

RVK

# Semi-Annual Performance Report

Ohio Retirement Study Council

December 31, 2024

## 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

**Fourth Quarter Economic Environment**

Despite multiple risks to economic growth—including persistent pockets of inflation, ongoing wars, and the prospect of renewed trade disruptions—risk assets delivered robust returns in 2024. For the calendar year, the MSCI All Country World Investable Market Index generated returns of 16.9%, primarily due to the returns of the US stock market and many of its largest companies. However, during Q4, investor sentiment for Chinese and other non-US securities weakened due to the trade measures expected from the second Trump administration, which caused global stock markets to experience a minor retracement. Credit spreads within debt markets continued to tighten throughout the year, leading to attractive returns for noninvestment grade, leveraged loan, securitized, and hard currency emerging markets debt. In December, the Organisation for Economic Co-operation and Development (OECD) Economic Outlook report forecasted global GDP growth of 3.2% for 2024, with a slight increase to 3.3% in 2025 and 2026. The year-over-year Headline Consumer Price Index change was 2.9% according to the December reading, representing a decline from 3.4% at the end of 2023. The Federal Open Markets Committee (FOMC) continued its trend of reducing the Federal Funds Rate with a 0.25% cut in December, following a 0.25% cut in November and 0.50% cut in September. The range for the Federal Funds Rate is now 4.25%–4.50%, down from its recent peak range of 5.25%–5.50%.

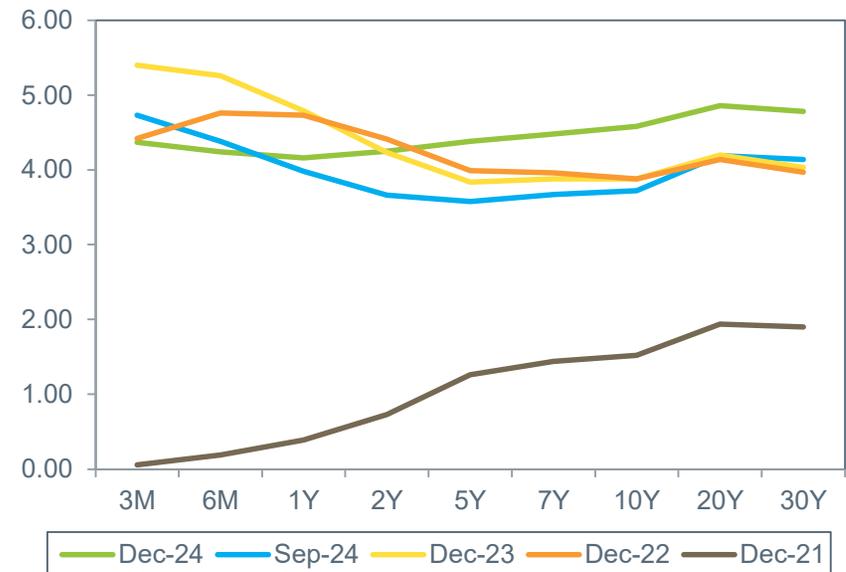
**Key Economic Indicators**



Economic Indicators	Dec-24	Sep-24	Dec-23	Dec-21	20 Yr
Federal Funds Rate (%)	4.33 ▼	4.83	5.33	0.07	1.68
Breakeven Infl. - 5 Yr (%)	2.37 ▲	2.06	2.14	2.91	1.93
Breakeven Infl. - 10 Yr (%)	2.33 ▲	2.16	2.17	2.59	2.09
CPI YoY (Headline) (%)	2.9 ▲	2.4	3.4	7.0	2.6
Unemployment Rate (%)	4.1 —	4.1	3.7	3.9	5.8
Real GDP YoY (%)	2.5 ▼	2.7	3.1	5.4	2.0
PMI - Manufacturing	49.2 ▲	47.2	47.4	58.8	52.9
USD Total Wtd Idx	129.49 ▲	121.53	118.77	115.37	104.49
WTI Crude Oil per Barrel (\$)	71.6 ▲	68.2	71.7	75.2	71.9
Gold Spot per Oz (\$)	2,612 ▼	2,636	2,068	1,829	1,335

Market Performance (%)	QTD	CYTD	1 Yr	5 Yr	10 Yr
S&P 500 (Cap Wtd)	2.41	25.02	25.02	14.53	13.10
Russell 2000	0.33	11.54	11.54	7.40	7.82
MSCI EAFE (Net)	-8.11	3.82	3.82	4.73	5.20
MSCI EAFE SC (Net)	-8.36	1.82	1.82	2.30	5.52
MSCI Emg Mkts (Net)	-8.01	7.50	7.50	1.70	3.64
Bloomberg US Agg Bond	-3.06	1.25	1.25	-0.33	1.35
ICE BofAML 3 Mo US T-Bill	1.17	5.25	5.25	2.46	1.77
NCREIF ODCE (Gross)	1.16	-1.43	-1.43	2.87	5.88
FTSE NAREIT Eq REIT (TR)	-6.21	8.73	8.73	4.27	5.73
HFRI FOF Comp	2.30	9.40	9.40	5.28	3.81
Bloomberg Cmdbt (TR)	-0.45	5.38	5.38	6.77	1.28

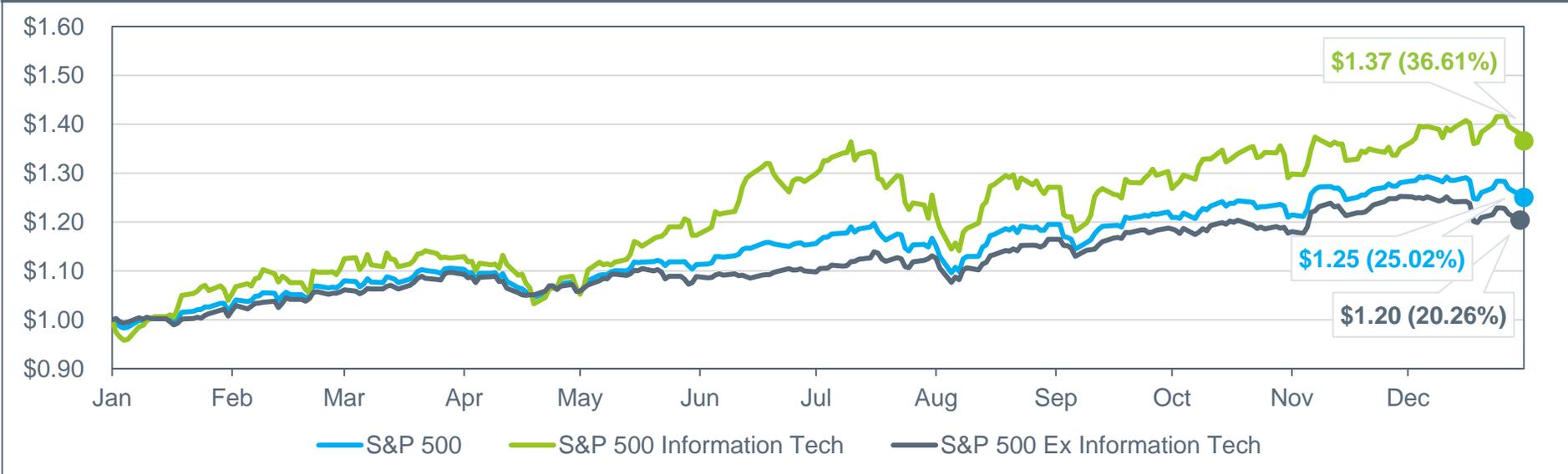
**Treasury Yield Curve (%)**



### 10 Year Treasury Yields



### S&P 500 Index Components: Growth of \$1



Source: Federal Reserve Bank of St. Louis and FactSet.  
 Treasury Yield Dates: Beginning: January 2, High: April 25, Low: September 16, End: December 31.

Fourth Quarter Review

**Broad Market**

US equities began on a strong note in Q4, supported by easing monetary policy and optimism related to anticipated policies from the incoming administration. This positive momentum lasted through much of the quarter but was disrupted after the December FOMC meeting. During the meeting, guidance was provided that interest rates could remain higher than expected, triggering a sharp market correction. US markets still ended Q4 in positive territory, with the Russell 3000 Index gaining 2.6% in Q4 and 23.8% for the year.

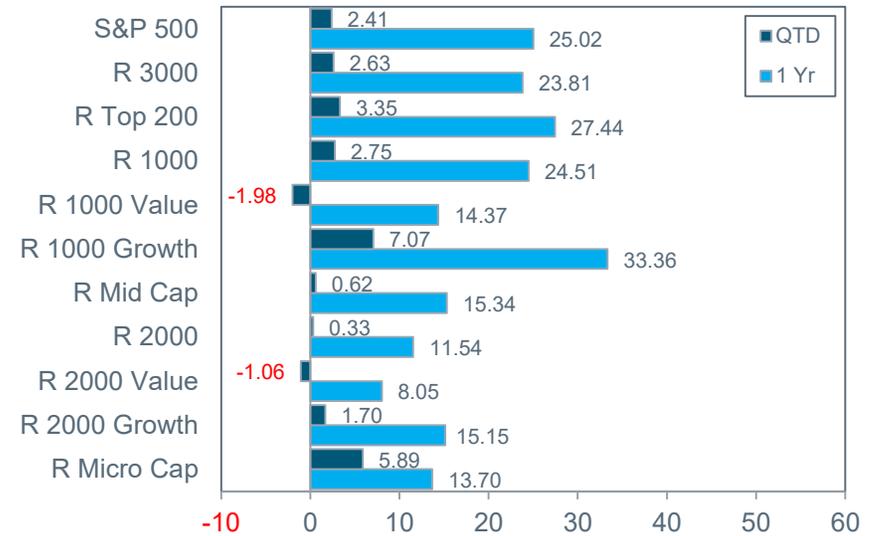
**Market Cap**

The Russell 1000 Growth Index gained 7.1%, while the Russell 2000 Value Index declined by -1.1%. Gains were concentrated in a few sectors, with only 4 of the 11 GICS sectors posting positive results.

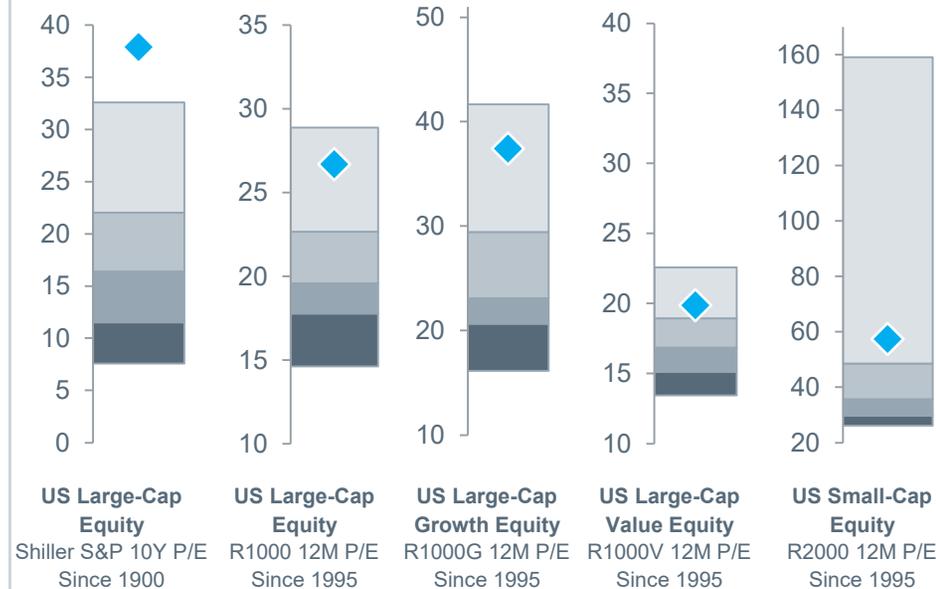
**Style and Sector**

Active managers faced headwinds during the quarter, with median core and growth managers underperforming across size spectrums. Value managers fared the best, with median large-cap and small-cap value managers generating incremental excess returns.

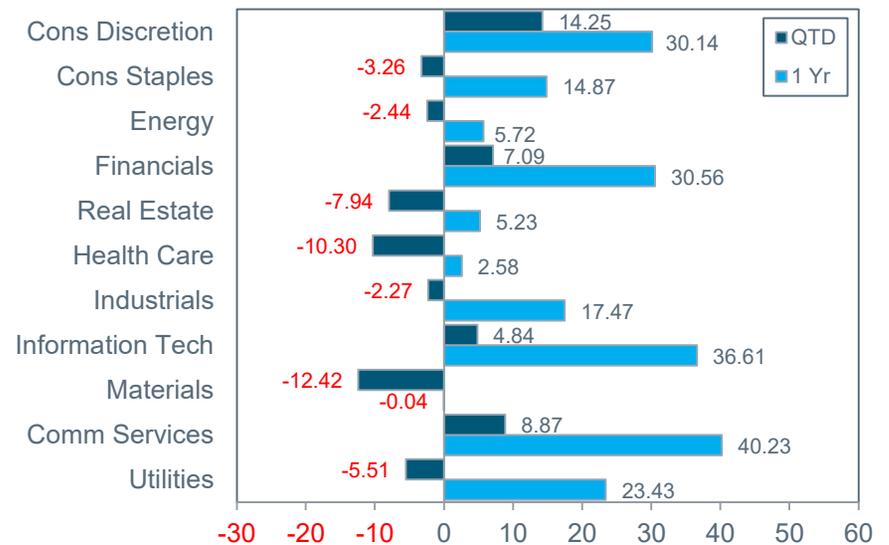
Style and Capitalization Market Performance (%)



Valuations



S&P 500 Index Sector Performance (%)

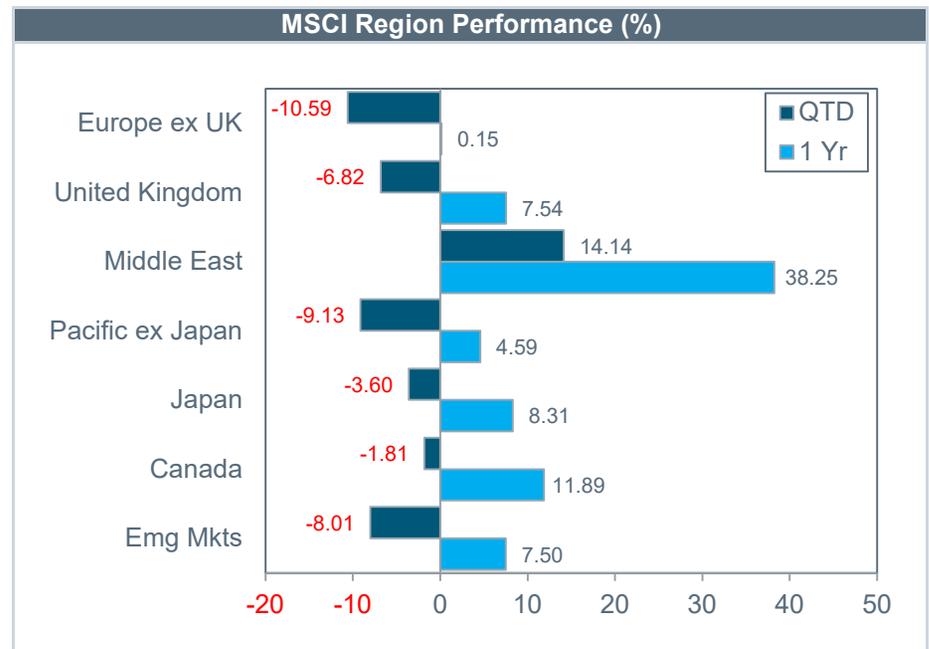
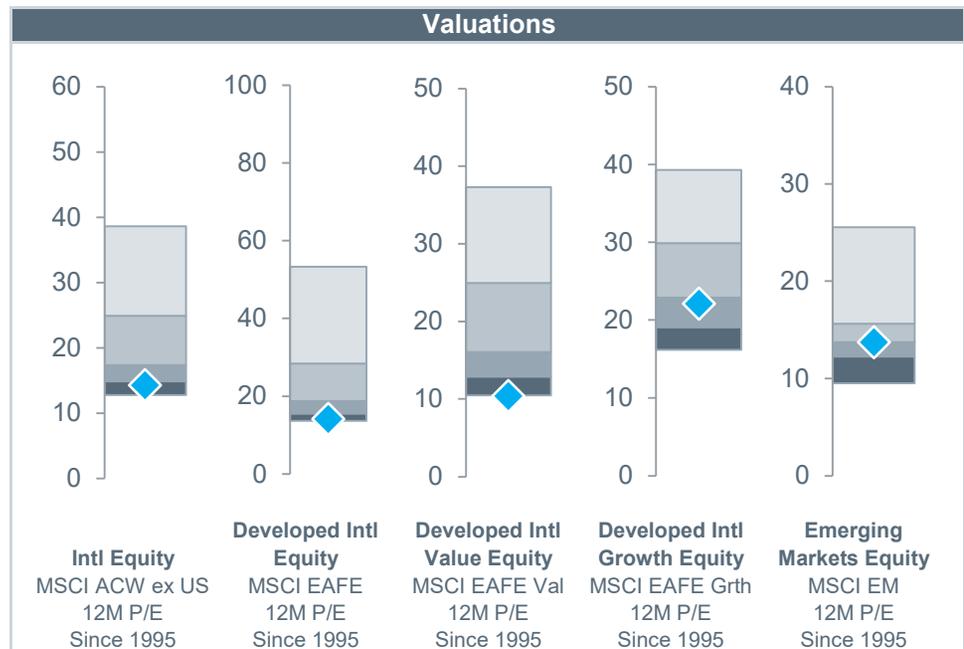
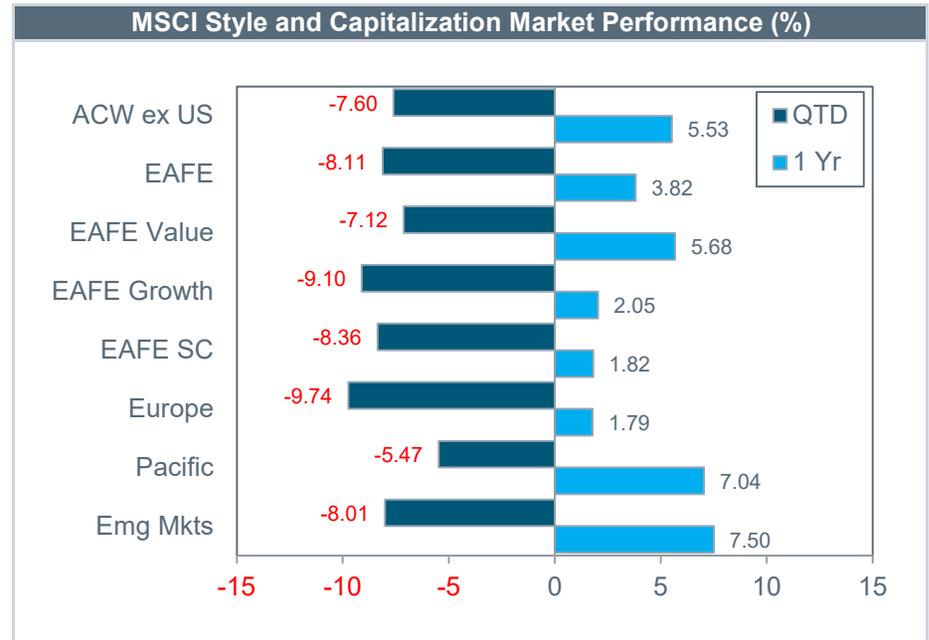


Valuation data courtesy of Bloomberg Professional Service and Robert J. Shiller, Irrational Exuberance, Second Edition. P/E metrics shown represent the 5th through 95th percentiles to minimize the effect of outliers.

### Fourth Quarter Review

**Developed Markets**  
 Developed international markets posted significant negative results in Q4, with the MSCI EAFE Index generating returns of -8.1% in Q4. International value stocks continued to outperform growth stocks during the quarter—outperforming by a wide margin for the year. Small-cap slightly underperformed large-cap stocks for Q4 and all of 2024. Most country returns finished the quarter in negative territory. Israel was a standout, with double-digit positive returns, while Singapore, Taiwan, and Austria posted more modest gains. European securities continue to struggle due to subdued investor sentiment and lackluster economic forecasts.

**Emerging Markets**  
 Emerging market slightly outperformed developed international markets for Q4. For 2024, emerging markets outperformed with the MSCI Emerging Markets Indexes returning 7.5% compared to 3.8% for the MSCI EAFE Index. Within emerging markets, growth stocks outperformed value stocks in Q4 and the year. Small-cap stocks outperformed large-cap stocks in Q4. China continues to dominate headlines. In Q4, returns for Chinese securities turned negative as investors worried about the impact of tariffs from the incoming Trump administration. Investors also became more skeptical of Chinese government stimulus efforts, which were previously buoying the market.



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.

**Fourth Quarter Review**

**Broad Market**

Treasury yields rose across most maturities in 2024, with a sharp increase in Q4, while the 2-year Treasury yield remained stable. The results of the US election boosted expectations for economic growth, inflation, and deficits, contributing to an increase in the premium for longer-dated debt. In 2024, investor focus was on the Treasury yield curve and spreads between key maturities commonly used as recession indicators. The inversion between the 2- and 10-year Treasuries ended in Q3 while the inversion between the 3-month and 10-year Treasuries ended in Q4. The Bloomberg US Aggregate Bond Index declined by -3.1% in Q4 but finished the year with a 1.3% gain.

