SEMI-ANNUAL INVESTMENT REVIEW

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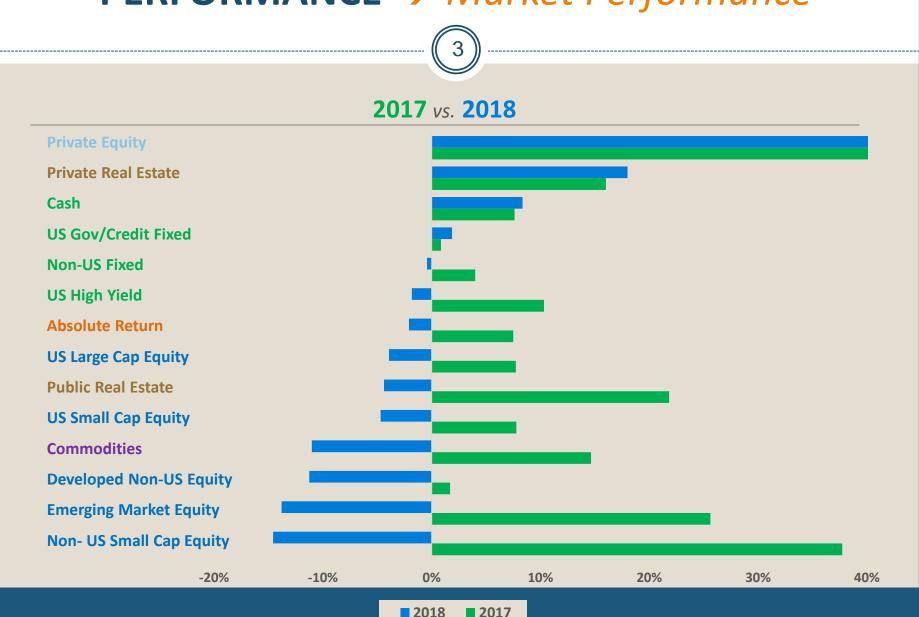
Public Pension Oversight Board

March 25, 2019

ASSET ALLOCATION → *Drives 90% of Returns*

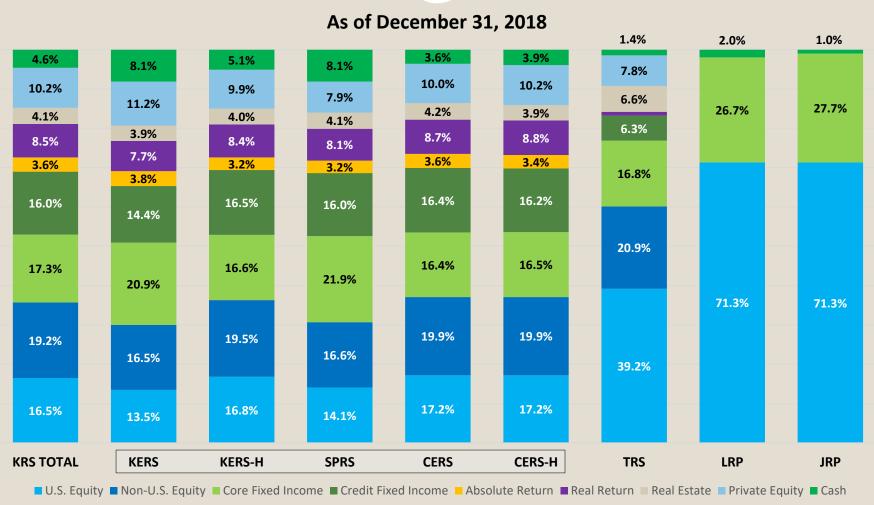
	Asset Class	Description									
Assets	U.S. Equity	Capitalization companies. Very liquid, but tend to have higher volatility.									
Traditional A	Non-U.S. Equity	Public stocks listed outside U.S. in local currency. Includes developed and emerging countries. Liquid, have higher return & risk expectation than U.S.	50%								
Tradi	Bonds and other assets with yield component. Includes investment grade (high Fixed Income quality), sovereign debt (global), and high yield (riskier) assets. Have lower expected return than equity, but less volatility given income component.										
S	Real Estate	Includes both private and public real estate investment trusts (REITs). Larger plans tend to invest in more private real estate, which consists of both core & non-core holdings. Illiquid in nature, but has provided stable returns over time.									
ve Assets	Private Equity/Credit	Includes private equity, venture capital, distressed or other private debt strategies. Generally in form of limited partnership agreements. Illiquid in nature and have long investment horizon (7-12 years). Have higher expected return, but also can exhibit higher levels of risk.	25%								
Alternative	Includes real assets, such as commodities or timber, as well as inflation-linked Real Return securities, such as Treasury Inflation Protected Securities (TIPS). Tend to have low correlation to stocks and bonds. Can be less liquid than traditional assets.										
4	Absolute Return	Funds that seek positive return regardless of market condition. Can include equity, fixed income, real estate, commodities, or other assets. Can include buying or "shorting" underlying securities. Expected to provide less volatile stream of positive returns over long term.									

