



# Investment Performance Analysis

## Ohio Retirement Study Council

Period Ended: June 30, 2021



## 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 24 Emerging Markets (EM) countries. With 6,174 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 24 emerging market country indexes: *Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, South Africa, Taiwan, Thailand, Turkey\* and United Arab Emirates*.

**Bloomberg US Agg Bond:** The **Bloomberg 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.

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

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

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

**Bloomberg Mortgage:** The **Bloomberg 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).

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

**Bloomberg US High Yield:** The **Bloomberg 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.

**Bloomberg Global High Yield:** The **Bloomberg 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.

**NCREIF Timberland:** The **NCREIF Timberland Index** is a quarterly time series composite return measure of investment performance of a large pool of individual U.S. timber properties acquired in the private market for investment purposes only.

**NCREIF Farmland:** The **NCREIF Farmland Index** is a quarterly time series composite return measure of investment performance of a large pool of individual farmland properties acquired in the private market for investment purposes only.

**HFRI FOF Composite:** The **HFRI 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.

**3 Month LIBOR Rate:** The **3 Month LIBOR Rate Index** is the rate of interest at which banks offer to lend money to one another in the wholesale money markets in London.

**S&P Risk Parity Index – 8% Target Volatility:** The **S&P Risk Parity Index – 8% Target Volatility Index** seeks to measure the performance of a multi-asset risk parity strategy that allocates risk equally among U.S. dollar-denominated equity, fixed income, and commodities futures contracts, while targeting a volatility level of 8%.

**S&P GSCI Gold:** The **S&P GSCI Gold Index** provides investors with a reliable and publicly available benchmark tracking the COMEX gold future.

**FTSE Dev Core 50/50 Infrastructure:** The **FTSE Dev Core 50/50 Infrastructure Index** is a market-capitalization-weighted index of worldwide infrastructure and infrastructure-related securities.

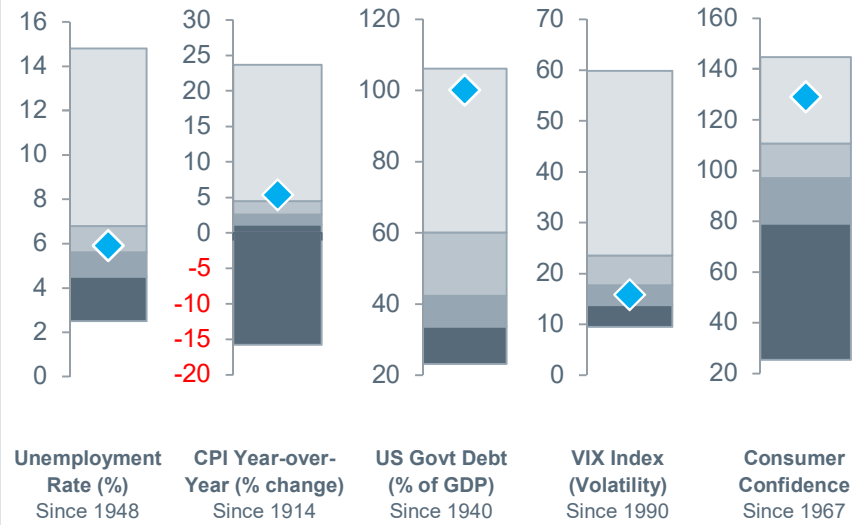
# Capital Markets Review



**Second Quarter Economic Environment**

Optimism stemming from reopening efforts, lifted mask mandates, and a proposed bipartisan infrastructure spending bill in the US was balanced with concerns regarding emerging variants of the coronavirus and increasing inflation. Global equity markets provided strong gains in Q2 led by the US equity market. Joining equity markets in positive territory were commodities and REITs. Aggregate fixed income markets generally trailed, although issues with longer dated maturities or that are inflation-linked fared better. Key inflation indicators experienced significant year-over-year increases in Q2, but many forecasters view these elevated levels as transitory. Currently, Fed officials are projecting two rate increases by the end of 2023 but remain sensitive to repeating the taper tantrum experienced in 2013. Inflation is also rising outside of the US which notably led both the Bank of Canada and Bank of England to announce the tapering of their bond purchasing programs. Progress in the US labor market recovery was mixed in Q2. The jobs reports in April and May failed to meet expectations, but the gains in the June report outpaced most forecasts. The unemployment rate remains above target levels, although the Congressional Budget Office projected that the rate would decline to 3.6% by the end of 2022. Overall, the economic recovery continues to advance, with the International Monetary Fund forecasting global GDP growth of 6.0% and 4.4% in 2021 and 2022, respectively.

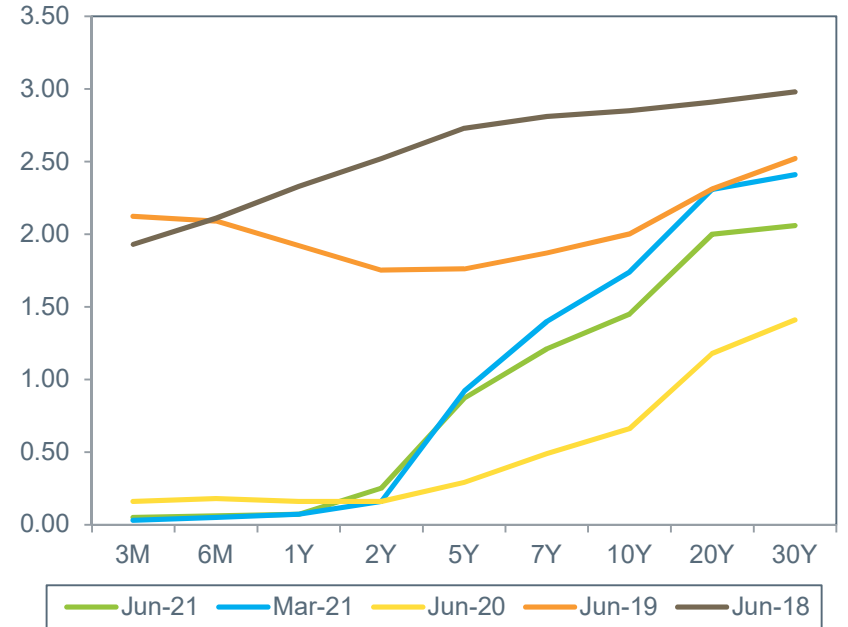
**Key Economic Indicators**

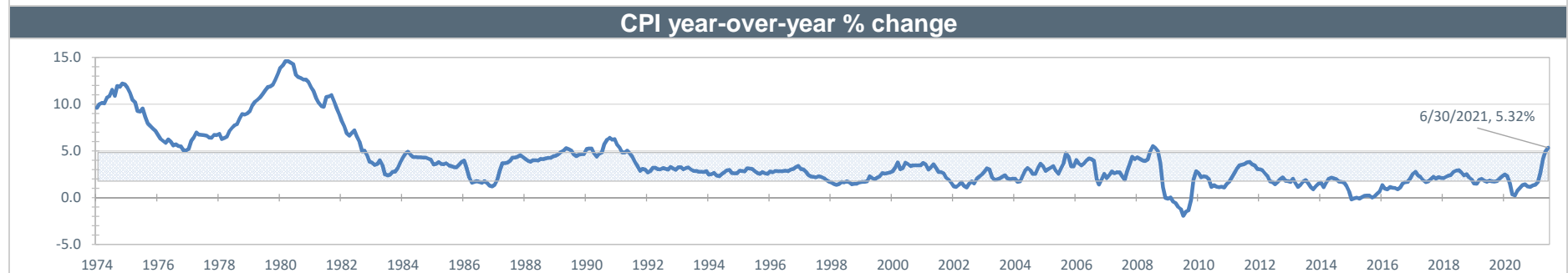
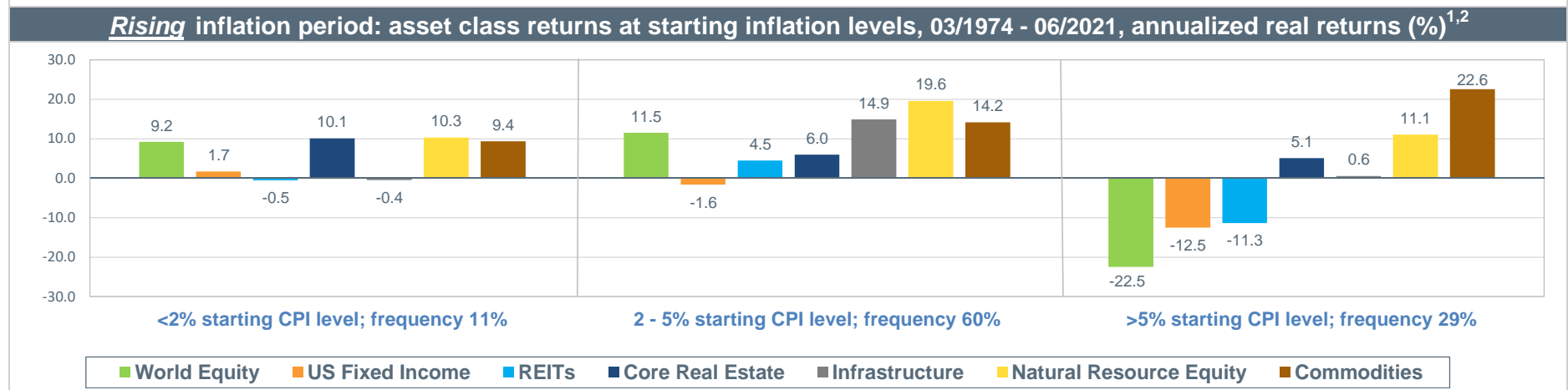
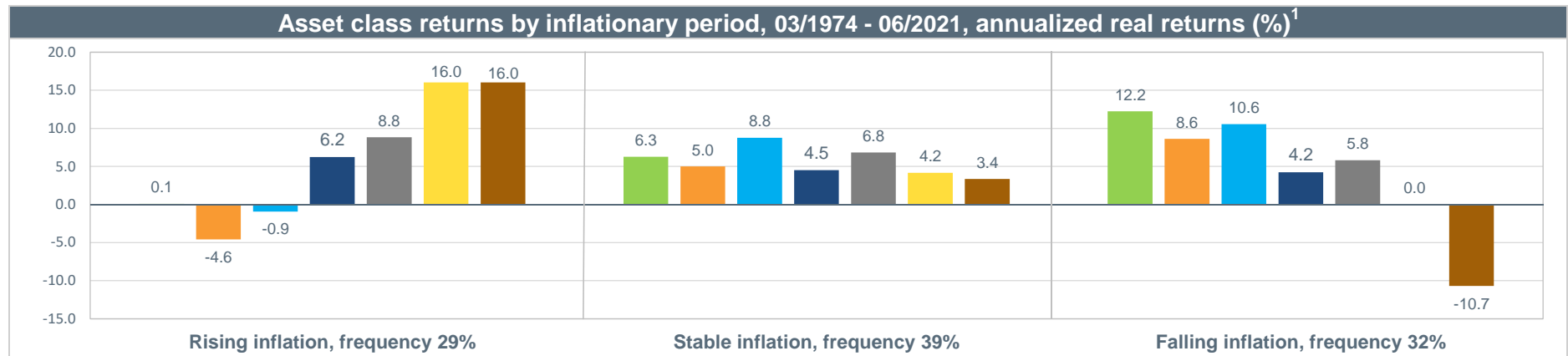


| Economic Indicators           | Jun-21   | Mar-21 | Jun-20 | Jun-18 | 20 Yr  |
|-------------------------------|----------|--------|--------|--------|--------|
| Federal Funds Rate (%)        | 0.08 ▲   | 0.06   | 0.08   | 1.91   | 1.37   |
| Breakeven Infl. - 5 Yr (%)    | 2.50 ▼   | 2.60   | 1.17   | 2.08   | 1.83   |
| Breakeven Infl. - 10 Yr (%)   | 2.34 ▼   | 2.37   | 1.34   | 2.13   | 2.02   |
| CPI YoY (Headline) (%)        | 5.4 ▲    | 2.6    | 0.6    | 2.9    | 2.1    |
| Unemployment Rate (%)         | 5.9 ▼    | 6.0    | 11.1   | 4.0    | 6.1    |
| Real GDP YoY (%)              | 12.2 ▲   | 0.5    | -9.1   | 3.3    | 1.8    |
| PMI - Manufacturing           | 60.6 ▼   | 64.7   | 52.2   | 59.7   | 53.1   |
| USD Total Wtd Idx             | 112.85 ▼ | 114.13 | 120.78 | 113.26 | 103.17 |
| WTI Crude Oil per Barrel (\$) | 73.5 ▲   | 59.2   | 39.3   | 74.2   | 63.2   |
| Gold Spot per Oz (\$)         | 1,770 ▲  | 1,708  | 1,781  | 1,253  | 1,048  |

| Market Performance (%)    | QTD   | CYTD  | 1 Yr  | 5 Yr  | 10 Yr |
|---------------------------|-------|-------|-------|-------|-------|
| S&P 500 (Cap Wtd)         | 8.55  | 15.25 | 40.79 | 17.65 | 14.84 |
| Russell 2000              | 4.29  | 17.54 | 62.03 | 16.47 | 12.34 |
| MSCI EAFE (Net)           | 5.17  | 8.83  | 32.35 | 10.28 | 5.89  |
| MSCI EAFE SC (Net)        | 4.34  | 9.04  | 40.98 | 12.03 | 8.38  |
| MSCI Emg Mkts (Net)       | 5.05  | 7.45  | 40.90 | 13.03 | 4.29  |
| Bloomberg US Agg Bond     | 1.83  | -1.61 | -0.34 | 3.03  | 3.39  |
| ICE BofAML 3 Mo US T-Bill | 0.00  | 0.02  | 0.09  | 1.17  | 0.63  |
| NCREIF ODCE (Gross)       | 3.93  | 6.12  | 8.02  | 6.57  | 9.60  |
| FTSE NAREIT Eq REIT (TR)  | 12.02 | 21.96 | 38.02 | 6.31  | 9.41  |
| HFRI FOF Comp             | 2.86  | 4.94  | 18.28 | 6.12  | 3.85  |
| Bloomberg Cmdty (TR)      | 13.30 | 21.15 | 45.61 | 2.40  | -4.44 |

**Treasury Yield Curve (%)**





<sup>1</sup> Real returns are based on US CPI and are calculated using quarterly periodicity. A rising inflation period is defined as any quarter when Y/Y US CPI rose by 0.3% or more; a falling inflation period when Y/Y CPI fell by -0.3% or more in a quarter; the remaining periods are classified as stable inflation. Starting date for Core Real Estate is March 1978. <sup>2</sup> Starting CPI level is based on Y/Y US CPI in a given quarter; rising inflation period is defined in Footnote 1.

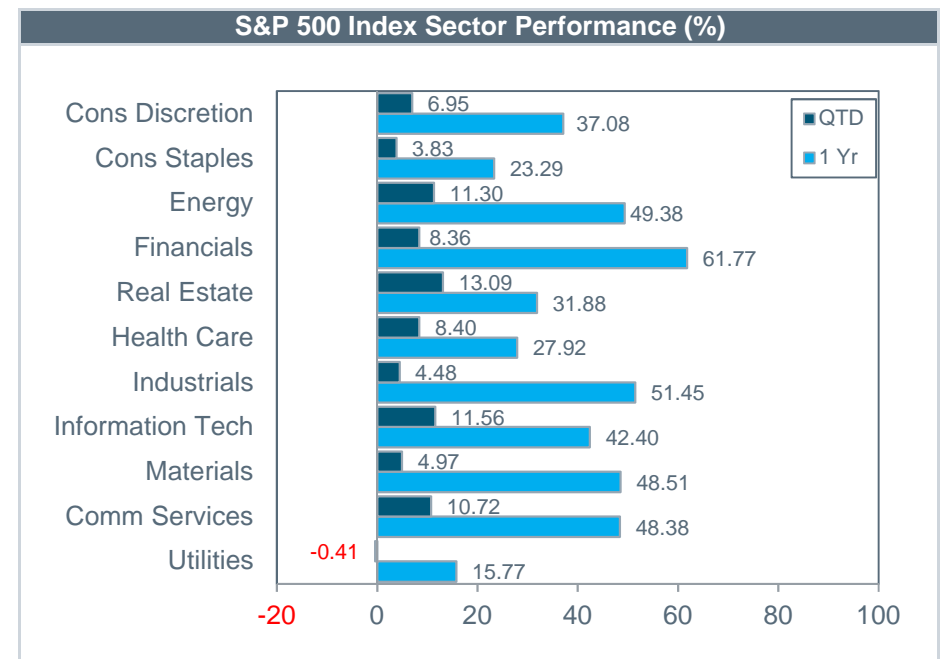
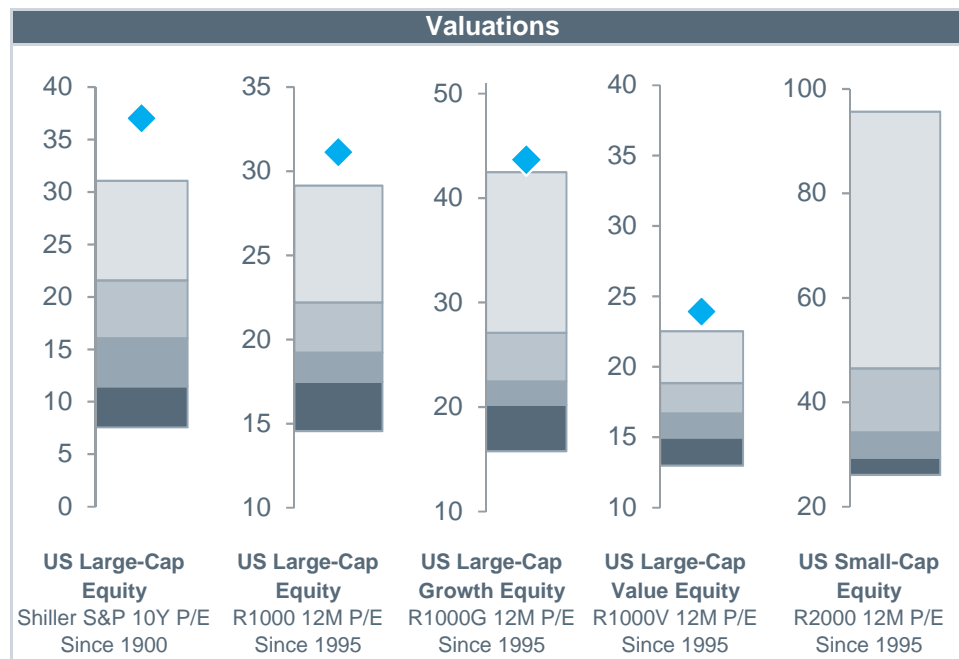
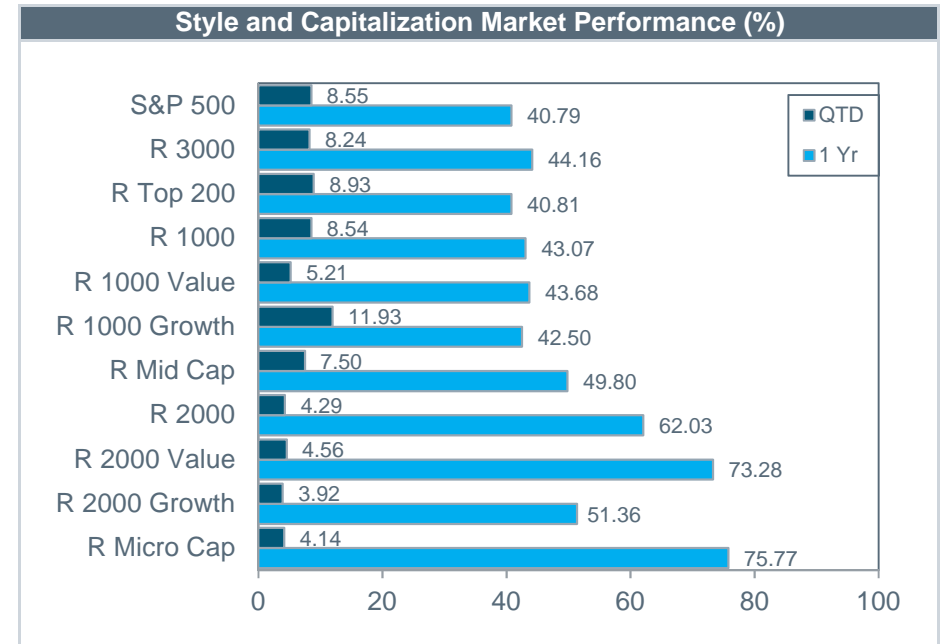
Data: World Equity: MSCI World Index (net). US Fixed Income: BB US Gov Bond Index through 12/31/1975, and BB US Agg Index thereafter. REIT: FTSE NAREIT Equity REITs Index through 12/31/1995, and MSCI World/Real Estate GR USD Index thereafter. Infrastructure: 50/50 Blend of Datastream World Pipelines and Datastream World Gas, Water & Multi-Utilities through 12/31/2001, and S&P Global Infrastructure thereafter. Natural Resource Equity: 50/50 Datastream World Oil & Gas and Datastream World Basic Materials through 11/30/2002, and S&P Global Natural Resources thereafter. Commodity: S&P GSCI through 12/31/1991, and BB Commodity Index thereafter.

### Second Quarter Review

**Broad Market**  
 US equity markets built on the solid start to 2021, with strong performance in Q2 driven by continued monetary and fiscal stimulus, along with increasing vaccination rates leading to economic reopening efforts across the country. The S&P 500 Index finished Q2 up 8.5%. The forward P/E ratio of the S&P 500 Index continues to be above historical levels; however, it has seen a slight decrease relative to Q1.

**Market Cap**  
 Large-cap stocks significantly outperformed their smaller-cap counterparts. The Russell 2000 Index returned 4.29% compared to 8.55% for the S&P 500.

**Style and Sector**  
 Large- and mid-cap growth stocks outperformed value in Q2, however, value stocks continued to lead growth stocks in the small-cap space. The Russell 1000 Growth Index returned 11.9% versus 5.2% for the Russell 1000 Value Index.



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. Current R2000 P/E is unavailable due to negative earnings per share as of 6/30/2021.





**Second Quarter Review**

**Developed Markets**

Developed international markets delivered positive returns in Q2, as growth outperformed value in a reversal of the value rally experienced in Q1, while small-cap stocks slightly trailed their large counterparts. Active management did well this quarter, with a majority of developed international equity managers beating their benchmarks in the large- and small-cap universes.

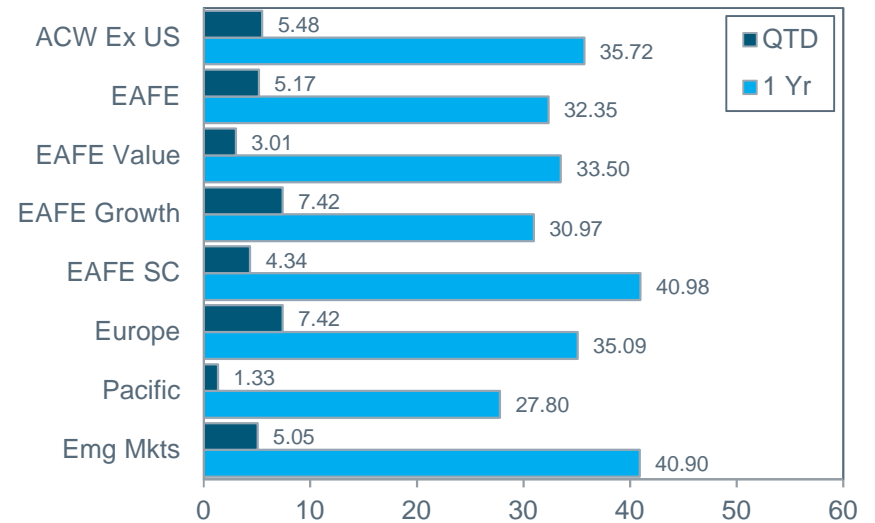
**Emerging Markets**

Emerging markets lagged developed markets in Q2 but still continued a trend of positive performance. Contrary to the reversal seen in developed markets, emerging market value stocks continued to outperform growth while small-cap stocks also continued their outperformance over large. Active manager results in emerging markets were mixed, with just under half outpacing their benchmarks for the quarter.

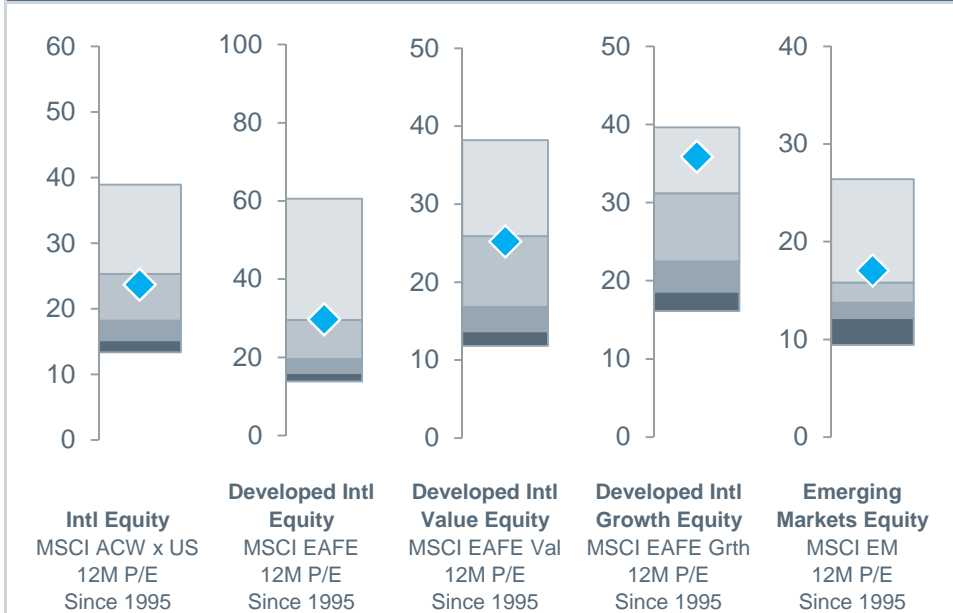
**Market Cap & Style**

In international markets, growth stocks outperformed value, while large-cap stocks outperformed small-cap. In emerging markets, value stocks outperformed growth, while small-cap stocks outperformed large-cap.

