

# Arizona State Retirement System

## Independent ASRS Investment Program Oversight for the Period Ending June 30, 2015

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# ASRS Investment Objectives/Performance

**Note: All of the data shown on the following pages is as of June 30, 2015 and reflects the deduction of investment manager fees, unless otherwise noted.**



Macro

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.
- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.
- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.
- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

Micro

Source: ASRS Strategic Plan, March 2013

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.

	<u>20 Year Annualized Return</u>
Total Fund	8.1%
Constant 8%	<u>8.0%</u>
Excess Return	0.1%

**Goal Met: Yes**

**Total Fund Performance**

- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception (6/30/75)
<b>Total Fund</b>	0.6%	<b>3.2%</b>	<b>11.4%</b>	11.8%	6.9%	9.9%
<b>Interim SAA Policy<sup>1</sup></b>	0.7%	<b>1.6%</b>	<b>10.5%</b>	11.2%	6.6%	9.6%
<b>Excess Return</b>	<b>-0.1%</b>	<b>1.6%</b>	<b>0.9%</b>	0.6%	0.3%	0.3%

**1 Year Goal Met: Yes**  
**3 Year Goal Met: Yes**

<sup>1</sup>Composition of SAA Policy can be found in the appendix.

Arizona State Retirement System  
**Total Fund Attribution Analysis**

<b>Total Plan</b>	<b>1 Year</b>	<b>3 Years</b>	<b>5 Years</b>
Allocation Effect <sup>1</sup>	0.88%	0.78%	0.54%
Manager Selection Effect <sup>2</sup>	0.69%	0.26%	0.20%
Residual <sup>4</sup>	0.03%	-0.10%	-0.10%
<b>Excess Return</b>	<b>1.60%</b>	<b>0.94%</b>	<b>0.64%</b>

*The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:*

**Allocation Effect:** Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights. (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio – Weight Asset Class Interim Policy Index)

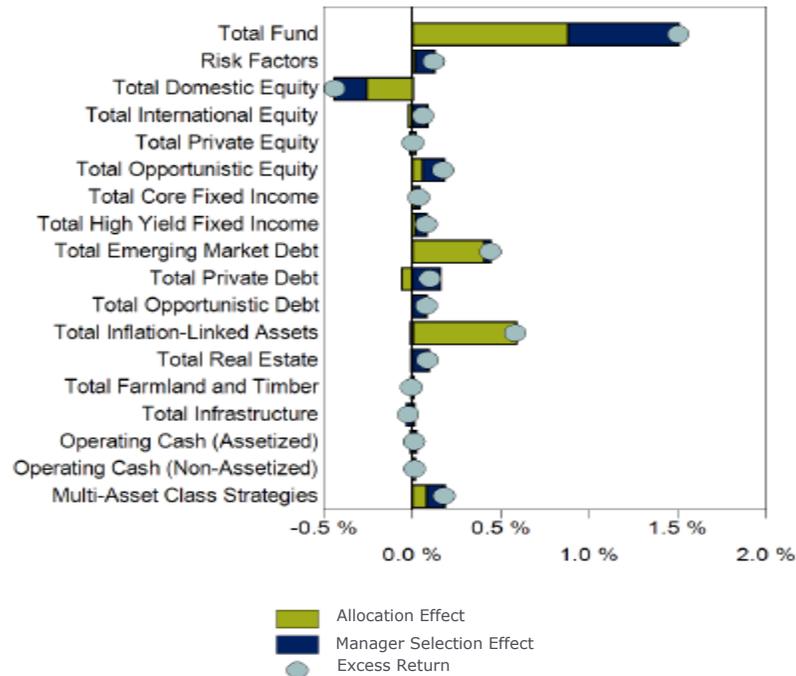
**Manager Selection Effect:** Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class – Return Asset Class in Interim Policy Index)] + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio – Weight Asset Class Policy Index)) – (Return Asset Class Index (Weight Asset Class Portfolio – Weight Asset Class Index))

**Residual:** Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

# Arizona State Retirement System

## Total Fund Attribution Detail

**Attribution Effects**  
1 Year Ending June 30, 2015



### 1 Year Excess Return: +1.60%

- Allocation Effect: +0.88%
  - Commodities tactical underweight (+0.59%)
  - Emerging Market Debt tactical underweight (+0.41%)
  - Opportunistic Equity tactical overweight (+0.06%)
  - Domestic Equity tactical underweight (-0.26%)
- Manager Selection Effect: +0.69%
  - Opportunistic Equity outperformed due to various managers (+0.18%)
  - Private Debt outperformed due to various managers (+0.16%)
  - Public Markets Fixed Income outperformed due to various managers (+0.11%)
  - Multi-Asset Class outperformed due to Bridgewater (+0.10)
  - Risk Factors outperformed (+0.10%)
  - Real Estate outperformed due to various managers (+0.09%)
  - International Equity outperformed due to various managers (+0.08%)
  - Domestic Equity underperformed due to various managers (-0.18%)
- Residual: 0.03%

**The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:**

**Allocation Effect:** Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights.  $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

**Manager Selection Effect:** Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark.  $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$  + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance.  $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

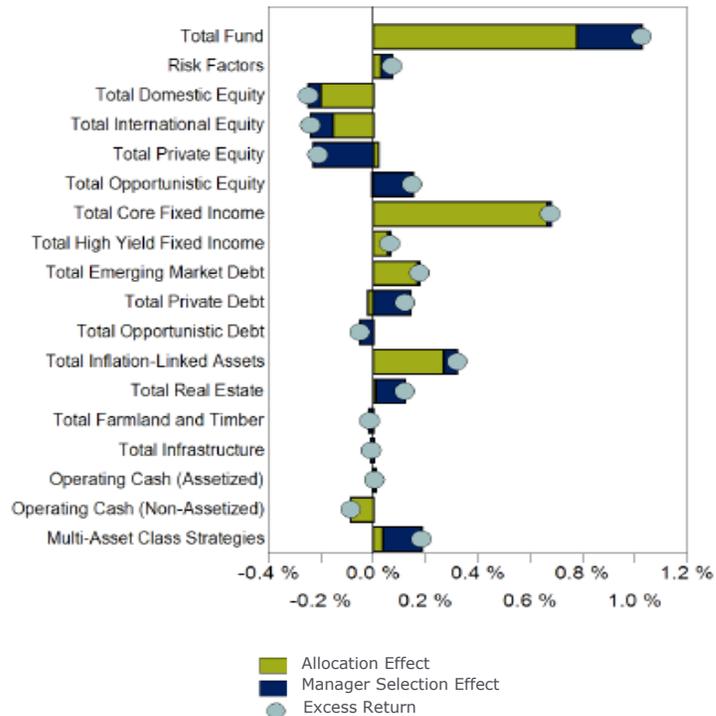
**Residual:** Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.



# Arizona State Retirement System

## Total Fund Attribution Detail

**Attribution Effects**  
3 Years Ending June 30, 2015



### 3 Year Excess Return: +0.94%

- Allocation Effect: +0.78%
  - Public Markets Fixed Income tactical underweight (+0.89%)
  - Commodities tactical underweight (+0.27%)
  - Domestic Equity tactical underweight (-0.20%)
  - International Equity tactical overweight (-0.16%)
- Manager Selection Effect: +0.26%
  - Opportunistic Equity outperformed due to various managers (+0.18%)
  - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.15%)
  - Private Debt outperformed due to various managers (+0.14%)
  - Real Estate outperformed due to various managers (+0.11%)
  - Private Equity underperformed due to various managers (-0.23%)
  - International Equity underperformed due to various managers (-0.08%)
- Residual: -0.10%

**The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:**

**Allocation Effect:** Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights.  $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

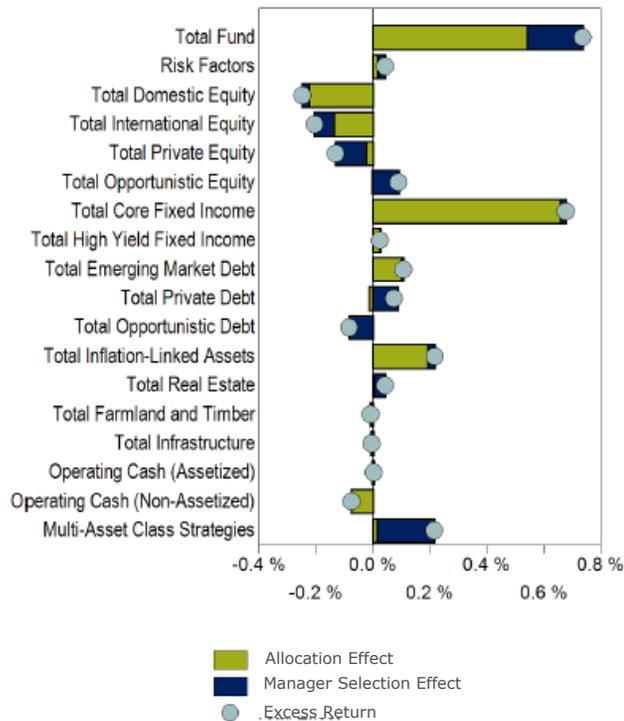
**Manager Selection Effect:** Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark.  $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$  + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance.  $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

**Residual:** Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

# Arizona State Retirement System

## Total Fund Attribution Detail

Attribution Effects  
5 Years Ending June 30, 2015



### 5 Year Excess Return: +0.64%

- Allocation Effect: +0.54%
  - Public Markets Fixed Income tactical underweight (+0.78%)
  - Commodities tactical underweight (+0.19%)
  - Domestic Equity tactical underweight (-0.22%)
  - International Equity tactical overweight (-0.14%)
- Manager Selection Effect: +0.20%
  - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.20%)
  - Opportunistic Equity outperformed due to various managers (+0.11%)
  - Private Debt outperformed due to various managers (+0.09%)
  - Private Equity underperformed due to various managers (-0.11%)
  - International Equity underperformed due to various managers (-0.07%)
- Residual: -0.10%

**The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:**

**Allocation Effect:** Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights.  $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

**Manager Selection Effect:** Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark.  $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$  + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance.  $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

**Residual:** Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

Asset Class Performance vs. Benchmark – Public Markets

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return
ASRS Total Domestic and Int'l Equity <sup>1</sup>	2.5%	14.5%
ASRS Custom Total Equity Benchmark	2.6%	14.8%
Excess Return	<b>-0.1%</b>	<b>-0.3%</b>
ASRS Domestic Equity	6.7%	17.6%
ASRS Custom Domestic Equity Benchmark	7.3%	17.8%
Excess Return	<b>-0.6%</b>	<b>-0.2%</b>
ASRS International Equity	<b>-3.8%</b>	10.0%
ASRS Custom Int'l Equity Benchmark	<b>-4.1%</b>	10.4%
Excess Return	0.3%	<b>-0.4%</b>
ASRS Public Markets Fixed Income	<b>-0.3%</b>	1.7%
ASRS Custom Fixed Income Benchmark	<b>-2.0%</b>	1.2%
Excess Return	1.7%	0.5%
ASRS Inflation-Linked	<b>-24.0%</b>	<b>-7.4%</b>
ASRS Custom Inflation-Linked Benchmark	<b>-23.7%</b>	<b>-8.8%</b>
Excess Return	<b>-0.3%</b>	1.4%
ASRS Multi-Asset Class Strategies	1.8%	11.6%
ASRS Multi-Asset Class Strategies Benchmark	1.1%	10.3%
Excess Return	0.7%	1.3%

<sup>1</sup>Performance of ASRS Total Domestic and Int'l Equity includes the performance of the ASRS Domestic Equity and ASRS International Equity asset classes and the Equity Risk Factor Portfolio with an inception date of 6/1/2013.

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

**Goal Met:  
Partially**

Asset Class Performance vs. Benchmark – Private Markets<sup>1</sup>

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return	IRR Since Inception	Inception Date
ASRS Private Equity	9.7%	13.3%	12.1%	Oct-07
Russell 2000	7.2%	15.0%	14.2%	
Excess Return	2.5%	-1.7%	-2.1%	
ASRS Opportunistic Equity <sup>2</sup>	28.6%	35.6%	33.6%	Apr-11
ASRS Private Debt	9.8%	--	12.3%	Jul-12
S&P/LSTA Levered Loan Index + 250 bps	5.2%	--	6.5%	
Excess Return	4.6%	--	5.8%	
ASRS Opportunistic Debt <sup>2</sup>	6.5%	9.7%	11.4%	Jan-08
ASRS Real Estate	13.8%	13.5%	7.1%	Oct-05
NFI - ODCE Index	12.4%	11.6%	6.1%	
Excess Return	1.4%	1.9%	1.0%	
ASRS Farmland and Timber	4.3%	--	3.8%	Jul-13
CPI ex-Food and Energy + 350 bps	5.4%	--	5.4%	
Excess Return	-1.1%		-1.6%	
ASRS Total Infrastructure	--	--	-1.7%	Oct-14
CPI - Infrastructure + 350 bps	--	--	2.3%	
Excess Return			-4.0%	

1- Performance of private markets portfolios and corresponding benchmarks is reported on a one quarter lag. Performance shown as of March 31, 2015.

2- Net absolute rate of return expectations range from 10-14% per annum.

Note: Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return (IRR) is a more appropriate measure of the performance of ASRS private markets portfolios.

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

**Goal Met:  
Partially**

Cash Management

- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

Month	External CFs +	Internal CFs =	Total CFs during the Month	Last day of the Month Ending Balance*
Jul – 14	(\$153.7)	(\$59.0)	(\$212.7)	\$249.6
Aug – 14	(\$117.4)	(\$133.1)	(\$250.5)	\$141.8
Sep – 14	(\$84.7)	(\$6.8)	(\$91.5)	\$365.4
Oct – 14	(\$64.8)	\$57.7	(\$7.1)	\$139.9
Nov – 14	(\$109.5)	(\$72.2)	(\$181.7)	\$314.7
Dec – 14	(\$56.7)	(\$571.9)	(\$628.6)	\$467.3
Jan – 15	(\$82.9)	(\$39.8)	(\$122.7)	\$140.1
Feb – 15	(\$123.2)	\$7.2	(\$116.0)	\$80.4
Mar – 15	(\$64.8)	(\$19.3)	(\$84.1)	\$418.0
Apr – 15	(\$90.9)	(\$154.8)	(\$245.7)	\$550.1
May – 15	(\$47.8)	(\$37.8)	(\$85.6)	\$479.0
Jun – 15	(\$74.4)	(\$117.1)	(\$191.5)	\$318.3

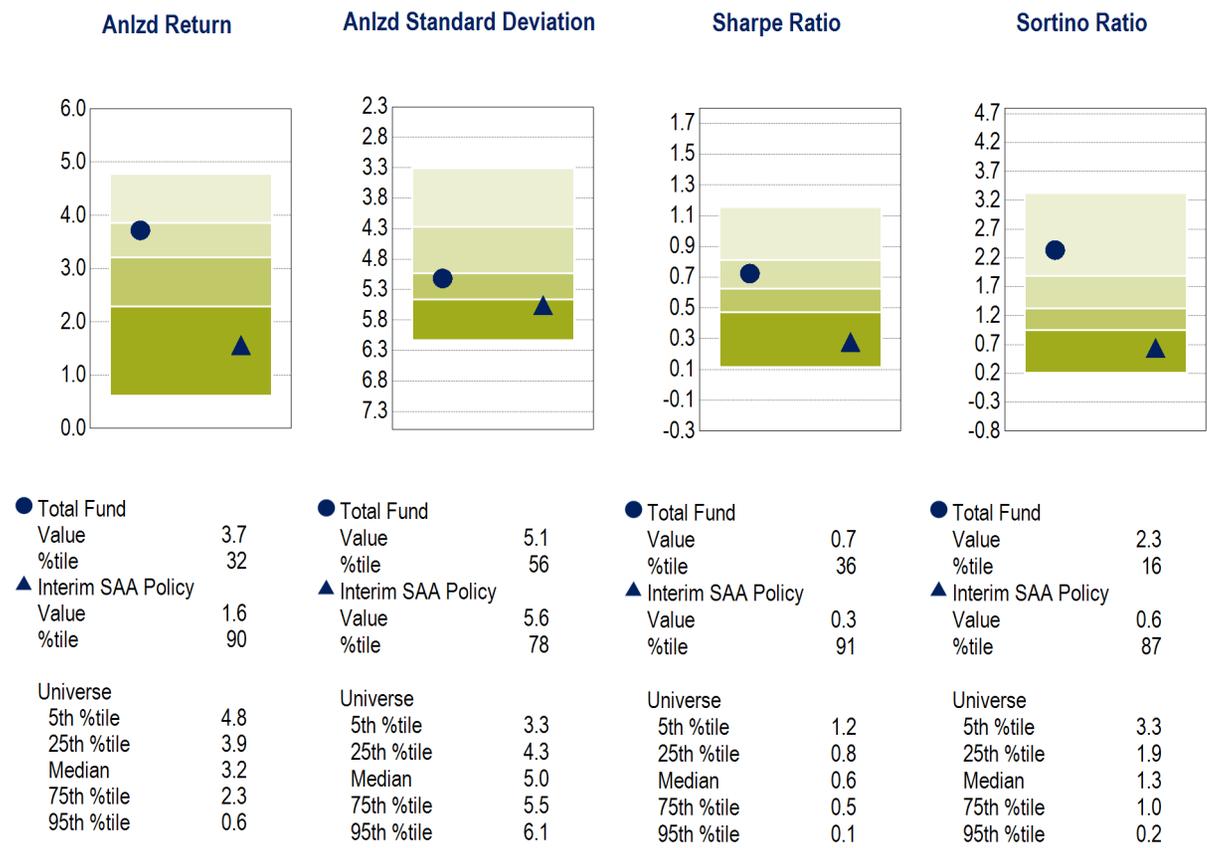
\* Includes assetized & unassetized cash balances (Inception of 1/26/15); represent monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.

**Goal Met: Yes**

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

1 Year



Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > \$1 Billion Universe.

