August 2023 IC Meeting

Schedule	Friday, August 25, 2023 10:00 AM — 2:30 PM CDT
Venue	6850 Austin Center Blvd., Suite 320, Austin, TX 78731
Organizer	Sarah McCleary

Agenda

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1. Call roll of Committee members

Presented by Committee Chair Liu

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 1:
Call roll of Committee members

AGENDA ITEM OBJECTIVE

The objective of the agenda item is to determine for the record which Trustees are present at the start of the meeting.

Each Trustee should respond to the roll call, and it will be noted which Trustees are present in person and which Trustees have joined via video conference.

2. Review order of business and establish meeting objectives

Presented by Committee Chair Liu

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AGENDA ITEM 2:
Review order of business and establish meeting objectives

AGENDA ITEM OBJECTIVE
This agenda item provides Trustees the opportunity to review the order of business and to express a desire to take an agenda item out of order, and to discuss the key objectives of the meeting. The time frames on the agenda are for informational purposes only.

RELEVANCE TO STRATEGIC PLAN
This agenda item meets **COAERS Strategic Plan Goal 4: Identify and implement leading practices in board governance, pension administration, and investment management.** It is an industry best practice to establish meeting objectives and review them at the outset of each meeting.

MEETING OBJECTIVES
1. The Committee will review reports on investment performance including strategy, compliance, and delegation of authority.
2. The Committee will review the Investment Risk Framework.
3. The Committee will discuss and consider the Premier List for Global Equities with potential recommendations to the Board.
4. The Committee will review reports on an updated Asset/Liability Study following the passage of SB 1444.
5. The Committee will discuss and consider the Fund's strategic asset allocation through an updated Asset Allocation Study and related presentations with potential asset allocation recommendations to the Board.
6. The Committee will receive a report on the status of the general consultant request for proposal process.
7. In its oversight capacity, the Committee will review the custodial bank relationship.

ATTACHMENT
1. Proposed timeline of agenda items with potential time frames

Agenda Timeframes

August 25, 2023

Committee:
Investment Committee

Agenda Number	Agenda Item	Duration	Start	End
1	Call roll of Committee members – Committee Chair Liu	0:05	10:00 AM	10:05 AM
2	Review order of business and establish meeting objectives – Committee Chair Liu	0:05	10:05 AM	10:10 AM
3	Receive public comments – Committee Chair Liu	0:05	10:10 AM	10:15 AM
4	Consider approval of the May 19, 2023 Investment Committee minutes – Committee Chair Liu	0:05	10:15 AM	10:20 AM
5	Review investment performance including strategy, compliance, and delegation of authority – David Stafford and RVK	0:30	10:20 AM	10:50 AM
6	Discuss and consider investment strategy including Investment Risk Framework – David Stafford	0:30	10:50 AM	11:20 AM
7	Discuss and consider investment implementation including Premier List for Global Equities –Ty Sorrel and RVK	0:45	11:20 AM	12:05 PM
8	Receive report on updated Asset/Liability Study – Christopher Hanson, David Stafford and RVK	0:45	12:05 PM	12:50 PM
9	Discuss and consider investment program including goals, strategy, and allocation: a.Asset Allocation Study ¬– David Kushner, David Stafford, and RVK b.Private markets – David Kushner c.Functionally focused portfolio allocation – David Stafford	1:15	12:50 PM	2:05 PM
10	Receive update on general investment consultant RFP - Christopher Hanson	0:10	2:05 PM	2:15 PM
11	Receive report on custody bank – Kelly Doggett and David Kushner	0:10	2:15 PM	2:25 PM
12	Review key meeting takeaways and call for future agenda items – Committee Chair Liu	0:05	2:25 PM	2:30 PM
		4 Hr & 30 Min		

3. Receive public comments

Presented by Committee Chair Liu

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COMMITTEE MEETING
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AGENDA ITEM 3:
Receive public comments

AGENDA ITEM OBJECTIVE

This standing agenda item allows System members and members of the public the opportunity to provide comments to the Board.

RELEVANCE TO STRATEGIC PLAN/CORE COMPETENCIES

This agenda item meets the core competency established in the **COAERS Strategic Plan** "*Transparency: Complying with open meeting and public information laws to ensure the decision-making process is clear to members and the public.*"

The Chair will recognize any person who wishes to comment for up to three minutes per person.

4. Consider approval of the May 19, 2023 Investment Committee minutes

Presented by Committee Chair Liu

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COMMITTEE MEETING
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AGENDA ITEM 4:
Consider approval of the May 19, 2023 Investment Committee minutes

AGENDA ITEM OBJECTIVE
This standing agenda item seeks approval of the minutes from the prior quarterly Investment Committee meeting. The charter for the Investment Committee requires the Committee to keep minutes of its meetings.

RELEVANCE TO STRATEGIC PLAN
This agenda item meets the core competency established in the **COAERS Strategic Plan** "*Transparency: Complying with open meeting and public information laws to ensure the decision-making process is clear to members and the public.*"

RECOMMENDATION FOR COMMITTEE ACTION
Staff recommends approval of the minutes of the May 19, 2023 Investment Committee meeting.

ATTACHMENT
1. Draft minutes of May 19, 2023 Investment Committee meeting

COAERS
CITY OF AUSTIN
EMPLOYEES' RETIREMENT SYSTEM

Public Meeting held in person and videoconference
on May 19, 2023 at 10:00 a.m. CT

Pursuant to Texas Govt. Code 551.127
6850 Austin Center Blvd., Suite 320, Austin, TX 78731

Committee Member Present/(Absent)
Yuejiao Liu, Committee Chair
Michael Granof
(Amy Hunter)
Dick Lavine
Diana Thomas

Guests:
Ian Bray, RVK
Spencer Hunter, RVK
Paige Saenz, General Counsel
Kevin Balaod, WithIntelligence*
Issa Frampton, T Rowe Price*

Other Board Trustees Present/(Absent)
Michael Benson*
(Kelly Crook)
(Chris Noak)
(Leslie Pool)
(Anthony Ross)
(Brad Sinclair)

Others Present

Staff:
Christopher Hanson
David Kushner
David Stafford
Ty Sorrel
Kelly Doggett
Sarah McCleary
Mehrin Rahman
Jenni Bonds
Yun Quintanilla
Russell Nash
Amy Kelley*

* present telephonically
† present via videoconference

1 Call roll of Committee members

Committee Chair Liu called the meeting to order at 10:01 a.m. The following Committee members were present in person: Liu, Granof, Lavine, and Thomas. Trustee Benson was not on camera thus not considered present at this meeting except for purposes of receiving PRB training.

2 Review order of business and establish meeting objectives

Committee Chair Liu reviewed the order of business and meeting objectives with the Committee. No changes were made to the order of business.

3 Receive public comments

Committee Chair Liu asked if any members of the public wished to speak, either now or during an agenda item. There were no comments.

4 Consider approval of the April 21, 2023 Investment Committee minutes

Committee Chair Liu asked the Committee to review the Investment Committee minutes. Mr. Michael Granof moved approval of the April 21, 2023 Investment Committee minutes. Ms. Diana Thomas seconded, and the motion passed 4-0.

5 Review investment performance including strategy, compliance, and delegation of authority

The Committee reviewed investment performance and market data from RVK through March 31, 2023. Fund investments increased 4.7% net of fees during the first quarter.

Mr. David Stafford discussed the investment strategy and the compliance dashboards. He shared data showing Fund returns were lower than the assumed rate of return over the trailing 10-years and that 3-year returns were skewed upward as a result of measuring from near the COVID lows. Additionally, he discussed relative returns noting the strong performance relative to the Passive Benchmark and near to the Policy Benchmark over longer periods of time. He noted that Staff completed Board approved rebalancing activities in the month of April that somewhat significantly changed Fund positioning when compared to the end of the first quarter.

Mr. Ian Bray of RVK noted that both defensive and risk assets generally provided positive returns during the first quarter, and although capital markets continued to experience bouts of volatility, broad equity market indexes finished the first quarter in positive territory. Investor sentiment was driven partly by the failure of three US banks, and the Federal Open Market Committee’s decision to increase the federal funds rate target.

Mr. Stafford also reviewed the delegation of authority report and the investment cash activity report.

6 Discuss and consider Investment Risk Framework Process

Mr. Stafford presented the IRF update via a memo this quarter and asked for feedback on the reporting change. Trustees were supportive of the new format.

Mr. Stafford reported that the Fund is positioned with a heavy overweight to Cash & Equivalents and heavy underweights to Multi-Asset and Fixed Income as of the end of April 2023, based on best available data. Mr. Stafford suggested that in the view of Staff, this positioning in the Strategic Bands remained appropriate as the outlook had not materially changed since completion of the rebalance. He also noted that a key risk to this outlook was the likelihood of default on US Treasury debt, though Staff believed the actual likelihood to be close to 0%. He also suggested that Staff was prepared with a plan should this risk increase materially.

Additionally, he discussed the significant concentration building in the US Equities benchmark and noted the more diversified approach taken by the Fund as a prudent risk-management approach despite recent underperformance.

7 Receive educational presentation on Functionally Focused Portfolios

****This agenda item is considered in-house training provided by COAERS, an accredited sponsor of Minimum Educational Training (MET) for purposes of fulfilling the Pension Review Board's MET Program requirements.**

(For PRB purposes, this presentation began at 10:48 a.m. and ended at 11:36 a.m.)

Mr. David Stafford led an educational presentation on Functionally Focused Portfolio construction as a follow-up to a previous presentation on this concept to the Committee in April. He discussed applying this approach to the current Strategic Asset Allocation, noting that the Fund has approximately 70% exposure to Growth Assets. Additionally, he discussed the shortcomings of mean variance optimization processes used in setting asset allocations including the "fast food ordering" approach that gives the illusion of precision.

Mr. Stafford discussed the importance of using common sense in addition to quantitative measures for setting the asset allocation. He noted four steps of decision-making to better think through setting the Fund's asset allocation starting with determining the liquidity needs of the System, then selecting the amount of growth investments, then deciding the mix of growth investments, and finally choosing the mix of diversifying investments. Mr. Stafford discussed several methods to choose appropriate benchmarks under this framework which warranted further Committee and Board discussion. Additionally, he suggested that Staff believes that increasing Fund exposure to additional asset classes and strategy types was prudent to consider in this process and noted that Private Credit could be a near term consideration for the Committee.

Mr. Stafford then discussed potential policy considerations for this approach including those on investment beliefs, risk guidelines, risk modelling, permissible investments, and manager selection.

8 Discuss and consider investment implementation including Premier List for Fixed Income and Cash & Equivalents

Mr. Ty Sorrel presented a report of the first quarter's investment program implementation activities, reviewed the manager monitoring report, and discussed investment manager fees by quarter.

Mr. Sorrel presented reports on both Fixed Income and Cash & Equivalents, including the historical context and the current construction and composition of those asset classes. He observed that the allocation to Cash & Equivalents has been stable but has risen recently in response to higher short-term rates and increased opportunities. He noted that the Fixed Income allocation has changed several times over the years; in 2019 the Fixed Income portfolio was disaggregated into the current three sub-strategies and in 2020 US Treasury Futures were added.

Mr. Sorrel noted that Staff proposed no changes to the Premier List.

Mr. Lavine moved to recommend to the Board for approval the Premier Lists for Fixed Income and Cash & Equivalents as presented. Mr. Granof seconded, and the motion passed 4-0.

Trustees took a break from 12:07 p.m. to 12:35 p.m.
Ms. Thomas rejoined the meeting at 12:46 p.m.

9 Receive educational presentation on Private Credit

****This agenda item is considered in-house training provided by COAERS, an accredited sponsor of Minimum Educational Training (MET) for purposes of fulfilling the Pension Review Board's MET Program requirements.**

(For PRB purposes, this presentation began at 12:35 p.m. and ended at 1:41 p.m.)

Ty Sorrel, along with Ian Bray and Spencer Hunter of RVK, led an educational presentation regarding Private Credit as a follow-up to April's presentation. RVK presented several types of private credit strategies (distressed debt, direct lending, specialty finance, and asset-backed/real estate debt) and discussed their respective characteristics, such as risk and return, among other key attributes. Mr. Sorrel educated Trustees on four different approaches to private credit implementation, each with different benefits and drawbacks. Mr. Sorrel also briefly discussed different methods of benchmarking a private credit allocation.

Chair Liu directed Staff and RVK to proceed as discussed relating to the August Committee meeting as well as continuing work for the Asset Allocation Study and private equity education.

10 Discuss and consider Investment Consultant annual review

Mr. David Kushner shared Staff's assessment of investment consultant services by RVK, which was rated excellent. He reminded Trustees that the contract with RVK included an initial 3-year period that ended on June 30, 2020, and two potential extensions of 2 years. As last year the second and final 2-year contract extension was executed, COAERS will issue a Request for Proposal later this year.

Ms. Thomas left the meeting at 1:53 p.m. and rejoined at 2:05 p.m.
Mr. Benson left the meeting at 1:58 p.m.

11 Discuss and consider consultant selection for 2023 PRB Investment Practices and Performance Evaluation report

Mr. Hanson reported that after the Investment Committee’s approval in February, Staff had issued a Request for Information (RFI) in March to complete the Investment Practices and Performance Evaluation Report. He noted that four firms responded, and results were summarized. Mr. Hanson discussed considerations in Staff’s scoring of these responses and noted that two firms ranked highly.

Mr. Granof moved to recommend that the Board select RVK as the firm to conduct the 2023 Investment Practices and Performance Evaluation, and to direct Staff to negotiate a final contract with said firm in advance of the June 29 Board meeting. Ms. Thomas seconded, and the motion passed 4-0.

12 Receive key meeting takeaways and call for future agenda items

Committee Chair Liu summarized the actions taken and information discussed at the meeting and provided an opportunity to add future agenda items.

As there were no further items to address, the meeting adjourned at 2:25 p.m.

5. Review investment performance including strategy, compliance, and delegation of authority

Presented by David Stafford and RVK

COAERS

COMMITTEE MEETING
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AGENDA ITEM 5:
Review investment performance including strategy, compliance, and delegation of authority.

AGENDA ITEM OBJECTIVE
This agenda item is for the Committee to review the Fund's performance through June 30, 2023, as well as receive reports on the investment program related to strategy, compliance, delegation of authority, and cash management.

RELEVANCE TO STRATEGIC PLAN
This item allows the Committee to review Fund performance and assess the extent to which the System is meeting **COAERS Strategic Plan Goal 1: Achieve and maintain a funding level that ensures the long-term sustainability of the retirement system** since long-term investment performance consistent with the investment program's goals is central to long-term system sustainability. Additionally, the agenda item allows the Committee to review the approved risk parameters and compliance requirements to ensure the System is fulfilling **COAERS Strategic Plan Goal 2: Responsibly Manage the Risks of the System**.

