

Montana Board of Investments

CEM Benchmarking Results

(for the 3-year period ending December 31, 2012)

Mike Heale

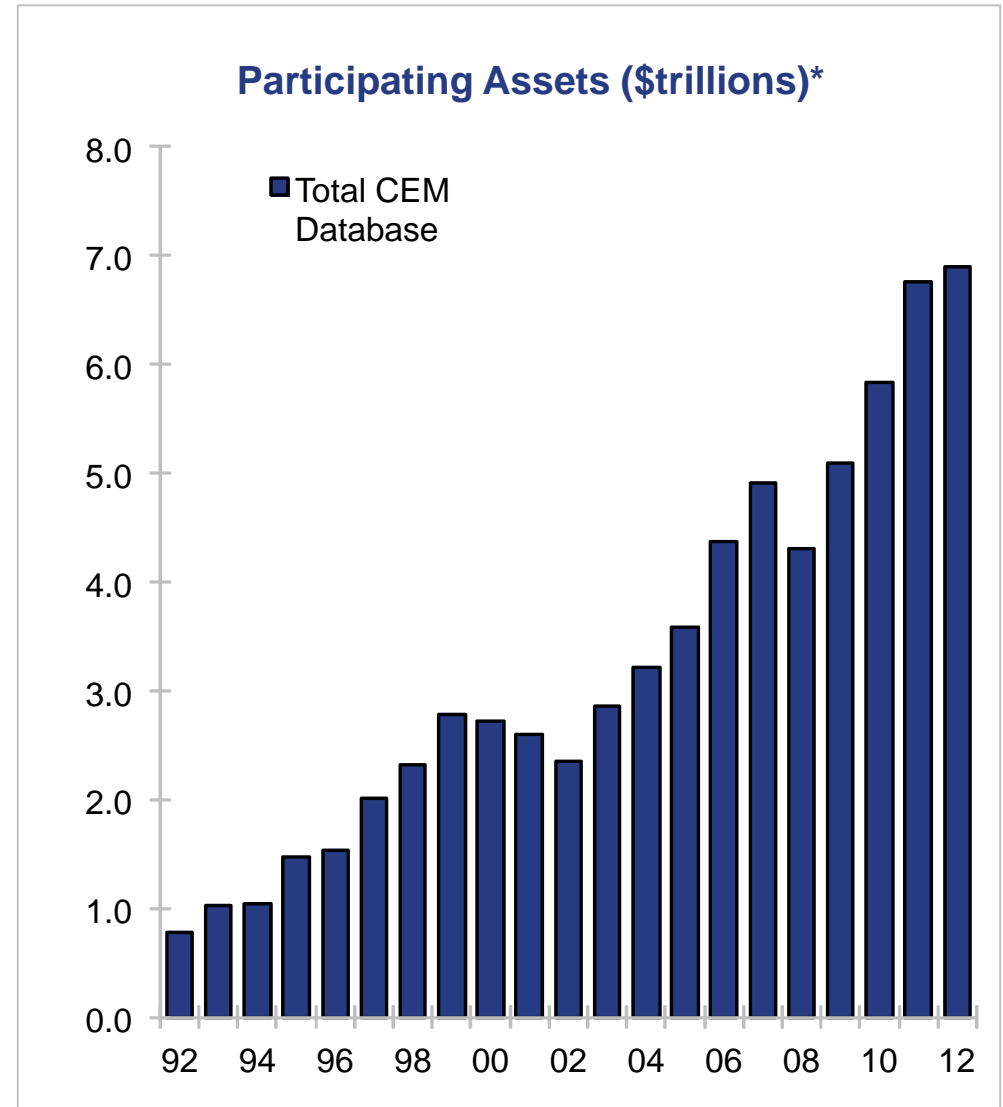
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This benchmarking report compares your cost and return performance to CEM's extensive pension database.

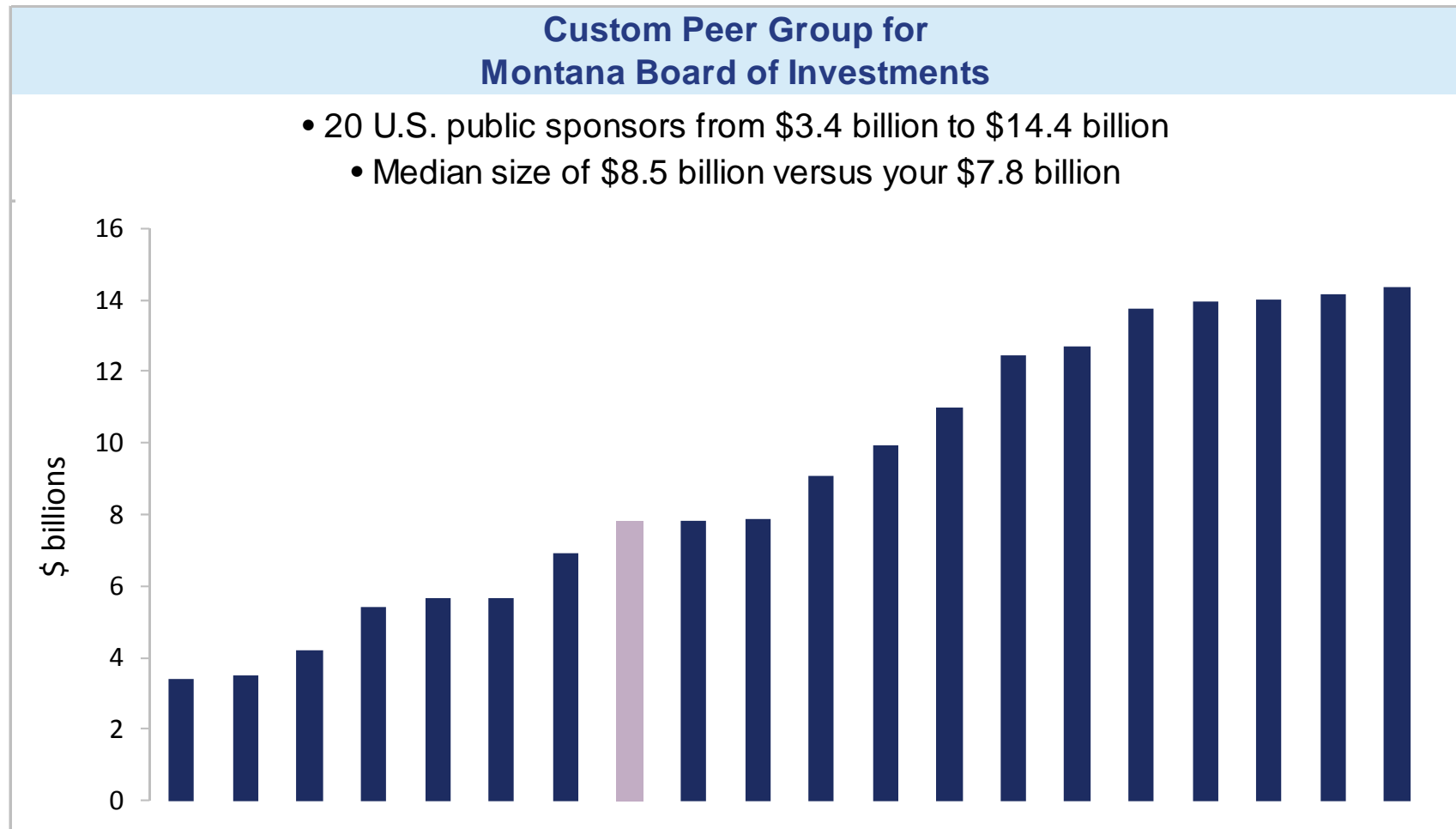
- 167 U.S. pension funds participate. The median U.S. fund had assets of \$5.8 billion and the average U.S. fund had assets of \$16.1 billion. Total participating U.S. assets were \$2.7 trillion.
- 69 Canadian funds participate with assets totaling \$345 billion.
- 34 European funds participate with aggregate assets of \$1.4 trillion. Included are funds from the Netherlands, Norway, Sweden, Finland, Ireland, Denmark and the U.K.
- 4 Asia-Pacific funds participate with aggregate assets of \$92 billion. Included are funds from Australia, China, New Zealand and South Korea.

The most meaningful comparisons for your returns and value added are to the U.S. Public universe of 58 funds with assets totaling \$1.8 trillion.



* 2012 includes an estimate of data not yet in the database.

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



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. Policy Return

How did the impact of your policy mix decision compare to other funds?

2. 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

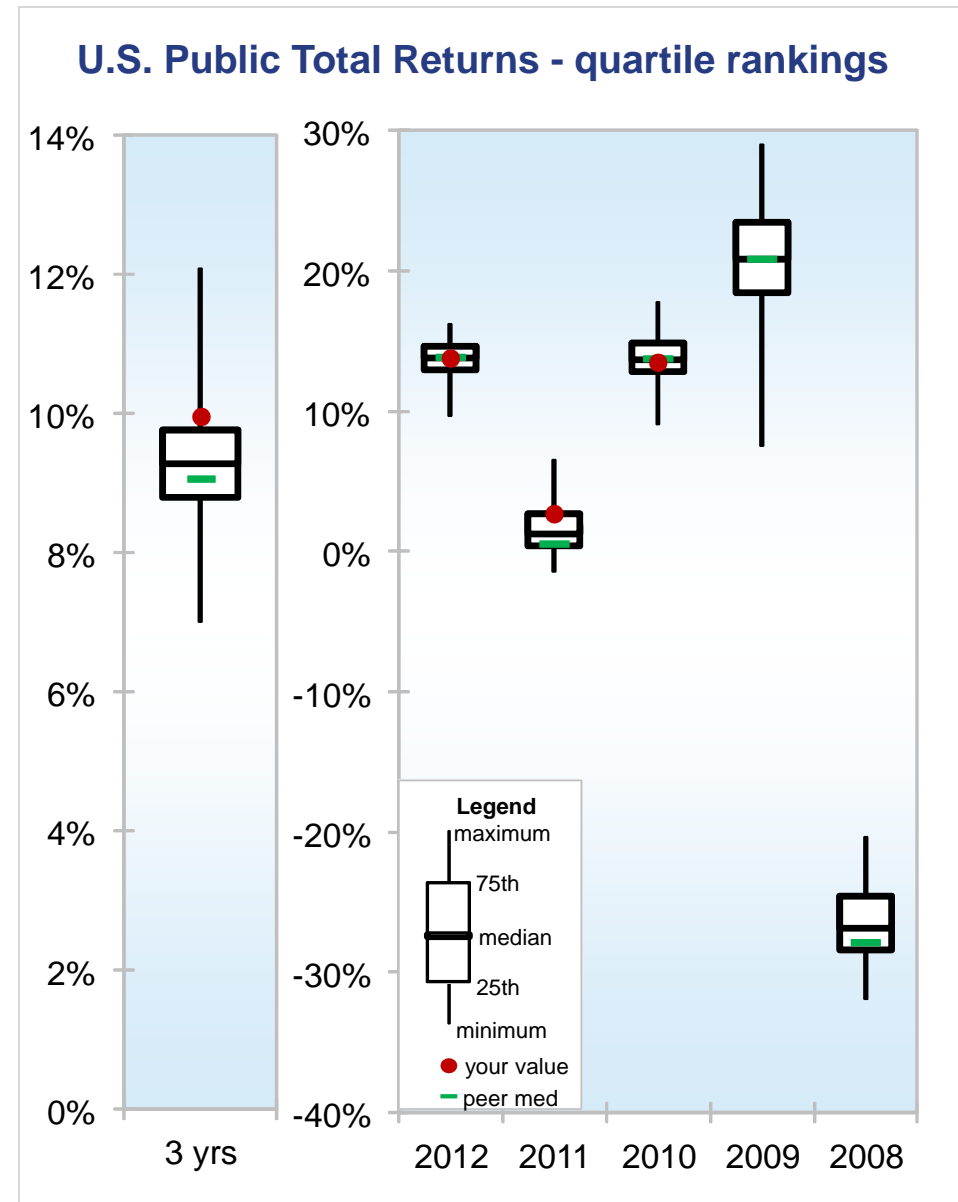
Net implementation value added versus excess cost. Does paying more get you more?