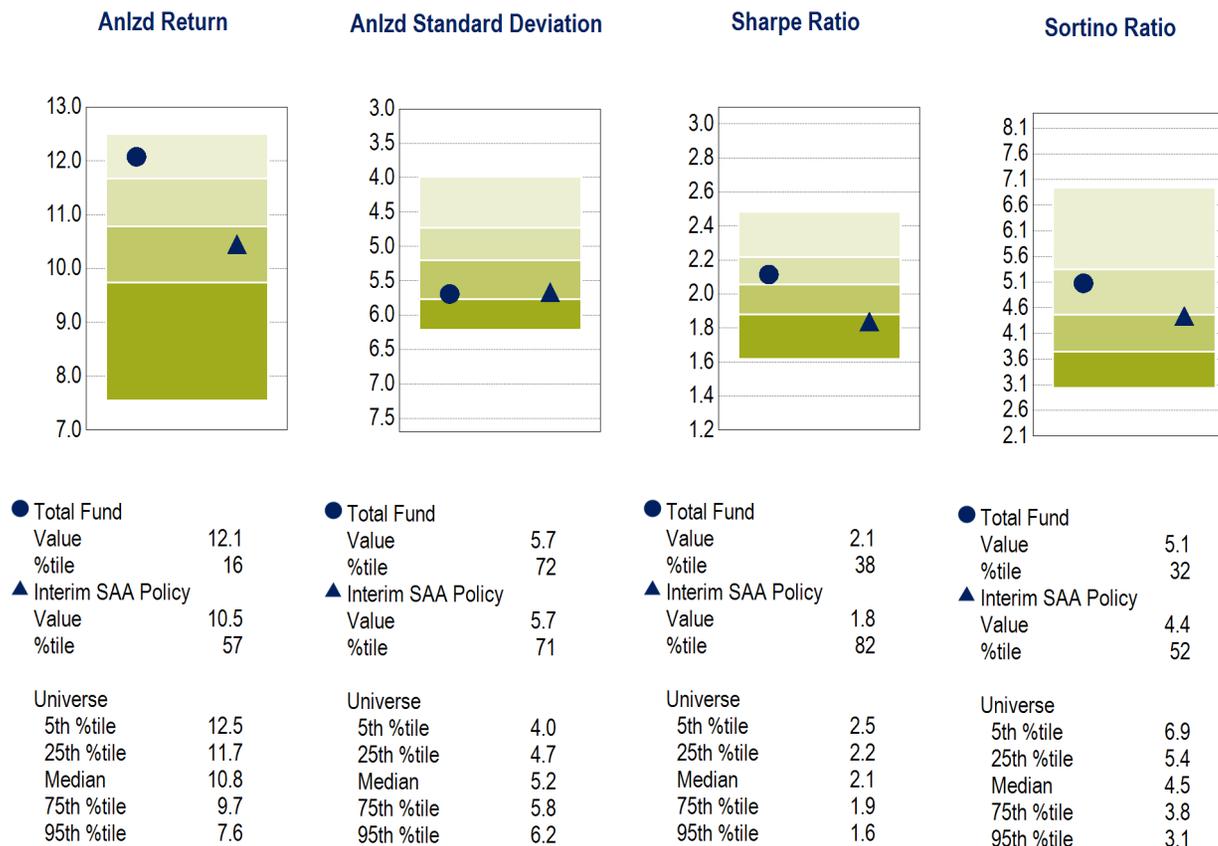
The InvestorForce Public Funds > \$1 Billion Universe contains 100 observations for the period ending June 30, 2015, with total assets of \$2,063 billion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

3 Year



Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

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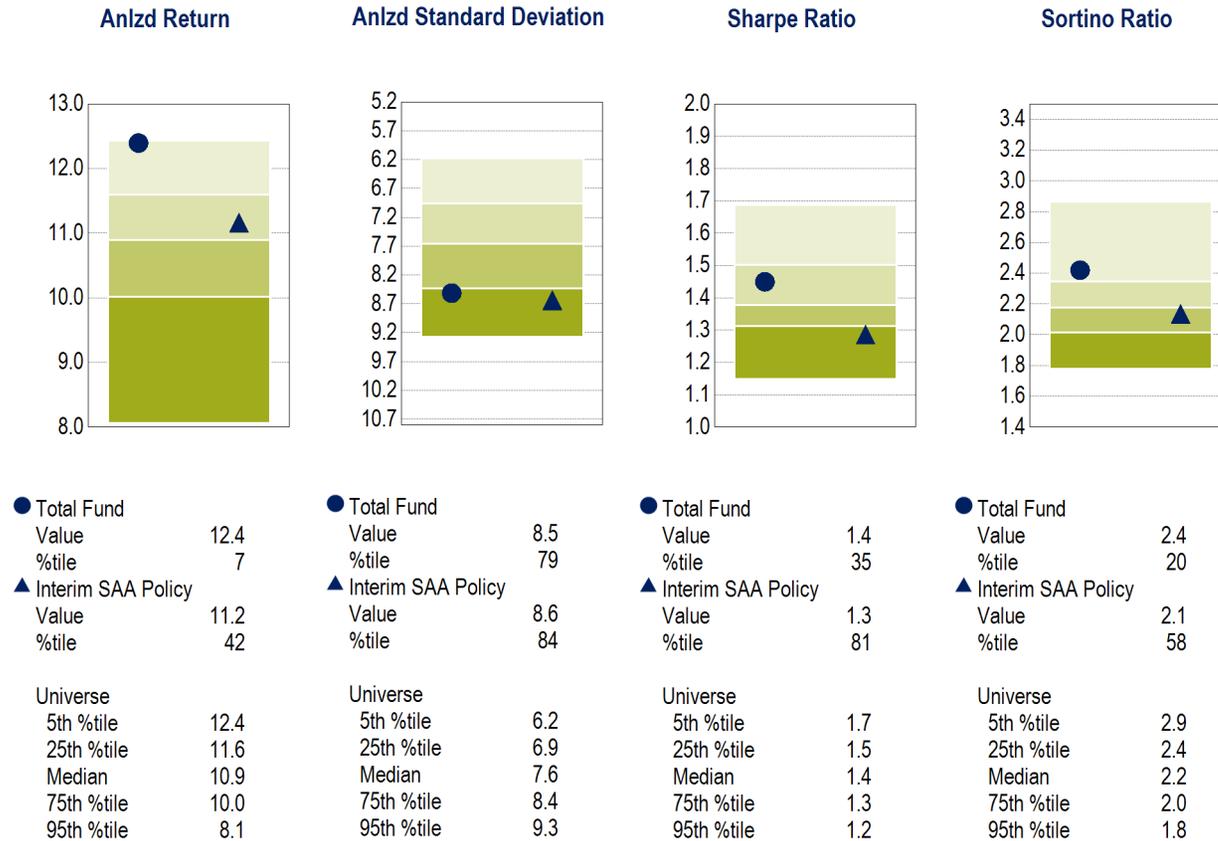
The InvestorForce Public Funds > \$1 Billion Universe contains 100 observations for the period ending June 30, 2015, with total assets of \$2,063 billion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

5 Year



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Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > \$1 Billion Universe.

The InvestorForce Public Funds > \$1 Billion Universe contains 100 observations for the period ending June 30, 2015, with total assets of \$2,063 billion.

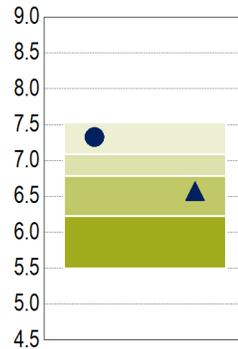
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Total Fund Risk Statistics vs. Peer Universe

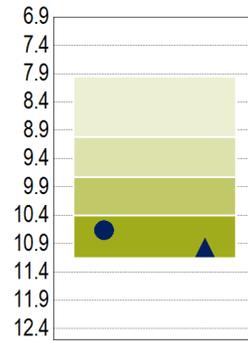
Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

10 Year

Anlzd Return



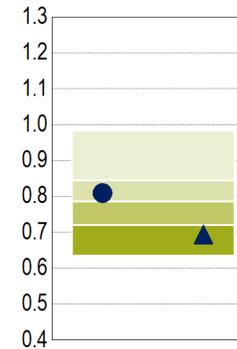
Anlzd Standard Deviation



Sharpe Ratio



Sortino Ratio



● Total Fund

Value 7.3  
%tile 17

▲ Interim SAA Policy

Value 6.6  
%tile 65

Universe

5th %tile 7.5  
25th %tile 7.1  
Median 6.8  
75th %tile 6.2  
95th %tile 5.5

● Total Fund

Value 10.7  
%tile 85

▲ Interim SAA Policy

Value 11.0  
%tile 90

Universe

5th %tile 7.9  
25th %tile 9.0  
Median 9.7  
75th %tile 10.4  
95th %tile 11.1

● Total Fund

Value 0.6  
%tile 51

▲ Interim SAA Policy

Value 0.5  
%tile 86

Universe

5th %tile 0.7  
25th %tile 0.6  
Median 0.6  
75th %tile 0.5  
95th %tile 0.4

● Total Fund

Value 0.8  
%tile 39

▲ Interim SAA Policy

Value 0.7  
%tile 86

Universe

5th %tile 1.0  
25th %tile 0.8  
Median 0.8  
75th %tile 0.7  
95th %tile 0.6

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

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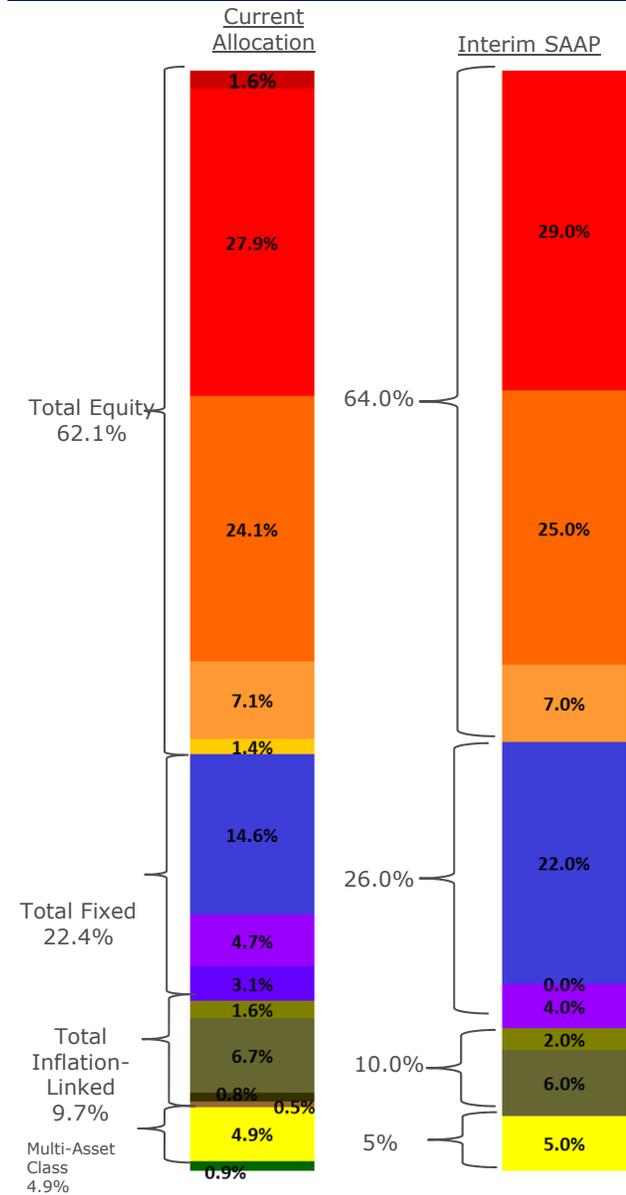
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# Independent Oversight/Compliance

**Note: All of the data shown on the following pages is as of June 30, 2015 and reflects the deduction of investment manager fees, unless otherwise noted.**



SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Difference	Policy Range	Within Range
<b>Total Domestic and International Equity<sup>1</sup></b>	<b>\$18,703,704,797</b>	<b>53.7%</b>	<b>54.0%</b>	<b>-0.3%</b>		
<b>Domestic Equity<sup>2</sup></b>	<b>\$9,738,087,643</b>	<b>27.9%</b>	<b>29.0%</b>	<b>-1.1%</b>	<b>16% - 36%</b>	<b>Yes</b>
U.S. Large Cap	\$7,588,764,370	21.8%	23.0%	-1.2%		
U.S. Mid Cap	\$1,073,753,486	3.1%	3.0%	0.1%		
U.S. Small Cap	\$1,075,569,787	3.1%	3.0%	0.1%		
<b>International Equity<sup>2</sup></b>	<b>\$8,407,598,048</b>	<b>24.1%</b>	<b>25.0%</b>	<b>-0.9%</b>	<b>14% - 34%</b>	<b>Yes</b>
Developed Large Cap	\$6,069,818,119	17.4%	18.0%	-0.6%		
Developed Small Cap	\$687,351,544	2.0%	2.0%	0.0%		
Emerging Markets	\$1,633,091,879	4.7%	5.0%	-0.3%		
<b>Private Equity<sup>3</sup></b>	<b>\$2,474,325,298</b>	<b>7.1%</b>	<b>7.0%</b>	<b>0.1%</b>	<b>6% - 10%</b>	<b>Yes</b>
<b>Opportunistic Equity<sup>3,5</sup></b>	<b>\$485,647,943</b>	<b>1.4%</b>	<b>0.0%</b>	<b>1.4%</b>	<b>0% - 3%</b>	<b>Yes</b>
<b>Total Equity</b>	<b>\$21,663,678,038</b>	<b>62.1%</b>	<b>61.0%</b>	<b>1.1%</b>	<b>48% - 65%</b>	<b>Yes</b>
<b>U.S. Fixed Income</b>	<b>\$5,081,547,655</b>	<b>14.6%</b>	<b>22.0%</b>	<b>-7.4%</b>	<b>8% - 28%</b>	<b>Yes</b>
Core	\$3,781,019,278	10.8%	17.0%	-6.2%		
High Yield	\$1,300,528,377	3.7%	5.0%	-1.3%		
<b>Private Debt<sup>3</sup></b>	<b>\$1,631,115,653</b>	<b>4.7%</b>	<b>4.0%</b>	<b>0.7%</b>	<b>8% - 12%</b>	
<b>Opportunistic Debt<sup>3,5</sup></b>	<b>\$1,089,167,963</b>	<b>3.1%</b>	<b>0.0%</b>	<b>3.1%</b>	<b>0% - 3%</b>	<b>Yes</b>
<b>Total Fixed Income</b>	<b>\$7,801,831,271</b>	<b>22.4%</b>	<b>26.0%</b>	<b>-3.6%</b>	<b>18% - 35%</b>	<b>Yes</b>
<b>Commodities</b>	<b>\$561,620,866</b>	<b>1.6%</b>	<b>2.0%</b>	<b>-0.4%</b>	<b>0% - 4%</b>	<b>Yes</b>
<b>Real Estate<sup>3</sup></b>	<b>\$2,343,221,525</b>	<b>6.7%</b>	<b>6.0%</b>	<b>0.7%</b>	<b>8% - 12%</b>	<b>Yes</b>
<b>Infrastructure</b>	<b>\$294,905,121</b>	<b>0.8%</b>	<b>0.0%</b>	<b>0.8%</b>	<b>0% - 3%</b>	<b>Yes</b>
<b>Farmland and Timber</b>	<b>\$170,400,209</b>	<b>0.5%</b>	<b>0.0%</b>	<b>0.5%</b>	<b>0% - 3%</b>	<b>Yes</b>
<b>Opportunistic Inflation-Linked<sup>4</sup></b>	<b>\$0</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0% - 3%</b>	<b>Yes</b>
<b>Total Inflation-Linked</b>	<b>\$3,370,147,721</b>	<b>9.7%</b>	<b>8.0%</b>	<b>1.7%</b>	<b>8% - 16%</b>	<b>Yes</b>
<b>Multi-Asset Class Strategies</b>	<b>\$1,703,372,187</b>	<b>4.9%</b>	<b>5.0%</b>	<b>-0.1%</b>	<b>0% - 12%</b>	<b>Yes</b>
<b>Cash<sup>4</sup></b>	<b>\$322,861,484</b>	<b>0.9%</b>	<b>0.0%</b>	<b>0.9%</b>		
Operating Cash (Non-Assetized)	\$26,878,039	0.1%	0.0%	0.1%		
Operating Cash (Assetized)	\$295,983,445	0.8%	0.0%	0.8%		
<b>Total</b>	<b>\$34,861,890,700</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>		

<sup>1</sup>Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of \$558.2 million.

<sup>2</sup>Domestic Equity, International Equity and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.

<sup>3</sup>Values shown for private markets portfolios include cash flows that occurred during 1Q 2015.

<sup>4</sup>Cash includes money for the upcoming monthly pension distribution.

<sup>5</sup>Aggregate Opportunistic asset classes not to exceed 10%.

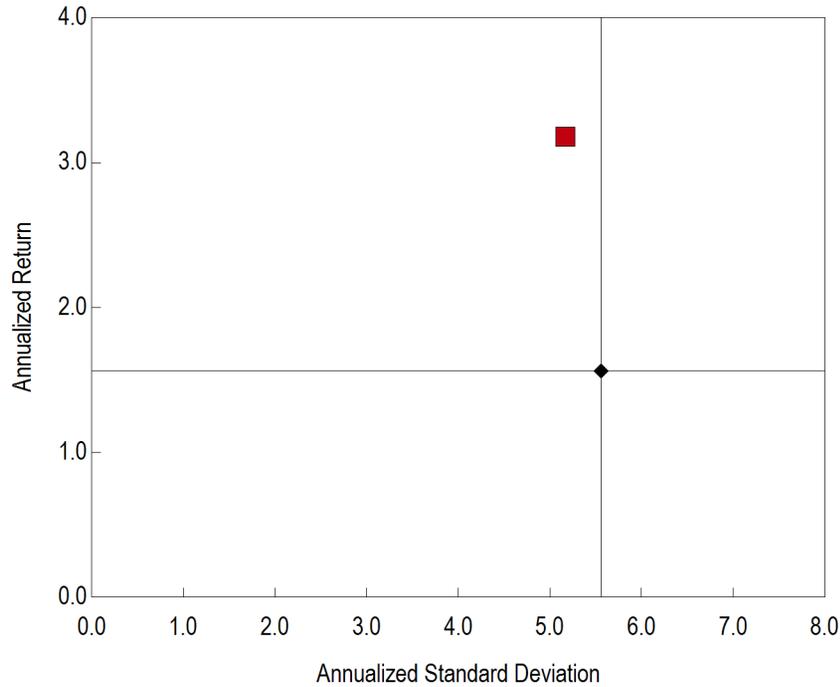
Note: Interim SAA Policy includes proration of 1% Private Equity and 2% Real Estate, which are unfunded.

