Memorandum

To	Ohio Retirement Study Council
From	RVK, Inc.
Subject	Investment Performance Analysis Commentary
Date	December 31, 2014

Outlined below please find a summary of significant observations regarding performance of Ohio's six public retirement plans for the period ended December 31, 2014. While much of the discussion in this summary focuses on the trailing year's results, we strongly encourage the Council to place significant weight on the 3- and 5-year results to better assess the management of the State's various pension plan assets. The information received by RVK, to the best of our knowledge, is complete and appropriate. Those results of our analysis are contained in our Investment Performance Analysis Report and we hope this summary will help in your review of that data.

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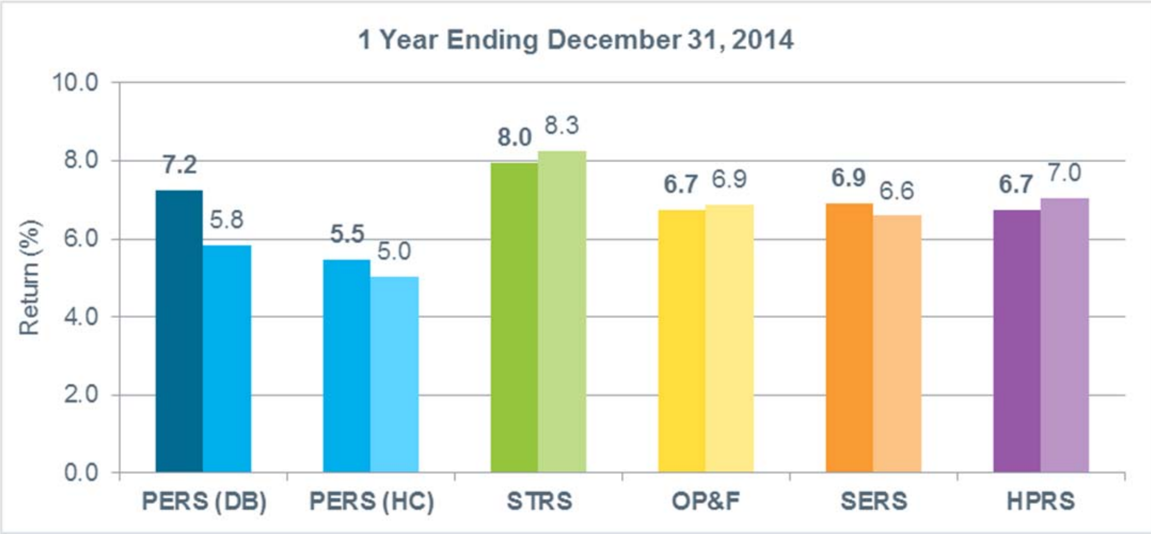
Total Fund Returns and Risk

Returns for the Ohio Funds ranged from 5.5% to 8.0%[i] for the 2014 calendar year period, as institutional investors completed the sixth year of recovery from the trough of the Great Financial Crisis of 2008-2009. This period has been marked by historic intervention by central banks around the world which has resulted in extremely low, even negative, interest rates and a simultaneous shift of investment assets to "risk" assets, primarily equity.

The wide dispersion in results among the State's pension plans in 2014 is driven by differences in asset allocation, asset class structure (including the mix of assets actively and passively managed) and investment manager selection, though it is not possible with the data available to RVK for us to weight each factor. Significant differences in the direction of monetary policy and economic growth between the U.S. and most of the rest of the world has caused both the U.S. equity market and the dollar to outperform most foreign equity markets and currencies (see page 3 of Investment Performance Analysis Report). Although U.S. long-term rates fell significantly during 2014, they are still among the highest in the developed world.

During 2014, three of the six plans trailed their custom benchmarks (see Figure 1).

Figure 1: Total Fund Performance (dark shade) **vs. Total Fund Benchmarks** (light shade)



In many publicly traded asset and sub-asset classes, a majority of active investment managers (though not all) were unable to outperform their relevant broad market indices as multiple trends within the capital markets continued to suppress returns achieved for active risk taken. Most of the State's pension plans invest in both active and passive (index-tracking) strategies within public equities, as shown below. As an example, the broad market indices for both US equities and fixed income ranked near the top third of all active investment fund strategies in the selected peer groups, while broad international equities (developed and emerging markets) placed in the top two thirds (see Figure 2).

