WILSHIRE ASSOCIATES

Wilshire Consulting

Kentucky Retirement Systems

Quarterly Board Summary

December 31, 2020

Wilshire

Wilshire Consulting

DECEMBER 2020 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
													Real Estate					
	US Stock	Dev ex-US Stock	Emg Stock	Global ex-US Stock	Global Stock	Private Equity	Cash	Core Bond	LT Core Bond	TIPS	High Yield	Dev ex-US Bond (Hdg)	US RES	Global RES	Private RE	Cmdty	Real Assets	US CPI
COMPOUND RETURN (%)	5.00	5.75	5.75	6.00	5.55	6.95	0.70	1.30	1.75	0.80	3.10	0.35	5.20	5.40	6.20	2.85	5.65	2.15
ARITHMETIC RETURN (%)	6.35	7.25	8.75	7.65	6.90	10.35	0.70	1.40	2.15	1.00	3.60	0.45	6.55	6.55	7.10	3.90	6.15	2.15
EXPECTED RISK (%)	17.00	18.00	26.00	19.15	17.15	28.00	0.75	4.30	8.85	6.00	10.00	4.30	17.00	15.85	14.00	15.00	10.15	1.75
CASH YIELD (%)	1.50	2.25	1.75	2.10	1.75	0.00	0.70	2.35	3.00	1.60	7.00	1.35	3.60	3.60	2.50	0.70	2.00	0.00
GROWTH EXPOSURE	8.00	8.00	8.00	8.00	8.00	13.50	0.00	-0.80	-2.10	-3.00	4.00	-1.00	6.00	6.00	3.50	0.00	1.80	0.00
INFLATION EXPOSURE	-3.00	0.00	5.00	1.55	-1.10	-3.80	0.00	-2.45	-6.55	2.50	-1.00	-3.00	1.00	1.95	1.00	12.00	4.90	1.00
CORRELATIONS																		
US Stock	1.00																	
Dev ex-US Stock (USD)	0.81	1.00																
Emerging Mkt Stock	0.74	0.74	1.00															
Global ex-US Stock	0.83	0.96	0.87	1.00														
Global Stock	0.95	0.92	0.83	0.94	1.00													
Private Equity	0.74	0.64	0.62	0.67	0.74	1.00												
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
Core Bond	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT Core Bond	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.92	1.00									
TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.59	0.47	1.00								
High Yield Bond	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
Dev ex-US Bond (Hdg)	0.16	0.25	-0.01	0.17	0.18	0.26	0.10	0.66	0.65	0.39	0.26	1.00						
US RE Securities	0.58	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
Global RE Securities	0.64	0.58	0.56	0.61	0.65	0.58	-0.05	0.17	0.22	0.11	0.61	0.03	0.96	1.00				
Private Real Estate	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.75	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Assets	0.48	0.51	0.58	0.57	0.54	0.47	-0.02	0.23	0.25	0.39	0.56	0.05	0.70	0.75	0.70	0.65	1.00	
Inflation (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

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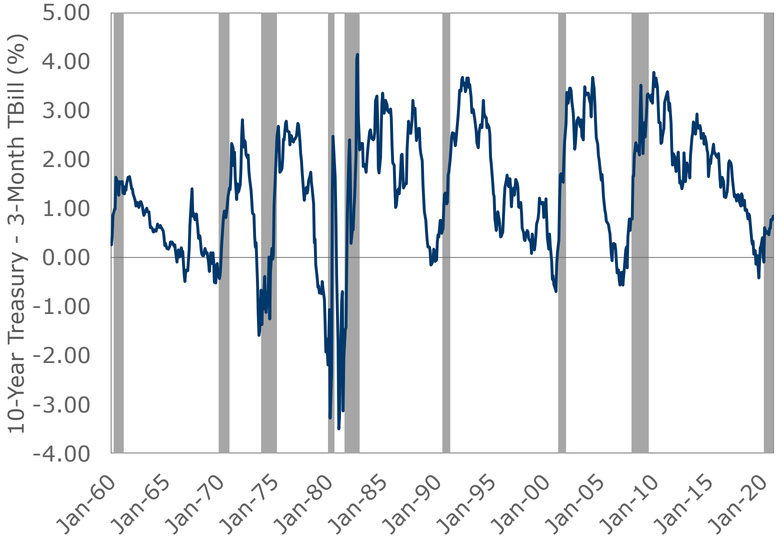
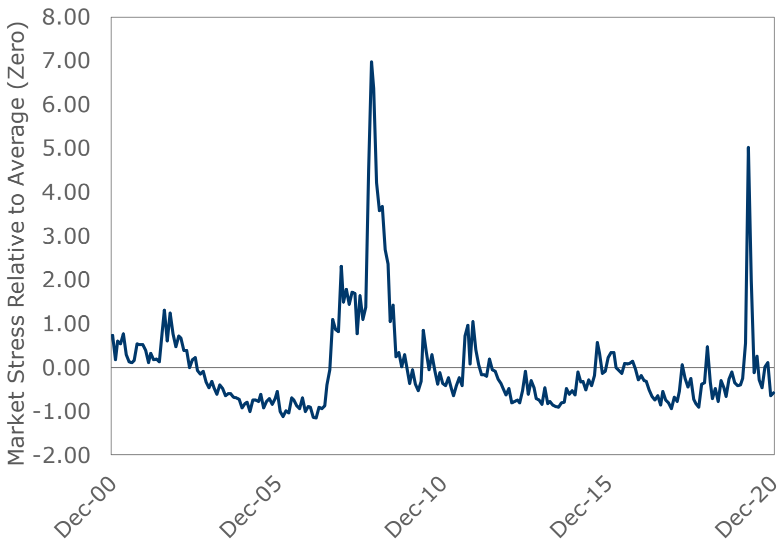
RISK MONITOR

YIELD CURVE SLOPE VS RECESSIONS (IN GRAY)