BACKGROUND
Staff and Consultant will review the performance of the Fund and major asset classes through the most recent quarter, which is summarized below for the period ended June 30, 2023:

as of 2023-Q2

	QTD	1Y	3Y	5Y	10Y
Fund return - gross of fees	**2.71**	**7.80**	**6.40**	**5.43**	**6.68**
** Percentile Rank vs. all peers (1=highest)*	*68*	*66*	*77*	*85*	*76*
** Percentile Rank vs. small peers (1=highest)*	*47*	*50*	*87*	*85*	*73*
Fund return - net of fees	**2.65**	**7.57**	**6.13**	**5.17**	**6.36**
Policy Index - gross return	**3.43**	**9.52**	**6.97**	**5.39**	**6.31**
Passive Index - gross return	**3.07**	**9.25**	**4.53**	**4.62**	**5.46**
Realized risk – standard deviation	***N/A***	**13.70**	**12.12**	**12.47**	**9.96**
** Percentile Rank vs. all peers (1=highest)*	*N/A*	*N/A*	*27*	*27*	*23*

** Peer Return Data is provided by RVK and is as of 8/11/2023.*

COAERS

COMMITTEE MEETING
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ATTACHMENTS
1. COAERS Investment Strategy Dashboard as of 2023-Q2
2. COAERS Investment Compliance Dashboard as of 2023-Q2
3. COAERS Staff Report on Status of Delegated Authority as of 2023-Q2
4. RVK Summary of Fund Performance for 2023-Q2
5. COAERS Investment Operations Cash Activity Detail for 2023-Q2

SUPPLEMENTAL MATERIALS PROVIDED VIA CONVENE APP
1. RVK Quarterly Investment Performance Analysis for 2023-Q2
2. RVK Capital Markets Review for 2023-Q2
3. Callan Periodic Tables of Investment Returns for June 2023

COAERS Investment Strategy Dashboard

as of 2023-Q2

COAERS

INVESTMENT GOALS

1. Achieve long-term, annualized nominal rate of return net of fees that:

- Meets or exceeds the assumed actuarial rate of return for the System

	3Y	5Y	10Y
COAERS Fund - Net Return	6.13%	5.17%	6.36%
COAERS Actuarially Assumed Rate of Return	6.75%	6.75%	6.75%
Difference	-0.62%	-1.58%	-0.39%
Status	BELOW	BELOW	BELOW

2. Achieve a long-term, risk-adjusted relative rate of return net of fees that:

- Meets or exceeds the Passive Index (i.e. the Reference Portfolio)

Passive Index: 60% MSCI ACWI Net USD Unhedged/40% Bloomberg Global Agg USD Unhedged

	3Y	5Y	10Y
COAERS Fund - Net Return	6.13%	5.17%	6.36%
COAERS Passive Index - Gross Return	4.53%	4.62%	5.46%
Difference	1.60%	0.55%	0.90%
Status	ABOVE	ABOVE	ABOVE

Incorporating fee levels for the Passive Index that are consistent with best COAERS Premier List fees (11 bps)

COAERS Passive Index - Net Return	4.42%	4.51%	5.35%
Difference	1.71%	0.66%	1.01%
Status	ABOVE	ABOVE	ABOVE

- Meets or exceeds the Policy Index (i.e. the Strategic Benchmark)

Policy Index: Target weighted composite of the benchmarks for the major asset classes in the SAA

	3Y	5Y	10Y
COAERS Fund - Net Return	6.13%	5.17%	6.36%
COAERS Policy Index - Gross Return	6.97%	5.39%	6.31%
Difference	-0.84%	-0.22%	0.05%
Status	BELOW	BELOW	ABOVE

Assuming fee levels for the Policy Index that are consistent with best COAERS Premier List fees (11 bps)

COAERS Policy Index - Net Return	6.86%	5.28%	6.20%
Difference	-0.73%	-0.11%	0.16%
Status	BELOW	BELOW	ABOVE

Investment returns are presented in an annualized net basis unless otherwise noted

- Ranks in the top quartile of peer comparisons consistently

*Versus **all plans** and incorporating fee levels equal to the CEM Benchmarking median of 80 bps*

	3Y	5Y	10Y
COAERS Fund - Net Return	6.13%	5.17%	6.36%
Top Quartile Net Return - All Peers *	7.94%	6.36%	7.07%
Difference	-1.81%	-1.19%	-0.71%
Status	BELOW	BELOW	BELOW

*Versus **small plans** and incorporating fee levels equal to the CEM Benchmarking median of 99 bps*

	3Y	5Y	10Y
COAERS Fund - Net Return	6.13%	5.17%	6.36%
Top Quartile Net Return - Small Peers *	8.47%	5.97%	6.84%
Difference	-2.34%	-0.80%	-0.48%
Status	BELOW	BELOW	BELOW

** Peer Return Data is provided by RVK and is preliminary as of 8/11/2023.*

INVESTMENT GOALS (continued)

3. Achieve these strategic objectives via fiduciary best practices that:

- Ensure proper diversification of asset classes and factor exposures
  - Staff and Consultant continue to assess the diversification of Fund's Strategic Asset Allocation including Functionally Focused portfolio construction concepts.
  - Staff is evaluating current portfolio hedging strategies to ensure the Fund maintains appropriate diversification against adverse regimes.
- Maintain appropriate long-term risk and return expectations
  - CMAs reviewed each year with IC/Board to assess outlook and market conditions.
  - Key Investment Manager views and asset allocation strategies are incorporated int IRF discussions to inform outlook.
- Adapt the asset allocation to changing market conditions
  - Staff regularly evaluates current market conditions via the Investment Risk Framework to guide recommendations to the IC/Board regarding changes to SAA parameters based upon current market conditions and their impact to return and risk expectations.
  - Delegated authority to implement strategy within SAA parameters approved by Board.
  - Investment Risk Framework approved by Board, regular reporting provided to IC.

RISK BUDGET

ABSOLUTE RISK (aka VOLATILITY)

	POLICY			REALIZED		
	MIN	TARGET	MAX	3Y	5Y	10Y
COAERS Fund - Volatility	10%	-	12%	12.1%	12.5%	10.0%
Status				ABOVE	ABOVE	BELOW
	MIN	TARGET	MAX	3Y	5Y	10Y
COAERS Fund - Sharpe Ratio	-	0.50	-	0.47	0.36	0.60
Status				BELOW	BELOW	ABOVE

RELATIVE RISK (aka TRACKING ERROR)

	POLICY			REALIZED		
	MIN	NEUTRAL	MAX	3Y	5Y	10Y
COAERS Fund - Tracking Error	-	150	300	181	179	173
Status				WITHIN	WITHIN	WITHIN
	MIN	TARGET	MAX	3Y	5Y	10Y
COAERS Fund - Information Ratio	-	0.50	-	0.94	0.44	0.67
Status				ABOVE	BELOW	ABOVE

ASSET ALLOCATION

COAERS Fund Positioning

YTD Return (Net): 7.49% | as of 2023-Q2 | AUM: $3.099 Bn

	Current	SAA Neutral	Relative	Bands	Strategic / Tactical / Neutral / Current
Global Equity	**57.4%**	**56.0%**	**1.4%**	**TACTICAL**	46% 51% 56% 61% 66%
US Equity	34.7%	34.0%	0.7%	TACTICAL	22% 29% 34% 39% 47%
DM Equity	16.0%	16.0%	0.0%	TACTICAL	11% 14% 16% 19% 20%
EM Equity	6.7%	6.0%	0.7%	TACTICAL	2% 4% 6% 11% 13%
Real Assets	**14.3%**	**15.0%**	**-0.7%**	**TACTICAL**	10% 11% 15% 19% 20%
Real Estate Equity	9.2%	10.0%	-0.8%	TACTICAL	5% 7% 10% 13% 15%
Infrastructure Equity	5.1%	5.0%	0.1%	TACTICAL	0% 1% 5% 7% 10%
* **Fixed Income**	**16.7%**	**21.0%**	**-4.3%**	**STRATEGIC U/W**	16% 18% 21% 27% 33%
UST	11.8%	13.0%	-1.2%	TACTICAL	9% 11% 13% 21% 25%
* MBS	2.3%	4.0%	-1.7%	STRATEGIC U/W	2% 3% 4% 6% 8%
Credit	2.6%	4.0%	-1.4%	TACTICAL	1% 3% 4% 7% 10%
* **Multi Asset**	**4.0%**	**7.0%**	**-3.0%**	**STRATEGIC U/W**	3% 5% 7% 13% 15%
* Asset Allocation	2.8%	5.0%	-2.2%	STRATEGIC U/W	3% 4% 5% 8% 10%
Commodities & Other	1.3%	2.0%	-0.8%	TACTICAL	0% 1% 2% 5% 10%
* **Cash & Equivalents**	**7.6%**	**1.0%**	**6.6%**	**STRATEGIC O/W**	-10% -5% 1% 5% 10%
* US Dollar Instruments	6.1%	1.0%	5.1%	STRATEGIC O/W	-10% -5% 1% 5% 10%
* Foreign Currency	1.6%	0.0%	1.6%	STRATEGIC O/W	0% 1% 2%

** Strategic Positioining Approved at June 29, 2023 Board Meeting*

COAERS Compliance Dashboard *as of 2023-Q2*

INVESTMENT STRATEGY

1. Pursue a superior investment strategy by conducting:

- Formal Asset/Liability Study every 5 years or upon major changes to contributions, benefits, or capital markets.

	Completion Date	As of Date	Service Provider
Asset/Liability Study:	**February 2023**	**December 2022**	**RVK**

- Formal Asset Allocation Study every 3 years.

	Completion Date	As of Date	Service Provider
Strategic Asset Allocation Study:	**April 2023**	**December 2022**	**RVK**

- Review of Strategic Asset Allocation parameters at least every 1 year.

	Completion Date	As of Date
Strategic Asset Allocation Review:	**April 2023**	**December 2022**

- Review of IPS and IIP at least annually or upon major changes in capital markets or industry practices.

	Last Review Date	Last Revision Date
Investment Policy Statement:	**March 30, 2023**	**March 30, 2023**
Investment Implementation Policy:	**March 30, 2023**	**March 30, 2023**

ASSET DIVERSIFICATION

2. Maintain proper diversification of assets by:

- Reviewing investment concentration levels in any single public corporation.

Individual Holding Concentration Limits:	Largest Concentration Company Name	Level	Status
3% of the Fund in the securities of any one company:	EQUINIX INC	0.5%	OK
5% of the Fund of any class of voting security of any one company:	EQUINIX INC	0.5%	OK

- Reviewing investment concentration levels in any single investment manager or investment vehicle.

Investment Manager Concentration Limits:	Largest Concentration Manager/Vehicle	Level	Status
≤15% of Fund assets with any active manager:	Newton IM	8.7%	OK
≤30% of Fund assets with any passive manager:	Agincourt	14.9%	OK
≤20% of firm assets for any manager:	Agincourt	6.0%	OK
≤20% of fund/vehicle assets unless a seed investment:	LGIMA MSCI USA	14.3%	OK
Board approved Seed Investments:	PGIM IG Credit	33.9%	Seed

FUND LIQUIDITY

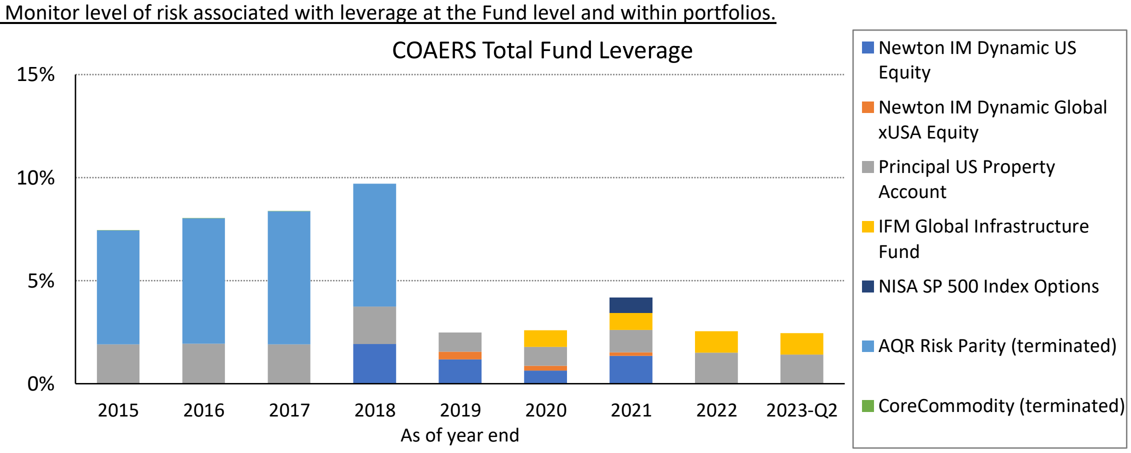
3. Ensure sufficient liquidity to meet benefit payment and other obligations by:

- Review allocation to highly liquid investments quarterly.

Liquidity:	$ millions	% of Fund	Accounts Included
0 - 5 Days	2,421	78%	All except those listed below
5-30 Days	410	13%	1607, PGIM, DoubleLine, Fidelity, Agincourt
30+ Days	268	9%	Principal, IFM

FUND LEVERAGE

4. Monitor level of risk associated with leverage at the Fund level and within portfolios.

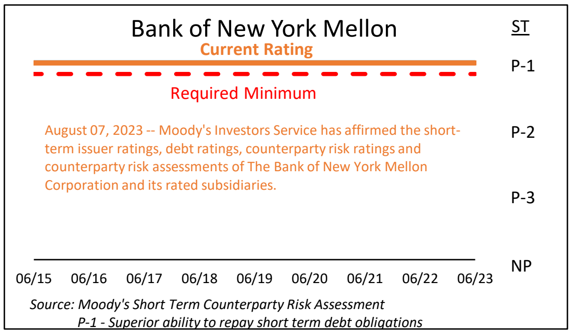


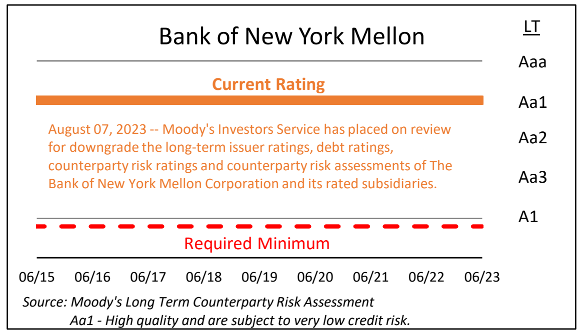
COAERS Compliance Dashboard

as of 2023-Q2

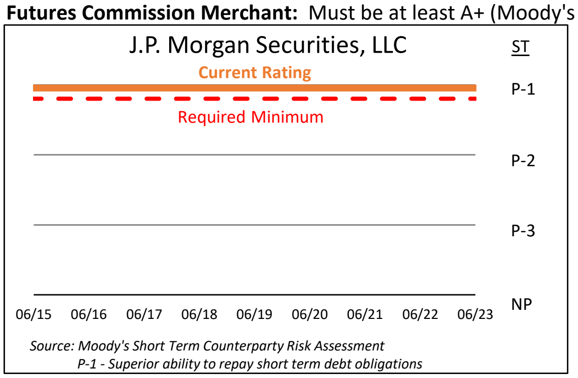
COUNTERPARTY MANAGEMENT

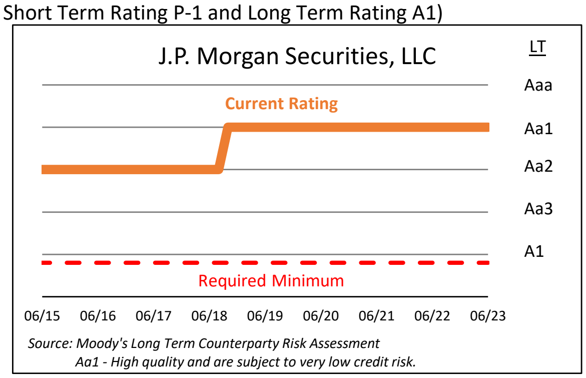
5. Monitor risk of loss from counterparty default and/or insolvency

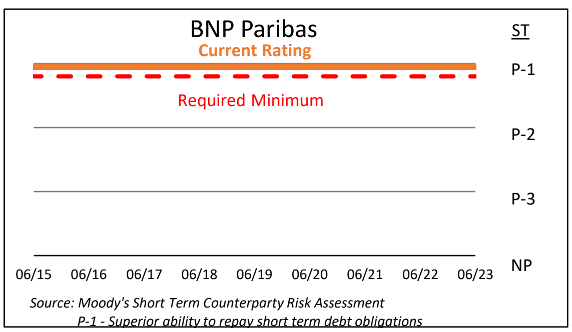


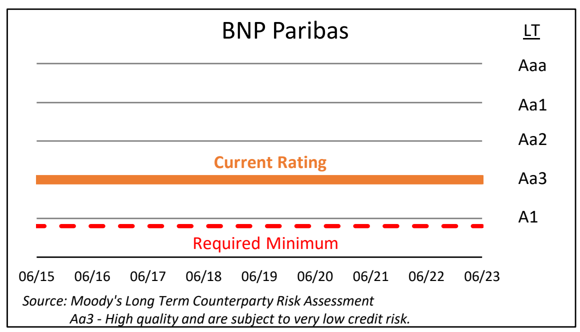


Futures Commission Merchant: Must be at least A+ (Moody's Short Term Rating P-1 and Long Term Rating A1)









Status of Authority Delegated To COAERS Staff

Source	Nature of Delegated Authority	Status during 2023-Q2
IPS Section I	Executive Director may approve variances to further compliance	Unused
IPS Section I	Executive Director may update policies for administrative items	Unused
IPS Section II	Executive Director may act to protect System assets	Unused
IPS Section V	Fund positioning may be rebalanced due to market drift	Unused
IPS Section V	Fund positioning may be rebalanced for risk management	Unused
IPS Section V	Fund positioning may be rebalanced due to phased transition	Unused
IPS Section VI	Staff may move between lending and non-lending shares to manage risk	Unused
IIP Section I	Executive Director may update policies for administrative items	Unused
IIP Section IV	Staff may transition between approved Premier List managers	Unused
IIP Section V	Emergency termination of managers by Executive Director	Unused
IIP Section VIII	Staff may select Money Market Funds for cash investments.	Unused

Status of Approved Policy Deviations

Source	Nature of Delegated Authority	Status during 2023-Q2
6/29/2023 Board Meeting	Board authorized Fund positioning in the Strategic Bands and a policy exception through the September 21, 2023 Board Meeting to allow Staff discretion to not rebalance asset and underlying sub-asset classes for Fixed Income, Multi-Asset, and Cash & Equivalents for market drift	Unused
6/29/2023 Board Meeting	Board authorized Staff discretion to rebalance between existing Cash & Equivalents mandates through the September 21, 2023 Board Meeting	Unused

Summary of Fund Performance

City of Austin Employees' Retirement System

Period Ended: June 30, 2023

Capital Markets Review

- At the start of 2023, the combination of rate hikes and quantitative tightening kept expectations for a near-term US recession embedded in many market forecasts. However, the continued strength of certain indicators, such as consumer spending and job growth, has altered the expected timing of a recession for some market participants.
- In the June data release, the Consumer Price Index (CPI) slowed to a 3.0% year-over-year rate, its lowest since March 2021.
- The World Bank released its 2023 Global Economic Prospects report in June, forecasting subdued global GDP growth of 2.1% in 2023 and 2.4% in 2024, caused by tightening financial conditions and decreases in demand due to continued elevated inflation.