Figure 2: Actively Managed Assets

Percentage of Actively Managed Assets - As of 12/31/2014						
	Total Fund	**Domestic Equity**	**International Equity**	**Fixed Income**	**Real Estate**	**Alternatives**
PERS (DB)	85%	34%	88%	100%	100%	100%
PERS (HC)	81%	34%	88%	100%	-	100%
STRS	87%	62%	100%	100%	85%	100%
OP&F	88%	52%	100%	100%	100%	100%
SERS	80%	54%	61%	100%	92%	100%
HPRS	79%	46%	77%	100%	100%	100%
		Russell 3000	MSCI ACW ex US	Barclays US Agg		
2014 Index Ranks*	---	32	65	36	---	---

*Investment Metrics Separate Account and Commingled Fund Manager Peer Groups used for index rankings.

During the past three years, five of the six plans outperformed their custom benchmarks, which we view has been appropriately selected by each individual System. Longer-term relative performance also remains strong as four of six beat their custom benchmarks over the last five years and five of six outperformed over the trailing ten-year period. Relative to peers, five of the six plans outperformed the All Public Plans > $1B median over the trailing three-year period and two plans also outperformed the median peer over the trailing ten-year period (see Figure 3). When reviewing a peer group of plan sponsors with assets greater than $10B (may not be an appropriate asset level cutoff for all plans, for example HPRS has $849m in plan assets) ranks generally improve over the 3-, 5-, and 7-year periods for all plans. Over the ten-year period, the HPRS results would compare more favorably to similar sized peers.

Figure 3: Fund Performance vs. Public Plans

	1 Year			3 Years			5 Years			7 Years			10 Years		
	% Return	Rank > $1B	Rank > $10B	% Return	Rank > $1B	Rank > $10B	% Return	Rank > $1B	Rank > $10B	% Return	Rank > $1B	Rank > $10B	% Return	Rank > $1B	Rank > $10B
PERS (DB)	7.2	(29)	(37)	12.2	(39)	(39)	10.1	(41)	(34)	5.0	(65)	(53)	6.8	(52)	(53)
PERS (HC)	5.5	(74)	(85)	10.2	(78)	(87)	8.7	(85)	(85)	5.0	(68)	(56)	6.2	(78)	(92)
STRS	8.0	(18)	(19)	12.9	(21)	(6)	10.6	(18)	(4)	4.9	(70)	(58)	7.2	(19)	(6)
OP&F	6.7	(46)	(53)	12.9	(19)	(5)	11.3	(6)	(1)	5.8	(28)	(11)	7.6	(7)	(1)
SERS	6.9	(35)	(41)	12.7	(30)	(20)	9.9	(49)	(43)	4.4	(85)	(77)	6.6	(63)	(69)
HPRS	6.7	(47)	(54)	12.5	(35)	(31)	9.5	(69)	(62)	4.7	(76)	(64)	6.3	(78)	(92)
> $1B Peer Median	6.6			11.8			9.9			5.2			6.8		
> $10B Peer Median	6.8			11.8			9.8			5.0			6.8		

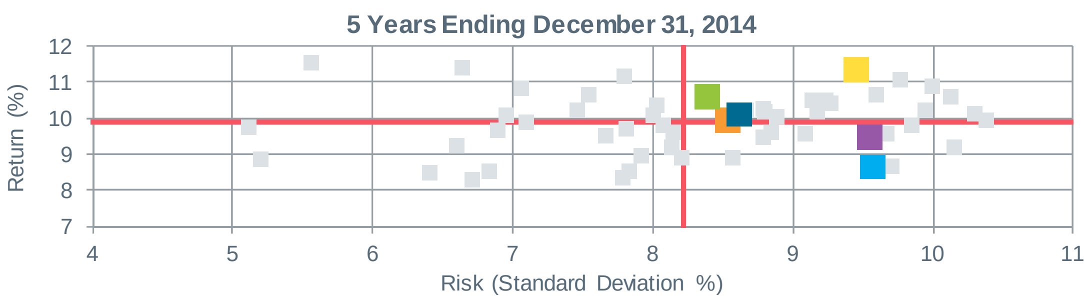
Over the trailing three-and five-year periods, all six plans outperformed their actuarial assumed rate of return as shown by Figure 4. However over the longer seven- and ten-year time periods, all plans trailed their respective actuarial benchmark.

