Memorandum

To	Ohio Retirement Study Council
From	RVK, Inc.
Subject	Executive Summary: December 31, 2015 Investment Performance
Date	May 12, 2016

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Outlined below please find a summary of significant observations, key attributes, and performance metrics of Ohio's six[1] public retirement plans for the period ended December 31, 2015. The purpose of this analysis is to facilitate an objective "apples-to-apples" comparison of the six plans relative to each other, similar benchmarks, and peer universe data consisting of similarly sized public pension plans.

While much of the discussion in this summary focuses on results from the trailing year results, we strongly encourage the Council to place significant weight on the 3-, 5-, and 10-year results to better assess the management of the State's various pension plan assets. Though the six investment programs share many similarities, it is important to be aware of the crucial differences that may affect performance when reviewing this analysis. Each plan has unique long-term investment objectives and therefore distinct asset allocations in order to meet these objectives. Investment execution approaches also vary as it relates to active/passive and internal/external management.

The full results of our analysis are contained within our Investment Performance Analysis Report and we hope this Executive Summary will help in your review of that data. The information received by RVK, to the best of our knowledge, is complete and appropriate.

Total Fund Returns and Risk

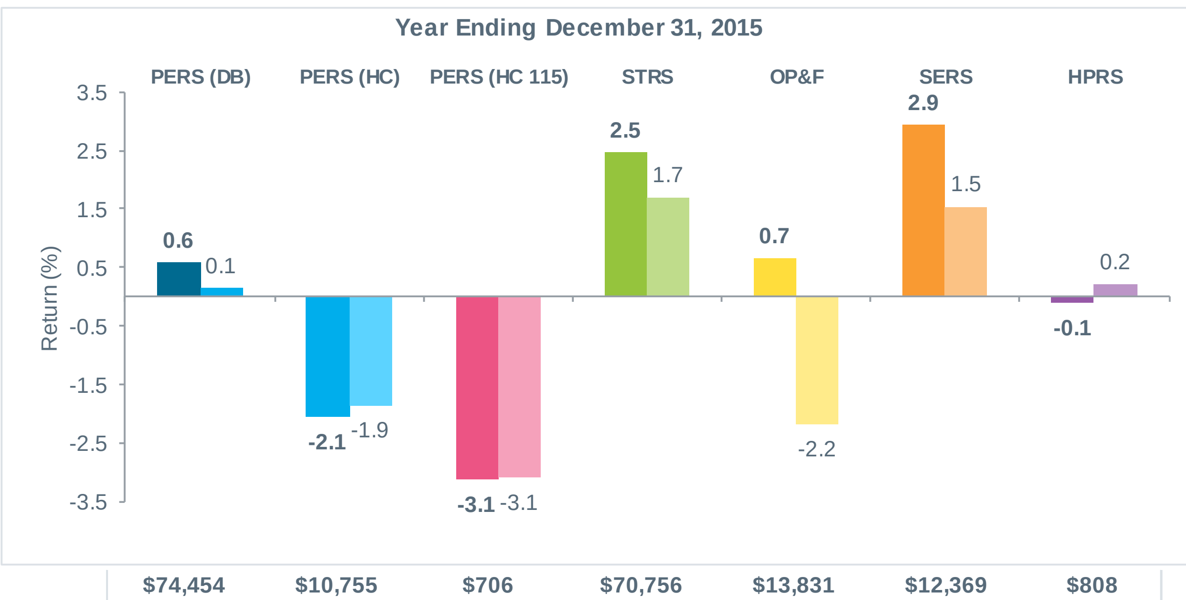
Returns for the Ohio plans ranged from -3.1% to 2.9% for the 2015 calendar year period as diverging monetary policies continued to exert pressure on asset prices and resulted in heightened volatility. Headwinds included substantial US dollar strengthening, commodity market dislocations, and emerging market asset volatility. World equity, bond, and commodity markets each ended the year in negative territory, with commodities and emerging market equities suffering the largest declines.

[1]Ohio PERS funded a new Plan during October 2014 (PERS (HC 115)). PERS (HC 115) is excluded from some sections of the Executive Summary Memo due to limited performance history. Additional details regarding PERS (HC 115) can be found in the full performance report.

