

Arizona State Retirement System

Independent ASRS Investment Program Oversight for the Period Ending December 31, 2014

February 23, 2015

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ASRS Investment Objectives/Performance

Note: All of the data shown on the following pages is as of December 31, 2014 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	8.7%
Constant 8%	<u>8.0%</u>
Excess Return	0.7%

Goal Met: Yes

- 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)
Total Fund	1.1%	6.2%	12.4%	10.5%	6.6%	9.9%
Interim SAA Policy¹	0.4%	4.3%	11.7%	9.8%	6.3%	9.6%
Excess Return	0.7%	1.9%	0.7%	0.7%	0.3%	0.3%

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

¹Composition of SAA Policy can be found in the appendix.

Arizona State Retirement System
Total Fund Attribution Analysis

Total Plan	1 Year	3 Years	5 Years
Allocation Effect ¹	0.35%	0.69%	0.32%
Manager Selection Effect ²	0.86%	-0.03%	0.11%
Interaction Effect ³	0.66%	0.11%	0.35%
Residual ⁴	-0.02%	-0.09%	-0.10%
Excess Return	1.85%	0.68%	0.68%

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:

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

2. 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)]

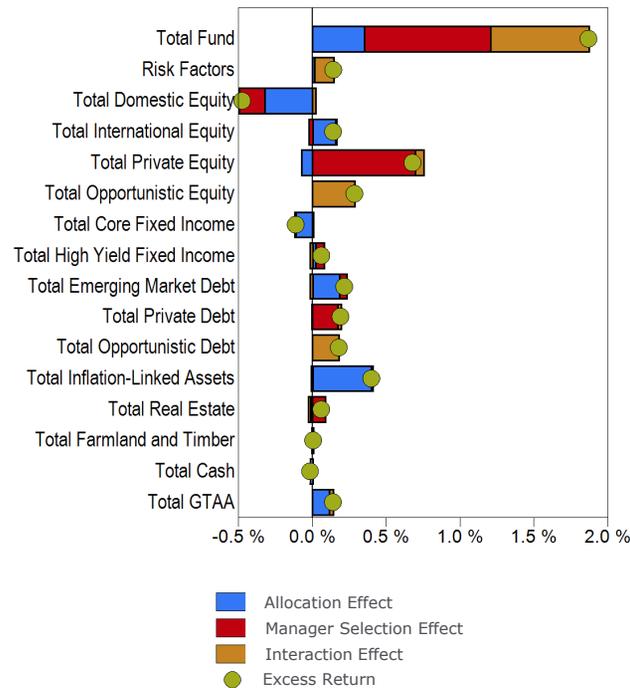
3. Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio – Weight Asset Class Policy Index)) – (Return Asset Class Index (Weight Asset Class Portfolio – Weight Asset Class Index))

4. Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.

Arizona State Retirement System

Total Fund Attribution Detail

Attribution Effects
1 Year Ending December 31, 2014



1 Year Excess Return: +1.85%

- Allocation Effect: +0.35%
 - Commodities tactical underweight (+0.40%)
 - Emerging Market Debt tactical underweight (+0.19%)
 - Domestic Equity tactical underweight (-0.32%)
- Manager Selection Effect: +0.86%
 - Private Equity outperformed due to various managers (+0.70%)
 - Private Debt outperformed due to various managers (+0.17%)
 - Real Estate outperformed due to various managers (+0.08%)
 - Domestic Equity underperformed due to various managers (-0.17%)
- Interaction Effect: +0.66%
 - Opportunistic Equity outperformed due to various managers (+0.28%)
 - Opportunistic Debt outperformed due to various managers (+0.18%)
 - Equity Risk Factor Portfolio outperformed due to various exposures (+0.13%)
- Residual: -0.02%

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Allocation Effect: Measures the impact of the decision to over/under weight assets 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. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$

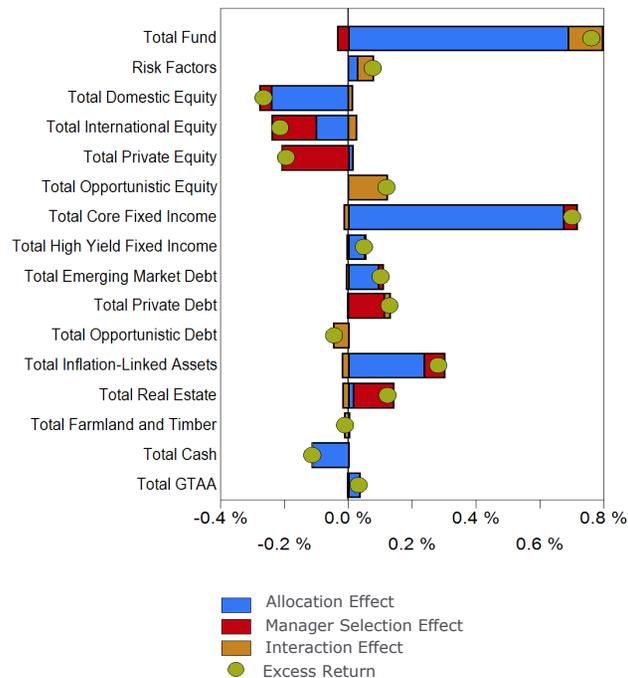
Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

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

Arizona State Retirement System

Total Fund Attribution Detail

Attribution Effects
3 Years Ending December 31, 2014



3 Year Excess Return: +0.68%

- Allocation Effect: +0.69%
 - Public Markets Fixed Income tactical underweight (+0.81%)
 - Commodities tactical underweight (+0.24%)
 - Domestic Equity tactical underweight (-0.24%)
- Manager Selection Effect: -0.03%
 - Private Equity underperformed due to various managers (-0.21%)
 - International Equity underperformed due to various managers (-0.14%)
 - Real Estate outperformed due to various managers (+0.12%)
 - Private Debt outperformed due to various managers (+0.11%)
 - Commodities outperformed due to Gresham (+0.06%)
- Interaction Effect: +0.10%
 - Opportunistic Equity outperformed due to various managers (+0.12%)
 - Opportunistic Debt underperformed due to various managers (-0.05%)
- Residual: -0.09%

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 assets 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. $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

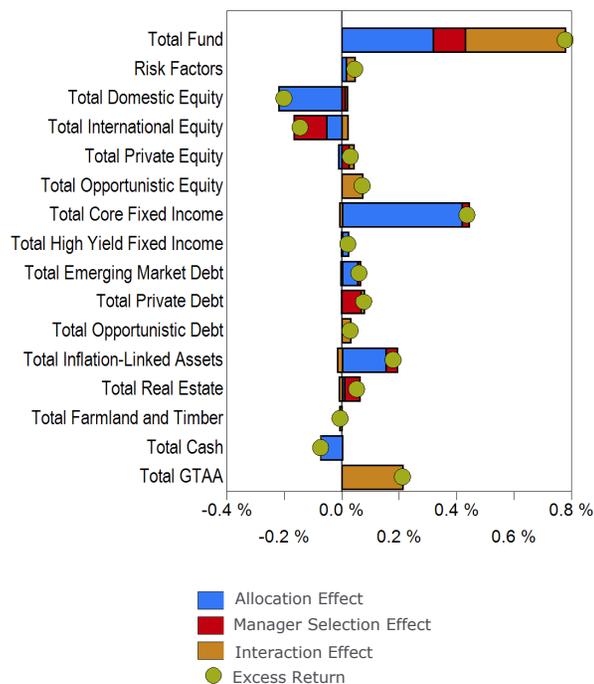
Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.



Arizona State Retirement System

Total Fund Attribution Detail

Attribution Effects
5 Years Ending December 31, 2014



5 Year Excess Return: +0.68%

- Allocation Effect: +0.32%
 - Public Markets Fixed Income tactical underweight (+0.50%)
 - Commodities tactical underweight (+0.15%)
 - Domestic Equity tactical underweight (-0.22%)
- Manager Selection Effect: +0.11%
 - Private Debt outperformed due to various managers (+0.07%)
 - Real Estate outperformed due to various managers (+0.05%)
 - Commodities outperformed due to Gresham (+0.04%)
 - International Equity underperformed due to various managers (-0.11%)
- Interaction Effect: +0.35%
 - GTAA outperformed due to Bridgewater (+0.21%)
 - Opportunistic Equity outperformed due to various managers (+0.07%)
 - Opportunistic Debt outperformed due to various managers (+0.03%)
- 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 assets 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, Manager Selection Effect and Interaction 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 ¹	5.2%	16.1%
ASRS Custom Total Equity Benchmark	5.1%	16.2%
Excess Return	0.1%	-0.1%
ASRS Domestic Equity	11.5%	20.3%
ASRS Custom Domestic Equity Benchmark	12.0%	20.4%
Excess Return	-0.5%	-0.1%
ASRS International Equity	-4.2%	9.4%
ASRS Custom Int'l Equity Benchmark	-4.1%	9.9%
Excess Return	-0.1%	-0.5%
ASRS Public Markets Fixed Income	3.6%	2.6%
ASRS Custom Fixed Income Benchmark	3.1%	2.3%
Excess Return	0.5%	0.3%
ASRS Inflation-Linked	-17.1%	-8.2%
ASRS Custom Inflation-Linked Benchmark	-17.0%	-9.4%
Excess Return	-0.1%	1.2%
ASRS GTAA	5.5%	12.0%
ASRS Custom GTAA Benchmark	5.4%	12.0%
Excess Return	0.1%	0.0%

¹Performance 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 Markets¹

- 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	16.7%	16.2%	13.0%	Oct-07
Russell 2000	3.9%	21.3%	12.3%	
Excess Return	12.8%	-5.1%	0.7%	
ASRS Opportunistic Equity ²	45.7%	28.2%	31.9%	Apr-11
ASRS Private Debt	12.9%	--	14.1%	Jul-12
S&P/LSTA Levered Loan Index + 250 bps	6.4%	--	6.6%	
Excess Return	6.5%	--	7.5%	
ASRS Opportunistic Debt ²	11.0%	11.3%	12.1%	Jan-08
ASRS Real Estate	12.9%	13.3%	6.2%	Oct-05
NFI - ODCE Index	11.4%	11.3%	5.8%	
Excess Return	1.5%	2.0%	0.4%	
ASRS Farmland and Timber	4.6%	--	1.6%	Jul-13
CPI ex-Food and Energy + 350 bps	5.2%	--	5.3%	
Excess Return	-0.6%	--	-3.7%	

¹Performance of private markets portfolios and corresponding benchmarks are reported on a one quarter lag. Performance shown as of September 30, 2014.

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

Note: Time-weighted performance of private markets portfolios shown for the one- and three-year periods to reconcile Total Fund performance as it is reported on a time-weighted basis. 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.

**Goal Met:
Partially**

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

Month	Cash In	Cash Out	Balance as of 1st Business Day
Jan-14	\$386,764,591	(\$190,949,369)	\$352,809,530
Feb-14	\$210,787,413	(\$191,680,149)	\$189,010,112
Mar-14	\$679,587,225	(\$192,454,469)	\$486,243,101
Apr-14	\$455,478,123	(\$192,789,720)	\$246,095,874
May-14	\$328,489,975	(\$193,063,809)	\$162,815,927
Jun-14	\$143,781,061	(\$193,481,152)	\$90,885,762
Jul-14	\$249,555,269	(\$196,223,085)	\$101,745,713
Aug-14	\$196,994,381	(\$198,736,874)	\$141,827,348
Sep-14	\$365,370,874	(\$199,232,408)	\$165,530,449
Oct-14	\$321,707,041	(\$200,104,305)	\$139,949,815
Nov-14	\$314,711,411	(\$200,572,009)	\$111,628,426
Dec-14	\$467,265,987	(\$200,810,121)	\$275,989,580

All Pension Obligations, Capital Calls and Other Requirements Met with Available Cash

Goal Met: Yes

Note:

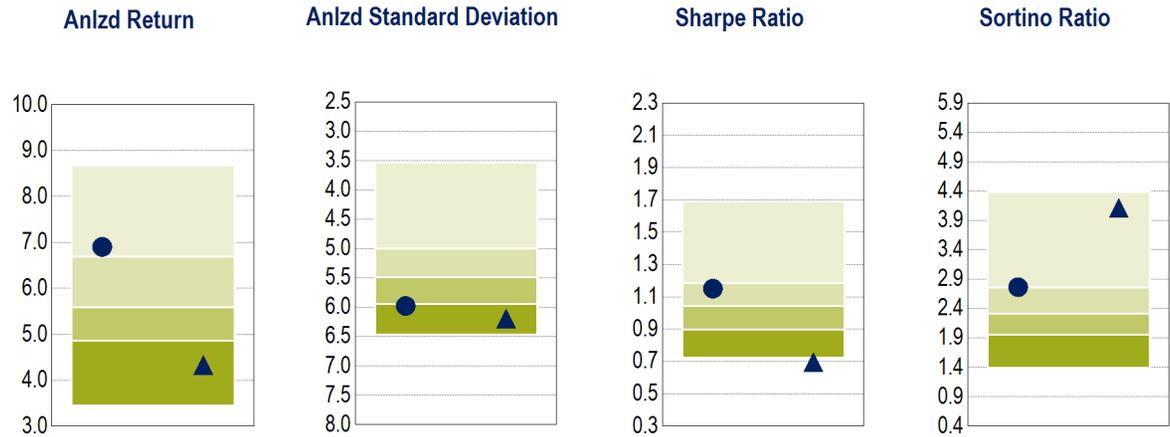
Cash In - The balance as of the business day prior to the monthly pension run payment, comprised of month-to-date contributions and excess cash held to fund manager(s) or as a tactical allocation.

Cash Out - The monthly pension run payment.



Total Fund Risk Statistics vs. Peer Universe

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



Metric	Value	%tile	Value	%tile	Value	%tile	Value	%tile
● Total Fund	6.9	17	6.0	77	1.2	33	2.8	26
	4.3	80	6.2	89	0.7	96	4.1	7
▲ Interim SAA Policy	4.3	80	6.2	89	0.7	96	4.1	7
	4.3	80	6.2	89	0.7	96	4.1	7
Universe	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8
5th %tile	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8
25th %tile	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8
Median	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8
75th %tile	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8
95th %tile	8.7	6.7	5.6	4.9	3.5	3.5	4.4	2.8

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 67 observations for the period ending December 31, 2014, with total assets of \$617.9 billion.

