004.0	15.3	2,140.9	19.0	4						552.2	552.2	6.2		5,296.7				5,296.7	25.7			
	2012	149.0	n/a		764.1	14.2	1,975.9	16.3	4		16.3	2.0			235.2	235.2	4.7		5,758.4				5,758.4	27.9			
Fixed Income - U.S.	2014					6.4	1,388.8	4.1											3,021.8				3,021.8	22.1			
	2013					-2.2	1,344.3	-2.8	2										2,895.6				2,895.6	21.3			
	2012						1,377.2	5.8	2										2,922.0				2,922.0	17.6			
Fixed Income - Global	2014					587.4	2.9	7											1,775.6				1,775.6	30.9			
	2013					561.4	-2.0	1											2,036.2				2,036.2	35.7			
	2012					578.1	n/a												1,874.1				1,874.1	64.8			
Fixed Income - Inflation Indexed	2014	293.3	3.1			275.4	3.4				60.0	1.2							183.5				183.5	6.7			
	2013	505.6	-8.2			272.0	-8.2	1			115.2	1.8							186.8				186.8	5.5			
	2012	770.6	7.1			403.0	11.9	1			115.2	1.5							201.7				201.7	3.7			
Fixed Income - High Yield	2014					687.1	6.1												3,720.2	1,159.7			4,879.9	67.4			
	2013					761.0	7.6	4											3,188.4				3,188.4	40.1			
	2012					830.0	16.1	5											3,575.0				3,575.0	44.2			
Cash	2014			520.3	0.2																						
	2013			520.1	0.5																						
	2012			407.4	0.4								n/a														
Hedge Funds	2014					142.4	n/a	10											886.4	940.4			1,826.8	238.8			
	2013							6																			
	2012							3																			
																Underlying*											
																Base Fees	Perf. Fees	Base Fees	Perform Fees	Internal & Other	Total						
Hedge Funds - Fund of Funds	2014					1,514.3	5.1												21,698.8	15,641.6			8,992.7	10,379.4	56,712.5	368.3	
	2013					1,565.8	12.1													21,222.7				10,177.4		31,400.1	208.5
	2012					1,446.7	7.3													18,937.6				8,753.2	89,821.5	27,690.8	206.0

1. Cost in basis points = total cost / average of beginning and end of year holdings

2. Default for fees paid to underlying partnerships have been applied.

\* Total cost for hedge funds includes performance fees in 2014 only.

## Appendix A: Assets, Returns and Costs (cont.)

### Kentucky Retirement Systems

Asset Class		Assets (millions) and Annual Returns					# Ext Mgrs	Investment Fees / Costs in 000s <sup>1</sup>					
		Internal & Co-Inv		External				Internal & Co-Inv		External			
		Assets	Return	Amt fees based on	Assets	Return		Total 000s	bps	Base Fees	Perform Fees	Internal & Other	Total <sup>1</sup> 000s
Real Estate ex-REITs	2014					16							
	2013					11							
	2012					5							
				<u>LPs</u>									
	2014			733.4	733.4	9.1			7,336.4	1,996.7		7,336.4	115.4
	2013			538.1	538.1	9.1			3,497.6			3,497.6	80.2
	2012			334.4	334.4	8.5			1,986.0			1,986.0	75.0
Other Real Assets	2014				742.6	4.1	9		3,210.4	3,702.0		3,210.4	45.0
	2013				682.8	3.4	5		4,438.0			4,438.0	130.0
	2012	10.0	0.0										
Diversified Private Equity	2014			166.4	117.4	9.1	59		3,137.5	(293.6)	319.7	3,457.2	181.8
	2013			213.9	213.9	18.4	11		3,780.7			3,780.7	165.0
	2012			244.4	244.4	21.2	8		4,274.4			4,274.4	165.0
LBO	2014			1,442.1	992.9	11.2			13,841.0	18,105.0	5,028.3	18,869.3	164.6
	2013			850.1	850.1	18.1	31		14,219.2			14,219.2	165.0
	2012			873.4	873.4	20.8	23		14,096.2			14,096.2	165.0
Venture Capital	2014			381.8	348.3	7.0			5,368.3	12,603.6	340.0	5,708.3	164.7
	2013			311.2	311.2	13.2	15		6,259.1			6,259.1	200.0
	2012			314.7	314.7	-3.6	10		6,325.5			6,325.5	200.0

1. Cost in basis points = total cost / average of beginning and end of year holdings. Total cost excludes private asset performance fees because of comparability issues.