Market Performance

	QTD	1 Year	3 Years	5 Years	10 Years
S&P 500 (Mkt Cap Wtd)	8.7	19.6	14.6	12.3	12.9
Russell 2000	5.2	12.3	10.8	4.2	8.3
MSCI EAFE (Net)	3.0	18.8	8.9	4.4	5.4
MSCI Emg Mkts (Net)	0.9	1.7	2.3	0.9	3.0
Bbrg US Agg Bond	-0.8	-0.9	-4.0	0.8	1.5
Bbrg Cmdty (TR)	-2.6	-9.6	17.8	4.7	-1.0
NCREIF ODCE (Net)	-2.9	-10.7	7.0	5.6	7.8

Total Fund Performance

	QTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2022	2021	2020	2019	2018
Total Fund	**2.7**	**7.5**	**7.6**	**6.1**	**5.2**	**6.5**	**6.4**	**-15.6**	**13.0**	**10.8**	**20.7**	**-5.9**
Policy Benchmark	3.4	9.0	9.5	7.0	5.4	6.6	6.3	-17.3	14.4	10.9	21.6	-6.8
Excess Return	-0.7	-1.5	-1.9	-0.9	-0.2	-0.1	0.1	1.7	-1.4	-0.1	-0.9	0.9

Total Fund Risk Metrics

	1 Year	3 Years	5 Years	7 Years	10 Years	2022	2021	2020	2019	2018
Sharpe Ratio	0.3	0.4	0.3	0.5	0.6	-1.2	1.9	0.6	2.3	-0.9
Standard Deviation	13.7	12.1	10.8	12.5	10.0	14.3	6.7	17.4	7.3	8.3
Tracking Error	1.8	1.8	1.8	1.7	1.8	2.1	1.2	2.0	1.0	1.8

Asset Class Performance

	QTD	CYTD	1 Year	3 Years	Since Incep	Inception Date
Total Fund	**2.7**	**7.5**	**7.6**	**6.1**	**9.3**	**06/01/1982**
Policy Benchmark	3.4	9.0	9.5	7.0	N/A	
Excess Return	-0.7	-1.5	-1.9	-0.9	N/A	
US Equity	**6.0**	**11.7**	**15.4**	**12.0**	**10.5**	**06/01/1988**
US Equity Benchmark	8.6	16.8	19.0	13.6	10.7	
Excess Return	-2.6	-5.1	-3.6	-1.6	-0.2	
Developed Markets Equity	**3.0**	**12.3**	**17.0**	**7.9**	**4.9**	**01/01/2008**
Developed Market Equity Benchmark	3.0	11.3	17.4	9.3	2.5	
Excess Return	0.0	1.0	-0.4	-1.4	2.4	
Emerging Markets Equity	**2.5**	**8.6**	**5.6**	**1.6**	**0.9**	**03/01/2008**
Emerging Market Equity Benchmark	0.9	4.9	1.7	2.3	1.4	
Excess Return	1.6	3.7	3.9	-0.7	-0.5	
Real Estate Equity	**-0.2**	**-0.4**	**-6.0**	**8.0**	**6.8**	**09/01/2004**
Real Estate Equity Benchmark	2.6	5.4	-0.1	8.9	7.8	
Excess Return	-2.8	-5.8	-5.9	-0.9	-1.0	
Infrastructure Equity	**1.4**	**4.3**	**5.8**	**8.9**	**2.3**	**01/01/2020**
Infrastructure Equity Benchmark	-0.4	3.3	3.2	9.8	1.7	
Excess Return	1.8	1.0	2.6	-0.9	0.6	
Global Fixed Income	**-0.9**	**2.5**	**-1.7**	**-5.1**	**5.0**	**02/01/1991**
Global Fixed Income Benchmark	-1.5	1.4	-1.3	-5.0	4.7	
Excess Return	0.6	1.1	-0.4	-0.1	0.3	
Asset Allocation	**3.6**	**9.3**	**9.9**	**5.5**	**7.0**	**05/01/2020**
Multi-Asset Benchmark	3.1	8.8	9.2	5.9	7.4	
Excess Return	0.5	0.5	0.7	-0.4	-0.4	
Commodities & Other	**-6.3**	**2.1**	**1.8**	**1.3**	**N/A**	**07/01/2017**
Commodities & Other Benchmark	-2.6	-7.8	-9.6	17.8	5.2	
Excess Return	-3.7	9.9	11.4	-16.5	N/A	

Performance Commentary

- The Total Fund returned 2.7% net of fees during the quarter, underperforming the Policy Benchmark which returned 3.4%.
- US Equity was the best performing asset class on an absolute basis, net of fees, returning 6.0%. Emerging Markets Equity had strong relative returns, outpacing its benchmark in Q2 by 1.6%

Asset Allocation vs. Target Allocation

	Market Value ($000)	Allocation (%)	Target (%)
US Equity	1,075,559	34.7	34.0
DM Equity	495,560	16.0	16.0
EM Equity	207,099	6.7	6.0
Real Estate Equity	284,833	9.2	10.0
Infrastructure Equity	157,423	5.1	5.0
Global Fixed Income	516,876	16.7	21.0
Asset Allocation	86,262	2.8	5.0
Commodities & Other	38,725	1.2	2.0
Cash & Equivalents	236,449	7.6	1.0
Total Fund	3,098,785	100.0	100.0

Schedule of Investable Assets

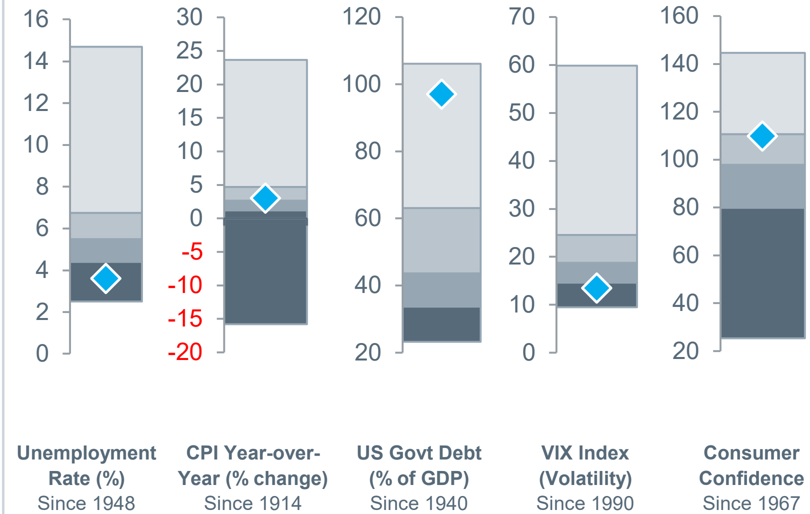
Periods Ending	Beginning Market Value ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)	% Return
CYTD	**2,941,251,159**	**-60,656,166**	**218,190,398**	**3,098,785,392**	**7.49**

Performance shown is net of fees. Allocations shown may not sum up to 100% exactly. Tracking Error shown is relative to the Passive Benchmark. Risk statistics shown are less meaningful for periods less than one year. Please see the addendum for custom benchmark definitions.

Second Quarter Economic Environment

During Q2, investors focused on the uncertainty of the future interest rate path and timing of further actions by the US Federal Reserve and other global central banks. At the start of 2023, the combination of rate hikes and quantitative tightening kept expectations for a near-term US recession embedded in many market forecasts. However, the continued strength of certain indicators, such as consumer spending and job growth, has altered the expected timing of a recession for some market participants. Mid-quarter forecasts and market outlooks were further complicated by the US debt ceiling debate, raising concerns regarding a potential default on the national debt. Ultimately, a deal was struck that suspended the ceiling until 2025. In the June data release, the Consumer Price Index (CPI) slowed to a 3.0% year-over-year rate, its lowest since March 2021. Recent job growth reports in the US provided mixed signals. US equity markets delivered strong results in Q2, primarily driven by the largest growth-oriented companies. US fixed income markets broadly posted negative returns in Q2, as the yield curve inverted further. The economic outlook in China, and its impact on global growth, continued to be a significant topic for investors. As concerns about China have grown, more investors are starting to view India and other south-east Asia countries as the drivers of growth in the region. The World Bank released its 2023 Global Economic Prospects report in June, forecasting subdued global GDP growth of 2.1% in 2023 and 2.4% in 2024, caused by tightening financial conditions and decreases in demand due to continued elevated inflation.

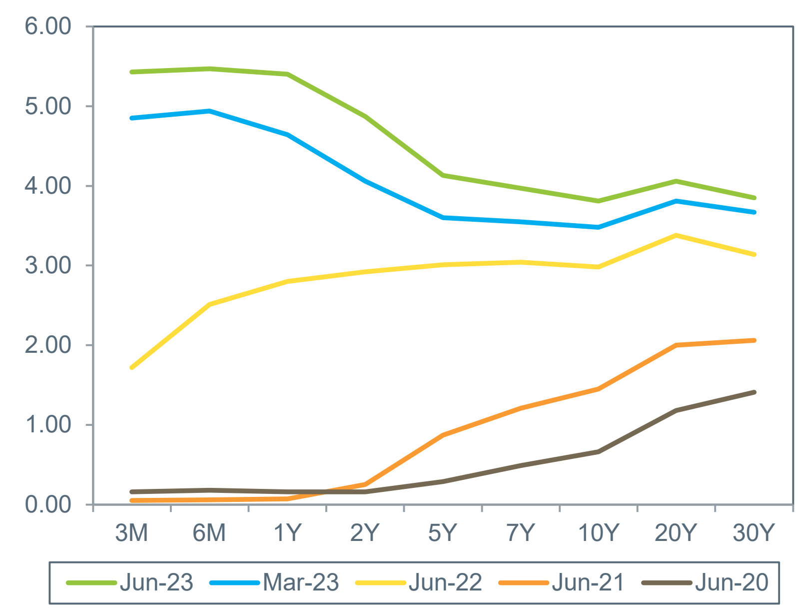
Key Economic Indicators



Economic Indicators	Jun-23		Mar-23	Jun-22	Jun-20	20 Yr
Federal Funds Rate (%)	5.08	▲	4.83	1.58	0.08	1.39
Breakeven Infl. - 5 Yr (%)	2.17	▼	2.47	2.62	1.17	1.94
Breakeven Infl. - 10 Yr (%)	2.21	▼	2.33	2.34	1.34	2.09
CPI YoY (Headline) (%)	3.0	▼	5.0	9.1	0.6	2.6
Unemployment Rate (%)	3.6	▲	3.5	3.6	11.0	5.9
Real GDP YoY (%)	N/A	—	1.8	1.8	-8.4	2.0
PMI - Manufacturing	46.0	▼	46.3	53.0	52.4	53.6
USD Total Wtd Idx	119.89	▲	119.48	121.05	120.49	103.57
WTI Crude Oil per Barrel ($)	70.6	▼	75.7	105.8	39.3	69.0
Gold Spot per Oz ($)	1,906	▼	1,979	1,807	1,781	1,199

Market Performance (%)	QTD	CYTD	1 Yr	5 Yr	10 Yr
S&P 500 (Cap Wtd)	8.74	16.89	19.59	12.31	12.86
Russell 2000	5.21	8.09	12.31	4.21	8.26
MSCI EAFE (Net)	2.95	11.67	18.77	4.39	5.41
MSCI EAFE SC (Net)	0.58	5.53	10.18	1.30	6.19
MSCI Emg Mkts (Net)	0.90	4.89	1.75	0.93	2.95
Bloomberg US Agg Bond	-0.84	2.09	-0.94	0.77	1.52
ICE BofAML 3 Mo US T-Bill	1.17	2.25	3.59	1.55	0.98
NCREIF ODCE (Gross)	-2.68	-5.77	-9.98	6.50	8.74
FTSE NAREIT Eq REIT (TR)	2.62	5.37	-0.13	4.55	6.42
HFRI FOF Comp	1.43	2.18	3.58	3.30	3.38
Bloomberg Cmdty (TR)	-2.56	-7.79	-9.61	4.73	-0.99

Treasury Yield Curve (%)



Treasury data courtesy of the US Department of the Treasury. Economic data courtesy of Bloomberg Professional Service.

City of Austin Employees' Retirement System **As of June 30, 2023**

Composite: Total Fund

Asset Alloc. by Asset Class, Asset Alloc. vs. Target, and Schedule of Investable Assets

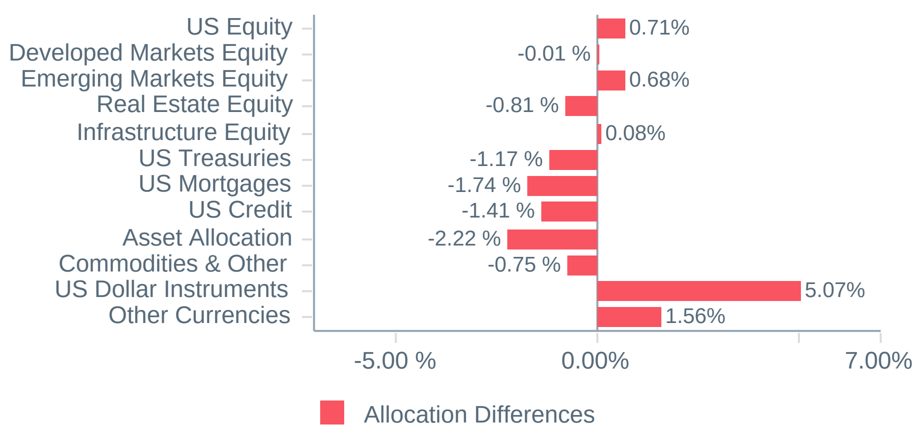
Schedule of Investable Assets

Periods Ending	Beginning Market Value ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)	% Return
CYTD	2,941,251,159	-60,656,166	218,190,398	3,098,785,392	7.49
1 Year	2,961,650,113	-83,787,779	220,923,058	3,098,785,392	7.57
3 Years	2,749,066,322	-183,713,246	533,432,316	3,098,785,392	6.13

Asset Allocation vs. Target Allocation

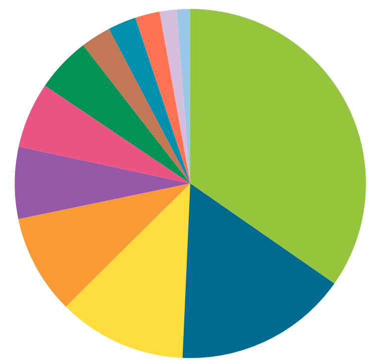
	Market Value ($)	Allocation (%)	Neutral (%)	Min. (%)	Max. (%)
Total Fund	**3,098,785,392**	**100.00**	**100.00**	**-**	**-**
US Equity	1,075,558,641	34.71	34.00	29.00	39.00
Developed Markets Equity	495,560,276	15.99	16.00	13.50	18.50
Emerging Markets Equity	207,098,613	6.68	6.00	4.00	10.50
Real Estate Equity	284,833,015	9.19	10.00	7.00	13.00
Infrastructure Equity	157,422,797	5.08	5.00	1.00	7.00
US Treasuries	366,556,324	11.83	13.00	11.00	21.00
US Mortgages	70,056,892	2.26	4.00	3.00	6.00
US Credit	80,262,540	2.59	4.00	2.50	7.00
Asset Allocation	86,262,259	2.78	5.00	3.50	7.50
Commodities & Other	38,725,275	1.25	2.00	1.00	5.00
US Dollar Instruments	188,000,695	6.07	1.00	0.00	5.00
Other Currencies	48,448,065	1.56	0.00	0.00	1.00

Asset Allocation vs. Target Allocation Differences



Asset Allocation by Asset Class

June 30, 2023 : $3,098,785,392



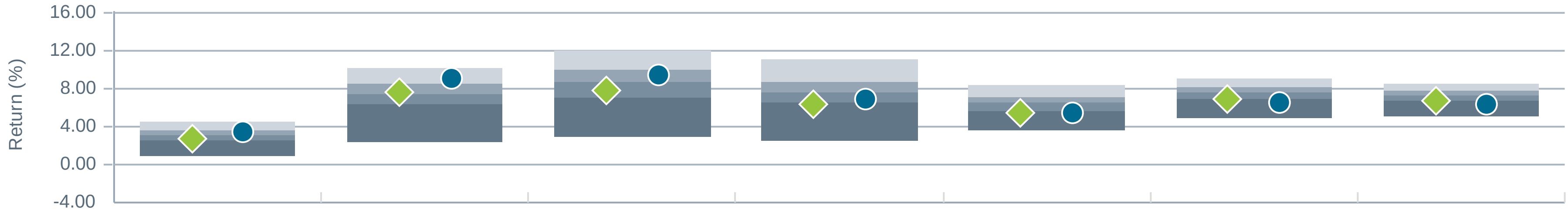
	Market Value ($)	Allocation (%)
US Equity	1,075,558,641	34.71
Developed Markets Equity	495,560,276	15.99
US Treasuries	366,556,324	11.83
Real Estate Equity	284,833,015	9.19
Emerging Markets Equity	207,098,613	6.68
US Dollar Instruments	188,000,695	6.07
Infrastructure Equity	157,422,797	5.08
Asset Allocation	86,262,259	2.78
US Credit	80,262,540	2.59
US Mortgages	70,056,892	2.26
Other Currencies	48,448,065	1.56
Commodities & Other	38,725,275	1.25

Performance shown is net of fees. Allocations shown may not sum up to 100% exactly due to rounding. Performance is annualized for periods greater than one year. Total Fund market value does not include $405,246.33 in assets remaining at Northern Trust - representing accruals, cash, tax reclaims, and some assets that were restricted from being delivered due to a liquidation or pending corporate action.