PERFORMANCE \rightarrow *Market Performance*



ASSET CLASSES \rightarrow Current Allocations





INVESTMENTS \rightarrow *Pension* (as of December 31, 2018)

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As of December 31, 2018	MV	FYTD	1 –Year	3-Year	5-Year	10-Year	20-Year
KERS Pension (N)	\$1.97B	-1.6%	-1.0%	6.3%	5.1%	8.1%	5.4%
Policy Benchmark		-2.0%	-2.2%	6.3%	4.9%	8.4%	5.4%
KERS-Haz Pension (N)	\$627.8M	-2.4%	-2.0%	7.1%	5.2%	8.2%	5.4%
Policy Benchmark		-2.4%	-2.9%	6.8%	5.0%	8.5	5.4%
SPRS Pension (N)	\$257.7M	-1.9%	-1.6%	6.4%	4.7%	7.9%	5.3%
Policy Benchmark		-2.0%	-2.4%	6.5%	4.9%	8.4%	5.4%
CERS Pension (N)	\$6.68B	-2.4%	-2.1%	7.1%	5.2%	8.2%	5.4%
Policy Benchmark		-2.4%	-2.9%	6.8%	5.0%	8.5%	5.4%
CERS-Haz Pension (N)	\$2.24B	-2.4%	-2.0%	7.1%	5.2%	8.2%	5.4%
Policy Benchmark		-2.4%	-2.9%	6.8%	5.0%	8.5%	5.4%
TRS Pension (N)	\$18.29B	-6.5%	-5.1%	6.4%	5.4%	9.2%	5.5%
Policy Benchmark ¹		-4.9%	-4.2%	7.2%	6.7%	9.2%	-
LRP (N*)	\$112.8M	-2.2%	-1.4%	7.2%	7.7%	11.3%	6.5%
Policy Benchmark		-4.1%	-2.6%	7.1%	6.6%	10.2%	5.4%
JRP (N*)	\$385.4M	-2.0%	-1.2%	7.3%	7.6%	11.3%	6.5%
Policy Benchmark		-4.1%	-2.6%	7.1%	6.6%	10.2%	5.4%
Peer Groups Median Re	eturns		1 –Year	3-Year	5-Year	10-Year	
LRC Calculated 42 plans			-2.6%	6.7%	5.7%	8.7%	-
Wilshire TUCS > \$1 Billion	n (G)		-2.7%	6.7%	5.5%	8.9%	_

AROR
5.25%
6.25%
5.25%
6.25%
6.25%
7.50%
6.50%
6.50%

Peer Groups Median Returns	1 –Year	3-Year	5-Year	10-Year	
LRC Calculated 42 plans	-2.6%	6.7%	5.7%	8.7%	-
Wilshire TUCS > \$1 Billion (G)	-2.7%	6.7%	5.5%	8.9%	-
BNY Mellon Public Funds (G)	-3.4%	5.1%		8.8%	-

