



Ohio Retirement Study Council

Investment Performance Analysis

Period Ended: June 30, 2016



INDEX GLOSSARY

S&P 500: The **S&P 500 Index (Cap Wtd)** is a commonly recognized, market-capitalization weighted index of 500 widely held equity securities designed to measure broad US equity performance.

R 3000: The **Russell 3000 Index** is a market-capitalization weighted index of 3,000 widely held equity securities designed to measure performance of the entire U.S. stock market.

Wilshire 5000: The **Wilshire 5000 Index** is a market-capitalization weighted index of more than 6,700 widely held equity securities designed to measure performance of the entire U.S. stock market.

MSCI ACW Ex US: The **MSCI ACW (All Country World) Ex US Index** is designed to measure equity market performance in global developed and emerging markets, excluding the US. The 22 underlying developed countries are: *Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the United Kingdom*. The 23 emerging market countries are: *Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Qatar, South Africa, Taiwan, Thailand, Turkey, and United Arab Emirates*.

MSCI ACW Ex US Investable Mkt: The **MSCI ACW Ex US Investable Mkt Index** is designed to measure equity performance across 22 of 23 Developed Markets (DM) countries (excluding the United States) and 23 Emerging Markets (EM) countries. With 6,085 constituents, the index covers approximately 99% of the global equity opportunity set outside the US.

MSCI EAFE: The **MSCI EAFE (Europe, Australasia, Far East) Index** is designed to measure equity market performance of 21 developed countries, excluding the US & Canada: *Australia, Austria, Belgium, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the United Kingdom*.

MSCI World Ex US: The **MSCI World Index Ex US Index** is designed to measure the equity market performance of developed markets. The MSCI World Index consists of the following 22 developed market country indexes: *Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the United Kingdom*.

MSCI Emerging Markets: The **MSCI Emerging Markets Index** is designed to measure equity market performance of emerging markets. The MSCI Emerging Markets Index consists of the following 23 emerging market country indexes: *Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Russia, South Africa, Taiwan, Thailand, Turkey* and United Arab Emirates*.

Barclays US Agg Bond: The **Barclays US Aggregate Bond Index** covers the US dollar-denominated, investment-grade, fixed-rate, taxable bond market of SEC-registered securities: US Treasury and agency bonds, domestic corporate debt, and mortgage-backed securities.

Barclays US Universal: The **Barclays US Universal Index** covers US dollar-denominated, taxable bonds that are rated either investment grade or high-yield.

Barclays US Trsy: The Barclays US Treasury Index measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury.

Barclays US Trsy: US TIPS: The **Barclays US Treasury: US TIPS Index** is an unmanaged index that consists of inflation-protected securities issued by the U.S. Treasury.

Barclays Mortgage: The **Barclays US Mortgage Backed Securities (MBS) Index** tracks agency mortgage backed pass-through securities (both fixed-rate and hybrid ARM) guaranteed by Ginnie Mae (GNMA), Fannie Mae (FNMA), and Freddie Mac (FHLMC).

Barclays CMBS: The **U.S. CMBS Investment Grade Index** measures the market of conduit and fusion CMBS deals with a minimum current deal size of \$300mn.

Barclays US High Yield: The **Barclays US Corporate High Yield Bond Index** measures the USD-denominated, high yield, fixed-rate corporate bond market. Securities are classified as high yield if the middle rating of Moody's, Fitch and S&P is Ba1/BB+/BB+ or below.

Barclays Global High Yield: The **Barclays Global High-Yield Index** provides a broad-based measure of the global high-yield fixed income markets.

CS High Yield Dev Countries Only: The **Credit Suisse High Yield Dev Countries Only Index** tracks the performance of noninvestment-grade corporate bonds from developed countries.

CS Leveraged Loan: The **Credit Suisse Leveraged Loan Index** is an index designed to mirror the investable universe of the \$US-denominated leveraged loan market.

JPMorgan GBI-EM Gbl Dvf'd: The **JPMorgan GBI-EM Global Diversified Total Return Index (Unhedged)** is a global emerging markets index that consists of regularly traded, liquid fixed-rate, domestic currency government bonds.

JPMorgan Emerging Markets Bond Global: The **JPMorgan Emerging Markets Bond Global Index** is a global emerging markets index that consists of regularly traded, liquid fixed-rate, US dollar-denominated government bonds.

NCREIF ODCE: The **NCREIF ODCE (Open End Diversified Core) Index** is an index of investment returns reporting on both a historical and current basis the results of 16 open-end commingled funds pursuing a core investment strategy, some of which have performance histories dating back to the 1970s. The NCREIF ODCE Index is capitalization-weighted and performance is time-weighted.

NCREIF Property: The **NCREIF Property Index** prepared by the National Council of Real Estate Investment Fiduciaries is a quarterly time series composite return measure for over 6,000 individual commercial real estate properties acquired in the private market for investment purposes. Total performance represents returns from appreciation and income, and includes multi-family, office, retail, and industrial properties.

HFRI FOF Composite: The **HFN FOF (Fund of Funds) Composite Index** is an equal-weighted index that contains over 400 constituent hedge fund of funds, both domestic and offshore.

Burgiss All Private Equity: The **Burgiss All Private Equity Benchmark** is a composite of nearly 1400 private equity funds derived from the holdings of over 200 institutional investors.

Alerian MLP: The **Alerian MLP Index** is a market-capitalization weighted index of the 50 most prominent energy Master Limited Partnerships.

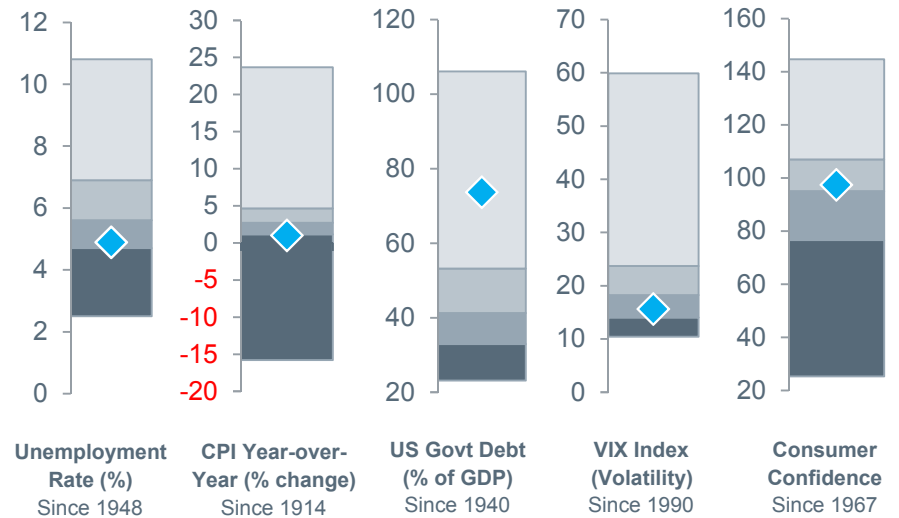
S&P Goldman Sachs Commodity: The **S&P Goldman Sachs Commodity Index** is a composite index of commodity sector returns representing an unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. Components are weighted by their respective world production quantities.

Second Quarter Economic Environment

Key Economic Indicators

The second quarter of 2016 was characterized by a broad based rally across commodities, a range bound US dollar, and a flight to safety on the back of the UK's referendum vote to leave the European Union. Uncertainty around Brexit dominated the news flow in late June and catalyzed a flight to safety across risk assets. Recent data show that 36% of outstanding global developed market government debt is now yielding less than 0%. However, investors continue to have an appetite for risk where yields remain positive. In developed markets, the surprise Brexit vote led to sharp initial declines in equities, though markets recovered quickly following a series of dovish statements from central banks. Long duration assets outperformed short duration, and gold rallied amid the flight to safety. In the US, probabilities for a June interest rate hike swung from as high as 35% in late May, down to 0% after disappointing May payroll numbers were released.

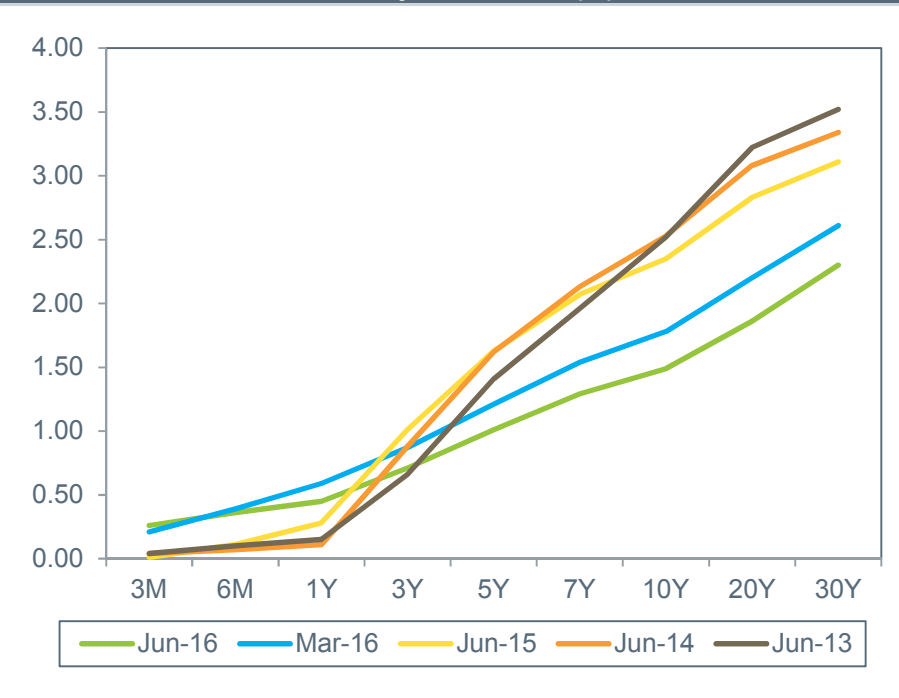
Key Economic Indicators



Economic Indicators

	Jun-16	Mar-16	Jun-15	Jun-13	20 Yr
Federal Funds Rate (%)	0.30 ▲	0.25	0.08	0.07	2.47
Breakeven Infl. - 1 Yr (%)	1.17 ▼	2.10	0.73	0.74	N/A
Breakeven Infl. - 10 Yr (%)	1.44 ▼	1.63	1.89	1.99	N/A
CPI YoY (Headline) (%)	1.0 ▲	0.9	0.1	1.8	2.2
Unemployment Rate (%)	4.9 ▼	5.0	5.3	7.5	6.0
Real GDP YoY (%)	1.2 ▼	1.6	3.0	1.0	2.4
PMI - Manufacturing	53.20 ▲	51.80	53.10	52.30	52.20
USD Total Wtd Idx	90.64 ▲	89.84	89.96	77.58	86.76
WTI Crude Oil per Barrel (\$)	48 ▲	38	59	97	55
Gold Spot per Oz (\$)	1,322 ▲	1,233	1,172	1,235	762

Treasury Yield Curve (%)



Market Performance (%)

	QTD	CYTD	1 Yr	5 Yr	10 Yr
S&P 500 (Cap Wtd)	2.46	3.84	3.99	12.10	7.42
Russell 2000	3.79	2.22	-6.73	8.35	6.20
MSCI EAFE (Net)	-1.46	-4.42	-10.16	1.68	1.58
MSCI EAFE SC (Net)	-2.60	-3.18	-3.67	4.84	3.57
MSCI Emg Mkts (Net)	0.66	6.41	-12.05	-3.78	3.54
Barclays US Agg Bond	2.21	5.31	6.00	3.76	5.13
BofA ML 3 Mo US T-Bill	0.07	0.15	0.19	0.09	1.04
NCREIF ODCE (Gross)	2.13	4.36	11.82	12.72	6.17
Wilshire US REIT	5.60	11.09	22.82	12.48	6.99
HFN FOF Multi-Strat	0.36	-2.83	-6.48	1.46	1.24
Bloomberg Cmdty (TR)	12.76	13.23	-13.34	-10.83	-5.59

Treasury data courtesy of the US Department of the Treasury. Economic data courtesy of Bloomberg Professional Service. Breakeven Inflation does not have 20 years of history; therefore, its 20-year average is shown as N/A.

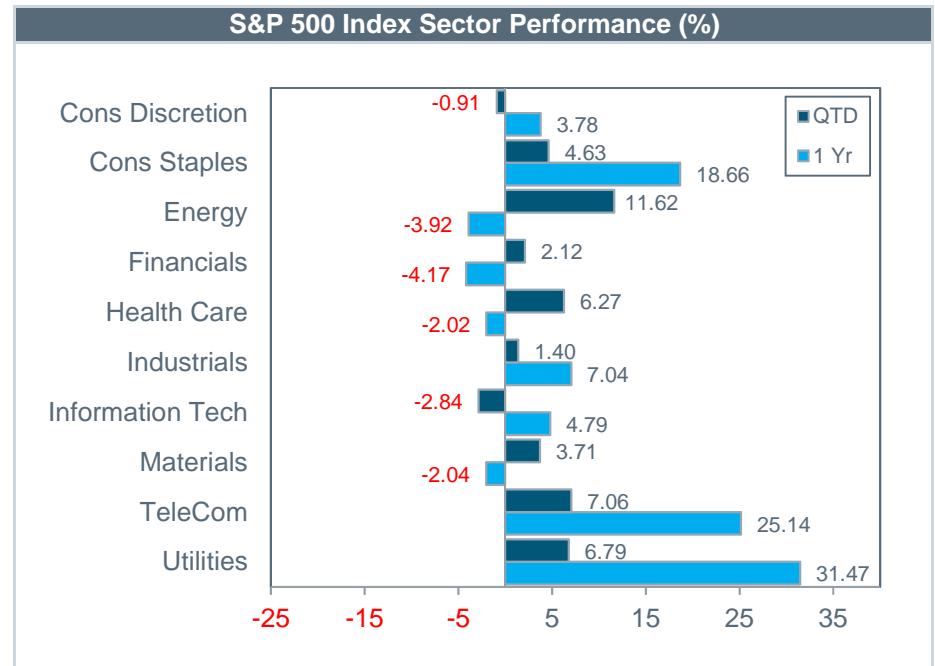
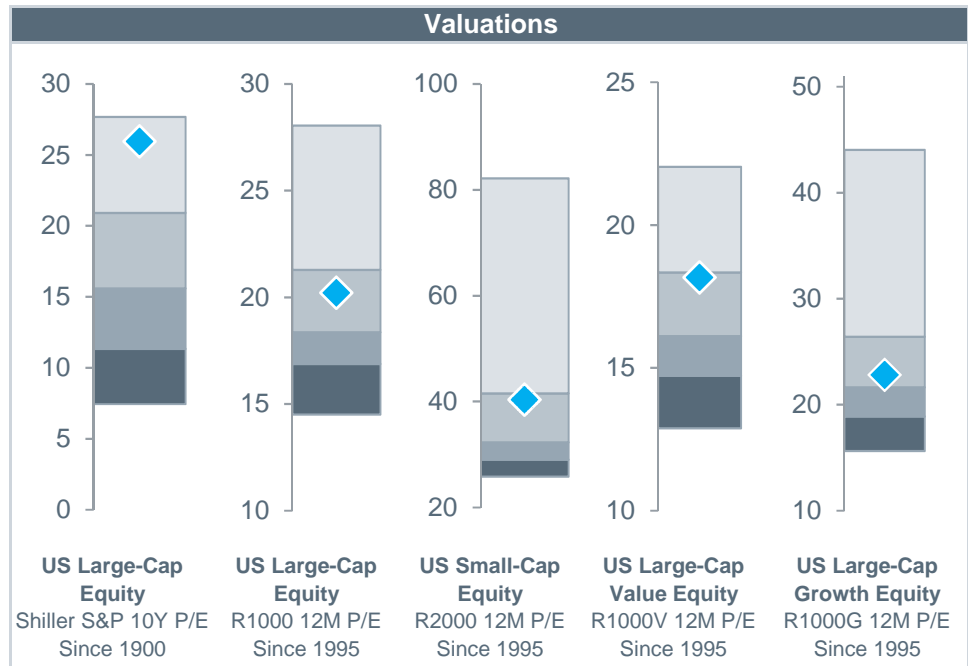
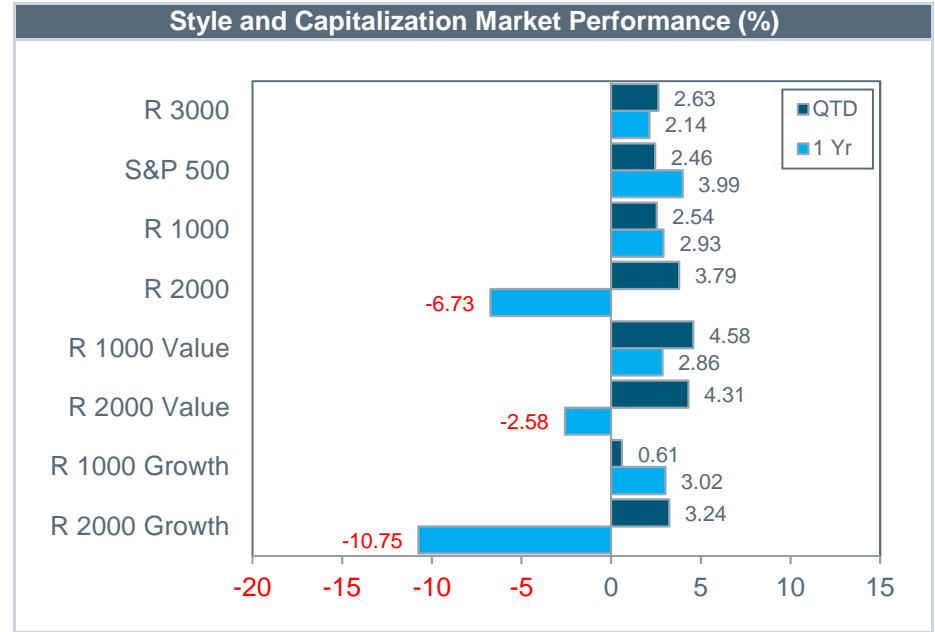


Second Quarter Review

Broad Market
 US equity markets finished the quarter in positive territory across all market capitalization ranges and styles, with the Russell 3000 Index rising 2.6%.

Market Cap
 Small cap stocks outperformed larger-cap stocks this quarter, as the Russell 2000 Index outperformed the Russell 1000 Index by 125 basis points.

Style and Sector
 Historically stable sectors such as utilities, consumer staples, and telecommunications continued to post strong gains as market volatility persisted and notably increased in the final week of the quarter amidst the uncertainty created by the UK's EU Referendum. Additionally, value stocks outperformed their growth counterparts over the quarter.



Valuation data courtesy of Bloomberg Professional Service and Robert J. Shiller, Irrational Exuberance, Second Edition. P/E metrics shown represent the 5th through 95th percentiles to minimize the effect of outliers.



Second Quarter Review

Developed Markets

Developed international markets continue to struggle, detracting value for the quarter and underperforming domestic equities. The uncertainty created by the UK's EU referendum is expected to result in a near-term slow-down in the EU, particularly in the UK. The European Economic Union ("EMU") was the worst performing developed region.

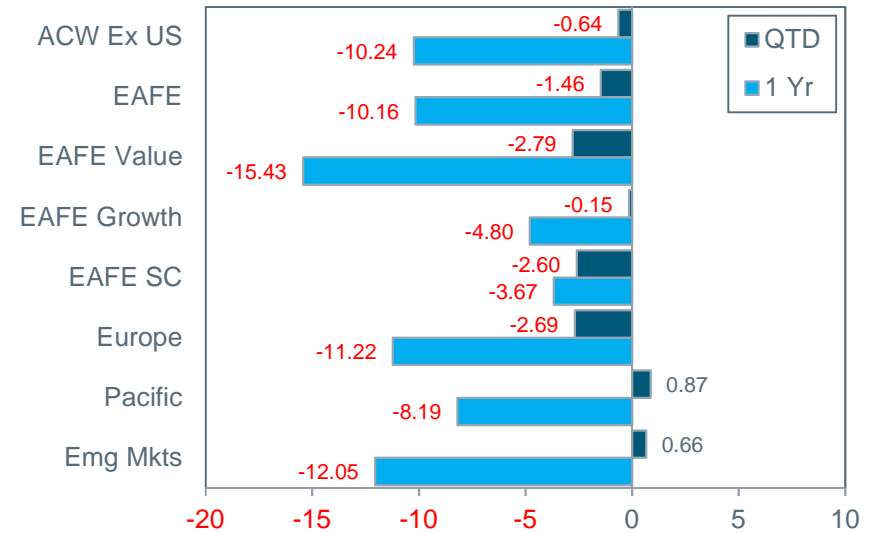
Emerging Markets

Emerging markets lagged domestic equities during the quarter, but performed better than developed international equity and have provided the highest returns among equity regions in 2016. Value underperformed growth for the quarter, but is still ahead year-to-date.

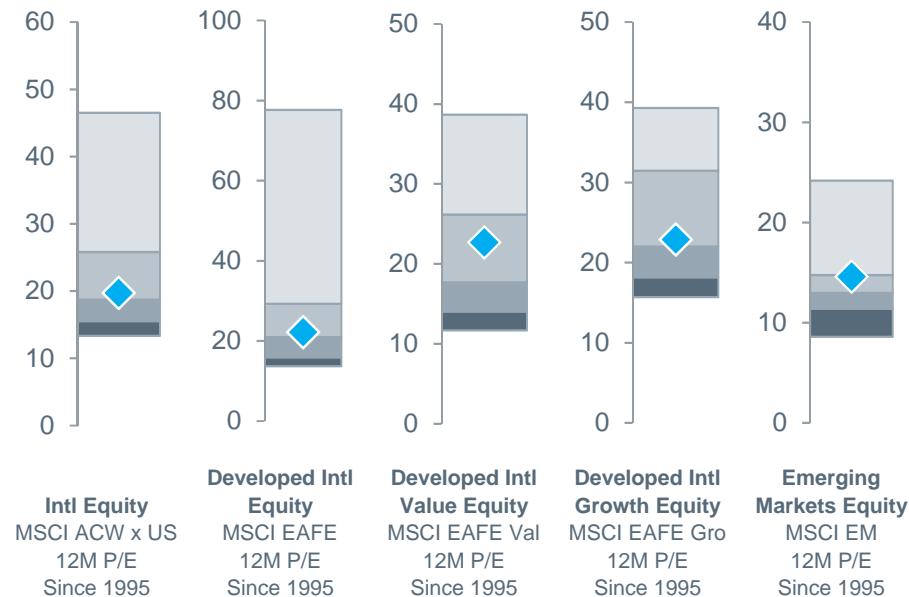
Market Cap & Style

The style trend continued as growth outpaced value with the MSCI EAFE Growth Index ending the quarter relatively flat at -0.1%, while the MSCI EAFE Value Index returned -2.8%. Small caps were a weak spot, lagging large cap developed stocks.

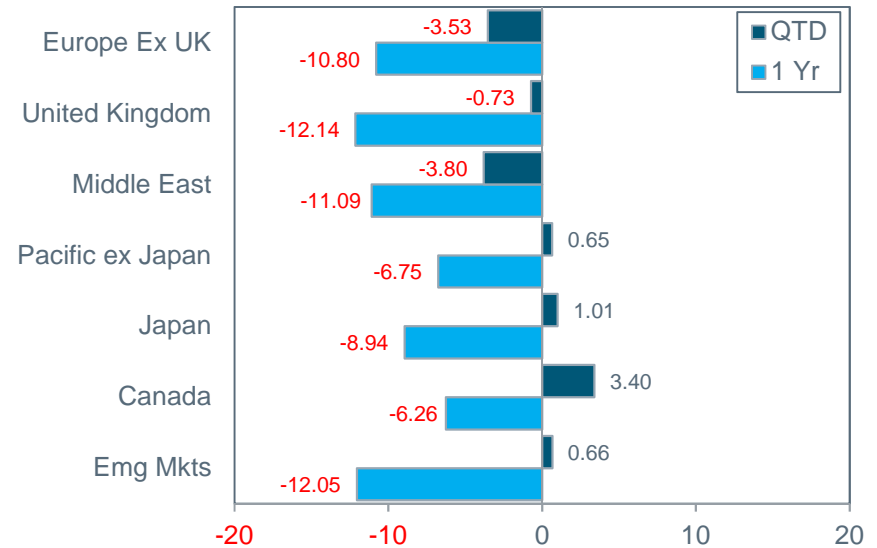
MSCI Style and Capitalization Market Performance (%)



Valuations



MSCI Region Performance (%)



Valuation data courtesy of Bloomberg Professional Service.

P/E metrics shown represent the 5th through 95th percentiles to minimize the effect of outliers. All returns are shown net of foreign taxes on dividends.

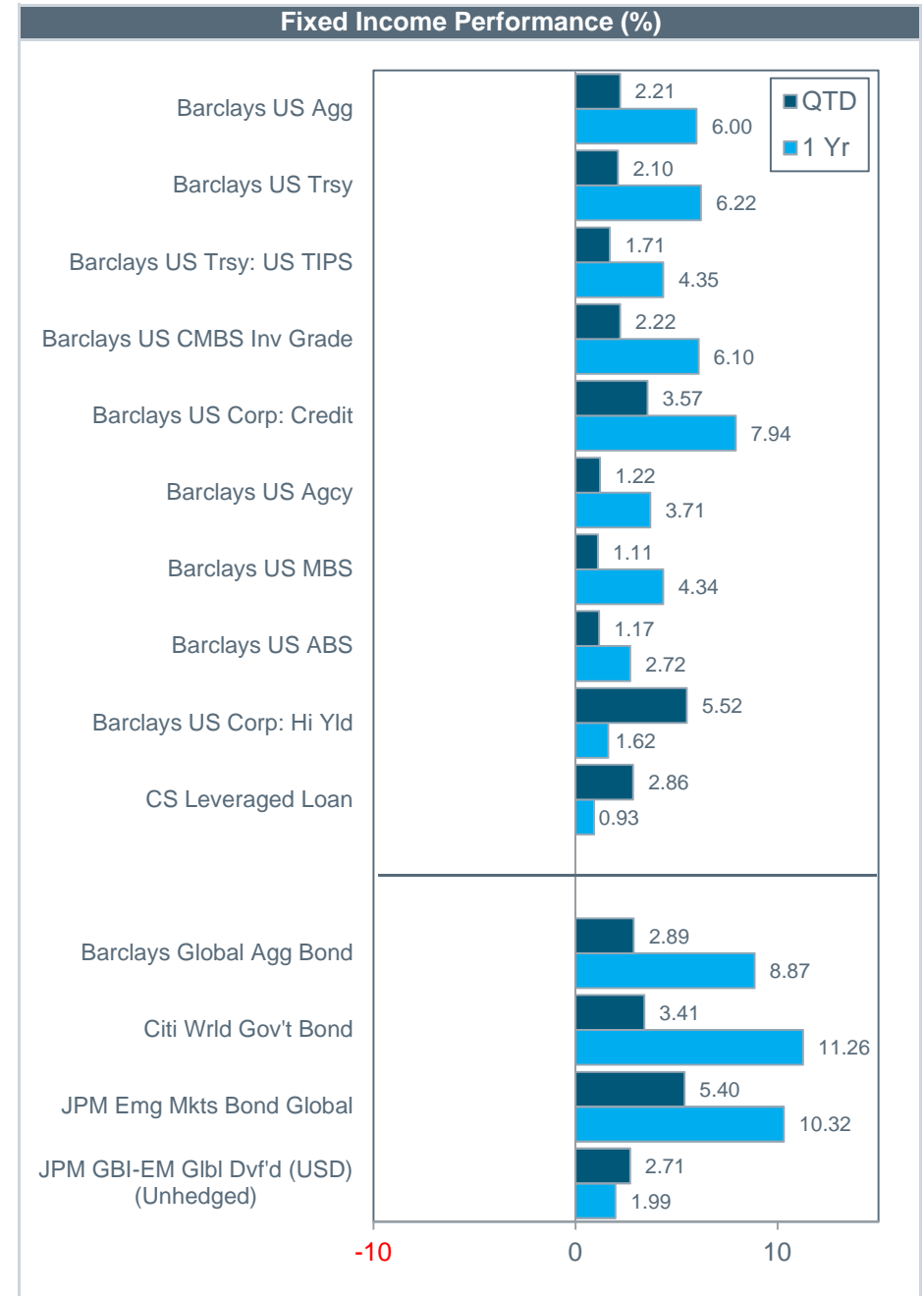
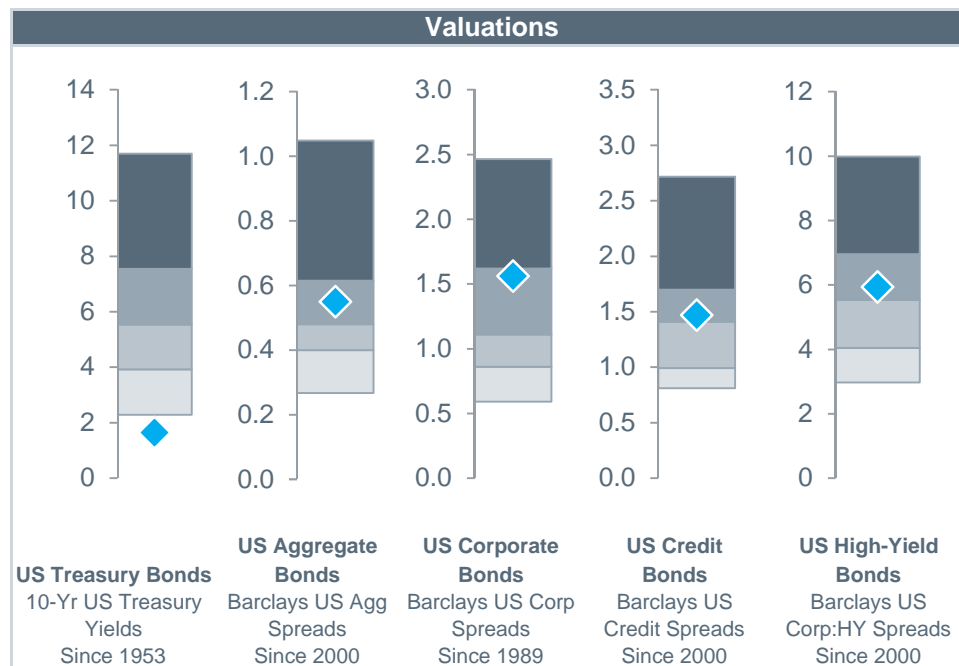


Second Quarter Review

Broad Market
 Virtually all fixed income sectors posted positive performance as interest rates fell and credits improved during the quarter. The Barclays US Agg posted a strong quarter, returning 2.21%.