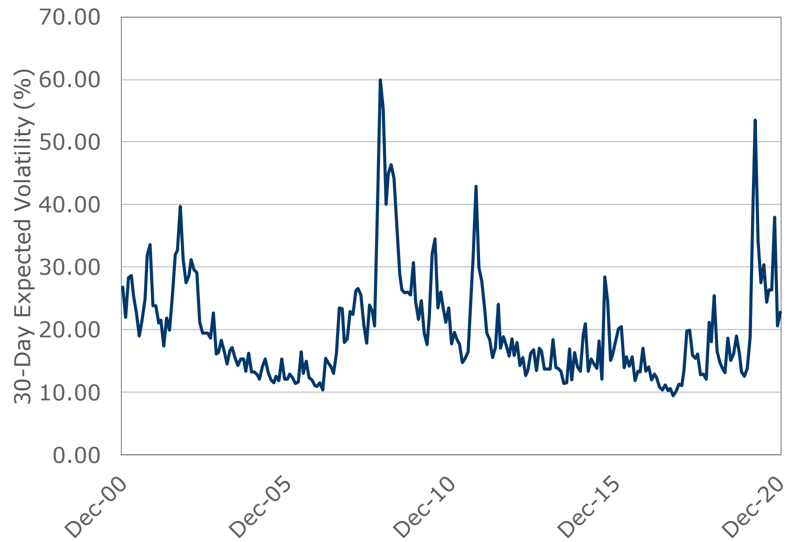


BLOOMBERG BARCLAYS CREDIT INDEXES

ST. LOUIS FED FINANCIAL STRESS INDEX



CBOE VOLATILITY INDEX



Data sources: Bloomberg

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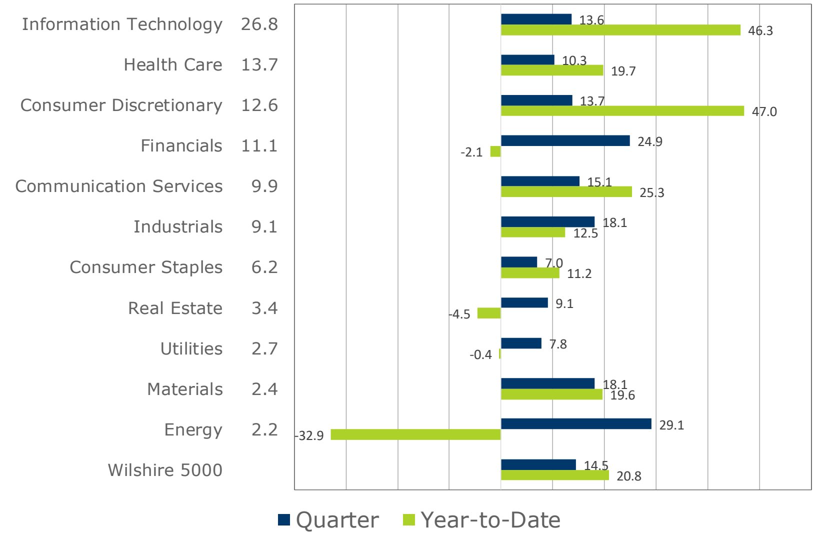
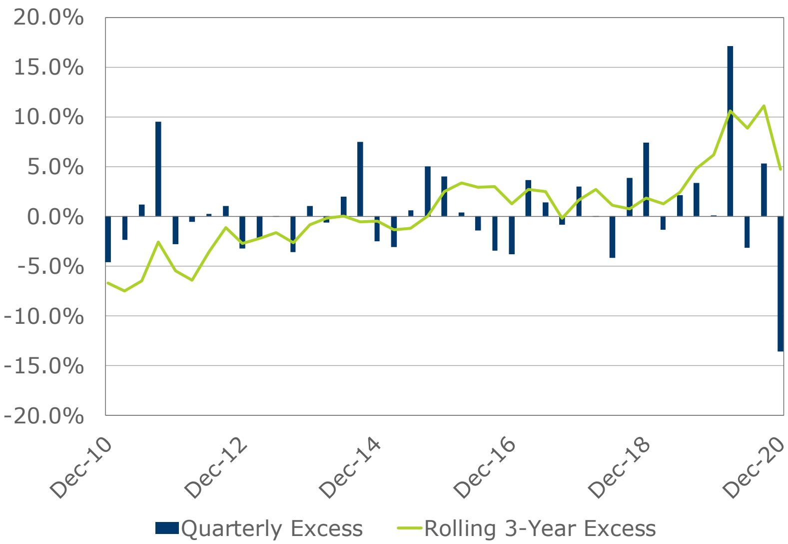
U.S. EQUITY MARKET

AS OF 12/31/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	14.5	20.8	20.8	14.5	15.5	13.8
WILSHIRE U.S. LARGE CAP	13.2	21.2	21.2	15.0	15.8	14.0
WILSHIRE U.S. SMALL CAP	31.0	17.4	17.4	9.7	12.9	11.5
WILSHIRE U.S. LARGE GROWTH	12.8	35.4	35.4	21.0	19.8	16.4
WILSHIRE U.S. LARGE VALUE	13.6	7.4	7.4	8.9	11.6	11.6
WILSHIRE U.S. SMALL GROWTH	29.7	29.7	29.7	14.9	16.2	13.2
WILSHIRE U.S. SMALL VALUE	32.2	6.2	6.2	4.7	9.5	9.7
WILSHIRE REIT INDEX	10.6	-7.9	-7.9	3.3	4.3	8.3
MSCI USA MIN. VOL. INDEX	6.9	5.8	5.8	11.2	12.6	13.4
FTSE RAFI U.S. 1000 INDEX	17.5	8.0	8.0	8.2	11.7	11.7

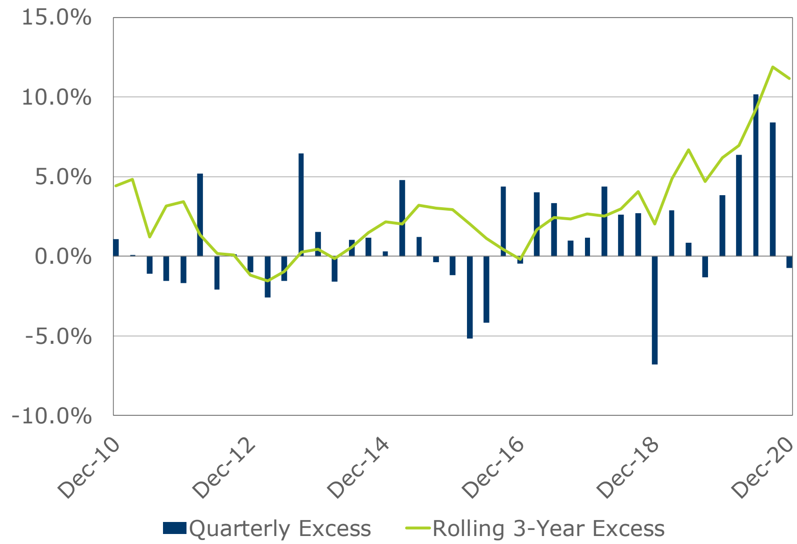
U.S. SECTOR WEIGHT AND RETURN (%)



