



NEPC, LLC

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Dallas Police & Fire Pension System

Investment Summary

Quarter Ending March 31, 2017

June 8, 2017

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Q1 2017 Market Update

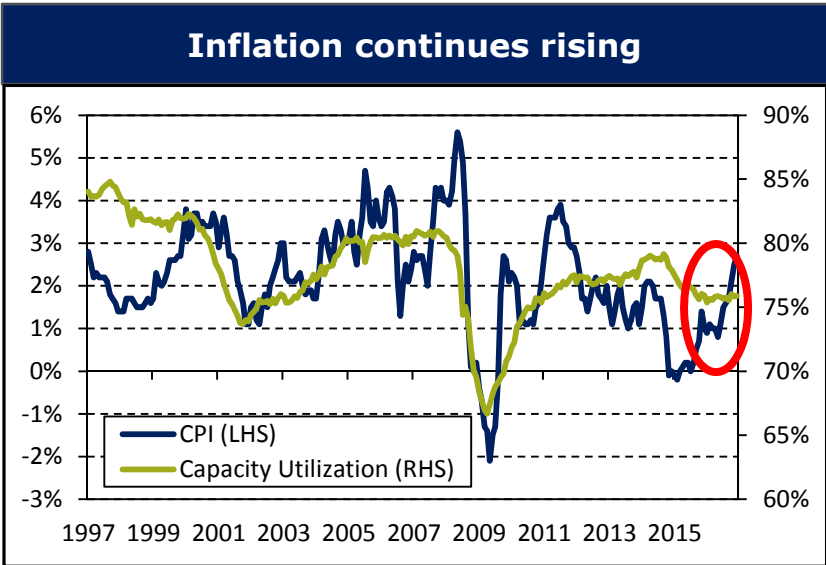


Index Performance Summary as of 03/31/2017

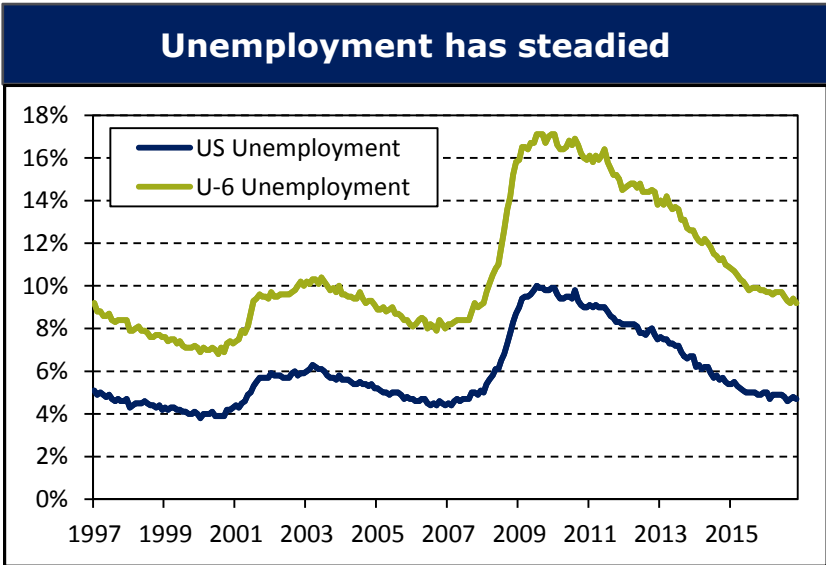
	2009	2010	2011	2012	2013	2014	2015	2016	Jan	Feb	Mar	YTD
MSCI EM	78.5%	18.9%	-18.4%	18.2%	-2.6%	-2.2%	-14.9%	11.2%	5.5%	3.1%	2.5%	11.4%
MSCI EAFE	31.8%	7.8%	-12.1%	17.3%	22.8%	-4.9%	-0.8%	1.0%	2.9%	1.4%	2.8%	7.2%
MSCI ACWI	34.6%	12.7%	-7.3%	16.1%	22.8%	4.2%	-2.4%	7.9%	2.7%	2.8%	1.2%	6.9%
JPM GBI-EM Global Div	22.0%	15.7%	-1.8%	16.8%	-9.0%	-5.7%	-14.9%	9.9%	2.3%	1.8%	2.3%	6.5%
S&P 500	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	12.0%	1.9%	4.0%	0.1%	6.1%
Russell 1000	28.4%	16.1%	1.5%	16.4%	33.1%	13.2%	0.9%	12.1%	2.0%	3.9%	0.1%	6.0%
Alerian MLP	76.4%	35.9%	13.9%	4.8%	27.6%	4.8%	-32.6%	18.3%	4.9%	0.4%	-1.3%	3.9%
JPM EMBI Glob Div	29.8%	12.2%	7.3%	17.4%	-5.3%	7.4%	1.2%	10.2%	1.4%	2.0%	0.4%	3.9%
Russell 2500	34.4%	26.7%	-2.5%	17.9%	36.8%	7.1%	-2.9%	17.6%	1.4%	2.4%	-0.1%	3.8%
Barclays US Corporate HY	58.2%	15.1%	5.0%	15.8%	7.4%	2.5%	-4.5%	17.1%	1.5%	1.5%	-0.2%	2.7%
Russell 2000	27.2%	26.9%	-4.2%	16.3%	38.8%	4.9%	-4.4%	21.3%	0.4%	1.9%	0.1%	2.5%
BC US STRIPS 20+ Yr	-36.0%	10.9%	58.5%	3.0%	-21.0%	46.4%	-3.7%	1.4%	0.5%	2.3%	-1.0%	1.8%
BC Global Agg	-6.5%	-5.3%	-5.3%	-4.1%	2.7%	-0.6%	3.3%	2.1%	1.1%	0.5%	0.2%	1.8%
Credit Suisse Hedge Fund	18.6%	10.9%	-2.5%	7.7%	9.7%	4.1%	-0.7%	1.2%	0.7%	1.0%	-	1.7%
BC US Long Credit	16.8%	10.7%	17.1%	12.7%	-6.6%	16.4%	-4.6%	10.2%	0.2%	2.0%	-0.6%	1.7%
BC Municipal	12.9%	2.4%	10.7%	6.8%	-2.6%	9.1%	3.3%	0.2%	0.7%	0.7%	0.2%	1.6%
BC US Govt/Credit Long	1.9%	10.2%	22.5%	8.8%	-8.8%	19.3%	-3.3%	6.7%	0.3%	1.8%	-0.6%	1.6%
BC TIPS	11.4%	6.3%	13.6%	7.0%	-8.6%	3.6%	-1.4%	4.7%	0.8%	0.5%	-0.1%	1.3%
CS Leveraged Loan	44.9%	10.0%	1.8%	9.4%	6.2%	2.1%	-0.4%	9.9%	0.5%	0.6%	0.1%	1.2%
FTSE NAREIT Equity REITs	28.0%	28.0%	8.3%	18.1%	2.5%	30.1%	3.2%	8.5%	0.1%	3.4%	-2.3%	1.2%
BC US Agg Bond	5.9%	6.5%	7.8%	4.2%	-2.0%	6.0%	0.5%	2.6%	0.2%	0.7%	-0.1%	0.8%
BC US Agg Interm	6.5%	6.1%	6.0%	3.6%	-1.0%	4.1%	1.2%	2.0%	0.2%	0.5%	0.0%	0.7%
BC US Govt/Credit 1-3 Yr	3.8%	2.8%	1.6%	1.3%	0.6%	0.8%	0.7%	1.3%	0.2%	0.2%	0.1%	0.4%
Bloomberg Commodity	18.9%	16.8%	-13.3%	-1.1%	-9.5%	-17.0%	-24.7%	11.8%	0.1%	0.2%	-2.7%	-2.3%

Source: Bloomberg, Barclays, Alerian, Nareit, MSCI, JP Morgan, Credit Suisse

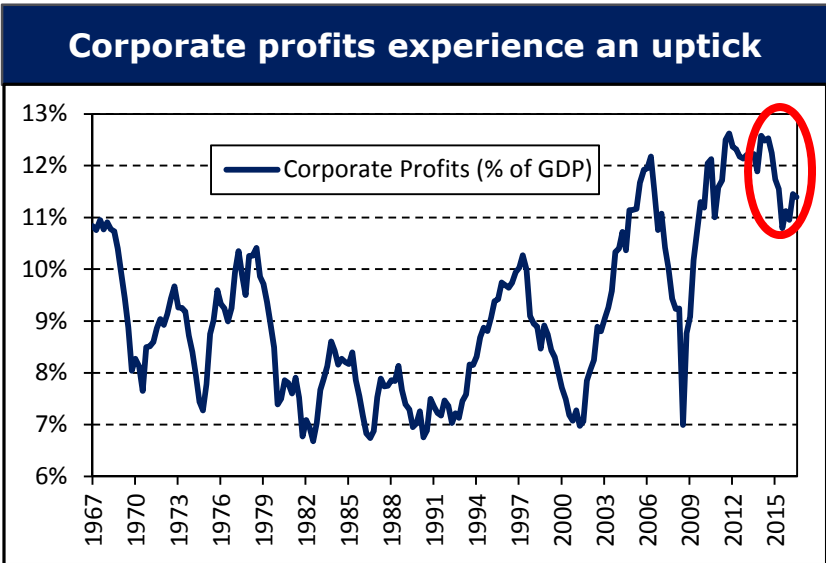
US Economic Indicators



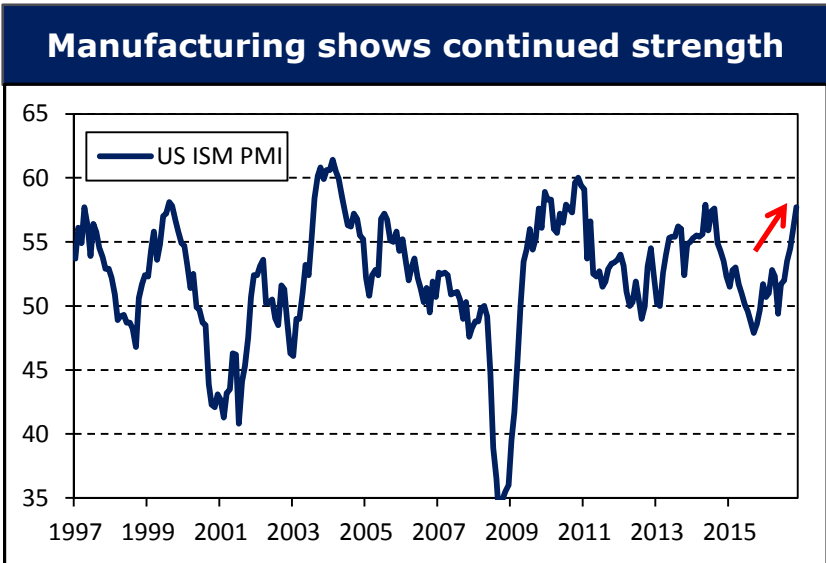
Source: Bloomberg, Federal Reserve, Bureau of Labor Statistics



Source: Bloomberg, Bureau of Labor Statistics



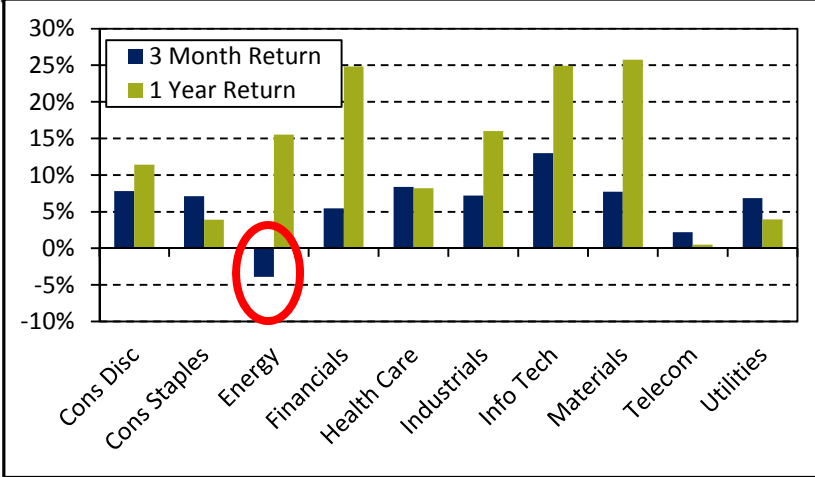
Source: Bloomberg, Bureau of Economic Analysis



Source: Bloomberg, Institute for Supply Management

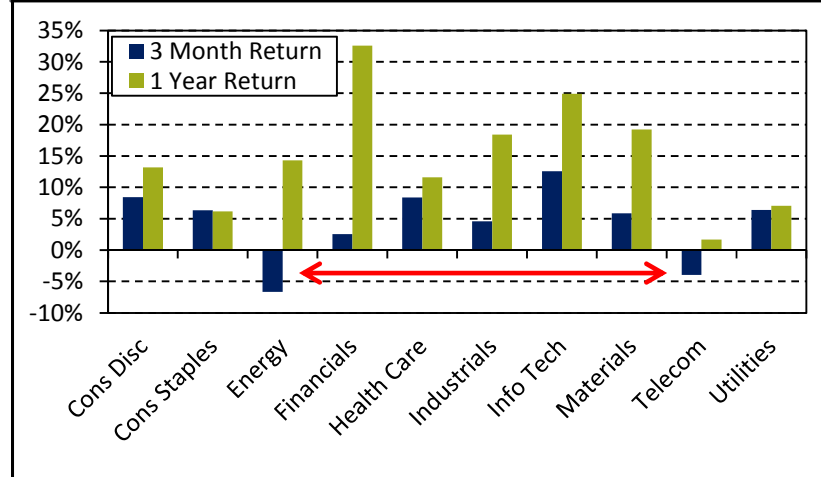
Global Equity by Sector

Ex-energy, MSCI ACWI has posted broad short-term returns



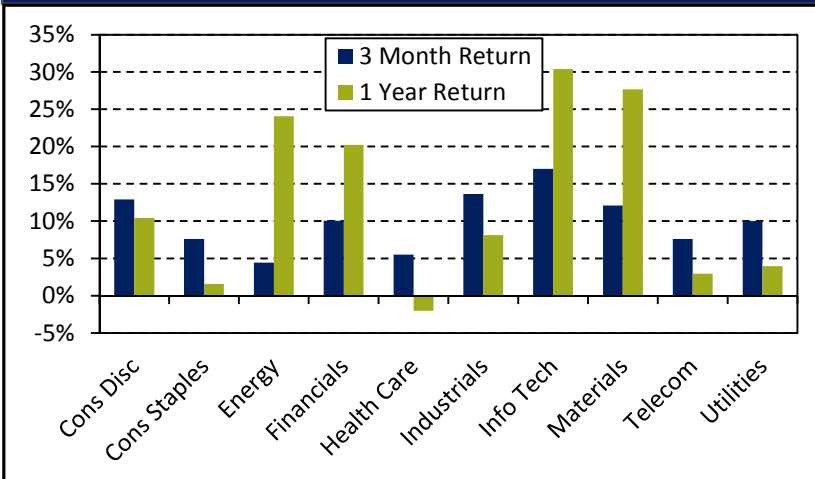
Source: Bloomberg, MSCI

Energy and Telecom sectors drag S&P 500 short-term returns



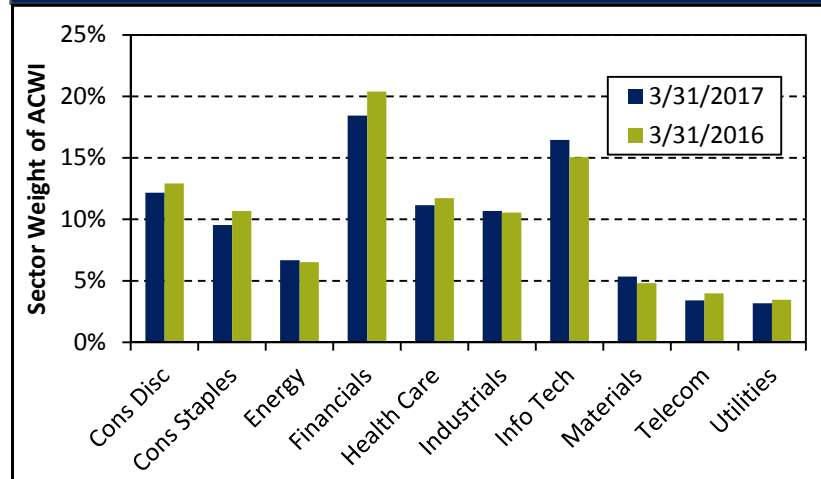
Source: Bloomberg, Standard and Poors

MSCI EM posts positive short-term returns across all sectors



Source: Bloomberg, MSCI

Financials sector weight has decreased in favor of Info Tech and Materials

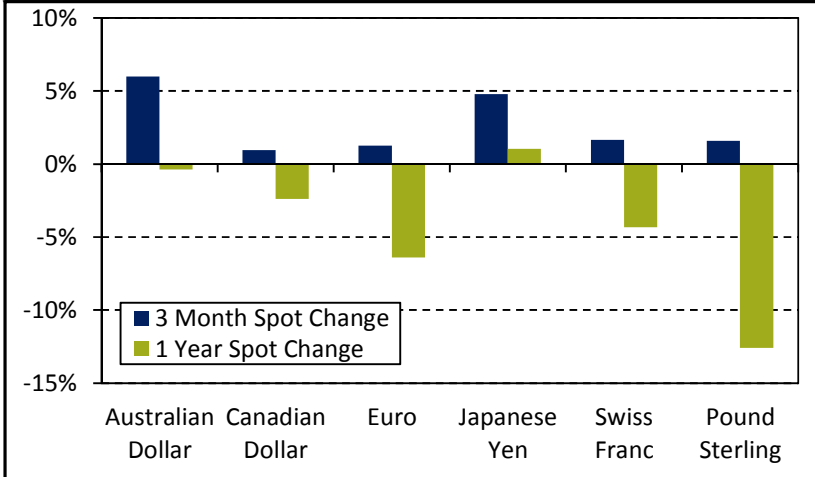


Source: Bloomberg, MSCI



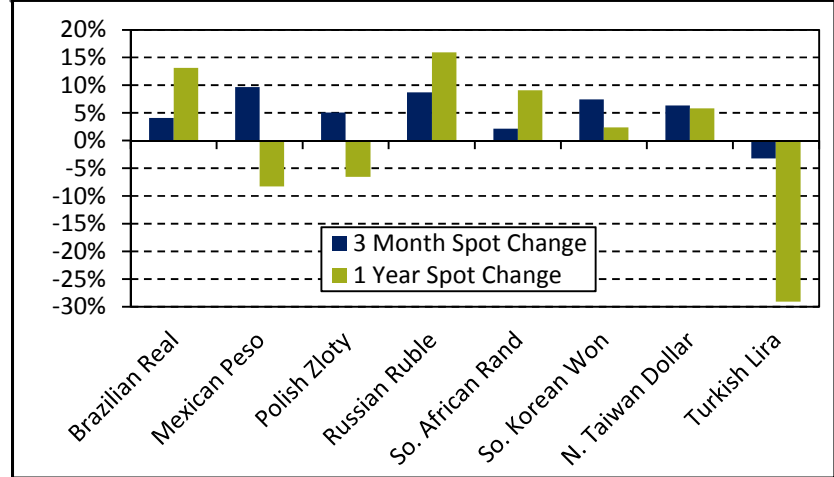
Currencies

International currencies have appreciated with the dollar decline



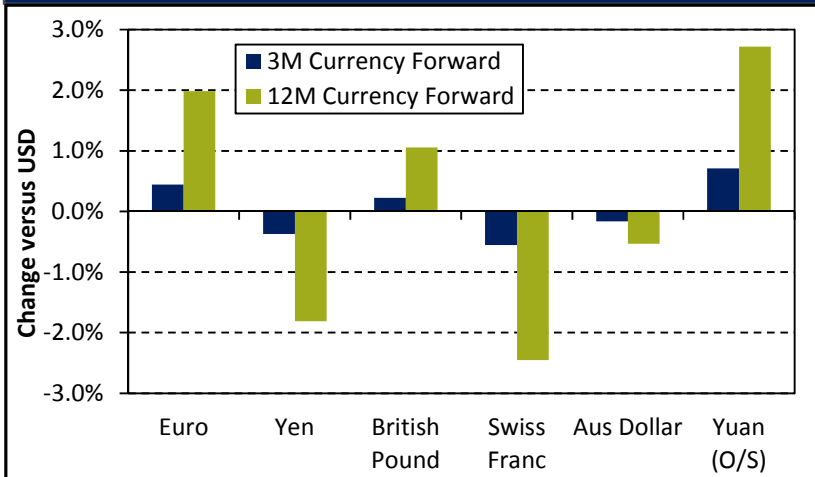
Source: Bloomberg

The Lira has experienced sharp depreciation



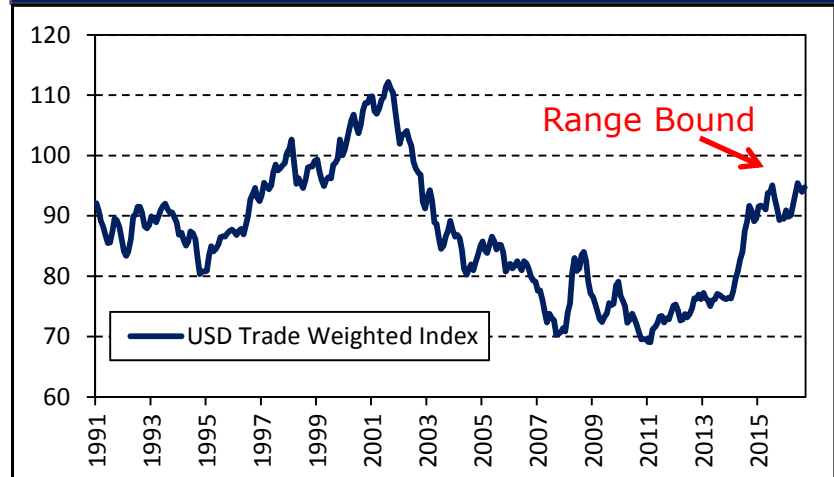
Source: Bloomberg

USD expectations vary across developed markets



Source: Bloomberg

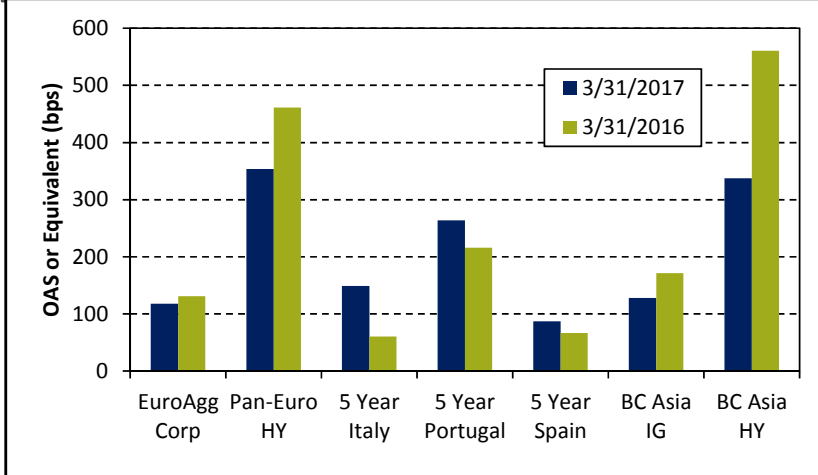
The dollar has steadied in 2017



Source: Bloomberg, Federal Reserve

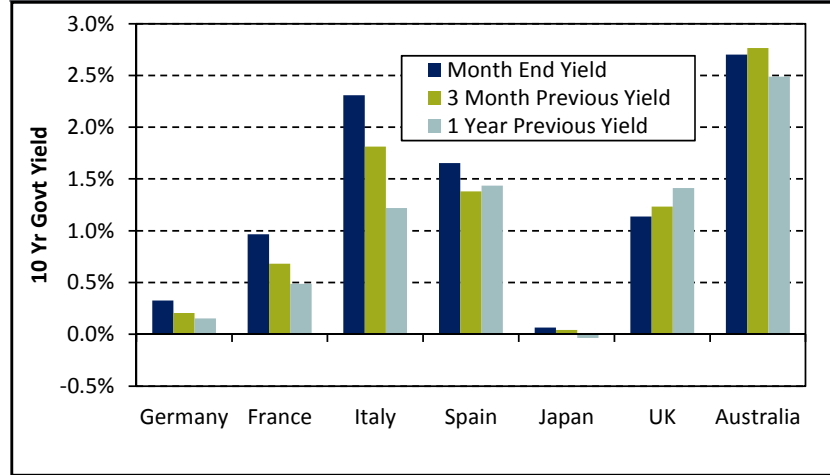
International Developed Fixed Income

European periphery yields vary relative to Germany



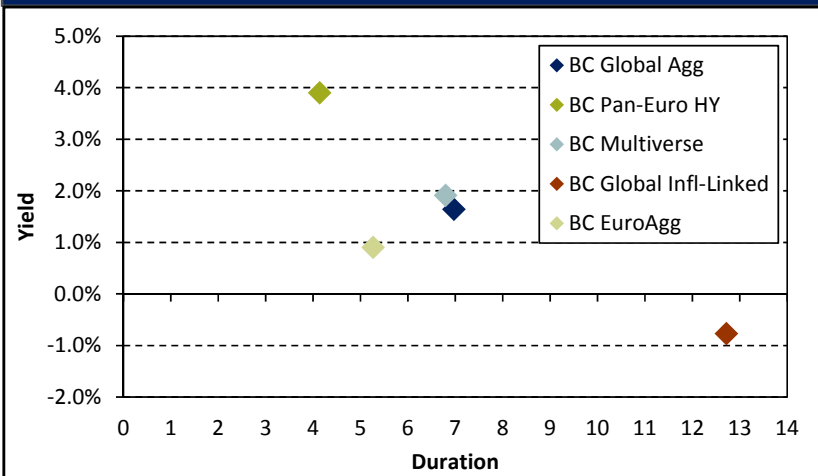
Source: Barclays, Bloomberg, *European periphery spreads are over equivalent German Bund