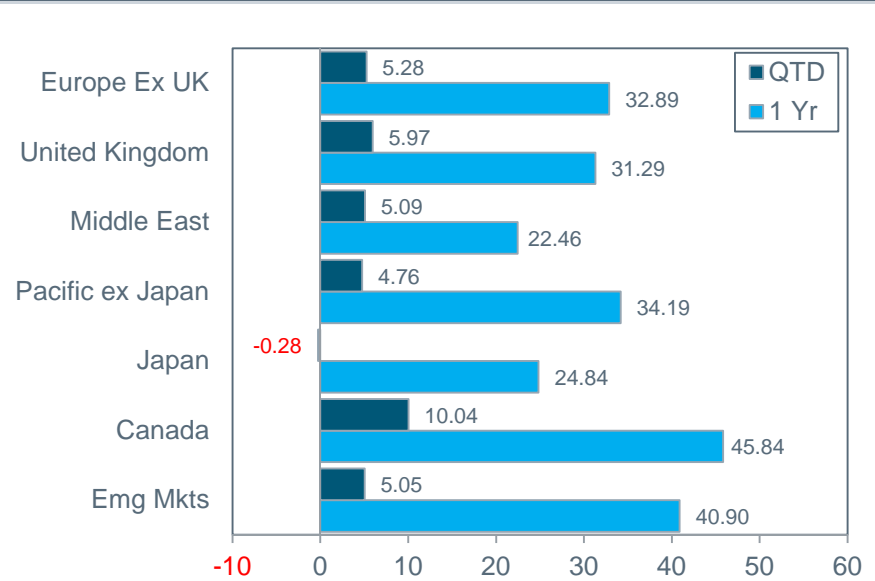
**MSCI Style and Capitalization Market Performance (%)**



**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**

The Bloomberg US Aggregate Index returned 1.8% in Q2, partially retracing losses from Q1, while overall remaining down -1.6% YTD. Treasury yields fell back despite an easing of pandemic related restrictions which supported economic growth and rising inflationary pressures.

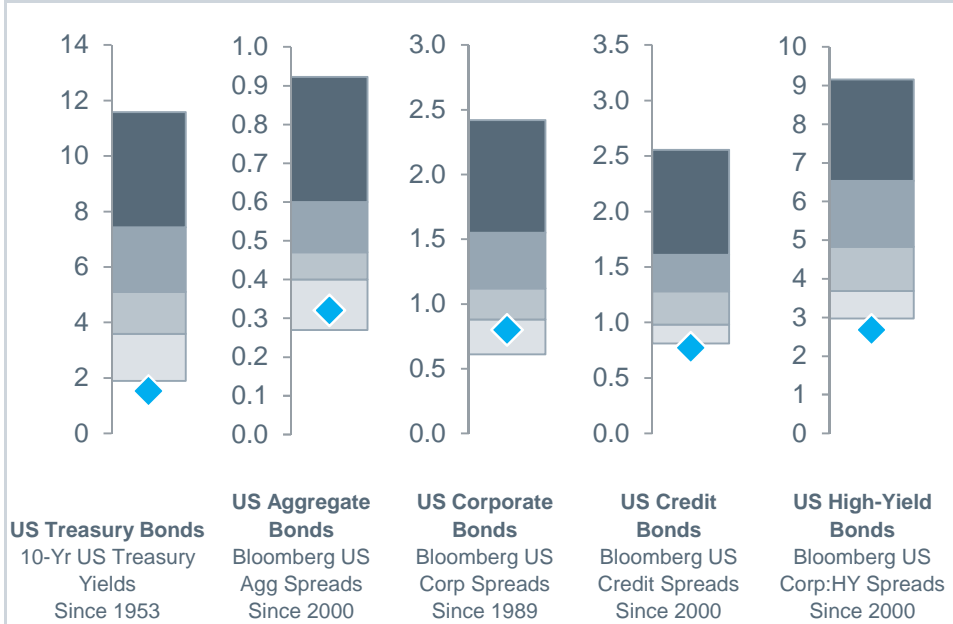
**Credit Market**

Lower quality investment grade debt rated BBB outperformed both the investment grade and high yield credit markets, a departure from the trend in past quarters of lowest quality credit outperforming higher grade debt. In Q2, the Bloomberg US Credit Index returned 3.3%, with the Bloomberg BBB Credit Index returning 3.7%.

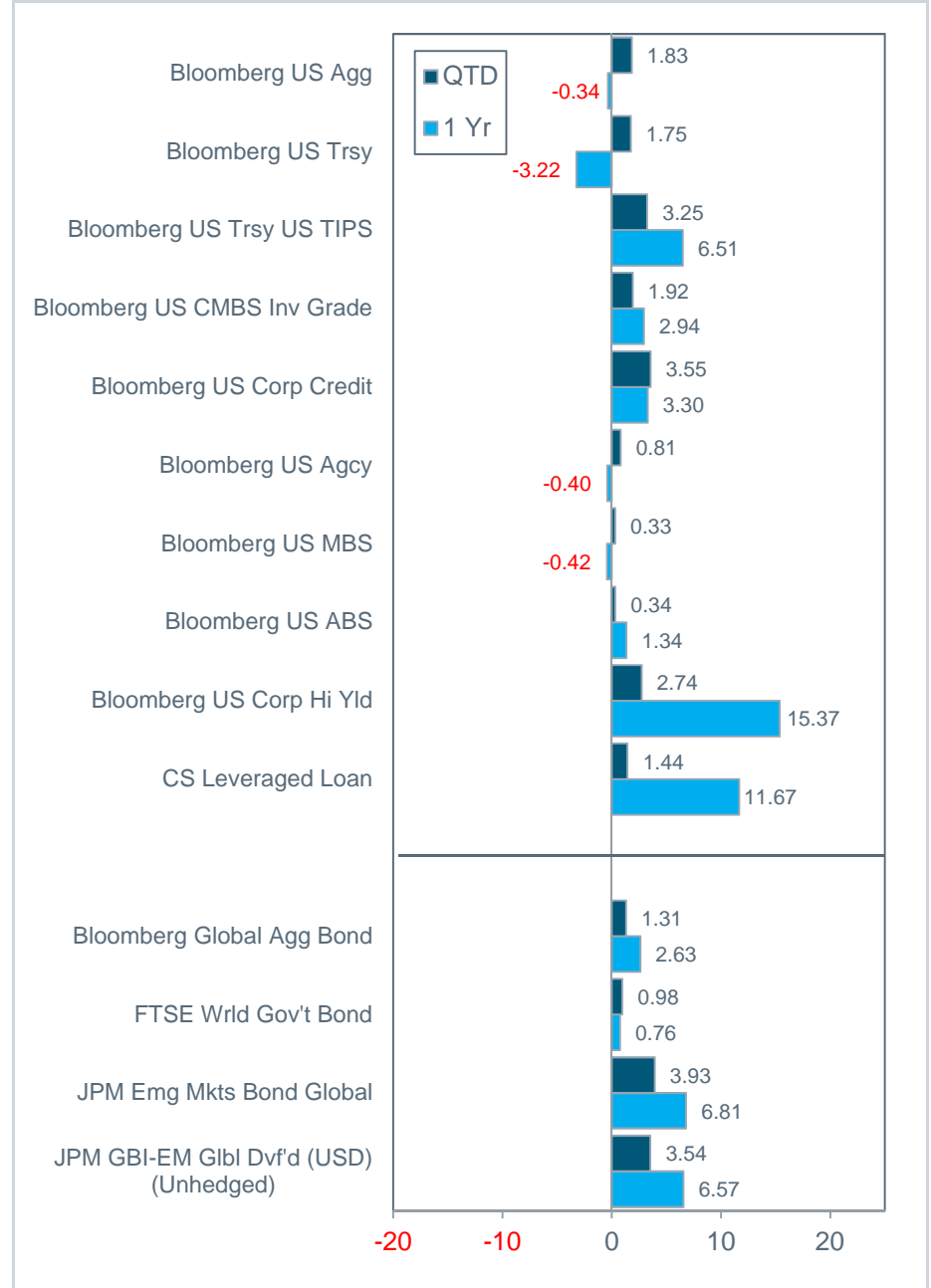
**Emerging Market Debt**

Emerging market debt saw improved performance compared to Q1 on the heels of falling US Treasury yields and rising commodity prices, contributing to broadly positive emerging market debt performance.

**Valuations**



**Fixed Income Performance (%)**



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**

Diversified hedge funds posted another strong quarter, returning 4.0% and bringing YTD returns to 10.0% according to the HFRI Fund Weighted Composite Index. Heightened levels of activity across convertible bond issuance, IPOs, SPACs, and M&A provided fertile ground for event-driven funds, and equity beta tailwinds continued to add to returns in the hedged equity space. Event-driven strategies have outperformed relative value YTD, and directional strategies have outperformed low net exposure and market neutral approaches.

**General Market - Global Tactical Asset Allocation (GTAA)**

Global Tactical Asset Allocation strategies that RVK follows closely largely generated positive absolute returns in Q2, ranging from the low- to midsingle digits. Long-biased strategies produced mixed results versus a less diversified blended benchmark of 60% US equity and 40% US fixed income, which returned 5.8% in Q2. Generally, strategies that have maintained a value bias, especially within emerging markets, outperformed relative to peers.

**Second Quarter Review - Real Assets**

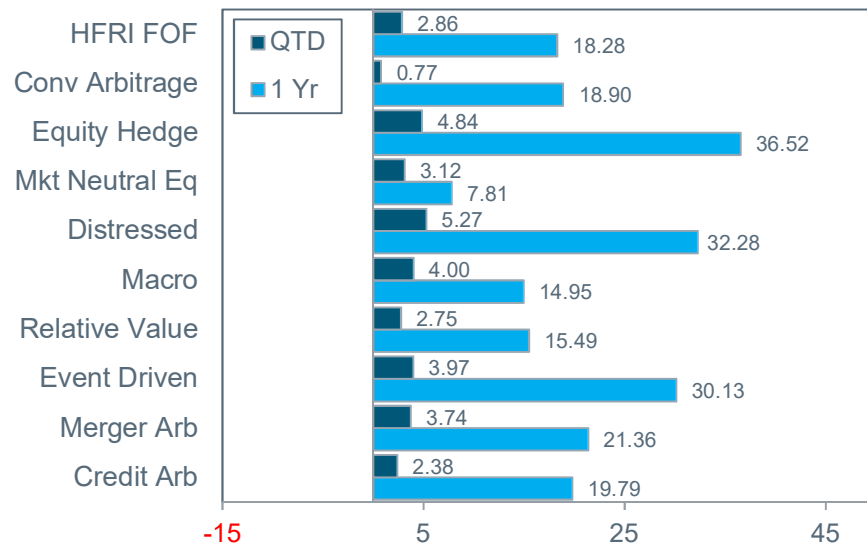
**General Market - Diversified Inflation Strategies (DIS)**

Diversified Inflation Strategies that RVK follows closely primarily generated strong positive absolute performance, ranging from the midsingle digits to low double-digits. In Q2, commodities, listed infrastructure, natural resource equities, REITs, and TIPS all posted positive absolute returns. Commodities led the way, with the Bloomberg Commodity Index posting a 13.3% return, largely driven by energy, with metals and agriculture also posting strong returns.

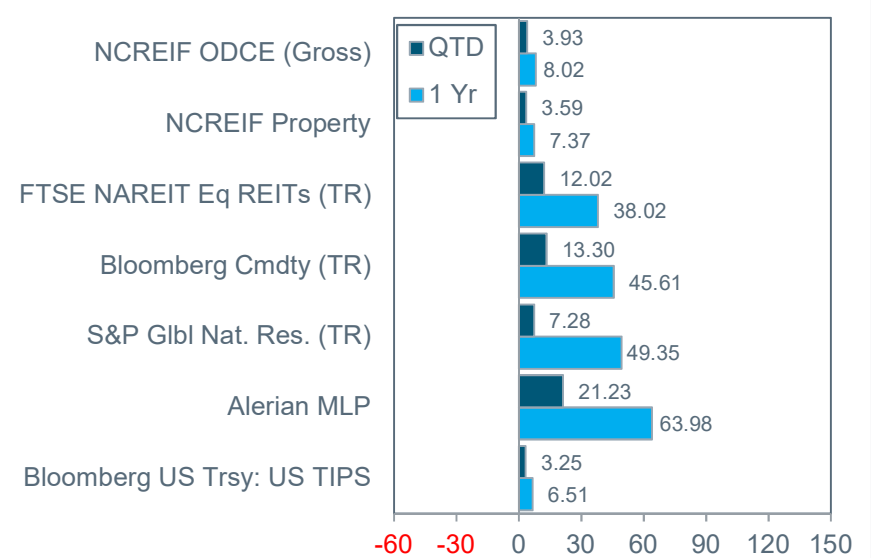
**General Market - Real Estate**

Core private real estate generated a positive 3.9% return in Q2, as reported by the NFI-ODCE Index, with the total return comprising of 1.0% income and 2.9% price appreciation. While the income trends in line with historical levels, price appreciation rebounded meaningfully by 1.8% from the level recorded in Q1. Publicly traded real estate investments outperformed their private market counterparts by a meaningful margin.

**HFRI Hedge Fund Performance (%)**



**Real Asset Performance (%)**



Annual Asset Class Performance

As of June 30, 2021

|       | 2007                   | 2008                  | 2009                         | 2010                          | 2011                           | 2012                      | 2013                           | 2014                          | 2015                            | 2016                              | 2017                            | 2018                      | 2019                          | 2020                                | YTD   |
|-------|------------------------|-----------------------|------------------------------|-------------------------------|--------------------------------|---------------------------|--------------------------------|-------------------------------|---------------------------------|-----------------------------------|---------------------------------|---------------------------|-------------------------------|-------------------------------------|-------|
| Best  | 39.38                  | 8.44                  | 78.51                        | 27.94                         | 22.49                          | 20.00                     | 38.82                          | 30.14                         | 15.02                           | 21.31                             | 37.28                           | 8.35                      | 31.49                         | 19.96                               | 21.96 |
|       | 16.23                  | 5.24                  | 58.21                        | 26.85                         | 15.99                          | 18.23                     | 32.39                          | 19.31                         | 9.59                            | 17.13                             | 33.01                           | 1.87                      | 26.00                         | 18.40                               | 21.15 |
|       | 15.97                  | 2.06                  | 46.78                        | 22.04                         | 13.56                          | 18.06                     | 29.30                          | 13.69                         | 3.20                            | 11.96                             | 25.03                           | 0.01                      | 25.53                         | 18.31                               | 17.54 |
|       | 11.63                  | -2.35                 | 31.78                        | 18.88                         | 8.29                           | 17.32                     | 22.78                          | 12.50                         | 1.38                            | 11.77                             | 21.83                           | -1.26                     | 24.96                         | 16.12                               | 15.25 |
|       | 11.17                  | -10.01                | 28.01                        | 16.83                         | 7.84                           | 16.35                     | 13.94                          | 5.97                          | 0.55                            | 11.19                             | 14.65                           | -2.08                     | 22.01                         | 12.34                               | 9.04  |
|       | 10.25                  | -21.37                | 27.17                        | 16.36                         | 4.98                           | 16.00                     | 8.96                           | 4.89                          | 0.05                            | 8.77                              | 10.71                           | -4.02                     | 19.59                         | 10.99                               | 8.83  |
|       | 6.97                   | -26.16                | 26.46                        | 15.12                         | 2.11                           | 15.81                     | 7.44                           | 3.64                          | -0.27                           | 8.52                              | 7.77                            | -4.38                     | 18.44                         | 10.88                               | 7.45  |
|       | 6.60                   | -33.79                | 18.91                        | 15.06                         | 0.10                           | 10.94                     | 2.47                           | 3.37                          | -0.81                           | 6.67                              | 7.62                            | -4.62                     | 14.32                         | 7.82                                | 6.12  |
|       | 5.49                   | -35.65                | 11.47                        | 10.16                         | -4.18                          | 8.78                      | 0.07                           | 2.45                          | -1.44                           | 4.68                              | 7.50                            | -4.68                     | 8.72                          | 7.51                                | 4.94  |
|       | 5.00                   | -37.00                | 11.41                        | 7.75                          | -5.72                          | 6.98                      | -2.02                          | 0.04                          | -3.30                           | 2.65                              | 5.23                            | -11.01                    | 8.43                          | 7.11                                | 3.62  |
|       | 1.87                   | -37.74                | 5.93                         | 6.54                          | -12.14                         | 4.79                      | -2.60                          | -2.19                         | -4.41                           | 2.18                              | 3.54                            | -11.25                    | 8.39                          | 1.19                                | 1.73  |
|       | 1.45                   | -43.38                | 1.92                         | 6.31                          | -13.32                         | 4.21                      | -8.61                          | -4.30                         | -4.47                           | 1.00                              | 3.01                            | -13.79                    | 7.69                          | 0.67                                | 0.02  |
|       | -1.57                  | -47.01                | 0.21                         | 5.70                          | -15.94                         | 0.11                      | -8.83                          | -4.95                         | -14.92                          | 0.51                              | 1.70                            | -14.58                    | 5.34                          | -3.12                               | -1.61 |
| Worst | -15.70                 | -53.33                | -29.76                       | 0.13                          | -18.42                         | -1.06                     | -9.52                          | -17.01                        | -24.66                          | 0.33                              | 0.86                            | -17.89                    | 2.28                          | -8.00                               | -4.64 |
|       | 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 | Bloombrg US Agg Bond - FI | Bloombrg US Corp Hi Yield - FI | Bloombrg US Trsy US TIPS - FI | Bloombrg US Gov Credit Lng - FI | NCREIF ODCE (Gross) - Real Estate | FTSE NAREIT Eq REITs Index (TR) | HFRI FOF Comp Index - ARS | Bloombrg Cmdty (TR) - Commod. | ICE BofAML 3 Mo T-Bill - Cash Equiv |       |

NCREIF ODCE (Gross) performance is reported quarterly; performance is shown N/A in interim-quarter months.



# Performance Report - All Systems



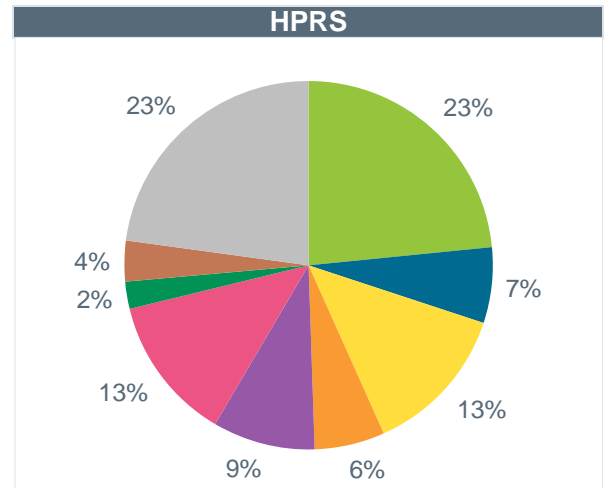
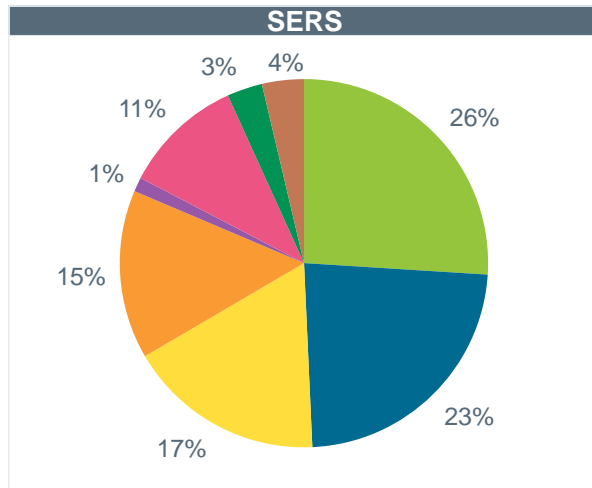
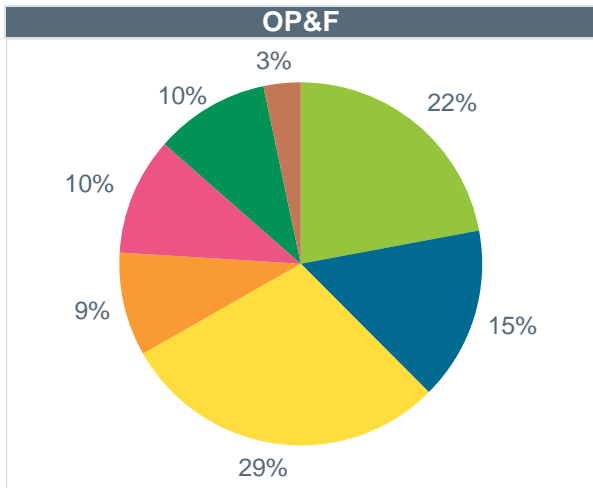
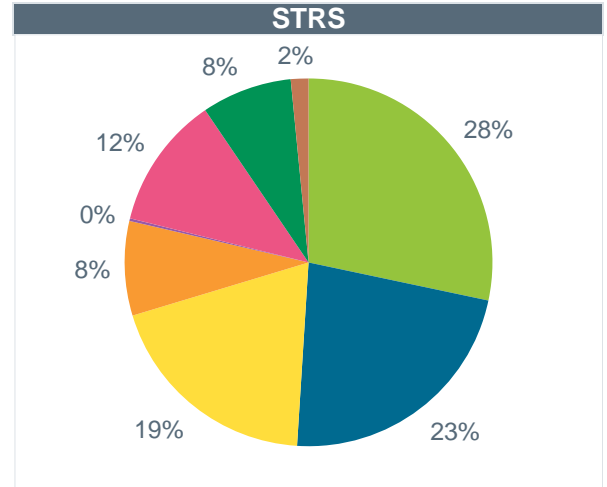
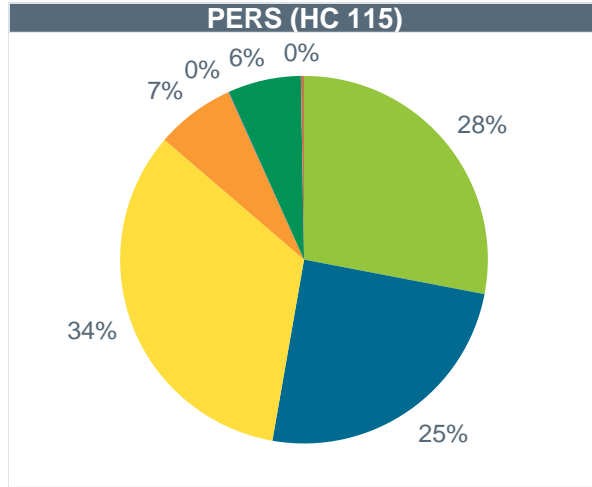
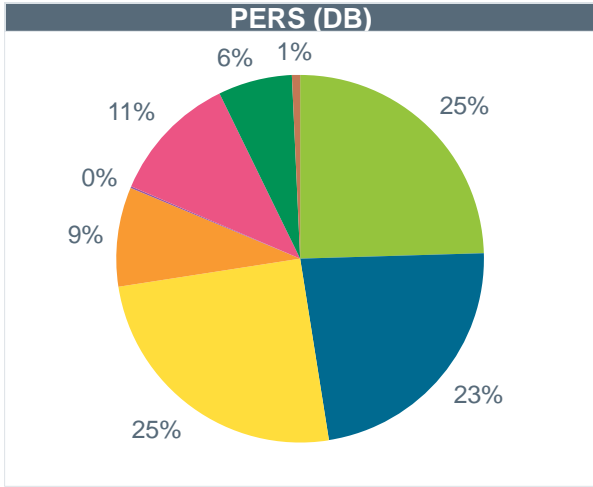
| Asset Allocation & Performance - Gross of Fees      |                      |                          |              |              |              |             |             |                               |              |              |              |
|---|----------------------|--------------------------|--------------|--------------|--------------|-------------|-------------|-------------------------------|--------------|--------------|--------------|
|   | Market Value (\$000) | Trailing Performance (%) |              |              |              |             |             | Calendar Year Performance (%) |              |              |              |
|   |                      | 2 Quarters               | 1 Year       | 3 Years      | 5 Years      | 7 Years     | 10 Years    | 2020                          | 2019         | 2018         | 2017         |
| <b>PERS (DB)</b>                                    | <b>105,051,540</b>   | <b>8.79</b>              | <b>26.70</b> | <b>11.42</b> | <b>11.11</b> | <b>8.58</b> | <b>9.10</b> | <b>12.11</b>                  | <b>17.31</b> | <b>-2.90</b> | <b>16.94</b> |
| PERS (DB) Total Fund Benchmark                      |                      | 9.44                     | 26.76        | 11.26        | 10.77        | 8.14        | 8.56        | 11.65                         | 17.06        | -3.08        | 15.19        |
| Difference  |                      | -0.65                    | -0.06        | 0.16         | 0.34         | 0.44        | 0.54        | 0.46                          | 0.25         | 0.18         | 1.75         |
| Rank  |                      | 72                       | 62           | 43           | 44           | 35          | 38          | 49                            | 49           | 46           | 25           |
| <b>PERS (HC 115)</b>                                | <b>14,240,926</b>    | <b>9.57</b>              | <b>26.88</b> | <b>11.14</b> | <b>10.20</b> | <b>7.35</b> | <b>7.77</b> | <b>10.96</b>                  | <b>19.59</b> | <b>-5.76</b> | <b>15.25</b> |
| PERS (HC 115) Total Fund Benchmark                  |                      | 9.35                     | 26.45        | 10.67        | 9.72         | 7.04        | 7.38        | 10.13                         | 19.20        | -5.97        | 14.31        |
| Difference  |                      | 0.22                     | 0.43         | 0.47         | 0.48         | 0.31        | 0.39        | 0.83                          | 0.39         | 0.21         | 0.94         |
| Rank  |                      | 52                       | 58           | 51           | 83           | 86          | 87          | 64                            | 16           | 90           | 63           |
| <b>STRS</b>   | <b>94,832,216</b>    | <b>11.47</b>             | <b>29.28</b> | <b>12.62</b> | <b>12.34</b> | <b>9.63</b> | <b>9.97</b> | <b>12.26</b>                  | <b>18.39</b> | <b>-1.75</b> | <b>15.90</b> |
| STRS Total Fund Benchmark                           |                      | 10.71                    | 27.98        | 12.28        | 11.85        | 9.20        | 9.75        | 11.92                         | 18.27        | -2.04        | 15.35        |
| Difference  |                      | 0.76                     | 1.30         | 0.34         | 0.49         | 0.43        | 0.22        | 0.34                          | 0.12         | 0.29         | 0.55         |
| Rank  |                      | 12                       | 27           | 15           | 12           | 8           | 11          | 47                            | 29           | 29           | 53           |
| <b>OP&amp;F</b>                                     | <b>18,461,070</b>    | <b>11.15</b>             | <b>28.54</b> | <b>11.05</b> | <b>11.19</b> | <b>8.64</b> | <b>9.49</b> | <b>9.09</b>                   | <b>17.39</b> | <b>-1.52</b> | <b>14.01</b> |
| OP&F Total Fund Benchmark                           |                      | 9.23                     | 24.43        | 10.48        | 9.86         | 7.53        | 8.45        | 9.84                          | 16.95        | -3.09        | 12.27        |
| Difference  |                      | 1.92                     | 4.11         | 0.57         | 1.33         | 1.11        | 1.04        | -0.75                         | 0.44         | 1.57         | 1.74         |
| Rank  |                      | 18                       | 33           | 53           | 40           | 33          | 19          | 85                            | 46           | 24           | 81           |
| <b>SERS</b>   | <b>17,773,969</b>    | <b>9.74</b>              | <b>27.45</b> | <b>12.31</b> | <b>12.14</b> | <b>9.53</b> | <b>9.86</b> | <b>12.99</b>                  | <b>17.69</b> | <b>-1.28</b> | <b>17.36</b> |
| SERS Total Fund Benchmark                           |                      | 8.94                     | 23.58        | 10.93        | 10.51        | 8.17        | 8.60        | 11.55                         | 16.04        | -2.03        | 14.37        |
| Difference  |                      | 0.80                     | 3.87         | 1.38         | 1.63         | 1.36        | 1.26        | 1.44                          | 1.65         | 0.75         | 2.99         |
| Rank  |                      | 47                       | 50           | 23           | 13           | 10          | 13          | 37                            | 41           | 21           | 12           |
| <b>HPRS</b>   | <b>1,112,191</b>     | <b>11.29</b>             | <b>34.43</b> | <b>13.15</b> | <b>12.36</b> | <b>9.10</b> | <b>9.32</b> | <b>16.86</b>                  | <b>18.85</b> | <b>-4.57</b> | <b>15.01</b> |
| HPRS Total Fund Benchmark                           |                      | 10.02                    | 29.88        | 11.82        | 11.20        | 8.48        | 8.90        | 13.16                         | 17.85        | -3.38        | 14.55        |
| Difference  |                      | 1.27                     | 4.55         | 1.33         | 1.16         | 0.62        | 0.42        | 3.70                          | 1.00         | -1.19        | 0.46         |
| Rank  |                      | 15                       | 4            | 9            | 11           | 16          | 27          | 3                             | 24           | 75           | 64           |
| <i>All Public Plans &gt; \$1B-Total Fund Median</i> |                      | 9.63                     | 27.45        | 11.18        | 10.97        | 8.25        | 8.64        | 12.04                         | 17.28        | -3.04        | 16.00        |