Your 3-year total return of 10.0% was above the U.S. Public median of 9.3% and above the peer median of 9.1%.

Total returns, by themselves, provide little insight into the reasons behind relative performance. Therefore, we separate total return into its more meaningful components: policy return, cost, and value added.

| | Your 3-yr |
|-------------------|------------------|
| Total Fund Return | 10.0% |
| - Policy Return | 9.3% |
| - Cost | 0.7% |
| = Net Value Added | 0.0% |

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).



1. Policy Return

Your 3-year policy return of 9.3% was above the U.S. Public median of 8.8% and above the peer median of 8.6%.

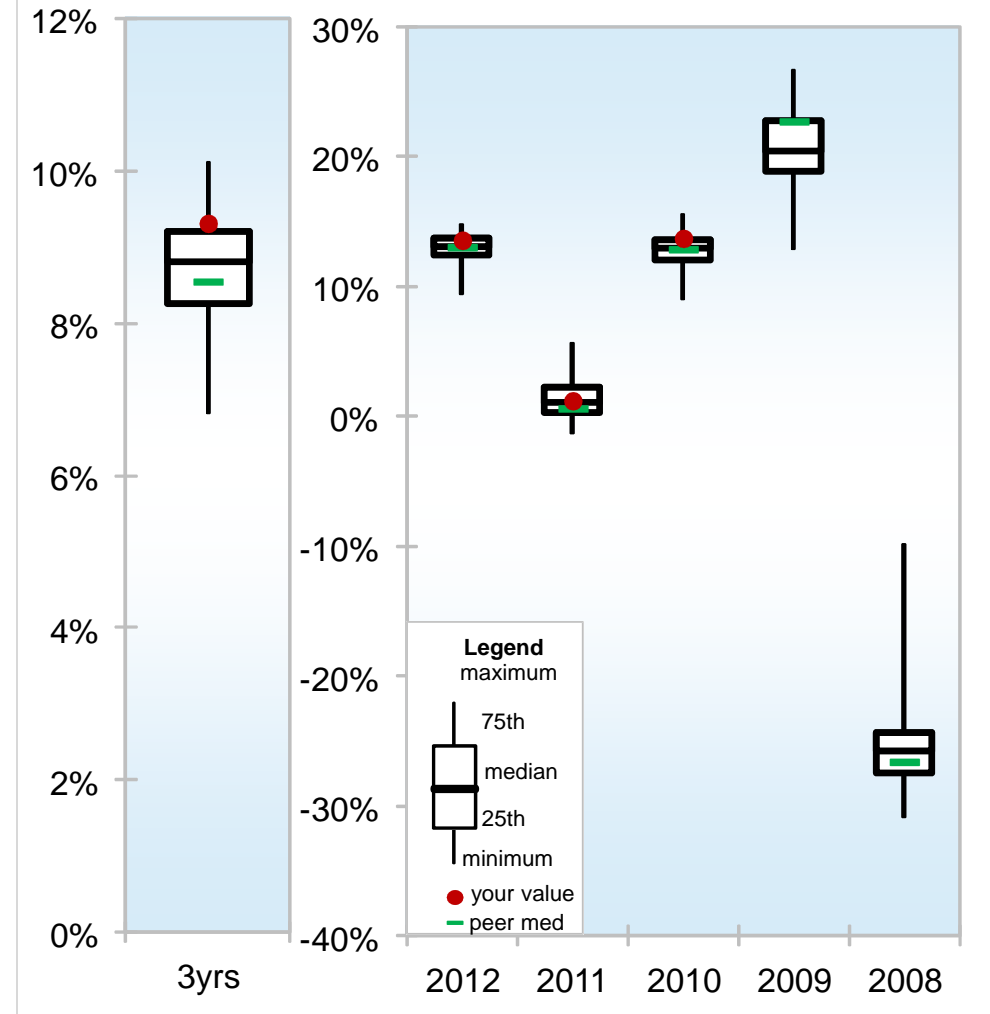
Your policy return is the return you could have earned passively by indexing your investments according to your policy mix.

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:

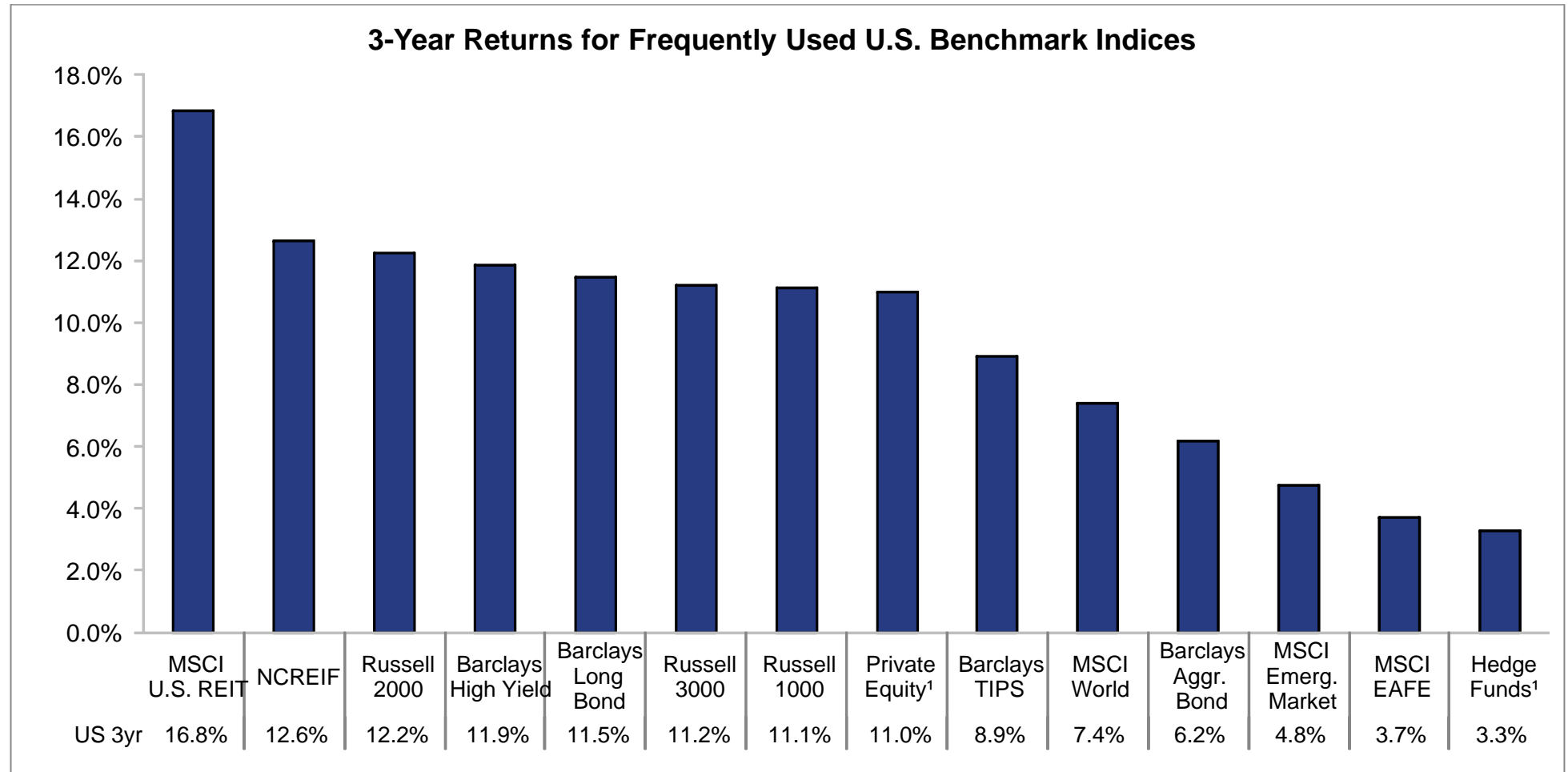
- Long term capital market expectations
- Liabilities
- Appetite for risk

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

U.S. Public Policy Returns - quartile rankings



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



1. The private equity and hedge fund benchmark returns reflect the average benchmarks of all U.S. participants. To enable fairer value added comparisons, the private equity benchmarks of all U.S. participants were set to equal your benchmarks.

Your 3-year policy return was slightly above the U.S. Public median.