Figure 4: Fund Performance vs. Actuarial Rate of Return (Excess Return)

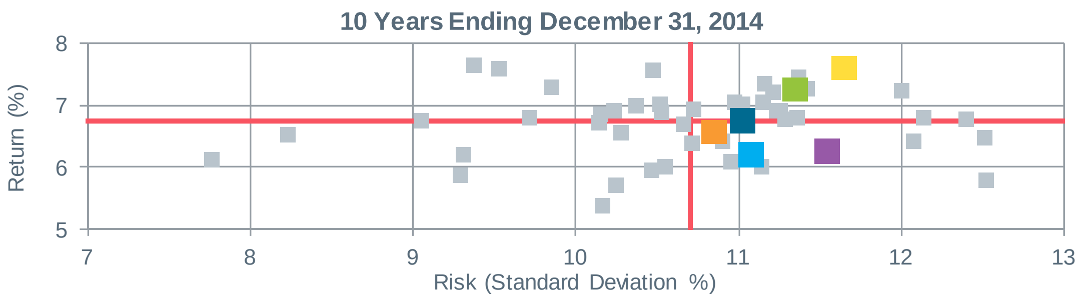
	Actuarial Rate of Return	Performance vs. Actuarial Rate of Return				
		1 Year	3 Years	5 Years	7 Years	10 Years
PERS (DB)	**8.00%**	-0.8%	4.2%	2.1%	-3.0%	-1.2%
PERS (HC)	**6.50%**	-1.0%	3.7%	2.2%	-1.6%	-0.3%
STRS	**7.75%**	0.2%	5.2%	2.9%	-2.8%	-0.5%
OP&F	**8.25%**	-1.5%	4.7%	3.1%	-2.4%	-0.6%
SERS	**7.75%**	-0.8%	4.9%	2.2%	-3.4%	-1.2%
HPRS	**8.00%**	-1.3%	4.5%	1.5%	-3.3%	-1.7%

While additional analysis is needed to fully understand the risk posture of each plan, the risk and return charts shown below suggest all six plans to varying degrees have exhibited more asset risk relative to peers (see Figure 5). Over the trailing five-year period, four of the six plans have generated more return for each unit of risk exposure than the median peer. OP&F and STRS have also generated risk-adjusted returns that rank in the top 40% of all Public Plans Greater than $1B over the trailing ten-year time period.

Figure 5: All Public Plans > $1B Risk and Return



	Return	Standard Dev.	Sharpe Ratio
PERS (DB)	10.1	8.6	1.2
PERS (HC)	8.7	9.6	0.9
STRS	10.6	8.4	1.3
OP&F	11.3	9.4	1.2
SERS	9.9	8.5	1.2
HPRS	9.5	9.5	1.0
Median	9.9	8.2	1.2

