

AKSIA LLC

PENNSYLVANIA PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM ABSOLUTE RETURN PROGRAM QUARTERLY UPDATE

AS OF DECEMBER 31, 2022

PSERS ABSOLUTE RETURN PROGRAM QUARTERLY UPDATE

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I. EXECUTIVE SUMMARY

Investment Policy and Program Objectives

- Reduce the risk and/or enhance the returns of PSERS' overall investment program through investment in a diversified basket of portfolios that incorporate various investment strategies, asset types, and investment vehicles
- Target risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle
- Target managers which provide idiosyncratic returns and portfolios that exhibit low correlation to equities, fixed income, commodities, and other sources of low-cost beta over a full market cycle

	Target Allocation	Current Allocation as of 12/31/2022
Absolute Return Program	4.0%	3.8%

- On December 17, 2021, the Board approved an asset allocation that will reduce the Target Allocation of the Absolute Return program to 0%. The transition to the new Target Allocation approved by the Board will occur over time.
- Effective 10/1/2022, the Target Allocation is 4%.
- A resolution was adopted by the Board at its March 2022 Investment Committee meeting where the Board suspended all guidelines within the Absolute Return Policy during the liquidation period.

Key Observations:

- Over the full market cycle, the AR portfolio return exceeds the current benchmark
- Over the full market cycle, the AR portfolio outperformed the current benchmark on a beta-adjusted basis
- The AR portfolio has a higher Sharpe Ratio, lower beta, and lower correlation to the S&P 500 Index than the current benchmark

Performance Objective: Target risk-adjusted returns in excess of the HRFI Fund of Funds Conservative Index +1%, net of fees, over a full market cycle

Time Period	Actual Performance		Beta-Adjusted Performance ("Alpha") ²	
	PSERS ¹	HFRI FOF Conservative + 1%	PSERS ¹	HFRI FOF Conservative + 1%
Current Fiscal YTD (Jul '22 - Dec '22)	-0.5%	2.2%	-1.0%	1.4%
Last Fiscal Year (Jul '21 - Jun '22)	9.7%	1.1%	11.0%	2.9%
CYTD 2022	7.7%	1.2%	10.8%	4.8%
One Year	7.7%	1.2%	10.8%	4.8%
Three Year	6.0%	5.7%	3.8%	3.3%
Five Year	5.2%	4.9%	3.7%	2.8%
Ten Year	4.6%	4.7%	3.2%	2.4%
Inception to Date (Oct 2005 - Dec 2022)	5.3%	3.7%	4.3%	1.8%
Risk and Return (Oct 2005 - Dec 2022)	(Oct 2008 - Dec 2022)²			
Return (Ann.)	5.3%	3.7%	4.3%	1.8%
Volatility (Ann.)	4.8%	4.2%	4.3%	2.9%
Sharpe Ratio	0.80	0.56	0.84	0.34
Correlation with S&P 500	0.30	0.65	-	-
Beta to S&P 500	0.09	0.17	-	-

¹ Net of hedge fund fees and expenses but gross of Aksia's fee.

² The beta-adjustment calculation requires 36 months of data, therefore the first available date for beta-adjusted performance is October 2008. The referenced index used to calculate Beta-adjusted performance is the S&P 500 TR.

Key Observations:

- The AR portfolio is intended to provide consistent, idiosyncratic returns that provide diversification from the broader equity, fixed income, and commodity markets
- Since inception, the Absolute Return portfolio has had one down year (-8.6% in 2008)
 - During 2008 the S&P 500 Index was down -37.0%, the MSCI ACWI World Index was down over -42.2%, and the current benchmark was down -19.0%
- The AR portfolio achieves these returns with low beta to the equity markets

Time Period	Actual Performance			Beta-Adjusted Performance ("Alpha") ³	
	PSERS ¹	Policy Index ²	HFRI FOF Conservative + 1%	PSERS ¹	HFRI FOF Conservative + 1%
Current Fiscal YTD (Jul '22 - Dec '22)	-0.5%	2.2%	2.2%	-1.0%	1.4%
Last Fiscal Year (Jul '21 - Jun '22)	9.7%	1.1%	1.1%	11.0%	2.9%
CYTD 2022	7.7%	1.2%	1.2%	10.8%	4.8%
2021	6.0%	8.7%	8.7%	1.0%	2.5%
2020	4.4%	7.5%	7.5%	-0.1%	2.5%
2019	4.0%	6.4%	7.4%	4.4%	3.2%
2018	3.8%	5.8%	0.1%	2.8%	0.8%
2017	4.2%	4.7%	5.2%	2.3%	2.5%
2016	4.0%	4.2%	2.9%	2.7%	1.4%
2015	3.8%	4.7%	1.4%	3.9%	1.2%
2014	3.1%	7.5%	4.2%	2.1%	1.8%
2013	4.8%	7.5%	8.8%	2.2%	3.1%
2012	3.5%	7.5%	5.3%	2.2%	2.9%
2011	7.7%	7.7%	-2.6%	8.7%	-2.4%
2010	17.3%	8.0%	6.1%	14.5%	3.0%
2009	15.3%	-	10.7%	11.4%	5.9%
2008	-8.6%	-	-19.0%	-5.0%	-7.2%
2007	8.2%	-	8.7%		
2006	3.7%	-	10.3%		
2005	0.2%	-	1.7%		

¹ Net of hedge fund fees and expenses but gross of Aksia's fee.

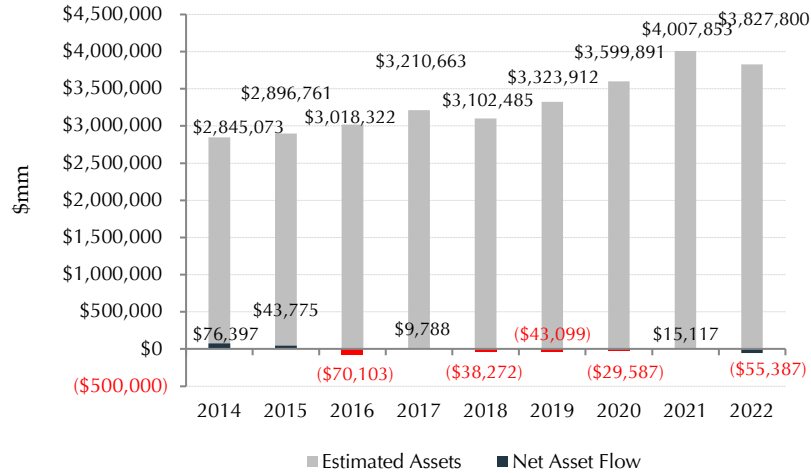
² The Policy Index is comprised of the following: April 2009 (this is when Absolute Return became a separate part of the Asset Allocation) – June 2011: 8% annualized return, July 2011 – June 2014: 7.5% annualized return, July 2014 – September 2019: 3m LIBOR plus 3.5%, October 2019 – Present: HFRI FOF Conservative Index plus 1%.