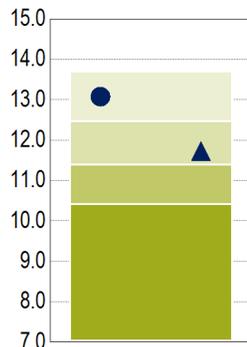
Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

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

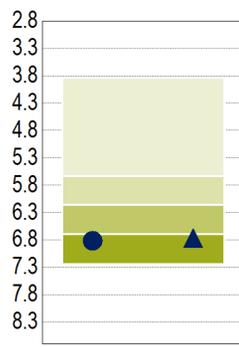
3 Year

Anlzd Return



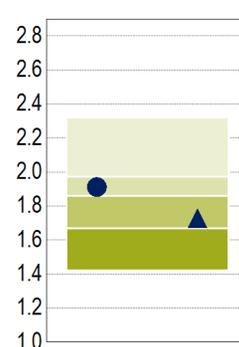
● Total Fund	
Value	13.1
%tile	17
▲ Interim SAA Policy	
Value	11.7
%tile	42
Universe	
5th %tile	13.7
25th %tile	12.5
Median	11.4
75th %tile	10.4
95th %tile	7.1

Anlzd Standard Deviation



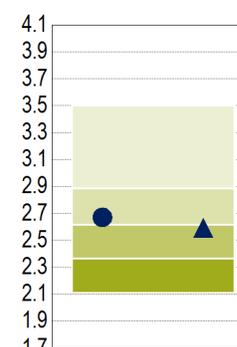
● Total Fund	
Value	6.8
%tile	87
▲ Interim SAA Policy	
Value	6.8
%tile	85
Universe	
5th %tile	3.8
25th %tile	5.6
Median	6.1
75th %tile	6.7
95th %tile	7.2

Sharpe Ratio



● Total Fund	
Value	1.9
%tile	43
▲ Interim SAA Policy	
Value	1.7
%tile	69
Universe	
5th %tile	2.3
25th %tile	2.0
Median	1.9
75th %tile	1.7
95th %tile	1.4

Sortino Ratio



● Total Fund	
Value	2.7
%tile	41
▲ Interim SAA Policy	
Value	2.6
%tile	59
Universe	
5th %tile	3.5
25th %tile	2.9
Median	2.6
75th %tile	2.4
95th %tile	2.1

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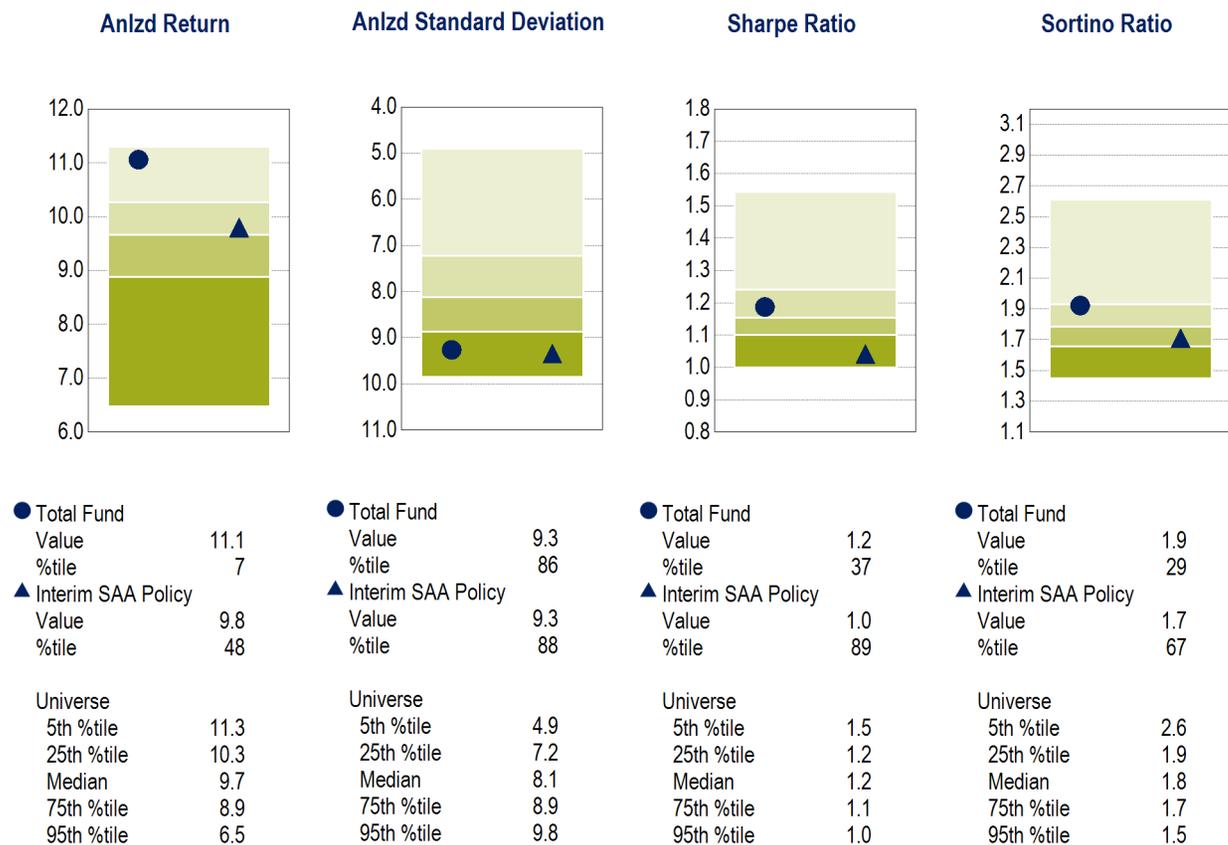
Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > \$1 Billion Universe.

The InvestorForce Public Funds > \$1 Billion Universe contains 67 observations for the period ending December 31, 2014, with total assets of \$617.9 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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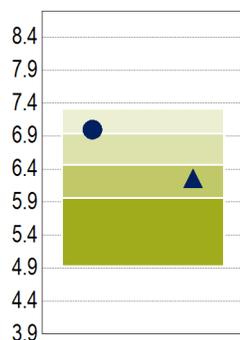
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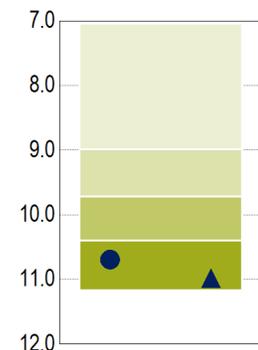
Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

10 Year

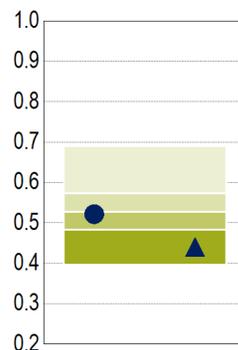
Anlzd Return



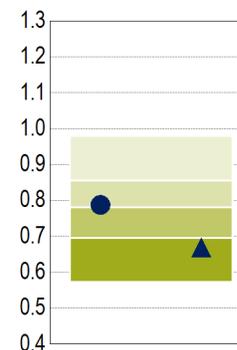
Anlzd Standard Deviation



Sharpe Ratio



Sortino Ratio



● Total Fund

Value 7.0
%tile 22

▲ Interim SAA Policy

Value 6.3
%tile 65

Universe

5th %tile 7.3
25th %tile 7.0
Median 6.5
75th %tile 6.0
95th %tile 4.9

● Total Fund

Value 10.7
%tile 88

▲ Interim SAA Policy

Value 11.0
%tile 91

Universe

5th %tile 7.0
25th %tile 9.0
Median 9.7
75th %tile 10.4
95th %tile 11.2

● Total Fund

Value 0.5
%tile 57

▲ Interim SAA Policy

Value 0.4
%tile 85

Universe

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

● Total Fund

Value 0.8
%tile 45

▲ Interim SAA Policy

Value 0.7
%tile 85

Universe

5th %tile 1.0
25th %tile 0.9
Median 0.8
75th %tile 0.7
95th %tile 0.6

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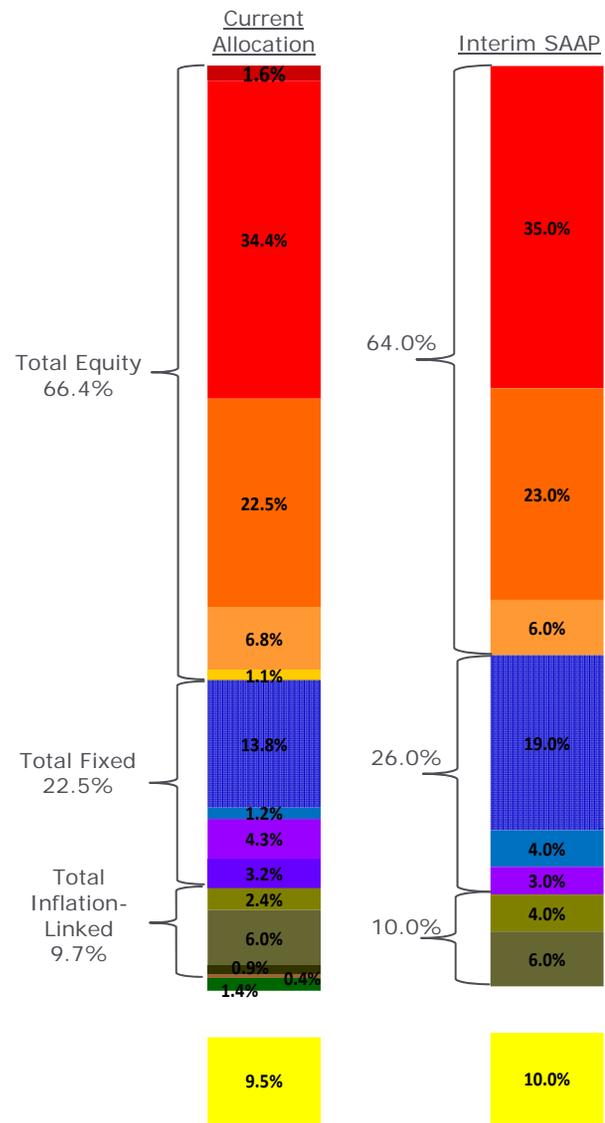
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Independent Oversight/Compliance

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SAA Policy Compliance

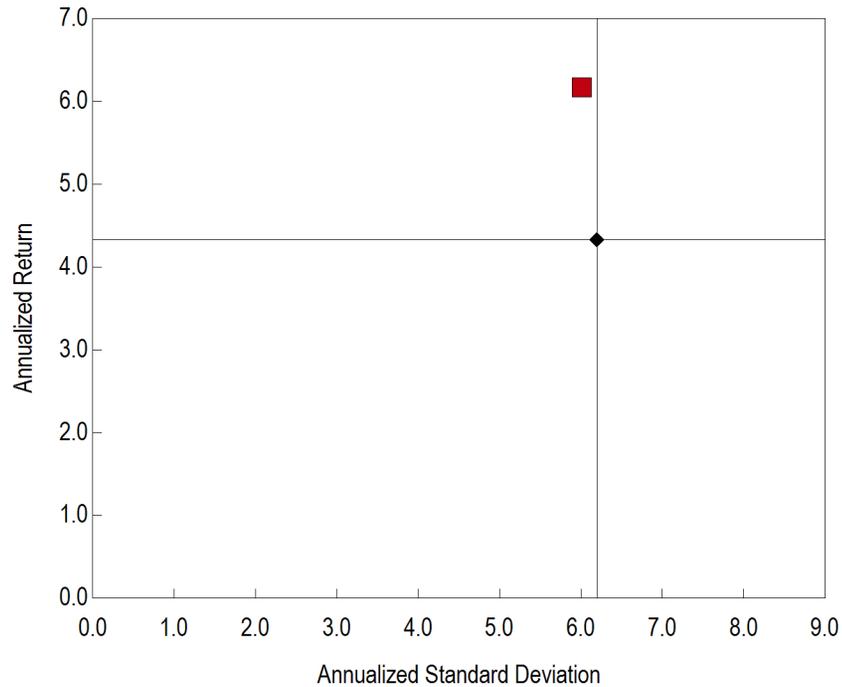


	Current Mkt Value	Current Allocation	Interim SAAP	Difference	Policy Range	Within Range
Total Domestic and International Equity¹	\$20,014,156,499	58.5%	58.0%	0.5%		
Domestic Equity³						
U.S. Large Cap ²	\$8,744,595,200	25.6%	25.0%	0.6%	26% - 38%	Yes
U.S. Mid Cap	\$1,574,006,298	4.6%	5.0%	-0.4%		
U.S. Small Cap	\$1,442,997,701	4.2%	5.0%	-0.8%		
International Equity³	\$7,707,235,911	22.5%	23.0%	-0.5%	16% - 28%	Yes
Developed Large Cap ²	\$4,675,963,159	13.7%	14.0%	-0.3%		
Developed Small Cap	\$1,169,023,387	3.4%	3.0%	0.4%		
Emerging Markets	\$1,862,249,364	5.4%	6.0%	-0.6%		
Private Equity⁴	\$2,334,272,042	6.8%	6.0%	0.8%	5% - 9%	Yes
Opportunistic Equity^{4,6}	\$374,912,037	1.1%	0.0%	1.1%	0% - 3%	Yes
Total Equity	\$22,723,340,578	66.4%	64.0%	2.4%	53% - 70%	Yes
U.S. Fixed Income	\$4,715,578,932	13.8%	19.0%	-5.2%	8% - 28%	Yes
Core ²	\$3,452,110,205	10.1%	14.0%	-3.9%		
High Yield	\$1,263,468,727	3.7%	5.0%	-1.3%		
Emerging Market Debt	\$418,364,158	1.2%	4.0%	-2.8%		
Private Debt⁴	\$1,474,167,707	4.3%	3.0%	1.3%		
Opportunistic Debt^{4,6}	\$1,089,483,616	3.2%	0.0%	3.2%	0% - 10%	Yes
Total Fixed Income	\$7,697,594,412	22.5%	26.0%	-3.5%	15% - 35%	Yes
Commodities²	\$815,809,393	2.4%	4.0%	-1.6%	1% - 7%	Yes
Real Estate^{2,4}	\$2,065,827,277	6.0%	6.0%	0.0%	6% - 10%	Yes
Infrastructure	\$300,000,000	0.9%	0.0%	0.9%	0% - 3%	Yes
Farmland and Timber	\$151,503,742	0.4%	0.0%	0.4%	0% - 3%	Yes
Opportunistic Inflation-Linked⁵	\$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Total Inflation-Linked	\$3,333,140,412	9.7%	10.0%	-0.3%	8% - 16%	Yes
Cash⁵	\$467,270,100	1.4%	0.0%	1.4%		
Total	\$34,221,345,501	100.0%	100.0%	0.0%		
Global Tactical Asset Allocation (GTAA)²	\$3,242,787,016	9.5%	10.0%	-0.5%	5% - 15%	Yes

¹Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of \$545.3 million.
²GTAA allocation distributed into U.S. Large Cap Equity, Int'l Developed Large Cap Equity, Core Fixed Income, Commodities and Real Estate.
³Domestic Equity, International Equity and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.
⁴Values shown for private markets portfolios include cash flows that occurred during 4Q 2014.
⁵Cash includes money for the upcoming monthly pension distribution.
⁶Aggregate 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.

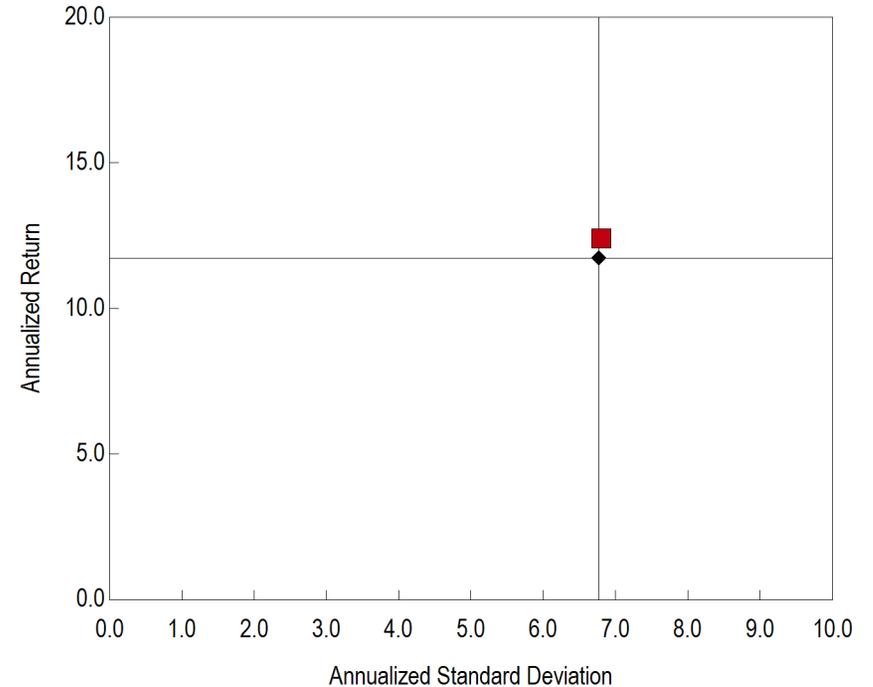
Total Fund Analysis

1 Year Ending December 31, 2014



■ Total Fund
◆ Interim SAA Policy

3 Years Ending December 31, 2014



■ Total Fund
◆ Interim SAA Policy

1 Year Ending December 31, 2014

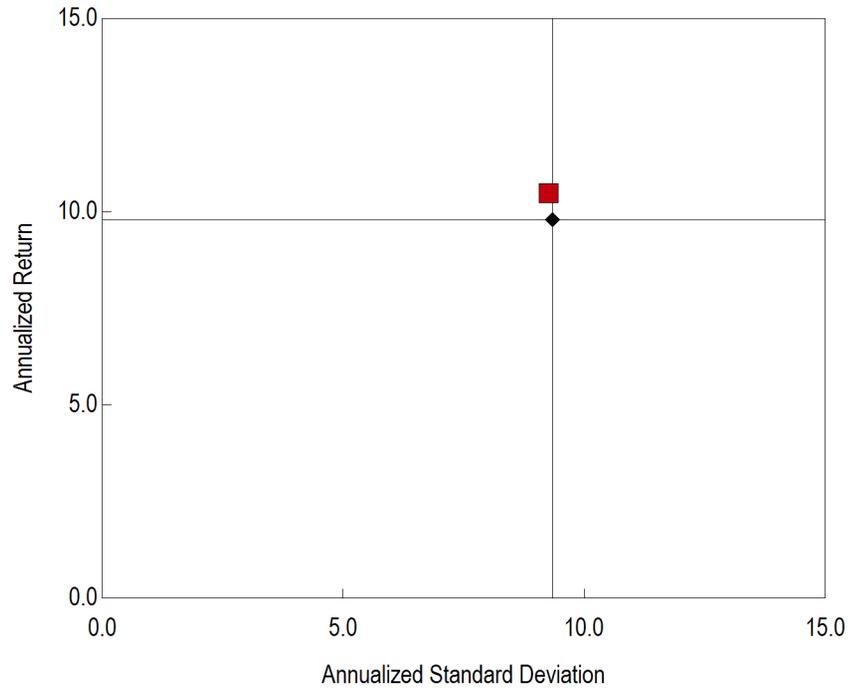
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	6.2%	6.0%	1.0	2.5
Interim SAA Policy	4.3%	6.2%	0.7	4.1