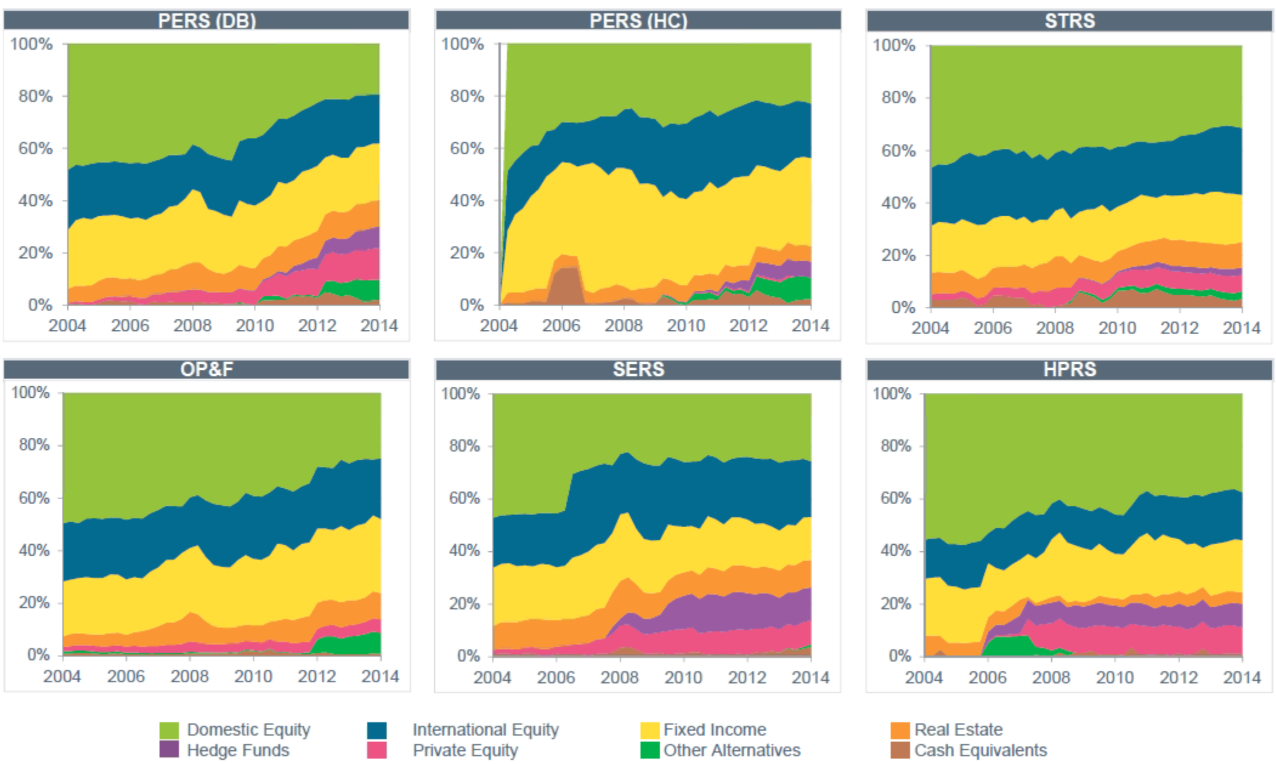


	Return	Standard Dev.	Sharpe Ratio
PERS (DB)	6.8	11.0	0.5
PERS (HC)	6.2	11.1	0.5
STRS	7.2	11.3	0.5
OP&F	7.6	11.7	0.6
SERS	6.6	10.9	0.5
HPRS	6.3	11.5	0.5
Median	6.8	10.7	0.5

Asset Allocation

Overall, the six plans all exhibit characteristics of increasingly diversified, institutional quality portfolios. Exposures to public equities (capital appreciation or "growth" assets) make up the largest component for each plan. Within equities, domestic equity investments have generally declined over the past ten years while allocations to alternatives, particularly hedge funds and private equity, have increased (see Figure 6). HPRS currently has the largest allocation to domestic equity at 38% while PERS (DB) has the smallest domestic equity allocation at 19%. The average total allocation to hedge funds, private equity, and other alternatives among the six plans is 18%. Relative to peers, the six plans have higher strategic exposures to international equities and lower strategic exposures to domestic equities. The six plans also have higher allocations to alternatives and real estate relative to the median Public Plan > $1B.

Figure 6: Historical Asset Allocation (10 Years)



Asset Class Returns and Risk

US Equity

The domestic equity allocation at all six plans trailed the 12.6% return earned by the Russell 3000 Index during 2014. Four of six plans also trailed the broad market index over the trailing three-year period (see Figure 7). Longer-term performance remains strong for the three plans that outperformed the Russell 3000 Index and peer universe over the trailing seven-year period. HPRS and OP&F also outperformed the 7.9% earned by both the Russell 3000 Index and the peer universe median over the trailing ten-year period.