Your 3-year policy return was slightly above the U.S. Public median. Two factors contributing to this were:

- Your higher weight in Private Equity, one of the better performing asset classes of the past 3 years, had a positive impact. Your 3-year average weight of 12% compares to a U.S. Public average of 7%.
- The fact that you had no allocation to hedge funds versus a 3-year average weight of 4% for U.S. Public funds also had a positive impact.

| 3-Year Average Policy Mix | | | |
|---------------------------------|------------|------------|------------------|
| | Your Fund | Peer Avg. | U.S. Public Avg. |
| U.S. Stock | 36% | 26% | 26% |
| EAFE/Global/Emerging | <u>18%</u> | <u>28%</u> | <u>25%</u> |
| Total Stock | 54% | 54% | 52% |
| U.S. Bonds | 22% | 21% | 20% |
| High Yield Bonds | 3% | 2% | 2% |
| Other Fixed Income ¹ | <u>1%</u> | <u>5%</u> | <u>6%</u> |
| Total Fixed Income | 26% | 28% | 28% |
| Hedge Funds | 0% | 3% | 4% |
| Real Estate incl. REITS | 8% | 6% | 7% |
| Other Real Assets ² | 0% | 2% | 2% |
| Private Equity | 12% | 7% | 7% |
| Total | 100% | 100% | 100% |

1. Other fixed income includes Inflation Indexed bonds, Global Bonds and Cash.
2. Other real assets includes Commodities, Natural Resources and Infrastructure.

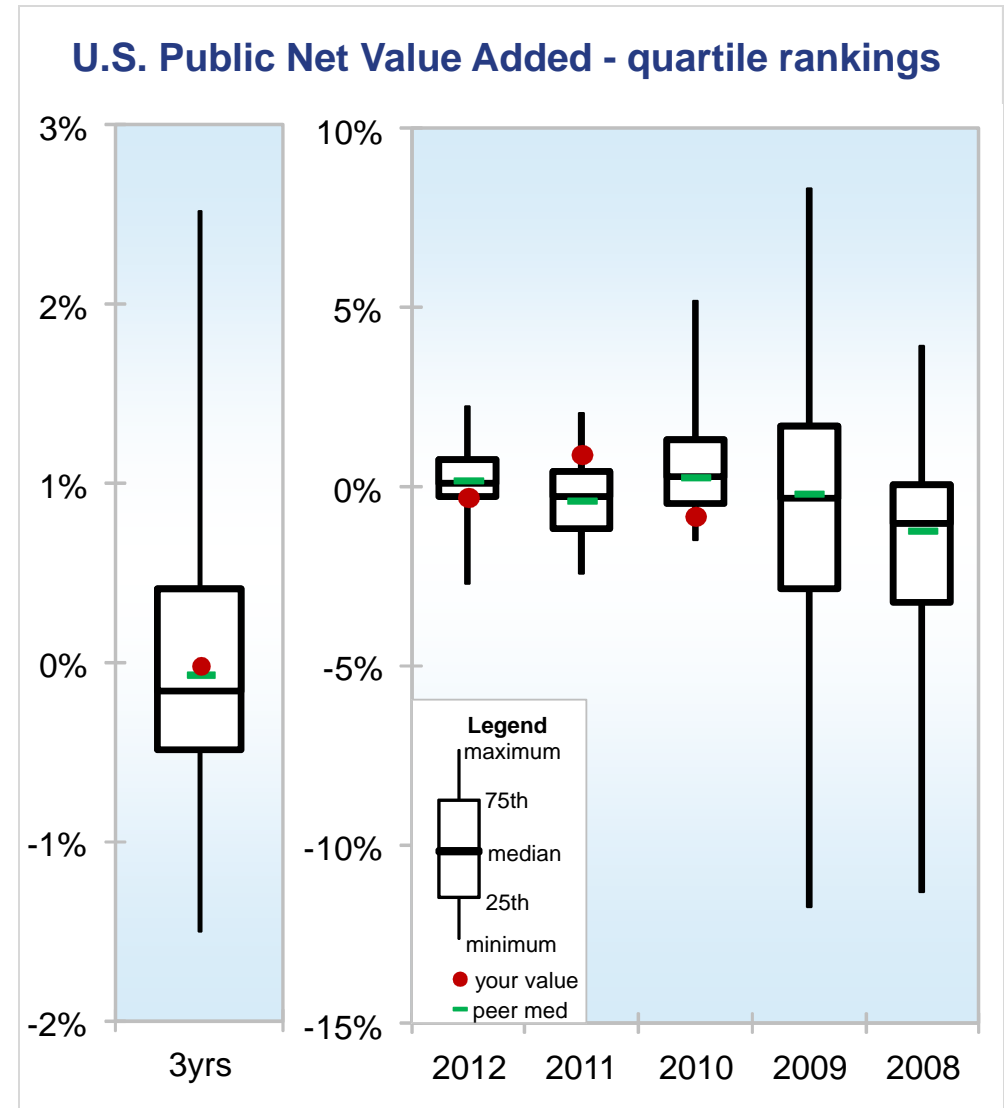
2. Net Value Added

Net value added is the component of total return from active management. Your 3-year net value added was 0.0%.

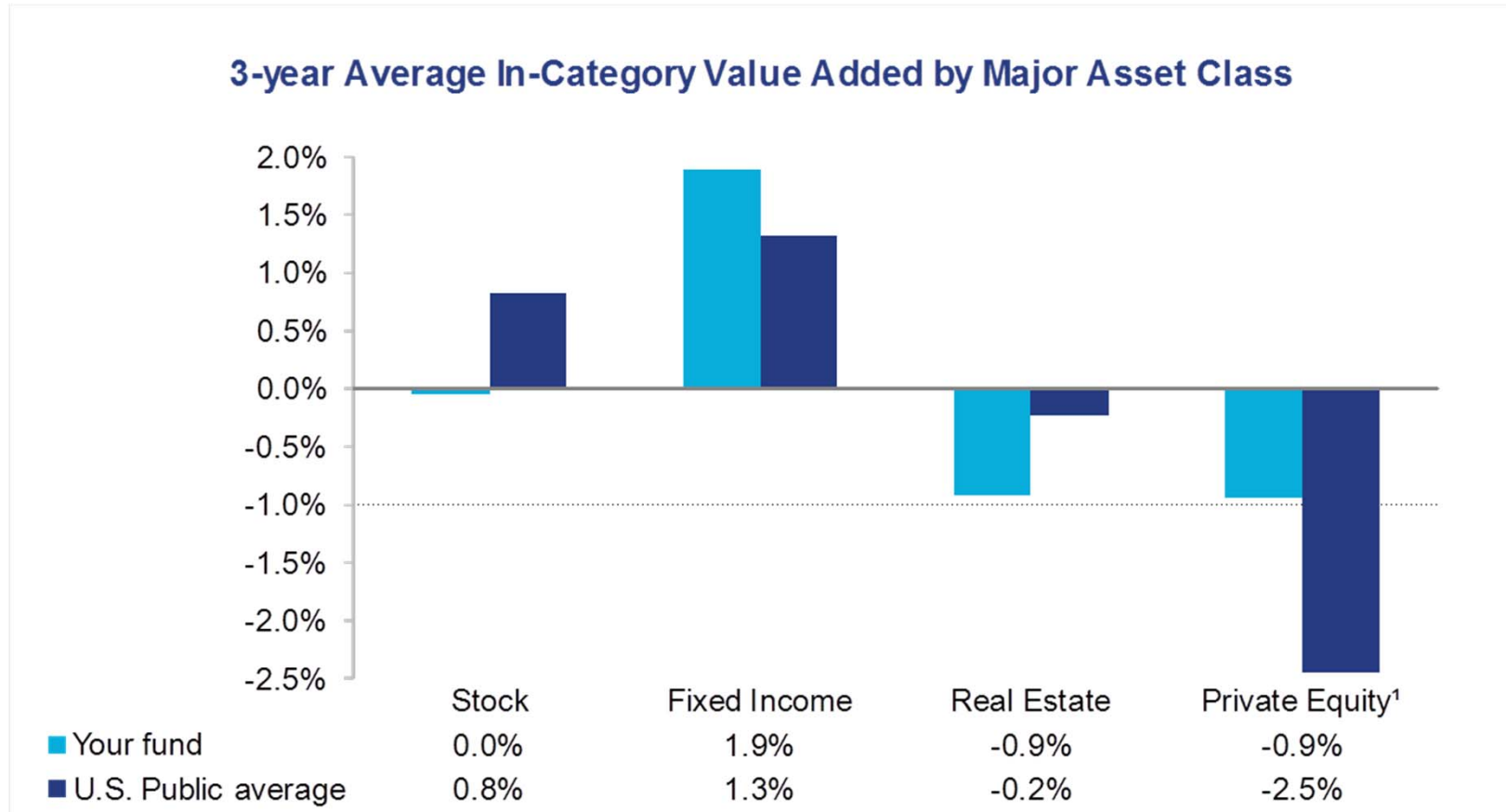
Net value added equals total return minus policy return minus costs.

| Montana Board of Investments | | | | |
|------------------------------|--------------|---------------|------|-----------------|
| Year | Total Return | Policy Return | Cost | Net Value Added |
| 2012 | 13.9% | 13.6% | 0.6% | (0.3)% |
| 2011 | 2.8% | 1.2% | 0.7% | 0.9% |
| 2010 | 13.6% | 13.7% | 0.7% | (0.8)% |
| 3-year | 10.0% | 9.3% | 0.7% | 0.0% |

Your 3-year net value added of 0.0% compares to a median of -0.1% for your peers and -0.2% for the U.S. Public universe.