Credit Market
 Utility and industrial bonds outperformed financial bonds as energy and commodity prices continued to rebound.

Emerging Market Debt
 Both local currency and hard currency emerging markets debt posted strong returns for a second consecutive quarter. Emerging market debt outperformed both US and developed markets, as evidenced by the JPM Emg Mkts Bond Global Index returning 5.40% during the quarter.



Valuation data courtesy of Bloomberg Professional Service.
 Valuations shown represent the 5th through 95th percentiles to minimize the effect of outliers.

Second Quarter Review - Absolute Return

General Market - Hedge Funds

After a poor first quarter, the hedge fund industry performed better during the second quarter of 2016, though Fund of Hedge Fund (“FoHF”) portfolios are still down between 2.5% to 3.0% year-to-date based on available peer group based benchmarks. Most of the FoHF managers RVK follows closely have performed roughly in line with peers YTD, with any dispersion explained to a large degree by strategy allocation. On the direct side, multi-strategy managers as a group continued to outperform their FoHF counterparts.

General Market - Global Tactical Asset Allocation (GTAA)

GTAA funds provided a dispersion in results for the second quarter, with many significantly outperforming an undiversified static portfolio of 60% US large cap equity and 40% US fixed income. Those that outperformed by the widest margins tended to follow fundamental value-oriented processes that have led to higher allocations to emerging market fixed income, high yield fixed income, and REITs.

Second Quarter Review - Real Assets

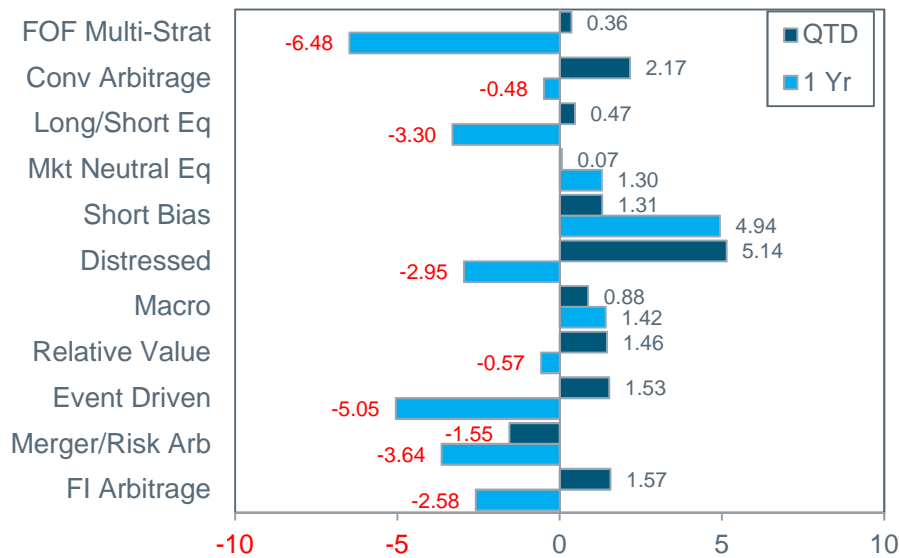
General Market - Diversified Inflation Strategies (DIS)

DIS provided strong performance with relatively narrow divergence for the second consecutive quarter. Most strategies significantly outperformed major world equity and fixed income indices, in addition to TIPS. Commodities, especially energy, provided strong performance over the quarter in a welcome reprieve from the longer-term trend of negative performance.

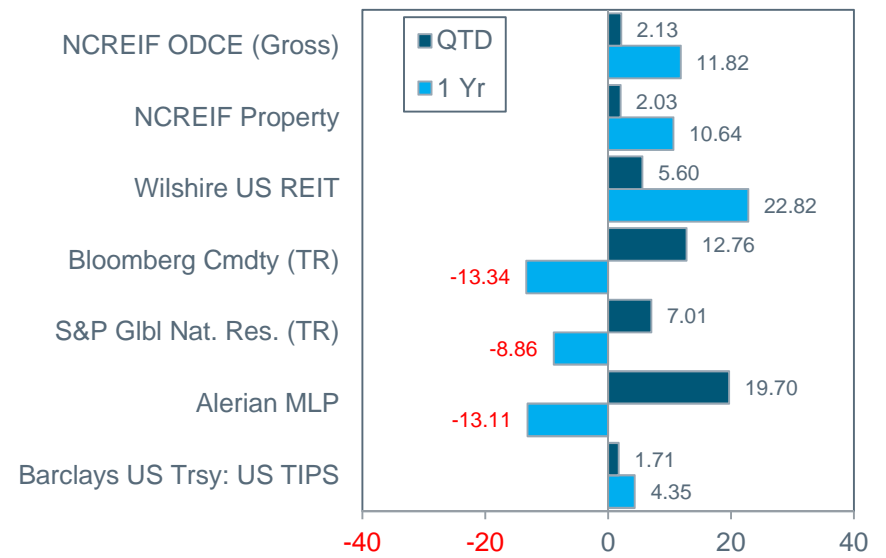
General Market - Real Estate

Due to the prolonged low-interest rate environment occurring globally and the economic uncertainty brought upon by the recent Brexit vote, the real estate sector proved to be an attractive option during the second quarter as investors sought the perceived safe-haven of property as well as the continued strong dividends yields relative to global treasury rates. The private real estate sector experienced themes similar to listed real estate as evidenced by a preliminary 2.1% return in the NCREIF-ODCE Index during Q2.

HFN Hedge Fund Performance (%)



Real Asset Performance (%)



Annual Asset Class Performance

As of June 30, 2016

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	YTD
Best	25.91	61.34	33.16	34.00	35.97	39.38	8.44	78.51	28.60	22.49	20.00	38.82	31.78	15.02	14.33
	16.56	55.81	31.45	26.19	32.18	16.23	5.24	58.21	26.86	15.99	18.23	32.39	19.31	9.59	13.23
	14.81	47.25	25.55	21.39	26.34	15.97	2.06	46.78	22.04	13.56	17.59	29.30	13.69	4.23	11.09
	10.25	38.59	20.25	21.36	19.31	11.63	-2.35	31.78	18.88	9.24	17.32	22.78	12.50	1.38	9.06
	5.54	36.18	18.33	13.82	18.37	11.17	-10.01	28.60	16.83	7.84	16.34	13.94	5.97	0.55	6.41
	3.58	28.97	13.06	13.54	16.32	9.91	-20.47	27.18	16.36	4.98	16.00	9.10	4.89	0.05	6.24
	3.12	28.68	11.13	6.75	15.79	6.97	-26.16	26.46	15.12	2.11	15.81	7.44	3.64	-0.81	5.31
	1.78	23.93	10.88	5.33	11.85	6.60	-33.79	18.91	15.06	0.10	10.94	1.86	3.03	-1.24	4.36
	-1.41	11.93	9.15	4.91	9.85	5.49	-35.65	11.41	10.16	-4.18	8.82	0.07	2.45	-1.44	3.84
	-6.17	9.28	8.56	4.55	4.85	5.00	-37.00	9.72	7.75	-5.55	6.98	-2.02	0.04	-3.30	2.22
	-7.83	8.39	8.46	3.07	4.33	1.87	-39.20	5.93	6.54	-12.14	4.80	-2.60	-2.19	-4.41	0.15
	-15.94	5.87	6.79	2.84	2.71	1.45	-43.38	1.92	6.31	-13.32	4.21	-8.61	-4.30	-4.47	-2.83
	-20.48	4.10	4.34	2.74	2.07	-1.57	-47.01	0.21	4.77	-15.94	0.11	-8.83	-4.95	-14.92	-3.18
Worst	-22.10	1.15	1.33	2.43	0.41	-17.55	-53.33	-29.76	0.13	-18.42	-1.06	-9.52	-17.01	-24.66	-4.42
	S&P 500 - US Large Cap	R 2000 - US Small Cap	MSCI EAFE (Net) - Int'l Dev.	MSCI EAFE SC (Net) - Int'l SC	MSCI EM (Net) - Int'l Emg Mkts	Barclays US Agg Bond - FI	Barclays US Corp: Hi Yield - FI	Barclays US Trsy: US TIPS - FI	Barclays US Gov/Credit: Lng - FI	NCREIF ODCE (Gross) - Real Estate	Wilshire US REIT - REITs	HFN FOF Multi-Strat (Net) - ARS	Bloomberg Cmdty (TR) - Commod.	BofA ML 3 Mo T-Bill - Cash Equiv	



Summary

During the first half of 2016, three of the six plans outperformed their custom benchmarks, and four outperformed the All Public Funds > \$1B-Total Fund median 2 Quarter return of 2.9%.

Over the trailing 3-year period, five of the six plans outperformed their respective benchmarks and the All Public Funds Universe. The six Ohio Funds earned returns ranging from 5.5% to 8.0%. Over the trailing 5-year period, four of the six plans outperformed their respective benchmarks and four plans outperformed the All Public Funds > \$1B Universe.

Over the trailing 10-year time period, none of the six plans outperformed their respective actuarial interest rates of 8.25% for OP&F, 8.0% for PERS (DB), 7.75% for STRS and HPRS, 7.5% for SERS, and 6.5% for PERS (HC).

Asset Allocation & Performance

	Market Value (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
PERS (DB)	75,857,456	4.17	1.75	7.25	7.13	10.09	5.92	0.58	7.25	14.65	14.78
PERS (DB) Total Fund Benchmark		4.03	1.59	6.55	6.41	9.72	5.56	0.25	5.83	14.24	15.35
Difference		0.14	0.16	0.70	0.72	0.37	0.36	0.33	1.42	0.41	-0.57
Rank		12	17	20	19	23	32	36	31	59	6
PERS (HC)	10,857,818	4.79	1.08	5.48	5.45	8.93	5.30	-2.06	5.46	11.54	13.85
PERS (HC) Total Fund Benchmark		4.73	1.31	5.30	5.14	8.55	5.29	-1.86	5.03	10.70	13.54
Difference		0.06	-0.23	0.18	0.31	0.38	0.01	-0.20	0.43	0.84	0.31
Rank		7	30	87	87	77	71	97	77	78	26
STRS	69,861,105	2.01	0.92	7.53	7.66	10.51	6.06	2.46	7.95	17.39	13.60
STRS Total Fund Benchmark		2.17	0.67	7.52	7.69	10.47	6.04	1.70	8.26	18.09	13.93
Difference		-0.16	0.25	0.01	-0.03	0.04	0.02	0.76	-0.31	-0.70	-0.33
Rank		82	35	10	6	12	23	5	17	26	41
OP&F	13,960,346	4.48	1.34	7.70	7.81	11.11	6.67	0.65	6.87	16.83	15.41
OP&F Total Fund Benchmark		6.09	1.48	6.69	7.13	10.11	5.82	-2.18	6.87	14.61	14.94
Difference		-1.61	-0.14	1.01	0.68	1.00	0.85	2.83	0.00	2.22	0.47
Rank		9	23	9	4	2	3	33	38	32	2
SERS	12,460,451	3.06	2.03	7.97	7.62	10.09	5.65	2.93	6.92	16.86	14.42
SERS Total Fund Benchmark		2.40	0.92	6.67	6.69	9.34	5.46	1.48	6.66	15.34	13.56
Difference		0.66	1.11	1.30	0.93	0.75	0.19	1.45	0.26	1.52	0.86
Rank		43	12	3	6	23	53	1	34	31	12
HPRS	800,100	1.68	-1.04	6.69	6.33	9.29	5.27	0.12	6.73	19.59	11.45
HPRS Total Fund Benchmark		2.51	-0.02	6.72	6.64	9.75	6.09	0.19	7.03	16.79	13.07
Difference		-0.83	-1.02	-0.03	-0.31	-0.46	-0.82	-0.07	-0.30	2.80	-1.62
Rank		91	84	44	51	55	71	51	45	10	88
<i>All Public Plans > \$1B-TF Median</i>		<i>2.87</i>	<i>0.18</i>	<i>6.37</i>	<i>6.40</i>	<i>9.47</i>	<i>5.67</i>	<i>0.17</i>	<i>6.57</i>	<i>15.48</i>	<i>13.13</i>

Performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments. Ranks are shown against All Public Plans >\$1B-Total Fund.

Summary

SERS was the only one of the six plans that outperformed its respective benchmark during the first half of 2016, net of investment management fees, while the performance for **PERS (DB)** and **PERS (HC)** were in line with their respective benchmarks.

Over the trailing 3-year period, four of the six plans outperformed their respective benchmarks. The six Ohio Funds earned returns ranging from 5.3% to 7.4%. Over the trailing 5-year period, four of the six plans outperformed their respective benchmarks.

Over the trailing 10-year time period, none of the six plans outperformed their respective actuarial interest rates of 8.25% for **OP&F**, 8.0% for **PERS (DB)**, 7.75% for **STRS** and **HPRS**, 7.5% for **SERS**, and 6.5% for **PERS (HC)**.

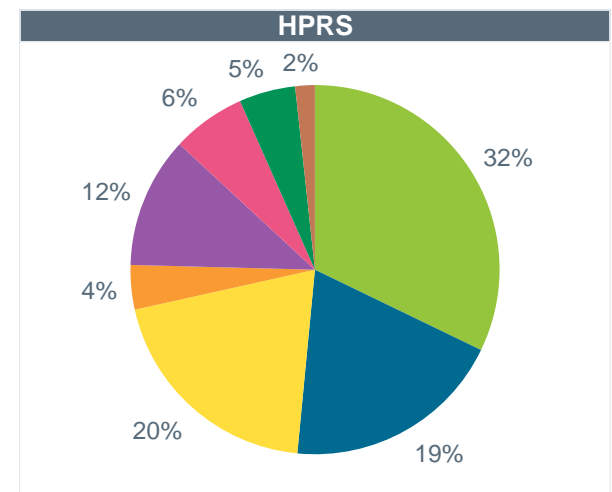
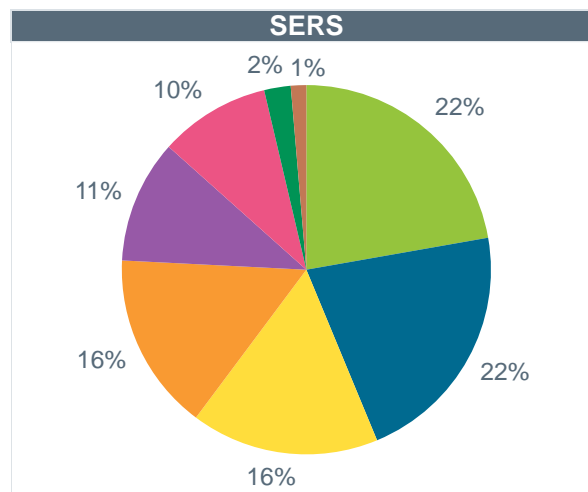
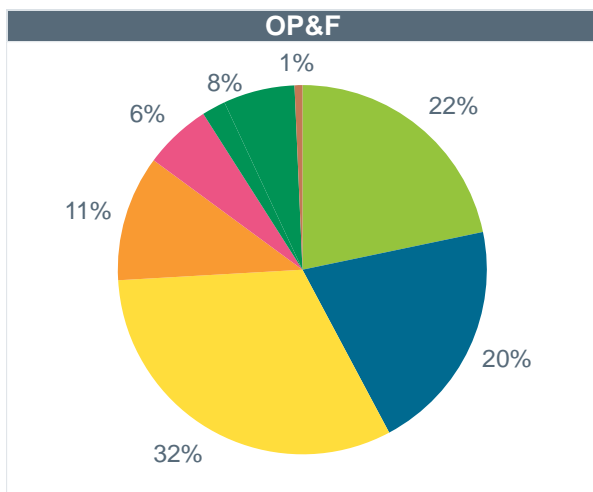
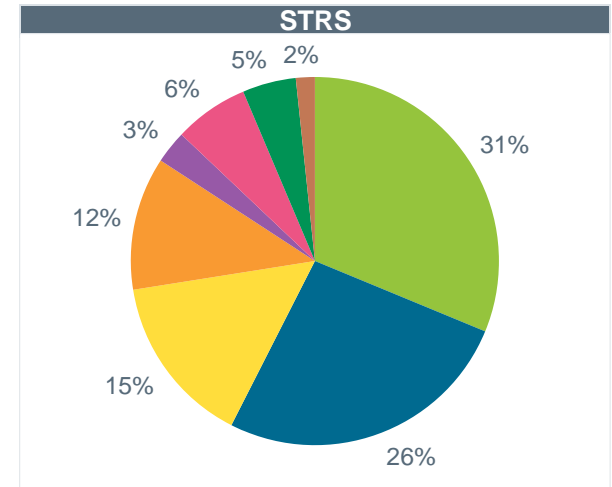
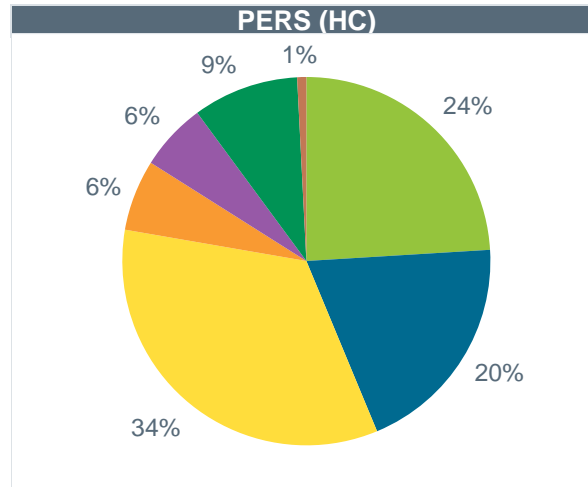
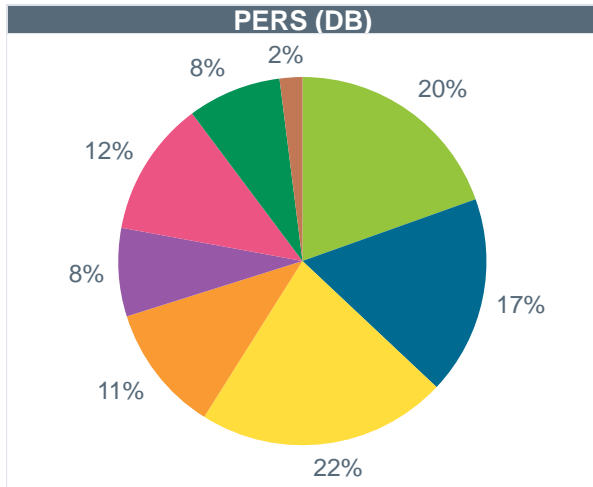
Asset Allocation & Performance - Net of Fees

	Market Value (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
PERS (DB)	75,857,456	4.02	1.47	6.97	6.87	9.87	5.77	0.33	6.96	14.38	14.54
PERS (DB) Total Fund Benchmark		4.03	1.59	6.55	6.41	9.72	5.56	0.25	5.83	14.24	15.35
Difference		-0.01	-0.12	0.42	0.46	0.15	0.21	0.08	1.13	0.14	-0.81
PERS (HC)	10,857,818	4.73	0.93	5.33	5.30	8.89	5.27	-2.18	5.28	11.36	13.72
PERS (HC) Total Fund Benchmark		4.73	1.31	5.30	5.14	8.55	5.29	-1.86	5.03	10.70	13.54
Difference		0.00	-0.38	0.03	0.16	0.34	-0.02	-0.32	0.25	0.66	0.18
STRS	69,861,105	1.94	0.78	7.39	7.53	10.38	5.93	2.33	7.82	17.25	13.47
STRS Total Fund Benchmark		2.17	0.67	7.52	7.69	10.47	6.04	1.70	8.26	18.09	13.93
Difference		-0.23	0.11	-0.13	-0.16	-0.09	-0.11	0.63	-0.44	-0.84	-0.46
OP&F	13,960,346	4.17	0.74	7.14	7.30	10.62	6.26	0.07	6.27	16.40	14.98
OP&F Total Fund Benchmark		6.09	1.48	6.69	7.13	10.11	5.82	-2.18	6.87	14.61	14.94
Difference		-1.92	-0.74	0.45	0.17	0.51	0.44	2.25	-0.60	1.79	0.04
SERS	12,460,451	2.72	1.38	7.29	6.90	9.33	4.96	2.31	6.25	16.09	13.55
SERS Total Fund Benchmark		2.40	0.92	6.67	6.69	9.34	5.46	1.48	6.66	15.34	13.56
Difference		0.32	0.46	0.62	0.21	-0.01	-0.50	0.83	-0.41	0.75	-0.01
HPRS	800,100	1.48	-1.49	6.24	5.94	8.91	4.92	-0.46	6.30	19.35	11.13
HPRS Total Fund Benchmark		2.51	-0.02	6.72	6.64	9.75	6.09	0.19	7.03	16.79	13.07
Difference		-1.03	-1.47	-0.48	-0.70	-0.84	-1.17	-0.65	-0.73	2.56	-1.94

Performance shown is net of all investment management costs.

Summary

PERS (DB) has the smallest allocation to domestic equity among the six plans and the highest allocation to total alternatives.
 PERS (HC) has the highest allocation to fixed income and does not have a dedicated allocation to private equity.
 STRS has the highest allocation to international equity and the lowest allocation to fixed income among the six plans.
 OP&F has the second highest allocation to fixed income relative to the other plans and does not have a dedicated allocation to hedge funds.
 SERS has the highest allocation to real estate and the second highest allocation to hedge funds among the six plans.
 HPRS has the highest allocation to domestic equity and hedge funds and the smallest allocation to real estate.



- US Equity
- International Equity
- Fixed Income
- Real Estate
- Hedge Funds
- Private Equity
- Other Alternatives
- Cash Equivalents

Allocations shown may not sum up to 100% exactly due to rounding. Cash Equivalents for PERS (DB) consists of cash, rebalancing, and additional annuity. Cash Equivalents for PERS (HC) consists of cash and rebalancing.

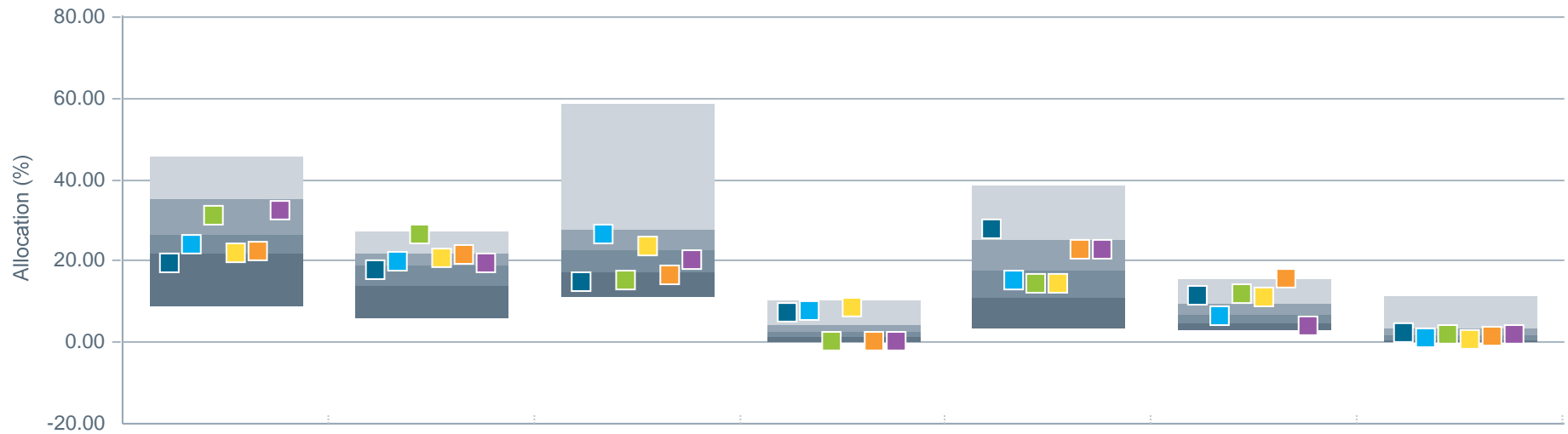


Summary

All six plans are diversified across multiple traditional (equity and fixed income) and alternative (real estate, real assets, private equity, hedge funds, etc.) asset classes, as compared to peers.

- **PERS (DB)** has a below median US Equity allocation and top quartile allocation to Alternatives and Real Estate. The US Fixed Income allocation is below median. **PERS (DB)** also allocates to Intl. Fixed Income.
- **PERS (HC)** has a lower allocation to US Equity and an above-median allocation to Intl. Equity, US Fixed Income and Intl. Fixed Income.
- **STRS** has an allocation to US and Intl. Equity that is above median. The allocation to US Fixed Income is lower than peers.
- **OP&F** has a lower allocation to US Equity while Intl. Equity allocation is above the peer median. The US Fixed Income allocation is relatively in line with the median. **OP&F** also allocates to Intl. Fixed Income.
- **SERS**'s allocation to US Fixed Income is below median, while the allocation to Real Estate is in the top decile among its peers.
- **HPRS** has a higher allocation to US Equity and an Intl. Equity allocation relatively in line with the peer median. **HPRS**'s allocation to Real Estate is below median.

