RVK

January 25, 2018

Kentucky Public Pension Oversight Board

Asset Allocation Discussion

Goals of An Asset Allocation Study

1. **Ties investment decisions to the asset liability study**

2. **Maximizes expected return at an acceptable level of risk** — a process that incorporates the need for customized asset allocation plans:
   a. **Liquidity Requirements** – Drives the allocation to assets with liquidity events beyond a 12-month period.
   b. **Downside Risk Tolerance** – Balances need to achieve actuarial assumed rate of return while preserving capital, particularly for distressed plans.

3. **Capital market assumptions used within the analysis are forward looking, 10+ year assumptions** — reflect historical trends and current market valuations. Assumptions are also net of fees and where possible assume no alpha.

4. **Prudent governance of the Plans require annual review of capital market assumptions and the fit of the target allocations relative to Plan objectives.**

Pension Asset/Liability Study – Summary

Summary Results

Pension Plans	Current Market Funded Ratio	Projected Year 20 Funded Ratio (Deterministic)	20-Year Peak Payout Ratio (Deterministic)
KERS Non Hazardous	**22%**	32%	**54%**
KERS Hazardous	68%	81%	10%
CERS Non Hazardous	67%	78%	11%
CERS Hazardous	60%	77%	11%
SPRS	**38%**	45%	27%

Takeaway

The current and forecasted ratios for the CERS Non Hazardous, CERS Hazardous, and KERS Hazardous plans indicate that those plans allow for a growth-oriented portfolio invested in a diverse mix of liquid and alternative investments that target a 7.5% actuarial return.

The current and forecasted ratios for KERS Non-Hazardous Pension and the State Police Pension Plans indicate those plans should maintain a higher level of liquidity and mitigate downside volatility; both conditions may lead to targeting a return below the 7.5% actuarial return.

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Current and Proposed Target Asset Allocations

CERS Non-Hazardous, CERS Hazardous, and KERS Hazardous Pension Plans

	Current Target	Recommended Portfolio
Global Equity	44%	53%
Global Fixed Income	19%	12%
Real Estate	5%	5%
Inflation-Sensitive Assets	10%	8%
Hedge Funds	10%	10%
Private Equity	10%	10%
Cash	2%	2%
Total	100%	100%
Expected Return (arithmetic)	**6.97%**	**7.23%**
Expected Risk (std deviation)	**12.96%**	**14.06%**
Expected Return (compound)	6.19%	6.32%
RVK Expected Equity Beta	0.65	0.71
RVK Liquidity Metric	69	70

Recommended Portfolio

- To achieve the target return of 7.5%, the plans should allocate more to higher returning asset classes, which also have higher levels of volatility.
- RVK believes the shortfall of approximately 30 basis points versus the target 7.5% is attainable through the Portfolios' investments in active mandates (expected to beat passive indexes)

Recommended Portfolio

KERS Non-Hazardous and SPRS Pension Plans

Greater focus on liquidity and down market protection, both of which can impact the expected return of the plans.

- As pension payroll (outflow) for both plans continues to exceed contributions and forecasted earnings (inflow), the plans will have a greater reliance on liquid strategies, which likely will not generate outsized returns like illiquid investments.
  - Illiquid investments tend to have higher return potential over liquid investments, but the assets can be inaccessible for several years.
  - Furthermore, to reduce potential downside volatility, the plans should invest in less volatile investments, many of which have limited upside returns.

- To avoid a "fire sale" of illiquid assets, it will take time to move toward the recommended target asset allocation.
  - Reallocation from private investments to more liquid strategies primarily will be *event driven* (return of capital and profits as investments are normally sold off and liquidated) instead of time dependent (a known date for a secondary sale at a discounted price).
  - Given the confidence in many of the legacy illiquid investments, it is expected they will generate a positive rate of return for the plans over time.