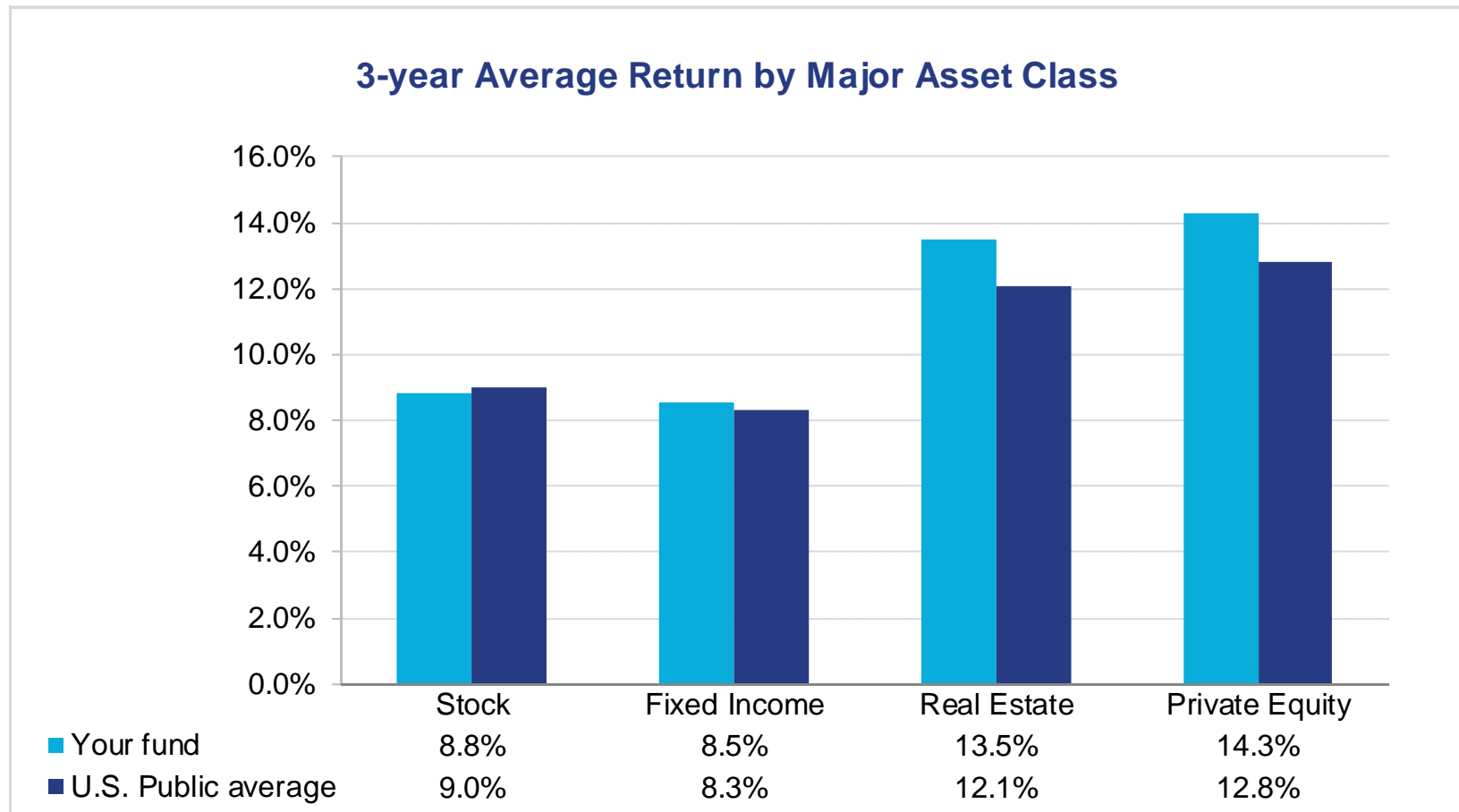


You had positive 3-year value added in Fixed Income. Value added is the difference between your actual returns and your benchmark returns. For the U.S. Public universe it is the difference between their average return and their average benchmark return.



1. Private equity value added is net whereas the other asset classes are gross. To enable fairer value added comparisons, the private equity benchmarks of all U.S. participants were set to equal your benchmarks. It is also useful to compare total returns. Your 3-year return of 14.3% for private equity was above the U.S. average of 12.8%.

You had better 3-year returns relative to the U.S. Public average in Fixed Income, Real Estate and Private Equity.



3. Costs

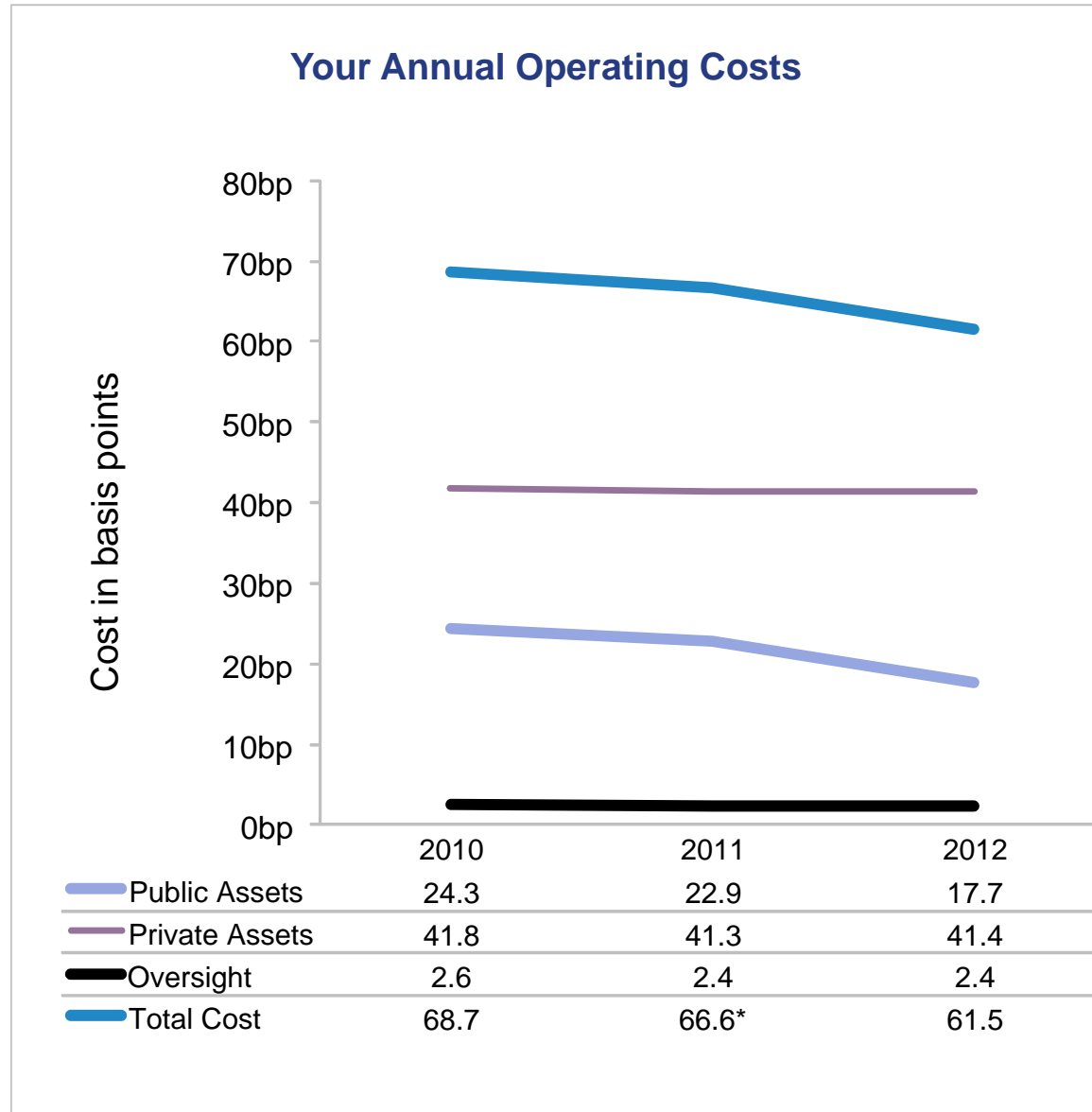
Your asset management costs in 2012 were \$48.0 million or 61.5 basis points.

| Your Investment Management Costs (\$000s) | | | | | | | |
|---|-----------------|--------|-------------------------|--------------------|------------------------|-----------------------|---------------|
| | <u>Internal</u> | | <u>External Passive</u> | | <u>External Active</u> | | Total |
| | Passive | Active | Fees | Monitoring & Other | Base Fees | Perform. Fees & Other | |
| U.S. Stock - Large Cap | | | 156 | 150 | 4,923 | 132 | 5,361 |
| U.S. Stock - Small/Mid Cap | | | 112 | 13 | 2,524 | 45 | 2,693 |
| Stock - ACWIxU.S. | | | 637 | 171 | 2,798 | 154 | 3,759 |
| Fixed Income - U.S. | | 341 | | | 686 | 85 | 1,112 |
| Fixed Income - High Yield | | | | | 824 | 41 | 865 |
| Cash | | 12 | | | | | 12 |
| Real Estate | | | | | 2,089 | 127 | 2,216 |
| Real Estate - LPs | | | | | 6,280 | 208 | 6,488 |
| Diversified Private Equity | | | | | 15,862 | 437 | 16,299 |
| Diversified Priv. Eq.- Fund of Funds | | | | | 7,220 | 130 | 7,349 |
| Total investment management costs | | | | | | 59.1bp | 46,154 |

| Your Oversight, Custodial and Other Asset Related Costs (\$000s) | | |
|--|--|--------------|
| Oversight of the fund | | 617 |
| Trustee & custodial | | 1,002 |
| Consulting and performance measurement | | 226 |
| Audit | | 34 |
| Total oversight, custodial & other costs | | 2.4bp |

| | | | |
|-------------------------------------|--|---------------|---------------|
| Total asset management costs | | 61.5bp | 48,033 |
|-------------------------------------|--|---------------|---------------|

Your costs decreased slightly between 2010 and 2012.



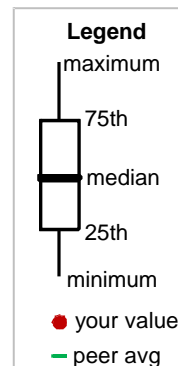
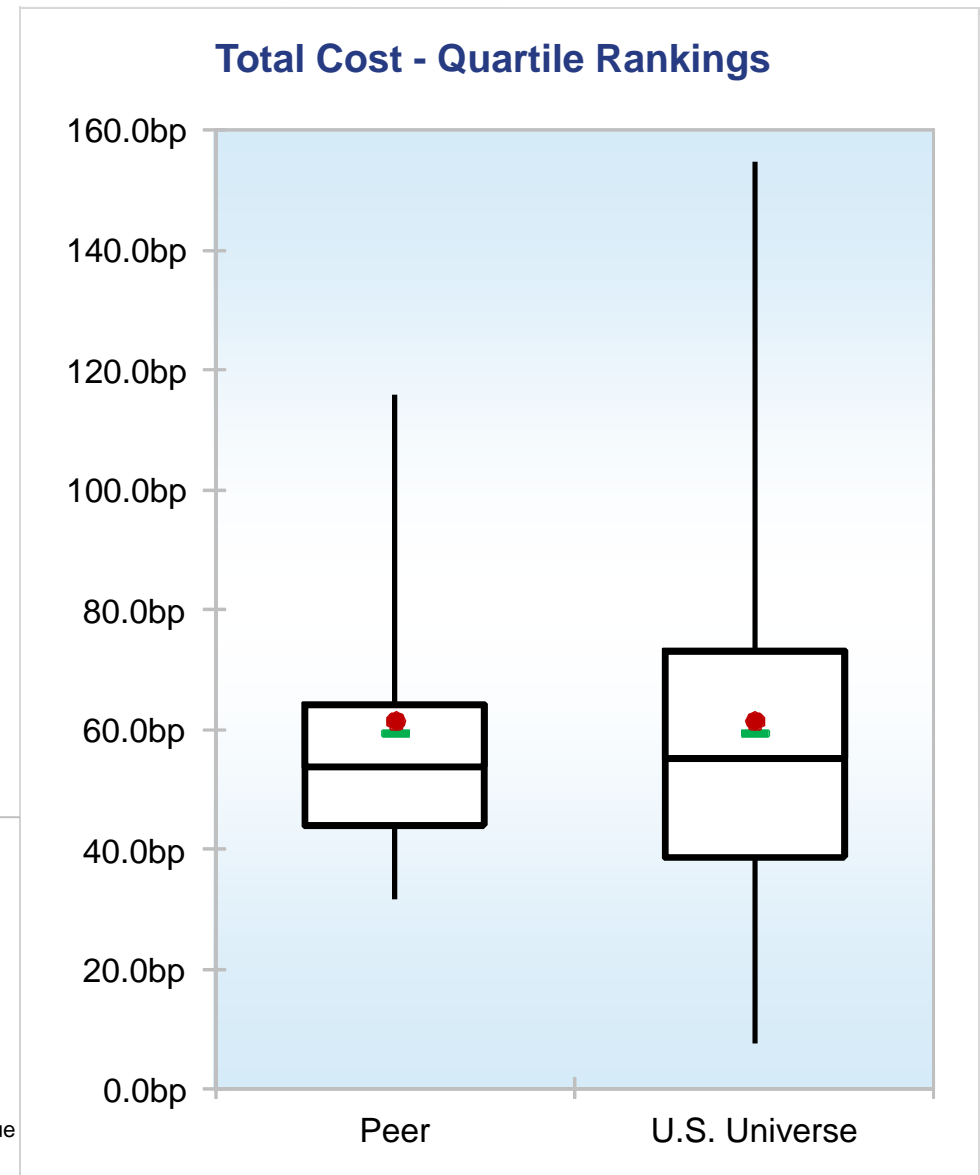
* 2011 Total Cost has changed from 64.9 bps in last year's report to 66.6 bps this year due to a change in Private Equity holdings for 2011 data year.