Plan Sponsor Peer Group Analysis - Total Fund Asset Allocation

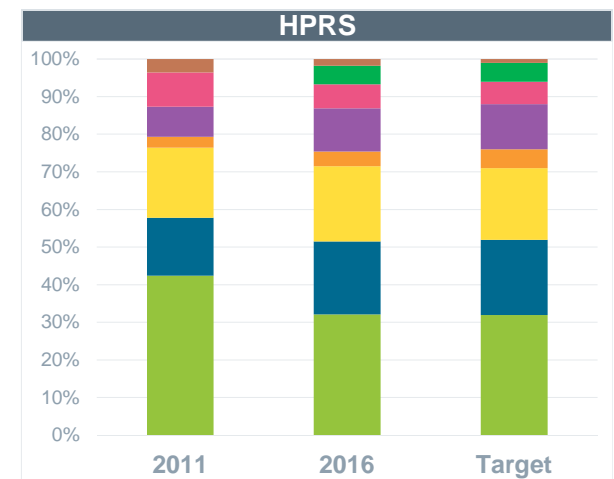
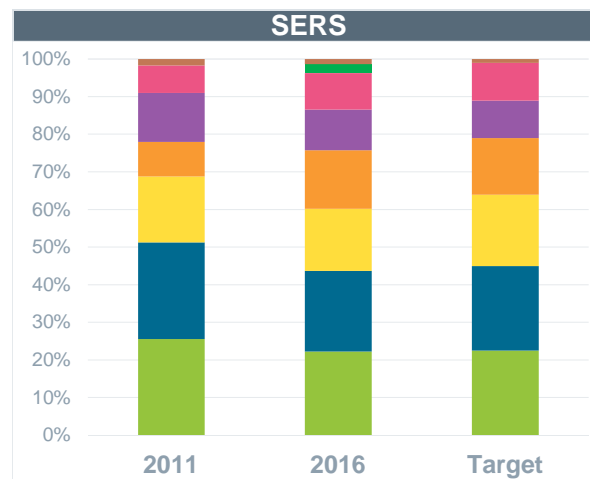
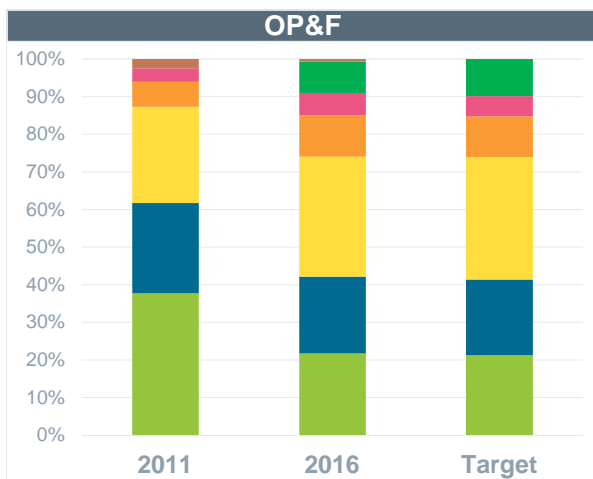
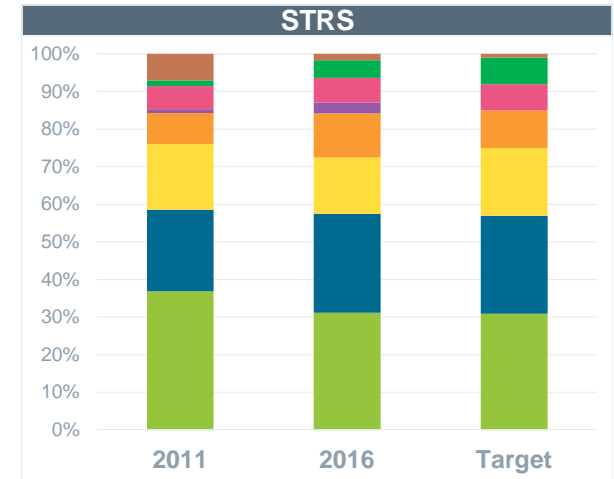
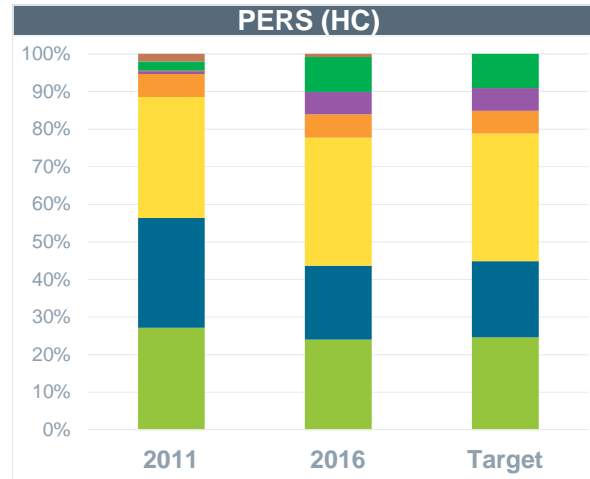
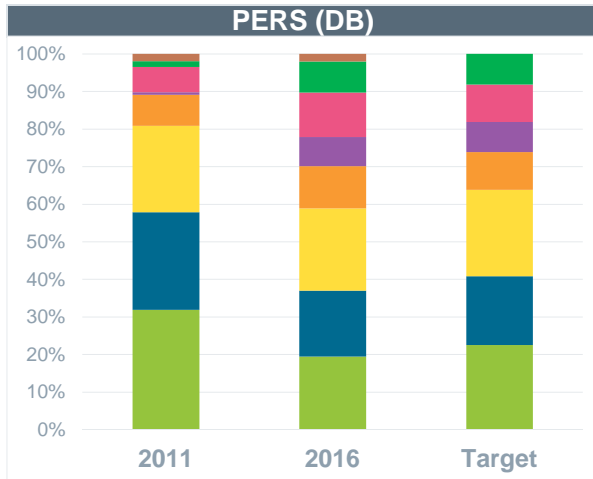


	US Equity	Intl. Equity	US Fixed Income	Intl. Fixed Income	Alternative Inv.	Real Estate	Cash
■ PERS (DB)	19.54 (81)	17.47 (58)	14.91 (85)	7.02 (14)	27.87 (17)	11.21 (15)	1.98 (44)
■ PERS (HC)	24.03 (62)	19.71 (41)	26.38 (32)	7.61 (13)	15.20 (58)	6.25 (58)	0.81 (71)
■ STRS	31.22 (36)	26.27 (11)	15.02 (83)	0.00	14.14 (61)	11.69 (14)	1.66 (55)
■ OP&F	21.72 (77)	20.48 (34)	23.46 (43)	8.42 (11)	14.23 (61)	11.01 (16)	0.67 (76)
■ SERS	22.24 (74)	21.50 (27)	16.47 (78)	0.00	22.85 (33)	15.58 (4)	1.35 (56)
■ HPRS	32.16 (32)	19.36 (44)	19.99 (63)	0.00	22.86 (32)	3.91 (85)	1.72 (54)
Median	26.51	18.84	22.47	2.71	17.65	6.86	1.78

Allocations shown may not add up to 100% due to rounding. US Fixed Income may include allocations to Intl. Fixed Income not explicitly broken out by the plans. Parentheses contain percentile ranks. Cash Equivalents for PERS (DB) consists of cash, rebalancing, and additional annuity. Cash Equivalents for PERS (HC) consists of cash and rebalancing.

Summary

Over the past five years, US equity allocations have generally declined across all six plans while allocations to alternatives, particularly hedge funds and private equity, have generally increased. Allocations to other alternatives have also increased since 2011, with plans introducing new asset classes such as MLPs, commodities and opportunistic investments. Allocations to international equity and fixed income have remained relatively consistent over time.

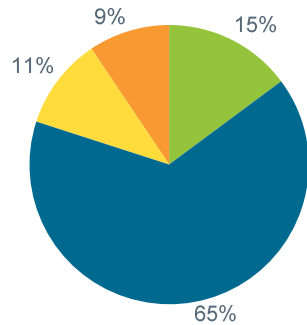


- US Equity
- International Equity
- Fixed Income
- Real Estate
- Hedge Funds
- Private Equity
- Other Alternatives
- Cash Equivalents

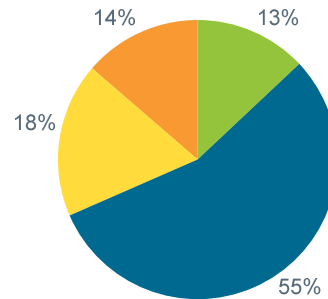
Summary

- **Alpha:** Aims to continually provide a return in excess of the portfolio benchmark return for a given level of risk and are intended to provide diversification (primarily with the Capital Appreciation and Capital Preservation components).
(Includes: Hedge Funds, Global Tactical Asset Allocation (GTAA), and Risk Parity)
- **Capital Appreciation:** Seeks high level of capital gains through increased risk-return trade-off.
(Includes: Public & Private Equities, High Yield, Emerging Markets Debt, MLPs, Timber, Non-Core Real Estate, Opportunistic Investments, and Securitized Debt)
- **Capital Preservation:** Conservative strategy designed to avoid risk of loss of principal.
(Includes: Core Fixed Income and Cash Equivalents)
- **Inflation:** Provide returns that will keep pace with normal inflationary movements in the long-term market. Designed not to lose value in an inflationary environment.
(Includes: TIPS, Commodities, Real Return, Floating Rate Debt, REITs, and Core Real Estate)

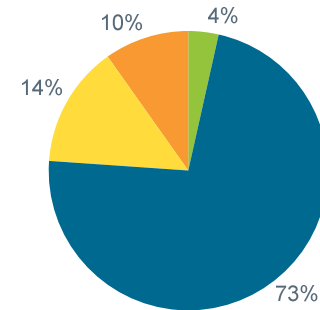
PERS (DB)



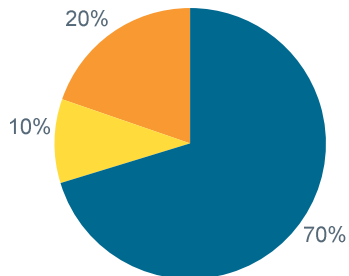
PERS (HC)



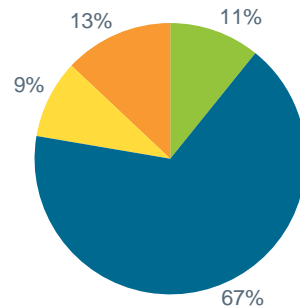
STRS



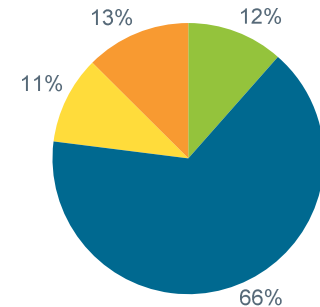
OP&F



SERS



HPRS



Asset Allocation by Thematic Category percentages are provided by the Plans. Allocations are based on dedicated composite allocations and not underlying investment manager exposures; as such, thematic allocations are approximations. OP&F does not have any dedicated exposure to Alpha strategies, but does have alpha exposure embedded within other asset class buckets. Allocations shown may not sum up to exactly 100% due to rounding. Please see the Glossary for additional information regarding thematic descriptions.

Summary

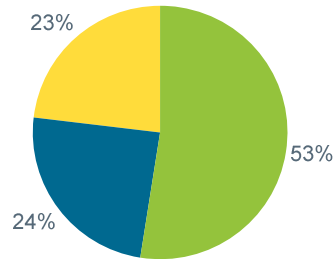
RVK Liquidity Rating - A qualitative method developed and calculated by RVK for determining the relative amount of liquidity in a portfolio.

Liquid Investments: Publicly traded assets, largely exchanged traded with significant trading volume for the overall asset classes. Takes a relatively small discount or time required to raise cash, but generally expected to clear at quoted bid prices within several trading days.

Less Liquid Investments: Smaller trading volume, non-exchange traded, or vehicle-based liquidity constraints. Moderate to significant discount to raise cash, expected to see fewer purchase-oriented bids, or time required to receive cash is significantly greater than several trading days.

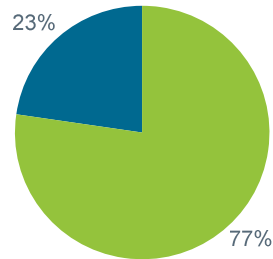
Not Liquid Investments: Private appraisal-based transactions, vehicle-based liquidity constraints, or privately held assets. Extreme discount to raise cash or 6-12+ months required to receive cash.

PERS (DB)



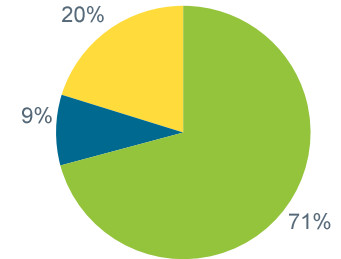
PERS (DB) Liquidity Rating 62

PERS (HC)



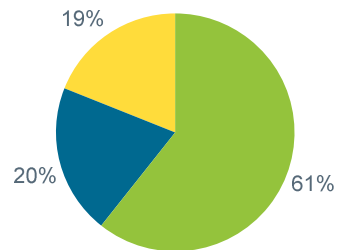
PERS (HC) Liquidity Rating 80

STRS



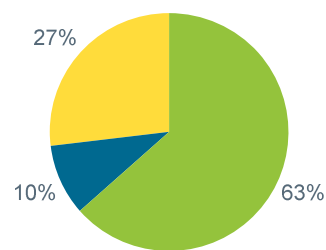
STRS Liquidity Rating 70

OP&F



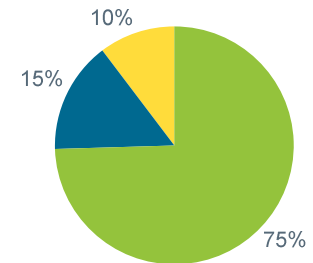
OP&F Liquidity Rating 70

SERS



SERS Liquidity Rating 63

HPRS



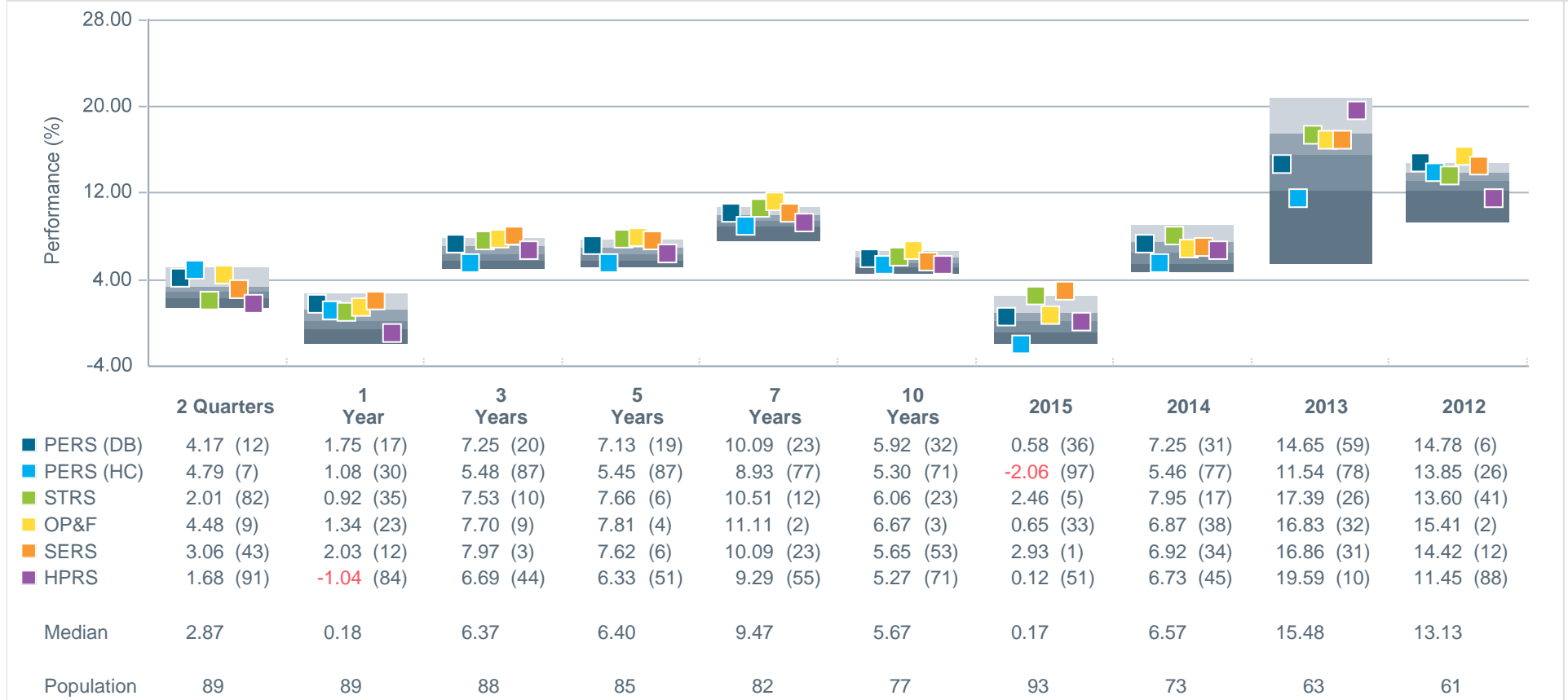
HPRS Liquidity Rating 70

Asset Allocation by Liquidity percentages are provided by the Plans. Allocations are based on dedicated composite allocations and not underlying investment manager exposures; as such, liquidity allocations are approximations. Allocations shown may not sum up to exactly 100% due to rounding. The RVK Liquidity Rating is calculated by RVK using beginning of quarter investment weights applied to each corresponding asset class liquidity rating. Please see the glossary for additional information regarding liquidity and custom index descriptions.

Summary

- Four of the six Ohio Funds outperformed the All Public Plans >\$1B-Total Fund median during the first half of 2016.
- **PERS (DB)** outperformed the median over all trailing periods shown.
- **PERS (HC)** has trailed the peer median over the 3, 5, 7, and 10-year trailing periods, while performing in the top decile in the previous 2 Quarters.
- **STRS** performed below median in the previous 2 Quarters, but above the median in all other trailing periods shown.
- **OP&F** performed in the top quartile over all trailing periods and outperformed the peer median in the calendar years shown.
- **SERS** has outperformed the peer median in all trailing periods shown except the 10-year period.
- **HPRS** outperformed the peer median over the trailing 3-year period, but underperformed over all other trailing periods shown.

Plan Sponsor Peer Group - Total Fund Performance

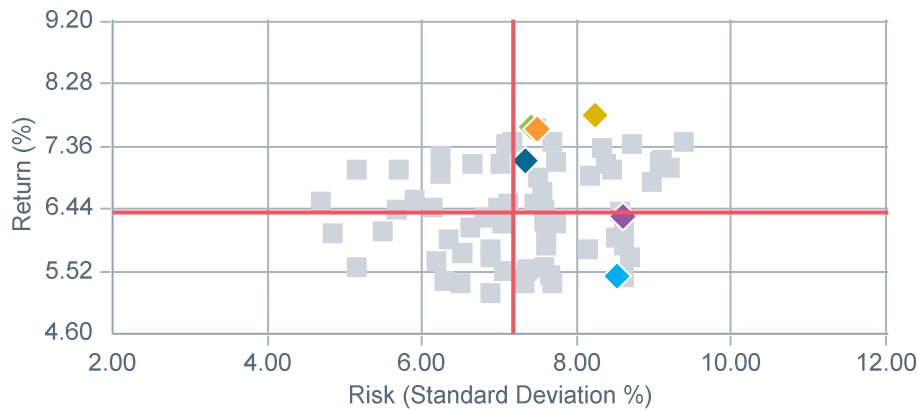


Performance shown is gross of fees. Parentheses contain percentile ranks.

Summary

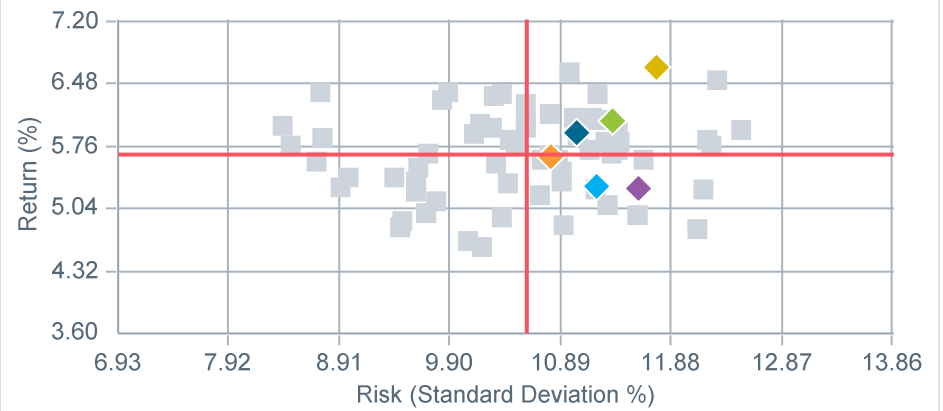
- All six plans have experienced higher volatility (standard deviation) than the All Public Plans > \$1B-Total Fund median over the trailing 5 and 10-year periods.
- Over the trailing 5-year period, PERS (DB), STRS, OP&F, and SERS have outperformed the median in terms of excess return per unit of risk. PERS (HC) and HPRS have trailed the median Sharpe Ratio over the same time period.
- Over the trailing 10-year period, PERS (DB), STRS, and OP&F have outperformed the median on an excess return per unit of risk basis. PERS (HC) and HPRS have trailed the median Sharpe Ratio over the same period, while SERS is at the median Sharpe Ratio.

Plan Sponsor Peer Group Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB)	7.13	7.34
◆ PERS (HC)	5.45	8.52
◆ STRS	7.66	7.42
◆ OP&F	7.81	8.23
◆ SERS	7.62	7.48
◆ HPRS	6.33	8.60
— Median	6.40	7.19

Plan Sponsor Peer Group Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB)	5.92	11.04
◆ PERS (HC)	5.30	11.22
◆ STRS	6.06	11.37
◆ OP&F	6.67	11.75
◆ SERS	5.65	10.81
◆ HPRS	5.27	11.60
— Median	5.67	10.59

Sharpe Ratio - 5 Year

PERS (DB)	0.97
PERS (HC)	0.66
STRS	1.03
OP&F	0.95
SERS	1.02
HPRS	0.75
All Public Plans > \$1B-Total Fund Median	0.87

Sharpe Ratio - 10 Year

PERS (DB)	0.48
PERS (HC)	0.42
STRS	0.49
OP&F	0.52
SERS	0.47
HPRS	0.41
All Public Plans > \$1B-Total Fund Median	0.47

Performance shown is gross of fees.

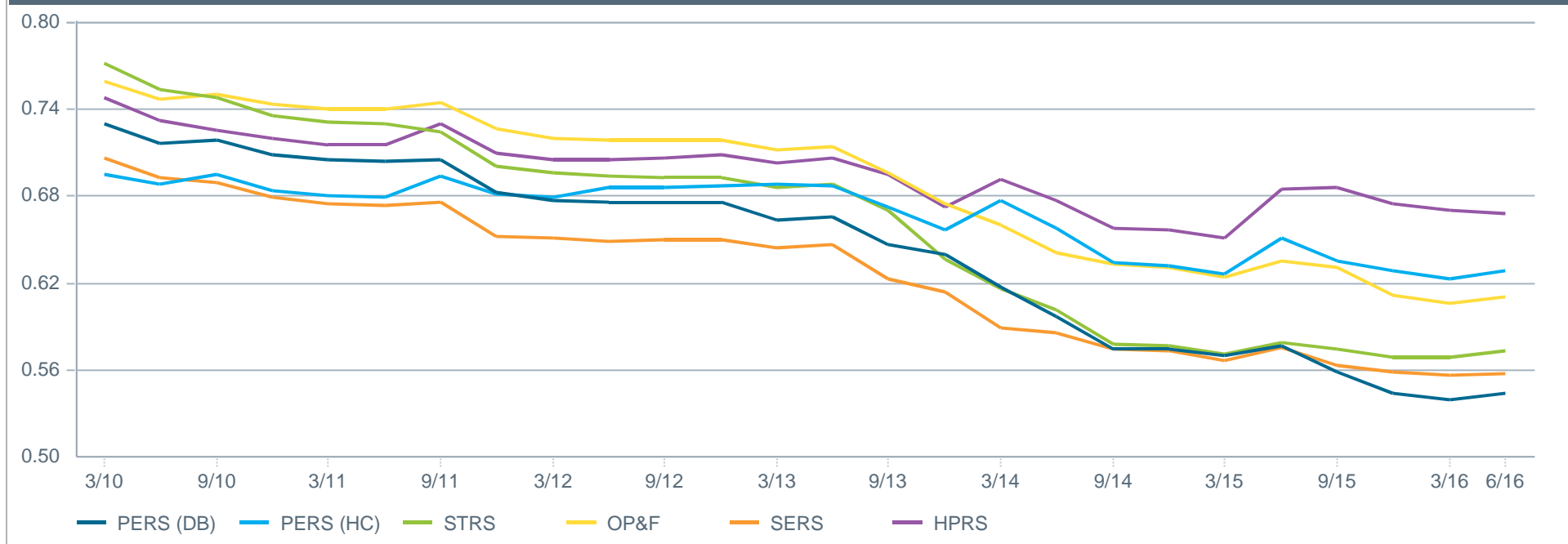
Summary

Beta is a measure of the sensitivity of a portfolio to the movements of the U.S. equity market as represented by the S&P 500 Index (Cap Wtd). Beta measures a portfolio's non-diversifiable or systematic risk. As an example, a Beta of 0.70 indicates that a portfolio captures roughly 70% of the S&P 500 Index return. If the S&P 500 Index returns 10%, the portfolio would be expected to return 7%.

Equity Beta

	3 Years	5 Years	7 Years	10 Years
PERS (DB)	0.49	0.54	0.59	0.65
PERS (HC)	0.56	0.63	0.66	0.66
STRS	0.56	0.57	0.61	0.68
OP&F	0.58	0.61	0.65	0.70
SERS	0.52	0.56	0.58	0.64
HPRS	0.63	0.67	0.68	0.69
S&P 500 Index (Cap Wtd)	1.00	1.00	1.00	1.00

5 Year Rolling Equity Beta



Performance shown is gross of fees and is calculated using quarterly periodicity.

Summary

- During the first half of 2016, none of the five plans benchmarked to the Russell 3000 Index outperformed the 3.6% return it earned. **OP&F**, benchmarked to the Wilshire 5000 Index, returned 3.8%. **OP&F** was the only plan that outperformed the peer median over the period.
- **SERS** was the only plan to outperform its benchmark over the trailing 3 and 5-year periods.
- Two of six funds outperformed their benchmark and peer median over the trailing 10-year period.

Performance

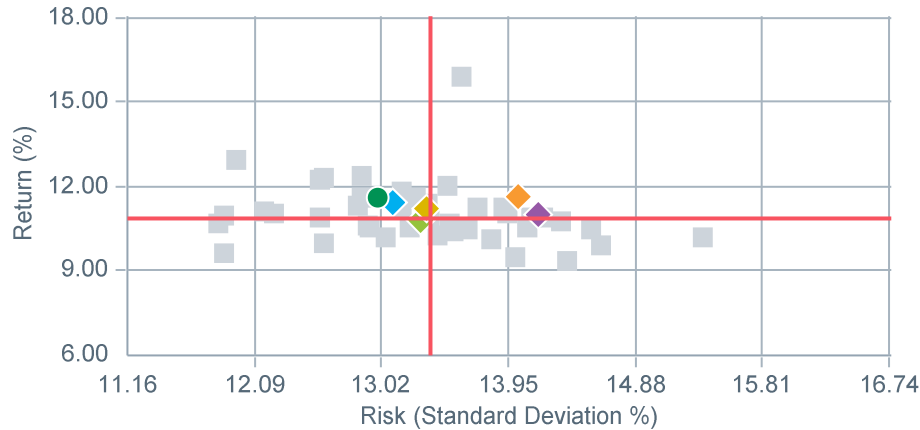
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
US Equity										
PERS (DB)	3.35	1.78	10.84	11.43	14.78	7.20	0.68	11.29	33.86	16.58
Russell 3000 Index	3.62	2.14	11.12	11.60	14.95	7.40	0.48	12.55	33.55	16.42
Difference	-0.27	-0.36	-0.28	-0.17	-0.17	-0.20	0.20	-1.26	0.31	0.16
Rank	53	26	31	26	57	59	27	52	52	49
PERS (HC)	3.35	1.78	10.84	11.43	14.78	7.20	0.68	11.29	33.86	16.58
Russell 3000 Index	3.62	2.14	11.12	11.60	14.95	7.40	0.48	12.55	33.55	16.42
Difference	-0.27	-0.36	-0.28	-0.17	-0.17	-0.20	0.20	-1.26	0.31	0.16
Rank	53	26	31	26	57	59	27	52	52	49
STRS	2.00	0.41	10.25	10.77	14.33	6.89	0.83	11.70	32.14	15.56
Russell 3000 Index	3.62	2.14	11.12	11.60	14.95	7.40	0.48	12.55	33.55	16.42
Difference	-1.62	-1.73	-0.87	-0.83	-0.62	-0.51	0.35	-0.85	-1.41	-0.86
Rank	80	57	54	56	68	69	24	43	81	69
OP&F	3.80	1.94	11.19	11.23	15.62	7.95	0.66	11.27	35.53	14.28
Wilshire 5000 Index	3.98	2.96	11.26	11.64	14.92	7.46	0.67	12.71	33.07	16.06
Difference	-0.18	-1.02	-0.07	-0.41	0.70	0.49	-0.01	-1.44	2.46	-1.78
Rank	41	24	16	37	16	11	27	52	18	96
SERS	3.26	2.07	11.37	11.67	15.39	7.24	1.24	10.99	35.76	17.09
Russell 3000 Index	3.62	2.14	11.12	11.60	14.95	7.40	0.48	12.55	33.55	16.42
Difference	-0.36	-0.07	0.25	0.07	0.44	-0.16	0.76	-1.56	2.21	0.67
Rank	58	23	12	21	18	56	19	59	12	23
HPRS	3.05	0.99	10.72	10.99	15.35	7.55	0.18	11.97	35.56	16.01
Russell 3000 Index	3.62	2.14	11.12	11.60	14.95	7.40	0.48	12.55	33.55	16.42
Difference	-0.57	-1.15	-0.40	-0.61	0.40	0.15	-0.30	-0.58	2.01	-0.41
Rank	64	42	35	46	18	29	44	33	17	62
<i>All Public Plans > \$1B-US Equity Segment Median</i>	<i>3.43</i>	<i>0.62</i>	<i>10.33</i>	<i>10.86</i>	<i>14.84</i>	<i>7.30</i>	<i>-0.10</i>	<i>11.41</i>	<i>34.33</i>	<i>16.53</i>

Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-US Equity Segment.