OPERS health care plan is not a pension plan and therefore has significantly different characteristics including a shorter focus asset allocation with more liquidity than the pension plans. For purposes of this study, the OPERS health care plan has been included in the results. The results for OPERS health care plan is reflected in the PERS 115 trust subsequent to October 2014 and in the PERS HC results prior to October 2014.

| 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    | 2020                          | 2019         | 2018         | 2017         |
| <b>PERS (DB)</b>                             | <b>105,051,540</b>   | <b>8.75</b>              | <b>26.61</b> | <b>11.33</b> | <b>11.00</b> | <b>8.43</b> | <b>8.92</b> | <b>12.02</b>                  | <b>17.23</b> | <b>-2.99</b> | <b>16.81</b> |
| PERS (DB) Total Fund Benchmark               |                      | 9.44                     | 26.76        | 11.26        | 10.77        | 8.14        | 8.56        | 11.65                         | 17.06        | -3.08        | 15.19        |
| Difference                                   |                      | -0.69                    | -0.15        | 0.07         | 0.23         | 0.29        | 0.36        | 0.37                          | 0.17         | 0.09         | 1.62         |
| <b>PERS (HC 115)</b>                         | <b>14,240,926</b>    | <b>9.57</b>              | <b>26.88</b> | <b>11.14</b> | <b>10.19</b> | <b>7.30</b> | <b>7.69</b> | <b>10.96</b>                  | <b>19.59</b> | <b>-5.76</b> | <b>15.25</b> |
| PERS (HC 115) Total Fund Benchmark           |                      | 9.35                     | 26.45        | 10.67        | 9.72         | 7.04        | 7.38        | 10.13                         | 19.20        | -5.97        | 14.31        |
| Difference                                   |                      | 0.22                     | 0.43         | 0.47         | 0.47         | 0.26        | 0.31        | 0.83                          | 0.39         | 0.21         | 0.94         |
| <b>STRS</b>                                  | <b>94,832,216</b>    | <b>11.40</b>             | <b>29.12</b> | <b>12.47</b> | <b>12.18</b> | <b>9.49</b> | <b>9.83</b> | <b>12.12</b>                  | <b>18.23</b> | <b>-1.89</b> | <b>15.74</b> |
| STRS Total Fund Benchmark                    |                      | 10.71                    | 27.98        | 12.28        | 11.85        | 9.20        | 9.75        | 11.92                         | 18.27        | -2.04        | 15.35        |
| Difference                                   |                      | 0.69                     | 1.14         | 0.19         | 0.33         | 0.29        | 0.08        | 0.20                          | -0.04        | 0.15         | 0.39         |
| <b>OP&amp;F</b>                              | <b>18,461,070</b>    | <b>10.78</b>             | <b>27.78</b> | <b>10.41</b> | <b>10.55</b> | <b>8.01</b> | <b>8.91</b> | <b>8.51</b>                   | <b>16.71</b> | <b>-2.14</b> | <b>13.39</b> |
| OP&F Total Fund Benchmark                    |                      | 9.23                     | 24.43        | 10.48        | 9.86         | 7.53        | 8.45        | 9.84                          | 16.95        | -3.09        | 12.27        |
| Difference                                   |                      | 1.55                     | 3.35         | -0.07        | 0.69         | 0.48        | 0.46        | -1.33                         | -0.24        | 0.95         | 1.12         |
| <b>SERS</b>                                  | <b>17,773,969</b>    | <b>9.40</b>              | <b>26.76</b> | <b>11.64</b> | <b>11.45</b> | <b>8.85</b> | <b>9.15</b> | <b>12.40</b>                  | <b>16.96</b> | <b>-1.94</b> | <b>16.65</b> |
| SERS Total Fund Benchmark                    |                      | 8.94                     | 23.58        | 10.93        | 10.51        | 8.17        | 8.60        | 11.55                         | 16.04        | -2.03        | 14.37        |
| Difference                                   |                      | 0.46                     | 3.18         | 0.71         | 0.94         | 0.68        | 0.55        | 0.85                          | 0.92         | 0.09         | 2.28         |
| <b>HPRS</b>                                  | <b>1,112,191</b>     | <b>11.07</b>             | <b>33.84</b> | <b>12.69</b> | <b>11.86</b> | <b>8.59</b> | <b>8.87</b> | <b>16.38</b>                  | <b>18.43</b> | <b>-5.02</b> | <b>14.29</b> |
| HPRS Total Fund Benchmark                    |                      | 10.02                    | 29.88        | 11.82        | 11.20        | 8.48        | 8.90        | 13.16                         | 17.85        | -3.38        | 14.55        |
| Difference                                   |                      | 1.05                     | 3.96         | 0.87         | 0.66         | 0.11        | -0.03       | 3.22                          | 0.58         | -1.64        | -0.26        |

Performance shown is net of all investment management costs.

Ohio Retirement Study Council  
Current Asset Allocation by Asset Class



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

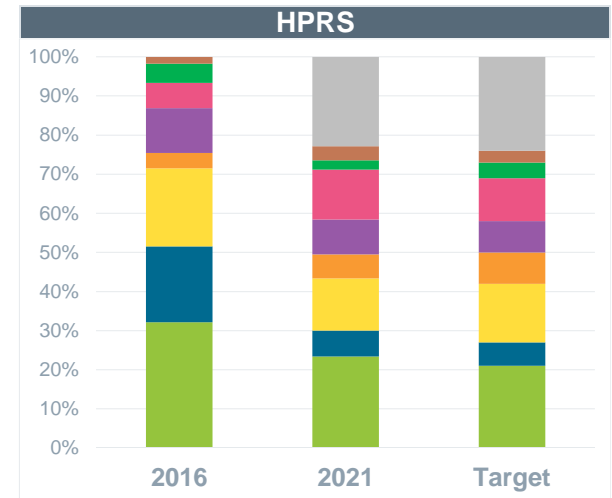
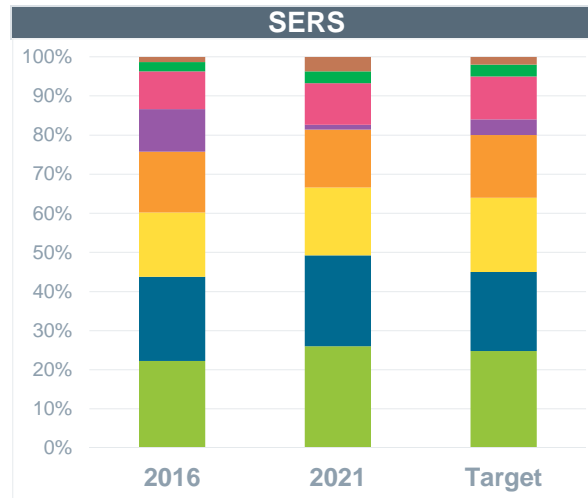
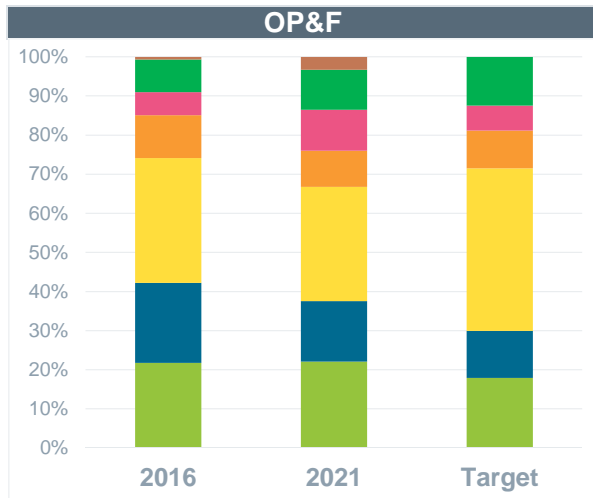
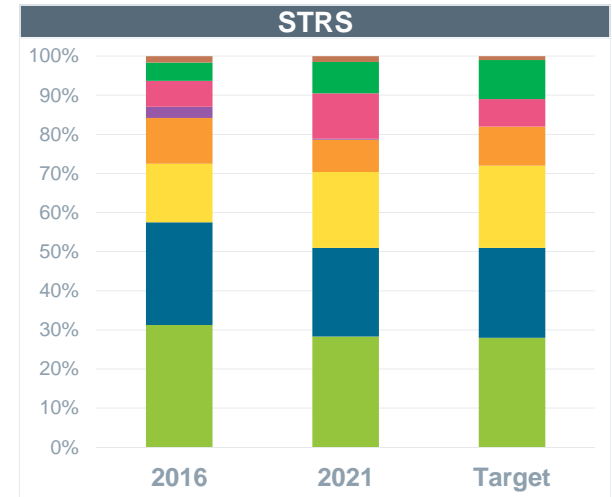
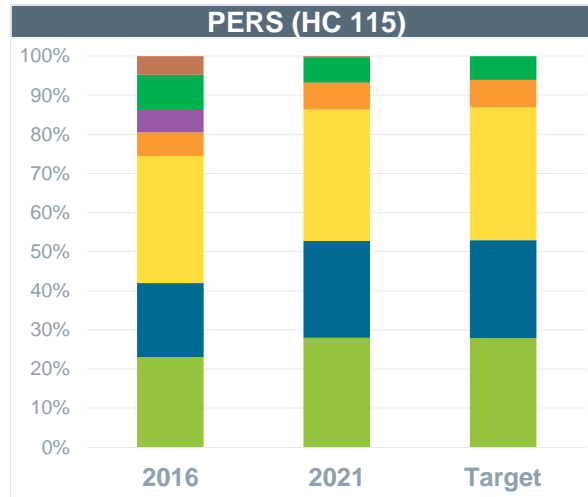
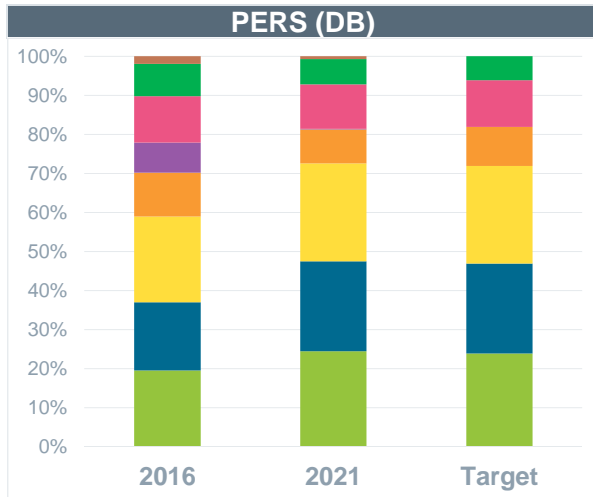
Allocations shown may not sum up to 100% exactly due to rounding. Cash Equivalents for PERS (DB) and PERS (HC 115) consists of cash, rebalancing, and additional annuity.







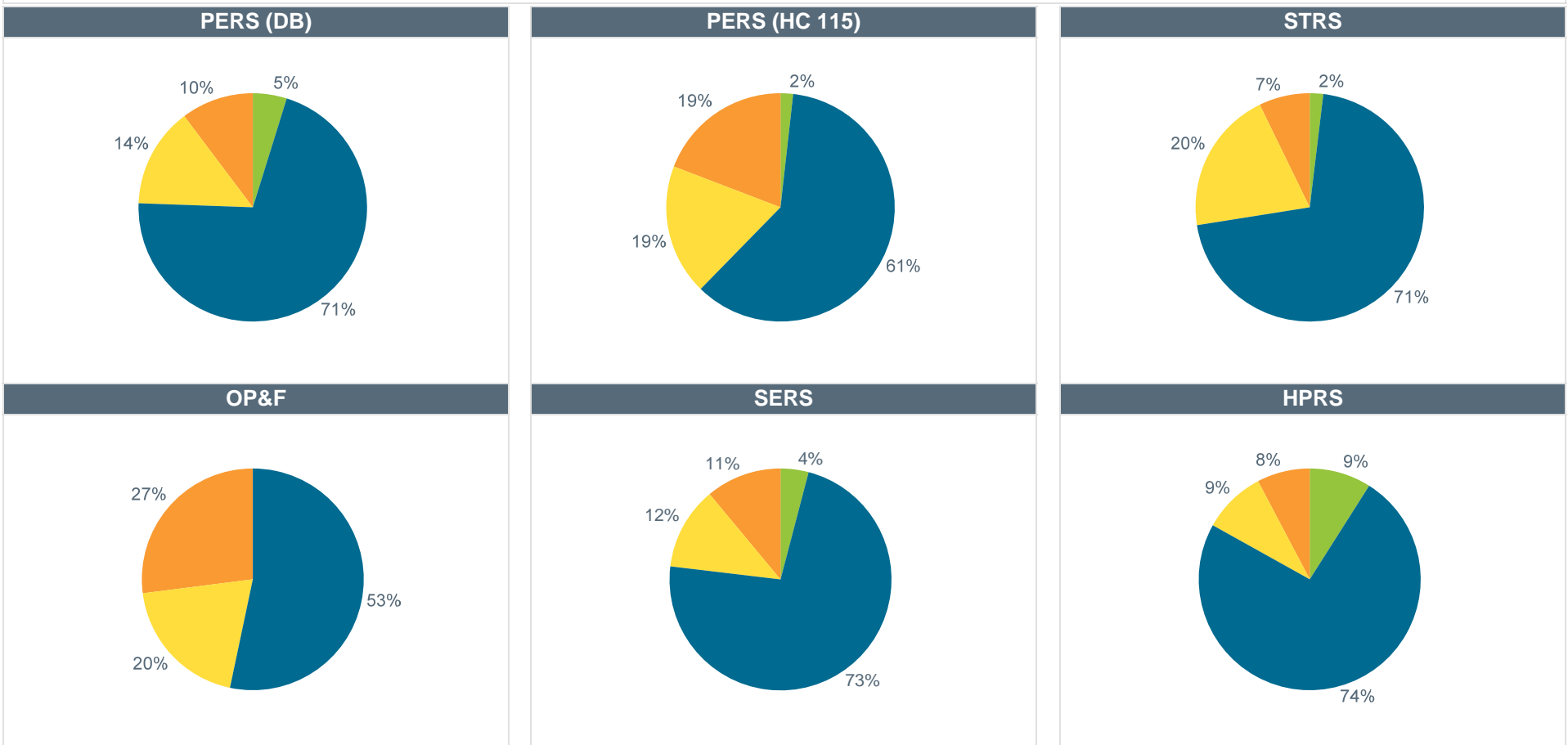
Allocations shown may not add up to 100% due to rounding. US Fixed Income may include allocations to Intl. Fixed Income not explicitly broken out by the plans. Parentheses contain percentile ranks. Cash Equivalents for PERS (DB) consists of cash, rebalancing, and additional annuity. Cash Equivalents for PERS (HC 115) consists of cash and rebalancing.



- US Equity
- International Equity
- Fixed Income
- Real Estate
- Global Equity
- 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)



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.

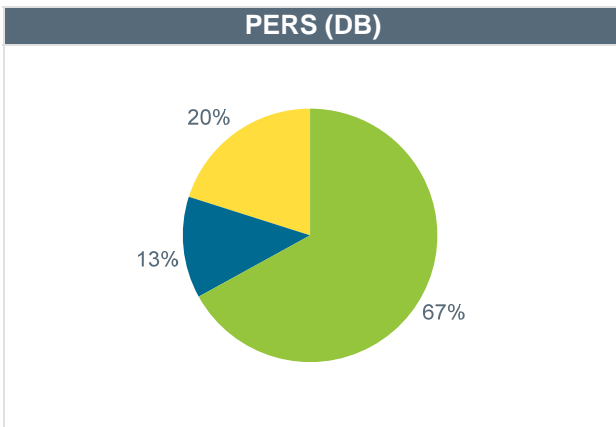
Summary

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

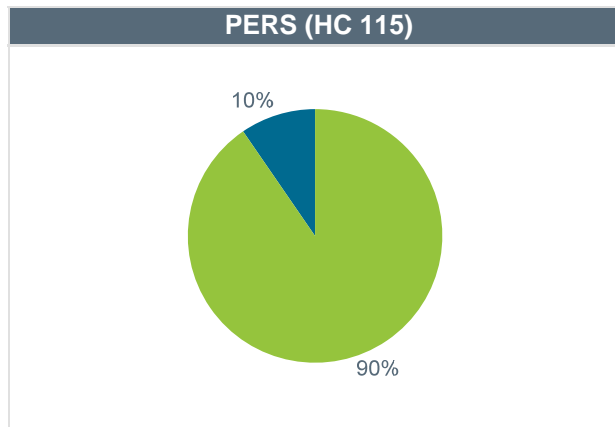
**Liquid Investments:** Publicly traded assets, largely exchanged traded with significant trading volume for the overall asset classes. Takes a relatively small discount or time required to raise cash, but generally expected to clear at quoted bid prices within several trading days.

**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.

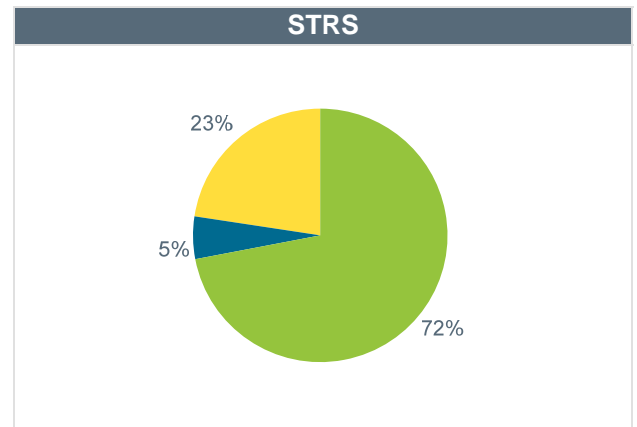
**Not Liquid Investments:** Private appraisal-based transactions, vehicle-based liquidity constraints, or privately held assets. Extreme discount to raise cash or 6-12+ months required to receive cash.



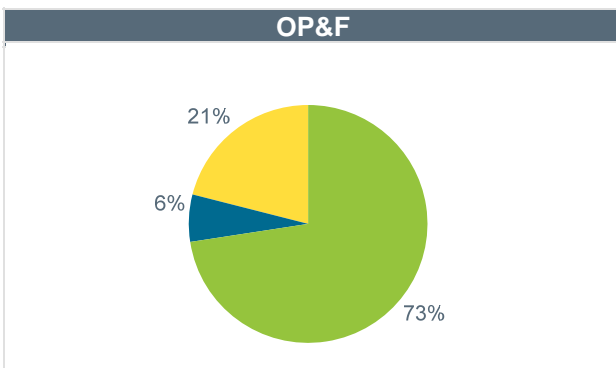
PERS (DB) Liquidity Rating 70



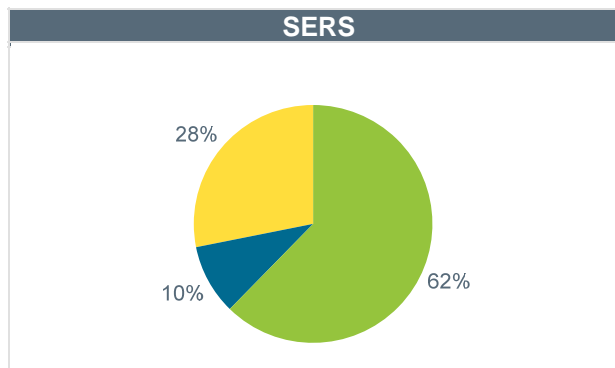
PERS (HC 115) Liquidity Rating 89



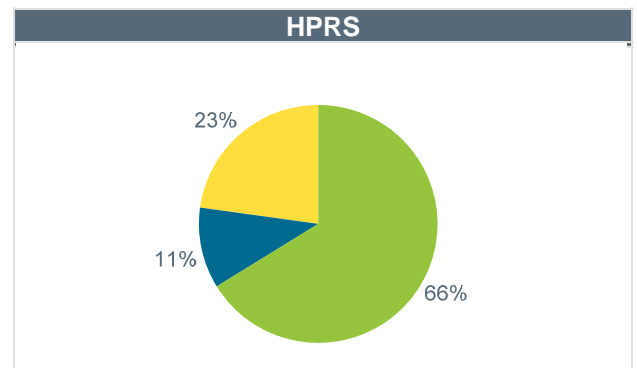
STRS Liquidity Rating 69



OP&F Liquidity Rating 66



SERS Liquidity Rating 67



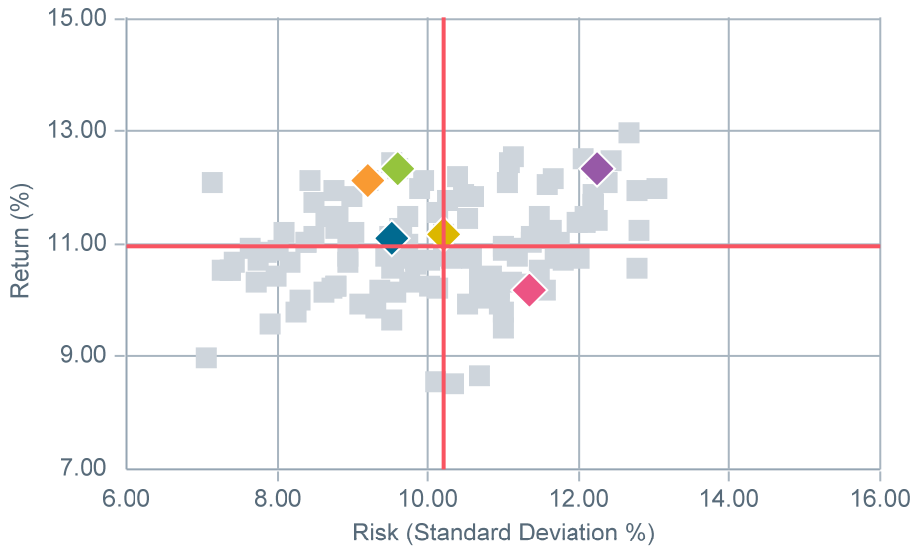
HPRS Liquidity Rating 59

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.



