Agenda Item 6

NJDOI Asset Allocation Study: Summary Review

New Jersey Division of Investment

July 2023

Presentation Overview

- The purpose of today's presentation is to summarize the results of the Capital Market Assumptions Update and Asset Allocation Study that RVK reviewed with the IPC and SIC in April 2023.
  - Importantly, this analysis was informed by the Asset / Liability Study results that RVK conducted for NJDOI and presented in January 2023.

- As a refresher, the State Investment Council reviews, approves, and adopts an investment plan that includes a targeted asset allocation, as well as allowable ranges for asset classes. **The Council's key objective in setting the targeted asset allocation is to provide for a well-diversified portfolio designed to achieve the best possible return at an acceptable level of risk utilizing the highest fiduciary standards.**

- Specific to the Asset Allocation Study, RVK collaborated closely with NJDOI Staff. Specific to the Capital Markets Assumptions, RVK collaborated closely with NJDOI's asset class officers and/or specialty consultants where appropriate to customize certain assumptions based on expected allocations to sub-asset classes.

RVK

Themes for 2023 Capital Markets Assumptions

Inflation

Past and future inflation levels are studied and considered given market conditions, break-even indications, sovereign intervention, and inflation component pricing behavior. *RVK's 2023 inflation assumption remained constant compared to 2022. This reflects short- to medium-term inflationary pressures stemming from ongoing supply chain bottlenecks, declining stimulus driven demand, and continued wage growth pressures while also accounting for longer-term deflationary factors such as deficits, debt, demographics, automation and globalization.*

Mean-reversion

Mean reversion is considered for asset classes that demonstrated strong performance over the last year (or longer). *Equity return assumptions were increased, given improved valuation levels – although still elevated domestically – following the negative returns in 2022. Dividend yields also improved.*

Higher yields

Yield history, current environment, and prospective environments are considered. *The majority of fixed income return assumptions were increased, reflecting elevated current yields – but with the expectation that the inverted yield curve will of course not persist indefinitely.*