Composite: Total Fund
Benchmark: Policy Benchmark
Peer Group: All Public Plans - Total Fund

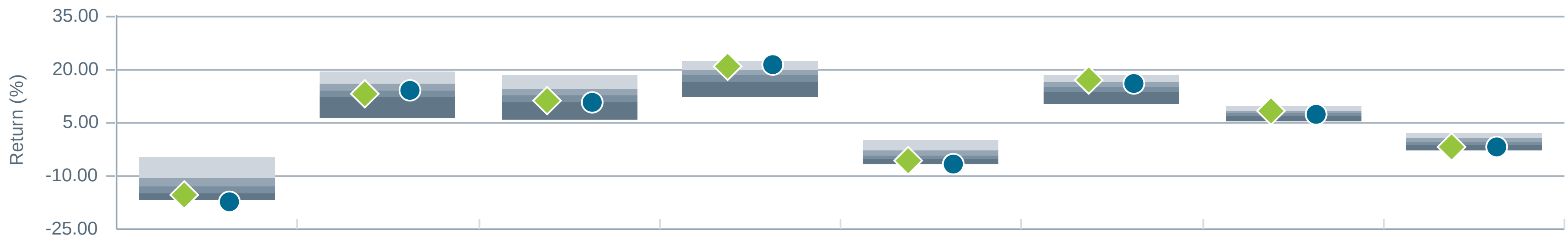
As of June 30, 2023

Rate of Return - Trailing



	QTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years
◆ Composite	2.71 (68)	7.60 (46)	7.80 (65)	6.40 (76)	5.43 (84)	6.83 (79)	6.68 (76)
● Benchmark	3.43 (34)	9.02 (17)	9.52 (34)	6.97 (68)	5.39 (86)	6.59 (85)	6.31 (86)
5th Percentile	4.49	10.17	11.91	11.06	8.33	9.10	8.55
1st Quartile	3.60	8.53	9.96	8.74	7.15	8.25	7.87
Median	3.05	7.46	8.81	7.72	6.59	7.57	7.29
3rd Quartile	2.52	6.29	7.12	6.46	5.70	6.96	6.68
95th Percentile	0.92	2.29	2.97	2.62	3.72	4.99	5.03

Rate of Return - Calendar



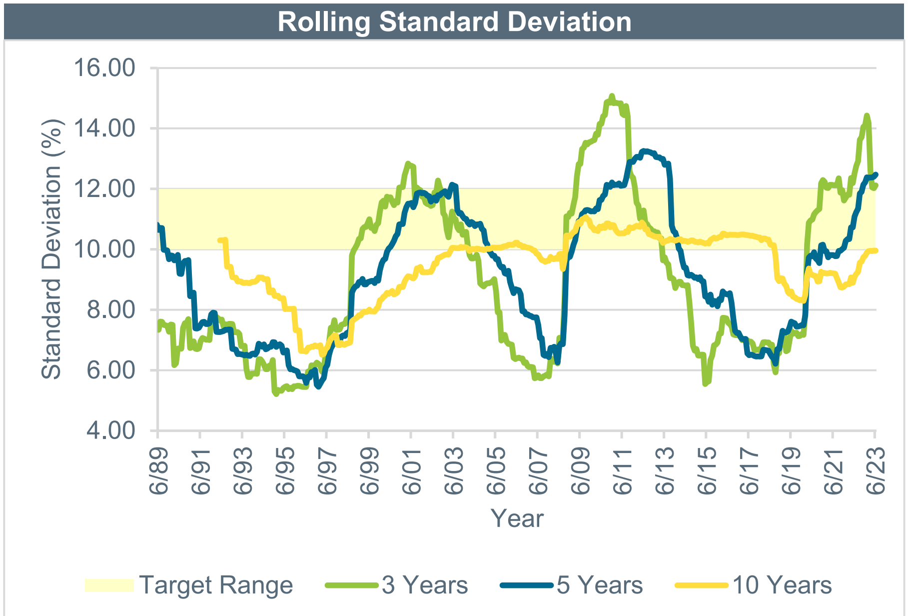
	2022	2021	2020	2019	2018	2017	2016	2015
◆ Composite	-15.40 (84)	13.32 (61)	11.07 (74)	20.97 (17)	-5.63 (86)	16.96 (17)	8.44 (27)	-1.55 (81)
● Benchmark	-17.32 (98)	14.38 (44)	10.92 (76)	21.57 (10)	-6.79 (97)	15.97 (34)	7.55 (54)	-1.92 (88)
5th Percentile	-4.61	19.60	18.42	22.22	-0.07	18.60	9.97	2.10
1st Quartile	-10.71	16.11	14.70	20.21	-2.88	16.44	8.51	0.72
Median	-12.78	14.01	12.54	18.57	-4.02	15.15	7.69	-0.11
3rd Quartile	-14.68	12.21	10.92	16.65	-5.11	13.87	6.92	-1.16
95th Percentile	-16.75	6.45	5.81	12.48	-6.65	10.12	5.27	-2.64

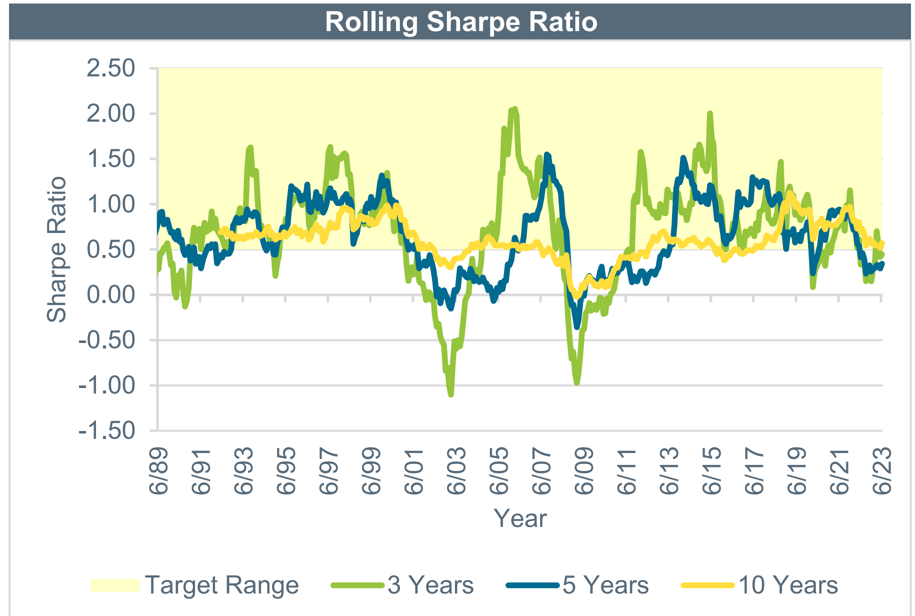
Performance shown is gross of fees and is annualized for periods greater than one year. Calculation is based on monthly periodicity. Parentheses contain percentile ranks.

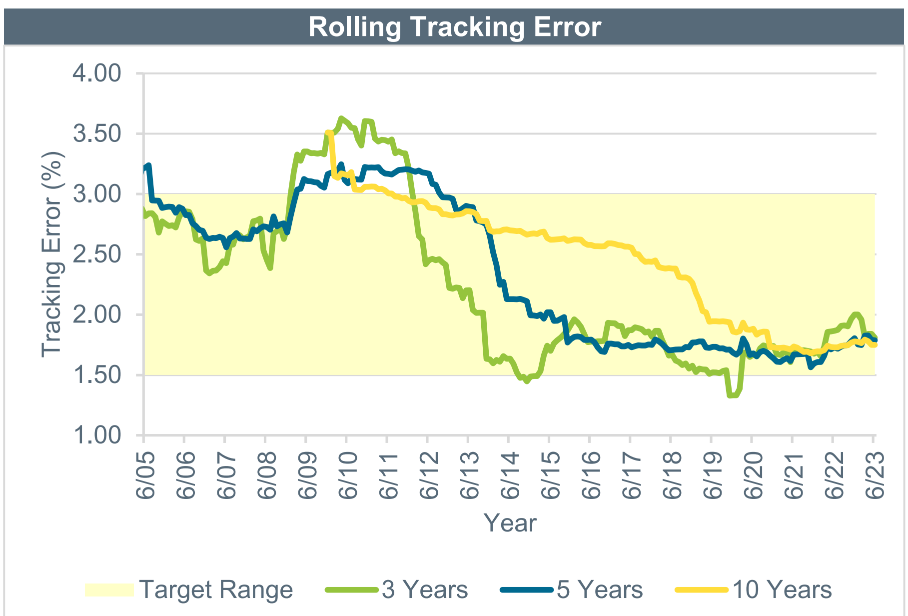
RVK

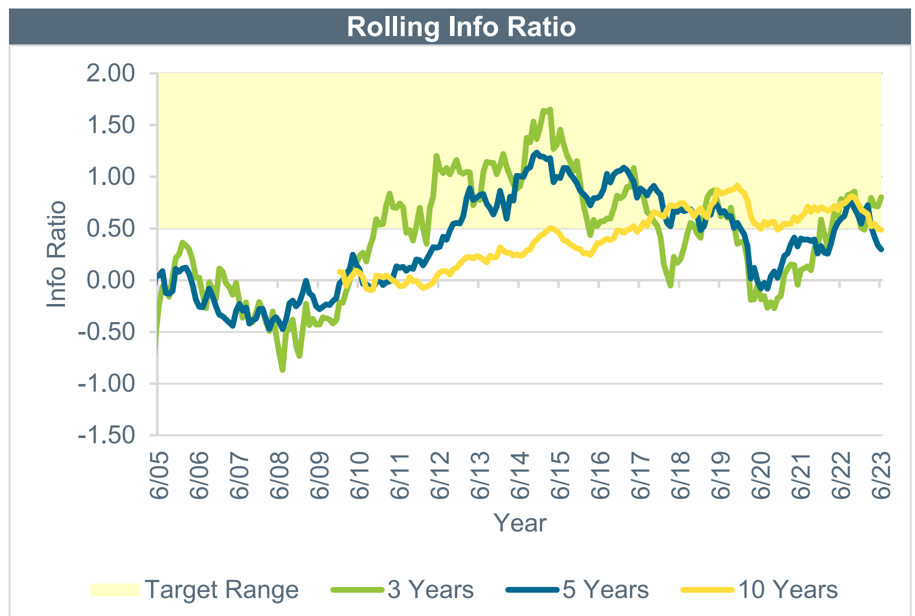
Composite: Total Fund
Rolling Risk Statistics (Net of Fees)

As of June 30, 2023









Performance shown is net of fees. Tracking Error and Info Ratio shown are relative to the Passive Benchmark.

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
Total Fund	**3,098,785,392**	**100.00**	**2.65**	**7.49**	**7.57**	**6.13**	**5.17**	**6.36**	**9.35**	**06/01/1982**
Policy Benchmark			3.43	9.02	9.52	6.97	5.39	6.31	N/A	
Excess Return			-0.78	-1.53	-1.95	-0.84	-0.22	0.05	N/A	
Passive Benchmark			3.07	8.82	9.25	4.53	4.62	5.46	N/A	
Excess Return			-0.42	-1.33	-1.68	1.60	0.55	0.90	N/A	
Global Equity	**1,778,217,530**	**57.38**	**4.71**	**11.45**	**14.52**	**9.37**	**6.61**	**8.22**	**8.85**	**06/01/1988**
Global Equity Benchmark			5.89	13.25	16.14	10.97	7.65	8.62	N/A	
Excess Return			-1.18	-1.80	-1.62	-1.60	-1.04	-0.40	N/A	
US Equity	**1,075,558,641**	**34.71**	**5.99**	**11.67**	**15.44**	**12.02**	**9.03**	**10.80**	**10.53**	**06/01/1988**
US Equity Benchmark			8.60	16.84	18.98	13.59	11.45	12.37	10.68	
Excess Return			-2.61	-5.17	-3.54	-1.57	-2.42	-1.57	-0.15	
Developed Markets Equity	**495,560,276**	**15.99**	**2.96**	**12.26**	**16.97**	**7.88**	**4.92**	**6.39**	**4.93**	**01/01/2008**
Developed Market Equity Benchmark			3.03	11.29	17.41	9.30	4.58	5.40	2.49	
Excess Return			-0.07	0.97	-0.44	-1.42	0.34	0.99	2.44	
Emerging Markets Equity	**207,098,613**	**6.68**	**2.48**	**8.60**	**5.63**	**1.57**	**0.62**	**2.64**	**0.86**	**03/01/2008**
Emerging Market Equity Benchmark			0.90	4.89	1.75	2.32	0.93	2.95	1.36	
Excess Return			1.58	3.71	3.88	-0.75	-0.31	-0.31	-0.50	
Real Assets	**442,255,812**	**14.27**	**0.38**	**1.17**	**-2.32**	**8.22**	**5.13**	**6.74**	**6.10**	**09/01/2004**
Real Assets Benchmark			1.59	4.74	1.15	9.37	4.65	6.35	7.51	
Excess Return			-1.21	-3.57	-3.47	-1.15	0.48	0.39	-1.41	
Real Estate Equity	**284,833,015**	**9.19**	**-0.17**	**-0.38**	**-5.97**	**7.97**	**5.21**	**8.02**	**6.77**	**09/01/2004**
Real Estate Equity Benchmark			2.62	5.37	-0.13	8.91	4.55	7.16	7.79	
Excess Return			-2.79	-5.75	-5.84	-0.94	0.66	0.86	-1.02	
Infrastructure Equity	**157,422,797**	**5.08**	**1.42**	**4.32**	**5.81**	**8.94**	**1.63**	**N/A**	**2.33**	**01/01/2020**
Infrastructure Equity Benchmark			-0.42	3.30	3.25	9.75	4.42	5.77	1.73	
Excess Return			1.84	1.02	2.56	-0.81	-2.79	N/A	0.60	

Performance shown is net of fees and is annualized for periods greater than one year. Indices show N/A for since inception returns when the fund contains more history than the corresponding benchmark.