³ The beta-adjustment calculation requires 36 months of data, therefore the first available date for beta-adjusted performance is October 2008. The referenced index used to calculate Beta-adjusted performance is the S&P 500 TR.

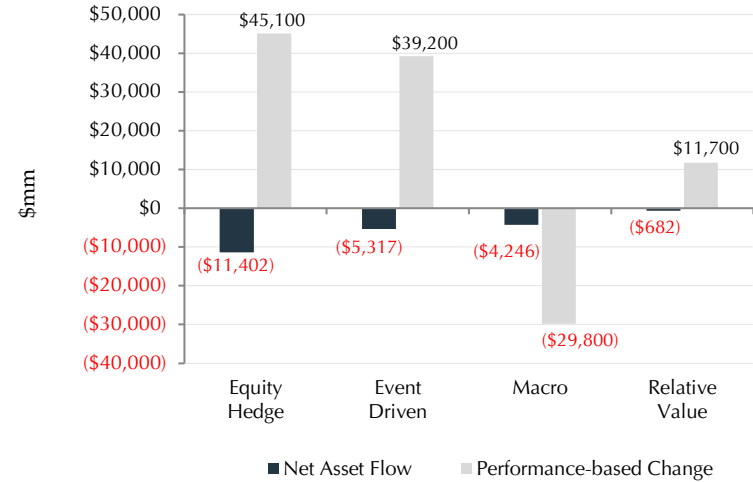
Q4 2022	Fund	Transaction	Amount
Capital Calls and Subscriptions	Falko Regional Aircraft Opportunities Fund II LP	Capital Call	+\$17.3mm
	HS Group Sponsor Fund II Ltd	Capital Call	+\$20.8mm
	SASOF V LP	Capital Call	+\$27.2mm
Distributions and Redemptions	Aeolus Property Catastrophe Keystone PF Fund LP	Distribution	-\$10.1mm
	Bridgewater Pure Alpha Fund II Ltd	Redemption	-\$150.0mm
	Caspian Keystone Focused Fund LP	Redemption	-\$15.1mm
	Caspian Select Credit International Ltd	Redemption	-\$289.1mm
	Falko Regional Aircraft Opportunities Fund II LP	Distribution	-\$1.0mm
	Garda Fixed Income Relative Value Opportunity Fund Ltd	Redemption	-\$125.0mm
	Oceanwood Investments SPC	Distribution	-\$1.5mm
	OWS Credit Opportunity Offshore Fund III Ltd	Redemption	-\$36.2mm
	Palmetto Fund Ltd	Redemption	-\$1.2mm
	PIMCO Commodity Alpha Fund Ltd	Redemption	-\$112.5mm
	PIMCO Global Credit Opportunity Offshore Fund Ltd	Redemption	-\$96.5mm
RenaissanceRe Upsilon Diversified Fund	Redemption	-\$8.9mm	
Sciens Aviation Special Opportunities Investment Fund II LP	Distribution	-\$0.4mm	
Total Activity During the Quarter			-\$782.2mm

II. HEDGE FUND INDUSTRY REVIEW

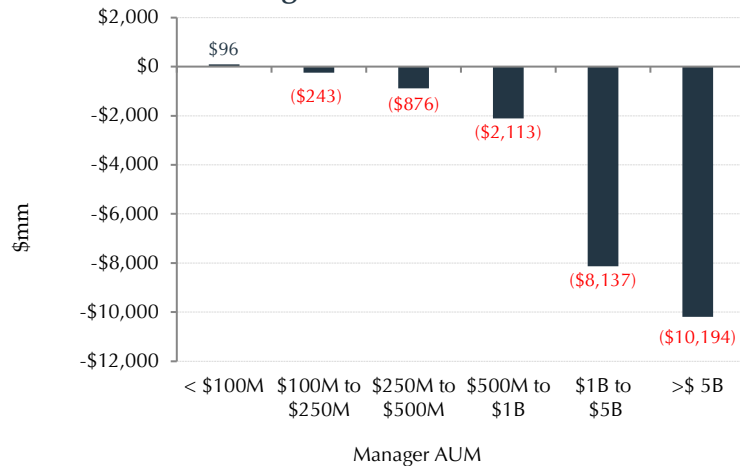
Industry Assets Had Been Modestly Increasing in the Last Several Years (as of Q4 2022)*



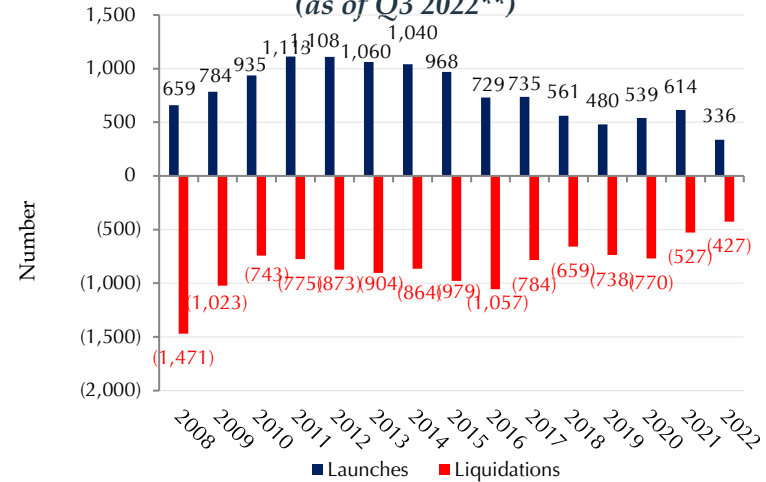
Mixed Performance Across Sectors Accompanied Negative Net Flows in Q4 2022*