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

Plan Sponsor Peer Group Scattergram - 5 Years

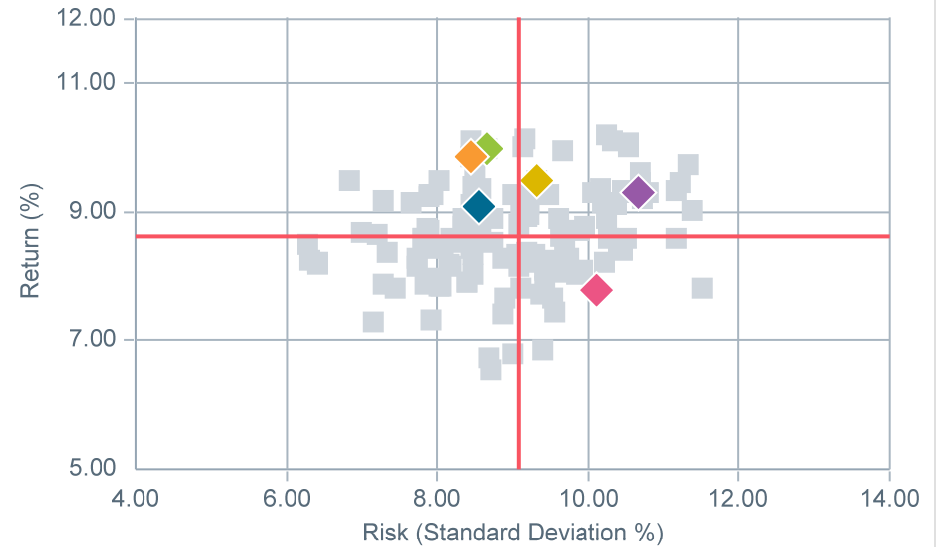


|                 | Return | Standard Deviation |
|-----------------|--------|--------------------|
| ◆ PERS (DB)     | 11.11  | 9.52               |
| ◆ PERS (HC 115) | 10.20  | 11.35              |
| ◆ STRS          | 12.34  | 9.61               |
| ◆ OP&F          | 11.19  | 10.20              |
| ◆ SERS          | 12.14  | 9.19               |
| ◆ HPRS          | 12.36  | 12.23              |
| — Median        | 10.97  | 10.20              |

Sharpe Ratio - 5 Year

|   |             |
|---|-------------|
| PERS (DB)   | 1.02        |
| PERS (HC 115)                                       | 0.81        |
| STRS  | 1.13        |
| OP&F  | 0.97        |
| SERS  | 1.15        |
| HPRS  | 0.91        |
| <i>All Public Plans &gt; \$1B-Total Fund Median</i> | <i>0.95</i> |

Plan Sponsor Peer Group Scattergram - 10 Years



|                 | Return | Standard Deviation |
|-----------------|--------|--------------------|
| ◆ PERS (DB)     | 9.10   | 8.55               |
| ◆ PERS (HC 115) | 7.77   | 10.11              |
| ◆ STRS          | 9.97   | 8.66               |
| ◆ OP&F          | 9.49   | 9.31               |
| ◆ SERS          | 9.86   | 8.45               |
| ◆ HPRS          | 9.32   | 10.68              |
| — Median        | 8.64   | 9.09               |

Sharpe Ratio - 10 Year

|   |             |
|---|-------------|
| PERS (DB)   | 0.99        |
| PERS (HC 115)                                       | 0.73        |
| STRS  | 1.07        |
| OP&F  | 0.95        |
| SERS  | 1.08        |
| HPRS  | 0.83        |
| <i>All Public Plans &gt; \$1B-Total Fund Median</i> | <i>0.91</i> |

Performance shown is gross of fees.

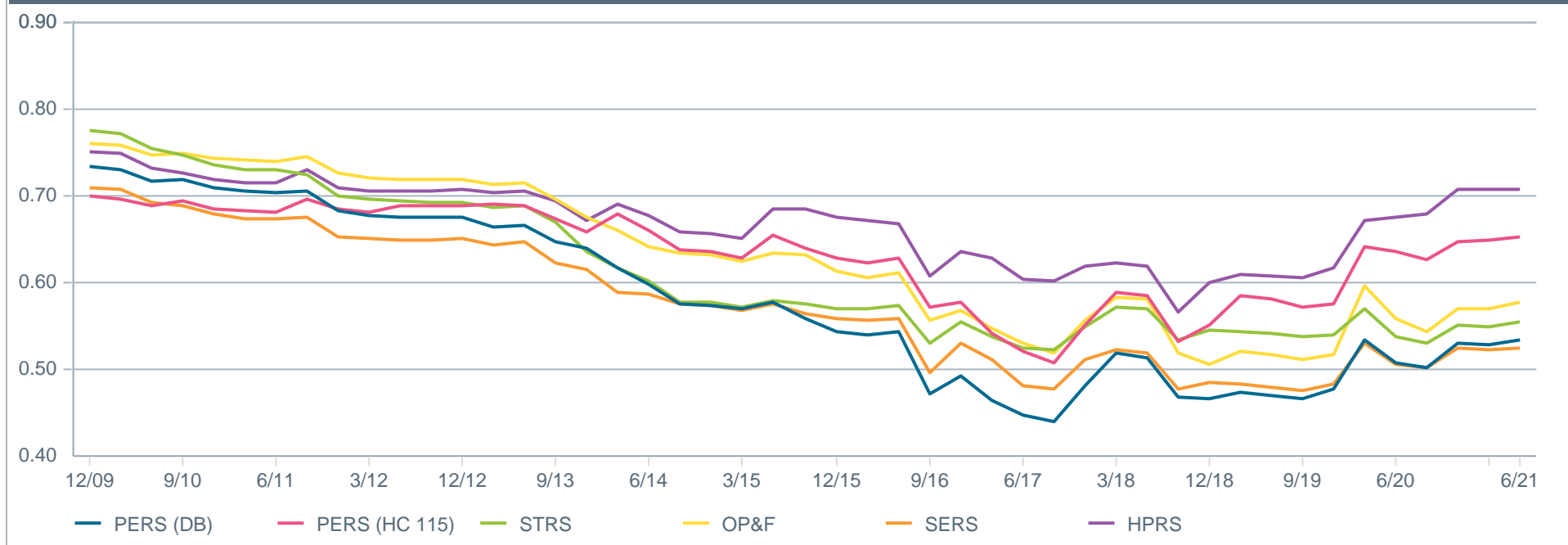
Summary

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<br>Years | 5<br>Years | 7<br>Years | 10<br>Years |
|-------------------------|------------|------------|------------|-------------|
| PERS (DB)               | 0.53       | 0.53       | 0.53       | 0.54        |
| PERS (HC 115)           | 0.65       | 0.65       | 0.65       | 0.65        |
| STRS                    | 0.56       | 0.55       | 0.56       | 0.56        |
| OP&F                    | 0.58       | 0.58       | 0.58       | 0.59        |
| SERS                    | 0.53       | 0.52       | 0.53       | 0.54        |
| HPRS                    | 0.71       | 0.71       | 0.71       | 0.70        |
| S&P 500 Index (Cap Wtd) | 1.00       | 1.00       | 1.00       | 1.00        |

5 Year Rolling Equity Beta

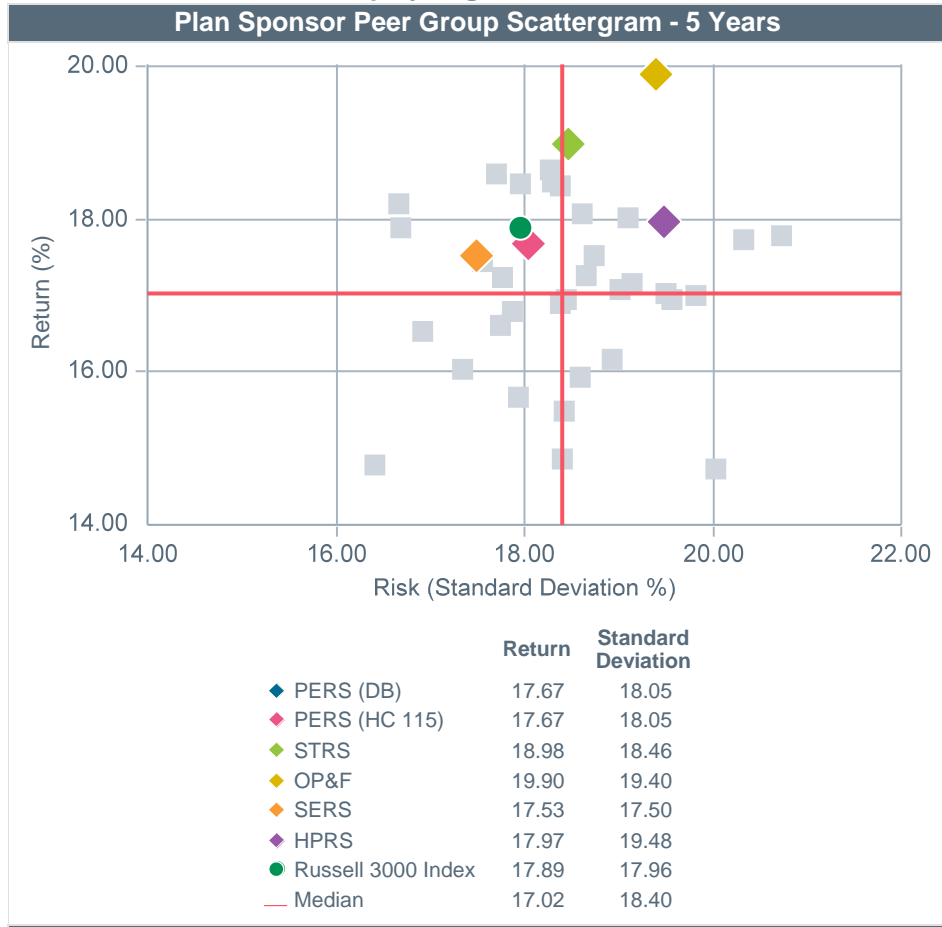


Performance shown is gross of fees and is calculated using quarterly periodicity.

| Performance  |                          |              |              |              |              |              |                               |              |              |              |
|--|--------------------------|--------------|--------------|--------------|--------------|--------------|-------------------------------|--------------|--------------|--------------|
|  | Trailing Performance (%) |              |              |              |              |              | Calendar Year Performance (%) |              |              |              |
|  | 2 Quarters               | 1 Year       | 3 Years      | 5 Years      | 7 Years      | 10 Years     | 2020                          | 2019         | 2018         | 2017         |
| <b>US Equity</b>   |                          |              |              |              |              |              |                               |              |              |              |
| <b>PERS (DB)</b>   | <b>15.32</b>             | <b>44.03</b> | <b>18.36</b> | <b>17.67</b> | <b>13.69</b> | <b>14.51</b> | <b>19.69</b>                  | <b>30.76</b> | <b>-5.00</b> | <b>21.30</b> |
| Russell 3000 Index   | 15.11                    | 44.16        | 18.73        | 17.89        | 13.95        | 14.70        | 20.89                         | 31.02        | -5.24        | 21.13        |
| Difference   | 0.21                     | -0.13        | -0.37        | -0.22        | -0.26        | -0.19        | -1.20                         | -0.26        | 0.24         | 0.17         |
| Rank   | 56                       | 56           | 26           | 33           | 29           | 25           | 43                            | 33           | 25           | 29           |
| <b>PERS (HC 115)</b>                                       | <b>15.32</b>             | <b>44.03</b> | <b>18.36</b> | <b>17.67</b> | <b>13.68</b> | <b>14.50</b> | <b>19.69</b>                  | <b>30.76</b> | <b>-5.00</b> | <b>21.30</b> |
| Russell 3000 Index   | 15.11                    | 44.16        | 18.73        | 17.89        | 13.95        | 14.70        | 20.89                         | 31.02        | -5.24        | 21.13        |
| Difference   | 0.21                     | -0.13        | -0.37        | -0.22        | -0.27        | -0.20        | -1.20                         | -0.26        | 0.24         | 0.17         |
| Rank   | 56                       | 56           | 26           | 33           | 29           | 25           | 43                            | 33           | 25           | 29           |
| <b>STRS</b>  | <b>16.14</b>             | <b>46.29</b> | <b>19.72</b> | <b>18.98</b> | <b>14.42</b> | <b>14.80</b> | <b>23.00</b>                  | <b>32.43</b> | <b>-5.33</b> | <b>22.01</b> |
| Russell 3000 Index   | 15.11                    | 44.16        | 18.73        | 17.89        | 13.95        | 14.70        | 20.89                         | 31.02        | -5.24        | 21.13        |
| Difference   | 1.03                     | 2.13         | 0.99         | 1.09         | 0.47         | 0.10         | 2.11                          | 1.41         | -0.09        | 0.88         |
| Rank   | 30                       | 34           | 6            | 2            | 6            | 17           | 16                            | 4            | 39           | 18           |
| <b>OP&amp;F</b>  | <b>16.06</b>             | <b>50.62</b> | <b>20.22</b> | <b>19.90</b> | <b>15.17</b> | <b>15.47</b> | <b>22.79</b>                  | <b>31.77</b> | <b>-3.30</b> | <b>22.40</b> |
| Wilshire 5000 Index  | 15.45                    | 44.24        | 18.89        | 17.96        | 14.10        | 14.76        | 20.82                         | 31.02        | -5.27        | 20.99        |
| Difference   | 0.61                     | 6.38         | 1.33         | 1.94         | 1.07         | 0.71         | 1.97                          | 0.75         | 1.97         | 1.41         |
| Rank   | 31                       | 9            | 2            | 1            | 1            | 1            | 17                            | 16           | 7            | 13           |
| <b>SERS</b>  | <b>13.95</b>             | <b>41.72</b> | <b>18.13</b> | <b>17.53</b> | <b>13.50</b> | <b>14.56</b> | <b>21.87</b>                  | <b>30.60</b> | <b>-6.15</b> | <b>22.27</b> |
| Russell 3000 Index   | 15.11                    | 44.16        | 18.73        | 17.89        | 13.95        | 14.70        | 20.89                         | 31.02        | -5.24        | 21.13        |
| Difference   | -1.16                    | -2.44        | -0.60        | -0.36        | -0.45        | -0.14        | 0.98                          | -0.42        | -0.91        | 1.14         |
| Rank   | 80                       | 86           | 29           | 34           | 33           | 24           | 22                            | 35           | 64           | 14           |
| <b>HPRS</b>  | <b>15.20</b>             | <b>46.85</b> | <b>18.17</b> | <b>17.97</b> | <b>13.90</b> | <b>14.43</b> | <b>23.28</b>                  | <b>30.36</b> | <b>-7.97</b> | <b>21.53</b> |
| Russell 3000 Index   | 15.11                    | 44.16        | 18.73        | 17.89        | 13.95        | 14.70        | 20.89                         | 31.02        | -5.24        | 21.13        |
| Difference   | 0.09                     | 2.69         | -0.56        | 0.08         | -0.05        | -0.27        | 2.39                          | -0.66        | -2.73        | 0.40         |
| Rank   | 60                       | 24           | 28           | 24           | 23           | 26           | 11                            | 39           | 88           | 21           |
| <i>All Public Plans &gt; \$1B-US Equity Segment Median</i> | 15.45                    | 44.54        | 17.42        | 17.02        | 13.10        | 13.83        | 18.92                         | 30.06        | -5.86        | 20.23        |

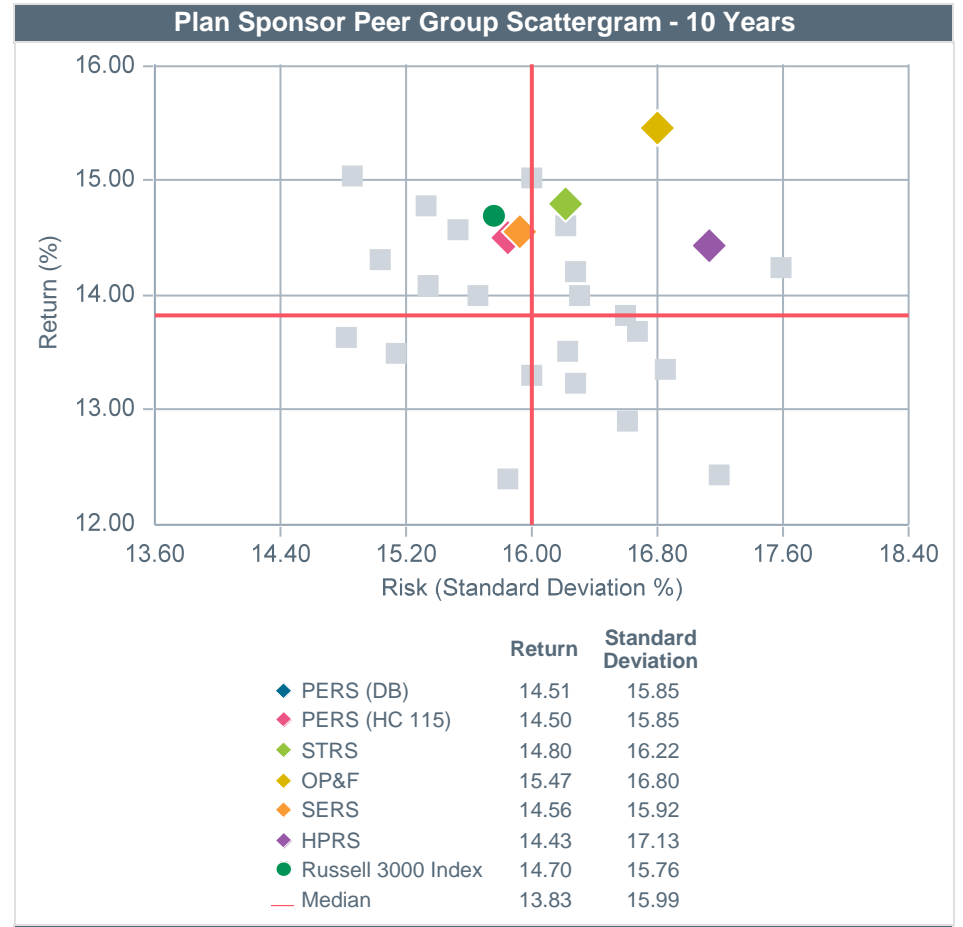
Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-US Equity Segment.





### Sharpe Ratio - 5 Years

|  |             |
|--|-------------|
| PERS (DB)  | 0.94        |
| PERS (HC 115)  | 0.94        |
| STRS   | 0.98        |
| OP&F   | 0.99        |
| SERS   | 0.95        |
| HPRS   | 0.90        |
| Russell 3000 Index   | 0.95        |
| <i>All Public Plans &gt; \$1B-US Equity Segment Median</i> | <i>0.88</i> |



### Sharpe Ratio - 10 Years

|  |             |
|--|-------------|
| PERS (DB)  | 0.91        |
| PERS (HC 115)  | 0.90        |
| STRS   | 0.90        |
| OP&F   | 0.91        |
| SERS   | 0.90        |
| HPRS   | 0.85        |
| Russell 3000 Index   | 0.92        |
| <i>All Public Plans &gt; \$1B-US Equity Segment Median</i> | <i>0.84</i> |

Performance shown is gross of fees.

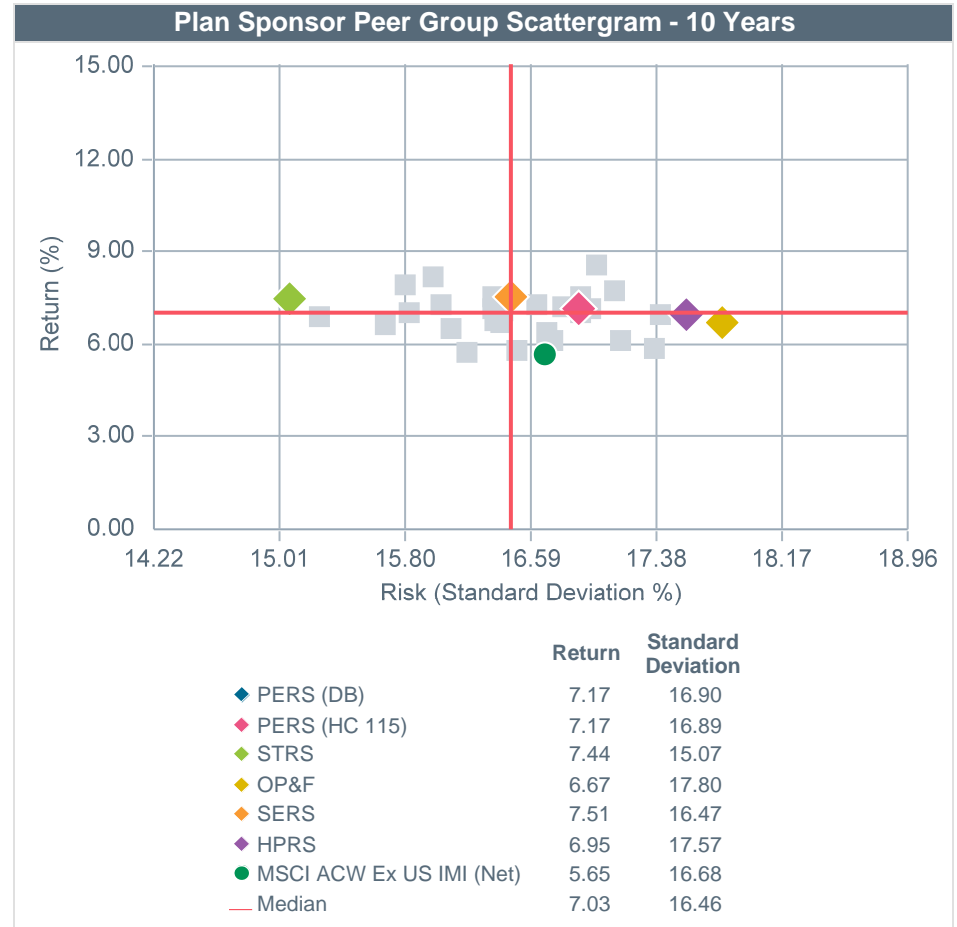
| Performance   |                          |              |              |              |             |             |                               |              |               |              |
|---|--------------------------|--------------|--------------|--------------|-------------|-------------|-------------------------------|--------------|---------------|--------------|
|   | Trailing Performance (%) |              |              |              |             |             | Calendar Year Performance (%) |              |               |              |
|   | 2 Quarters               | 1 Year       | 3 Years      | 5 Years      | 7 Years     | 10 Years    | 2020                          | 2019         | 2018          | 2017         |
| <b>International Equity</b>                                   |                          |              |              |              |             |             |                               |              |               |              |
| <b>PERS (DB)</b>  | <b>9.77</b>              | <b>39.06</b> | <b>11.31</b> | <b>12.94</b> | <b>7.39</b> | <b>7.17</b> | <b>14.81</b>                  | <b>23.21</b> | <b>-14.17</b> | <b>31.64</b> |
| PERS (DB) International Equity Custom Benchmark               | 9.61                     | 37.98        | 9.68         | 11.48        | 5.74        | 5.56        | 11.90                         | 21.09        | -14.74        | 29.24        |
| Difference  | 0.16                     | 1.08         | 1.63         | 1.46         | 1.65        | 1.61        | 2.91                          | 2.12         | 0.57          | 2.40         |
| Rank  | 67                       | 60           | 46           | 40           | 38          | 39          | 39                            | 61           | 66            | 11           |
| <b>PERS (HC 115)</b>  | <b>9.77</b>              | <b>39.06</b> | <b>11.31</b> | <b>12.94</b> | <b>7.40</b> | <b>7.17</b> | <b>14.81</b>                  | <b>23.21</b> | <b>-14.17</b> | <b>31.64</b> |
| PERS (HC 115) International Equity Custom Benchmark           | 9.61                     | 37.98        | 9.68         | 11.48        | 5.74        | 5.56        | 11.90                         | 21.09        | -14.74        | 29.24        |
| Difference  | 0.16                     | 1.08         | 1.63         | 1.46         | 1.66        | 1.61        | 2.91                          | 2.12         | 0.57          | 2.40         |
| Rank  | 67                       | 60           | 46           | 40           | 38          | 38          | 39                            | 61           | 66            | 11           |
| <b>STRS</b>   | <b>11.40</b>             | <b>34.39</b> | <b>9.44</b>  | <b>11.41</b> | <b>7.21</b> | <b>7.44</b> | <b>6.78</b>                   | <b>21.54</b> | <b>-11.80</b> | <b>24.16</b> |
| STRS International Equity Custom Benchmark                    | 10.84                    | 33.23        | 9.66         | 11.58        | 6.66        | 6.79        | 7.88                          | 22.51        | -12.08        | 23.43        |
| Difference  | 0.56                     | 1.16         | -0.22        | -0.17        | 0.55        | 0.65        | -1.10                         | -0.97        | 0.28          | 0.73         |
| Rank  | 26                       | 93           | 91           | 81           | 41          | 27          | 97                            | 85           | 9             | 99           |
| <b>OP&amp;F</b>   | <b>11.35</b>             | <b>43.29</b> | <b>9.94</b>  | <b>11.68</b> | <b>6.49</b> | <b>6.67</b> | <b>12.43</b>                  | <b>23.37</b> | <b>-17.32</b> | <b>29.12</b> |
| MSCI ACW Ex US IM Index (USD) (Net)                           | 9.58                     | 37.18        | 9.42         | 11.20        | 5.56        | 5.65        | 11.12                         | 21.63        | -14.76        | 27.81        |
| Difference  | 1.77                     | 6.11         | 0.52         | 0.48         | 0.93        | 1.02        | 1.31                          | 1.74         | -2.56         | 1.31         |
| Rank  | 27                       | 5            | 78           | 69           | 67          | 68          | 54                            | 59           | 100           | 53           |
| <b>SERS</b>   | <b>11.01</b>             | <b>42.11</b> | <b>12.38</b> | <b>13.35</b> | <b>7.53</b> | <b>7.51</b> | <b>15.29</b>                  | <b>24.36</b> | <b>-14.03</b> | <b>29.11</b> |
| SERS International Equity Custom Benchmark                    | 9.14                     | 35.69        | 9.37         | 11.07        | 5.32        | 5.89        | 10.65                         | 21.51        | -14.20        | 27.19        |
| Difference  | 1.87                     | 6.42         | 3.01         | 2.28         | 2.21        | 1.62        | 4.64                          | 2.85         | 0.17          | 1.92         |
| Rank  | 35                       | 12           | 28           | 24           | 36          | 26          | 34                            | 42           | 61            | 53           |
| <b>HPRS International Equity</b>                              | <b>11.01</b>             | <b>43.84</b> | <b>12.84</b> | <b>13.43</b> | <b>7.14</b> | <b>6.95</b> | <b>19.02</b>                  | <b>25.47</b> | <b>-14.88</b> | <b>28.72</b> |
| HPRS International Equity Custom Benchmark                    | 8.01                     | 35.22        | 8.90         | 10.88        | 5.29        | 5.57        | 11.12                         | 21.63        | -14.76        | 27.81        |
| Difference  | 3.00                     | 8.62         | 3.94         | 2.55         | 1.85        | 1.38        | 7.90                          | 3.84         | -0.12         | 0.91         |
| Rank  | 35                       | 4            | 16           | 21           | 44          | 59          | 12                            | 26           | 83            | 60           |
| <b>HPRS Global Equity</b>                                     | <b>N/A</b>               | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>  | <b>N/A</b>  | <b>N/A</b>                    | <b>N/A</b>   | <b>N/A</b>    | <b>N/A</b>   |
| HPRS Global Equity Custom Benchmark                           | N/A                      | N/A          | N/A          | N/A          | N/A         | N/A         | N/A                           | N/A          | N/A           | N/A          |
| Difference  | N/A                      | N/A          | N/A          | N/A          | N/A         | N/A         | N/A                           | N/A          | N/A           | N/A          |
| <i>All Public Plans &gt; \$1B-Intl. Equity Segment Median</i> | <i>10.28</i>             | <i>39.59</i> | <i>11.20</i> | <i>12.33</i> | <i>7.00</i> | <i>7.03</i> | <i>12.76</i>                  | <i>23.71</i> | <i>-13.59</i> | <i>29.22</i> |

Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-Intl. Equity Segment. In Q1 2021 HPRS added allocation to Global Equity.