The wide dispersion in results among the State's retirement plans 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.

During 2015, five of seven plans kept pace with or outperformed their custom total fund benchmarks. Each plan will have different investment objectives and goals and the "Total Fund Benchmarks" will reflect this. Total Fund over/under performance can come from differences in actual allocations or investment manager results.

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



- Total Fund Benchmark is a target allocation index based on the targeted asset class percentages and appropriate asset class indexes for each individual plan
- Market values shown are in millions ($000,000)
- "PERS (DB)" represents the Ohio PERS Defined Benefit Pension Plan
- "PERS (HC)" represents the Ohio PERS Health Care Plan
- PERS (HC 115) has adopted a more conservative asset allocation policy (effective Oct 1, 2015) versus the other two OPERS Funds, due to its distinct time horizon, and emphasis on capital preservation. Pending IRS decision, PERS (HC 115) is being treated as a liquidating Trust.

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, allocations to US equity investments have generally declined over the past ten years while allocations to alternatives, particularly hedge funds and private equity, have increased. The charts in Figure 2 show a 5-year asset allocation "lookback" for each plan and how they have moved to today's portfolio and target.

HPRS currently has the largest allocation to US equity at 35% while PERS (DB) has the smallest domestic equity allocation at 19%. PERS (HC) has the largest fixed income allocation at 33%. The average total allocation to hedge funds, private equity, and other alternatives among the six plans is 19%. Relative to peers, the six plans have higher strategic exposures to international equities and lower strategic exposures to US equities. The six plans also have higher allocations to alternatives and real estate relative to the median Public Plan > $1B.

Figure 2: Asset Allocation Changes (5 Years)

The table below highlights recent target allocation changes since our last report.

Figure 3: Changes to Target Allocations Since 06/30/2015

	Domestic Equity	International Equity	Fixed Income	Real Estate	Hedge Funds	Private Equity	Other Alternatives	Cash Equivalents
PERS (DB)	0.20%	-0.20%	---	---	---	---	---	---
PERS (HC)	0.30%	-0.30%	---	---	---	---	---	---
PERS (HC 115)	-14.30%	-12.70%	-22.00%	-3.00%	-3.00%	---	-4.00%	59.00%
STRS	---	---	---	---	---	---	---	---
OP&F	-1.30%	-1.90%	0.50%	0.50%	---	0.25%	1.95%	---
SERS	---	---	---	---	---	---	---	---
HPRS	---	---	---	---	---	---	---	---

Detailed asset allocation targets as of 12/31/2015 can be found in the full performance report.
Other Alternatives of PERS (HC 115) include Commodities (-1.0%), Risk Parity (-2.0%) and GTAA (-1.0%).
Other Alternatives of OP&F include Master Limited Partnerships (+0.85%) and Timber (+1.1%).
59% increase in PERS (HC 115) cash equivalents was due to the creation of short-term liquidity in the third quarter of 2015. The short-term liquidity portfolio is comprised of cash and cash equivalents and short term fixed income securities with weighted average maturity of 90 days or less.

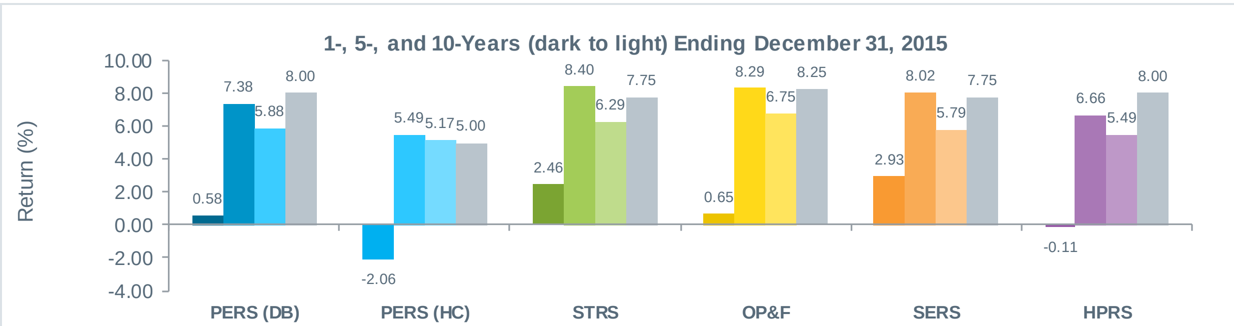
The table below highlights calendar year performance for key asset classes.