RVK

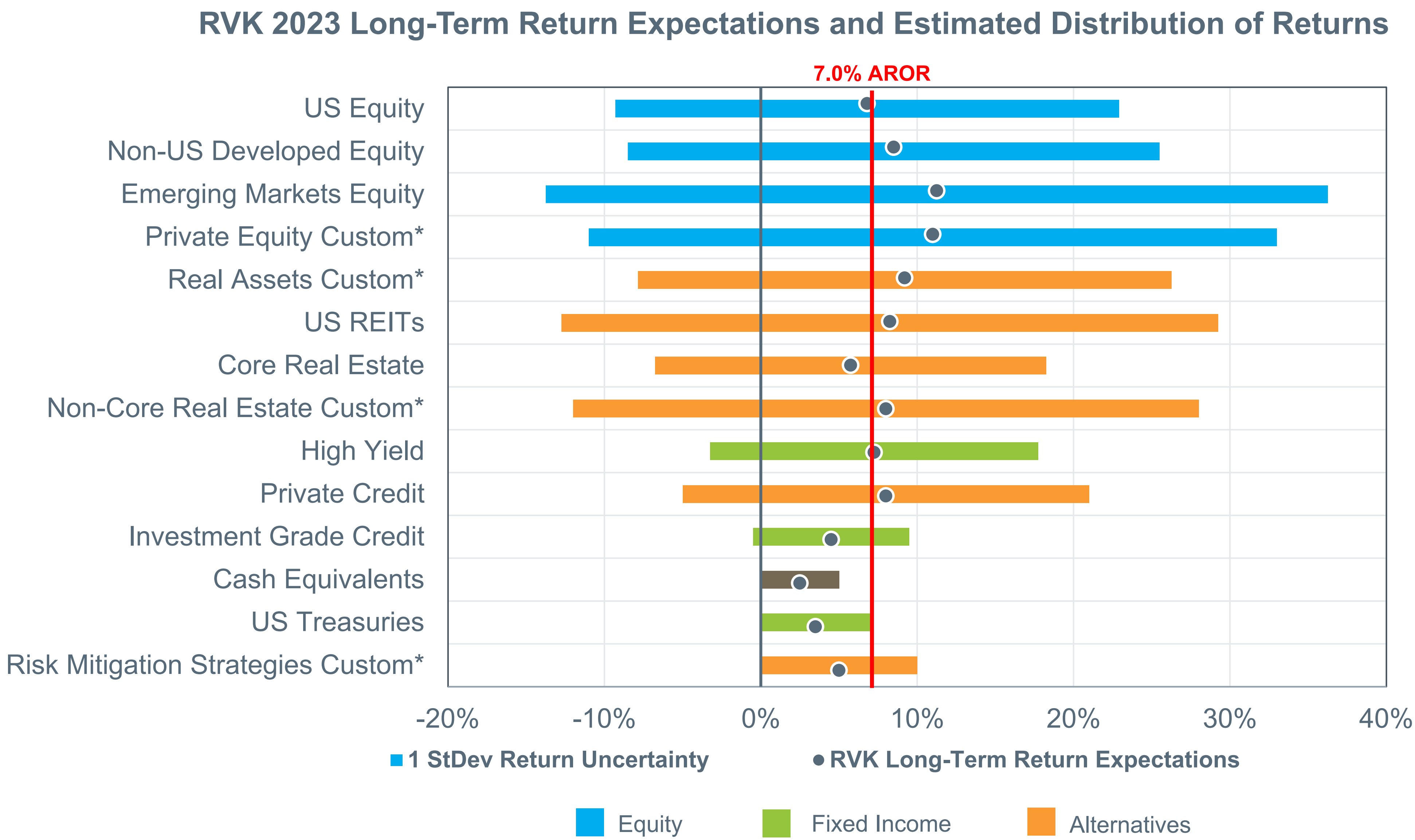
RVK Capital Market Assumptions

- The table below outlines RVK's 2023 Capital Market Assumptions utilized in the NJDOI Asset Allocation Study.

	2023		
Asset Class	Nominal Return (Arith.)	Standard Deviation	Nominal Return (Geo.)
U.S. Equity	6.80%	16.10%	5.61%
Non-U.S. Developed Market Equity	8.50%	17.00%	7.19%
Emerging Market Equity	11.25%	25.00%	8.54%
Private Equity Custom[1]	11.00%	22.00%	8.88%
Real Assets Custom[1]	9.20%	17.06%	7.89%
Real Estate Custom[1]	7.50%	14.47%	6.54%
High Yield	7.25%	10.50%	6.74%
Private Credit	8.00%	13.00%	7.23%
Investment Grade Credit	4.50%	5.00%	4.38%
Cash Equivalents	2.50%	2.00%	2.48%
U.S. Treasuries	3.50%	3.00%	3.46%
Risk Mitigation Strategies Custom[1]	5.00%	5.00%	4.88%

1) RVK collaborated with NJDOI's specialty consultants to inform RVK's expectations for these asset classes

Asset Return Expectations and Uncertainty



Standard Deviations are based on RVK 2023 CMA risk assumption for each asset class.
*RVK collaborated with NJDOI's specialty consultants to inform RVK's expectations for these asset classes.

RVK

Asset / Liability Study

Summary of January 2023 RVK Report

- The Asset/Liability Study (or the "Study") analyzed the collective pension plans of the NJDOI (or "System") using data from actuarial firms Cherion and The Segal Group as of June 30, 2021 – the valuation date of the liabilities used in the Study.
- Two key outputs from the Study that inform our asset allocation recommendations are the forecasted funded status and payout ratios of the System. Each informs the tolerance for downside loss, duration of a recovery, and limitations on allocations to illiquid investments.
  - As of fiscal-year end June 30, 2021, the System's market value funded ratio was 56%. We projected the funded ratio will fall to approximately 50% as of June 30, 2022 based on a projected –7.90% return for the fiscal year 2022. Furthermore, projected market value funded ratio remains below 60% through 2029 and rise above 70% in 2037.
  - The projected payout ratio (projected benefit payments / projected market values) is projected between 10% and 13% through 2029 before falling below 9%.
  - Both projected ratios suggest the System can continue to invest in a diversified manner that includes illiquid investments subject to the System's projected liabilities, a consistent and persistent adherence to its contribution policy, and trending liquidity needs.
- **The Study did not suggest material changes to the long-term strategic target allocation**. The incremental cost of adding additional volatility does not justify the potential increase in median return outcomes.
- **Therefore, the potential asset allocation portfolios presented represent incremental changes relative to the current target asset allocation. We note that the expected return and risk of each potential portfolio are similar, making the allocation to asset classes the focus of our discussion.**