Your total cost of 61.5 bps was close to the peer average of 59.5 bps.

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

- asset mix and
- fund size.

Therefore, to assess whether your costs are reasonable, CEM calculates a benchmark cost for your fund.



Benchmark cost analysis suggests your fund was normal cost.

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 61.5 bp was close to your benchmark cost of 65.3 bp. Your cost saving was 3.8 bps.

| | \$000s | basis points |
|---------------------|---------------|---------------------|
| Your actual cost | 48,033 | 61.5 bp |
| Your benchmark cost | <u>50,997</u> | <u>65.3 bp</u> |
| Your excess cost | (2,964) | (3.8) bp |

Your fund was normal cost because you had a lower cost implementation style and paid slightly more for similar mandates.

| Reasons for Your Low Cost Status | | |
|---|-----------------------------------|--------------|
| | Excess Cost/ (Savings) | |
| | \$000s | bps |
| 1. Lower cost implementation style | (3,350) | (4.3) |
| 2. Paying more or (less) than your peers for similar services | 386 | 0.5 |
| Total savings in 2012 | (2,964) | (3.8) |

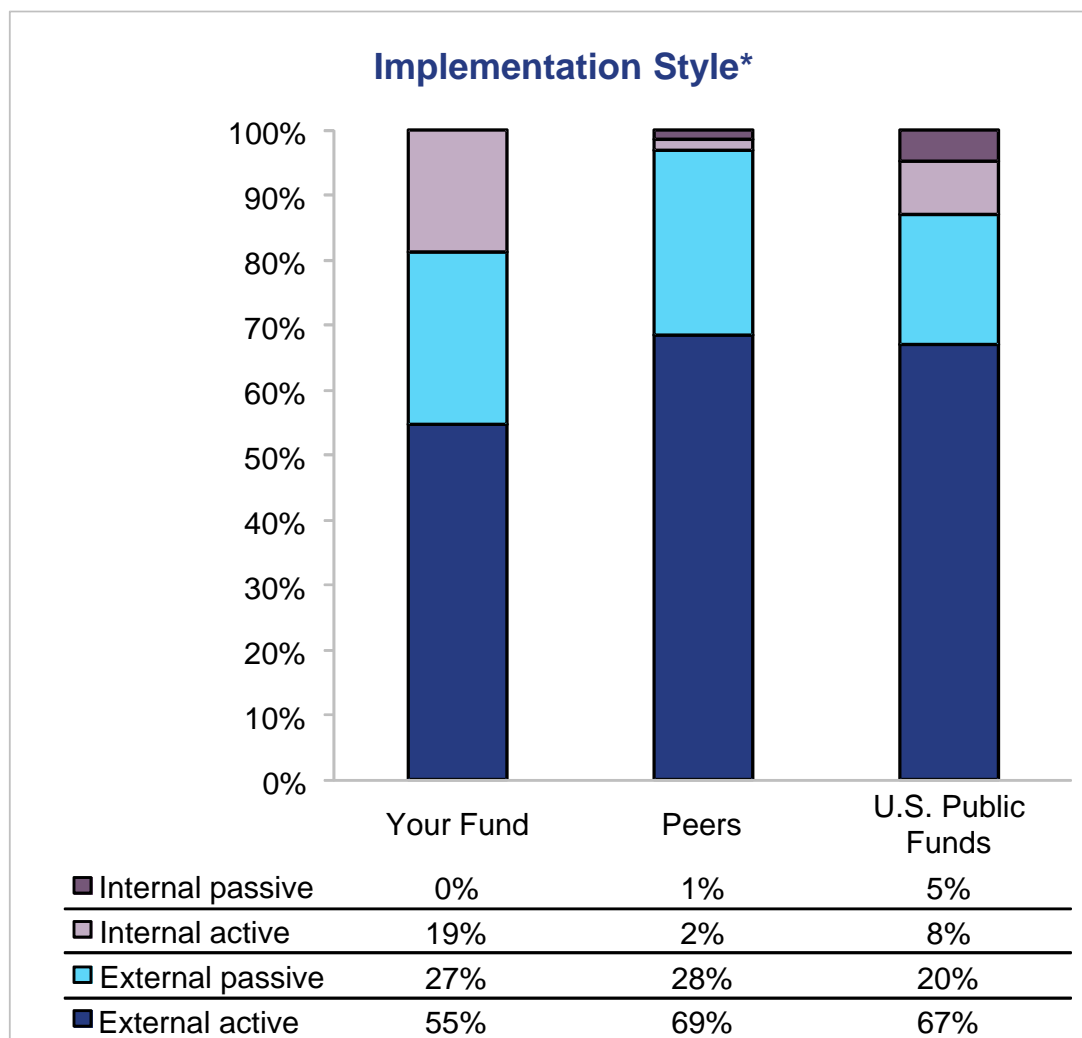
These reasons are examined in detail in the following pages.

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

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

The greatest cost impact is usually caused by differences in the use of:

- External active management because it tends to be much more expensive than internal or passive management. You used less external active management than your peers (your 55% versus 69% for your peers).
- Within external active holdings, fund of funds usage because it is more expensive than direct fund investment. You had similar amounts in fund of funds. Your 18% of hedge funds, real estate and private equity in fund of funds compared to 18% for your peers.



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

Differences in implementation style saved you 4.3 bp relative to your peers.

| Cost Impact of Differences in Implementation Style | | | | | | |
|--|-----------------------------|-------------------|--------------|----------------|-----------------------------|---------------------------|
| Asset class | Your avg holdings in \$mils | % External Active | | | Cost ^{1,2} premium | Cost/ (Savings) in \$000s |
| | | You | Peer average | More/ (less) | | |
| U.S. Stock - Large Cap | 2,417 | 46.7% | 39.9% | 6.7% | 24.2 bp | 395 |
| U.S. Stock - Small/Mid Cap | 494 | 77.2% | 95.4% | (18.2%) | 61.5 bp | (554) |
| Stock - ACWIxU.S. | 1,289 | 47.3% | 57.9% | (10.6%) | 37.2 bp | (510) |
| Fixed Income - U.S. | 1,728 | 20.0% | 75.1% | (55.1%) | 19.1 bp | (1,817) |
| Fixed Income - High Yield | 165 | 100.0% | 100.0% | 0.0% | | 0 |
| Real Estate ex-REITs | 852 | 100.0% | 100.0% | 0.0% | | 0 |
| of which Ltd Partnerships represent: | | 72.2% | 40.8% | 31.4% | 17.0 bp | 455 |
| Diversified Private Equity | 1,569 | 100.0% | 100.0% | 0.0% | | 0 |
| of which Fund of Funds represent: | | 27.8% | 38.9% | (11.1%) | 76.2 bp | (1,324) |
| Total | | 54.7% | 68.5% | (13.9%) | | (3,355) |
| Style impact related to fund of funds in bps | | | | | | (1.7) bp |
| External active style impact in bps | | | | | | (2.6) bp |
| Impact of differences in the use of lower cost styles ³ | | | | | | 0.1 bp |
| Savings from your lower use of portfolio level overlays | | | | | | (0.1) bp |
| Total style impact | | | | | | (4.3) bp |

1. The cost premium is the additional cost of external active management relative to the average of other lower cost implementation styles - internal passive, internal active and external passive.
2. A cost premium listed as 'Insufficient' indicates that there was not enough peer data to calculate the premium.
3. The 'Impact of differences in the use of lower cost styles' quantifies the net impact of your relative use of internal passive, internal active and external passive management.

