

Arizona State Retirement System

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

November 30, 2015

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 - Asset Class Committee Monitoring
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ASRS Investment Objectives/Performance

Note: All of the data shown on the following pages is as of September 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	7.6%
Constant 8%	<u>8.0%</u>
Excess Return	(0.4)%

Goal Met: No

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)
Total Fund	-4.6%	-0.2%	8.0%	8.8%	6.0%	9.7%
Interim SAA Policy¹	-4.9%	-1.5%	6.9%	8.1%	5.7%	9.4%
Excess Return	0.3%	1.3%	1.1%	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	0.50%	0.74%	0.50%
Manager Selection Effect ²	0.76%	0.45%	0.33%
Residual ³	0.00%	-0.05%	-0.07%
Excess Return	1.26%	1.14%	0.76%

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 asset classes relative to Interim SAAP benchmark weights. $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

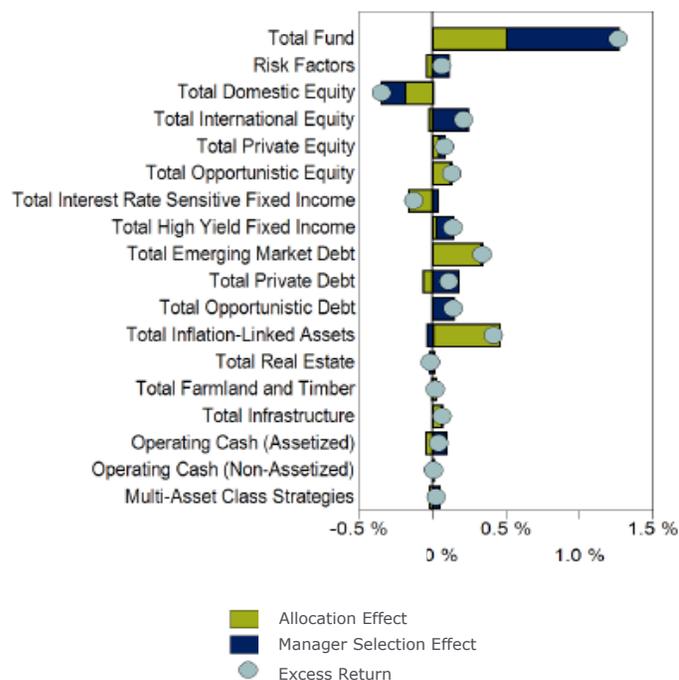
2. Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy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

3. 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 September 30, 2015



1 Year Excess Return: +1.26%

- Allocation Effect: +0.50%
 - Commodities tactical underweight (+0.45%)
 - Emerging Market Debt tactical underweight (+0.33%)
 - Opportunistic Equity tactical overweight (+0.12%)
 - Domestic Equity tactical underweight (-0.19%)
 - Interest Rate Sensitive Fixed Income tactical underweight (-0.16%)
- Manager Selection Effect: +0.76%
 - International Equity outperformed due to various managers (+0.24%)
 - Private Debt outperformed due to various managers (+0.17%)
 - Public Markets Fixed Income outperformed due to various managers (+0.15%)
 - Opportunistic Debt outperformed (+0.14%)
 - Risk Factors outperformed (+0.10%)
 - Domestic Equity underperformed due to various managers (-0.16%)
- Residual: 0.00%

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

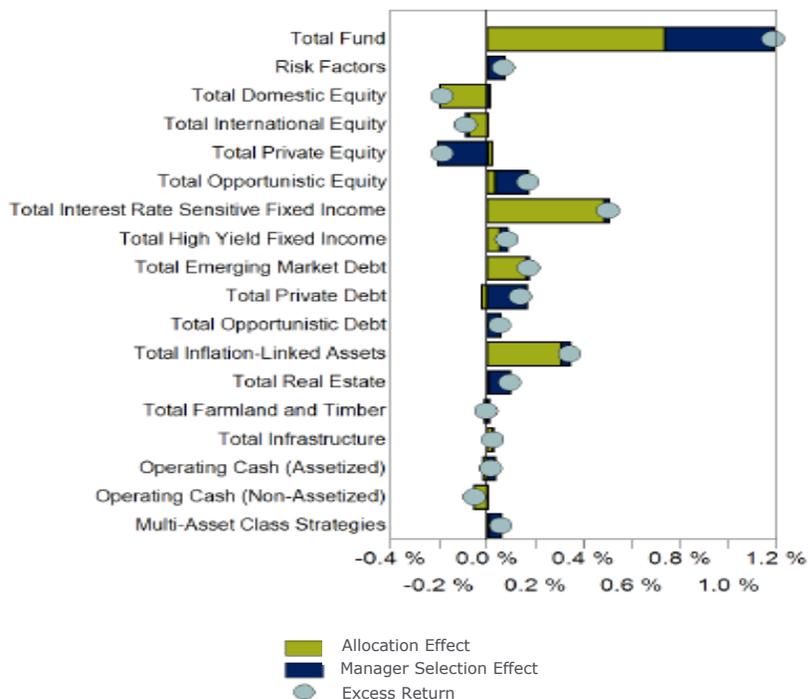
Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$ + **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 September 30, 2015



3 Year Excess Return: +1.14%

- Allocation Effect: +0.74%
 - Public Markets Fixed Income tactical underweight (+0.70%)
 - Commodities tactical underweight (+0.31%)
 - Domestic Equity tactical underweight (-0.20%)
 - International Equity tactical overweight (-0.08%)
- Manager Selection Effect: +0.45%
 - Private Debt outperformed due to various managers (+0.16%)
 - Opportunistic Equity outperformed due to various managers (+0.14%)
 - Real Estate outperformed due to various managers (+0.09%)
 - Risk Factors outperformed (+0.06%)
 - Public Markets Fixed Income outperformed due to various managers (+0.06%)
 - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.05%)
 - Opportunistic Debt outperformed due to various managers (+0.05%)
 - Commodities outperformed (+0.03%)
 - Private Equity underperformed due to various managers (-0.20%)
- Residual: -0.05%

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

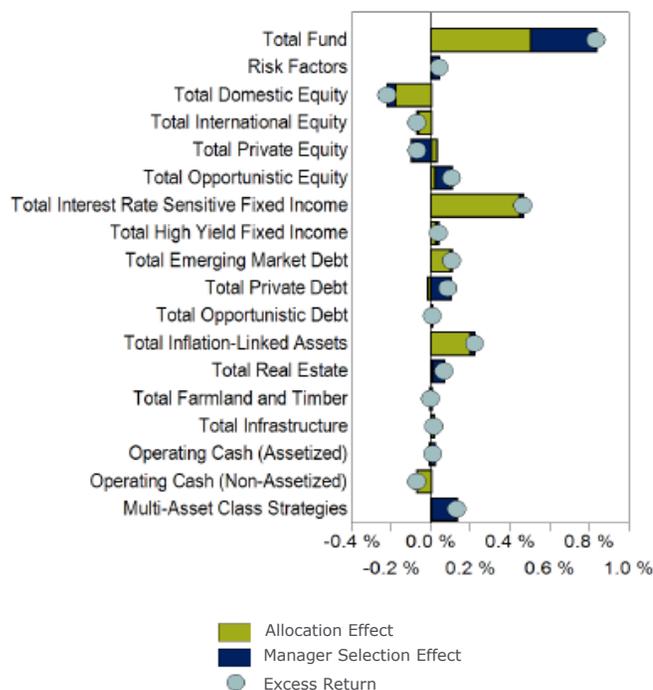
Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$ + **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 September 30, 2015



5 Year Excess Return: +0.76%

- Allocation Effect: +0.50%
 - Public Markets Fixed Income tactical underweight (+0.57%)
 - Commodities tactical underweight (+0.20%)
 - Domestic Equity tactical underweight (-0.18%)
 - International Equity tactical overweight (-0.06%)
- Manager Selection Effect: +0.33%
 - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.13%)
 - Private Debt outperformed due to various managers (+0.10%)
 - Opportunistic Equity outperformed due to various managers (+0.08%)
 - Real Estate outperformed due to various managers (+0.06%)
 - Private Equity underperformed due to various managers (-0.10%)
- Residual: -0.07%

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 ¹	-4.0%	8.9%
ASRS Custom Total Equity Benchmark	-4.2%	8.8%
Excess Return	0.2%	0.1%
ASRS Domestic Equity	0.1%	12.7%
ASRS Custom Domestic Equity Benchmark	0.6%	12.7%
Excess Return	-0.5%	0.0%
ASRS International Equity	-9.3%	3.4%
ASRS Custom Int'l Equity Benchmark	-10.3%	3.5%
Excess Return	1.0%	-0.1%
ASRS Public Markets Fixed Income	1.0%	1.1%
ASRS Custom Fixed Income Benchmark	-1.1%	0.5%
Excess Return	2.1%	0.6%
ASRS Inflation-Linked	-27.9%	-15.4%
ASRS Custom Inflation-Linked Benchmark	-26.0%	-16.0%
Excess Return	-1.9%	0.6%
ASRS Multi-Asset Class Strategies	-1.1%	7.4%
ASRS Multi-Asset Class Strategies Benchmark	1.5%	8.1%
Excess Return	-2.6%	-0.7%

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	8.1%	14.2%	12.3%	Oct-07
Russell 2000	5.4%	15.9%	13.4%	
Excess Return	2.7%	-1.7%	-1.1%	
ASRS Opportunistic Equity ²	10.4%	28.4%	26.8%	Apr-11
ASRS Private Debt	9.1%	--	12.1%	Jul-12
S&P/LSTA Levered Loan Index + 250 bps	4.6%	--	6.3%	
Excess Return	4.5%	--	5.8%	
ASRS Opportunistic Debt ²	4.4%	9.3%	11.1%	Jan-08
ASRS Real Estate	14.7%	13.8%	7.2%	Oct-05
NFI - ODCE Index	13.4%	12.1%	6.5%	
Excess Return	1.3%	1.7%	0.7%	
ASRS Farmland and Timber	4.0%	--	3.3%	Jul-13
CPI ex-Food and Energy + 350 bps	5.6%	--	5.5%	
Excess Return	-1.6%		-2.2%	
ASRS Total Infrastructure	--	--	2.8%	Dec-14
CPI ex-Food and Energy + 350 bps	--	--	4.6%	
Excess Return			-1.8%	

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*
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
Jul – 15	(\$150.0)	(\$205.8)	(\$355.8)	\$405.5
Aug – 15	(\$136.3)	(\$115.6)	(\$251.9)	\$351.7
Sep – 15	(\$103.3)	(\$333.9)	(\$437.2)	\$392.0

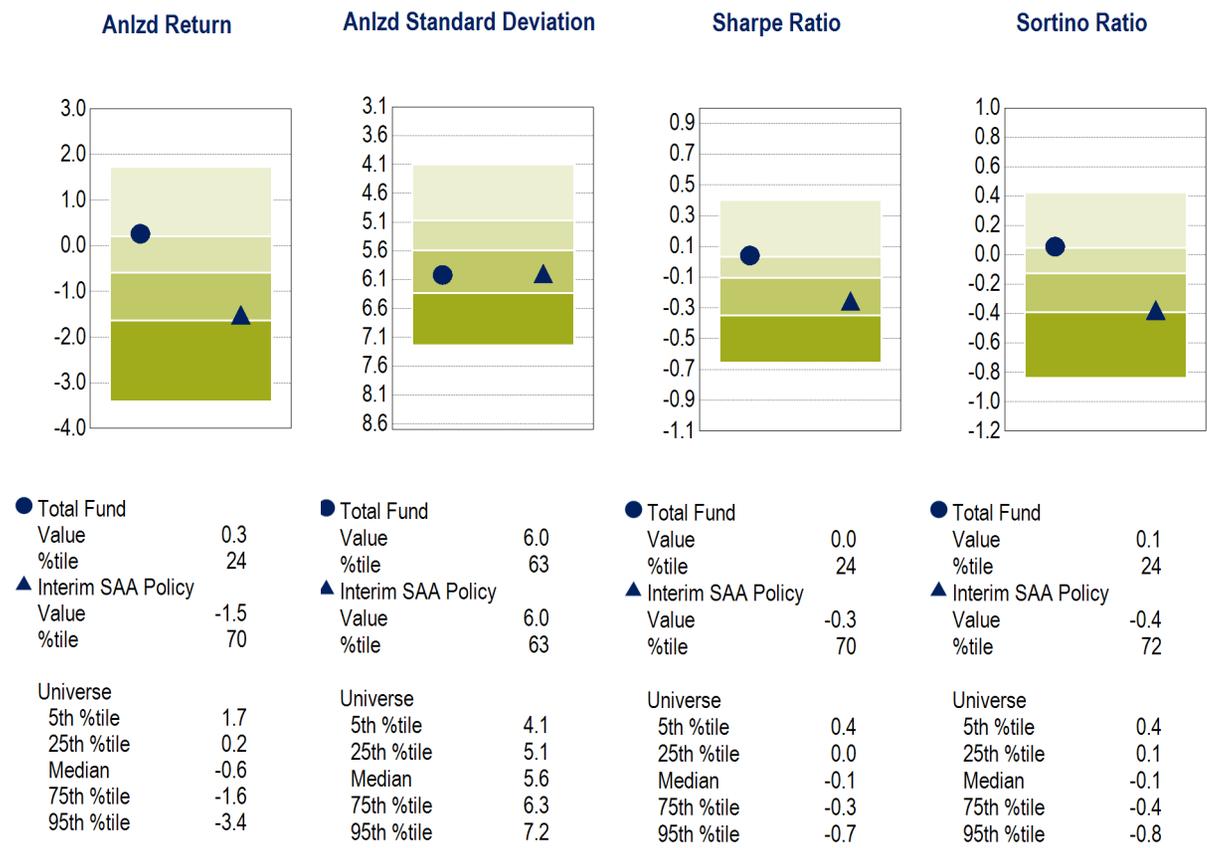
* Includes assetized & unassetized cash balances (Inception of 1/26/15); represent monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.

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.