Policy Ranges shown are relative to the long-term SAAP, causing some asset classes to be out of range while implementation of the long-term SAAP is in process.

Market values include manager held cash.

Total Fund Analysis

1 Year Ending June 30, 2015

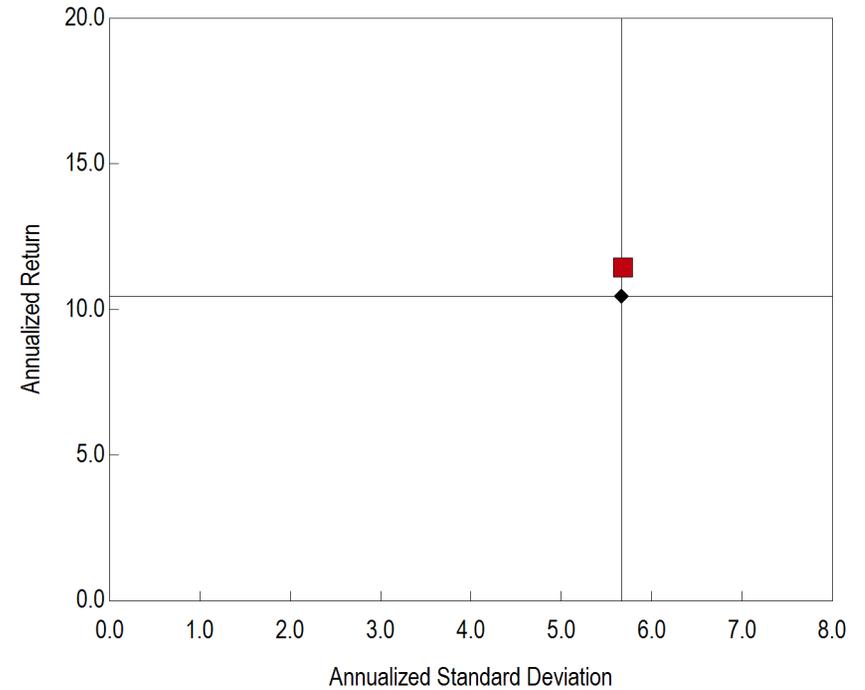


■ Total Fund  
◆ Interim SAA Policy

1 Year Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	3.2%	5.2%	0.6	1.5
Interim SAA Policy	1.6%	5.6%	0.3	0.6

3 Years Ending June 30, 2015



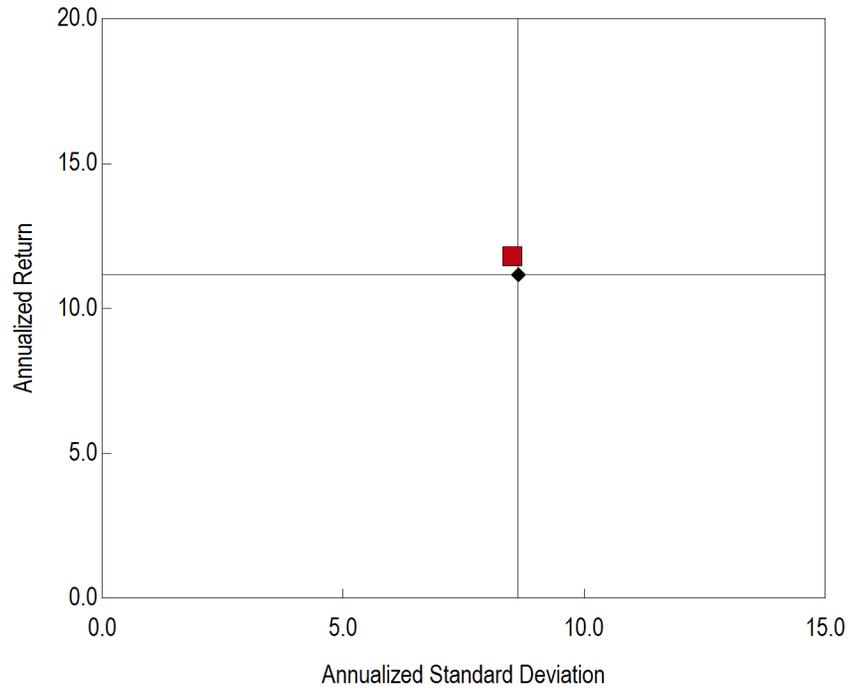
■ Total Fund  
◆ Interim SAA Policy

3 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	11.4%	5.7%	2.0	4.4
Interim SAA Policy	10.5%	5.7%	1.8	4.4

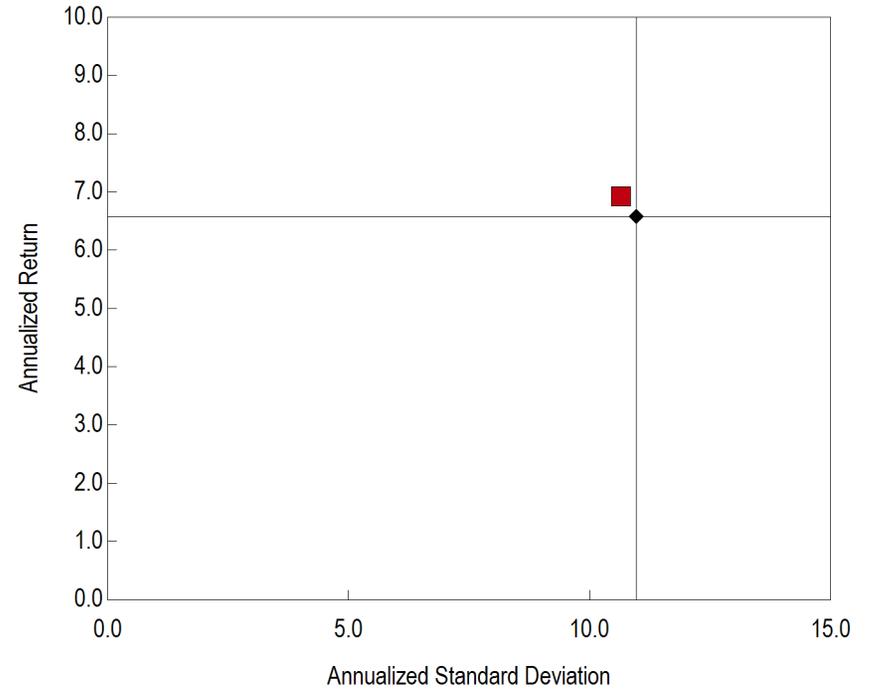
Total Fund Analysis

5 Years Ending June 30, 2015



■ Total Fund  
◆ Interim SAA Policy

10 Years Ending June 30, 2015



■ Total Fund  
◆ Interim SAA Policy

5 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	11.8%	8.5%	1.4	2.3
Interim SAA Policy	11.2%	8.6%	1.3	2.1

10 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	6.9%	10.7%	0.5	0.8
Interim SAA Policy	6.6%	11.0%	0.5	0.7

# Arizona State Retirement System

## Asset Class Performance Summary - Public Markets

	Market Value (\$)	% of Portfolio	3 Mo (%)	Rank	FYTD (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank	Inception (%)	Since
<b>Total Fund</b>	<b>34,861,890,700</b>	<b>100.0</b>	<b>0.6</b>	<b>--</b>	<b>3.2</b>	<b>--</b>	<b>3.2</b>	<b>--</b>	<b>11.4</b>	<b>--</b>	<b>11.8</b>	<b>--</b>	<b>6.9</b>	<b>--</b>	<b># 9.9</b>	<b>Jul-75</b>
<i>Interim SAA Policy</i>			<u>0.7</u>	--	<u>1.6</u>	--	<u>1.6</u>	--	<u>10.5</u>	--	<u>11.2</u>	--	<u>6.6</u>	--	<u>9.6</u>	<i>Jul-75</i>
Over/Under			-0.1		1.6		1.6		0.9		0.6		0.3		0.3	
<i>Actual Benchmark</i>			<u>0.7</u>	--	<u>2.4</u>	--	<u>2.4</u>	--	<u>11.0</u>	--	<u>11.4</u>	--	<u>6.6</u>	--	--	<i>Jul-75</i>
<b>Total Domestic and International Equity<sup>1</sup></b>	<b>18,703,704,797</b>	<b>53.7</b>	<b>0.7</b>	<b>--</b>	<b>2.5</b>	<b>--</b>	<b>2.5</b>	<b>--</b>	<b>14.5</b>	<b>--</b>	<b>14.3</b>	<b>--</b>	<b>7.2</b>	<b>--</b>	<b># 6.8</b>	<b>Jan-98</b>
<i>ASRS Custom Total Equity Benchmark</i>			<u>0.6</u>	--	<u>2.6</u>	--	<u>2.6</u>	--	<u>14.8</u>	--	<u>14.4</u>	--	<u>7.4</u>	--	<u>6.2</u>	<i>Jan-98</i>
Over/Under			0.1		-0.1		-0.1		-0.3		-0.1		-0.2		0.6	
<b>Total Domestic Equity</b>	<b>9,738,087,643</b>	<b>27.9</b>	<b>0.0</b>	<b>54</b>	<b>6.7</b>	<b>51</b>	<b>6.7</b>	<b>51</b>	<b>17.6</b>	<b>52</b>	<b>17.5</b>	<b>43</b>	<b>8.5</b>	<b>50</b>	<b>11.3</b>	<b>Jul-75</b>
<i>ASRS Custom Domestic Equity Benchmark</i>			<u>0.1</u>	53	<u>7.3</u>	47	<u>7.3</u>	47	<u>17.8</u>	49	<u>17.6</u>	41	<u>8.4</u>	55	<u>11.4</u>	<i>Jul-75</i>
Over/Under			-0.1		-0.6		-0.6		-0.2		-0.1		0.1		-0.1	
<i>eA All US Equity Net Median</i>			<u>0.2</u>		<u>6.8</u>		<u>6.8</u>		<u>17.7</u>		<u>17.1</u>		<u>8.5</u>		<u>12.7</u>	<i>Jul-75</i>
<b>Total International Equity</b>	<b>8,407,598,048</b>	<b>24.1</b>	<b>1.7</b>	<b>46</b>	<b>-3.8</b>	<b>66</b>	<b>-3.8</b>	<b>66</b>	<b>10.0</b>	<b>70</b>	<b>8.4</b>	<b>80</b>	<b>5.2</b>	<b>90</b>	<b>6.2</b>	<b>Apr-87</b>
<i>ASRS Custom Int'l Equity Benchmark</i>			<u>0.9</u>	63	<u>-4.1</u>	68	<u>-4.1</u>	68	<u>10.4</u>	68	<u>8.7</u>	77	<u>6.1</u>	65	<u>5.9</u>	<i>Apr-87</i>
Over/Under			0.8		0.3		0.3		-0.4		-0.3		-0.9		0.3	
<i>eA All ACWI ex-US Equity Net Median</i>			<u>1.4</u>		<u>-2.3</u>		<u>-2.3</u>		<u>11.7</u>		<u>10.1</u>		<u>6.8</u>		<u>7.8</u>	<i>Apr-87</i>
<b>Total Public Markets Fixed Income</b>	<b>5,081,567,512</b>	<b>14.6</b>	<b>-1.2</b>	<b>67</b>	<b>-0.3</b>	<b>90</b>	<b>-0.3</b>	<b>90</b>	<b>1.7</b>	<b>67</b>	<b>3.6</b>	<b>56</b>	<b>4.7</b>	<b>44</b>	<b>8.3</b>	<b>Jul-75</b>
<i>ASRS Custom Fixed Income Benchmark</i>			<u>-1.2</u>	67	<u>-2.0</u>	96	<u>-2.0</u>	96	<u>1.2</u>	81	<u>3.0</u>	68	<u>4.3</u>	58	--	<i>Jul-75</i>
Over/Under			0.0		1.7		1.7		0.5		0.6		0.4		--	
<i>eA All US Fixed Inc Net Median</i>			<u>-0.6</u>		<u>1.2</u>		<u>1.2</u>		<u>2.4</u>		<u>3.9</u>		<u>4.5</u>		<u>8.1</u>	<i>Jul-75</i>
<b>Total Inflation-Linked Assets</b>	<b>561,620,866</b>	<b>1.6</b>	<b>4.2</b>	<b>--</b>	<b>-24.0</b>	<b>--</b>	<b>-24.0</b>	<b>--</b>	<b>-7.4</b>	<b>--</b>	<b>-4.3</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>-3.5</b>	<b>Feb-10</b>
<i>ASRS Custom Inflation-Linked Benchmark</i>			<u>4.7</u>	--	<u>-23.7</u>	--	<u>-23.7</u>	--	<u>-8.8</u>	--	<u>-5.8</u>	--	--	--	<u>-4.9</u>	<i>Feb-10</i>
Over/Under			-0.5		-0.3		-0.3		1.4		1.5		--		1.4	
<b>Total Multi-Asset Class Strategies</b>	<b>1,703,372,187</b>	<b>4.9</b>	<b>-1.5</b>	<b>57</b>	<b>1.8</b>	<b>29</b>	<b>1.8</b>	<b>29</b>	<b>11.6</b>	<b>1</b>	<b>12.9</b>	<b>1</b>	<b>8.1</b>	<b>6</b>	<b>7.9</b>	<b>Jan-04</b>
<i>Multi-Asset Class Strategies Custom Benchm:</i>			<u>-0.6</u>	26	<u>1.1</u>	31	<u>1.1</u>	31	<u>10.3</u>	14	<u>11.0</u>	6	<u>6.2</u>	58	<u>6.3</u>	<i>Jan-04</i>
Over/Under			-0.9		0.7		3.2		1.3		1.9		1.9		1.6	
<i>eA Global TAA Net Median</i>			<u>-1.4</u>		<u>-0.3</u>		<u>-0.3</u>		<u>6.3</u>		<u>7.3</u>		<u>7.0</u>		<u>7.1</u>	<i>Jan-04</i>
<b>Operating Cash (Assetized)</b>	<b>295,983,445</b>	<b>0.8</b>	<b>1.0</b>												<b>5.1</b>	<b>Feb-15</b>
<i>ASRS Cash Assetization Custom Benchmark</i>			<u>-0.1</u>												<u>3.2</u>	<i>Feb-15</i>
Over/Under			1.1												1.9	

<sup>1</sup>Performance of ASRS Total Domestic and International Equity includes the performance of the ASRS Domestic and International Equity asset classes and the Equity Risk Factor Portfolio with an inception date of 6/1/2013. NEPC began calculating Total Domestic and International Equity performance in January 2009. Monthly performance data from January 1998 - December 2008 was provided by State Street.

Note: Performance, ranks and medians are based on net of fee performance data. Rankings are from highest (1) to lowest (100) in the eVestment Universe.

Composition of Interim SAA Policy and ASRS Custom Asset Class Benchmarks can be found in the appendix.

# Arizona State Retirement System

## Asset Class Performance Summary - Private Markets

	Market Value (\$)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	Inception (%)	Since
<b>Total Fund</b>	<b>34,861,890,700</b>	<b>100.0</b>	<b>0.6</b>	<b>3.2</b>	<b>11.4</b>	<b>11.8</b>	<b>9.9</b>	<b>Jul-75</b>
<i>Interim SAA Policy</i>			<u>0.7</u>	<u>1.6</u>	<u>10.5</u>	<u>11.2</u>	<u>9.6</u>	<i>Jul-75</i>
Over/Under			-0.1	1.6	0.9	0.6	0.3	
<i>Actual Benchmark</i>			<u>0.7</u>	<u>2.4</u>	<u>11.0</u>	<u>11.4</u>	--	<i>Jul-75</i>
<b>Total Private Equity</b>	<b>2,440,430,496</b>	<b>7.0</b>	<b>1.8</b>	<b>9.7</b>	<b>13.3</b>	<b>14.3</b>	<b>12.1</b>	<b>Oct-07</b>
<i>Russell 2000 1 QTR Lagged</i>			<u>4.0</u>	<u>7.2</u>	<u>15.0</u>	<u>14.3</u>	<u>14.2</u>	<i>Oct-07</i>
Over/Under			-2.2	2.5	-1.7	0.0	-2.1	
<b>Total Opportunistic Equity<sup>1</sup></b>	<b>442,669,347</b>	<b>1.3</b>	<b>4.6</b>	<b>28.6</b>	<b>35.6</b>		<b>33.6</b>	<b>Apr-11</b>
<b>Total Private Debt</b>	<b>1,564,975,116</b>	<b>4.5</b>	<b>2.1</b>	<b>9.8</b>	<b>--</b>	<b>--</b>	<b>12.3</b>	<b>Jul-12</b>
<i>S&amp;P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged</i>			<u>2.7</u>	<u>5.2</u>			<u>6.5</u>	<i>Jul-12</i>
Over/Under			-0.6	4.6			5.8	
<b>Total Opportunistic Debt<sup>1</sup></b>	<b>1,088,650,206</b>	<b>3.1</b>	<b>2.1</b>	<b>6.5</b>	<b>9.7</b>	<b>9.3</b>	<b>11.4</b>	<b>Jan-08</b>
<b>Total Real Estate</b>	<b>2,207,150,467</b>	<b>6.3</b>	<b>2.2</b>	<b>13.8</b>	<b>13.5</b>	<b>14.0</b>	<b>7.1</b>	<b>Oct-05</b>
<i>NCREIF ODCE 1 QTR Lagged (net)</i>			<u>3.2</u>	<u>12.4</u>	<u>11.6</u>	<u>13.2</u>	<u>6.1</u>	<i>Oct-05</i>
Over/Under			-1.0	1.4	1.9	0.8	1.0	
<b>Total Farmland and Timber</b>	<b>154,690,907</b>	<b>0.4</b>	<b>0.7</b>	<b>4.3</b>	<b>--</b>	<b>--</b>	<b>3.8</b>	<b>Jul-13</b>
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.4</u>	<u>5.4</u>	--	--	<u>5.4</u>	<i>Jul-13</i>
Over/Under			-0.7	-1.1			-1.6	
<b>Total Infrastructure</b>	<b>294,905,121</b>	<b>0.8</b>	<b>-2.0</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>-1.7</b>	<b>Oct-14</b>
<i>CPI - Infrastructure + 350 bps</i>			<u>1.7</u>				<u>2.3</u>	
Over/Under			-3.7				-4.0	

Note: Performance in private markets asset classes is based on net of fee money-weighted (IRR) performance data.