Figure 4: Annual Asset Class Performance

Index (Asset Class)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
S&P 500 (US Large Cap)	25.9	55.8	25.6	34.0	32.2	39.4	5.2	78.5	26.9	16.0	18.2	38.8	13.7	15.0	Highest Annual Return
Russell 2000 (US Small Cap)	10.3	47.3	20.2	21.4	26.3	16.2	-10.0	31.8	18.9	7.8	17.3	32.4	12.5	1.4	
MSCI EAFE (Int'l Developed)	5.5	38.6	18.3	21.4	18.4	16.0	-21.4	27.2	16.8	2.1	16.3	22.8	6.0	0.6	
MSCI EM (Int'l Emg Markets)	1.0	28.7	13.1	13.5	16.3	11.2	-33.8	26.5	16.4	-4.2	16.0	13.9	4.9	-0.3	
Barclays US Agg Bond (Fixed Income)	-6.2	23.9	10.9	7.5	15.8	10.3	-35.6	18.9	15.1	-5.7	10.9	9.0	3.4	-0.8	
NCREIF ODCE (Real Estate)	-15.9	11.6	9.1	4.9	10.4	7.0	-37.0	11.5	7.8	-12.1	4.8	-2.0	-2.2	-4.4	
HFRI FOF (Absolute Return)	-20.5	9.3	6.9	4.6	4.3	5.5	-43.4	5.9	6.5	-13.3	4.2	-2.6	-4.9	-14.9	
Bloomberg Cmdty (Commodities)	-22.1	4.1	4.3	2.4	2.1	-1.6	-53.3	-29.8	5.7	-18.4	-1.1	-9.5	-17.0	-24.7	Lowest Annual Return

Over the trailing five-year period, PERS (HC), STRS, OP&F and SERS outperformed their current actuarial assumed rate of return as shown by Figure 5. PERS (HC) also outperformed the Plan's current actuarial assumed rate of return over the ten-year period.

Figure 5: Fund Performance vs. Actuarial Rate of Return (Gray)



*PERS (HC 115)'s actuarial assumed rate of return is the same as PERS (HC) (5.00%).

Over the past ten years, the median actuarial rate of return for public funds within the RVK universe has declined (see Figure 6). Over the same time period, the actuarial rates for PERS (DB), OP&F, and HPRS have remained the same. The actuarial rates for STRS and SERS have decreased, though not as much as the peer median. Figure 7 shows the dispersion of actuarial rates of return around the median of 7.50%.