The net impact of differences in external investment management costs added 1.5 bps.

| Impact of Paying More/(Less) for External Investment Management | | | | | |
|---|-----------------------------------|--------------|----------------|-----------------|---------------------------------|
| | Your avg holdings in \$mils | Cost in bps | | | Cost/ (Savings) in \$000s |
| | | Your Fund | Peer median | More/ (Less) | |
| U.S. Stock - Large Cap - Passive | 1,289 | 2.4 | 1.3 | 1.0 | 133 |
| U.S. Stock - Large Cap - Active | 1,128 | 44.8 | 25.5 | 19.3 | 2,173 |
| U.S. Stock - Small/Mid Cap - Passive | 113 | 11.1 | 4.2 | 6.9 | 77 |
| U.S. Stock - Small/Mid Cap - Active | 382 | 67.3 | 65.7 | 1.6 | 61 |
| Stock - ACWIxU.S. - Passive | 679 | 11.9 | 4.8 | 7.1 | 480 |
| Stock - ACWIxU.S. - Active | 610 | 48.4 | 42.0 | 6.4 | 390 |
| Fixed Income - U.S. - Active | 346 | 22.3 | 21.3 | 1.0 | 34 |
| Fixed Income - High Yield - Active | 165 | 52.3 | 50.0 | 2.3 | 39 |
| Real Estate ex-REITs - Active | 237 | 93.5 | 81.6 | 11.8 | 280 |
| Real Estate ex-REITs - Limited Partnership | 615 | 105.5 | 98.7 | 6.8 | 419 |
| Diversified Private Equity - Active | 1,133 | 143.9 | 165.0 | (21.1) | (2,396) |
| Diversified Private Equity - Fund of Fund* | 436 | 63.7 | 76.2 | (12.5) | (544) |
| Total external investment management impact | | | | 1.5 bp | 1,148 |

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

The net impact of differences in internal investment management costs saved you 0.1 bps.

| Impact of Paying More/(Less) for Internal Investment Management | | | | | |
|---|-----------------------------|-------------|-------------|--------------|---------------------------|
| | Your avg holdings in \$mils | Cost in bps | | | Cost/ (Savings) in \$000s |
| | | Your Fund | Peer median | More/ (Less) | |
| Fixed Income - U.S. - Active | 1,382 | 2.5 | 2.8* | (0.4) | (49) |
| Total internal investment management impact | | | | (0.1) bp | (49) |

* All U.S. universe median used as peer data was insufficient.

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

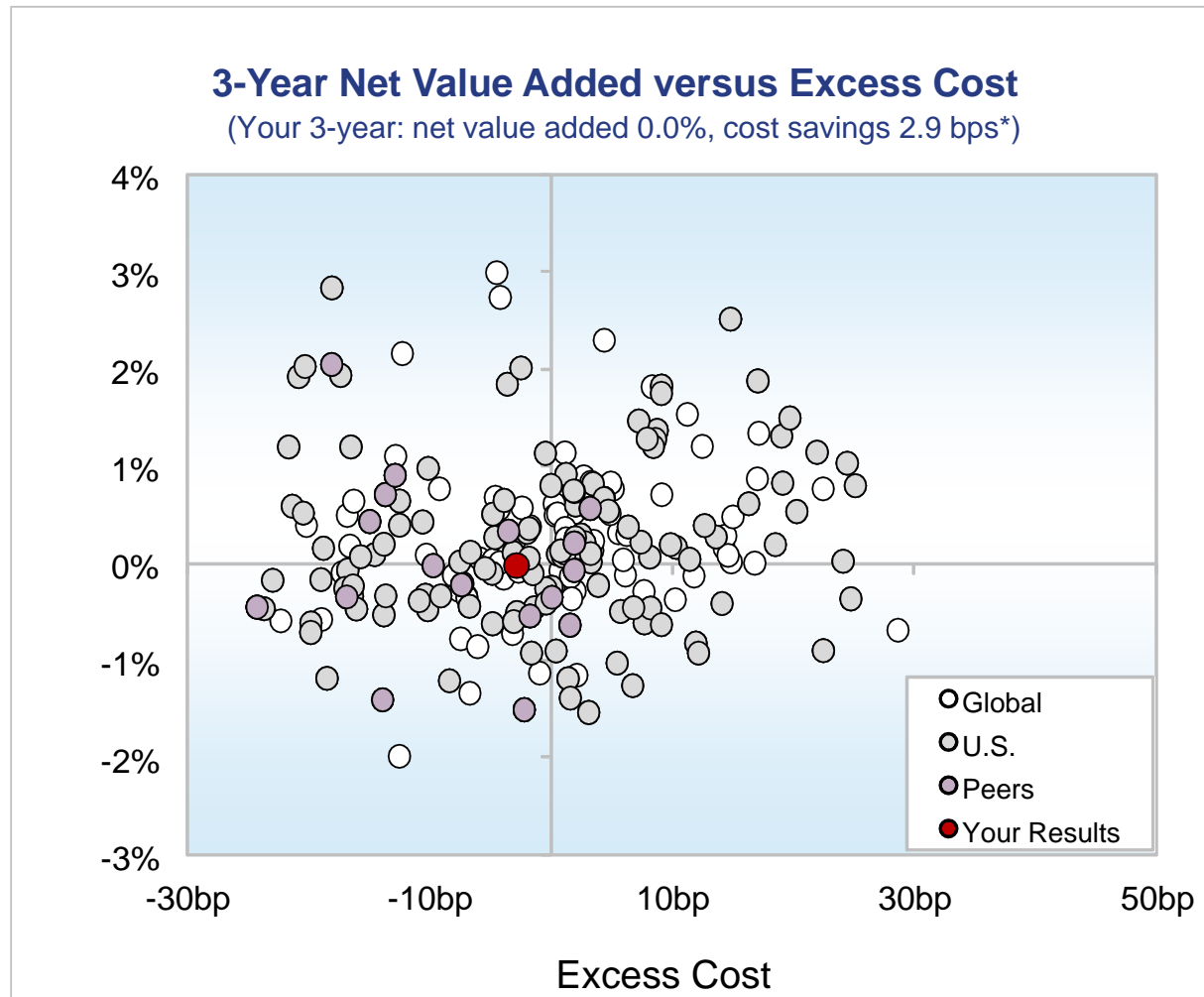
| Impact of Differences in Oversight, Custodial & Other Costs | | | | | |
|---|-----------------------------------|--------------|----------------|-----------------|---------------------------------|
| | Your avg holdings in \$mils | Cost in bps | | | Cost/ (Savings) in \$000s |
| | | Your Fund | Peer median | More/ (Less) | |
| Oversight | 7,808 | 0.8 | 1.6 | (0.8) | (661) |
| Custodial / trustee | 7,808 | 1.3 | 0.5 | 0.8 | 650 |
| Consulting / performance measurement | 7,808 | 0.3 | 1.0 | (0.7) | (517) |
| Audit | 7,808 | 0.0 | 0.1 | (0.1) | (54) |
| Other | 7,808 | 0.0 | 0.2 | (0.2) | (131) |
| Total impact | | | | (0.9) bp | (713) |

In summary, your fund was normal cost because you had a lower cost implementation style and paid slightly more for similar mandates.

| Reasons for Your Cost Status | | |
|---|---------------------------|--------------|
| | Excess Cost/ (Savings) | |
| | \$000s | bps |
| 1. Lower cost implementation style | | |
| • Lower use of fund of funds | (1,324) | (1.7) |
| • Less external active management and more lower cost passive and internal management | (2,030) | (2.6) |
| • Lower use of overlays | (81) | (0.1) |
| • Other style differences | <u>86</u> | <u>0.1</u> |
| | (3,350) | (4.3) |
| 2. Paying more or (less) than your peers for similar services | | |
| • External investment management costs | 1,148 | 1.5 |
| • Internal investment management costs | (49) | (0.1) |
| • Oversight, custodial & other costs | <u>(713)</u> | <u>(0.9)</u> |
| | 386 | 0.5 |
| Total savings | (2,964) | (3.8) |

4. Cost Effectiveness

Your fund had 3-year net value added of 0.0% and cost savings of 2.9 bps on the cost effectiveness chart.



Your 3-year cost savings of 2.9 basis points is the average of your cost savings for the past 3 years.

In summary:

1. Policy Return

Your 3-year policy return was 9.3%. This was above the U.S. Public median of 8.8% and above the peer median of 8.6%.

2. Value Added

Your 3-year net value added was 0.0%. This was slightly above the U.S. Public median of (0.2)% and close to the peer median of (0.1)%.

3. Costs

Your actual cost of 61.5 bps was close to your benchmark cost of 65.3 bps. This suggests that your fund was normal cost. Your fund was normal cost because you had a lower cost implementation style and paid slightly more for similar mandates.

4. Cost Effectiveness

Your fund had 3-year net value added of 0.0% and cost savings of 2.9 bps on the cost effectiveness chart.

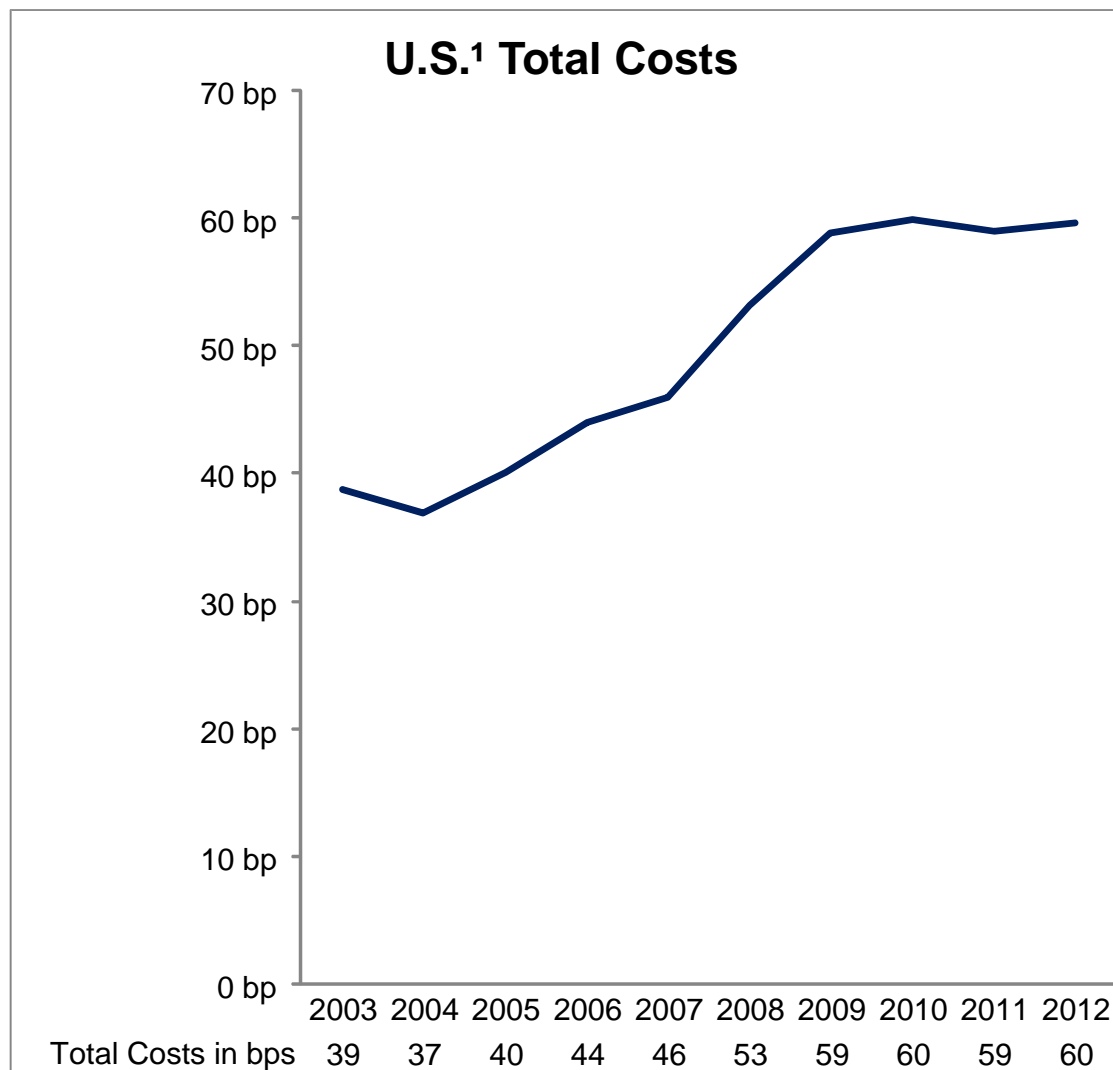
Key Trends and Research Insights from The CEM Global Investment Performance Database

Costs have been growing over ten years in the U.S.