Current and Proposed Target Asset Allocations

KERS Non-Hazardous Pension Plan

	Current Target	Recommended Portfolio – 2020	7.5% Target Portfolio
Global Equity	42%	50%	72%
Global Fixed Income	20%	22%	8%
Real Estate	3%	5%	4%
Inflation-Sensitive Assets	10%	8%	2%
Hedge Funds	10%	10%	9%
Private Equity	10%	2%	5%
Cash	5%	3%	0%
Total	100%	100%	100%
Expected Return (arithmetic)	**6.79%**	**6.67%**	**7.48%**
Expected Risk (std deviation)	**12.54%**	**12.36%**	**15.58%**
Expected Return (compound)	6.06%	5.96%	6.37%
RVK Expected Equity Beta	0.63	0.63	0.80
RVK Liquidity Metric	70	75	76

Current and Proposed Target Asset Allocations

State Police Retirement Pension Plan

	Current Target	Recommended Portfolio – 2020	7.5% Target Portfolio
Global Equity	44%	54%	72%
Global Fixed Income	18%	18%	8%
Real Estate	5%	5%	4%
Inflation-Sensitive Assets	10%	8%	2%
Hedge Funds	10%	10%	9%
Private Equity	10%	2%	5%
Cash	3%	3%	0%
Total	100%	100%	100%
Expected Return (arithmetic)	**6.97%**	**6.77%**	**7.48%**
Expected Risk (std deviation)	**12.96%**	**12.79%**	**15.58%**
Expected Return (compound)	6.19%	5.99%	6.37%
RVK Expected Equity Beta	0.65	0.65	0.80
RVK Liquidity Metric	69	76	76

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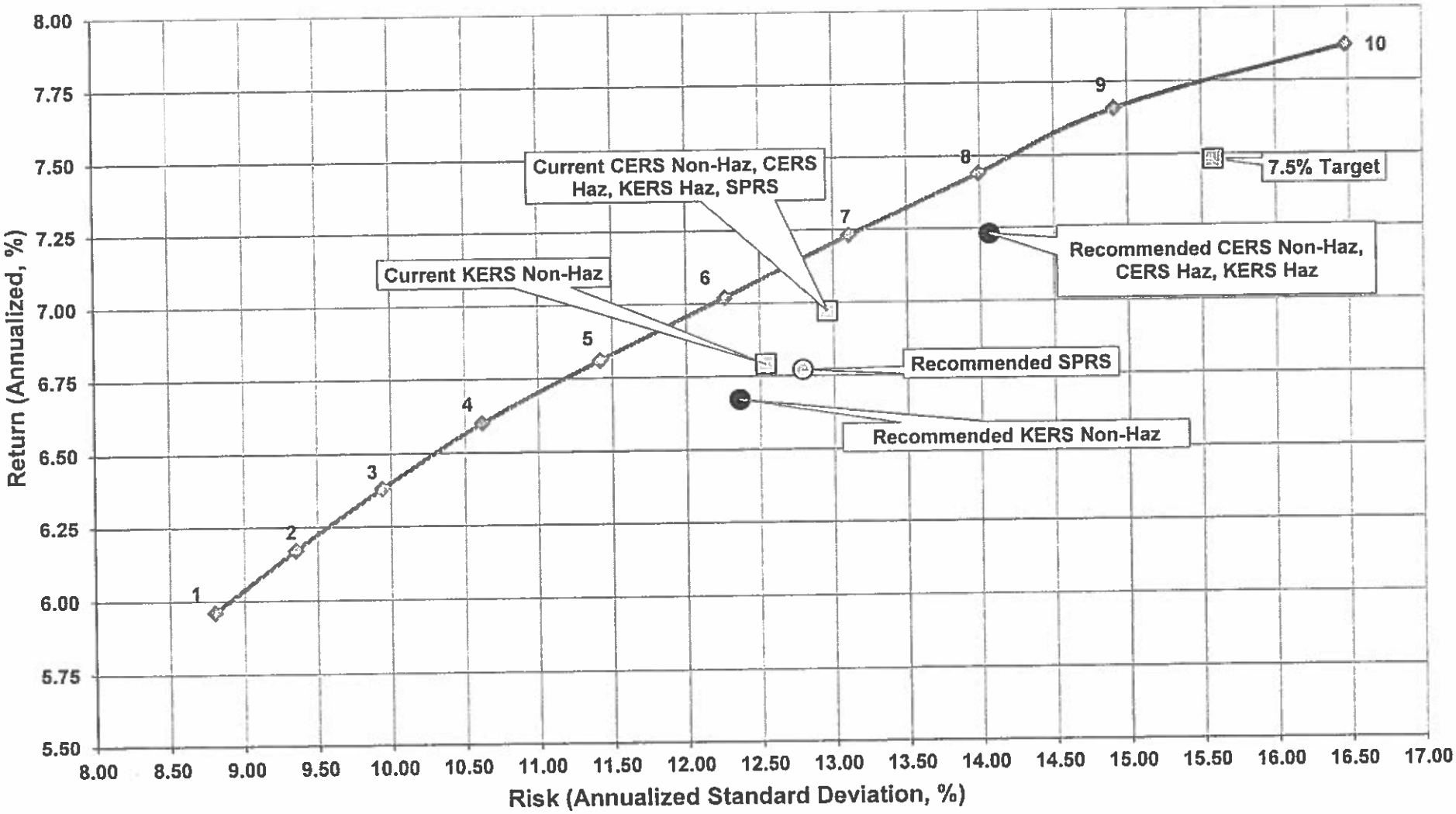
Efficient Frontier