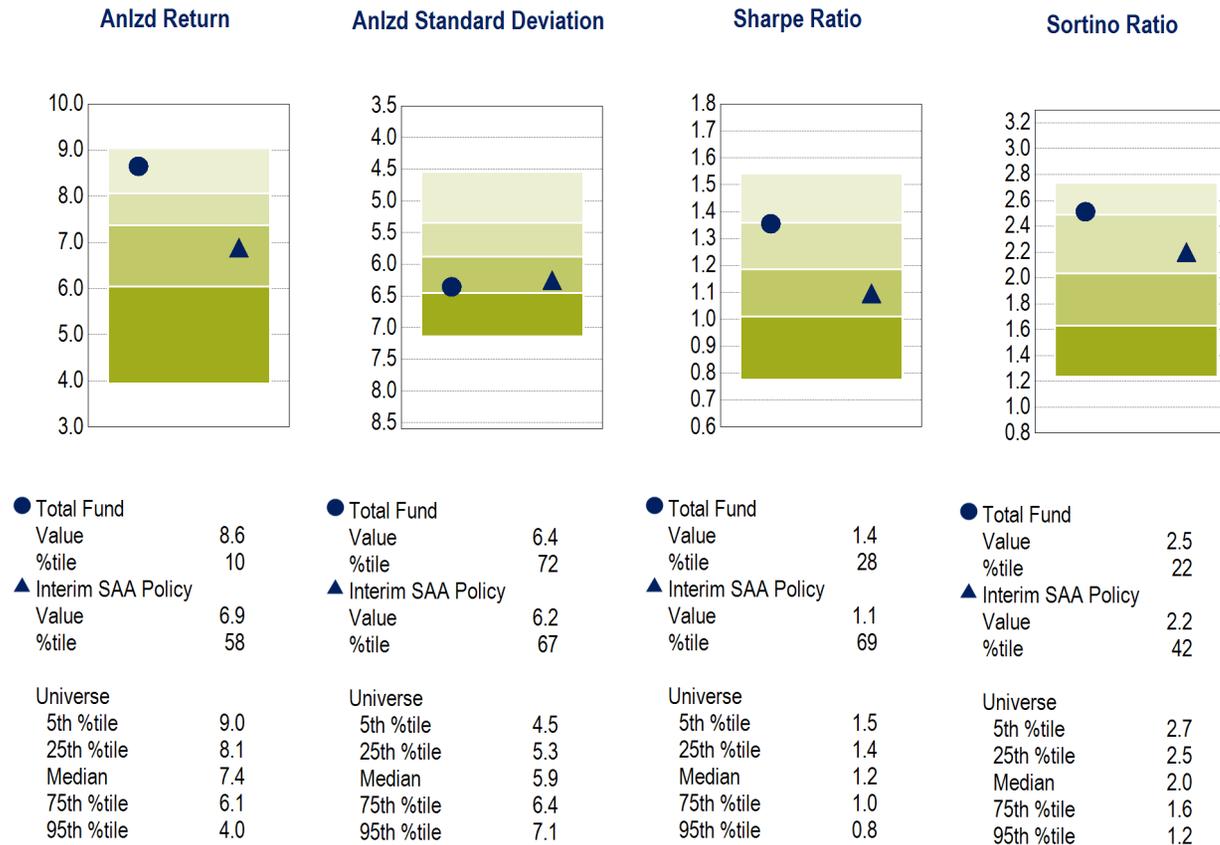
The InvestorForce Public Funds > \$1 Billion Universe contains 95 observations for the period ending September 30, 2015, with total assets of \$1.7 trillion.

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



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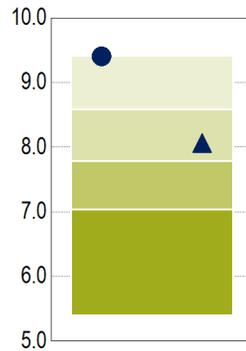
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Total Fund Risk Statistics vs. Peer Universe

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

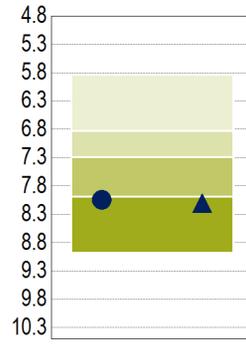
5 Year

Anlzd Return



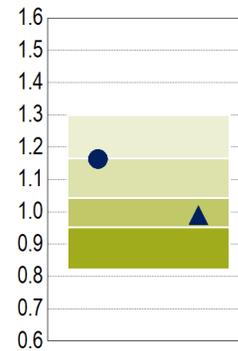
● Total Fund	
Value	9.4
%tile	6
▲ Interim SAA Policy	
Value	8.1
%tile	45
Universe	
5th %tile	9.4
25th %tile	8.6
Median	7.8
75th %tile	7.0
95th %tile	5.4

Anlzd Standard Deviation



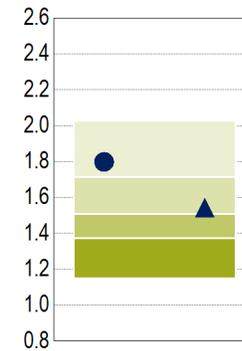
● Total Fund	
Value	8.0
%tile	78
▲ Interim SAA Policy	
Value	8.1
%tile	78
Universe	
5th %tile	5.8
25th %tile	6.8
Median	7.3
75th %tile	8.0
95th %tile	9.0

Sharpe Ratio



● Total Fund	
Value	1.2
%tile	26
▲ Interim SAA Policy	
Value	1.0
%tile	64
Universe	
5th %tile	1.3
25th %tile	1.2
Median	1.0
75th %tile	1.0
95th %tile	0.8

Sortino Ratio



● Total Fund	
Value	1.8
%tile	18
▲ Interim SAA Policy	
Value	1.5
%tile	42
Universe	
5th %tile	2.0
25th %tile	1.7
Median	1.5
75th %tile	1.4
95th %tile	1.2

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.

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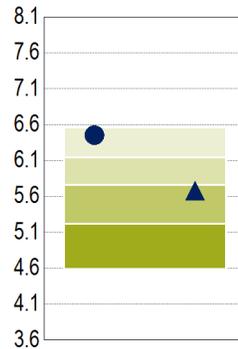
Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

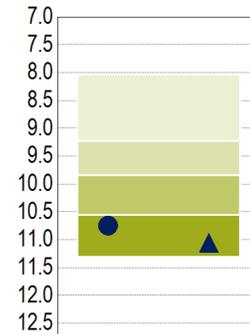
Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

10 Year

Anlzd Return



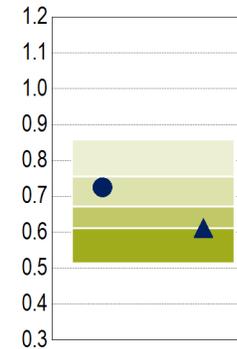
Anlzd Standard Deviation



Sharpe Ratio



Sortino Ratio



● Total Fund

Value 6.5
%tile 7

▲ Interim SAA Policy

Value 5.7
%tile 54

Universe

5th %tile 6.6
25th %tile 6.2
Median 5.8
75th %tile 5.2
95th %tile 4.6

● Total Fund

Value 10.7
%tile 84

▲ Interim SAA Policy

Value 11.1
%tile 87

Universe

5th %tile 8.0
25th %tile 9.2
Median 9.8
75th %tile 10.5
95th %tile 11.3

● Total Fund

Value 0.5
%tile 36

▲ Interim SAA Policy

Value 0.4
%tile 79

Universe

5th %tile 0.6
25th %tile 0.5
Median 0.5
75th %tile 0.4
95th %tile 0.3

● Total Fund

Value 0.7
%tile 31

▲ Interim SAA Policy

Value 0.6
%tile 76

Universe

5th %tile 0.9
25th %tile 0.8
Median 0.7
75th %tile 0.6
95th %tile 0.5

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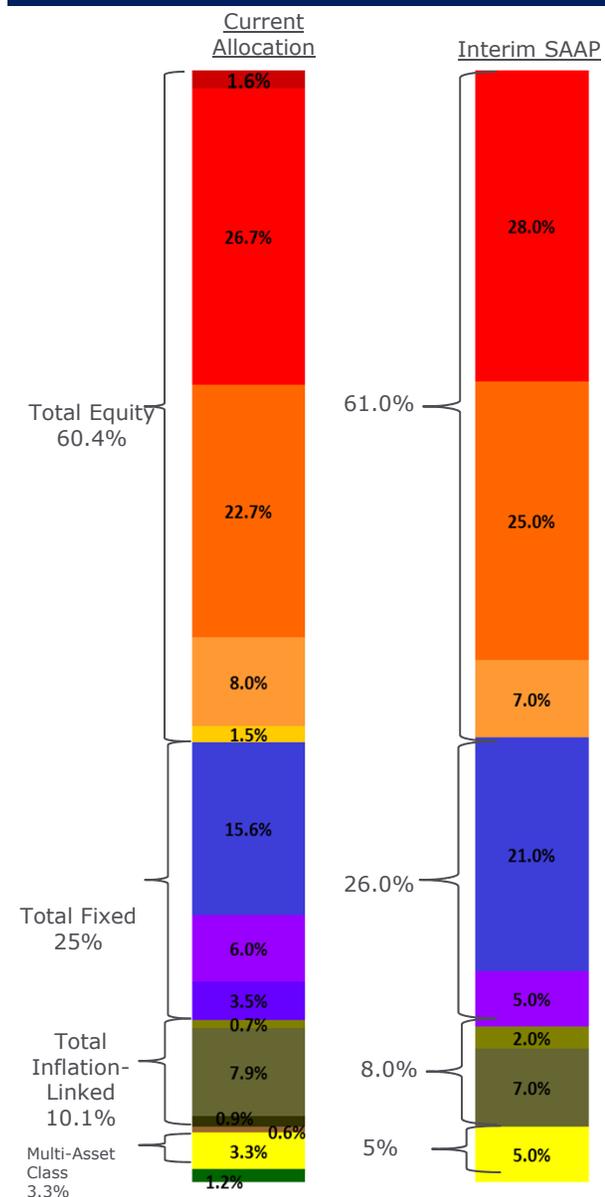
Composition of Interim SAA Policy can be found in the appendix.

Independent Oversight/Compliance

Note: All of the data shown on the following pages is as of September 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
Total Domestic and International Equity¹	\$16,823,835,177	51.0%	53.0%	-2.0%		
Domestic Equity²	\$8,804,975,453	26.7%	28.0%	-1.3%	16% - 36%	Yes
U.S. Large Cap	\$6,958,889,493	21.1%	22.0%	-0.9%		
U.S. Mid Cap	\$941,088,936	2.9%	3.0%	-0.1%		
U.S. Small Cap	\$904,997,024	2.7%	3.0%	-0.3%		
International Equity²	\$7,490,182,873	22.7%	25.0%	-2.3%	14% - 34%	Yes
Developed Large Cap	\$5,496,020,109	16.7%	18.0%	-1.3%		
Developed Small Cap	\$641,867,052	1.9%	2.0%	-0.1%		
Emerging Markets	\$1,351,557,075	4.1%	5.0%	-0.9%		
Private Equity³	\$2,630,672,223	8.0%	7.0%	1.0%	6% - 10%	Yes
Opportunistic Equity^{3,5}	\$480,673,177	1.5%	0.0%	1.5%	0% - 3%	Yes
Total Equity	\$19,935,180,577	60.4%	60.0%	0.4%	48% - 65%	Yes
U.S. Fixed Income	\$5,131,640,536	15.6%	21.0%	-5.4%	8% - 28%	Yes
Treasuries Long Duration	\$388,053,348	1.2%	0.0%	1.2%		
Core	\$3,731,607,177	11.3%	16.0%	-4.7%		
High Yield	\$1,011,962,598	3.1%	5.0%	-1.9%		
Private Debt³	\$1,963,196,587	6.0%	5.0%	1.0%	8% - 12%	Yes
Opportunistic Debt^{3,5}	\$1,145,367,306	3.5%	0.0%	3.5%	0% - 3%	Yes
Total Fixed Income	\$8,240,204,429	25.0%	26.0%	-1.0%	18% - 35%	Yes
Commodities	\$232,059,332	0.7%	2.0%	-1.3%	0% - 4%	Yes
Real Estate³	\$2,618,473,818	7.9%	7.0%	0.9%	8% - 12%	Yes
Infrastructure	\$308,318,001	0.9%	0.0%	0.9%	0% - 3%	Yes
Farmland and Timber	\$182,866,836	0.6%	0.0%	0.6%	0% - 3%	Yes
Opportunistic Inflation-Linked⁴	\$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Total Inflation-Linked	\$3,341,717,987	10.1%	9.0%	1.1%	8% - 16%	Yes
Multi-Asset Class Strategies	\$1,085,617,751	3.3%	5.0%	-1.7%	0% - 12%	Yes
Cash⁴	\$392,075,938	1.2%	0.0%	1.2%		
Operating Cash (Non-Assetized)	\$28,920,981	0.1%	0.0%	0.1%		
Operating Cash (Assetized)	\$363,154,956	1.1%	0.0%	1.1%		
Total	\$32,994,796,681	100.0%	100.0%	0.0%		

¹Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of \$528.7 million.

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

³Values shown for private markets portfolios include cash flows that occurred during 2Q 2015.

⁴Cash includes money for the upcoming monthly pension distribution.

⁵Aggregate 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.