LARGE CAP VS SMALL CAP



LARGE GROWTH VS LARGE VALUE



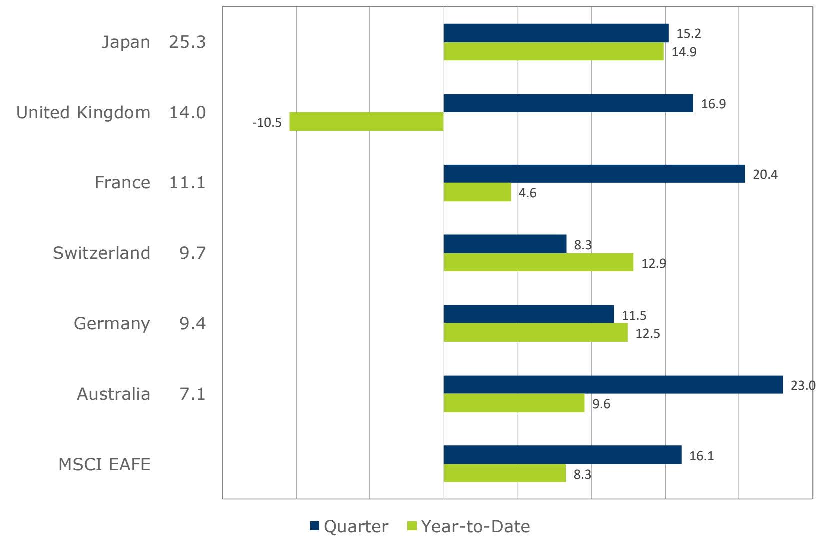
Data sources: Bloomberg, Wilshire Atlas

Wilshire Consulting

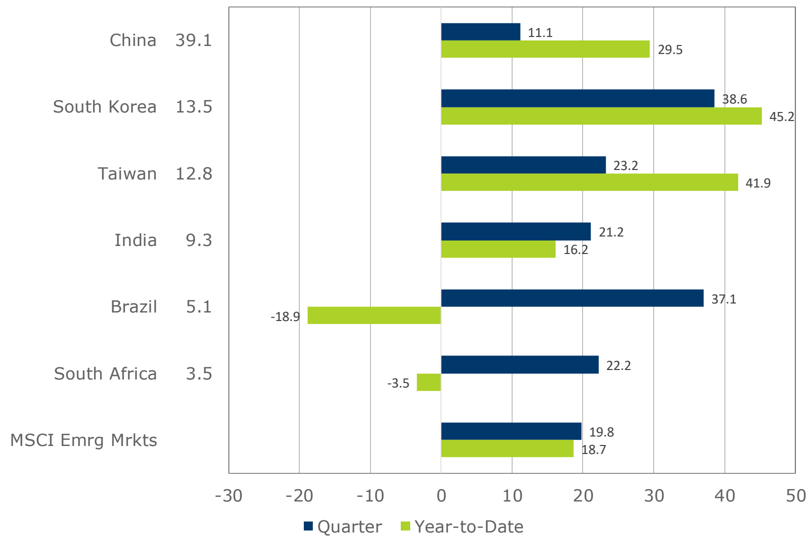
NON-U.S. EQUITY MARKET

AS OF 12/31/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	17.1	11.1	11.1	5.4	9.4	5.4
MSCI EAFE ($G)	16.1	8.3	8.3	4.8	8.0	6.0
MSCI EMERGING MARKETS ($G)	19.8	18.7	18.7	6.6	13.2	4.0
MSCI FRONTIER MARKETS ($G)	17.5	-2.4	-2.4	-1.5	5.1	1.7
MSCI ACWI EX-US GROWTH ($G)	14.0	22.6	22.6	10.4	12.4	7.3
MSCI ACWI EX-US VALUE ($G)	20.6	0.5	0.5	0.4	6.6	3.6
MSCI ACWI EX-US SMALL ($G)	18.6	14.7	14.7	5.0	9.8	6.3
MSCI ACWI MINIMUM VOLATILITY	6.5	3.3	3.3	7.6	9.8	9.8
MSCI EAFE MINIMUM VOLATILITY	8.0	0.6	0.6	3.8	6.2	7.2
FTSE RAFI DEVELOPED EX-US	21.3	3.0	3.0	1.1	6.6	4.2
MSCI EAFE LC (G)	11.4	1.3	1.3	3.5	6.3	7.3
MSCI EMERGING MARKETS LC (G)	16.1	19.5	19.5	8.5	13.0	7.0

DEVELOPED MARKETS WEIGHT AND RETURN (%)



EMERGING MARKETS WEIGHT AND RETURN (%)



Data sources: Bloomberg

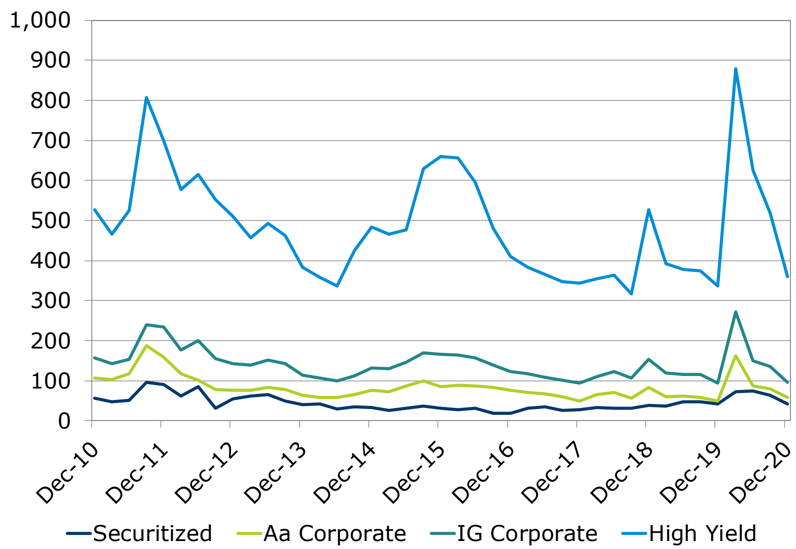
Wilshire Consulting

U.S. FIXED INCOME

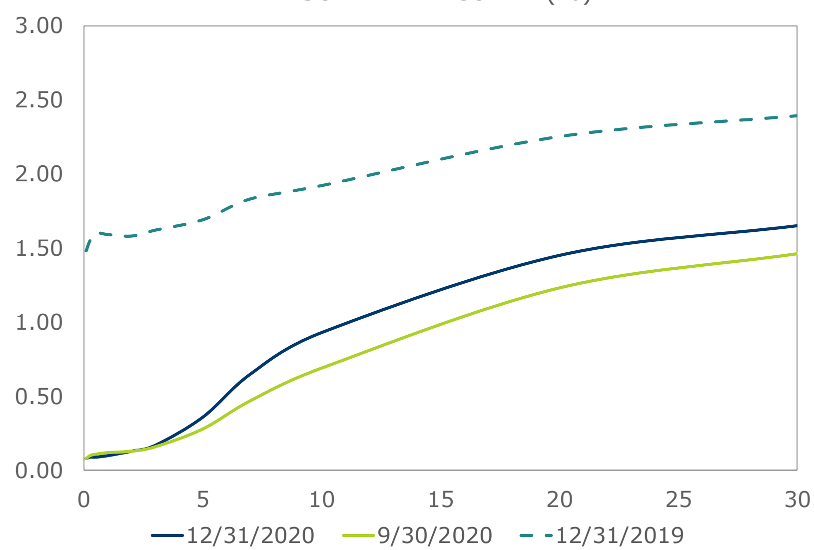
AS OF 12/31/2020	YTW	DUR.	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	1.1	6.2	0.7	7.5	7.5	5.3	4.4	3.8
BLOOMBERG BARCLAYS TREASURY	0.6	7.2	-0.8	8.0	8.0	5.2	3.8	3.3
BLOOMBERG BARCLAYS GOV'T-REL.	1.1	6.0	0.9	5.9	5.9	5.0	4.4	3.6
BLOOMBERG BARCLAYS SECURITIZED	1.2	2.6	0.3	4.2	4.2	3.8	3.2	3.1
BLOOMBERG BARCLAYS CORPORATE	1.7	8.8	3.0	9.9	9.9	7.1	6.7	5.6
BLOOMBERG BARCLAYS LT G/C	2.3	16.8	1.7	16.1	16.1	9.8	9.3	8.2
BLOOMBERG BARCLAYS LT TREASURY	1.5	19.2	-3.0	17.7	17.7	9.9	7.8	7.8
BLOOMBERG BARCLAYS LT GOV't-REL.	2.7	13.8	2.7	9.6	9.6	8.0	8.4	7.7
BLOOMBERG BARCLAYS LT CORP.	2.8	15.5	5.1	13.9	13.9	9.4	10.2	8.3
BLOOMBERG BARCLAYS U.S. TIPS *	0.8	8.0	1.6	11.0	11.0	5.9	5.1	3.8
BLOOMBERG BARCLAYS HIGH YIELD	4.2	3.6	6.5	7.1	7.1	6.2	8.6	6.8
TREASURY BILLS	0.1	0.3	0.0	0.7	0.7	1.6	1.2	0.7

* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index

FIXED INCOME OPTION ADJUSTED SPREAD (BPS)



TREASURY YIELD CURVE (%)

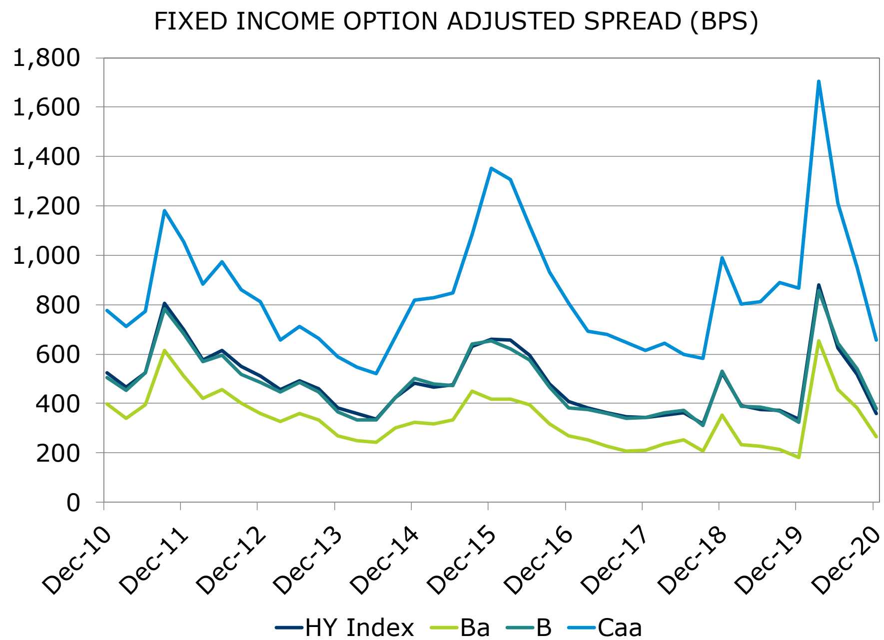


Data sources: Bloomberg

Wilshire Consulting

HIGH YIELD BOND MARKET

AS OF 12/31/2020		YTW	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		4.2	6.5	7.1	7.1	6.2	8.6	6.8
S&P LSTA LEVERAGE LOAN INDEX		4.0	3.4	2.8	2.8	4.2	5.3	4.0
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT							
Ba U.S. HIGH YIELD	54.4%	3.2	5.7	10.2	10.2	7.5	8.5	7.3
B U.S. HIGH YIELD	32.7%	4.4	5.8	4.6	4.6	5.8	7.9	6.3
Caa U.S. HIGH YIELD	12.1%	7.1	9.9	2.3	2.3	2.5	9.3	6.4
Ca to D U.S. HIGH YIELD	0.8%	15.6	34.1	2.6	2.6	0.3	16.1	-3.9
Non-Rated U.S. HIGH YIELD	0.0%	0.0	0.0	-6.5	-6.5	0.2	3.0	3.2



Data sources: Bloomberg

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ASSET CLASS PERFORMANCE

ASSET CLASS RETURNS - BEST TO WORST						
2015	2016	2017	2018	2019	2020 YTD	ANNUALIZED 5-YEAR AS OF 12/20
REITs 4.2%	MLPs 18.3%	Emrg Mrkts 37.7%	T-Bills 1.9%	U.S. Equity 31.0%	U.S. Equity 20.8%	U.S. Equity 15.5%
U.S. Equity 0.7%	High Yield 17.1%	Developed 25.6%	Core Bond 0.0%	REITs 25.8%	Emrg Mrkts 18.7%	Emrg Mrkts 13.2%
Core Bond 0.6%	U.S. Equity 13.4%	U.S. Equity 21.0%	U.S. TIPS -1.3%	Developed 22.7%	U.S. TIPS 11.0%	High Yield 8.6%
T-Bills 0.1%	Commodities 11.8%	High Yield 7.5%	High Yield -2.1%	Emrg Mrkts 18.9%	Developed 8.3%	Developed 8.0%
Developed -0.4%	Emrg Mrkts 11.6%	REITs 4.2%	REITs -4.8%	High Yield 14.3%	Core Bond 7.5%	U.S. TIPS 5.1%
U.S. TIPS -1.4%	REITs 7.2%	Core Bond 3.6%	U.S. Equity -5.3%	Core Bond 8.7%	High Yield 7.1%	Core Bond 4.4%
High Yield -4.5%	U.S. TIPS 4.7%	U.S. TIPS 3.0%	Commodities -11.2%	U.S. TIPS 8.4%	T-Bills 0.7%	REITs 4.3%
Emrg Mrkts -14.6%	Core Bond 2.6%	Commodities 1.7%	MLPs -12.4%	Commodities 7.7%	Commodities -3.1%	Midstream 1.5%
Commodities -24.7%	Developed 1.5%	T-Bills 0.8%	Developed -13.4%	MLPs 6.6%	REITs -7.9%	T-Bills 1.2%
MLPs -32.6%	T-Bills 0.3%	MLPs -6.5%	Emrg Mrkts -14.2%	T-Bills 2.3%	Midstream -23.4%	Commodities 1.0%

Data sources: Bloomberg

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

KRS Insurance Plan

Wilshire Consulting

Asset Allocation

KRS Insurance Plan

Periods Ended As of December 31, 2020

	Actual			Difference	
	$	%	Target	$	%
Growth	**$4,473,982,930**	**70.9%**	**68.5%**	**$151,027,871**	**2.4%**
U.S. Equity	$1,433,099,042	22.7%	21.8%	$60,481,925	1.0%
Non-U.S. Equity	$1,407,518,008	22.3%	21.8%	$34,900,891	0.6%
Private Equity	$548,052,248	8.7%	10.0%	-$83,036,082	-1.3%
High Yield/Specialty Credit	$1,085,313,632	17.2%	15.0%	$138,681,137	2.2%
Liquidity	**$981,572,093**	**15.6%**	**11.5%**	**$255,820,514**	**4.1%**
Core Fixed Income	$873,074,113	13.8%	10.0%	$241,985,783	3.8%
Cash	$108,497,980	1.7%	1.5%	$13,834,731	0.2%
Diversifying	**$608,111,687**	**9.6%**	**20.0%**	**-$654,064,973**	**-10.4%**
Real Estate	$246,753,396	3.9%	10.0%	-$384,334,934	-6.1%
Real Return	$361,358,291	5.7%	10.0%	-$269,730,039	-4.3%
Opportunistic	**$247,216,588**	**3.9%**	**0.0%**	**$247,216,588**	**3.9%**