## Appendix A - Data Summary: Oversight, Custodial and Other Costs

### Kentucky Retirement Systems

Oversight, Custodial and Other Costs			
		000s	bps
Oversight of the fund assets <sup>1</sup>	2014	786.0	0.5bp
	2013	590.0	0.4bp
	2012	580.0	0.4bp
Custodial total	2014	2,038.0	1.3bp
	2013	516.0	0.4bp
	2012	250.0	0.2bp
Custodial foreign (if available)	2014		
	2013		
	2012		
Custodial domestic (if available)	2014		
	2013		
	2012		
Consulting / performance measurement	2014	1,490.0	1.0bp
	2013	997.0	0.7bp
	2012	997.0	0.7bp
Audit	2014	76.0	0.0bp
	2013		
	2012		
Other (legal etc)	2014	720.0	0.5bp
	2013	225.0	0.2bp
	2012	225.0	0.2bp
Total	2014	5,110.0	3.3bp
	2013	2,328.0	1.6bp
	2012	2,052.0	1.5bp

Summary of All Asset Management Costs			
		000s	bps
Investment Management Costs	2014	121,510.3	78.6bp
	2013	87,391.8	59.4bp
	2012	76,232.7	55.8bp
Overlay Costs	2014		
	2013		
	2012		
Oversight, Custodial & Other Costs	2014	5,110.0	3.3bp
	2013	2,328.0	1.6bp
	2012	2,052.0	1.5bp
Total	2014	126,620.3	81.9bp
	2013	89,719.8	61.0bp
	2012	78,284.7	57.3bp

1. Oversight includes the salaries and benefits of executives and their staff responsible for overseeing the entire fund or multiple asset classes and the fees / salaries of the board or investment committee. All costs associated with the above including fees / salaries, travel, director's insurance and attributed overhead should be included.

## Appendix A - Data Summary: Comments and defaults

As discussed with you during the data confirmation process, the following defaults and footnotes are applicable to your data:

- Hedge Funds - Fund of Funds : For comparability with other styles, a default for management fees paid to the 'bottom layer' underlying managers of 141 bps was used.
- Hedge Funds - Fund of Funds : For comparability, a default for performance fees paid to the 'bottom layer' underlying managers of 102 bps (on NAV) was used.
- Diversified Private Equity : A default of 165 bps was used because you were unable to provide support for your unusually low cost of 141 bps (2.7 million).

## Appendix B - Data quality

The value of the information contained in these reports is only as good as the quality of the data received. CEM's procedures for checking and improving the data include the following.

### **Improved survey clarity**

Twenty years of feedback from survey participants has led to improved definitions and survey clarity. In addition to immediate feedback from participants, CEM has hosted user workshops to solicit additional feedback and to resolve issues, such as trade-offs between more information and effort on the part of participants.

### **Computer and desktop verification**

Survey responses are compared to norms for the survey universe and to each sponsor's prior year data when available. This typically results in questions generated by our online survey engine as well as additional follow-up to clarify responses or with additional questions.

In addition to these procedures, data quality continues to improve for the following reasons:

### **Learning curve -**

This is CEM's 23rd year of gathering this data and experience is teaching the firm and the participants how to do a better job.

### **Growing universe -**

As our universe of respondents continues to increase in size, so does our confidence in the results as unbiased errors tend to average themselves out.

Any suggestions on how to further improve data quality are welcome.

### **Currency Conversions**

For reports where either the peer group or report universe includes funds from multiple countries, we have converted the returns back to the base currency of the fund we prepared the report for. For example, for a Euro zone fund with peers from the U.S. we converted U.S. returns to Euro based on the currency return for the year using December 31 spot rates.



## Appendix C - Glossary of terms

### **Average cost**

- Calculated by dividing actual annual costs by the average of beginning and end-of-year holdings. If beginning-of-year holdings are not available, they are estimated using end-of-year holdings before the effect of this year's return on investment.

### **Benchmark return**

- Rate of return on a portfolio of investable assets (such as the S&P500) designated as the benchmark portfolio against which the fund measures its own performance for that asset class.

### **F statistics**

- Measure of the statistical significance of the regression coefficients taken as a group. Generally, regression equations with 5 coefficients and sample sizes greater than 20 are statistically significant if its F statistic is greater than 3.

### **Global TAA**

- Fully funded segregated asset pool dedicated to active asset allocation.

### **Impact coefficient**

- Estimate of the impact on the dependent variable in a regression of a change in the value of a given explanatory variable

### **Level of significance**

- Degree to which sample data explains the universe from which they are extracted.

### **N-year peers**

- Subset of peer group that have participated in our study for at least the consecutive n years.

### **Oversight of the fund**

- Resources devoted to the oversight of the fund.

### **Overlay**

- Derivative based program (unfunded other than margin requirements), designed to enhance total portfolio return (such as a tactical asset allocation program) or to achieve some specific mandate such as currency hedging.

### **Passive proportion**

- Proportion of assets managed passively, i.e., indexed to broad capital market benchmarks or dedicated to replicate market benchmarks.

### **Policy mix**

- Reflects long-term policy or target asset weights. Policy asset mix is often established by a fund's investment committee or board and is determined by such long term considerations as liability structure, risk tolerance and long term capital markets prospects.

### **Policy return**

- The return you would have earned if you had passively implemented your policy mix decision through your benchmark portfolios. Your policy return equals the sum of your policy weights multiplied by your asset class benchmarks for each asset class.

### **R squared (coefficient of determination)**

- The percentage of the differences in the dependent variable explained by the regression equation. For example, an R squared of 1 means 100% of the differences are explained and an R squared of 0 means that none of the differences are explained.

### **Value added**

- the difference between your total actual return and your policy return. It is a measure of actual value produced over what could have been earned passively.