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	
Total Fund	32,994,796,681	100.0	-4.6	--	-4.6	--	-0.2	--	8.0	--	8.8	--	6.0	--	#	9.7	Jul-75
<i>Interim SAA Policy</i>			<u>-4.9</u>	--	<u>-4.9</u>	--	<u>-1.5</u>	--	<u>6.9</u>	--	<u>8.1</u>	--	<u>5.7</u>	--	<u>9.4</u>	<i>Jul-75</i>	
Over/Under			0.3		0.3		1.3		1.1		0.7		0.3		0.3		
<i>Actual Benchmark</i>			-5.0	--	-5.0	--	-1.1	--	7.5	--	8.4	--	5.7	--	--	<i>Jul-75</i>	
Total Domestic and International Equity¹	16,823,835,177	51.0	-8.6	--	-8.6	--	-4.0	--	8.9	--	9.5	--	5.7	--	#	6.1	Jan-98
<i>ASRS Custom Total Equity Benchmark</i>			<u>-9.2</u>	--	<u>-9.2</u>	--	<u>-4.2</u>	--	<u>8.8</u>	--	<u>9.5</u>	--	<u>5.8</u>	--	<u>5.5</u>	<i>Jan-98</i>	
Over/Under			0.6		0.6		0.2		0.1		0.0		-0.1		0.6		
Total Domestic Equity	8,804,975,453	26.7	-6.8	28	-6.8	28	0.1	49	12.7	44	13.3	35	7.4	42	11.0	Jul-75	
<i>ASRS Custom Domestic Equity Benchmark</i>			<u>-7.0</u>	31	<u>-7.0</u>	31	<u>0.6</u>	45	<u>12.7</u>	43	<u>13.5</u>	34	<u>7.2</u>	47	<u>11.1</u>	<i>Jul-75</i>	
Over/Under			0.2		0.2		-0.5		0.0		-0.2		0.2		-0.1		
<i>eA All US Equity Net Median</i>			-8.4		-8.4		0.0		12.3		12.6		7.1		12.4	<i>Jul-75</i>	
Total International Equity	7,490,182,873	22.7	-11.0	61	-11.0	61	-9.3	68	3.4	73	2.8	77	3.0	80	5.7	Apr-87	
<i>ASRS Custom Int'l Equity Benchmark</i>			<u>-11.6</u>	67	<u>-11.6</u>	67	<u>-10.3</u>	74	<u>3.5</u>	72	<u>2.8</u>	77	<u>3.8</u>	65	<u>5.4</u>	<i>Apr-87</i>	
Over/Under			0.6		0.6		1.0		-0.1		0.0		-0.8		0.3		
<i>eA All ACWI ex-US Equity Net Median</i>			-10.4		-10.4		-7.2		5.4		4.4		4.3		7.2	<i>Apr-87</i>	
Total Public Markets Fixed Income	5,131,640,536	15.6	0.3	60	0.3	60	1.0	63	1.1	76	3.1	58	4.8	45	8.3	Jul-75	
<i>ASRS Custom Fixed Income Benchmark</i>			<u>-0.4</u>	78	<u>-0.4</u>	78	<u>-1.1</u>	88	<u>0.5</u>	91	<u>2.4</u>	72	<u>4.3</u>	59	--	<i>Jul-75</i>	
Over/Under			0.7		0.7		2.1		0.6		0.7		0.5		--		
<i>eA All US Fixed Inc Net Median</i>			0.5		0.5		1.6		1.8		3.4		4.6		8.1	<i>Jul-75</i>	
Total Inflation-Linked Assets	232,059,332	0.7	-15.4	--	-15.4	--	-27.9	--	-15.4	--	-8.2	--	--	--	-6.1	Feb-10	
<i>ASRS Custom Inflation-Linked Benchmark</i>			<u>-14.5</u>	--	<u>-14.5</u>	--	<u>-26.0</u>	--	<u>-16.0</u>	--	<u>-9.6</u>	--	<u>-2.1</u>	--	<u>-7.3</u>	<i>Feb-10</i>	
Over/Under			-0.9		-0.9		-1.9		0.6		1.4				1.2		
Total Multi-Asset Class Strategies	1,085,617,751	3.3	-5.4	41	-5.4	41	-1.1	22	7.4	1	9.3	1	7.1	1	7.2	Jan-04	
<i>Multi-Asset Class Strategies Custom Benchm:</i>			<u>-1.0</u>	5	<u>-1.0</u>	5	<u>1.5</u>	10	<u>8.1</u>	1	<u>8.7</u>	1	<u>5.8</u>	20	<u>6.1</u>	<i>Jan-04</i>	
Over/Under			-4.4		-4.4		-2.6		-0.7		0.6		1.3		1.1		
<i>eA Global TAA Net Median</i>			-5.8		-5.8		-4.3		3.0		4.5		4.8		6.2	<i>Jan-04</i>	
Operating Cash (Assetized)	363,154,956	1.1	-4.2	--	-4.2	--	--	--	--	--	--	--	--	--	0.7	Feb-15	
<i>ASRS Cash Assetization Custom Benchmark</i>			<u>-8.1</u>	--	<u>-8.1</u>	--	--	--	--	--	--	--	--	--	<u>-5.2</u>	<i>Feb-15</i>	
Over/Under			3.9		3.9										5.9		

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 (%)	Since
Total Fund	32,994,796,681	100.0	-4.6	-0.2	8.0	8.8	9.7	Jul-75
<i>Interim SAA Policy</i>			<u>-4.9</u>	<u>-1.5</u>	<u>6.9</u>	<u>8.1</u>	<u>9.4</u>	<i>Jul-75</i>
Over/Under			0.3	1.3	1.1	0.7	0.3	
<i>Actual Benchmark</i>			-5.0	-1.1	7.5	8.4		<i>Jul-75</i>
Total Private Equity	2,562,010,302	7.8	3.6	8.1	14.2	14.7	12.3	Oct-07
<i>Russell 2000 1 QTR Lagged</i>			<u>0.1</u>	<u>5.4</u>	<u>15.9</u>	<u>14.9</u>	<u>13.4</u>	<i>Oct-07</i>
Over/Under			3.5	2.7	-1.7	-0.2	-1.1	
Total Opportunistic Equity¹	464,608,128	1.4	-4.2	10.4	28.4		26.8	Apr-11
Total Private Debt	1,671,047,905	5.1	2.6	9.1			12.1	Jul-12
<i>S&P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged</i>			<u>1.3</u>	<u>4.6</u>			<u>6.3</u>	<i>Jul-12</i>
Over/Under			1.3	4.5			5.8	
Total Opportunistic Debt¹	1,103,397,755	3.3	1.3	4.4	9.3	8.7	11.1	Jan-08
Total Real Estate	2,393,418,366	7.3	2.2	14.7	13.8	14.3	7.2	Oct-05
<i>NCREIF ODCE 1 QTR Lagged (net)</i>			<u>3.6</u>	<u>13.4</u>	<u>12.1</u>	<u>13.2</u>	<u>6.5</u>	<i>Oct-05</i>
Over/Under			-1.4	1.3	1.7	1.1	0.7	
Total Farmland and Timber	170,722,650	0.5	0.2	4.0			3.3	Jul-13
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.5</u>	<u>5.6</u>			<u>5.5</u>	<i>Jul-13</i>
Over/Under			-1.3	-1.6			-2.2	
Total Infrastructure	308,318,001	0.9	4.6				2.8	Dec-14
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.5</u>				<u>4.6</u>	
Over/Under			3.1				-1.8	

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 September 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%	8.0%	27	6.3%	71	1.1%	50	1.0	14	1.1%	10	1.0	1.3
Interim SAA Policy	--	6.9%	58	6.2%	67	--	--	--	--	--	59	--	1.1
Total Domestic and International Equity	51.0%	8.9%	--	9.8%	--	0.6%	--	0.1	--	0.2%	--	1.0	0.9
ASRS Custom Total Equity Benchmark	--	8.8%	--	10.0%	--	--	--	--	--	--	--	--	0.9
Total Domestic Equity	26.7%	12.7%	44	9.9%	16	0.5%	1	0.0	44	0.1%	36	1.0	1.3
ASRS Custom Domestic Equity Benchmark	--	12.7%	43	10.0%	18	--	--	--	--	--	38	--	1.3
Total International Equity	22.7%	3.4%	73	11.3%	51	0.7%	1	-0.1	78	0.0%	74	1.0	0.3
ASRS Custom Int'l Equity Benchmark	--	3.5%	72	11.6%	64	--	--	--	--	--	74	--	0.3
Total Public Markets Fixed Income	15.6%	1.1%	76	3.8%	72	0.6%	1	1.1	17	0.6%	85	1.0	0.3
ASRS Custom Public Markets Fixed Income Benchmark	--	0.5%	91	3.6%	70	--	--	--	--	--	97	--	0.1
Total Inflation-Linked Assets	0.7%	-15.4%	--	12.6%	--	2.3%	--	0.3	--	0.7%	--	1.0	-1.2
ASRS Custom Inflation-Linked Benchmark	--	-16.0%	--	12.3%	--	--	--	--	--	--	--	--	-1.3
Multi-Asset Class Strategies	3.3%	7.4%	1	7.9%	74	3.4%	26	-0.2	1	-2.2%	21	1.2	0.9
Multi-Asset Class Strategies Custom Benchmark	--	8.1%	1	6.1%	29	--	--	--	--	--	11	--	1.3

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 September 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%	8.8%	12	8.0%	78	1.1%	41	0.7	28	0.9%	18	1.0	1.1
Interim SAA Policy	--	8.1%	45	8.1%	78	--	--	--	--	--	66	--	1.0
Total Domestic and International Equity	51.0%	9.5%	--	12.5%	--	0.6%	--	0.0	--	0.2%	--	1.0	0.8
ASRS Custom Total Equity Benchmark	--	9.5%	--	12.6%	--	--	--	--	--	--	--	--	0.7
Total Domestic Equity	26.7%	13.3%	35	12.1%	25	0.5%	1	-0.3	57	-0.2%	32	1.0	1.1
ASRS Custom Domestic Equity Benchmark	--	13.5%	34	12.1%	24	--	--	--	--	--	31	--	1.1
Total International Equity	22.7%	2.8%	77	14.7%	38	0.8%	1	0.0	77	0.1%	75	1.0	0.2
ASRS Custom Int'l Equity Benchmark	--	2.8%	77	15.0%	53	--	--	--	--	--	77	--	0.2
Total Public Markets Fixed Income	15.6%	3.1%	58	3.3%	64	0.6%	1	1.2	4	0.6%	87	1.0	0.9
ASRS Custom Public Markets Fixed Income Benchmark	--	2.4%	72	3.2%	62	--	--	--	--	--	98	--	0.7
Total Inflation-Linked Assets	0.7%	-8.2%	--	14.7%	--	2.4%	--	0.6	--	1.1%	--	1.0	-0.6
ASRS Custom Inflation-Linked Benchmark	--	-9.6%	--	14.8%	--	--	--	--	--	--	--	--	-0.6
Multi-Asset Class Strategies	3.3%	9.3%	1	9.1%	77	2.9%	6	0.2	1	-0.1%	18	1.1	1.0
Multi-Asset Class Strategies Custom Benchmark	--	8.7%	1	8.1%	53	--	--	--	--	--	17	--	1.1

Note: Performance is reported net of fees.

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

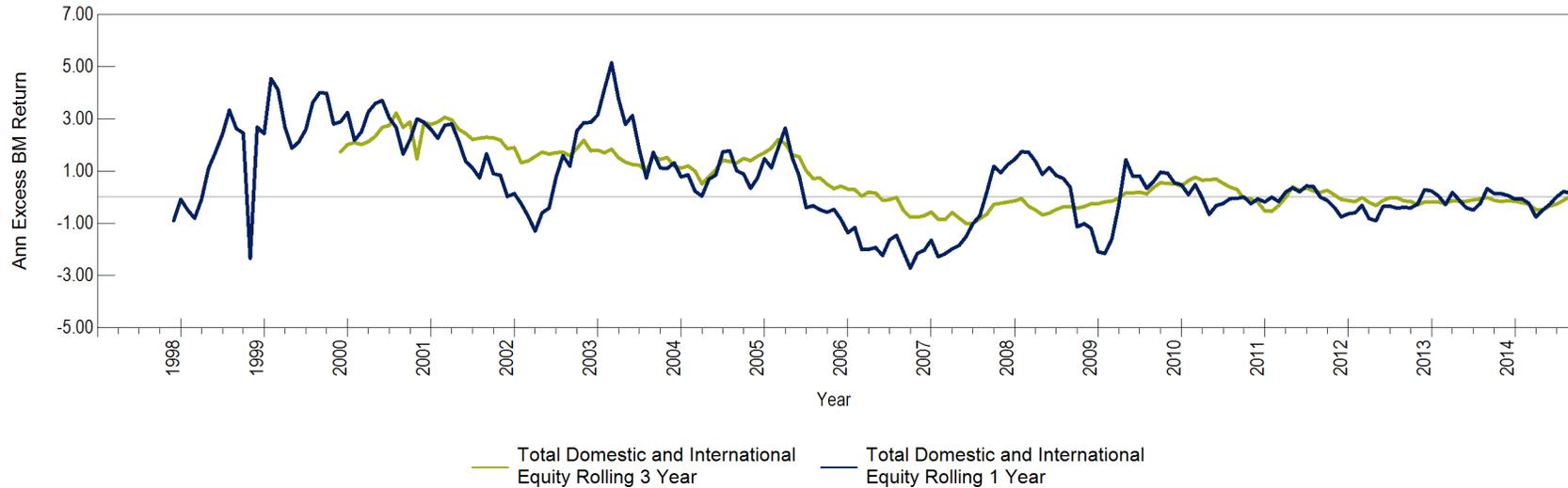
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