Q4 2022 Capital Flows Were Most Notable Among Managers with >\$500M in AUM*



YTD 2022 Liquidations Have Outpaced New Launches (as of Q3 2022)**



Source: Q4 2022 Global Report

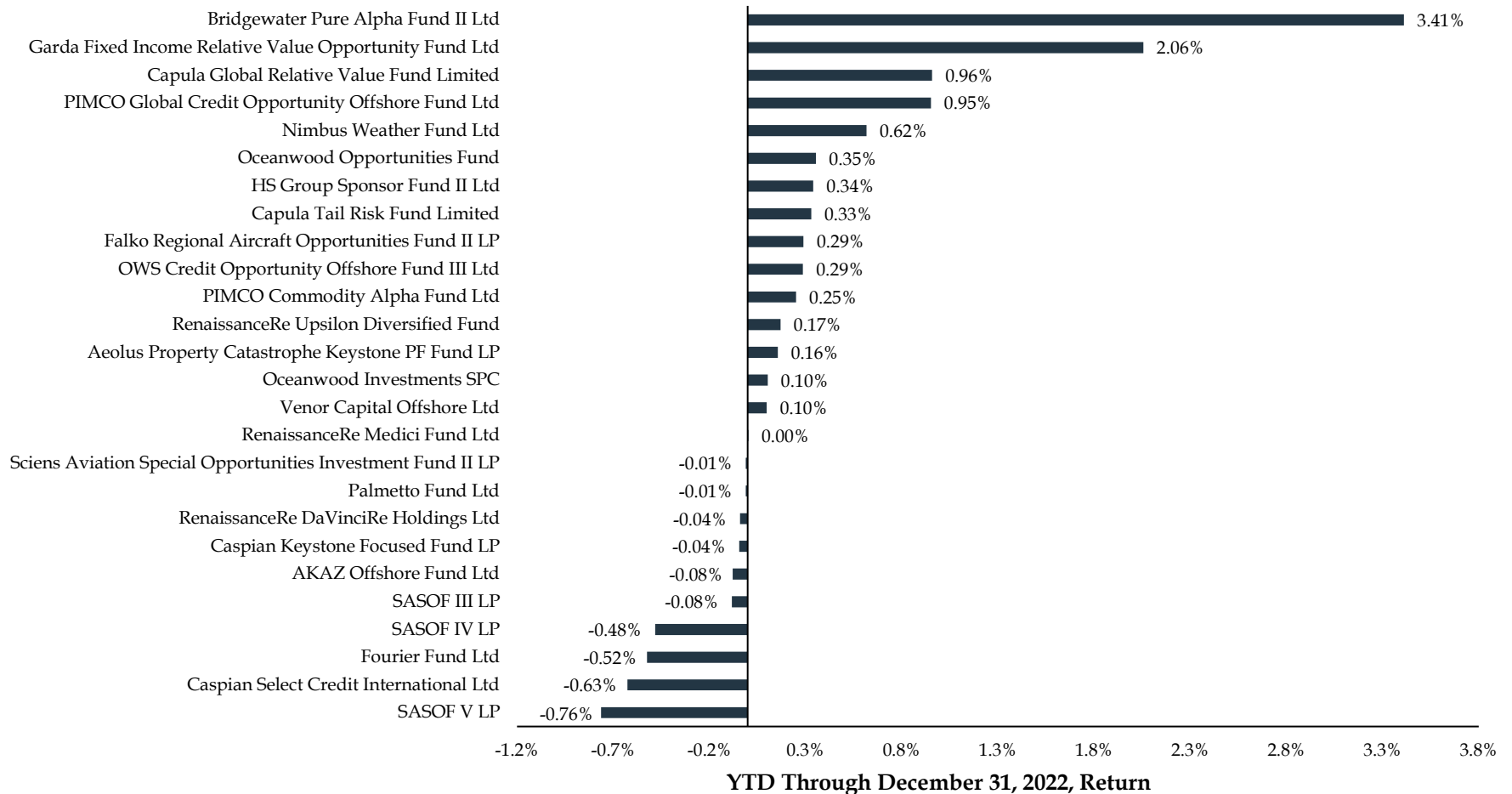
*Figures are rounded to the nearest \$100M

**Chart data is one quarter lagged

III. PSERS PORTFOLIO REVIEW

Key Observations:

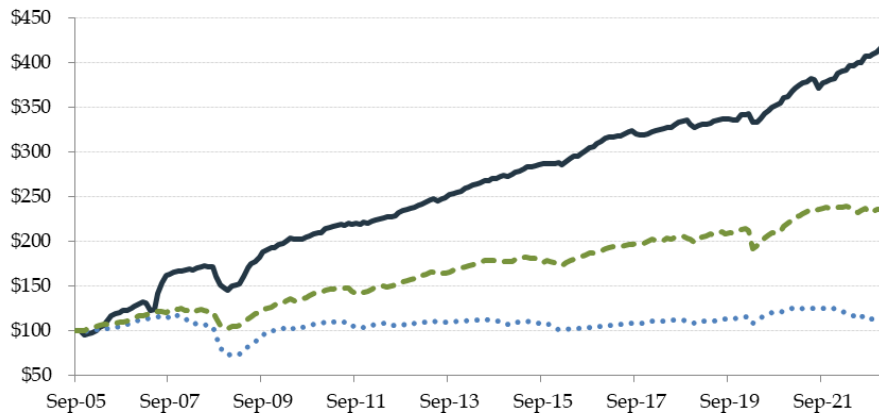
- The return for the period was positive (+7.72%)
- The return for the period is fairly diversified among many sectors and funds
- There were more positive contributors than detractors



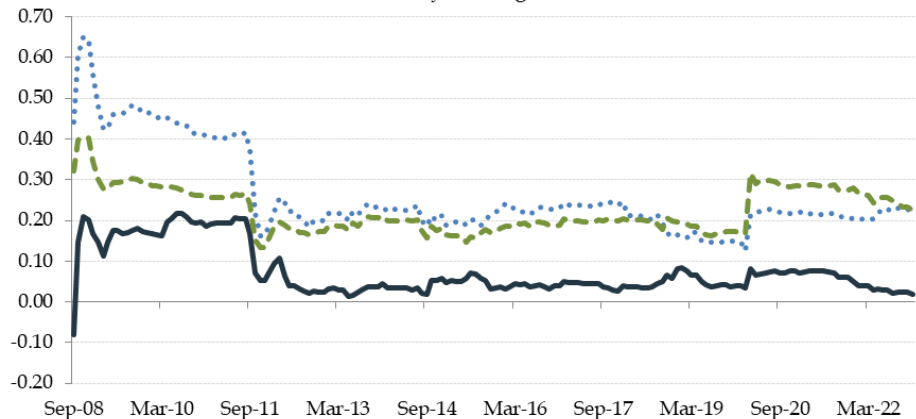
Key Observations:

- The AR portfolio's Relative Value allocation performance has exceeded the sector indices' performance
- The AR portfolio objective focuses on funds with low equity beta - total Relative Value sector beta achieves this objective and is lower than that of the indices

Cumulative Performance
\$100 Invested on October 1, 2005



Beta to S&P 500
3yr Rolling



— PSERS Relative Value HFRX Relative Value - - - HFRI Relative Value

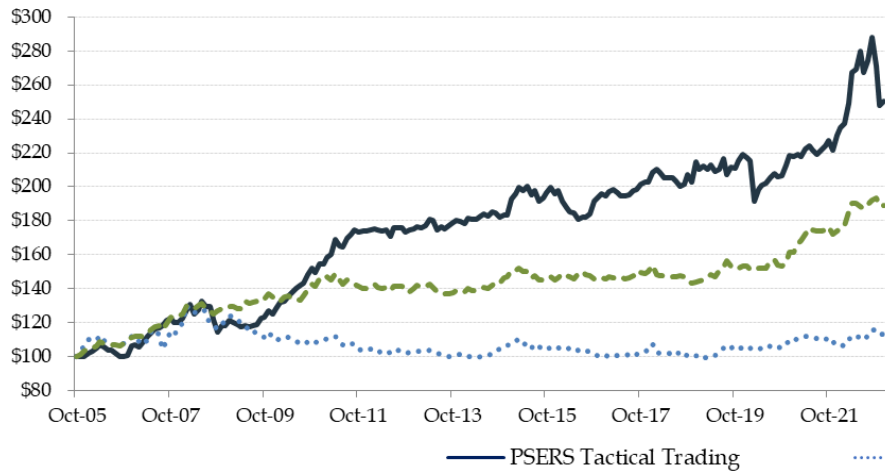
* Analysis for PSERS Relative Value Carve Out is based on realized performance of PSERS' Relative Value hedge funds. The track record includes current funds and funds that have been formerly redeemed.

* Aksia has included both HFRI & HFRX indices as together they provide a decent indicator of hedge fund performance by strategy. HFRX indices are considered 'investable,' whereas HFRI indices are equally weighted across funds in the HFR database. We believe that HFRX indices have a negative selection bias (funds willing to accept new investments may be non-institutional and/or struggling to raise assets), while HFRI has a self-reporting bias (funds who self-report are likely to have recently outperformed, and funds who do poorly may stop reporting). As a result of these biases, we expect HFRX to understate and HFRI to overstate institutional hedge fund performance, over the long run.

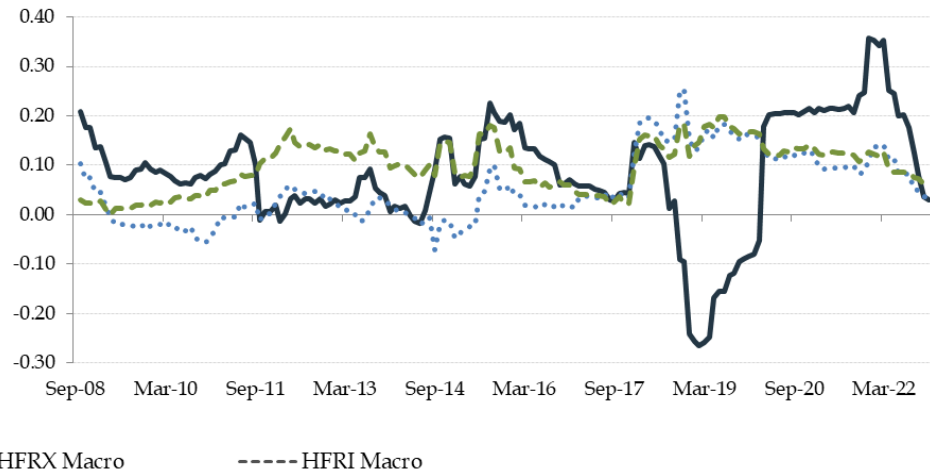
Key Observations:

- The AR portfolio's Tactical Trading allocation performance has exceeded the sector indices' performance
- The AR portfolio objective focuses on funds with low equity beta - total Tactical Trading sector beta achieves this objective over the longer term

Cumulative Performance
\$100 Invested on November 1, 2005



Beta to S&P 500
3yr Rolling



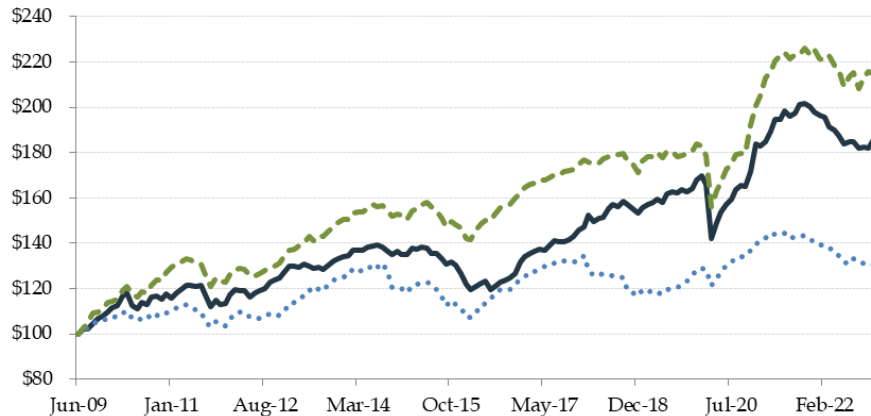
* Analysis for PSERS Tactical Trading Carve Out is based on realized performance of PSERS' Tactical Trading hedge funds. The track record includes current funds and funds that have been formerly redeemed.

* Aksia has included both HFRI & HFRX indices as together they provide a decent indicator of hedge fund performance by strategy. HFRX indices are considered 'investable,' whereas HFRI indices are equally weighted across funds in the HFR database. We believe that HFRX indices have a negative selection bias (funds willing to accept new investments may be non-institutional and/or struggling to raise assets), while HFRI has a self-reporting bias (funds who self-report are likely to have recently outperformed, and funds who do poorly may stop reporting). As a result of these biases, we expect HFRX to understate and HFRI to overstate institutional hedge fund performance, over the long run.