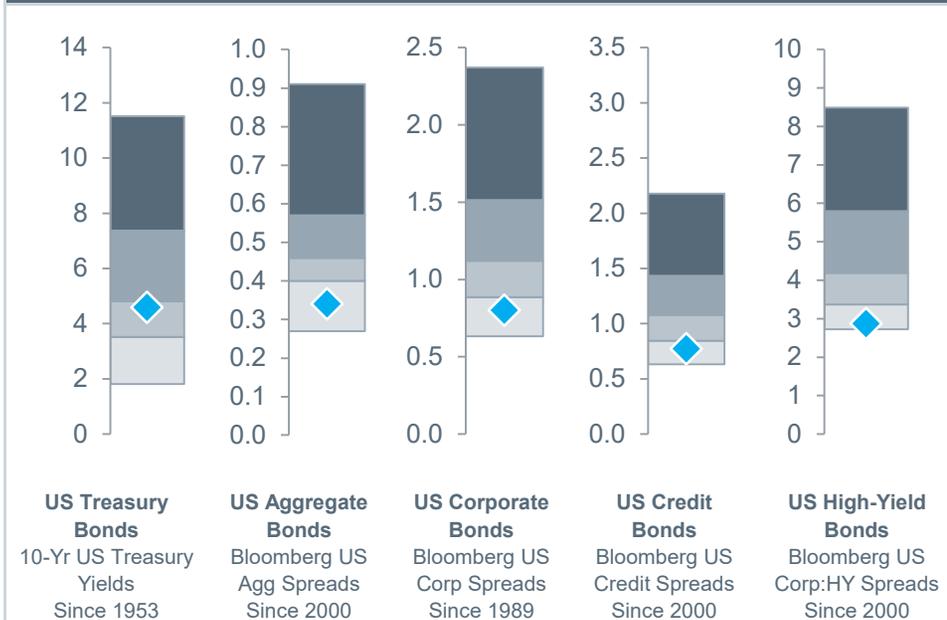
**Credit Market**

Risk assets showed resilience, with lower-rated bonds outperforming. The Bloomberg US Corporate Investment Grade Index posted -3.0% for Q4 and 2.1% for the year, while the Bloomberg US Corporate High Yield Index returned 0.2% in Q4 and 8.2% for the year.

**Emerging Market Debt**

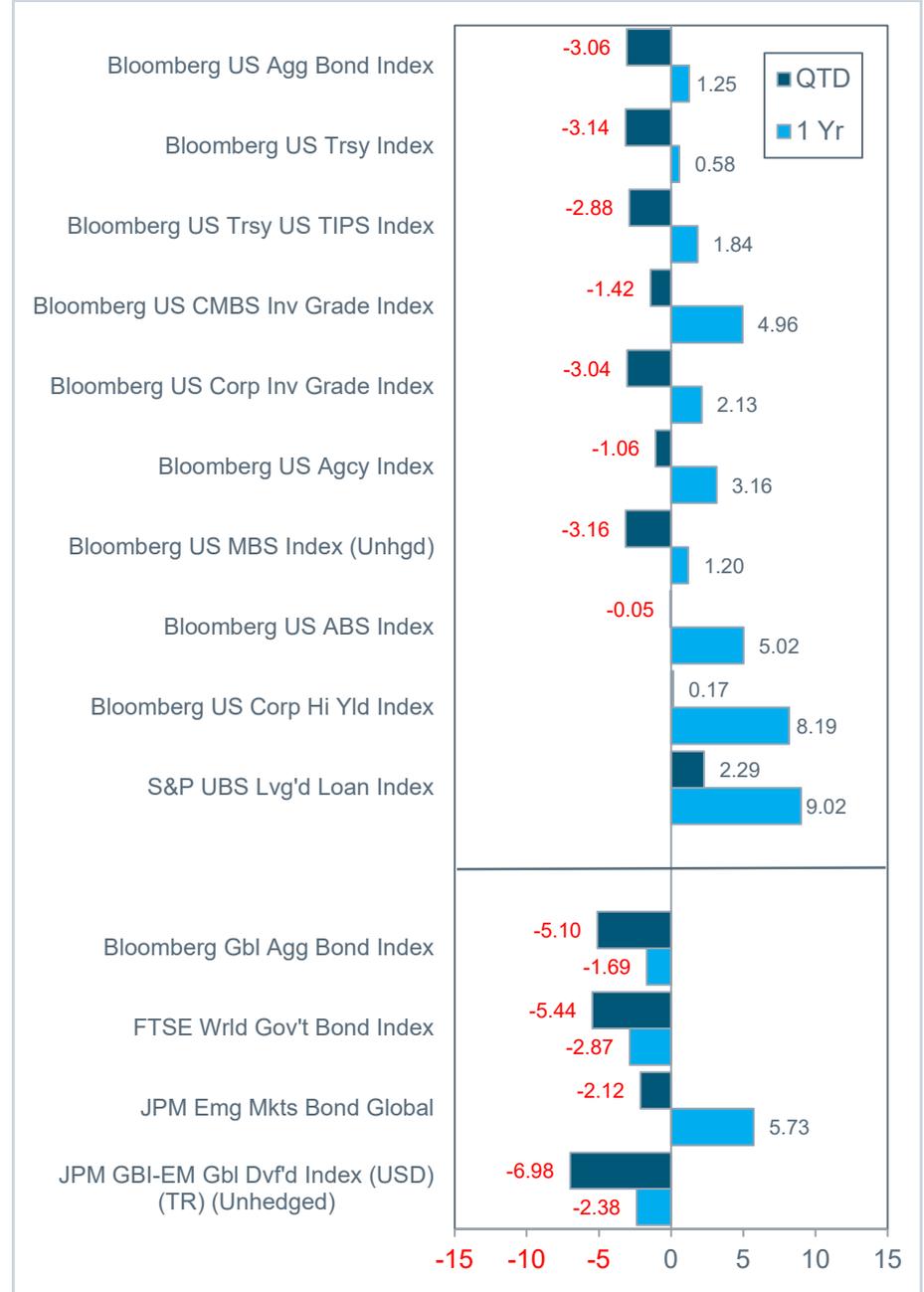
Emerging market debt had mixed results. The JPMorgan EMBI Global Diversified Index, tracking hard currency bonds, fell -1.9% in Q4 but gained 6.5% for the year. In contrast, local currency bonds struggled due to a strong US dollar, with the JPMorgan GBI-EM Global Diversified Index returning -7.0% in Q4 and -2.4% for the year.

**Valuations**



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

**Fixed Income Performance (%)**



**Fourth Quarter Review - Absolute Return**

**General Market - Hedge Funds**

Hedge funds finished the year strongly, with the HFR Composite Index returning 2.5% in Q4, resulting in a total return of 9.2% for 2024. All major strategy indices posted positive results during the quarter. Positive performance primarily came during November, as the US presidential election served as a positive catalyst for various strategies. The top performing strategy index in Q4 was Credit Arbitrage, with a return of 2.9%. Credit Arbitrage managers continued to find opportunities as volatility remained elevated due to the disparity of inflation expectations between policy makers and the bond market.

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

Global Tactical Asset Allocation (GTAA) strategies that RVK follows closely posted negative returns in Q4 to close a challenging year for long-biased active managers, as all underperformed a US-centric blend of 60% equity and 40% fixed income (60/40 blend) in Q4 and 2024. In Q4, the top performing long-biased GTAA strategies featured a higher allocation to US banks, high yield credit, and mega-cap companies that were less sensitive to interest rates. Underperforming peers tended to hold larger exposures to emerging markets and long duration government bonds.

**Fourth Quarter Review - Real Assets**

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

Diversified Inflation Strategies (DIS) closely monitored by RVK reported positive performance for the first three quarters of the year. However, this positive trend reversed in Q4 as rate-sensitive sectors faced pressure following the December FOMC meeting. DIS managers ended the year with negative absolute performance, underperforming a 60/40 blend in Q4 and for the year.

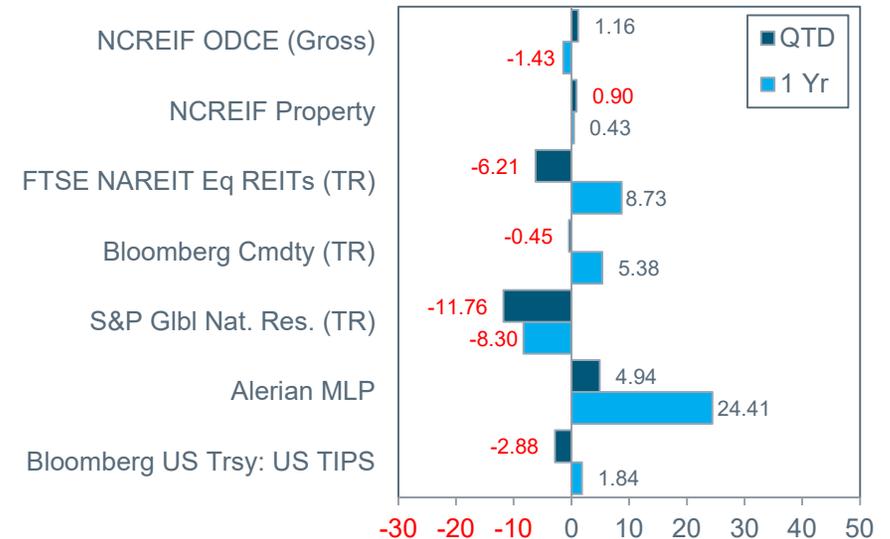
**General Market - Real Estate**

Core private real estate generated a 1.2% total return in Q4 (on a preliminary and gross of fee basis), as reported by the NFI-ODCE Index, with the total return comprised of 1.0% from income and 0.1% from price appreciation. Income returns were generally flat for quarter-over-quarter and remained slightly elevated compared to recent years. This is the first quarter of positive overall price appreciation returns after nine consecutive quarters of negative returns. Investors of publicly traded real estate significantly underperformed their private market counterparts. Publicly traded real estate securities delivered a total return of -8.2% in Q4, as measured by FTSE/NAREIT All REITs Index, finishing 2024 with a 4.9% return.

**HFRI Hedge Fund Performance (%)**



**Real Asset Performance (%)**



Annual Asset Class Performance

As of December 31, 2024

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	CYTD
Best	27.94	22.49	20.00	38.82	30.14	15.02	21.31	37.28	8.35	31.49	19.96	43.24	16.09	26.29	25.02
	26.85	15.99	18.23	32.39	19.31	9.59	17.13	33.01	1.87	26.00	18.40	28.71	7.47	18.24	11.54
	22.04	13.56	18.06	29.30	13.69	3.20	11.96	25.03	0.01	25.53	18.31	27.11	1.46	16.93	9.40
	18.88	8.29	17.32	22.78	12.50	1.38	11.77	21.83	-1.26	24.96	16.12	22.17	-5.31	13.73	8.73
	16.83	7.84	16.35	13.94	5.97	0.55	11.19	14.65	-2.08	22.01	12.34	14.82	-11.19	13.45	8.19
	16.36	4.98	16.00	8.96	4.89	0.05	8.77	10.71	-4.02	19.59	10.99	11.26	-11.85	13.16	7.50
	15.12	2.11	15.81	7.44	3.64	-0.27	8.52	7.77	-4.38	18.42	10.88	10.10	-13.01	9.83	5.38
	15.06	0.10	10.94	2.47	3.37	-0.81	6.67	7.62	-4.62	14.32	7.82	6.17	-14.45	7.13	5.25
	10.16	-4.18	8.78	0.07	2.45	-1.44	4.68	7.50	-4.68	8.72	7.51	5.96	-18.11	6.07	3.82
	7.75	-5.72	6.98	-2.02	0.04	-3.30	2.65	5.23	-11.01	8.43	7.11	5.28	-20.09	5.53	1.84
	6.54	-12.14	4.79	-2.60	-2.19	-4.41	2.18	3.54	-11.25	8.39	1.19	0.05	-20.44	5.02	1.82
	6.31	-13.32	4.21	-8.61	-4.90	-4.47	1.00	3.01	-13.79	7.69	0.67	-1.55	-21.39	3.90	1.25
	5.70	-15.94	0.11	-8.83	-4.95	-14.92	0.51	1.70	-14.57	5.34	-3.12	-2.52	-24.37	-7.91	-1.43
Worst	0.13	-18.42	-1.06	-9.52	-17.01	-24.66	0.33	0.86	-17.89	2.28	-8.00	-2.54	-27.09	-12.02	-4.15
	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	2023	2022	2021	2020
<b>PERS (DB)</b>	<b>104,096,748</b>	<b>3.37</b>	<b>8.96</b>	<b>2.25</b>	<b>6.70</b>	<b>6.71</b>	<b>7.24</b>	<b>11.42</b>	<b>-11.95</b>	<b>15.43</b>	<b>12.11</b>
PERS (DB) Total Fund Benchmark		3.51	7.93	1.83	6.32	6.38	6.82	10.46	-11.44	15.28	11.65
Difference		-0.14	1.03	0.42	0.38	0.33	0.42	0.97	-0.51	0.15	0.46
Rank		72	60	76	68	63	50	52	69	54	47
<b>PERS (HC 115)</b>	<b>13,366,043</b>	<b>3.89</b>	<b>10.00</b>	<b>1.93</b>	<b>6.09</b>	<b>6.11</b>	<b>6.29</b>	<b>13.97</b>	<b>-15.51</b>	<b>14.34</b>	<b>10.96</b>
PERS (HC 115) Total Fund Benchmark		3.90	9.53	1.68	5.66	5.72	5.95	13.65	-15.56	13.76	10.13
Difference		-0.01	0.47	0.26	0.43	0.39	0.33	0.32	0.04	0.58	0.83
Rank		52	30	85	85	84	88	11	96	65	64
<b>STRS</b>	<b>96,270,500</b>	<b>3.68</b>	<b>10.11</b>	<b>3.61</b>	<b>8.31</b>	<b>8.18</b>	<b>8.33</b>	<b>11.64</b>	<b>-9.52</b>	<b>19.36</b>	<b>12.26</b>
STRS Total Fund Benchmark		4.25	10.48	3.43	7.76	7.73	7.87	12.39	-10.90	17.36	11.92
Difference		-0.57	-0.37	0.18	0.54	0.45	0.46	-0.76	1.38	1.99	0.35
Rank		64	27	30	14	9	8	47	42	11	44
<b>OP&amp;F</b>	<b>18,617,767</b>	<b>5.18</b>	<b>11.13</b>	<b>3.56</b>	<b>7.86</b>	<b>7.76</b>	<b>7.96</b>	<b>9.52</b>	<b>-8.73</b>	<b>20.48</b>	<b>9.09</b>
OP&F Total Fund Benchmark		5.25	10.03	2.77	6.76	6.67	6.76	10.30	-10.57	16.29	9.86
Difference		-0.06	1.10	0.80	1.11	1.09	1.21	-0.78	1.84	4.19	-0.78
Rank		6	12	32	28	21	17	80	33	8	85
<b>SERS</b>	<b>19,488,398</b>	<b>4.21</b>	<b>10.33</b>	<b>5.11</b>	<b>9.11</b>	<b>8.73</b>	<b>8.90</b>	<b>10.66</b>	<b>-4.89</b>	<b>17.88</b>	<b>12.99</b>
SERS Total Fund Benchmark		3.83	9.36	3.47	7.22	7.05	7.18	10.00	-7.91	14.66	11.55
Difference		0.38	0.97	1.64	1.90	1.68	1.72	0.66	3.02	3.22	1.44
Rank		28	23	6	4	3	2	67	8	22	34
<b>HPRS</b>	<b>1,143,505</b>	<b>4.15</b>	<b>10.54</b>	<b>5.02</b>	<b>9.61</b>	<b>8.71</b>	<b>8.30</b>	<b>15.03</b>	<b>-8.92</b>	<b>16.92</b>	<b>16.86</b>
HPRS Total Fund Benchmark		4.40	11.57	5.04	8.87	8.25	7.94	14.41	-9.21	16.63	13.16
Difference		-0.25	-1.03	-0.03	0.74	0.46	0.36	0.62	0.28	0.29	3.70
Rank		33	20	9	2	4	8	4	37	36	3
<i>All Public Plans &gt; \$1B-Total Fund Median</i>		3.90	9.24	3.09	7.26	7.01	7.24	11.47	-10.39	15.56	11.86

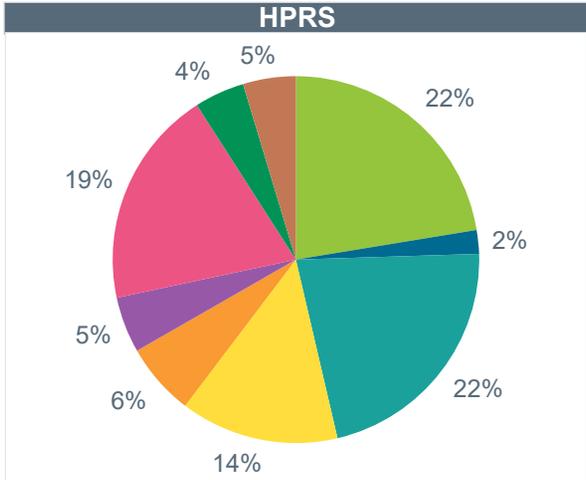
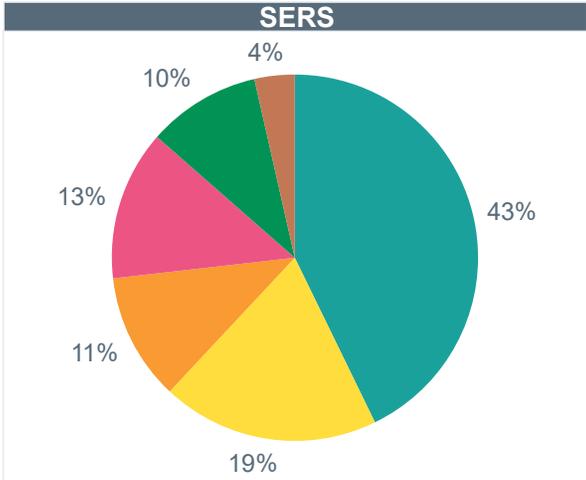
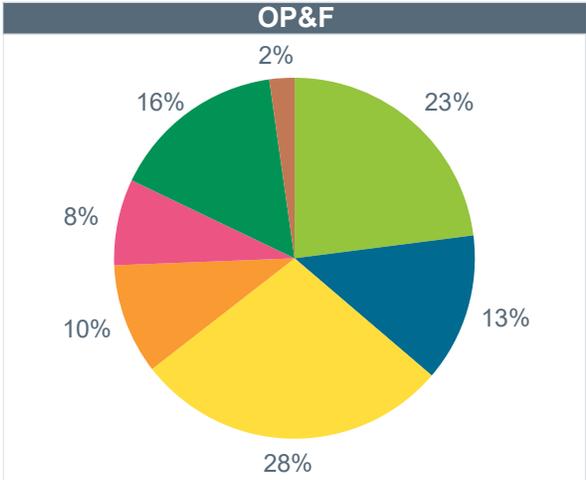
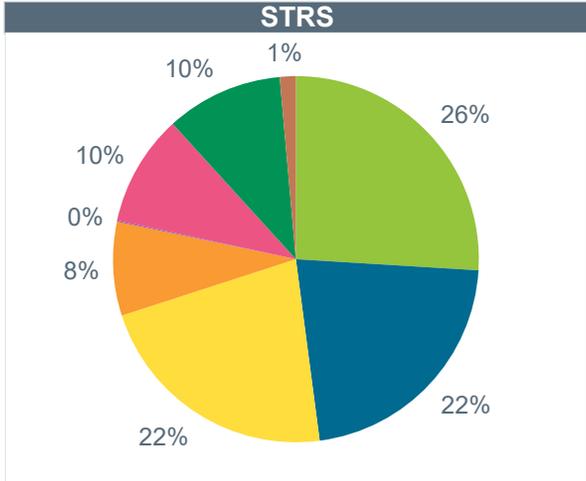
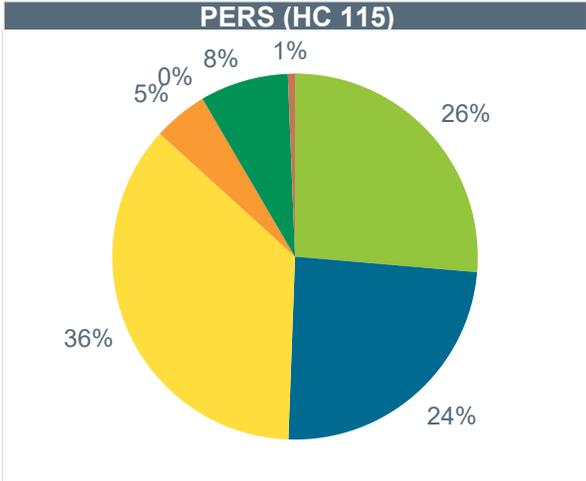
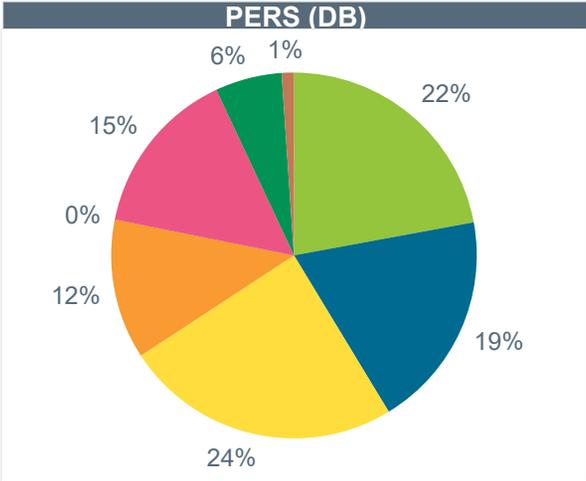
OPERS health care plan is not a pension plan and therefore has significantly different characteristics including a shorter focus asset allocation with more liquidity than the pension plans. For purposes of this study, the OPERS health care plan has been included in the results. The results for OPERS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

Performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments. Ranks are shown against All Public Plans >\$1B-Total Fund. PERS (DB): 3 Year performance reduced 0.36%, 5 Year performance reduced 0.23%, 7 Year performance reduced 0.16%, and 10 Year performance reduced 0.11% due to change in distribution methodology in private equity and real estate portfolios.