### Sharpe Ratio - 5 Years

|   |      |
|---|------|
| PERS (DB)   | 0.70 |
| PERS (HC 115)   | 0.70 |
| STRS  | 0.67 |
| OP&F  | 0.60 |
| SERS  | 0.73 |
| HPRS  | 0.70 |
| MSCI ACW Ex US IMI (Net)                                      | 0.62 |
| <i>All Public Plans &gt; \$1B-Intl. Equity Segment Median</i> | 0.68 |



### Sharpe Ratio - 10 Years

|   |      |
|---|------|
| PERS (DB)   | 0.46 |
| PERS (HC 115)   | 0.46 |
| STRS  | 0.52 |
| OP&F  | 0.42 |
| SERS  | 0.49 |
| HPRS  | 0.44 |
| MSCI ACW Ex US IMI (Net)                                      | 0.38 |
| <i>All Public Plans &gt; \$1B-Intl. Equity Segment Median</i> | 0.46 |

Performance shown is gross of fees.

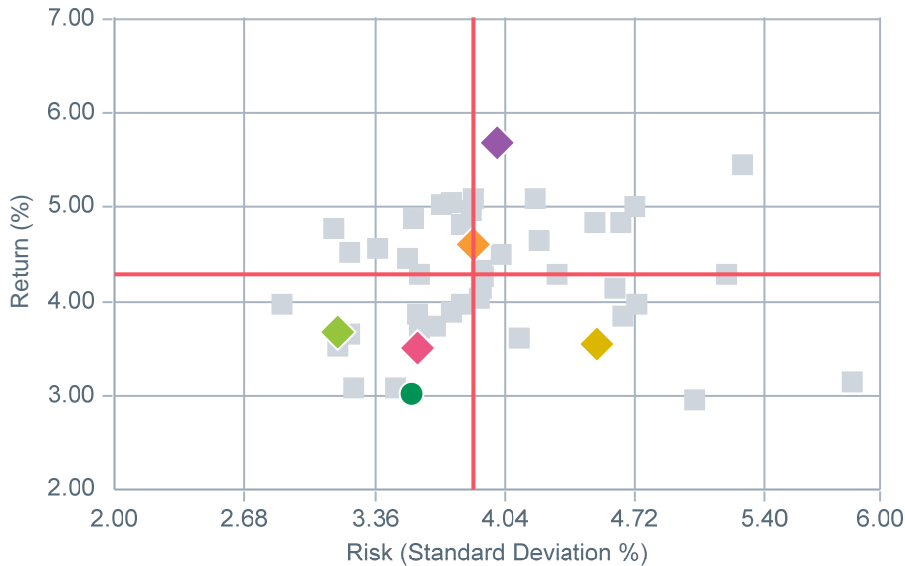
| Performance  |                          |              |             |             |             |             |                               |             |              |             |
|--|--------------------------|--------------|-------------|-------------|-------------|-------------|-------------------------------|-------------|--------------|-------------|
|  | Trailing Performance (%) |              |             |             |             |             | Calendar Year Performance (%) |             |              |             |
|  | 2 Quarters               | 1 Year       | 3 Years     | 5 Years     | 7 Years     | 10 Years    | 2020                          | 2019        | 2018         | 2017        |
| <b>Fixed Income</b>  |                          |              |             |             |             |             |                               |             |              |             |
| <b>PERS (DB) Core Fixed Income</b>                               | <b>-1.19</b>             | <b>0.68</b>  | <b>6.01</b> | <b>3.50</b> | <b>3.65</b> | <b>3.83</b> | <b>9.09</b>                   | <b>8.72</b> | <b>-0.06</b> | <b>3.75</b> |
| PERS (DB) Core Fixed Income Custom Benchmark                     | -1.60                    | -0.33        | 5.34        | 3.03        | 3.28        | 3.39        | 7.51                          | 8.72        | 0.01         | 3.54        |
| Difference   | 0.41                     | 1.01         | 0.67        | 0.47        | 0.37        | 0.44        | 1.58                          | 0.00        | -0.07        | 0.21        |
| Rank   | 78                       | 86           | 58          | 84          | 73          | 86          | 41                            | 68          | 39           | 79          |
| <b>PERS (HC 115) Core Fixed Income</b>                           | <b>-1.19</b>             | <b>0.68</b>  | <b>6.01</b> | <b>3.50</b> | <b>3.65</b> | <b>3.82</b> | <b>9.09</b>                   | <b>8.72</b> | <b>-0.06</b> | <b>3.75</b> |
| PERS (HC 115) Core Fixed Income Custom Benchmark                 | -1.60                    | -0.33        | 5.34        | 3.03        | 3.27        | 3.29        | 7.51                          | 8.72        | 0.01         | 3.54        |
| Difference   | 0.41                     | 1.01         | 0.67        | 0.47        | 0.38        | 0.53        | 1.58                          | 0.00        | -0.07        | 0.21        |
| Rank   | 78                       | 86           | 58          | 84          | 74          | 86          | 41                            | 68          | 39           | 79          |
| <b>STRS</b>  | <b>-0.97</b>             | <b>1.16</b>  | <b>5.59</b> | <b>3.68</b> | <b>3.66</b> | <b>3.90</b> | <b>7.95</b>                   | <b>8.51</b> | <b>0.16</b>  | <b>3.98</b> |
| STRS Fixed Income Blended Benchmark                              | -1.16                    | 0.57         | 5.38        | 3.32        | 3.43        | 3.66        | 7.39                          | 8.51        | 0.09         | 3.86        |
| Difference   | 0.19                     | 0.59         | 0.21        | 0.36        | 0.23        | 0.24        | 0.56                          | 0.00        | 0.07         | 0.12        |
| Rank   | 73                       | 80           | 75          | 77          | 71          | 77          | 67                            | 73          | 27           | 74          |
| <b>OP&amp;F Core Fixed Income</b>                                | <b>-3.37</b>             | <b>-1.29</b> | <b>4.42</b> | <b>3.56</b> | <b>3.41</b> | <b>3.57</b> | <b>7.35</b>                   | <b>8.13</b> | <b>1.24</b>  | <b>4.26</b> |
| Bloomberg US Agg Bond Index + Leverage Factor                    | -3.37                    | -1.69        | 4.87        | 2.75        | 3.08        | 3.25        | 8.00                          | 8.71        | 0.02         | 3.55        |
| Difference   | 0.00                     | 0.40         | -0.45       | 0.81        | 0.33        | 0.32        | -0.65                         | -0.58       | 1.22         | 0.71        |
| Rank   | 96                       | 98           | 93          | 83          | 81          | 88          | 80                            | 78          | 9            | 67          |
| <b>SERS</b>  | <b>-0.57</b>             | <b>3.90</b>  | <b>6.97</b> | <b>4.60</b> | <b>4.20</b> | <b>4.58</b> | <b>10.59</b>                  | <b>9.95</b> | <b>-0.38</b> | <b>5.09</b> |
| Bloomberg US Agg Bond Index                                      | -1.61                    | -0.34        | 5.34        | 3.03        | 3.28        | 3.39        | 7.51                          | 8.72        | 0.01         | 3.54        |
| Difference   | 1.04                     | 4.24         | 1.63        | 1.57        | 0.92        | 1.19        | 3.08                          | 1.23        | -0.39        | 1.55        |
| Rank   | 59                       | 37           | 13          | 34          | 42          | 41          | 18                            | 29          | 57           | 41          |
| <b>HPRS</b>  | <b>2.05</b>              | <b>7.96</b>  | <b>6.83</b> | <b>5.68</b> | <b>4.95</b> | <b>4.74</b> | <b>7.79</b>                   | <b>9.33</b> | <b>2.56</b>  | <b>5.29</b> |
| HPRS Fixed Income Custom Benchmark                               | 0.81                     | 5.27         | 5.09        | 3.35        | 3.49        | 3.54        | 5.95                          | 7.94        | 0.68         | 3.43        |
| Difference   | 1.24                     | 2.69         | 1.74        | 2.33        | 1.46        | 1.20        | 1.84                          | 1.39        | 1.88         | 1.86        |
| Rank   | 4                        | 5            | 18          | 5           | 12          | 32          | 75                            | 48          | 4            | 38          |
| <i>All Public Plans &gt; \$1B-US Fixed Income Segment Median</i> | <i>-0.41</i>             | <i>3.15</i>  | <i>6.21</i> | <i>4.29</i> | <i>4.07</i> | <i>4.30</i> | <i>8.58</i>                   | <i>9.30</i> | <i>-0.27</i> | <i>4.81</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.

Risk & Return - Fixed Income

All Public Plans > \$1B-US Fixed Income Segment

Plan Sponsor Peer Group Scattergram - 5 Years

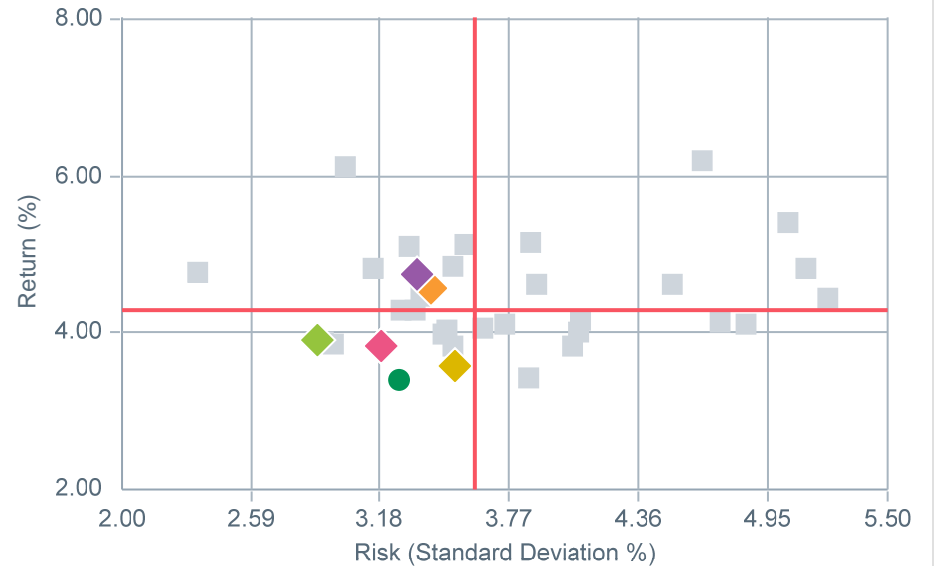


|                                   | Return | Standard Deviation |
|-----------------------------------|--------|--------------------|
| ◆ PERS (DB) Core Fixed Income     | 3.50   | 3.59               |
| ◆ PERS (HC 115) Core Fixed Income | 3.50   | 3.59               |
| ◆ STRS                            | 3.68   | 3.17               |
| ◆ OP&F Core Fixed Income          | 3.56   | 4.52               |
| ◆ SERS                            | 4.60   | 3.88               |
| ◆ HPRS                            | 5.68   | 4.00               |
| ● Bloomberg US Agg Bond Index     | 3.03   | 3.55               |
| — Median                          | 4.29   | 3.87               |

Sharpe Ratio - 5 Years

|  |      |
|--|------|
| PERS (DB) Core Fixed Income                            | 0.68 |
| PERS (HC 115) Core Fixed Income                        | 0.68 |
| STRS   | 0.81 |
| OP&F Core Fixed Income                                 | 0.55 |
| SERS   | 0.88 |
| HPRS   | 1.07 |
| Bloomberg US Agg Bond Index                            | 0.56 |
| All Public Plans > \$1B-US Fixed Income Segment Median | 0.79 |

Plan Sponsor Peer Group Scattergram - 10 Years



|                                   | Return | Standard Deviation |
|-----------------------------------|--------|--------------------|
| ◆ PERS (DB) Core Fixed Income     | 3.83   | 3.18               |
| ◆ PERS (HC 115) Core Fixed Income | 3.82   | 3.18               |
| ◆ STRS                            | 3.90   | 2.89               |
| ◆ OP&F Core Fixed Income          | 3.57   | 3.52               |
| ◆ SERS                            | 4.58   | 3.41               |
| ◆ HPRS                            | 4.74   | 3.35               |
| ● Bloomberg US Agg Bond Index     | 3.39   | 3.26               |
| — Median                          | 4.30   | 3.61               |

Sharpe Ratio - 10 Years

|  |      |
|--|------|
| PERS (DB) Core Fixed Income                            | 1.02 |
| PERS (HC 115) Core Fixed Income                        | 1.02 |
| STRS   | 1.13 |
| OP&F Core Fixed Income                                 | 0.85 |
| SERS   | 1.15 |
| HPRS   | 1.20 |
| Bloomberg US Agg Bond Index                            | 0.87 |
| All Public Plans > \$1B-US Fixed Income Segment Median | 0.99 |

Performance shown is gross of fees.

| Performance                        |                          |              |             |             |             |             |                               |              |              |              |
|------------------------------------|--------------------------|--------------|-------------|-------------|-------------|-------------|-------------------------------|--------------|--------------|--------------|
|                                    | Trailing Performance (%) |              |             |             |             |             | Calendar Year Performance (%) |              |              |              |
|                                    | 2 Quarters               | 1 Year       | 3 Years     | 5 Years     | 7 Years     | 10 Years    | 2020                          | 2019         | 2018         | 2017         |
| <b>Additional Fixed Income</b>     |                          |              |             |             |             |             |                               |              |              |              |
| <b>PERS (DB) US Treasury</b>       | <b>-2.52</b>             | <b>-3.12</b> | <b>4.69</b> | <b>2.19</b> | <b>N/A</b>  | <b>N/A</b>  | <b>8.08</b>                   | <b>6.84</b>  | <b>0.84</b>  | <b>2.33</b>  |
| Bloomberg US Trsy Index            | -2.58                    | -3.22        | 4.66        | 2.15        | N/A         | N/A         | 8.00                          | 6.86         | 0.86         | 2.31         |
| Difference                         | 0.06                     | 0.10         | 0.03        | 0.04        | N/A         | N/A         | 0.08                          | -0.02        | -0.02        | 0.02         |
| <b>PERS (DB) EMD</b>               | <b>-0.77</b>             | <b>10.90</b> | <b>5.93</b> | <b>4.88</b> | <b>2.73</b> | <b>N/A</b>  | <b>5.36</b>                   | <b>13.55</b> | <b>-5.63</b> | <b>13.52</b> |
| PERS (DB) EMD Custom Benchmark     | -2.18                    | 6.71         | 5.34        | 3.89        | 2.32        | N/A         | 4.32                          | 14.01        | -5.33        | 12.26        |
| Difference                         | 1.41                     | 4.19         | 0.59        | 0.99        | 0.41        | N/A         | 1.04                          | -0.46        | -0.30        | 1.26         |
| <b>PERS (DB) High Yield</b>        | <b>3.29</b>              | <b>15.09</b> | <b>7.68</b> | <b>7.26</b> | <b>5.41</b> | <b>6.70</b> | <b>7.42</b>                   | <b>14.76</b> | <b>-2.06</b> | <b>7.23</b>  |
| Bloomberg U.S. High Yield Index    | 3.62                     | 15.37        | 7.45        | 7.48        | 5.47        | 6.66        | 7.11                          | 14.32        | -2.08        | 7.50         |
| Difference                         | -0.33                    | -0.28        | 0.23        | -0.22       | -0.06       | 0.04        | 0.31                          | 0.44         | 0.02         | -0.27        |
| <b>PERS (DB) Securitized Debt</b>  | <b>4.57</b>              | <b>14.27</b> | <b>8.77</b> | <b>6.63</b> | <b>5.99</b> | <b>N/A</b>  | <b>7.40</b>                   | <b>11.70</b> | <b>3.21</b>  | <b>7.52</b>  |
| Bloomberg CMBS Index + 2%          | 5.38                     | 20.08        | 6.65        | 4.87        | 5.20        | N/A         | 1.18                          | 10.70        | 2.79         | 5.76         |
| Difference                         | -0.81                    | -5.81        | 2.12        | 1.76        | 0.79        | N/A         | 6.22                          | 1.00         | 0.42         | 1.76         |
| <b>PERS (DB) TIPS</b>              | <b>1.72</b>              | <b>6.46</b>  | <b>6.50</b> | <b>4.13</b> | <b>3.31</b> | <b>N/A</b>  | <b>10.89</b>                  | <b>8.42</b>  | <b>-1.26</b> | <b>2.88</b>  |
| Bloomberg U.S. TIPS Index          | 1.73                     | 6.51         | 6.53        | 4.17        | 3.34        | N/A         | 10.99                         | 8.43         | -1.26        | 3.01         |
| Difference                         | -0.01                    | -0.05        | -0.03       | -0.04       | -0.03       | N/A         | -0.10                         | -0.01        | 0.00         | -0.13        |
| <b>PERS (HC 115) EMD</b>           | <b>-0.77</b>             | <b>10.90</b> | <b>5.93</b> | <b>4.88</b> | <b>2.74</b> | <b>3.31</b> | <b>5.36</b>                   | <b>13.55</b> | <b>-5.63</b> | <b>13.52</b> |
| PERS (HC 115) EMD Custom Benchmark | -2.18                    | 6.71         | 5.34        | 3.89        | 2.32        | 2.94        | 4.32                          | 14.01        | -5.33        | 12.26        |
| Difference                         | 1.41                     | 4.19         | 0.59        | 0.99        | 0.42        | 0.37        | 1.04                          | -0.46        | -0.30        | 1.26         |

Performance shown is gross of fees.