⁽G) Gross of fee return, (N) Net of Fee Return * JFRS 1- year returns are net of fee, longer term are gross 1TRS did not benchmark overall performance prior to July 1, 2008

PERFORMANCE \rightarrow New Years Bounce



What a difference a month can make

- December returns were some of worse, January experienced strong bounce
- Equites (both US/Non) up approx. 8.0%, High Yield Bonds up 4% in January
- As result, short term trailing results can change significantly

KERS NH preliminary returns											
Dec 31	as of	Jan 31									
-1.6%	FYTD	1.5%									
6.3%	3-Year	8.5%									
5.1%	5-year	6.0%									
8.1%	10-year	9.0%									
5.4%	20-year	5.4%									

	ERS N	
Dec 31	as of	Jan 31
-2.4%	FYTD	0.8%
7.1%	3-Year	9.6%
5.2%	5-year	6.4%
8.2%	10-year	9.2%
5.4%	20-year	5.5%

TRS ¹ preliminary returns											
Dec 31	as of	Jan 31									
-6.5%	FYTD	-0.7%									
6.4%	3-Year	10.4%									
5.4%	5-year	7.3%									
9.2%	10-year	10.6%									
5.5%	20-year	-									

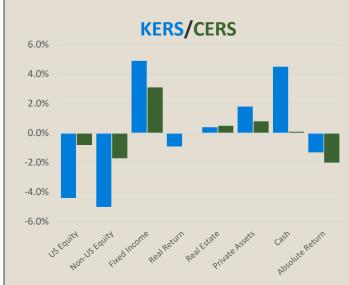
¹ TRS returns are gross of investment fees. 20-Year return not unavailable.

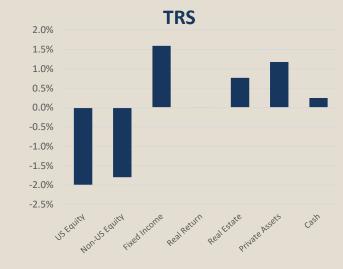
ASSET ALLOCATION \rightarrow *Recent Changes*

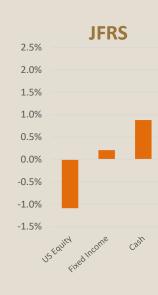


% Change in Asset Allocation

From June 30, 2018 to December 31, 2018







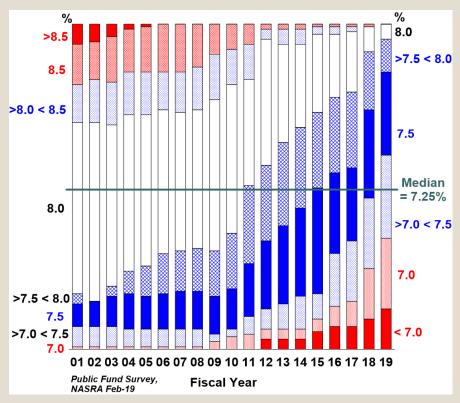
- Portfolio rebalancing/decline in equity markets
- Fixed Income/PE stronger performers
- Largely due to negative equity markets
- Did rebalance into some fixed income during 1Q of fiscal year
- · Continue to reduce Absolute Return · Continue to add to Private Assets

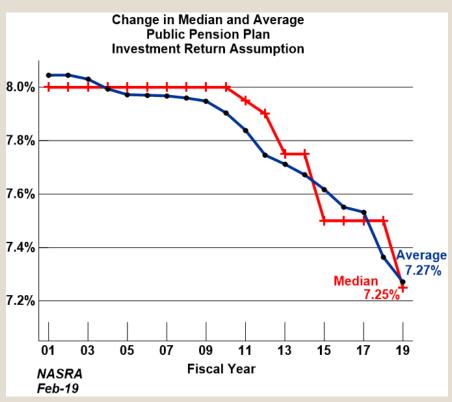
Market driven

FOLLOW UP → *Investment Return Assumptions*



- NASRA has recently updated annual survey
 - Median AROR of 7.25%, continues trend of plans lowering assumption