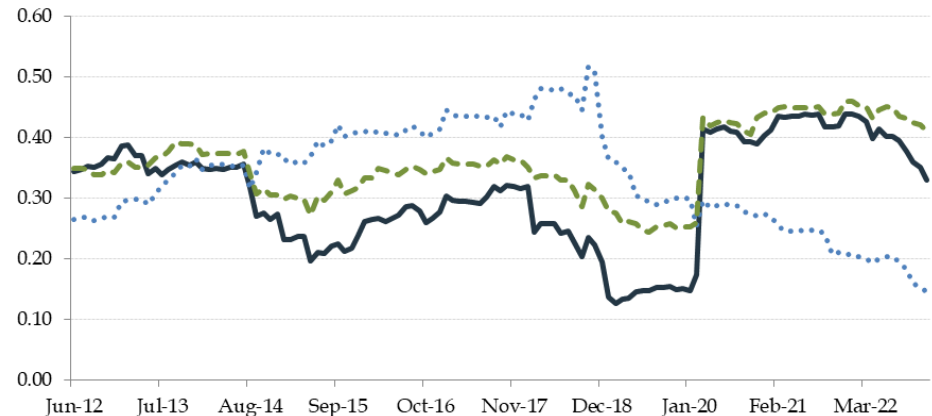
Key Observations:

- The AR portfolio's Event Driven allocation has exceeded the investable index sector performance
- The AR portfolio objective focuses on funds with low equity beta – total Event Driven sector beta achieves this objective, although beta did spike during COVID

Cumulative Performance
\$100 Invested on July 1, 2009



Beta to S&P 500
3yr Rolling



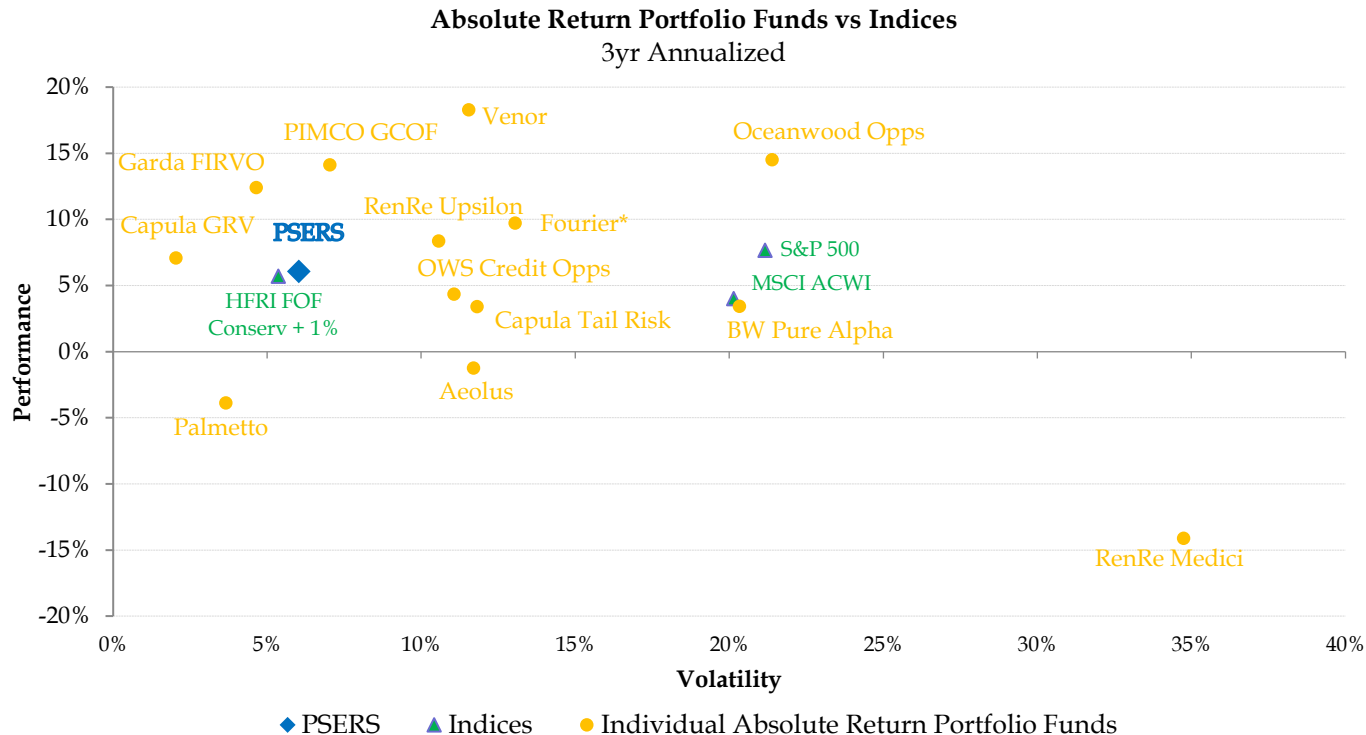
— PSERS Event Driven HFRX Event Driven - - - HFRI Event Driven

* Analysis for PSERS Event Driven Carve Out is based on realized performance of PSERS' Event Driven hedge funds. The track record includes current funds and funds that have been formerly redeemed.

* Aksia has included both HFRI & HFRX indices as together they provide a decent indicator of hedge fund performance by strategy. HFRX indices are considered 'investable,' whereas HFRI indices are equally weighted across funds in the HFR database. We believe that HFRX indices have a negative selection bias (funds willing to accept new investments may be non-institutional and/or struggling to raise assets), while HFRI has a self-reporting bias (funds who self-report are likely to have recently outperformed, and funds who do poorly may stop reporting). As a result of these biases, we expect HFRX to understate and HFRI to overstate institutional hedge fund performance, over the long run.