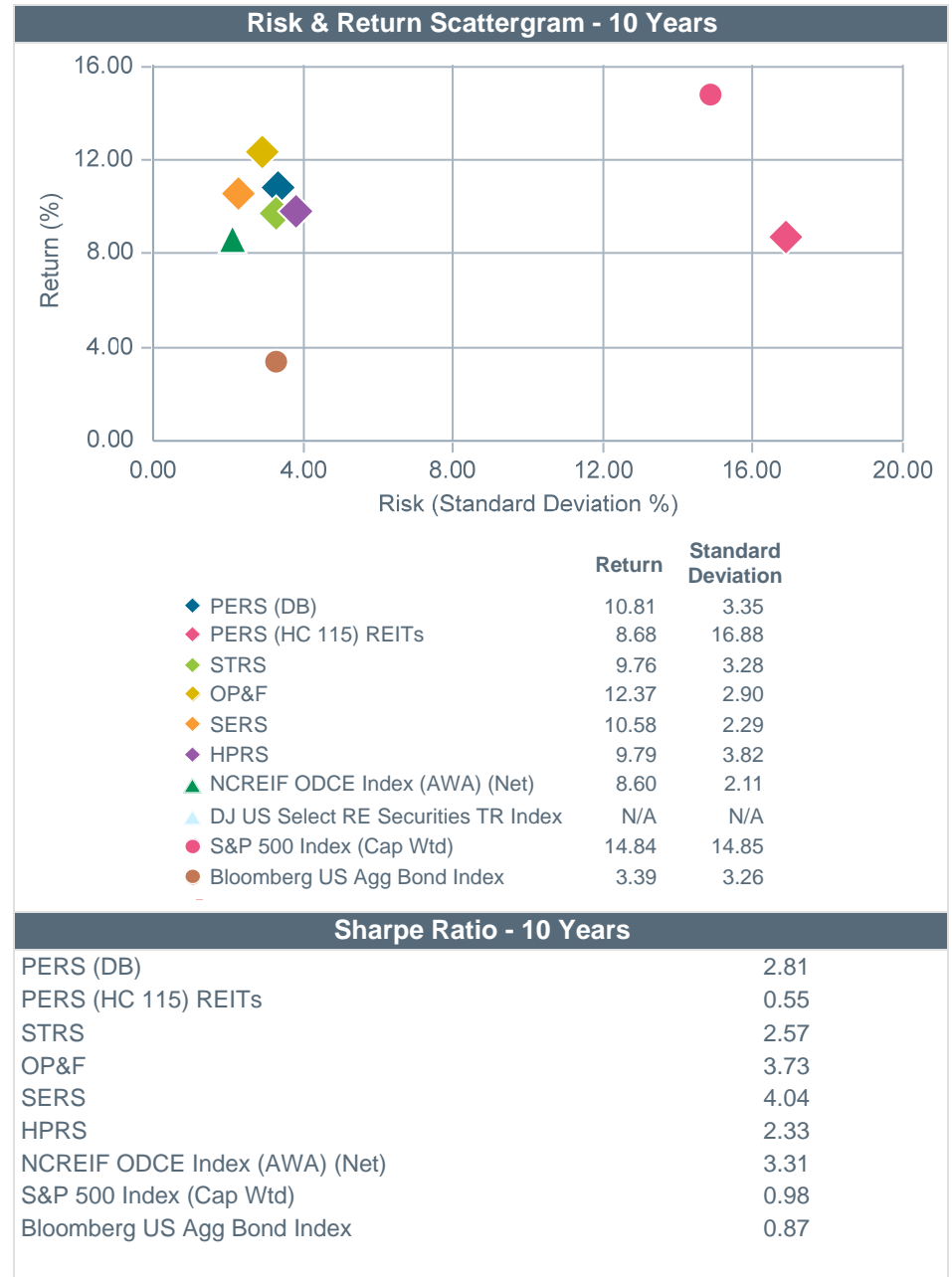
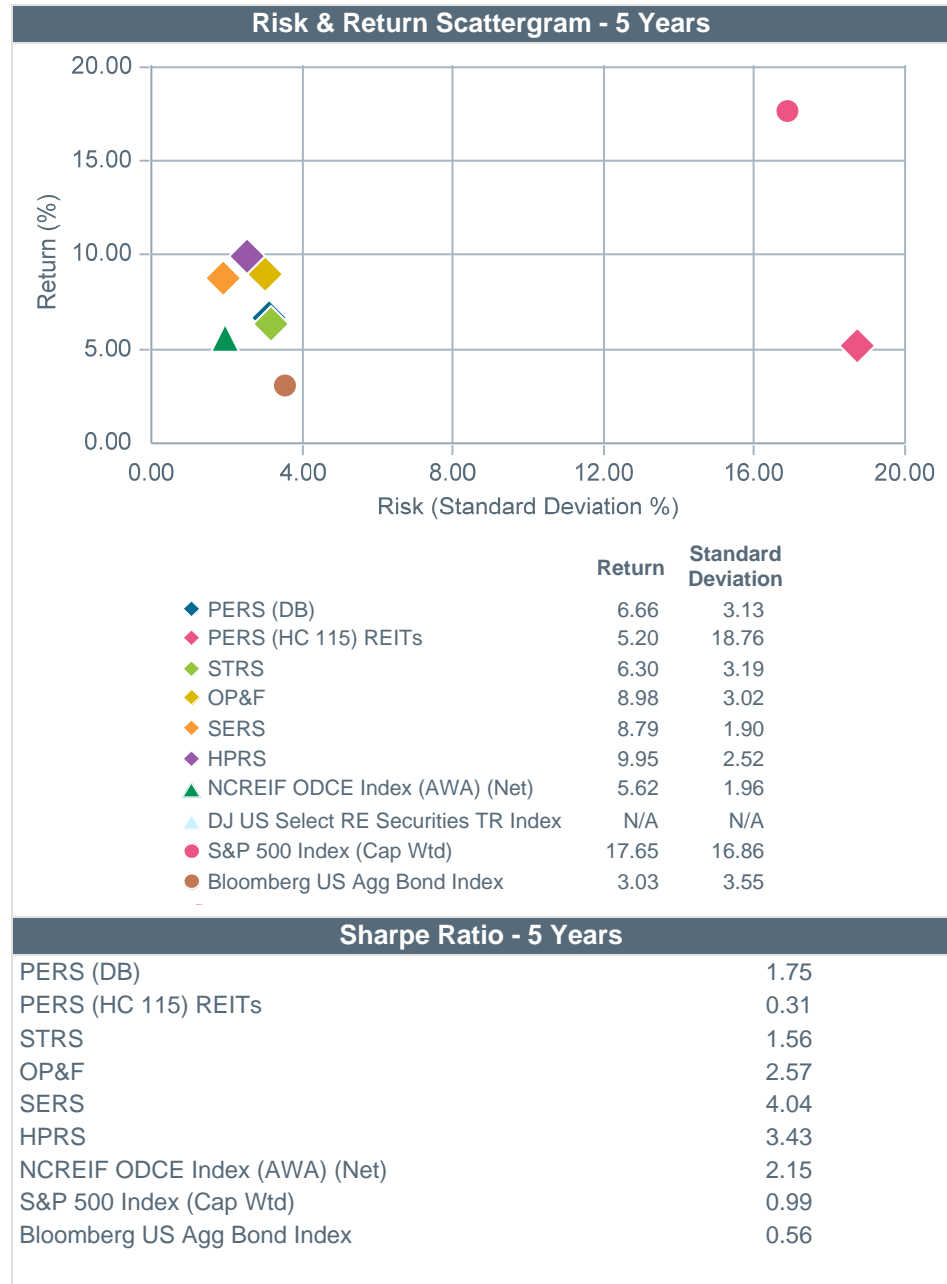
|   | Trailing Performance (%) |        |         |         |         |          | Calendar Year Performance (%) |       |       |       |
|---|--------------------------|--------|---------|---------|---------|----------|-------------------------------|-------|-------|-------|
|   | 2 Quarters               | 1 Year | 3 Years | 5 Years | 7 Years | 10 Years | 2020                          | 2019  | 2018  | 2017  |
| <b>Additional Fixed Income</b>              |                          |        |         |         |         |          |                               |       |       |       |
| <b>PERS (HC 115) High Yield</b>             | 3.29                     | 15.09  | 7.68    | 7.26    | 5.41    | 6.70     | 7.42                          | 14.76 | -2.06 | 7.23  |
| Bloomberg Barclays U.S. High Yield Index    | 3.62                     | 15.37  | 7.45    | 7.48    | 5.47    | 6.66     | 7.11                          | 14.32 | -2.08 | 7.50  |
| Difference                                  | -0.33                    | -0.28  | 0.23    | -0.22   | -0.06   | 0.04     | 0.31                          | 0.44  | 0.02  | -0.27 |
| <b>PERS (HC 115) Securitized Debt</b>       | 4.57                     | 14.27  | 8.77    | 6.63    | 5.98    | N/A      | 7.40                          | 11.70 | 3.21  | 7.52  |
| Bloomberg CMBS Index + 2%                   | 5.38                     | 20.08  | 6.65    | 4.87    | 5.20    | N/A      | 1.18                          | 10.70 | 2.79  | 5.76  |
| Difference                                  | -0.81                    | -5.81  | 2.12    | 1.76    | 0.78    | N/A      | 6.22                          | 1.00  | 0.42  | 1.76  |
| <b>PERS (HC 115) TIPS</b>                   | 1.72                     | 6.46   | 6.50    | 4.13    | 3.31    | 3.39     | 10.89                         | 8.42  | -1.26 | 2.88  |
| Bloomberg Barclays U.S. Tips Index          | 1.73                     | 6.51   | 6.53    | 4.17    | 3.34    | 3.40     | 10.99                         | 8.43  | -1.26 | 3.01  |
| Difference                                  | -0.01                    | -0.05  | -0.03   | -0.04   | -0.03   | -0.01    | -0.10                         | -0.01 | 0.00  | -0.13 |
| <b>OP&amp;F High Yield</b>                  | 3.92                     | 15.42  | 7.45    | 7.20    | 5.69    | 6.65     | 6.71                          | 13.49 | -0.48 | 7.05  |
| CS Developed Countries High Yield           | 3.71                     | 15.60  | 7.12    | 7.42    | 5.27    | 6.50     | 6.08                          | 14.41 | -2.26 | 7.48  |
| Difference                                  | 0.21                     | -0.18  | 0.33    | -0.22   | 0.42    | 0.15     | 0.63                          | -0.92 | 1.78  | -0.43 |
| <b>OP&amp;F Private Credit Fixed Income</b> | 11.23                    | 15.34  | 8.23    | N/A     | N/A     | N/A      | -1.54                         | 10.47 | N/A   | N/A   |
| S&P LTSA Levered Loan Index + 2%            | 6.72                     | 23.13  | 6.24    | N/A     | N/A     | N/A      | 3.09                          | 5.26  | 7.30  | N/A   |
| Difference                                  | 4.51                     | -7.79  | 1.99    | N/A     | N/A     | N/A      | -4.63                         | 5.21  | N/A   | N/A   |
| <b>OP&amp;F US TIPS</b>                     | 4.13                     | 17.76  | 12.66   | 9.42    | 9.06    | 10.10    | 20.11                         | 15.70 | -0.26 | 2.89  |
| Bridgewater Custom US TIPS Index            | 2.91                     | 12.86  | 11.93   | 7.32    | 7.74    | 8.04     | 23.25                         | 15.12 | -5.04 | 1.90  |
| Difference                                  | 1.22                     | 4.90   | 0.73    | 2.10    | 1.32    | 2.06     | -3.14                         | 0.58  | 4.78  | 0.99  |
| <b>SERS Private Credit</b>                  | 10.29                    | 19.51  | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A   | N/A   | N/A   |
| 3 Month LIBOR Rate + 4.5%                   | 2.33                     | 4.75   | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A   | N/A   | N/A   |
| Difference                                  | 7.96                     | 14.76  | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A   | N/A   | N/A   |

Performance shown is gross of fees.

| Performance                                  |                          |              |             |             |              |              |                               |              |              |              |
|--|--------------------------|--------------|-------------|-------------|--------------|--------------|-------------------------------|--------------|--------------|--------------|
|  | Trailing Performance (%) |              |             |             |              |              | Calendar Year Performance (%) |              |              |              |
|  | 2 Quarters               | 1 Year       | 3 Years     | 5 Years     | 7 Years      | 10 Years     | 2020                          | 2019         | 2018         | 2017         |
| <b>Real Estate</b>                           |                          |              |             |             |              |              |                               |              |              |              |
| <b>PERS (DB)</b>                             | <b>2.96</b>              | <b>3.51</b>  | <b>5.82</b> | <b>6.66</b> | <b>9.59</b>  | <b>10.81</b> | <b>2.55</b>                   | <b>7.86</b>  | <b>4.37</b>  | <b>9.61</b>  |
| PERS (DB) Real Estate Custom Benchmark       | 3.45                     | 2.32         | 4.81        | 6.11        | 8.13         | 9.41         | 1.37                          | 5.49         | 8.56         | 7.55         |
| Difference                                   | -0.49                    | 1.19         | 1.01        | 0.55        | 1.46         | 1.40         | 1.18                          | 2.37         | -4.19        | 2.06         |
| <b>PERS (HC 115) REITs</b>                   | <b>23.05</b>             | <b>40.08</b> | <b>8.16</b> | <b>5.20</b> | <b>7.50</b>  | <b>8.68</b>  | <b>-11.40</b>                 | <b>23.23</b> | <b>-4.10</b> | <b>3.81</b>  |
| DJ US Select Real Estate Securities TR Index | 22.94                    | 39.98        | 8.13        | 5.16        | 7.52         | 8.61         | -11.20                        | 23.10        | -4.22        | 3.76         |
| Difference                                   | 0.11                     | 0.10         | 0.03        | 0.04        | -0.02        | 0.07         | -0.20                         | 0.13         | 0.12         | 0.05         |
| <b>STRS</b>                                  | <b>6.95</b>              | <b>8.01</b>  | <b>5.93</b> | <b>6.30</b> | <b>8.39</b>  | <b>9.76</b>  | <b>-1.27</b>                  | <b>10.65</b> | <b>6.65</b>  | <b>6.14</b>  |
| STRS Real Estate Custom Benchmark            | 7.78                     | 11.64        | 6.55        | 6.40        | 8.04         | 9.09         | 0.89                          | 9.31         | 5.09         | 6.70         |
| Difference                                   | -0.83                    | -3.63        | -0.62       | -0.10       | 0.35         | 0.67         | -2.16                         | 1.34         | 1.56         | -0.56        |
| <b>OP&amp;F</b>                              | <b>7.28</b>              | <b>7.48</b>  | <b>6.93</b> | <b>8.98</b> | <b>11.31</b> | <b>12.37</b> | <b>0.11</b>                   | <b>8.76</b>  | <b>13.69</b> | <b>10.30</b> |
| NCREIF ODCE Index (AWA) (Net) (1 Qtr Lag)    | 3.00                     | 1.47         | 3.96        | 5.26        | 7.28         | 8.67         | 0.52                          | 4.64         | 7.71         | 6.70         |
| Difference                                   | 4.28                     | 6.01         | 2.97        | 3.72        | 4.03         | 3.70         | -0.41                         | 4.12         | 5.98         | 3.60         |
| <b>SERS</b>                                  | <b>5.66</b>              | <b>8.72</b>  | <b>8.04</b> | <b>8.79</b> | <b>10.08</b> | <b>10.58</b> | <b>3.30</b>                   | <b>9.84</b>  | <b>11.41</b> | <b>10.24</b> |
| SERS Global Real Assets Custom Benchmark     | 2.88                     | 2.61         | 4.89        | 5.81        | 7.62         | 8.83         | 2.00                          | 6.24         | 7.16         | 6.89         |
| Difference                                   | 2.78                     | 6.11         | 3.15        | 2.98        | 2.46         | 1.75         | 1.30                          | 3.60         | 4.25         | 3.35         |
| <b>HPRS</b>                                  | <b>5.69</b>              | <b>9.74</b>  | <b>8.97</b> | <b>9.95</b> | <b>10.02</b> | <b>9.79</b>  | <b>2.84</b>                   | <b>10.32</b> | <b>15.75</b> | <b>10.30</b> |
| HPRS Real Estate Custom Benchmark (Net)      | 5.22                     | 9.04         | 8.31        | 8.44        | 9.53         | 10.02        | 2.34                          | 10.07        | 14.00        | 6.90         |
| Difference                                   | 0.47                     | 0.70         | 0.66        | 1.51        | 0.49         | -0.23        | 0.50                          | 0.25         | 1.75         | 3.40         |

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.

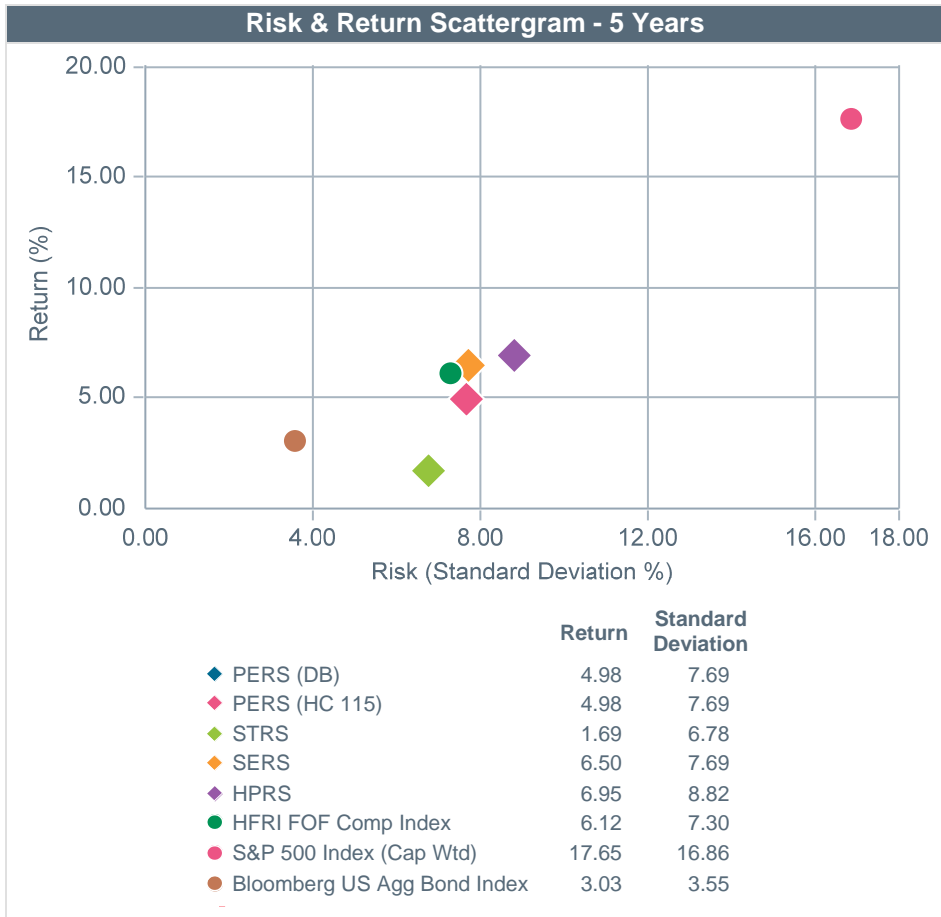




Performance shown may be net or gross of fees depending on underlying investments.

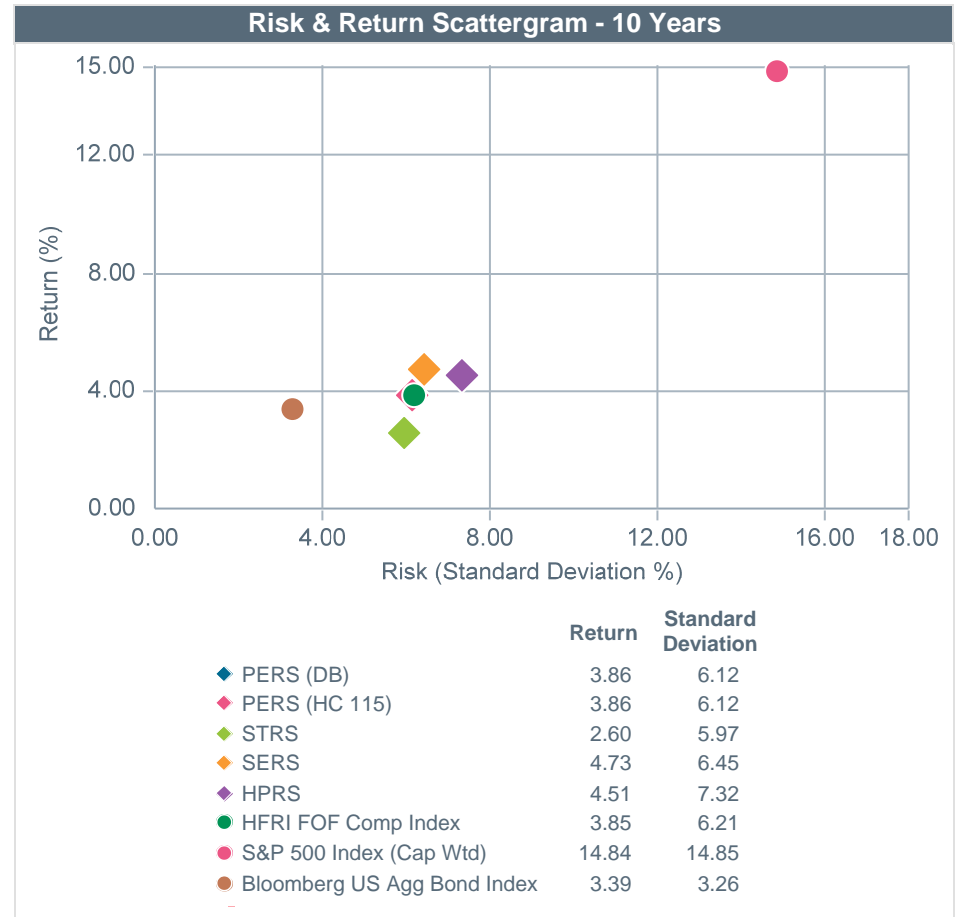
| Performance                                |                          |              |              |             |             |             |                               |              |              |             |
|--|--------------------------|--------------|--------------|-------------|-------------|-------------|-------------------------------|--------------|--------------|-------------|
|  | Trailing Performance (%) |              |              |             |             |             | Calendar Year Performance (%) |              |              |             |
|  | 2 Quarters               | 1 Year       | 3 Years      | 5 Years     | 7 Years     | 10 Years    | 2020                          | 2019         | 2018         | 2017        |
| <b>Hedge Funds</b>                         |                          |              |              |             |             |             |                               |              |              |             |
| <b>PERS (DB)</b>                           | <b>3.68</b>              | <b>16.95</b> | <b>3.87</b>  | <b>4.98</b> | <b>3.37</b> | <b>3.86</b> | <b>3.63</b>                   | <b>7.66</b>  | <b>-1.51</b> | <b>7.25</b> |
| PERS (DB) Hedge Funds Custom Benchmark     | 9.90                     | 20.86        | 6.68         | 6.58        | 4.49        | 5.27        | 6.04                          | 8.49         | -3.19        | 7.38        |
| Difference                                 | -6.22                    | -3.91        | -2.81        | -1.60       | -1.12       | -1.41       | -2.41                         | -0.83        | 1.68         | -0.13       |
| <b>PERS (HC 115)</b>                       | <b>3.68</b>              | <b>16.95</b> | <b>3.87</b>  | <b>4.98</b> | <b>3.36</b> | <b>3.86</b> | <b>3.63</b>                   | <b>7.66</b>  | <b>-1.51</b> | <b>7.25</b> |
| PERS (HC 115) Hedge Funds Custom Benchmark | 9.90                     | 20.86        | 6.68         | 6.58        | 4.49        | 5.27        | 6.04                          | 8.49         | -3.19        | 7.38        |
| Difference                                 | -6.22                    | -3.91        | -2.81        | -1.60       | -1.13       | -1.41       | -2.41                         | -0.83        | 1.68         | -0.13       |
| <b>STRS</b>                                | <b>-3.70</b>             | <b>1.45</b>  | <b>-1.37</b> | <b>1.69</b> | <b>0.90</b> | <b>2.60</b> | <b>-2.47</b>                  | <b>3.91</b>  | <b>0.64</b>  | <b>5.59</b> |
| HFRI FOF Comp Index                        | 4.94                     | 18.28        | 6.32         | 6.12        | 4.09        | 3.85        | 10.88                         | 8.39         | -4.02        | 7.77        |
| Difference                                 | -8.64                    | -16.83       | -7.69        | -4.43       | -3.19       | -1.25       | -13.35                        | -4.48        | 4.66         | -2.18       |
| <b>SERS</b>                                | <b>4.86</b>              | <b>16.82</b> | <b>6.45</b>  | <b>6.50</b> | <b>4.21</b> | <b>4.73</b> | <b>9.23</b>                   | <b>8.15</b>  | <b>-1.61</b> | <b>7.27</b> |
| HFRI FOF Comp Index + 1%                   | 5.47                     | 19.47        | 7.38         | 7.19        | 5.13        | 4.89        | 11.99                         | 9.47         | -3.06        | 8.85        |
| Difference                                 | -0.61                    | -2.65        | -0.93        | -0.69       | -0.92       | -0.16       | -2.76                         | -1.32        | 1.45         | -1.58       |
| <b>HPRS</b>                                | <b>8.18</b>              | <b>22.95</b> | <b>8.45</b>  | <b>6.95</b> | <b>4.58</b> | <b>4.51</b> | <b>12.02</b>                  | <b>12.31</b> | <b>-5.96</b> | <b>5.70</b> |
| HFRI FOF Comp Index                        | 4.94                     | 18.28        | 6.32         | 6.12        | 4.09        | 3.85        | 10.88                         | 8.39         | -4.02        | 7.77        |
| Difference                                 | 3.24                     | 4.67         | 2.13         | 0.83        | 0.49        | 0.66        | 1.14                          | 3.92         | -1.94        | -2.07       |

Performance shown is net of fees.



### Sharpe Ratio - 5 Years

|                             |             |
|-----------------------------|-------------|
| PERS (DB)                   | 0.51        |
| PERS (HC 115)               | 0.51        |
| STRS                        | 0.11        |
| SERS                        | 0.69        |
| HPRS                        | 0.66        |
| <i>HFRI FOF Comp Index</i>  | <i>0.67</i> |
| S&P 500 Index (Cap Wtd)     | 0.99        |
| Bloomberg US Agg Bond Index | 0.56        |



### Sharpe Ratio - 10 Years

|                             |             |
|-----------------------------|-------------|
| PERS (DB)                   | 0.54        |
| PERS (HC 115)               | 0.54        |
| STRS                        | 0.35        |
| SERS                        | 0.64        |
| HPRS                        | 0.55        |
| <i>HFRI FOF Comp Index</i>  | <i>0.53</i> |
| S&P 500 Index (Cap Wtd)     | 0.98        |
| Bloomberg US Agg Bond Index | 0.87        |

Performance shown is net of fees.

| Performance                               |              |              |              |              |              |              |              |              |              |              |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|   | 2 Quarters   | 1 Year       | 3 Years      | 5 Years      | 7 Years      | 10 Years     | 2020         | 2019         | 2018         | 2017         |
| <b>Private Equity</b>                     |              |              |              |              |              |              |              |              |              |              |
| <b>PERS (DB)</b>                          | <b>19.18</b> | <b>49.39</b> | <b>18.51</b> | <b>17.11</b> | <b>14.44</b> | <b>14.92</b> | <b>16.38</b> | <b>10.39</b> | <b>15.48</b> | <b>19.60</b> |
| PERS (DB) Private Equity Custom Benchmark | 26.43        | 53.12        | 18.52        | 17.01        | 13.67        | 14.41        | 13.78        | 8.02         | 15.00        | 15.13        |
| Difference                                | -7.25        | -3.73        | -0.01        | 0.10         | 0.77         | 0.51         | 2.60         | 2.37         | 0.48         | 4.47         |
| <b>STRS</b>                               | <b>27.86</b> | <b>64.49</b> | <b>25.96</b> | <b>22.47</b> | <b>18.28</b> | <b>17.30</b> | <b>25.49</b> | <b>13.97</b> | <b>19.85</b> | <b>19.35</b> |
| STRS Private Equity Custom Benchmark      | 15.67        | 45.56        | 19.90        | 19.05        | 15.08        | 16.06        | 22.08        | 32.30        | -4.29        | 22.32        |
| Difference                                | 12.19        | 18.93        | 6.06         | 3.42         | 3.20         | 1.24         | 3.41         | -18.33       | 24.14        | -2.97        |
| <b>OP&amp;F</b>                           | <b>25.76</b> | <b>61.08</b> | <b>24.05</b> | <b>21.23</b> | <b>18.02</b> | <b>16.22</b> | <b>22.30</b> | <b>13.65</b> | <b>19.82</b> | <b>18.02</b> |
| OP&F Private Equity Custom Benchmark      | 25.76        | 61.08        | 24.05        | 21.23        | 18.02        | 16.22        | 22.30        | 13.65        | 19.82        | 18.02        |
| Difference                                | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| <b>SERS</b>                               | <b>21.40</b> | <b>46.70</b> | <b>20.33</b> | <b>19.52</b> | <b>18.24</b> | <b>17.74</b> | <b>16.39</b> | <b>12.76</b> | <b>18.27</b> | <b>21.56</b> |
| Burgiss All Private Equity Benchmark      | 28.38        | 47.27        | 18.27        | 16.53        | 13.92        | 14.79        | 12.16        | 8.08         | 16.05        | 12.10        |
| Difference                                | -6.98        | -0.57        | 2.06         | 2.99         | 4.32         | 2.95         | 4.23         | 4.68         | 2.22         | 9.46         |
| <b>HPRS</b>                               | <b>17.02</b> | <b>52.47</b> | <b>16.52</b> | <b>14.43</b> | <b>11.17</b> | <b>11.05</b> | <b>20.29</b> | <b>9.66</b>  | <b>8.80</b>  | <b>8.46</b>  |
| HPRS Private Equity Custom Benchmark      | 17.02        | 52.47        | 16.63        | 15.30        | 14.01        | 15.20        | 20.30        | 9.96         | 8.80         | 12.37        |
| Difference                                | 0.00         | 0.00         | -0.11        | -0.87        | -2.84        | -4.15        | -0.01        | -0.30        | 0.00         | -3.91        |

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.