3 Years Ending December 31, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	12.4%	6.8%	1.8	2.5
Interim SAA Policy	11.7%	6.8%	1.7	2.6

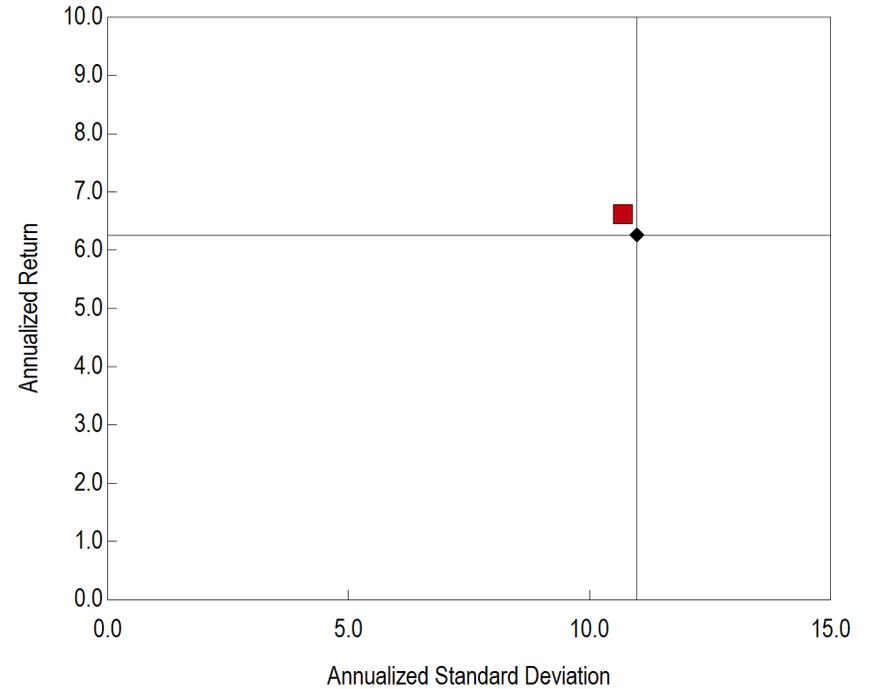
Total Fund Analysis

5 Years Ending December 31, 2014



■ Total Fund
◆ Interim SAA Policy

10 Years Ending December 31, 2014



■ Total Fund
◆ Interim SAA Policy

5 Years Ending December 31, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	10.5%	9.3%	1.1	1.8
Interim SAA Policy	9.8%	9.3%	1.0	1.7

10 Years Ending December 31, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	6.6%	10.7%	0.5	0.7
Interim SAA Policy	6.3%	11.0%	0.4	0.7

Arizona State Retirement System

Asset Class Performance Summary - Public Markets

	Market Value (\$)	% of Portfolio	3 Mo (%)	Rank	6 Mo (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank	Inception (%)	Since
Total Fund	34,221,345,501	100.0	1.1	--	-0.2	--	6.2	--	12.4	--	10.5	--	6.6	--	9.9	Jul-75
<i>Interim SAA Policy</i>			<u>0.4</u>	--	<u>-1.6</u>	--	<u>4.3</u>	--	<u>11.7</u>	--	<u>9.8</u>	--	<u>6.3</u>	--	<u>9.6</u>	<i>Jul-75</i>
Over/Under			0.7		1.4		1.9		0.7		0.7		0.3		0.3	
<i>Actual Benchmark</i>			<u>0.6</u>	--	<u>-1.0</u>	--	<u>5.1</u>	--	<u>12.1</u>	--	<u>9.9</u>	--	<u>6.3</u>	--	--	<i>Jul-75</i>
Total Domestic and International Equity¹	18,164,680,985	53.1	1.7	--	-0.9	--	5.2	--	16.1	--	12.0	--	6.8	--	6.8	Jan-98
<i>ASRS Custom Total Equity Benchmark</i>			<u>1.9</u>	--	<u>-0.9</u>	--	<u>5.1</u>	--	<u>16.2</u>	--	<u>12.0</u>	--	<u>6.9</u>	--	<u>6.1</u>	<i>Jan-98</i>
Over/Under			-0.2		0.0		0.1		-0.1		0.0		-0.1		0.7	
Total Domestic Equity	10,867,172,487	31.8	5.3	51	4.6	38	11.5	33	20.3	38	15.9	38	8.3	52	11.4	Jul-75
<i>ASRS Custom Domestic Equity Benchmark</i>			<u>5.9</u>	42	<u>5.0</u>	33	<u>12.0</u>	30	<u>20.4</u>	36	<u>15.8</u>	39	<u>8.1</u>	58	<u>11.5</u>	<i>Jul-75</i>
Over/Under			-0.6		-0.4		-0.5		-0.1		0.1		0.2		-0.1	
<i>eA All US Equity Net Median</i>			<u>5.3</u>		<u>3.6</u>		<u>9.1</u>		<u>19.3</u>		<u>15.3</u>		<u>8.4</u>		<u>12.6</u>	<i>Jul-75</i>
Total International Equity	6,752,187,108	19.7	-3.7	75	-9.1	72	-4.2	61	9.4	72	4.8	77	4.4	86	6.1	Apr-87
<i>ASRS Custom Int'l Equity Benchmark</i>			<u>-3.6</u>	74	<u>-8.9</u>	71	<u>-4.1</u>	59	<u>9.9</u>	65	<u>5.2</u>	69	<u>5.5</u>	72	<u>5.8</u>	<i>Apr-87</i>
Over/Under			-0.1		-0.2		-0.1		-0.5		-0.4		-1.1		0.3	
<i>eA All ACWI ex-US Equity Net Median</i>			<u>-2.5</u>		<u>-7.9</u>		<u>-3.4</u>		<u>10.9</u>		<u>6.5</u>		<u>6.0</u>		<u>7.7</u>	<i>Apr-87</i>
Total Public Markets Fixed Income	4,019,981,496	11.7	0.3	65	-0.8	84	3.6	55	2.6	63	4.5	55	4.9	42	8.4	Jul-75
<i>ASRS Custom Fixed Income Benchmark</i>			<u>-0.2</u>	87	<u>-1.6</u>	88	<u>3.1</u>	60	<u>2.3</u>	69	<u>4.2</u>	61	<u>4.6</u>	54	--	<i>Jul-75</i>
Over/Under			0.5		0.8		0.5		0.3		0.3		0.3		--	
<i>eA All US Fixed Inc Net Median</i>			<u>0.7</u>		<u>0.7</u>		<u>3.9</u>		<u>3.5</u>		<u>4.8</u>		<u>4.6</u>		<u>8.2</u>	<i>Jul-75</i>
Total Inflation-Linked Assets	570,997,289	1.7	-13.1	--	-22.6	--	-17.1	--	-8.2	--	-3.4	--	--	--	-3.4	Feb-10
<i>ASRS Custom Inflation-Linked Benchmark</i>			<u>-12.1</u>	--	<u>-22.5</u>	--	<u>-17.0</u>	--	<u>-9.4</u>	--	<u>-4.7</u>	--	<u>-0.1</u>	--	<u>-5.1</u>	<i>Feb-10</i>
Over/Under			-1.0		-0.1		-0.1		1.2		1.3		-0.1		1.7	
Total GTAA	3,242,787,016	9.5	0.9	43	-1.8	56	5.5	11	12.0	1	11.8	1	7.8	9	8.0	Jan-04
<i>ASRS Custom GTAA Benchmark</i>			<u>1.2</u>	30	<u>-0.3</u>	37	<u>5.4</u>	12	<u>12.0</u>	1	<u>9.8</u>	1	<u>6.1</u>	36	<u>6.5</u>	<i>Jan-04</i>
Over/Under			-0.3		-1.5		0.1		0.0		2.0		1.7		1.5	
<i>eA Global TAA Net Median</i>			<u>0.7</u>		<u>-1.6</u>		<u>3.3</u>		<u>6.7</u>		<u>5.3</u>		<u>5.8</u>		<u>6.4</u>	<i>Jan-04</i>

¹Performance 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 (%)	IRR (%)	Since
Total Fund	34,221,345,501	100.0	1.1	6.2	12.4	10.5	9.9	--	Jul-75
<i>Interim SAA Policy</i>			<u>0.4</u>	<u>4.3</u>	<u>11.7</u>	<u>9.8</u>	<u>9.6</u>	--	<i>Jul-75</i>
Over/Under			0.7	1.9	0.7	0.7	0.3	--	
<i>Actual Benchmark</i>			0.6	5.1	12.1	9.9	--	--	<i>Jul-75</i>
Total Private Equity	2,296,309,757	6.7	1.7	16.7	16.2	15.7	5.3	13.0	Oct-07
<i>Russell 2000 1 QTR Lagged</i>			<u>-7.4</u>	<u>3.9</u>	<u>21.3</u>	<u>14.3</u>	<u>6.0</u>	<u>12.3</u>	<i>Oct-07</i>
Over/Under			9.1	12.8	-5.1	1.4	-0.7	0.7	
Total Opportunistic Equity¹	372,297,570	1.1	-1.8	45.7	28.2	--	23.7	31.9	Apr-11
Total Private Debt	1,265,984,479	3.7	2.0	12.9	--	--	15.3	14.1	Jul-12
<i>S&P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged</i>			<u>0.2</u>	<u>6.4</u>	<u>--</u>	<u>--</u>	<u>8.0</u>	<u>6.6</u>	<i>Jul-12</i>
Over/Under			1.8	6.5	--	--	7.3	7.5	
Total Opportunistic Debt¹	1,074,792,940	3.1	1.5	11.0	11.3	--	9.1	12.1	Jan-08
Total Real Estate	2,045,413,190	6.0	2.0	12.9	13.3	12.4	4.1	6.2	Oct-05
<i>NCREIF ODCE 1 QTR Lagged</i>			<u>3.0</u>	<u>11.4</u>	<u>11.3</u>	<u>11.3</u>	<u>5.2</u>	<u>5.8</u>	<i>Oct-05</i>
Over/Under			-1.0	1.5	2.0	1.1	-1.1	0.4	
Total Farmland and Timber	116,439,488	0.3	0.2	4.6	--	--	-39.1	1.6	Jul-13
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.1</u>	<u>5.2</u>	<u>--</u>	<u>--</u>	<u>5.2</u>	<u>5.3</u>	<i>Jul-13</i>
Over/Under			-0.9	-0.6	--	--	-44.3	-3.7	

¹Net absolute rate of return expectations range from 10-14% per annum.

Note: Performance is based on net of fee performance data.

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 Grosvenor Capital Management.

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.

Time-weighted performance of private markets portfolios shown to reconcile Total Fund performance as it is reported on a time-weighted basis. 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.

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

Arizona State Retirement System

Public Market Asset Class Analysis

3 Years Ending December 31, 2014

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Anlzd AJ	Rank	Tracking Error	Rank	Info Ratio	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	12.4%	--	6.8%	--	0.8%	--	1.2%	--	0.6	--	1.0	1.8
Interim SAA Policy	--	11.7%	--	6.8%	--	--	--	--	--	--	--	--	1.7
Total Domestic and International Equity	53.1%	16.1%	--	10.0%	--	0.2%	--	0.6%	--	-0.2	--	1.0	1.6
ASRS Custom Total Equity Benchmark	--	16.2%	--	10.2%	--	--	--	--	--	--	--	--	1.6
Total Domestic Equity	31.8%	20.3%	38	9.5%	19	0.1%	31	0.6%	1	-0.2	50	1.0	2.1
ASRS Custom Domestic Equity Benchmark	--	20.4%	36	9.6%	20	--	32	--	--	--	--	--	2.1
Total International Equity	19.7%	9.4%	72	12.8%	55	-0.3%	80	0.7%	1	-0.8	96	1.0	0.7
ASRS Custom Int'l Equity Benchmark	--	9.9%	65	13.1%	70	--	76	--	--	--	--	--	0.8
Total Public Markets Fixed Income	11.7%	2.6%	63	3.8%	71	0.2%	92	0.5%	1	0.6	49	1.0	0.7
ASRS Custom Public Markets Fixed Income Benchmark	--	2.3%	69	3.6%	69	--	96	--	--	--	--	--	0.6
Total Inflation-Linked Assets	1.7%	-8.2%	--	12.4%	--	0.9%	--	2.4%	--	0.5	--	1.0	-0.7
ASRS Custom Inflation-Linked Benchmark	--	-9.4%	--	12.7%	--	--	--	--	--	--	--	--	-0.7
Total GTAA	9.5%	12.0%	1	8.0%	79	-1.5%	33	1.5%	1	-0.1	1	1.1	1.5
ASRS Custom GTAA Benchmark	--	12.0%	1	7.1%	58	--	23	--	--	--	--	--	1.7

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private markets 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 December 31, 2014

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Anlzd AJ	Rank	Tracking Error	Rank	Info Ratio	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	10.5%	--	9.3%	--	0.8%	--	1.0%	--	0.7	--	1.0	1.1
Interim SAA Policy	--	9.8%	--	9.3%	--	--	--	--	--	--	--	--	1.0
Total Domestic and International Equity	53.1%	12.0%	--	14.1%	--	0.2%	--	0.6%	--	0.0	--	1.0	0.8
ASRS Custom Total Equity Benchmark	--	12.0%	--	14.2%	--	--	--	--	--	--	--	--	0.8
Total Domestic Equity	31.8%	15.9%	38	13.8%	31	0.0%	34	0.6%	1	0.0	35	1.0	1.1
ASRS Custom Domestic Equity Benchmark	--	15.8%	39	13.7%	30	--	33	--	--	--	--	--	1.1
Total International Equity	19.7%	4.8%	77	16.1%	38	-0.3%	76	1.0%	1	-0.4	95	1.0	0.3
ASRS Custom Int'l Equity Benchmark	--	5.2%	69	16.5%	52	--	71	--	--	--	--	--	0.3
Total Public Markets Fixed Income	11.7%	4.5%	55	3.3%	63	0.3%	92	0.6%	1	0.6	38	1.0	1.3
ASRS Custom Public Markets Fixed Income Benchmark	--	4.2%	61	3.2%	62	--	97	--	--	--	--	--	1.3
Total Inflation-Linked Assets	1.7%	-3.4%	--	13.2%	--	1.0%	--	2.5%	--	0.5	--	0.9	-0.3
ASRS Custom Inflation-Linked Benchmark	--	-4.7%	--	13.8%	--	--	--	--	--	--	--	--	-0.3
Total GTAA	9.5%	11.8%	1	9.9%	86	1.9%	9	1.9%	1	1.1	1	1.0	1.2
ASRS Custom GTAA Benchmark	--	9.8%	1	9.6%	82	--	36	--	--	--	--	--	1.0

Note: Performance is reported net of fees.