Summary

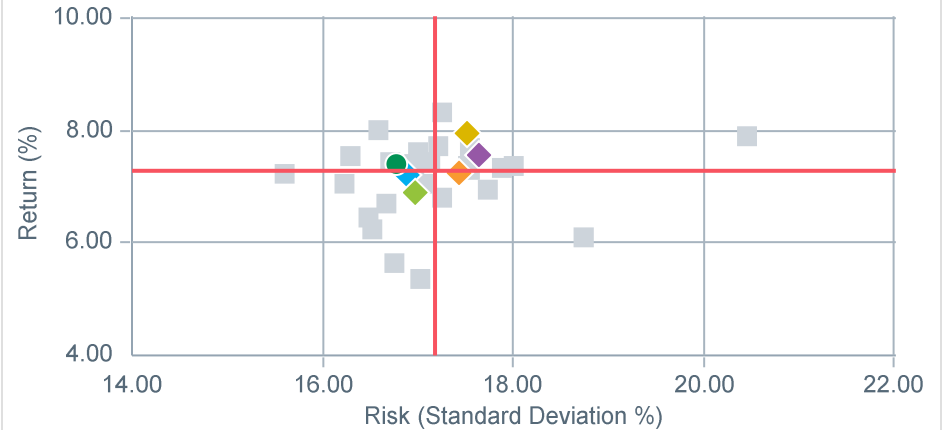
- Four of the six plans US equity composites have earned more return for each unit of risk exposure over the trailing 5-year period.
- Two of the six plans (OP&F and HPRS) outperformed the All Public Plans > \$1B-US Equity Segment median over the trailing 10-year period.
- All six plans have generated Sharpe Ratios relatively in line with the peer median over the trailing ten-year period.

Plan Sponsor Peer Group Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB)	11.43	13.10
◆ PERS (HC)	11.43	13.10
◆ STRS	10.77	13.30
◆ OP&F	11.23	13.35
◆ SERS	11.67	14.02
◆ HPRS	10.99	14.17
● Russell 3000 Index	11.60	13.00
— Median	10.86	13.38

Plan Sponsor Peer Group Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB)	7.20	16.90
◆ PERS (HC)	7.20	16.90
◆ STRS	6.89	16.97
◆ OP&F	7.95	17.52
◆ SERS	7.24	17.43
◆ HPRS	7.55	17.64
● Russell 3000 Index	7.40	16.79
— Median	7.30	17.18

Sharpe Ratio - 5 Years

PERS (DB)	0.90
PERS (HC)	0.90
STRS	0.84
OP&F	0.87
SERS	0.86
HPRS	0.81
Russell 3000 Index	0.91
All Public Plans > \$1B-US Equity Segment Median	0.84

Sharpe Ratio - 10 Years

PERS (DB)	0.44
PERS (HC)	0.44
STRS	0.42
OP&F	0.47
SERS	0.43
HPRS	0.45
Russell 3000 Index	0.45
All Public Plans > \$1B-US Equity Segment Median	0.43

Performance shown is gross of fees.

Summary

- Four of the six plans' international equity composites outperformed their respective benchmarks during the first half of 2016.
- All plans outperformed their respective benchmarks over all other trailing periods shown.
- Three of the six plans outperformed the peer group median over the trailing 10-year period.

Performance

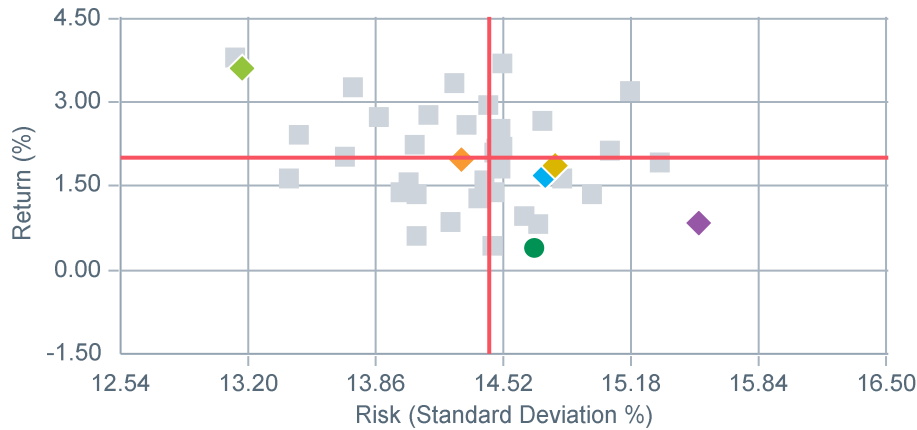
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
International Equity										
PERS (DB)	0.94	-7.50	2.99	1.69	6.62	2.70	-4.01	-1.48	15.61	18.15
PERS (DB) International Equity Custom Benchmark	0.30	-9.84	1.31	-0.05	5.20	1.78	-6.09	-3.42	12.92	17.18
Difference	0.64	2.34	1.68	1.74	1.42	0.92	2.08	1.94	2.69	0.97
Rank	25	24	48	59	67	52	79	27	81	71
PERS (HC)	0.94	-7.50	2.99	1.69	6.62	2.71	-4.01	-1.48	15.61	18.15
PERS (HC) International Equity Custom Benchmark	0.30	-9.84	1.31	-0.05	5.20	1.78	-6.09	-3.42	12.92	17.18
Difference	0.64	2.34	1.68	1.74	1.42	0.93	2.08	1.94	2.69	0.97
Rank	25	24	48	59	67	52	79	27	81	71
STRS	-1.24	-7.11	4.60	3.62	7.67	3.70	0.30	0.83	19.23	17.32
STRS International Equity Custom Benchmark	-2.20	-9.85	2.88	2.20	6.30	2.69	-2.78	0.24	17.63	16.93
Difference	0.96	2.74	1.72	1.42	1.37	1.01	3.08	0.59	1.60	0.39
Rank	67	20	7	10	26	17	12	6	35	81
OP&F	-2.50	-9.06	2.37	1.89	7.57	3.48	-0.77	-5.56	21.01	20.08
MSCI ACW Ex US IM Index (USD) (Net)	-0.91	-9.61	1.65	0.39	5.77	2.16	-4.60	-3.89	15.82	17.04
Difference	-1.59	0.55	0.72	1.50	1.80	1.32	3.83	-1.67	5.19	3.04
Rank	86	65	61	53	31	25	25	99	17	22
SERS	-0.10	-8.07	2.28	1.98	6.95	3.12	-2.37	-4.10	17.29	19.16
SERS International Equity Custom Benchmark	-1.02	-10.24	0.80	0.95	5.52	2.13	-5.66	-3.87	17.15	17.39
Difference	0.92	2.17	1.48	1.03	1.43	0.99	3.29	-0.23	0.14	1.77
Rank	41	40	63	51	51	39	51	88	70	34
HPRS	-1.62	-9.27	1.98	0.84	5.91	2.21	-2.91	-4.65	19.05	18.06
MSCI ACW Ex US Index (USD) (Net)	-1.02	-10.24	1.16	0.10	5.35	1.87	-5.66	-3.87	15.29	16.83
Difference	-0.60	0.97	0.82	0.74	0.56	0.34	2.75	-0.78	3.76	1.23
Rank	75	66	76	82	86	85	57	93	36	72
<i>All Public Plans > \$1B-Intl. Equity Segment Median</i>	<i>-0.47</i>	<i>-8.46</i>	<i>2.80</i>	<i>2.02</i>	<i>6.96</i>	<i>2.77</i>	<i>-2.36</i>	<i>-2.94</i>	<i>17.97</i>	<i>18.87</i>

Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-Intl. Equity Segment.

Summary

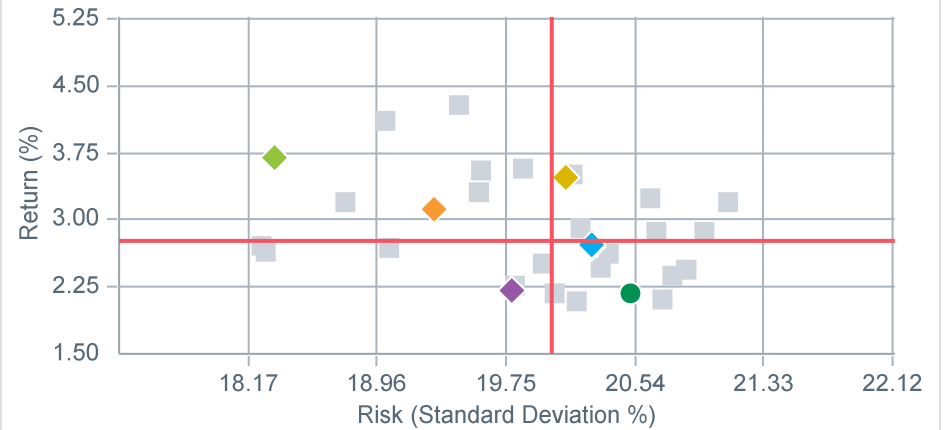
- The international equity composites for **STRS** has generated higher risk-adjusted returns than peers over both the trailing 5 and 10-year periods.
- **OP&F** and **SERS** also have a higher Sharpe Ratio over the trailing 10-year period.

Plan Sponsor Peer Group Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB)	1.69	14.73
◆ PERS (HC)	1.69	14.73
◆ STRS	3.62	13.17
◆ OP&F	1.89	14.79
◆ SERS	1.98	14.30
◆ HPRS	0.84	15.53
● MSCI ACW Ex US IMI (Net)	0.39	14.68
— Median	2.02	14.45

Plan Sponsor Peer Group Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB)	2.70	20.28
◆ PERS (HC)	2.71	20.28
◆ STRS	3.70	18.33
◆ OP&F	3.48	20.12
◆ SERS	3.12	19.32
◆ HPRS	2.21	19.79
● MSCI ACW Ex US IMI (Net)	2.16	20.52
— Median	2.77	20.03

Sharpe Ratio - 5 Years

PERS (DB)	0.19
PERS (HC)	0.19
STRS	0.33
OP&F	0.20
SERS	0.21
HPRS	0.13
MSCI ACW Ex US IMI (Net)	0.10
All Public Plans > \$1B-Intl. Equity Segment Median	0.21

Sharpe Ratio - 10 Years

PERS (DB)	0.18
PERS (HC)	0.19
STRS	0.24
OP&F	0.22
SERS	0.20
HPRS	0.16
MSCI ACW Ex US IMI (Net)	0.16
All Public Plans > \$1B-Intl. Equity Segment Median	0.19

Performance shown is gross of fees.

Summary

- During the first half of 2016, two of the six plans' (SERS and STRS) fixed income composites outperformed the Barclays US Agg Bond Index return of 5.3%.
- Over the 3-year trailing period, three of the six plans outperformed their respective index and three plans ranked above the peer median.
- Five of the six plans' fixed income composites outperformed their respective benchmark over the trailing 5-year period and all six outperformed their respective benchmark over the trailing 7-year period with mixed results relative to the peer median.

Performance

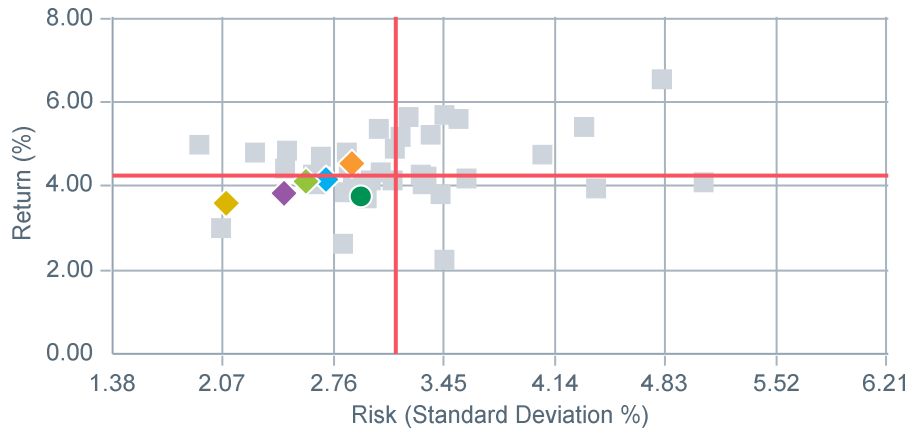
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Fixed Income										
PERS (DB) Core Fixed Income	5.03	5.93	4.44	4.15	5.17	4.81	0.96	6.47	-1.04	4.99
PERS (DB) Core Fixed Income Custom Benchmark	5.31	5.99	4.16	3.83	4.63	5.17	0.56	6.09	-1.94	4.33
Difference	-0.28	-0.06	0.28	0.32	0.54	-0.36	0.40	0.38	0.90	0.66
Rank	72	30	47	58	66	84	19	40	46	97
PERS (HC) Core Fixed Income	5.03	5.93	4.44	4.15	5.17	4.81	0.96	6.47	-1.04	4.99
PERS (HC) Core Fixed Income Benchmark	5.31	5.99	4.16	3.83	4.63	5.17	0.56	6.09	-1.94	4.33
Difference	-0.28	-0.06	0.28	0.32	0.54	-0.36	0.40	0.38	0.90	0.66
Rank	72	30	47	58	66	84	19	40	46	97
STRS	5.64	5.62	4.06	4.12	5.53	5.76	0.60	5.02	-1.02	6.14
Barclays US Unv Bond Index	5.68	5.82	4.20	4.01	5.04	5.30	0.43	5.56	-1.35	5.53
Difference	-0.04	-0.20	-0.14	0.11	0.49	0.46	0.17	-0.54	0.33	0.61
Rank	56	35	58	60	59	37	30	81	46	77
OP&F Core Fixed Income	3.54	3.73	3.34	3.58	5.29	5.39	1.45	4.31	-1.06	6.31
Barclays US Agg Bond Index	5.31	6.00	4.06	3.76	4.58	5.13	0.55	5.97	-2.02	4.21
Difference	-1.77	-2.27	-0.72	-0.18	0.71	0.26	0.90	-1.66	0.96	2.10
Rank	92	83	80	83	63	54	9	87	46	74
SERS	5.81	5.40	4.28	4.56	6.73	6.19	-0.14	5.84	-0.37	9.21
Barclays US Agg Bond Index	5.31	6.00	4.06	3.76	4.58	5.13	0.55	5.97	-2.02	4.21
Difference	0.50	-0.60	0.22	0.80	2.15	1.06	-0.69	-0.13	1.65	5.00
Rank	47	46	50	43	24	27	59	60	31	29
HPRS	4.78	4.13	3.50	3.81	5.17	5.38	0.54	4.00	-0.81	6.55
Barclays US Agg Bond Index	5.31	6.00	4.06	3.76	4.58	5.13	0.55	5.97	-2.02	4.21
Difference	-0.53	-1.87	-0.56	0.05	0.59	0.25	-0.01	-1.97	1.21	2.34
Rank	78	77	78	78	66	55	31	91	43	72
<i>All Public Plans > \$1B-US Fixed Income Segment Median</i>	<i>5.73</i>	<i>5.27</i>	<i>4.24</i>	<i>4.28</i>	<i>5.95</i>	<i>5.40</i>	<i>0.09</i>	<i>6.12</i>	<i>-1.30</i>	<i>7.64</i>

Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-US Fixed Income Segment. PERS (DB), PERS (HC), and OP&F performance for Total Fixed Income is unavailable, so Core Fixed Income is shown for illustrative purposes. PERS (DB) and PERS (HC) changed mandates in 2010 and are therefore unable to report 7- and 10-year trailing returns.

Summary

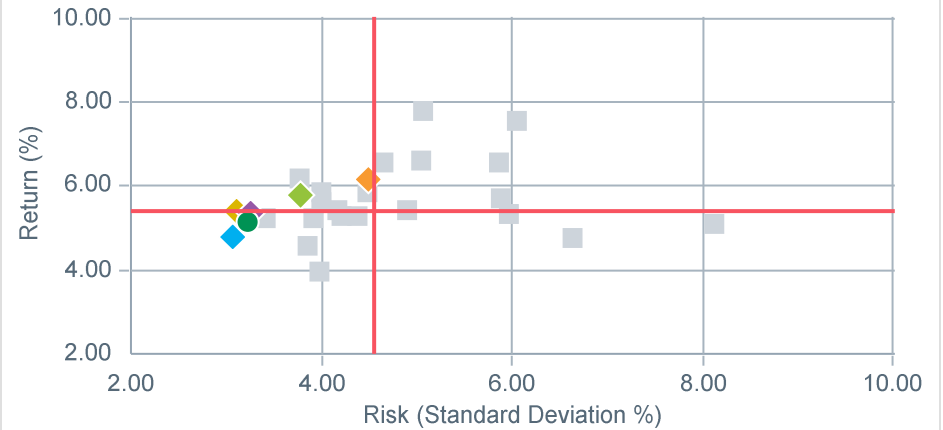
- Over the trailing 5-year period all six plans achieved a higher Sharpe Ratio than the peer median.
- Over the trailing 10-year period all six plans achieved a higher Sharpe Ratio than the peer median.

Plan Sponsor Peer Group Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB) Core Fixed Income	4.15	2.71
◆ PERS (HC) Core Fixed Income	4.15	2.71
◆ STRS	4.12	2.59
◆ OP&F Core Fixed Income	3.58	2.09
◆ SERS	4.56	2.87
◆ HPRS	3.81	2.45
● Barclays US Agg Bond Index	3.76	2.94
— Median	4.28	3.15

Plan Sponsor Peer Group Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB) Core Fixed Income	4.81	3.07
◆ PERS (HC) Core Fixed Income	4.81	3.07
◆ STRS	5.76	3.77
◆ OP&F Core Fixed Income	5.39	3.11
◆ SERS	6.19	4.49
◆ HPRS	5.38	3.25
● Barclays US Agg Bond Index	5.13	3.23
— Median	5.40	4.56

Sharpe Ratio - 5 Years

PERS (DB) Core Fixed Income	1.49
PERS (HC) Core Fixed Income	1.49
STRS	1.56
OP&F Core Fixed Income	1.66
SERS	1.55
HPRS	1.52
Barclays US Agg Bond Index	1.25
All Public Plans > \$1B-US Fixed Income Segment Median	1.35

Sharpe Ratio - 10 Years

PERS (DB) Core Fixed Income	1.18
PERS (HC) Core Fixed Income	1.18
STRS	1.22
OP&F Core Fixed Income	1.35
SERS	1.10
HPRS	1.30
Barclays US Agg Bond Index	1.27
All Public Plans > \$1B-US Fixed Income Segment Median	1.02

Performance shown is gross of fees.

Summary

- The majority of each plans' additional fixed income composites have underperformed their respective benchmarks over the available time periods.
- Additional fixed income composite performance provided by **PERS (DB)** and **PERS (HC)** includes U.S. Treasury, Emerging Markets Debt, High Yield, Floating Rate Debt (Bank Loans), Securitized Debt, TIPS, and Global High Yield.
- Additional fixed income composite performance provided by **OP&F** includes Mortgages, High Yield, and Global Inflation Protected Securities.

Performance

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Additional Fixed Income										
PERS (DB) U.S. Treasury	5.29	6.16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barclays US Trsy Index	5.37	6.22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-0.08	-0.06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PERS (DB) EMD	11.17	4.59	0.76	N/A	N/A	N/A	-6.82	-1.64	-6.35	18.83
PERS (DB) EMD Custom Benchmark	12.68	6.34	1.43	N/A	N/A	N/A	-7.12	-0.20	-7.76	17.74
Difference	-1.51	-1.75	-0.67	N/A	N/A	N/A	0.30	-1.44	1.41	1.09
PERS (DB) High Yield	7.79	1.64	4.46	6.14	N/A	N/A	-2.74	2.73	7.92	15.82
Barclays U.S. High Yield Index	9.06	1.62	4.58	6.08	N/A	N/A	-4.47	2.45	8.68	15.81
Difference	-1.27	0.02	-0.12	0.06	N/A	N/A	1.73	0.28	-0.76	0.01
PERS (DB) Floating Rate Debt	-0.24	-0.74	3.55	N/A	N/A	N/A	2.83	4.43	6.69	N/A
CS Lvg'd Loan Index	4.23	0.93	3.04	N/A	N/A	N/A	-0.38	2.06	6.15	N/A
Difference	-4.47	-1.67	0.51	N/A	N/A	N/A	3.21	2.37	0.54	N/A
PERS (DB) Securitized Debt	0.16	0.62	10.82	N/A	N/A	N/A	4.93	17.98	21.25	24.51
Barclays CMBS Index + 2%	7.09	8.45	6.08	N/A	N/A	N/A	2.59	5.76	2.23	11.66
Difference	-6.93	-7.83	4.74	N/A	N/A	N/A	2.34	12.22	19.02	12.85
PERS (DB) TIPS	6.24	4.36	2.34	N/A	N/A	N/A	-1.43	3.66	N/A	N/A
Barclays U.S. TIPS Index	6.24	4.35	2.31	N/A	N/A	N/A	-1.44	3.64	N/A	N/A
Difference	0.00	0.01	0.03	N/A	N/A	N/A	0.01	0.02	N/A	N/A
PERS (DB) Global High Yield	7.66	2.13	3.52	N/A	N/A	N/A	-4.03	0.00	7.58	N/A
Barclays Global High Yield Index	8.73	3.76	4.35	N/A	N/A	N/A	-2.72	0.01	7.33	N/A
Difference	-1.07	-1.63	-0.83	N/A	N/A	N/A	-1.31	-0.01	0.25	N/A

Performance shown is gross of fees.

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Additional Fixed Income										
PERS (HC) U.S. Treasury	5.29	6.16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Barclays US Trsy Index	5.37	6.22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-0.08	-0.06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PERS (HC) EMD	11.17	4.59	0.76	1.75	N/A	N/A	-6.82	-1.64	-6.35	18.83
PERS (HC) EMD Custom Benchmark	12.68	6.34	1.43	2.02	N/A	N/A	-7.12	-0.20	-7.76	17.74
Difference	-1.51	-1.75	-0.67	-0.27	N/A	N/A	0.30	-1.44	1.41	1.09
PERS (HC) High Yield	7.79	1.64	4.46	6.14	N/A	N/A	-2.74	2.73	7.92	15.82
Barclays U.S. High Yield Index	9.06	1.62	4.58	6.08	N/A	N/A	-4.47	2.45	8.68	15.81
Difference	-1.27	0.02	-0.12	0.06	N/A	N/A	1.73	0.28	-0.76	0.01
PERS (HC) Floating Rate Debt	-0.24	-0.74	3.55	N/A	N/A	N/A	2.83	4.43	6.69	N/A
CS Lvg'd Loan Index	4.23	0.93	3.04	N/A	N/A	N/A	-0.38	2.06	6.15	N/A
Difference	-4.47	-1.67	0.51	N/A	N/A	N/A	3.21	2.37	0.54	N/A
PERS (HC) Securitized Debt	0.16	0.62	10.82	N/A	N/A	N/A	4.93	17.98	21.25	24.51
Barclays CMBS Index + 2%	7.09	8.45	6.08	N/A	N/A	N/A	2.59	5.76	2.23	11.66
Difference	-6.93	-7.83	4.74	N/A	N/A	N/A	2.34	12.22	19.02	12.85
PERS (HC) TIPS	6.24	4.36	2.34	2.66	4.38	4.86	-1.43	3.66	-8.55	6.95
Barclays U.S. TIPS Index	6.24	4.35	2.31	2.63	4.31	4.75	-1.44	3.64	-8.61	6.98
Difference	0.00	0.01	0.03	0.03	0.07	0.11	0.01	0.02	0.06	-0.03
PERS (HC) Global High Yield	7.66	2.13	3.52	N/A	N/A	N/A	-4.03	0.00	7.58	N/A
Barclays Global High Yield Index	8.73	3.76	4.35	N/A	N/A	N/A	-2.72	0.01	7.33	N/A
Difference	-1.07	-1.63	-0.83	N/A	N/A	N/A	-1.31	-0.01	0.25	N/A
OP&F Mortgages	0.88	1.62	6.28	5.08	8.03	5.19	3.21	8.56	6.72	5.28
Barclays Mortgage Index (1 Qtr Lag)	1.88	2.44	2.70	3.24	3.68	4.85	3.43	3.78	-1.20	3.71
Difference	-1.00	-0.82	3.58	1.84	4.35	0.34	-0.22	4.78	7.92	1.57
OP&F High Yield	6.81	2.54	4.60	6.10	9.88	7.84	-0.92	2.81	6.13	15.64
CS Developed Countries High Yield	9.02	0.84	3.83	5.58	9.67	7.11	-4.83	1.85	7.52	14.77
Difference	-2.21	1.70	0.77	0.52	0.21	0.73	3.91	0.96	-1.39	0.87
OP&F Global Inflation Protected Securities	12.41	7.75	10.57	10.78	12.53	10.81	0.26	19.43	-10.62	14.93
Bridgewater Custom GIPS Index	15.91	12.36	9.52	8.77	9.03	8.10	-2.36	18.76	-13.10	13.49
Difference	-3.50	-4.61	1.05	2.01	3.50	2.71	2.62	0.67	2.48	1.44

Performance shown is gross of fees.

Summary

- Of the plans with exposure to core and value-added real estate, four of the five plans outperformed their respective benchmark during the first half of 2016.
- PERS (HC)'s exposure to REITs earned 10.8% during the period, while the other four plans exposure to real estate earned returns ranging from 2.6% to 7.8%.
- Over the trailing 10-year period, four of the six plans outperformed their respective benchmarks.

Performance

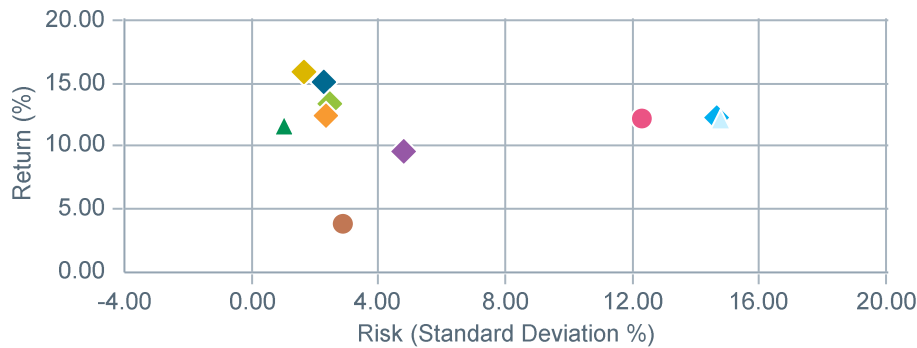
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Real Estate										
PERS (DB)	5.78	14.39	16.69	15.14	10.83	8.41	17.28	18.92	15.43	12.91
PERS (DB) Real Estate Custom Benchmark	5.56	13.47	13.44	12.81	9.74	7.61	14.71	12.21	12.82	11.00
Difference	0.22	0.92	3.25	2.33	1.09	0.80	2.57	6.71	2.61	1.91
PERS (HC) REITs	10.75	22.58	13.50	12.32	20.96	6.96	4.41	31.79	1.38	17.17
DJ US Select Real Estate Securities TR Index	10.79	22.72	13.52	12.18	20.78	6.75	4.46	31.85	1.31	17.09
Difference	-0.04	-0.14	-0.02	0.14	0.18	0.21	-0.05	-0.06	0.07	0.08
STRS	6.89	13.47	13.76	13.33	12.48	9.62	11.36	17.57	10.36	15.40
STRS Real Estate Custom Benchmark	5.63	12.59	12.01	11.84	12.11	7.83	11.89	14.54	9.72	11.69
Difference	1.26	0.88	1.75	1.49	0.37	1.79	-0.53	3.03	0.64	3.71
OP&F	7.80	16.38	17.41	15.86	10.26	7.39	16.83	18.57	15.11	13.06
NCREIF ODCE Index (AWA) (Net) (1 Qtr Lag)	5.12	12.62	12.59	12.20	8.05	5.38	13.86	11.36	11.97	10.47
Difference	2.68	3.76	4.82	3.66	2.21	2.01	2.97	7.21	3.14	2.59
SERS	6.56	13.45	14.15	12.40	10.05	4.71	13.81	14.22	12.00	14.02
SERS Real Estate Custom Benchmark	5.19	11.84	11.91	11.93	10.27	7.51	13.48	11.26	11.00	11.00
Difference	1.37	1.61	2.24	0.47	-0.22	-2.80	0.33	2.96	1.00	3.02
HPRS	2.64	3.75	12.19	9.63	6.74	2.67	6.34	22.02	13.78	6.46
NCREIF Property Index (1 Qtr Lag)	5.19	11.84	11.91	11.93	9.12	7.61	13.47	11.26	11.00	11.00
Difference	-2.55	-8.09	0.28	-2.30	-2.38	-4.94	-7.13	10.76	2.78	-4.54

Performance shown may be net or gross of fees depending on underlying investments. Prior to 2008, HPRS's real estate portfolio consisted of two buildings. Since then, HPRS has shifted its focus to externally managed funds.