| Performance                                |                          |              |              |             |              |              |                               |              |               |              |
|--|--------------------------|--------------|--------------|-------------|--------------|--------------|-------------------------------|--------------|---------------|--------------|
|  | Trailing Performance (%) |              |              |             |              |              | Calendar Year Performance (%) |              |               |              |
|  | 2 Quarters               | 1 Year       | 3 Years      | 5 Years     | 7 Years      | 10 Years     | 2020                          | 2019         | 2018          | 2017         |
| <b>Other Alternatives</b>                  |                          |              |              |             |              |              |                               |              |               |              |
| <b>PERS (DB) Commodities</b>               | <b>30.11</b>             | <b>56.17</b> | <b>-2.24</b> | <b>2.22</b> | <b>-8.64</b> | <b>N/A</b>   | <b>-21.96</b>                 | <b>17.54</b> | <b>-13.59</b> | <b>6.40</b>  |
| S&P Goldman Sachs Commodity Index (TR)     | 29.10                    | 54.61        | -3.29        | 1.37        | -9.43        | N/A          | -23.72                        | 17.63        | -13.82        | 5.77         |
| Difference                                 | 1.01                     | 1.56         | 1.05         | 0.85        | 0.79         | N/A          | 1.76                          | -0.09        | 0.23          | 0.63         |
| <b>PERS (DB) Risk Parity</b>               | <b>7.05</b>              | <b>27.45</b> | <b>10.58</b> | <b>9.65</b> | <b>6.30</b>  | <b>N/A</b>   | <b>5.96</b>                   | <b>30.30</b> | <b>-9.93</b>  | <b>18.51</b> |
| PERS (DB) Risk Parity Custom Benchmark     | 7.38                     | 27.96        | 10.30        | 8.69        | 7.61         | N/A          | 5.25                          | 29.93        | -10.07        | 11.50        |
| Difference                                 | -0.33                    | -0.51        | 0.28         | 0.96        | -1.31        | N/A          | 0.71                          | 0.37         | 0.14          | 7.01         |
| <b>PERS (DB) Opportunistic</b>             | <b>7.32</b>              | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>  | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>                    | <b>N/A</b>   | <b>N/A</b>    | <b>N/A</b>   |
| PERS (DB) Opportunistic Benchmark          | 7.17                     | N/A          | N/A          | N/A         | N/A          | N/A          | N/A                           | N/A          | N/A           | N/A          |
| Difference                                 | 0.15                     | N/A          | N/A          | N/A         | N/A          | N/A          | N/A                           | N/A          | N/A           | N/A          |
| <b>PERS (HC 115) Commodities</b>           | <b>30.11</b>             | <b>56.17</b> | <b>-2.24</b> | <b>2.22</b> | <b>-8.55</b> | <b>-5.90</b> | <b>-21.96</b>                 | <b>17.54</b> | <b>-13.59</b> | <b>6.40</b>  |
| S&P Goldman Sachs Commodity Index (TR)     | 29.10                    | 54.61        | -3.29        | 1.37        | -9.43        | -6.65        | -23.72                        | 17.63        | -13.82        | 5.77         |
| Difference                                 | 1.01                     | 1.56         | 1.05         | 0.85        | 0.88         | 0.75         | 1.76                          | -0.09        | 0.23          | 0.63         |
| <b>PERS (HC 115) Risk Parity</b>           | <b>7.05</b>              | <b>27.45</b> | <b>10.58</b> | <b>9.65</b> | <b>6.30</b>  | <b>N/A</b>   | <b>5.96</b>                   | <b>30.30</b> | <b>-9.93</b>  | <b>18.51</b> |
| PERS (HC 115) Risk Parity Custom Benchmark | 7.38                     | 27.96        | 10.30        | 8.69        | 7.61         | N/A          | 5.25                          | 29.93        | -10.07        | 11.50        |
| Difference                                 | -0.33                    | -0.51        | 0.28         | 0.96        | -1.31        | N/A          | 0.71                          | 0.37         | 0.14          | 7.01         |
| <b>PERS (HC 115) Opportunistic</b>         | <b>7.32</b>              | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>  | <b>N/A</b>   | <b>N/A</b>   | <b>N/A</b>                    | <b>N/A</b>   | <b>N/A</b>    | <b>N/A</b>   |
| PERS (HC 115) Opportunistic Benchmark      | 7.17                     | N/A          | N/A          | N/A         | N/A          | N/A          | N/A                           | N/A          | N/A           | N/A          |
| Difference                                 | 0.15                     | 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. PERS (DB) and PERS (HC115) funded new opportunistic investment portfolios in the fourth quarter of 2020.

|  | Trailing Performance (%) |        |         |         |         |          | Calendar Year Performance (%) |        |        |        |
|--|--------------------------|--------|---------|---------|---------|----------|-------------------------------|--------|--------|--------|
|  | 2 Quarters               | 1 Year | 3 Years | 5 Years | 7 Years | 10 Years | 2020                          | 2019   | 2018   | 2017   |
| <b>Other Alternatives</b>                          |                          |        |         |         |         |          |                               |        |        |        |
| <b>STRS Opportunistic Investments ex HF</b>        | 13.78                    | 25.54  | 6.28    | 7.37    | 5.94    | 7.35     | -1.58                         | 6.39   | 6.25   | 6.07   |
| STRS Opportunistic Custom Benchmark                | 14.55                    | 42.78  | 17.57   | 16.73   | 12.83   | 13.57    | 19.70                         | 29.75  | -6.18  | 19.95  |
| Difference   | -0.77                    | -17.24 | -11.29  | -9.36   | -6.89   | -6.22    | -21.28                        | -23.36 | 12.43  | -13.88 |
| <b>OP&amp;F Real Assets</b>                        | 3.23                     | 3.91   | 4.44    | 4.51    | 3.93    | N/A      | -0.28                         | 5.80   | 10.45  | 3.26   |
| OP&F Real Assets Custom Benchmark                  | 6.24                     | 12.43  | 5.94    | 5.79    | 5.88    | N/A      | -0.11                         | 12.27  | 0.40   | 10.59  |
| Difference   | -3.01                    | -8.52  | -1.50   | -1.28   | -1.95   | N/A      | -0.17                         | -6.47  | 10.05  | -7.33  |
| <b>OP&amp;F MLPs</b>                               | 39.94                    | 51.45  | 0.05    | 0.90    | -3.56   | N/A      | -26.09                        | 13.46  | -13.10 | -4.08  |
| Alerian MLP Index                                  | 42.53                    | 55.15  | 4.11    | 1.57    | -3.97   | N/A      | -23.37                        | 17.21  | -12.42 | -6.52  |
| Difference   | -2.59                    | -3.70  | -4.06   | -0.67   | 0.41    | N/A      | -2.72                         | -3.75  | -0.68  | 2.44   |
| <b>OP&amp;F Gold</b>                               | -6.27                    | N/A    | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A    | N/A    | N/A    |
| S&P GSCI Gold Index Minus the Cost of Financing    | -7.02                    | N/A    | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A    | N/A    | N/A    |
| Difference   | 0.75                     | N/A    | N/A     | N/A     | N/A     | N/A      | N/A                           | N/A    | N/A    | N/A    |
| <b>SERS Opportunistic &amp; Tactical Portfolio</b> | 15.20                    | 27.34  | 8.25    | 11.24   | 7.44    | N/A      | 2.27                          | 7.11   | 5.33   | 14.55  |
| SERS Opportunistic Custom Benchmark                | -0.39                    | 1.67   | 3.94    | 6.28    | 5.19    | N/A      | 0.36                          | 16.04  | -2.03  | 14.37  |
| Difference   | 15.59                    | 25.67  | 4.31    | 4.96    | 2.25    | N/A      | 1.91                          | -8.93  | 7.36   | 0.18   |
| <b>HPRS Real Assets</b>                            | 16.64                    | 31.31  | 5.98    | 3.27    | N/A     | N/A      | -1.92                         | 12.81  | -6.64  | -4.27  |
| HPRS Real Assets Custom Benchmark (Net)            | 16.26                    | 29.38  | 6.96    | 5.17    | N/A     | N/A      | -3.04                         | 12.54  | -0.53  | -0.43  |
| Difference   | 0.38                     | 1.93   | -0.98   | -1.90   | N/A     | N/A      | 1.12                          | 0.27   | -6.11  | -3.84  |

Performance shown may be net or gross of fees depending on underlying investments. The OP&F Gold composite was inceptioned during the second half of 2020.

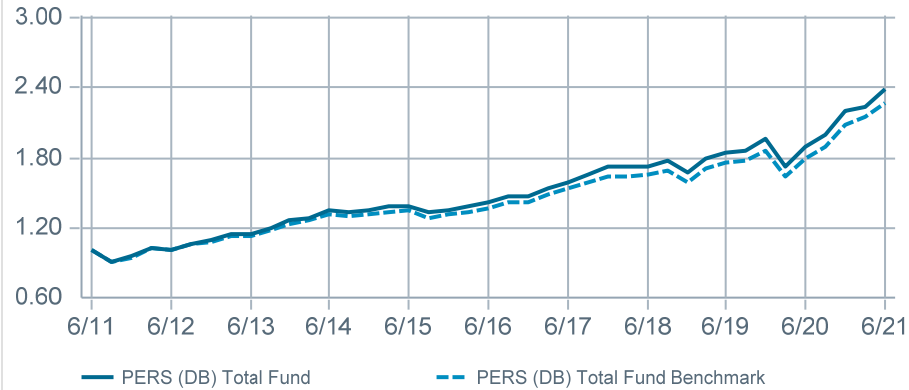
# Plan Specific Pages



**Summary**

- PERS (DB) has generated an annualized 0.18% of alpha over the trailing 5-year period and 0.52% 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**



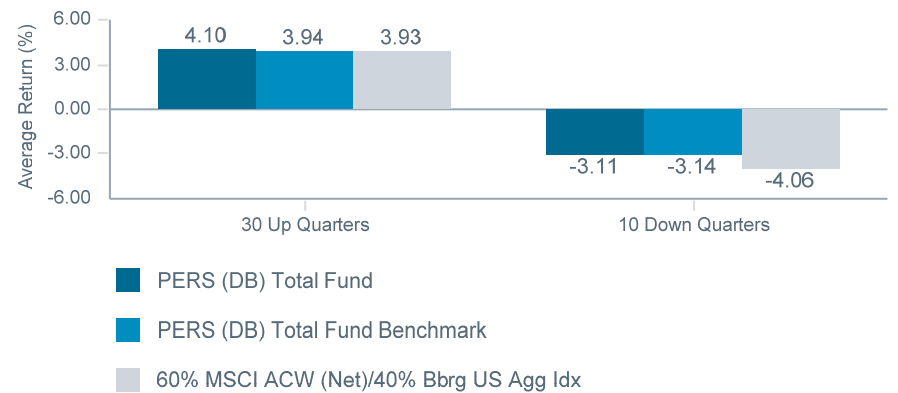
**MPT Stats**

|                                     | 5 Years | 10 Years |
|-------------------------------------|---------|----------|
| Maximum Return                      | 10.35   | 10.35    |
| Minimum Return                      | -11.66  | -11.66   |
| Standard Deviation                  | 9.52    | 8.55     |
| vs. PERS (DB) Total Fund Benchmark  |         |          |
| Info Ratio                          | 0.40    | 0.59     |
| Tracking Error                      | 0.81    | 0.85     |
| Alpha                               | 0.18    | 0.52     |
| vs. S&P 500 Index (Cap Wtd)         |         |          |
| Beta                                | 0.53    | 0.54     |
| vs. ICE BofAML 3 Mo US T-Bill Index |         |          |
| Sharpe Ratio                        | 1.02    | 0.99     |

**Asset Allocation vs. Targets**

|                      | Market Value (\$) | Allocation (%) | Target (%) |
|----------------------|-------------------|----------------|------------|
| US Equity            | 25,768,397,288    | 24.53          | 23.90      |
| International Equity | 24,135,573,853    | 22.97          | 23.00      |
| Core Fixed Income    | 11,079,288,371    | 10.55          | 11.00      |
| U.S. Treasury        | 3,052,872,271     | 2.91           | 3.00       |
| High Yield           | 2,062,920,015     | 1.96           | 2.00       |
| Global High Yield    | 6,196             | 0.00           | 0.00       |
| EMD                  | 4,983,461,717     | 4.74           | 5.00       |
| Floating Rate Debt   | 2,913,076         | 0.00           | 0.00       |
| Securitized Debt     | 1,335,671,442     | 1.27           | 1.00       |
| TIPS                 | 3,807,725,734     | 3.62           | 3.00       |
| Real Estate          | 9,159,565,169     | 8.72           | 10.00      |
| Hedge Funds          | 154,977,432       | 0.15           | 0.00       |
| Opportunistic        | 186,280,898       | 0.18           | 0.10       |
| Commodities          | 1,732,017,621     | 1.65           | 1.00       |
| Private Equity       | 11,924,100,207    | 11.35          | 12.00      |
| Risk Parity          | 4,895,630,383     | 4.66           | 5.00       |
| Cash Equivalents     | 753,940,185       | 0.72           | 0.00       |
| Additional Annuity   | 16,023,342        | 0.02           | 0.00       |
| Other Pension Assets | 46,163            | 0.00           | 0.00       |
| TAA                  | 128,394           | 0.00           | 0.00       |
| Total Fund           | 105,051,539,755   | 100.00         | 100.00     |

**Up/Down Markets - 10 Years**



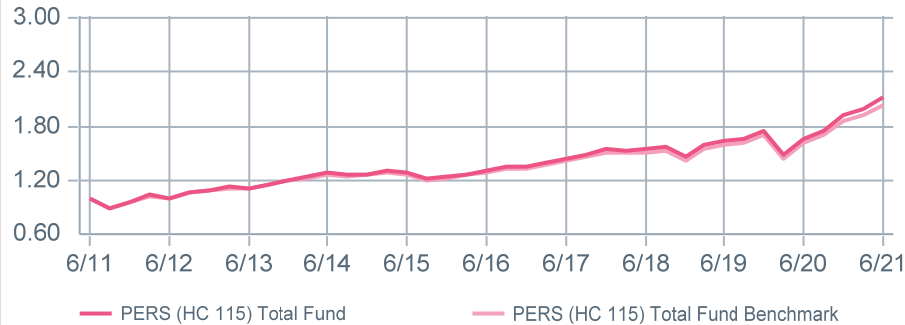
Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.



**Summary**

- PERS HC was formed in 2005, segregating HC from the DB assets. PERS HC 115 was formed October 2014 to hold all HC assets of PERS, and has a performance inception date of January 2015.
- OPERS health care plan is not a pension plan and therefore has significantly different characteristics including a shorter focus asset allocation with more liquidity than the pension plans. For purposes of this study, the OPERS health care plan has been included in the results. The results for OPERS HC plan were reflected in the PERS HC since 2005 through October 2014, and then transferred to and renamed PERS HC 115 at that time.

**Growth of \$1 - 10 Years**



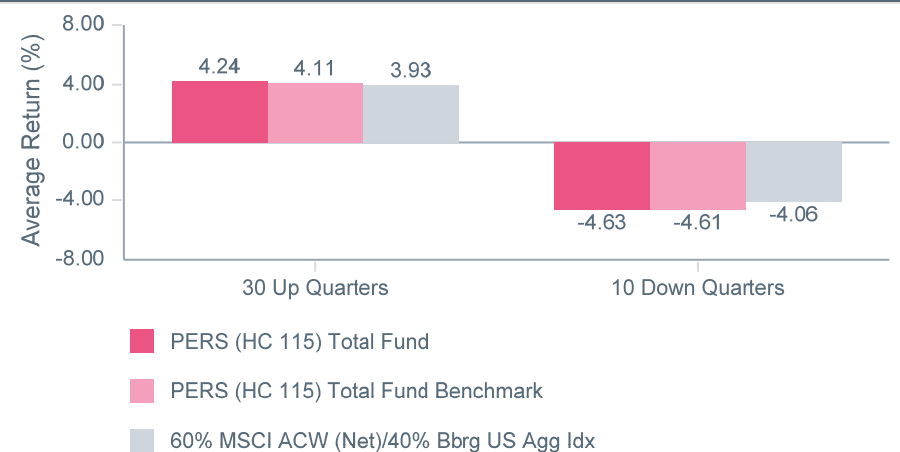
**MPT Stats**

|  | <b>10 Years</b> |
|--|-----------------|
| Maximum Return                         | 12.24           |
| Standard Deviation                     | 10.11           |
| Minimum Return                         | -14.63          |
| vs. PERS (HC 115) Total Fund Benchmark |                 |
| Info Ratio                             | 0.93            |
| Tracking Error                         | 0.40            |
| Alpha                                  | 0.36            |
| vs. S&P 500 Index (Cap Wtd)            |                 |
| Beta                                   | 1.18            |
| vs. ICE BofAML 3 Mo US T-Bill Index    |                 |
| Sharpe Ratio                           | 4.76            |

**Asset Allocation vs. Targets**

|                      | Market Value (\$)     | Allocation (%) | Target (%)    |
|----------------------|-----------------------|----------------|---------------|
| US Equity            | 3,987,732,127         | 28.00          | 27.90         |
| International Equity | 3,524,297,604         | 24.75          | 25.00         |
| Core Fixed Income    | 2,324,224,309         | 16.32          | 17.00         |
| EMD                  | 258,554,022           | 1.82           | 2.00          |
| High Yield           | 546,547,803           | 3.84           | 4.00          |
| Floating Rate Debt   | 342,169               | 0.00           | 0.00          |
| Securitized Debt     | 278,194,447           | 1.95           | 2.00          |
| TIPS                 | 1,094,806,083         | 7.69           | 7.00          |
| Global High Yield    | 30,713                | 0.00           | 0.00          |
| REITs                | 989,821,603           | 6.95           | 7.00          |
| Hedge Funds          | 10,114,076            | 0.07           | 0.00          |
| Opportunistic        | 25,401,941            | 0.18           | 0.10          |
| Commodities          | 645,312,077           | 4.53           | 4.00          |
| Risk Parity          | 243,599,392           | 1.71           | 2.00          |
| Cash Equivalents     | 40,281,953            | 0.28           | 0.00          |
| U.S. Treasury        | 271,665,768           | 1.91           | 2.00          |
| Rebalancing          | -                     | 0.00           | 0.00          |
| <b>Total Fund</b>    | <b>14,240,926,086</b> | <b>100.00</b>  | <b>100.00</b> |

**Up/Down Markets - 10 Years**

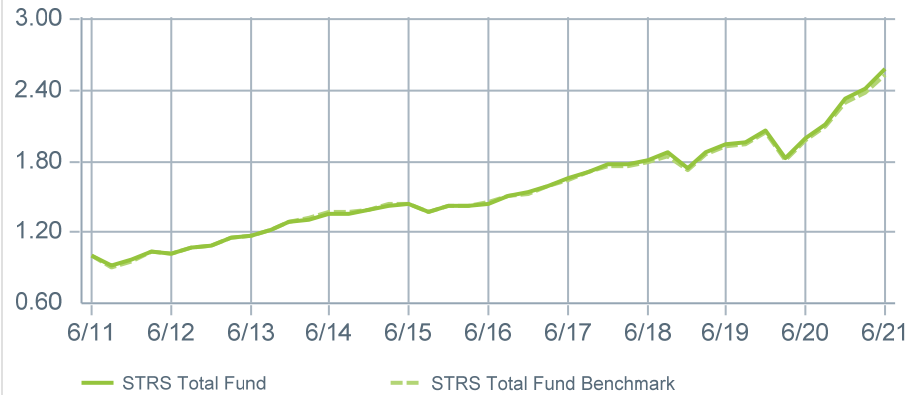


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- STRS has generated 0.27% of alpha over the trailing 5-year period and 0.30% 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**



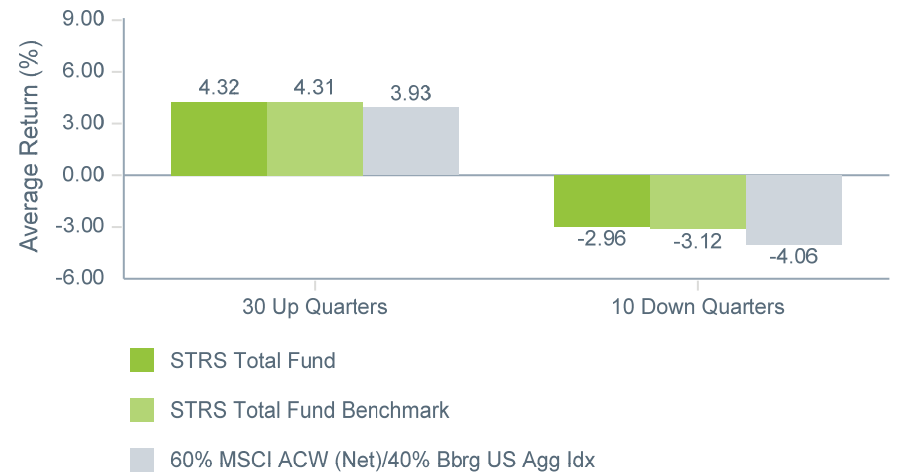
**MPT Stats**

|                                     | 5 Years | 10 Years |
|-------------------------------------|---------|----------|
| Maximum Return                      | 10.00   | 10.00    |
| Minimum Return                      | -11.51  | -11.51   |
| Standard Deviation                  | 9.61    | 8.66     |
| vs. STRS Total Fund Benchmark       |         |          |
| Info Ratio                          | 1.25    | 0.42     |
| Tracking Error                      | 0.37    | 0.48     |
| Alpha                               | 0.27    | 0.30     |
| vs. S&P 500 Index (Cap Wtd)         |         |          |
| Beta                                | 0.55    | 0.56     |
| vs. ICE BofAML 3 Mo US T-Bill Index |         |          |
| Sharpe Ratio                        | 1.13    | 1.07     |

**Asset Allocation vs. Targets**

|                                   | Market Value (\$) | Allocation (%) | Target (%) |
|-----------------------------------|-------------------|----------------|------------|
| US Equity                         | 26,931,502,867    | 28.40          | 28.00      |
| International Equity              | 21,537,279,434    | 22.71          | 23.00      |
| Fixed Income                      | 18,382,600,175    | 19.38          | 21.00      |
| Real Estate                       | 7,867,795,679     | 8.30           | 10.00      |
| Opportunistic (Incl. Hedge Funds) | 7,561,981,257     | 7.97           | 10.00      |
| Private Equity                    | 11,086,128,398    | 11.69          | 7.00       |
| Cash Equivalents                  | 1,464,927,836     | 1.54           | 1.00       |
| Total Fund                        | 94,832,215,645    | 100.00         | 100.00     |

**Up/Down Markets - 10 Years**

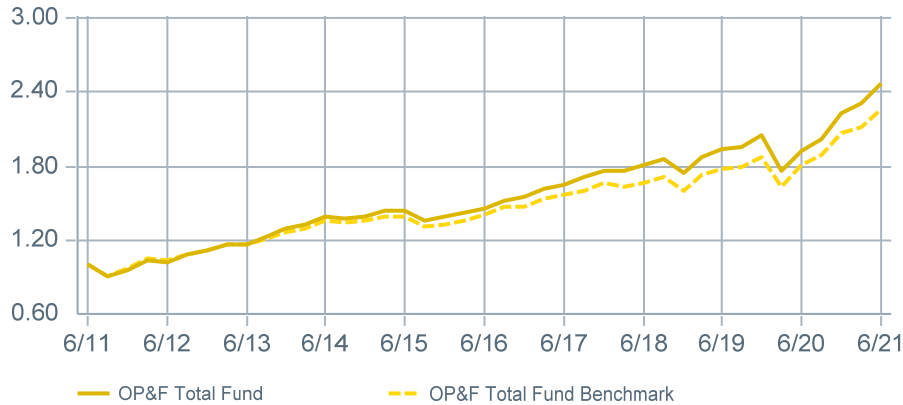


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- OP&F has generated 1.05% 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 smaller down-market capture characteristics over the past 10 years.

**Growth of \$1 - 10 Years**



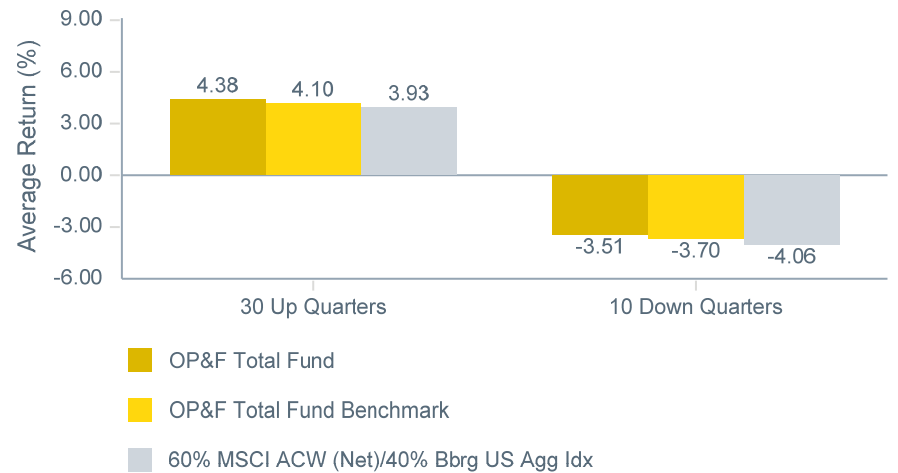
**MPT Stats**

|                                     | 5 Years | 10 Years |
|-------------------------------------|---------|----------|
| Maximum Return                      | 10.66   | 10.66    |
| Minimum Return                      | -13.55  | -13.55   |
| Standard Deviation                  | 10.20   | 9.31     |
| vs. OP&F Total Fund Benchmark       |         |          |
| Info Ratio                          | 0.99    | 0.84     |
| Tracking Error                      | 1.27    | 1.20     |
| Alpha                               | 1.05    | 0.74     |
| vs. S&P 500 Index (Cap Wtd)         |         |          |
| Beta                                | 0.58    | 0.59     |
| vs. ICE BofAML 3 Mo US T-Bill Index |         |          |
| Sharpe Ratio                        | 0.97    | 0.95     |

**Asset Allocation vs. Targets**

|                         | Market Value (\$) | Allocation (%) | Target (%) |
|-------------------------|-------------------|----------------|------------|
| US Equity               | 4,072,574,679     | 22.06          | 17.92      |
| International Equity    | 2,852,761,257     | 15.45          | 12.00      |
| High Yield Fixed Income | 1,430,959,719     | 7.75           | 7.20       |
| US TIPS                 | 1,601,276,074     | 8.67           | 13.60      |
| Core Fixed Income       | 1,877,828,119     | 10.17          | 18.40      |
| Private Credit          | 486,799,747       | 2.64           | 2.40       |
| Real Estate             | 1,706,982,582     | 9.25           | 9.60       |
| Private Markets         | 1,934,725,224     | 10.48          | 6.40       |
| MLPs                    | 1,152,549,519     | 6.24           | 4.00       |
| Real Assets             | 594,633,737       | 3.22           | 3.20       |
| Gold                    | 139,427,052       | 0.76           | 5.28       |
| Cash Equivalents        | 610,551,840       | 3.31           | 0.00       |
| Total Fund              | 18,461,069,549    | 100.00         | 100.00     |

**Up/Down Markets - 10 Years**

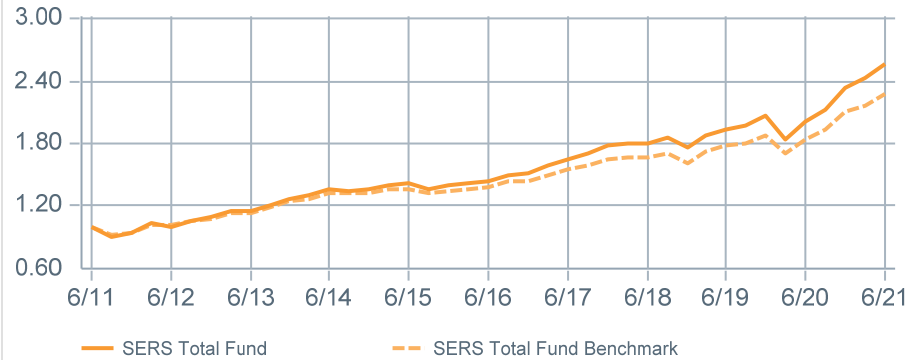


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding. OP&F's target allocations are based on notional value, and have been scaled to 100% for this report.