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

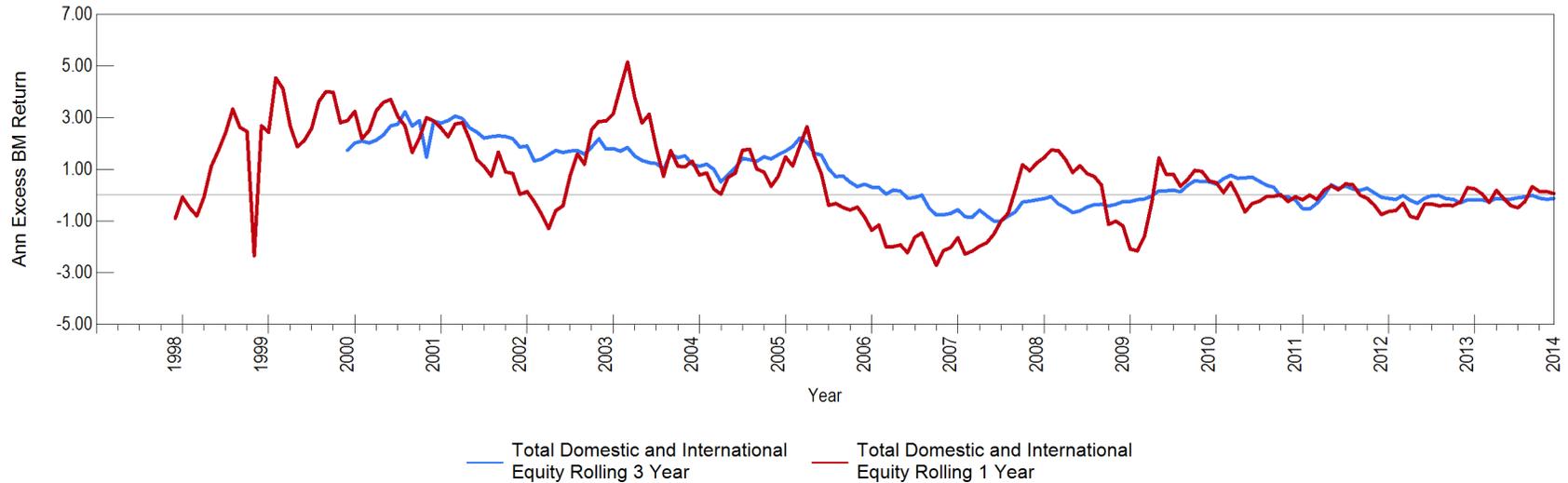
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Rankings are from highest (1) to lowest (100) in the eVestment Universe.

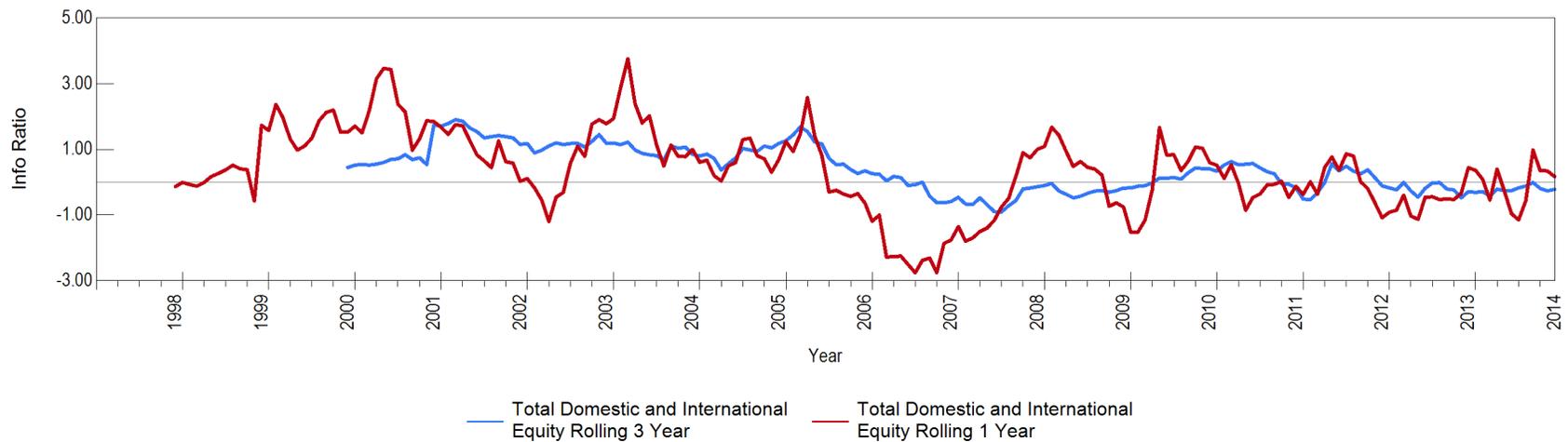
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Asset Class Analysis - Total Domestic and International Equity

Rolling Annual Excess Benchmark Return

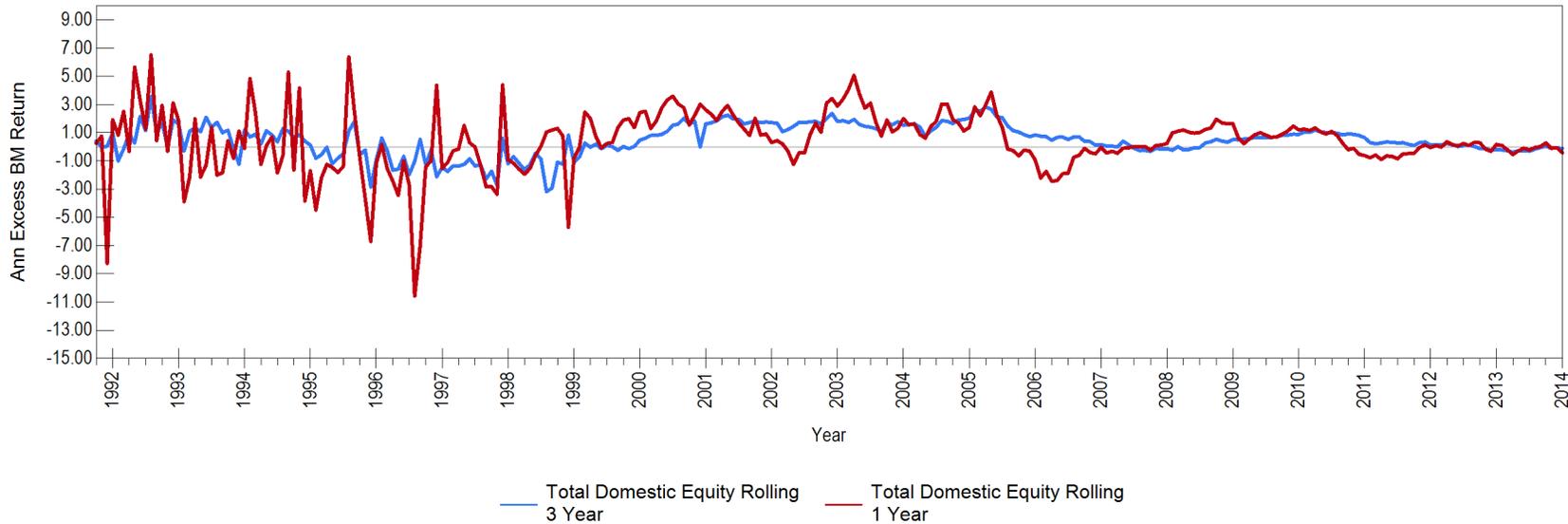


Rolling Information Ratio



Asset Class Analysis - Total Domestic Equity

Rolling Annual Excess Benchmark Return

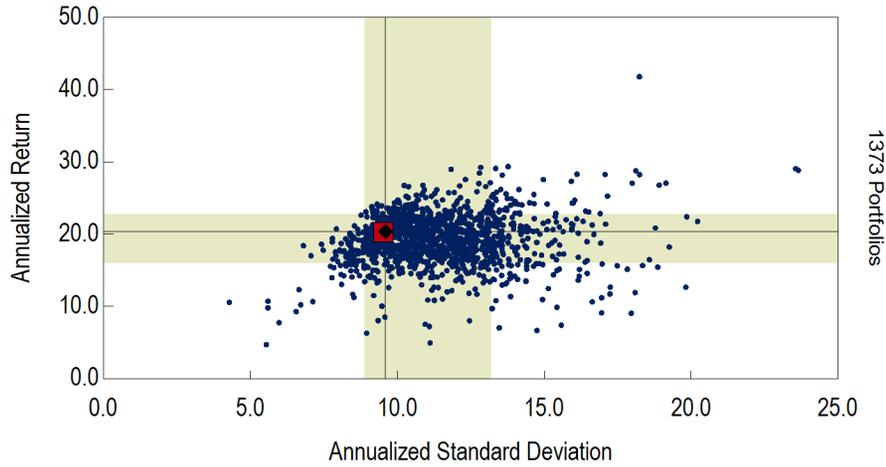


eA All US Equity Net Accounts



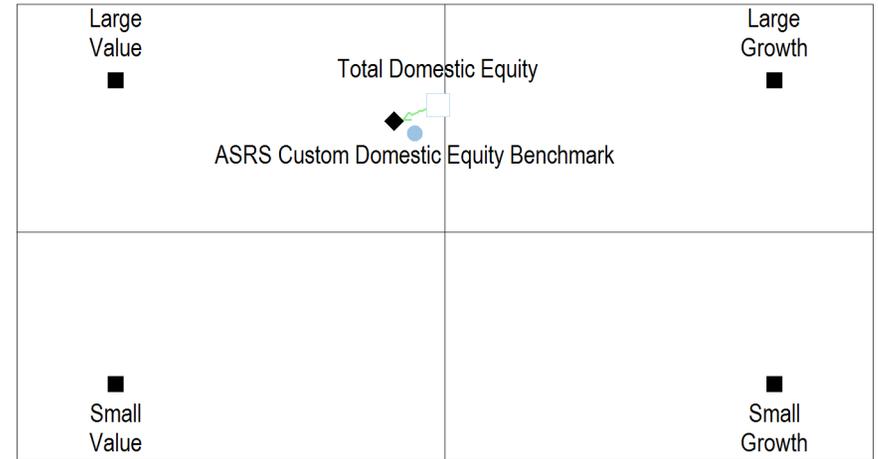
Asset Class Analysis - Total Domestic Equity

3 Year Risk Return



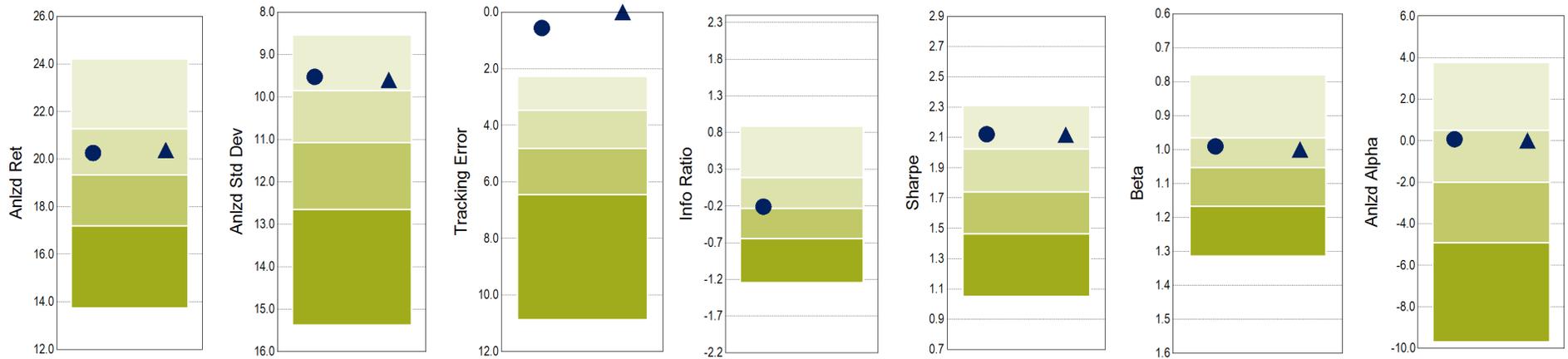
- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

3 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period

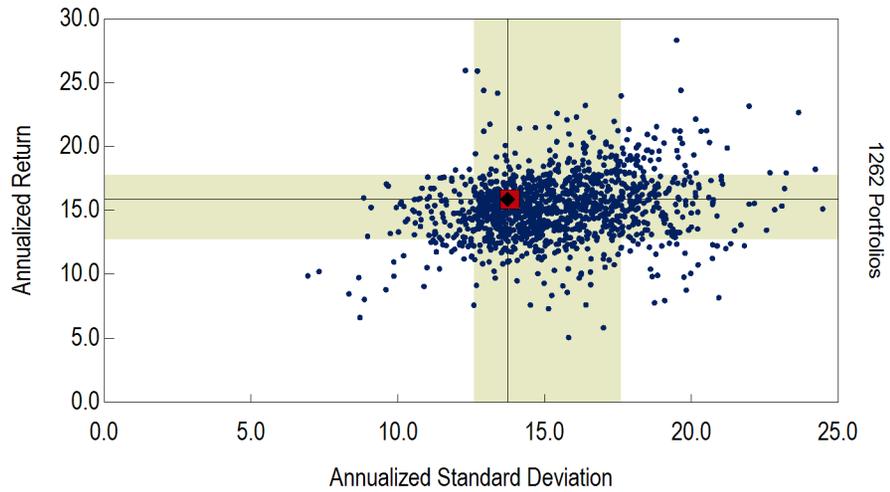
*Style map is returns based.



- 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



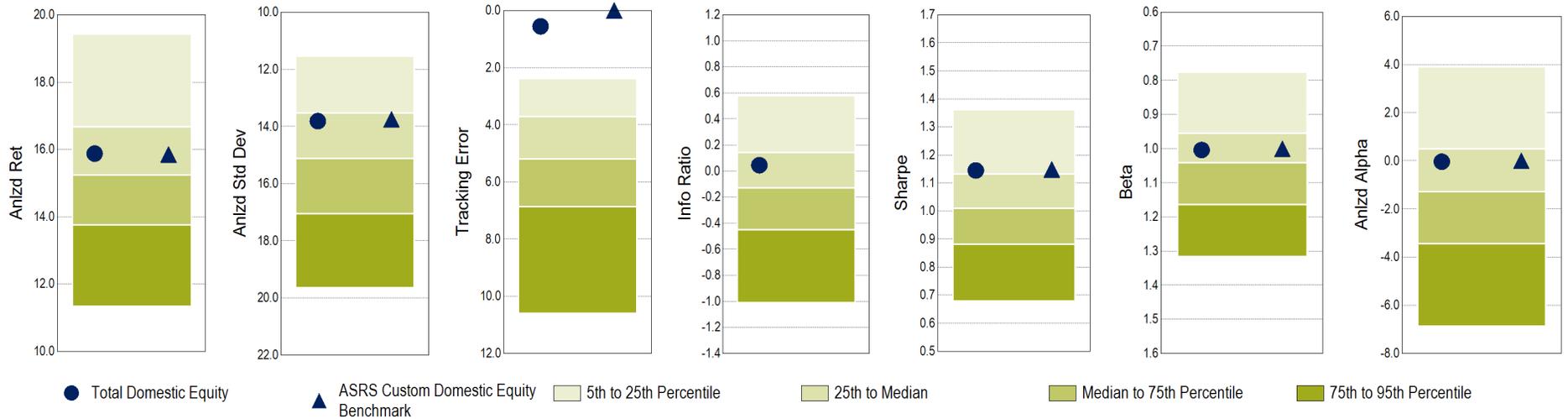
- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