Summary

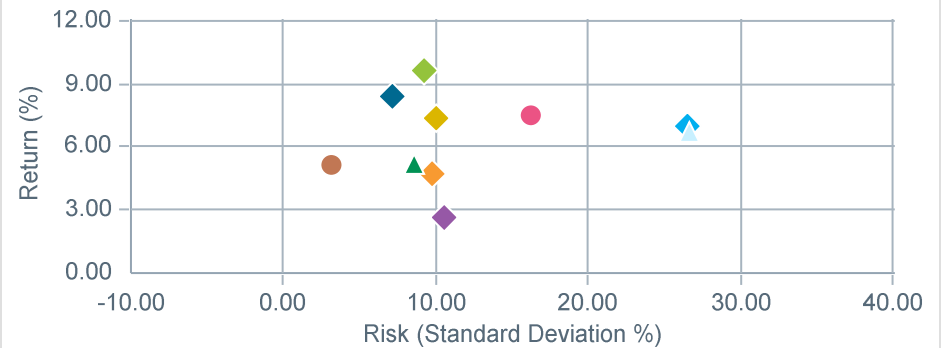
- The five plans with core and value-added real estate exposure exhibit fairly similar risk and return characteristics over the trailing 5 and 10-year periods.
- As expected, PERS (HC)'s REITs exposure exhibits risk and return characteristics similar to that of public equity markets.

Risk & Return Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB)	15.14	2.26
◆ PERS (HC)	12.32	14.65
◆ STRS	13.33	2.45
◆ OP&F	15.86	1.66
◆ SERS	12.40	2.34
◆ HPRS	9.63	4.77
▲ NCREIF ODCE Index (AWA) (Net)	11.66	1.04
▲ DJ US Select RE Securities TR Index	12.18	14.77
● S&P 500 Index (Cap Wtd)	12.10	12.35
● Barclays US Agg Bond Index	3.76	2.94

Risk & Return Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB)	8.41	7.14
◆ PERS (HC)	6.96	26.56
◆ STRS	9.62	9.27
◆ OP&F	7.39	10.06
◆ SERS	4.71	9.71
◆ HPRS	2.67	10.54
▲ NCREIF ODCE Index (AWA) (Net)	5.19	8.59
▲ DJ US Select RE Securities TR Index	6.75	26.64
● S&P 500 Index (Cap Wtd)	7.42	16.26
● Barclays US Agg Bond Index	5.13	3.23

Sharpe Ratio - 5 Years

PERS (DB)	6.28
PERS (HC) REITs	0.87
STRS	5.15
OP&F	8.95
SERS	5.04
HPRS	1.95
NCREIF ODCE Index (AWA) (Net)	10.45

Sharpe Ratio - 10 Years

PERS (DB)	1.05
PERS (HC) REITs	0.36
STRS	0.97
OP&F	0.68
SERS	0.43
HPRS	0.21
NCREIF ODCE Index (AWA) (Net)	0.52

Performance shown may be net or gross of fees depending on underlying investments.

Summary

- The five plans with dedicated hedge fund exposure experienced losses ranging from -3.6% to -1.0% during the first half of 2016.
- Three of five hedge fund composites outperformed their respective benchmark over the trailing 5-year period, and all five plans outperformed their respective benchmarks over the 7-year trailing period.
- Among the five plans, **STRS**'s composite has the longest available history and has earned 5.5% per annum over the trailing 10-year period.

Performance

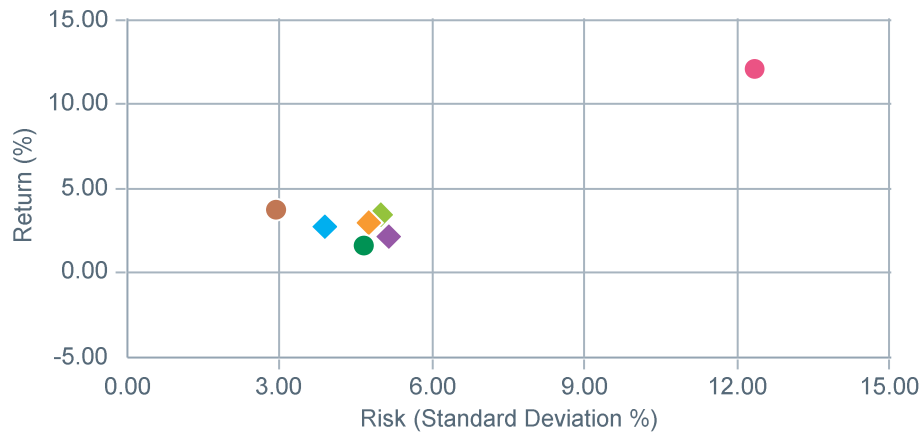
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Hedge Funds										
PERS (DB)	-0.96	-4.42	2.33	2.75	4.32	2.47	-1.20	3.93	9.63	6.26
PERS (DB) Hedge Funds Custom Benchmark	1.82	-2.07	2.04	4.00	4.27	5.40	-1.70	2.59	7.00	7.00
Difference	-2.78	-2.35	0.29	-1.25	0.05	-2.93	0.50	1.34	2.63	-0.74
PERS (HC)	-0.96	-4.42	2.33	2.75	4.32	2.47	-1.20	3.93	9.63	6.26
PERS (HC) Hedge Funds Custom Benchmark	1.82	-2.07	2.04	4.00	4.27	5.40	-1.70	2.59	7.00	7.00
Difference	-2.78	-2.35	0.29	-1.25	0.05	-2.93	0.50	1.34	2.63	-0.74
STRS	-1.37	-3.25	0.21	3.52	4.33	5.46	-0.55	3.27	11.44	7.37
HFRI FOF Comp Index	-2.88	-5.68	1.81	1.57	2.73	1.55	-0.26	3.37	8.96	4.79
Difference	1.51	2.43	-1.60	1.95	1.60	3.91	-0.29	-0.10	2.48	2.58
SERS	-2.47	-4.80	2.34	2.99	5.17	N/A	-0.05	4.10	9.80	7.98
HFRI FOF Comp Index + 1%	-2.39	-4.74	2.83	2.59	3.76	N/A	0.74	4.40	10.04	5.84
Difference	-0.08	-0.06	-0.49	0.40	1.41	N/A	-0.79	-0.30	-0.24	2.14
HPRS	-3.60	-5.49	1.76	2.12	3.98	N/A	1.21	3.34	9.47	7.03
HFRI FOF Comp Index	-2.88	-5.68	1.81	1.57	2.73	N/A	-0.26	3.37	8.96	4.79
Difference	-0.72	0.19	-0.05	0.55	1.25	N/A	1.47	-0.03	0.51	2.24

Performance shown is net of fees.

Summary

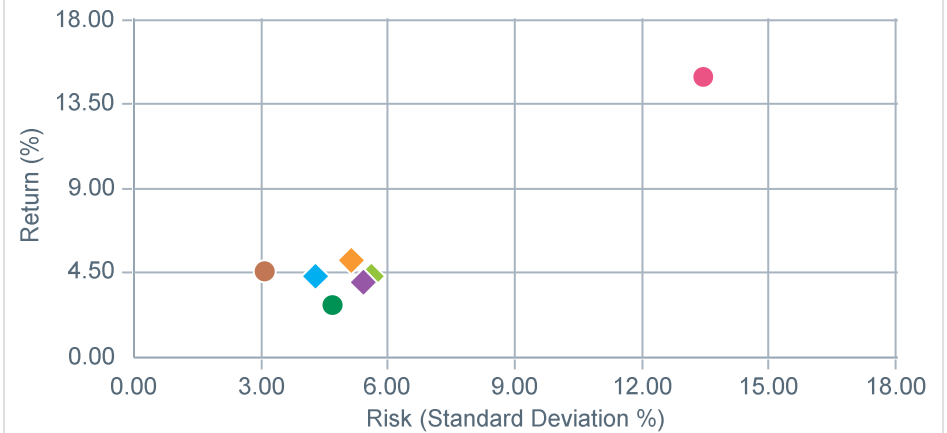
- The five plans with dedicated hedge fund exposure exhibit similar return and risk characteristics over the trailing 5 and 7-year periods.
- All plans with available history have generated more return for each unit of risk relative to the HFRI FOF Comp Index over both time periods shown.

Risk & Return Scattergram - 5 Years



	Return	Standard Deviation
◆ PERS (DB)	2.75	3.90
◆ PERS (HC)	2.75	3.90
◆ STRS	3.52	5.00
◆ SERS	2.99	4.73
◆ HPRS	2.12	5.13
● HFRI FOF Comp Index	1.57	4.66
● S&P 500 Index (Cap Wtd)	12.10	12.35
● Barclays US Agg Bond Index	3.76	2.94

Risk & Return Scattergram - 7 Years



	Return	Standard Deviation
◆ PERS (DB)	4.32	4.30
◆ PERS (HC)	4.32	4.30
◆ STRS	4.33	5.62
◆ SERS	5.17	5.12
◆ HPRS	3.98	5.42
● HFRI FOF Comp Index	2.73	4.70
● S&P 500 Index (Cap Wtd)	14.92	13.49
● Barclays US Agg Bond Index	4.58	3.09

Sharpe Ratio - 5 Years

PERS (DB)	0.70
PERS (HC)	0.70
STRS	0.70
SERS	0.63
HPRS	0.42
HFRI FOF Comp Index	0.34

Sharpe Ratio - 7 Years

PERS (DB)	0.99
PERS (HC)	0.99
STRS	0.77
SERS	1.00
HPRS	0.73
HFRI FOF Comp Index	0.58

Performance shown is net of fees.

Summary

- The five plans with dedicated private equity exposure earned time-weighted returns ranging from 1.4% to 5.5% during the first two quarters of 2016.
- Over the trailing 10-year period, all plans with available history have outperformed their respective benchmarks, except OP&F which slightly trailed its benchmark.
- RVK prefers to measure private equity performance using since inception money-weighted returns (IRR), but we have included time-weighted performance in our analysis for illustrative purposes.

Performance

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Private Equity										
PERS (DB)	2.47	5.38	11.64	12.78	15.60	11.37	6.09	17.94	16.29	18.54
PERS (DB) Private Equity Custom Benchmark	1.76	4.59	10.81	11.86	18.70	8.92	6.04	15.41	22.81	33.20
Difference	0.71	0.79	0.83	0.92	-3.10	2.45	0.05	2.53	-6.52	-14.66
STRS	1.36	4.80	13.24	12.34	14.86	10.53	9.89	18.90	20.00	16.27
STRS Private Equity Custom Benchmark	4.14	3.16	12.23	13.15	17.07	9.77	1.48	13.67	34.86	18.73
Difference	-2.78	1.64	1.01	-0.81	-2.21	0.76	8.41	5.23	-14.86	-2.46
OP&F	1.60	8.30	13.01	11.26	12.42	10.23	12.06	18.34	11.50	9.58
OP&F Private Equity Custom Benchmark	9.23	3.29	14.62	14.36	20.56	10.28	2.65	21.45	24.59	33.76
Difference	-7.63	5.01	-1.61	-3.10	-8.14	-0.05	9.41	-3.11	-13.09	-24.18
SERS	5.54	11.40	17.58	15.99	14.59	11.16	13.81	22.77	17.32	13.16
Burgiss All Private Equity Benchmark	1.13	5.04	11.63	12.66	18.54	9.16	7.37	15.75	22.34	33.20
Difference	4.41	6.36	5.95	3.33	-3.95	2.00	6.44	7.02	-5.02	-20.04
HPRS	4.06	0.10	8.75	7.13	5.46	N/A	-0.93	12.41	15.54	3.12
HPRS Private Equity Custom Benchmark	4.06	-2.20	12.80	13.29	12.82	N/A	2.55	21.15	25.63	33.50
Difference	0.00	2.30	-4.05	-6.16	-7.36	N/A	-3.48	-8.74	-10.09	-30.38

Performance shown is net of fees. HPRS's private equity portfolio did not begin in earnest until after 2008. Therefore longer period trailing returns relative to the benchmark may not be relevant.

Summary

- The plans' other alternatives composites exhibited mixed relative results versus their respective benchmarks over the time periods shown.
- Other alternatives composite performance provided by PERS (DB) and PERS (HC) includes Opportunistic Investments, Commodities, Risk Parity, and GTAA.
- Other alternatives composite performance provided by OP&F includes Timber and MLPs.
- Opportunistic Investments performance was provided by STRS and SERS.
- Other alternatives composite performance provided by HPRS references Real Assets.

Performance

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Other Alternatives										
PERS (DB) Opportunistic Investments	5.22	6.27	N/A	N/A	N/A	N/A	1.12	N/A	-3.06	4.15
PERS (DB) Opportunistic Custom Benchmark	5.37	6.22	N/A	N/A	N/A	N/A	0.84	N/A	-1.34	5.43
Difference	-0.15	0.05	N/A	N/A	N/A	N/A	0.28	N/A	-1.72	-1.28
PERS (DB) Commodities	10.05	-25.68	-19.13	N/A	N/A	N/A	-32.44	-32.12	N/A	N/A
S&P Goldman Sachs Commodity Index (TR)	9.86	-26.08	-19.81	N/A	N/A	N/A	-32.86	-33.06	N/A	N/A
Difference	0.19	0.40	0.68	N/A	N/A	N/A	0.42	0.94	N/A	N/A
PERS (DB) Risk Parity	14.97	2.54	6.54	N/A	N/A	N/A	-10.42	9.73	N/A	N/A
PERS (DB) Risk Parity Custom Benchmark	3.86	5.20	6.90	N/A	N/A	N/A	3.30	7.64	N/A	N/A
Difference	11.11	-2.66	-0.36	N/A	N/A	N/A	-13.72	2.09	N/A	N/A
PERS (DB) GTAA	0.78	-0.71	4.25	N/A	N/A	N/A	0.94	4.44	N/A	N/A
PERS (DB) GTAA Custom Benchmark	3.43	1.61	5.45	N/A	N/A	N/A	-0.69	3.61	N/A	N/A
Difference	-2.65	-2.32	-1.20	N/A	N/A	N/A	1.63	0.83	N/A	N/A
PERS (HC) Opportunistic Investments	5.22	6.27	N/A	N/A	N/A	N/A	1.12	N/A	-3.06	4.25
PERS (HC) Opportunistic Custom Benchmark	5.37	6.22	N/A	N/A	N/A	N/A	0.84	N/A	-1.34	5.43
Difference	-0.15	0.05	N/A	N/A	N/A	N/A	0.28	N/A	-1.72	-1.18
PERS (HC) Commodities	10.05	-25.68	-19.13	-13.48	N/A	N/A	-32.44	-32.12	-0.68	0.30
S&P Goldman Sachs Commodity Index	9.86	-26.08	-19.81	-14.03	N/A	N/A	-32.86	-33.06	-1.22	0.08
Difference	0.19	0.40	0.68	0.55	N/A	N/A	0.42	0.94	0.54	0.22
PERS (HC) Risk Parity	14.97	2.54	6.54	N/A	N/A	N/A	-10.42	9.73	N/A	N/A
PERS (HC) Risk Parity Custom Benchmark	3.86	5.20	6.90	N/A	N/A	N/A	3.30	7.64	N/A	N/A
Difference	11.11	-2.66	-0.36	N/A	N/A	N/A	-13.72	2.09	N/A	N/A

Performance shown may be net or gross of fees depending on underlying investments. PERS (DB) and PERS (HC) funded a new opportunistic investments portfolio in the third quarter of 2014. Historical performance is represented by an opportunistic investments portfolio that was closed at the end of 2013.

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
Other Alternatives										
PERS (HC) GTAA	0.78	-0.71	4.25	N/A	N/A	N/A	0.94	4.44	N/A	N/A
PERS (HC) GTAA Custom Benchmark	3.43	1.61	5.45	N/A	N/A	N/A	-0.69	3.61	N/A	N/A
Difference	-2.65	-2.32	-1.20	N/A	N/A	N/A	1.63	0.83	N/A	N/A
STRS Opportunistic Investments	-1.84	-1.32	3.44	5.48	8.79	N/A	2.35	7.47	11.68	12.00
STRS Opportunistic Custom Benchmark	3.11	1.13	10.03	10.50	13.82	N/A	-0.52	11.45	32.26	15.28
Difference	-4.75	-2.45	-6.59	-5.02	-5.03	N/A	2.87	-3.98	-20.58	-3.28
OP&F Timber	2.11	2.22	3.57	N/A	N/A	N/A	1.03	8.99	3.07	N/A
Consumer Price Index + 5%	4.42	6.06	6.12	N/A	N/A	N/A	5.77	5.79	6.58	N/A
Difference	-2.31	-3.84	-2.55	N/A	N/A	N/A	-4.74	3.20	-3.51	N/A
OP&F MLPs	12.61	-16.86	0.53	N/A	N/A	N/A	-29.31	16.91	32.25	N/A
Alerian MLP Index	14.71	-13.11	-5.38	N/A	N/A	N/A	-32.59	4.80	27.58	N/A
Difference	-2.10	-3.75	5.91	N/A	N/A	N/A	3.28	12.11	4.67	N/A
SERS Opportunistic Investments	-2.74	-10.70	1.90	N/A	N/A	N/A	-5.64	7.96	N/A	N/A
SERS Opportunistic Custom Benchmark	2.40	0.92	6.67	N/A	N/A	N/A	1.48	6.66	N/A	N/A
Difference	-5.14	-11.62	-4.77	N/A	N/A	N/A	-7.12	1.30	N/A	N/A
HPRS Real Assets	2.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HPRS Real Assets Custom Benchmark	6.60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-4.20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Performance shown may be net or gross of fees depending on underlying investments. STRS opportunistic investments portfolio includes Hedge Funds.

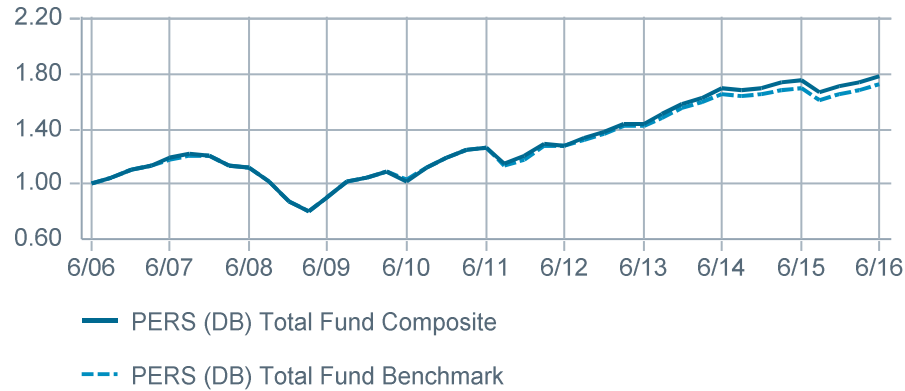
Plan Specific Pages



Summary

- PERS (DB) has generated an annualized 0.81% of alpha over the trailing 5-year period and 0.41% over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited larger up-market capture and smaller down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



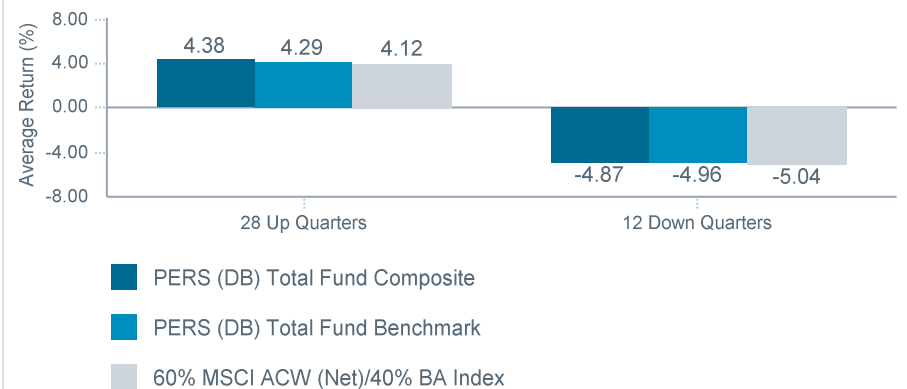
MPT Stats

	5 Years	10 Years
Maximum Return	7.87	12.34
Minimum Return	-9.24	-13.81
Standard Deviation	7.34	11.04
vs. PERS (DB) Total Fund Benchmark		
Info Ratio	0.77	0.38
Tracking Error	0.89	0.90
Alpha	0.81	0.41
vs. S&P 500 Index (Cap Wtd)		
Beta	0.54	0.65
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	0.97	0.48

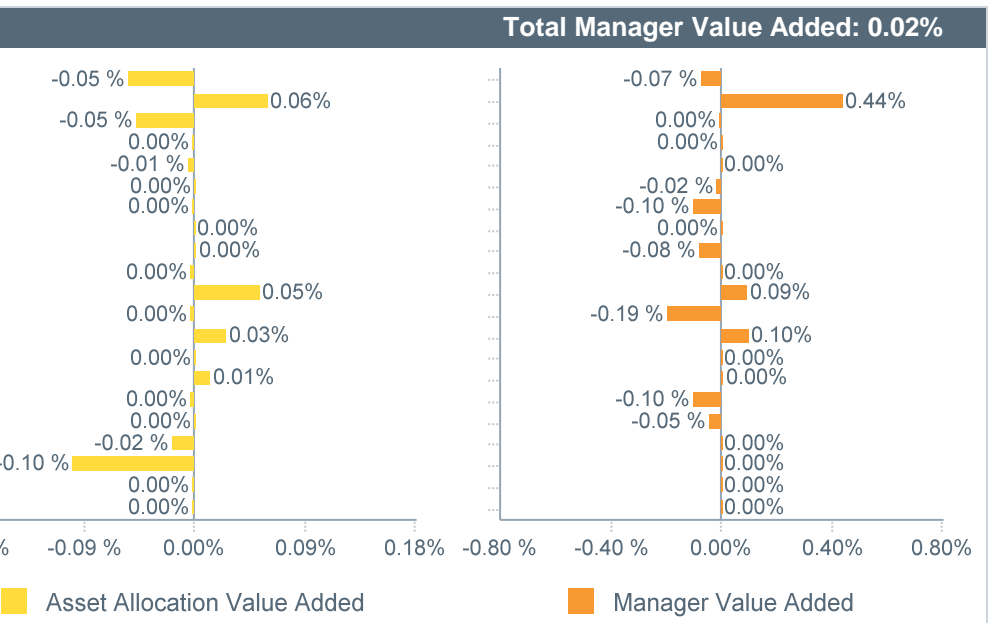
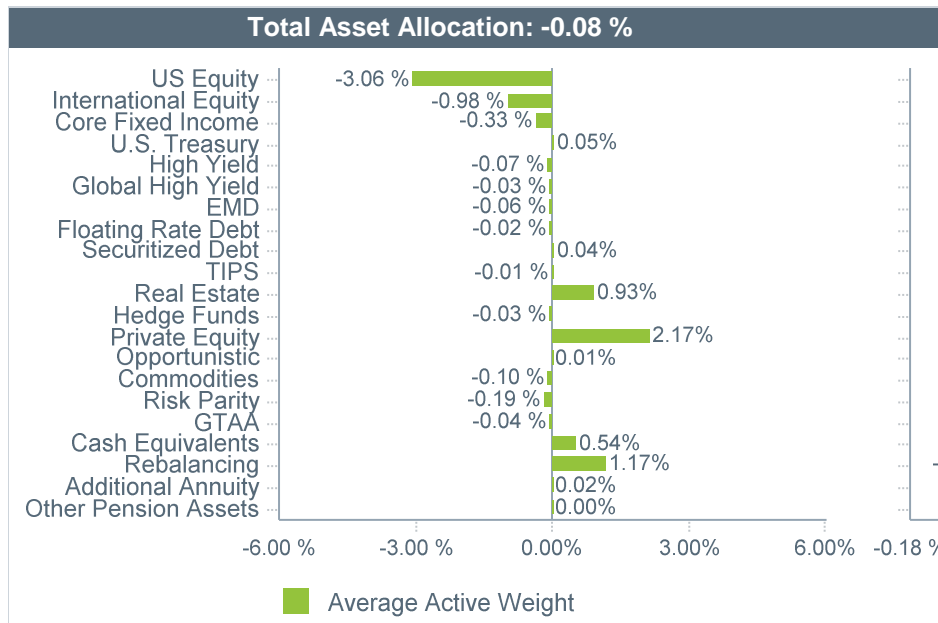
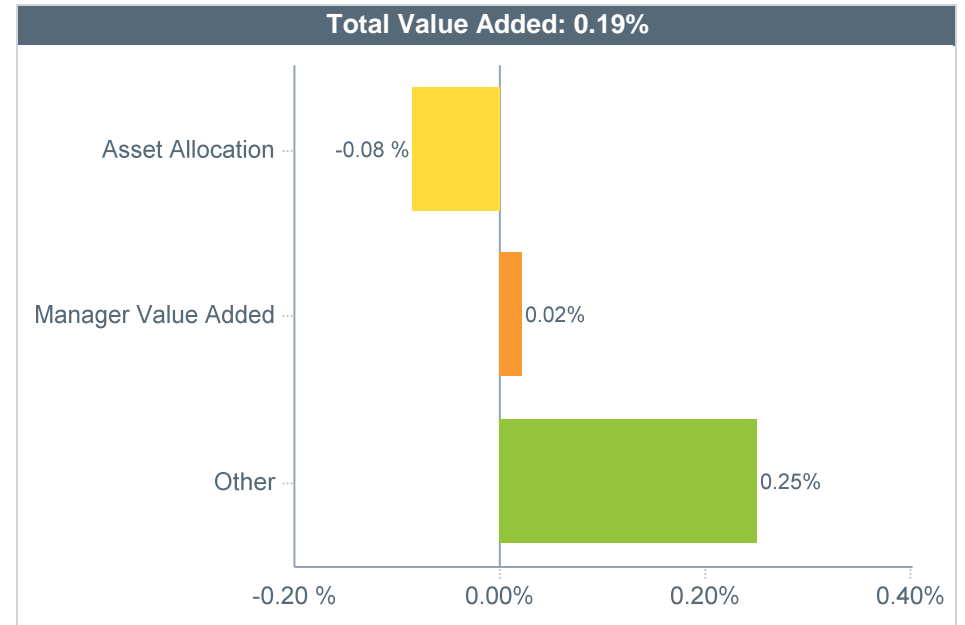
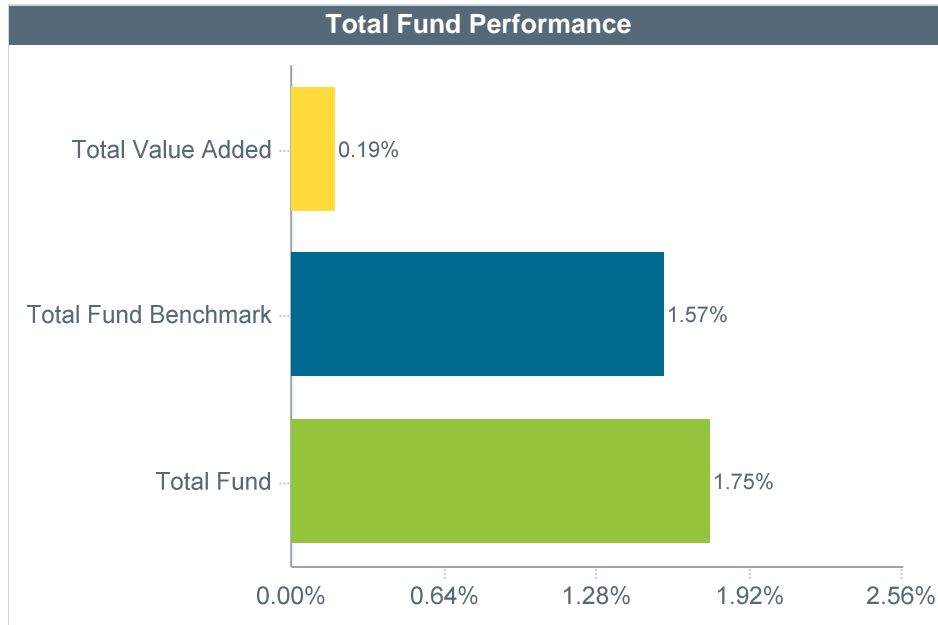
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	14,822,272,951	19.54	22.60
International Equity	13,248,594,806	17.47	18.30
Core Fixed Income	6,568,230,130	8.66	9.60
U.S. Treasury	789,619,844	1.04	1.00
High Yield	2,235,019,395	2.95	3.00
Global High Yield	778,500,186	1.03	1.00
EMD	4,550,484,386	6.00	6.00
Floating Rate Debt	187,262,919	0.25	0.40
Securitized Debt	785,363,955	1.04	1.00
TIPS	746,908,400	0.98	1.00
Real Estate	8,506,490,464	11.21	10.00
Hedge Funds	5,880,356,730	7.75	8.00
Private Equity	9,017,906,973	11.89	10.00
Opportunistic	84,175,176	0.11	0.10
Commodities	806,012,128	1.06	1.00
Risk Parity	4,003,813,046	5.28	5.00
GTAA	1,348,244,060	1.78	2.00
Cash Equivalents	425,421,311	0.56	0.00
Rebalancing	1,054,443,789	1.39	0.00
Additional Annuity	17,491,048	0.02	0.00
Other Pension Assets	844,306	0.00	0.00
Total Fund	75,857,456,004	100.00	100.00