Figure 7: Domestic Equity Performance

	1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB)	11.3	(53)	20.2	(49)	15.4	(63)	7.3	(55)	7.8	(56)
PERS (HC)	11.3	(53)	20.2	(49)	15.4	(63)	7.3	(55)	7.8	(56)
STRS	11.7	(44)	19.5	(73)	15.1	(73)	7.0	(62)	7.6	(67)
OP&F	11.3	(53)	19.9	(58)	16.3	(18)	8.4	(19)	8.6	(12)
SERS	11.0	(60)	20.8	(21)	16.0	(35)	7.6	(43)	7.8	(54)
HPRS	12.0	(36)	20.8	(24)	16.1	(32)	8.1	(24)	8.3	(31)
R 3000 Index	12.6		20.5		15.6		7.5		7.9	
Peer Median	11.4		20.2		15.7		7.4		7.9	

International Equity

The international equity allocation at three of the six plans outperformed their respective international equity benchmarks, as international equity markets struggled during the year. STRS earned the highest absolute performance in 2014 with a return of 0.8% (see Figure 8). All funds outperformed their respective benchmarks over the trailing three- and five-year periods, with two of the six funds also outperforming the peer median. Over the trailing ten-year period, the six funds earned absolute returns ranging from 5.0% to 7.0%. Five plans outperformed their respective benchmarks and three plans outperformed the Universe median.

Figure 8: International Equity Performance

	1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB)	-1.5	(28)	10.4	(64)	5.5	(77)	0.0	(73)	5.7	(70)
PERS (HC)	-1.5	(28)	10.4	(64)	5.5	(77)	0.0	(73)	5.7	(70)
STRS	0.8	(9)	12.1	(21)	6.6	(30)	1.2	(25)	7.0	(26)
OP&F	-5.8	(100)	11.0	(49)	6.6	(30)	0.6	(43)	6.4	(40)
SERS	-4.1	(90)	10.3	(70)	5.8	(76)	0.4	(48)	6.7	(37)
HPRS	-4.6	(95)	10.3	(70)	5.0	(85)	-0.4	(83)	5.0	(85)
MSCI ACW Ex US IMI	-3.9		9.2		4.7		-0.3		5.4	
Peer Median	-3.0		10.9		6.2		0.4		6.2	

Fixed Income

Domestic fixed income markets performed modestly well during 2014 with the Barclays US Aggregate Bond Index rising 6.0%, despite the Federal Reserve ending its quantitative easing (bond buying) program. For the year, Ohio's Funds generated mixed relative performance versus the Barclays US Aggregate Bond Index, returning 4.0% to 6.5%. All plans outperformed the broad market index over all other trailing periods (3-, 5-, 7-, and 10-year periods), as shown by Figure 9. SERS's fixed income composite returned 5.9% versus 4.7% for the Barclays US Aggregate Bond Index, the highest absolute and relative return earned among the six plans during the trailing ten-year period.

Figure 9: Fixed Income Performance

	1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB) Core FI	6.5	(33)	3.4	(69)	5.1	(76)	N/A	(N/A)	N/A	(N/A)
PERS (HC) Core FI	6.5	(33)	3.4	(69)	5.1	(76)	N/A	(N/A)	N/A	(N/A)
STRS	5.0	(81)	3.3	(71)	5.0	(77)	5.5	(54)	5.4	(44)
OP&F Core FI	4.0	(92)	3.1	(78)	5.0	(76)	5.3	(64)	5.1	(60)
SERS	5.8	(51)	4.8	(35)	6.2	(42)	6.5	(30)	5.9	(27)
HPRS	4.0	(92)	3.2	(74)	4.9	(77)	5.2	(70)	5.3	(52)
B US Agg Bond Index	6.0		2.7		4.4		4.8		4.7	
Peer Median	5.9		4.1		6.1		5.6		5.3	

Real Estate

Of the five plans with exposure to core and value-added real estate, returns ranged from 14.2% to 22.0% during the year, making a substantial contribution to absolute returns for these plans. PERS (HC)'s REITs (real estate investment trusts) composite earned 31.8% as REITs were the strongest performing asset class of the year. Over the trailing ten-year period, returns ranged from 3.2% to 11.4% per annum and four plans outperformed their respective benchmarks (see Figure 10).