Composition of Interim SAA Policy can be found in the appendix.

Performance data for Total Private Equity, Total Opportunistic Equity, Total Private Debt, Total Opportunistic Debt, Total Real Estate, and Total Farmland and Timber and corresponding benchmarks is lagged by one quarter. Performance data and market values provided by State Street.

Prior to 3Q 2012, the performance of the Total Private Debt and Total Opportunistic Debt asset classes was reported in aggregate. Effective 6/30/2012, the Fund's allocations to Private Debt and Opportunistic Debt were separated and will be reported separately going forward.

Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return (IRR) is a more appropriate measure of ASRS private markets portfolios.

# Arizona State Retirement System

## Public Market Asset Class Analysis

3 Years Ending June 30, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	11.4%	32	5.7%	72	1.1%	51	0.9	41	1.1%	21	1.0	2.0
Interim SAA Policy	--	10.5%	57	5.7%	71	--	--	--	--	--	74	--	1.8
Total Domestic and International Equity	53.7%	14.5%	--	8.6%	--	0.6%	--	-0.5	--	-0.1%	--	1.0	1.7
ASRS Custom Total Equity Benchmark	--	14.8%	--	8.7%	--	--	--	--	--	--	--	--	1.7
Total Domestic Equity	27.9%	17.6%	52	8.8%	16	0.5%	1	-0.4	--	0.0%	44	1.0	2.0
ASRS Custom Domestic Equity Benchmark	--	17.8%	49	8.9%	18	--	--	--	--	--	43	--	2.0
Total International Equity	24.1%	10.0%	70	10.2%	48	0.7%	1	-0.7	--	-0.3%	80	1.0	1.0
ASRS Custom Int'l Equity Benchmark	--	10.4%	68	10.3%	59	--	--	--	--	--	74	--	1.0
Total Public Markets Fixed Income	14.6%	1.7%	67	3.8%	72	0.6%	1	0.9	35	0.5%	88	1.0	0.4
ASRS Custom Public Markets Fixed Income Benchmark	--	1.2%	81	3.6%	70	--	--	--	--	--	96	--	0.3
Total Inflation-Linked Assets	1.6%	-7.4%	--	12.1%	--	2.5%	--	0.6	--	1.3%	--	1.0	-0.6
ASRS Custom Inflation-Linked Benchmark	--	-8.8%	--	11.9%	--	--	--	--	--	--	--	--	-0.7
Multi-Asset Class Strategies	4.9%	11.6%	1	7.1%	71	2.3%	9	0.6	1	0.0%	26	1.1	1.6
Multi-Asset Class Strategies Custom Benchmark	--	10.3%	14	6.0%	44	--	--	--	--	--	25	--	1.7

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private market composites.

Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Universe.

Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

# Arizona State Retirement System

## Public Market Asset Class Analysis

5 Years Ending June 30, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	11.8%	20	8.5%	78	1.1%	29	0.6	40	0.9%	27	1.0	1.4
Interim SAA Policy	--	11.2%	42	8.6%	84	--	--	--	--	--	68	--	1.3
Total Domestic and International Equity	53.7%	14.3%	--	13.1%	--	0.6%	--	-0.3	--	0.0%	--	1.0	1.1
ASRS Custom Total Equity Benchmark	--	14.4%	--	13.2%	--	--	--	--	--	--	--	--	1.1
Total Domestic Equity	27.9%	17.5%	43	12.8%	29	0.5%	1	-0.2	--	-0.2%	37	1.0	1.4
ASRS Custom Domestic Equity Benchmark	--	17.6%	41	12.7%	27	--	--	--	--	--	34	--	1.4
Total International Equity	24.1%	8.4%	80	15.3%	37	0.8%	1	-0.4	--	-0.2%	80	1.0	0.5
ASRS Custom Int'l Equity Benchmark	--	8.7%	77	15.6%	53	--	--	--	--	--	77	--	0.6
Total Public Markets Fixed Income	14.6%	3.6%	56	3.4%	63	0.5%	1	1.1	11	0.5%	87	1.0	1.1
ASRS Custom Public Markets Fixed Income Benchmark	--	3.0%	68	3.3%	60	--	--	--	--	--	97	--	0.9
Total Inflation-Linked Assets	1.6%	-4.3%	--	13.9%	--	2.6%	--	0.6	--	1.3%	--	1.0	-0.3
ASRS Custom Inflation-Linked Benchmark	--	-5.8%	--	14.3%	--	--	--	--	--	--	--	--	-0.4
Multi-Asset Class Strategies	4.9%	12.9%	1	9.4%	85	2.2%	4	0.8	1	1.5%	19	1.0	1.4
Multi-Asset Class Strategies Custom Benchmark	--	11.0%	6	8.9%	74	--	--	--	--	--	51	--	1.2

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private market composites.

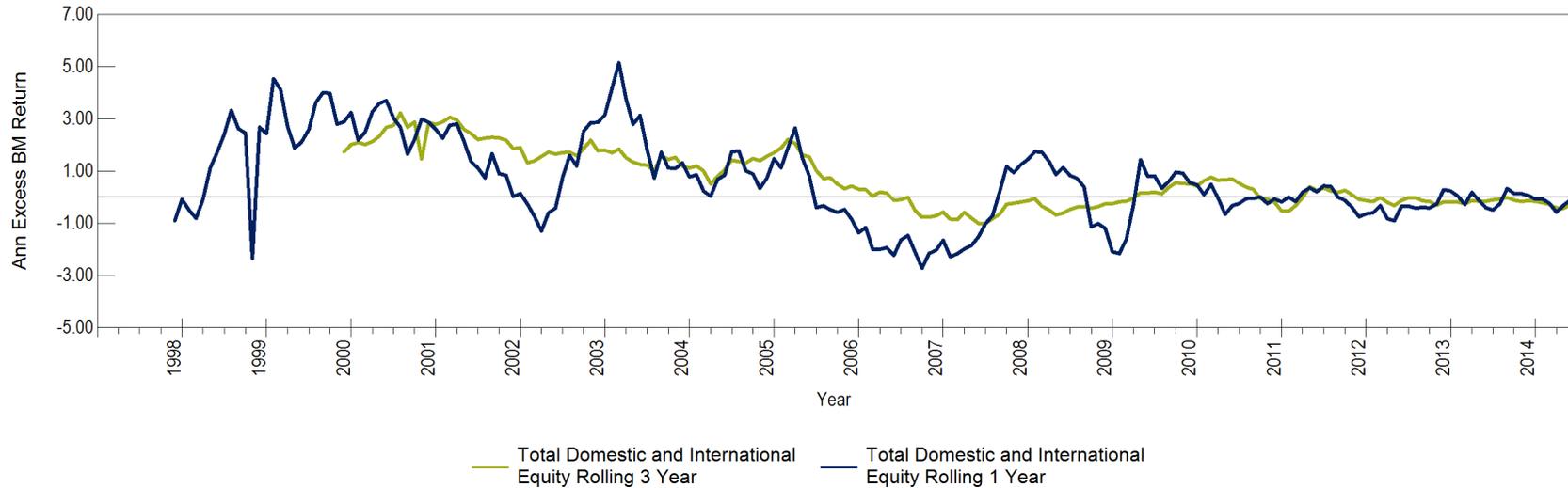
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Universe.

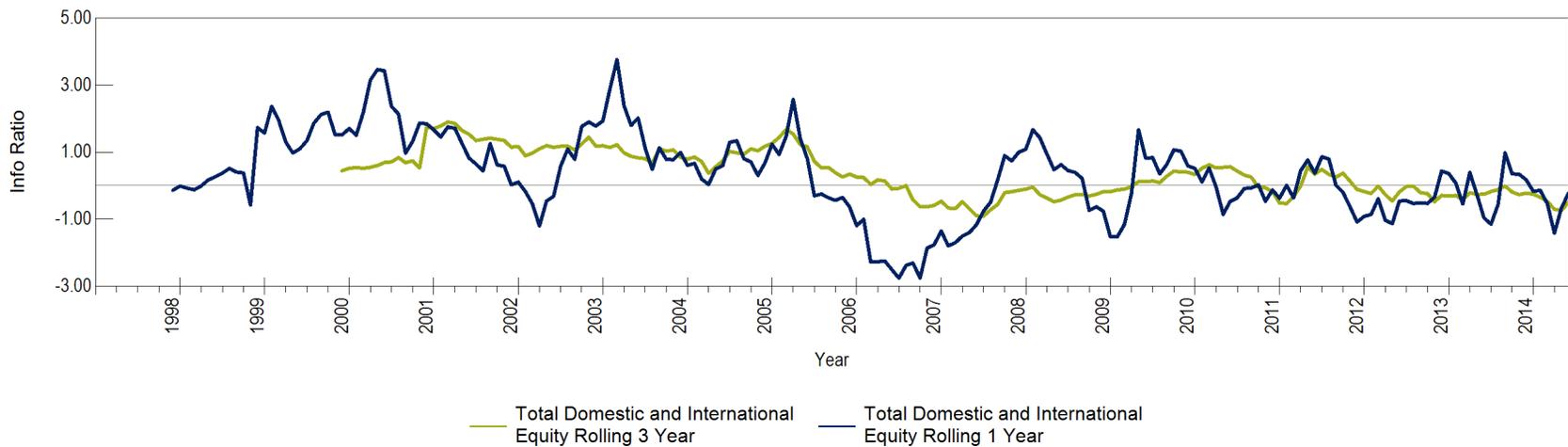
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Asset Class Analysis - Total Domestic and International Equity

Rolling Annual Excess Benchmark Return

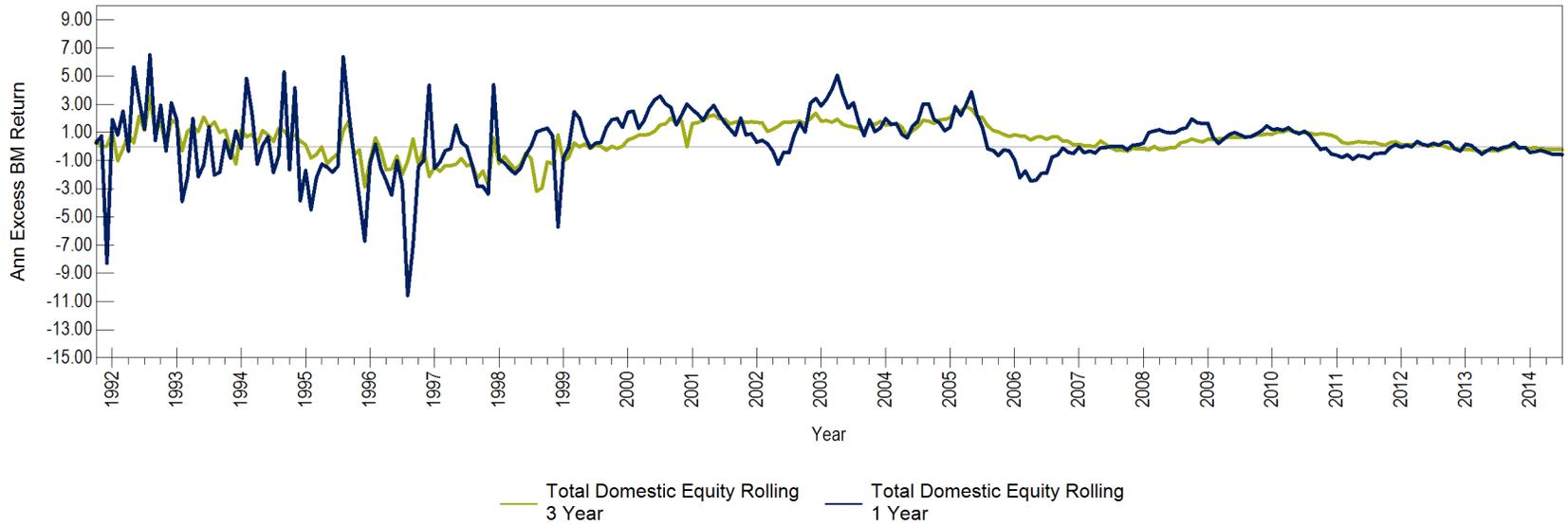


Rolling Information Ratio



Asset Class Analysis - Total Domestic Equity

Rolling Annual Excess Benchmark Return

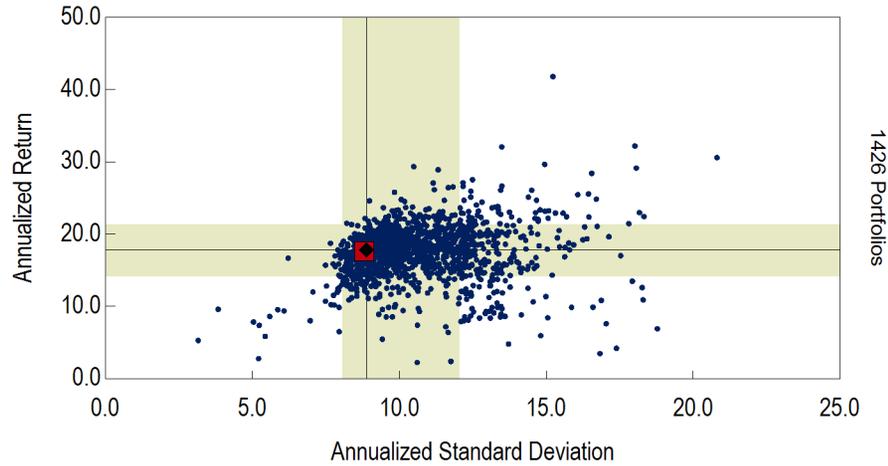


eA All US Equity Net Accounts



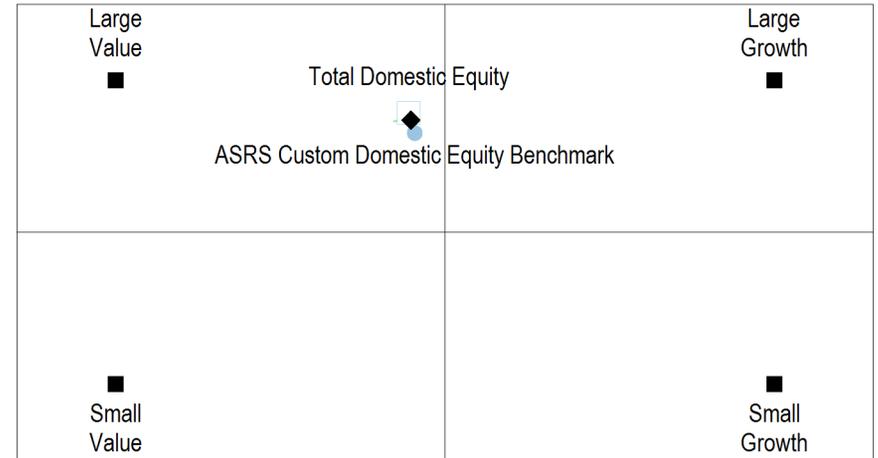
Asset Class Analysis - Total Domestic Equity

3 Year Risk Return

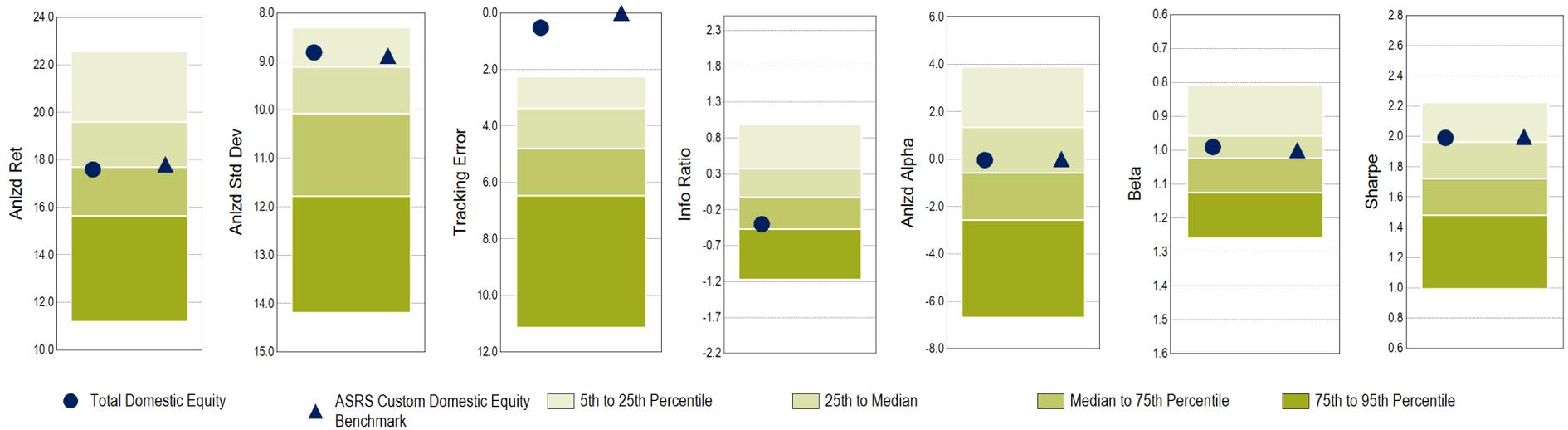


- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

3 Year Style Map



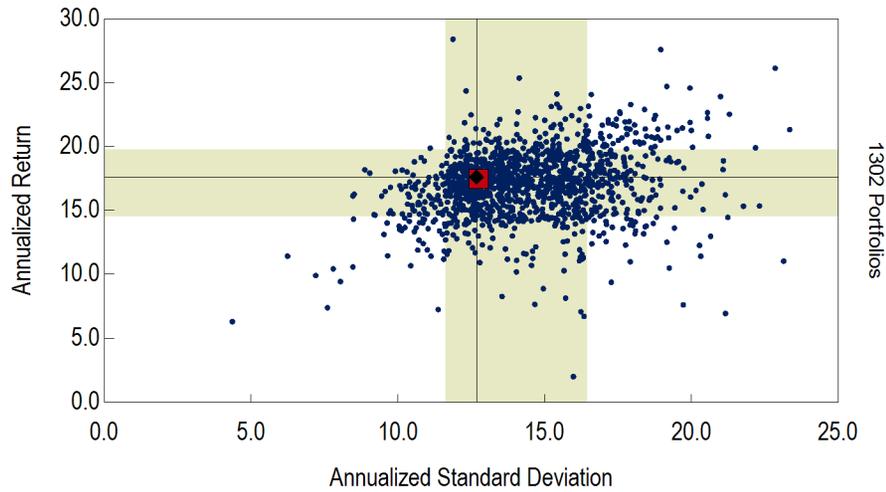
- First Rolling Period
- ◆ Last Rolling Period