RVK

Asset Allocation Study

Summary of April 2023 RVK Report

- The **goal** of this Asset Allocation Study is to compare NJDOI's current target asset allocation to potential alternative portfolios that reflect incremental changes to forecasted risk-adjusted results and exposures to certain asset classes (consistent with the A/L Study conclusion).
- As compared to our prior analysis using 2022 CMAs, **long-term return expectations for the target portfolio have increased** by at least 100 bps across most building block asset class assumptions.
- Because the expected returns and risk statistics of each portfolio are very close, the IPC and SIC might benefit from focusing on the **incremental changes** to allocations that could lead to amending or reaffirming the current target allocation.
- The Monte Carlo exercise shows modest differences in median outcome expectations of the current target and proposed portfolios over all analyzed periods, which shows slight i**mprovements to the likelihood of achieving the current 7.0% assumed rate of return**.
- Finally, RVK and NJDOI Staff did consider several alternative scenarios, which are detailed on the following slide.
  - Scenario **P1** shows increased allocations to both growth and income-oriented asset classes, whilst reducing the cash target.
    - RVK and Staff view this as **<u>the most pragmatic alternative option at present</u>**, given the ease of implementation, the maintenance of liquidity, and the similar compound return expectations versus the other alternatives, given the outlook for these asset classes.
  - Several scenarios **(P2 – P4)** contemplate increased allocation to alternatives, mainly real assets and private credit.
    - While we do believe there may be merit to increasing certain private market exposures based on forward-looking expectations, RVK and Staff have collectively agreed that the results of the A/L Study, preference to control total portfolio illiquidity, and challenges to the investment pacing support small or no increases to private assets.

RVK

Asset Allocation Study

Modeled Portfolios

- The table below summarizes key output from our full Asset Allocation Study, which can be found in the Appendix. In addition to modeling expectations for the current target allocation, RVK and NJDOI Staff arrived at several proposed alternative portfolios for consideration. Note that the alternatives are primarily allocation decisions rather than a risk/return trade off decisions.