Ex the UK and Australia, international developed market yields have increased



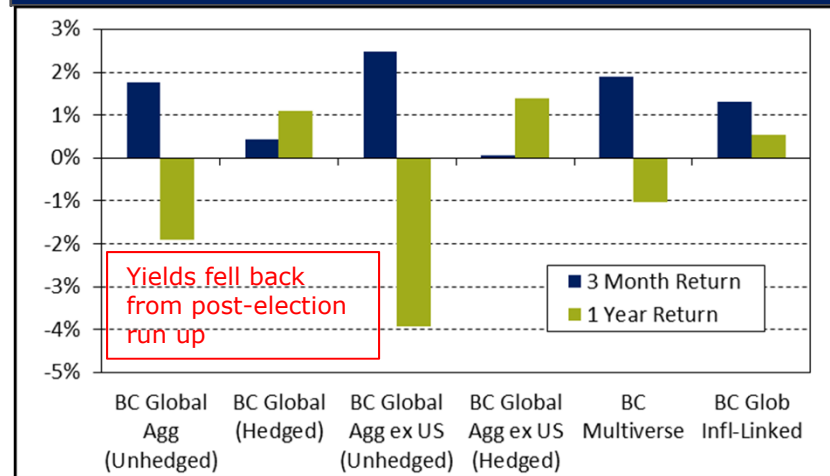
Source: Bloomberg

Low yields persist in global bond universe



Source: Bloomberg, Citigroup, Barclays

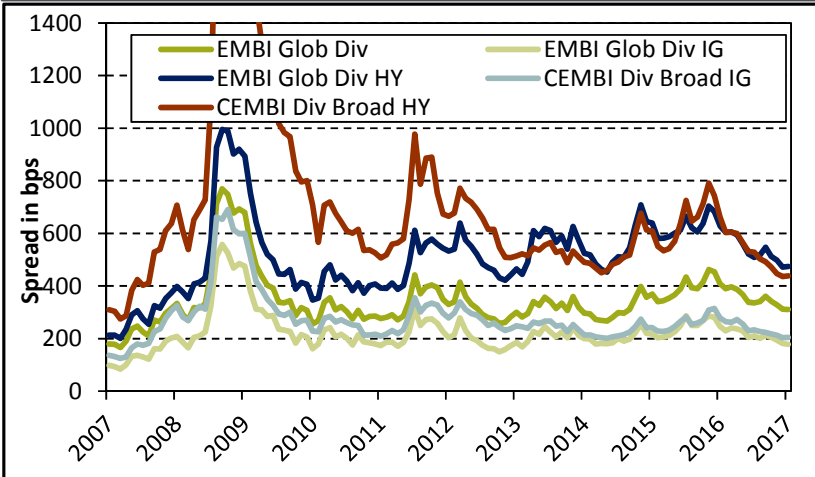
Global bonds post relatively strong short-term returns



Source: Bloomberg, Citigroup, Barclays

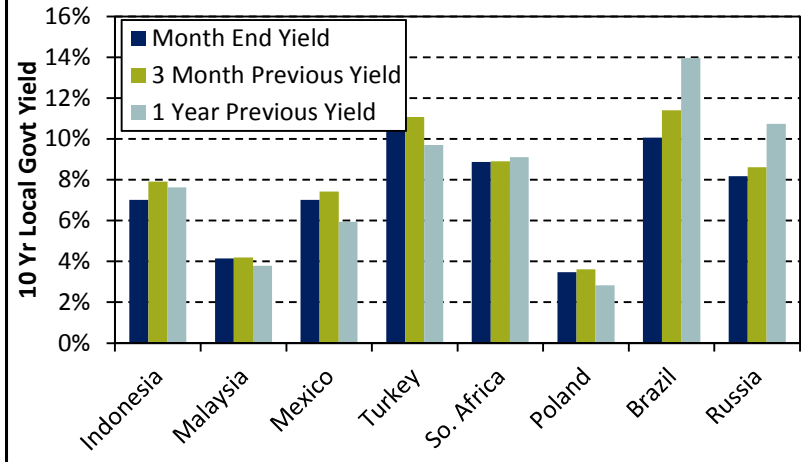
Emerging Markets Fixed Income

Spreads continue to decline



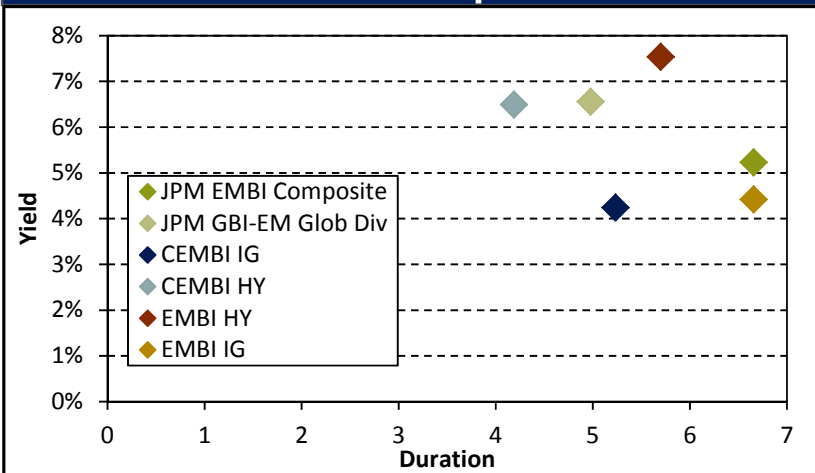
Source: Bloomberg, JP Morgan

Ex Russia and Brazil, EM local bond yields remain largely unchanged for the year



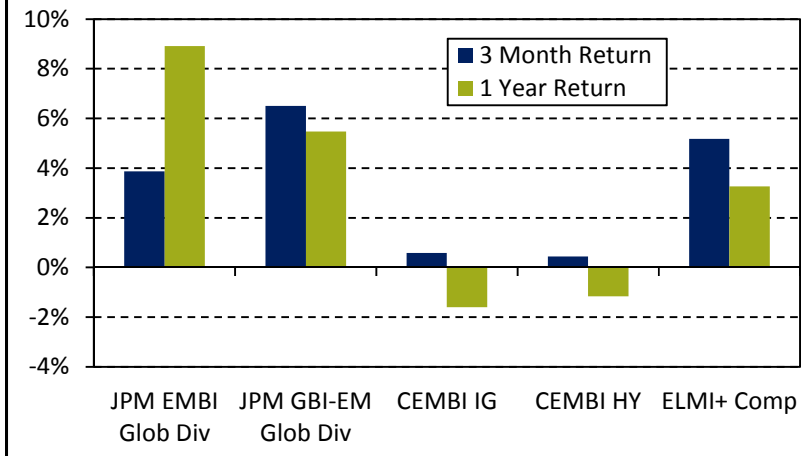
Source: Bloomberg

EM yields remain attractive versus global counterparts



Source: Bloomberg, JP Morgan

EM debt posts strong positive short-term returns



Source: Bloomberg, JP Morgan



- **Past performance is no guarantee of future results.**
- **The goal of this report is to provide a basis for monitoring financial markets. The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.**
- **Information on market indices was provided by sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.**
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Q1 2017 Performance & Asset Allocation



Asset Allocation: Broad Composites

	Market Value \$	% of Portfolio	Policy %
Total Equity	487,413,857	23.1%	30%
Total Fixed Income	229,749,325	10.9%	33%
Total GAA	137,758,176	6.5%	10%
Total Real Assets	948,651,396	44.9%	25%
Cash	421,017,340	19.9%	2%
DPFP Debt	(110,000,000)	-5.2%	---
Total DPFP	2,114,590,093	100%	100%



Asset Allocation: By Asset Class

	Current Allocation \$	Current Allocation %	Policy %
Global Equity	174,175,706	8.2%	20%
Emerging Market Equity	--	0.0%	5%
Private Equity	313,238,150	14.8%	5%
<i>Total Equity</i>	487,413,857	23.1%	30%
Short-Term Core Bonds	--	0.0%	2%
High Yield	77,608,681	3.7%	5%
Bank Loans	57,068,161	2.7%	6%
Emerging Market Debt	18,650,794	0.9%	6%
Global Bonds	61,997,149	2.9%	3%
Structured & AR Credit	--	0.0%	6%
Private Debt	14,424,541	0.7%	5%
<i>Total Fixed Income</i>	229,749,325	10.9%	33%
GTAA	21,678,235	1.0%	3%
Risk Parity	77,688,398	3.7%	5%
Absolute Return	38,391,543	1.8%	2%
<i>Total GAA</i>	137,758,176	6.5%	10%
Real Estate	510,582,738	24.1%	12%
Real Assets – Liquid	--	0.0%	3%
Natural Resources	266,068,236	12.6%	5%
Infrastructure	172,000,422	8.1%	5%
<i>Total Real Assets</i>	948,651,396	44.9%	25%
Cash	421,017,340	19.9%	2%
DPPF Debt	(110,000,000)	-5.2%	--
Total	2,114,590,093	100%	100%



Asset Allocation: Portfolio Lookthrough

	Lookthrough %	Actual %	Policy %
US Equity	4.0%	--	--
International Equity	4.1%	--	--
Emerging Markets Eq	0.8%	--	5%
Global Equity	--	8.2%	20%
Private Equity	14.8%	14.8%	5%
<i>Total Equity</i>	23.7%	23.0%	30%
Short-Term Core Bonds	--	--	2%
High Yield	3.7%	3.7%	5%
Bank Loans	2.7%	2.7%	6%
Emerging Market Debt	1.1%	0.9%	6%
Global Bonds	5.3%	2.9%	3%
Structured & AR Credit	--	--	6%
Private Debt	0.7%	0.7%	5%
<i>Total Fixed Income</i>	13.5%	10.9%	33%

	Lookthrough %	Actual %	Policy %
GTAA	--	1.0%	3%
Risk Parity	--	3.7%	5%
Absolute Return	--	1.8%	2%
Hedge Funds*	2.6%	--	--
<i>Total GAA</i>	2.6%	6.5%	10%
Real Estate	24.7%	24.2%	12%
Real Assets – Liquid	--	--	3%
Natural Resources	12.6%	12.6%	5%
Infrastructure	8.1%	8.1%	5%
<i>Total Real Assets</i>	45.4%	44.9%	25%
Cash	19.7%	19.9%	2%
DPPF Debt	-5.2%	-5.2%	--

*Hedge Fund lookthrough exposure due to GMO and Bridgewater Pure Alpha Major Markets allocations.

Dallas Police & Fire Pension

Trailing Returns: By Broad Composite

	Market Value (\$)	% of Portfolio	3 Mo (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	7 Yrs (%)	Rank	10 Yrs (%)	Rank	Return (%)	Since
DPFP	2,114,590,093	100.0	0.7	99	5.7	99	-2.5	99	1.1	99	2.4	99	1.0	99	6.1	Jun-96
<i>Policy Index</i>			4.4	40	11.7	28	7.9	1	8.7	5	8.9	5	5.9	13	--	Jun-96
Total Equity	487,413,857	23.1	1.3	--	5.8	--	2.3	--	7.3	--	--	--	--	--	6.3	Dec-10
<i>Total Equity Policy Index</i>			7.7	--	17.1	--	--	--	--	--	--	--	--	--	--	Dec-10
Total Fixed Income	229,749,325	10.9	-0.9	99	6.4	40	0.9	61	4.0	38	6.3	16	5.0	43	5.6	Jul-06
<i>Total Fixed Income Policy Index</i>			2.8	30	9.3	26	--	--	--	--	--	--	--	--	--	Jul-06
Total GAA	137,758,176	6.5	2.8	81	13.9	11	4.4	24	4.8	42	6.2	33	--	--	3.9	Jul-07
<i>Total Asset Allocation Policy Index</i>			4.0	46	6.7	60	6.1	10	6.3	17	6.7	23	--	--	6.7	Jul-07
Total Real Assets	948,651,396	44.9	0.7	--	3.6	--	-8.6	--	-4.6	--	--	--	--	--	-4.7	Dec-10
<i>Total Real Assets Policy Index</i>			3.1	--	11.5	--	--	--	--	--	--	--	--	--	--	Dec-10
Cash Equivalents	421,017,340	19.9	0.1	--	0.7	--	--	--	--	--	--	--	--	--	1.1	Apr-15
<i>91 Day T-Bills</i>			0.1	--	0.4	--	0.2	--	0.1	--	0.1	--	0.5	--	0.2	Apr-15

Policy Indexes are calculated using policy benchmarks and weights of the underlying sub composites.

Net of fees returns shown on report are time weighted.

Dallas Police & Fire Pension

Trailing Returns: By Asset Class

	Market Value (\$)	% of Portfolio	3 Mo (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	7 Yrs (%)	Rank	10 Yrs (%)	Rank	Return (%)	Since
DPFP	2,114,590,093	100.0	0.7	99	5.7	99	-2.5	99	1.1	99	2.4	99	1.0	99	6.1	Jun-96
<i>Policy Index</i>			4.4	40	11.7	28	7.9	1	8.7	5	8.9	5	5.9	13	--	Jun-96
Global Equity	174,175,706	8.2	8.3	21	16.9	20	6.3	31	9.6	37	8.9	49	4.4	46	5.6	Jul-06
<i>MSCI ACWI Gross</i>			7.0	39	15.7	28	5.7	39	9.0	50	8.4	57	4.6	45	5.8	Jul-06
Private Equity	313,238,150	14.8	-2.1	--	1.0	--	-6.5	--	-2.4	--	-0.1	--	-0.4	--	1.9	Oct-05
<i>Russell 3000 + 3%</i>			6.5	--	21.6	--	13.0	--	16.5	--	16.2	--	10.7	--	11.4	Oct-05
Global Bonds	61,997,149	2.9	4.5	8	0.4	76	0.7	64	1.5	68	--	--	--	--	2.5	Dec-10
<i>BBgBarc Global Aggregate TR</i>			1.8	64	-1.9	88	-0.4	80	0.4	83	2.0	84	3.3	83	1.3	Dec-10
High Yield	77,608,681	3.7	5.6	1	23.3	1	3.1	71	6.1	50	--	--	--	--	7.1	Dec-10
<i>BBgBarc Global High Yield TR</i>			3.2	22	13.2	49	3.7	60	6.5	39	7.6	23	7.4	1	6.9	Dec-10
Bank Loans	57,068,161	2.7	1.6	72	12.9	13	3.9	21	--	--	--	--	--	--	4.1	Jan-14
<i>S&P/LSTA U.S. Leveraged Loan</i>			1.1	84	9.7	23	3.6	28	4.6	29	4.8	34	4.6	48	3.7	Jan-14
Emerging Markets Debt	18,650,794	0.9	6.9	24	14.2	7	3.0	53	2.5	58	--	--	--	--	3.6	Dec-10
<i>50% JPM EMBI/50% JPM GBI-EM</i>			5.2	49	7.3	75	1.5	60	1.8	60	--	--	--	--	3.0	Dec-10
Private Debt	14,424,541	0.7	-20.8	--	-19.4	--	--	--	--	--	--	--	--	--	-14.5	Jan-16
<i>Barclays Global High Yield +2%</i>			3.7	--	15.5	--	--	--	--	--	--	--	--	--	16.3	Jan-16
Risk Parity	77,688,398	3.7	3.3	61	11.3	26	3.3	38	4.5	49	--	--	--	--	6.7	Dec-10
<i>60% MSCI ACWI/40% Barclays Global Agg</i>			4.8	33	8.0	48	3.0	45	5.2	35	5.6	43	4.0	61	5.0	Dec-10
GTA	21,678,235	1.0	5.1	28	9.0	41	2.5	47	4.8	42	--	--	--	--	5.4	Dec-10
<i>60% MSCI ACWI/40% Barclays Global Agg</i>			4.8	33	8.0	48	3.0	45	5.2	35	5.6	43	4.0	61	5.0	Dec-10
Absolute Return	38,391,543	1.8	0.5	50	23.0	3	9.2	5	7.8	10	--	--	--	--	7.9	Aug-11
<i>HFRX Absolute Return Index</i>			0.7	47	1.5	52	1.1	65	1.7	56	0.9	66	-0.8	92	1.3	Aug-11
Natural Resources	266,068,236	12.6	0.7	--	3.7	--	--	--	--	--	--	--	--	--	4.0	Apr-15
<i>Natural Resources Benchmark</i>			2.8	--	23.8	--	15.1	--	15.3	--	--	--	--	--	19.6	Apr-15
Infrastructure	172,000,422	8.1	2.7	--	0.0	--	-1.7	--	--	--	--	--	--	--	1.1	Jul-12
<i>Infrastructure Benchmark</i>			7.9	--	11.7	--	10.1	--	--	--	--	--	--	--	8.9	Jul-12
Real Estate	510,582,738	24.1	0.1	--	4.7	--	-12.8	--	-7.6	--	-6.2	--	-4.8	--	3.6	Mar-85
<i>NCREIF Property Index</i>			1.6	--	7.3	--	10.6	--	10.7	--	11.8	--	6.7	--	8.0	Mar-85
Cash Equivalents	421,017,340	19.9	0.1	--	0.7	--	--	--	--	--	--	--	--	--	1.1	Apr-15
<i>91 Day T-Bills</i>			0.1	--	0.4	--	0.2	--	0.1	--	0.1	--	0.5	--	0.2	Apr-15

Total Fund Risk/Return

3 Years Ending March 31, 2017

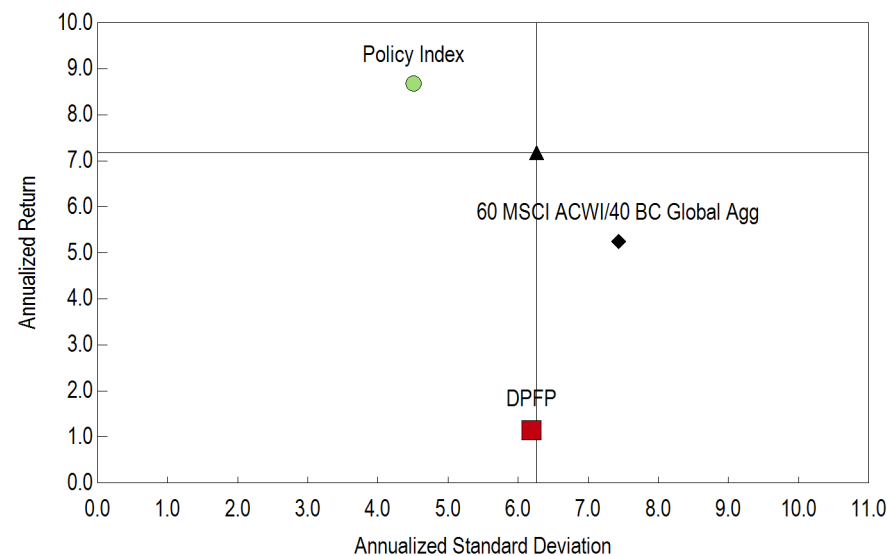
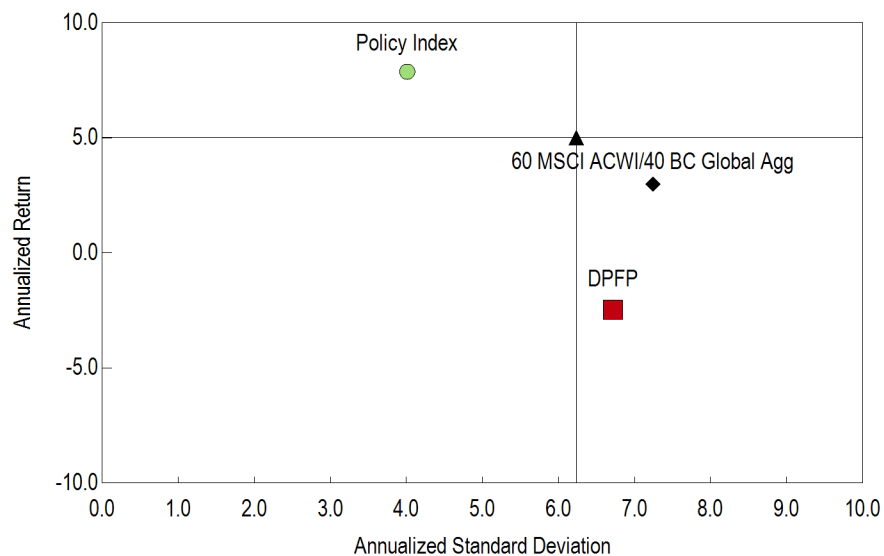
	Anlzd Ret	Rank	Anlzd Std Dev	Rank
DPFP	-2.5%	99	6.7%	73
Policy Index	7.9%	1	4.0%	3
60 MSCI ACWI/40 BC Global Agg	3.0%	97	7.2%	88
InvestorForce Public DB Net Median	5.0%	--	6.2%	--