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	2023	2022	2021	2020
<b>PERS (DB)</b>	<b>104,096,748</b>	<b>3.30</b>	<b>8.82</b>	<b>2.13</b>	<b>6.60</b>	<b>6.61</b>	<b>7.11</b>	<b>11.26</b>	<b>-12.03</b>	<b>15.34</b>	<b>12.02</b>
PERS (DB) Total Fund Benchmark		3.51	7.93	1.83	6.32	6.38	6.82	10.46	-11.44	15.28	11.65
Difference		-0.21	0.90	0.30	0.27	0.23	0.29	0.81	-0.59	0.06	0.37
<b>PERS (HC 115)</b>	<b>13,366,043</b>	<b>3.89</b>	<b>10.00</b>	<b>1.93</b>	<b>6.09</b>	<b>6.11</b>	<b>6.26</b>	<b>13.97</b>	<b>-15.51</b>	<b>14.34</b>	<b>10.96</b>
PERS (HC 115) Total Fund Benchmark		3.90	9.53	1.68	5.66	5.72	5.95	13.65	-15.56	13.76	10.13
Difference		-0.01	0.47	0.26	0.43	0.39	0.31	0.32	0.04	0.58	0.83
<b>STRS</b>	<b>96,270,500</b>	<b>3.61</b>	<b>9.97</b>	<b>3.48</b>	<b>8.18</b>	<b>8.05</b>	<b>8.21</b>	<b>11.51</b>	<b>-9.64</b>	<b>19.24</b>	<b>12.14</b>
STRS Total Fund Benchmark		4.25	10.48	3.43	7.76	7.73	7.87	12.39	-10.90	17.36	11.92
Difference		-0.64	-0.51	0.05	0.42	0.32	0.33	-0.89	1.26	1.88	0.22
<b>OP&amp;F</b>	<b>18,617,767</b>	<b>4.92</b>	<b>10.58</b>	<b>3.00</b>	<b>7.24</b>	<b>7.13</b>	<b>7.34</b>	<b>9.03</b>	<b>-9.38</b>	<b>19.63</b>	<b>8.51</b>
OP&F Total Fund Benchmark		5.25	10.03	2.77	6.76	6.67	6.76	10.30	-10.57	16.29	9.86
Difference		-0.33	0.55	0.23	0.48	0.46	0.58	-1.26	1.19	3.34	-1.35
<b>SERS</b>	<b>19,488,398</b>	<b>3.80</b>	<b>9.54</b>	<b>4.35</b>	<b>8.39</b>	<b>8.02</b>	<b>8.20</b>	<b>9.89</b>	<b>-5.60</b>	<b>17.13</b>	<b>12.40</b>
SERS Total Fund Benchmark		3.83	9.36	3.47	7.22	7.05	7.18	10.00	-7.91	14.66	11.55
Difference		-0.03	0.19	0.88	1.18	0.97	1.02	-0.11	2.31	2.48	0.86
<b>HPRS</b>	<b>1,143,505</b>	<b>3.95</b>	<b>10.07</b>	<b>4.49</b>	<b>9.08</b>	<b>8.21</b>	<b>7.78</b>	<b>14.39</b>	<b>-9.38</b>	<b>16.31</b>	<b>16.38</b>
HPRS Total Fund Benchmark		4.40	11.57	5.04	8.87	8.25	7.94	14.41	-9.21	16.63	13.16
Difference		-0.44	-1.50	-0.55	0.21	-0.04	-0.16	-0.02	-0.18	-0.32	3.22

Performance shown is net of all investment management costs. PERS (DB): 3 Year performance reduced 0.36%, 5 Year performance reduced 0.23%, 7 Year performance reduced 0.16%, and 10 Year performance reduced 0.11% due to change in distribution methodology in private equity and real estate portfolios.

Ohio Retirement Study Council  
Current Asset Allocation by Asset Class



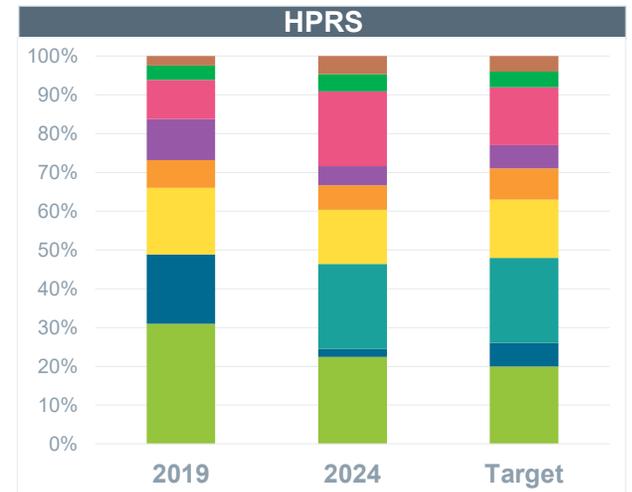
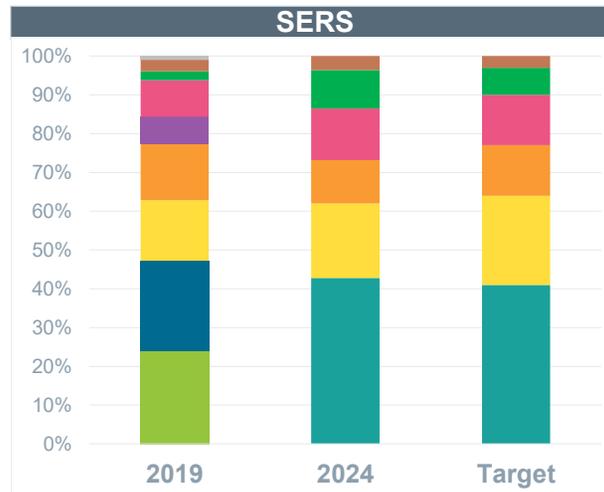
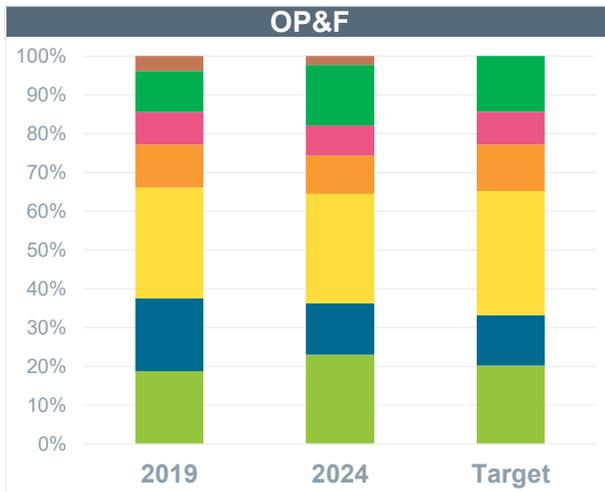
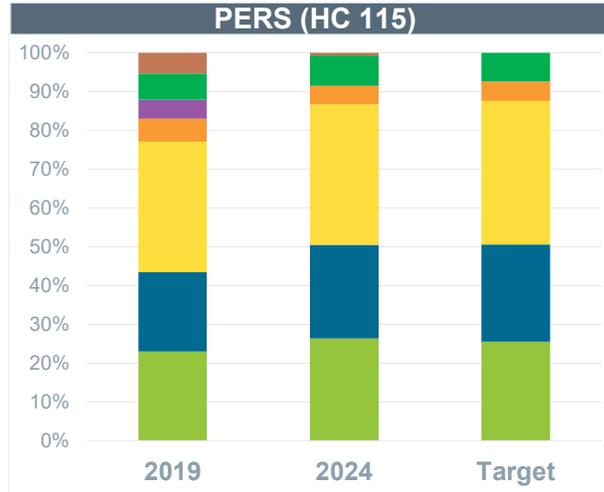
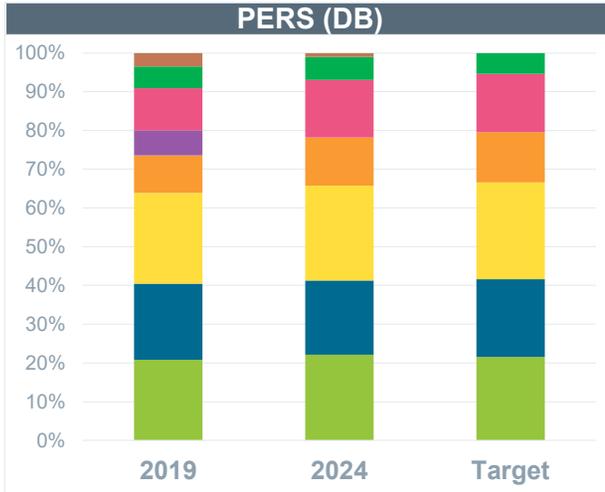
- US Equity
- International Equity
- Global Equity
- Fixed Income
- Real Estate
- Hedge Funds
- Private Equity
- Other Alternatives
- Cash Equivalents

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





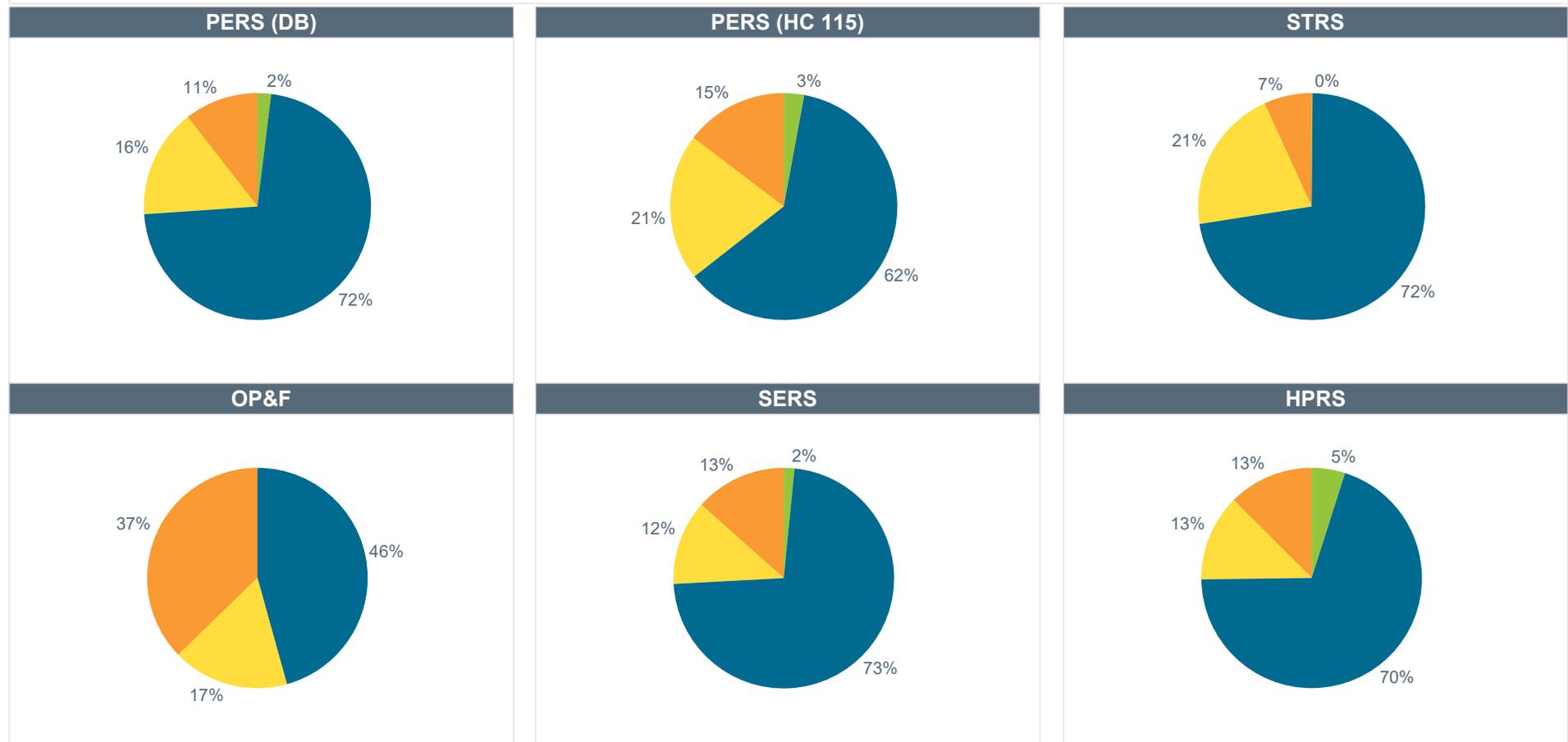
Allocations shown may not add up to 100% due to rounding. US Fixed Income may include allocations to Intl. Fixed Income not explicitly broken out by the plans. Parentheses contain percentile ranks. Cash Equivalents for PERS (DB) consists of cash, rebalancing, and additional annuity. Cash Equivalents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



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

Summary

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



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.

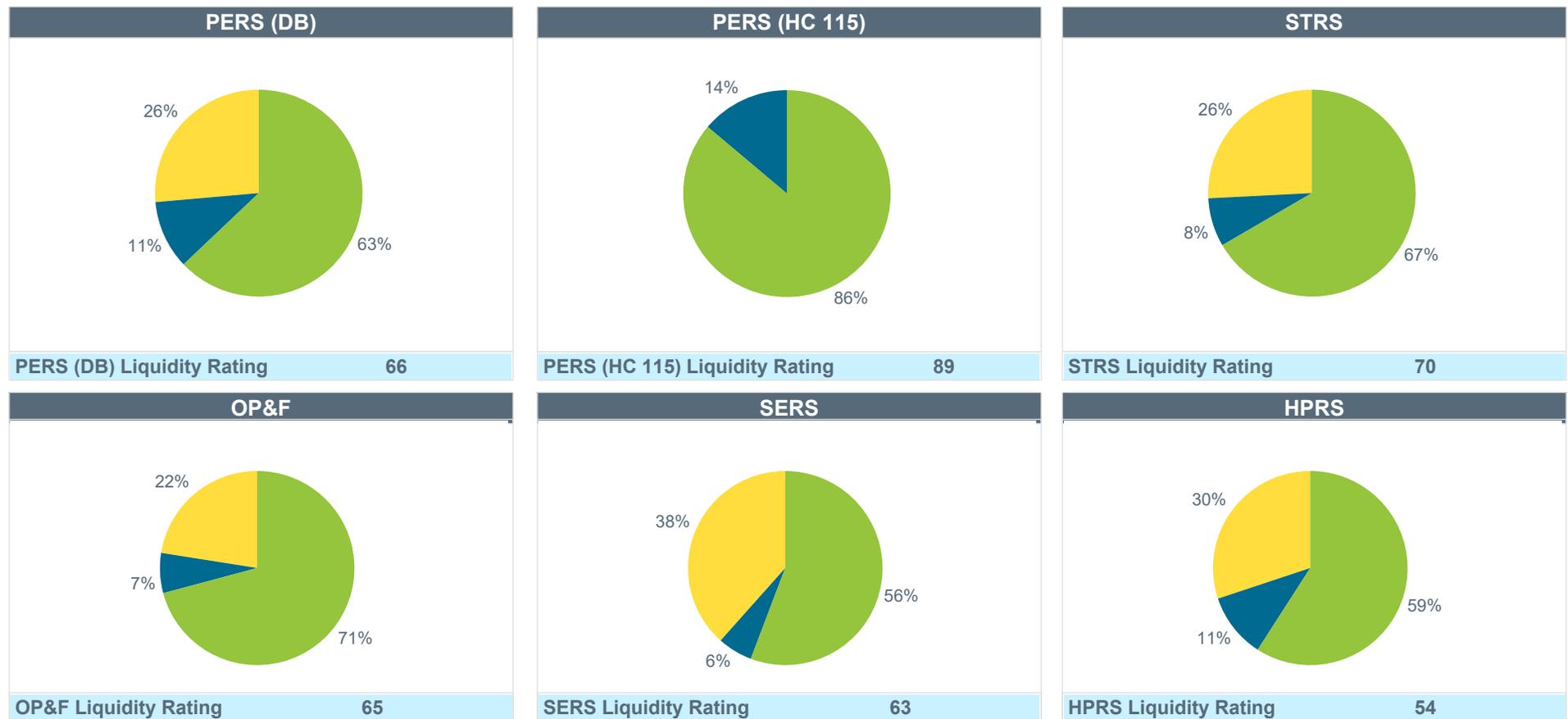
Summary

**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.

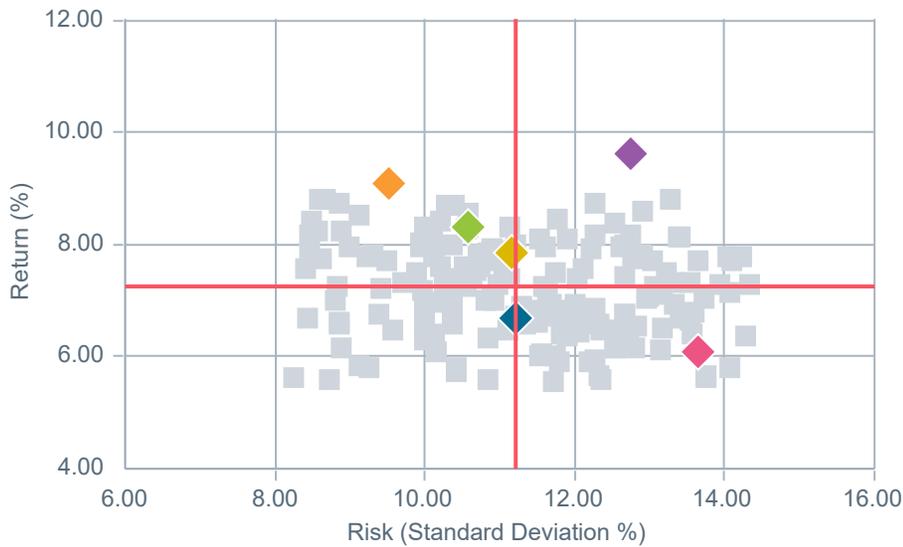


Asset Allocation by Liquidity percentages are provided by the Plans. Allocations are based on dedicated composite allocations and not underlying investment manager exposures; as such, liquidity allocations are approximations. Allocations shown may not sum up to exactly 100% due to rounding. The RVK Liquidity 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. PERS (DB): 3 Year performance reduced 0.36%, 5 Year performance reduced 0.23%, 7 Year performance reduced 0.16%, and 10 Year performance reduced 0.11% due to change in distribution methodology in private equity and real estate portfolios.

Plan Sponsor Peer Group Scattergram - 5 Years

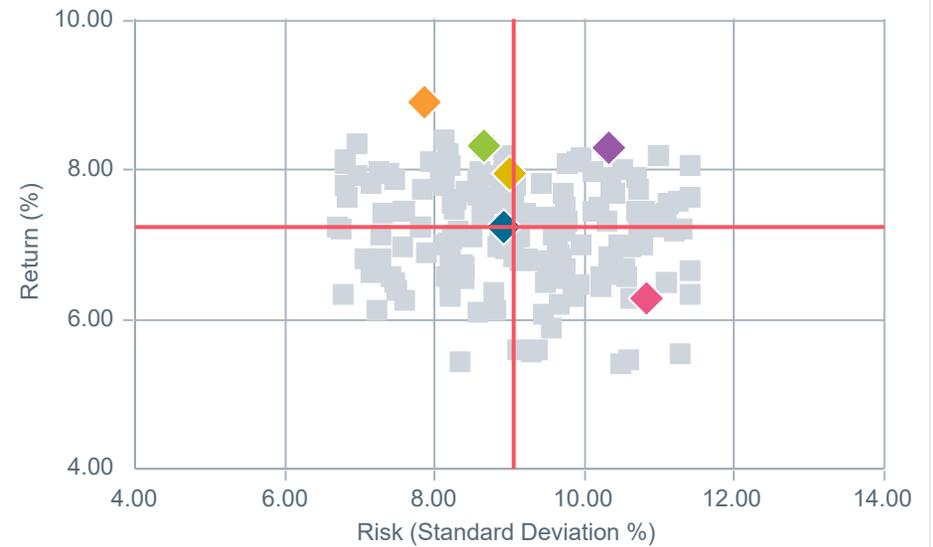


	Return	Standard Deviation
◆ PERS (DB)	6.70	11.22
◆ PERS (HC 115)	6.09	13.64
◆ STRS	8.31	10.58
◆ OP&F	7.86	11.15
◆ SERS	9.11	9.52
◆ HPRS	9.61	12.74
— Median	7.26	11.22

Sharpe Ratio - 5 Year

PERS (DB)	0.42
PERS (HC 115)	0.33
STRS	0.58
OP&F	0.52
SERS	0.70
HPRS	0.60
<i>All Public Plans &gt; \$1B-Total Fund Median</i>	<i>0.45</i>

Plan Sponsor Peer Group Scattergram - 10 Years



	Return	Standard Deviation
◆ PERS (DB)	7.24	8.92
◆ PERS (HC 115)	6.29	10.81
◆ STRS	8.33	8.67
◆ OP&F	7.96	9.01
◆ SERS	8.90	7.86
◆ HPRS	8.30	10.33
— Median	7.24	9.06

Sharpe Ratio - 10 Year

PERS (DB)	0.64
PERS (HC 115)	0.46
STRS	0.77
OP&F	0.70
SERS	0.90
HPRS	0.66
<i>All Public Plans &gt; \$1B-Total Fund Median</i>	<i>0.61</i>

Performance shown is gross of fees.