Figure 6: Historical Actuarial Rates of Return

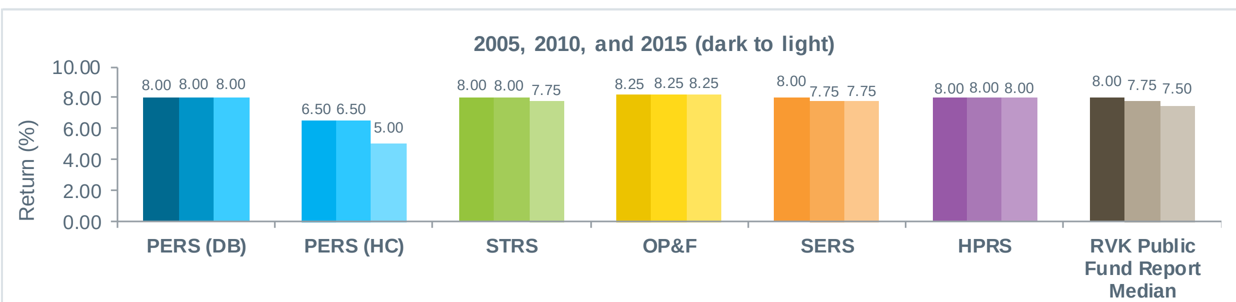
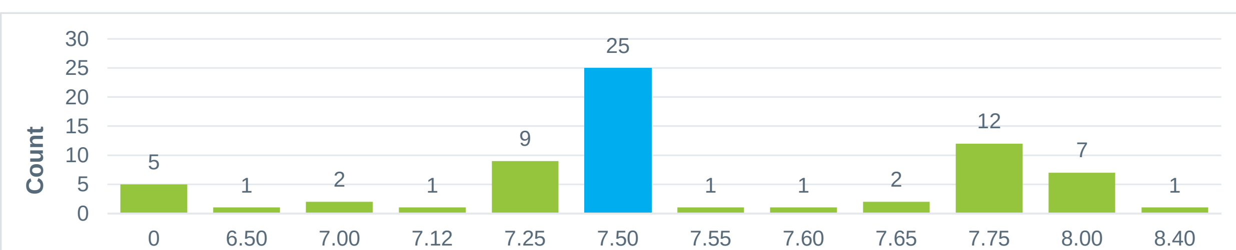


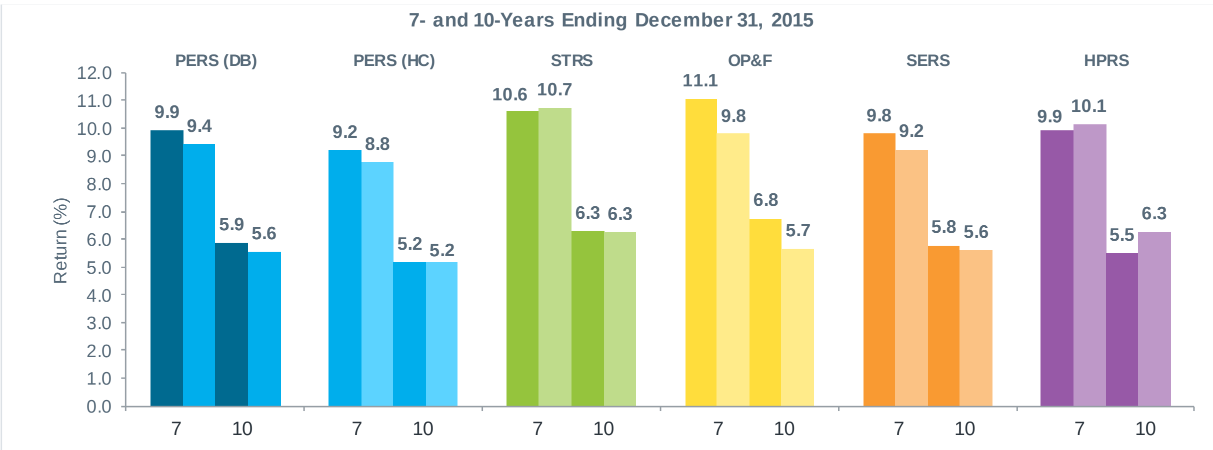
Figure 7: RVK Public Fund Report Survey Actuarial Rates of Return – As of 12/31/2015



RVK prepares a proprietary Public Fund Report with over 70 participating public funds across the U.S., including Ohio PERS and Ohio STRS. Participating public funds are surveyed semi-annually.

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 seven years and five of six outperformed over the trailing ten-year period (see Figure 8).

Figure 8: Long-Term Fund Performance (dark shade) vs. Total Fund Benchmarks (light shade)



Plan sponsor peer group benchmarking is another way to compare performance results of Ohio's retirement plans, however there can be a wide range in investment objectives and different benefit plan structures, for example PERS Health Care Fund's objective of capital preservation which leads to a larger allocation to fixed income. Relative to peers, five of the six plans outperformed the All Public Plans > $1B median over the trailing three-year period and three plans also outperformed the median peer over the trailing ten-year period (see Figure 9).