Figure 10: Real Estate Performance

Core and Value-Added Real Estate					
	1 Year	3 Years	5 Years	7 Years	10 Years
	% Return	% Return	% Return	% Return	% Return
PERS (DB)	18.9	15.7	13.3	4.9	8.7
STRS	17.6	14.4	14.3	5.3	11.4
OP&F	18.2	15.4	13.7	2.9	8.9
SERS	14.2	13.4	11.3	0.8	5.5
HPRS	22.0	13.9	7.4	-1.2	3.2
NCREIF ODCE Index (Net) (AWA)	11.5	11.4	12.9	1.9	6.1
REITs					
PERS (HC) REITs	31.8	16.1	17.3	8.1	8.3
DJ US Sel RE Securities	31.9	16.1	16.9	7.9	8.0

Hedge Funds

Composite returns ranged from 3.3% to 4.1% among the five plans with dedicated hedge fund composites. Over the trailing three--year period the hedge fund allocations for all five plans outperformed their respective benchmarks, as shown by Figure 11. STRS's hedge funds composite has the longest available history among the five plans and earned 8.0% per annum over the trailing-ten year period.

Figure 11: Hedge Funds Performance

	1 Year % Return	3 Years % Return	5 Years % Return	7 Years % Return	10 Years % Return
PERS (DB)	3.9	6.6	4.5	1.4	N/A
PERS (HC)	3.9	6.6	4.5	1.4	N/A
STRS	3.3	7.3	4.9	2.7	8.0
SERS	4.1	7.3	5.7	N/A	N/A
HPRS	3.3	6.6	4.3	2.7	N/A
HFRI FOF Comp Index	3.4	5.7	3.3	0.4	3.0

Private Equity

Five of the six plans have dedicated exposure to private equity. Over the trailing seven-year period, the time-weighted returns for these allocations have ranged from 3.6% to 9.8% per annum. All four plans with available history have outperformed their respective benchmarks over the trailing ten-year period. Although we prefer to measure private equity performance using since inception money-weighted returns (IRR), we have included time-weighted performance in our analysis for illustrative purposes.

Additional Investments

We have included additional asset class composites which are not shared across the majority of the six plans within our Investment Performance Analysis. PERS (DB), PERS (HC), and OP&F provided additional fixed income sub-asset class performance and five of the six plans provided composite performance for other alternatives such as commodities and opportunistic investments. Please see the respective pages within our Investment Performance Analysis for additional information.

Recommendations

After careful consideration and analysis, we put forth the following recommendations for the Ohio Retirement Study Council to consider:

1. Be mindful of target asset allocation for each fund and the goals they are attempting to achieve. Currently all the funds are diversified across multiple asset classes and exhibit characteristics of prudent investor diversification.

   ➔ The determination of a fund's asset allocation is the single most important investment decision and is a major determinant of long-term return and the volatility risk of asset values. Creating a diversified portfolio of asset classes enables the investor to achieve a potential higher rate of return while minimizing volatility of the portfolio. A fund following a smoother, less volatile path compounds value at a faster rate.

- ➔ Don't assume that all six funds should have the same asset allocation. Differences in their liabilities, funding status, the risk tolerance of their fiduciaries and other factors will likely produced legitimate differences in their respective asset allocations.

2. Monitor the change in asset allocation over time.

   - ➔ Target allocations should be formally reviewed (by the Board) every few years with potentially more frequent informal reviews (by Staff). From each review there can be multiple reasons for adopting new targets (with generally gradual shifts) – from a rare occurrence of the overarching goal of the investment program changing to potential consideration of significant, longer-term economic or market changes to the possibility of opportunities to improve the risk/return tradeoff.

3. With your approval, we would like to request the most recent asset allocation study, asset/liability study, and actuarial valuation from each of the six plans. These documents would provide RVK additional insight into:

   - ➔ The evaluation of the target allocation in light of a plan's investment objectives (asset allocation study)
   - ➔ Possible consequences of applying a series of different allocation strategies to the assets invested in order to meet the liabilities created by the benefit provisions in each plan (asset/liability study).
   - ➔ The funded status of a plan's liabilities based on current asset levels and the ability of a plan's current position to meet its liabilities with future contributions and assumed investment returns (actuarial report).

4. While this and subsequent reports we deliver to the Council will focus on recent information in return and risk taken at each of the funds, we strongly encourage you to once again focus on the 3 and 5 year risk and return results to better gauge the stewardship of the State's pension assets.

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[i] All performance shown is gross of fees, with the exception of externally managed real estate, hedge fund, and private equity investments. Total Fund performance shown is gross of fees but is net of embedded fees on externally managed real estate and alternative investments.