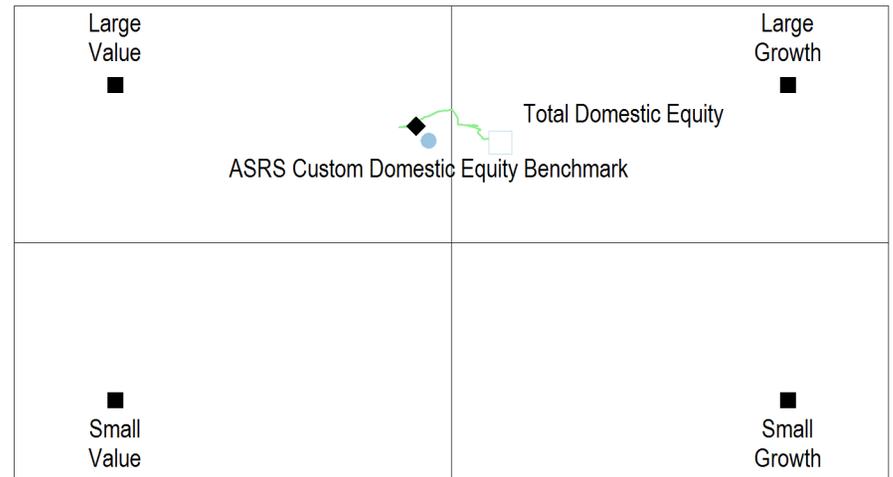
- Total Domestic Equity
- ▲ ASRS Custom Domestic Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total Domestic Equity

5 Year Risk Return

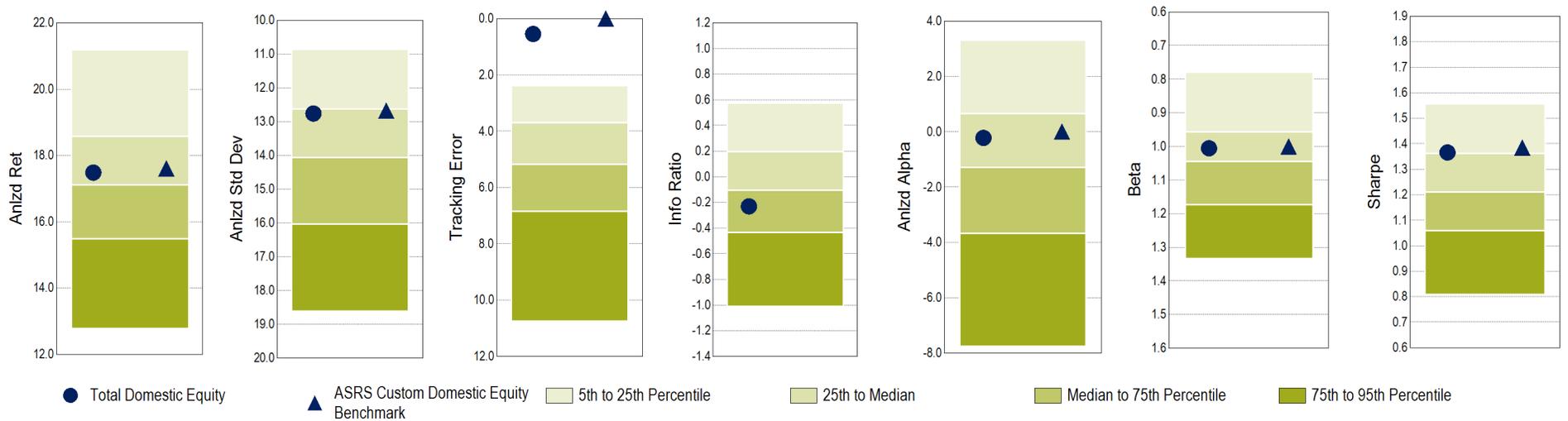


5 Year Style Map



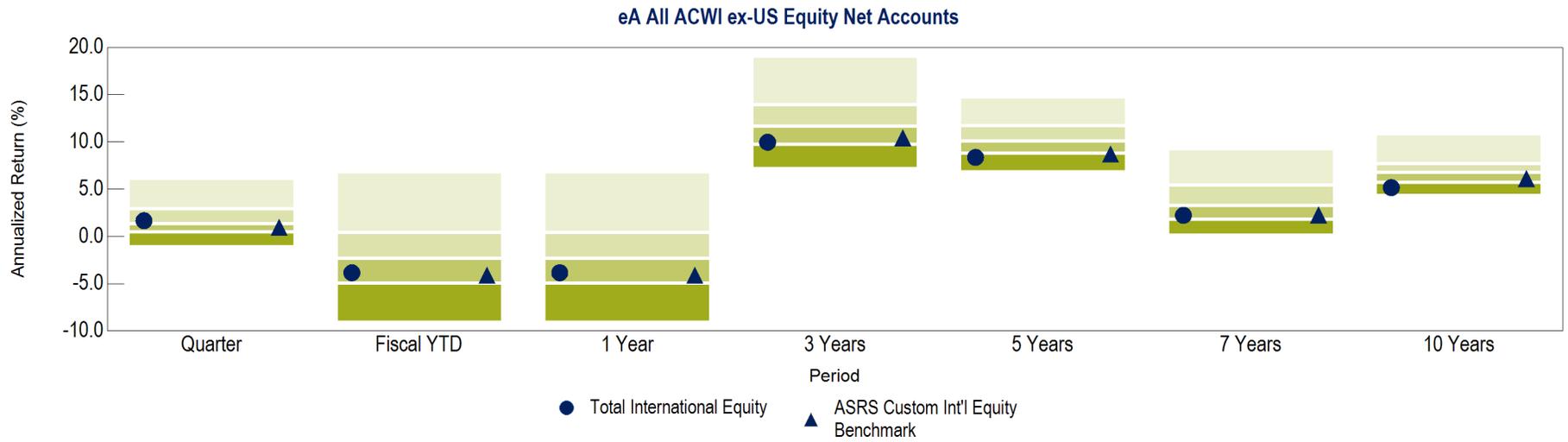
- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

- First Rolling Period
- ◆ Last Rolling Period



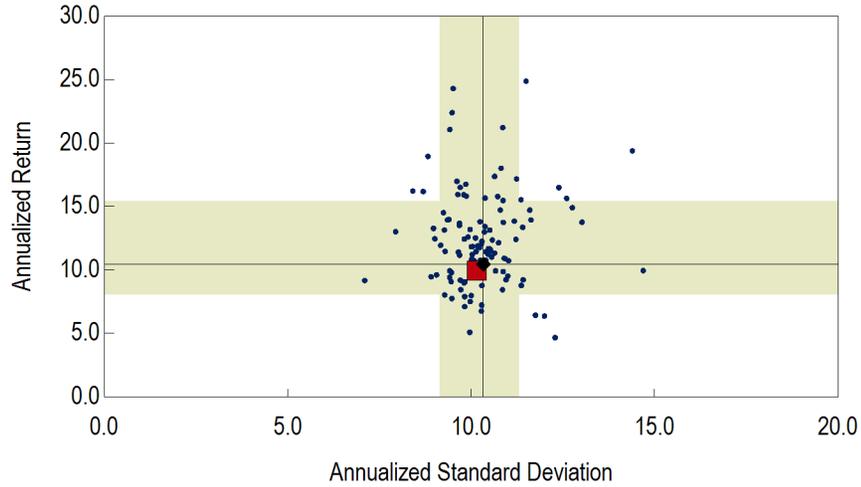
Asset Class Analysis - Total International Equity

Rolling Annual Excess Benchmark Return

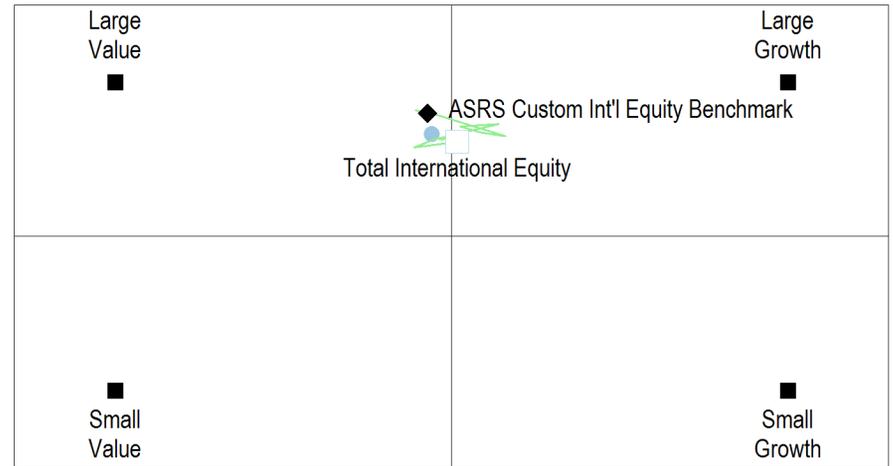


Asset Class Analysis - Total International Equity

3 Year Risk Return

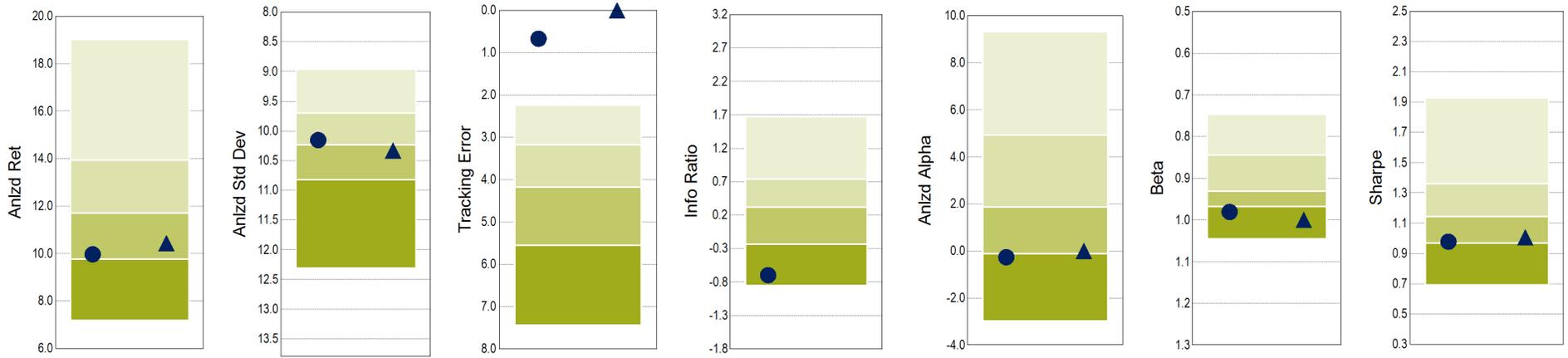


3 Year Style Map



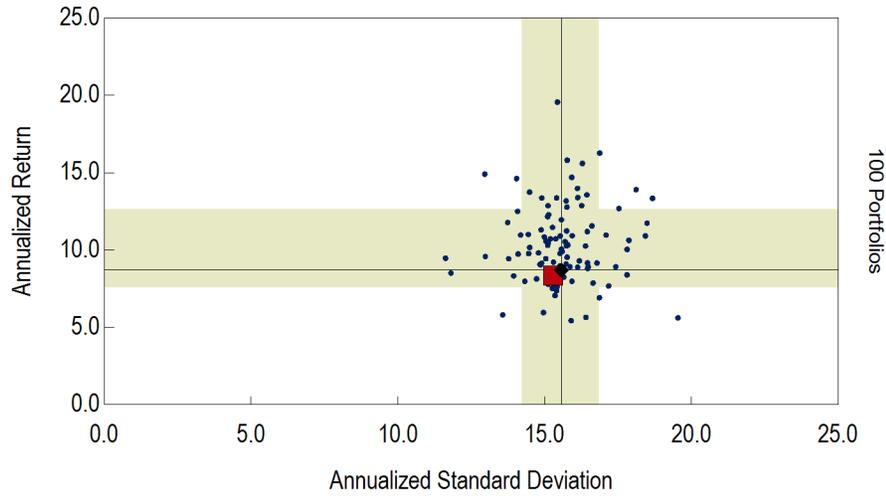
- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

- First Rolling Period
- ◆ Last Rolling Period



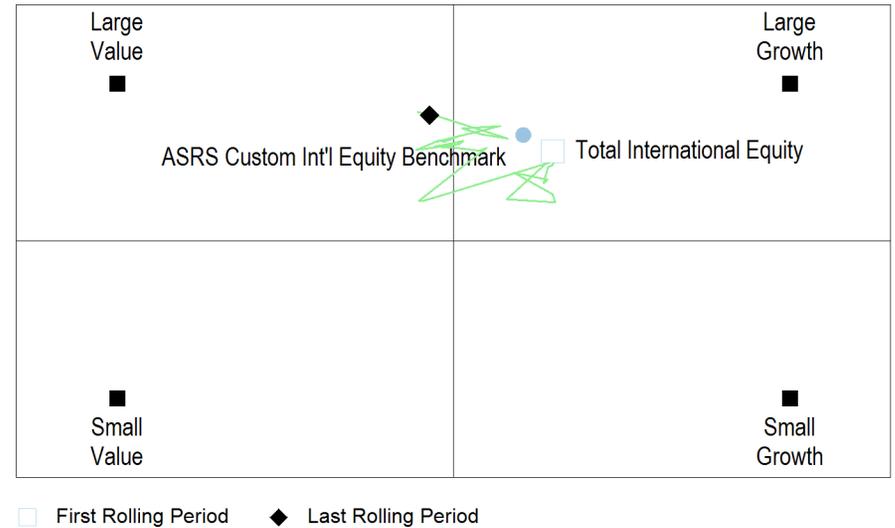
- Total International Equity
- ▲ ASRS Custom Int'l Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

5 Year Risk Return

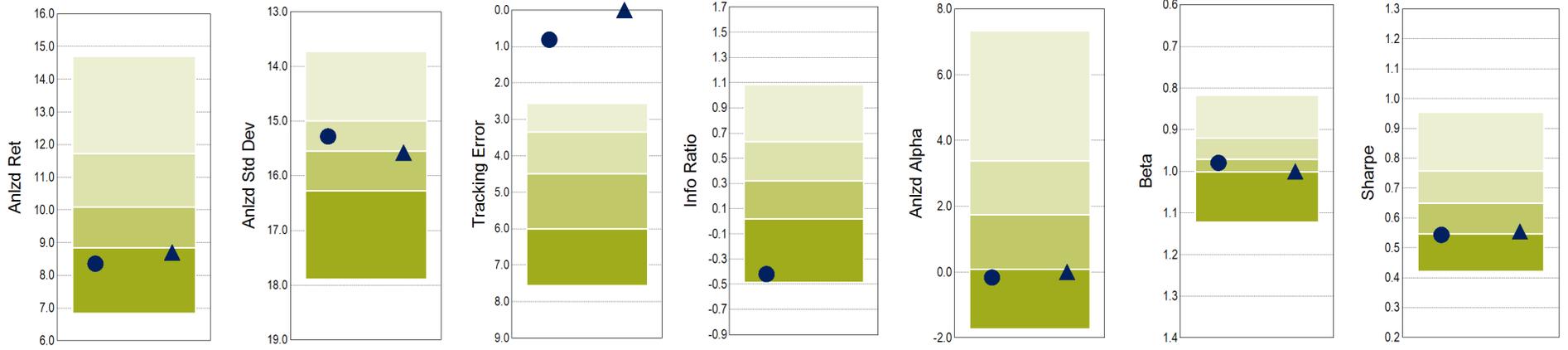


- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

5 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period

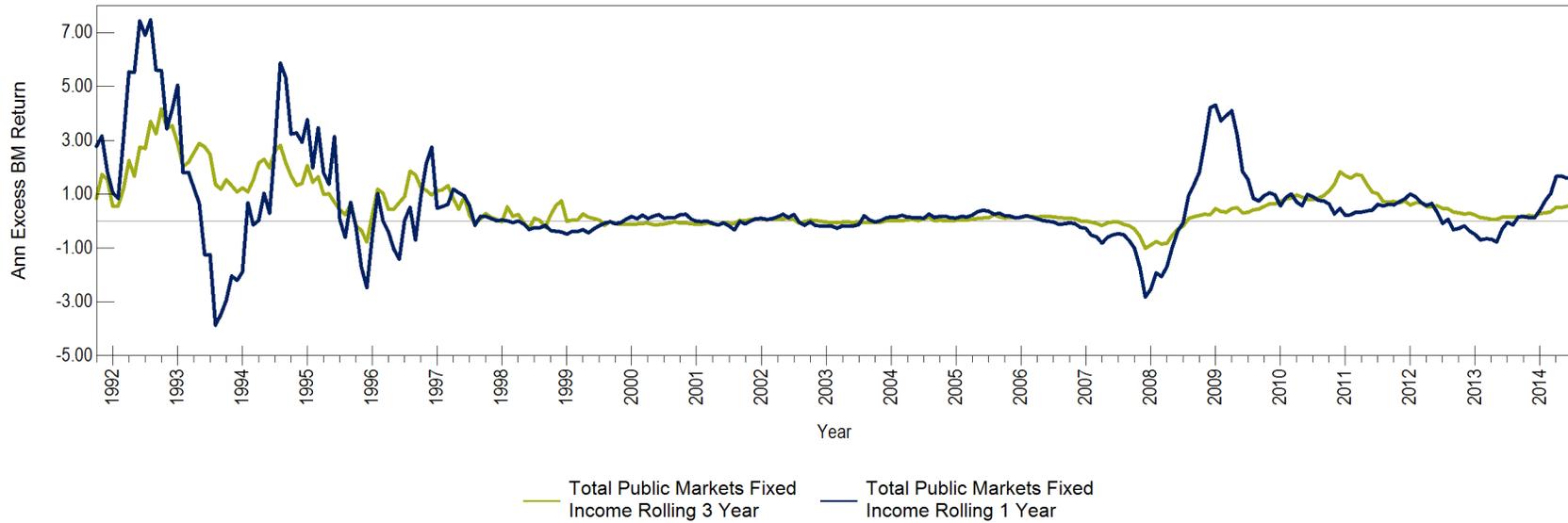


- Total International Equity
- ▲ ASRS Custom Int'l Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