RVK

Composite: Total Fund **As of June 30, 2023**

Asset Allocation & Performance - Net of Fees

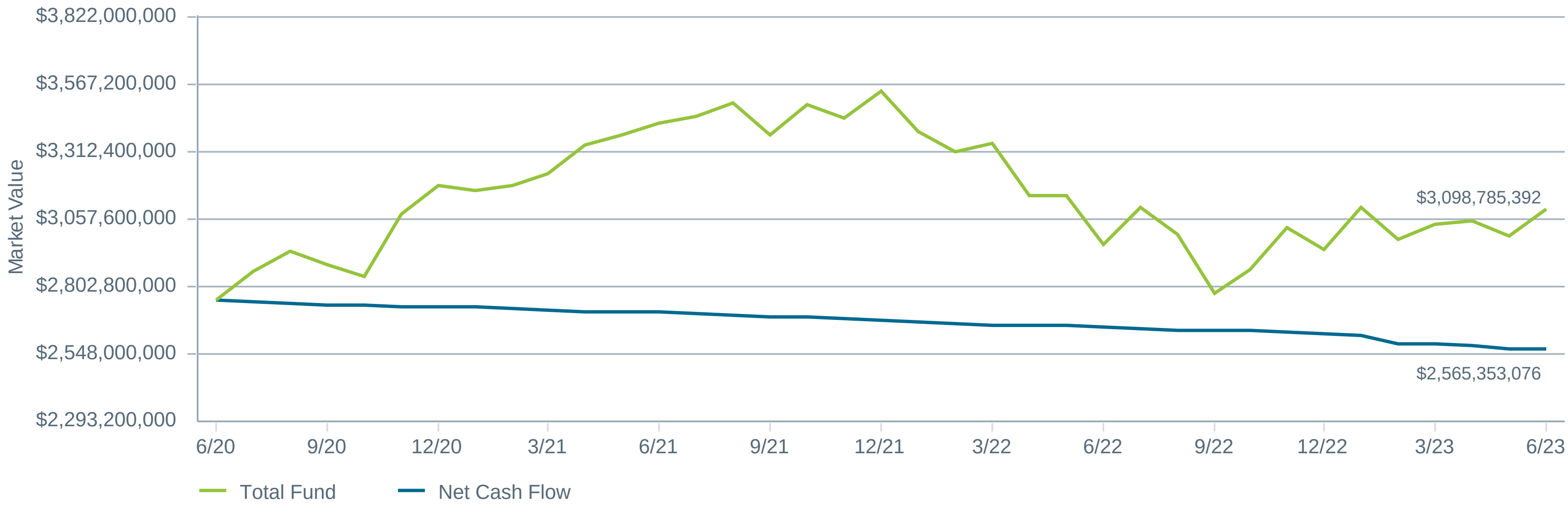
	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
Global Fixed Income	**516,875,756**	**16.68**	**-0.91**	**2.45**	**-1.65**	**-5.06**	**0.36**	**1.36**	**4.96**	**02/01/1991**
Global Fixed Income Benchmark			-1.53	1.43	-1.32	-4.96	-0.78	0.74	4.69	
Excess Return			0.62	1.02	-0.33	-0.10	1.14	0.62	0.27	
US Treasuries	**366,556,324**	**11.83**	**-1.15**	**2.22**	**-2.44**	**-6.19**	**N/A**	**N/A**	**-0.02**	**05/01/2019**
US Treasuries Benchmark			-1.38	1.59	-2.13	-4.80	0.44	0.96	-0.38	
Excess Return			0.23	0.63	-0.31	-1.39	N/A	N/A	0.36	
US Mortgages	**70,056,892**	**2.26**	**-0.54**	**2.22**	**-2.04**	**-3.75**	**N/A**	**N/A**	**-1.63**	**08/01/2019**
US Mortgages Benchmark			-0.64	1.87	-1.52	-3.73	0.03	1.13	-1.60	
Excess Return			0.10	0.35	-0.52	-0.02	N/A	N/A	-0.03	
US Credit	**80,262,540**	**2.59**	**-0.18**	**3.71**	**2.13**	**-2.94**	**N/A**	**N/A**	**-0.21**	**08/01/2019**
US Credit Benchmark			-0.31	3.13	1.39	-3.38	1.65	2.51	-0.55	
Excess Return			0.13	0.58	0.74	0.44	N/A	N/A	0.34	
Multi-Asset	**124,987,534**	**4.03**	**0.42**	**6.89**	**7.20**	**7.40**	**5.71**	**N/A**	**4.85**	**02/01/2014**
Multi-Asset Benchmark			3.07	8.82	9.25	5.91	4.53	5.41	4.89	
Excess Return			-2.65	-1.93	-2.05	1.49	1.18	N/A	-0.04	
Asset Allocation	**86,262,259**	**2.78**	**3.58**	**9.32**	**9.86**	**5.55**	**N/A**	**N/A**	**6.98**	**05/01/2020**
Multi-Asset Benchmark			3.07	8.82	9.25	5.91	4.53	5.41	7.44	
Excess Return			0.51	0.50	0.61	-0.36	N/A	N/A	-0.46	
Commodities & Other	**38,725,275**	**1.25**	**-6.34**	**2.08**	**1.79**	**1.30**	**N/A**	**N/A**	**4.37**	**04/01/2021**
Commodities & Other Benchmark			-2.56	-7.79	-9.61	17.82	4.73	-0.99	11.31	
Excess Return			-3.78	9.87	11.40	-16.52	N/A	N/A	-6.94	
Cash & Equivalents	**236,448,760**	**7.63**	**1.10**	**2.36**	**3.96**	**1.35**	**1.52**	**N/A**	**1.47**	**07/01/2017**
Cash & Equivalents Benchmark			1.22	2.33	3.73	1.31	1.53	0.96	1.49	
Excess Return			-0.12	0.03	0.23	0.04	-0.01	N/A	-0.02	
US Dollar Instruments	**188,000,695**	**6.07**	**0.99**	**2.30**	**3.93**	**1.33**	**1.52**	**0.93**	**1.19**	**09/01/2015**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	1.22	
Excess Return			-0.23	-0.03	0.20	0.02	-0.01	-0.03	-0.03	
Other Currencies	**48,448,065**	**1.56**	**1.24**	**2.45**	**3.92**	**N/A**	**N/A**	**N/A**	**2.61**	**12/01/2021**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	2.44	
Excess Return			0.02	0.12	0.19	N/A	N/A	N/A	0.17	

Performance shown is net of fees and is annualized for periods greater than one year. Indices show N/A for since inception returns when the fund contains more history than the corresponding benchmark.

Composite: Total Fund
Total Fund Asset Growth Summary

As of June 30, 2023

3 Years Ending June 30, 2023



Schedule of Investable Assets - Quarter To Date

Periods Ending	Beginning Market Value ($)	Contributions ($)	Withdrawals ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)
QTD	3,037,798,691	473,165,739	492,311,856	-19,146,116	80,132,817	3,098,785,392

Schedule of Investable Assets - Year To Date

Periods Ending	Beginning Market Value ($)	Contributions ($)	Withdrawals ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)
CYTD	2,941,251,159	514,803,807	575,459,972	-60,656,166	218,190,398	3,098,785,392

Schedule of Investable Assets - 1 Year

Periods Ending	Beginning Market Value ($)	Contributions ($)	Withdrawals ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)
1 Year	2,961,650,113	941,088,372	1,024,876,151	-83,787,779	220,923,058	3,098,785,392

Schedule of Investable Assets - 3 Years

Periods Ending	Beginning Market Value ($)	Contributions ($)	Withdrawals ($)	Net Cash Flow ($)	Gain/Loss ($)	Ending Market Value ($)
3 Years	2,749,066,322	3,433,145,509	3,616,858,755	-183,713,246	533,432,316	3,098,785,392

Cash flows shown are net of fees. Net cash flow shown in the line chart represents the beginning market value, adjusted for cash flows. Contributions and withdrawals detail shown includes intra-portfolio cash flows.

Cash Activity - Investment Operations

01 April 2023 - 30 June 2023

DATE	FROM	TO	PURPOSE	AMOUNT
BENEFIT PAYMENTS				
04/25/23	AGINCOURT 1-3M US TREASURIES	COAERS CASH	WITHDRAW TO FUND BENEFITS	$4,000,000.00
04/25/23	COAERS CASH	CHASE OPERATING ACCOUNT	TRANSFER TO FUND BENEFITS	($4,000,000.00)
05/25/23	AGINCOURT 1-3M US TREASURIES	COAERS CASH	WITHDRAW TO FUND BENEFITS	$15,000,000.00
05/25/23	COAERS CASH	CHASE OPERATING ACCOUNT	TRANSFER TO FUND BENEFITS	($15,000,000.00)
SUBTOTAL				**$0.00**
MANAGEMENT FEES				
04/28/23	AGINCOURT 1-3 YR UST	AGINCOURT 1-3 YR UST	MANAGEMENT FEE	($15,614.81)
04/28/23	AGINCOURT 1-3M US TB	AGINCOURT 1-3M US TB	MANAGEMENT FEE	($5,788.81)
04/28/23	AGINCOURT 1-5YR USTP	AGINCOURT 1-5YR USTP	MANAGEMENT FEE	($6,384.40)
04/28/23	AGINCOURT FTSENAREIT	AGINCOURT FTSENAREIT	MANAGEMENT FEE	($985.41)
04/28/23	AGINCOURT PASSIV IND	AGINCOURT PASSIV IND	MANAGEMENT FEE	($11,316.29)
04/28/23	DOUBLELINE MBS	DOUBLELINE MBS	MANAGEMENT FEE	($49,874.18)
04/28/23	FIDELITY DJBKF GLINF	FIDELITY DJBKF GLINF	MANAGEMENT FEE	($14,053.00)
04/28/23	FIDELITY US REITS	FIDELITY US REITS	MANAGEMENT FEE	($21,722.57)
04/28/23	HOISINGTON MACROECON	HOISINGTON MACROECON	MANAGEMENT FEE	($69,721.23)
04/28/23	COAERS CASH	NTAM INTL SMALL CAP	MANAGEMENT FEE	($6,101.62)
05/09/23	PGIM US IG CORP BOND	PGIM US IG CORP BOND	MANAGEMENT FEE	($62,084.47)
05/31/23	1607 CAPITAL EAFE EQ	1607 CAPITAL EAFE EQ	MANAGEMENT FEE	($225,530.00)
05/31/23	FIDELITY DJBKF GLINF	FIDELITY DJBKF GLINF	MANAGEMENT FEE	($14,560.49)
05/31/23	FIDELITY US REITS	FIDELITY US REITS	MANAGEMENT FEE	($22,784.13)
05/31/23	MELLON SCIBETA US DC	MELLON SCIBETA US DC	MANAGEMENT FEE	($41,055.26)
05/31/23	NEWTON DYNAMIC US EQ	NEWTON DYNAMIC US EQ	MANAGEMENT FEE	($192,691.14)
05/31/23	COAERS CASH	NEWTON DYNAMIC XUSEQ	MANAGEMENT FEE	($23,710.19)
05/31/23	SSGA MSCI USA EW IND	SSGA MSCI USA EW IND	MANAGEMENT FEE	($11,383.96)
05/31/23	COAERS CASH	SSGA MSCI USA SC IND	MANAGEMENT FEE	($4,866.04)
05/31/23	WALTER SCOTT EAFE EQ	WALTER SCOTT EAFE EQ	MANAGEMENT FEE	($199,995.35)
06/01/23	TOBAM MAXDIV USA	TOBAM MAXDIV USA	MANAGEMENT FEE	($71,386.37)
SUBTOTAL				**($1,071,609.72)**
ALLOCATION CHANGES				
04/13/23	LGIMA MSCI USA INDEX	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	HOISINGTON MACROECON	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	DOUBLELINE MBS	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	PGIM US IG CORP BOND	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	FIDELITY US REITS	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	AGINCOURT PASSIV IND	COAERS CASH	DECREASE ALLOCATION TO ACCOUNT	$30,000,000.00
04/13/23	COAERS CASH	COAERS AGINCOURT 1 3 MO US TBILL	INCREASE ALLOCATION TO ACCOUNT	($100,000,000.00)
04/13/23	COAERS CASH	COAERS NISA CASH AND CARRY	INCREASE ALLOCATION TO ACCOUNT	($50,000,000.00)
04/13/23	COAERS CASH	COAERS AGINCOURT 1 3 YR UST	INCREASE ALLOCATION TO ACCOUNT	($30,000,000.00)
06/29/23	LGIMA INFLATION PLUS	COAERS CASH	TERMINATE ACCOUNT	$282,464.43
06/29/23	COAERS CASH	MELLON INFLATION PLUS	INITIAL FUNDING TO ACCOUNT	($282,464.43)
SUBTOTAL				**$0.00**

TOTAL EXTERNAL TRANSFERS	
BENEFIT PAYMENTS	($19,000,000.00)
MANAGEMENT FEES	($1,071,609.72)
TOTAL	**($20,071,609.72)**

6. Discuss and consider investment strategy including Investment Risk Framework

Presented by David Stafford

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 6:
Discuss and consider Investment Risk Framework

AGENDA ITEM OBJECTIVE
The Committee will receive a report from Staff on the Investment Risk Framework (IRF) as well as insights from the IRF related to the Fund's investment strategy.

RELEVANCE TO STRATEGIC PLAN
This item meets **COAERS Strategic Goal 2: Responsibly Manage the Risks of the System**. Maintaining appropriate risk and return expectations is critical to meeting strategic goals, and failure to do so raises the risk of large drawdowns and the risk of subpar long-term returns for the Fund.

RECOMMENDATION FOR COMMITTEE ACTION
At the Committee's discretion.

BACKGROUND
The Investment Policy Statement (IPS) requires Staff to develop and maintain the Investment Risk Framework (IRF) to determine when deviations from neutral policy weights are expected to be advantageous to the Fund. The IPS requires that the outputs be reported at regular meetings of the IC and more frequently if needed.
The IPS empowers Staff to act upon the outputs of the IRF to rebalance the Fund to further the Board's strategic goals. Any such rebalancing is required to be (1) approved by the Executive Director, (2) reported to the Board within one business day, and (3) reviewed with the IC at its next regular meeting.

Staff will review insights from the current Investment Risk Framework (IRF) dashboard to help inform Fund positioning for the current market environment. This review will include discussion of key questions facing the Fund such as strategic positioning, expected returns, and the potential for regime changes.

ATTACHMENTS
1. Staff Investment Risk Framework Memo 2023-08 (CONFIDENTIAL)
2. Investment Risk Framework Dashboard 2023-07-31 (CONFIDENTIAL)
3. Investment Manager Strategy Update (CONFIDENTIAL)

SUPPLEMENTAL MATERIALS PROVIDED VIA CONVENE APP
1. IRF Detailed Dashboard 2023-07-31 (CONFIDENTIAL)

7. Review investment implementation including Premier List for Global Equities

Presented by Ty Sorrel and RVK

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 7:
Discuss and consider investment implementation
including Premier List for Global Equities

AGENDA ITEM OBJECTIVE
The Committee will conduct the required quarterly review of the implementation of the System's investment strategies and the status of the System's funded investment managers.

RELEVANCE TO STRATEGIC PLAN
This agenda item is part of the core competency set forth in the **COAERS Strategic Plan** ***"Prudent Investment Management:*** *Fulfilling fiduciary duty through monitoring performance within adopted process and stated goals."* Committee review of the implementation of the investment program ensures that Trustees monitor the performance of the portfolio.

RECOMMENDATION FOR COMMITTEE ACTION
Staff recommends that the Committee refer to the Board the approval of the proposed Premier List.

BACKGROUND
The Investment Implementation Policy (IIP) requires Staff to develop and maintain a Premier List of viable managers for potential inclusion within each allocation of the Fund. The IIP also requires the Premier List for each asset class to be reviewed with the Board via the Investment Committee on an annual basis.

Staff will lead the required annual review of the current construction and composition of the Global Equities allocations, including the associated Premier Lists.

ATTACHMENTS
1. Investment Implementation Update 2023-Q2 [CONFIDENTIAL]
2. Investment Implementation Dashboard
3. Investment Manager Monitoring Dashboard 2023-Q2 [CONFIDENTIAL]
4. Investment Manager Monitoring Report 2023-Q2 [CONFIDENTIAL]
5. Investment Manager Fees by Quarter 2023-Q2
6. RVK Summary of Manager Performance 2023-Q2
7. Current COAERS Premier List 2023-Q2 [CONFIDENTIAL]
8. Global Equities Market & Portfolio Review 2023-Q2
9. Premier List Recommendations – Global Equity [CONFIDENTIAL]

COAERS

COMMITTEE MEETING
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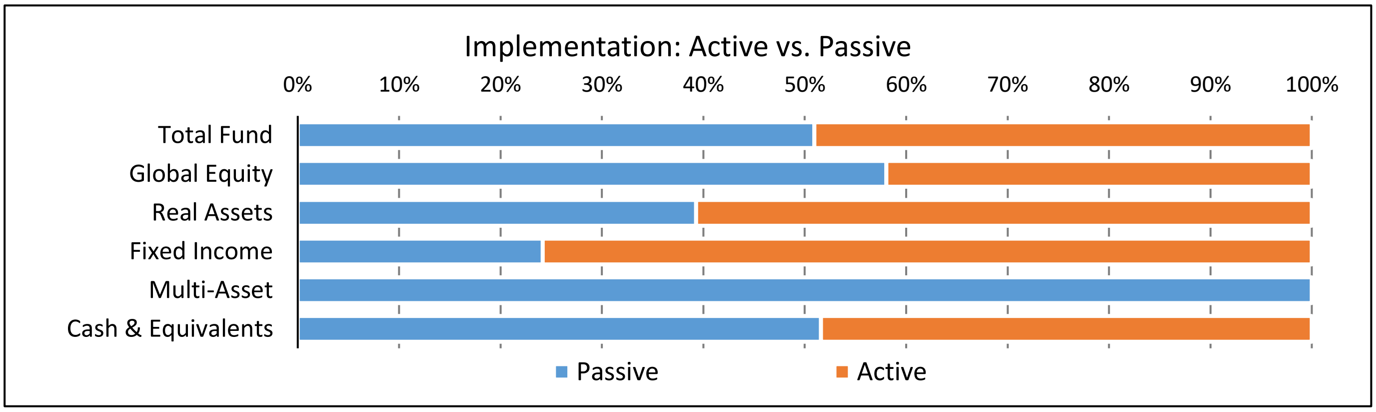
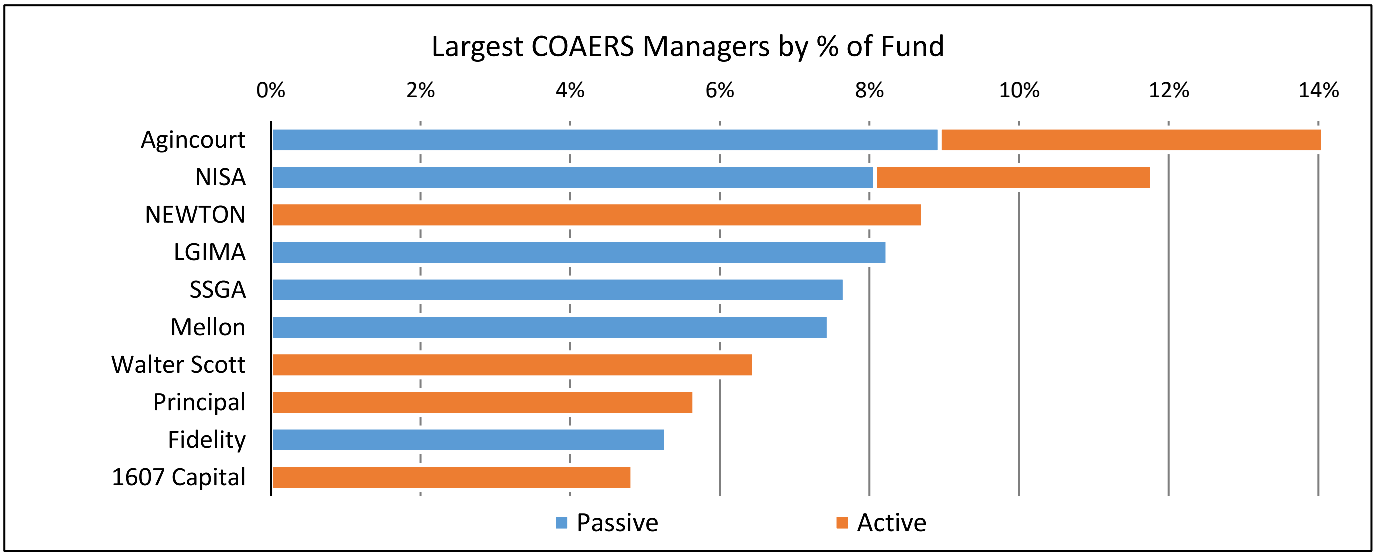
SUPPLEMENTAL INFORMATION PROVIDED VIA CONVENE APP