5 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period

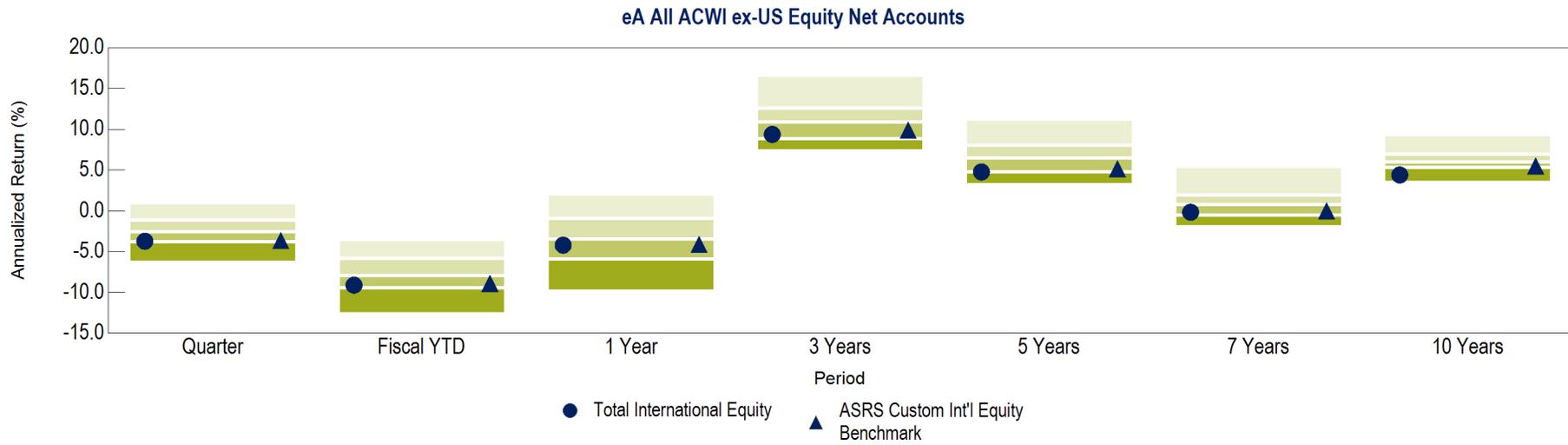
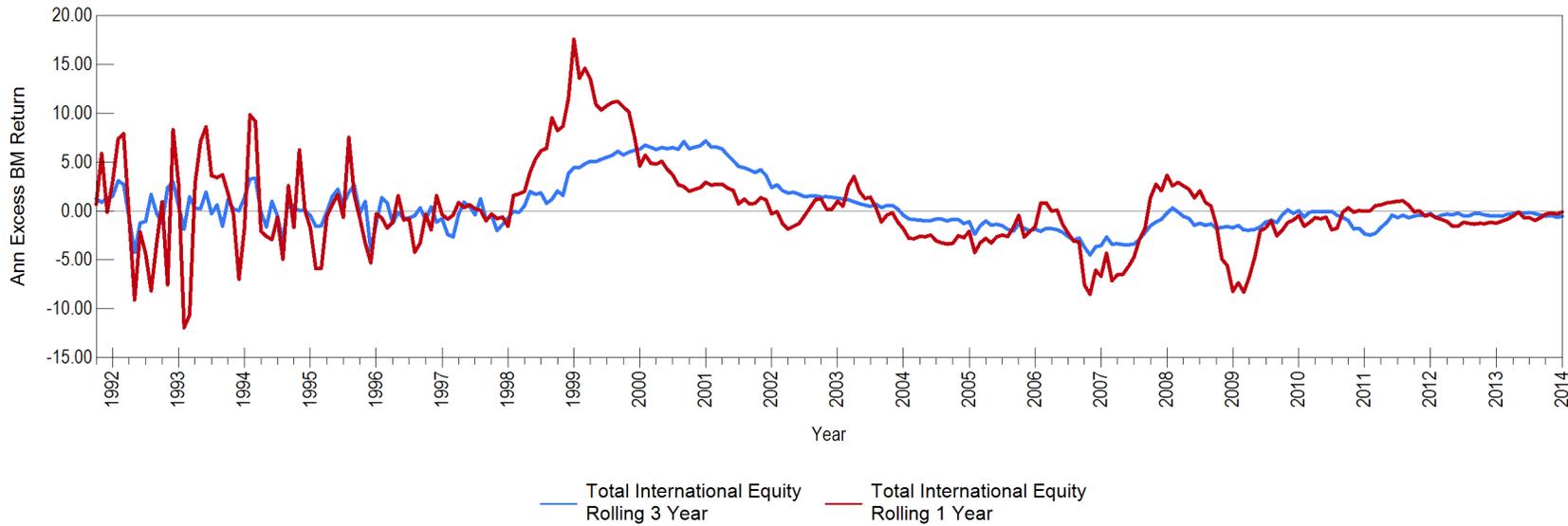
*Style map is returns based.



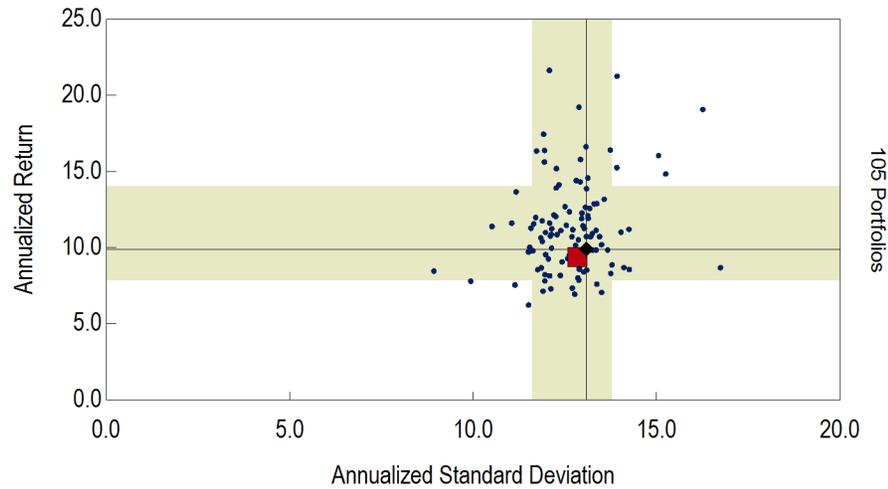
- Total Domestic Equity
- ▲ ASRS Custom Domestic Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total International Equity

Rolling Annual Excess Benchmark Return

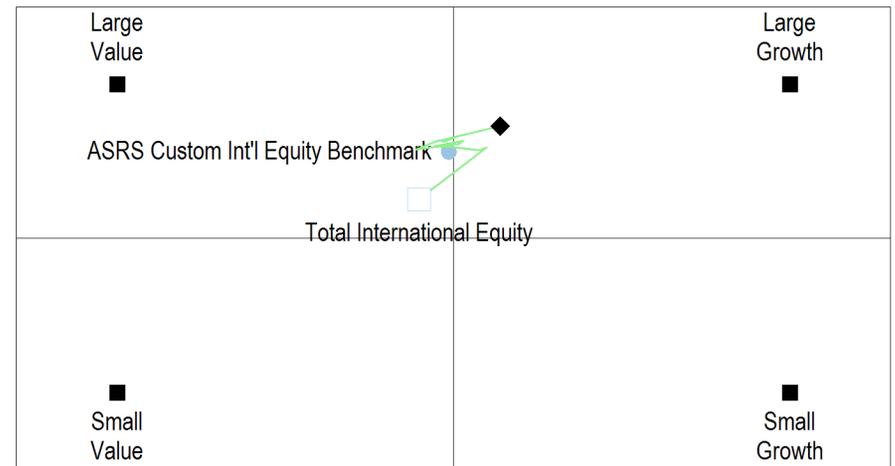


3 Year Risk Return



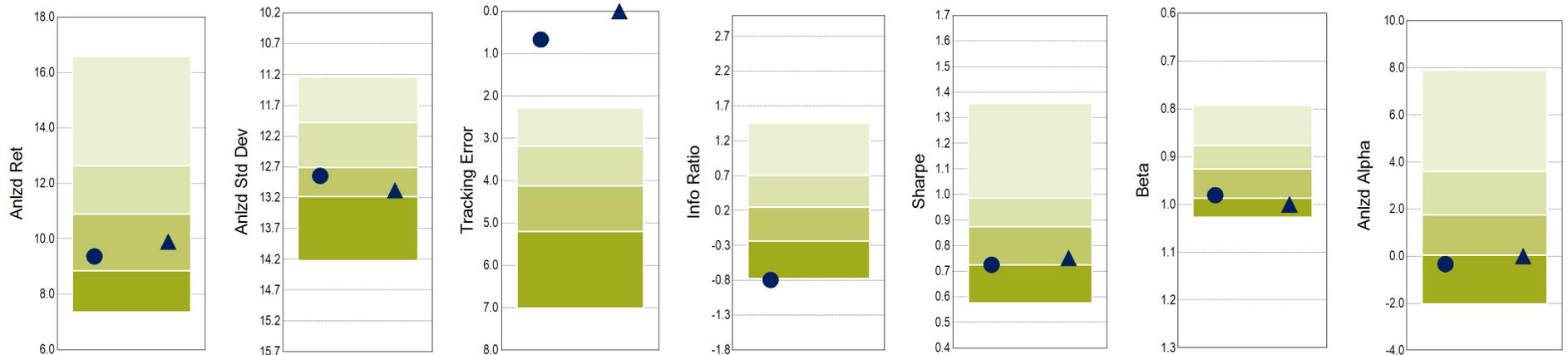
- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

3 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period

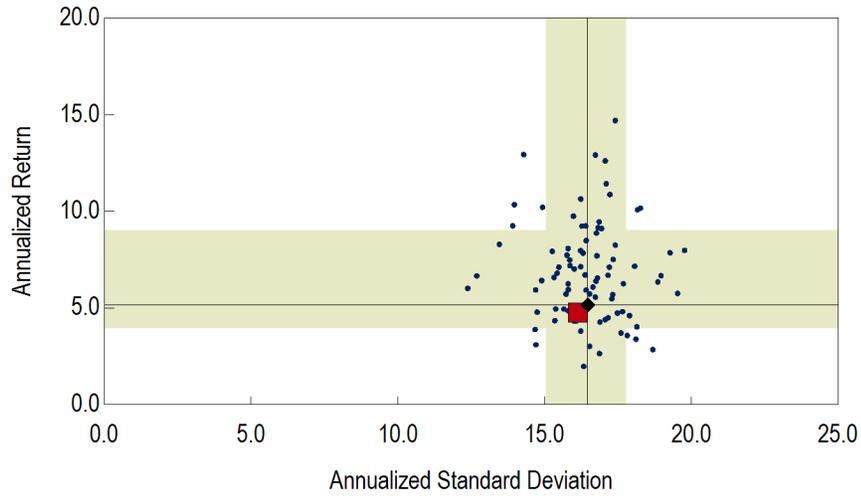
*Style map is returns based.



- 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 International Equity

5 Year Risk Return

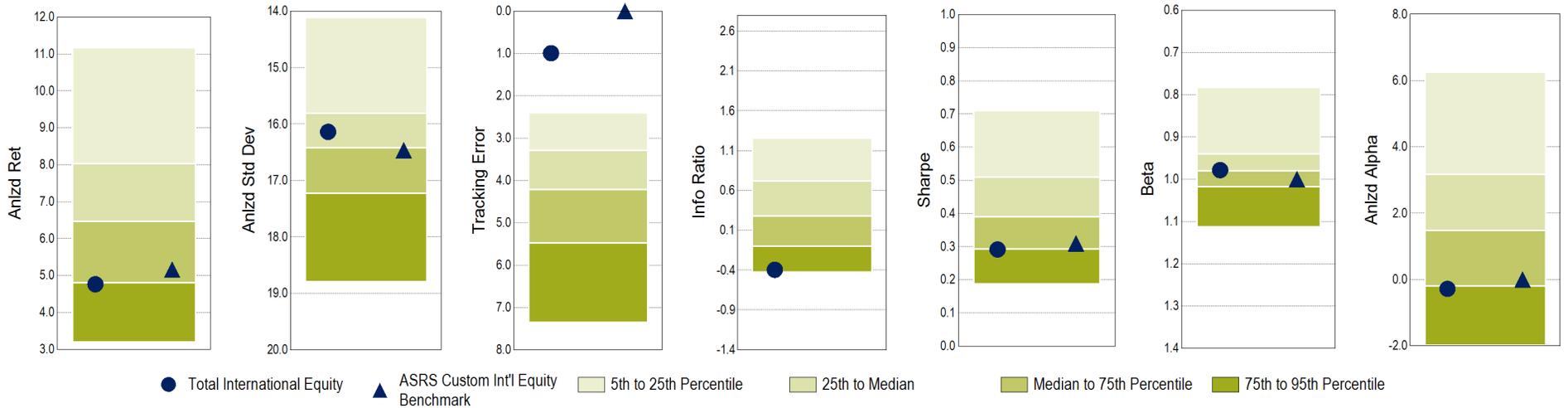


- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

5 Year Style Map

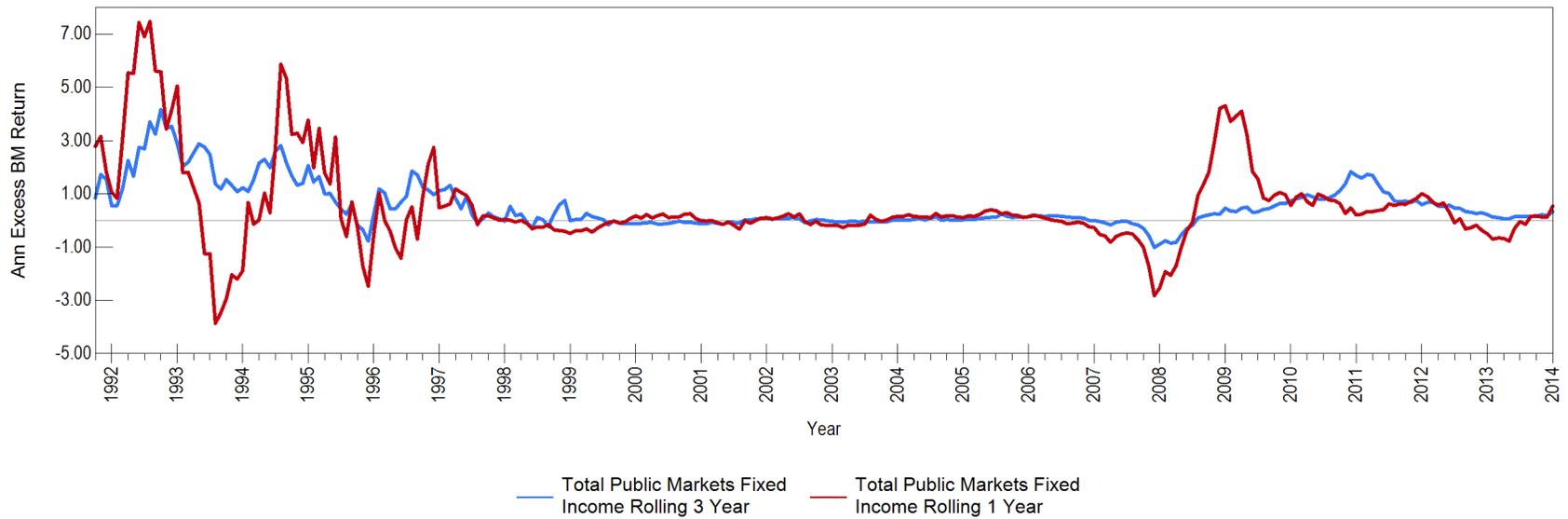


*Style map is returns based.