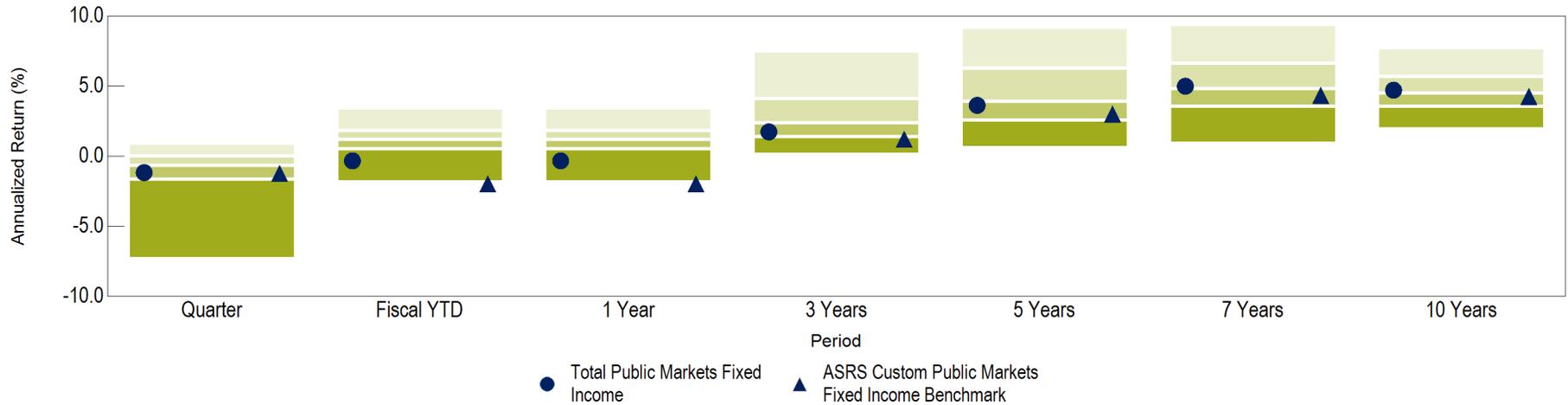


Asset Class Analysis - Total Public Markets Fixed Income

Rolling Annual Excess Benchmark Return

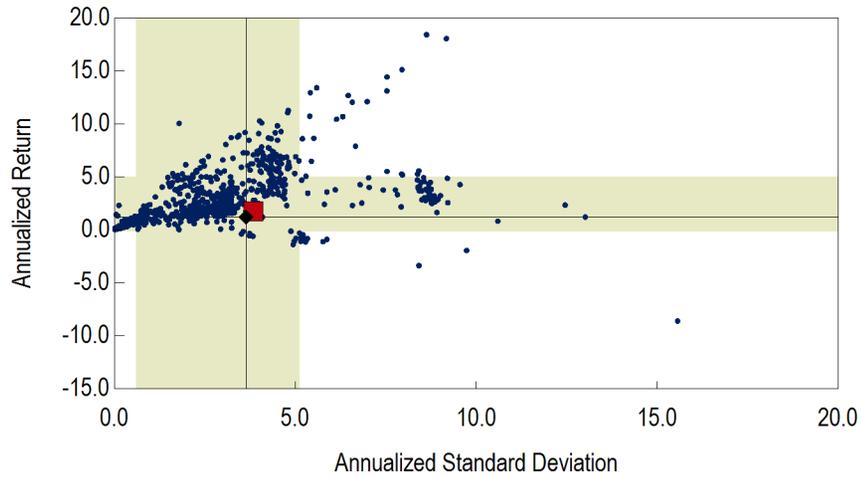


eA All US Fixed Inc Net Accounts



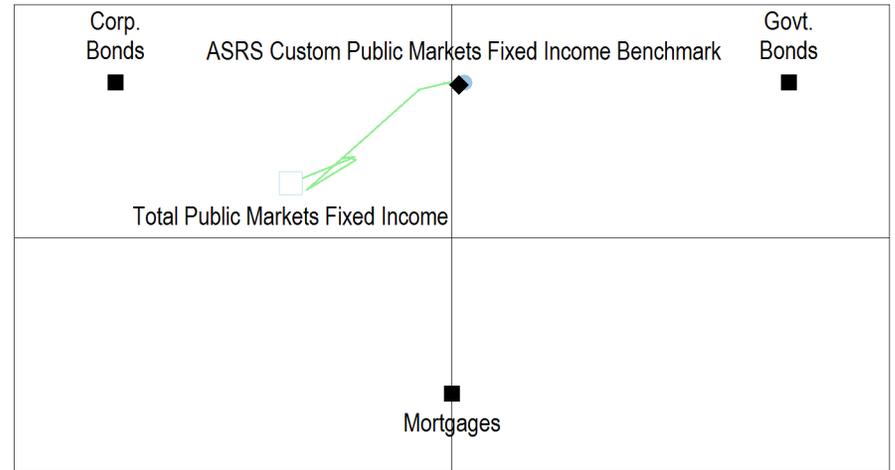
Asset Class Analysis - Total Public Markets Fixed Income