APPENDIX A

9

Insurance Fund Investment Performance

INVESTMENT PERFORMANCE \rightarrow *Insurance*

Period Ending December 31, 2018

	MV	FYTD	1 –Year	3-Year	5-Year	10-Year	AROR
KRS Insurance (N)	\$5.0B	-3.2%	-1.8%	7.3%	5.2%	8.5%	6.25%
Policy Benchmark		-3.5%	-2.7%	6.9%	5.4%	9.2%	0.23/0
KERS	\$820.4M	-4.1%	-3.3%	6.6%	4.6%	8.2%	6.25%
Policy Benchmark		-3.4%	-2.7%	7.0%	5.2%	9.1%	0.23/6
KERS – H	\$488.9M	-3.3%	-2.0%	7.2%	5.1%	8.5%	6.25%
Policy Benchmark		-3.2%	-2.3%	7.1%	5.3%	9.2%	0.23/0
CERS	\$2.3B	-3. 1%	-1.6%	7.4%	5.3%	8.6%	6.25%
Policy Benchmark		-3.5%	-2.7%	7.0%	5.2%	9.2%	0.23/0
CERS – H	\$1.2B	-3.1%	-1.5%	7.5%	5.4%	8.6%	6.25%
Policy Benchmark		-3.5%	-2.7%	7.0%	5.2%	9.2%	0.23/0
SPRS	\$182.6M	-3.1%	-1.5%	7.4%	5.3%	8.6%	6.25%
Policy Benchmark		-3.5%	-2.7%	7.0%	5.2%	9.2%	0.23/0
TRS Insurance (G)	\$1.1B	-7.4%	-3.4%	7.1%	4.6%	-	8.0%
Policy Benchmark ¹		-8.1%	-4.7%	7.0%	-	-	0.070

⁽N) Net of fees return ¹ TRS did not have target asset allocation prior to June 30, 2014, thus not benchmark return was calculated

⁽G) Gross of fees return

APPENDIX B

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LRC Staff Calculated Peer Group Data