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

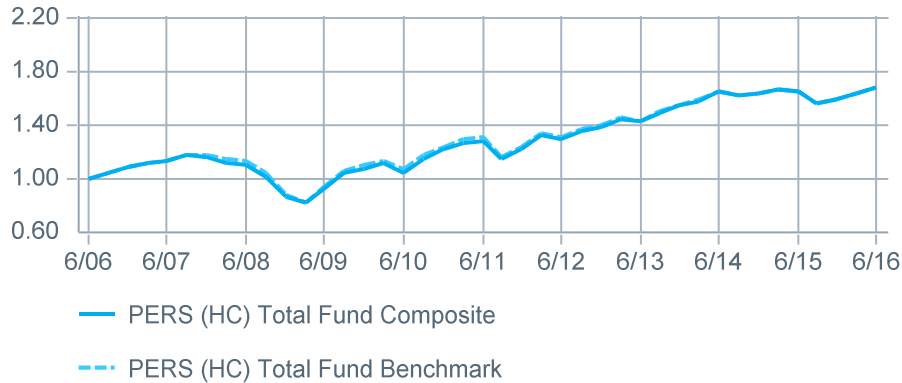


Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Summary

- PERS (HC) has generated 0.19% of alpha annualized over the trailing 5-year period and has risk adjusted excess returns in line with its benchmark over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited larger up-market and down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



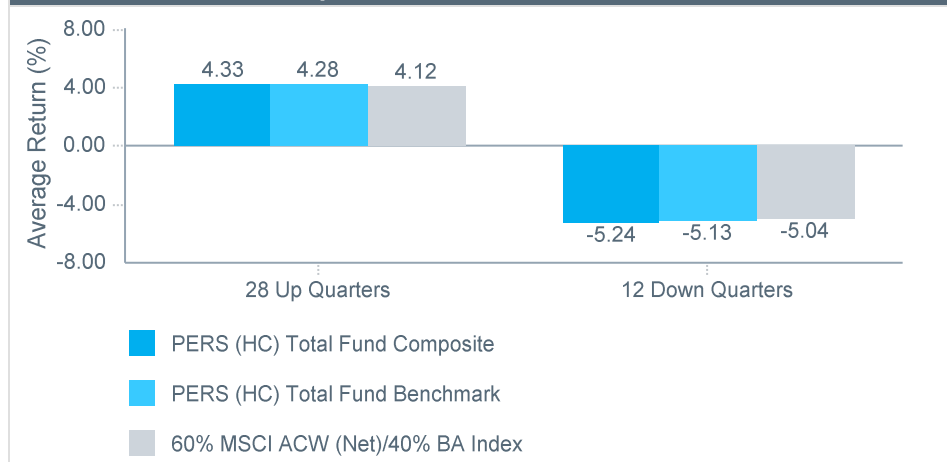
MPT Stats

	5 Years	10 Years
Maximum Return	8.58	12.96
Standard Deviation	8.52	11.22
Minimum Return	-10.71	-14.68
vs. PERS (HC) Total Fund Benchmark		
Info Ratio	0.71	0.01
Tracking Error	0.44	0.80
Alpha	0.19	0.01
vs. S&P 500 Index (Cap Wtd)		
Beta	0.63	0.66
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	0.66	0.42

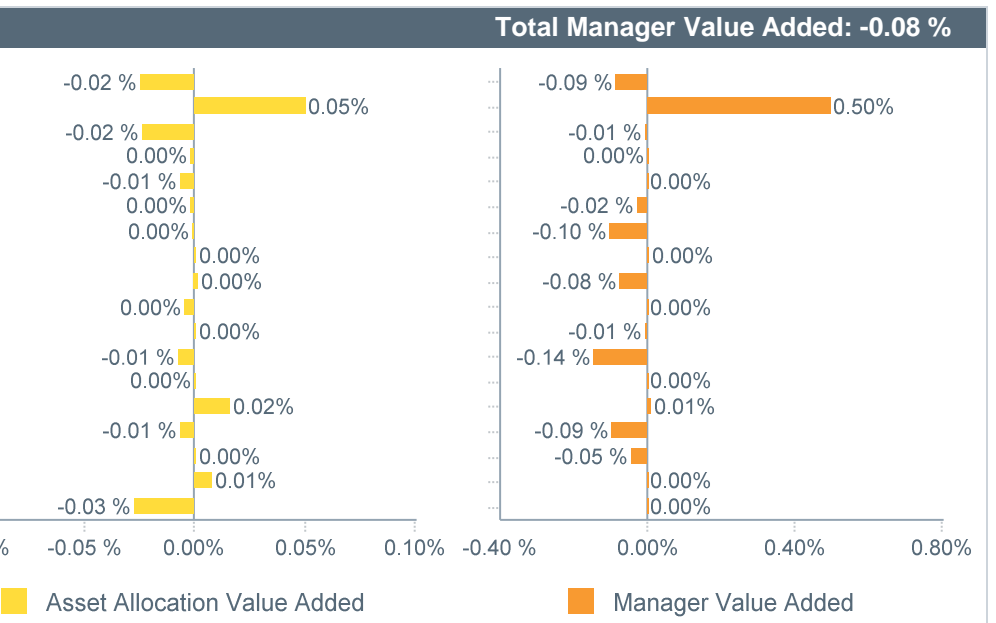
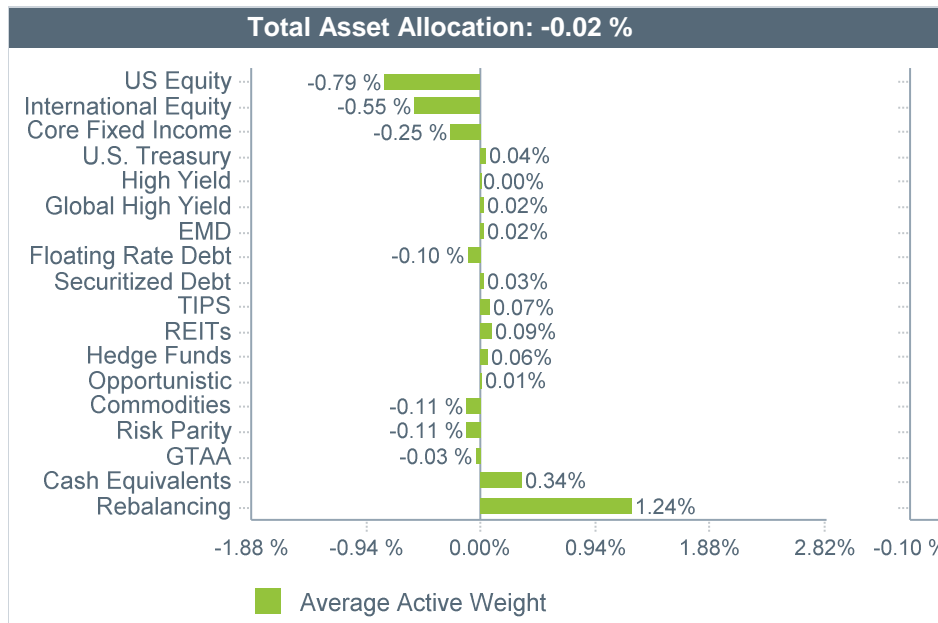
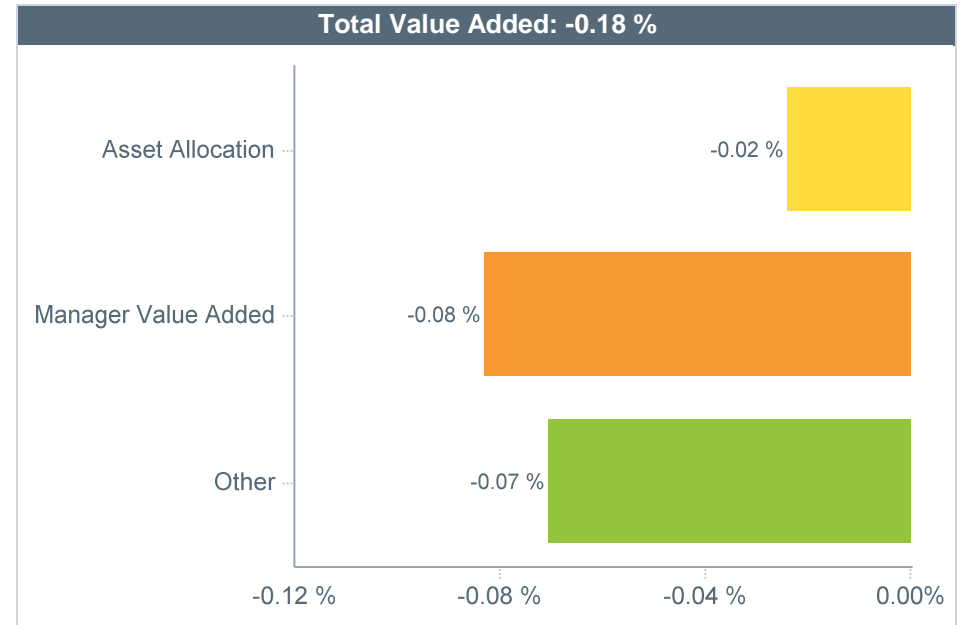
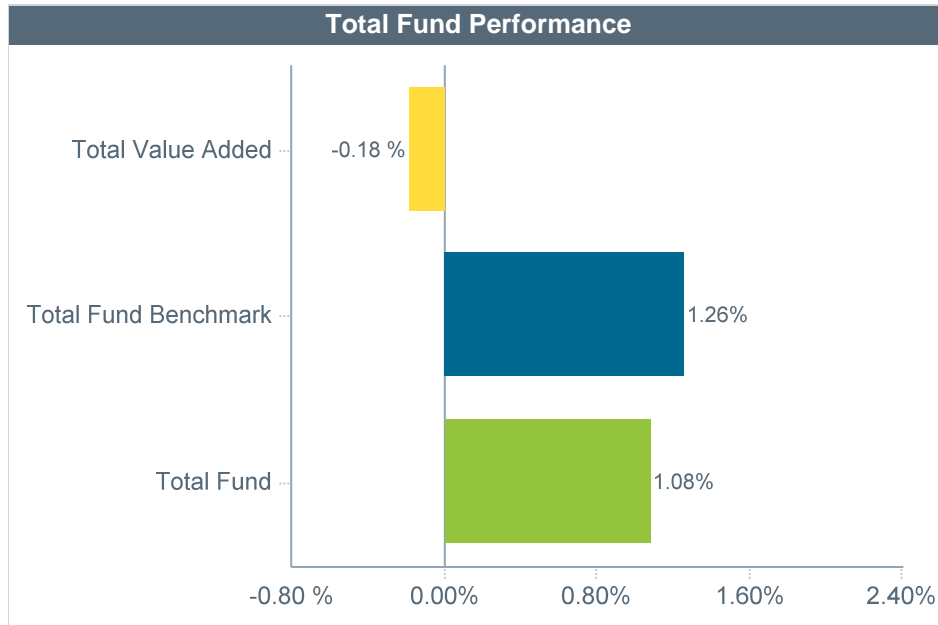
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	2,609,106,993	24.03	24.70
International Equity	2,140,125,071	19.71	20.20
Core Fixed Income	1,800,363,541	16.58	16.60
U.S. Treasury	109,852,624	1.01	1.00
High Yield	270,244,210	2.49	2.50
Global High Yield	162,156,835	1.49	1.50
EMD	663,782,100	6.11	6.00
Floating Rate Debt	30,829,742	0.28	0.40
Securitized Debt	110,171,038	1.01	1.00
TIPS	543,005,204	5.00	5.00
REITs	678,797,953	6.25	6.00
Hedge Funds	641,945,675	5.91	6.00
Opportunistic	13,109,228	0.12	0.10
Commodities	229,204,662	2.11	2.00
Risk Parity	575,477,586	5.30	5.00
GTAA	191,155,543	1.76	2.00
Cash Equivalents	4,936,242	0.05	0.00
Rebalancing	83,553,467	0.77	0.00
Total Fund	10,857,817,715	100.00	100.00

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

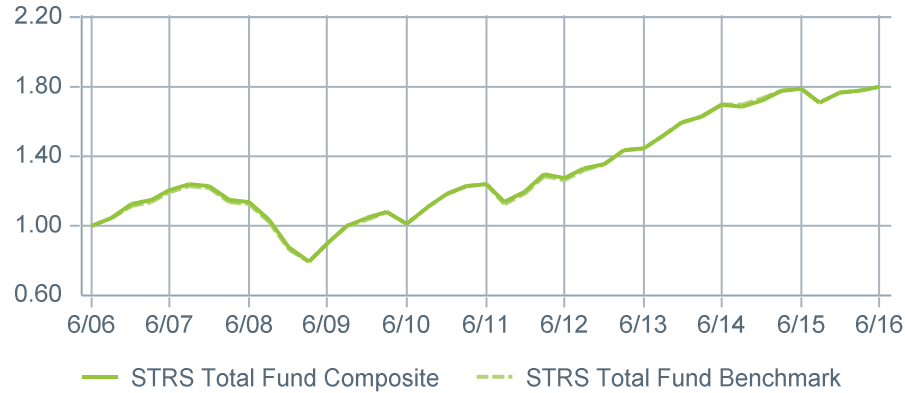


Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Summary

- STRS has generated 0.36% of alpha over the trailing 5-year period and 0.06% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited larger up-market capture and smaller down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



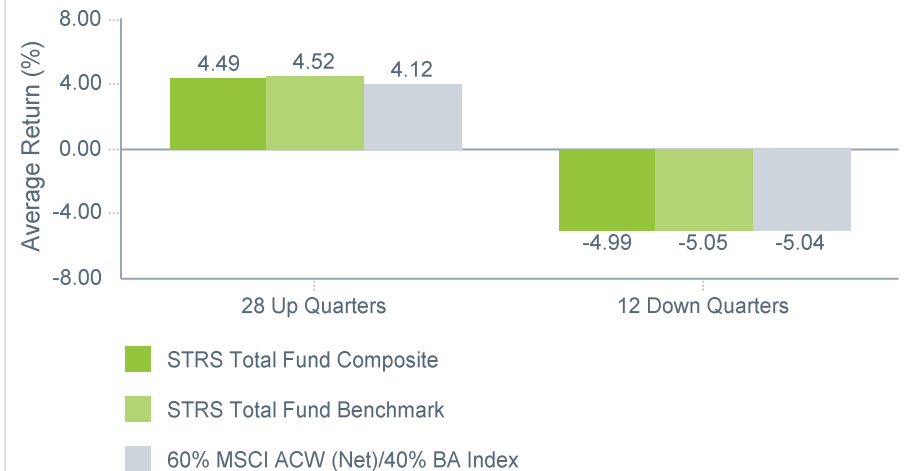
MPT Stats

	5 Years	10 Years
Maximum Return	8.11	12.25
Minimum Return	-8.92	-15.99
Standard Deviation	7.42	11.37
vs. STRS Total Fund Benchmark		
Info Ratio	-0.12	0.00
Tracking Error	0.53	0.65
Alpha	0.36	0.06
vs. S&P 500 Index (Cap Wtd)		
Beta	0.57	0.68
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	1.03	0.49

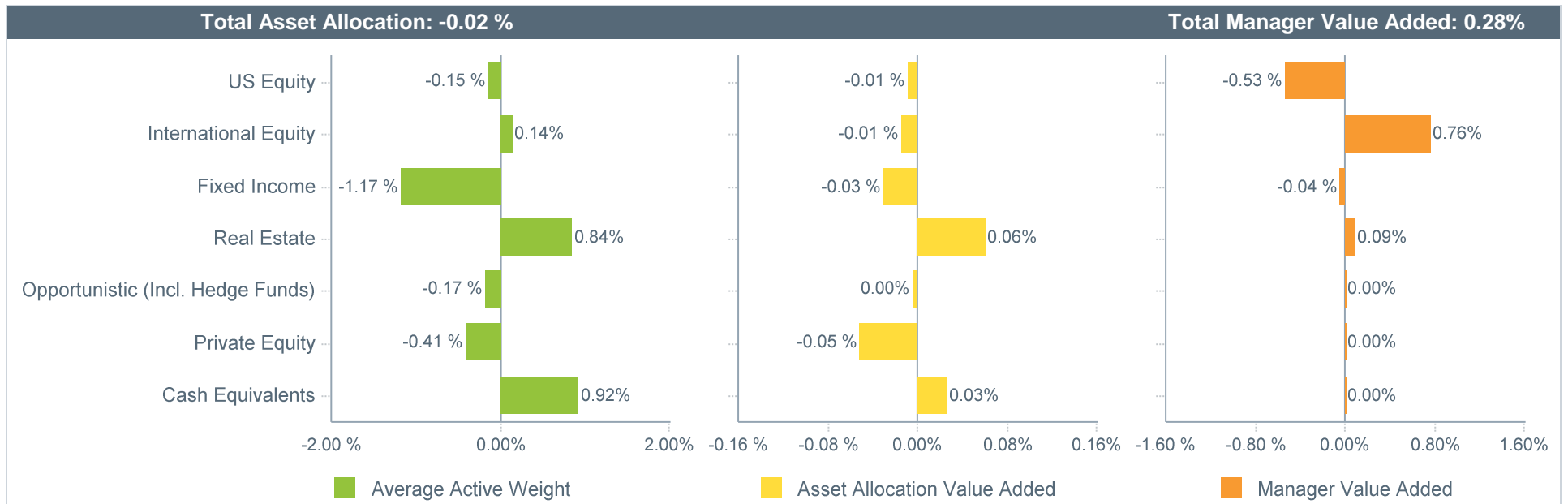
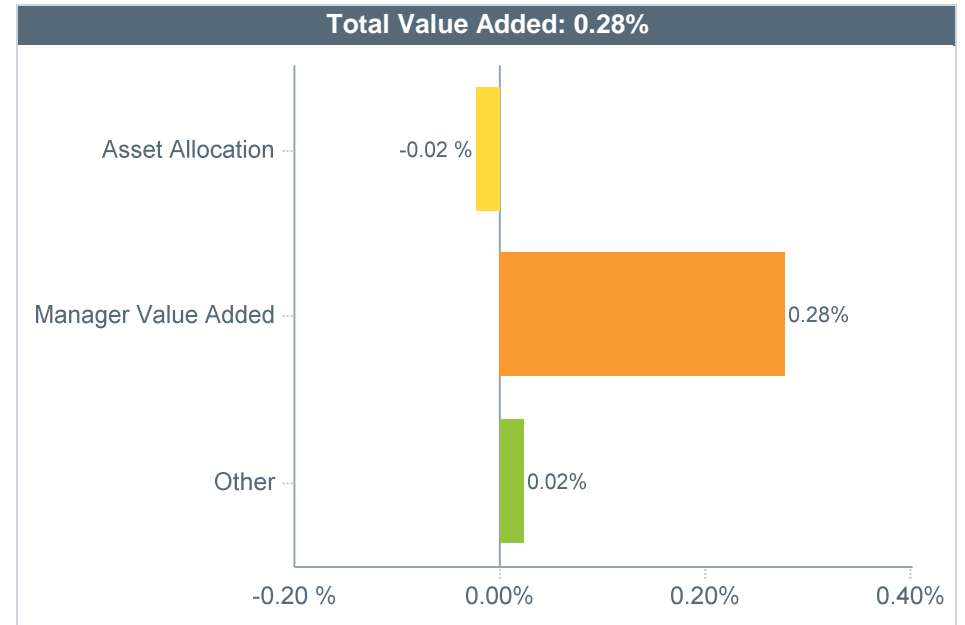
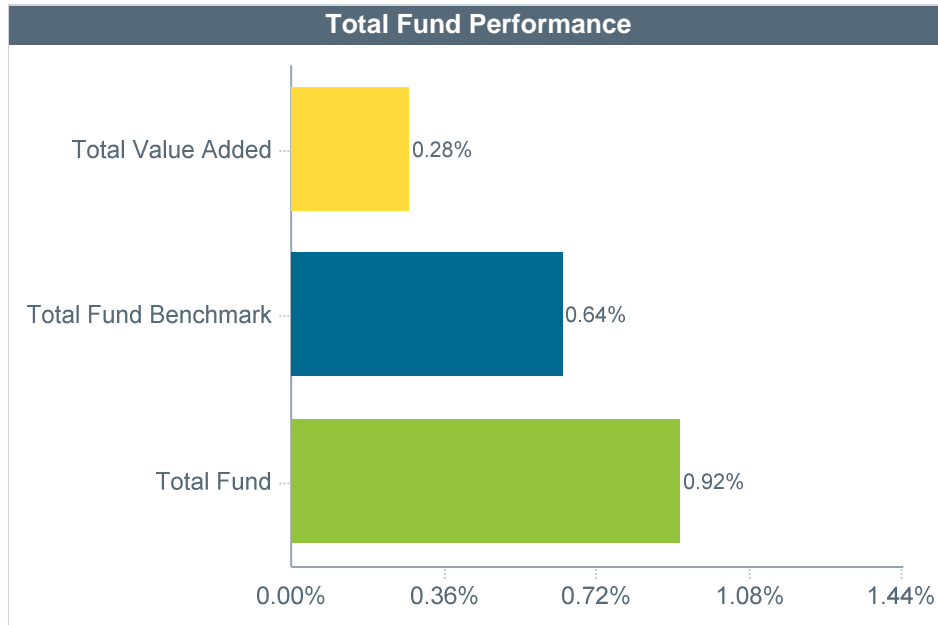
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	21,810,393,828	31.22	31.00
International Equity	18,350,670,210	26.27	26.00
Fixed Income	10,492,494,741	15.02	18.00
Real Estate	8,168,197,381	11.69	10.00
Opportunistic (Incl. Hedge Funds)	5,302,468,314	7.59	7.00
Private Equity	4,578,386,657	6.55	7.00
Cash Equivalents	1,158,493,725	1.66	1.00
Total Fund	69,861,104,856	100.00	100.00

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

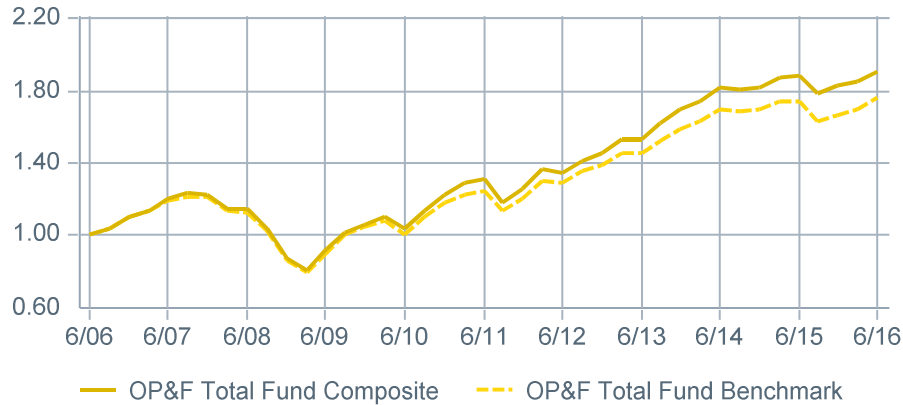


Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Summary

- OP&F has generated 0.35% of alpha over the trailing 5-year period and 0.74% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited larger up-market and down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



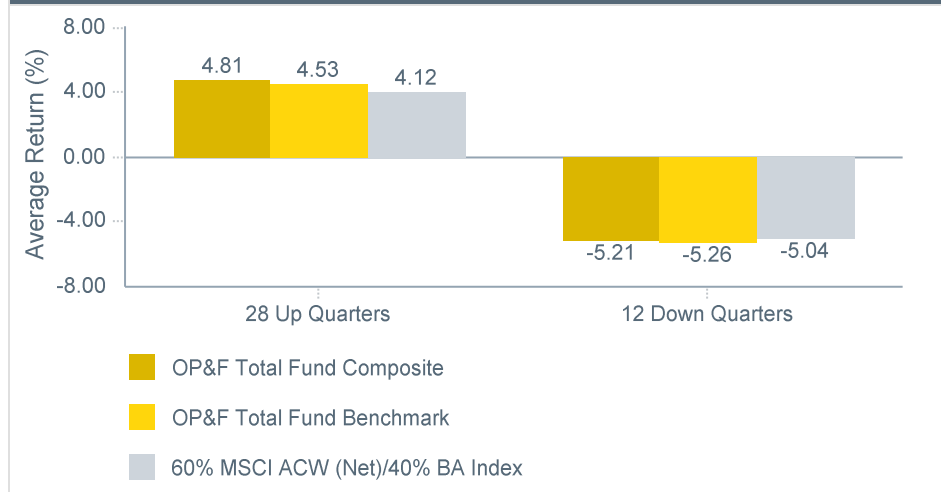
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	3,032,339,736	21.72	21.30
International Equity	2,859,705,508	20.48	20.10
High Yield Fixed Income	1,935,357,469	13.86	13.70
Global TIPS	1,175,783,152	8.42	8.80
Core Fixed Income	1,302,978,425	9.33	10.10
Mortgages	36,593,838	0.26	0.00
Real Estate	1,537,193,618	11.01	10.80
Private Markets	822,114,753	5.89	5.40
MLPs	874,352,679	6.26	7.20
Timber	289,797,383	2.08	2.60
Cash Equivalents	94,129,486	0.67	0.00
Total Fund	13,960,346,046	100.00	100.00