**Summary**

- SERS has generated 0.47% of alpha over the trailing 5-year period and 0.08% 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**



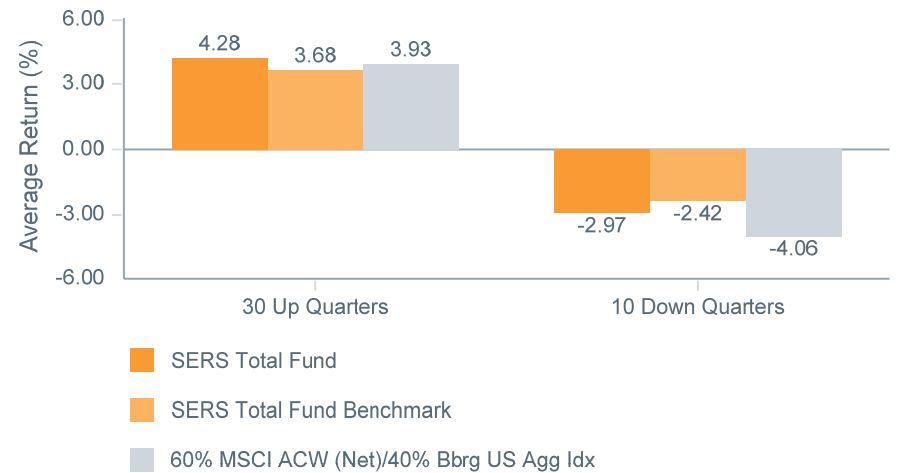
**MPT Stats**

|                                     | 5 Years | 10 Years |
|-------------------------------------|---------|----------|
| Maximum Return                      | 9.94    | 9.94     |
| Minimum Return                      | -11.00  | -11.00   |
| Standard Deviation                  | 9.19    | 8.45     |
| vs. SERS Total Fund Benchmark       |         |          |
| Info Ratio                          | 1.43    | 0.89     |
| Tracking Error                      | 1.11    | 1.42     |
| Alpha                               | 0.47    | 0.08     |
| vs. S&P 500 Index (Cap Wtd)         |         |          |
| Beta                                | 0.52    | 0.54     |
| vs. ICE BofAML 3 Mo US T-Bill Index |         |          |
| Sharpe Ratio                        | 1.15    | 1.08     |

**Asset Allocation vs. Targets**

|                           | Market Value (\$) | Allocation (%) | Target (%) |
|---------------------------|-------------------|----------------|------------|
| US Equity                 | 4,620,981,014     | 26.00          | 24.75      |
| International Equity      | 4,136,637,758     | 23.27          | 20.25      |
| Fixed Income              | 2,675,904,145     | 15.06          | 19.00      |
| Private Credit            | 400,854,425       | 2.26           | 3.00       |
| Real Estate               | 2,635,980,193     | 14.83          | 16.00      |
| Hedge Funds               | 221,520,918       | 1.25           | 4.00       |
| Opportunistic Investments | 548,554,038       | 3.09           | 0.00       |
| Private Equity            | 1,880,160,921     | 10.58          | 11.00      |
| Cash Equivalents          | 653,376,084       | 3.68           | 2.00       |
| Total Fund                | 17,773,969,495    | 100.00         | 100.00     |

**Up/Down Markets - 10 Years**

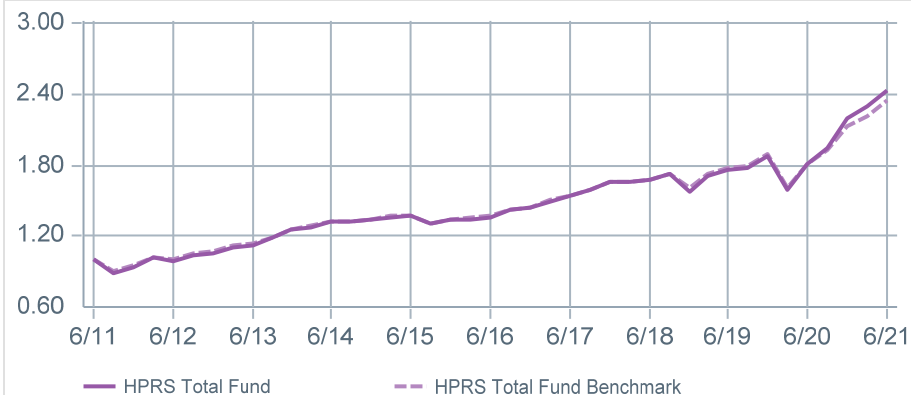


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- HPRS has generated 0.44% of alpha over the trailing 5-year period, but lost **-0.34%** 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 smaller down-market capture characteristics over the past 10 years.

**Growth of \$1 - 10 Years**



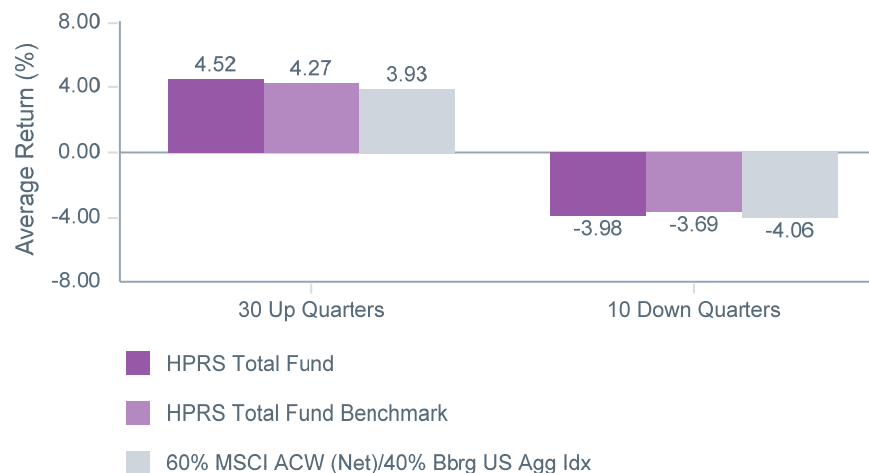
**MPT Stats**

|                                     | 5 Years       | 10 Years      |
|-------------------------------------|---------------|---------------|
| Maximum Return                      | 13.60         | 13.60         |
| Minimum Return                      | <b>-14.84</b> | <b>-14.84</b> |
| Standard Deviation                  | 12.23         | 10.68         |
| vs. HPRS Total Fund Benchmark       |               |               |
| Info Ratio                          | 1.02          | 0.36          |
| Tracking Error                      | 1.13          | 1.35          |
| Alpha                               | 0.44          | <b>-0.34</b>  |
| vs. S&P 500 Index (Cap Wtd)         |               |               |
| Beta                                | 0.71          | 0.70          |
| vs. ICE BofAML 3 Mo US T-Bill Index |               |               |
| Sharpe Ratio                        | 0.91          | 0.83          |

**Asset Allocation vs. Targets**

|                      | Market Value (\$) | Allocation (%) | Target (%) |
|----------------------|-------------------|----------------|------------|
| US Equity            | 260,637,782       | 23.43          | 21.00      |
| International Equity | 73,703,071        | 6.63           | 6.00       |
| Global Equity        | 254,294,631       | 22.86          | 24.00      |
| Fixed Income         | 147,482,871       | 13.26          | 15.00      |
| Real Estate          | 68,313,004        | 6.14           | 8.00       |
| Hedge Funds          | 99,935,118        | 8.99           | 8.00       |
| Private Equity       | 141,822,258       | 12.75          | 11.00      |
| Real Assets          | 26,443,774        | 2.38           | 4.00       |
| Cash Equivalents     | 39,558,835        | 3.56           | 3.00       |
| Total Fund           | 1,112,191,344     | 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.

Ohio Retirement Study Council  
**HPRS Total Fund Performance vs. Peers**

As of June 30, 2021

|  | Market Value (\$000) | Trailing Performance (%) |              |              |              |             |             | Calendar Year Performance (%) |              |              |              |
|--|----------------------|--------------------------|--------------|--------------|--------------|-------------|-------------|-------------------------------|--------------|--------------|--------------|
|  |                      | 2 Quarters               | 1 Year       | 3 Years      | 5 Years      | 7 Years     | 10 Years    | 2020                          | 2019         | 2018         | 2017         |
| <b>HPRS</b>                                      | <b>1,112,191</b>     | <b>11.29</b>             | <b>34.43</b> | <b>13.15</b> | <b>12.36</b> | <b>9.10</b> | <b>9.32</b> | <b>16.86</b>                  | <b>18.85</b> | <b>-4.57</b> | <b>15.01</b> |
| HPRS Total Fund Benchmark                        |                      | 10.02                    | 29.88        | 11.82        | 11.20        | 8.48        | 8.90        | 13.16                         | 17.85        | -3.38        | 14.55        |
| Difference                                       |                      | 1.27                     | 4.55         | 1.33         | 1.16         | 0.62        | 0.42        | 3.70                          | 1.00         | -1.19        | 0.46         |
| <i>All Public Plans &gt; \$1B-TF Median</i>      |                      | 9.63                     | 27.45        | 11.18        | 10.97        | 8.25        | 8.64        | 12.04                         | 17.28        | -3.04        | 16.00        |
| Rank   |                      | 15                       | 4            | 9            | 11           | 16          | 27          | 3                             | 24           | 75           | 64           |
| Population                                       |                      | 168                      | 166          | 158          | 155          | 154         | 150         | 202                           | 184          | 143          | 109          |
| <i>All Public Plans \$250M to \$1B-TF Median</i> |                      | 8.94                     | 27.23        | 11.77        | 11.31        | 8.59        | 9.13        | 13.16                         | 18.76        | -4.58        | 15.60        |
| Rank   |                      | 3                        | 5            | 12           | 16           | 30          | 38          | 10                            | 48           | 50           | 63           |
| Population                                       |                      | 105                      | 105          | 93           | 91           | 90          | 83          | 119                           | 121          | 76           | 41           |

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



## Appendix

### Performance Related Comments

- Performance shown is gross of fees unless otherwise noted and is annualized for periods greater than one year.
- Peer group ranks are measured in percentiles.
- 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.
- In 2005, the 401(h) Health Care Trust portfolio assets were segregated from the pension portfolio and invested with a more conservative asset-allocation. In 2014, the 115 Health Care Trust portfolio was created as another funding vehicle for post-employment health care for members in the Traditional Pension Plan and Combined Plan. Assets were segregated into the 115 Health Care Trust beginning September 2014, with the initial health care disbursements from the trust commencing late 2015 for January 2016 premium reimbursements. Favorable rulings from the Internal Revenue Service received March 2016 allowed OPERS to consolidate health care assets from the VEBA Trust and the 401(h) Health Care Trust into the 115 Health Care Trust.

### Asset Class Fee Comparison – as of 6/30/2021

|  | (annualized fees shown in basis points) |               |                      |              |             |                |             |                    |
|--|---|---------------|----------------------|--------------|-------------|----------------|-------------|--------------------|
|  | Domestic Equity                         | Global Equity | International Equity | Fixed Income | Real Estate | Private Equity | Hedge Funds | Other Alternatives |
| <span style="color: blue;">■</span> PERS (DB)    | 2                                       | -             | 24                   | 7            | 68          | 49             | 121         | 49                 |
| <span style="color: red;">■</span> PERS (HC 115) | 0                                       | -             | 4                    | 1            | -           | -              | 8           | 2                  |
| <span style="color: green;">■</span> STRS        | 11                                      | -             | 18                   | 6            | 47          | 69             | 200         | 71                 |
| <span style="color: yellow;">■</span> OP&F       | 47                                      | -             | 45                   | 58           | 66          | 71             | -           | 94                 |
| <span style="color: orange;">■</span> SERS       | 19                                      | -             | 44                   | 31           | 81          | 123            | 68          | 179                |
| <span style="color: purple;">■</span> HPRS       | 16                                      | 52            | 89                   | 48           | 127         | 112            | 90          | 119                |

- Fees for Private Equity are based on committed capital, with the exception of SERS and OP&F, which is based on AUM.
- PERS (DB) and PERS (HC 115) Other Alternatives include Risk Parity, GTAA, Opportunistic, and Commodities.
- PERS (DB) and PERS (HC 115) expenses for Real Estate, Private Equity, and Hedge Funds include net management fees and partnership expenses. Fees are estimated and are for externally managed accounts or portfolios.
- PERS (HC 115) Domestic Equity fee is 0.33 bps.
- STRS Other Alternatives fees include Opportunistic/Diversified Investments excluding Hedge Fund exposure.
- OP&F Fixed income fee is the weighted average of Core Fixed Income, High Yield, Private Credit Fixed Income, and US TIPS. Core Fixed income and US TIPS fees are on the notional value of the portfolio.
- OP&F Other Alternatives fees include Real Assets, MLPs, and Gold.
- SERS Other Alternatives fees include Opportunistic and Tactical Portfolio.
- HPRS Other Alternatives fees include Real Assets.

## Appendix

### Percentage of Assets Managed by External Managers – as of 6/30/2021

| Percentage of Assets Managed by External Managers - As of 6/30/2021 |            |                 |                      |              |             |                |             |                    |
|---|------------|-----------------|----------------------|--------------|-------------|----------------|-------------|--------------------|
|   | Total Fund | Domestic Equity | International Equity | Fixed Income | Real Estate | Private Equity | Hedge Funds | Other Alternatives |
| ■ PERS (DB)   | 50%        | 4%              | 77%                  | 25%          | 100%        | 100%           | 100%        | 72%                |
| ■ PERS (HC 115)   | 27%        | 4%              | 77%                  | 14%          | -           | -              | 100%        | 27%                |
| ■ STRS  | 34%        | 11%             | 46%                  | 11%          | 14%         | 98%            | 100%        | 75%                |
| ■ OP&F  | 99%        | 100%            | 100%                 | 100%         | 100%        | 100%           | -           | 100%               |
| ■ SERS  | 97%        | 100%            | 100%                 | 100%         | 100%        | 100%           | 100%        | 100%               |
| ■ HPRS  | 100%       | 100%            | 100%                 | 100%         | 100%        | 100%           | 100%        | 100%               |

- PERS (DB) and PERS (HC 115) Other Alternatives include Risk Parity, GTAA, Opportunistic, and Commodities.
- STRS Other Alternatives include Opportunistic/Diversified Investments excluding Hedge Fund exposure.
- OP&F Other Alternatives include Real Assets, MLPs, and Gold.
- OP&F's Cash is 45% externally managed.
- SERS Other Alternatives include Opportunistic Investments and Tactical Portfolio.
- SERS has one internally-managed Cash mandate.
- HPRS Other Alternatives include Real Assets.

### Percentage of Actively Managed Assets – as of 6/30/2021

| Percentage of Assets Actively Managed - As of 6/30/2021 |            |                 |                      |              |             |                |             |                    |
|---|------------|-----------------|----------------------|--------------|-------------|----------------|-------------|--------------------|
|   | Total Fund | Domestic Equity | International Equity | Fixed Income | Real Estate | Private Equity | Hedge Funds | Other Alternatives |
| ■ PERS (DB)   | 67%        | 16%             | 82%                  | 74%          | 100%        | 100%           | 100%        | 75%                |
| ■ PERS (HC 115)   | 51%        | 16%             | 82%                  | 71%          | -           | -              | 100%        | 29%                |
| ■ STRS  | 89%        | 67%             | 100%                 | 100%         | 84%         | 100%           | 100%        | 100%               |
| ■ OP&F  | 84%        | 73%             | 100%                 | 50%          | 100%        | 100%           | -           | 100%               |
| ■ SERS  | 77%        | 33%             | 77%                  | 100%         | 96%         | 100%           | 100%        | 100%               |
| ■ HPRS  | 81%        | 20%             | 100%                 | 100%         | 100%        | 100%           | 100%        | 100%               |

- PERS (DB) and PERS (HC 115) Other Alternatives include Risk Parity, GTAA, Opportunistic, and Commodities.
- STRS Other Alternatives include Opportunistic/Diversified Investments excluding Hedge Fund exposure.
- OP&F Other Alternatives include Real Assets, MLPs, and Gold.
- SERS Other Alternatives include Opportunistic Investments and Tactical Portfolio.
- SERS has one internally-managed Cash mandate.
- HPRS Other Alternatives include Real Assets.



## Custom Benchmark Glossary

### PERS (DB) Total Fund Custom Benchmark:

- 23.9% Russell 3000 Index
- 23.0% PERS (DB) International Equity Custom Benchmark
- 11.0% PERS (DB) Core Fixed Income Custom Benchmark
- 3.0% Bloomberg U.S. Treasury Index
- 2.0% Bloomberg U.S. High Yield Index
- 5.0% PERS (DB) EMD Custom Benchmark
- 1.0% PERS (DB) Securitized Debt Custom Benchmark
- 3.0% Bloomberg U.S. TIPS Index
- 10.0% PERS (DB) Real Estate Custom Benchmark
- 12.0% PERS (DB) Private Equity Custom Benchmark
- 0.1% PERS (DB) S&P Risk Parity Index – 8% Target Volatility
- 1.0% Commodities Custom Benchmark
- 5.0% PERS (DB) Risk Parity Custom Benchmark

### PERS (HC 115) Total Fund Custom Benchmark:

- 27.9% Russell 3000 Index
- 25.0% PERS (HC 115) International Equity Custom Benchmark
- 17.0% PERS (HC 115) Core Fixed Income Custom Benchmark
- 2.0% PERS (HC 115) EMD Custom Benchmark
- 4.0% Bloomberg U.S. High Yield Index
- 2.0% PERS (HC 115) Securitized Debt Custom Benchmark
- 7.0% Bloomberg U.S. TIPS Index
- 7.0% Dow Jones U.S. Select Real Estate Securities TR Index
- 0.1% PERS (HC 115) S&P Risk Parity Index – 8% Target Volatility
- 4.0% Commodities Custom Benchmark
- 2.0% PERS (HC 115) Risk Parity Custom Benchmark
- 2.0% Bloomberg U.S. Treasury Index

### STRS Total Fund Custom Benchmark:

- 28.0% Russell 3000 Index
- 23.0% MSCI World Ex US Index (50% Hedged)/ MSCI Emg Mkts Index
- 21.0% STRS Fixed Income Blended Benchmark
- 10.0% STRS Real Estate Custom Benchmark
- 10.0% Opportunistic Composite Performance
- 7.0% Private Equity Composite Performance
- 1.0% BofA Merrill Lynch 91-Day T-Bill

### OP&F Total Fund Custom Benchmark:

- 17.9% Wilshire 5000 Index
- 12.0% MSCI ACW Ex US IMI Index (Net)
- 18.4% Bloomberg US Aggregate Bond Index + Leverage Factor
- 7.2% CS High Yield Dev. Countries Only Index
- 13.6% Bridgewater Custom US TIPS Index
- 2.4% S&P LTSA Levered Loan Index + 2%
- 9.6% NCREIF ODCE (Net) (1 Quarter Lag)
- 3.2% OP&F Real Assets Custom Index
- 4.0% Alerian MLP Index
- 6.4% OP&F Private Equity Custom Benchmark
- 5.3% S&P GSCI Gold Index Minus the Cost of Financing

\*OP&F's target allocations are based on notional value, and have been scaled to 100% for this report.

### SERS Total Fund Custom Benchmark:

- 24.75% Russell 3000 Index
- 20.25% SERS International Equity Custom Benchmark
- 19.0% Bloomberg US Aggregate Bond Index
- 16.0% NCREIF Property Index (1 Quarter Lag)
- 4.0% HFRI FOF Composite Index + 1%
- 3.0% 3 Month LIBOR Rate + 4.5%
- 11.0% Burgiss All Private Equity (1 Quarter Lag)
- 2.0% Citigroup 30 Day T-Bill Index

### HPRS Total Fund Custom Benchmark:

- 21.0% Russell 3000 Index
- 6.0% HPRS International Equity Custom Benchmark
- 24.0% HPRS Global Equity Custom Benchmark
- 15.0% HPRS Fixed Income Custom Benchmark
- 8.0% HPRS Total Real Estate Composite (Net)
- 8.0% HFRI FOF Composite Index
- 11.0% HPRS Total Private Equity Custom Composite
- 4.0% HPRS Real Assets Composite (Net)
- 3.0% BofA Merrill Lynch 91-Day T-Bill

## Custom Benchmark Glossary

### **PERS (DB) International Equity Custom Benchmark:**

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

### **PERS (DB) Core Fixed Income Custom Benchmark:**

- Bloomberg US Aggregate Bond Index

### **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) Securitized Debt Custom Benchmark:**

- 50% Bloomberg Non-Agency Investment Grade CMBS: BBB Total Return Index (Unhedged) (USD)
- 50% Bloomberg Non-Agency CMBS Agg Eligible Total Return Index Value (Unhedged) (USD)

### **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)
- Prior to 2013: Russell 3000 Index + 300 bps (1 Quarter Lag)

### **PERS (DB) Hedge Funds Custom Benchmark:**

- 65% HFRI Event Driven (Total) Index
- 35% HFRI Relative (Total) Index

### **PERS (DB) Opportunistic Custom Benchmark:**

- The market weight of underlying portfolio benchmarks

### **PERS (DB) Risk Parity Custom Benchmark:**

- HFR Risk Parity Vol 15 Institutional Index

### **PERS (HC 115) International Equity Custom Benchmark:**

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

### **PERS (HC 115) Core Fixed Income Custom Benchmark:**

- Bloomberg US Aggregate Bond Index

### **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) Securitized Debt Custom Benchmark:**

- 50% Bloomberg Non-Agency Investment Grade CMBS: BBB Total Return Index (Unhedged) (USD)
- 50% Bloomberg Non-Agency CMBS Agg Eligible Total Return Index Value (Unhedged) (USD)

### **PERS (HC 115) Hedge Funds Custom Benchmark:**

- 65% HFRI Event Driven (Total) Index
- 35% HFRI Relative (Total) Index

### **PERS (HC 115) Opportunistic Custom Benchmark:**

- The market weight of underlying portfolio benchmarks

### **PERS (HC 115) Risk Parity Custom Benchmark:**

- HFR Risk Parity Institutional Custom Index

### **STRS International Equity Custom Benchmark:**

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

### **STRS Fixed Income Blended Benchmark:**

- Effective July 1, 2017, the Fixed Income Blended Benchmark is calculated using the actual daily beginning weight of Core Fixed Income multiplied by the Bloomberg U.S. Universal Index return combined with the actual daily beginning weight of the Liquid Treasury Portfolio multiplied by the Bloomberg US Intermediate Treasury Index return. Prior to July 1, 2017, the Fixed Income Blended Benchmark consisted of the Bloomberg U.S. Universal 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

## Custom Benchmark Glossary

### STRS Opportunistic Custom Benchmark:

- Russell 3000 - 100 basis points

### OP&F Real Assets Custom Benchmark:

- 45% FTSE Dev Core 50/50 Infrastructure Index
- 35% NCREIF Timberland Index
- 20% NCREIF Farmland Index (1 Quarter Lag)

### OP&F Private Equity Custom Benchmark:

- Actual net of fee return of the Private Equity Composite

### 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 Opportunistic Custom Benchmark:

- Bloomberg US Aggregate Bond Index + 2%
- Prior to 2020Q1: SERS Total Fund Custom Benchmark

### HPRS International Equity Custom Benchmark:

- 67% MSCI Emerging Markets
- 33% MSCI EAFE Small Cap

### HPRS Fixed Income Custom Benchmark:

- 40% Bloomberg Aggregate Bond Index
- 45% Credit Suisse Leveraged Loans
- 15% JP Morgan EMBI Global Diversified

### HPRS Total Private Equity Custom Benchmark:

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

## 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.

## 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:

### Alpha

Absolute Return Strategies  
Currency Overlay  
GTAA (Global Tactical Asset Allocation)

### Capital Appreciation

Public Equity  
Private Equity  
Preferred Securities  
High Yield  
Convertible Fixed Income  
TALF Funds  
Distressed Debt  
Emerging Market Fixed Income  
MLPs  
Value Added Real Estate  
Opportunistic Real Estate

### Capital Preservation

Core Fixed Income  
CMBS Fixed Income  
Asset Backed Fixed Income  
Domestic Core Plus Fixed Income  
Mortgage Backed Fixed Income  
International Developed Fixed Income  
Cash Equivalents  
Stable Value

### Inflation

TIPS  
Bank Loans  
Core Real Estate  
Real Return  
Inflation Hedges  
REITs  
Commodities

**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

BOISE

CHICAGO

NEW YORK

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