Key Observations:

- Diversification of funds dampens volatility
- AR performance and volatility results over the last three years are similar to the current benchmark
- The AR portfolio has roughly a third of the volatility of the equity markets (S&P 500 and MSCI ACWI)

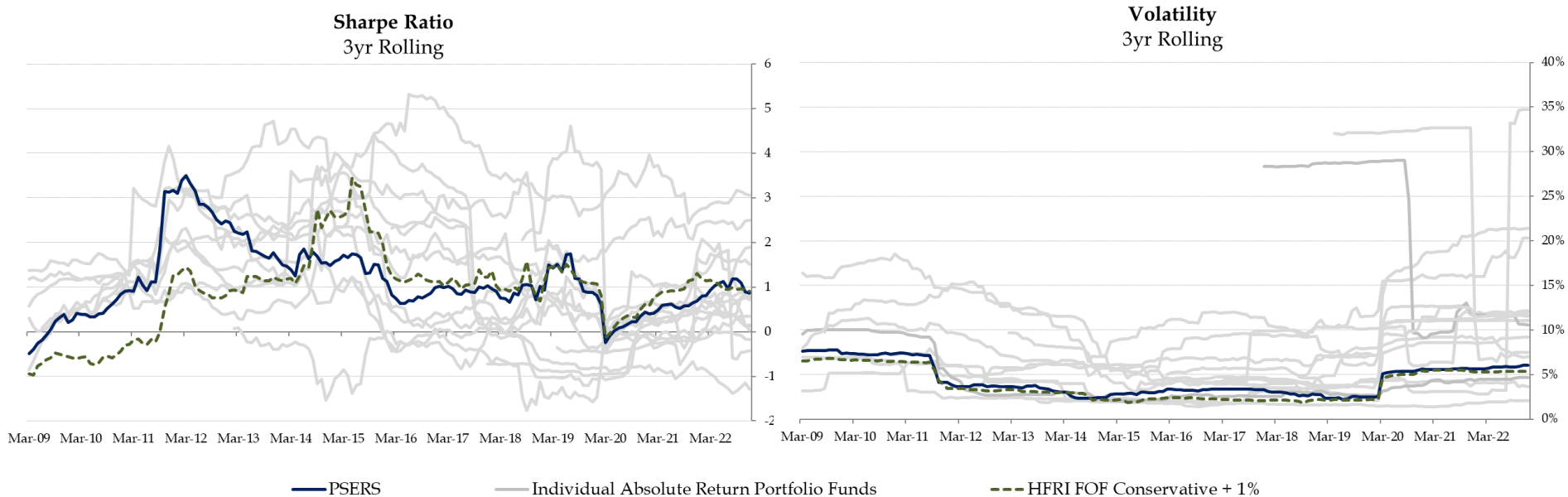


- The return and volatility analysis for the Absolute Return portfolio funds utilizes PSERS' realized performance for the 36-month period prior to and including December 2022. If PSERS has been invested in a fund for less than 36 months, the analysis uses the blended performance of realized returns and fund-level returns prior to PSERS initial investment date. Please see pages 21-23 in this presentation for the inception date of each fund in PSERS portfolio. Analysis for PSERS is performed on realized performance for the Absolute Return portfolio.
- This chart only shows funds that are traditional open-ended fund structures with return methodologies comparable to index returns
- The following private (drawdown structure) funds are not included in this analysis: Carlyle Aviation SASOF fund composite (1.97% net IRR), Falko Regional Aircraft Opportunities Fund II LP (4.3% net IRR), HS Group Sponsor Fund II Ltd. (7.8% net IRR) and Oceanwood Investments SPC (14.5% net IRR)

*Includes PSERS' realized performance for Nimbus Weather Fund Ltd

Key Observations:

- Diversification of funds dampens volatility
- AR portfolio Sharpe Ratio and volatility are in-line with the current benchmark

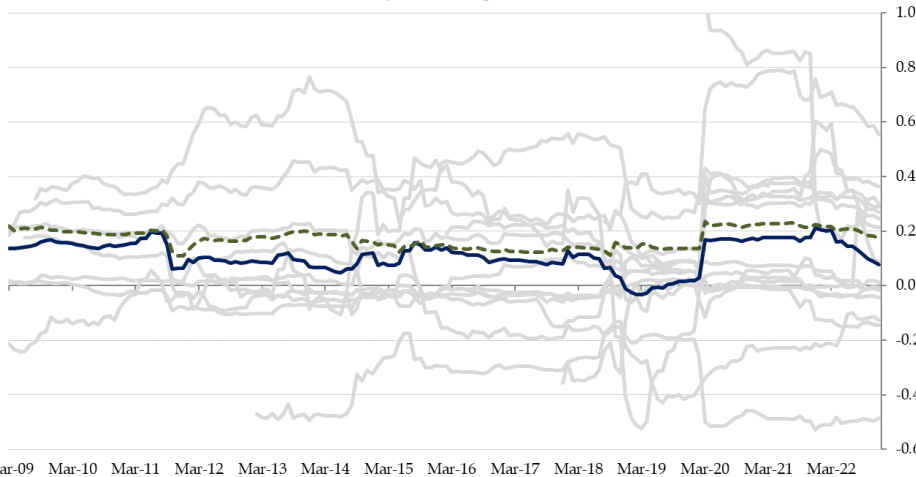


- The Sharpe and volatility analysis for the Absolute Return portfolio funds utilizes PSERS' realized performance for the 36-month period prior to and including December 2022. If PSERS has been invested in a fund for less than 36 months, the analysis uses the blended performance of realized returns and fund-level returns prior to PSERS initial investment date. Please see pages 20-22 in this presentation for the inception date of each fund in PSERS portfolio. Analysis for PSERS is performed on realized performance for the Absolute Return portfolio. Sharpe Ratio uses LIBOR as the risk-free rate.
- For a broad indicator of average 'hedge fund portfolio' performance, Aksia prefers to use the HFRI FOF index group, as there tends to be less self-reporting/dropout bias and losses and side pockets are captured by the FOF vehicle.