3 Year Risk Return

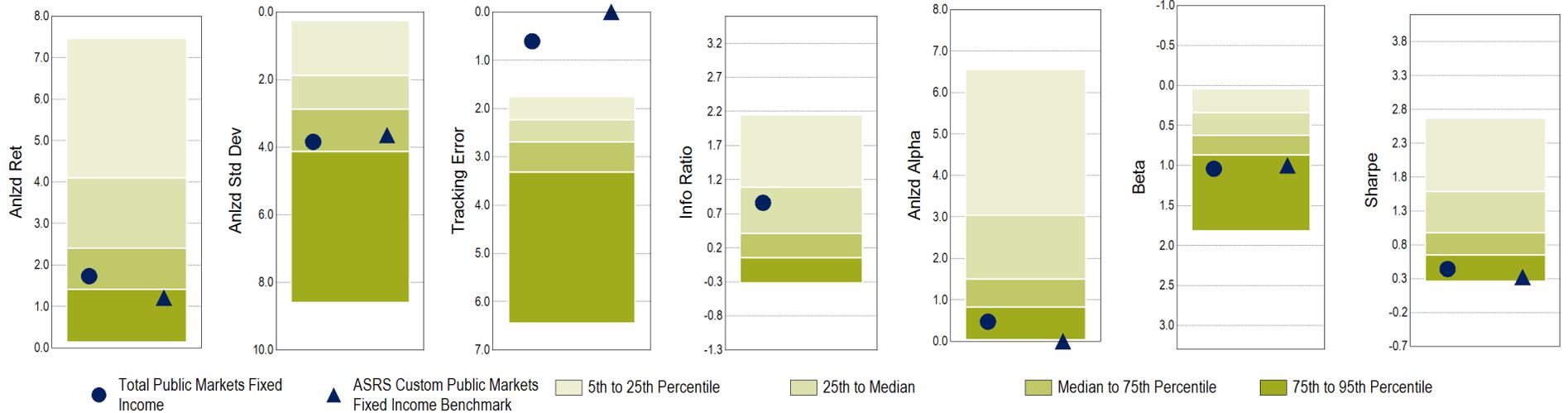


- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

3 Year Style Map

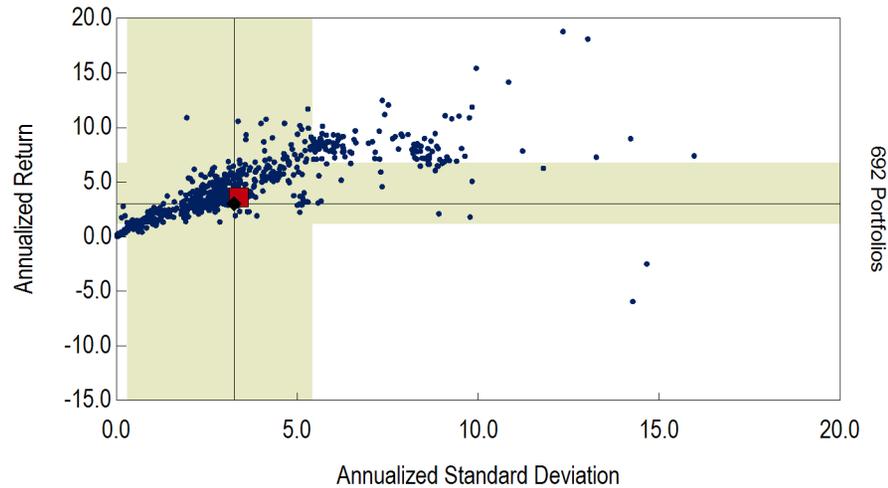


- First Rolling Period
- ◆ Last Rolling Period

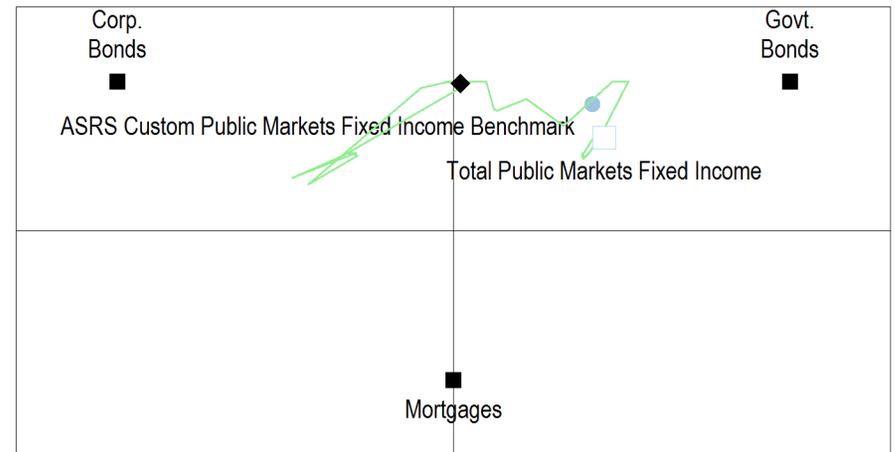


- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

5 Year Risk Return

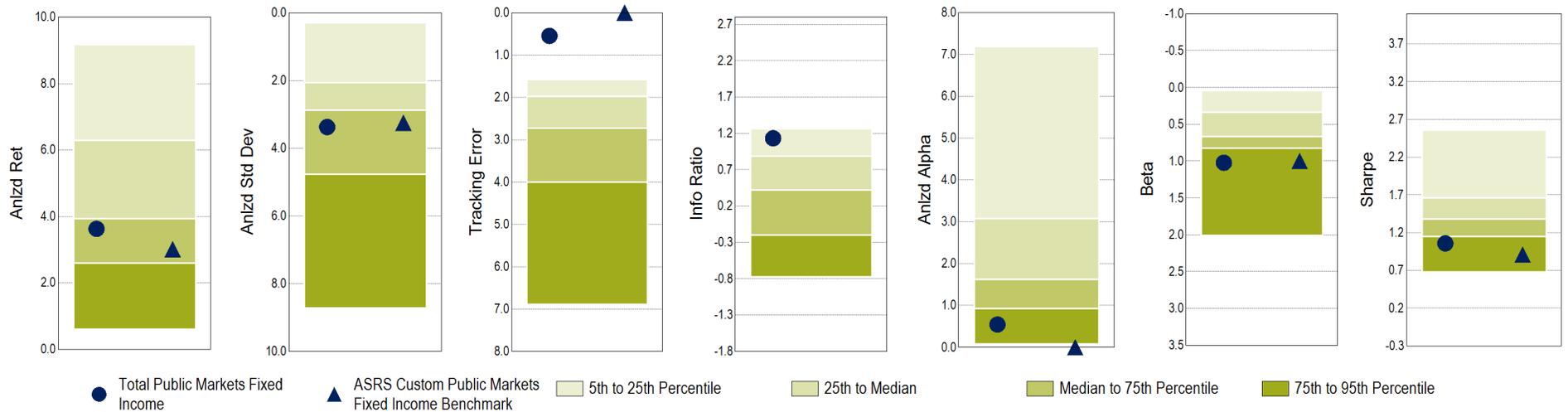


5 Year Style Map



- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

- First Rolling Period
- ◆ Last Rolling Period

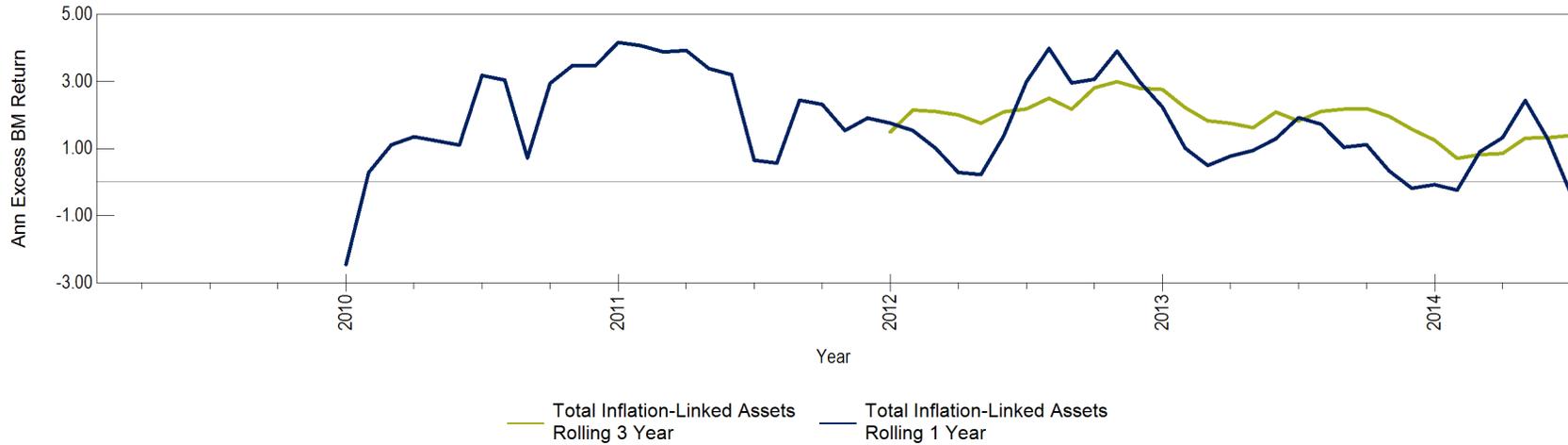


- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

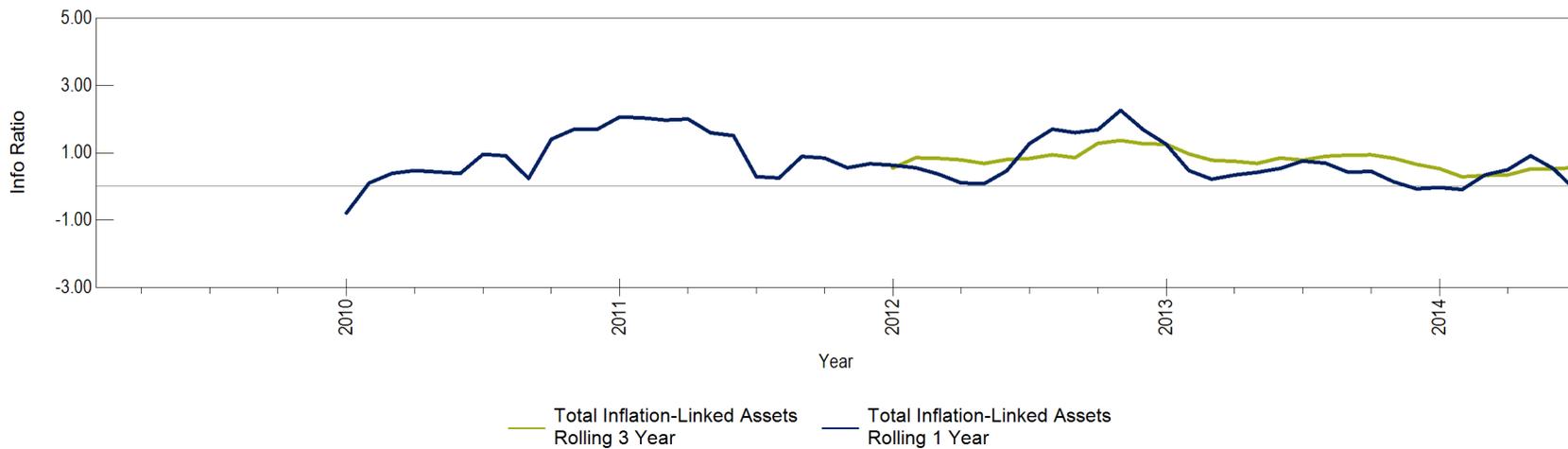


Asset Class Analysis - Total Inflation-Linked Assets

Rolling Annual Excess Benchmark Return

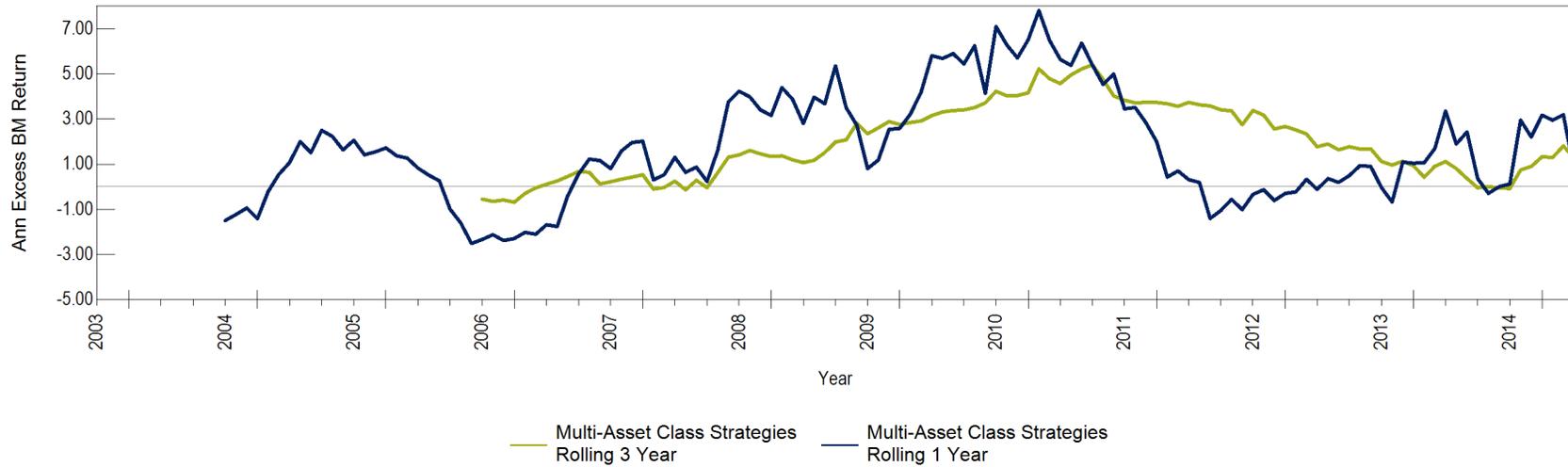


Rolling Information Ratio

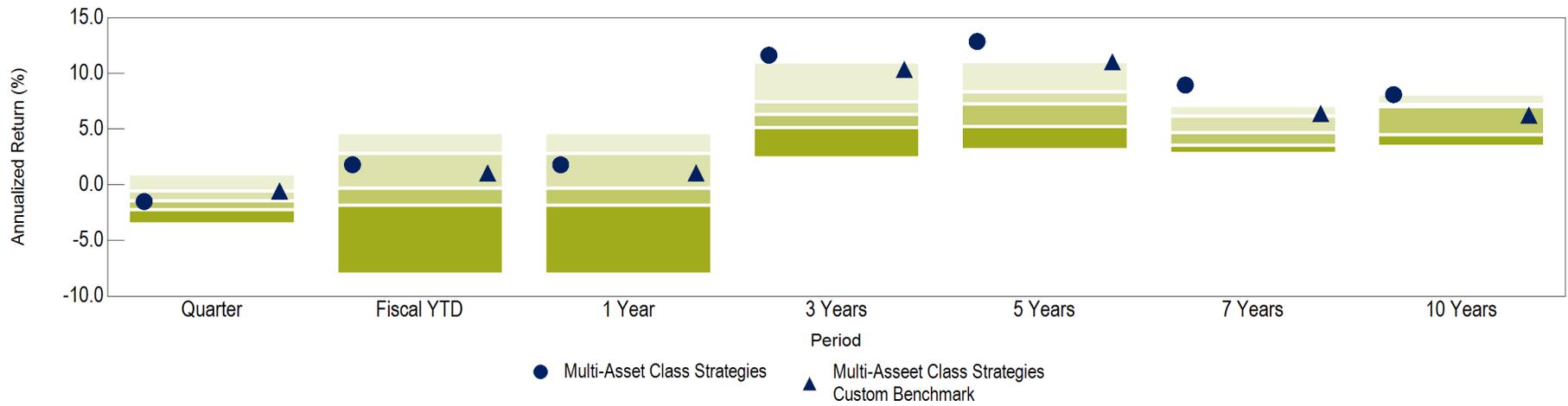


Asset Class Analysis - Multi-Asset Class Strategies

Rolling Annual Excess Benchmark Return

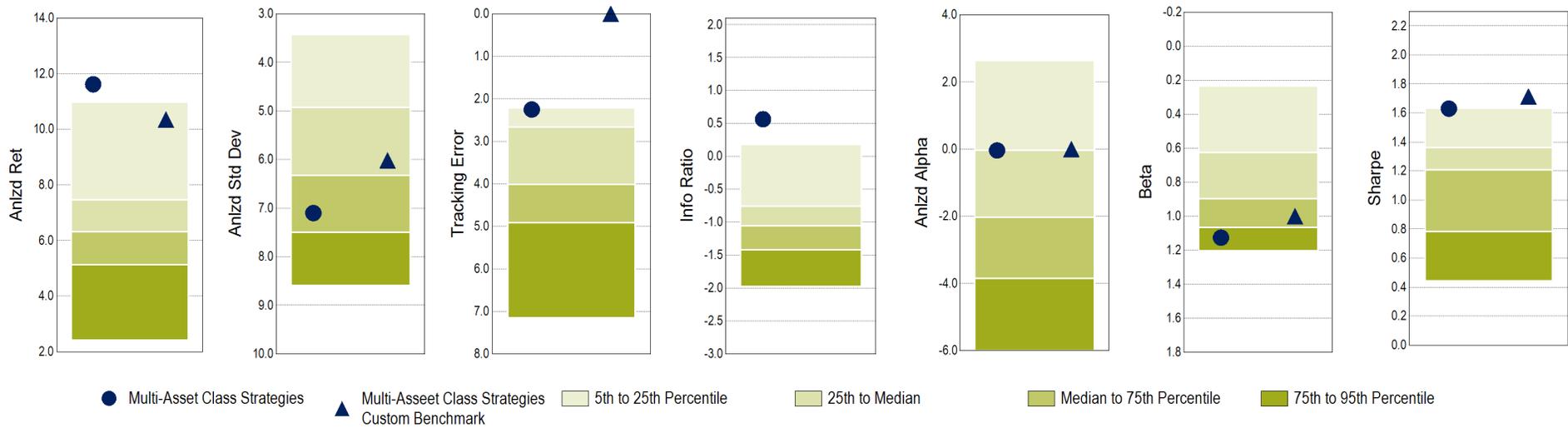
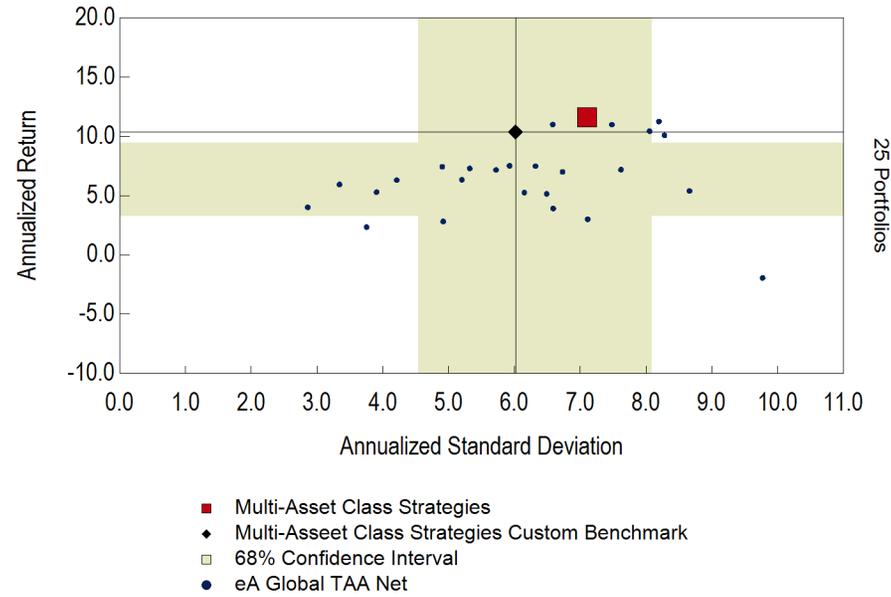


eA Global TAA Net Accounts



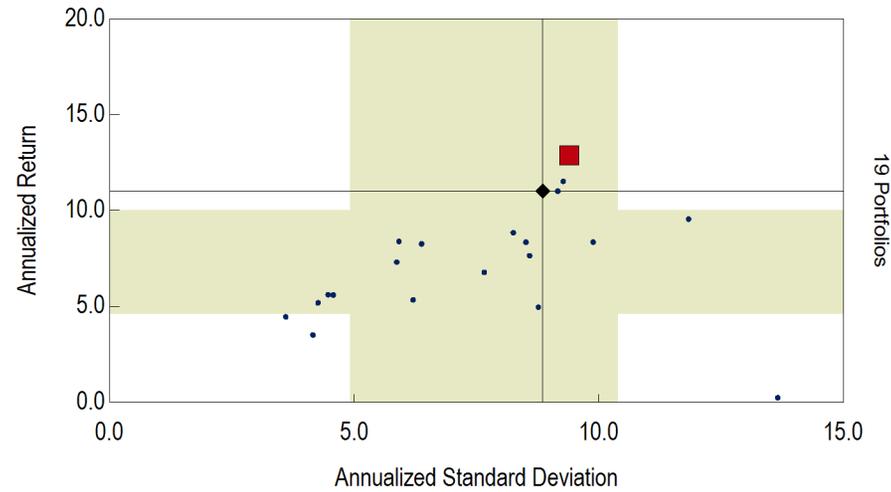
# Asset Class Analysis - Multi-Asset Class Strategies

3 Years Ending June 30, 2015

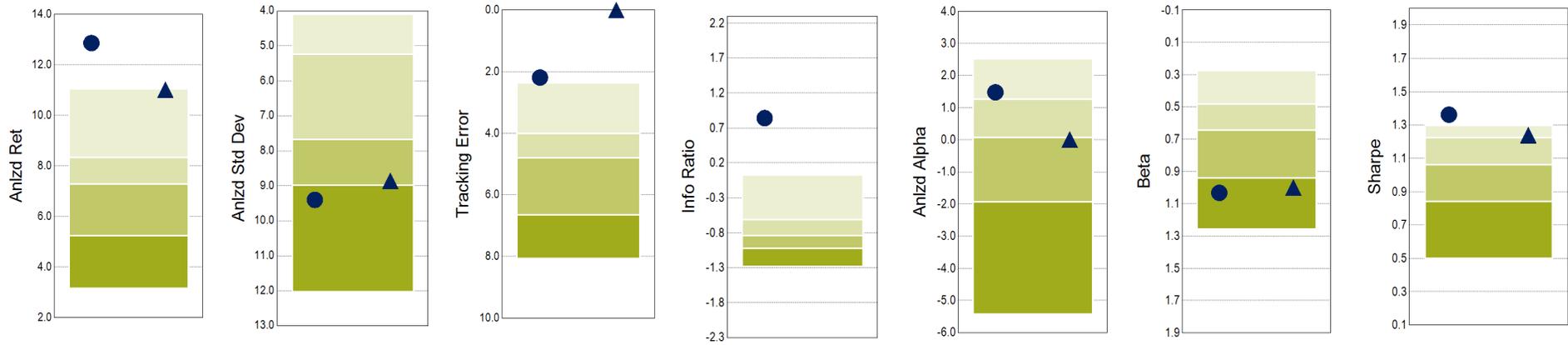


Asset Class Analysis - Multi-Asset Class Strategies

5 Years Ending June 30, 2015



- Multi-Asset Class Strategies
- ◆ Multi-Asset Class Strategies Custom Benchmark
- 68% Confidence Interval
- eA Global TAA Net



- Multi-Asset Class Strategies
- ▲ Multi-Asset Class Strategies Custom Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

- **Two Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**
- **June 23, 2015 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Real Estate Pipeline Discussion
    - Informational item to provide an update on real estate investment pipeline and to solicit guidance as necessary
  - Real Estate Manager Recommendation (increase commitment to \$300 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - The ASRS has current commitments to this manager at \$100 million
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Variance Request
    - RCLCO and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the financing criteria required to make an investment
      - Equity ownership guidelines amended in order to proceed to diligence phase of the investment process
    - Committee approved the variance request to equity position cap allowing up to 35% of equity ownership
- **July 20, 2015 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Semi-Annual SMA review – the private markets committee reviewed market conditions, capital deployment and strategic outlook within the SMA program
  - Real Estate Manager Recommendation (\$200 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - The ASRS is currently invested with this manager in multiple funds across the ASRS private markets landscape
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

• **July 20, 2015 – Private Markets Committee (continued)**

- Real Estate Manager Recommendation (\$200 million)
  - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
  - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
  - Committee approved the recommendation
- Opportunistic Equity Manager Recommendation (20% of first round funding or \$100 million)
  - RCLCo and the Private Markets Committee recommended that a co-investment opportunity with a current ASRS manager be committed to within Opportunistic Equity
  - The private markets committee asked that more diligence be completed on items in the co-investment guidelines Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
  - Committee approved the recommendation at the July 29, 2015 meeting
- Variance Request
  - RCLCO and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the geographic investment guidelines criteria
    - Current guidelines did not allow for investment in this specific geographic region
  - Committee approved the variance request
- Variance Request
  - RCLCO and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the geographic and investment structure criteria in the investment guidelines
    - Variance would allow for updated term structure and geographic criteria
  - Committee approved the variance request
- Real Estate Manager Recommendation (termination of investment period)
  - RCLCo and ASRS private markets team recommended the ASRS approve termination of the investment period in an existing manager
  - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
  - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
  - Committee approved the recommendation

- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP. New long-term SAAP adopted as of April 1, 2015.**
  - Current Interim SAAP includes proration of 1.1% Private Equity, 4.1% Real Estate and 5.6% Private Debt which are unfunded. Continued build out of private markets asset classes provides opportunity to take advantage of illiquidity premium to produce expected returns in excess of what we believe can be achieved in the public markets.
- **IMD has already taken significant steps to move the Fund toward implementation of the recently approved SAAP.**
  - The largest single underweight position in the Fund is Private Debt, which was increased from a 3% SAAP target to a 10% SAAP target (current actual is 4.7%).
    - \$3.9 billion in commitments to private debt strategies equates to approximately 11.2% of Total Fund assets vs. the SAAP target of 10%.
  - Emerging Market Debt investment managers have been liquidated as the asset class was removed from the SAAP.
  - Multi-Asset Class Strategies (formerly GTAA) has been restructured and moved 'above the line' and now has an explicit 5% target within the SAAP.
- **Cash Assetization Program implemented:**
  - To facilitate fund liquidity by decreasing the settlement times and market frictions related to overall investment management.
  - To retain unleveraged Total Fund market (beta) exposure, and concurrently offset the hindrance on investment performance from maintaining sizeable transitional cash balances intended to meet fund payment obligations (e.g., pension, health supplement, LTD, fees, accounts payable and associated capital calls).
- **ASRS SAAP Benchmark evaluation is complete. New SAAP targets are effective April 1, 2015.**
- **Tactical positioning consistent with IMD House Views.**

# Market Environment Update and Outlook

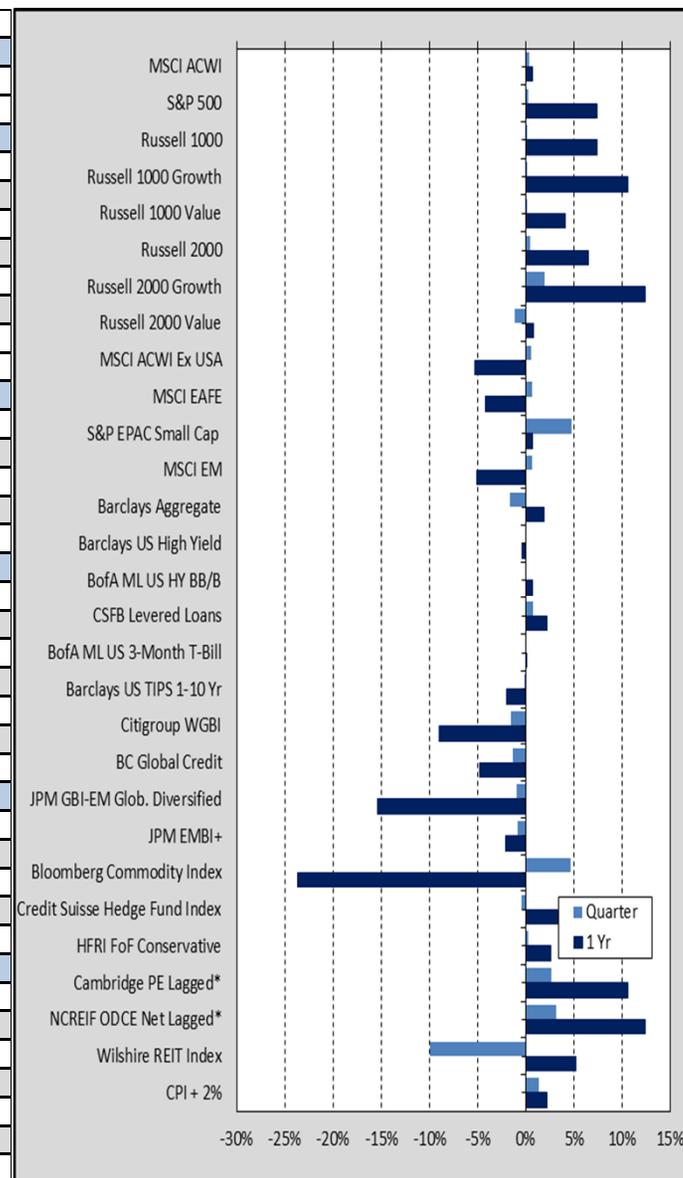


## Economic Environment

- **Second quarter GDP growth rate printed at +2.3%.**
  - Retail sales (ended May) at +1.6% on a year-over-year growth rate basis.
  - The inventory-to-sales ratio at May 31 was flat at 1.4 and has remained relatively flat since early 2010.
  - Corporate profits as a percent of GDP increased in the first quarter to 10.7% from 10.4% in the fourth quarter and remain elevated relative to historical levels.
  - The U.S. trade deficit widened slightly during May.
- **The unemployment rate fell to 5.3% in Q2 from 5.5% in Q1 2014; U-6, a broader measure of unemployment, fell to 10.5% during the second quarter.**
- **The Case-Shiller Home Price Index (as of 4/30) increased slightly to 170.0 from first quarter levels (168.2) and is at levels higher than that of pre-financial crisis levels of 150.92.**
- **Rolling 12-month seasonally adjusted CPI increased to +0.2% from -0.02% at the end of March; Capacity Utilization increased slightly to 77.8% in June.**
- **Fed Funds rate remains at 0.25%, while the 10-year Treasury Yield finished Q2 at 2.4% up 50 basis points from Q1.**
- **The Fed balance sheet declined slightly in Q2 2015, while the European Central Bank balance sheet increased in the same period.**
  - ECB continues asset purchases of €60 billion per month.
- **S&P valuations increased in June remaining above the 10-year and long-term averages**
  - Cyclically adjusted Shiller PE ratio (26.6x) is above the long-term average of 16.4x and above the 10-year average of 22.9x.
- **The U.S. Dollar continues to strengthen against a basket of major currencies as the Fed ends its quantitative easing program and the ECB ramps up easing.**
  - Currency volatility has seen a sustained uptick since Q1.