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

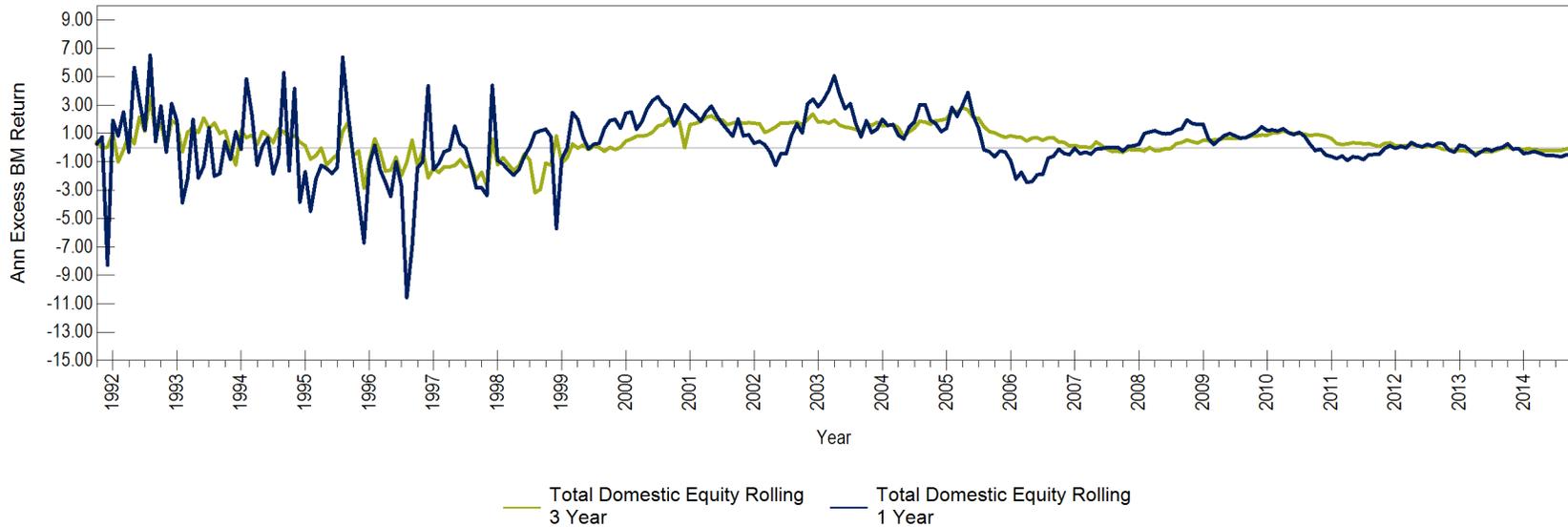


Rolling Information Ratio

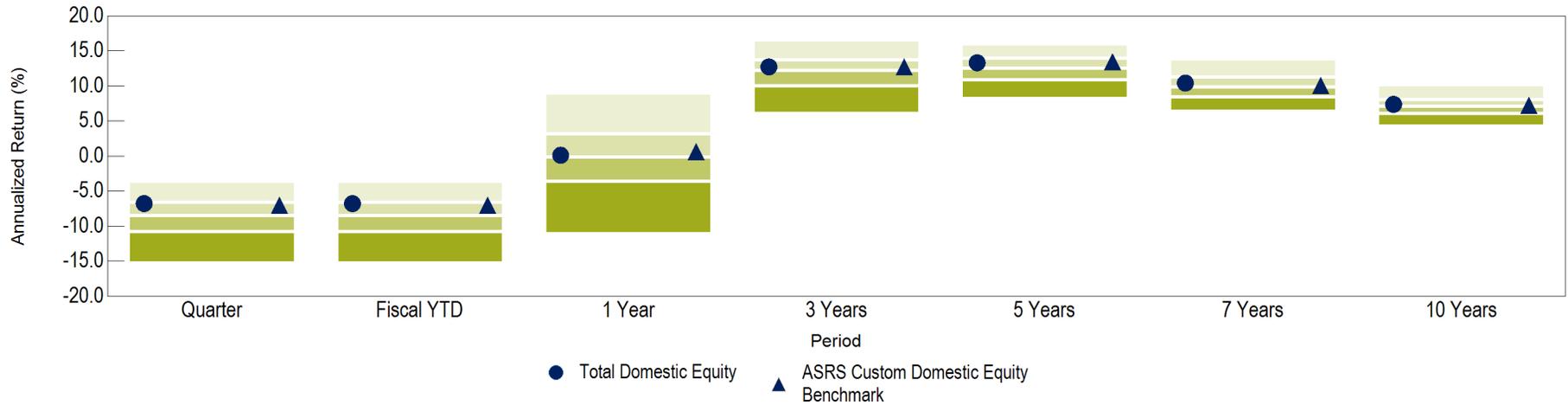


Asset Class Analysis - Total Domestic Equity

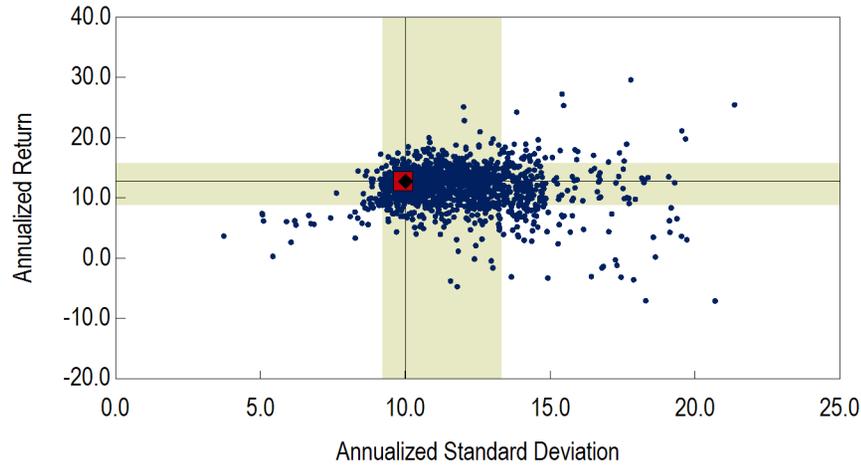
Rolling Annual Excess Benchmark Return



eA All US Equity Net Accounts

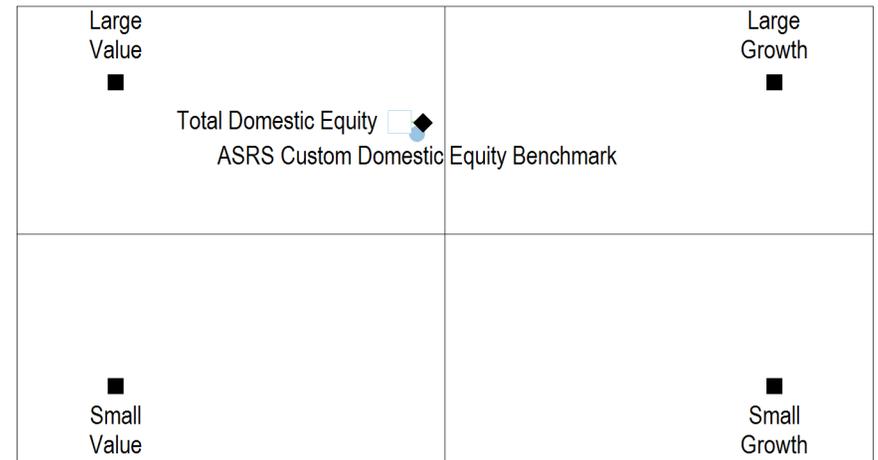


3 Year Risk Return

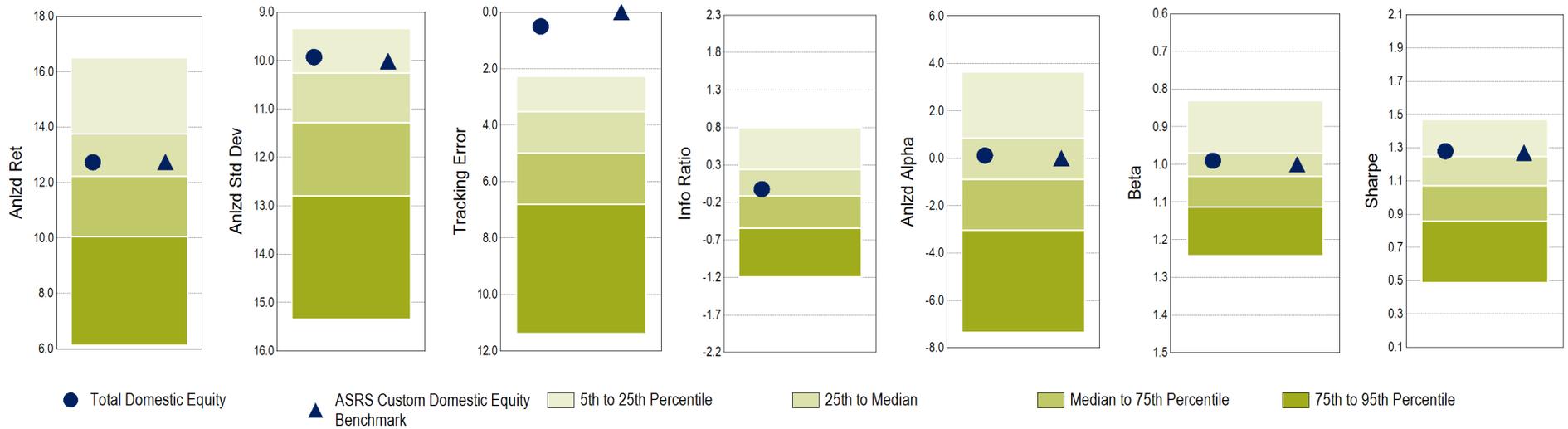


- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

3 Year Style Map

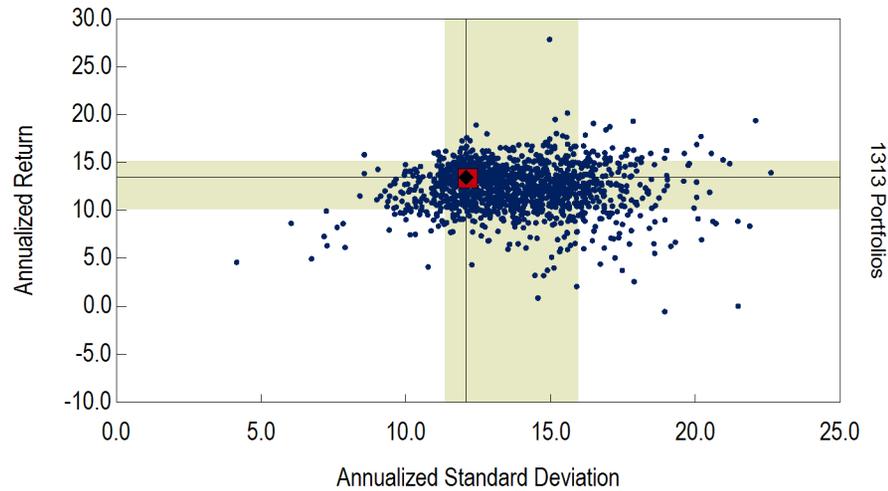


- First Rolling Period
- ◆ Last Rolling Period

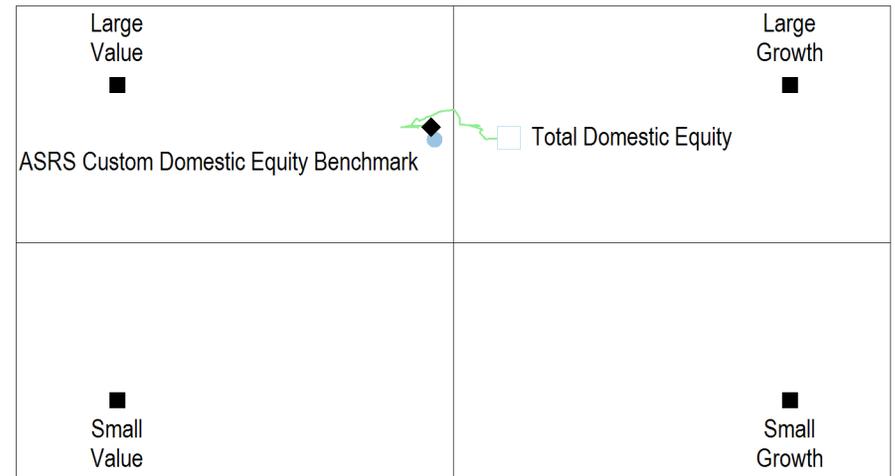


- Total Domestic Equity
- ▲ ASRS Custom Domestic Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

5 Year Risk Return

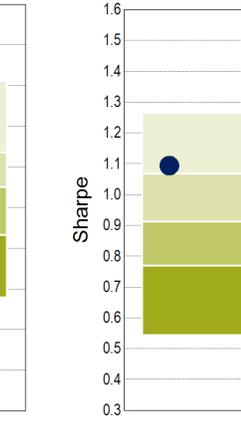
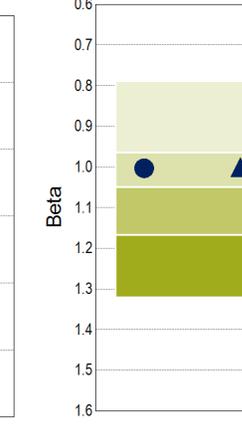
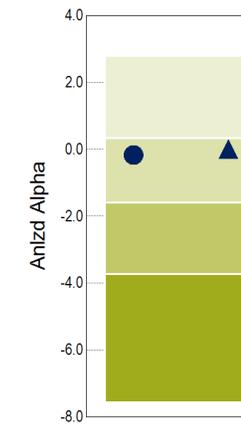
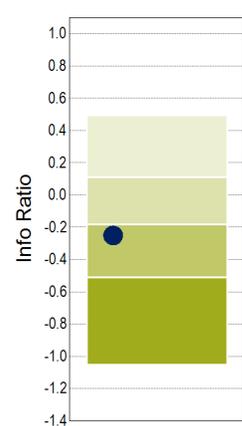
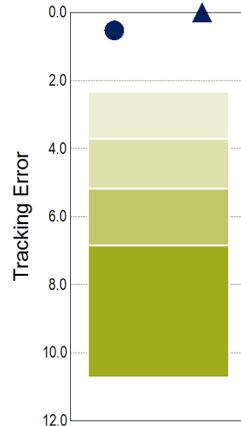
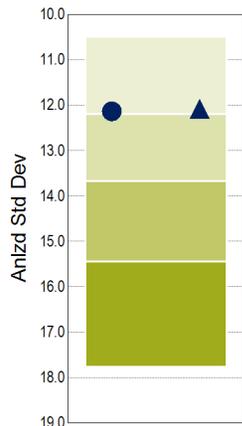
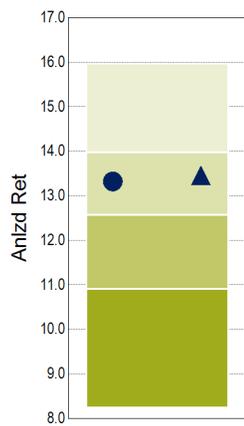