	Sharpe Ratio	Rank	Sortino Ratio RF	Rank
DPFP	-0.39	99	-0.33	99
Policy Index	1.92	1	4.39	1
60 MSCI ACWI/40 BC Global Agg	0.39	98	0.75	93
InvestorForce Public DB Net Median	0.79	--	1.22	--

5 Years Ending March 31, 2017

	Anlzd Ret	Rank	Anlzd Std Dev	Rank
DPFP	1.1%	99	6.2%	47
Policy Index	8.7%	5	4.5%	4
60 MSCI ACWI/40 BC Global Agg	5.2%	95	7.4%	92
InvestorForce Public DB Net Median	7.2%	--	6.3%	--

	Sharpe Ratio	Rank	Sortino Ratio RF	Rank
DPFP	0.17	99	0.15	99
Policy Index	1.90	2	2.36	5
60 MSCI ACWI/40 BC Global Agg	0.69	98	1.12	97
InvestorForce Public DB Net Median	1.13	--	1.68	--



Attribution Analysis: By Asset Class – 3 Months Ending March 31, 2017

	Portfolio Weights		Returns		Attribution Effects By			
	DPFP [#]	Policy	DPFP	Index	Selection	Allocation	Interaction	Total *
Global Equity	8.2%	20.0%	8.317%	7.047%	0.245%	-0.337%	-0.156%	-0.248%
Emerging Markets Equity	0.0%	5.0%	0.000%	11.486%	-0.564%	-0.344%	0.564%	-0.344%
Private Equity	14.8%	5.0%	-2.064%	6.513%	-0.430%	0.193%	-0.839%	-1.076%
Short Term Core Bonds	0.0%	2.0%	0.000%	0.272%	-0.006%	0.083%	0.006%	0.083%
Global Bonds	2.9%	3.0%	4.504%	1.761%	0.082%	0.009%	-0.009%	0.082%
High Yield	3.7%	5.0%	5.581%	3.176%	0.120%	0.019%	-0.041%	0.098%
Bank Loans	2.7%	6.0%	1.569%	1.145%	0.026%	0.114%	-0.015%	0.124%
Structured & A/R Credit	0.0%	6.0%	0.000%	2.436%	-0.148%	0.117%	0.148%	0.117%
Emerging Markets Debt	0.9%	6.0%	6.915%	5.181%	0.102%	-0.037%	-0.087%	-0.022%
Private Debt	0.7%	5.0%	-20.760%	3.683%	-1.298%	0.020%	0.669%	-0.609%
GTAA	1.0%	3.0%	5.054%	4.830%	0.007%	-0.009%	-0.005%	-0.007%
Risk Parity	3.7%	5.0%	3.298%	4.830%	-0.075%	-0.007%	0.024%	-0.058%
Absolute Return	1.8%	2.0%	0.452%	0.650%	-0.003%	0.013%	0.000%	0.010%
Real Estate	24.1%	12.0%	0.072%	1.550%	-0.179%	-0.383%	-0.201%	-0.764%
Liquid Real Assets	0.0%	3.0%	0.000%	1.614%	-0.049%	0.083%	0.049%	0.083%
Natural Resources	12.6%	5.0%	0.748%	2.763%	-0.106%	-0.106%	-0.137%	-0.349%
Infrastructure	8.1%	5.0%	2.680%	7.945%	-0.258%	0.082%	-0.129%	-0.304%
Cash Equivalents	19.9%	2.0%	0.115%	0.144%	-0.001%	-0.554%	-0.004%	-0.559%
Total *	105.1%	100.0%	0.649%	4.392%	-2.535%	-1.046%	-0.162%	-3.743%

*Total column may not add up due to rounding.

#Total DPFP Portfolio Weights include 5.2% in DPFP debt.



Attribution Analysis: By Asset Class – 12 Months Ending March 31, 2017

	Portfolio Weights		Returns		Attribution Effects By			
	DPFP #	Policy	DPFP	Index	Selection	Allocation	Interaction	Total *
Global Equity	8.2%	20.0%	16.938%	15.686%	0.245%	-0.516%	-0.088%	-0.359%
Emerging Markets Equity	0.0%	5.0%	0.000%	17.652%	-0.909%	-0.306%	0.909%	-0.306%
Private Equity	14.8%	5.0%	1.038%	21.559%	-0.954%	1.089%	-2.419%	-2.285%
Short Term Core Bonds	0.0%	2.0%	0.000%	0.236%	-0.005%	0.236%	0.005%	0.236%
Global Bonds	2.9%	3.0%	0.355%	-1.903%	0.076%	0.012%	-0.053%	0.034%
High Yield	3.7%	5.0%	23.290%	13.246%	0.464%	0.052%	-0.036%	0.479%
Bank Loans	2.7%	6.0%	12.930%	9.722%	0.189%	0.067%	-0.128%	0.128%
Structured & A/R Credit	0.0%	6.0%	0.000%	11.534%	-0.709%	0.014%	0.709%	0.014%
Emerging Markets Debt	0.9%	6.0%	14.225%	7.258%	0.407%	0.172%	-0.292%	0.288%
Private Debt	0.7%	5.0%	-19.398%	15.488%	-1.864%	-0.059%	0.905%	-1.018%
GTAA	1.0%	3.0%	9.041%	8.025%	0.030%	0.015%	-0.008%	0.036%
Risk Parity	3.7%	5.0%	11.326%	8.025%	0.165%	0.000%	0.080%	0.245%
Absolute Return	1.8%	2.0%	22.961%	1.545%	0.439%	0.066%	-0.147%	0.358%
Real Estate	24.1%	12.0%	4.681%	7.270%	-0.320%	-0.540%	-0.321%	-1.180%
Liquid Real Assets	0.0%	3.0%	0.000%	7.492%	-0.234%	0.127%	0.234%	0.127%
Natural Resources	12.6%	5.0%	3.666%	23.806%	-1.011%	0.638%	-1.122%	-1.495%
Infrastructure	8.1%	5.0%	0.022%	11.683%	-0.612%	0.035%	-0.273%	-0.849%
Cash Equivalents	19.9%	2.0%	0.682%	0.377%	0.007%	-0.672%	-0.003%	-0.668%
Total *	105.1%	100.0%	5.518%	11.733%	-4.598%	0.431%	-2.047%	-6.215%

*Total column may not add up due to rounding.

#Total DPFP Portfolio Weights include 5.2% in DPFP debt.



Attribution Analysis: Definition and Explanation (3 months ending 3/31/2017)

- **Selection Effect**

- Contribution to excess return due to the over/under weighting of managers within asset classes
 - The Selection Effect of **0.245%** is due to the outperformance of the DPF Global Equity return vs. the Global Equity Index return. Based on policy, DPF selected outperforming managers vs. the index.
 - $20\% * (8.317\% - 7.047\%) = 0.245\%$

- **Allocation Effect**

- Contribution to excess return due to the over/under weighting of asset classes
 - The Allocation Effect of **-0.337%** is due to the underweighting of the Global Equity allocation, 8.2% vs. the Global Equity Policy Allocation, 20% and also the out performance of the Global Equity Index, 7.047% vs. the Total Plan Index, 4.392%. DPF was underweight to an outperforming sector resulting in a negative Allocation Effect.
 - $(8.2\% - 20\%) * (7.047\% - 4.392\%) = -0.337\%$

- **Interaction Effect**

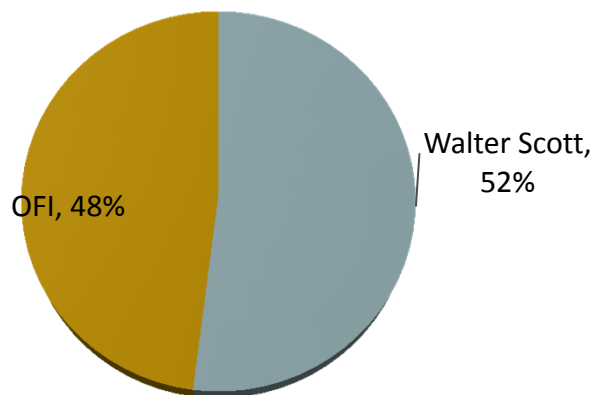
- Is the residual effect due to timing not explained directly by either the selection or the allocation effect.
 - $(8.2\% - 20\%) * (8.317\% - 7.047\%) = -0.156\%$

	Portfolio Weights		Returns		Attribution Effects By			
	DPFP [#]	Policy	DPFP	Index	Selection	Allocation	Interaction	Total *
Global Equity	8.2%	20.0%	8.317%	7.047%	0.245%	-0.337%	-0.156%	-0.248%
Total *	105.1%	100.0%	0.649%	4.392%	-2.535%	-1.046%	-0.162%	-3.743%

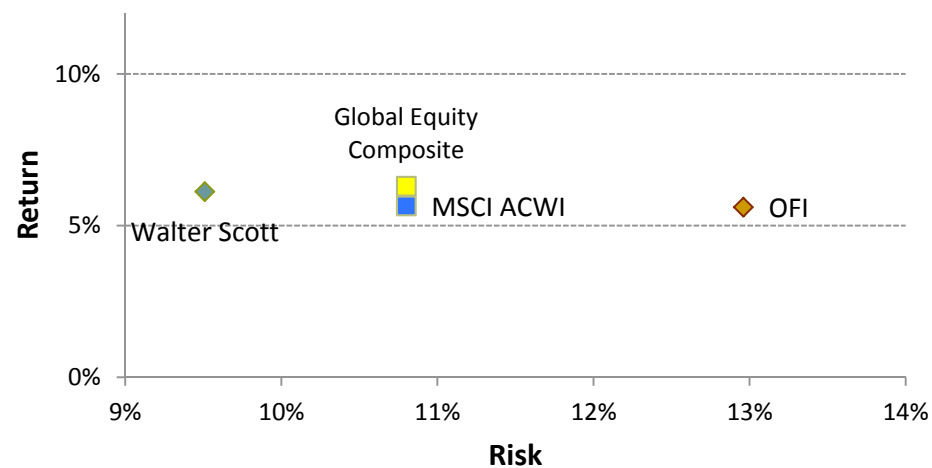
Global Public Equity: Composite Overview

Manager	Benchmark	Descriptions
OFI	MSCI ACWI	Growth
Walter Scott	MSCI ACWI	Growth

Global Equity Managers



3-Year Risk/Return



*May not add to 100% due to rounding.

Dallas Police & Fire Pension

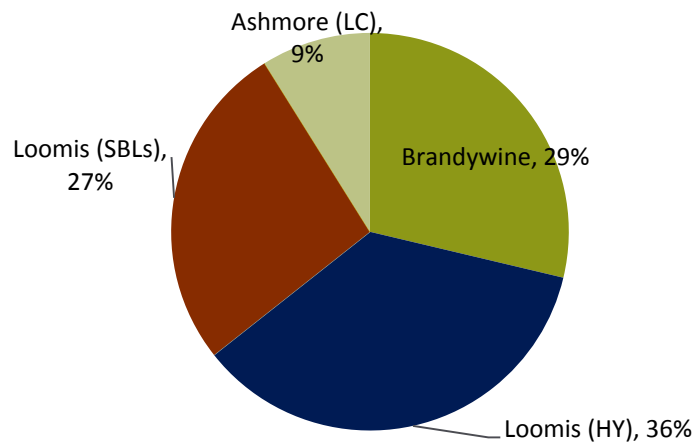
DPFP

	Market Value (\$)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Return (%)	Since
DPFP	2,114,590,093	100.0	0.7	5.7	-2.5	1.1	2.4	1.0	6.1	Jun-96
<i>Policy Index</i>			4.4	11.7	7.9	8.7	8.9	5.9	--	Jun-96
<i>InvestorForce Public DB Net Rank</i>			99	99	99	99	99	99	72	Jun-96
Global Equity	174,175,706	8.2	8.3	16.9	6.3	9.6	8.9	4.4	5.6	Jul-06
<i>MSCI ACWI Gross</i>			7.0	15.7	5.7	9.0	8.4	4.6	5.8	Jul-06
<i>eA All Global Equity Net Rank</i>			21	20	31	37	49	46	45	Jul-06
Pyramis	162,814	0.0								
<i>eA All Global Equity Net Rank</i>										
Walter Scott	90,433,986	4.3	6.9	11.5	6.1	8.6	8.4	--	8.5	Dec-09
<i>MSCI ACWI Gross</i>			7.0	15.7	5.7	9.0	8.4	4.6	8.8	Dec-09
<i>eA Global Large Cap Growth Eq Net Rank</i>			90	81	46	77	67	--	80	Dec-09
OFI	83,461,757	3.9	9.9	18.4	5.6	10.1	9.2	--	4.8	Oct-07
<i>MSCI ACWI Gross</i>			7.0	15.7	5.7	9.0	8.4	4.6	3.6	Oct-07
<i>eA Global Large Cap Growth Eq Net Rank</i>			39	11	61	29	44	--	56	Oct-07
RREEF Global REIT	88,420	0.0								
<i>eA Global REIT Net Rank</i>										
Sustainable Asset Management	28,706	0.0								
<i>eA All Global Equity Net Rank</i>										

Global Fixed Income: Composite Overview

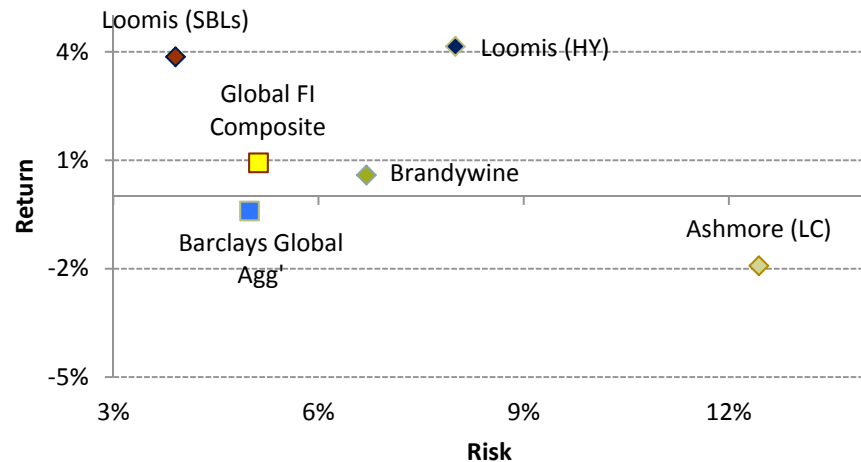
Manager	Benchmark	Asset Class	Descriptions
Brandywine	Barclays Global Aggregate	Global Bonds	Aggressive, but diversified
Loomis (HY)	70% MLHY/30% JPM EMBI+	High Yield	Aggressive
Loomis (BLs)	S&P/LSTA US Levered	Bank Loans	Bank Loans (min 65% of portfolio)
Ashmore (Local Currency)	JPM EMBI Global Diversified	Emerging Market Debt	Diversified, Local Currency

Global Fixed Income Managers



*May not add to 100% due to rounding.

3-Year Risk/Return



Dallas Police & Fire Pension

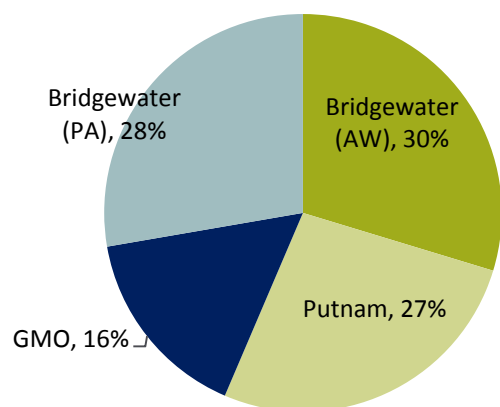
DPFP

	Market Value (\$)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Return (%)	Since
DPFP	2,114,590,093	100.0	0.7	5.7	-2.5	1.1	2.4	1.0	6.1	Jun-96
<i>Policy Index</i>			4.4	11.7	7.9	8.7	8.9	5.9	--	Jun-96
<i>InvestorForce Public DB Net Rank</i>			99	99	99	99	99	99	72	Jun-96
Public Fixed Income	215,324,784	10.2	4.3	13.3	2.6	4.4	--	--	5.7	Dec-10
<i>BBgBarc Global Aggregate TR</i>			1.8	-1.9	-0.4	0.4	2.0	3.3	1.3	Dec-10
Brandywine	61,997,149	2.9	4.5	0.8	0.6	2.2	4.8	5.7	4.8	Oct-04
<i>BBgBarc Global Aggregate TR</i>			1.8	-1.9	-0.4	0.4	2.0	3.3	3.5	Oct-04
<i>eA All Global Fixed Inc Net Rank</i>			8	73	66	61	34	30	48	Oct-04
Loomis Sayles	77,608,681	3.7	5.7	25.1	4.2	7.3	8.3	7.9	10.0	Oct-98
<i>70% BofA ML High Yield / 30% JPM EMBI Plus</i>			3.0	14.0	5.0	6.4	7.4	7.2	8.2	Oct-98
<i>eA Global High Yield Fixed Inc Net Rank</i>			1	1	42	12	1	1	1	Oct-98
Loomis Sayles Senior Rate and Fixed Income	57,068,161	2.7	1.6	12.9	3.9	--	--	--	4.1	Jan-14
<i>S&P/LSTA U.S. Leveraged Loan</i>			1.1	9.7	3.6	4.6	4.8	4.6	3.7	Jan-14
<i>eA Float-Rate Bank Loan Net Rank</i>			10	9	29	--	--	--	27	Jan-14
Ashmore AEMLCB	18,650,794	0.9	7.9	9.0	-1.9	-1.6	--	--	-0.4	Mar-11
<i>JP Morgan GBI EM Global Diversified TR USD</i>			6.5	5.5	-2.7	-1.6	1.0	4.1	-0.3	Mar-11
<i>eA All Emg Mkts Fixed Inc Net Rank</i>			7	52	80	81	--	--	78	Mar-11

Global Asset Allocation: Composite Overview

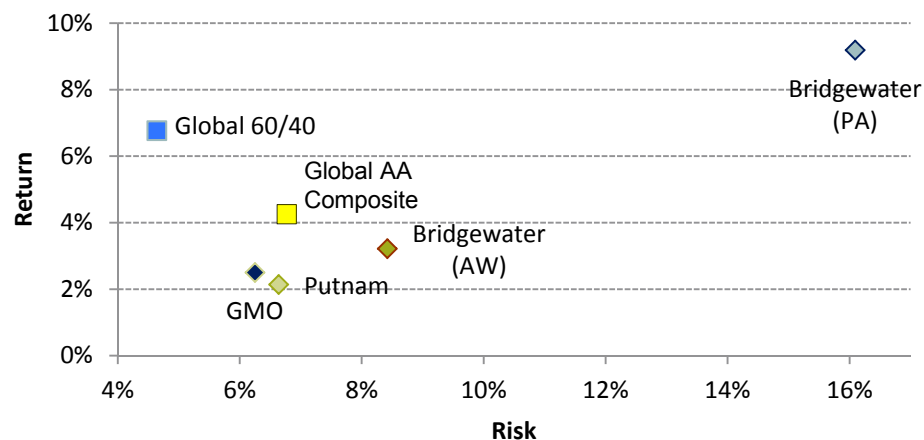
Manager	Benchmark	Asset Class	Descriptions
Bridgewater (All Weather)	Global 60/40	Risk Parity	Passive approach
Bridgewater (Pure Alpha)	HFRX Absolute Return	Absolute Return	Global Macro Hedge Fund
GMO	Global 60/40	GTAA	Unconstrained
Putnam	Global 60/40	Risk Parity	Active approach

GAA Managers



*May not add to 100% due to rounding.

3-Year Risk/Return



Dallas Police & Fire Pension

DPFP

	Market Value (\$)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Return (%)	Since
DPFP	2,114,590,093	100.0	0.7	5.7	-2.5	1.1	2.4	1.0	6.1	Jun-96
Policy Index			4.4	11.7	7.9	8.7	8.9	5.9	--	Jun-96
InvestorForce Public DB Net Rank			99	99	99	99	99	99	72	Jun-96
Total GAA	137,758,176	6.5	2.8	13.9	4.4	4.8	6.2	--	3.9	Jul-07
Total Asset Allocation Policy Index			4.0	6.7	6.1	6.3	6.7	--	6.7	Jul-07
eA All Global Balanced / TAA Net Rank			81	11	24	42	33	--	61	Jul-07
Bridgewater All Weather	41,100,372	1.9	3.6	12.5	3.2	4.2	8.5	--	5.7	Sep-07
Global 60/40			4.8	8.0	7.1	6.7	6.5	--	6.7	Sep-07
eA All Global Balanced / TAA Net Rank			55	17	43	53	12	--	13	Sep-07
Putnam	36,588,026	1.7	3.0	10.0	2.1	3.7	5.5	--	5.8	Dec-09
Global 60/40			4.8	8.0	6.8	6.7	7.0	--	6.9	Dec-09
eA All Global Balanced / TAA Net Rank			78	35	56	63	44	--	43	Dec-09
GMO	21,678,235	1.0	5.1	9.0	2.5	4.8	5.3	--	4.5	Sep-07
Global 60/40			4.8	8.0	6.8	6.7	7.0	--	7.0	Sep-07
eA All Global Balanced / TAA Net Rank			28	41	47	42	51	--	45	Sep-07
Bridgewater Pure Alpha	38,391,543	1.8	0.5	23.0	9.2	7.8	--	--	7.9	Aug-11
HFRX Absolute Return			0.7	1.5	3.8	4.7	--	--	4.9	Aug-11
eV Alt All Macro Rank			50	3	5	10	--	--	10	Aug-11

Policy Compliance Test: Traditional Managers

3 Year Rolling Excess Return Violations:

Manager	Return Rank	NEPC Recommendation
Global Equity		
OFI	61	HOLD
Public Fixed Income		
Brandywine	66	HOLD
Ashmore AEMLCB	80	N/A
GAA		
Putnam	85	N/A

3 Year Rolling Risk-Adjusted Excess Return Violations:

Manager	Sharpe Ratio Rank	NEPC Recommendation
Global Equity		
OFI	67	HOLD
Public Fixed Income		
Brandywine	68	HOLD
Loomis Sayles HY	72	HOLD
Ashmore AEMLCB	77	N/A
GAA		
Putnam	56	N/A

Qualitative Concerns:

Manager	NEPC Status
N/A	N/A

Note: 'N/A' denotes that the Board has voted to terminate the manager in question. However, market exposure will be maintained with managers that have previously been approved for liquidation and to rebalance if additional cash is needed.