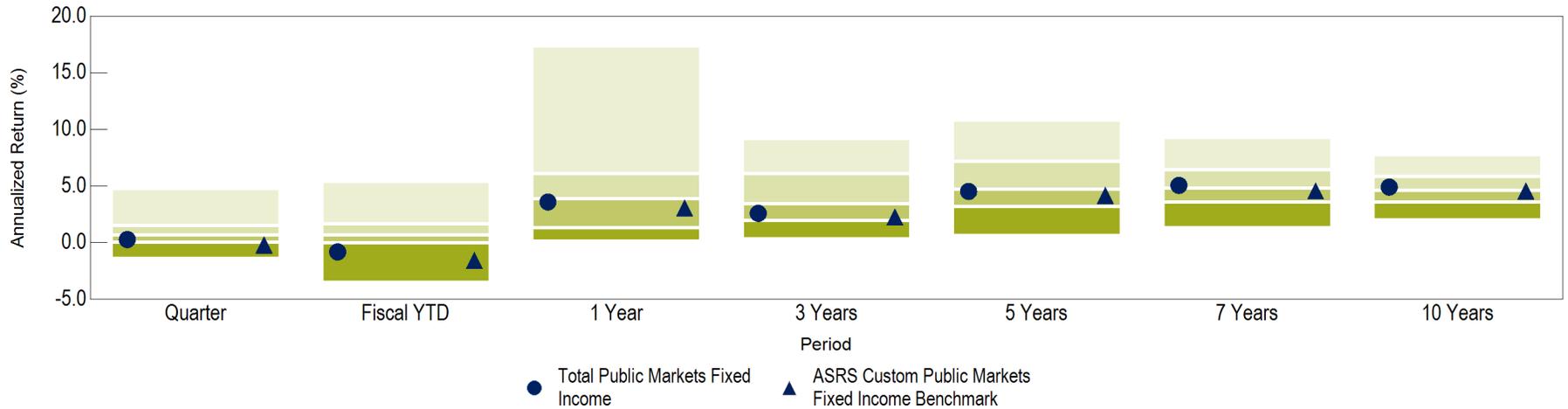


Asset Class Analysis - Total Public Markets Fixed Income

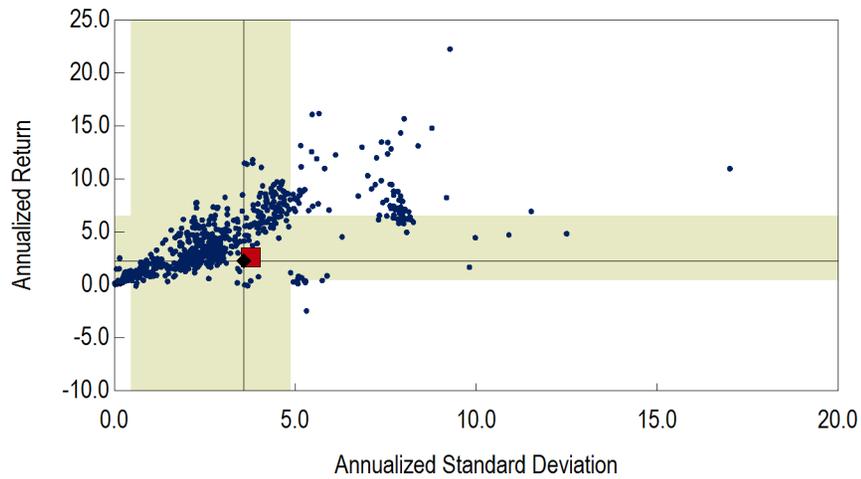
Rolling Annual Excess Benchmark Return



eA All US Fixed Inc Net Accounts

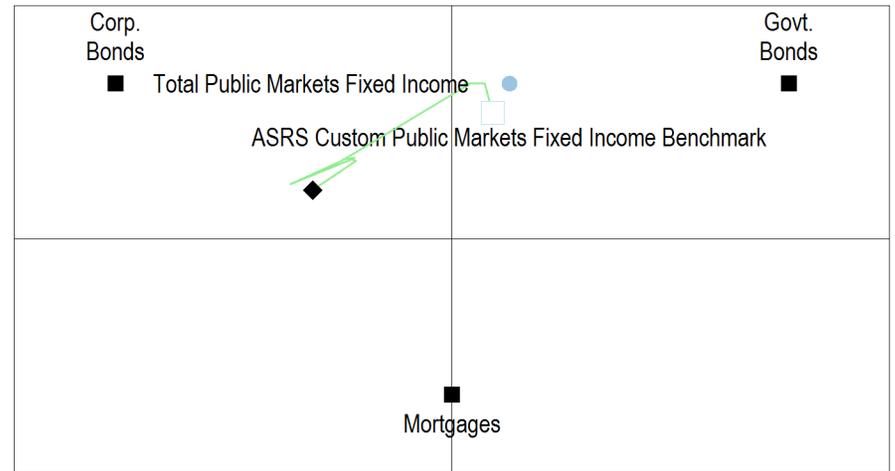


3 Year Risk Return



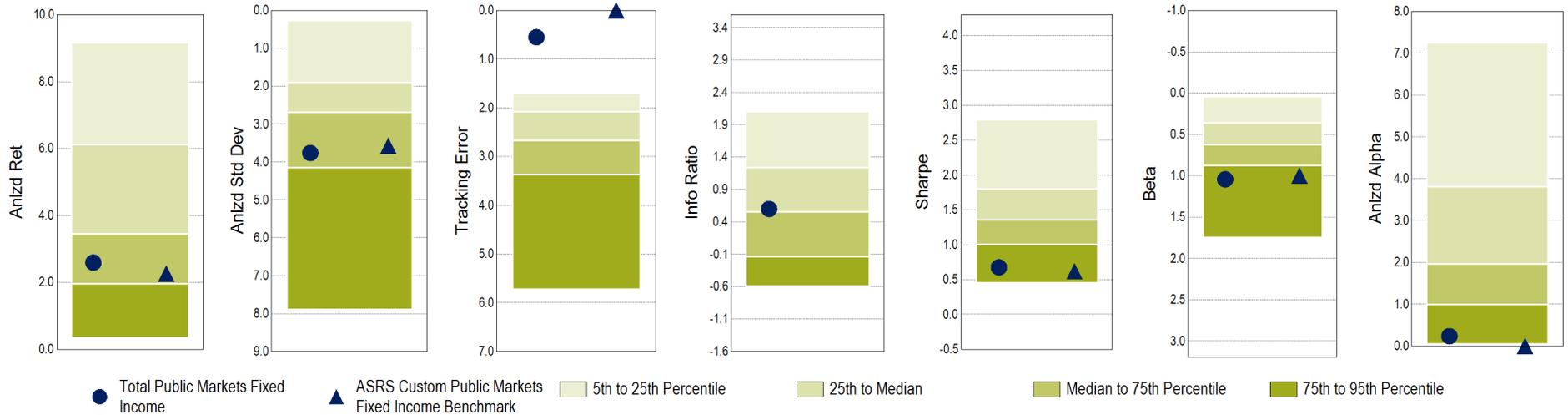
- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

3 Year Style Map



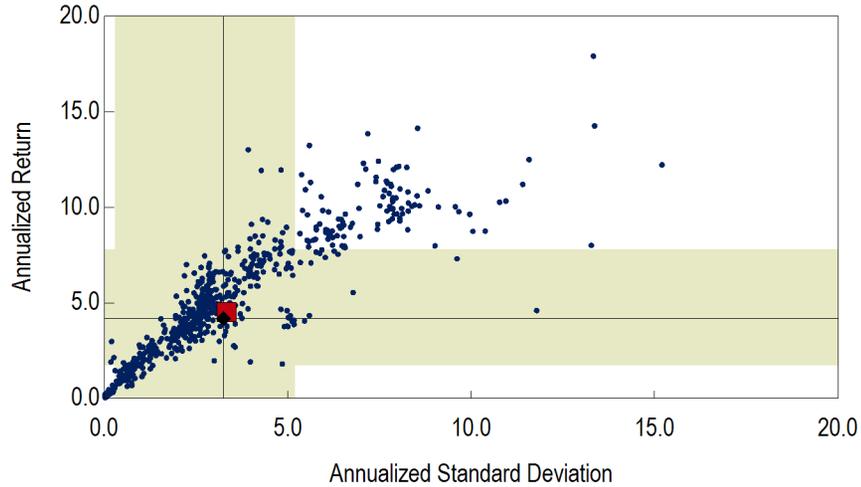
- First Rolling Period
- ◆ Last Rolling Period

*Style map is returns based.

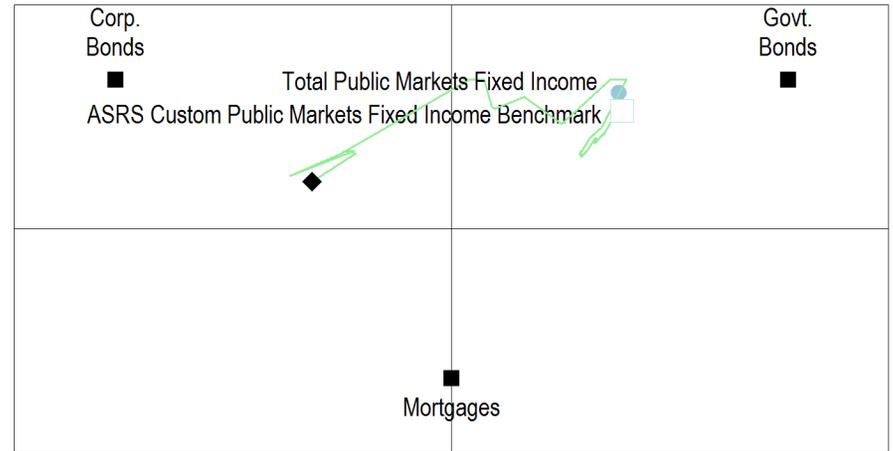


- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

5 Year Risk Return



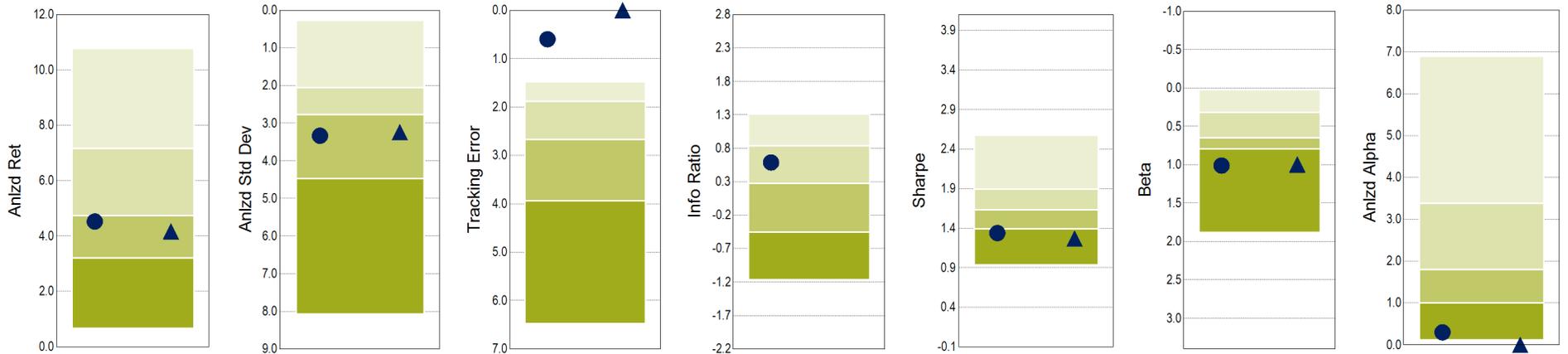
5 Year Style Map



- 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

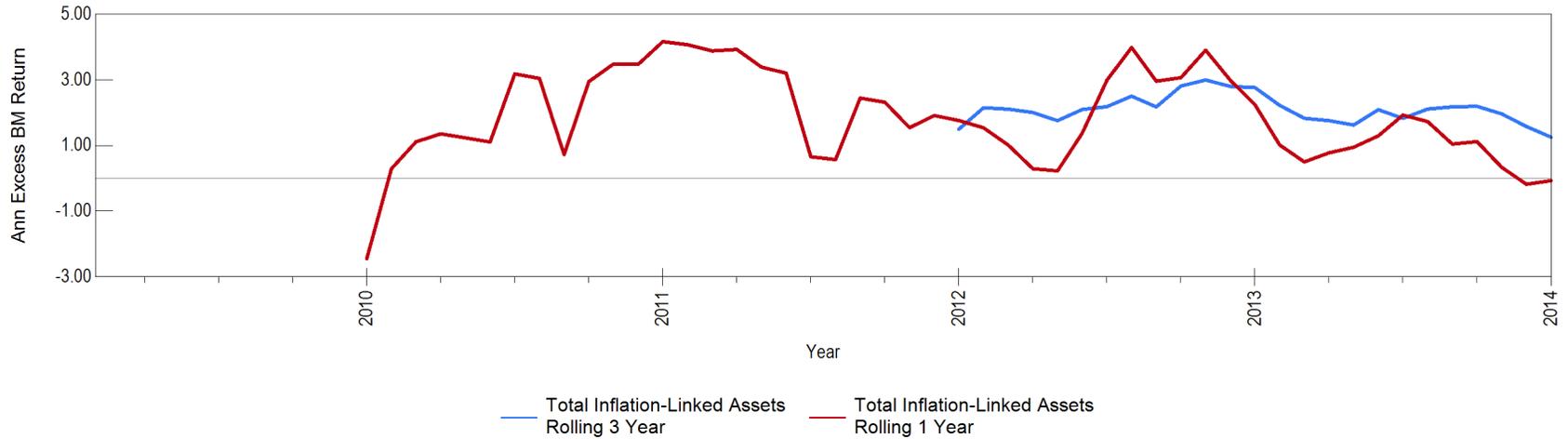
*Style map is returns based.



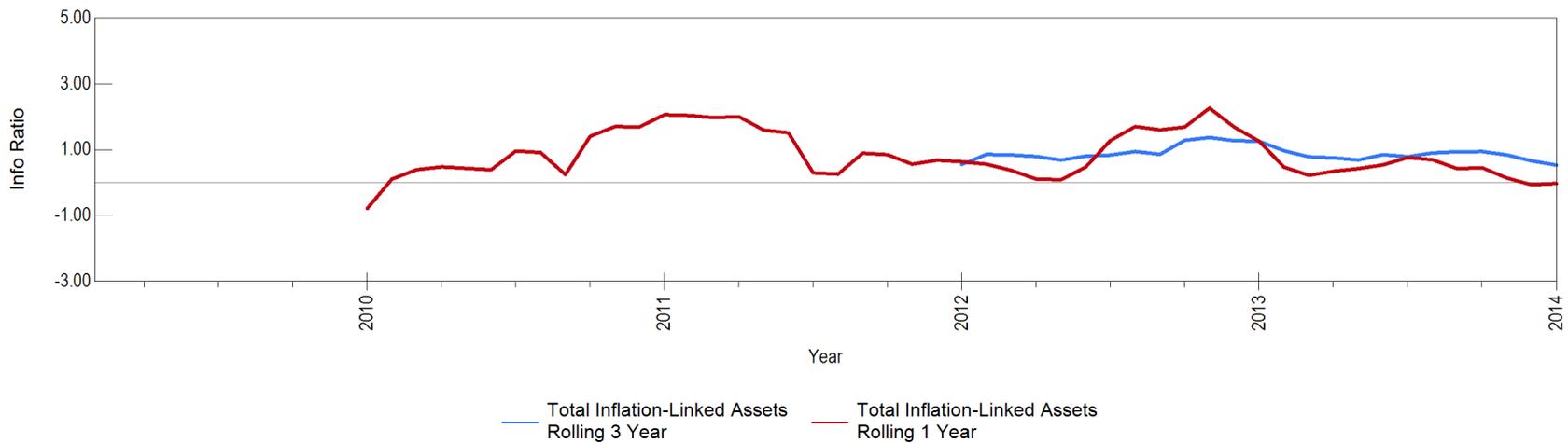
- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total Inflation-Linked Assets