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Efficient Portfolios

	Min	Max	1	2	3	4	5	6	7	8	9	10
Global Equity	30	70	30	30	30	30	30	30	32	40	51	66
Global Fixed Income	0	35	30	33	30	27	26	26	24	16	5	0
Real Estate	5	10	10	10	10	10	10	10	10	10	10	5
Inflation-Sensitive Assets	2	15	5	3	2	2	2	2	2	2	2	2
Hedge Funds	10	15	15	15	15	15	15	15	15	15	15	10
Private Equity	5	15	5	7	11	14	15	15	15	15	15	15
Cash	2	5	5	2	2	2	2	2	2	2	2	2
Total			100	100	100	100	100	100	100	100	100	100
Capital Appreciation			35	37	41	44	45	45	47	55	66	81
Capital Preservation			35	35	32	29	28	28	26	18	7	2
Alpha			15	15	15	15	15	15	15	15	15	10
Inflation			15	13	12	12	12	12	12	12	12	7
Expected Return			**5.96**	**6.17**	**6.38**	**6.60**	**6.81**	**7.02**	**7.23**	**7.44**	**7.66**	**7.87**
Risk (Standard Deviation)			**8.80**	**9.35**	**9.94**	**10.62**	**11.42**	**12.26**	**13.11**	**13.99**	**14.91**	**16.48**
Return (Compound)			5.60	5.76	5.92	6.07	6.20	6.32	6.44	6.54	6.64	6.63
Return/Risk Ratio			0.68	0.66	0.64	0.62	0.60	0.57	0.55	0.53	0.51	0.48
RVK Expected Eq Beta (LCUS Eq = 1)			0.43	0.46	0.49	0.52	0.56	0.59	0.63	0.68	0.74	0.84
RVK Liquidity Metric (T-Bills = 100)			70	67	64	62	59	56	53	56	61	69

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2015 Capital Market Assumptions

Asset Class	Arithmetic Return Assumption	Standard Deviation Assumption
Global Equity	7.80	18.35
Int. Duration Fixed Income	3.50	6.00
Custom KRS Fixed Income	5.83	10.79
Core Real Estate	6.75	12.50
Diversified Hedge Funds	6.50	9.50
Private Equity	10.50	26.00
Diversified Infl Strat	5.65	11.45
Cash Equivalents	2.25	3.00

	Global Equity	Int. Duration Fixed Income	Custom KRS Fixed Income	Core Real Estate	Diversified Hedge Funds	Private Equity	Diversified Infl Strat	Cash Equivalents
Global Equity	1.00	-0.02	0.84	0.32	0.70	0.78	0.72	-0.05
Int. Duration Fixed Income	-0.02	1.00	0.28	-0.06	0.12	-0.26	0.22	0.24
Custom KRS Fixed Income	0.84	0.28	1.00	0.27	0.69	0.66	0.82	-0.07
Core Real Estate	0.32	-0.06	0.27	1.00	0.24	0.60	0.37	0.14
Diversified Hedge Funds	0.70	0.12	0.69	0.24	1.00	0.69	0.59	0.22
Private Equity	0.78	-0.26	0.66	0.60	0.69	1.00	0.62	0.07
Diversified Infl Strat	0.72	0.22	0.82	0.37	0.59	0.62	1.00	-0.03
Cash Equivalents	-0.05	0.24	-0.07	0.14	0.22	0.07	-0.03	1.00

Arithmetic Return Assumptions are net of fees and assume no excess return (alpha) where possible.

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