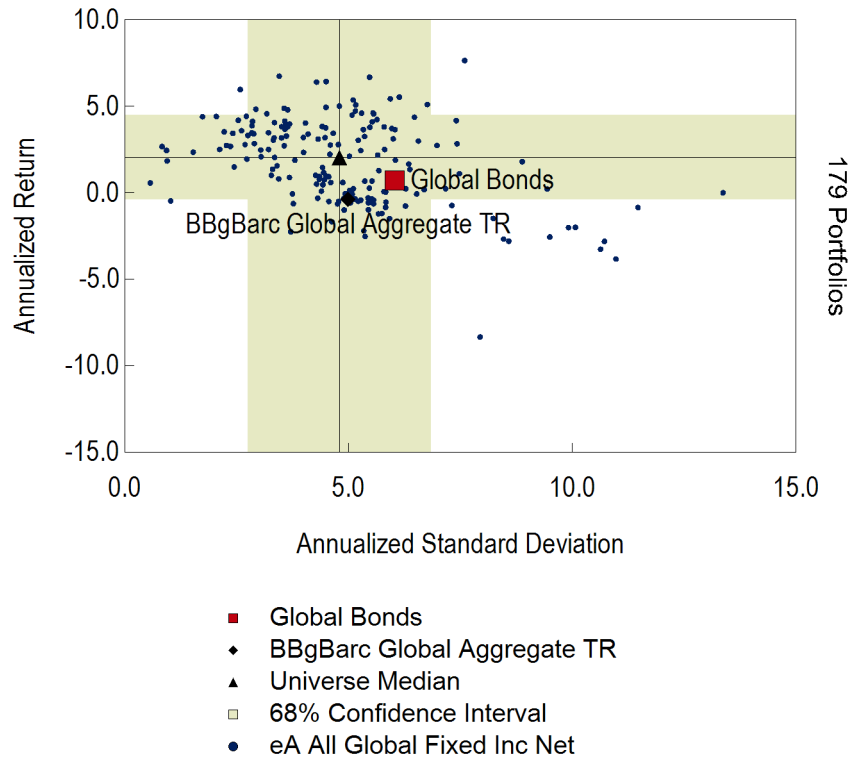
Footnotes

1. **Mitchell Group** was included in the Global Natural Resources composite from 10/1/2001 to 3/31/2015 and included in the Global Equity composite from 4/1/2015 to present.
2. **Sustainable Asset Management** was included in the Global Natural Resources composite from 11/1/2008 to 3/31/2015 and included in the Global Equity composite from 4/1/2015 to present.
3. **Hudson Clean Energy** was included in the Global Natural Resources composite from 1/1/2010 to 3/31/2015 and included in the Private Markets composite from 4/1/2015 to 12/31/2015 and the Private Equity composite from 1/1/2016 to present.
4. **RREEF** was included in the Real Estate composite from 2/1/1999 to 12/31/2009 and included in the Global Equity composite from 1/1/2010 to present.
5. **Highland Crusader** was included in the Global Fixed Income composite from 7/1/2003 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
6. **Highland Capital Management** was included in the Global Fixed Income composite from 1/1/2007 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
7. **Lone Star Fund VII, LP** was included in the Global Fixed Income composite from 10/1/2011 to 3/31/2015 and included in the Private Markets composite from 4/1/2015 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
8. **Lone Star Fund VIII, LP** was included in the Global Fixed Income composite from 10/1/2013 to 3/31/2015 and included in the Private Markets composite from 4/1/2015 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
9. **Lone Star Fund IX, LP** was included in the Global Fixed Income composite from 10/1/2014 to 3/31/2015 and included in the Private Markets composite from 4/1/2015 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
10. **Oaktree Fund IV & 2x Loan Fund** was included in the Global Fixed Income composite from 1/1/2002 to 3/31/2015 and included in the Private Markets composite from 4/1/2015 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
11. **Ashmore Capital GSSF IV** was included in the Private Markets composite from 10/1/2007 to 12/31/2015 and included in the Private Credit composite from 1/1/2016 to present.
12. **Global Infrastructure composite** was included in the Private Markets composite history until 6/30/2012.
13. **Private Equity composite** includes Private Credit managers until 12/31/2015. From 01/01/2016 to present the Private Equity and Credit managers are now in separate composites.
14. **Policy index** changed on 4/1/2016 from 20% MSCI ACWI, 15% S&P 500+2%, 10% Global Natural Resources Benchmark, 15% Barclays Global Agg, 20% CPI+5%, 10% CPI +5%, 15% NCREIF PI to 20% MSCI ACWI (gross), 5% MSCI EM Equity (gross), 5% Russell 3000 +3%, 2% Barclays UST 1-3 Yr, 3% Barclays Global Agg, 5% Barclays Global HY, 6% S&P Leveraged Loan Index, 6% HFRX RV: FI (50/50- Abs/Corp), 6%50% JPM EMBI/50% JPM GBI-EM, 5% Barclays Global HY +2%, 5% S&P Global Nat Res, 5% S&P Global Infra, 12% NCREIF, 3% CPI +5%, 5% 60% MSCI ACWI/40% Barclays Global Agg, 3% 60% MSCI ACWI/40% Barclays Global Agg, 2% HFRX Abs Ret Index, 2% 90 Day T-Bill.
15. **Natural Resources** benchmark changed from the Global Natural Resources benchmark from 12/1/2010 to 12/31/2015 to the S&P Global Natural Resources benchmark 1/1/2016 to present.
16. **Infrastructure** benchmark changed from CPI +5% from 7/1/2012 to 12/31/2015 to S&P Global Infrastructure benchmark 1/1/2016 to present.
17. **Total Asset Allocation** benchmark changed from CPI+ 5% from 7/1/2007 to 12/31/2015 to 80% 60/40 MSCI ACWI & Barclays Global Agg and 20% HFRX Absolute Return Index 1/1/2016 to present.
18. **Bridgewater All Weather** benchmark changed from 91 Day T Bills +6% from 9/1/2007 to 12/31/2015 to 60/40 MSCI ACWI & Barclays Global Agg 1/1/2016 to present.
19. **GMO** benchmark changed from CPI +5% from 9/1/2007 to 12/31/2015 to 60/40 MSCI ACWI & Barclays Global Agg 1/1/2016 to present.
20. **Putnam** benchmark changed from CPI +5% from 12/1/2009 to 12/31/2016 to 60/40 MSCI ACWI & Barclays Global Agg 1/1/2016 to present.
21. **Bridgewater Pure Alpha** benchmark changed from 91 Day T Bills +6% from 8/1/2011 to 12/31/2015 to HFRX Absolute Return Index 1/1/2016 to present.

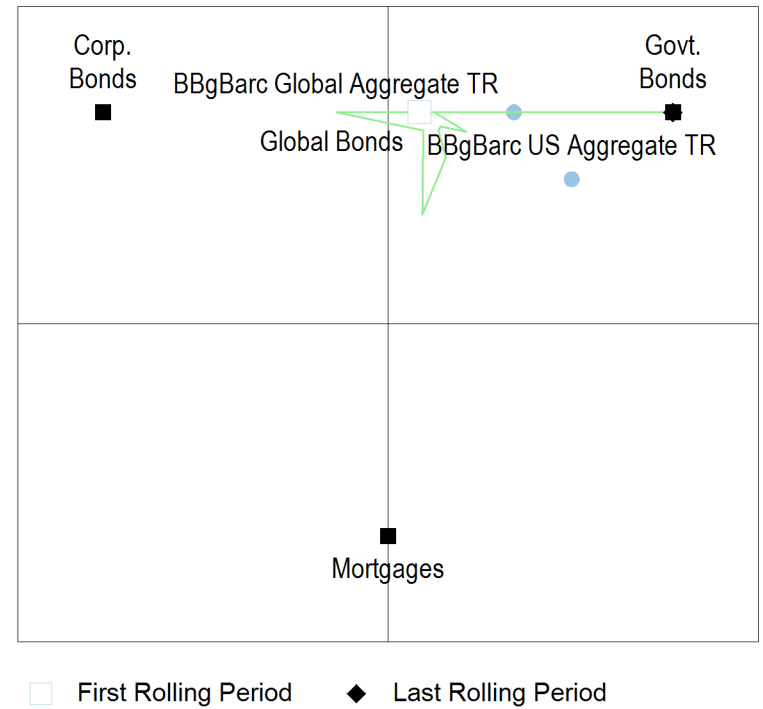
Portfolio Review: Global Fixed Income



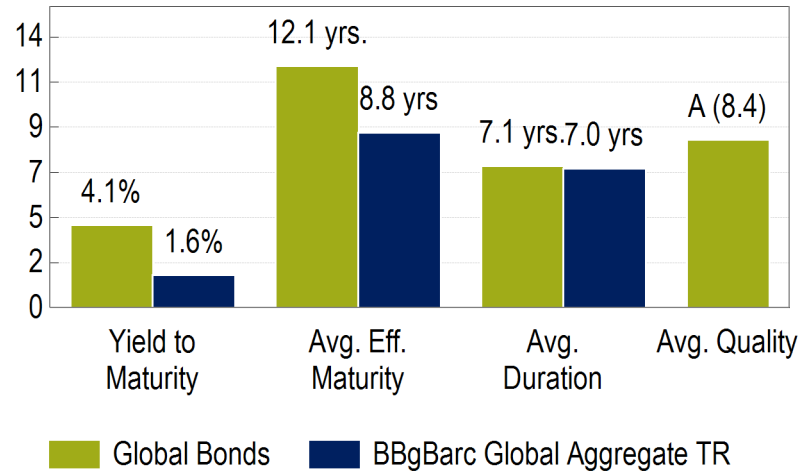
3 Year Risk Return



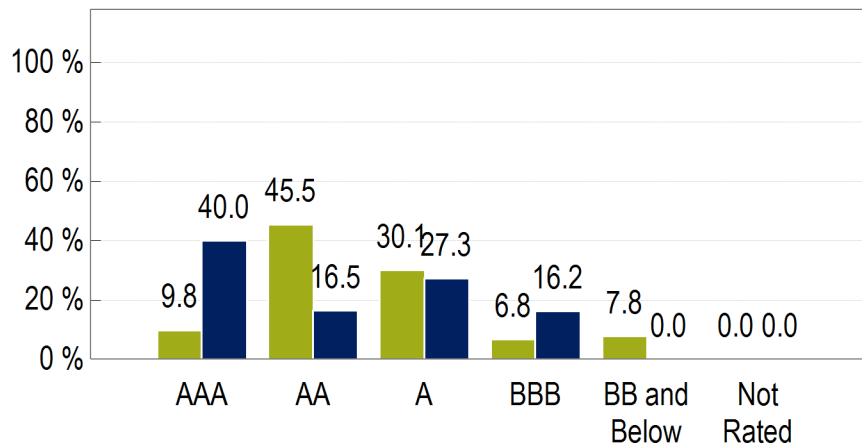
3 Year Style Analysis



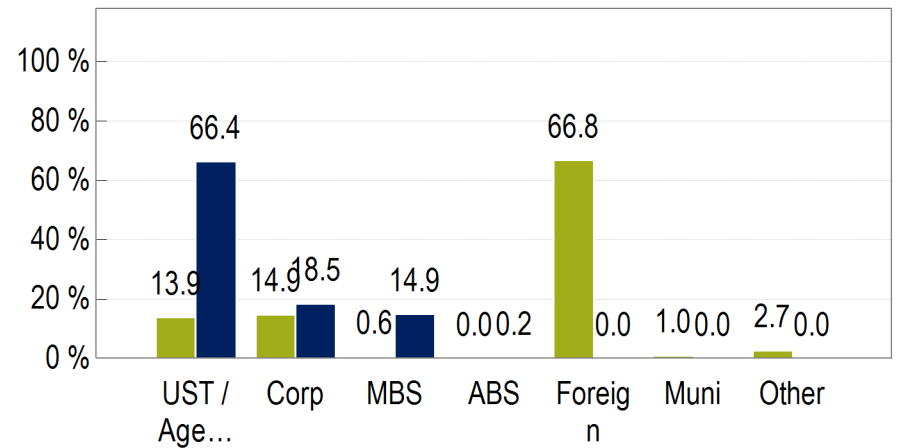
Characteristics



Quality Ratings



Sectors



Brandywine

- **Manager Role in Portfolio**

- Global fixed income manager

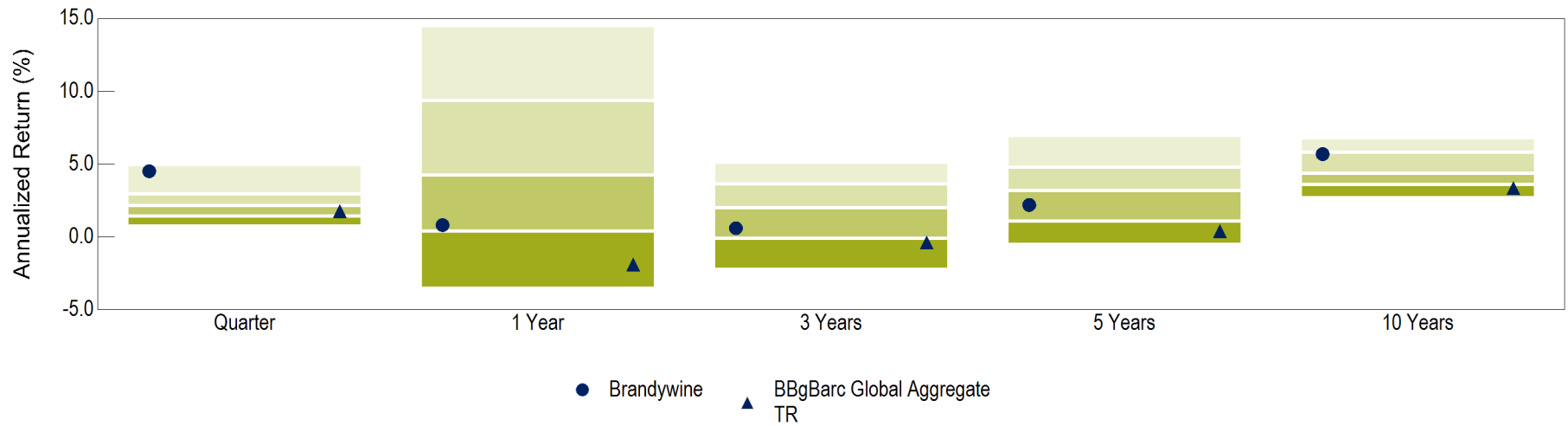
- **Organizational Profile**

- Brandywine Asset Management, LLC is a wholly-owned, independent subsidiary of Legg Mason, Inc. Prior to October 2001, they were Brandywine Asset Management, Inc. Of note, their senior investment professionals have non-competes with Legg Mason, Inc. for up to 6 years.

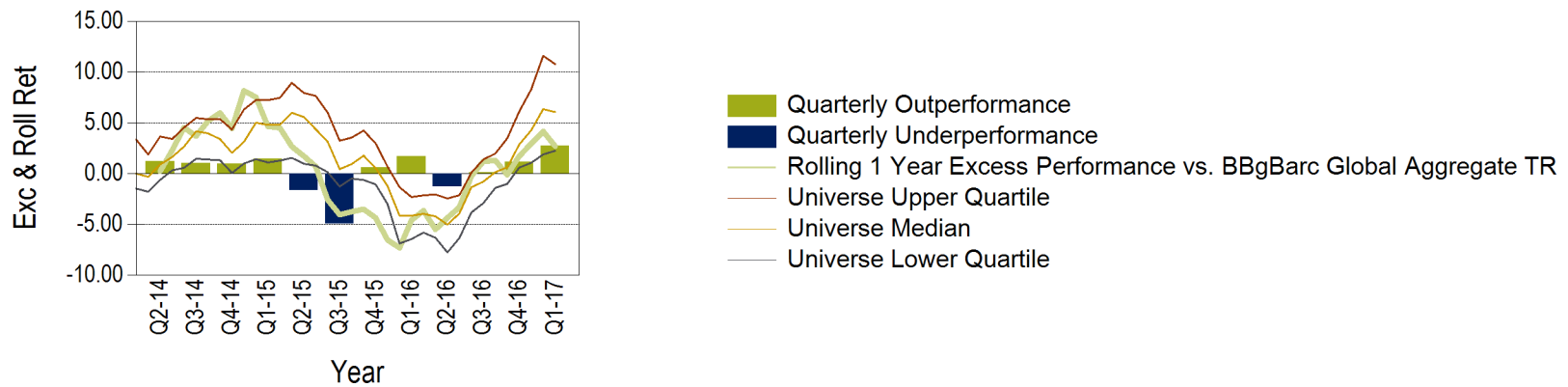
- **Investment Strategy Commentary**

- Brandywine attempts to invest in bonds with the highest real yield, manage currencies to protect principle and increase returns, avoid index-like weights, limit risk and patiently rotate countries
- Secular trends drive bond markets and opportunities exist to add value by identifying trends which capitalize on the dynamics of liquidity cycles and business cycles in each country
- Currency valuations that Brandywine considers extreme are hedged

eA All Global Fixed Inc Net Accounts

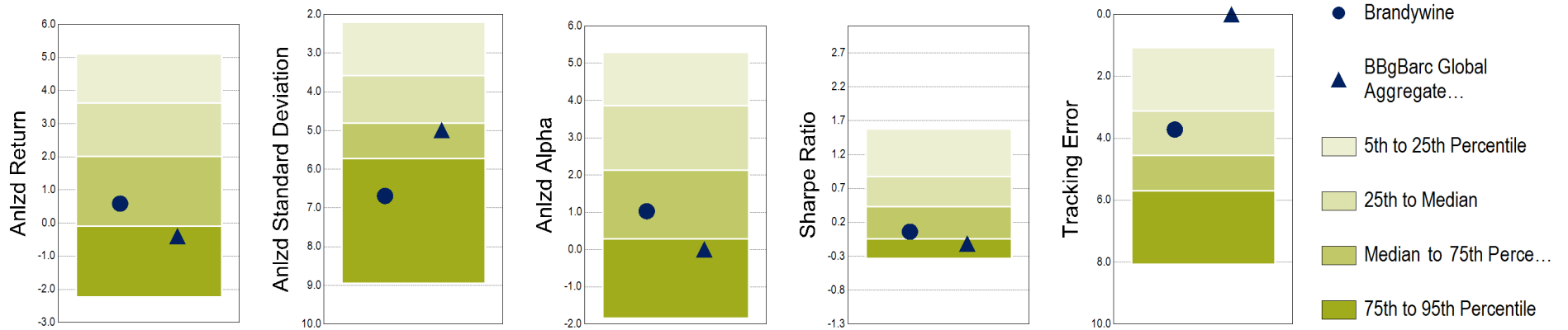
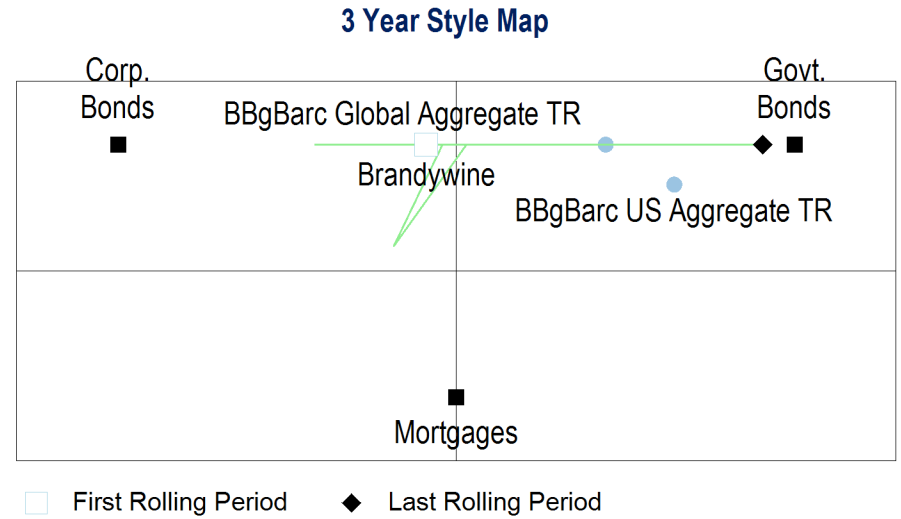
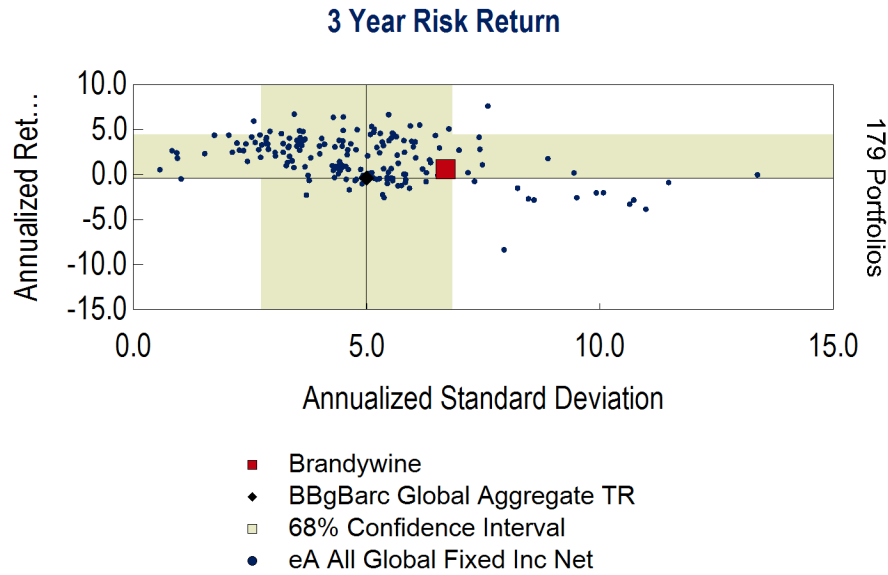