When reviewing a peer group of plan sponsors with assets greater than $10B ranks generally improve over the 3-, 5-, and 7-year periods for all plans (may not be an appropriate asset level cutoff for all plans, for example HPRS has $808m in plan assets). Over the ten-year period, the HPRS results would compare more favorably to similar sized peers ($250M to $1B).

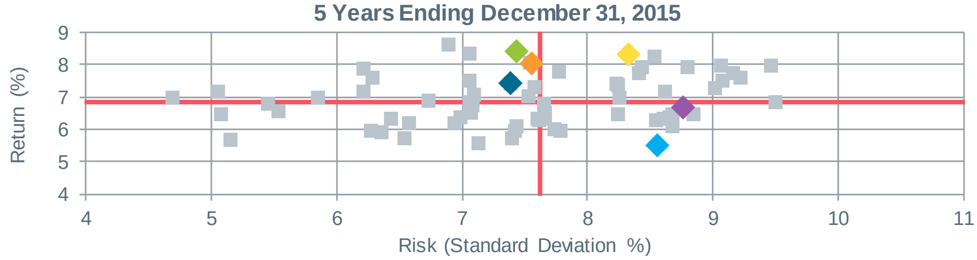
Figure 9: Fund Performance vs. Public Plans

	Market Value	2 Quarters			1 Year			3 Years			5 Years			7 Years			10 Years		
		Return	Rank		Return	Rank		Return	Rank		Return	Rank		Return	Rank		Return	Rank	
	($000,000)	%	> $1B	> $10B	%	> $1B	> $10B	%	> $1B	> $10B	%	> $1B	> $10B	%	> $1B	> $10B	%	> $1B	> $10B
PERS (DB)	74,454	-2.3	(37)	(72)	0.6	(34)	(48)	7.3	(45)	(37)	7.4	(33)	(32)	9.9	(38)	(22)	5.9	(49)	(45)
PERS (HC)	10,756	-3.5	(80)	(100)	-2.1	(96)	(100)	4.8	(92)	(97)	5.5	(97)	(100)	9.2	(64)	(60)	5.2	(81)	(100)
STRS	70,756	-1.1	(14)	(16)	2.5	(6)	(4)	9.1	(10)	(1)	8.4	(6)	(1)	10.6	(13)	(3)	6.3	(17)	(6)
OP&F	13,831	-3.0	(59)	(94)	0.7	(31)	(46)	7.9	(31)	(27)	8.3	(7)	(1)	11.1	(6)	(1)	6.8	(1)	(1)
SERS	12,369	-1.0	(12)	(10)	2.9	(1)	(1)	8.8	(14)	(6)	8.0	(13)	(6)	9.8	(47)	(37)	5.8	(57)	(67)
HPRS	808	-2.9	(58)	(93)	-0.1	(55)	(88)	8.4	(18)	(11)	6.7	(56)	(66)	9.9	(40)	(25)	5.5	(70)	(93)
> $1B Peer Median		-2.7			0.1			6.8			6.8			9.8			5.9		
> $10B Peer Median		-2.0			0.6			6.8			6.9			9.6			5.9		

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 over the trailing ten-year period (see Figure 10). Over the trailing five-year period, four of the six plans have generated more return for each unit of risk exposure (as measured by standard deviation) than the median peer. OP&F has also generated risk-adjusted returns (as measured by Sharpe Ratio) that rank in the top 25% of all Public Plans Greater than $1B over the trailing ten-year time period. Peers may have different risk/return results for a variety of reasons, including but not limited to: objectives and goals, target allocations, time of allocation changes, investment restrictions, asset class exposures, or investment management execution.