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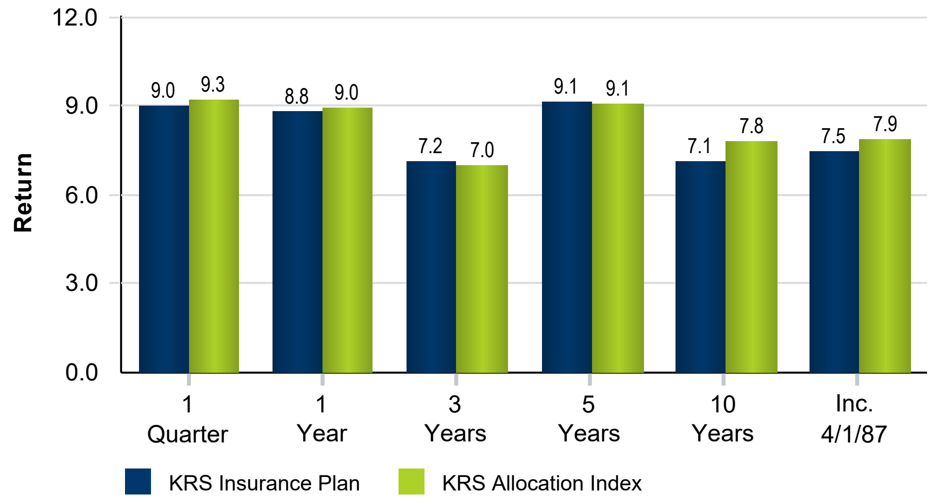
Total Fund Summary

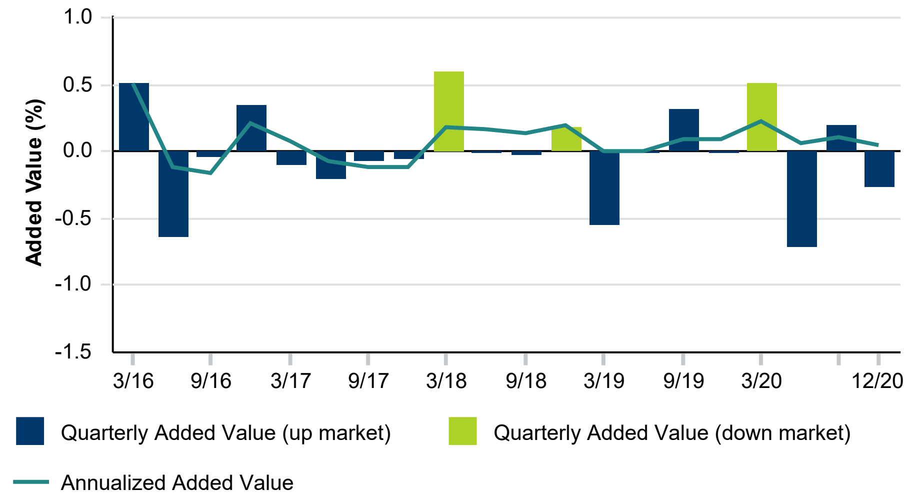
KRS Insurance Plan

Periods Ended December 31, 2020

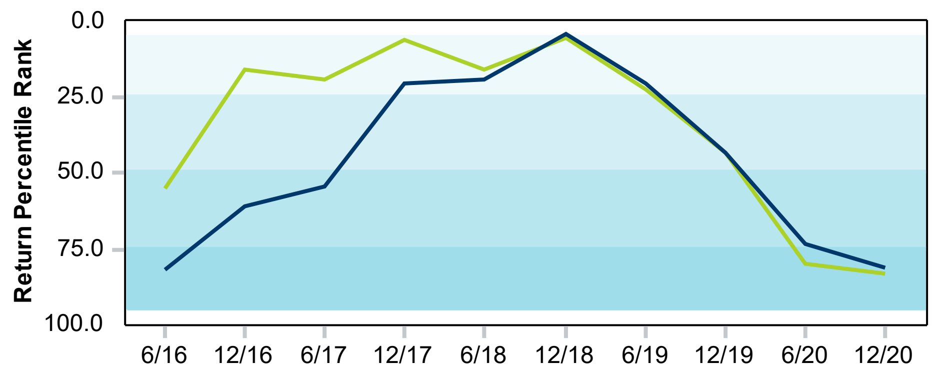
Comparative Performance



Added Value History

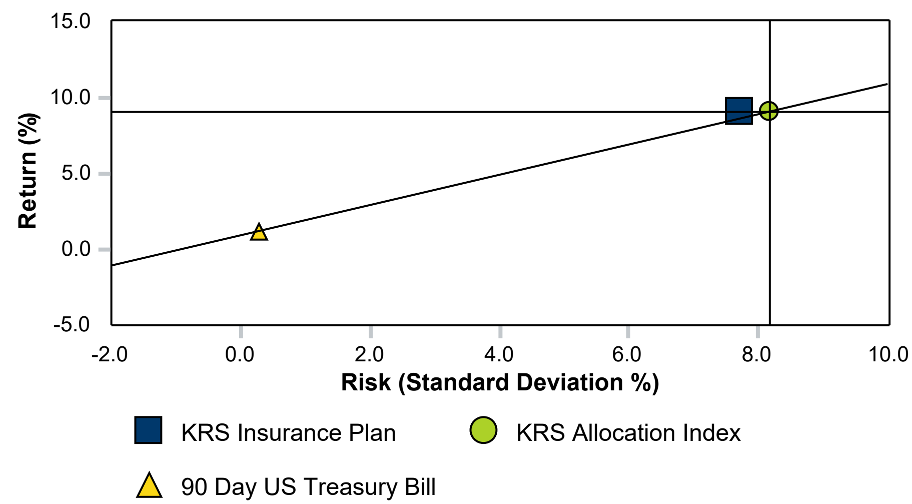


Rolling Percentile Rank: All Public Plans-Total Fund



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
KRS Insurance Plan	10	4 (40%	1 (10%	3 (30%	2 (20%
Benchmark	10	6 (60%)	1 (10%)	1 (10%)	2 (20%)

Risk and Return 01/1/16 - 12/31/20



Asset Allocation & Performance

KRS Insurance Plan

Periods Ended December 31, 2020

	Allocation		Performance (%) net of fees								
	Market Value $	%	1 Month	QTD	FYTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
KRS Insurance Plan	**6,310,883,297**	**100.00**	**3.42**	**9.00**	**14.29**	**8.83**	**7.17**	**9.14**	**7.13**	**7.51**	**4/1/1987**
KRS Allocation Index			3.20	9.26	14.36	8.97	7.01	9.09	7.80	7.89	
Value Added			0.22	-0.26	-0.07	-0.14	0.16	0.05	-0.67	-0.38	
KRS IPS Index			3.18	9.24	14.36	9.07	7.27				
Value Added			0.24	-0.24	-0.07	-0.24	-0.10				
KERS Insurance Plan	**1,175,348,540**	**18.62**	**3.38**	**9.19**	**14.73**	**9.98**	**7.01**	**8.94**	**6.91**	**7.45**	**4/1/1987**
KERS Allocation Index			3.26	9.24	14.42	9.33	6.79	8.94	7.67	7.85	
Value Added			0.12	-0.05	0.31	0.65	0.22	0.00	-0.76	-0.40	
KERS IPS Index			3.25	9.21	14.42	9.43	7.07				
Value Added			0.13	-0.02	0.31	0.55	-0.06				
Assumed Rate 6.25%			0.51	1.53	3.08	6.25	6.25				
Value Added			2.87	7.66	11.65	3.73	0.76				
KERS (H) Insurance Plan	**578,787,558**	**9.17**	**3.46**	**8.90**	**14.15**	**8.46**	**6.97**	**8.99**	**7.07**	**7.49**	**4/1/1987**
KERS (H) Allocation Index			3.19	9.20	14.37	8.94	6.96	9.06	7.73	7.87	
Value Added			0.27	-0.30	-0.22	-0.48	0.01	-0.07	-0.66	-0.38	
KERS (H) IPS Index			3.18	9.17	14.37	9.03	7.20				
Value Added			0.28	-0.27	-0.22	-0.57	-0.23				
Assumed Rate 6.25%			0.51	1.53	3.08	6.25	6.25				
Value Added			2.95	7.37	11.07	2.21	0.72				