Annualized Excess Performance



Returns are net of fees

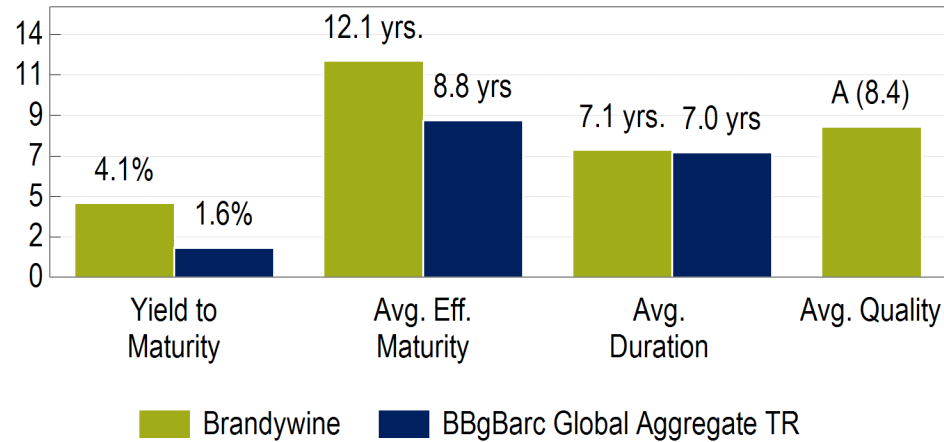
Brandywine



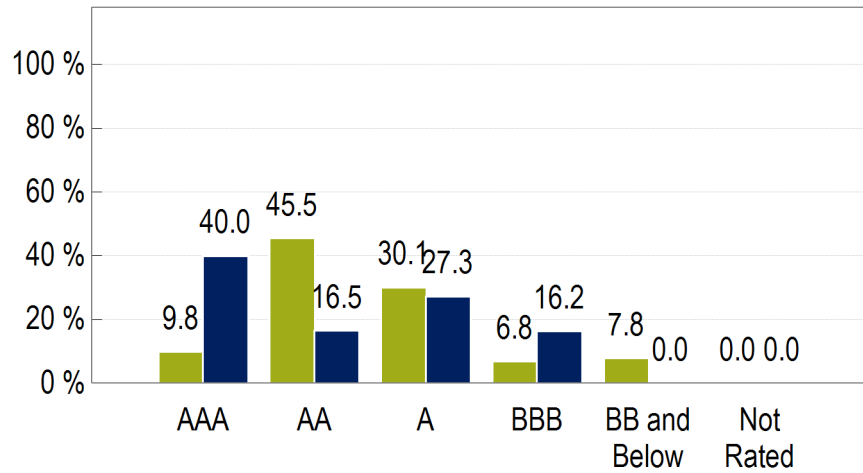
Returns are net of fees

Brandywine

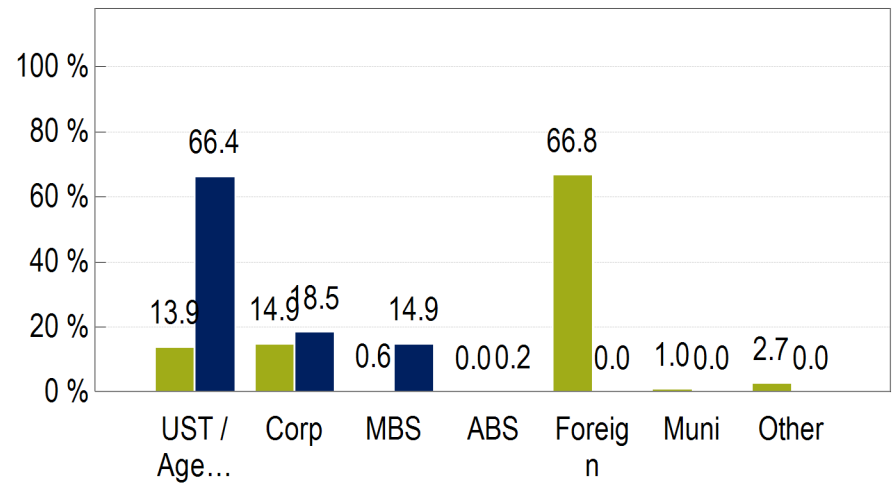
Characteristics



Quality Ratings



Sectors



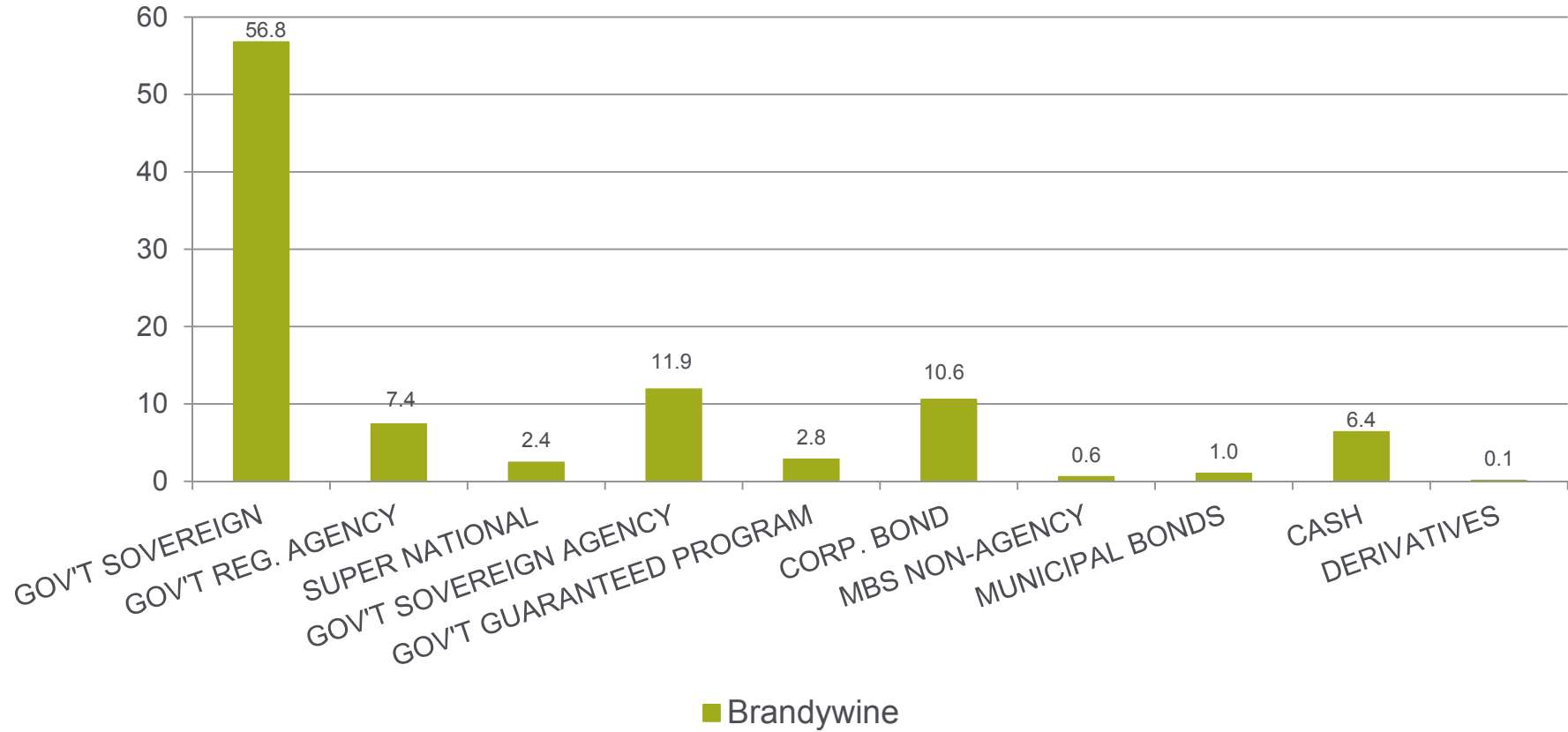
Characteristics

Brandywine

Average Coupon	4.5
Average Maturity	11.3
Modified Duration	5.9
Number of Issues	49
Yield to Maturity	3.8

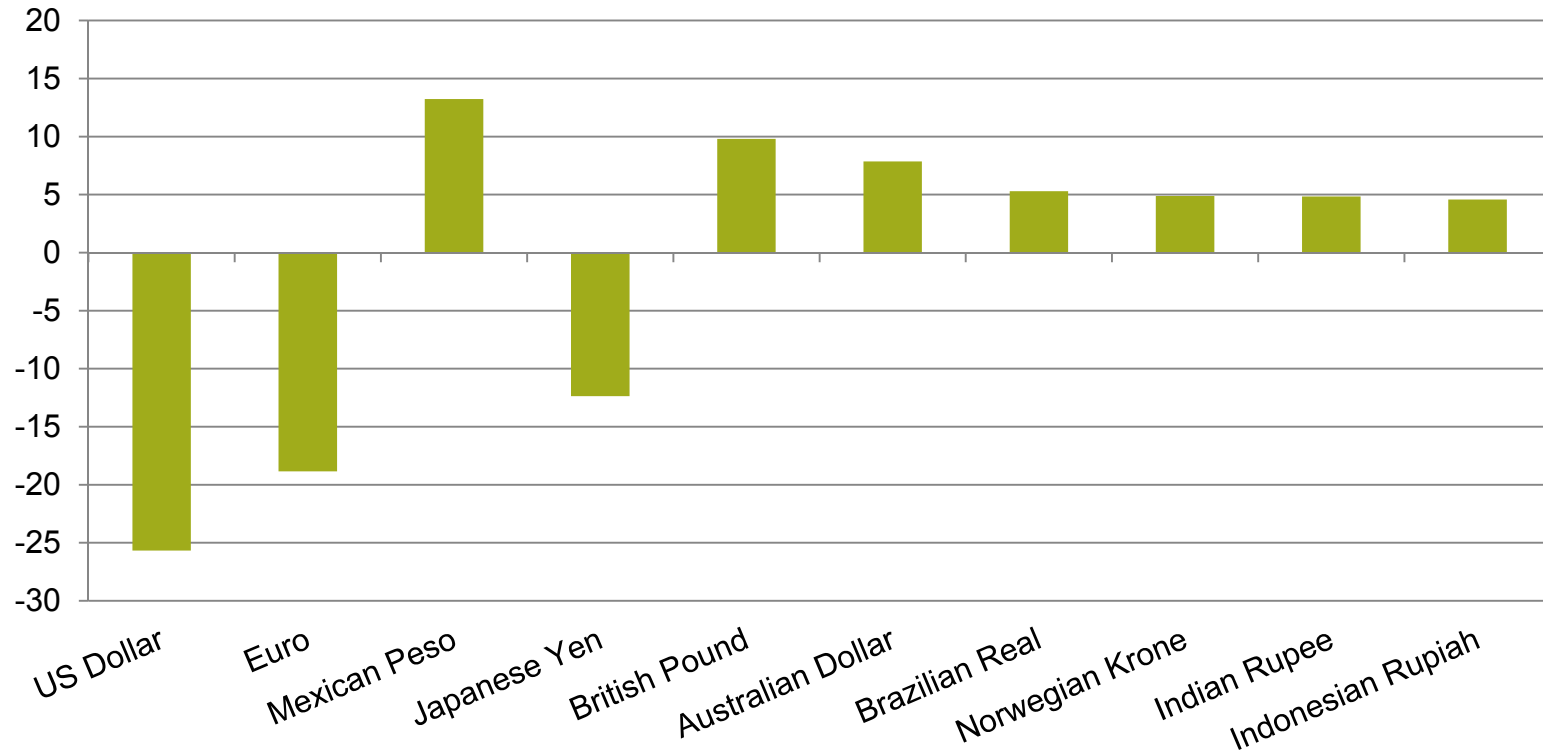
Source: Brandywine, March 2017

Sector Allocation



Source: Brandywine, March 2017

■ **Currency Allocations: Top 10 Over/Under Weights**



Source: Brandywine, March 2017

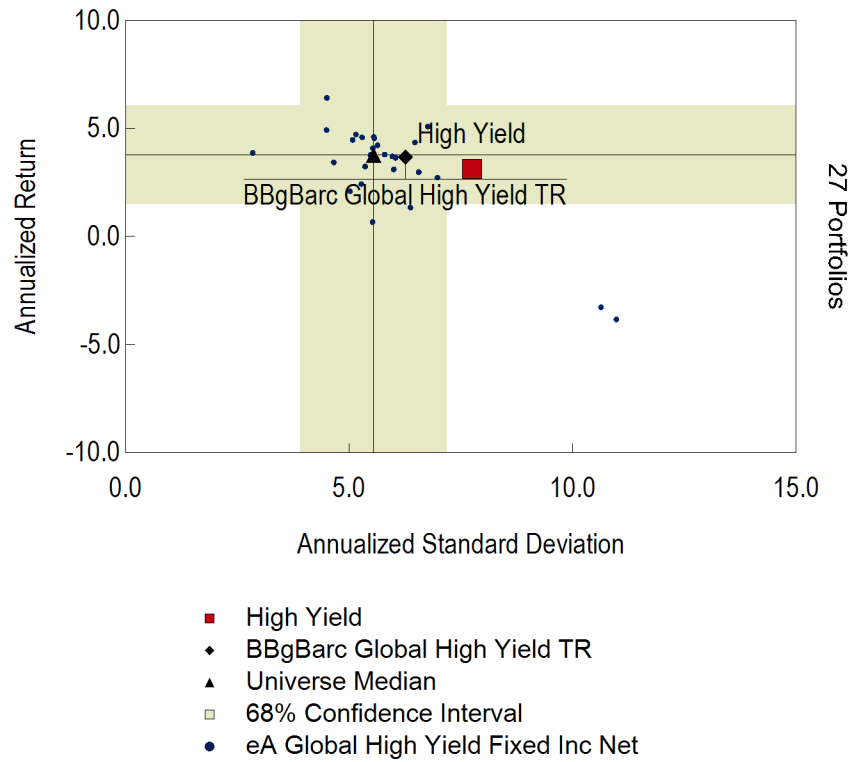
■ Country Allocations: Top 10 Over/Under Weights



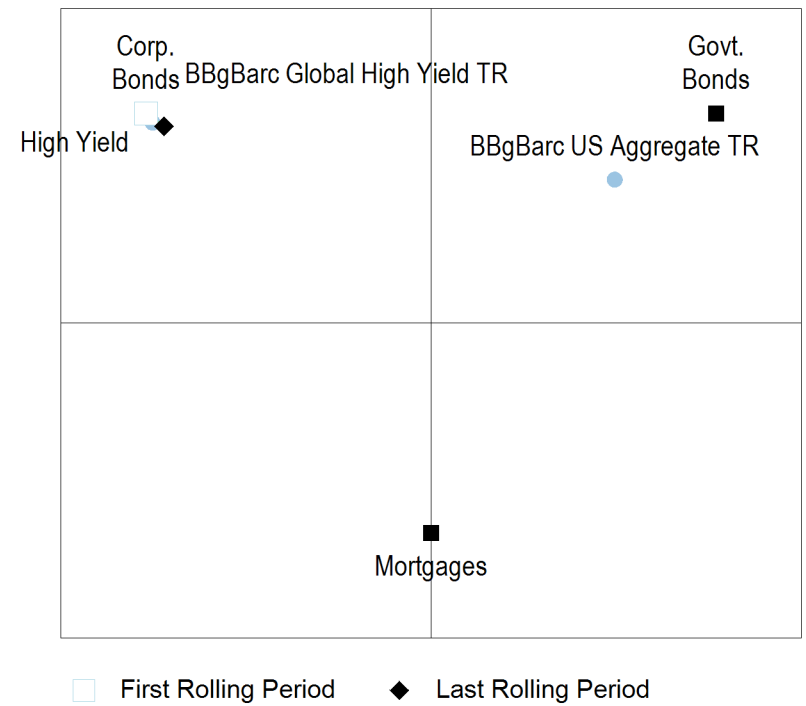
Source: Brandywine, March 2017

High Yield

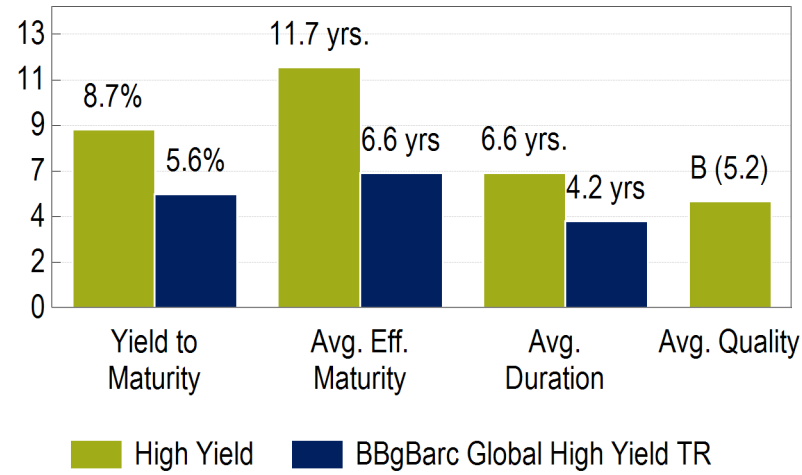
3 Year Risk Return



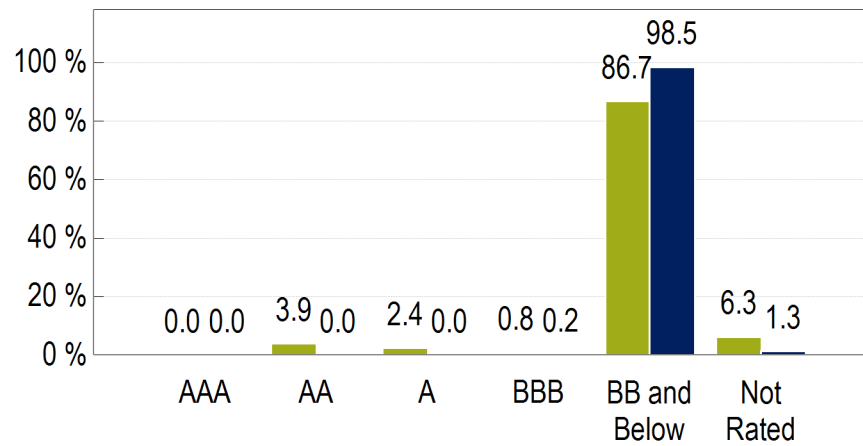
3 Year Style Analysis



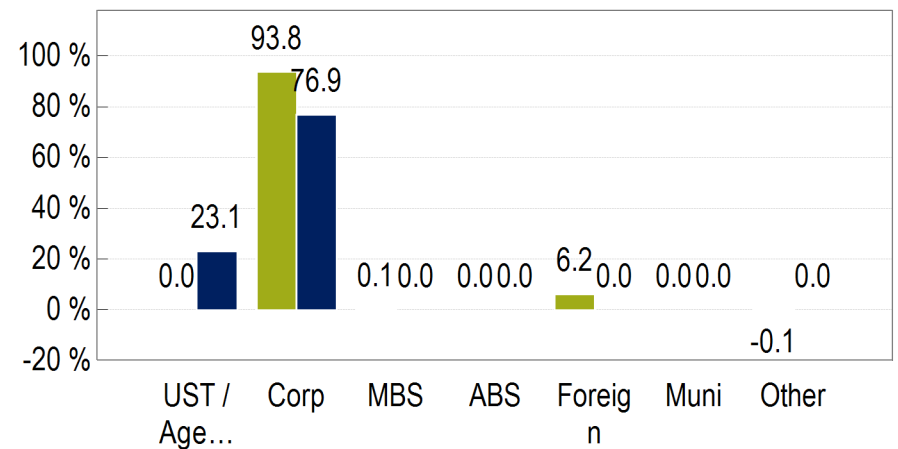
Characteristics



Quality Ratings



Sectors



- **Manager Role in Portfolio**

- Global opportunistic fixed income manager operating in public securities markets

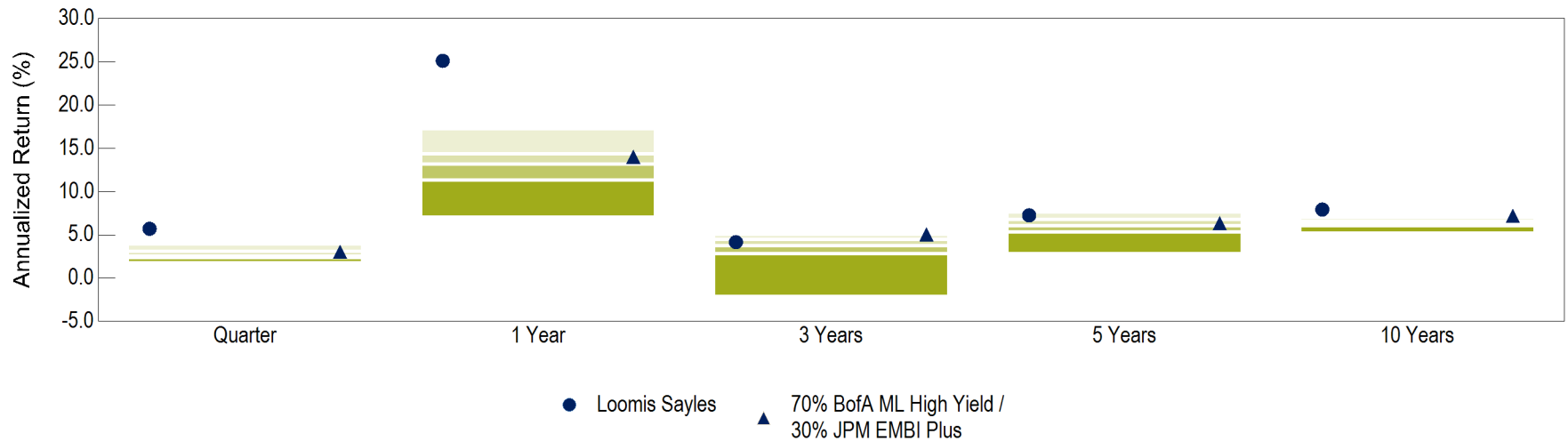
- **Organizational Profile**

- Originally founded in 1926, Loomis Sayles is now a wholly-owned subsidiary of CDC IXIS Asset Management
- Loomis is highly regarded for its credit research skills