5 Year Style Map



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

- First Rolling Period
- ◆ Last Rolling Period



- 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

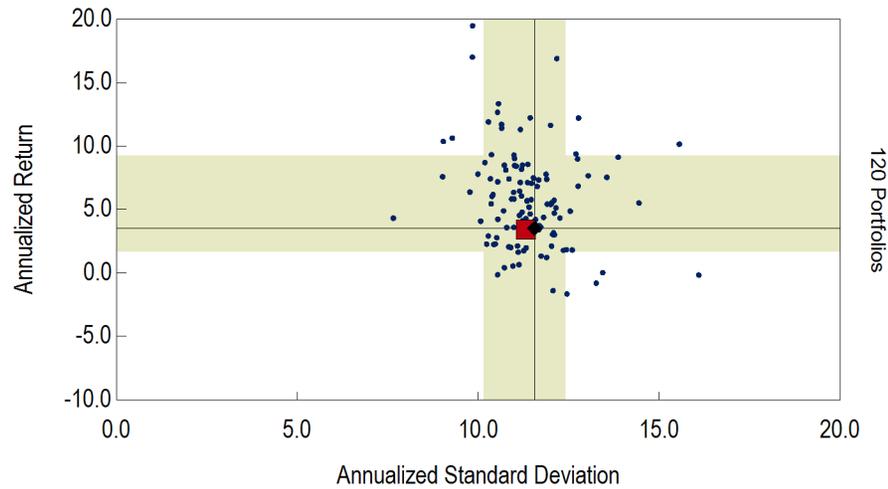
Rolling Annual Excess Benchmark Return



eA All ACWI ex-US Equity Net Accounts



3 Year Risk Return

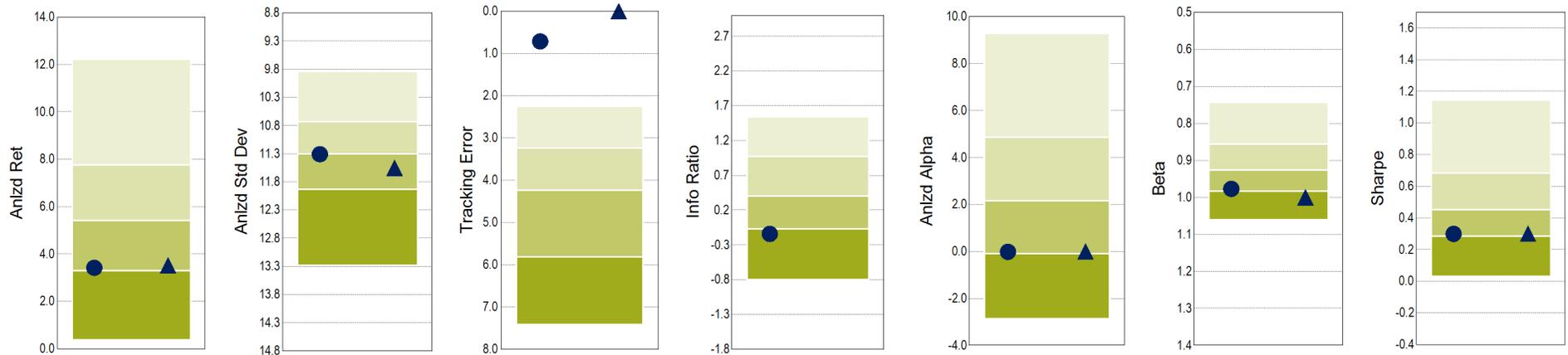


3 Year Style Map



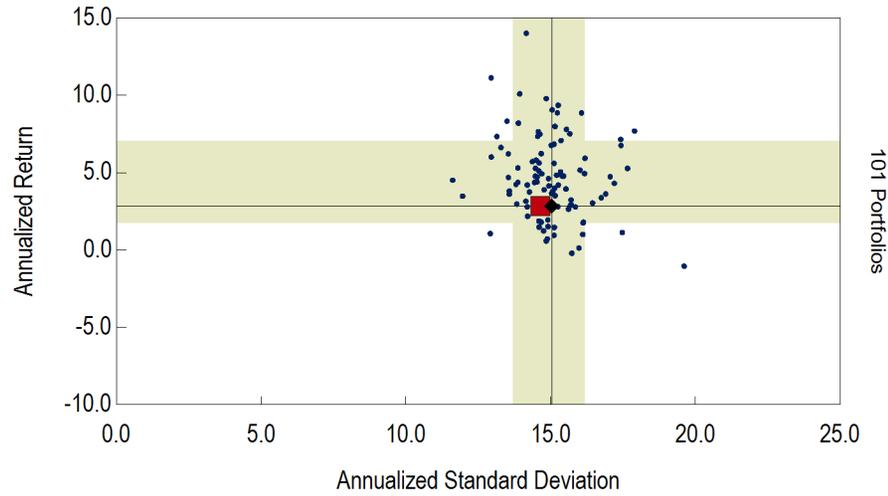
- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

- 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

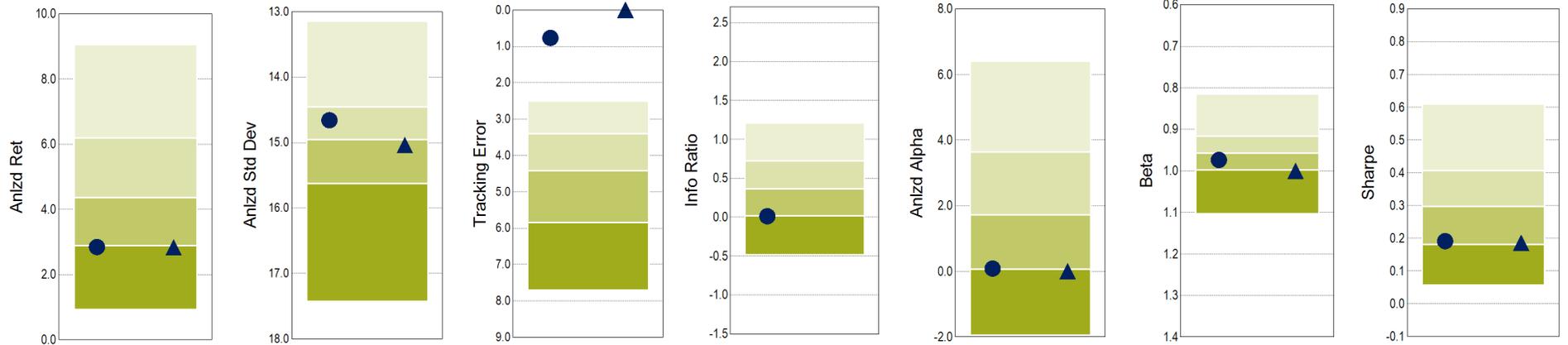
5 Year Risk Return



5 Year Style Map

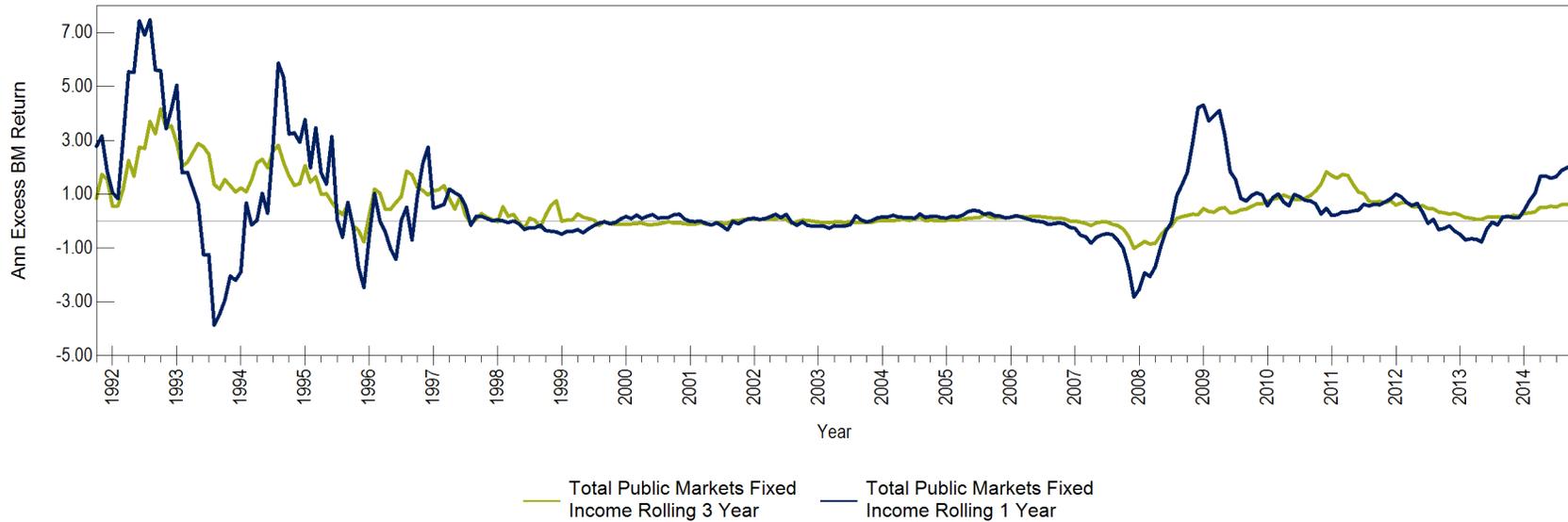


- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

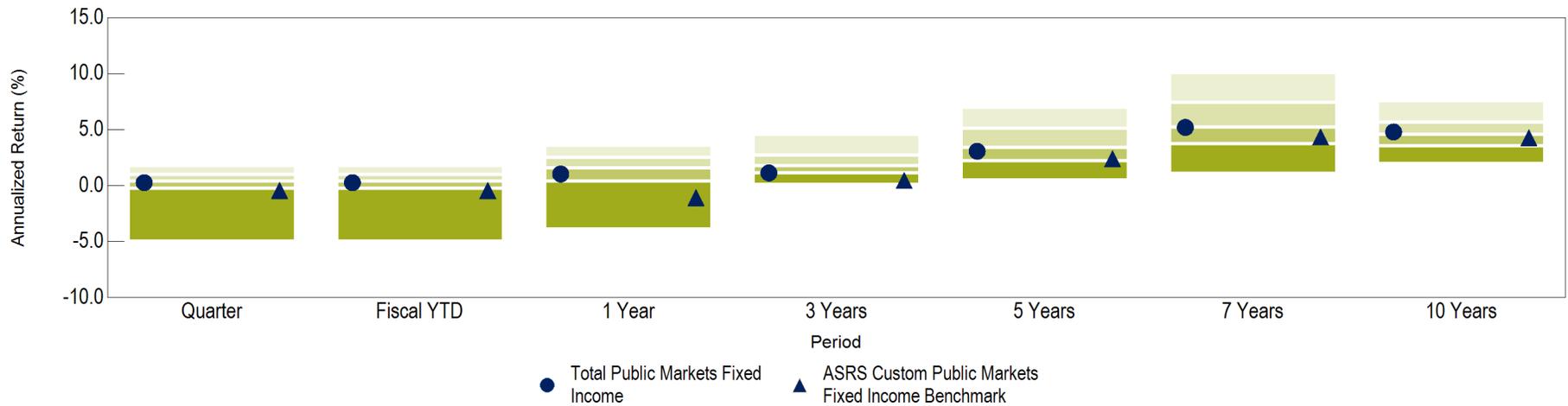


- Total International Equity
- ▲ ASRS Custom Int'l Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