Asset Allocation & Performance

KRS Insurance Plan

Periods Ended December 31, 2020

	Allocation		Performance (%) net of fees								
	Market Value $	%	1 Month	QTD	FYTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
CERS Insurance Plan	**2,854,409,129**	**45.23**	**3.44**	**8.97**	**14.17**	**8.59**	**7.14**	**9.13**	**7.15**	**7.52**	**4/1/1987**
CERS Allocation Index			2.72	9.21	14.07	8.57	6.80	8.96	7.68	7.86	
Value Added			0.72	-0.24	0.10	0.02	0.34	0.17	-0.53	-0.34	
CERS IPS Index			3.17	9.24	14.33	9.03	7.30				
Value Added			0.27	-0.27	-0.16	-0.44	-0.16				
Assumed Rate 6.25%			0.51	1.53	3.08	6.25	6.25				
Value Added			2.93	7.44	11.09	2.34	0.89				
CERS (H) Insurance Plan	**1,476,229,056**	**23.39**	**3.49**	**8.98**	**14.19**	**8.48**	**7.16**	**9.17**	**7.17**	**7.52**	**4/1/1987**
CERS (H) Allocation Index			3.19	9.25	14.35	8.88	7.04	9.11	7.75	7.88	
Value Added			0.30	-0.27	-0.16	-0.40	0.12	0.06	-0.58	-0.36	
CERS (H) IPS Index			3.18	9.23	14.35	8.97	7.27				
Value Added			0.31	-0.25	-0.16	-0.49	-0.11				
Assumed Rate 6.25%			0.51	1.53	3.08	6.25	6.25				
Value Added			2.98	7.45	11.11	2.23	0.91				
SPRS Insurance Plan	**226,112,309**	**3.58**	**3.55**	**9.12**	**14.41**	**9.14**	**7.34**	**9.27**	**7.22**	**7.54**	**4/1/1987**
SPRS Allocation Index			3.20	9.26	14.41	8.99	7.04	9.11	7.75	7.88	
Value Added			0.35	-0.14	0.00	0.15	0.30	0.16	-0.53	-0.34	
SPRS IPS Index			3.19	9.24	14.41	9.09	7.28				
Value Added			0.36	-0.12	0.00	0.05	0.06				
Assumed Rate 6.25%			0.51	1.53	3.08	6.25	6.25				
Value Added			3.04	7.59	11.33	2.89	1.09				

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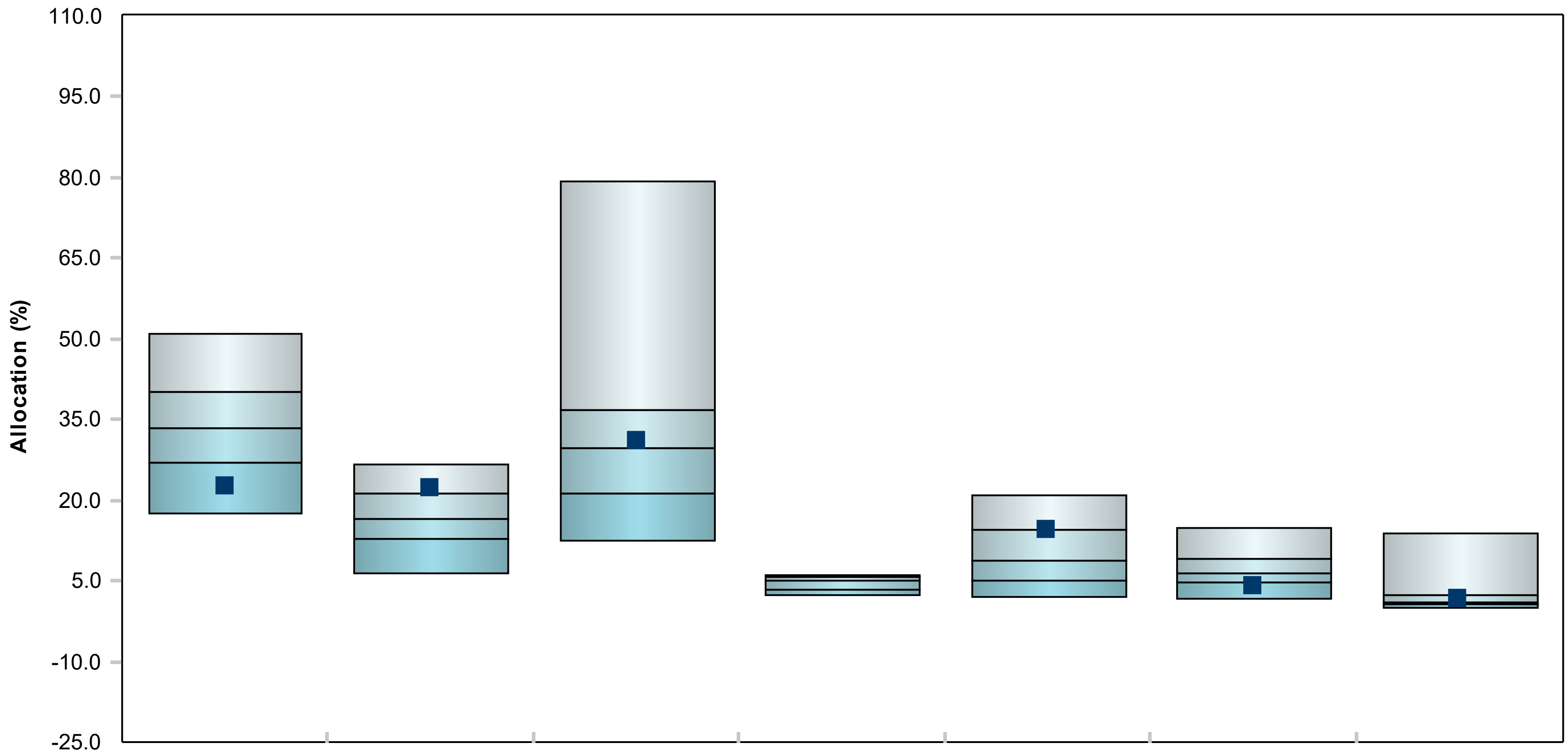
Plan Sponsor TF Asset Allocation