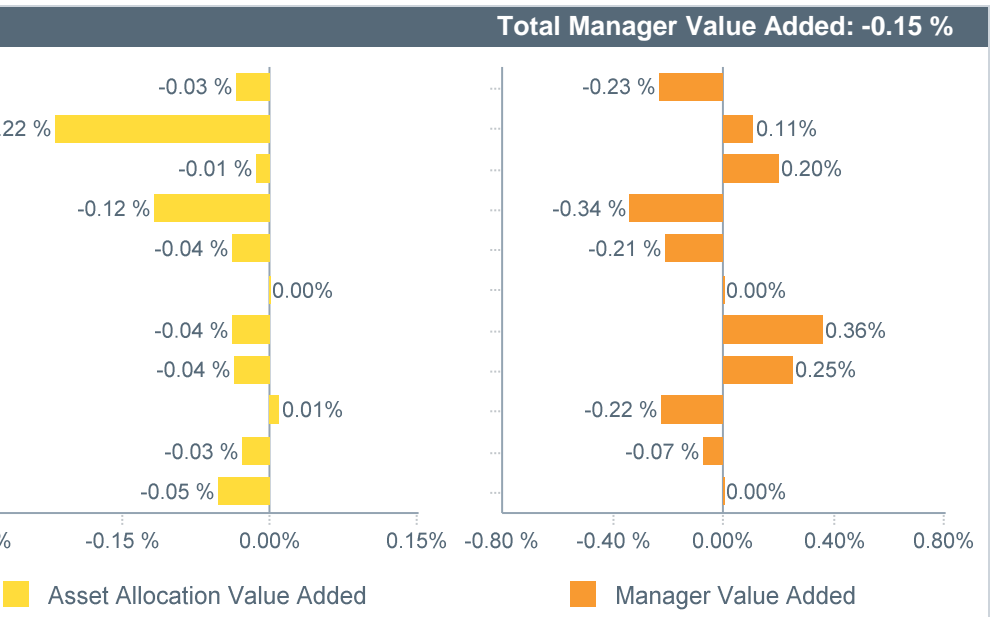
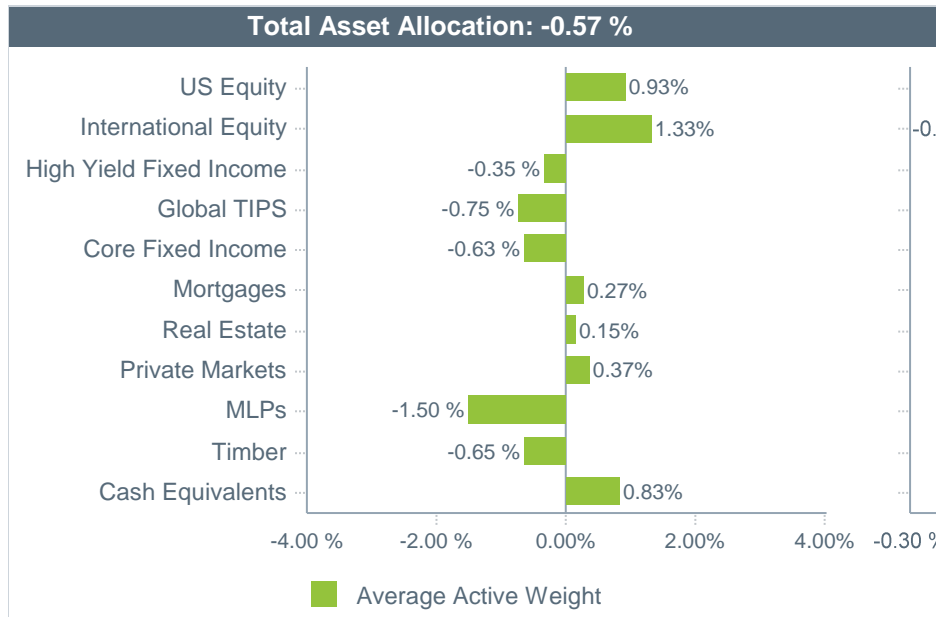
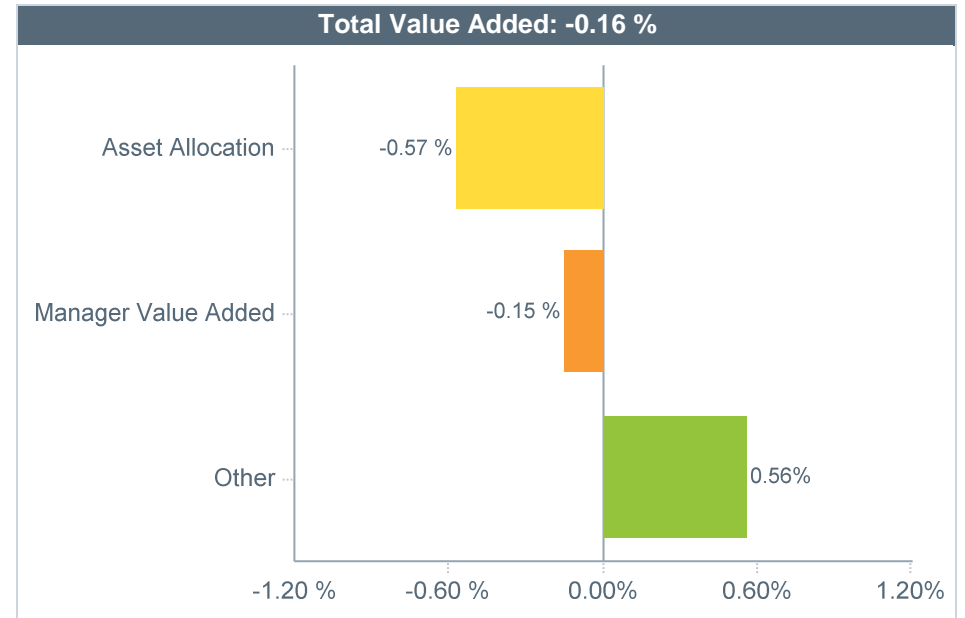
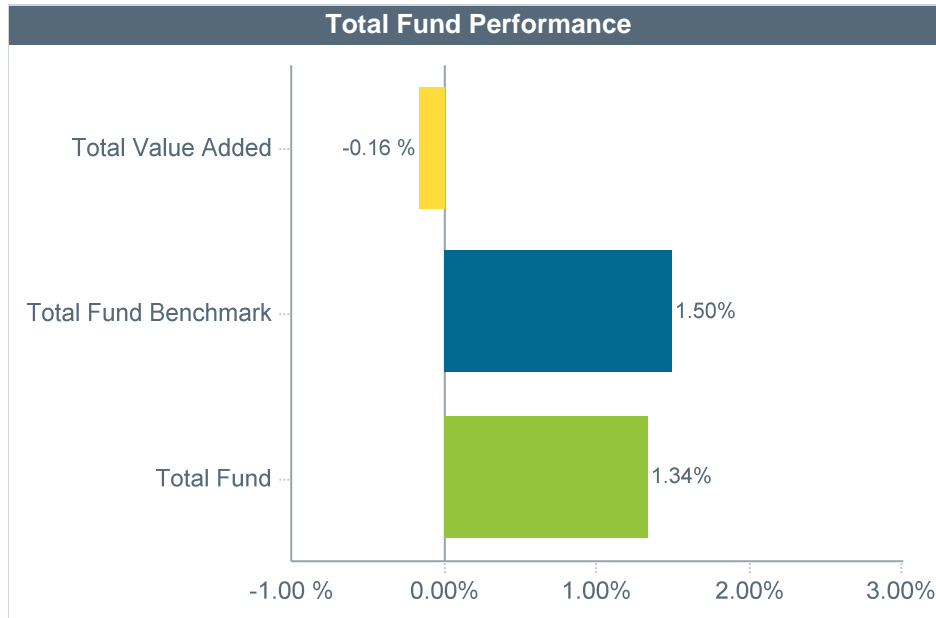
MPT Stats

	5 Years	10 Years
Maximum Return	8.40	13.00
Minimum Return	-9.75	-15.45
Standard Deviation	8.23	11.75
vs. OP&F Total Fund Benchmark		
Info Ratio	0.60	0.82
Tracking Error	1.14	1.03
Alpha	0.35	0.74
vs. S&P 500 Index (Cap Wtd)		
Beta	0.61	0.70
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	0.95	0.52

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

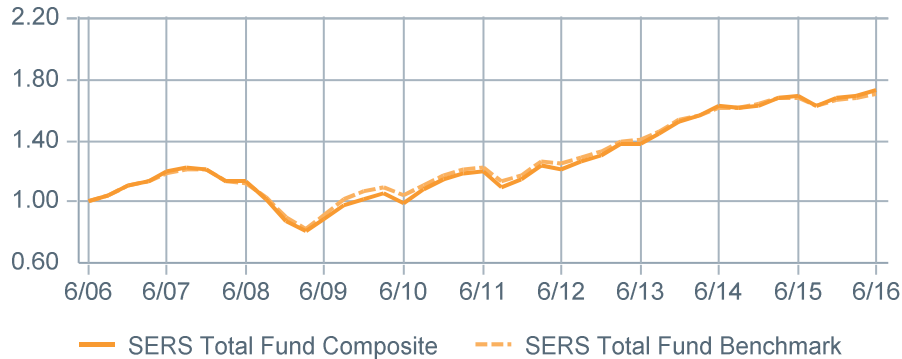


Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Summary

- SERS has lost 0.28% of alpha over the trailing 5-year period and lost 0.16% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, SERS has exhibited larger up-market capture and smaller down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



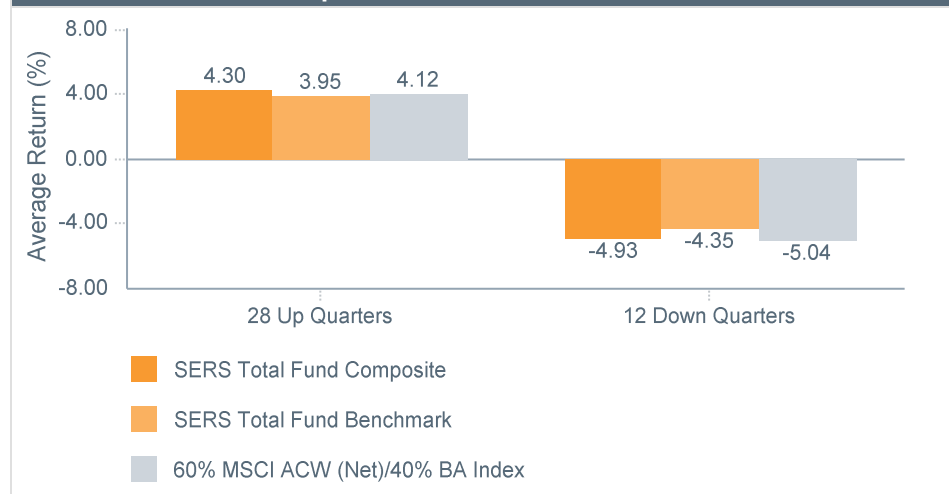
MPT Stats

	5 Years	10 Years
Maximum Return	8.11	11.01
Minimum Return	-9.12	-13.65
Standard Deviation	7.48	10.81
vs. SERS Total Fund Benchmark		
Info Ratio	0.59	0.16
Tracking Error	1.66	1.77
Alpha	-0.28	-0.16
vs. S&P 500 Index (Cap Wtd)		
Beta	0.56	0.64
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	1.02	0.47

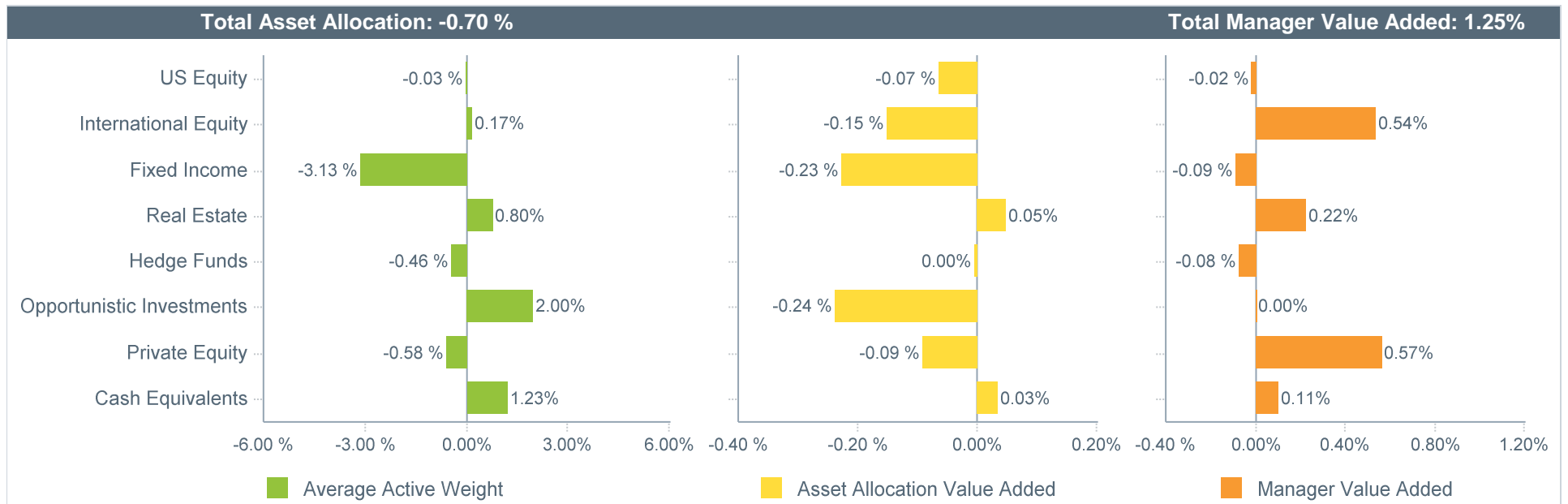
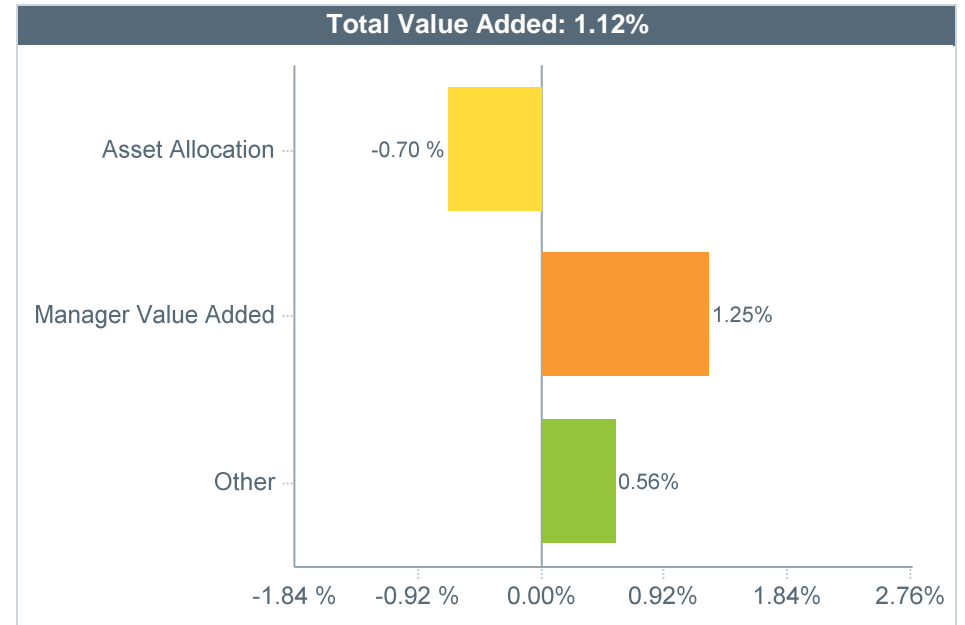
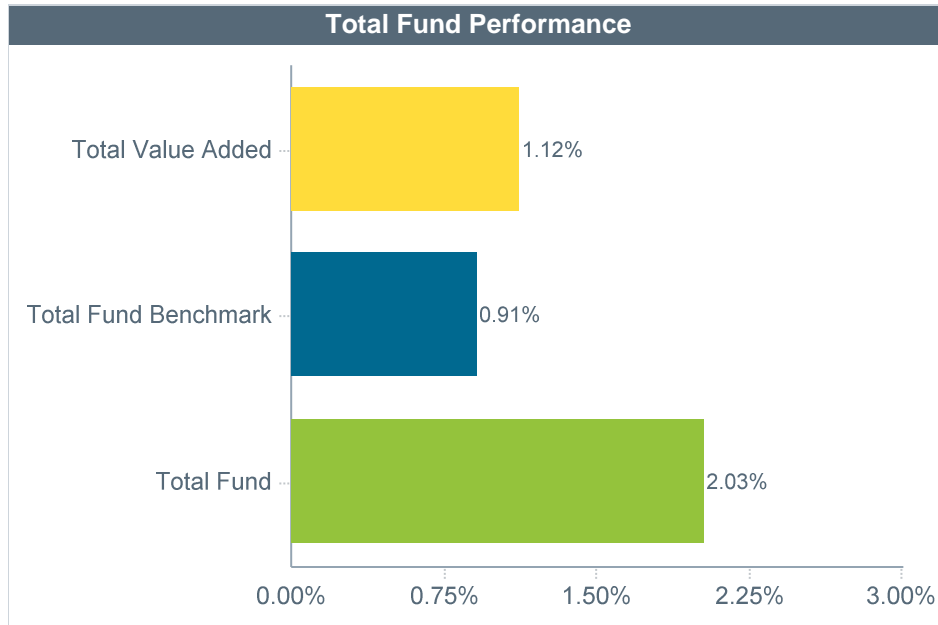
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	2,771,205,001	22.24	22.50
International Equity	2,678,939,985	21.50	22.50
Fixed Income	2,052,509,377	16.47	19.00
Real Estate	1,941,654,569	15.58	15.00
Hedge Funds	1,346,888,059	10.81	10.00
Opportunistic Investments	289,787,427	2.33	0.00
Private Equity	1,210,875,459	9.72	10.00
Cash Equivalents	168,590,680	1.35	1.00
Total Fund	12,460,450,557	100.00	100.00

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

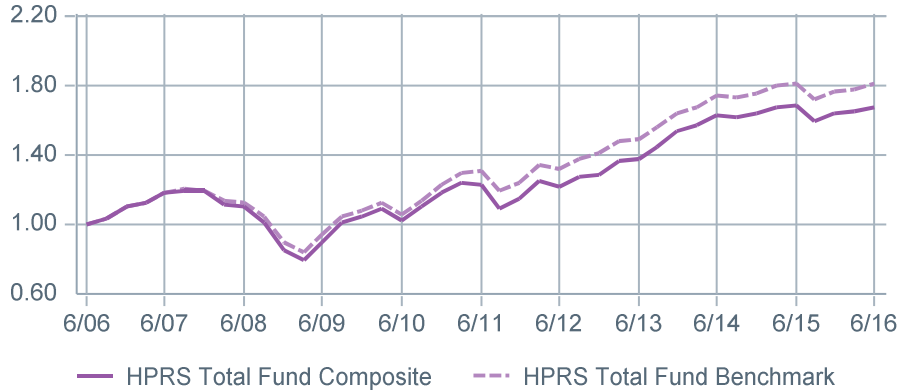


Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Summary

- HPRS has lost 1.18% of alpha over the trailing 5-year period and lost 1.20% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the total portfolio has exhibited larger up-market and down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



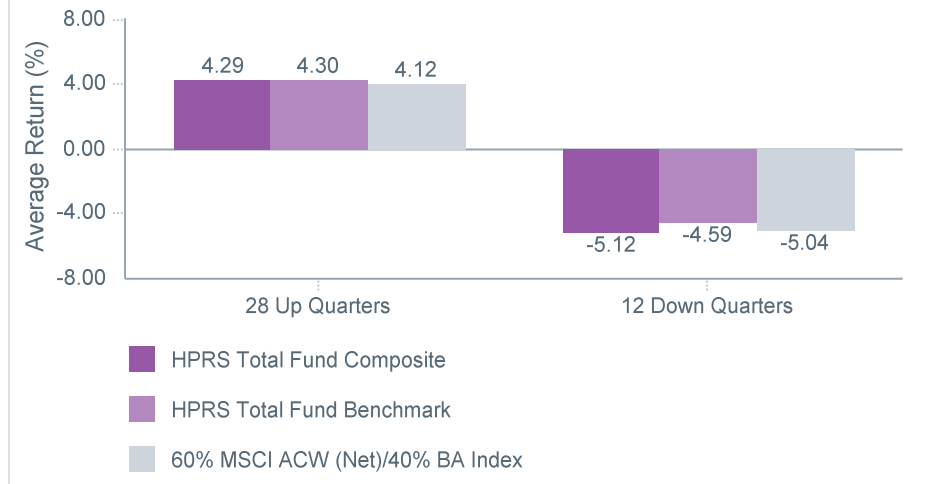
Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	257,275,944	32.16	32.00
International Equity	154,911,258	19.36	20.00
Fixed Income	159,954,159	19.99	19.00
Real Estate	31,290,456	3.91	5.00
Hedge Funds	91,934,121	11.49	12.00
Private Equity	51,484,468	6.43	6.00
Real Assets	39,476,792	4.93	5.00
Cash Equivalents	13,772,386	1.72	1.00
Total Fund	800,099,584	100.00	100.00

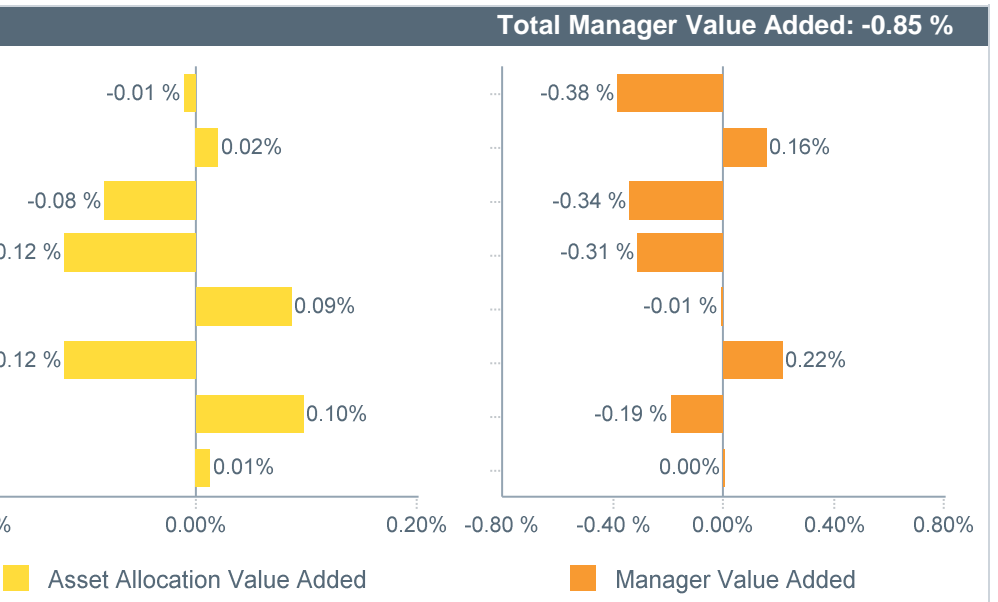
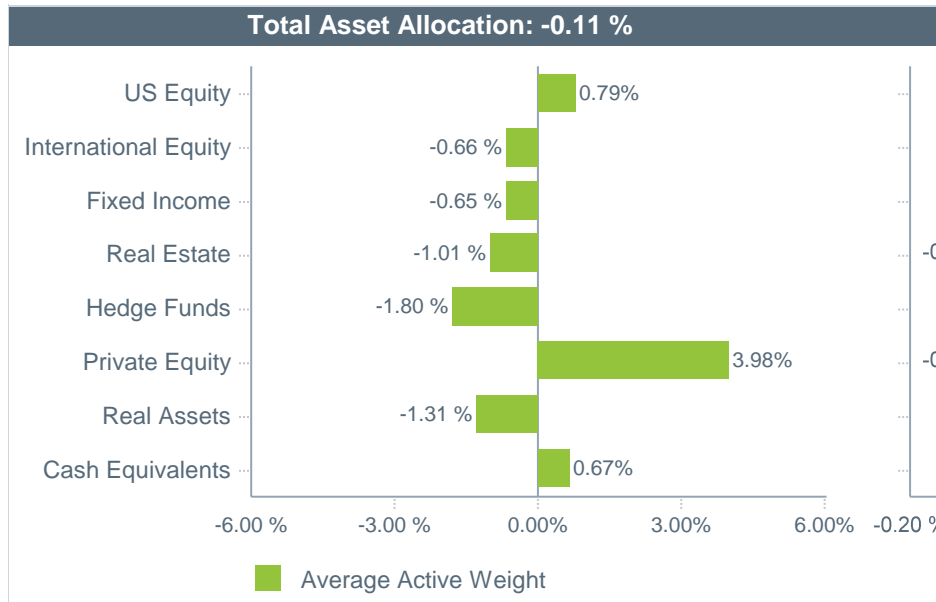
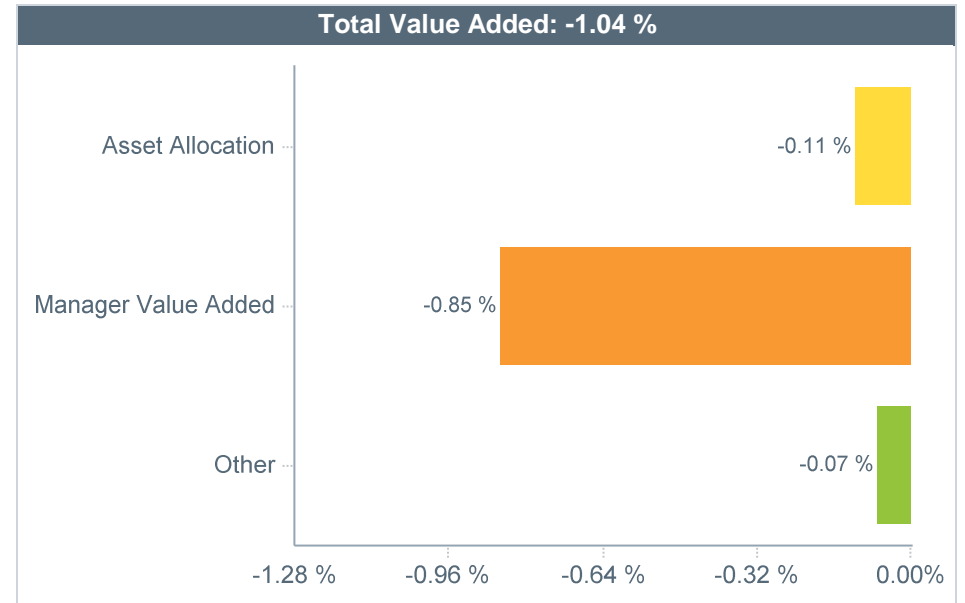
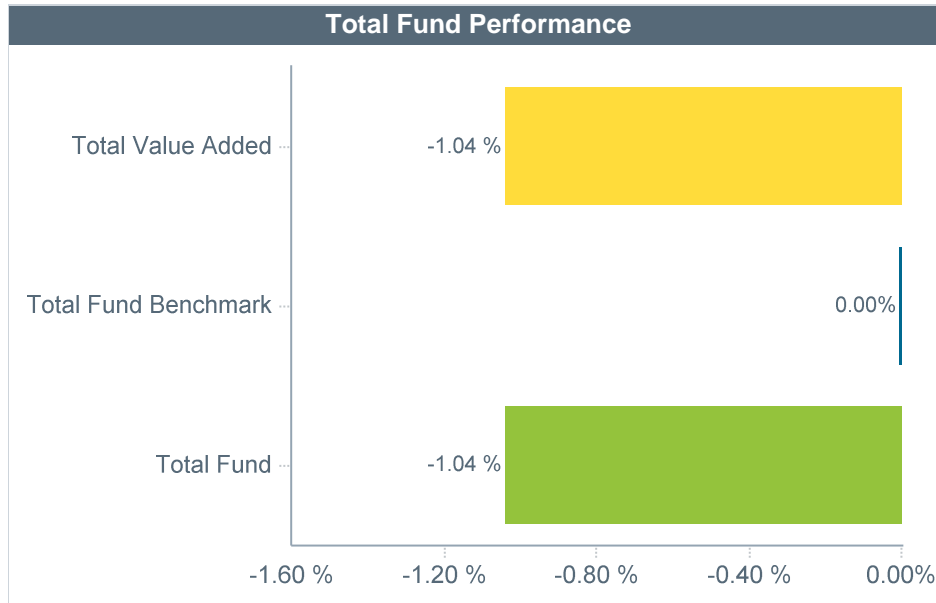
MPT Stats

	5 Years	10 Years
Maximum Return	8.19	12.56
Minimum Return	-11.24	-16.16
Standard Deviation	8.60	11.60
vs. HPRS Total Fund Benchmark		
Info Ratio	-0.14	-0.41
Tracking Error	1.47	1.63
Alpha	-1.18	-1.20
vs. S&P 500 Index (Cap Wtd)		
Beta	0.67	0.69
vs. BofA ML 3 Mo US T-Bill Index		
Sharpe Ratio	0.75	0.41

Up/Down Markets - 10 Years



Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.



Performance shown is gross of fees. Calculation is based on monthly periodicity. See Glossary for additional information regarding the Total Fund Attribution calculation. Total Fund Benchmark return is calculated by RVK and may differ from Plan provided return due to rounding.

Ohio Retirement Study Council
HPRS Total Fund Performance vs. Peers

As of June 30, 2016

	Market Value (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
HPRS	800,100	1.68	-1.04	6.69	6.33	9.29	5.27	0.12	6.73	19.59	11.45
HPRS Total Fund Benchmark		2.51	-0.02	6.72	6.64	9.75	6.09	0.19	7.03	16.79	13.07
Difference		-0.83	-1.02	-0.03	-0.31	-0.46	-0.82	-0.07	-0.30	2.80	-1.62
<i>All Public Plans > \$1B-TF Median</i>		2.87	0.18	6.37	6.40	9.47	5.67	0.17	6.57	15.48	13.13
Rank		91	84	44	51	55	71	51	45	10	88
Population		89	89	88	85	82	77	93	73	63	61
<i>All Public Plans \$250M to \$1B-TF Median</i>		2.79	0.67	6.78	6.86	9.69	5.73	0.32	6.41	16.38	13.14
Rank		83	82	54	76	70	75	57	41	19	87
Population		47	46	46	45	45	37	58	50	51	47

Performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments.

Summary

- PERS (HC 115) was formed in October of 2014 and has a performance inception date of January 2015.
- PERS (HC 115) adopted a new asset allocation policy during Q4 2015, focused on providing liquidity.
- PERS (HC 115) returned 2.2% in the first half of 2016, while it's benchmark returned 2.0%.