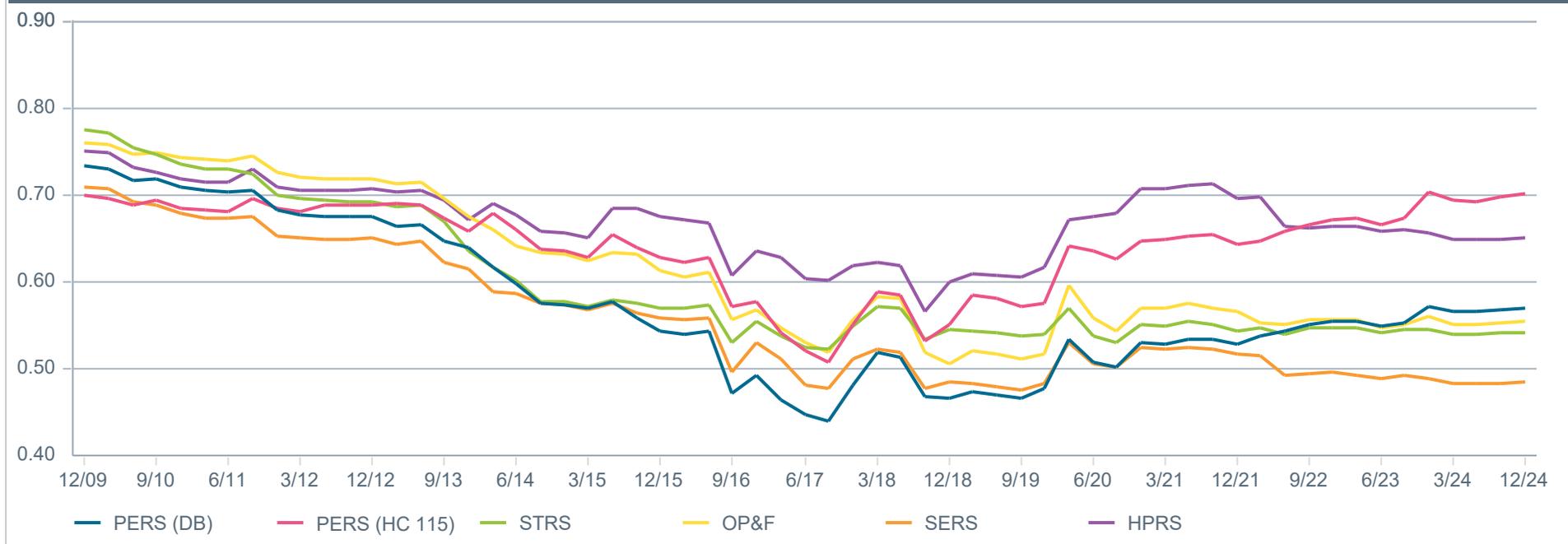
Summary

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 Years	5 Years	7 Years	10 Years
PERS (DB)	0.57	0.57	0.55	0.54
PERS (HC 115)	0.72	0.70	0.67	0.67
STRS	0.50	0.54	0.54	0.54
OP&F	0.48	0.56	0.54	0.55
SERS	0.39	0.48	0.48	0.48
HPRS	0.52	0.65	0.64	0.64
S&P 500 Index (Cap Wtd)	1.00	1.00	1.00	1.00

5 Year Rolling Equity Beta

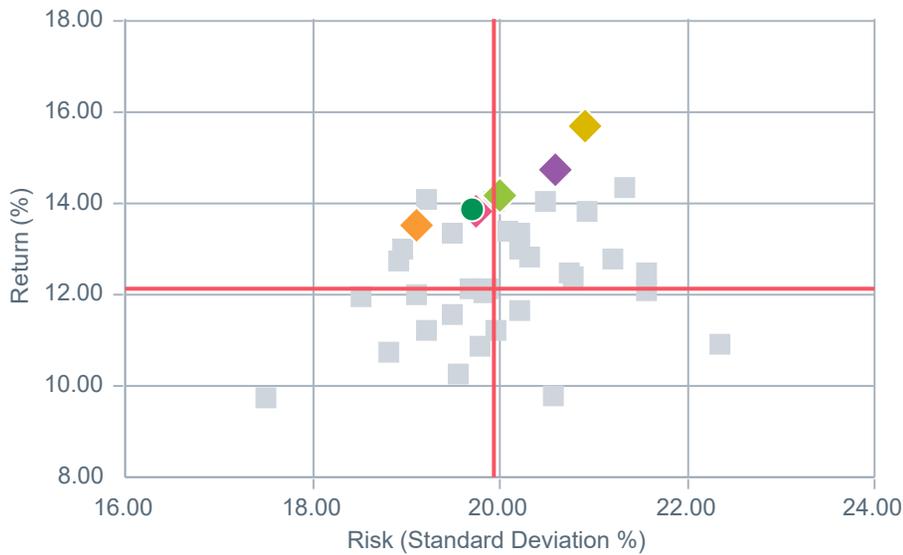


Performance shown is gross of fees and is calculated using quarterly periodicity.

Performance										
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>US Equity</b>										
<b>PERS (DB)</b>	<b>8.91</b>	<b>23.74</b>	<b>8.09</b>	<b>13.80</b>	<b>13.13</b>	<b>12.50</b>	<b>25.95</b>	<b>-18.97</b>	<b>26.30</b>	<b>19.69</b>
Russell 3000 Index	9.03	23.81	8.01	13.86	13.16	12.55	25.96	-19.21	25.66	20.89
Difference	-0.11	-0.07	0.08	-0.06	-0.03	-0.05	-0.01	0.24	0.64	-1.20
Rank	18	19	15	17	12	14	19	61	34	41
<b>PERS (HC 115)</b>	<b>8.91</b>	<b>23.74</b>	<b>8.09</b>	<b>13.80</b>	<b>13.13</b>	<b>12.50</b>	<b>25.95</b>	<b>-18.97</b>	<b>26.30</b>	<b>19.69</b>
Russell 3000 Index	9.03	23.81	8.01	13.86	13.16	12.55	25.96	-19.21	25.66	20.89
Difference	-0.11	-0.07	0.08	-0.06	-0.03	-0.05	-0.01	0.24	0.64	-1.20
Rank	18	19	15	17	12	14	19	61	34	41
<b>STRS</b>	<b>7.83</b>	<b>23.57</b>	<b>7.60</b>	<b>14.16</b>	<b>13.53</b>	<b>12.78</b>	<b>25.25</b>	<b>-19.50</b>	<b>26.53</b>	<b>23.00</b>
Russell 3000 Index	9.03	23.81	8.01	13.86	13.16	12.55	25.96	-19.21	25.66	20.89
Difference	-1.19	-0.24	-0.40	0.30	0.37	0.23	-0.71	-0.30	0.87	2.11
Rank	60	20	25	9	6	7	21	73	32	14
<b>OP&amp;F</b>	<b>9.14</b>	<b>27.17</b>	<b>9.03</b>	<b>15.68</b>	<b>14.87</b>	<b>14.15</b>	<b>23.13</b>	<b>-17.23</b>	<b>30.14</b>	<b>22.79</b>
Wilshire 5000 Index	8.96	23.76	8.12	14.11	13.33	12.73	26.14	-19.04	26.70	20.82
Difference	0.18	3.41	0.91	1.57	1.54	1.42	-3.01	1.81	3.45	1.98
Rank	14	2	6	1	1	1	49	38	5	15
<b>SERS</b>	<b>8.68</b>	<b>23.38</b>	<b>7.38</b>	<b>13.51</b>	<b>12.70</b>	<b>12.27</b>	<b>23.13</b>	<b>-18.51</b>	<b>24.90</b>	<b>21.87</b>
Russell 3000 Index	9.03	23.81	8.01	13.86	13.16	12.55	25.96	-19.21	25.66	20.89
Difference	-0.35	-0.43	-0.63	-0.35	-0.46	-0.27	-2.83	0.70	-0.76	0.99
Rank	21	21	33	19	24	19	49	59	43	21
<b>HPRS</b>	<b>8.28</b>	<b>22.15</b>	<b>8.21</b>	<b>14.75</b>	<b>13.23</b>	<b>12.70</b>	<b>25.38</b>	<b>-17.27</b>	<b>27.38</b>	<b>23.28</b>
Russell 3000 Index	9.03	23.81	8.01	13.86	13.16	12.55	25.96	-19.21	25.66	20.89
Difference	-0.75	-1.66	0.20	0.89	0.07	0.15	-0.58	1.94	1.71	2.39
Rank	44	31	14	1	9	11	20	38	26	9
<i>All Public Plans &gt; \$1B-US Equity Segment Median</i>	<i>8.02</i>	<i>20.67</i>	<i>6.42</i>	<i>12.11</i>	<i>11.53</i>	<i>11.14</i>	<i>23.03</i>	<i>-17.92</i>	<i>24.31</i>	<i>18.33</i>

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

**Plan Sponsor Peer Group Scattergram - 5 Years**

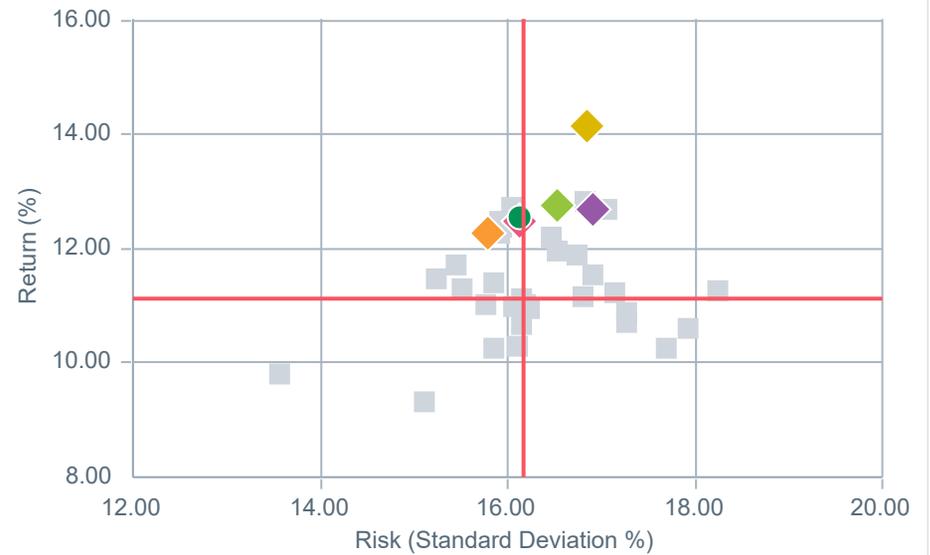


	Return	Standard Deviation
◆ PERS (DB)	13.80	19.74
◆ PERS (HC 115)	13.80	19.74
◆ STRS	14.16	20.00
◆ OP&F	15.68	20.90
◆ SERS	13.51	19.10
◆ HPRS	14.75	20.58
● Russell 3000 Index	13.86	19.70
— Median	12.11	19.94

**Sharpe Ratio - 5 Years**

PERS (DB)	0.64
PERS (HC 115)	0.64
STRS	0.65
OP&F	0.70
SERS	0.64
HPRS	0.67
Russell 3000 Index	0.65
<i>All Public Plans &gt; \$1B-US Equity Segment Median</i>	0.56

**Plan Sponsor Peer Group Scattergram - 10 Years**



	Return	Standard Deviation
◆ PERS (DB)	12.50	16.13
◆ PERS (HC 115)	12.50	16.13
◆ STRS	12.78	16.53
◆ OP&F	14.15	16.84
◆ SERS	12.27	15.79
◆ HPRS	12.70	16.92
● Russell 3000 Index	12.55	16.12
— Median	11.14	16.18

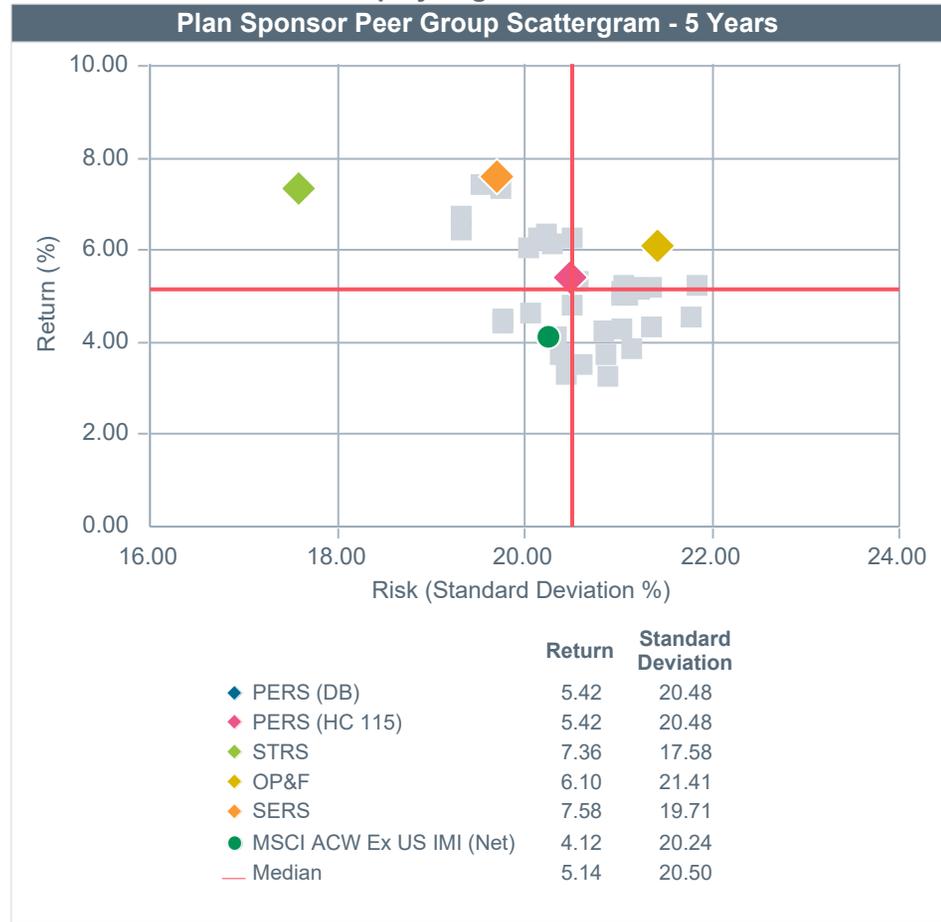
**Sharpe Ratio - 10 Years**

PERS (DB)	0.72
PERS (HC 115)	0.72
STRS	0.72
OP&F	0.78
SERS	0.71
HPRS	0.70
Russell 3000 Index	0.72
<i>All Public Plans &gt; \$1B-US Equity Segment Median</i>	0.64

Performance shown is gross of fees.

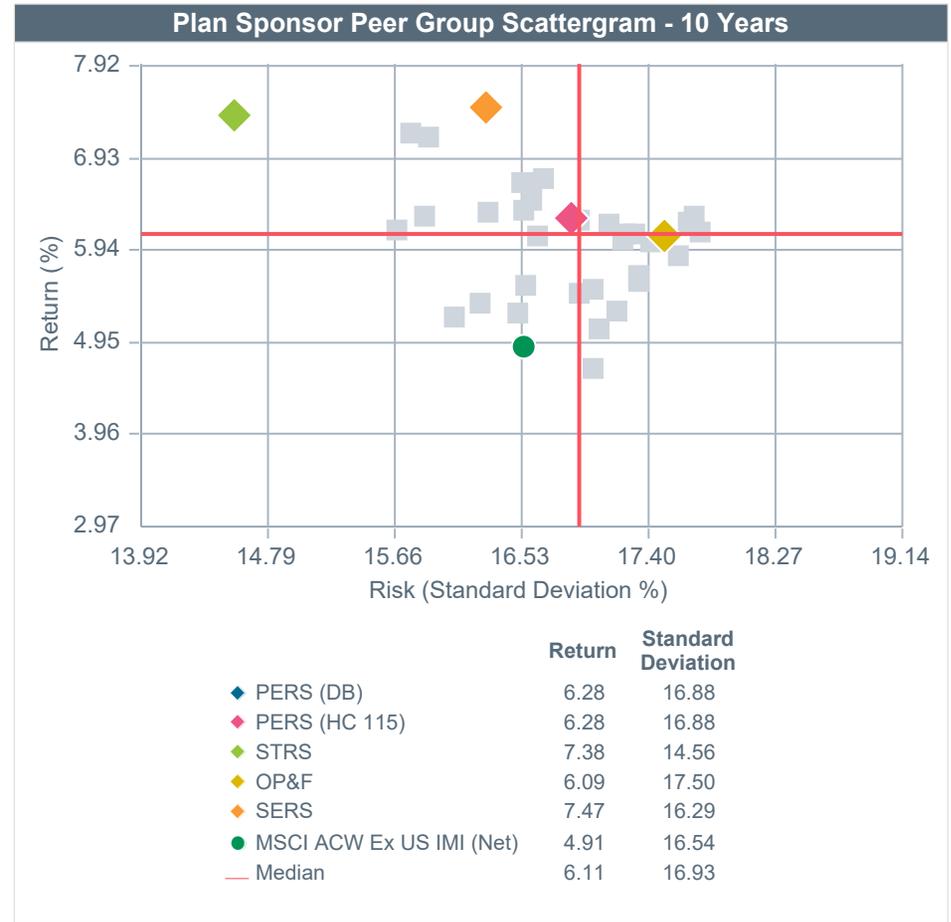
Performance										
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>International Equity</b>										
<b>PERS (DB)</b>	<b>-0.04</b>	<b>7.35</b>	<b>1.33</b>	<b>5.42</b>	<b>4.68</b>	<b>6.28</b>	<b>17.50</b>	<b>-17.51</b>	<b>9.00</b>	<b>14.81</b>
PERS (DB) International Equity Custom Benchmark	-0.05	5.40	0.30	4.02	3.33	4.88	15.12	-16.85	7.89	11.90
Difference	0.01	1.95	1.04	1.40	1.35	1.40	2.38	-0.65	1.11	2.91
Rank	64	31	45	37	51	35	37	55	60	37
<b>PERS (HC 115)</b>	<b>-0.04</b>	<b>7.35</b>	<b>1.33</b>	<b>5.42</b>	<b>4.68</b>	<b>6.28</b>	<b>17.50</b>	<b>-17.51</b>	<b>9.00</b>	<b>14.81</b>
PERS (HC 115) International Equity Custom Benchmark	-0.05	5.40	0.30	4.02	3.33	4.88	15.12	-16.85	7.89	11.90
Difference	0.01	1.95	1.04	1.40	1.35	1.40	2.38	-0.65	1.11	2.91
Rank	64	31	45	37	51	35	37	55	60	37
<b>STRS</b>	<b>1.50</b>	<b>11.11</b>	<b>5.67</b>	<b>7.36</b>	<b>6.25</b>	<b>7.38</b>	<b>16.83</b>	<b>-9.11</b>	<b>13.20</b>	<b>6.78</b>
STRS International Equity Custom Benchmark	1.21	9.51	4.20	6.52	5.73	6.55	16.93	-11.64	12.36	7.88
Difference	0.29	1.61	1.47	0.84	0.52	0.83	-0.10	2.53	0.84	-1.11
Rank	18	9	2	11	10	5	52	3	19	95
<b>OP&amp;F</b>	<b>-0.17</b>	<b>6.00</b>	<b>2.28</b>	<b>6.10</b>	<b>4.62</b>	<b>6.09</b>	<b>19.82</b>	<b>-15.75</b>	<b>11.79</b>	<b>12.43</b>
OP&F International Equity Custom Benchmark	-0.08	5.11	0.53	4.15	3.46	4.96	15.65	-16.42	8.53	11.12
Difference	-0.09	0.90	1.75	1.96	1.16	1.13	4.17	0.66	3.26	1.31
Rank	75	49	27	33	54	55	10	37	31	53
<b>SERS</b>	<b>2.08</b>	<b>13.32</b>	<b>4.11</b>	<b>7.58</b>	<b>6.37</b>	<b>7.47</b>	<b>18.60</b>	<b>-16.03</b>	<b>10.76</b>	<b>15.29</b>
SERS International Equity Custom Benchmark	2.31	10.45	3.17	5.48	4.50	5.49	18.17	-15.87	7.46	10.65
Difference	-0.23	2.86	0.95	2.10	1.87	1.98	0.43	-0.15	3.30	4.64
Rank	15	4	10	4	9	4	22	38	45	33
<b>HPRS International Equity</b>	<b>-0.74</b>	<b>3.72</b>	<b>-3.05</b>	<b>2.02</b>	<b>2.39</b>	<b>4.14</b>	<b>13.08</b>	<b>-22.31</b>	<b>1.89</b>	<b>19.02</b>
HPRS International Equity Custom Benchmark	0.51	5.79	-2.19	1.10	1.31	3.31	11.02	-20.33	1.59	11.12
Difference	-1.26	-2.07	-0.86	0.92	1.09	0.83	2.07	-1.98	0.29	7.90
<b>HPRS Global Equity</b>	<b>3.74</b>	<b>11.68</b>	<b>2.47</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>24.61</b>	<b>-22.67</b>	<b>N/A</b>	<b>N/A</b>
MSCI ACW Index (Net)	5.56	17.49	5.43	N/A	N/A	N/A	22.20	-18.36	N/A	N/A
Difference	-1.82	-5.81	-2.96	N/A	N/A	N/A	2.40	-4.31	N/A	N/A
<i>All Public Plans &gt; \$1B-Intl. Equity Segment Median</i>	<i>0.33</i>	<i>5.83</i>	<i>1.14</i>	<i>5.14</i>	<i>4.68</i>	<i>6.11</i>	<i>17.01</i>	<i>-17.06</i>	<i>9.52</i>	<i>12.71</i>

Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-Intl. Equity Segment. HPRS International Equity Portfolio consists of international small cap holdings. HPRS Global Equity consists of domestic equity and broad international equity holdings.