# Market Environment – Q2 2015 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>World Equity Benchmarks</b>						
MSCI ACWI	World	0.3%	0.7%	13.0%	11.9%	6.4%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>Domestic Equity Benchmarks</b>						
S&P 500	Large Core	0.3%	7.4%	17.3%	17.3%	7.9%
Russell 1000	Large Core	0.1%	7.4%	17.7%	17.6%	8.1%
Russell 1000 Growth	Large Growth	0.1%	10.6%	18.0%	18.6%	9.1%
Russell 1000 Value	Large Value	0.1%	4.1%	17.3%	16.5%	7.0%
Russell 2000	Small Core	0.4%	6.5%	17.8%	17.1%	8.4%
Russell 2000 Growth	Small Growth	2.0%	12.3%	20.1%	19.3%	9.9%
Russell 2000 Value	Small Value	-1.2%	0.8%	15.5%	14.8%	6.9%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>International Equity Benchmarks</b>						
MSCI ACWI Ex USA	World ex-US	0.5%	-5.3%	9.4%	7.8%	5.5%
MSCI EAFE	Int'l Developed	0.6%	-4.2%	12.0%	9.5%	5.1%
S&P EPAC Small Cap	Small Cap Int'l	4.7%	0.7%	16.3%	12.9%	7.7%
MSCI EM	Emerging Equity	0.7%	-5.1%	3.7%	3.7%	8.1%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>Domestic Fixed Income Benchmarks</b>						
Barclays Aggregate	Core Bonds	-1.7%	1.9%	1.8%	3.3%	4.4%
Barclays US High Yield	High Yield	0.0%	-0.4%	6.8%	8.6%	7.9%
BofA ML US HY BB/B	High Yield	0.0%	0.7%	6.8%	8.4%	7.2%
CSFB Levered Loans	Bank Loans	0.8%	2.2%	5.3%	5.7%	4.8%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.0%	0.1%	0.1%	1.4%
Barclays US TIPS 1-10 Yr	Inflation	-0.1%	-1.9%	-0.5%	2.4%	3.7%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>Global Fixed Income Benchmarks</b>						
Citigroup WGBI	World Gov. Bonds	-1.5%	-9.0%	-2.4%	1.0%	3.1%
BC Global Credit	Global Bonds	-1.3%	-4.8%	2.2%	4.3%	4.2%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-1.0%	-15.4%	-3.8%	0.9%	5.9%
JPM EMBI+	Em. Mkt. Bonds	-0.9%	-2.1%	2.8%	6.2%	7.2%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>Alternative Benchmarks</b>						
Bloomberg Commodity Index	Commodity	4.7%	-23.7%	-8.8%	-3.9%	-2.6%
Credit Suisse Hedge Fund Index	Hedge Fund	-0.5%	3.3%	7.1%	6.2%	5.9%
HFRI FoF Conservative	Fund of Funds	0.2%	2.6%	5.5%	3.6%	2.6%
Cambridge PE Lagged*	Private Equity	2.6%	10.5%	14.4%	15.1%	13.7%
NCREIF ODCE Net Lagged*	Real Estate	3.2%	12.4%	11.6%	13.4%	6.0%
Wilshire REIT Index	REIT	-9.9%	5.2%	9.0%	14.7%	6.9%
CPI + 2%	Inflation/Real Assets	1.4%	2.2%	3.3%	3.9%	4.1%



\* As of 3/31/2015

## Positives

- **Divergence in monetary policies signaling different investment environments globally**
- **US Economy shows strength relative to other developed markets**
- **ECB monetary easing continues with €60 billion in monthly asset purchases**
  - ECB commits €1.3 trillion in asset purchases in the Eurozone
  - Global risk assets responding positively
  - Negative short dated interest rates in Eurozone
- **Contagion risk from Greece's Euro exit is largely contained**
  - Greece represents only 1.7% of total Eurozone GDP
- **Developed world inflation is low**
  - In US, CPI for all Urban Consumers on a seasonally adjusted basis bounced back to positive territory after posting negative results in Q1

## Negatives

- **Geopolitical instability continues to drive volatility**
  - Instability in the Mid-East, Eastern Europe, Greece, China
- **Slowing economic growth in China may have broad implications for many emerging economies**
  - Commodity producers impacted
- **Fed rate hike uncertainty contributed to volatility in domestic markets**
  - Market expecting a slow pace to rate increases
- **Valuations remain above 10 year and long term averages**
  - Developed Equity P/Es above median

### Global Equity

- **U.S. equities posted modest gains in the second quarter as global monetary accommodation ramped up.**
- **Small cap stocks outperformed large cap stocks during the quarter, with the Russell 2000 Index returning 0.4% and the Russell 1000 Index returning 0.1%.**
- **International equities outperformed U.S. markets during the quarter, returning 0.5%, as measured by the MSCI ACWI ex-U.S. Index.**
  - Developed markets returned 0.6% as measured by the MSCI EAFE Index. Relatively strong returns were posted by Hong Kong and Japan at +5.6% and +3.1% respectively.
  - Emerging markets returned +0.7% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. Russia and China bolstered the quarter returning +7.6% and +6.0% respectively.

### Private Equity

- **New private equity commitments totaled \$101.5 billion in Q2 2015.**
  - Rapid fundraising pace continues for high demand managers.
- **Buyout and growth equity funds raised \$57 billion in Q2 2015.**
  - Very strong Q2 totals driven by one fund which raised \$17 billion.
- **Venture capital raised \$24.6 billion ended June.**
  - At 13% of total private equity raised, commitments are just below the 10-year historic relative average and are buoyed by strong IPO and M&A environment.
- **Energy funds raised \$30.1 billion representing 16% of capital raised in Q2.**
  - Investors are opportunistically approaching the energy market dislocation.
- **Asian private equity commitments slowed to total 6% of total funds raised down from 10% in 2014.**
- **European commitments comprised 17% of all new PE commitments in Q2 2015.**
  - 70% of European funds raised were based in the United Kingdom.

## Market Environment

### Fixed Income

- **The yield curve steepened amid global financial instability in the Eurozone and the Fed's rate hike signaling.**
- **The spread between two and 10-year rates increased to 176 basis points from 138 basis points ended March. Treasury Inflation-Protected Securities, or TIPS, returned -1.1% during the quarter, as measured by the Barclays US TIPS Index.**
- **The Barclays Long Duration Credit Index lost -7.3% as the long end of the curve ended the quarter 57 basis points higher.**
- **Long Treasuries fell -8.3% and investment-grade corporate debt lost -2.9%.**
  - Despite strong earnings and credit fundamentals, the overall performance of US high-grade corporate bonds was hindered by record new issuance, which contributed to 16 basis points of spread widening in the quarter. Issuance has totaled almost \$650 billion year-to-date (with a record issuance of \$155 billion in May). This issuance is over 20% higher than in the first half of 2014.
- **The Barclays 1-3 year Government/ Credit Index returned 0.1% and US high yield bonds were flat returning 0%.**
- **Emerging markets debt continued to slow in local and external currency as yields increased globally.**
  - US dollar-denominated debt, as measured by the JP Morgan EMBI Index, fell 34 basis points; local currency debt fell 96 basis points, according to the JP Morgan GBI-EM Index.
  - Emerging market currencies—in particular, the Mexican peso, Thai baht and Turkish Lira—weakens against the US dollar.

**Real Assets/Inflation-Linked Assets**

- **Massive energy market dislocation.**
  - Oil prices trending lower.
  - Private equity and private debt opportunities attractive.
  - Potential for public stressed/distressed credit, equity and commodity plays.
  
- **OPEC and Saudi Arabia have indicated a willingness to allow lower oil prices to persist in efforts to cement market share and reduce marginal supply.**
  
- **Select infrastructure opportunities are attractive.**
  - Target opportunistic strategies in niche sub-sectors to take advantage of market dislocations.
  
- **NEPC continues to believe in the long-term demand drivers in agriculture.**
  - Long-term commodity prices driven by growing emerging market demand.
  - Softness in commodity prices may provide attractive entry point.
  
- **Timber opportunity set limited but warrants further review**
  - 45% increase in housing starts forecasted; timber prices highly correlated

### Commodities

- **Commodities broke their three quarter losing streak with the Bloomberg Commodity Index posting a 4.7% gain.**
  - Energy and agriculture led the way, while industrial metals, precious metals and livestock declined.
  - The Bloomberg WTI Crude Oil Index gained 17.5% for the quarter amid continued declines in rig counts and announced project deferrals, expectations of demand rebounding and lower US output.

### Real Estate

- **NEPC continues to be neutral on core real estate in the US and remains positive on non-core real estate, that is, value-add and opportunistic strategies.**
- **Within U.S. core real estate, strong fundamentals continue to be the story along with attractive income spreads relative to interest rates.**
  - Real estate fundamentals and debt terms are attractive, however valuations are high and the possibility of rising interest rates and the impact on cap rates causes concern.
- **U.S. REITs posted a very weak quarter with a -9.9% return.**
  - FFO multiples are high, at approximately 15x but are decreasing.
  - REITs are trading at a discount to NAV.
- **Overall, the non-core real estate investment environment in the U.S. is normalizing; however, select areas remain attractive.**
- **Europe is viewed as the best place for a marginal dollar of non-core real estate investment.**
  - Europe is emerging from multi-year recession, but recovery is slow and uneven with global markets experiencing large capital inflows.
  - Banks in EU are still overleveraged and have significant real estate exposure to jettison.

- **Be judicious with risk**
  - Avoid chasing risk for only marginal return enhancements
  - Less liquid opportunities may provide the best risk-adjusted approach, but liquidity needs should be incorporated (e.g., substituting direct lending for high yield)
- **Catalysts are present to drive international equity markets above pre-financial crisis highs**
  - Encourage an equal weight exposure to international developed and US equities
  - If currency hedged, encourage larger international developed equity exposure relative to US equities
- **Question the “traditional” approach; different investment environments require different perspectives of risk and return**
  - A low-return environment may require a fresh perspective
  - Continue to remove traditional portfolio constraints by adding active managers with skill to exploit inefficiencies within and across asset classes (e.g., flexible global equity, global asset allocation, absolute return fixed income)
- **Rethink fixed income portfolio structure in light of current market environment**
  - Use of an unconstrained/multi-sector fixed income portfolio may provide sound diversification and enhanced liquidity
  - Examine if alternatives are available to traditional portfolio positions (e.g., combining cash and long treasuries vs. holding core bond portfolio)

# NEPC Updates

June 30, 2015

## Highlights of Second Quarter Happenings at NEPC

### NEPC Research Recent White Papers

- 2015 2<sup>nd</sup> Quarter Market Thoughts
- *Rising Rates and Implications for Credit Investors* (April 2015) – Seth Bancroft, Senior Research Analyst, Traditional Research
- *Socially Responsible Investing in Action* (May 2015) – Sheila Healy Berube, CFA, Senior Consultant.
- *A Dynamic Approach to Pension Glide Paths* (May 2015) - Christopher A. Levell, ASA, CFA, CAIA, Partner, Client Strategy



### NEPC Client Recognitions

- NEPC is pleased to announce that two of our clients recently won *Institutional Investor Intelligence Awards*. Ruth Ryerson, Executive Director at Wyoming Retirement System, was a co-winner of the Executive Director of the Year award, along with Steve Yoakum from Public School and Education Employee Retirement Systems of Missouri. Dave Underwood, Deputy CIO and Portfolio Manager – Equities at Arizona State Retirement System, won the *Institutional Investor Intelligence Award: Innovator*.

### NEPC Recognitions

- We are pleased to announce that **NEPC has won two Alternative Investment Awards for 2015** from *Wealth & Finance International*, one for Sustained Excellence in Client Investment Management and the other for Macro Strategy Specialist of the Year – USA. Awards Coordinator Peter Rujgev commented, "The caliber of the 2015 nominees was simply outstanding and this ensured that the judging process was more than a little demanding. Put simply, our winners represent the very best of the best and with such a tremendous amount of competition, it is an honor to acknowledge them and wish them well for another award winning year ahead."

### News from NEPC

- **Doris Ewing honored by the NASP.** Please join us in congratulating retired NEPC Partner, Doris Ewing, who was honored as the first female African-American Partner of an Investment Consulting Firm at the NASP Women's Legends Tea on June 14 in Chicago. Congratulations Doris!

### Recent Events

- **NEPC Clients Invited to the White House.** A diverse group of NEPC clients were invited to the White House on June 16 for the Clean Energy Investment Summit. The goal of the event was to help address the fundraising gap for scalable investments in clean energy and catalyze more institutional investment. Attendees engaged with senior members of the Administration to discuss recent or potential clean energy investments.



NEPC, LLC

## Appendix: SAA Policy History

## Strategic Asset Allocation Policy (SAAP) History

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.<sup>1</sup>/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- 7/1/2012 – 3/31/2015 – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index
- **4/1/2015 - present – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index**
- **\*Interim SAA Policy:** 23% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/17% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/6% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index

Note: Interim SAA Policy includes proration of 1.1% Private Equity, 4.1% Real Estate and 5.6% Private Debt which are unfunded. Private Equity was prorated to domestic equity; Real Estate was prorated to domestic equity and fixed income; Private Debt was prorated to Core and High Yield Fixed Income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

<sup>1</sup>MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net dividend withholding taxes effective 1/1/2014.

## ASRS Custom Asset Class Benchmark History

- **ASRS Custom Total Equity Benchmark** was 77% S&P 500, 23% MSCI EAFE through 12/31/1999; 76% S&P 500, 24% MSCI EAFE through 9/30/2003; 78% S&P 500, 22% MSCI EAFE/ACWI ex-U.S.<sup>1</sup> through 12/31/2006; 49% S&P 500, 11% S&P 400, 11% S&P 600, 29% MSCI ACWI ex-U.S. through 10/31/2009; 48% S&P 500, 10% S&P 400, 10% S&P 600, 23% MSCI EAFE, 4% MSCI EAFE Small Cap, 5% MSCI Emerging Markets through 6/30/2012; 41% S&P 500, 9% S&P 400, 9% S&P 600, 25% MSCI EAFE, 5% MSCI EAFE Small Cap, 11% MSCI Emerging Markets through 3/31/2015; 40% S&P 500, 6% S&P 400, 6% S&P 600, 34% MSCI EAFE, 4% MSCI EAFE Small Cap, 10% MSCI Emerging Markets thereafter.
- **ASRS Custom Domestic Equity Benchmark** was S&P 500 through 12/31/2006; 74% S&P 500, 13% S&P 400, 13% S&P 600 through 12/31/2010; 70% S&P 500, 15% S&P 400, 15% S&P 600 through 3/31/2015.; 77% S&P 500, 11.5% S&P 400, 11.5% S&P 600 thereafter.
- **ASRS Custom International Equity Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 72% MSCI EAFE, 11% MSCI EAFE Small Cap and 17% MSCI Emerging Markets through 6/30/2012; 61% MSCI EAFE, 13% MSCI EAFE Small Cap and 26% MSCI Emerging Markets through 3/31/2015; 71% MSCI EAFE, 8% MSCI EAFE Small Cap and 21% MSCI Emerging Markets thereafter.
- **ASRS Custom Public Markets Fixed Income Benchmark** was Barclays Capital U.S. Aggregate Index through 12/31/2010; 93% Barclays Capital U.S. Aggregate Index, 7% Barclays Capital U.S. High Yield Bond Index through 12/31/2012; 59% Barclays Capital U.S. Aggregate Index, 23% Barclays Capital U.S. High Yield Bond Index, 18% JP Morgan GBI-EM Global Diversified through 3/31/2015; 73% Barclays Capital U.S. Aggregate Index, 27% Barclays Capital U.S. High Yield Bond Index thereafter.
- **ASRS Custom Inflation-Linked Benchmark** was 100% Barclays Capital U.S. TIPS through 7/31/2010; 50% Barclays Capital U.S. TIPS, 50% Bloomberg Commodity Index through 8/31/2010; 30% Barclays Capital U.S. TIPS, 70% Bloomberg Commodity Index through 5/31/2011; 100% Bloomberg Commodity Index thereafter.
- **Multi-Asset Class Custom Benchmark** was 56% S&P 500, 16% MSCI EAFE, 28% Barclays Capital Aggregate through 9/30/2011; 50% S&P 500, 19% MSCI EAFE, 28% Barclays Capital Aggregate, and 3% Bloomberg Commodity Index through 06/30/2012; 43% S&P 500, 25% MSCI EAFE, 28% Barclays Capital Aggregate, and 4% Bloomberg Commodity Index through 3/31/2015; market value weighted average of the benchmarks for Bridgewater (91 Day T-Bill) and Windham (52% MSCI ACWI net, 30% Citi WGBI, 9% DJ US REIT, and 9% Bloomberg Commodities Index) thereafter.

<sup>1</sup>MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

## Information Disclaimer and Reporting Methodology

### Information Disclaimer

- Past performance is no guarantee of future results.
- All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.
- NEPC's source for portfolio pricing, calculation of accruals, and transaction information is the plan's custodian bank. Information on market indices and security characteristics is received from other sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may be preliminary and subject to change.
- This report is provided as a management aid for the client's internal use only. Information contained in this report does not constitute a recommendation by NEPC.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

### Reporting Methodology

- The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC generally reconciles custodian data to manager data. If the custodian cannot provide accurate data, manager data may be used.
- Trailing time period returns are determined by geometrically linking the holding period returns, from the first full month after inception to the report date. Rates of return are annualized when the time period is longer than a year. Performance is presented gross and/or net of manager fees as indicated on each page.
- For managers funded in the middle of a month, the "since inception" return will start with the first full month, although actual inception dates and cash flows are taken into account in all Composite calculations.
- This report may contain forward-looking statements that are based on NEPC's estimates, opinions and beliefs, but NEPC cannot guarantee that any plan will achieve its targeted return or meet other goals.