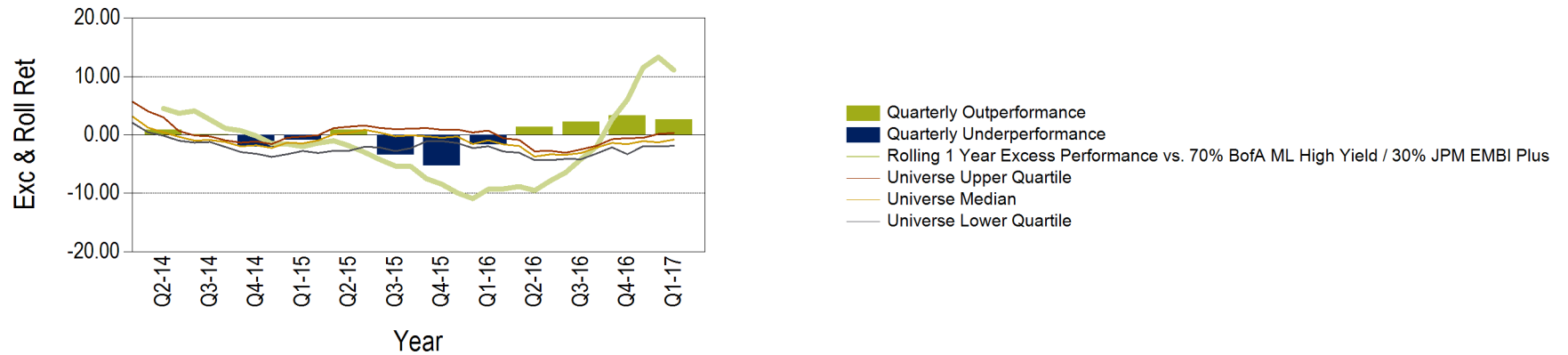
- **Investment Strategy Commentary**

- Bottom-up selection with top-down “awareness”
- Bond Policy Committee provides top-down, macro view of market conditions
- Investment professionals from research, portfolio management and trading collaborate for bottom-up selection in eleven specific sectors

eA Global High Yield Fixed Inc Net Accounts

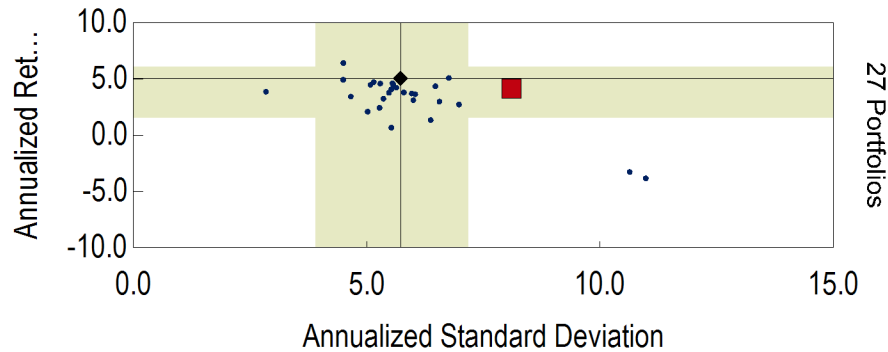


Annualized Excess Performance



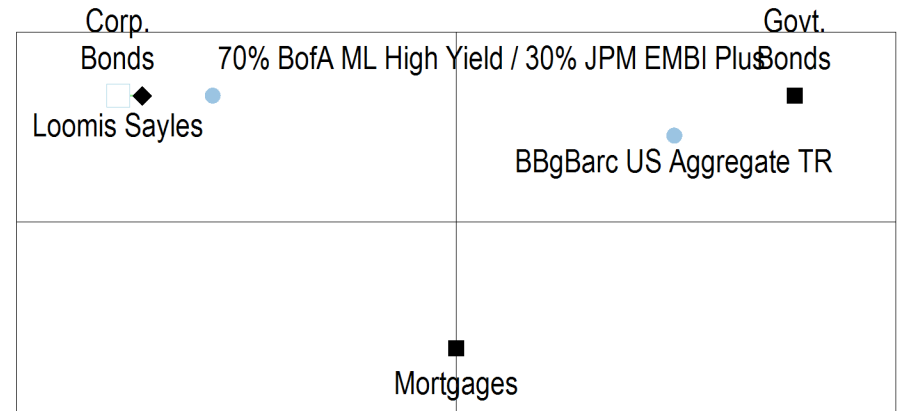
Returns are net of fees

3 Year Risk Return

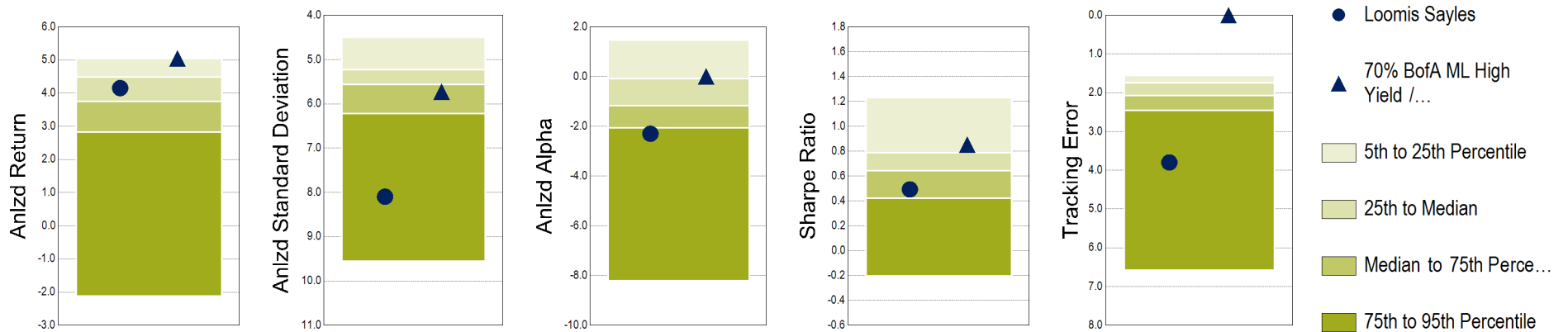


- Loomis Sayles
- ◆ 70% BofA ML High Yield / 30% JPM EMBI Plus
- 68% Confidence Interval
- eA Global High Yield Fixed Inc Net

3 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period



Returns are net of fees

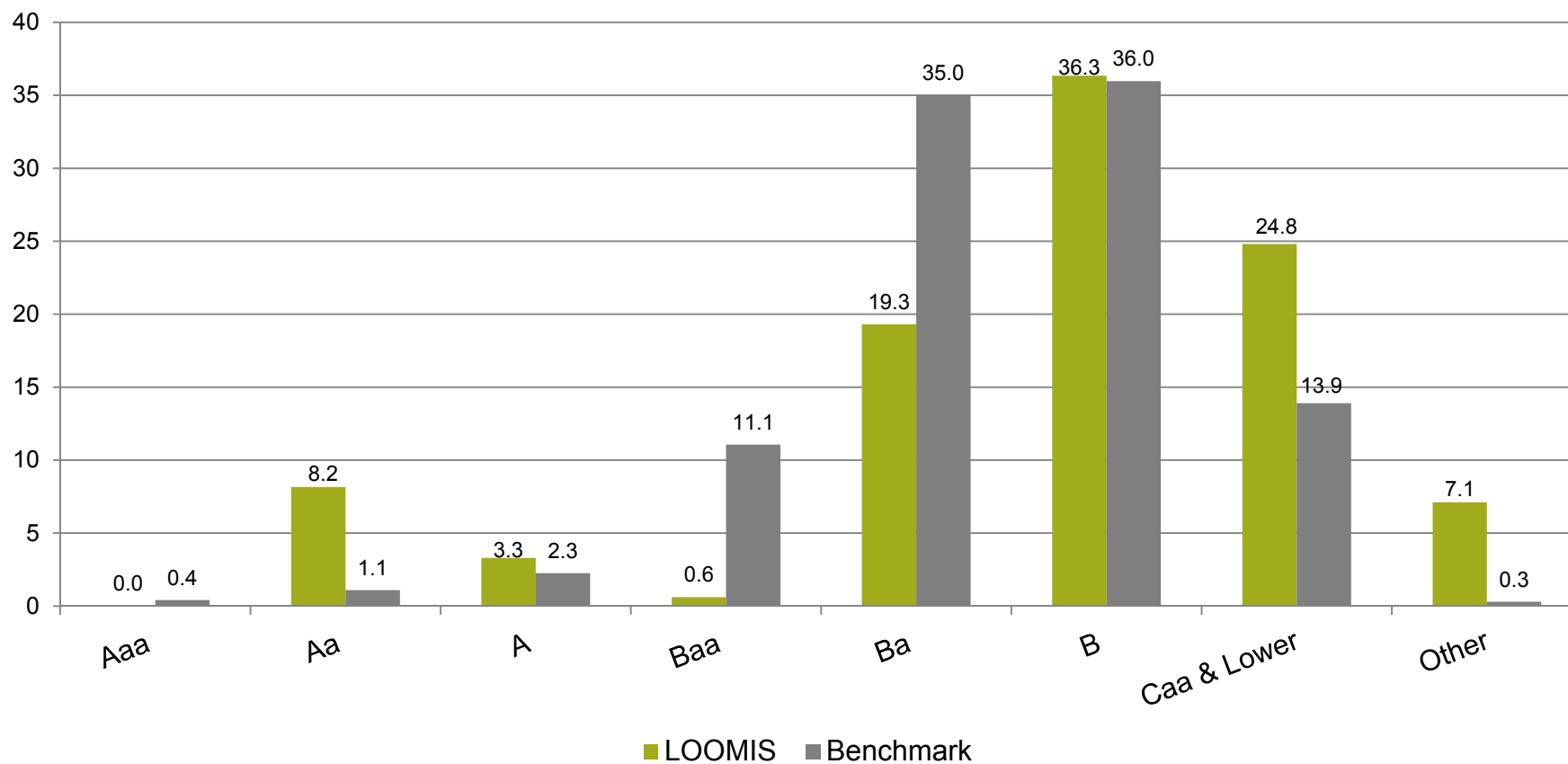
Characteristics

Loomis

Average Maturity (Yrs)	6.4
Duration(Yrs)	4.0
Average Quality	B2
Yield(%)	6.5

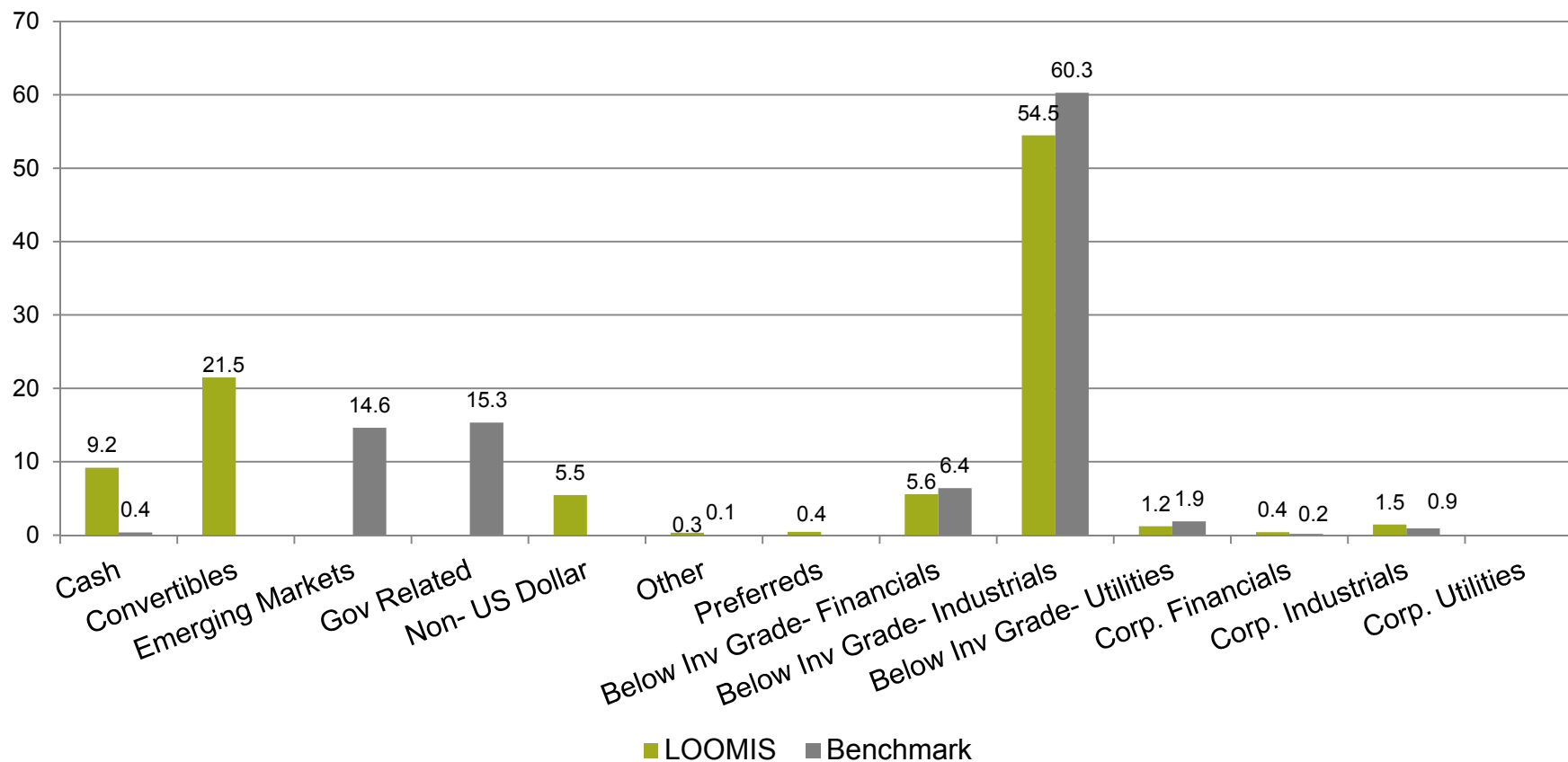
Source: Loomis March 2017

Quality Allocation



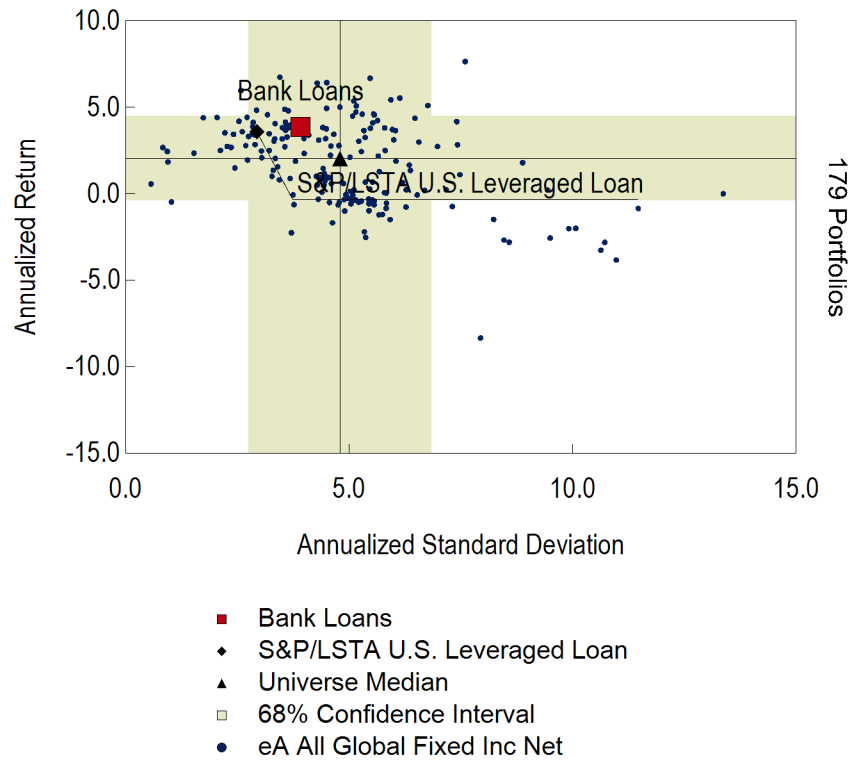
Source: Loomis, March 2017

Sector Allocation

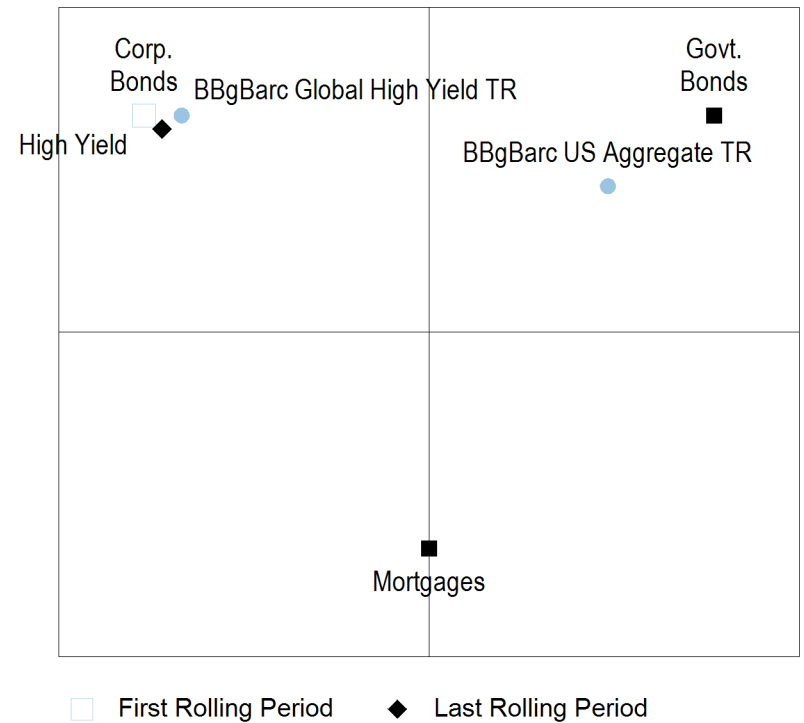


Source: Loomis, March 2017

3 Year Risk Return



3 Year Style Analysis

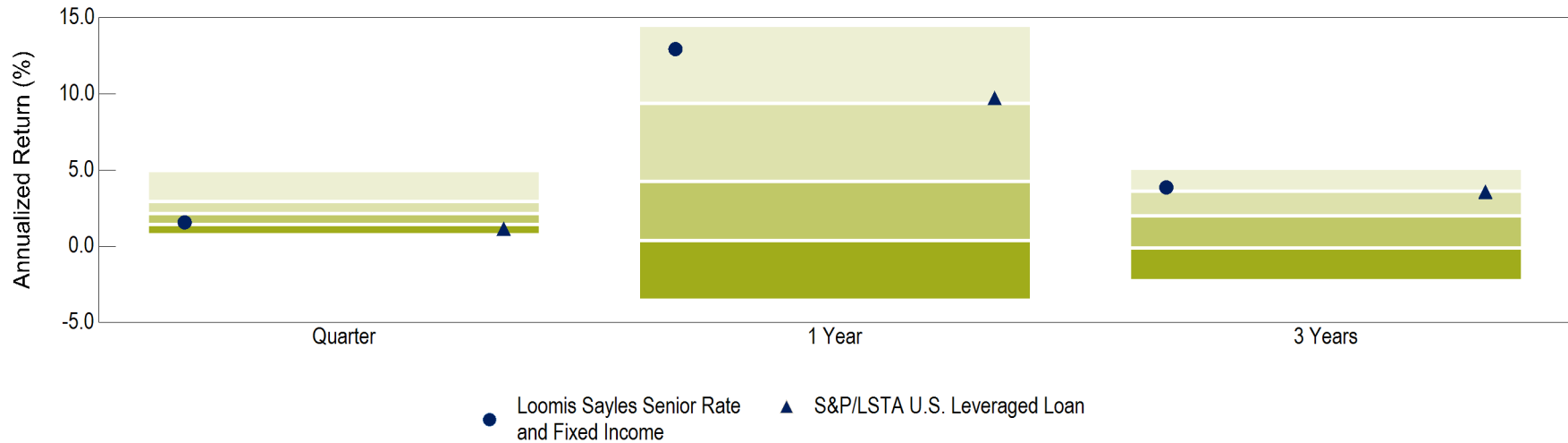


Loomis Sayles Senior Floating Rate and Fixed Income

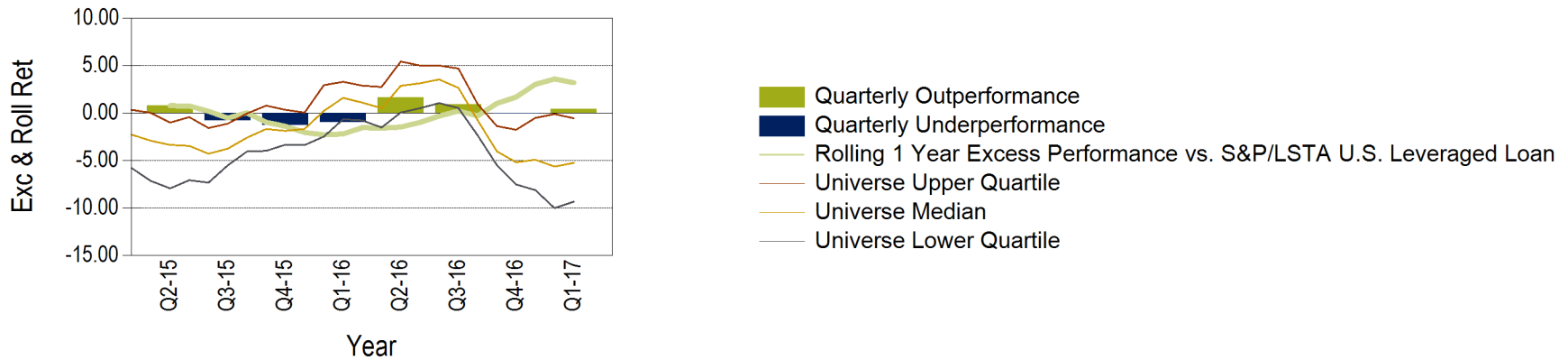
- **Manager Role in Portfolio**
 - Seeks to provide a high level of current income by using a value driven, opportunistic approach and macro-guided portfolio construction
 - Provides some protection in a rising rate environment
- **Organizational Profile**
 - Originally founded in 1926, Loomis Sayles is now a wholly-owned subsidiary of Natixis Global Asset Management.
 - Loomis is highly regarded for its credit research skills
- **Investment Strategy Commentary**
 - Allocations to out of benchmark securities for offensive and defensive purposes
 - Must invest at least 65% in floating rate loans
 - May invest up to 35% of assets in other fixed income securities
 - May invest up to 20% of assets in non-US issuers, including 10% in emerging market debt securities
 - May use leverage through borrowing up to 33.33% of the Fund's total assets after such borrowing