### Sharpe Ratio - 5 Years

PERS (DB)	0.25
PERS (HC 115)	0.25
STRS	0.36
OP&F	0.28
SERS	0.35
MSCI ACW Ex US IMI (Net)	0.18
All Public Plans > \$1B-Intl. Equity Segment Median	0.23



### Sharpe Ratio - 10 Years

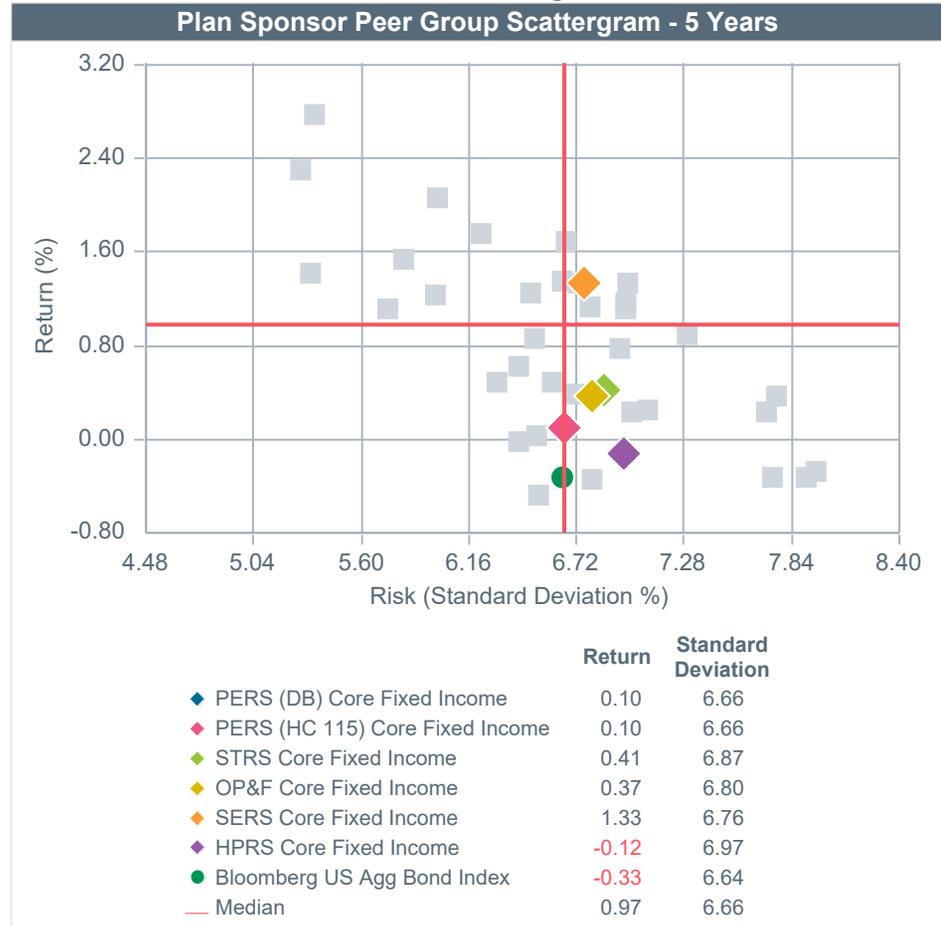
PERS (DB)	0.35
PERS (HC 115)	0.35
STRS	0.45
OP&F	0.33
SERS	0.42
MSCI ACW Ex US IMI (Net)	0.27
All Public Plans > \$1B-Intl. Equity Segment Median	0.33

Performance shown is gross of fees. HPRS International Equity Portfolio consists of international small cap holdings.

	Performance									
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Fixed Income</b>										
<b>PERS (DB) Core Fixed Income</b>	<b>2.15</b>	<b>1.49</b>	<b>-2.37</b>	<b>0.10</b>	<b>1.27</b>	<b>1.62</b>	<b>5.29</b>	<b>-12.93</b>	<b>-0.98</b>	<b>9.09</b>
PERS (DB) Core Fixed Income Custom Benchmark	1.98	1.25	-2.41	-0.33	0.97	1.35	5.53	-13.01	-1.54	7.51
Difference	0.17	0.24	0.04	0.43	0.30	0.27	-0.24	0.08	0.56	1.59
Rank	44	65	72	76	78	83	68	66	85	41
<b>PERS (HC 115) Core Fixed Income</b>	<b>2.15</b>	<b>1.49</b>	<b>-2.37</b>	<b>0.10</b>	<b>1.27</b>	<b>1.62</b>	<b>5.29</b>	<b>-12.93</b>	<b>-0.98</b>	<b>9.09</b>
PERS (HC 115) Core Fixed Income Custom Benchmark	1.98	1.25	-2.41	-0.33	0.97	1.35	5.53	-13.01	-1.54	7.51
Difference	0.17	0.24	0.04	0.43	0.30	0.27	-0.24	0.08	0.56	1.59
Rank	44	65	72	76	78	83	68	66	85	41
<b>STRS Core Fixed Income</b>	<b>2.57</b>	<b>2.28</b>	<b>-1.64</b>	<b>0.41</b>	<b>1.55</b>	<b>2.04</b>	<b>6.32</b>	<b>-12.51</b>	<b>-0.76</b>	<b>8.12</b>
Bloomberg US Universal index	2.32	2.04	-1.95	0.06	1.28	1.73	6.17	-12.99	-1.10	7.58
Difference	0.25	0.24	0.31	0.36	0.27	0.31	0.15	0.49	0.34	0.55
Rank	29	48	52	65	65	57	36	57	82	64
<b>OP&amp;F Core Fixed Income</b>	<b>2.41</b>	<b>2.52</b>	<b>-1.77</b>	<b>0.37</b>	<b>1.57</b>	<b>2.08</b>	<b>6.63</b>	<b>-13.30</b>	<b>-0.54</b>	<b>8.08</b>
Bloomberg US Agg Bond Index	1.98	1.25	-2.41	-0.33	0.97	1.35	5.53	-13.01	-1.55	7.51
Difference	0.44	1.27	0.64	0.70	0.60	0.73	1.10	-0.29	1.00	0.57
Rank	34	46	55	68	63	54	34	70	75	65
<b>SERS Core Fixed Income</b>	<b>2.80</b>	<b>3.03</b>	<b>-0.96</b>	<b>1.33</b>	<b>2.27</b>	<b>2.54</b>	<b>7.39</b>	<b>-12.21</b>	<b>-0.56</b>	<b>10.59</b>
Bloomberg US Agg Bond Index	1.98	1.25	-2.41	-0.33	0.97	1.35	5.53	-13.01	-1.55	7.51
Difference	0.83	1.78	1.45	1.65	1.30	1.19	1.86	0.80	0.99	3.08
Rank	17	35	43	33	33	30	17	50	75	18
<b>HPRS Core Fixed Income</b>	<b>1.87</b>	<b>1.49</b>	<b>-2.38</b>	<b>-0.12</b>	<b>1.18</b>	<b>1.66</b>	<b>5.35</b>	<b>-13.00</b>	<b>-1.50</b>	<b>8.49</b>
Bloomberg US Agg Bond Index	1.98	1.25	-2.41	-0.33	0.97	1.35	5.53	-13.01	-1.55	7.51
Difference	-0.10	0.24	0.03	0.21	0.21	0.31	-0.18	0.01	0.05	0.99
Rank	60	65	72	80	81	81	68	68	92	58
<i>All Public Plans &gt; \$1B-US Fixed Income Segment Median</i>	<i>1.96</i>	<i>2.11</i>	<i>-1.35</i>	<i>0.97</i>	<i>1.82</i>	<i>2.18</i>	<i>5.79</i>	<i>-12.28</i>	<i>0.15</i>	<i>8.60</i>

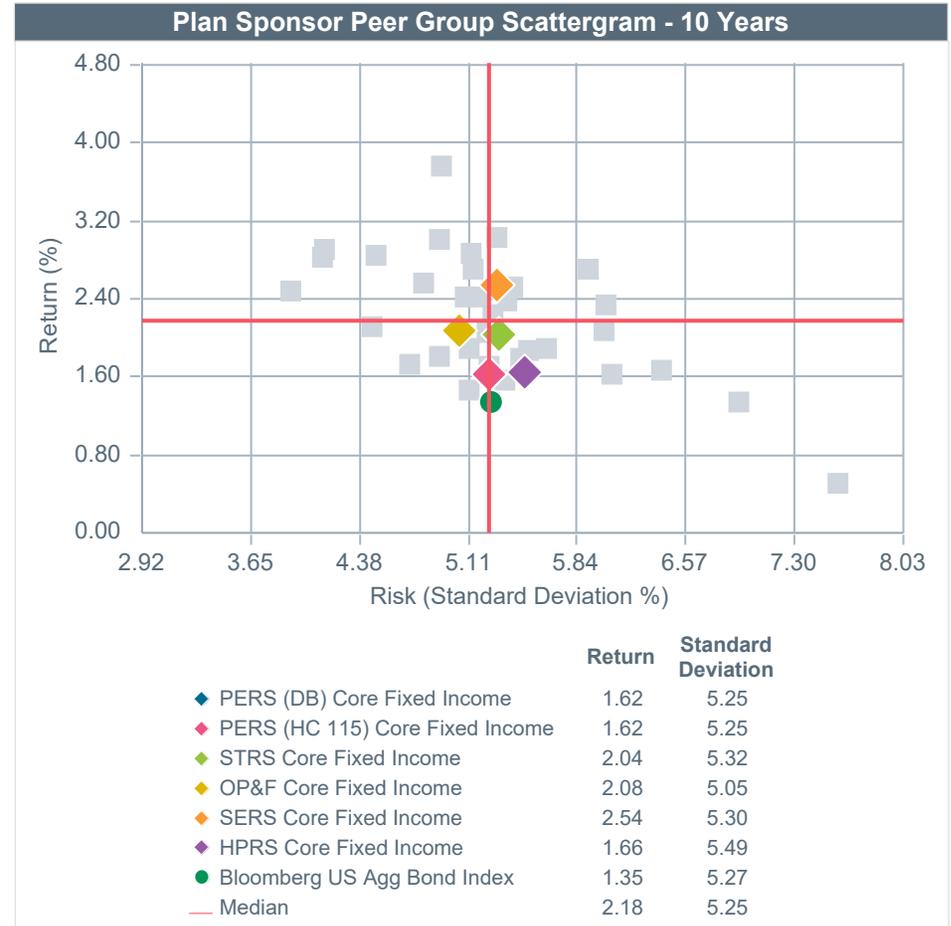
Performance shown is gross of fees. Ranks are shown against All Public Plans >\$1B-US Fixed Income Segment.

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



### Sharpe Ratio - 5 Years

PERS (DB) Core Fixed Income	-0.33
PERS (HC 115) Core Fixed Income	-0.33
STRS Core Fixed Income	-0.27
OP&F Core Fixed Income	-0.28
SERS Core Fixed Income	-0.14
HPRS Core Fixed Income	0.48
Bloomberg US Agg Bond Index	-0.40
All Public Plans > \$1B-US Fixed Income Segment Median	-0.21



### Sharpe Ratio - 10 Years

PERS (DB) Core Fixed Income	0.00
PERS (HC 115) Core Fixed Income	0.00
STRS Core Fixed Income	0.08
OP&F Core Fixed Income	0.09
SERS Core Fixed Income	0.17
HPRS Core Fixed Income	0.77
Bloomberg US Agg Bond Index	-0.05
All Public Plans > \$1B-US Fixed Income Segment Median	0.11

Performance shown is gross of fees.

	Performance									
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Additional Fixed Income</b>										
<b>PERS (DB) US Treasury</b>	<b>1.26</b>	<b>0.37</b>	<b>-3.01</b>	<b>-0.74</b>	<b>0.54</b>	<b>N/A</b>	<b>3.84</b>	<b>-12.47</b>	<b>-2.27</b>	<b>8.08</b>
Bloomberg US Trsy Index	1.45	0.58	-2.88	-0.68	0.58	N/A	4.05	-12.46	-2.32	8.00
Difference	-0.19	-0.21	-0.13	-0.06	-0.05	N/A	-0.21	-0.01	0.05	0.08
<b>PERS (DB) EMD</b>	<b>3.78</b>	<b>4.49</b>	<b>1.89</b>	<b>1.22</b>	<b>1.87</b>	<b>2.94</b>	<b>17.02</b>	<b>-13.50</b>	<b>-4.65</b>	<b>5.36</b>
PERS (DB) EMD Custom Benchmark	2.61	1.62	-0.86	-0.73	0.57	1.80	11.60	-14.07	-5.18	4.32
Difference	1.17	2.87	2.74	1.95	1.30	1.14	5.42	0.57	0.53	1.04
<b>PERS (DB) High Yield</b>	<b>4.56</b>	<b>7.24</b>	<b>2.68</b>	<b>4.11</b>	<b>4.65</b>	<b>5.08</b>	<b>12.68</b>	<b>-10.41</b>	<b>5.16</b>	<b>7.42</b>
Bloomberg U.S. High Yield Index	5.47	8.19	2.92	4.21	4.67	5.17	13.45	-11.19	5.28	7.11
Difference	-0.91	-0.95	-0.23	-0.11	-0.01	-0.09	-0.76	0.78	-0.12	0.31
<b>PERS (DB) Securitized Debt</b>	<b>5.92</b>	<b>13.82</b>	<b>1.98</b>	<b>3.69</b>	<b>4.73</b>	<b>4.45</b>	<b>7.38</b>	<b>-13.23</b>	<b>5.20</b>	<b>7.40</b>
Bloomberg CMBS Index + 2%	4.66	14.68	-0.28	0.95	2.55	3.20	-0.43	-13.17	4.50	1.18
Difference	1.26	-0.86	2.26	2.74	2.18	1.26	7.81	-0.05	0.71	6.22
<b>PERS (DB) TIPS</b>	<b>1.13</b>	<b>1.83</b>	<b>-2.28</b>	<b>1.86</b>	<b>2.31</b>	<b>2.22</b>	<b>3.91</b>	<b>-11.82</b>	<b>5.96</b>	<b>10.89</b>
Bloomberg U.S. TIPS Index	1.12	1.84	-2.30	1.87	2.32	2.24	3.90	-11.85	5.96	10.99
Difference	0.01	0.00	0.01	-0.01	-0.01	-0.02	0.01	0.03	0.00	-0.10
<b>PERS (DB) Investment Grade Credit</b>	<b>2.58</b>	<b>1.98</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>
Bloomberg US Corporate Investment Grade Credit Index	2.62	2.13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-0.05	-0.14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>PERS (DB) Private Credit</b>	<b>1.26</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>
S&P UBS Leveraged Loan Index	4.41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-3.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>PERS (HC 115) EMD</b>	<b>3.78</b>	<b>4.49</b>	<b>1.89</b>	<b>1.22</b>	<b>1.87</b>	<b>2.94</b>	<b>17.02</b>	<b>-13.50</b>	<b>-4.65</b>	<b>5.36</b>
PERS (HC 115) EMD Custom Benchmark	2.61	1.62	-0.86	-0.73	0.57	1.80	11.60	-14.07	-5.18	4.32
Difference	1.17	2.87	2.74	1.95	1.30	1.14	5.42	0.57	0.53	1.04
<b>PERS (HC 115) High Yield</b>	<b>4.56</b>	<b>7.24</b>	<b>2.68</b>	<b>4.11</b>	<b>4.65</b>	<b>5.08</b>	<b>12.68</b>	<b>-10.41</b>	<b>5.16</b>	<b>7.42</b>
Bloomberg Barclays U.S. High Yield Index	5.47	8.19	2.92	4.21	4.67	5.17	13.45	-11.19	5.28	7.11
Difference	-0.91	-0.95	-0.23	-0.11	-0.01	-0.09	-0.76	0.78	-0.12	0.31

Performance shown is gross of fees.

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Additional Fixed Income</b>										
<b>PERS (HC 115) Securitized Debt</b>	5.92	13.82	1.98	3.69	4.73	4.45	7.38	-13.23	5.20	7.40
Bloomberg CMBS Index + 2%	4.66	14.68	-0.28	0.95	2.55	3.20	-0.43	-13.17	4.50	1.18
Difference	1.26	-0.86	2.26	2.74	2.18	1.26	7.81	-0.05	0.71	6.22
<b>PERS (HC 115) TIPS</b>	1.13	1.83	-2.28	1.86	2.31	2.22	3.91	-11.82	5.96	10.89
Bloomberg U.S. Tips Index	1.12	1.84	-2.30	1.87	2.32	2.24	3.90	-11.85	5.96	10.99
Difference	0.01	0.00	0.01	-0.01	-0.01	-0.02	0.01	0.03	0.00	-0.10
<b>PERS (HC 115) Investment Grade Credit</b>	2.58	1.98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bloomberg US Corporate Investment Grade Credit Index	2.62	2.13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	-0.05	-0.14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>PERS (HC 115) US Treasury</b>	1.26	0.37	-3.01	-0.74	0.54	N/A	3.84	-12.47	-2.27	8.08
Bloomberg US Treasury Index	1.45	0.58	-2.88	-0.68	0.58	N/A	4.05	-12.46	-2.32	8.00
Difference	-0.19	-0.21	-0.13	-0.06	-0.05	N/A	-0.21	-0.01	0.05	0.08
<b>STRS Liquid Treasury Portfolio</b>	2.24	2.48	-0.45	0.54	1.33	N/A	4.32	-7.71	-1.67	5.90
Bloomberg US Intermediate Treasury Index	2.20	2.42	-0.50	0.48	1.27	N/A	4.28	-7.77	-1.72	5.78
Difference	0.03	0.06	0.05	0.07	0.06	N/A	0.04	0.06	0.05	0.13
<b>OP&amp;F High Yield</b>	5.36	8.46	3.20	4.32	4.87	5.26	12.09	-9.60	5.35	6.71
ICE BofA U.S. High Yield Master II Constrained Index	5.44	8.20	2.91	4.02	4.51	5.09	13.47	-11.25	5.34	6.08
Difference	-0.08	0.26	0.29	0.30	0.37	0.17	-1.38	1.65	0.01	0.64
<b>OP&amp;F Private Credit Fixed Income</b>	6.28	13.97	11.95	9.85	9.60	N/A	17.38	4.87	15.80	-1.54
S&P LTSA Levered Loan Index + 2%	5.02	11.79	8.60	7.86	7.41	N/A	15.31	-0.63	10.58	3.09
Difference	1.26	2.18	3.35	1.99	2.19	N/A	2.07	5.50	5.22	-4.63
<b>OP&amp;F US TIPS</b>	-1.41	0.72	-7.42	1.94	3.47	4.52	-0.05	-21.16	15.47	20.11
Bridgewater Custom US TIPS Index	-0.60	-2.11	-9.44	0.47	1.62	2.66	2.14	-25.71	11.81	23.25
Difference	-0.82	2.83	2.02	1.47	1.86	1.86	-2.19	4.55	3.66	-3.14
<b>OP&amp;F US Treasury</b>	-1.78	-5.16	-6.83	N/A	N/A	N/A	-1.28	-13.62	-2.31	N/A
Bloomberg US Agg Bond Index Ex Financing	-0.61	-3.92	-6.43	N/A	N/A	N/A	0.31	-14.99	-1.68	N/A
Difference	-1.17	-1.24	-0.40	N/A	N/A	N/A	-1.59	1.37	-0.63	N/A

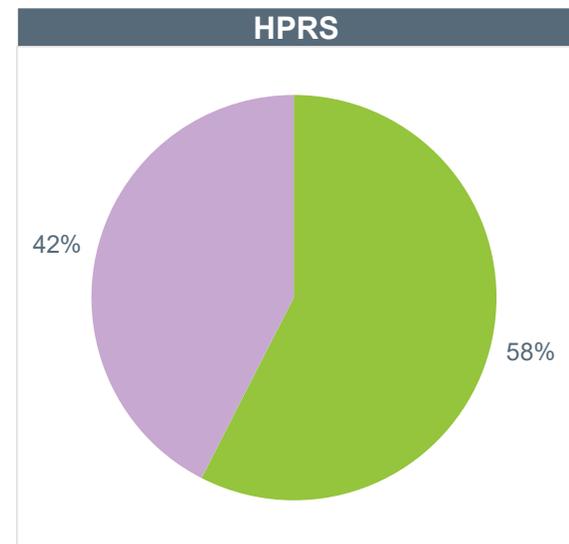
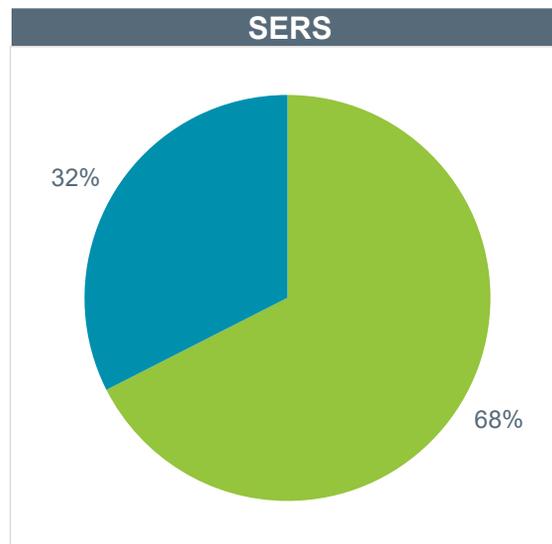
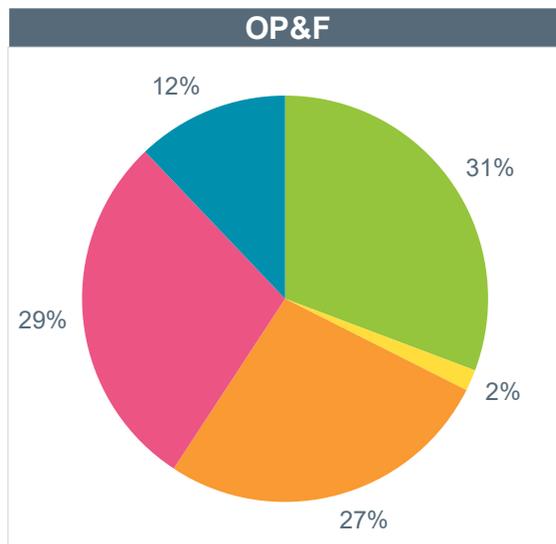
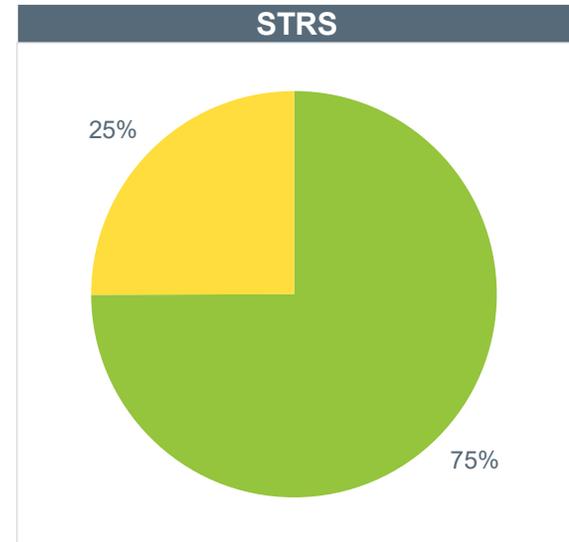
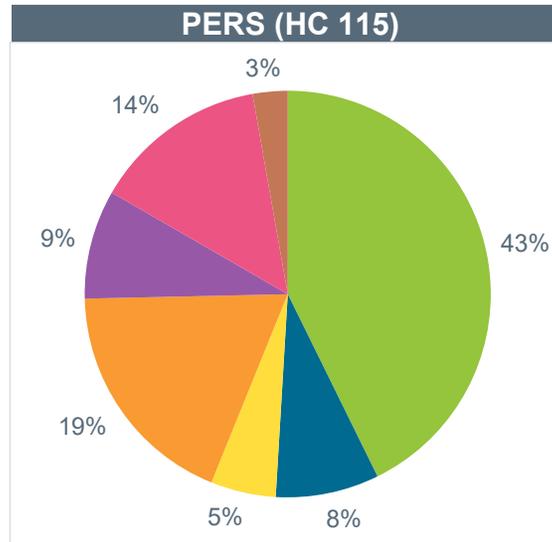
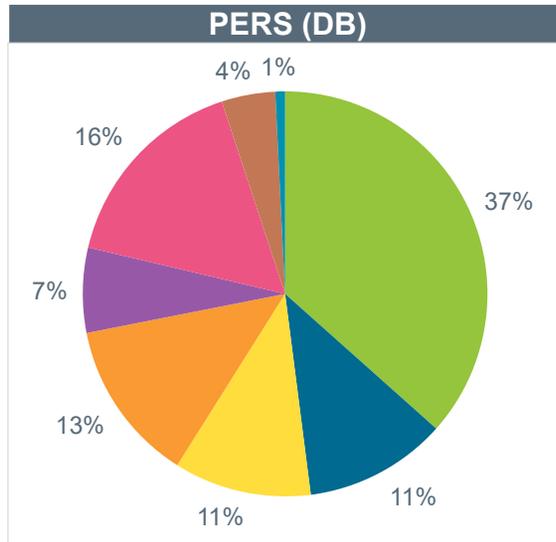
Performance shown is gross of fees. OP&F's Levered Bond Portfolio is a combination of the Core Fixed Income and US Treasury composites, levered two times to one using Treasury futures.