LRC Staff Peer Group

Returns as of December 31, 2018

		Return	n Data		Asset Allocation							
System	1 Year	3 Year	5 year	10 Year	Global Eq	Global FI		Real Assets	RE/RA	HF	PA	Cash
Public Employee or Consolidated State Plans												
Retirement Systems of Alabama												
Alaska Public Employee Retirement System												
Arizona State Retirement System	ı											
Arkansas Public Retirement System												
California Public Employees Retirement System	-3.5%	6.3%	5.1%	7.9%	47.5	28.0	10.1	4.0	14.1	0.0	9.4	1.0
Colorado Public Employees Retirement Association	3.370	0.070	3.270	7.1370	17.5	20.0	10.1	1.0		0.0	3.1	1.0
Connecticut State Employees Retirement System	-4.3%	6.4%	5.0%	8.2%	48.8	19.4	6.9	13.5	20.4	0.0	7.8	3.5
Delaware Public Employees Retirement System	4.570	0.170	3.070	0.270	40.0	13.4	0.5	13.3	20.4	0.0	7.0	5.5
Florida Retirement System												
Georgia Employees Retirement System												
Hawaii Employees Retirement System												
Public Employees Retirement System of Idaho	-3.0%	7.0%	5.7%	8.6%	55.0	19.5	9.3	9.2	18.5	0.0	6.6	0.4
Illinois State Employees Retirement System	-3.0%	7.076	J.770	0.070	33.0	19.5	9.3	3.2	10.5	0.0	0.0	0.4
Indiana Public Employees Netherical System												
Iowa Public Employees Retirement System	-1.1%	6.9%	5.9%	8.7%								
Kansas Public Employees Retirement System	1.170	0.570	3.370	0.770								
Kentucky Employees Retirement Systems	-1.0%	6.3%	5.1%	8.1%	31.7	33.0	5.1	7.8	12.9	3.7	11.2	7.3
Louisiana State Employees' Retirement System	-4.8%	7.1%	4.9%	9.2%	55.3	14.2	0.0	6.9	6.9	7.2	15.8	0.6
Maine Public Employees Retirement System	1.9%	8.3%	6.0%	9.0%	30.5	20.9	8.2	25.3	33.5	0.0	15.0	0.1
Maryland State Retirement and Pension System	-1.6%	6.2%	4.9%	8.2%	30.3	20.3	0.2	23.3	33.3	0.0	13.0	0.1
Massachusetts State Employees Retirement System	-1.8%	7.7%	6.4%	9.1%	37.8	21.3	9.4	4.1	13.5	14.2	12.1	1.1
Michigan State Employees Retirement System	2.7%	8.7%	8.0%	9.6%	38.5	12.8	10.1	11.5	21.6	6.2	18.0	2.9
Minnesota State Retirement System	-2.9%	7.3%	6.1%	9.9%	58.4	24.5	0.0	0.0	0.0	0.0	15.8	1.3
Public Employees' Retirement System of Mississippi	-3.7%	7.3%	5.8%	9.8%	57.8	20.9	10.9	0.0	10.9	0.0	8.9	1.6
					37.6	20.9	10.9	0.0	10.9	0.0	0.9	1.0
Missouri State Employees Retirement System	-6.8%	4.8%	2.6%	7.1%	46.7	20.7	0.4	6.0	45.0	4.4	44.7	4.5
Montana Public Employees Retirement	-2.6% -4.2%	6.3% 6.6%	5.7% 5.6%	8.8% 9.3%	46.7	20.7	8.1 7.0	6.9	15.0	1.4	11.7	4.5
Nebraska Public Employees Retirement System	-4.2%	6.3%		9.3% 8.9%	56.3	31.0		0.0	7.0	0.0	5.6	0.1
Nevada Public Employees Retirement System			5.7%		61.8	27.2	4.7	0.0	4.7	0.0	5.7	0.4
New Hampshire Retirement System	-2.3%	7.1%	5.5%	9.2%	43.4	24.0	9.5	0.0	9.5	0.0	18.3	4.8
New Jersey Public Employees Retirement System	-2.0%	6.5%	5.4%	8.5%	45.6	19.8	6.4	9.0	15.4	1.5	11.9	5.8
New Mexico Public Employees Retirement Assoc	-2.5%	6.0%	4.5%	8.5%	35.6	36.2	7.0	13.0	20.0	0.0	6.9	1.3
New York State Common Retirement Fund	1 = 2 (=/										
North Carolina Retirement Systems	-1.5%	5.9%	4.8%	7.6%	36.4	35.7	9.2	6.7	15.9	2.0	5.8	4.2
North Dakota Public Employees Retirement System												
Ohio Public Employees Retirement System												
Oklahoma Public Employees Retirement System		7.50	6.604	0.554								
Oregon Public Employees Retirement System	0.5%	7.5%	6.3%	9.5%	33.7	21.1	11.2	9.3	20.5	0.0	24.4	0.3
Pennsylvania State Employees Retirement System	-4.3%	5.5%	4.6%	7.2%	51.5	14.9	7.2	8.8	16.0	0.2	14.6	2.8
Employees' Retirement System of Rhode Island	-2.7%	6.1%	4.5%	7.9%	43.3	19.7	6.7	6.3	13.0	10.9	8.6	4.5
South Carolina Retirement System	-4.2%	5.8%	4.3%	8.1%	39.4	21.7	9.4	11.8	21.2	8.6	7.6	1.5
South Dakota Retirement System	ı I											