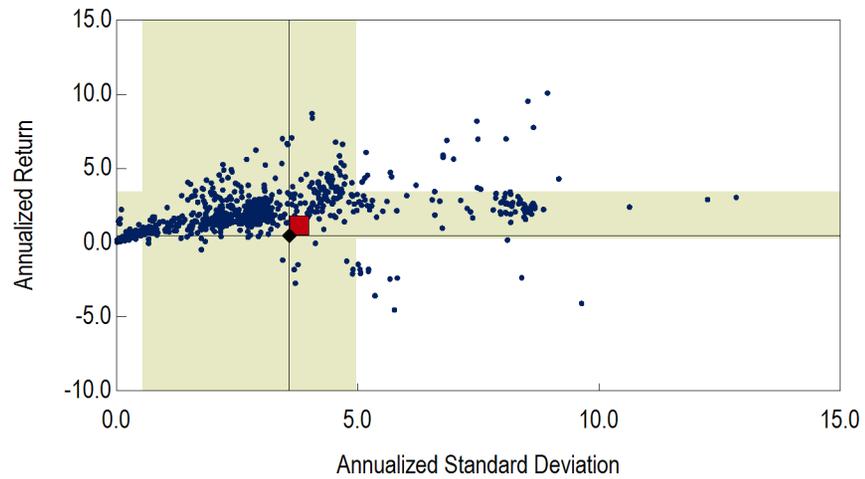
Rolling Annual Excess Benchmark Return



eA All US Fixed Inc Net Accounts

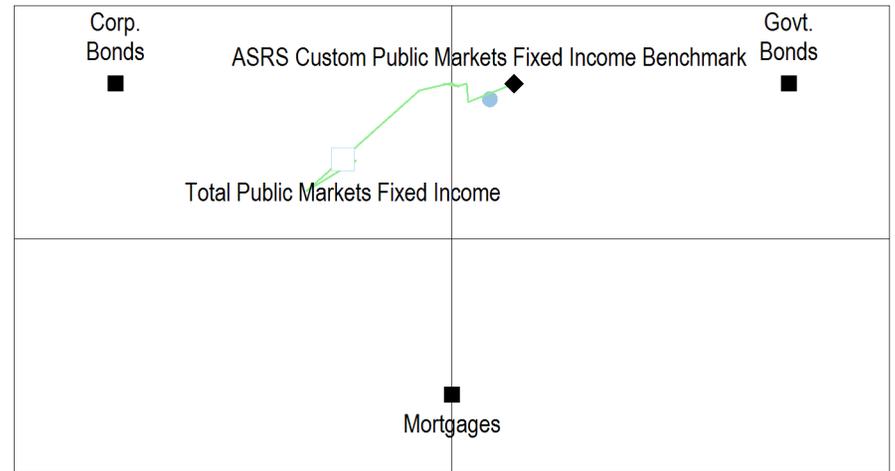


3 Year Risk Return

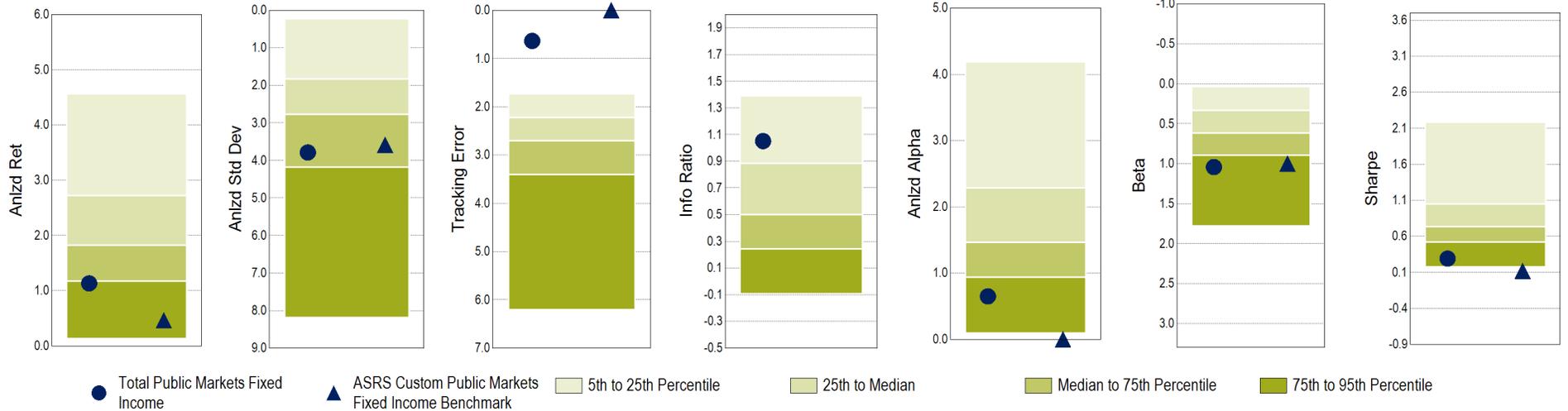


- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

3 Year Style Map

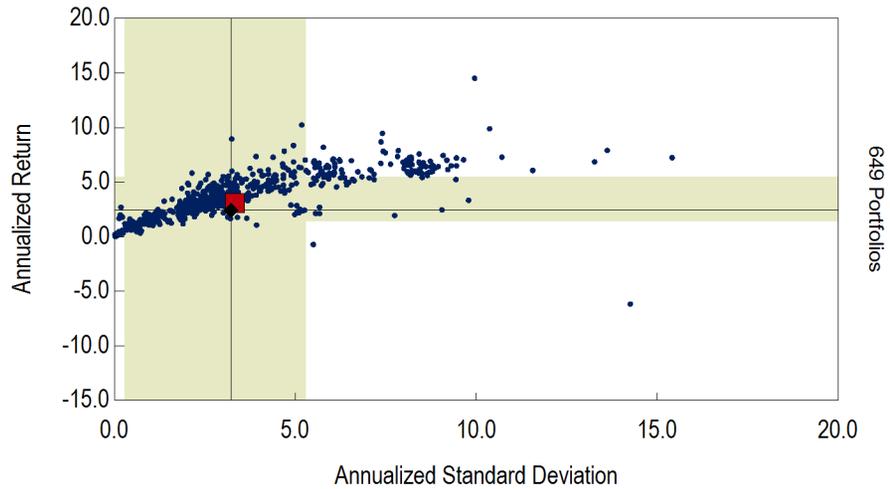


- First Rolling Period
- ◆ Last Rolling Period



- 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

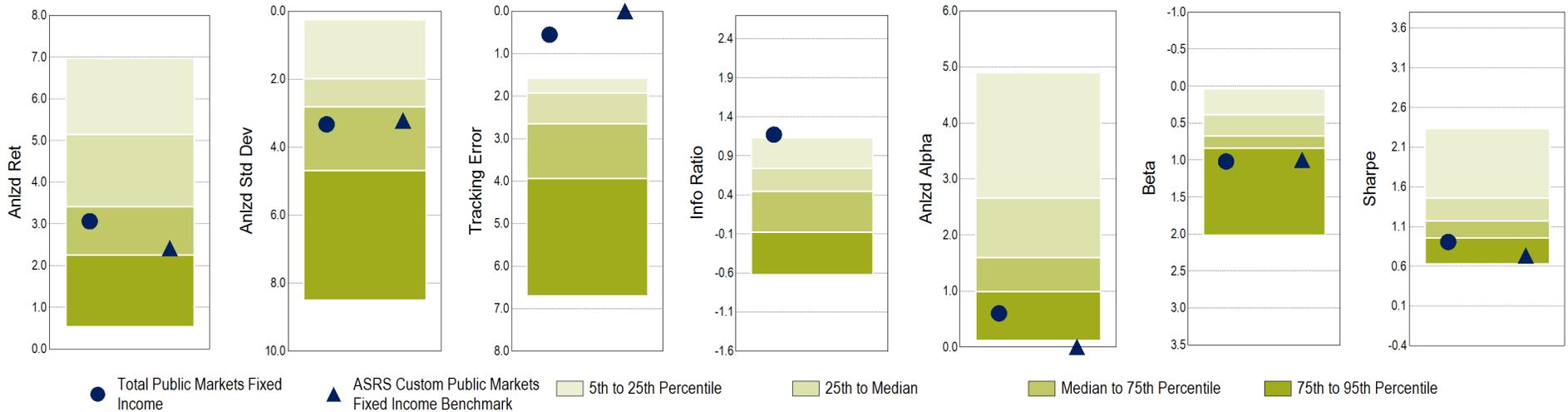


5 Year Style Map



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

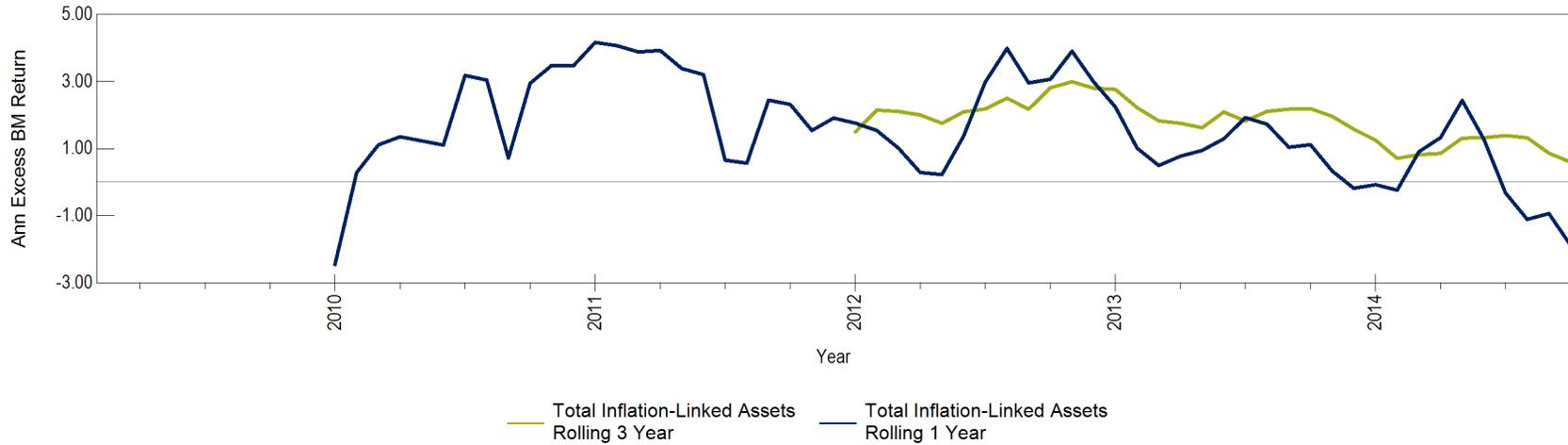
- First Rolling Period
- ◆ Last Rolling Period



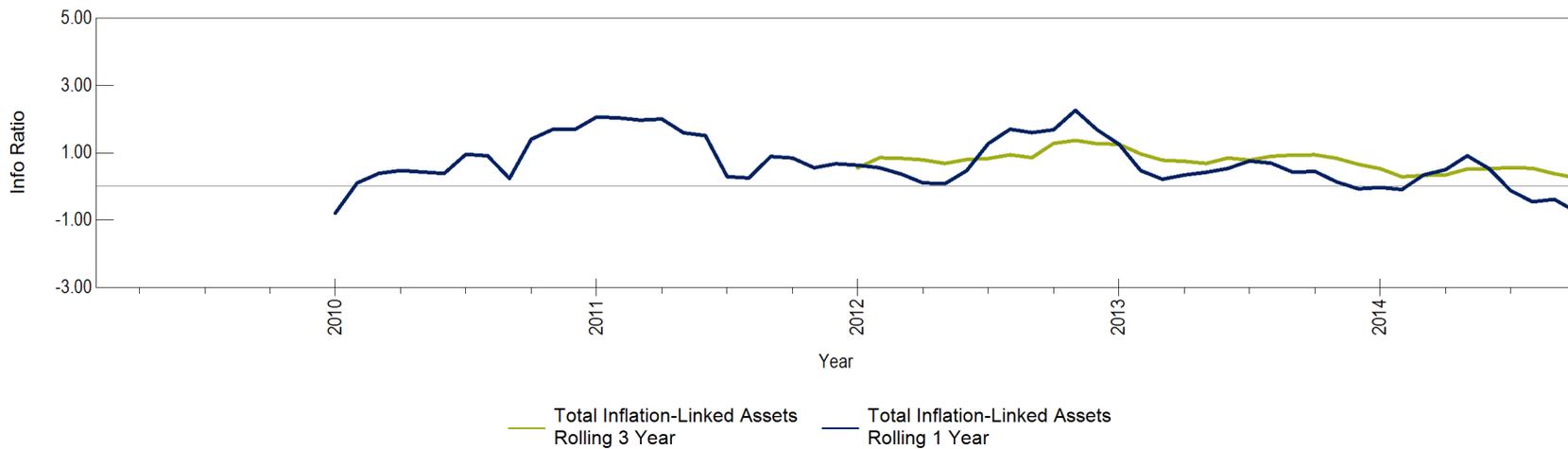
- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total Inflation-Linked Assets