Ohio Retirement Study Council  
**Additional Fixed Income Performance**

As of December 31, 2024

	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>OP&amp;F Levered Bond Portfolio</b>	<b>0.33</b>	<b>-2.84</b>	<b>-9.39</b>	<b>-4.97</b>	<b>-2.33</b>	<b>-0.68</b>	<b>4.72</b>	<b>-26.89</b>	<b>-2.97</b>	<b>7.35</b>
Bloomberg US Agg Bond Index + Leverage Factor	1.25	-2.95	-9.25	-4.81	-2.30	-0.96	5.25	-26.84	-3.30	8.16
Difference	-0.92	0.11	-0.14	-0.17	-0.03	0.28	-0.53	-0.05	0.33	-0.81
<b>SERS Private Credit</b>	<b>5.81</b>	<b>12.99</b>	<b>10.65</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>12.25</b>	<b>6.80</b>	<b>16.30</b>	<b>N/A</b>
3 Month LIBOR Rate + 4.5%	4.93	10.13	8.56	N/A	N/A	N/A	9.60	6.00	4.67	N/A
Difference	0.89	2.86	2.08	N/A	N/A	N/A	2.65	0.80	11.62	N/A

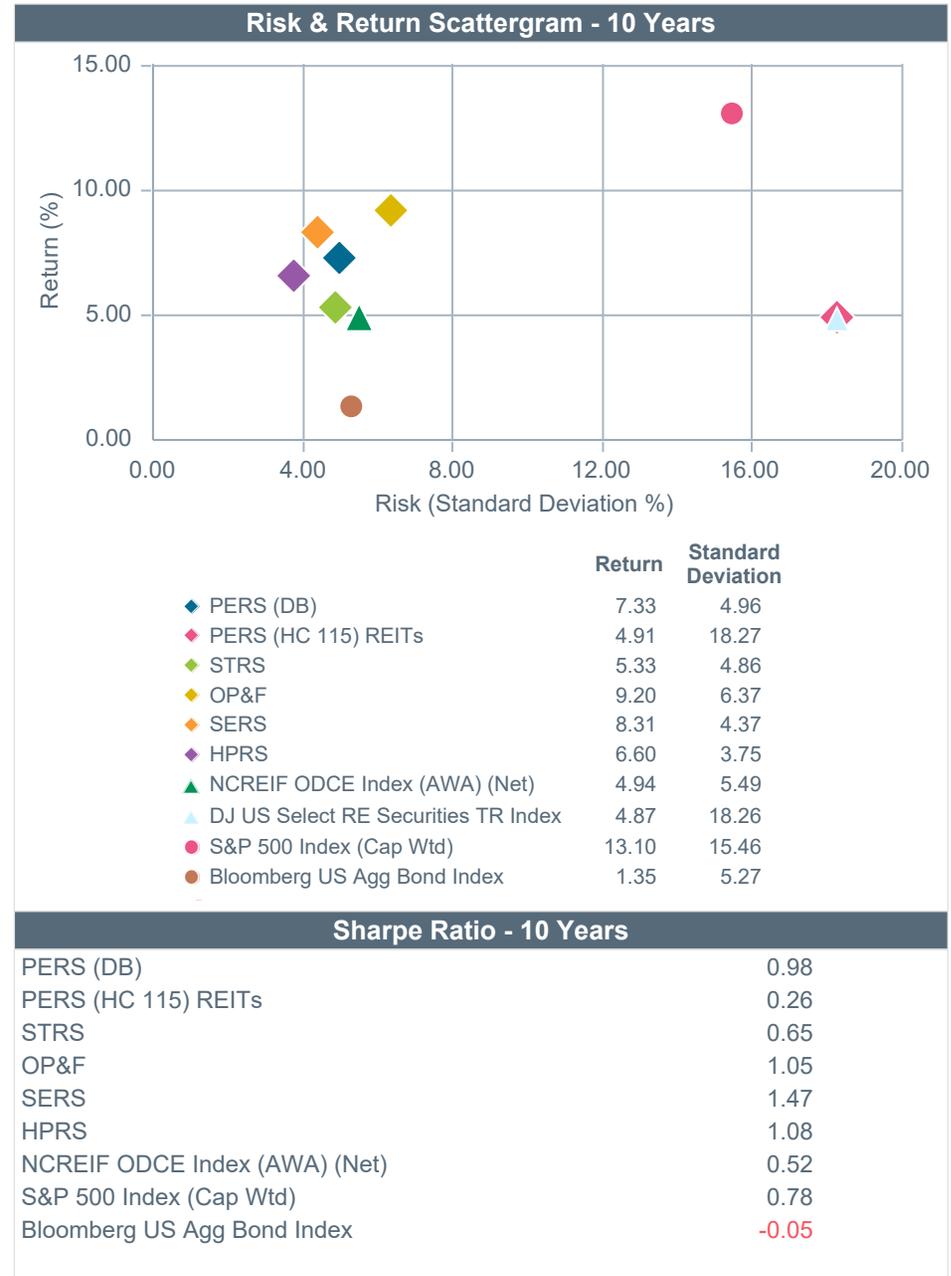
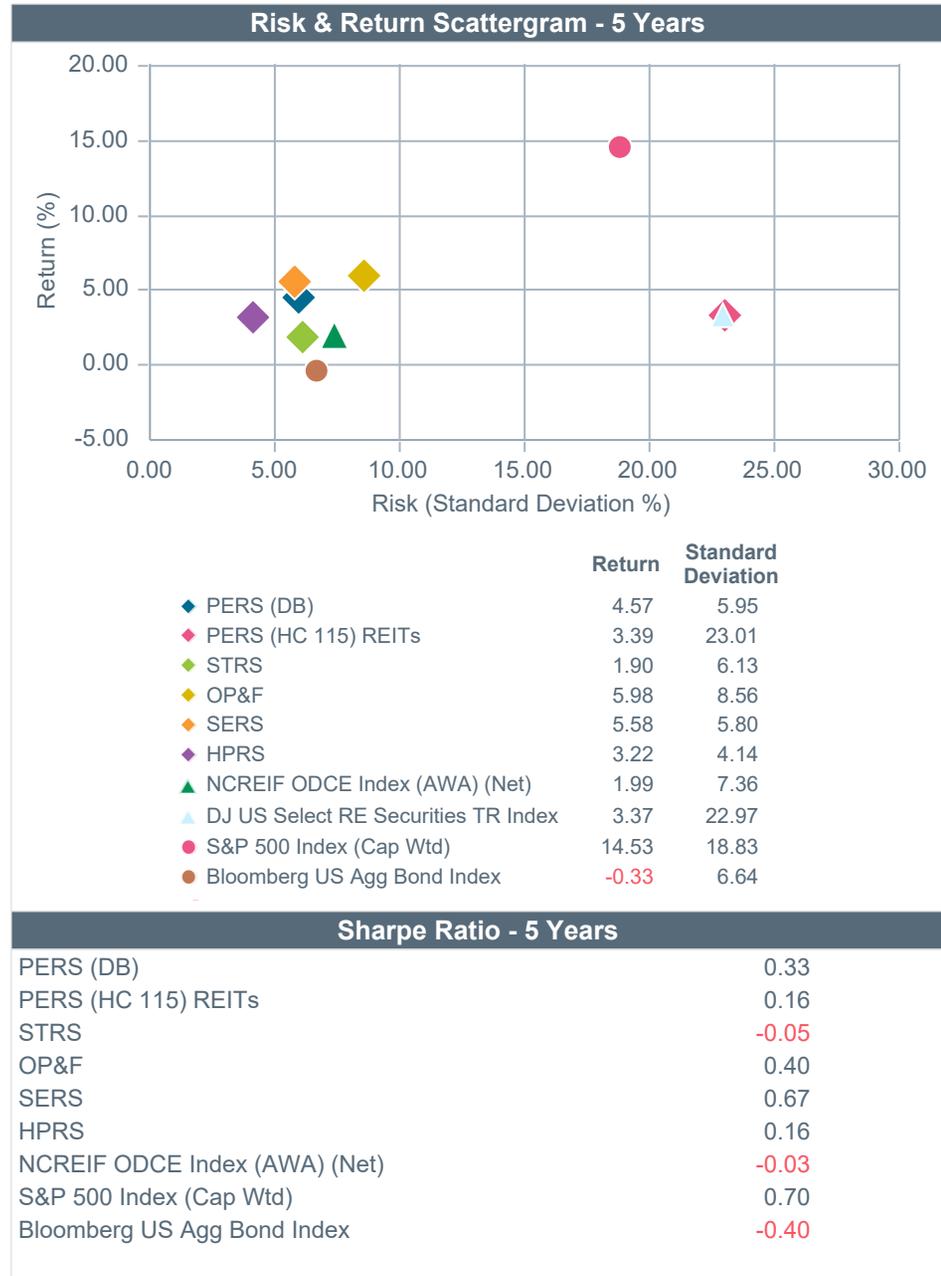
Performance shown is gross of fees. OP&F's Levered Bond Portfolio is a combination of the Core Fixed Income and US Treasury composites, levered two times to one using Treasury futures.



Allocations shown may not sum up to 100% exactly due to rounding. OP&F's Levered Bond Portfolio consists of core fixed income, levered two times to one using Treasury futures.

Performance										
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Real Estate</b>										
<b>PERS (DB)</b>	<b>-1.12</b>	<b>-3.94</b>	<b>1.37</b>	<b>4.57</b>	<b>5.01</b>	<b>7.33</b>	<b>-5.78</b>	<b>15.07</b>	<b>17.08</b>	<b>2.55</b>
PERS (DB) Real Estate Custom Benchmark	-0.24	-7.19	-0.18	2.91	4.07	6.01	-12.03	21.81	14.49	1.37
Difference	-0.88	3.25	1.55	1.66	0.94	1.32	6.26	-6.73	2.59	1.18
<b>PERS (DB) REITs</b>	<b>8.66</b>	<b>8.01</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>14.04</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
PERS (DB) REITs Benchmark	8.68	8.02	N/A	N/A	N/A	N/A	14.03	N/A	N/A	N/A
Difference	-0.01	-0.01	N/A	N/A	N/A	N/A	0.01	N/A	N/A	N/A
<b>PERS (HC 115) REITs</b>	<b>8.66</b>	<b>8.01</b>	<b>-2.98</b>	<b>3.39</b>	<b>4.89</b>	<b>4.91</b>	<b>14.04</b>	<b>-25.86</b>	<b>46.02</b>	<b>-11.40</b>
DJ US Select Real Estate Securities TR Index	8.68	8.02	-3.06	3.37	4.84	4.87	14.03	-26.03	45.91	-11.20
Difference	-0.01	-0.01	0.08	0.02	0.05	0.04	0.01	0.18	0.11	-0.20
<b>STRS</b>	<b>-0.86</b>	<b>-5.74</b>	<b>-2.66</b>	<b>1.90</b>	<b>3.78</b>	<b>5.33</b>	<b>-7.32</b>	<b>5.56</b>	<b>20.64</b>	<b>-1.27</b>
STRS Real Estate Custom Benchmark	2.90	1.80	-0.73	3.68	4.67	5.91	-4.72	0.85	21.38	0.89
Difference	-3.76	-7.54	-1.93	-1.78	-0.89	-0.58	-2.60	4.71	-0.74	-2.16
<b>OP&amp;F</b>	<b>3.01</b>	<b>-2.79</b>	<b>2.44</b>	<b>5.98</b>	<b>7.44</b>	<b>9.20</b>	<b>-10.80</b>	<b>23.99</b>	<b>24.21</b>	<b>0.11</b>
NCREIF ODCE Index (AWA) (Net) (1 Qtr Lag)	-0.64	-8.04	-1.04	2.05	3.21	5.16	-12.88	20.96	13.64	0.52
Difference	3.65	5.25	3.49	3.93	4.23	4.04	2.08	3.03	10.57	-0.41
<b>SERS</b>	<b>0.02</b>	<b>-5.15</b>	<b>2.34</b>	<b>5.58</b>	<b>7.00</b>	<b>8.31</b>	<b>-4.14</b>	<b>17.90</b>	<b>18.47</b>	<b>3.30</b>
NCREIF Property Index (1 Qtr Lag)	0.52	-3.47	0.87	3.26	4.23	5.88	-8.39	16.08	12.15	2.00
Difference	-0.51	-1.68	1.47	2.31	2.76	2.43	4.26	1.82	6.32	1.29
<b>HPRS</b>	<b>-1.49</b>	<b>-3.49</b>	<b>-0.25</b>	<b>3.22</b>	<b>5.95</b>	<b>6.60</b>	<b>-4.47</b>	<b>7.64</b>	<b>14.28</b>	<b>3.32</b>
HPRS Real Estate Custom Benchmark (Net)	-1.95	-4.39	-1.52	1.95	4.66	6.18	-5.67	5.90	12.91	2.11
Difference	0.46	0.90	1.26	1.27	1.30	0.42	1.20	1.74	1.37	1.21
<b>NCREIF ODCE Index (AWA) (Net)</b>	<b>0.99</b>	<b>-2.27</b>	<b>-3.14</b>	<b>1.99</b>	<b>3.08</b>	<b>4.94</b>	<b>-12.73</b>	<b>6.55</b>	<b>21.02</b>	<b>0.34</b>

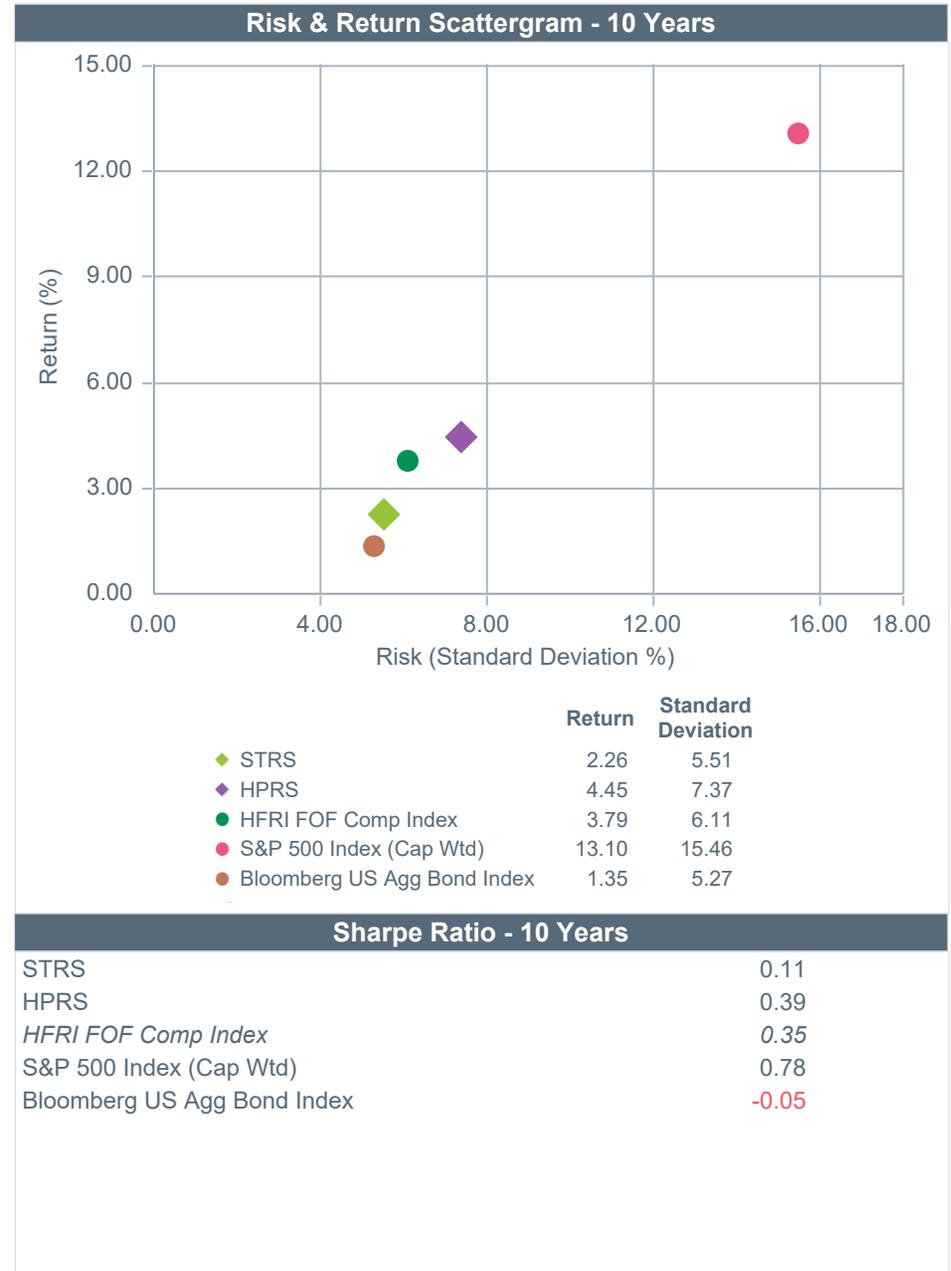
Performance shown may be net or gross of fees depending on underlying investments. Prior to 2008, HPRS's real estate portfolio consisted of two buildings. Since then, HPRS has shifted its focus to externally managed funds. PERS (DB): 3 Year performance reduced 1.15%, 5 Year performance reduced 0.71%, 7 Year performance reduced 0.51%, and 10 Year performance reduced 0.36% due to change in distribution methodology in real estate portfolios.



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	2023	2022	2021	2020
<b>Hedge Funds</b>										
<b>STRS</b>	1.84	6.11	3.39	1.94	2.04	2.26	-1.78	6.05	2.14	-2.47
HFRI FOF Comp Index	4.08	9.13	3.11	5.23	4.30	3.79	6.07	-5.31	6.17	10.88
Difference	-2.24	-3.02	0.29	-3.29	-2.26	-1.53	-7.85	11.36	-4.04	-13.35
<b>HPRS</b>	7.10	12.63	4.24	6.52	5.44	4.45	7.78	-6.68	8.09	12.02
HFRI FOF Comp Index	4.08	9.13	3.11	5.23	4.30	3.79	6.07	-5.31	6.17	10.88
Difference	3.02	3.50	1.14	1.29	1.14	0.66	1.70	-1.37	1.92	1.14

Performance shown is net of fees. PERS (DB) has no Hedge Fund target allocation and remaining assets are liquidating.



Performance shown is net of fees. PERS (DB) has no Hedge Fund target allocation and remaining assets are liquidating.