Loomis Sayles Senior Rate and Fixed Income

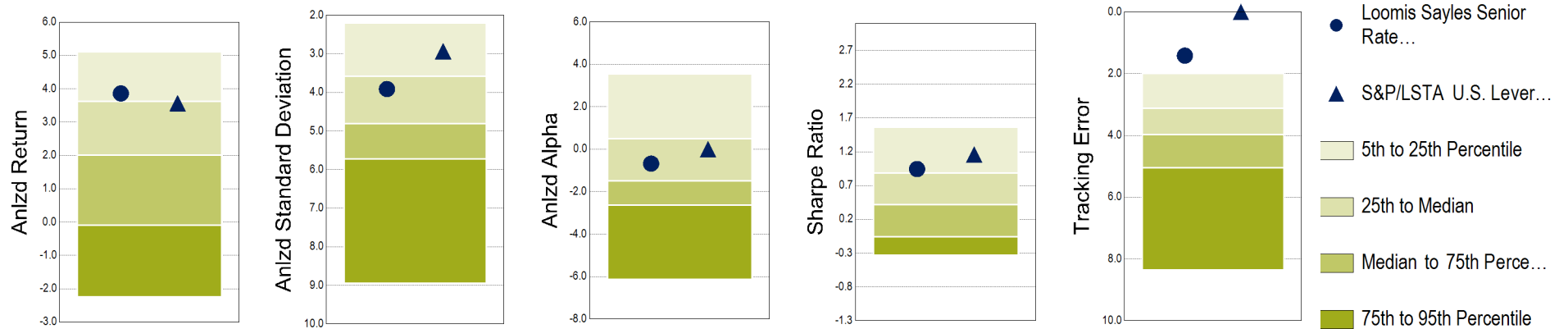
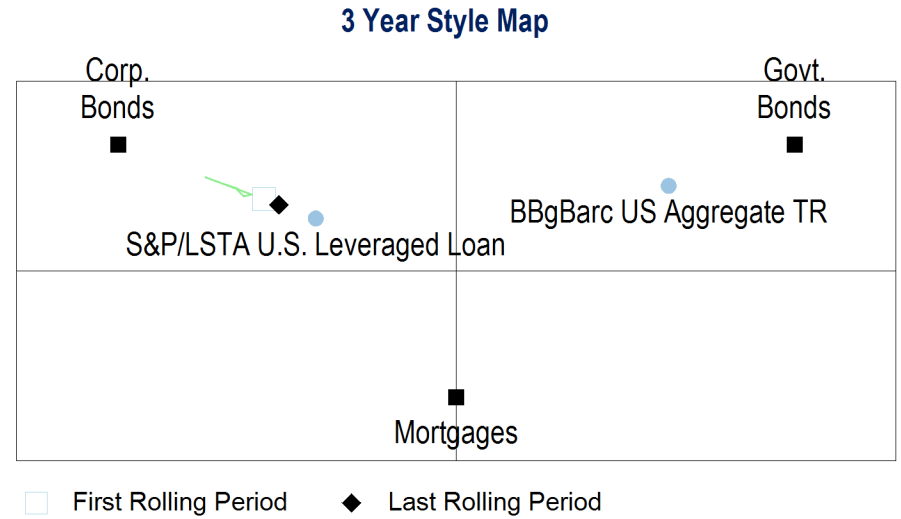
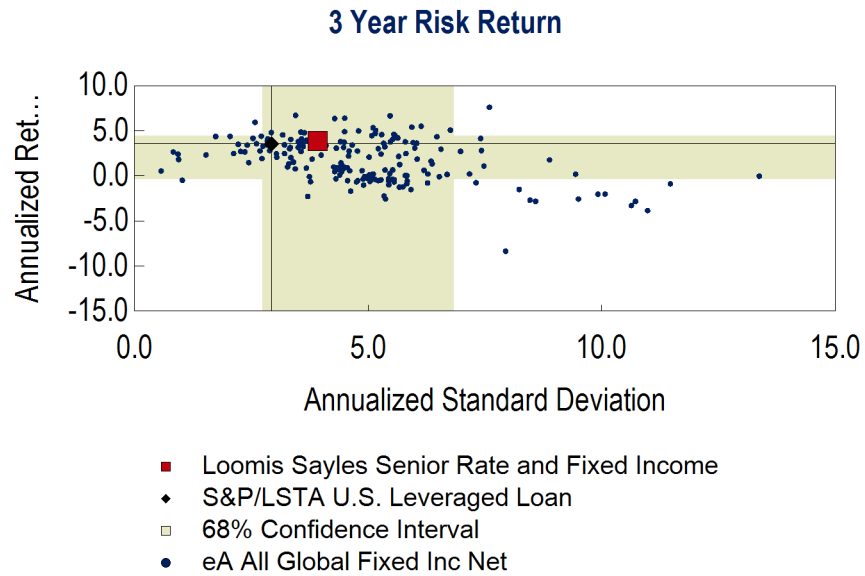
eA All Global Fixed Inc Net Accounts



Annualized Excess Performance



Returns are net of fees



Returns are net of fees

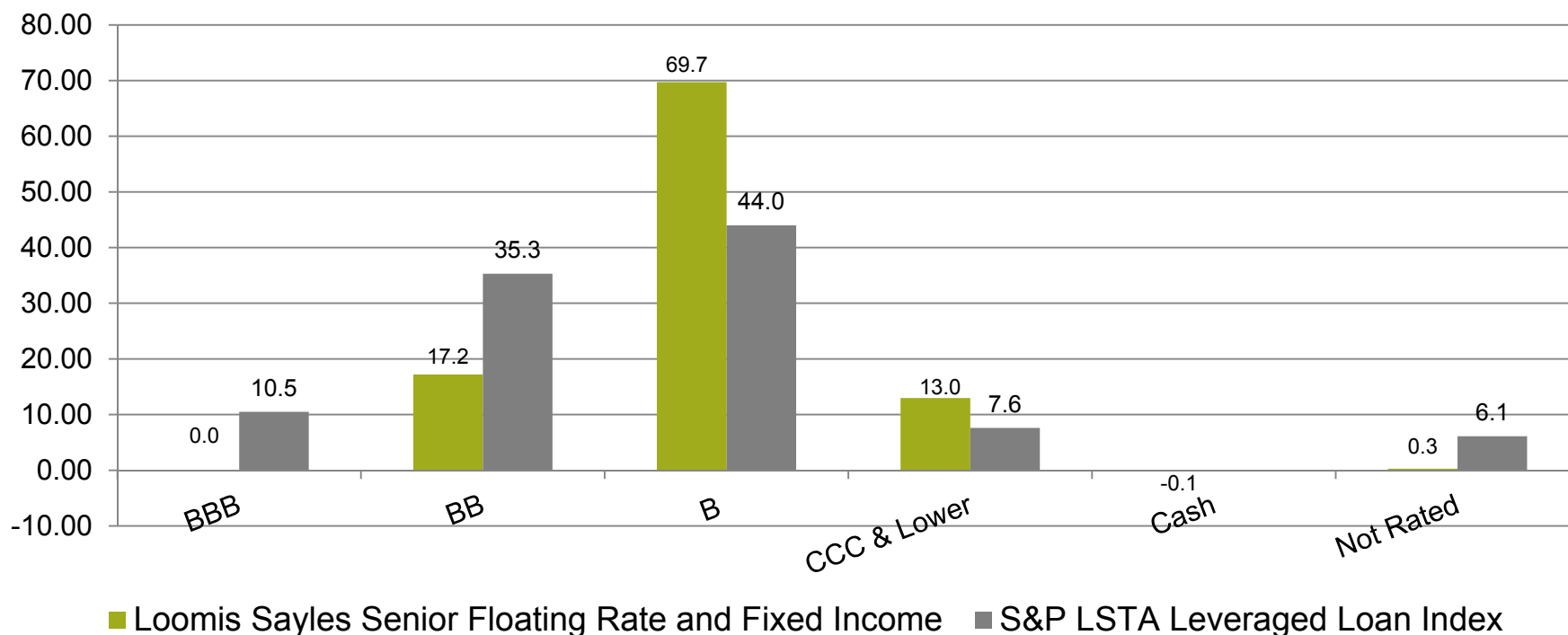
Characteristics

Loomis Sayles

Current Yield	5.9
Stated Maturity	5.3
Duration	0.3
Number of Issues	292
Average Quality	B

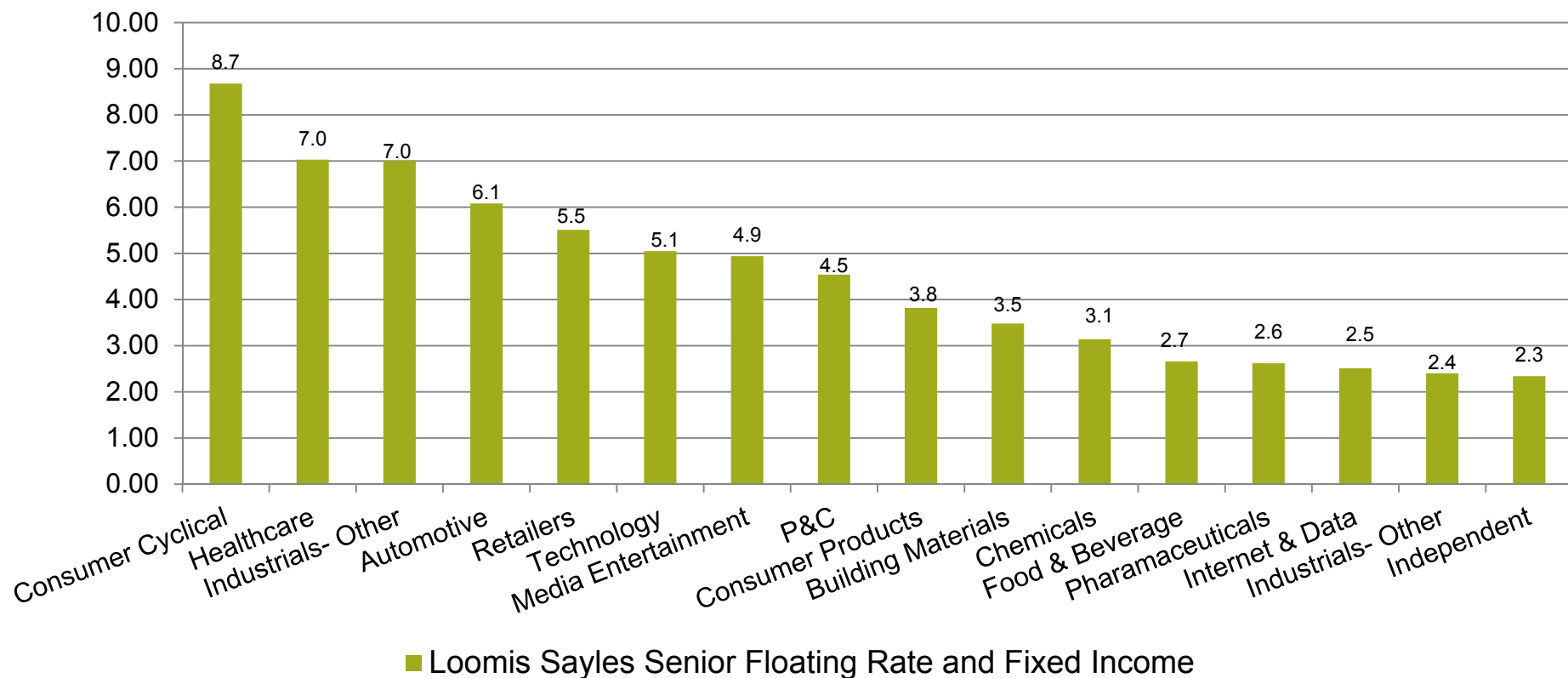
Source: Loomis Sayles, March 2017

Quality Allocation

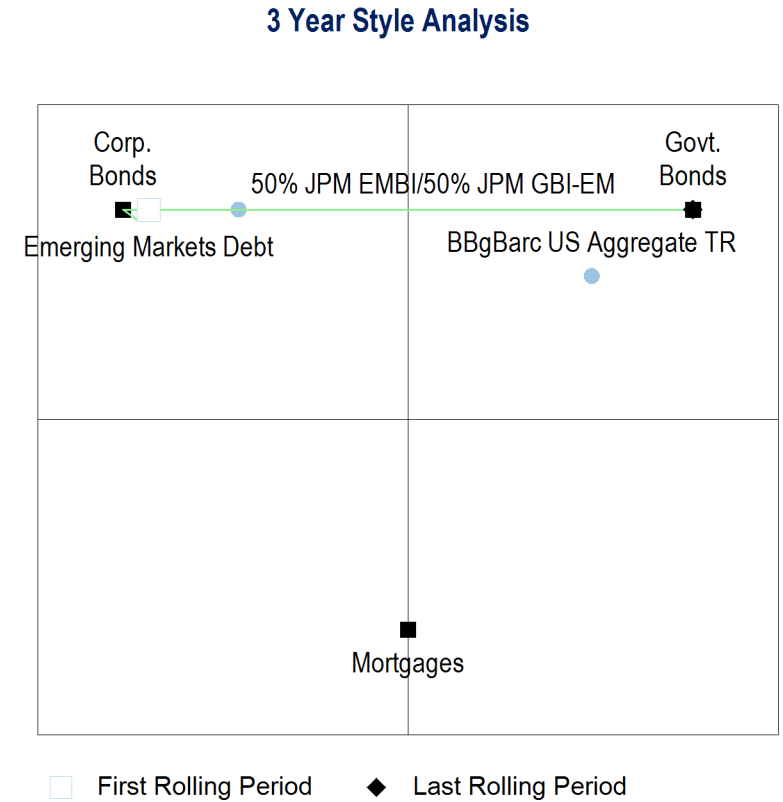
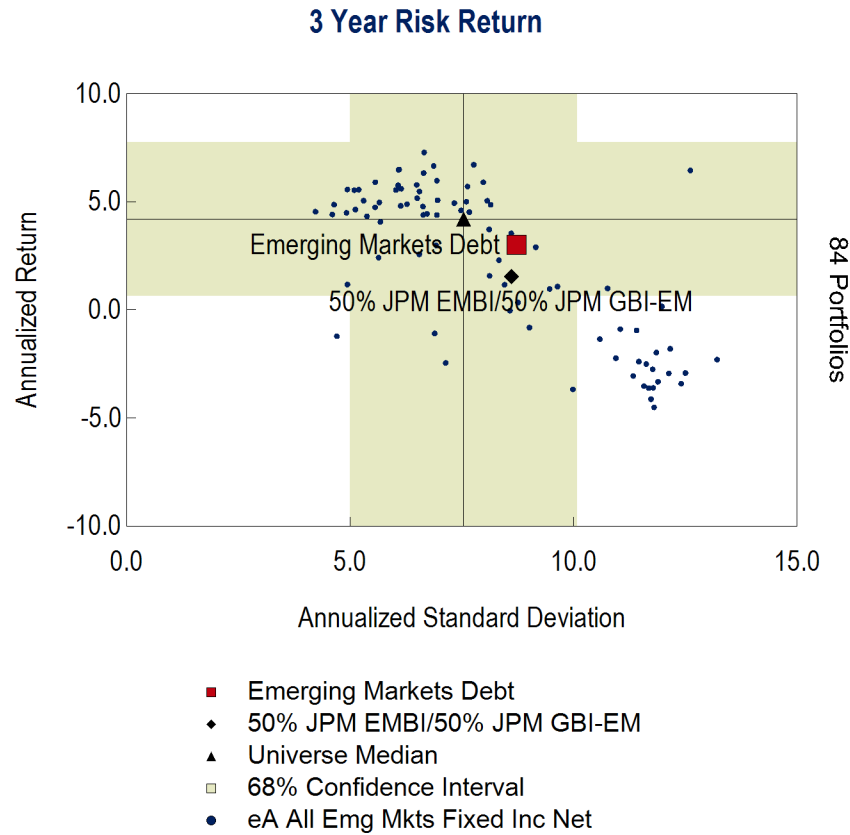


Source: Loomis Sayles, March 2017

Sector Distribution



Source: Loomis Sayles, March 2017



- **Manager Role in Portfolio**

- Represents the local emerging market debt portion of the global fixed income allocation

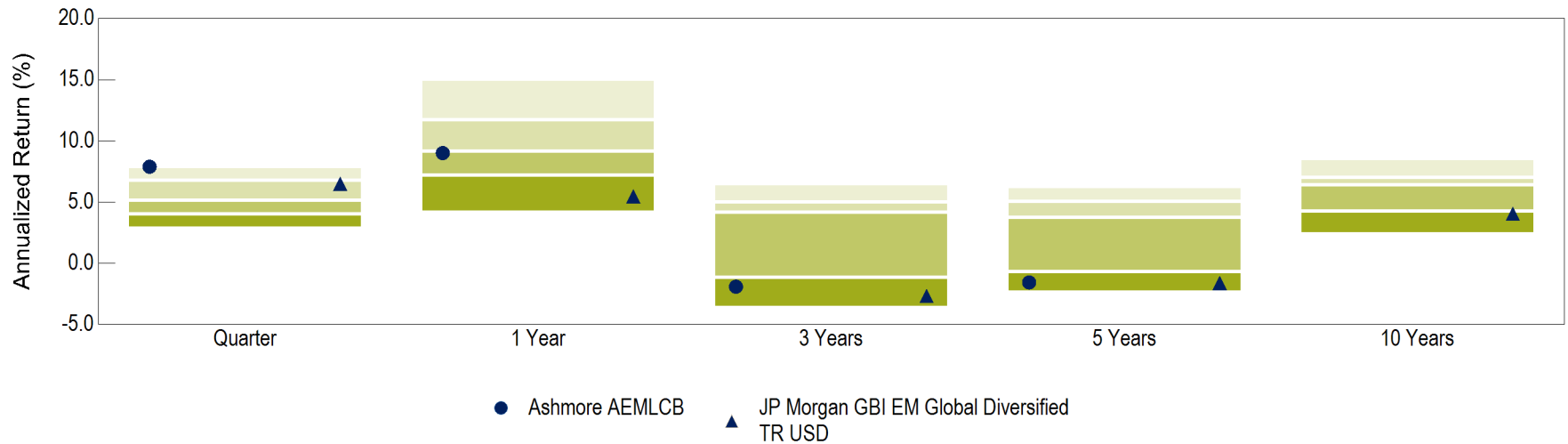
- **Organizational Profile**

- Established in 1992 with a management buyout in 1998/1999
- Ashmore Group plc, the parent company of Ashmore Investment Management Limited ("AIML" or "Ashmore"), was listed on the London Stock Exchange in October 2006.
- Specialist in emerging market investing

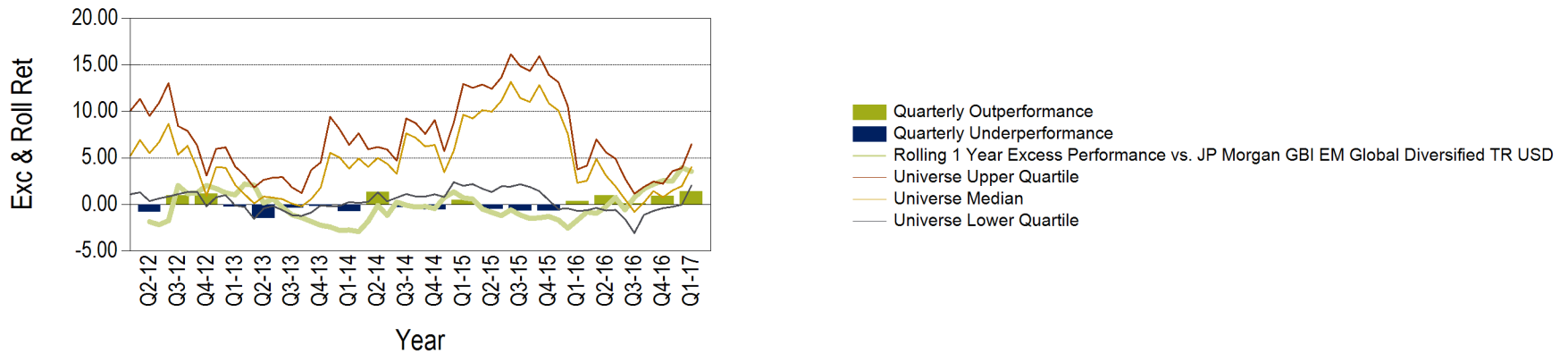
- **Investment Strategy Commentary**

- Ashmore combines top down thematic approaches with issue-by-issue security selection.
- Process is overseen by an investment committee which meets weekly to approve all strategies and transactions.
- Strong emphasis on risk management in portfolio construction and ongoing monitoring.

eA All Emg Mkts Fixed Inc Net Accounts

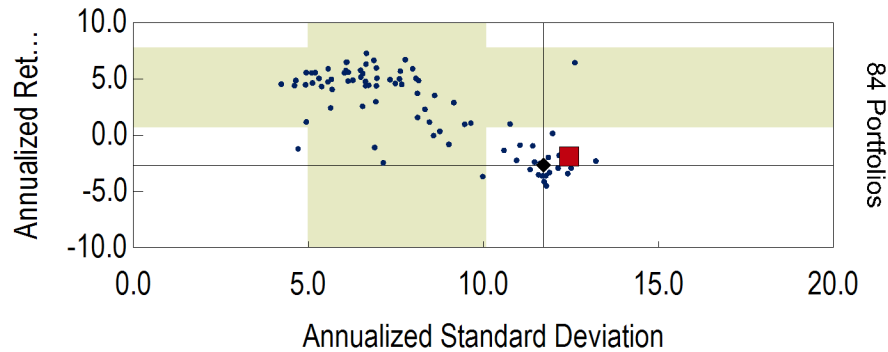


Annualized Excess Performance



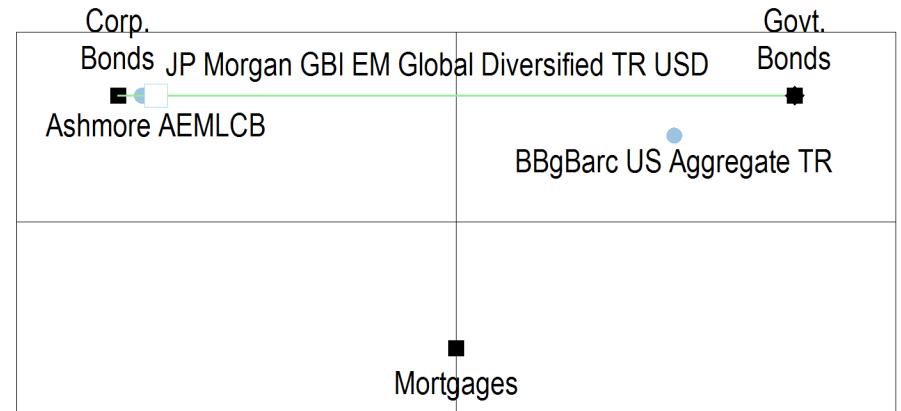
Returns are net of fees

3 Year Risk Return

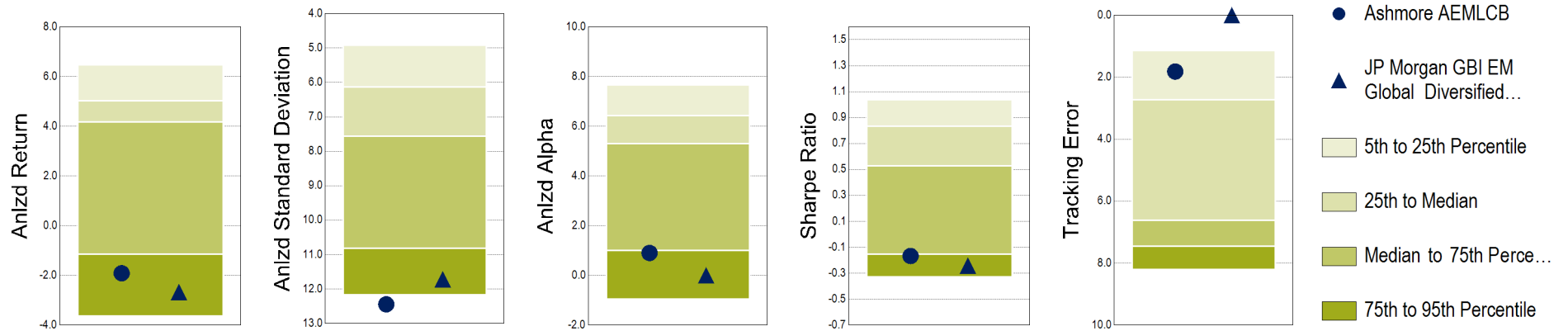


- Ashmore AEMLCB
- ◆ JP Morgan GBI EM Global Diversified TR USD
- 68% Confidence Interval
- eA All Emg Mkts Fixed Inc Net