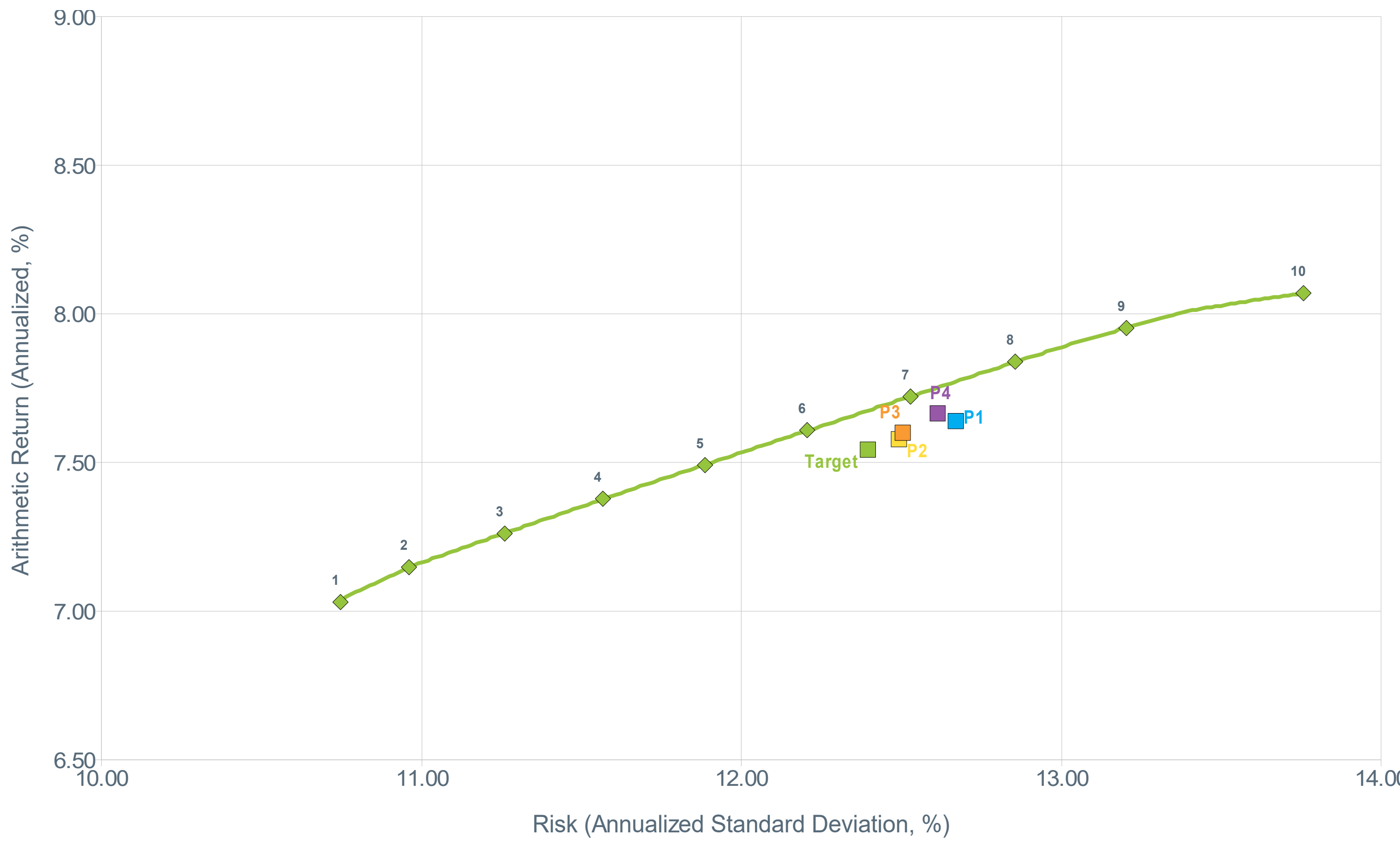
	Min	Max	Target	P1	P2	P3	P4
U.S. Equity	25	35	27	⬆ 28	27	27	27
Non-U.S. Developed Market Equity	13	18	13.5	⬆ 14	13.5	13.5	13.5
Emerging Markets Equity	3	8	5.5	5.5	5.5	5.5	5.5
Custom Private Equity	10	15	13	13	13	13	13
Custom Real Assets	1	5	3	3	3	⬆ 4	⬆ 4
Custom Real Estate	5	10	8	8	8	8	8
High Yield	1	5	4	⬆ 4.5	4	4	4
Private Credit	5	10	8	8	⬆ 9	8	⬆ 9
Investment Grade Credit	5	11	7	7	⬇ 6	7	7
U.S. Treasuries	3	8	4	4	4	⬇ 3	4
Custom Risk Mitigation Strategies	1	5	3	3	3	3	3
Cash Equivalents	2	4	4	⬇ 2	4	4	⬇ 2
Total			**100**	**100**	**100**	**100**	**100**
Global Growth			**59**	**61**	**59**	**59**	**59**
Real Return			**11**	**11**	**11**	**12**	**12**
Income			**19**	**20**	**19**	**19**	**20**
Defensive			**11**	**9**	**11**	**10**	**9**
Expected Arithmetic Return			7.5	7.6	7.6	7.6	7.7
Expected Risk (Standard Deviation)			12.4	12.7	12.5	12.5	12.6
Expected Compound (Geometric Return)			**6.8**	**6.9**	**6.9**	**6.9**	**6.9**
Expected Return (Arithmetic)/Risk Ratio			0.61	0.60	0.61	0.61	0.61
RVK Expected Eq Beta (LCUS Eq = 1)			0.72	0.73	0.72	0.72	0.73
RVK Liquidity Metric (T-Bills = 100)			63	63	62	62	61

RVK

Asset Allocation Study

Efficient Frontier

- The figure below illustrates the relationship between risk and return.
- The risk of each allocation is plotted against the horizontal axis, while the return is measured on the vertical axis. The line connecting the points represents all the optimal portfolios subject to the given constraints and is known as the "efficient frontier." The colored portfolios represent those portfolios that RVK and NJDOI have arrived at using the model output and the current target allocations as a guide.
- The scaling of each axis enhances the marginal differences among the portfolios.



Created with MPI Analytics

Appendix

Asset Allocation Study

Monte Carlo Simulation Introduction

- Monte Carlo simulation uses a random sampling of asset class returns, based on the probability distribution implied by the empirical returns, to create several thousand estimates of portfolio performance. Undergoing a Monte Carlo simulation provides insight into the performance of the asset allocation by examining many randomly sampled return outcomes.