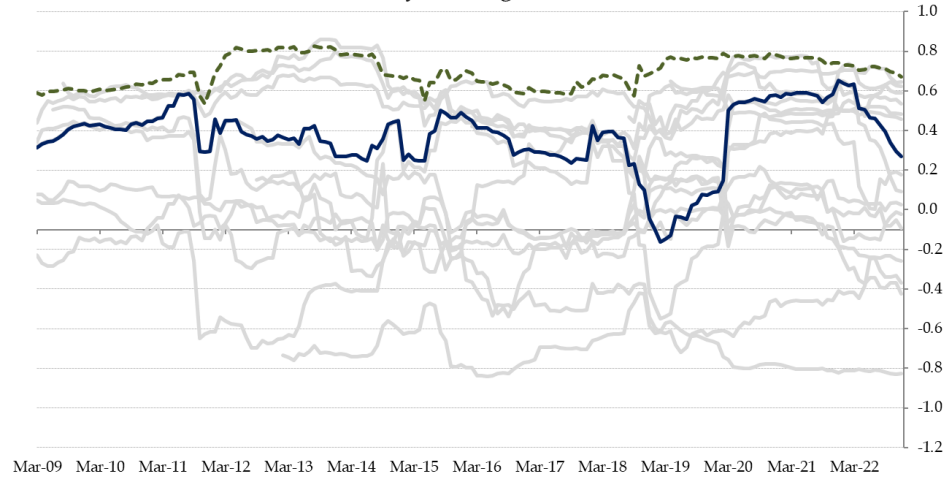
Key Observations:

- The AR portfolio is intended to provide the PSERS overall plan with diversification from the broader equity markets, and the portfolio has relatively low beta and correlation to the S&P 500
- AR portfolio beta and correlation to the S&P 500 are lower than that of the current benchmark

Beta to S&P 500
3yr Rolling



Correlation to S&P 500
3yr Rolling



— PSERS

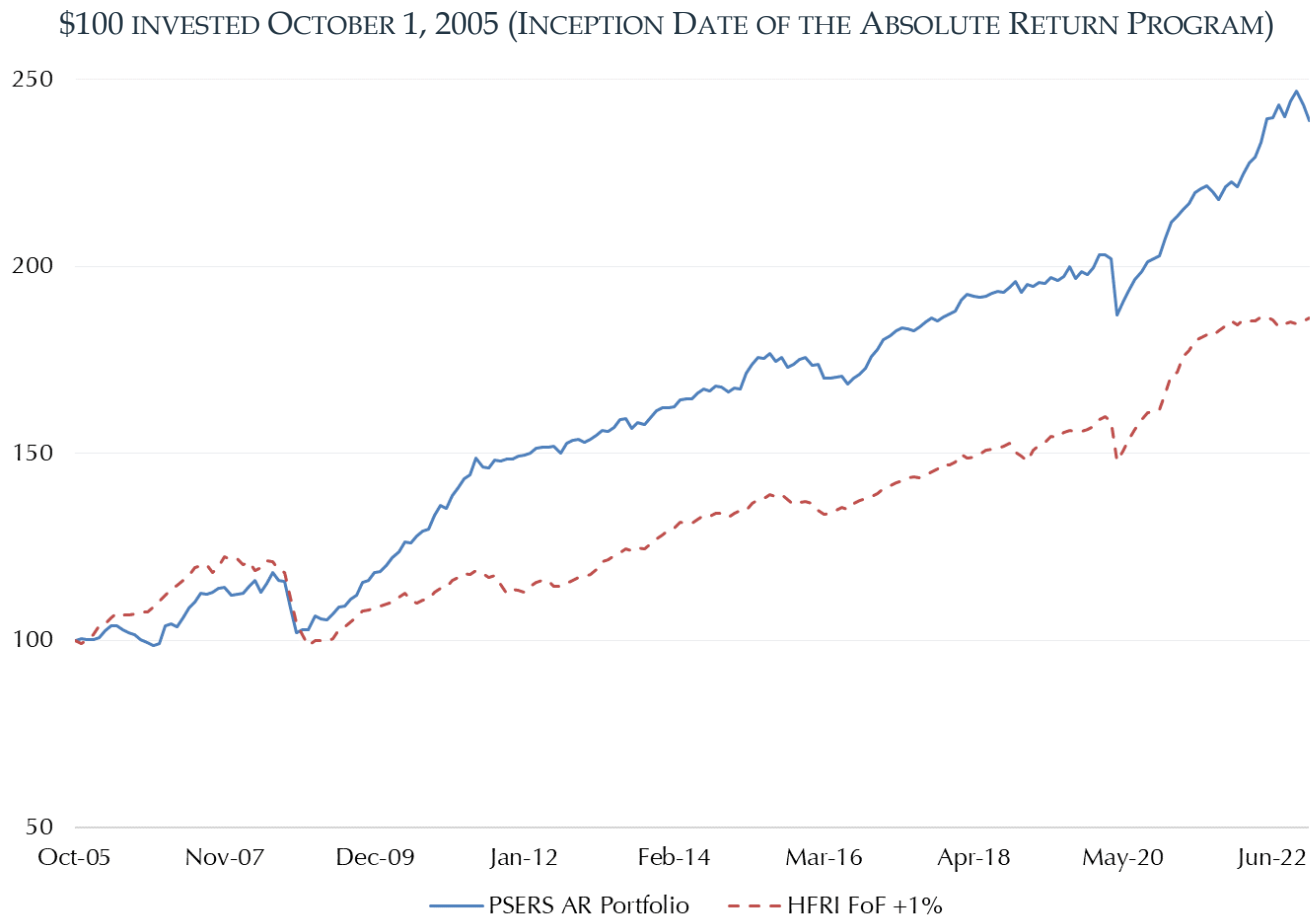
— Individual Absolute Return Portfolio Funds