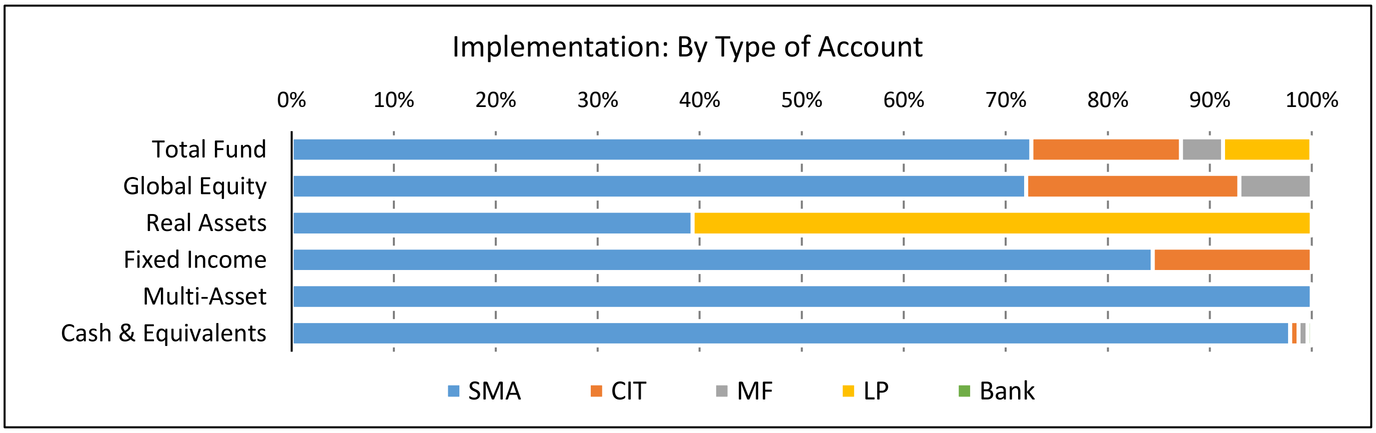
1. RVK COAERS Investment Manager Compliance Reports
2. COAERS Funded Investment Manager Strategy Summaries
3. COAERS Proprietary Due Diligence Materials [CONFIDENTIAL]

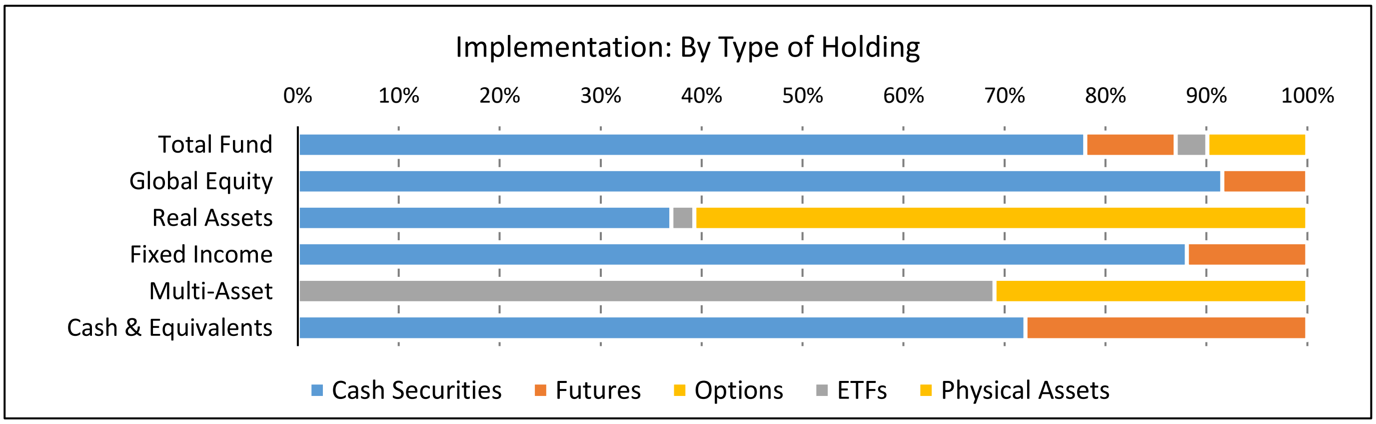
COAERS Implementation Dashboard

As of 6/30/2023









SMA = Separately Managed Account, CIT = Commingled Investment Trust, MF = Mutual Fund, LP = Limited Partner

COAERS Investment Manager Fees *For 2Q-2023*

DIRECT FEE PAYMENTS & ACCRUALS					
Earned In	**2Q22**	**3Q22**	**4Q22**	**1Q23**	
Paid In	**3Q22**	**4Q22**	**1Q23**	**2Q23**	
1607 Capital Intl Equities	247,143	203,452	143,007	225,530	
Agincourt: 1-3M US Treasuries	3,215	4,812	4,531	5,789	
Agincourt: 1-3Y US Treasuries	15,301	15,282	15,391	15,615	
Agincourt: 10Y US Treasuries	5,038	4,723	4,239	-	
Agincourt: 1-5Y TIPS	6,362	6,158	6,236	6,384	
Agincourt Passive Index	9,812	10,073	10,722	11,316	
Agincourt FTSE NAREIT Equity	1,872	915	962	985	
Doubleline MBS	51,215	50,339	48,341	49,874	
Fidelity DJ Brookfield	43,852	14,714	14,053	14,560	
Fidelity US REITs	60,069	23,109	21,723	22,784	
Hoisington	73,401	66,967	66,514	69,721	
LGIMA 5 15YR US TIPS	1,583	1,494	1,292	-	
LGIMA Inflation Plus	26,127	15,688	26,880	24,663	*
LGIMA - MSCI USA	14,551	14,303	13,854	13,058	*
LGIMA - MSCI EM	18,853	17,852	16,890	18,153	*
Mellon DEXUS	21,851	19,756	22,577	23,710	
Mellon DUSE	178,840	172,714	184,198	192,691	
Mellon Scibeta US Max Decorr	38,358	36,937	40,527	41,055	
NISA Futures	45,542	46,037	49,188	70,532	*
NT Dev Intl Small Cap Fund[1]	7,007	5,827	5,244	6,102	
SSGA MSCI USA Equal Weight	11,532	11,501	11,460	11,384	
SSGA MSCI USA SmallCap	4,718	4,749	4,790	4,866	
TOBAM Max Decorrelation	70,371	67,341	70,471	71,386	
Walter Scott Intl Equities	191,449	183,744	185,458	199,995	
TOTAL DIRECT PAYMENTS	**1,148,062**	**998,488**	**968,548**	**1,100,156**	

[1] NTAM Management Fees are paid in the quarter they are earned.

** Accrual*

INDIRECT FEE PAYMENTS				
Earned In	**3Q22**	**4Q22**	**1Q23**	**2Q23**
Paid In	**3Q22**	**4Q22**	**1Q23**	**2Q23**
Baillie Gifford Emerging Market	180,407	183,574	188,839	189,656
IFM Infrastructure	164,742	168,173	170,204	175,768
PGIM US Credit	63,479	63,177	61,349	62,084
Principal US Property	394,559	387,031	359,798	355,039
SUBTOTAL INDIRECT	**803,186**	**801,955**	**780,190**	**782,547**

TOTAL FEES	**1,951,248**	**1,800,443**	**1,748,738**	**1,882,702**
% of AUM	*0.07%*	*0.06%*	*0.06%*	*0.06%*

RVK

Summary of Manager Performance

City of Austin Employees' Retirement System

Period Ended: June 30, 2023

Composite: Total Fund
Benchmark: Policy Benchmark

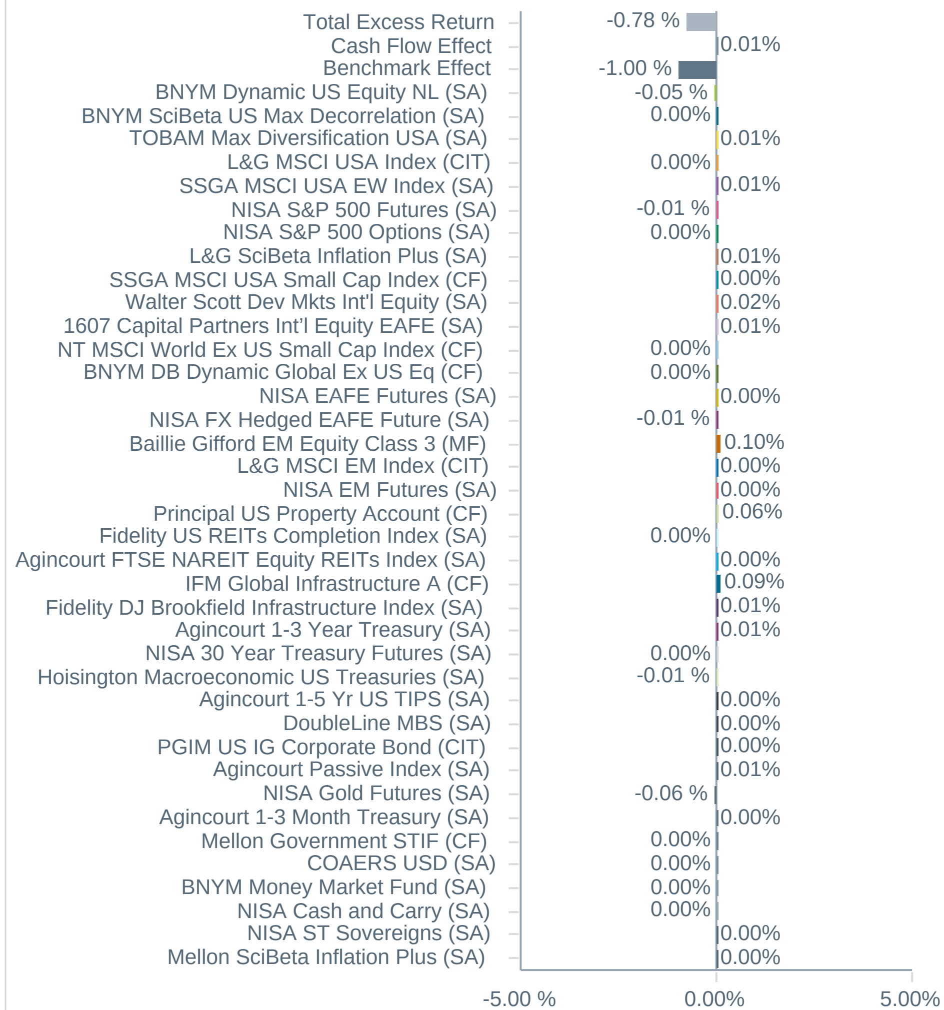
As of June 30, 2023

	Market Value ($)	Allocation (%)
BNYM Dynamic US Equity NL (SA)	241,397,143	7.79
Walter Scott Dev Mkts Int'l Equity (SA)	201,626,229	6.51
SSGA MSCI USA EW Index (SA)	192,225,302	6.20
Agincourt 1-3 Year Treasury (SA)	185,189,153	5.98
L&G MSCI USA Index (CIT)	181,396,214	5.85
Principal US Property Account (CF)	175,074,141	5.65
1607 Capital Partners Int'l Equity EAFE (SA)	150,120,452	4.84
BNYM SciBeta US Max Decorrelation (SA)	134,879,488	4.35
Baillie Gifford EM Equity Class 3 (MF)	125,828,965	4.06
Agincourt 1-3 Month Treasury (SA)	116,966,279	3.77
TOBAM Max Diversification USA (SA)	115,140,098	3.72
Fidelity US REITs Completion Index (SA)	99,653,433	3.22
Mellon SciBeta Inflation Plus (SA)	95,832,857	3.09
IFM Global Infrastructure A (CF)	92,851,610	3.00
Agincourt Passive Index (SA)	86,262,259	2.78
PGIM US IG Corporate Bond (CIT)	80,262,540	2.59
L&G MSCI EM Index (CIT)	73,399,704	2.37
DoubleLine MBS (SA)	70,056,892	2.26
NISA S&P 500 Futures (SA)	69,401,441	2.24
NISA Cash and Carry (SA)	66,023,230	2.13
Fidelity DJ Brookfield Infrastructure Index (SA)	64,571,186	2.08
Agincourt 1-5 Yr US TIPS (SA)	63,241,097	2.04
NISA 30 Year Treasury Futures (SA)	61,701,893	1.99
Hoisington Macroeconomic US Treasuries (SA)	56,424,181	1.82
NISA ST Sovereigns (SA)	48,448,065	1.56
SSGA MSCI USA Small Cap Index (CF)	45,124,522	1.46
NT MSCI World Ex US Small Cap Index (CF)	42,909,210	1.38
NISA Gold Futures (SA)	38,725,275	1.25
NISA FX Hedged EAFE Future (SA)	38,359,908	1.24
NISA EAFE Futures (SA)	34,397,705	1.11
BNYM DB Dynamic Global Ex US Eq (CF)	28,146,773	0.91
Agincourt FTSE NAREIT Equity REITs Index (SA)	10,105,441	0.33
NISA EM Futures (SA)	7,869,944	0.25
BNYM Money Market Fund (SA)	2,072,740	0.07
Mellon Government STIF (CF)	1,926,352	0.06
COAERS USD (SA)	1,012,095	0.03
L&G SciBeta Inflation Plus (SA)	98,196	0.00
NISA S&P 500 Options (SA)	63,382	0.00

Rate of Return

	QTD
Composite	**2.65**
Benchmark	3.43
Excess Return	-0.78

Attribution by Manager



Performance shown is net of fees. Calculation is based on monthly periodicity. Allocations shown may not sum up to 100% exactly due to rounding. See glossary for calculation definitions. During 06/2023, L&G SciBeta Inflation Plus (SA) was liquidated and Mellon SciBeta Inlfation Plus (SA) was funded. Market value shown for L&G SciBeta Inflation Plus (SA) represents residual cash from liquidation.