- The asset allocation process provides a snapshot of portfolio performance that is highly dependent on the mean return expectations. A Monte Carlo simulation process "stress tests" these assumptions and asset allocation recommendations that stem from them through thousands of independent samplings of portfolio returns, based on the assumptions and indicated asset allocations. Through the Monte Carlo simulation process, we are better able to ascertain the real-world probability of achieving various return targets over time.

- RVK's Monte Carlo simulation model assumes a non-normal (downside log-stable (DLS), or "fat-tailed") distribution of returns for equity asset classes (as well as high yield fixed income and bank loans), which we believe provides a more realistic representation of historical market experience than the typically used normal or log-normal (LN) distribution. Given this non-normal distribution of random returns derived from our assumption inputs and empirical return dispersion, we can estimate the potential return for a given portfolio over the indicated time period.

- It is important to note that the output that follows refers to geometric (compound) return, rather than the arithmetic return assumptions used in the asset allocation analysis. The geometric return of a portfolio will be less than (or equal to) its arithmetic return over time, because geometric return accounts for the dampening effect of volatility on the portfolio's compound returns.

Asset Allocation Study

Percent Probability of Achieving or Exceeding Target Return

1 Year	Target	P1	P2	P3	P4
Target 0%	75	75	75	75	75
Target 2%	69	69	69	69	69
Target 4%	62	62	62	62	63
Target 6%	55	56	55	55	56
Target 7%	52	52	52	52	52
Target 10%	41	41	41	41	41
3 Years					
Target 0%	85	85	85	85	85
Target 2%	78	77	78	78	78
Target 4%	68	68	68	68	69
Target 6%	57	58	58	58	58
Target 7%	51	52	51	52	52
Target 10%	33	34	33	34	34
5 Years					
Target 0%	90	89	90	89	90
Target 2%	82	82	82	82	83
Target 4%	72	72	72	72	72
Target 6%	58	58	58	58	59
Target 7%	51	51	51	51	52
Target 10%	29	30	29	29	30
10 Years					
Target 0%	96	95	96	96	96
Target 2%	90	89	90	90	90
Target 4%	78	78	78	78	78
Target 6%	60	61	61	61	61
Target 7%	50	51	50	50	51
Target 10%	21	22	21	21	22

RVK

Asset Allocation Study

The table below shows the expected return by percentile for each portfolio outlined below for the 1-, 3-, 5-, and 10-year periods.

1 Year	Target	P1	P2	P3	P4
1st Percentile	-24.46	-25.22	-24.54	-24.89	-24.86
5th Percentile	-11.12	-11.5	-11.08	-11.23	-11.18
25th Percentile	-0.01	-0.09	0.05	-0.05	0.03
50th Percentile	7.46	7.55	7.50	7.52	7.59
75th Percentile	14.98	15.26	14.99	15.11	15.17
95th Percentile	26.76	27.34	26.78	27.02	27.09
99th Percentile	35.04	35.89	35.08	35.32	35.33
3 Years					
1st Percentile	-11.92	-12.4	-11.84	-12.04	-12.02
5th Percentile	-4.59	-4.82	-4.57	-4.65	-4.61
25th Percentile	2.62	2.57	2.64	2.64	2.69
50th Percentile	7.22	7.30	7.25	7.29	7.35
75th Percentile	11.6	11.8	11.62	11.7	11.77
95th Percentile	18.08	18.42	18.10	18.22	18.29
99th Percentile	23.23	23.7	23.21	23.33	23.42
5 Years					
1st Percentile	-8.5	-8.94	-8.46	-8.72	-8.68
5th Percentile	-2.48	-2.71	-2.47	-2.52	-2.52
25th Percentile	3.43	3.41	3.47	3.46	3.53
50th Percentile	7.09	7.17	7.13	7.14	7.20
75th Percentile	10.60	10.76	10.63	10.68	10.75
95th Percentile	15.60	15.90	15.66	15.73	15.80
99th Percentile	18.83	19.24	18.92	19.02	19.13
10 Years					
1st Percentile	-3.53	-3.78	-3.46	-3.61	-3.55
5th Percentile	0.28	0.18	0.31	0.26	0.32
25th Percentile	4.37	4.36	4.40	4.39	4.45
50th Percentile	6.98	7.06	7.03	7.03	7.10
75th Percentile	9.47	9.60	9.51	9.55	9.62
95th Percentile	13.02	13.24	13.05	13.12	13.19
99th Percentile	15.6	15.89	15.64	15.73	15.81

Please see the Monte Carlo introduction for more information about assumed distribution.