--- HFRI FOF Conservative + 1%

- The beta and correlation analysis for the Absolute Return portfolio funds utilizes PSERS' realized performance for the 36-month period prior to and including December 2022. If PSERS has been invested in a fund for less than 36 months, the analysis uses the blended performance of realized returns and fund-level returns prior to PSERS initial investment date. Please see pages 20-22 in this presentation for the inception date of each fund in PSERS portfolio. Analysis for PSERS is performed on realized performance for the Absolute Return portfolio.
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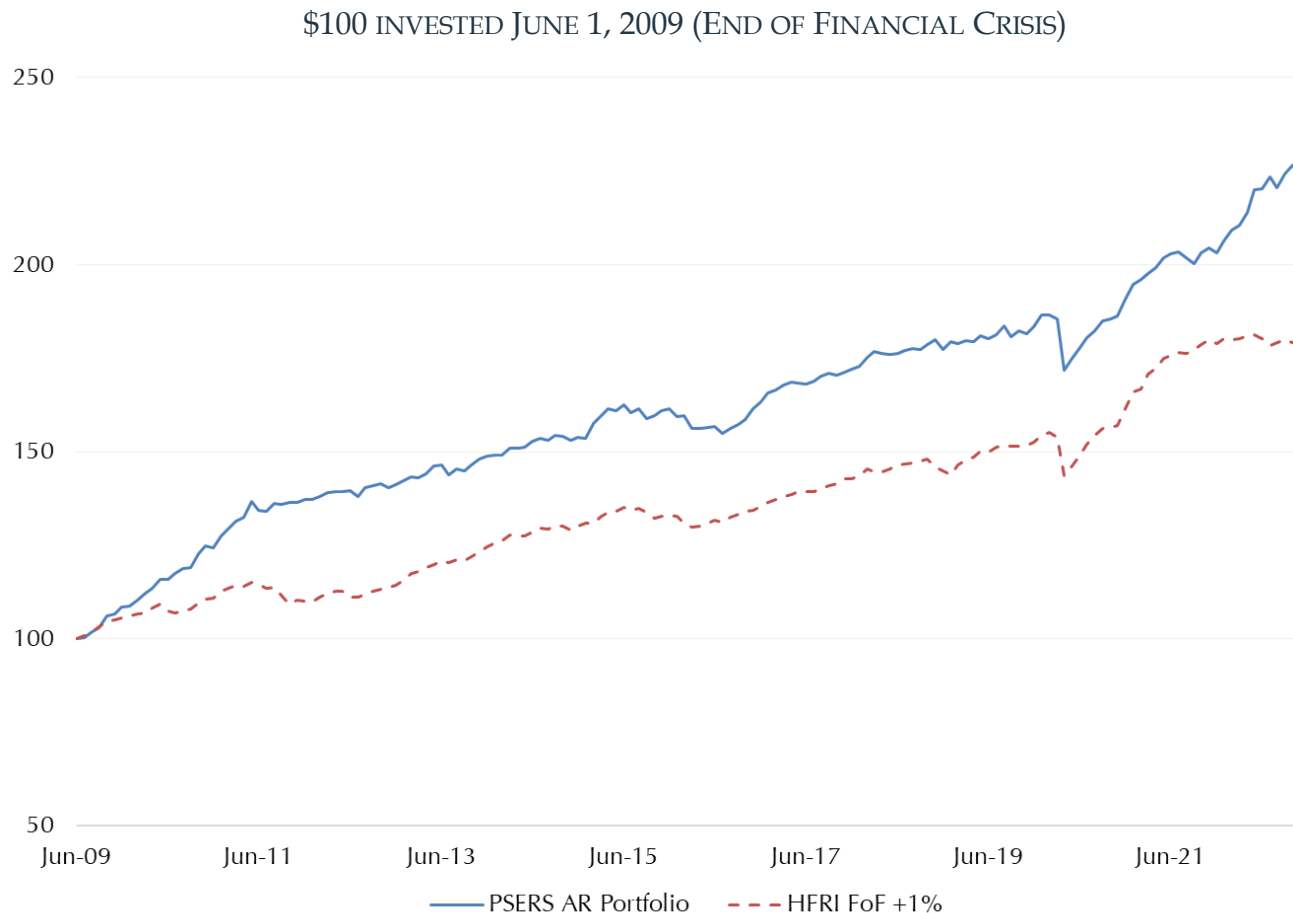
Key Observations:

- The dips in AR performance are generally in line with the current benchmark, and at times are positive during drawdowns in the current benchmark
- The consistent performance of the AR portfolio enables compounding of returns and capital



Key Observations:

- The dips in AR performance are generally in line with the current benchmark, and at times are positive during drawdowns in the current benchmark
- The consistent performance of the AR portfolio enables compounding of returns and capital



VI. APPENDIX

Sector	Strategy	Fund Name	NAV (\$MM)	Multiple of Cost	IRR	TWR Since Investment*	Investment as of
Event Driven	Event Credit	Oceanwood Investments SPC	8.8	1.36	14.5%	12.4%	Sep-18
		Venor Capital Offshore Ltd	67.1	1.48	10.5%	11.5%	Sep-16
	Event & Merger	Oceanwood Opportunities Fund	65.0	1.46	7.1%	9.0%	Sep-14
	Real Assets	SASOF V LP	64.9	0.71	-28.5%	N/A	May-20
		SASOF IV LP	35.4	0.66	-16.9%	N/A	Mar-18
		SASOF III LP	15.4	1.17	11.3%	N/A	Feb-15
		Falko RAOF II LP	79.0	1.05	4.3%	N/A	Jul-19
Total Event Driven			335.7				

*Annualized net performance shown is since inception of the fund in the PSERS portfolio.

Sector	Strategy	Fund Name	NAV (\$MM)	Multiple of Cost	IRR	TWR Since Investment*	Investment as of
Relative Value	Fixed Income Arbitrage	Capula Global Relative Value Fund Limited	118.3	1.35	6.6%	6.8%	Feb-11
		Garda Fixed Income Relative Value Opportunity Fund Ltd	452.3	2.01	7.5%	7.4%	Nov-11
	Insurance Linked	Aeolus Property Catastrophe Keystone PF Fund LP - Composite	52.5	1.05	5.3%	4.7%	Jun-12
		Fourier Fund Ltd**	198.4	1.12	6.2%	6.0%	Jan-18
		Palmetto Fund Ltd	31.0	1.17	2.9%	1.2%	Jul-11
		RenaissanceRe Medici Fund Ltd	0.5	1.23	4.1%	-4.2%	Feb-16
		RenaissanceRe Upsilon Diversified Fund	37.2	1.03	0.8%	-10.5%	Jan-17
		PIMCO Global Credit Opportunity Offshore Fund Ltd	202.7	2.71	9.0%	8.8%	Feb-08
	Structured Credit	OWS Credit Opportunity Offshore Fund III Ltd	326.5	1.25	8.0%	7.6%	Dec-15
	Multi-Strategy	HS Group Sponsor Fund II Ltd	190.7	1.16	7.8%	5.3%	May-18
Total Relative Value			1,609.9				

*Annualized net performance shown is since inception of the fund in the PSERS portfolio.

**Includes PSERS' realized performance for Nimbus Weather Fund Ltd

Sector	Strategy	Fund Name	NAV (\$MM)	Multiple of Cost	IRR	TWR Since Investment*	Investment as of
Tactical Trading	Global Macro	Bridgewater Pure Alpha Fund II Ltd	357.8	3.65	12.1%	9.7%	Nov-05
	Risk Mitigators	Capula Tail Risk Fund Limited	251.7	0.96	-0.6%	-0.5%	Jun-11
Total Tactical Trading			609.5				
PSERS Total			2,555.1	1.30	5.4%	5.3%	Oct-05

*Annualized net performance shown is since inception of the fund in the PSERS portfolio.

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