3 Year Style Map



- First Rolling Period
- ◆ Last Rolling Period



Returns are net of fees

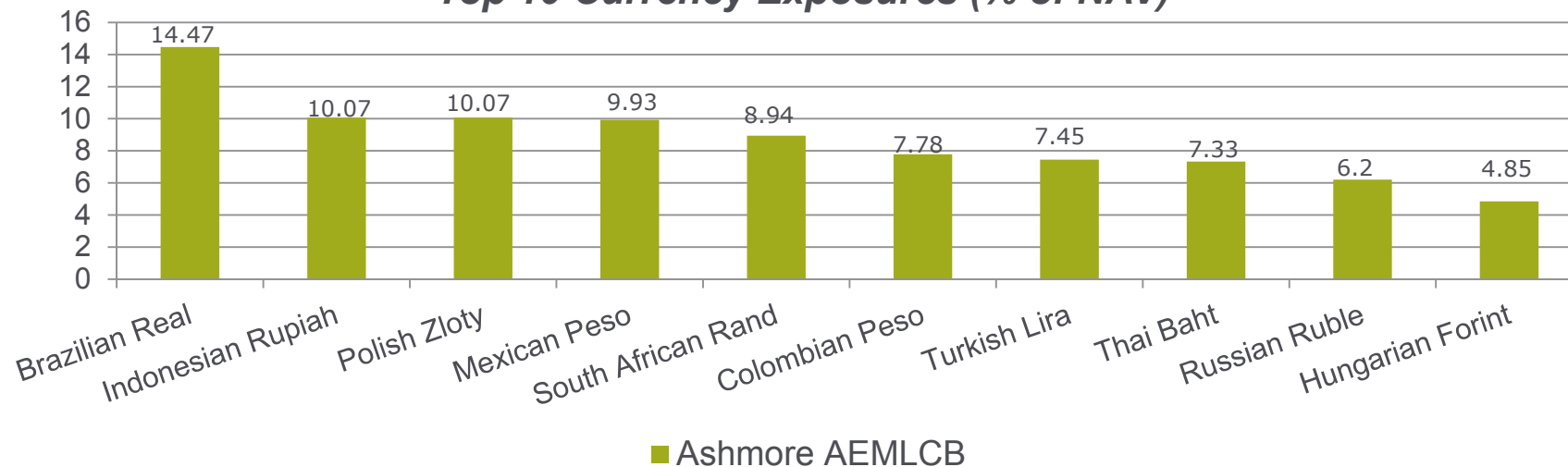
Characteristics

**Ashmore
AEMLCB**

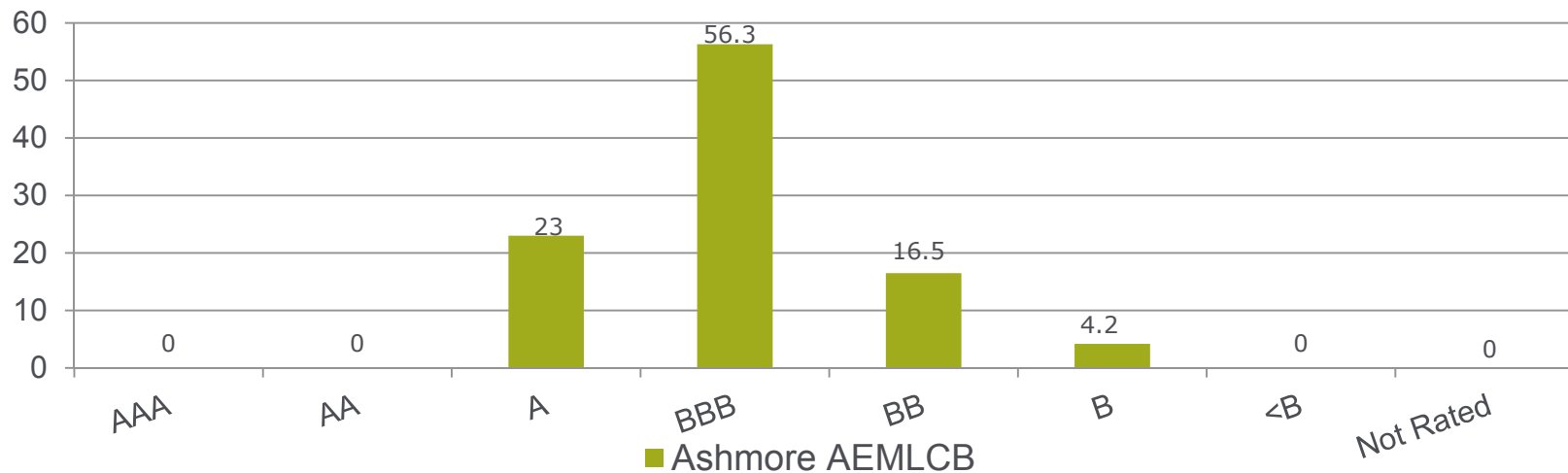
Average Modified Duration	5.4
Average Life (years)	6.7
Yield to Maturity	6.4

Source: Ashmore, March 2017

Top 10 Currency Exposures (% of NAV)

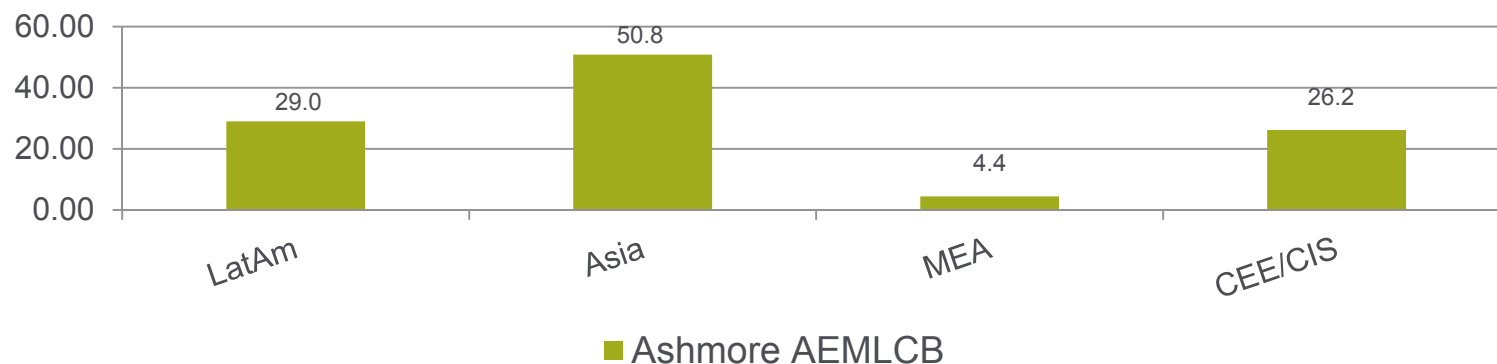


Credit Rating of Debt Instruments (% of NAV)

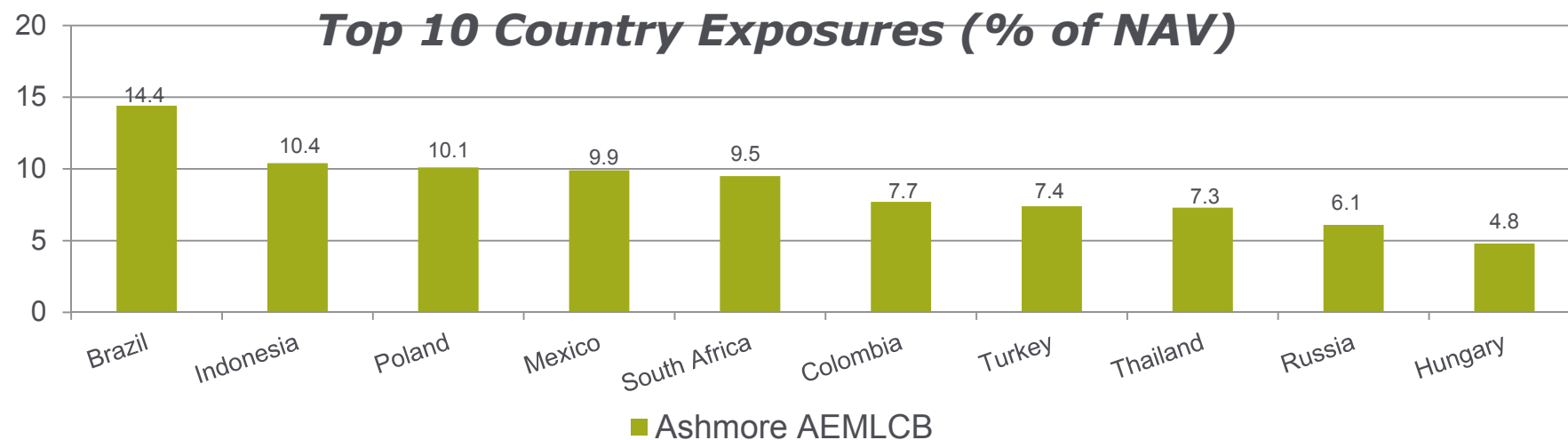


Source: Ashmore, March 2017

Exposure by Region



Top 10 Country Exposures (% of NAV)



Source: Ashmore, March 2017

Appendix



Glossary of Investment Terminology – Risk Statistics

Alpha - Measures the relationship between the fund performance and the performance of another fund or benchmark index and equals the excess return while the other fund or benchmark index is zero.

Alpha Jensen - The average return on a portfolio over and above that predicted by the capital asset pricing model (CAPM), given the portfolio's beta and the average market return. Also known as the abnormal return or the risk adjusted excess return.

Annualized Excess Return over Benchmark - Annualized fund return minus the annualized benchmark return for the calculated return.

Annualized Return - A statistical technique whereby returns covering periods greater than one year are converted to cover a 12 month time span.

Beta - Measures the volatility or systematic risk and is equal to the change in the fund's performance in relation to the change in the assigned index's performance.

Information Ratio - A measure of the risk adjusted return of a financial security, asset, or portfolio.

Formula:
 $(\text{Annualized Return of Portfolio} - \text{Annualized Return of Benchmark}) / \text{Annualized Standard Deviation}(\text{Period Portfolio Return} - \text{Period Benchmark Return})$. To annualize standard deviation, multiply the deviation by the square root of the number of periods per year where monthly returns per year equals 12 and quarterly returns is four periods per year.

R-Squared - Represents the percentage of a fund's movements that can be explained by movements in an index. R-Squared values range from 0 to 100. An R-Squared of 100 denotes that all movements of a fund are completely explained by movements in the index.

Sharpe Ratio - A measure of the excess return or risk premium per unit of risk in an investment asset or trading strategy.

Sortino Ratio - A method to differentiate between good and bad volatility in the Sharpe Ratio. The differentiation of up and down volatility allows the calculation to provide a risk adjusted measure of a security or fund's performance without upward price change penalties.

Formula:
 $\text{Calculation Average } (X-Y) / \text{Downside Deviation } (X-Y) * 2$
Where X=Return Series X Y = Return Series Y which is the risk free return (91 day T-bills)

Standard Deviation - The standard deviation is a statistical term that describes the distribution of results. It is a commonly used measure of volatility of returns of a portfolio, asset class, or security. The higher the standard deviation the more volatile the returns are.

Formula:
 $(\text{Annualized Return of Portfolio} - \text{Annualized Return of Risk Free}) / \text{Annualized Standard Deviation (Portfolio Returns)}$

Tracking Error - Tracking error, also known as residual risk, is a measure of the degree to which a portfolio tracks its benchmark. It is also a measure of consistency of excess returns. Tracking error is computed as the annualized standard deviation of the difference between a portfolio's return and that of its benchmark.

Formula:
 $\text{Tracking Error} = \text{Standard Deviation } (X-Y) * \sqrt{(\# \text{ of periods per year})}$
Where X = periods portfolio return and Y = the period's benchmark return
For monthly returns, the periods per year = 12
For quarterly returns, the periods per year = 4

Treynor Ratio - A risk-adjusted measure of return based on systematic risk. Similar to the Sharpe ratio with the difference being the Treynor ratio uses beta as the measurement of volatility.

Formula:
 $(\text{Portfolio Average Return} - \text{Average Return of Risk-Free Rate}) / \text{Portfolio Beta}$

Up/Down Capture Ratio - A measure of what percentage of a market's returns is "captured" by a portfolio. For example, if the market declines 10% over some period, and the manager declines only 9%, then his or her capture ratio is 90%. In down markets, it is advantageous for a manager to have as low a capture ratio as possible. For up markets, the higher the capture ratio the better. Looking at capture ratios can provide insight into how a manager achieves excess returns. A value manager might typically have a lower capture ratio in both up and down markets, achieving excess returns by protecting on the downside, whereas a growth manager might fall more than the overall market in down markets, but achieve above-market returns in a rising market.

$\text{Upside Capture} = \text{Total Return}(\text{Fund Returns}) / \text{Total Returns}(\text{BM Return})$ when Period Benchmark Return is $> = 0$

$\text{Downside Capture} = \text{Total Return}(\text{Fund Returns}) / \text{Total Returns}(\text{BM Return})$ when Benchmark < 0

Source: Investor Force

Glossary of Investment Terminology

Of Portfolios/Observations¹ – The total number of data points that make up a specified universe

Allocation Index³ - The allocation index measures the value added (or subtracted) to each portfolio by active management. It is calculated monthly: The portfolio asset allocation to each category from the prior month-end is multiplied by a specified market index.

Asset Allocation Effect² - Measures an investment manager's ability to effectively allocate their portfolio's assets to various sectors. The allocation effect determines whether the overweighting or underweighting of sectors relative to a benchmark contributes positively or negatively to the overall portfolio return. Positive allocation occurs when the portfolio is over weighted in a sector that outperforms the benchmark and underweighted in a sector that underperforms the benchmark. Negative allocation occurs when the portfolio is over weighted in a sector that underperforms the benchmark and under weighted in a sector that outperforms the benchmark.

Agency Bonds (Agencies)³ - The full faith and credit of the United States government is normally not pledged to payment of principal and interest on the majority of government agencies issuing these bonds, with maturities of up to ten years. Their yields, therefore, are normally higher than government and their marketability is good, thereby qualifying them as a low risk-high liquidity type of investment. They are eligible as security for advances to the member banks by the Federal Reserve, which attests to their standing.

Asset Backed Securities (ABS)³ - Bonds which are similar to mortgage-backed securities but are collateralized by assets other than mortgages; commonly backed by credit card receivables, auto loans, or other types of consumer financing.

Attribution³ - Attribution is an analytical technique that allows us to evaluate the performance of the portfolio relative to the benchmark. A proper attribution tells us where value was added or subtracted as a result of the manager's decisions.

Average Effective Maturity⁴ - For a single bond, it is a measure of maturity that takes into account the possibility that a bond might be called back to the issuer.

For a portfolio of bonds, average effective maturity is the weighted average of the maturities of the underlying bonds. The measure is computed by weighing each bond's maturity by its market value with respect to the portfolio and the likelihood of any of the bonds being called. In a pool of mortgages, this would also account for the likelihood of prepayments on the mortgages.

Batting Average¹ - A measurement representing an investment manager's ability to meet or beat an index.

Formula: Divide the number of days (or months, quarters, etc.) in which the manager beats or matches the index by the total number of days (or months, quarters, etc.) in the period of question and multiply that factor by 100.

Brinson Fachler (BF) Attribution¹ - The BF methodology is a highly accepted industry standard for calculating the allocation, selection, and interaction effects within a portfolio that collectively explains a portfolio's underlying performance. The main advantage of the BF methodology is that rather than using the overall return of the benchmark, it goes a level deeper than BHB and measures whether the benchmark sector, country, etc. outperformed/or underperformed the overall benchmark.

Brinson Hood Beebower (BHB) Attribution¹ - The BHB methodology shows that excess return must be equal to the sum of all other factors (i.e., allocation effect, selection effect, interaction effect, etc.). The advantage to using the BHB methodology is that it is a highly accepted industry standard for calculating the allocation, selection, and interaction effects within a portfolio that collectively explains a portfolio's underlying performance.

Corporate Bond (Corp)⁴ - A debt security issued by a corporation and sold to investors. The backing for the bond is usually the payment ability of the company, which is typically money to be earned from future operations. In some cases, the company's physical assets may be used as collateral for bonds.

Correlation¹ - A range of statistical relationships between two or more random variables or observed data values. A correlation is a single number that describes the degree of relationship between variables.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net



Glossary of Investment Terminology

Coupon⁴ – The interest rate stated on a bond when it is issued. The coupon is typically paid semiannually. This is also referred to as the "coupon rate" or "coupon percent rate."

Currency Effect¹ - Is the effect that changes in currency exchange rates over time affect excess performance.

Derivative Instrument³ - A financial obligation that derives its precise value from the value of one or more other instruments (or assets) at the same point of time. For example, the relationship between the value of an S&P 500 futures contract (the derivative instrument in this case) is determined by the value of the S&P 500 Index and the value of a U.S. Treasury bill that matures at the expiration of the futures contract.

Downside Deviation¹ - Equals the standard deviation of negative return or the measure of downside risk focusing on the standard deviation of negative returns.

Formula:

Annualized Standard Deviation (Fund Return - Average Fund Return) where average fund return is greater than individual fund returns, monthly or quarterly.

Duration³ - Duration is a measure of interest rate risk. The greater the duration of a bond, or a portfolio of bonds, the greater its price volatility will be in response to a change in interest rates. A bond's duration is inversely related to interest rates and directly related to time to maturity.

Equity/Debt/Cash Ratio¹ – The percentage of an investment or portfolio that is in Equity, Debt, and/or Cash (i.e. A 7/89/4 ratio represents an investment that is made up of 7% Equity, 89% Debt, and 4% Cash).

Foreign Bond³ - A bond that is issued in a domestic market by a foreign entity, in the domestic market's currency. A foreign bond is most often issued by a foreign firm to raise capital in a domestic market that would be most interested in purchasing the firm's debt. For foreign firms doing a large amount of business in the domestic market, issuing foreign bonds is a common practice.

Hard Hurdle⁵ – is a hurdle rate that once beaten allows a fund manager to charge a performance fee on only the funds above the specified hurdle rate.

High-Water Mark⁴ - The highest peak in value that an investment fund/account has reached. This term is often used in the context of fund manager compensation, which is performance based. Some performance-based fees only get paid when fund performance exceeds the high-water mark. The high-water mark ensures that the manager does not get paid large sums for poor performance.

Hurdle Rate⁴ - The minimum rate of return on an investment required, in order for a manager to collect incentive fees from the investor, which is usually tied to a benchmark.

Interaction Effects² - The interaction effect measures the combined impact of an investment manager's selection and allocation decisions within a sector. For example, if an investment manager had superior selection and over weighted that particular sector, the interaction effect is positive. If an investment manager had superior selection, but underweighted that sector, the interaction effect is negative. In this case, the investment manager did not take advantage of the superior selection by allocating more assets to that sector. Since many investment managers consider the interaction effect to be part of the selection or the allocation, it is often combined with the either effect.

Median³ - The value (rate of return, market sensitivity, etc.) that exceeds one-half of the values in the population and that is exceeded by one-half of the values. The median has a percentile rank of 50.

Modified Duration³ - The percentage change in the price of a fixed income security that results from a change in yield.

Mortgage Backed Securities (MBS)³ - Bonds which are a general obligation of the issuing institution but are also collateralized by a pool of mortgages.

Municipal Bond (Muni)⁴ - A debt security issued by a state, municipality or county to finance its capital expenditures.

Net Investment Change¹ – Is the change in an investment after accounting for all Net Cash Flows.

Performance Fee⁴ - A payment made to a fund manager for generating positive returns. The performance fee is generally calculated as a percentage of investment profits, often both realized and unrealized.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net



Glossary of Investment Terminology

Policy Index³ - A custom benchmark designed to indicate the returns that a passive investor would earn by consistently following the asset allocation targets set forth in this investment policy statement.

Price to Book (P/B)⁴ - A ratio used to compare a stock's market value to its book value. It is calculated by dividing the current closing price of the stock by the latest quarter's book value per share, also known as the "price-equity ratio".

Price to Earnings (P/E)³ - The weighted equity P/E is based on current price and trailing 12 months earnings per share (EPS).

Price to Sales (P/S)⁴ - A ratio for valuing a stock relative to its own past performance, other companies, or the market itself. Price to sales is calculated by dividing a stock's current price by its revenue per share for the trailing 12 months.

Return on Equity (ROE)⁴ - The amount of net income returned as a percentage of shareholders equity. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested.

Selection (or Manager) Effect² - Measures the investment manager's ability to select securities within a given sector relative to a benchmark. The over or underperformance of the portfolio is weighted by the benchmark weight, therefore, selection is not affected by the manager's allocation to the sector. The weight of the sector in the portfolio determines the size of the effect—the larger the sector, the larger the effect is, positive or negative.

Soft Hurdle rate⁵ - is a hurdle rate that once beaten allows a fund manager to charge a performance fee based on the entire annualized return.

Tiered Fee¹ - A fee structure that is paid to fund managers based on the size of the investment (i.e. 1.00% fee on the first \$10M invested, 0.90% on the next \$10M, and 0.80% on the remaining balance).

Total Effects² - The active management (total) effect is the sum of the selection, allocation, and interaction effects. It is also the difference between the total portfolio return and the total benchmark return. You can use the active management effect to determine the amount the investment manager has added to a portfolio's return.

Total Return¹ - The actual rate of return of an investment over a specified time period. Total return includes interest, capital gains, dividends, and distributions realized over a defined time period.

Universe³ - The list of all assets eligible for inclusion in a portfolio.

Upside Deviation¹ - Standard Deviation of Positive Returns

Weighted Avg. Market Cap.⁴ - A stock market index weighted by the market capitalization of each stock in the index. In such a weighting scheme, larger companies account for a greater portion of the index. Most indexes are constructed in this manner, with the best example being the S&P 500.

Yield (%)³ - The current yield of a security is the current indicated annual dividend rate divided by current price.

Yield to Maturity³ - The discount rate that equates the present value of cash flows, both principal and interest, to market price.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net



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