PORTLAND BOISE CHICAGO NEW YORK

RVK

ASSET ALLOCATION AND POLICY BENCHMARK DISCUSSION

Asset Class	FY 2023 Target	Current Target Ranges	Current Benchmark		Proposed Target	Changes to Target Weights		Proposed Benchmark weights should equal Proposed Target	Changes to Benchmark Weights		Proposed Target Ranges	Proposed Benchmarks
GLOBAL GROWTH	**59.00%**		**59.00%**		**60.50%**	**1.50%**		**60.50%**	**1.50%**			
US Equity	27.00%	22% - 32%	28.00%		28.00%	1.00%		28.00%	0.00%		22% - 32%	MSCI U.S. IMI Index
Non-U.S. DM Equity	13.50%	11% - 16%	13.50%		12.75%	-0.75%		12.75%	-0.75%		10% - 14%	MSCI NJDI Index on EAFE+Canada
Int'l Small Cap Equity					1.25%	1.25%		1.25%	1.25%		0% - 3%	MSCI NJDI Index on ACWI ex USA Small Cap
Emerging Market Eq	5.50%	3% - 8%	5.50%		5.50%	0.00%		5.50%	0.00%		3% - 8%	MSCI NJDI Index on EM (Emerging Markets)
Private Equity	13.00%	10% - 16%	12.00%		13.00%	0.00%		13.00%	1.00%		10% - 16%	Custom Cambridge Blend
REAL RETURN	**11.00%**		**10.00%**		**11.00%**	0.00%		**11.00%**	**1.00%**			
Real Estate	8.00%	5% - 11%	7.00%		8.00%	0.00%		8.00%	1.00%		5% - 11%	NCREIF ODCE (Net)Daily Lag
Real Assets	3.00%	1% - 5%	3.00%		3.00%	0.00%		3.00%	0.00%		1% - 5%	Custom Cambridge Blend for Real Assets
INCOME	**19.00%**		**18.00%**		**19.50%**	**0.50%**		**19.50%**	**1.50%**			
High Yield	4.00%	1% - 5%	2.00%		4.50%	0.50%		4.50%	2.50%		1% - 6%	Bloomberg U.S. HY - 2% Issuer Cap
Private Credit	8.00%	5% - 11%	7.00%		8.00%	0.00%		8.00%	1.00%		5% - 11%	Bloomberg US Corp HY 1M lag +100bps
Investment Grade Credit	7.00%	5% - 11%	9.00%		7.00%	0.00%		7.00%	-2.00%		5% - 11%	Bloomberg A+ U.S. Credit
DEFENSIVE	**11.00%**		**13.00%**		**9.00%**	**-2.00%**		**9.00%**	**-4.00%**			
Cash Equivalents	4.00%	3% -7%	5.00%		2.00%	-2.00%		2.00%	-3.00%		1% -7%	ICE BofA US 3-Month Treasury Bill
US Treasuries	4.00%	3% - 8%	5.00%		4.00%	0.00%		4.00%	-1.00%		3% - 8%	Bloomberg U.S. Treasury
Risk Mitigation Strategies	3.00%	1% - 6%	3.00%		3.00%	0.00%		3.00%	0.00%		1% - 6%	T-Bill + 300 BP

CHANGES PROPOSED:

1. US Equity to INCREASE 100 basis points to 28%.
2. Non-US DM Equity to INCREASE 50 basis points to 12.75%. (Non-US DM Equity currently managed to 12.25% with 1.25% out of benchmark allocation to Int'l Small Cap; see note below.)
3. Separate Non-US DM Equity and International Small Cap Equity.
4. Allocate International Small Cap 1.25%.
5. High Yield to INCREASE 50 basis points to 4.50%.
6. Cash Equivalents to DECREASE 200 basis points to 2.00%.
7. Add MSCI NJDI Index on ACWI ex USA Small Cap as benchmark for the International Small Cap asset allocation.

PROPOSED ACTIONS TO TAKE:

1. Approve Asset Allocation Targets and Target ranges.
2. Approve Benchmarks and Benchmark weights.