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

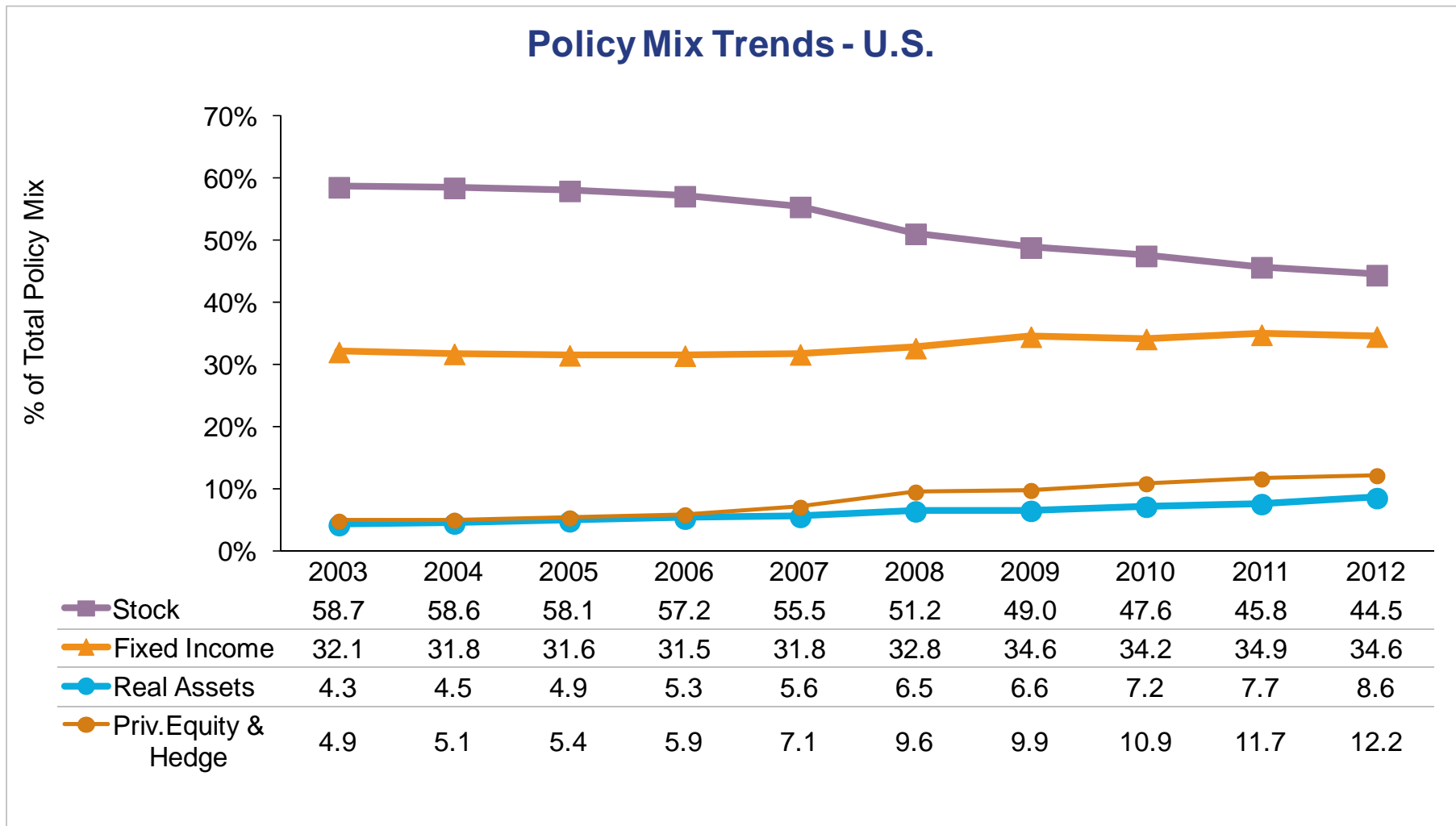
Reasons why include:

- An increase in the more expensive asset classes (hedge funds, real assets and private equity) from 4.9% to 10.9% on average
- An increase in the most expensive implementation style, external active management, from 66% to 73% on average.

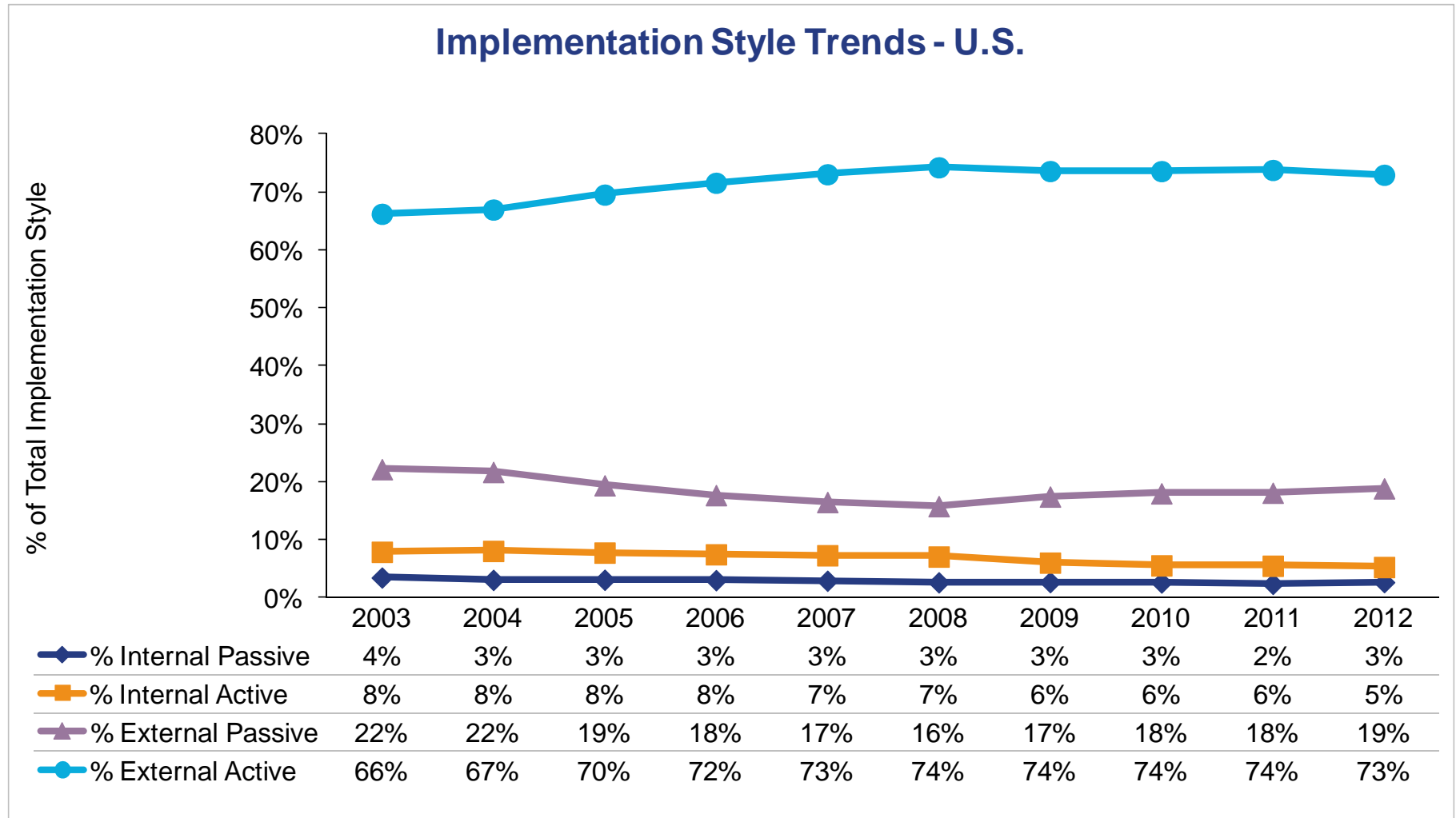


¹ Trend analysis is based on 54 U.S. funds with 10 consecutive years of data.

For U.S. plans, real asset, private equity & hedge fund policy weights grew from a total of 9.2% in 2003 to 20.9% in 2012.



For U.S. plans, external active management increased from 66% to 73% over the past 10 years.