LRC Staff Peer Group

Returns as of December 31, 2018

		Returi	n Data		Asset Allocation							
System	1 Year	3 Year	5 year	10 Year	Global Eq	Global FI	Real Estate	Real Assets	RE/RA	HF	PA	Cash
Tennessee Consolidated Retirement System												
Employee Retirement System of Texas	-1.7%	6.7%	5.4%	8.7%	39.8	27.7	10.5	2.4	12.8	4.0	15.2	0.4
Utah Retirement System												
Vermont State Employees Retirement System	-4.4%	6.0%	3.9%	8.1%	49.0	34.4	6.5	0.0	6.5	7.3	2.7	0.1
Virginia Retirement System	-1.3%	6.7%	6.0%	8.7%	39.1	30.8	0.0	14.0	14.0	2.8	12.8	0.5
Washington Public Employees Pension System	1.6%	8.8%	7.5%	8.7%	31.0	22.5	18.2	4.8	23.0	0.0	22.2	1.3
West Viginia Public Employees Retirement System	-2.7%	7.7%	6.1%	10.1%	48.5	17.5	11.6	0.0	11.6	11.6	10.8	0.0
Wisconsin Retirement System	-3.3%	6.9%	5.2%	8.8%	44.7	22.6	7.2	16.3	23.5	0.0	8.7	0.5
Wyoming Retirement System												
Standalone Teacher/Public School Retirement Plans												
Arkansas Teachers Retirement System												
California State Teachers' Retirement System	-3.2%	6.9%	6.0%	8.4%	49.0	13.0	15.0	2.0	17.0	9.0	10.0	2.0
Connecticut Teachers Retirement Board	-4.5%	6.3%	4.9%	8.2%	50.1	19.7	7.0	12.0	19.0	0.0	7.9	3.5
Teacher's Retirement System of Georgia												
Teachers Retirement System of Illinois	-1.3%	6.7%	5.7%	8.6%	51.2	23.5	0.0	14.7	14.7	10.6	0.0	0.0
Kentucky Teachers Retirement System	5.1%	6.4%	5.4%	9.2%	60.1	23.2	6.6	1.0	7.6	0.0	7.7	1.4
Teacher's Retirement of Louisana	-1.4%	8.7%	6.5%	9.4%	44.8	17.9	10.0	0.0	10.0	0.0	26.5	0.8
Public School Retirement System of Missouri	-1.0%	7.1%	8.4%	9.0%	42.8	18.3	8.0	3.3	11.3	12.2	12.2	3.2
Montana Teacher's Retirement System	-2.6%	6.2%	5.7%	8.4%								
School Retirement System for Nebraska	-4.2%	6.6%	5.6%	9.3%	56.3	31.0	7.0	0.0	7.0	0.0	5.6	0.1
New Mexico Educational Retirement Board	0.6%	7.5%	63.0%	9.6%	30.2	26.9	6.4	13.1	19.5	0.0	21.9	1.5
New York State Teacher's Retirement System												
North Dakota Teacher's Fund for Retirement												
State Teachers Retirement System of Ohio												
Oklahoma Teacher's Retirement System												
Public School Employees' Retirement System of Pennsylvania	0.7%	7.8%	6.0%	8.0%								
Teacher Retirement System of Texas												
Vermont State Teachers' Retirement System	-4.2%	6.0%	4.0%	8.0%	48.7	31.9	7.3	0.0	7.3	7.4	4.6	0.1
West Virginia Teachers Retirement System	-2.7%	7.7%	6.1%	9.9%	23.1	28.7	14.0	11.6	25.6	11.6	10.8	0.2
LRC Peer Group Summary												
Count	42	42	42	42	27	27	27	27	27	27	27	27
Average	-2.1%	6.8%	6.9%	8.7%	45.0	23.7	7.9	6.7	14.6	3.6	11.4	1.8
Median	-2.6%	6.7%	5.7%	8.7%	45.6	22.5	7.3	6.7	14.1	0.2	10.8	1.3

Additional Peer Group Review				
TUCS Public Fund > \$1 Billion	-2.7%	6.7%	5.5%	8.9%
BNY Mellon Total Public Funds Universe	-3.4%	5.1%		8.8%