Performance										
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Private Equity</b>										
<b>PERS (DB)</b>	<b>3.64</b>	<b>9.21</b>	<b>3.60</b>	<b>13.39</b>	<b>13.25</b>	<b>12.46</b>	<b>6.93</b>	<b>-4.79</b>	<b>44.84</b>	<b>16.38</b>
PERS (DB) Private Equity Custom Benchmark	4.22	8.76	4.18	13.93	13.22	12.19	5.27	-1.25	49.22	13.78
Difference	-0.57	0.45	-0.58	-0.54	0.03	0.27	1.66	-3.54	-4.38	2.61
<b>STRS</b>	<b>2.43</b>	<b>5.53</b>	<b>-0.19</b>	<b>13.88</b>	<b>14.73</b>	<b>13.86</b>	<b>0.77</b>	<b>-6.49</b>	<b>53.50</b>	<b>25.49</b>
STRS Private Equity Benchmark	3.76	7.70	1.84	N/A	N/A	N/A	3.67	-5.40	N/A	N/A
Difference	-1.33	-2.17	-2.03	N/A	N/A	N/A	-2.89	-1.09	N/A	N/A
<b>OP&amp;F</b>	<b>4.32</b>	<b>6.93</b>	<b>1.23</b>	<b>14.41</b>	<b>15.06</b>	<b>14.36</b>	<b>7.68</b>	<b>-9.91</b>	<b>54.51</b>	<b>22.30</b>
OP&F Private Equity Custom Benchmark	4.32	6.93	1.23	14.41	15.05	14.36	7.68	-9.91	54.51	22.30
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>3.48</b>	<b>10.80</b>	<b>8.82</b>	<b>17.18</b>	<b>16.69</b>	<b>16.43</b>	<b>8.12</b>	<b>7.57</b>	<b>48.06</b>	<b>15.77</b>
Burgiss All Private Equity Benchmark	1.20	8.01	3.59	12.48	12.34	11.48	3.77	-0.81	44.38	12.16
Difference	2.29	2.79	5.23	4.70	4.35	4.96	4.36	8.38	3.68	3.61
<b>HPRS</b>	<b>2.63</b>	<b>5.09</b>	<b>6.59</b>	<b>14.71</b>	<b>13.12</b>	<b>11.39</b>	<b>8.97</b>	<b>5.76</b>	<b>36.53</b>	<b>20.12</b>
HPRS Private Equity Custom Benchmark	2.63	5.09	6.59	14.71	13.12	12.72	8.97	5.76	36.53	20.12
Difference	0.00	0.00	0.00	0.00	0.00	-1.33	0.00	0.00	0.00	0.00

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. The STRS Private Equity Benchmark is the quarterly Cambridge Associates Private Equity and Venture Capital Index, one quarter lagged to be consistent with external fund reporting, effective July 1, 2021. PERS DB: 3 year performance reduced 2.08%, 5 Year performance reduced 1.36%, 7 Year performance reduced 0.97%, and 10 Year performance reduced 0.67% due to change in distribution methodology in private equity portfolios.

Performance										
	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Other Alternatives</b>										
<b>PERS (DB) Commodities</b>	<b>0.39</b>	<b>5.62</b>	<b>4.21</b>	<b>3.88</b>	<b>2.98</b>	<b>-0.12</b>	<b>-7.54</b>	<b>15.88</b>	<b>36.99</b>	<b>-21.96</b>
S&P Goldman Sachs Commodity Index (TR)	0.23	5.38	4.05	3.08	2.39	-0.69	-7.91	16.09	35.46	-23.72
Difference	0.16	0.24	0.15	0.80	0.59	0.57	0.37	-0.21	1.53	1.76
<b>PERS (DB) Risk Parity</b>	<b>1.39</b>	<b>5.74</b>	<b>-6.94</b>	<b>-0.90</b>	<b>1.66</b>	<b>3.24</b>	<b>8.53</b>	<b>-29.78</b>	<b>11.94</b>	<b>5.96</b>
PERS (DB) Risk Parity Custom Benchmark	1.26	5.04	-7.60	-1.52	1.14	2.92	7.67	-30.25	11.56	5.25
Difference	0.13	0.70	0.66	0.62	0.52	0.32	0.86	0.47	0.37	0.71
<b>PERS (DB) Opportunistic</b>	<b>13.42</b>	<b>26.15</b>	<b>7.56</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>15.21</b>	<b>-14.38</b>	<b>11.59</b>	<b>N/A</b>
PERS (DB) Opportunistic Benchmark	11.14	18.76	5.57	N/A	N/A	N/A	16.76	-15.14	12.63	N/A
Difference	2.29	7.39	1.99	N/A	N/A	N/A	-1.55	0.76	-1.04	N/A
<b>PERS (HC 115) Commodities</b>	<b>0.39</b>	<b>5.62</b>	<b>4.21</b>	<b>3.88</b>	<b>2.98</b>	<b>-0.12</b>	<b>-7.54</b>	<b>15.88</b>	<b>36.99</b>	<b>-21.96</b>
S&P Goldman Sachs Commodity Index (TR)	0.23	5.38	4.05	3.08	2.39	-0.69	-7.91	16.09	35.46	-23.72
Difference	0.16	0.24	0.15	0.80	0.59	0.57	0.37	-0.21	1.53	1.76
<b>PERS (HC 115) Risk Parity</b>	<b>1.39</b>	<b>5.74</b>	<b>-6.94</b>	<b>-0.90</b>	<b>1.66</b>	<b>3.24</b>	<b>8.53</b>	<b>-29.78</b>	<b>11.94</b>	<b>5.96</b>
PERS (HC 115) Risk Parity Custom Benchmark	1.26	5.04	-7.60	-1.52	1.14	2.92	7.67	-30.25	11.56	5.25
Difference	0.13	0.70	0.66	0.62	0.52	0.32	0.86	0.47	0.37	0.71
<b>PERS (HC 115) Opportunistic</b>	<b>13.42</b>	<b>26.15</b>	<b>7.56</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>15.21</b>	<b>-14.38</b>	<b>11.59</b>	<b>N/A</b>
PERS (HC 115) Opportunistic Benchmark	11.14	18.76	5.57	N/A	N/A	N/A	16.76	-15.14	12.63	N/A
Difference	2.29	7.39	1.99	N/A	N/A	N/A	-1.55	0.76	-1.04	N/A

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

	Trailing Performance (%)						Calendar Year Performance (%)			
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>Other Alternatives</b>										
<b>STRS Opportunistic/Diversified Investments</b>	5.18	10.80	8.70	9.35	8.18	6.94	10.89	4.55	23.68	-1.80
STRS Opportunistic/Diversified Blended Benchmark	4.60	9.54	6.27	N/A	N/A	N/A	9.13	0.40	N/A	N/A
Difference	0.59	1.26	2.43	N/A	N/A	N/A	1.75	4.15	N/A	N/A
<b>OP&amp;F Real Assets</b>	3.05	6.25	7.08	5.72	6.39	4.97	5.03	10.03	7.85	-0.28
OP&F Real Assets Custom Benchmark	9.17	19.15	8.98	6.80	6.65	6.76	5.12	3.34	9.84	-2.27
Difference	-6.13	-12.90	-1.90	-1.08	-0.25	-1.79	-0.09	6.69	-1.99	1.99
<b>OP&amp;F MLPs</b>	18.64	44.05	30.80	18.46	12.64	6.51	19.03	30.50	41.02	-26.09
Alerian MLP Index	24.47	44.53	26.05	16.26	11.78	4.98	14.02	21.53	38.43	-23.37
Difference	-5.83	-0.47	4.75	2.19	0.86	1.53	5.01	8.97	2.59	-2.73
<b>OP&amp;F Gold</b>	9.99	20.93	8.19	N/A	N/A	N/A	7.34	-2.45	-3.82	N/A
S&P GSCI Gold Index Minus the Cost of Financing	9.53	20.31	7.78	N/A	N/A	N/A	7.25	-2.97	-4.41	N/A
Difference	0.46	0.62	0.41	N/A	N/A	N/A	0.09	0.51	0.79	N/A
<b>SERS Opportunistic &amp; Tactical Portfolio</b>	5.57	9.25	5.22	7.49	6.89	6.72	7.82	-1.12	22.04	0.96
SERS Opportunistic Custom Benchmark	2.74	3.25	-0.40	-0.08	1.79	3.47	7.53	-11.01	0.46	0.36
Difference	2.83	6.01	5.62	7.57	5.10	3.25	0.29	9.89	21.58	0.60
<b>SERS Global Infrastructure</b>	6.25	9.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Consumer Price Index+1.2%	3.94	8.23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Difference	2.32	0.96	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>HPRS Real Assets</b>	5.08	17.86	20.72	17.54	13.08	N/A	19.76	24.62	29.85	-1.80
HPRS Real Assets Custom Benchmark (Net)	5.08	17.82	20.34	17.19	13.82	N/A	19.06	24.23	29.17	-1.80
Difference	0.00	0.04	0.38	0.34	-0.74	N/A	0.70	0.40	0.68	0.00

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. Beginning with the Dec. 2021 report, STRS will report Opportunistic/Diversified Investments (which includes Hedge Funds). Effective July 1, 2021, the STRS Opportunistic/diversified blended benchmark consists of the actual Opportunistic Investments Portfolio weight multiplied by the Cambridge Associates Private Credit Index one quarter lagged to be consistent with external fund reporting plus the actual weight of the Diversified Investments Portfolio multiplied by the HFRI Fund of Funds Composite Index, which is a monthly index where subsequent revisions will be reflected in the following period.

# Plan Specific Pages

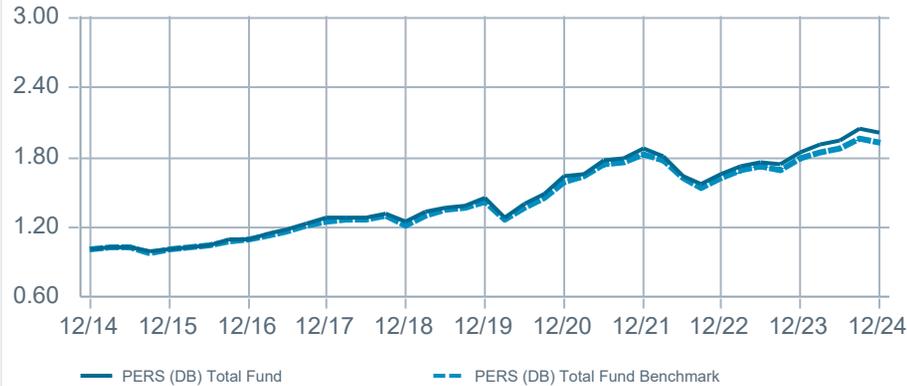
Ohio Retirement Study Council  
**Public Employees Employment Retirement System (DB)**  
**Total Fund Characteristics**

As of December 31, 2024

**Summary**

- PERS (DB) has generated an annualized 0.27% of alpha over the trailing 5-year period and 0.29% over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited similar up-market capture and lower down-market capture characteristics over the past 10 years.

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



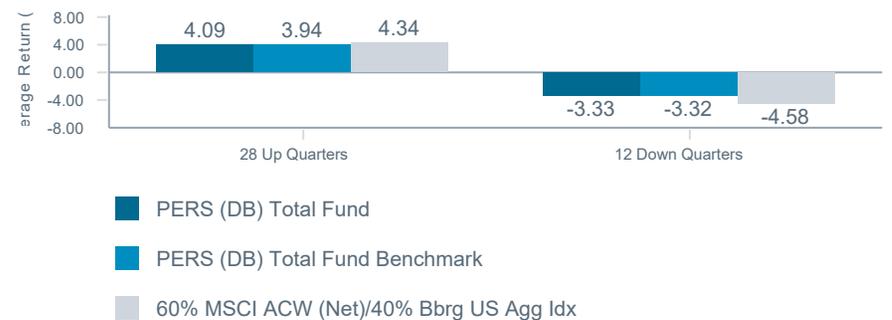
**MPT Stats**

	<b>5 Years</b>	<b>10 Years</b>
Maximum Return	10.35	10.35
Minimum Return	-11.66	-11.66
Standard Deviation	11.22	8.92
vs. PERS (DB) Total Fund Benchmark		
Info Ratio	0.36	0.50
Tracking Error	1.05	0.83
Alpha	0.30	0.34
vs. S&P 500 Index (Cap Wtd)		
Beta	0.57	0.54
vs. ICE BofAML 3 Mo US T-Bill Index		
Sharpe Ratio	0.42	0.64

**Asset Allocation vs. Targets**

	<b>Market Value (\$)</b>	<b>Allocation (%)</b>	<b>Target (%)</b>
US Equity	22,952,071,086	22.05	21.60
International Equity	19,959,370,083	19.17	20.00
Core Fixed Income	9,373,385,382	9.00	9.80
US Treasury	2,815,292,424	2.70	3.00
High Yield	4,161,668,851	4.00	4.00
Global High Yield	3,521	0.00	0.00
EMD	1,098,057,164	1.05	1.00
Securitized Debt	1,740,029,293	1.67	1.00
TIPS	3,312,681,850	3.18	3.00
Investment Grade Credit	2,919,566,933	2.80	3.00
Private Credit	203,416,949	0.20	0.20
Real Estate	12,048,257,430	11.57	12.00
REITs	834,057,130	0.80	1.00
Hedge Funds	1,512,130	0.00	0.00
Opportunistic	1,920,468,754	1.84	1.40
Commodities	2,201,324,222	2.11	2.00
Private Equity	15,435,988,477	14.83	15.00
Risk Parity	2,011,694,275	1.93	2.00
Cash Equivalents	1,093,095,628	1.05	0.00
Additional Annuity	14,806,199	0.01	0.00
Other Pension Assets	340	0.00	0.00
TAA	-	0.00	0.00
<b>Total Fund</b>	<b>104,096,748,122</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**

- 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**



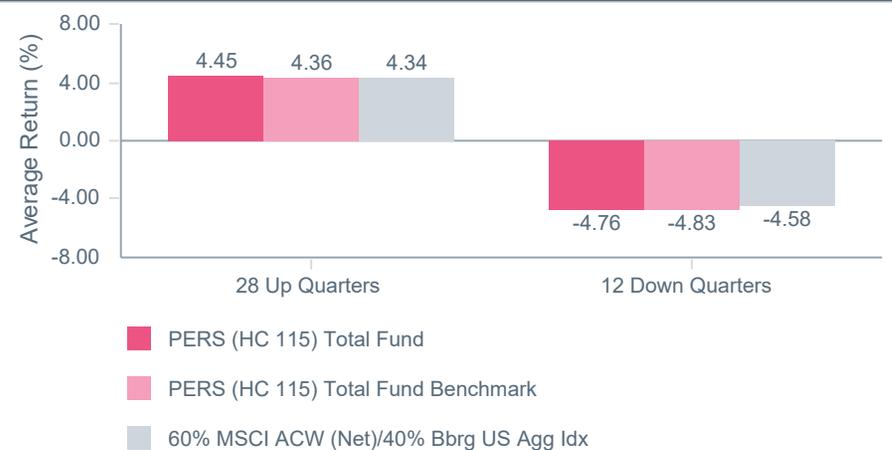
**MPT Stats**

	<b>10 Years</b>
Maximum Return	12.24
Standard Deviation	10.81
Minimum Return	-14.63
<b>vs. PERS (HC 115) Total Fund Benchmark</b>	
Info Ratio	0.77
Tracking Error	0.41
Alpha	0.36
vs. S&P 500 Index (Cap Wtd)	
Beta	0.73
<b>vs. ICE BofAML 3 Mo US T-Bill Index</b>	
Sharpe Ratio	0.46

**Asset Allocation vs. Targets**

	<b>Market Value (\$)</b>	<b>Allocation (%)</b>	<b>Target (%)</b>
US Equity	3,524,360,650	26.37	25.60
International Equity	3,234,862,755	24.20	25.00
Core Fixed Income	2,064,388,589	15.45	16.00
EMD	134,642,312	1.01	1.00
High Yield	671,880,275	5.03	5.00
Securitized Debt	418,860,730	3.13	3.00
TIPS	894,902,757	6.70	7.00
Global High Yield	17,665	0.00	0.00
Investment Grade Credit	398,157,846	2.98	3.00
US Treasury	250,412,709	1.87	2.00
REITs	645,313,969	4.83	5.00
Hedge Funds	915,964	0.01	0.00
Opportunistic	239,530,651	1.79	1.40
Commodities	418,770,279	3.13	3.00
Risk Parity	385,124,715	2.88	3.00
Cash Equivalents	83,901,097	0.63	0.00
<b>Total Fund</b>	<b>13,366,042,961</b>	<b>100.00</b>	<b>100.00</b>

**Up/Down Markets - 10 Years**

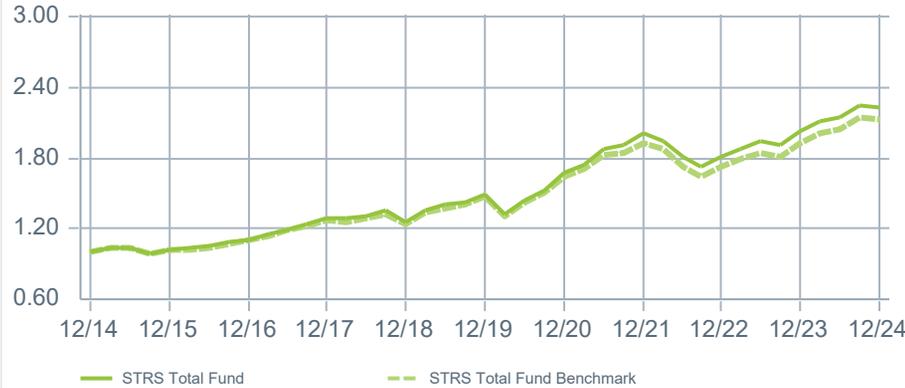


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- STRS has generated 0.54% of alpha over the trailing 5-year period and 0.46% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited similar up-market capture and smaller down-market capture characteristics over the past 10 years.

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



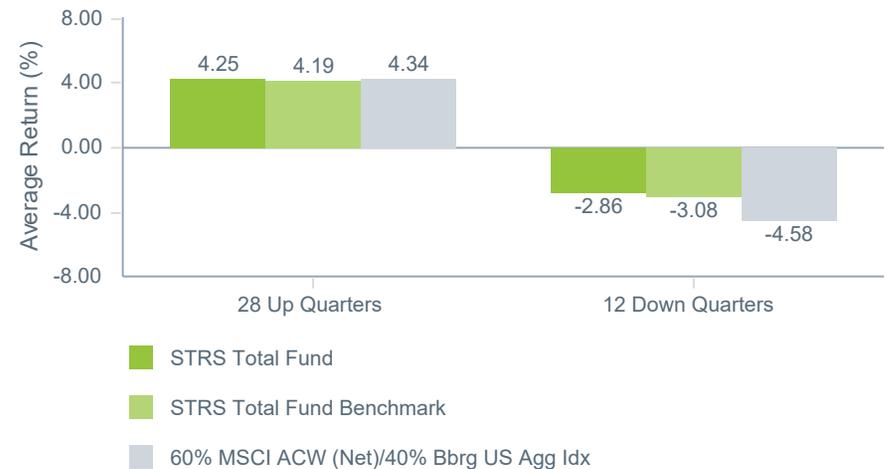
**MPT Stats**

	5 Years	10 Years
Maximum Return	10.00	10.00
Minimum Return	-11.51	-11.51
Standard Deviation	10.58	8.67
vs. STRS Total Fund Benchmark		
Info Ratio	0.76	0.82
Tracking Error	0.66	0.53
Alpha	0.61	0.48
vs. S&P 500 Index (Cap Wtd)		
Beta	0.54	0.54
vs. ICE BofAML 3 Mo US T-Bill Index		
Sharpe Ratio	0.58	0.77

**Asset Allocation vs. Targets**

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	25,024,416,822	25.99	26.00
International Equity	21,166,538,841	21.99	22.00
Fixed Income	21,296,849,938	22.12	22.00
Real Estate	7,962,608,236	8.27	10.00
Opportunistic (Incl. Hedge Funds)	9,971,489,181	10.36	10.00
Private Equity	9,496,477,815	9.86	9.00
Cash Equivalents	1,352,119,481	1.40	1.00
<b>Total Fund</b>	<b>96,270,500,314</b>	<b>100.00</b>	<b>100.00</b>

**Up/Down Markets - 10 Years**

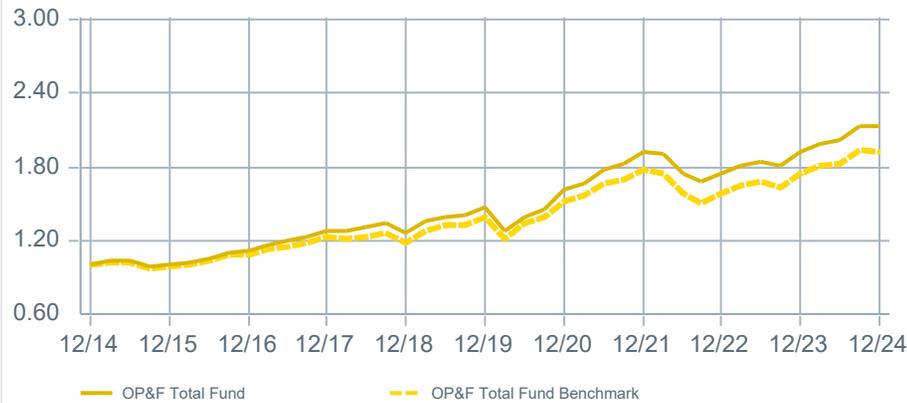


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- OP&F has generated 0.88% of alpha over the trailing 5-year period and 1.09% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, the plan has exhibited similar up-market and smaller down-market capture characteristics over the past 10 years.