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
US Equity										
BNYM Dynamic US Equity NL (SA)	**241,397,143**	**7.79**	**8.12**	**15.61**	**17.78**	**12.48**	**12.14**	**N/A**	**12.43**	**05/01/2018**
S&P 500 Index (Cap Wtd)			8.74	16.89	19.59	14.60	12.31	12.86	12.54	
Excess Return			-0.62	-1.28	-1.81	-2.12	-0.17	N/A	-0.11	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	11.53	
Rank			53	48	62	73	26	N/A	23	
BNYM SciBeta US Max Decorrelation (SA)	**134,879,488**	**4.35**	**3.42**	**7.34**	**12.52**	**N/A**	**N/A**	**N/A**	**11.45**	**10/01/2020**
SciBeta Max Decorrelation Index			3.44	7.39	12.65	12.99	9.57	11.51	11.62	
Excess Return			-0.02	-0.05	-0.13	N/A	N/A	N/A	-0.17	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	11.14	
Rank			97	94	92	N/A	N/A	N/A	44	
TOBAM Max Diversification USA (SA)	**115,140,098**	**3.72**	**1.15**	**3.05**	**7.23**	**N/A**	**N/A**	**N/A**	**3.02**	**10/01/2020**
TOBAM Max Diversification Index			1.01	2.93	7.26	5.67	6.03	10.05	3.15	
Excess Return			0.14	0.12	-0.03	N/A	N/A	N/A	-0.13	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	11.14	
Rank			100	99	99	N/A	N/A	N/A	100	
L&G MSCI USA Index (CIT)	**181,396,214**	**5.85**	**8.60**	**16.97**	**19.39**	**N/A**	**N/A**	**N/A**	**11.79**	**10/01/2020**
MSCI USA Index (Net)			8.60	16.84	18.98	13.59	11.61	12.16	11.18	
Excess Return			0.00	0.13	0.41	N/A	N/A	N/A	0.61	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	11.14	
Rank			38	29	36	N/A	N/A	N/A	35	
SSGA MSCI USA EW Index (SA)	**192,225,302**	**6.20**	**4.55**	**8.74**	**13.65**	**N/A**	**N/A**	**N/A**	**11.93**	**11/01/2020**
MSCI USA Equal Weighted Index (Net)			4.43	8.47	13.06	12.53	8.27	10.11	11.41	
Excess Return			0.12	0.27	0.59	N/A	N/A	N/A	0.52	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	12.63	
Rank			95	91	88	N/A	N/A	N/A	67	
SSGA MSCI USA Small Cap Index (CF)	**45,124,522**	**1.46**	**5.23**	**9.34**	**15.36**	**N/A**	**N/A**	**N/A**	**12.27**	**11/01/2020**
MSCI US Sm Cap Index (USD) (Net)			5.12	9.09	14.82	13.31	6.29	9.35	11.79	
Excess Return			0.11	0.25	0.54	N/A	N/A	N/A	0.48	
IM U.S. Small Cap Equity (MF) Median			4.29	8.15	12.94	13.38	5.37	8.48	12.60	
Rank			32	38	32	N/A	N/A	N/A	52	

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RVK

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
NISA S&P 500 Futures (SA)	**69,401,441**	**2.24**	**8.30**	**15.99**	**18.16**	**14.06**	**N/A**	**N/A**	**11.19**	**02/01/2020**
S&P 500 Index (Cap Wtd)			8.74	16.89	19.59	14.60	12.31	12.86	11.70	
Excess Return			-0.44	-0.90	-1.43	-0.54	N/A	N/A	-0.51	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	10.74	
Rank			48	43	56	31	N/A	N/A	37	
Mellon SciBeta Inflation Plus (SA)	**95,832,857**	**3.09**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**07/01/2023**
SciBeta Inflation Plus Index			5.38	11.34	16.58	N/A	N/A	N/A	N/A	
Excess Return			N/A	N/A	N/A	N/A	N/A	N/A	N/A	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	N/A	
Rank			N/A	N/A	N/A	N/A	N/A	N/A	N/A	
L&G SciBeta Inflation Plus (SA)	**98,196**	**0.00**	**5.62**	**11.56**	**16.75**	**N/A**	**N/A**	**N/A**	**-1.88**	**12/01/2021**
SciBeta Inflation Plus Index			5.38	11.34	16.58	N/A	N/A	N/A	-1.95	
Excess Return			0.24	0.22	0.17	N/A	N/A	N/A	0.07	
IM U.S. Large Cap Core Equity (MF) Median			8.23	15.42	18.44	13.41	11.37	11.84	-1.11	
Rank			91	83	72	N/A	N/A	N/A	66	
Developed Markets Equity										
Walter Scott Dev Mkts Int'l Equity (SA)	**201,626,229**	**6.51**	**3.36**	**16.71**	**21.39**	**7.21**	**7.99**	**7.91**	**8.36**	**10/01/1992**
MSCI EAFE Index (USD) (Net)			2.95	11.67	18.77	8.93	4.39	5.41	5.72	
Excess Return			0.41	5.04	2.62	-1.72	3.60	2.50	2.64	
IM All EAFE (MF) Median			3.13	11.94	17.93	8.25	3.97	5.09	6.72	
Rank			37	1	11	66	2	4	4	
1607 Capital Partners Int'l Equity EAFE (SA)	**150,120,452**	**4.84**	**2.91**	**9.08**	**13.95**	**8.38**	**4.24**	**6.39**	**7.04**	**08/01/2010**
90% MSCI EAFE/10% MSCI EM Index			2.76	10.99	17.05	8.32	4.09	5.21	5.47	
Excess Return			0.15	-1.91	-3.10	0.06	0.15	1.18	1.57	
IM International Core Equity (MF) Median			3.05	11.29	16.59	8.31	3.61	5.05	5.32	
Rank			57	83	70	50	31	5	6	
BNYM DB Dynamic Global Ex US Eq (CF)	**28,146,773**	**0.91**	**2.36**	**9.79**	**12.02**	**5.72**	**N/A**	**N/A**	**4.53**	**09/01/2019**
MSCI ACW Ex US Index (USD) (Net)			2.44	9.47	12.72	7.22	3.52	4.75	5.45	
Excess Return			-0.08	0.32	-0.70	-1.50	N/A	N/A	-0.92	
IM ACWI Ex US Core (MF) Median			2.54	9.80	14.26	7.48	3.73	4.96	5.86	
Rank			62	52	82	83	N/A	N/A	88	

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Composite: Total Fund
As of June 30, 2023
Asset Allocation & Performance - Net of Fees

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
NISA EAFE Futures (SA)	**34,397,705**	**1.11**	**3.01**	**11.75**	**17.38**	**8.64**	**N/A**	**N/A**	**4.61**	**02/01/2020**
MSCI EAFE Index (USD) (Net)			2.95	11.67	18.77	8.93	4.39	5.41	4.71	
Excess Return			0.06	0.08	-1.39	-0.29	N/A	N/A	-0.10	
IM All EAFE (MF) Median			3.13	11.94	17.93	8.25	3.97	5.09	4.85	
Rank			58	55	58	46	N/A	N/A	55	
NT MSCI World Ex US Small Cap Index (CF)	**42,909,210**	**1.38**	**0.41**	**5.46**	**10.39**	**6.67**	**N/A**	**N/A**	**2.11**	**08/01/2018**
MSCI Wrld Ex US Sm Cap Index (USD) (Net)			0.49	5.50	10.05	6.42	1.83	5.97	1.74	
Excess Return			-0.08	-0.04	0.34	0.25	N/A	N/A	0.37	
IM International SMID Cap Equity (MF) Median			0.71	7.27	11.47	5.56	1.79	5.45	1.67	
Rank			61	80	62	39	N/A	N/A	44	
NISA FX Hedged EAFE Future (SA)	**38,359,908**	**1.24**	**4.41**	**12.98**	**18.06**	**N/A**	**N/A**	**N/A**	**4.27**	**01/01/2022**
MSCI EAFE Index (USD) (Net) (Hedged)			5.04	13.79	21.32	13.69	8.55	9.02	5.62	
Excess Return			-0.63	-0.81	-3.26	N/A	N/A	N/A	-1.35	
IM All EAFE (MF) Median			3.13	11.94	17.93	8.25	3.97	5.09	-3.50	
Rank			7	29	48	N/A	N/A	N/A	4	
Emerging Markets Equity										
Baillie Gifford EM Equity Class 3 (MF)	**125,828,965**	**4.06**	**3.50**	**11.12**	**8.83**	**1.79**	**2.68**	**N/A**	**6.10**	**10/01/2016**
MSCI Emerging Markets Index (USD) (Net)			0.90	4.89	1.75	2.32	0.93	2.95	3.80	
Excess Return			2.60	6.23	7.08	-0.53	1.75	N/A	2.30	
IM Emerging Markets Equity (MF) Median			1.81	7.09	4.65	2.09	1.14	2.84	3.57	
Rank			25	14	26	54	23	N/A	13	
L&G MSCI EM Index (CIT)	**73,399,704**	**2.37**	**0.91**	**4.92**	**1.68**	**N/A**	**N/A**	**N/A**	**-0.91**	**10/01/2020**
MSCI Emerging Markets Index (USD) (Net)			0.90	4.89	1.75	2.32	0.93	2.95	-0.82	
Excess Return			0.01	0.03	-0.07	N/A	N/A	N/A	-0.09	
IM Emerging Markets Equity (MF) Median			1.81	7.09	4.65	2.09	1.14	2.84	-1.13	
Rank			72	78	71	N/A	N/A	N/A	48	
NISA EM Futures (SA)	**7,869,944**	**0.25**	**1.20**	**4.94**	**0.06**	**1.98**	**N/A**	**N/A**	**0.35**	**02/01/2020**
MSCI Emerging Markets Index (USD) (Net)			0.90	4.89	1.75	2.32	0.93	2.95	0.40	
Excess Return			0.30	0.05	-1.69	-0.34	N/A	N/A	-0.05	
IM Emerging Markets Equity (MF) Median			1.81	7.09	4.65	2.09	1.14	2.84	0.50	
Rank			65	78	83	51	N/A	N/A	52	

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RVK

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
Real Estate Equity										
Principal US Property Account (CF)	**175,074,141**	**5.65**	**-1.86**	**-4.97**	**-10.46**	**7.37**	**6.20**	**8.52**	**7.03**	**09/01/2004**
NCREIF ODCE Index (AWA) (Net)			-2.88	-6.16	-10.73	7.04	5.56	7.77	6.77	
Excess Return			1.02	1.19	0.27	0.33	0.64	0.75	0.26	
Fidelity US REITs Completion Index (SA)	**99,653,433**	**3.22**	**2.63**	**6.80**	**0.81**	**9.66**	**N/A**	**N/A**	**2.74**	**01/01/2020**
Fidelity REITs Completion Index			2.74	6.94	1.14	9.85	N/A	N/A	2.88	
Excess Return			-0.11	-0.14	-0.33	-0.19	N/A	N/A	-0.14	
Agincourt FTSE NAREIT Equity REITs Index (SA)	**10,105,441**	**0.33**	**2.55**	**5.00**	**-0.42**	**N/A**	**N/A**	**N/A**	**-1.07**	**05/01/2021**
FTSE NAREIT All Eq REITs Index (TR)			1.20	2.97	-4.39	6.12	4.78	6.81	-3.18	
Excess Return			1.35	2.03	3.97	N/A	N/A	N/A	2.11	
Infrastructure Equity										
IFM Global Infrastructure A (CF)	**92,851,610**	**3.00**	**2.53**	**5.16**	**9.59**	**12.21**	**N/A**	**N/A**	**11.60**	**04/01/2020**
S&P Gbl Infrastructure Index (Net)			-0.42	3.30	3.25	9.75	4.42	5.77	13.34	
Excess Return			2.95	1.86	6.34	2.46	N/A	N/A	-1.74	
Fidelity DJ Brookfield Infrastructure Index (SA)	**64,571,186**	**2.08**	**-0.12**	**3.14**	**0.55**	**7.83**	**N/A**	**N/A**	**2.18**	**01/01/2020**
DJ Brookfield Gbl Infrastructure Comp Idx			-0.43	2.66	0.80	7.45	4.59	5.33	1.73	
Excess Return			0.31	0.48	-0.25	0.38	N/A	N/A	0.45	
US Treasuries										
Agincourt 1-3 Year Treasury (SA)	**185,189,153**	**5.98**	**-0.50**	**0.95**	**0.03**	**-1.15**	**N/A**	**N/A**	**0.45**	**05/01/2019**
Bloomberg US Trsy 1-3 Yr Index			-0.60	0.98	0.15	-1.12	0.93	0.75	0.47	
Excess Return			0.10	-0.03	-0.12	-0.03	N/A	N/A	-0.02	
IM U.S. Short Term Treasury/Govt Bonds (MF) Median			-0.64	0.93	-0.35	-1.46	0.46	0.49	0.05	
Rank			36	47	36	30	N/A	N/A	20	
Agincourt 1-5 Yr US TIPS (SA)	**63,241,097**	**2.04**	**-0.94**	**1.41**	**-0.59**	**2.13**	**N/A**	**N/A**	**2.50**	**01/01/2020**
Bloomberg US TIPS 1-5 Yr Index			-0.97	1.28	-0.60	2.01	2.62	1.67	2.36	
Excess Return			0.03	0.13	0.01	0.12	N/A	N/A	0.14	
IM U.S. TIPS (MF) Median			-1.48	1.53	-1.42	-0.15	2.23	1.61	1.43	
Rank			15	59	26	16	N/A	N/A	12	

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RVK

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
NISA 30 Year Treasury Futures (SA)	**61,701,893**	**1.99**	**-2.54**	**2.98**	**-11.99**	**-12.63**	**N/A**	**N/A**	**-12.63**	**05/01/2020**
Bloomberg US Trsy Bellwethers 30 Yr Index			-2.36	3.49	-9.68	-14.46	-1.73	1.32	-14.48	
Excess Return			-0.18	-0.51	-2.31	1.83	N/A	N/A	1.85	
IM U.S. Long Term Treasury/Govt Bond (MF) Median			-1.62	1.50	-3.25	-4.85	-0.06	0.83	-4.60	
Rank			89	22	98	93	N/A	N/A	96	
Hoisington Macroeconomic US Treasuries (SA)	**56,424,181**	**1.82**	**-2.13**	**3.96**	**-8.30**	**-13.67**	**N/A**	**N/A**	**-2.19**	**05/01/2019**
Bloomberg US Trsy Index			-1.38	1.59	-2.13	-4.80	0.44	0.96	-0.38	
Excess Return			-0.75	2.37	-6.17	-8.87	N/A	N/A	-1.81	
IM U.S. Long Term Treasury/Govt Bond (MF) Median			-1.62	1.50	-3.25	-4.85	-0.06	0.83	-0.93	
Rank			64	18	94	97	N/A	N/A	85	
US Mortgages										
DoubleLine MBS (SA)	**70,056,892**	**2.26**	**-0.54**	**2.22**	**-2.04**	**-3.75**	**N/A**	**N/A**	**-1.63**	**08/01/2019**
Bloomberg US MBS Index (Unhgd)			-0.64	1.87	-1.52	-3.73	0.03	1.13	-1.60	
Excess Return			0.10	0.35	-0.52	-0.02	N/A	N/A	-0.03	
IM U.S. Mortgage Backed Bonds (MF) Median			-0.75	1.79	-1.85	-3.56	-0.12	0.83	-1.61	
Rank			31	26	60	63	N/A	N/A	53	
US Credit										
PGIM US IG Corporate Bond (CIT)	**80,262,540**	**2.59**	**-0.18**	**3.71**	**2.13**	**-2.94**	**N/A**	**N/A**	**0.02**	**08/01/2019**
Bloomberg US Crdt Index			-0.31	3.13	1.39	-3.38	1.65	2.51	-0.55	
Excess Return			0.13	0.58	0.74	0.44	N/A	N/A	0.57	
IM U.S. Corporate Bonds (MF) Median			-0.48	3.15	1.13	-3.45	1.43	2.36	-0.63	
Rank			22	23	15	33	N/A	N/A	20	
Asset Allocation										
Agincourt Passive Index (SA)	**86,262,259**	**2.78**	**3.58**	**9.32**	**9.86**	**N/A**	**N/A**	**N/A**	**0.61**	**01/01/2021**
Passive Benchmark			3.07	8.82	9.25	4.53	4.62	5.46	-0.86	
Excess Return			0.51	0.50	0.61	N/A	N/A	N/A	1.47	
Commodities & Other										
NISA Gold Futures (SA)	**38,725,275**	**1.25**	**-6.34**	**2.08**	**1.79**	**1.40**	**N/A**	**N/A**	**3.04**	**05/01/2020**
Bloomberg Gold Sub Index (TR)			-2.52	5.38	6.23	1.12	7.80	3.78	2.81	
Excess Return			-3.82	-3.30	-4.44	0.28	N/A	N/A	0.23	

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RVK

Composite: Total Fund
Asset Allocation & Performance - Net of Fees

As of June 30, 2023

	Allocation		Rate of Return (%)							
	Market Value ($)	%	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	Since Incep.	Inception Date
US Dollar Instruments										
Agincourt 1-3 Month Treasury (SA)	**116,966,279**	**3.77**	**1.24**	**2.32**	**3.67**	**1.25**	**N/A**	**N/A**	**1.35**	**05/01/2019**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	1.40	
Excess Return			0.02	-0.01	-0.06	-0.06	N/A	N/A	-0.05	
Mellon Government STIF (CF)	**1,926,352**	**0.06**	**1.21**	**2.30**	**3.67**	**N/A**	**N/A**	**N/A**	**1.55**	**02/01/2021**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	1.60	
Excess Return			-0.01	-0.03	-0.06	N/A	N/A	N/A	-0.05	
COAERS USD (SA)	**1,012,095**	**0.03**	**0.36**	**0.70**	**1.16**	**0.40**	**N/A**	**N/A**	**0.38**	**05/01/2020**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	1.25	
Excess Return			-0.86	-1.63	-2.57	-0.91	N/A	N/A	-0.87	
BNYM Money Market Fund (SA)	**2,072,740**	**0.07**	**1.13**	**2.19**	**3.50**	**N/A**	**N/A**	**N/A**	**2.41**	**01/01/2022**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	2.57	
Excess Return			-0.09	-0.14	-0.23	N/A	N/A	N/A	-0.16	
NISA Cash and Carry (SA)	**66,023,230**	**2.13**	**0.38**	**2.47**	**N/A**	**N/A**	**N/A**	**N/A**	**4.92**	**09/01/2022**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	3.45	
Excess Return			-0.84	0.14	N/A	N/A	N/A	N/A	1.47	
Other Currencies										
NISA ST Sovereigns (SA)	**48,448,065**	**1.56**	**1.24**	**2.45**	**3.92**	**N/A**	**N/A**	**N/A**	**2.75**	**01/01/2022**
Bloomberg US T-Bills 1-3 Mo Index			1.22	2.33	3.73	1.31	1.53	0.96	2.57	
Excess Return			0.02	0.12	0.19	N/A	N/A	N/A	0.18	

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COAERS

Investment Committee
August 25, 2023

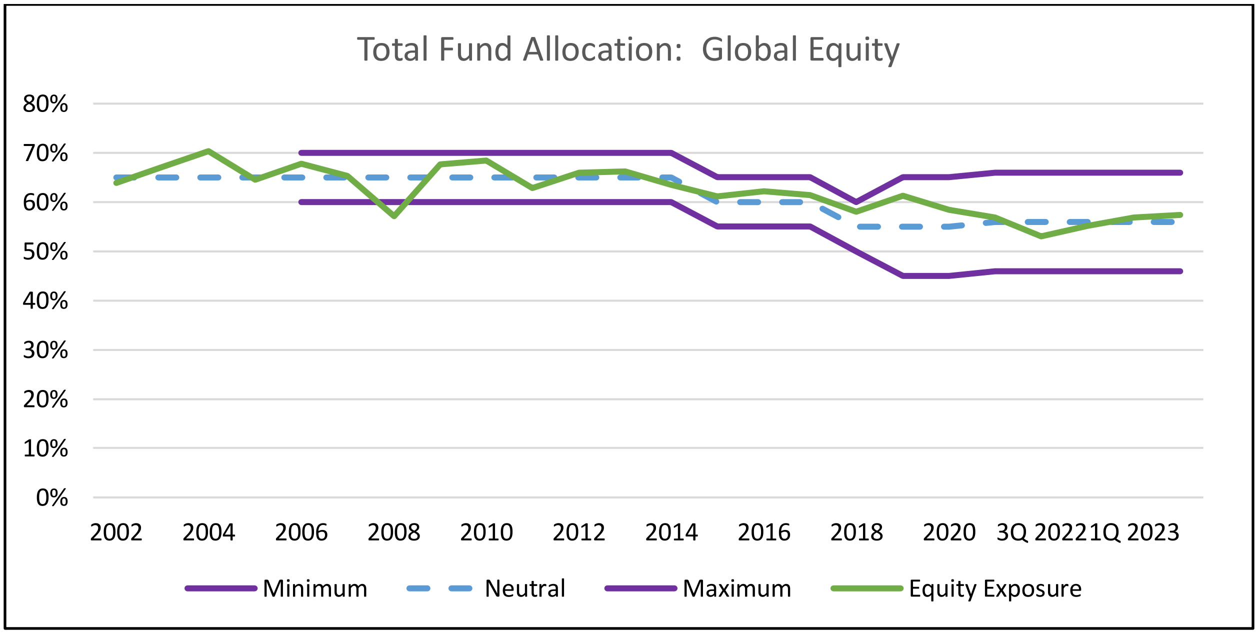
Historical Context of Global Equity

COAERS has long held exposure to the equity market over the years. While the mix of equities within the overall portfolio has changed, equities continue to serve as the main driver of long-term growth for the Fund. The current global equity portfolio is allocated across three sub-asset classes: US Equity, DM (Developed Markets) Equity, and EM (Emerging Markets) Equity.