Rolling Annual Excess Benchmark Return

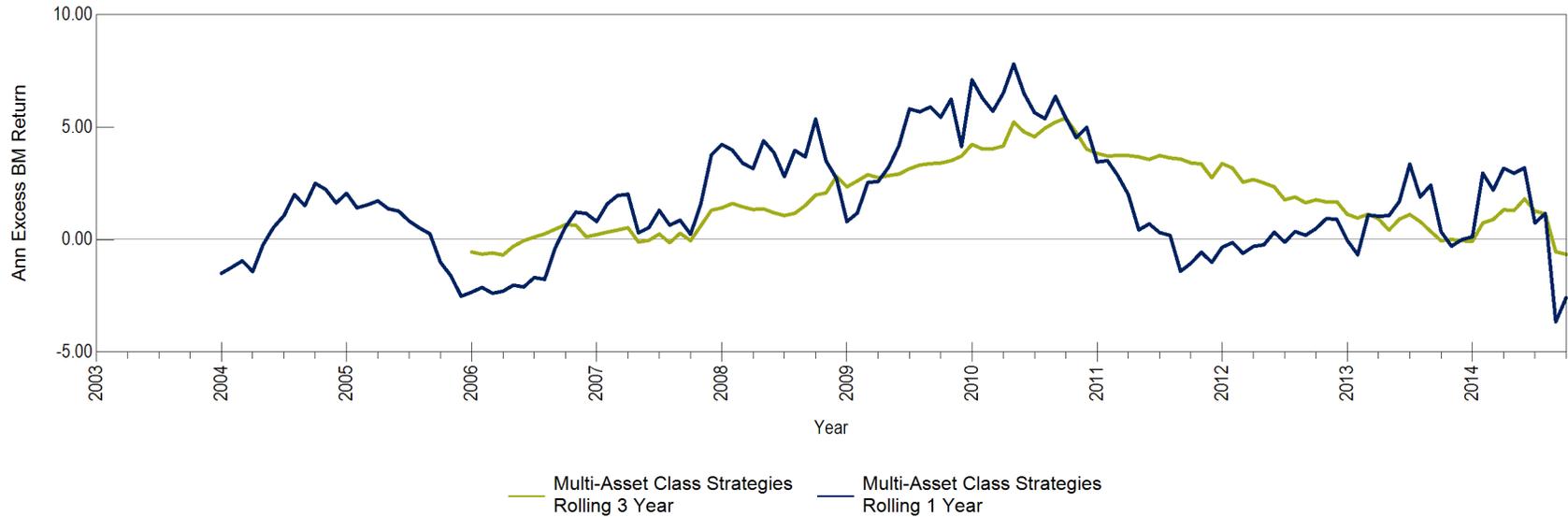


Rolling Information Ratio

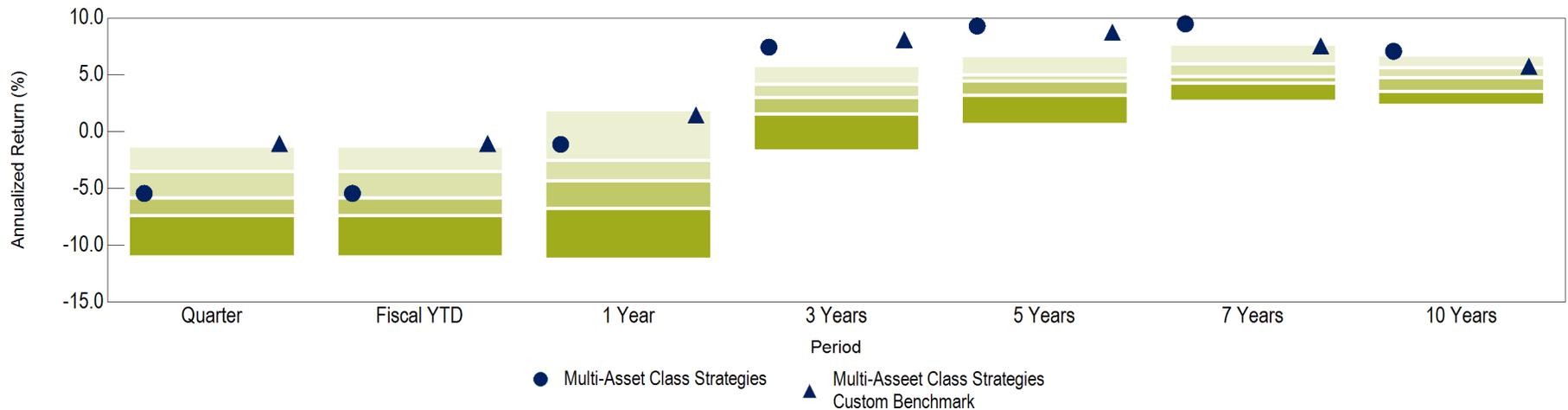


Asset Class Analysis - Multi-Asset Class Strategies

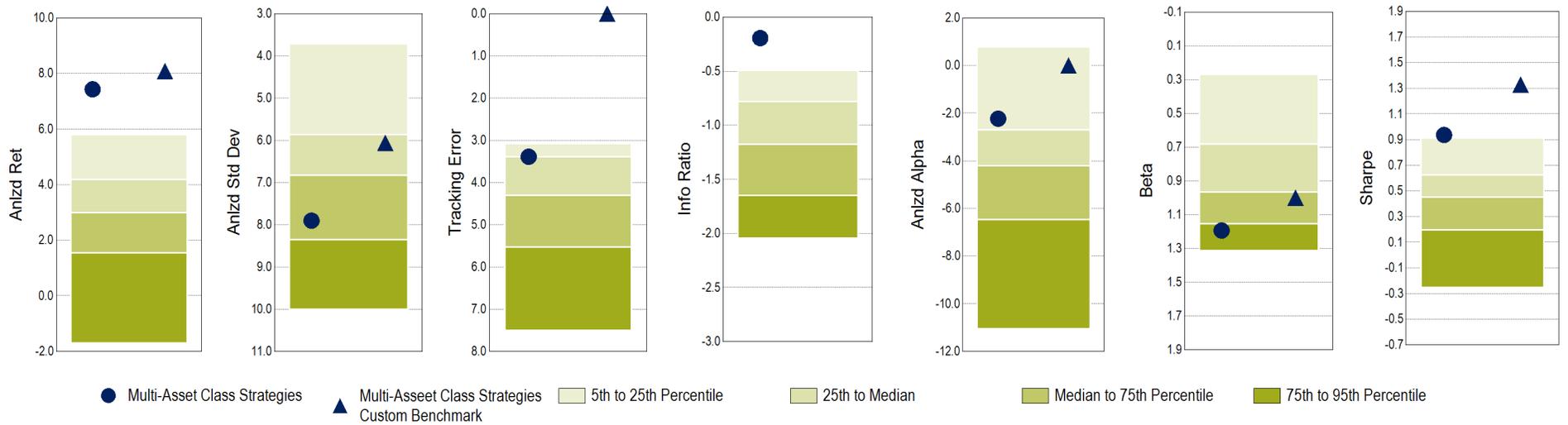
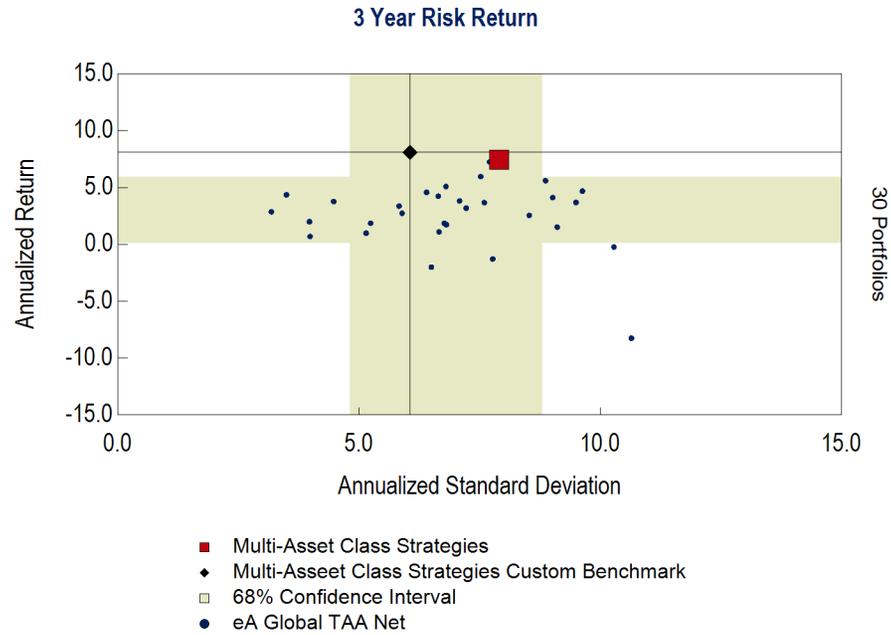
Rolling Annual Excess Benchmark Return



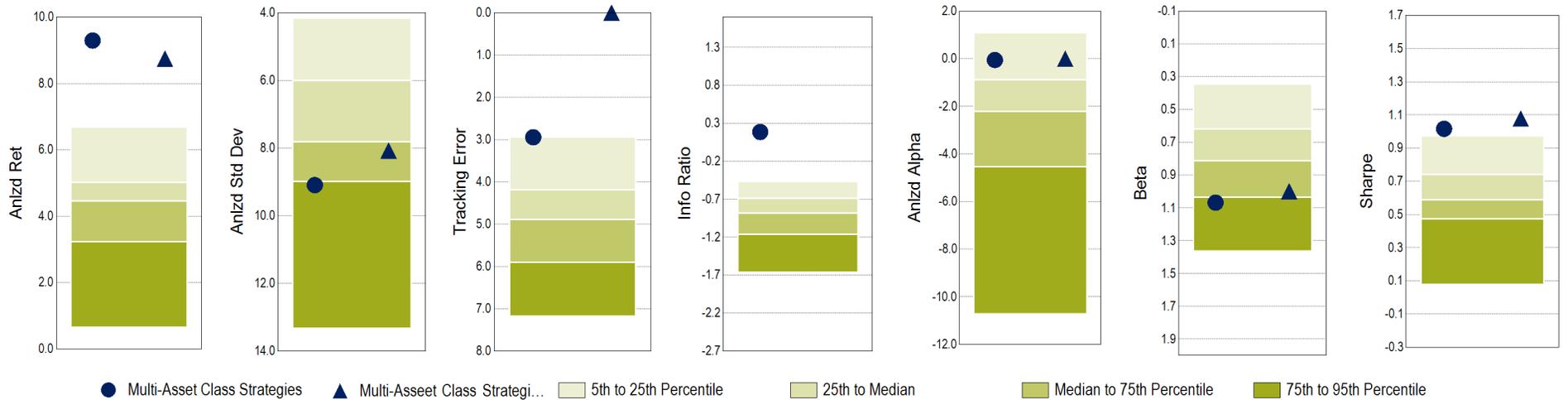
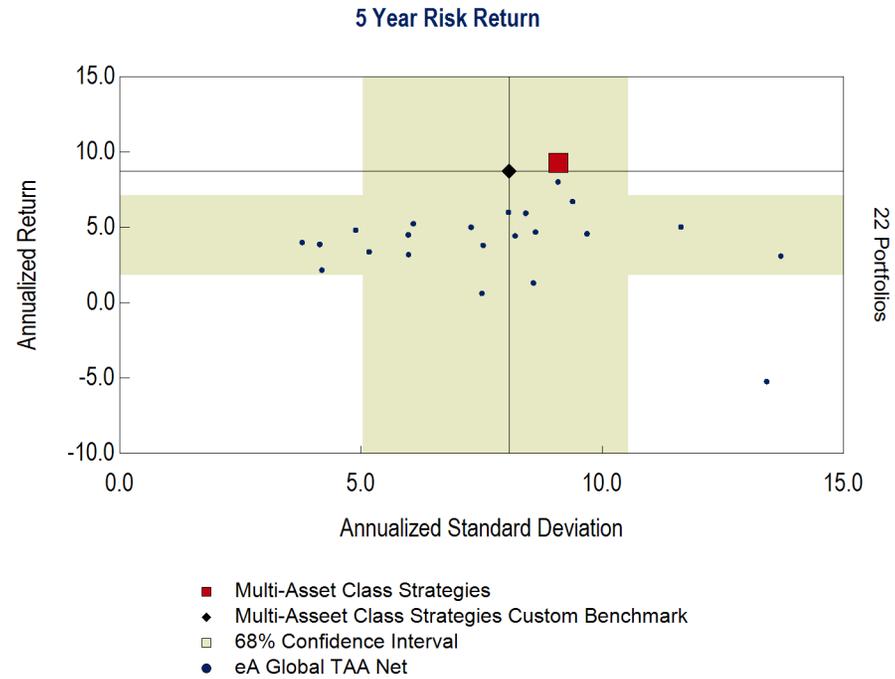
eA Global TAA Net Accounts



Asset Class Analysis - Multi-Asset Class Strategies



Asset Class Analysis - Multi-Asset Class Strategies



- **Five Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**
- **July 29, 2015 – Private Markets Committee**
 - Opportunistic Equity Manager Recommendation (Lesser of 20% of capital raised in this round of fundraising or \$100 million co-investment) – Follow Up from July 20, 2015 PRIVMC meeting
 - The PRIVMC requested additional due diligence at the July 20, 2015 PRIVMC meeting
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Opportunistic Equity is 0%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
- **August 14, 2015 – Public Markets Committee**
 - Public Markets Staff Reports and Capital Markets Discussion
 - Update on Cash Assetization Program and Liquidity Cash Flow Sourcing Discussion
 - Equity Risk Factor Portfolio Asset Allocation Reassignment Discussion
 - Non-U.S. Equities Portfolio Development
 - Public Equity Risk Management Options

- **August 28, 2015 – Private Markets Committee**

- Variance Request

- The Private Markets Team, in conjunction with RCLCO, recommended the ASRS approve a variance request from an existing real estate manager that would allow the manager to invest in a property that does not meet the current investment criteria for the portfolio.
 - Current investment criteria requires stabilization of an asset within four years of investment, but the asset in question is not expected to achieve stabilization until 4Q 2019, which is during the fifth year.
- Committee approved the recommendation

- Change in Investment Criteria

- The Private Markets Team, in conjunction with RCLCO, recommended the ASRS approve a change to the investment criteria of an existing real estate manager that would allow the manager to pursue opportunities without the use of leverage.
 - Current investment criteria identifies IRR return hurdles that each asset must meet prior to investment. The asset in question is attractive and meets the IRR return hurdle on a levered basis; however, the private markets team believes it is preferable to pursue the opportunity on an unlevered basis at this time.
 - In addition, changing the investment criteria to allow for future investments on an unlevered basis allows for more flexibility in managing risk and focusing the use of leverage on situations where it is most advantageous to the ASRS.
- Committee approved the recommendation

- **September 15, 2015 – Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
- Real Estate Manager Recommendation – Additional Commitment (\$40 million; \$100 million original commitment)
 - 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 Committee approved the original \$100 million investment at the May 12, 2014 PRIVMC meeting
 - In addition to the additional commitment, the investment criteria of the portfolio were also amended to accommodate the higher commitment amount and a proposed transaction that is currently in the pipeline.
- Investment Valuation Discussion
 - KPMG presented the results of their valuation analysis of an existing ASRS investment
- Private Debt Manager Recommendation – Additional Commitment (\$650 million to 7 existing ASRS private debt mandates)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt 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
 - Fund A - \$1.0 billion - \$1.1 billion
 - Fund B - \$0.5 billion - \$0.6 billion
 - Fund C - \$0.5 billion - \$0.6 billion
 - Fund D - \$0.35 billion - \$0.5 billion
 - Fund E - \$0.35 billion - \$0.45 billion
 - Fund F - \$0.35 billion - \$0.4 billion
 - Fund G - \$0.16 billion - \$0.25 billion

• **October 15, 2015 – Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
- Real Estate Manager Recommendation (\$300 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
 - The ASRS has invested with this manager in a prior fund in the private debt program
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
- Real Estate Manager Recommendation – Additional Commitment (\$50 million; \$300 million original commitment)
 - 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 Committee approved the original \$300 million investment at the October 29, 2012 PRIVMC meeting
 - In addition to the additional commitment, the investment criteria of the portfolio were also amended to allow for investments in Dallas, TX.
- Private Equity Manager Recommendation (\$50 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity 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
- Private Equity Manager Recommendation (\$50 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity 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

- **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% Private Equity, 5% Private Debt, and 3% Real Estate, 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 with an 8% - 12% range (current actual is 5.9%).
 - \$4.55 billion in commitments to private debt strategies equates to approximately 13.5% of Total Fund assets vs. the SAAP target of 10%.
 - Additional \$500 million commitment is currently being contemplated, which would bring commitments to \$5.1 billion, or 15.1% of Total Fund assets vs. the SAAP target of 10%.
 - Estimate private debt asset class reaching 10% target by the end of 2016.
 - Estimate private debt asset class reaching 12% cap in 3Q 2017.
 - Multi-Asset Class Strategies (formerly GTAA) has been restructured and moved 'above the line', and now has an explicit 5% target within the SAAP.