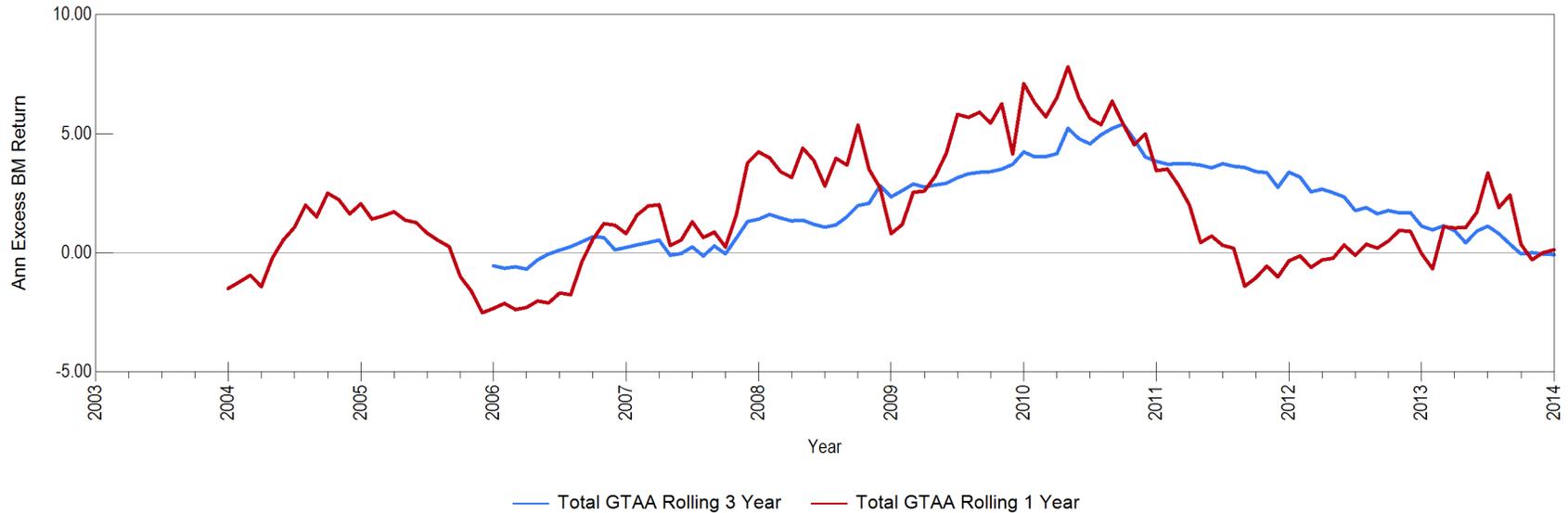
Rolling Annual Excess Benchmark Return



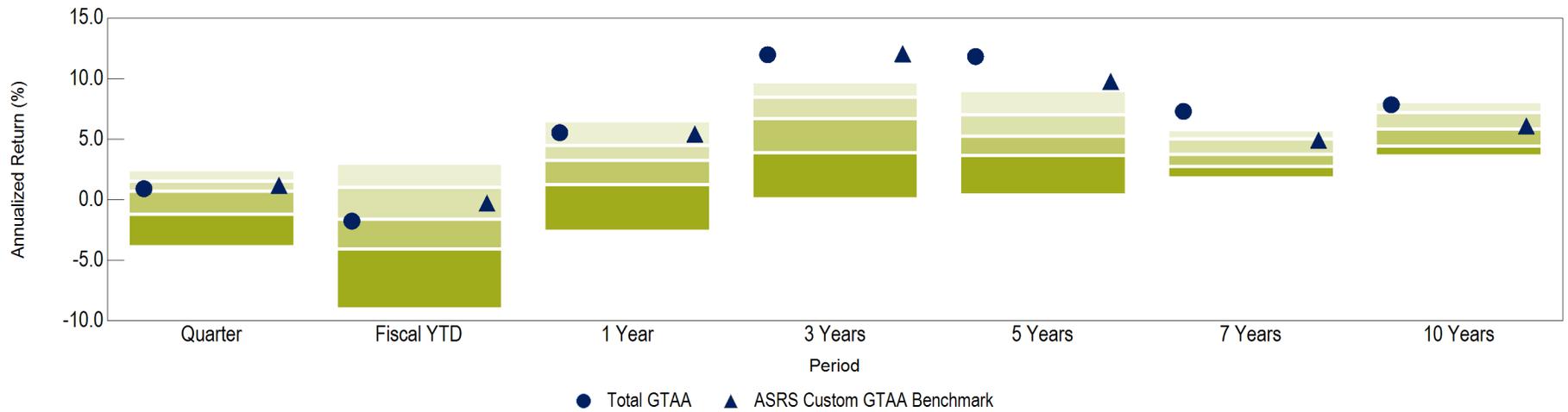
Rolling Information Ratio

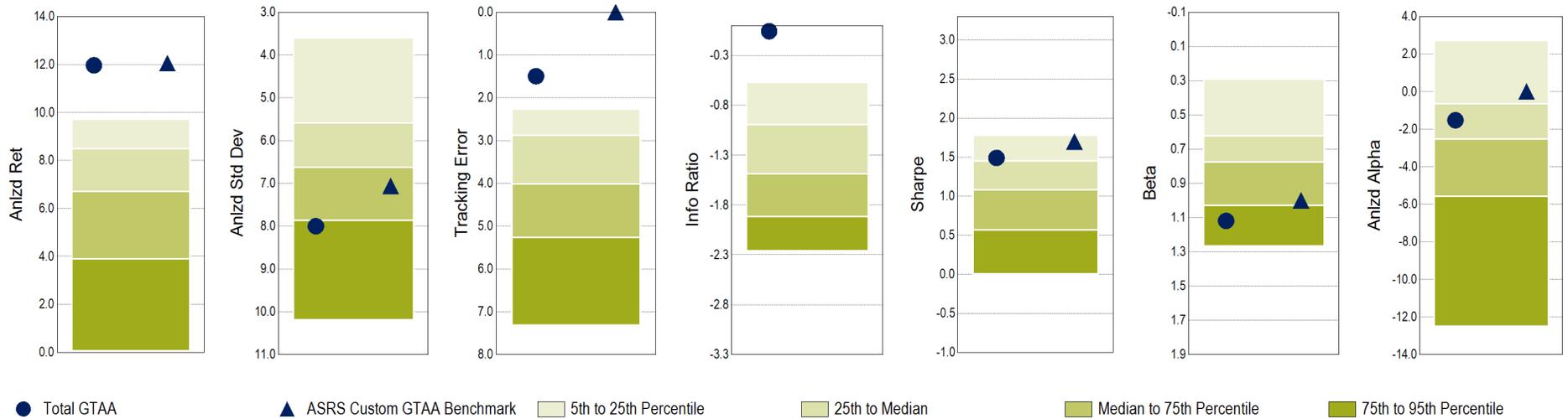
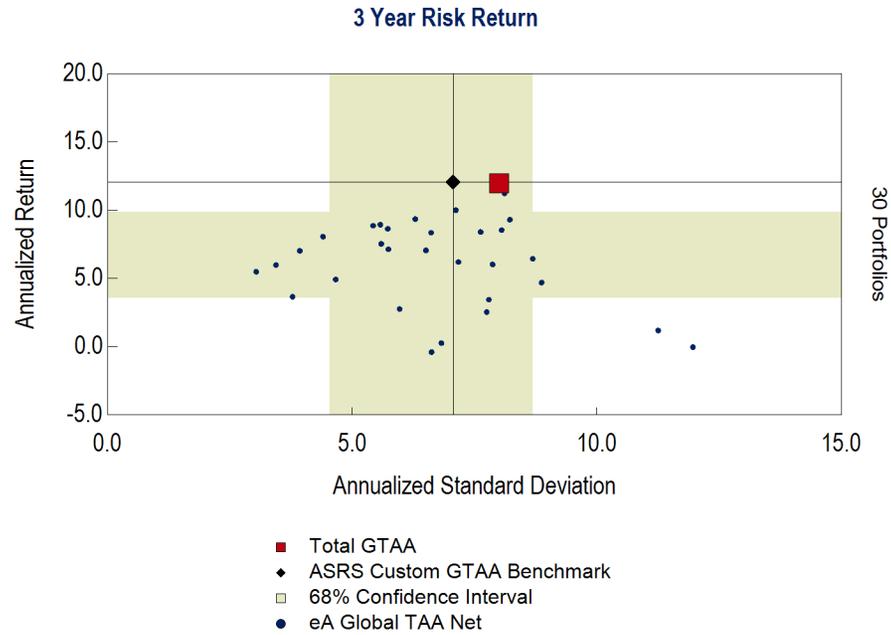


Rolling Annual Excess Benchmark Return

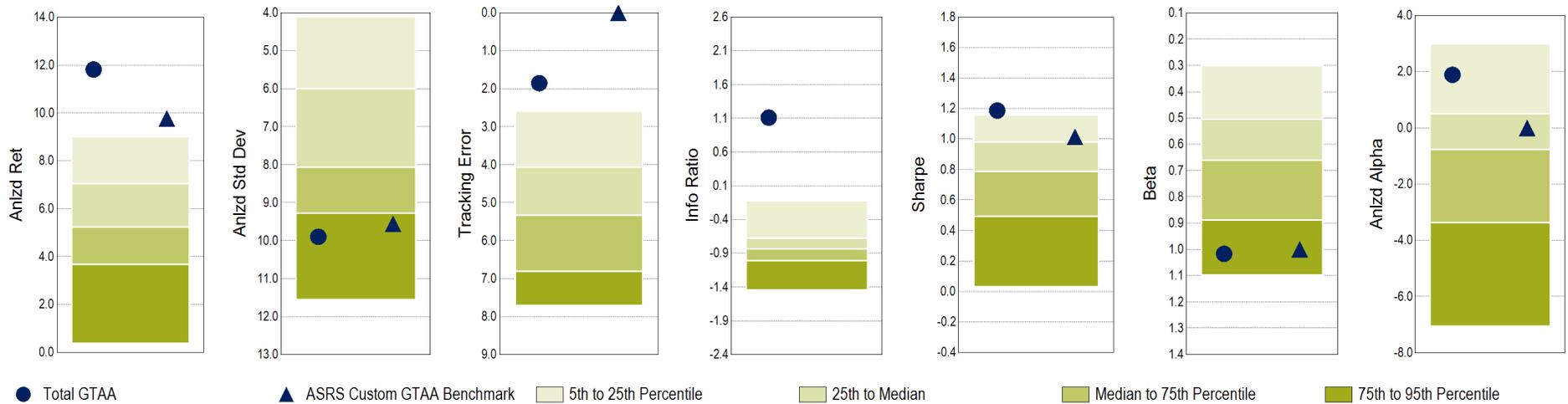
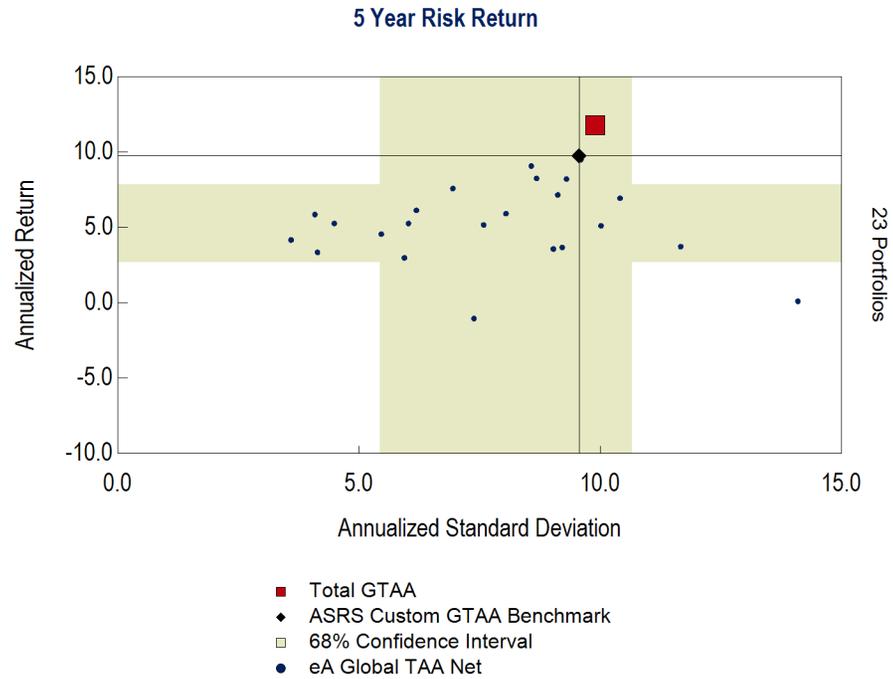


eA Global TAA Net Accounts





Asset Class Analysis - Total GTAA



- **Six Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**

- **November 13, 2014 – Public Markets Committee**
 - Review of Public Equity Program Staff Report
 - Public Equities Asset Class
 - Public Fixed Income Asset Class

- **November 19, 2014 – Private Markets Committee**
 - Monthly Status Report, General Discussion and Deal Flow
 - Anticipated investment levels of Private Debt and Opportunistic Fixed Income asset classes and pipeline for investments in private debt space reviewed
 - Variance Requests
 - RCLCO recommended the ASRS approve three variance requests from existing real estate managers to invest in properties that do not meet the investment criteria of the respective portfolios
 - Variance Request 1 – not required after further review and determination that property in question does indeed reside within a pre-approved market for investment
 - Variance Request 2 – required as apartment building investment under review is complete and stable and the assumable loan on the property exceeds 50% of acquisition price
 - Investment leverage risk is mitigated by the fact that the property was recently appraised at a value higher than the acquisition price, the loan has a favorable interest rate, and the building is complete and stable in a market with growing rents
 - Variance Request 3 – required as medical office building investment under review has lease rollover that exceeds 20% in the next two years
 - Risks associated with exceeding the lease rollover limit mitigated by the fact that the building is in a superior location near a hospital campus and the manager has interviewed tenants with expiring leases, and tenants occupying 30,000 sq. feet of the 33,000 sq. feet in expiring leases intend to renew
 - Committee approved the recommendation
 - 2015 Private Equity Pacing Model and Implementation Plan
 - Anticipate \$600 million of new private equity commitments during the year
 - Committee approved the recommended commitment pace for 2015, noting that the actual amount may differ as determined by the committee as market conditions evolve throughout the year

- **November 21, 2014 – Ad Hoc Private Markets Committee**

- Private Debt Manager Recommendation (\$300 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt is 3%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation

- **December 18, 2014 – Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
- Variance Request
 - RCLCO recommended the ASRS approve two variance requests from an existing real estate manager to invest in properties that do not meet the investment criteria of the portfolio
 - Variance Request 1 – required as senior housing development investment under review includes a third party developer with a promoted return structure that exceeds the maximum return structure allowed in the investment guidelines and a 10% equity contribution, which is below the 15% minimum
 - The investment potentially offers an attractive risk-adjusted return compared to other development opportunities being evaluated
 - Variance Request 2 – not required after further review and manager's decision to not proceed with the transaction
 - Committee approved the recommendation
- Niche and Tactical Real Estate Co-Investment Recommendation (\$50 - \$70 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
 - The ASRS is currently invested with this manager in multiple funds
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation pending legal approvals under the Niche and Tactical Real Estate Program
- REIT Analysis Discussion
 - Review of Staff analysis of REITs

- **December 18, 2014 – Private Markets Committee (cont.)**

- 2015 Real Estate Pacing Model and Implementation Plan
 - Anticipate \$700 million - \$1.6 billion of new real estate commitments during the year
 - Target \$500 million to \$1 billion in new separate account investments;
 - \$100 million to \$300 million in additions to existing separate account relationships; and
 - \$100 million to \$300 million in new commingled fund investments
 - Committee approved the recommended commitment pace for 2015, noting that the actual amount may differ as determined by the committee as market conditions evolve throughout the year
- Opportunistic Equity Disposition Discussion
 - Staff provided a review of the holding's characteristics and recommended a disposition plan according to guidelines outlined within the recommendation
 - No action was taken on this item

- **January 23, 2015 – Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
 - Discussion included a review of private markets investments that may be directly or tangentially impacted by changes in energy expectations (oil, natural gas, etc.)
- Private Equity Manager Recommendation (\$50 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
- Private Equity Manager Recommendation (\$50 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
 - The ASRS has invested with this manager in a prior fund
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation

- **January 23, 2015 – Private Markets Committee (cont.)**

- Private Debt Manager Recommendation – Additional Commitment (\$101 million; \$300 million original commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt is 3%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The Committee approved the original \$300 million investment at the November 21, 2014 PRIVMC meeting
- Private Debt Manager Recommendation (\$500 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt is 3%)
 - The ASRS has invested with this manager in a prior fund
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
- Niche and Tactical Real Estate Investment Recommendation (\$300 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
- Separately Managed Account Portfolio Review
 - RCLCO presented the results of its semi-annual portfolio review of the separately managed real estate accounts
- Real Estate Pipeline Discussion

- **January 29, 2015 – Ad Hoc Private Markets Committee**

- Private Debt Variance Request and Investment Guideline Amendment
 - Staff recommended the ASRS approve a variance request from an existing private debt manager to make an investment that would cause the overall portfolio to exceed concentration limits
 - Required because investment would exceed the maximum position limit for any single investment in the portfolio and maximum limit on preferred equity investments in the portfolio
 - While structured as preferred equity, the investment has mezzanine loan characteristics
 - Committee approved the recommendation
 - In addition to approving the variance request, the Committee also authorized an amendment to the manager’s investment guidelines allowing similar preferred equity investments having mezzanine loan characteristics be treated as mezzanine for concentration limit purposes

General Observations

- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP.**
 - Full implementation results in a further reduction of 2% within U.S. Equities and 1% within U.S. Core Fixed Income and an addition of 2% to Real Estate and 1% to Private Equity.
- **The Fund's performance for calendar year 2014 was driven by the Fund's allocation to private markets asset classes and U.S. equities.**
 - Private market asset classes account for approximately 20% of the Total Fund, with one-year returns ranging from 11.0% for opportunistic debt to 45.7% for opportunistic equity.
 - Underweight allocations to core, high yield and emerging market debt in favor of private and opportunistic debt strategies has proved to be a source of significant value add at the Total Fund level.
 - Generally, active managers across public equities underperformed their benchmarks, whereas collectively, active emerging markets equities managers were able to add significant value.
- **Additional \$901 million in commitments to Private Debt asset class during Q4 consistent with House Views on the asset class's relative attractiveness and desire to increase overweight vs. current SAAP target.**
 - Continued build-out of private debt asset class provides an opportunity to generate equity-like returns with less volatility.
- **Tactical positioning consistent with IMD House Views.**
 - Opportunistic Equity, Opportunistic Debt and Equity Risk Factor portfolios have performed well, adding value on both a relative and absolute basis.
- **ASRS SAAP Benchmark evaluation is complete and a recommendation was made to the Investment Committee by Staff and NEPC on February 9, 2015.**