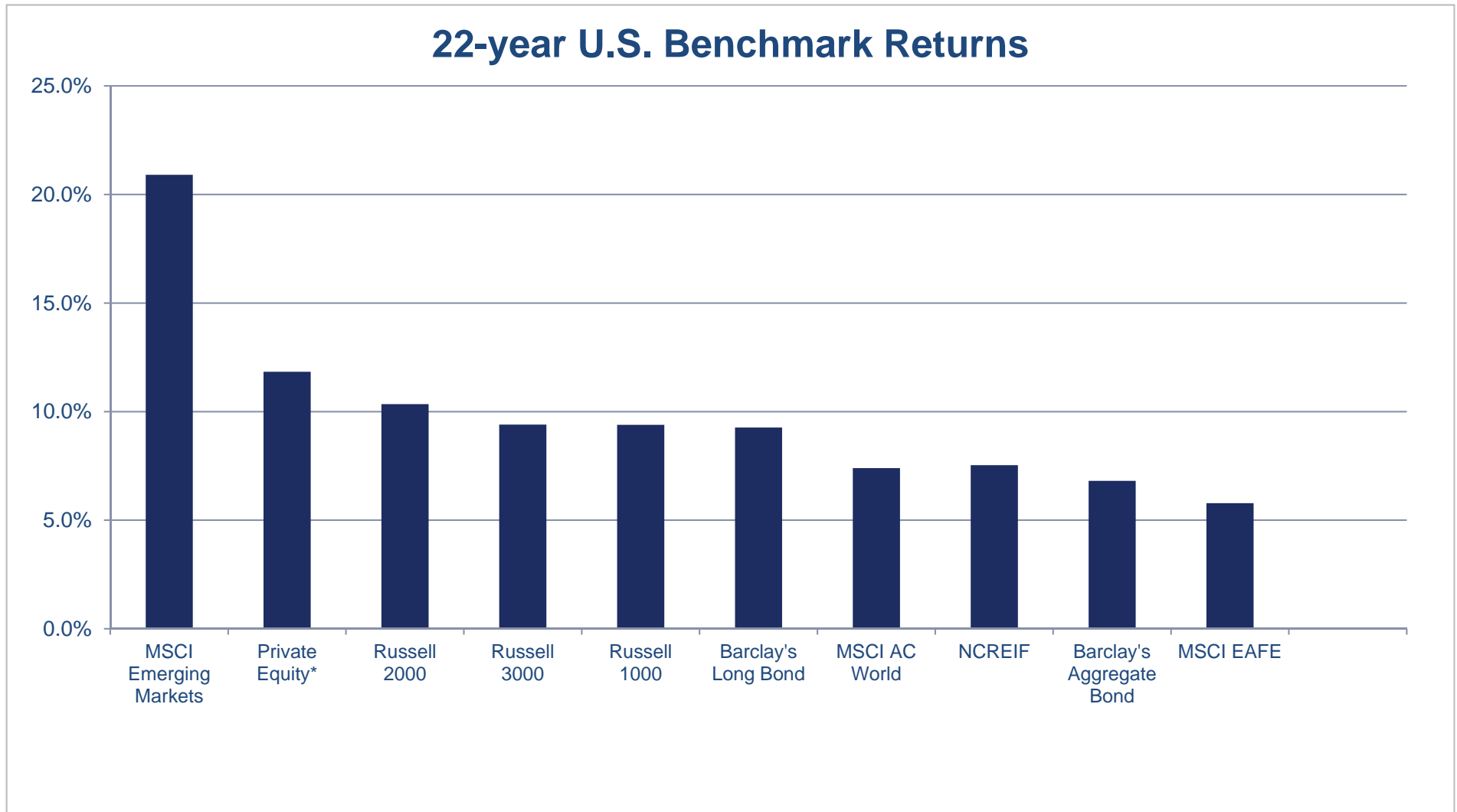
Key U.S. pension fund performance results:

- Policy returns (from asset mix) are by far the biggest component of total returns.
- U.S. pension funds in the CEM database generated 18 bps of value added from active management after costs.

| <u>U.S. Funds*</u> | |
|------------------------|--------------|
| (22-year average) | |
| Total Return | 9.85% |
| - <u>Policy Return</u> | <u>9.21%</u> |
| = Gross Value Added | 0.64% |
| - <u>Costs</u> | <u>0.45%</u> |
| = Net Value Added | 0.18% |

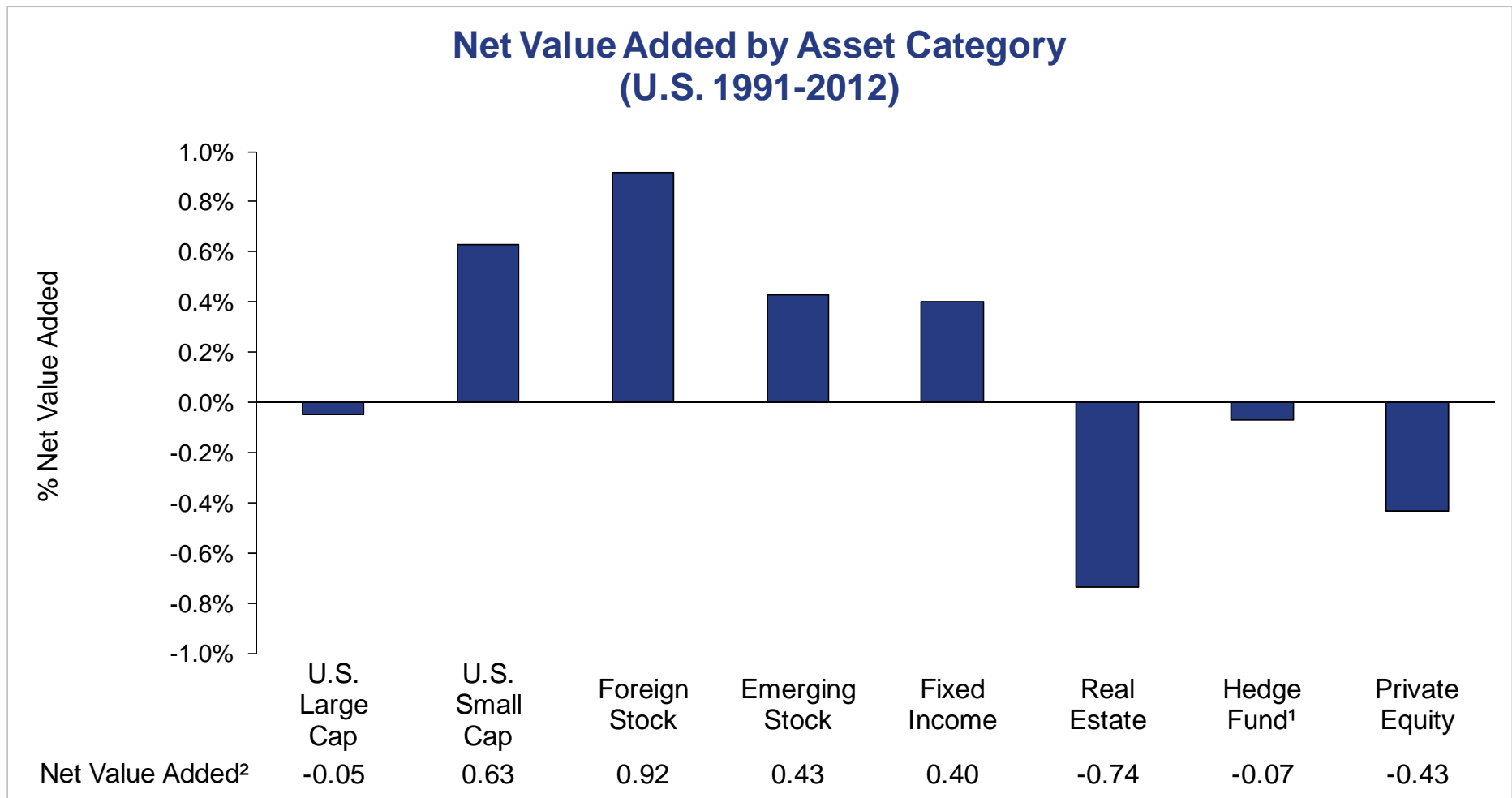
* Number of annual observations: 3,682
Median fund size: \$ 5.3 Billion

Asset mix is the primary driver of total return. Below are key 22-year U.S. benchmark returns.



* The benchmark for private equity is the compound average return of annual average benchmarks used by all participants.

In the U.S., the asset class with the highest value added was Foreign Stock.



1. Hedge Fund gross value added performance reflect data for the 13 year period from 2000 to 2012.
2. Value added analysis is from 3,668 annual fund performance observations from the CEM U.S. universe for the 22-year period ending 2012. Value added reflects the asset weighted value added of all mandates in each asset category including indexed holdings. Averages shown above are the simple average of the annual averages of all observations of funds with holdings in the asset category for each year.

Fund characteristics associated with higher net value added:

1. More internal management was better.
2. Large funds did better than small funds.

More internal management was better.

A 10% increase in internal management was associated with 3.3 bps higher net value added.

- Internal management was better primarily because of lower costs.
- Internal management increases with fund size. Funds under \$10 billion manage 8% of assets internally on average. Funds over \$50 billion manage 51% of assets internally on average.
- Fixed income is the most likely asset class to be managed internally followed by public equity and real estate. A few large funds manage some of their private equity program internally.

Large funds did better than small funds.

For a ten-fold increase in size, net value added increased by 15 bps.

Larger funds outperform because of:

- Lower total costs from scale economies
- More internal management
- Private market asset classes, especially private equity and real estate:
 - higher holdings
 - lower costs
 - higher returns

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

| DB versus DC Return and Value Added - U.S. | | | |
|--|--|--------------|--------------|
| | 16-year average ² ending 2012 | | |
| | DB | DC | Difference |
| Total Return | 7.62% | 6.11% | 1.51% |
| - Policy Return ¹ | <u>7.04%</u> | <u>5.70%</u> | <u>1.34%</u> |
| = Gross Value Added | 0.58% | 0.41% | 0.17% |
| - Costs | <u>0.47%</u> | <u>0.41%</u> | <u>0.06%</u> |
| = Net Value Added | 0.12% | 0.00% | 0.12% |
| # of Observations | 2,831 | 1,856 | |

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

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

| DB versus DC Asset Mix - U.S. | | 10-year Average | | 10-year Average | |
|--|------------------------|-----------------|----------------------|-----------------|--|
| Asset Class (Ranked by returns) | Asset Mix ¹ | | Returns ² | | |
| | DB | DC | DB | DC | |
| Private Equity | 3% | n/a | 12.2% | n/a | |
| Real Estate, REITs & Other Real Assets | 5% | n/a | 9.6% | n/a | |
| Small Cap Stock | 6% | 7% | 8.2% | 8.4% | |
| Employer Stock | n/a | 21% | n/a | 8.5% | |
| Fixed Income | 31% | 10% | 7.6% | 6.7% | |
| Hedge Funds | 2% | n/a | 8.2% | n/a | |
| Stock U.S. Large Cap or Broad | 28% | 30% | 6.4% | 6.1% | |
| Stock Non U.S. or Global | 24% | 7% | 6.4% | 6.5% | |
| Stable Value/GICs | n/a | 17% | n/a | 4.9% | |
| Cash | 2% | 8% | 3.3% | 3.2% | |
| Total | 100% | 100% | 7.6% | 6.1% | |
| # of Observations | 2,831 | | 1,856 | | |

1. 16 years ending 2012. Equals simple average of annual asset mix weights.

2. 16 years from 1997 to 2012. Returns are the compound average of the annual averages for each asset class. Hedge funds were not treated as a separate asset class until 2000, so 60% stock, 40% bond returns were used as a proxy for 1997-1999.