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



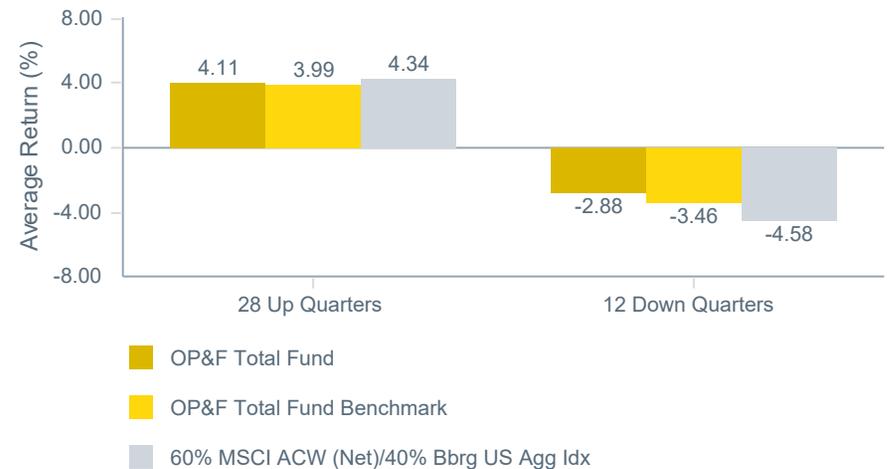
**MPT Stats**

	5 Years	10 Years
Maximum Return	10.66	10.66
Minimum Return	-13.55	-13.55
Standard Deviation	11.06	8.96
vs. OP&F Total Fund Benchmark		
Info Ratio	0.49	0.74
Tracking Error	1.70	1.41
Alpha	0.95	1.16
vs. S&P 500 Index (Cap Wtd)		
Beta	0.55	0.54
vs. ICE BofAML 3 Mo US T-Bill Index		
Sharpe Ratio	0.50	0.69

**Asset Allocation vs. Targets**

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	4,281,373,202	23.00	20.20
International Equity	2,470,496,073	13.27	13.00
High Yield Fixed Income	1,504,387,303	8.08	8.00
US TIPS	1,409,066,915	7.57	7.50
Core Fixed Income	1,614,739,258	8.67	12.50
Private Credit	635,997,766	3.42	4.00
US Treasury	89,166,020	0.48	0.00
Real Estate	1,839,815,473	9.88	12.00
Private Markets	1,437,127,837	7.72	8.50
MLPs	1,190,978,169	6.40	5.00
Real Assets	1,168,308,918	6.28	6.80
Gold	179,513,910	0.96	0.50
Cash Equivalents	420,452,320	2.26	0.00
Commodities	376,343,906	2.02	2.00
Total Fund	18,617,767,070	100.00	100.00

**Up/Down Markets - 10 Years**



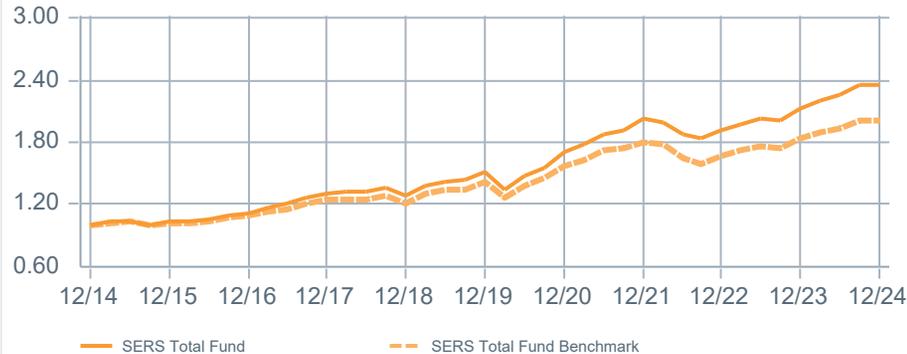
Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding. OP&F's target allocations are based on market value and does not reflect the notional exposures as a result of the embedded leverage in the asset allocation policy.

Total Fund Characteristics

Summary

- SERS has generated 1.90% of alpha over the trailing 5-year period and 1.72% of alpha over the trailing 10-year period.
- Relative to a 60 Equity/40 Bond portfolio, SERS has exhibited similar up-market capture and smaller down-market capture characteristics over the past 10 years.

Growth of \$1 - 10 Years



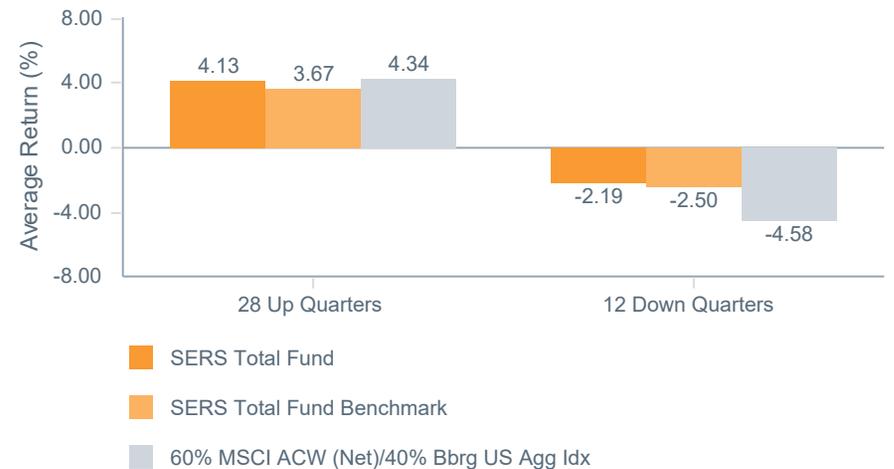
MPT Stats

	5 Years	10 Years
Maximum Return	9.94	9.94
Minimum Return	-11.00	-11.00
Standard Deviation	9.52	7.86
vs. SERS Total Fund Benchmark		
Info Ratio	1.41	1.62
Tracking Error	1.29	1.02
Alpha	1.61	1.36
vs. S&P 500 Index (Cap Wtd)		
Beta	0.48	0.48
vs. ICE BofAML 3 Mo US T-Bill Index		
Sharpe Ratio	0.70	0.90

Asset Allocation vs. Targets

	Market Value (\$)	Allocation (%)	Target (%)
Global Equity	8,340,149,411	42.80	41.00
Fixed Income	2,525,422,055	12.96	18.00
Private Credit	1,213,651,451	6.23	5.00
Real Estate	2,183,627,440	11.20	13.00
Infrastructure	1,336,749,897	6.86	7.00
Opportunistic Investments	613,387,126	3.15	0.00
Private Equity	2,580,689,570	13.24	13.00
Cash Equivalents	694,721,302	3.56	3.00
Total Fund	19,488,398,251	100.00	100.00

Up/Down Markets - 10 Years

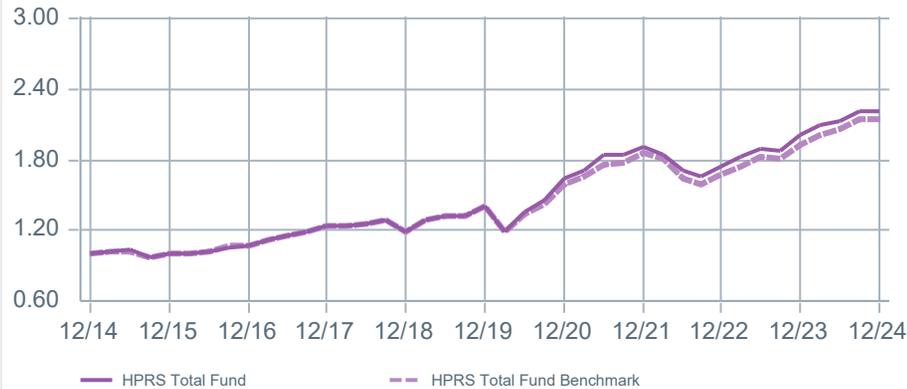


Performance shown is gross of fees. Calculations are based on quarterly periodicity. Allocations shown may not sum up to 100% exactly due to rounding.

**Summary**

- HPRS has generated 0.73% of alpha over the trailing 5-year period and 0.36% 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**



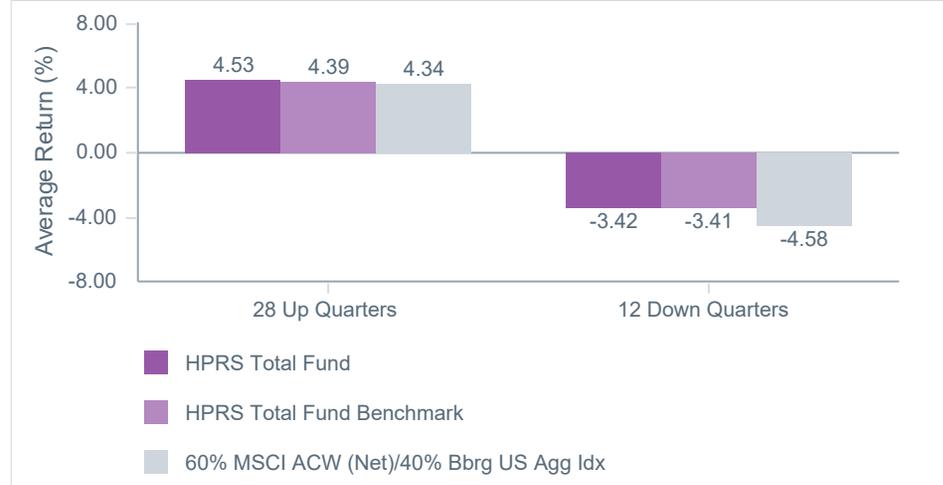
**MPT Stats**

	5 Years	10 Years
Maximum Return	13.60	13.60
Minimum Return	-14.84	-14.84
Standard Deviation	12.74	10.33
vs. HPRS Total Fund Benchmark		
Info Ratio	0.59	0.35
Tracking Error	1.24	1.10
Alpha	0.45	0.05
vs. S&P 500 Index (Cap Wtd)		
Beta	0.65	0.64
vs. ICE BofAML 3 Mo US T-Bill Index		
Sharpe Ratio	0.59	0.66

**Asset Allocation vs. Targets**

	Market Value (\$)	Allocation (%)	Target (%)
US Equity	256,481,381	22.43	20.00
International Equity	23,778,709	2.08	6.00
Global Equity	249,786,398	21.84	22.00
Fixed Income	159,841,418	13.98	15.00
Real Estate	73,035,791	6.39	8.00
Hedge Funds	56,349,749	4.93	6.00
Private Equity	220,534,774	19.29	15.00
Real Assets	50,496,704	4.42	4.00
Cash Equivalents	53,200,345	4.65	4.00
Total Fund	1,143,505,270	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 December 31, 2024

	Market Value (\$) (\$000)	Trailing Performance (%)						Calendar Year Performance (%)			
		2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years	2023	2022	2021	2020
<b>HPRS</b>	<b>1,143,505</b>	<b>4.15</b>	<b>10.54</b>	<b>5.02</b>	<b>9.61</b>	<b>8.71</b>	<b>8.30</b>	<b>15.03</b>	<b>-8.92</b>	<b>16.92</b>	<b>16.86</b>
HPRS Total Fund Benchmark		4.40	11.57	5.04	8.87	8.25	7.94	14.41	-9.21	16.63	13.16
Difference		-0.25	-1.03	-0.03	0.74	0.46	0.36	0.62	0.28	0.29	3.70
<i>All Public Plans &gt; \$1B-TF Median</i>		3.89	9.20	2.85	7.12	6.98	7.23	11.48	-10.48	15.53	11.81
Rank		33	17	8	2	3	7	3	36	36	3
Population		160	160	155	153	150	148	238	244	286	299
<i>All Public Plans \$250M to \$1B-TF Median</i>		4.24	10.22	2.81	7.02	6.85	7.11	12.79	-12.92	14.27	13.08
Rank		52	43	2	1	3	6	18	9	17	9
Population		103	99	97	95	95	91	138	145	168	178

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 12/31/2024

	(annualized fees shown in basis points)							
	Domestic Equity	Global Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	2	-	25	4	85	45	-	18
■ PERS (HC 115)	0	-	4	1	-	-	-	3
■ STRS	12	-	24	5	48	80	78	74
■ OP&F	53	-	39	49	60	70	-	64
■ SERS	19	-	50	59	81	107	-	109
■ HPRS	7	50	86	61	132	134	95	126

- 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, Opportunistic, and Commodities.
- PERS (DB) and PERS (HC 115) expenses for Real Estate, Other Alternatives, and Private Equity include net management fees and partnership expenses. Fees are estimated and are for externally managed accounts or portfolios.
- PERS (DB) and PERS (HC 115) are in the process of liquidating all Hedge Funds
- 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, Gold and Commodities.
- 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 12/31/2024

Percentage of Assets Managed by External Managers - As of 12/31/2024								
	Total Fund	Domestic Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	48%	4%	82%	16%	94%	100%	100%	18%
■ PERS (HC 115)	26%	4%	82%	13%	-	-	100%	11%
■ STRS	34%	5%	46%	10%	24%	89%	100%	78%
■ OP&F	100%	100%	100%	100%	100%	100%	-	100%
■ SERS	96%	100%	100%	96%	99%	100%	100%	91%
■ HPRS	100%	100%	100%	100%	100%	100%	100%	100%

- PERS (DB) and PERS (HC 115) Other Alternatives include Risk Parity, Opportunistic, and Commodities.
- STRS Other Alternatives include Opportunistic/Diversified Investments (includes Hedge Fund exposure).
- OP&F Other Alternatives include Real Assets, MLPs, and Gold.
- OP&F's Cash is 100% 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 12/31/2024

Percentage of Assets Actively Managed - As of 12/31/2024								
	Total Fund	Domestic Equity	International Equity	Fixed Income	Real Estate	Private Equity	Hedge Funds	Other Alternatives
■ PERS (DB)	77%	19%	90%	87%	100%	100%	100%	100%
■ PERS (HC 115)	70%	19%	90%	81%	100%	-	100%	100%
■ STRS	89%	63%	95%	100%	100%	100%	100%	100%
■ OP&F	85%	80%	100%	84%	100%	100%	-	94%
■ SERS	82%	25%	93%	100%	99%	100%	100%	100%
■ HPRS	82%	18%	100%	100%	100%	100%	100%	100%

- PERS (DB) and PERS (HC 115) Other Alternatives include Risk Parity, Opportunistic, and Commodities.
- STRS Other Alternatives include Opportunistic/Diversified Investments (includes Hedge Fund exposure).
- STRS International Equity beginning 12/31/2024 reflects recategorization of passive component contained in an active portfolio.
- 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:

- 21.6% Russell 3000 Index
- 20.0% PERS (DB) International Equity Custom Benchmark
- 9.8% PERS (DB) Core Fixed Income Custom Benchmark
- 3.0% Bloomberg U.S. Treasury Index
- 4.0% Bloomberg U.S. High Yield Index
- 1.0% PERS (DB) EMD Custom Benchmark
- 1.0% PERS (DB) Securitized Debt Custom Benchmark
- 3.0% Bloomberg U.S. TIPS Index
- 3.0% Bloomberg U.S. Corporate Bond Index
- 0.2% S&P UBS Leveraged Loan Index
- 12.0% PERS (DB) Real Estate Custom Benchmark
- 1.0% Dow Jones U.S. Select Real Estate Securities TR Index
- 1.4% PERS (DB) Opportunistic Custom Benchmark
- 2.0% Commodities Custom Benchmark
- 15.0% PERS (DB) Private Equity Custom Benchmark
- 2.0% PERS (DB) Risk Parity Custom Benchmark

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

- 25.6% Russell 3000 Index
- 25.0% PERS (HC 115) International Equity Custom Benchmark
- 16.0% PERS (HC 115) Core Fixed Income Custom Benchmark
- 1.0% PERS (HC 115) EMD Custom Benchmark
- 5.0% Bloomberg U.S. High Yield Index
- 3.0% PERS (HC 115) Securitized Debt Custom Benchmark
- 7.0% Bloomberg U.S. TIPS Index
- 3.0% Bloomberg U.S. Corporate Bond Index
- 2.0% Bloomberg U.S. Treasury Index
- 5.0% Dow Jones U.S. Select Real Estate Securities TR Index
- 1.4% PERS (HC 115) Opportunistic Custom Benchmark
- 3.0% Commodities Custom Benchmark
- 3.0% PERS (HC 115) Risk Parity Custom Benchmark

### STRS Total Fund Custom Benchmark:

- 26.0% Russell 3000 Index
- 22.0% MSCI World Ex US Index (50% Hedged)/ MSCI Emg Mkts Index
- 22.0% STRS Fixed Income Blended Benchmark
- 10.0% STRS Real Estate Custom Benchmark
- 19.0% Alternative Investment Blended Benchmark
- 1.0% ICE BofA US 3-Month Treasury Bill Index

### OP&F Total Fund Custom Benchmark:

- 20.2% Wilshire 5000 Index
- 13.0% OP&F International Equity Custom Benchmark
- 8.0% CS High Yield Dev. Countries Only Index
- 7.5% Bridgewater Custom US TIPS Index
- 12.5% Bloomberg US Aggregate Bond Index + Leverage Factor
- 4.0% S&P LTSA Levered Loan Index + 2%
- 12.0% NCREIF ODCE (Net) (1 Quarter Lag)
- 8.5% OP&F Private Equity Custom Benchmark
- 5.0% Alerian MLP Index
- 6.8% OP&F Real Assets Custom Index
- 0.5% S&P GSCI Gold Index Minus the Cost of Financing
- 2.0% Bloomberg Commodity TR Index

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

### SERS Total Fund Custom Benchmark:

- 41.0% MSCI All Country World Net Total Return Index (USD)
- 18.0% Bloomberg Barclays US Aggregate Bond Index
- 7.0% Quarterly Smoothed CPI +1.20% per Quarter
- 13.0% NCREIF Property Index (1 Quarter Lag)
- 5.0% 90 Day T-Bill + 4.5%
- 13.0% Burgiss All Private Equity (1 Quarter Lag)
- 3.0% FTSE 30 Day T-Bill Index

### HPRS Total Fund Custom Benchmark:

- 20.0% Russell 3000 Index
- 6.0% HPRS International Equity Custom Benchmark
- 22.0% MSCI ACWI Index
- 15.0% HPRS Fixed Income Custom Benchmark
- 8.0% HPRS Total Real Estate Composite (Net)
- 6.0% HFRI FOF Composite Index
- 15.0% HPRS Total Private Equity Composite
- 4.0% HPRS Real Assets Composite (Net)
- 4.0% 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
- From 2012-2014: Barclays Capital 75% U.S. Aggregate ex Govt/25% U.S. Govt 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)
- Prior to 2018: Non-Agency CMBS component of the U.S. Aggregate Index plus 160 annualized basis points

### 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:

- Russell 2000 Index
- Bloomberg Gold Subindex Total Return
- Prior to Q4 2023:S&P Risk Parity 10% Target Volatility Index
- Russell 2000 Index
- Bloomberg Gold Subindex Total Return

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

- External: HFR Risk Parity Institutional Custom Index
- Internal: S&P Risk Parity 10% Target Volatility Index
- Prior to Q4 2023: HFR Risk Parity Institutional Custom Index

### PERS (DB) Commodity Custom Benchmark:

- Bloomberg Commodity Index
- Prior to Q3 2021: Goldman Sachs Commodity 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
- From 2012-2014: Barclays Capital 75% U.S. Aggregate ex Govt/25% U.S. Govt 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)
- Prior to 2018: Non-Agency CMBS component of the U.S. Aggregate Index plus 160 annualized basis points

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

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

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

- Russell 2000 Index
- Bloomberg Gold Subindex Total Return
- Prior to Q4 2023:S&P Risk Parity 10% Target Volatility Index
- Russell 2000 Index
- Bloomberg Gold Subindex Total Return

## Custom Benchmark Glossary

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

- External: HFR Risk Parity Institutional Custom Index
- Internal: S&P Risk Parity 10% Target Volatility Index
- Prior to Q4 2023: HFR Risk Parity Institutional Custom Index

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

- Goldman Sachs Commodity Index

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

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

### **STRS Real Estate Custom Benchmark:**

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

### **STRS Private Equity Benchmark:**

- The Private Equity Benchmark is the quarterly Cambridge Associates Private Equity and Venture Capital Index, one quarter lagged to be consistent with external fund reporting, effective July 1, 2021.

### **STRS Opportunistic/Diversified Blended Benchmark:**

- Effective July 1, 2021, the Opportunistic/diversified blended benchmark consists of the actual Opportunistic Investments Portfolio weight multiplied by the Cambridge Associates Private Credit Index one quarter lagged to be consistent with external fund reporting plus the actual weight of the Diversified Investments Portfolio multiplied by the HFRI Fund of Funds Composite Index, which is a monthly index where subsequent revisions will be reflected in the following period.

### **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

### **OP&F International Equity Custom Benchmark**

- MSCI ACWI Ex US Iran/Sudan Free IMI Index
- Prior to 2012Q4: MSCI ACW Ex US IM Index (USD) (Net)

### **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
- 60% Credit Suisse Leveraged Loans

### **HPRS Total Private Equity Custom Benchmark:**

- Private Equity Composite Performance
- Prior to 2017Q1: 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

**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:

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

**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.

# RVK

**Disclaimer of Warranties and Limitation of Liability** - This document was prepared by RVK, Inc. (RVK) and may include information and data from some or all of the following sources: client staff; custodian banks; investment managers; specialty investment consultants; actuaries; plan administrators/record-keepers; index providers; as well as other third-party sources as directed by the client or as we believe necessary or appropriate. RVK has taken reasonable care to ensure the accuracy of the information or data, but makes no warranties and disclaims responsibility for the accuracy or completeness of information or data provided or methodologies employed by any external source. This document is provided for the client's internal use only. It should not be construed as legal or tax advice. It does not constitute a recommendation by RVK or an offer of, or a solicitation for, any particular security and it is not intended to convey any guarantees as to the future performance of the investment products, asset classes, or capital markets. This document should not be construed as investment advice: it does not reflect all potential risks with regard to the client's investments and should not be used to make investment decisions without additional considerations or discussions about the risks and limitations involved. Any decision, investment or otherwise, made on the basis of this document is the sole responsibility of the client or intended recipient.