Market Environment Update and Outlook

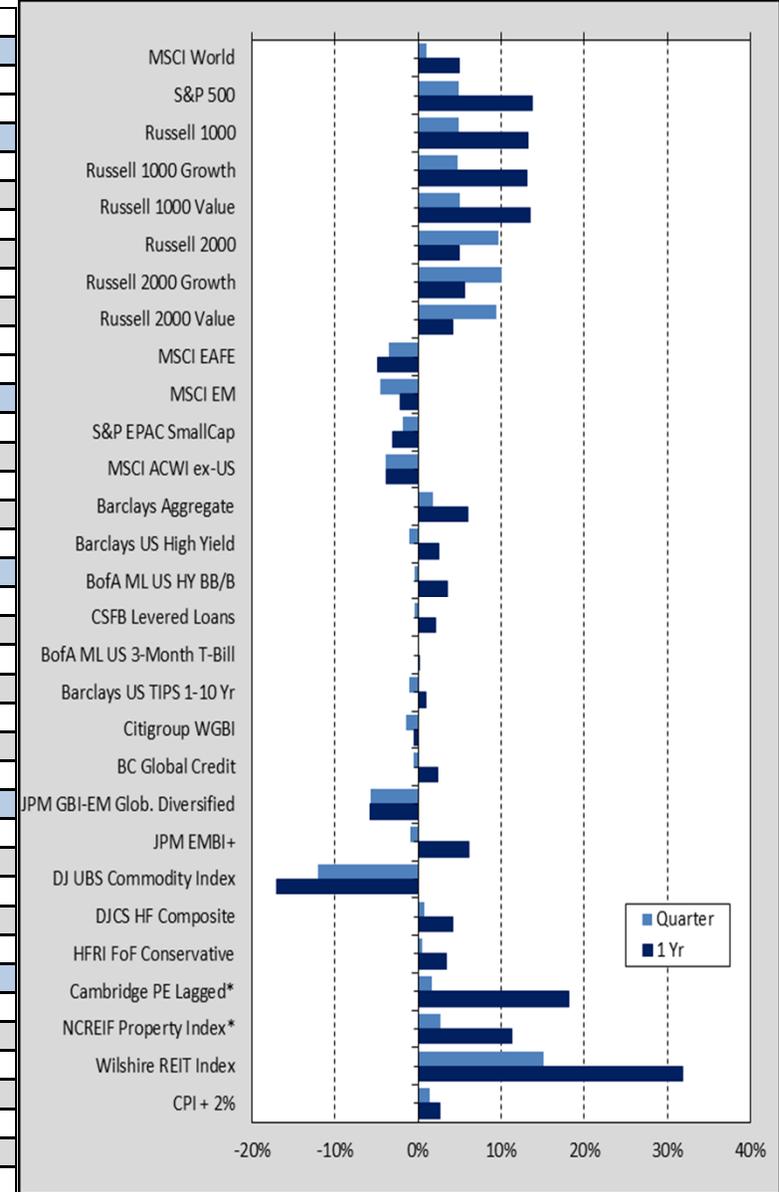


- **Fourth quarter “advanced” estimate of GDP growth remained positive, but decreased to an annual rate of +2.6%.**
 - Retail sales (ended December) rose to 1.9% on a year-over-year growth rate basis.
 - The inventory-to-sales ratio has remained mostly flat since early 2010 and closed at 1.3 in November.
 - Corporate profits as a percent of GDP increased, ending the fourth quarter at 12.2% and remain elevated relative to historical levels.
 - The U.S. trade deficit increased slightly in December.
- **The unemployment rate fell to 5.8% in December; U-6, a broader measure of unemployment, fell to 11.2% the fourth quarter.**
- **The Case-Schiller Home Price Index (as of 12/31) declined slightly to 167.11 from third quarter levels and is at levels higher than that of pre-financial crisis levels of 150.92.**
- **Rolling 12-month CPI decreased to 0.8% at the end of December; Capacity Utilization declined slightly to 79.7% in December.**
- **Fed Funds rate remains at 0.25%, while the 10-year Treasury Yield finished Q4 at 2.17%.**
- **The Fed balance sheet continued to grow in 2014, while the European Central Bank balance sheet decreased in 2014.**
 - ECB announced it will be embarking on an asset purchasing stimulus plan.
- **S&P valuations decreased in December, remaining above the 10-year and long-term averages, which are nearly equal at 16.4x, using current price/earnings ratios.**
 - Cyclically-adjusted Shiller PE ratio is above the long-term average of 17.6x 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.**

Market Environment – Q4 2014 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI World	World	1.0%	4.9%	15.5%	10.2%	6.0%
Domestic Equity Benchmarks						
S&P 500	Large Core	4.9%	13.7%	20.4%	15.5%	7.7%
Russell 1000	Large Core	4.9%	13.2%	20.6%	15.6%	8.0%
Russell 1000 Growth	Large Growth	4.8%	13.1%	20.3%	15.8%	8.5%
Russell 1000 Value	Large Value	5.0%	13.5%	20.9%	15.4%	7.3%
Russell 2000	Small Core	9.7%	4.9%	19.2%	15.6%	7.8%
Russell 2000 Growth	Small Growth	10.1%	5.6%	20.1%	16.8%	8.5%
Russell 2000 Value	Small Value	9.4%	4.2%	18.3%	14.3%	6.9%
International Equity Benchmarks						
MSCI EAFE	International Developed	-3.6%	-4.9%	11.1%	5.3%	4.4%
MSCI EM	Emerging Equity	-4.5%	-2.2%	4.0%	1.8%	8.4%
S&P EPAC SmallCap	Small Cap Int'l	-1.9%	-3.1%	14.4%	8.9%	6.9%
MSCI ACWI ex-US	World ex-US	-3.9%	-3.9%	9.0%	4.4%	5.1%
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	1.8%	6.0%	2.7%	4.5%	4.7%
Barclays US High Yield	High Yield	-1.0%	2.5%	8.4%	9.0%	7.7%
BofA ML US HY BB/B	High Yield	-0.4%	3.5%	8.1%	8.8%	7.2%
CSFB Levered Loans	Bank Loans	-0.4%	2.1%	5.8%	5.8%	4.7%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.0%	0.1%	0.1%	1.5%
Barclays US TIPS 1-10 Yr	Inflation	-1.0%	0.9%	0.0%	2.8%	3.8%
Global Fixed Income Benchmarks						
Citigroup WGBI	World Gov. Bonds	-1.5%	-0.5%	-1.0%	1.7%	3.1%
BC Global Credit	Global Bonds	-0.5%	2.4%	5.1%	5.3%	4.8%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-5.7%	-5.7%	0.1%	2.6%	6.7%
JPM EMBI+	Em. Mkt. Bonds	-0.9%	6.2%	4.7%	7.0%	7.7%
Alternative Benchmarks						
DJ UBS Commodity Index	Commodity	-12.1%	-17.0%	-9.4%	-5.5%	-1.9%
DJCS HF Composite	Hedge Fund	0.7%	4.1%	7.2%	5.9%	5.8%
HFRI FoF Conservative	Fund of Funds	0.5%	3.4%	5.1%	3.3%	2.5%
Cambridge PE Lagged*	Private Equity	1.7%	18.1%	17.1%	16.6%	15.1%
NCREIF Property Index*	Real Estate	2.6%	11.3%	11.1%	11.0%	8.1%
Wilshire REIT Index	REIT	15.1%	31.8%	16.4%	17.3%	8.3%
CPI + 2%	Inflation/Real Assets	1.4%	2.7%	3.3%	3.7%	4.3%

* As of 9/30/2014



Positives

- **Fed asset purchases come to an end**
 - Divergence in monetary policies signaling different investment environments globally
- **Q4 GDP growth estimated at 2.6%**
 - U.S. employment continues to gain
- **ECB announces further monetary easing through asset purchases in addition to negative short dated interest rates**
- **Developed world inflation is low**
 - In U.S., CPI for all Urban Consumers was negative in Q4 driven by lower energy

Negatives

- **Geopolitical instability drives volatility**
 - Instability in the Mid-East, Eastern Europe, Greece
- **Europe continues to see ongoing political and economic growth challenges**
- **U.S. Dollar strength continues to translate into negative dollar denominated returns in international markets**
- **Valuations remain above 10 year and long-term averages**
 - Developed Equity P/Es above median
 - Credit spreads near historically low levels
- **Volatility re-emerges; the VIX spiked substantially toward the end of the fourth quarter**
 - VIX spiked approximately 100% in mid-December

Global Equity

- **U.S. equities advanced in the fourth quarter amid increasing volatility.**
- **Small cap stocks outperformed large cap stocks during the quarter, with the Russell 2000 Index returning 9.7% and the S&P 500 Index returning 4.9%.**
- **International equities underperformed U.S. markets during the quarter, returning -3.9%, as measured by the MSCI ACWI ex-U.S. Index.**
 - Developed markets returned -3.6% as measured by the MSCI EAFE Index. Europe was the worst performing region returning -4.6%.
 - Emerging markets returned -4.5% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. In local currency terms emerging markets were up 0.1%. Emerging countries in Europe (-6.45%) and Latin America (-6.13%) were the largest detractors in local currency terms.

Private Equity

- **New private equity commitments totaled \$83 billion in Q4 2014, bringing total new commitments to \$348 billion for the year, making 2014 the fifth straight year of increasing commitments.**
 - 2014 global PE fundraising pace increased 7% over 2013; U.S. fundraising exceeded 2013 totals by 4% or \$9.4 billion.
- **Buyout and growth equity fund deal volume in both the U.S. and Europe gradually declined throughout 2014.**
 - Buyout and growth equity deals totaled \$181 billion, approximately \$3.0 billion less than 2013.
- **Venture capital commitments totaled \$44.9 billion, outpacing total 2013 commitments by 33%.**
 - At 13% of total private equity raised, commitments are just below the 10-year historic relative average.
- **Mezzanine funds continue to face strong headwinds from a robust high yield market and an expanding supply of private debt.**
 - Mezzanine funds raised \$16.5 billion or 5% of total private equity funds raised, \$8.8 billion less than in 2013.
- **Asian private equity commitments accelerated in 2014 to \$38.1 billion.**
 - Represents 11% of the 2014 total across all geographies. Asian funds raised \$27.5 billion in 2013, with 70% by China-based firms.

Fixed Income

- **Risk aversion permeated fixed income markets in the fourth quarter amid growing concerns around global economic growth and geopolitical events.**
- **2 and 3 year Treasury yields increased by 20 basis points while the 10-year Treasury yield fell 33 basis points during the quarter, finishing at 2.17%.**
- **The Treasury yield curve flattened with the spread between two- and ten-year rates falling to 1.50%.**
- **Treasury Inflation-Protected Securities, or TIPS, underperformed nominal Treasuries due to lower inflation (expectations and actual), with the Barclays U.S. TIPS Index posting a loss of 1.0% during the quarter.**
- **Investment grade credit spreads continued to widen, ending December at 125 basis points.**
- **High yield bonds returned -1.0% as spreads increased to 483 basis points, up from 424 basis points, nearly 59 basis points wider than September 2014 levels.**
 - High yield markets were most significantly impacted by the decline of oil prices as energy makes up approximately 14% of the Barclays U.S. High Yield Bond Index.
- **Emerging markets debt continued to slow in the fourth quarter after a strong first half of the year.**
 - Concerns over geopolitical events, economic growth and a Fed rate increase caused local currency (JP Morgan GBI-EM Global Diversified – Unhedged) to fare worse than external currency (JP Morgan EMBI+) emerging markets debt, resulting in losses of 5.7% and 0.9%, respectively.

Commodities

- **Commodities sold off in the fourth quarter with the Bloomberg Commodity Index losing 12.1%.**
 - Oil continued to be the headline story with a decline of approximately 40% in the quarter on negative supply pressure from OPEC and on lower demand growth expectations.

Real Estate

- **NEPC continues to be neutral on core real estate in the U.S. 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.**
 - The concerns for U.S. core real estate (and U.S. real estate, broadly) continues to be plentiful capital that is driving up pricing; and the market's expectation for higher future interest rates and their impact on capitalization rates and capital values.
- **U.S. REITs traded up relative to net asset values ending Q4 at a slight premium to NAV (long-term average is 2.4% above NAV).**
 - The Wilshire REIT Index ended the quarter up 15.1% and ended the year with a gain of 31.8%.
 - FFO multiples are up to approximately 18x remaining above the average of 12.5x since 2000.
- **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.
 - Banks in EU are still overleveraged and have significant real estate exposure (banks in Europe hold 90%+ of real estate debt or €2,300B; in the U.S. banks hold 49% of real estate debt).

Real Assets/Inflation-Linked Assets

- **Massive energy market dislocation.**
 - 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.
- **Timber opportunity set limited but warrants further review**
 - 45% increase in housing starts forecasted; timber prices highly correlated

- **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)
- **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)
- **Review inflation hedging allocations in light of recent market action**
 - Some areas have likely sold off more than is warranted
- **Consider market weight or slightly over-weighted target allocation to developed non-U.S. equity**
 - Consider reducing the risk of the position by allocating to a currency hedged portfolio or implementing a currency hedge overlay

NEPC Updates

Fourth Quarter 2014

Highlights of Fourth Quarter Happenings at NEPC

NEPC Research

Recent White Papers Posted

- *Improving Asset Allocation with Factor Analysis (November 2014)* – Mark Cintolo, CAIA, Research Consultant
- *Improving Governance Under an OCIO Structure (October 2014)* – Steven Charlton, CFA, Director of Consulting Services
- *NEPC 2014 Defined Contribution Plan & Fee Survey: What Plan Sponsors Are Doing Now (October 2014)* – Ross Bremen, CFA, Partner; Dan Beaton, Senior Analyst



Recent/Upcoming Events

- 2015 Market Outlook Webinar - January 22, 2015 at 3:00 PM EST.
- NEPC's 20th Annual Client Conference – May 19-20, 2015 in Boston at the Boston Convention & Exhibition Center (BCEC)

NEPC Gives Back

A team of NEPC employees participated in November once again this year. November is a global men's health charity requiring each 'Mo Bro' to sport a well-groomed mustache during the entire month of November to raise funds and awareness for men's prostate cancer, testicular cancer, and mental health. The team raised about \$20,000 this year and ranked #49 nationally! Additionally, NEPC employees participated in Lee National Denim Day once again this year and raised \$1,745. Lee National Denim Day is a fundraiser that takes place in October and was created by Lee Jeans to support the American Cancer Society's breast cancer programs.

Professional Staff Updates

- **New Partner:** Sean Ruhmann, Partner, Director of Real Assets Research
- **New Principals:** Jeffrey Mitchell, CFA, CAIA, Principal, Senior Consultant ; Terri Sacramone, SPHR, Principal, Senior Human Resources Manager; and Michael Sullivan, Principal, Senior Consultant
- We are also pleased to announce that Daniel Hennessy has joined NEPC as a Senior Consultant located in our Redwood City, CA office. Daniel will be focusing on Taft-Hartley and Public Funds in the West.

NEPC Client Recognitions

Several of NEPC's clients were recognized by CIO Magazine recently. First, the October 2014 issue of CIO Magazine ranked the Power 100 CIOs, which included Tim Barrett, CIO of Texas Tech University System (#59), and Don Pierce, CIO of San Bernardino County Employees' Retirement Association (#61). Next, several NEPC clients were nominated for the CIO 2014 Industry Innovation Awards. Additionally, NEPC's client SBCERA was nominated for an Investor Intelligence Award in 'Portfolio Design'.

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.¹/26% 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% Bloomberg Commodity Index
- **7/1/2012 – Present – 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% Bloomberg Commodity Index**
- *Interim SAA Policy: 25% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/6% Russell 2000 (lagged one quarter)/14% 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)/6% NCREIF ODCE (lagged one quarter)/4% Bloomberg Commodity Index

Note: Interim SAA Policy includes a proration of 1% Private Equity and 2% Real Estate, which are unfunded. Private Equity was prorated to domestic equity; Real Estate was prorated to domestic equity and fixed income. Recently approved Strategic Asset Allocation Policy effective July 1, 2012.

¹MSCI 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.

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.¹ 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 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, and 15% 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 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 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.
- **ASRS Custom GTAA 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 thereafter.

¹MSCI 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.

- **The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC 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 fees as indicated.**
- **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 included in all respective 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.**

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