Figure 10: All Public Plans > $1B Risk and Return

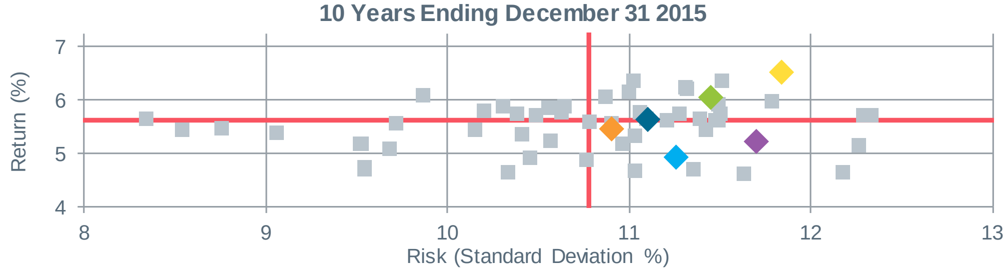
5 Years Ending December 31, 2015



	Return	Standard Dev.	Sharpe Ratio
PERS (DB)	7.4	7.4	1.0
PERS (HC)	5.5	8.6	0.7
STRS	8.4	7.4	1.1
OP&F	8.3	8.3	1.0
SERS	8.0	7.6	1.1
HPRS	6.7	8.8	0.8
Median	6.8	7.6	0.9

*Grey boxes on scatterplot charts represent members of the peer universe.

10 Years Ending December 31 2015



	Return	Standard Dev.	Sharpe Ratio
PERS (DB)	5.9	11.1	0.5
PERS (HC)	5.2	11.3	0.4
STRS	6.3	11.5	0.5
OP&F	6.8	11.8	0.5
SERS	5.8	10.9	0.5
HPRS	5.5	11.7	0.4
Median	5.9	10.7	0.5

*Grey boxes on scatterplot charts represent members of the peer universe.

Asset Class Returns and Risk

The following section includes information on all "major" asset classes. Broad market benchmarks are included for illustrative purposes. Additional details, including system-specific benchmark performance, are available within our Investment Performance Analysis Report.

US Equity

The US equity portfolios for five of the six plans outperformed the 0.5% return earned by the Russell 3000 Index during 2015. All six plans outperformed the peer median over the same period (see Figure 11). 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 7.4% earned by both the Russell 3000 Index over the trailing ten-year period.

Figure 11: US Equity Performance

	2 Quarters		1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB)	-1.5	(24)	0.7	(27)	14.5	(44)	12.1	(29)	15.0	(52)	7.1	(60)
PERS (HC)	-1.5	(24)	0.7	(27)	14.5	(44)	12.1	(29)	15.0	(52)	7.1	(60)
STRS	-1.6	(26)	0.8	(24)	14.2	(55)	11.8	(42)	14.8	(58)	7.0	(62)
OP&F	-1.8	(32)	0.7	(27)	14.9	(28)	11.9	(34)	16.1	(10)	7.9	(6)
SERS	-1.2	(19)	1.2	(19)	15.1	(21)	12.3	(17)	15.6	(30)	7.3	(54)
HPRS	-2.0	(37)	0.2	(44)	15.0	(25)	11.8	(42)	15.9	(15)	7.7	(16)
R 3000 Index	-1.4		0.5		14.7		12.2		15.0		7.4	
Peer Median	-2.6		-0.1		14.3		11.7		15.2		7.3	

International Equity

The international equity portfolios at all six plans outperformed their respective benchmarks over the one-year period. STRS earned the highest absolute performance over the trailing year with a return of 0.3% (see Figure 12). 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 3.4% to 4.9%. All six plans outperformed their respective benchmarks and three plans outperformed the Universe median.

Figure 12: International Equity Performance

	2 Quarters		1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB)	-8.4	(70)	-4.0	(79)	3.0	(70)	2.3	(75)	8.5	(62)	3.6	(64)
PERS (HC)	-8.4	(70)	-4.0	(79)	3.0	(70)	2.3	(75)	8.5	(62)	3.6	(63)
STRS	-6.0	(18)	0.3	(12)	6.4	(9)	4.3	(21)	9.8	(21)	4.6	(32)
OP&F	-6.7	(29)	-0.8	(25)	4.3	(38)	3.6	(34)	9.7	(25)	4.9	(24)
SERS	-8.0	(62)	-2.4	(51)	3.2	(68)	2.6	(65)	9.1	(40)	4.0	(41)
HPRS	-7.8	(55)	-2.9	(57)	3.3	(66)	2.2	(78)	7.2	(87)	3.4	(78)
MSCI ACW Ex US IMI	-8.8		-4.6		2.0		1.3		8.1		3.2	
Peer Median	-7.6		-2.4		3.8		3.1		8.7		3.8	