- **Long Treasuries mandate funded in August 2015 to mitigate volatility experienced during the third quarter.**

- **Tactical positioning consistent with IMD House Views.**

Market Environment Update and Outlook

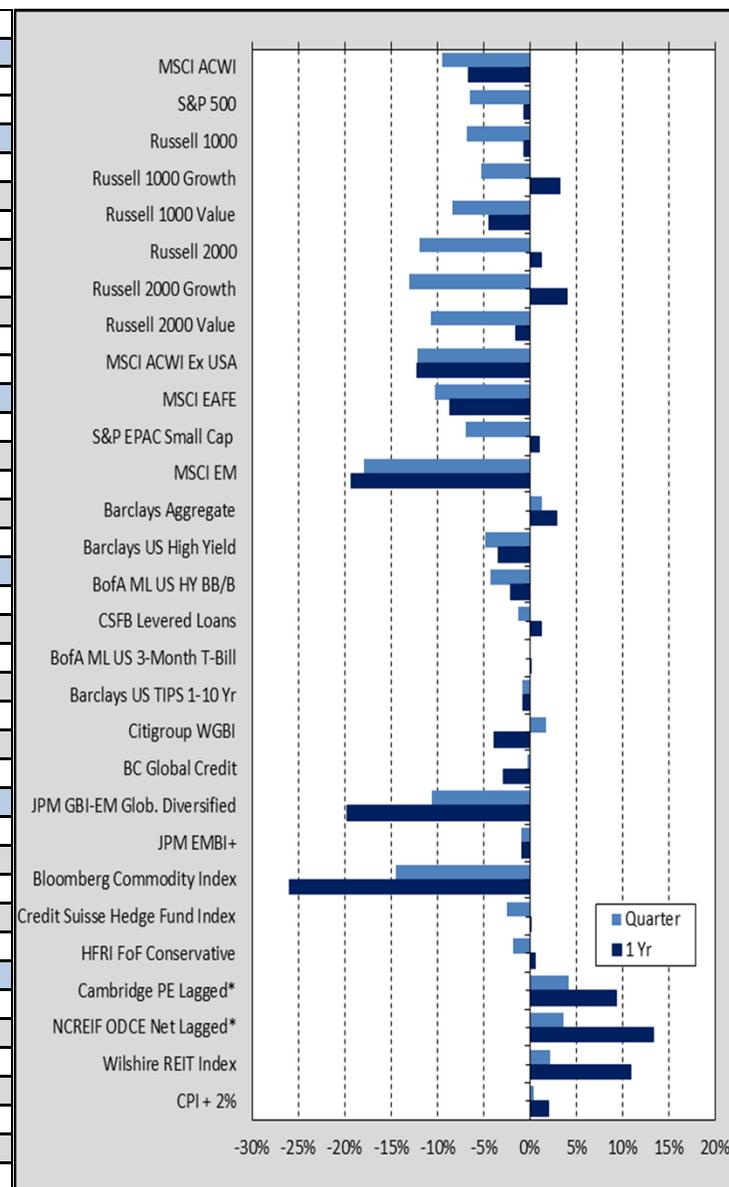


Economic Environment

- **Third quarter GDP growth rate (first estimate) printed at a modest +1.5%.**
 - Retail sales (ended August) at +1.3% on a year-over-year growth rate basis. The same period last year YoY growth rate was 4.6%.
 - The inventory-to-sales ratio at August, 31 was flat at 1.4 and has remained relatively flat since early 2010.
 - Corporate profits (ended June) as a percent of GDP declined slightly vs first quarter GDP to 10.4% from 10.7% and remain elevated relative to historical levels.
 - The U.S. trade deficit widened in August.
- **The unemployment rate fell to 5.1% in Q3 from 5.3% in Q2 2014; U-6, a broader measure of unemployment, fell to 10.0% during the third quarter.**
- **The Case-Shiller Home Price Index (as of 9/30) increased slightly to 175.1 from second quarter levels (170.0) and is at levels higher than that of pre-financial crisis levels of 150.9.**
- **Rolling 12-month seasonally adjusted CPI decreased to -0.02% from +0.2% at the end of June; Capacity Utilization decreased slightly to 77.5% in September.**
- **Fed Funds rate remains at 0.25%, while the 10-year Treasury Yield finished Q3 at 2.2% down 20 basis points from Q2.**
- **The Fed balance sheet remained flat in Q3 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 decreased in September remaining above the 10-year and long-term averages**
 - Cyclically adjusted Shiller PE ratio (24.6x) is above the long-term average of 16.4x and above the 10-year average of 22.9x.
- **The U.S. Dollar continues its strength against a basket of major currencies as the Fed ends its quantitative easing program and the ECB continues easing.**
 - Currency volatility has seen a sustained uptick since Q1.

Market Environment – Q3 2015 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI ACWI	World	-9.4%	-6.7%	7.0%	6.8%	4.6%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Equity Benchmarks						
S&P 500	Large Core	-6.4%	-0.6%	12.4%	13.3%	6.8%
Russell 1000	Large Core	-6.8%	-0.6%	12.7%	13.4%	7.0%
Russell 1000 Growth	Large Growth	-5.3%	3.2%	13.6%	14.5%	8.1%
Russell 1000 Value	Large Value	-8.4%	-4.4%	11.6%	12.3%	5.7%
Russell 2000	Small Core	-11.9%	1.2%	11.0%	11.7%	6.5%
Russell 2000 Growth	Small Growth	-13.1%	4.0%	12.8%	13.3%	7.7%
Russell 2000 Value	Small Value	-10.7%	-1.6%	9.2%	10.2%	5.3%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
International Equity Benchmarks						
MSCI ACWI Ex USA	World ex-US	-12.2%	-12.2%	2.3%	1.8%	3.0%
MSCI EAFE	Int'l Developed	-10.2%	-8.7%	5.6%	4.0%	3.0%
S&P EPAC Small Cap	Small Cap Int'l	-6.9%	1.0%	10.7%	7.8%	5.8%
MSCI EM	Emerging Equity	-17.9%	-19.3%	-5.3%	-3.6%	4.3%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	1.2%	2.9%	1.7%	3.1%	4.6%
Barclays US High Yield	High Yield	-4.9%	-3.4%	3.5%	6.1%	7.3%
BofA ML US HY BB/B	High Yield	-4.3%	-2.1%	3.7%	6.0%	6.7%
CSFB Levered Loans	Bank Loans	-1.2%	1.2%	3.8%	4.8%	4.4%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.0%	0.1%	0.1%	1.3%
Barclays US TIPS 1-10 Yr	Inflation	-0.9%	-0.8%	-1.4%	1.8%	3.6%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Global Fixed Income Benchmarks						
Citigroup WGBI	World Gov. Bonds	1.7%	-3.8%	-2.9%	-0.2%	3.4%
BC Global Credit	Global Bonds	-0.2%	-2.9%	0.6%	2.6%	4.3%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-10.5%	-19.8%	-8.7%	-3.6%	4.5%
JPM EMBI+	Em. Mkt. Bonds	-0.9%	-0.9%	0.2%	4.2%	6.7%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Alternative Benchmarks						
Bloomberg Commodity Index	Commodity	-14.5%	-26.0%	-16.0%	-8.9%	-5.7%
Credit Suisse Hedge Fund Index	Hedge Fund	-2.5%	0.1%	5.0%	4.5%	5.2%
HFRI FoF Conservative	Fund of Funds	-1.8%	0.6%	4.2%	2.8%	2.1%
Cambridge PE Lagged*	Private Equity	4.2%	9.3%	16.0%	15.7%	13.2%
NCREIF ODCE Net Lagged*	Real Estate	3.6%	13.4%	12.1%	13.3%	5.9%
Wilshire REIT Index	REIT	2.2%	10.9%	9.8%	12.4%	6.7%
CPI + 2%	Inflation/Real Assets	0.4%	2.0%	2.9%	3.7%	3.8%



* As of 6/30/2015

Positives

- **Divergence in monetary policies signaling different investment environments globally**
- **US Economy shows strength relative to other developed markets**
 - Low oil prices benefitting consumers
- **Global monetary stimulus flowing through to markets**
 - ECB €1.3 trillion in asset purchases in the Eurozone
 - Economic conditions in Europe and Japan responding to QE
 - China policy response remains stimulative with more tools available to deploy
- **Developed world inflation is low**
 - In US, CPI for all Urban Consumers on a seasonally adjusted basis was negative in Q3

Negatives

- **Volatility increased across global markets**
 - Financial and geo-political instability in the Mid-East, Eastern Europe, Greece
- **Slowing economic growth in China may have broad implications for many emerging economies**
 - China growth concerns sparked a rapid decline in commodities and emerging markets
- **Fed rate hike uncertainty contributed to volatility in domestic markets**
 - Fed signaled tightening to begin by year-end; market expecting a slow pace to rate increases
- **Valuations remain above 10 year and long term averages**
 - Developed Equity P/Es above median

Market Environment

Global Equity

- **U.S. equities posted sharp losses in the third quarter as global volatility ramped up.**
- **Small cap stocks underperformed large cap stocks during the quarter, with the Russell 2000 Index returning -11.9% and the Russell 1000 Index returning -6.8%.**
- **International equities underperformed U.S. markets during the quarter, returning -12.2%, as measured by the MSCI ACWI ex-U.S. Index.**
 - Developed markets returned -10.2% as measured by the MSCI EAFE Index. The Pacific Region led returns down posting a -13.1% with Singapore leading the group down -19.5%. Europe posted a loss of -8.7%.
 - Emerging markets returned -17.9% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. Indonesia and China led to the downside returning -24.2% and -22.7% respectively.

Private Equity

- **New private equity commitments totaled \$74.6 billion in Q3 2015.**
 - Represents a 25% decline from the \$101.5 billion raised in Q2 2015, resulting from public equity market volatility and increased economic uncertainties
- **Buyout and growth equity funds raised \$45.3 billion in Q3 2015.**
 - Annual pace is in line with the \$180-190 billion that was raised in each of the past two years
- **Venture capital raised \$10.0 billion ended Q3 2015.**
 - VC fundraising as a percent of total new PE funds is in line with historical post-dot com levels
- **Energy funds raised \$7.8 billion representing 10% of capital raised in Q3 2015.**
 - Investors are opportunistically approaching the energy market dislocation.
- **Asian private equity commitments slowed to total 7% of total funds raised down from 11% in 2014.**
- **European commitments comprised 23% of all new PE commitments in Q3 2015.**
 - Fifteen pan-European buyout managers with closes on over \$1 billion each raised over half of 2015 total



Market Environment

Fixed Income

- **The yield curve flattened significantly with long duration yields dropping 20-30 basis points.**
- **The spread between two and 10-year rates decreased to 142 basis points from 176 basis points ended June. Treasury Inflation-Protected Securities, or TIPS, returned -0.9% during the quarter, as measured by the Barclays US TIPS Index.**
- **The Barclays Long Duration Credit Index gained +0.5% as the long end of the curve ended the quarter 24 basis points lower.**
- **Long Treasuries gained +5.1% and investment-grade corporate debt gained +3.8%.**
- **The Barclays 1-3 year Government/ Credit Index returned 0.3% and US high yield bonds lost -4.9%.**
- **Emerging markets debt continued to slow in local and external currency.**
 - US dollar-denominated debt, as measured by the JP Morgan EMBI Index, fell 90 basis points; local currency debt fell 10.5%, according to the JP Morgan GBI-EM Index.

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

Market Environment

Commodities

- **Commodities retracted significantly with the Bloomberg Commodity Index posting a -14.5%.**
 - Energy led the way losing -24% (WTI Oil), while industrial metals, precious metals and agriculture declined.

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 modest gains with a +2.2% 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.

NEPC Updates

September 30, 2015

Highlights of Third Quarter Happenings at NEPC

NEPC Recognitions



- Two of NEPC's Partners were named on the *Chief Investment Officer* magazine's (CIO) annual ranking of the world's most influential investment consultants. NEPC's Chief Investment Officer, **Tim McCusker**, was named **the most influential general consultant on the 2015** list of Knowledge Brokers. **KC Connors**, Head of NEPC's Philanthropic Practice Team, **ranked 10th on the 2015 Knowledge Brokers – Specialist list**. The lists are CIO's annual rankings of the most influential investment consultants worldwide¹.



NEPC Client Recognitions

- Two of our clients were recognized for their work in the healthcare industry by *Institutional Investor* on October 7th. Mary O'Reilly, Director, Treasury and Investments at Rochester Health, received the II Investor Intelligence Award for Asset Allocation, and Joshua Rabuck, Executive Director, Investments at Indiana University Health, was accorded the II Investor Intelligence Award for Risk Management.

NEPC Research

Recent White Papers

- Best Practices: Managing Risk in Corporate VEBA and SERP Plans* (October 2015) - Mike Valchine, CAIA, CIPM, Senior Consultant
- NEPC's 2015 Defined Contribution Plan & Fee Survey: What a Difference a Decade Makes* (October 2015) - Ross Bremen, CFA, Partner
- Market Chatter – Has the China Bubble Burst?* (July 2015)
- Market Chatter – China's Devaluation of the Yuan* (August 2015)
- 2015 Third Quarter Market Thoughts*

Upcoming/Recent Events

- Healthcare Defined Contribution Fee Survey Results** - Tuesday, November 3, 2015, 3:00 to 4:00 p.m. (EST)
- NEPC's 2015 Defined Benefit Plan Trends Webinar** - Wednesday, October 21, 2015, 2:00 - 3:00 p.m. (EST)
- NEPC, Newton Capital Management, and the Centre for Endowment Asset Management are hosting a special event that delves into the influence of British economist John Maynard Keynes on the U.S. Endowment Model on October 15, 2015 in Boston, MA.

¹CIO Magazine interviews pension and non-profit CIOs, asset managers and former consultants, to approximate what it calls "the hierarchy of today's institutional consultant industry." The results should not be considered a recommendation of any specific firm or individual consultant. For more information, please visit CIO Magazine's web site at <http://www.ai-cio.com/2015-knowledge-brokers/>. Past performance is no guarantee of future results



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% 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:** 22% 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)/16% Barclays Capital Aggregate/5% Barclays Capital High Yield/5% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/7% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index

Note: Interim SAA Policy includes proration of 0.9% Private Equity, 3.3% Real Estate and 5.3% 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.

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 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 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.

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 Small Cap Equity Blended Benchmark** was the Russell 2000 Index through 12/31/2006; S&P 600 Index thereafter.
- **DFA Blended Benchmark** was the Russell 2000 Value Index through 12/31/2006; S&P/Citigroup 600 Value Index thereafter.
- **ASRS Custom Int'l Developed Markets Equity Index** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 87% MSCI EAFE and 13% MSCI EAFE Small Cap through 6/30/2012; 82% MSCI EAFE and 18% MSCI EAFE Small Cap through 3/31/2015; 89% MSCI EAFE and 11% MSCI EAFE Small Cap thereafter.
- **Brandes Custom Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 2/28/2011; MSCI EAFE thereafter.
- **Windham Custom GTAA Benchmark** was 47% S&P 500, 18% MSCI EAFE, 26% Barclays Capital Aggregate, 6% DJ REIT, and 3% Bloomberg Commodity Index through 6/30/2012; 40% S&P 500, 23% MSCI EAFE, 25% Barclays Capital Aggregate, 8% DJ REIT and 4% Bloomberg through 3/31/2015; 52% MSCI ACWI, 30% Citi World Government Bond Index, 9% Dow Jones US Reit, 9% Bloomberg Commodity Index thereafter.
- **ASRS Cash Assetization Custom Benchmark** is 33% S&P 500, 14% Russell 2000, 25% MSCI EAFE, 28% Barclays Treasury Index through 8/24/2015; 100% Barclays US Long Treasury Index thereafter.
- **ASRS Bridgewater 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; Citigroup 3-Month Treasury Bill Index thereafter.

Information Disclaimer and Reporting Methodology

Information Disclaimer

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- 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.
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