	Market Value (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
PERS (HC 115) Total Fund	801,499	2.21	-2.60	N/A	N/A	N/A	N/A	-3.13	N/A	N/A	N/A
PERS (HC 115) Total Fund Benchmark		2.01	-2.57	N/A	N/A	N/A	N/A	-3.10	N/A	N/A	N/A
Difference		0.20	-0.03	N/A	N/A	N/A	N/A	-0.03	N/A	N/A	N/A
<i>All Public Plans \$250M to \$1B-TF Median</i>		2.79	0.67	6.78	6.86	9.69	5.73	0.32	6.41	16.38	13.14
Rank		71	100	N/A	N/A	N/A	N/A	99	N/A	N/A	N/A
Population		47	46	46	45	45	37	58	50	51	47
PERS (HC 115) US Equity	81,659	3.35	1.78	N/A	N/A	N/A	N/A	0.68	N/A	N/A	N/A
Russell 3000 Index		3.62	2.14	N/A	N/A	N/A	N/A	0.48	N/A	N/A	N/A
Difference		-0.27	-0.36	N/A	N/A	N/A	N/A	0.20	N/A	N/A	N/A
PERS (HC 115) International Equity	66,217	0.94	-7.50	N/A	N/A	N/A	N/A	-4.01	N/A	N/A	N/A
PERS (HC 115) International Equity Custom Benchmark		0.30	-9.84	N/A	N/A	N/A	N/A	-6.09	N/A	N/A	N/A
Difference		0.64	2.34	N/A	N/A	N/A	N/A	2.08	N/A	N/A	N/A
PERS (HC 115) Core Fixed Income	54,999	5.03	5.93	N/A	N/A	N/A	N/A	0.96	N/A	N/A	N/A
PERS (HC 115) Core Fixed Income Custom Benchmark		5.31	5.99	N/A	N/A	N/A	N/A	0.56	N/A	N/A	N/A
Difference		-0.28	-0.06	N/A	N/A	N/A	N/A	0.40	N/A	N/A	N/A
PERS (HC 115) EMD	16,103	11.17	4.59	N/A	N/A	N/A	N/A	-6.82	N/A	N/A	N/A
PERS (HC 115) EMD Custom Benchmark		12.68	6.34	N/A	N/A	N/A	N/A	-7.12	N/A	N/A	N/A
Difference		-1.51	-1.75	N/A	N/A	N/A	N/A	0.30	N/A	N/A	N/A
PERS (HC 115) High Yield	7,963	7.79	1.64	N/A	N/A	N/A	N/A	-2.74	N/A	N/A	N/A
Barclays U.S. High Yield Index		9.06	1.62	N/A	N/A	N/A	N/A	-4.47	N/A	N/A	N/A
Difference		-1.27	0.02	N/A	N/A	N/A	N/A	1.73	N/A	N/A	N/A
PERS (HC 115) TIPS	15,778	6.24	4.36	N/A	N/A	N/A	N/A	-1.43	N/A	N/A	N/A
Barclays U.S. TIPS Index		6.24	4.35	N/A	N/A	N/A	N/A	-1.44	N/A	N/A	N/A
Difference		0.00	0.01	N/A	N/A	N/A	N/A	0.01	N/A	N/A	N/A
PERS (HC 115) REITs	24,634	10.75	22.58	N/A	N/A	N/A	N/A	4.41	N/A	N/A	N/A
DJ US Select Real Estate Securities TR Index		10.79	22.72	N/A	N/A	N/A	N/A	4.46	N/A	N/A	N/A
Difference		-0.04	-0.14	N/A	N/A	N/A	N/A	-0.05	N/A	N/A	N/A
PERS (HC 115) Hedge Funds	23,477	-0.96	-4.42	N/A	N/A	N/A	N/A	-1.20	N/A	N/A	N/A
PERS (HC 115) Hedge Funds Custom Benchmark		1.82	-2.07	N/A	N/A	N/A	N/A	-1.70	N/A	N/A	N/A
Difference		-2.78	-2.35	N/A	N/A	N/A	N/A	0.50	N/A	N/A	N/A

Performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments.

Ohio Retirement Study Council
PERS (HC 115) Performance & Asset Allocation

As of June 30, 2016

	Market Value (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2015	2014	2013	2012
PERS (HC 115) Opportunistic	785	5.22	6.27	N/A	N/A	N/A	N/A	1.12	N/A	N/A	N/A
PERS (HC 115) Opportunistic Custom Benchmark		5.37	6.22	N/A	N/A	N/A	N/A	0.84	N/A	N/A	N/A
Difference		-0.15	0.05	N/A	N/A	N/A	N/A	0.28	N/A	N/A	N/A
PERS (HC 115) Commodities	8,043	10.05	-25.68	N/A	N/A	N/A	N/A	-32.44	N/A	N/A	N/A
S&P Goldman Sachs Commodity Index		9.86	-26.08	N/A	N/A	N/A	N/A	-32.86	N/A	N/A	N/A
Difference		0.19	0.40	N/A	N/A	N/A	N/A	0.42	N/A	N/A	N/A
PERS (HC 115) Risk Parity	24,943	14.97	2.54	N/A	N/A	N/A	N/A	-10.42	N/A	N/A	N/A
PERS (HC 115) Risk Parity Custom Benchmark		3.86	5.20	N/A	N/A	N/A	N/A	3.30	N/A	N/A	N/A
Difference		11.11	-2.66	N/A	N/A	N/A	N/A	-13.72	N/A	N/A	N/A
PERS (HC 115) GTAA	7,852	0.78	-0.71	N/A	N/A	N/A	N/A	0.94	N/A	N/A	N/A
PERS (HC 115) GTAA Custom Benchmark		3.43	1.61	N/A	N/A	N/A	N/A	-0.69	N/A	N/A	N/A
Difference		-2.65	-2.32	N/A	N/A	N/A	N/A	1.63	N/A	N/A	N/A
PERS (HC 115) Short Term Liquidity	463,778	0.33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BofA ML 3 Mo US T-Bill Index		0.15	0.19	0.09	0.09	0.11	1.04	0.05	0.04	0.07	0.11
Difference		0.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments.

Ohio Retirement Study Council
PERS (HC 115) Asset Allocation vs. Targets

As of June 30, 2016

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	81,658,586	10.19	9.90
International Equity	66,216,546	8.26	8.00
Core Fixed Income	54,998,803	6.86	7.00
High Yield	7,962,737	0.99	1.00
EMD	16,102,883	2.01	2.00
TIPS	15,778,049	1.97	2.00
REITs	24,633,620	3.07	3.00
Hedge Funds	23,476,649	2.93	3.00
Opportunistic	784,636	0.10	0.10
Commodities	8,042,871	1.00	1.00
Risk Parity	24,943,083	3.11	3.00
GTAA	7,852,430	0.98	1.00
Cash Equivalents	1,674,869	0.21	0.00
Short Term Liquidity	463,778,085	57.86	59.00
Rebalancing	3,595,354	0.45	0.00
Total Fund	801,499,202	100.00	100.00

Allocations shown may not sum up to 100% exactly due to rounding.

Appendix

Performance Related Comments

- Performance shown is gross of fees unless otherwise noted and is annualized for periods greater than one year.
- Total Fund performance shown is net of embedded fees on externally managed real estate and alternative investments.
- All quarterly market value and performance data, including custom benchmark performance, is provided by the individual Plans.

Asset Class Fee Comparison – as of 6/30/2016

(annualized fees shown in basis points)							
	Domestic Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	7	27	13	63	36	169	46
■ PERS (HC)	1.3	4.4	2.8	0.0	-	18.5	6.6
■ PERS (HC 115)	0.0	0.1	0.1	0.0	-	0.7	0.3
■ STRS	11	20	9	46	73	173	70
■ OP&F	28	37	54	210	200	-	62
■ SERS	26	33	22	98	62	139	83
■ HPRS	31	69	44	151	105	96	91

- Fees for Private Equity are based on committed capital, with the exception of OP&F, which is based on AUM.
- PERS (DB), PERS (HC), and PERS (HC) Other Alternatives include risk parity and GTAA.
- STRS Other Alternatives include Opportunistic/Diversified Investments excluding Hedge Fund exposure. These fees reflect the current ramp-up period, with fees assessed on commitments instead of AUM.
- OP&F Other Alternatives include Timber and MLPs.
- SERS Other Alternatives include only Opportunistic Investments. These fees reflect the current ramp-up period, with fees assessed on commitments instead of AUM.
- HPRS Other Alternatives fees include Real Assets.

Appendix

Percentage of Assets Managed by External Managers – as of 6/30/2016

	Total Fund	Domestic Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	65%	16%	77%	47%	100%	100%	100%	86%
■ PERS (HC)	43%	16%	77%	31%	-	-	100%	76%
■ PERS (HC 115)	18%	16%	77%	26%	-	-	100%	79%
■ STRS	30%	10%	42%	17%	13%	97%	100%	60%
■ OP&F	100%	100%	100%	100%	100%	100%	-	100%
■ SERS	99%	100%	100%	100%	100%	100%	100%	92%
■ HPRS	100%	100%	100%	100%	100%	100%	100%	100%

- PERS (DB), PERS (HC) and PERS (HC 115) Other Alternatives include Risk Parity and GTAA, Commodities and Opportunistic.
- STRS Other Alternatives include Private Equity and Opportunistic/Diversified Investments (Incl. Hedge Funds).
- OP&F Other Alternatives include Timber and MLPs.
- SERS has one internally managed cash mandate.
- SERS Other Alternatives include Opportunistic Investments.
- HPRS Other Alternatives include Real Assets.

Percentage of Actively Managed Assets – as of 6/30/2016

	Total Fund	Domestic Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	84%	39%	77%	100%	100%	100%	100%	100%
■ PERS (HC)	74%	39%	77%	100%	-	-	100%	100%
■ PERS (HC 115)	89%	39%	77%	100%	-	-	100%	100%
■ STRS	85%	60%	99%	100%	85%	100%	100%	100%
■ OP&F	88%	55%	100%	100%	100%	100%	-	100%
■ SERS	82%	56%	65%	100%	96%	100%	100%	100%
■ HPRS	84%	49%	100%	100%	100%	100%	100%	100%

- PERS (DB), PERS (HC) and PERS (HC 115) Other Alternatives include Risk Parity, GTAA, Commodities and Opportunistic.
- STRS Other Alternatives include Private Equity and Opportunistic/Diversified Investments (Incl. Hedge Funds).
- OP&F Other Alternatives include Timber and MLPs.
- SERS Other Alternatives include Opportunistic Investments.
- HPRS Other Alternatives include Real Assets.

Custom Benchmark Glossary

PERS (DB) Total Fund Custom Benchmark:

- 22.6% Russell 3000 Index
- 18.3% PERS (DB) International Equity Custom Benchmark
- 9.6% PERS (DB) Core Fixed Income Custom Benchmark
- 1.0% Barclays U.S. Treasury Index
- 3.0% Barclays U.S. High Yield Index
- 1.0% Barclays Global High Yield Index
- 6.0% PERS (DB) EMD Custom Benchmark
- 0.4% CS Leveraged Loan Index
- 1.0% Barclays CMBS + 2%
- 1.0% Barclays U.S. TIPS Index
- 10.0% PERS (DB) Real Estate Custom Benchmark
- 8.0% PERS (DB) Hedge Funds Custom Benchmark
- 10.0% PERS (DB) Private Equity Custom Benchmark
- 0.1% PERS (DB) Opportunistic Custom Benchmark
- 1.0% S&P Goldman Sachs Commodity Index (TR)
- 5.0% PERS (DB) Risk Parity Custom Benchmark
- 2.0% PERS (DB) GTAA Custom Benchmark

PERS (HC) Total Fund Custom Benchmark:

- 24.7% Russell 3000 Index
- 20.2% PERS (HC) International Equity Custom Benchmark
- 16.6% PERS (HC) Core Fixed Income Custom Benchmark
- 1.0% Barclays U.S. Treasury Index
- 2.5% Barclays U.S. High Yield Index
- 1.5% Barclays Global High Yield Index
- 6.0% PERS (HC) EMD Custom Benchmark
- 0.4% CS Leveraged Loan Index
- 1.0% Barclays CMBS + 2%
- 5.0% Barclays U.S. TIPS Index
- 6.0% Dow Jones U.S. Select Real Estate Securities TR Index
- 6.0% PERS (HC) Hedge Funds Custom Benchmark
- 0.1% PERS (HC) Opportunistic Custom Benchmark
- 2.0% S&P Goldman Sachs Commodity Index (TR)
- 5.0% PERS (HC) Risk Parity Custom Benchmark
- 2.0% PERS (HC) GTAA Custom Benchmark

PERS (HC 115) Total Fund Custom Benchmark:

- 9.9% Russell 3000 Index
- 8.0% PERS (HC 115) International Equity Custom Benchmark
- 7.0% PERS (HC 115) Core Fixed Income Custom Benchmark
- 1.0% Barclays U.S. High Yield Index
- 2.0% PERS (HC 115) EMD Custom Benchmark
- 2.0% Barclays U.S. TIPS Index
- 3.0% Dow Jones U.S. Select Real Estate Securities TR Index

- 3.0% PERS (HC 115) Hedge Funds Custom Benchmark
- 0.1% PERS (HC 115) Opportunistic Custom Benchmark
- 1.0% S&P Goldman Sachs Commodity Index (TR)
- 3.0% PERS (HC 115) Risk Parity Custom Benchmark
- 1.0% PERS (HC 115) GTAA Custom Benchmark
- 59.0% BofA ML 3 Mo US T-Bill Index

STRS Total Fund Custom Benchmark:

- 31.0% Russell 3000 Index
- 20.8% MSCI World Ex US Index (50% Hedged)
- 5.2% MSCI Emerging Markets Index
- 18.0% Barclays US Universal Index
- 10.0% STRS Custom Real Estate Benchmark
- 7.0% Opportunistic Composite Performance
- 7.0% Private Equity Composite Performance
- 1.0% BofA ML 3 Mo US T-Bill Index

OP&F Total Fund Custom Benchmark:

- 21.3% Wilshire 5000 Index
- 20.1% MSCI ACW Ex US IMI Index (Net)
- 10.1% Barclays US Aggregate Bond Index
- 13.7% CS High Yield Dev. Countries Only Index
- 8.8% Bridgewater Custom GIPS Index
- 10.8% NCREIF ODCE (Net) (1 Quarter Lag)
- 2.6% CPI + 5%
- 7.2% Alerian MLP Index
- 5.4% Wilshire 5000 + 3% (1 Quarter Lag)

SERS Total Fund Custom Benchmark:

- 22.5% Russell 3000 Index
- 22.5% SERS International Equity Custom Benchmark
- 19.0% Barclays US Aggregate Bond Index
- 15.0% NCREIF Property Index (1 Quarter Lag)
- 10.0% HFRI FOF Composite Index + 1%
- 10.0% Burgiss All Private Equity (1 Quarter Lag)
- 1.0% Citigroup 30 Day T-Bill Index

HPRS Total Fund Custom Benchmark:

- 32.0% Russell 3000 Index
- 20.0% MSCI ACW Ex US Index (USD) (Net)
- 19.0% HPRS Fixed Income Custom Benchmark
- 5.0% NCREIF Index
- 12.0% HFRI FOF Composite Index
- 6.0% HPRS Total Private Equity Custom Composite
- 5.0% HPRS Real Assets Custom Index
- 1.0% BofA Merrill Lynch 91-Day T-Bill

Custom Benchmark Glossary

PERS (DB) International Equity Custom Benchmark:

- 55% MSCI World Ex US Index
- 10% MSCI World Ex US Small Cap Index
- 31% MSCI Emerging Markets Index
- 4% MSCI Emerging Markets Small Cap Index

PERS (DB) Core Fixed Income Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (DB) EMD Custom Benchmark:

- 50% JP Morgan Emerging Markets Bond Index Global
- 50% JP Morgan Government Bond Index-Emerging Markets Global Diversified

PERS (DB) Real Estate Custom Benchmark:

- NFI-ODCE Index (Net) + 0.85% (1 Quarter Lag)
- Prior to 2013: NCREIF Property Index (1 Quarter Lag)

PERS (DB) Private Equity Custom Benchmark:

- State Street Private Equity Index (1 Quarter Lag)
- Prior to 2015: 60% Russell 3000 Index, 40% MSCI ACWI Ex US IMI plus 300 basis points (1 Quarter Lag)

PERS (DB) Hedge Funds Custom Benchmark:

- 20% HFRI Equity Hedge (Total) Index
- 30% HFRI Event Driven (Total) Index
- 15% HFRI Relative Value (Total) Index
- 20% HFRI Macro (Total) Index
- 15% HFRI Fund Weighted Composite Index
- Prior to 2014Q2: The minimum of 700 basis points or 3-month LIBOR plus 400 basis points

PERS (DB) Opportunistic Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (DB) Risk Parity Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (DB) GTAA Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC) International Equity Custom Benchmark:

- 55% MSCI World Ex US Index
- 10% MSCI World Ex US Small Cap Index
- 31% MSCI Emerging Markets Index
- 4% MSCI Emerging Markets Small Cap Index

PERS (HC) Core Fixed Income Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC) EMD Custom Benchmark:

- 50% JP Morgan Emerging Markets Bond Global Index
- 50% JP Morgan Government Bond Index-Emerging Markets Global Diversified

PERS (HC) Hedge Funds Custom Benchmark:

- 20% HFRI Equity Hedge (Total) Index
- 30% HFRI Event Driven (Total) Index
- 15% HFRI Relative Value (Total) Index
- 20% HFRI Macro (Total) Index
- 15% HFRI Fund Weighted Composite Index
- Prior to 2014Q2: The minimum of 700 basis points or 3-month LIBOR plus 400 basis points

PERS (HC) Opportunistic Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC) Risk Parity Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC) GTAA Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC 115) International Equity Custom Benchmark:

- 55% MSCI World Ex US Index
- 10% MSCI World Ex US Small Cap Index
- 31% MSCI Emerging Markets Index
- 4% MSCI Emerging Markets Small Cap Index

PERS (HC 115) Core Fixed Income Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC 115) EMD Custom Benchmark:

- 50% JP Morgan Emerging Markets Bond Global Index
- 50% JP Morgan Government Bond Index-Emerging Markets Global Diversified

PERS (HC 115) Hedge Funds Custom Benchmark:

- 20% HFRI Equity Hedge (Total) Index
- 30% HFRI Event Driven (Total) Index
- 15% HFRI Relative Value (Total) Index
- 20% HFRI Macro (Total) Index
- 15% HFRI Fund Weighted Composite Index

Custom Benchmark Glossary

PERS (HC 115) Opportunistic Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC 115) Risk Parity Custom Benchmark:

- The market weight of underlying portfolio benchmarks

PERS (HC 115) GTAA Custom Benchmark:

- The market weight of underlying portfolio benchmarks

STRS International Equity Custom Benchmark:

- 80% MSCI EAFE Index
- 20% MSCI Emerging Markets Index

STRS Real Estate Custom Benchmark:

- 85% NCREIF Property Index
- 15% FTSE NAREIT Equity REITs Index

STRS Private Equity Custom Benchmark:

- Russell 3000 + 100 basis points

STRS Opportunistic Custom Benchmark:

- Russell 3000 - 100 basis points

OP&F Private Equity Custom Benchmark:

- Wilshire 5000 + 3% (1 Quarter Lag)
- Prior to 2007Q1: Wilshire 5000 (1 Quarter Lag)
- Prior to 2006Q4: Wilshire 5000 + 5%

SERS International Equity Custom Benchmark:

- MSCI ACW Ex US Index (USD) (Net)
- Prior to 2014Q1: MSCI ACWI ex-US (Net) Index (dev. markets 50% hedged)
- Prior to 2013Q3: MSCI ACWI ex-US (Gross) Index (dev. markets 50% hedged)

SERS Real Estate Custom Benchmark:

- NCREIF Property Index (1 Quarter Lag)
- Prior to 2010Q3: 80% NCREIF/20% NAREIT

SERS Opportunistic Custom Benchmark:

- SERS Total Fund Custom Benchmark

HPRS Fixed Income Custom Benchmark:

- 53% Barclays Aggregate
- 15.7% Citi WGBI
- 15.7% Credit Suisse Leveraged Loans
- 15.6% BofA Merrill Lynch 91-Day T-Bill

HPRS Total Private Equity Custom Benchmark:

- Wilshire 5000 + 3% (1 Quarter Lag)
- Prior to 2010Q3: CPI + 5%

HPRS Real Assets Custom Benchmark:

- 60% NCREIF Timberland
- 40% Alerian MLP

Glossary

Alpha - A measure of the difference between a portfolio's actual returns and its expected performance, given its level of risk as measured by beta. It is a measure of the portfolio's historical performance not explained by movements of the market.

Benchmark - A standard against which the performance of a fund or investment manager can be measured.

Beta - A measure of the sensitivity of a portfolio to the movements in the market. A beta of 1.0 indicates the same level of stock market risk as the S&P 500 Index (Cap Wtd), unless otherwise noted. Lower betas indicate lower stock market risk. Beta is a measure of a portfolio's non-diversifiable or systematic risk.

Capital Markets Review -

Breakeven Inflation - Measures the expected inflation rate at each stated maturity by taking the difference between the real yield of the inflation-linked maturity curve and the yield of the closest nominal Treasury maturity.

Consumer Confidence - Measures domestic consumer confidence as defined by the degree of optimism on the state of the economy that consumers express through saving and spending.

Consumer Price Index (CPI) - Measures the change in the price level of consumer goods and services.

Option-Adjusted Spread - Measures the flat spread of an index or bond to the Treasury yield curve after removing the effect of any embedded options.

Purchasing Managers Index (PMI) - Measures economic activity by surveying purchasing managers on a monthly basis as to whether business conditions have improved, worsened, or stayed the same.

US Dollar Total Weighted Index - Measures the value of the US Dollar relative to a basket of other world currencies. It is calculated as the weighted geometric mean of the dollar's value versus the EUR, GBP, CAD, SEK, CHF, and JPY.

VIX - Measures the implied volatility of S&P 500 Index options by looking at the market's expectation of the S&P 500 Index volatility over the next 30 day period. Commonly referred to as the "fear index" or the "fear gauge."

Downside Risk - A measure similar to standard deviation, but focuses only on the negative returns of the fund or investment. The higher the factor, the riskier the fund or investment.

Correlation - A statistical measure of the relationship between asset class returns. A value of 1.00 is a perfect correlation; that is, the asset classes always move in the same direction. A value of -1.00 indicates a perfect negative correlation, in which the asset classes always move in opposite directions of each other. A value of 0 indicates there is no relationship between the direction of returns of the two asset classes. Correlation calculations only consider the direction of changes relative to two variables and not the magnitude of those changes.

Down Market Capture - Down market by definition is negative benchmark return and down market capture represents the ratio in % terms of the average portfolios return over the benchmark during the down market period. The lower the value of the down market capture the better the product's performance.

Excess Return - Arithmetic difference between the fund or investment return and the risk-free return (or other specified market index) over a specified time period, shown on an annualized basis.

Indices - All indices and related information are considered intellectual property and are licensed by each index provider. The indices may not be copied, used or distributed without the index provider's prior written approval. Index providers make no warranties and bear no liability with respect to the indices, any related data, their quality, accuracy, suitability and/or completeness.

Information Ratio - Measured by dividing the active rate of return by the tracking error. The higher the information ratio, the more value-added contribution relative to the market benchmark.

Maximum Return - The maximum quarterly return earned over the specified time period.

Minimum Return - The minimum quarterly return earned over the specified time period.

Glossary

Peer Groups -

Plan Sponsor Peer Groups - RVK utilizes the Mellon Analytical Solutions Trust Universe along with the Investment Metrics Plan Sponsor Universe. The combined Mellon Analytical Solutions Trust Universe and Investment Metrics Plan Sponsor Universe is used for comparison of total fund composite results and utilizes actual client returns compiled from consultant and custodial data. The Plan Sponsor Peer Group database includes performance and other quantitative data for over 2,100 plans which include corporate, endowment, foundation, public, and Taft Hartley plans. Plan Sponsor Peer Groups are gross of fees.

Percentile Rankings - Percentile rank compares an individual fund's performance with those of other funds within a defined peer group of managers possessing a similar investment style. Percentile rank identifies the percentage of a fund's peer group that has a higher return (or other comparative measurement) than the fund being ranked. Conversely, 100 minus the individual fund's ranking will identify the percentage of funds within the peer group that have a lower return than the fund being ranked.

1 - Highest Statistical Value 100 - Lowest Statistical Value

Example: American Funds AMCP;R-4 (RAFEX) is ranked in the 4th percentile within the IM US Equity Large-Cap Growth Funds (MF) Peer Group for the Sharpe Ratio. Within the IM US Equity Large-Cap Growth Funds peer group, 4% of the other funds performed better than American Funds AMCP;R-4 (RAFEX), while 96% of the funds performed worse.

Performance Methodology - RVK calculates performance beginning with the first full month following inception. Since inception performance may vary from manager reported performance due to RVK using the first full month of returns as the inception date. Performance for both managers and composites is annualized for periods greater than one year.

Return - Compounded rate of return for the period.

%Return - The time-weighted rate of return of a portfolio for a given period.

RVK Liquidity Rating - A qualitative method for determining the relative amount of liquidity in a portfolio. The characteristics considered when determining relative liquidity include trading volume, gates for redemption, leverage, nature of transactions, and pricing mechanisms. The RVK Liquidity Rating is calculated using beginning of month investment weights applied to each corresponding asset class liquidity rating.

<u>Asset Class</u>	<u>RVK Liquidity Rating</u>	<u>Asset Class</u>	<u>RVK Liquidity Rating</u>
<u>Liquid Investments</u>		<u>Less Liquid Investments</u>	
T-Bills and Treasuries	100	Fixed Income Plus Sector	50
Cash Equivalents	98	Bank Loans	50
TIPS	95	Emerging Markets Debt	50
US Large Cap Equity	95	Hedge Funds	35
Diversified Real Return	93	Hedge Funds of Funds	35
Non-US Large Cap Equity	90	<u>Not Liquid Investments</u>	
Global Tactical Asset Allocation	88	Core Real Estate	25
US Small Cap Equity	85	Core Plus Real Estate	15
REITs	85	Plus Only Real Estate	5
Non-US Small Cap Equity	85	Private Equity	5
Emerging Markets Equity	85		
Core Fixed Income	85		
Core Plus Fixed Income	80		

Sharpe Ratio - Represents the excess rate of return over the risk-free return (i.e., BofA ML 3 Mo US T-Bill Index unless specified otherwise), divided by the standard deviation of the excess return. The result is the absolute rate of return per unit of risk. The higher the value, the better the portfolio's historical risk-adjusted performance.

Standard Deviation - A statistical measure of the range of a portfolio's performance and is a commonly used proxy for overall investment risk. The variability of a return around its average return over a specified time period.

Tracking Error - A measure of the standard deviation of a portfolio's performance relative to the performance of the market index.

Glossary

Thematic Classification - Represents dedicated manager allocations; as such, thematic allocations are approximations. RVK categorizes the following asset classes as Alpha, Capital Appreciation, Capital Preservation, and Inflation:

<u>Alpha</u>	<u>Capital Appreciation</u>	<u>Capital Preservation</u>	<u>Inflation</u>
Absolute Return Strategies	Public Equity	Core Fixed Income	TIPS
Currency Overlay	Private Equity	CMBS Fixed Income	Bank Loans
GTAA (Global Tactical Asset Allocation)	Preferred Securities	Asset Backed Fixed Income	Core Real Estate
	High Yield	Domestic Core Plus Fixed Income	Real Return
	Convertible Fixed Income	Mortgage Backed Fixed Income	Inflation Hedges
	TALF Funds	International Developed Fixed Income	REITs
	Distressed Debt	Cash Equivalents	Commodities
	Emerging Market Fixed Income	Stable Value	
	MLPs		
	Value Added Real Estate		
	Opportunistic Real Estate		

Total Fund Attribution - A method for identifying the sources of a total fund's over- or underperformance relative to its benchmark. The calculation identifies the contributions of positive or negative total fund excess return caused by allocation differences relative to the total fund's custom benchmark, and performance differences of the investment managers relative to the benchmark components that represent them.

Total Fund Performance -

Total Fund - The percentage return of the total fund for the specified time period.

Total Fund Benchmark - The percentage return of the total fund benchmark for the specified time period; calculated using the target asset allocation and the corresponding benchmark returns.

Total Value Added - The percentage of over- or underperformance of the total fund as compared to the total fund benchmark.

Total Value Added -

Asset Allocation - Shows how the variance of the total fund's actual allocation from its target allocation added to or subtracted from fund performance.

Manager Value Added - The portion of the total value added attributable to the outperformance or underperformance of the fund's investment managers, relative to the individual benchmarks that represent them in the total fund benchmark.

Market Timing/Other - The contribution of other residual factors, including estimation error and transaction timing.

Tracking Error - A measure of the standard deviation of a portfolio's performance relative to the performance of an appropriate market benchmark.

Unit Value - The dollar value of a portfolio, assuming an initial nominal investment of \$1.00, growing at the compounded rate of %Return for a given period.

Up Market Capture - Up market by definition is positive benchmark return and up market capture represents the ratio in % terms of the average portfolios return over the benchmark during the up market period. The higher the value of the up market capture the better the product's performance.

PORTLAND

CHICAGO

NEW YORK

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