Fixed Income

Domestic fixed income markets ended 2015 relatively flat, with the Barclays US Aggregate Bond Index returning 0.6%. During the period, five of six plans generated positive absolute performance and four plans generated relative outperformance versus their respective benchmarks. All plans outperformed the broad market index over the 5- and 7-year trailing periods as shown by Figure 13. SERS's fixed income composite returned 5.6% versus 4.5% 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 13: Fixed Income Performance

	2 Quarters		1 Year		3 Years		5 Years		7 Years		10 Years	
	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank	% Return	Rank
PERS (DB) Core FI	0.9	(7)	1.0	(19)	2.1	(38)	3.7	(67)	5.0	(75)	4.2	(82)
PERS (HC) Core FI	0.9	(7)	1.0	(19)	2.1	(38)	3.7	(67)	5.0	(75)	4.2	(82)
STRS	0.0	(25)	0.6	(30)	1.5	(55)	3.6	(73)	6.0	(45)	5.1	(37)
OP&F Core FI	0.2	(21)	1.5	(9)	1.5	(55)	3.4	(82)	5.5	(60)	5.0	(52)
SERS	-0.4	(46)	-0.1	(59)	1.7	(46)	4.2	(48)	7.1	(23)	5.6	(21)
HPRS	-0.6	(60)	0.5	(31)	1.2	(71)	3.5	(76)	5.5	(60)	4.9	(53)
B US Agg Bond Index	0.7		0.6		1.4		3.3		4.1		4.5	
Peer Median	-0.5		0.1		1.6		4.1		5.9		5.0	

Real Estate

Of the five plans with exposure to core and value-added real estate, returns ranged from 6.5% to 17.3% during 2015, making a substantial contribution to absolute returns for these plans. PERS (HC)'s REITs (real estate investment trusts) composite earned 4.4%. Over the trailing ten-year period, returns ranged from 2.4% to 9.9% per annum and four plans outperformed their respective benchmarks (see Figure 14).

Figure 14: Real Estate Performance

Core and Value-Added Real Estate						
	2 Quarters	1 Year	3 Years	5 Years	7 Years	10 Years
	% Return	% Return	% Return	% Return	% Return	% Return
PERS (DB)	8.1	17.3	17.2	15.5	7.9	8.4
STRS	6.2	11.4	13.1	14.7	7.7	9.9
OP&F	8.0	16.8	16.8	16.3	4.9	8.1
SERS	6.5	13.8	13.3	12.8	4.1	5.1
HPRS	0.9	6.5	13.9	8.7	4.9	2.4
NCREIF ODCE Index (Net) (AWA)	6.7	14.0	12.8	12.6	5.5	5.6
REITs						
PERS (HC) REITs	10.7	4.4	11.7	12.4	17.0	7.3
DJ US Sel RE Securities	10.8	4.5	11.8	12.2	16.7	7.1

Hedge Funds

Composite returns ranged from -1.2% to 1.2% 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 15. STRS's hedge funds composite has the longest available history among the five plans and earned 6.6% per annum over the trailing-ten year period.

Figure 15: Hedge Funds Performance

	2 Quarters % Return	1 Year % Return	3 Years % Return	5 Years % Return	7 Years % Return	10 Years % Return
PERS (DB)	-3.5	-1.2	4.0	3.1	3.9	N/A
PERS (HC)	-3.5	-1.2	4.0	3.1	3.9	N/A
STRS	-1.9	-0.6	4.6	3.9	5.5	6.6
SERS	-2.4	-0.1	4.5	4.0	6.8	N/A
HPRS	-2.0	1.2	4.6	3.0	6.2	N/A
HFRI FOF Comp Index	-2.9	-0.3	4.0	2.1	3.9	2.3

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 5.0% to 11.9% per annum. Four of the 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.

Considerations

After careful analysis, we put forth the following considerations for the Ohio Retirement Study Council:

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 of the Plans 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. 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.

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.