KRS Insurance Plan vs All Public Plans-Total Fund

Periods Ended December 31, 2020

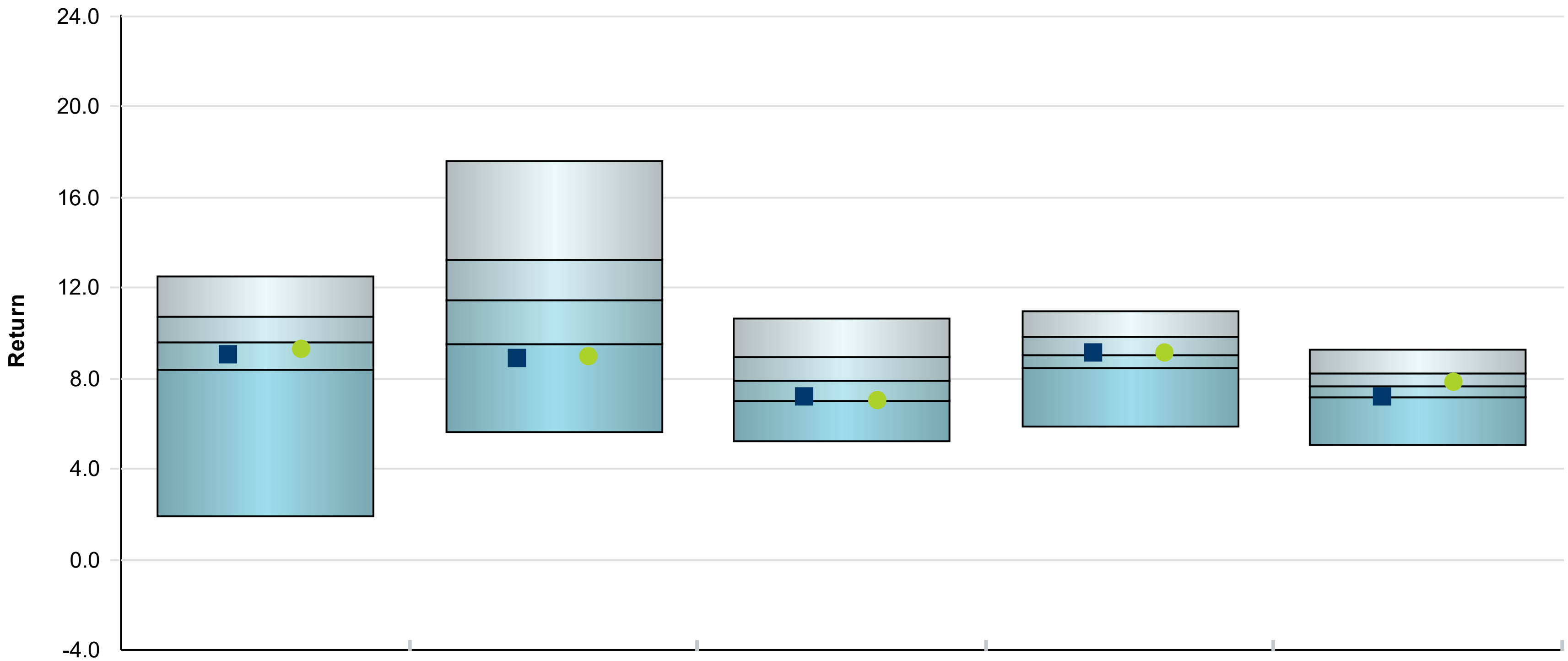


	US Equity	Global ex-US Equity	US Fixed	Global ex-US Fixed	Alternatives	Total Real Estate	Cash & Equivalents
■ KRS Insurance Plan	22.71	22.30	31.03		14.41	3.91	1.72
5th Percentile	50.95	26.70	79.19	5.94	20.81	14.84	13.96
1st Quartile	39.99	21.15	36.69	5.81	14.55	9.12	2.27
Median	33.22	16.60	29.60	5.12	8.64	6.50	1.00
3rd Quartile	27.11	12.65	21.23	3.24	4.93	4.61	0.51
95th Percentile	17.53	6.47	12.34	2.19	1.98	1.61	0.05

Plan Sponsor Peer Group Analysis

KRS Insurance Plan vs All Public Plans-Total Fund

Periods Ended December 31, 2020



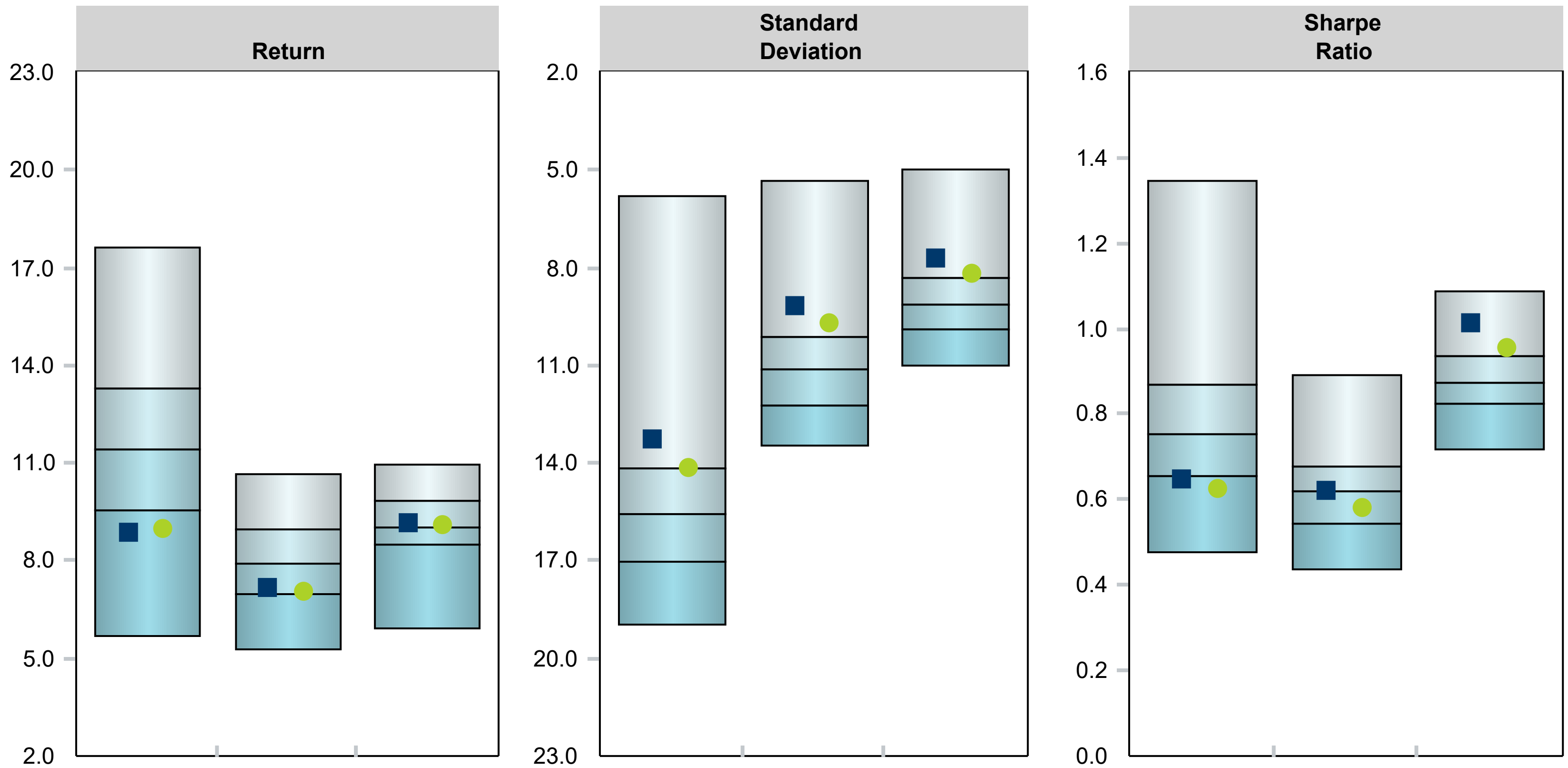
	QTD	1 Year	3 Years	5 Years	10 Years
■ KRS Insurance Plan	9.00 (66)	8.83 (84)	7.17 (71)	9.14 (44)	7.13 (79)
● KRS Allocation Index	9.26 (61)	8.97 (82)	7.01 (75)	9.09 (46)	7.80 (40)
5th Percentile	12.50	17.64	10.66	10.94	9.29
1st Quartile	10.71	13.27	8.98	9.87	8.24
Median	9.62	11.42	7.94	9.03	7.64
3rd Quartile	8.36	9.52	6.99	8.47	7.21
95th Percentile	1.88	5.67	5.25	5.91	5.03
Population	264	260	237	221	171

Parentheses contain percentile rankings.
Calculation based on monthly periodicity.

Plan Sponsor Peer Group Analysis - Multi Statistics

KRS Insurance Plan vs All Public Plans-Total Fund

Periods Ended December 31, 2020



	Return 1 Year	Return 3 Years	Return 5 Years	Std Dev 1 Year	Std Dev 3 Years	Std Dev 5 Years	Sharpe 1 Year	Sharpe 3 Years	Sharpe 5 Years
KRS Insurance Plan	8.83 (84)	7.17 (71)	9.14 (44)	13.29 (18)	9.17 (13)	7.71 (13)	0.64 (79)	0.62 (50)	1.01 (11)
KRS Allocation Index	8.97 (82)	7.01 (75)	9.09 (46)	14.17 (24)	9.71 (17)	8.18 (21)	0.62 (84)	0.58 (66)	0.95 (21)
5th Percentile	17.64	10.66	10.94	5.81	5.34	5.00	1.35	0.89	1.09
1st Quartile	13.27	8.98	9.87	14.19	10.11	8.32	0.87	0.68	0.93
Median	11.42	7.94	9.03	15.55	11.14	9.16	0.75	0.62	0.87
3rd Quartile	9.52	6.99	8.47	17.06	12.23	9.93	0.65	0.54	0.82
95th Percentile	5.67	5.25	5.91	18.99	13.46	10.99	0.48	0.44	0.72

Parentheses contain percentile rankings.
Calculation based on monthly periodicity.

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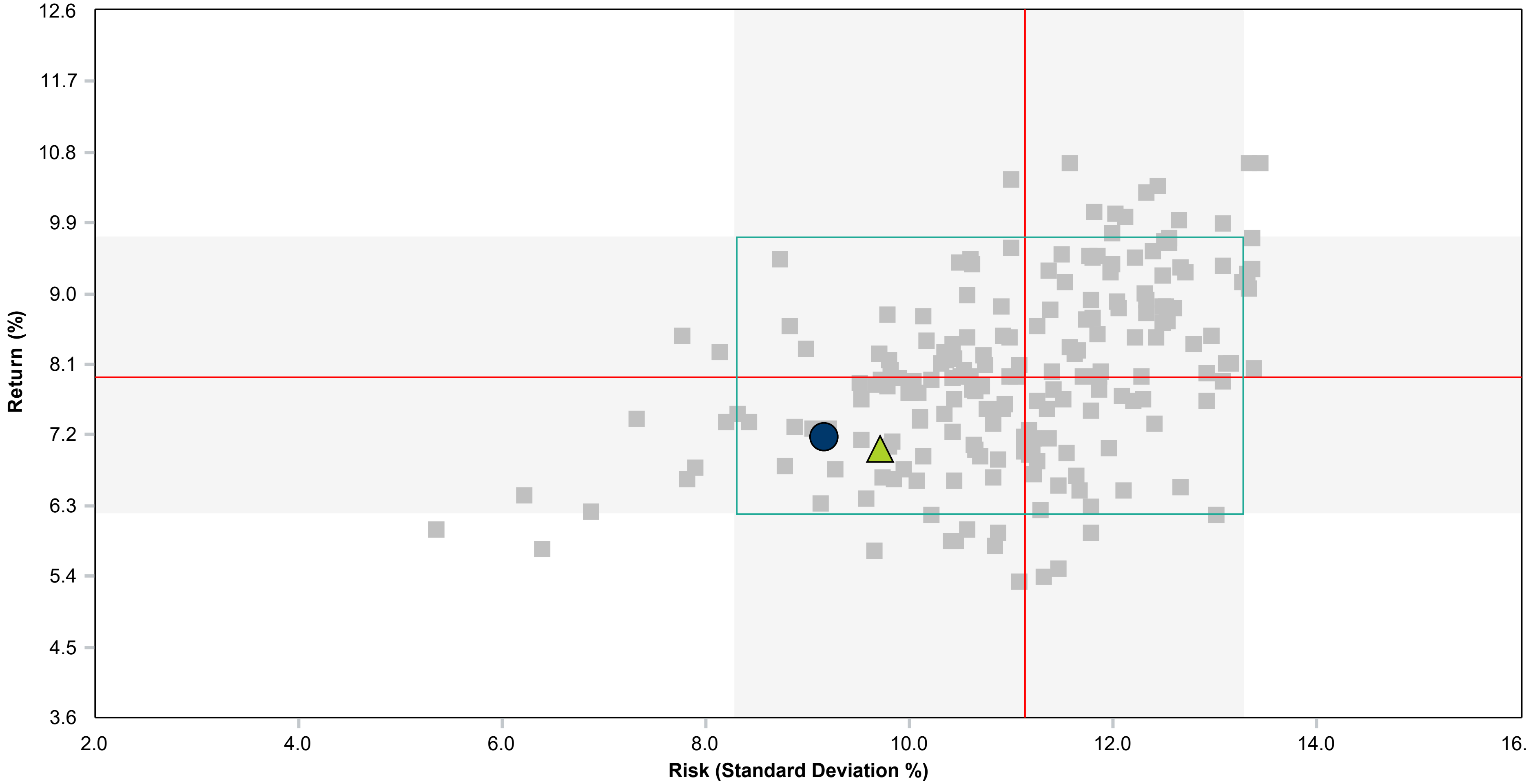
Plan Sponsor Scattergram

KRS Insurance Plan vs All Public Plans-Total Fund

Periods Ended January 1, 2018 To December 31, 2020



	Return	Standard Deviation
KRS Insurance Plan	7.17	9.17
KRS Allocation Index	7.01	9.71
Median	7.94	11.14

Calculation based on monthly periodicity.