Global Equities has changed several times, and below is a timeline that highlights some of the recent moves:

- 2018: Reduced Global Equity target allocation to fund Multi-Asset
- 2020: Equity index futures added to the portfolio
- 2020: Began adding diversifying US equity strategies

The following chart illustrates the target allocation, strategic bands, and funding position within Global Equity over time.



Global Equities Current Portfolio and Positioning

Within the Strategic Asset Allocation, the Fund has a neutral allocation to Global Equity of 56%, which includes 34% in US Equity, 16% in DM Equity, and 6% in EM Equity. As of the end of Q2 2023, Fund positioning was mostly in line with the target allocations with slight over-weights in US Equity (34.8%) and in EM Equity (6.7%).

Portfolio Returns: The Global Equity portfolio increased 4.7% during the second quarter of 2023 but lagged the Global Equity portfolio benchmark return of 5.9%. Of COAERS' three sub-asset classes, EM Equity posted the strongest relative performance, increasing by 2.5% while the MSCI EM Index rose by only 1.6%. The DM Equity portfolio was about in-line with its sub-asset class benchmark, both increasing by 3.0%. EM and DM Equities have both outperformed their respective benchmarks year-to-date.

The US Equity portfolio's second quarter performance of 6.0% lagged the benchmark's 8.6% return. The underperformance was mostly due to the underperformance of COAERS' US equity diversifying strategies, which accounted for about 50% of the weight of the US equity sub-asset class. Cap-weighted performance was significantly greater than equal-weighted and other diversifying strategy performance.

The following table provides characteristics of COAERS' equity portfolio and sub-asset classes on a longer time horizon (three years):

	Global Equity	US Equity	DM Equity	EM Equity
Benchmark (BM)	MSCI ACWI IMI	MSCI USA	MSCI World ex-US	MSCI EM
BM 3Y Return*	10.94%	13.56%	9.27%	2.22%
Portfolio 3Y Return	9.37%	12.02%	7.88%	1.57%
Portfolio Excess Return	-1.57%	-1.54%	-1.39%	-0.65%
TE Realized	149 bps	235 bps	379 bps	409 bps
TE Target	n/a	200 bps	400 bps	500 bps
TE Max	n/a	500 bps	700 bps	800 bps
Portfolio Volatility	17.0%	17.8%	17.5%	20.1%
BM Volatility	17.1%	18.2%	17.8%	17.7%
Portfolio Beta	0.99	0.97	0.96	1.12

**BM Returns include passive fee based on COAERS Premier List*

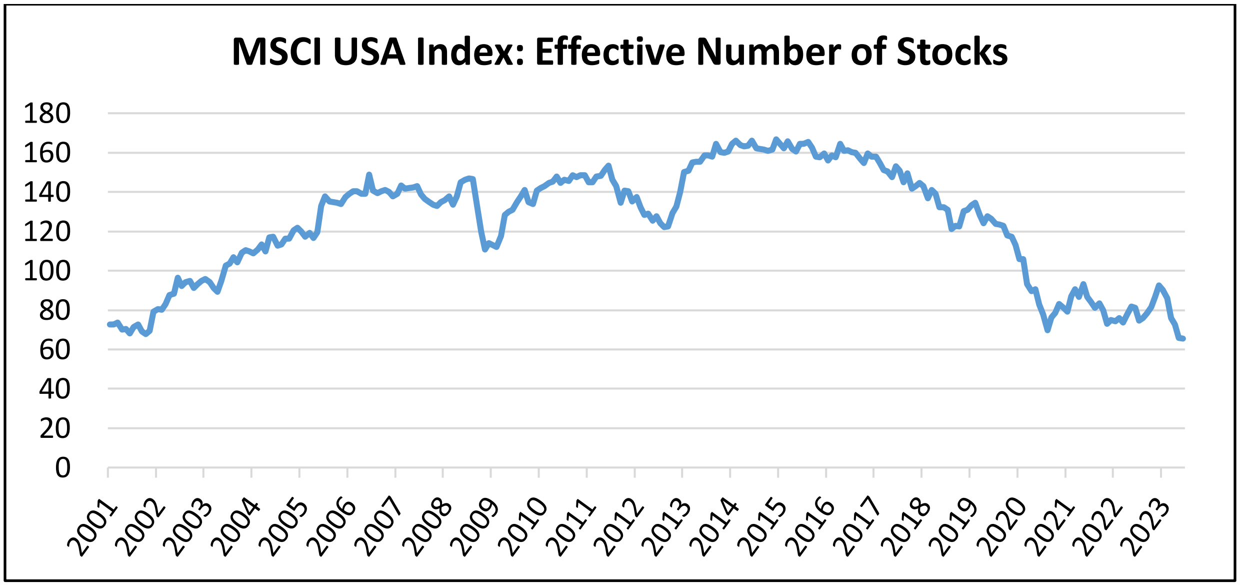
Mandate Types

Market Cap & Passive Exposure: These mandates express the respective benchmark exposures within their sub-asset classes. The exposures provide capitalization-weighted index exposure across US and developed markets, as well as emerging markets. By investing in cap-weighted indexes, the mandates larger companies receive a higher allocation than smaller ones. These mandates are expected to have low tracking error and remain cost-effective.

The equity portfolio uses equity index futures to gain a portion of this passive equity index exposure. Since their addition to the portfolio, equity index futures have increased the portfolio's rebalancing capabilities and have enhanced the liquidity profile, particularly in Emerging Markets. Furthermore, each futures position is fully collateralized.

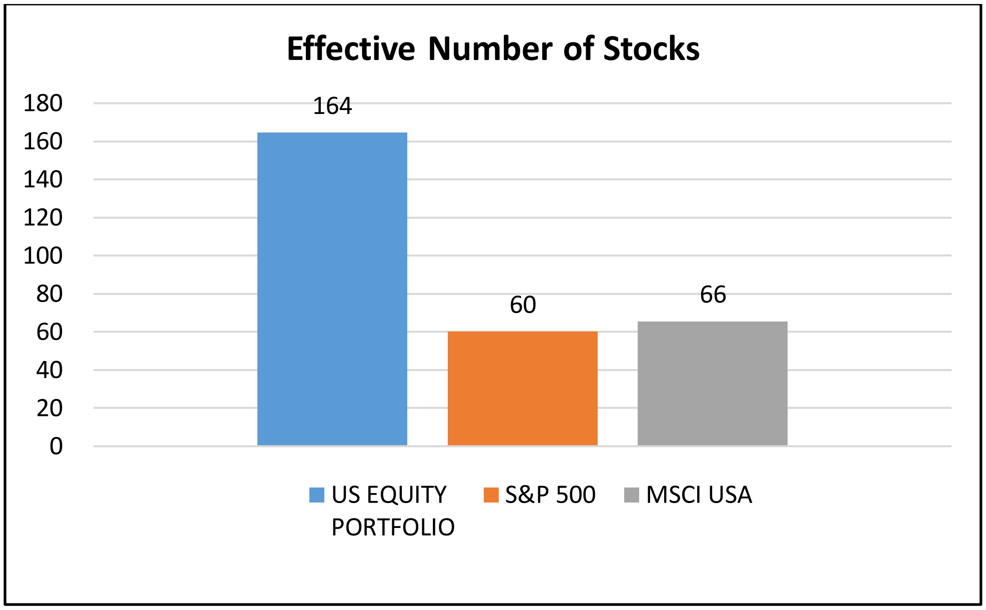
The equity portfolio also can employ leverage through equity index call options, which provide leverage while limiting downside risk. Currently, COAERS does not have an options position given the risk profile of the fund.

Diversifiers: Diversifying equity strategies are deployed within the US Equity portfolio and are meant to provide differentiated market exposures versus the cap-weighted benchmarks. For these mandates, the universe of available securities remains the respective benchmarks. In the past several years, stock concentration within US equity indexes such as the MSCI USA has reduced some of its diversification characteristics. This concentration can be measured by the index's effective number of stocks. As this number decreases, diversification decreases because fewer stocks are needed to replicate the index.

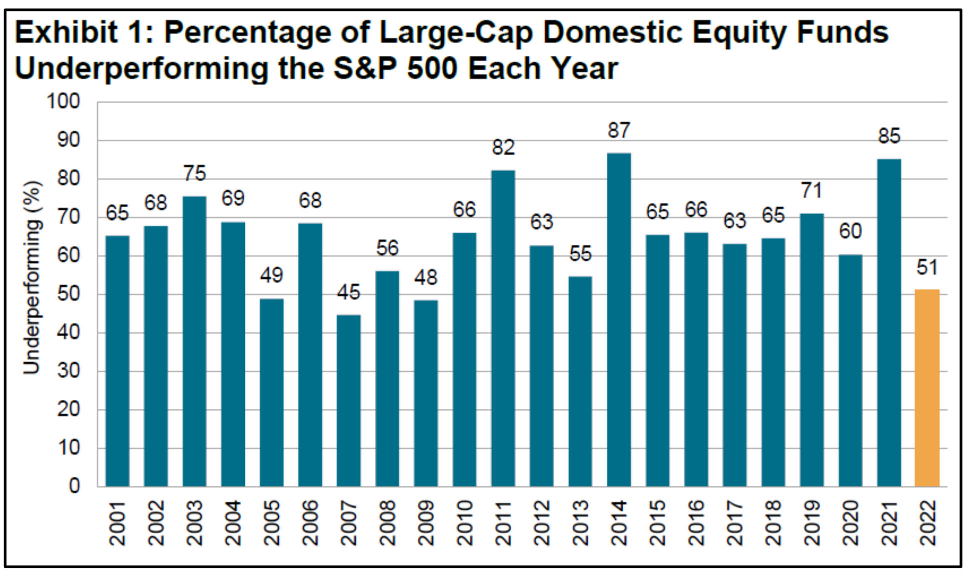


However, portfolio construction for diversifying strategies moves beyond security size, which is the main driver in the market cap strategies. COAERS has increased its allocation to diversifying strategies from 37% to 41% of US Equity as stock concentration within the cap-weighted indexes has increased.

COAERS' US Equity diversifying strategies have increased the number of effective stocks, and thus increased overall diversification within the portfolio.

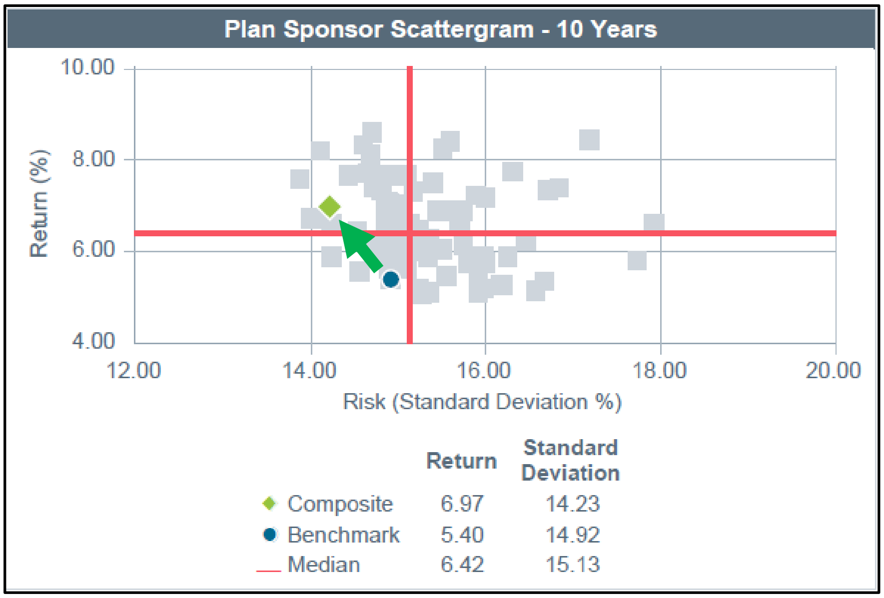


Active Management: COAERS employs active equity mandates across each of the three sub-asset classes, and the decision of whether to employ active management is guided by the opportunity set within each asset class. Opportunity for active management to outperform within the US is limited versus other markets. There is only one active strategy within US Equities, and it is unique in that it does not pick individual stocks.



Source: SPIVA Institutional Scorecard 2022

Within the DM and EM Equity portfolios, traditional active management is used by most of the mandates within each sub-asset class. Within DM Equity, active management as a percentage of net assets makes up 75% of the total sub-asset class. Over time horizons of ten years and longer, this decision has been accretive to the fund on a net of fees basis.



Source: RVK June 2Q23 Quarterly Report, annotated by Staff

EM Equity has only three mandates, which is fewer than the other equity sub-assets classes. Currently, the largest allocation (60%) is an actively managed mandate. The results of active management within EM Equity have been mixed over the years. The recent ten-year performance results show the portfolio underperforming the index by 31 basis points over ten years on a net-of-fees basis.

Implementation

Collective Investment Trusts (CITs): CITs have historically been used to gain access to large parts of the equity universe with a single investment. These vehicles provided cost-effective exposure to the market while maintaining daily liquidity. Currently, COAERS utilizes CITs to gain passive, equity index exposure within the US and the Emerging Markets sub-asset classes.

Futures: COAERS began investing in equity index futures in 2020, and since then, has used futures across all three equity sub-asset classes. While equity index futures provide the ability to assume leverage, COAERS does not currently use these instruments to add leverage and maintains fully collateralized futures positions. Equity index futures provide cost effective market exposure while reducing transaction costs when compared to holding individual securities or investing in a fund. This is especially true of emerging market equity index futures. As of the end of Q1, the Fund received approximately 4.8% of its total equity exposure using equity futures mandates and the remaining exposure through CITs and securities held in SMAs.

Securities: All three equity sub-asset classes hold individual securities through separately managed accounts except for Emerging Markets. The liquidity profile of many of the emerging market countries, in addition to operational complexities, make commingled vehicles the preferred vehicle choice and more cost effective.

Benchmarking

COAERS' Global Equity benchmark is the MSCI All Country World Index Investable Market Index (ACWI IMI), a global equity index comprised of small, medium, and large capitalization companies from developed and emerging markets. MSCI ACWI IMI includes over 9,000 constituents and represents most of the investable public market opportunity set.

At the sub-asset class level, the Investment Policy Statement (IPS) implements the following benchmarks:

- US Equity's benchmark is the MSCI USA Index, which is a market capitalization weighted benchmark of US public equities.
- DM Equity's benchmark is the MSCI World ex-US Index, which is a market capitalization weighted benchmark of developed market public equities; and
- EM Equity's benchmark is the MSCI EM Index, which is a market capitalization weighted benchmark of emerging market public equities.

The equity sub-asset class structuring reflects the makeup of Global Equity's benchmark, ACWI IMI. The largest component of the index and the portfolio is comprised of US Equities, followed by the rest of developed market equities, and then emerging market equities.

Within US Equities, COAERS employs several diversifying strategies as noted previously. While these strategies play a key role in reducing concentration risk within the indexes, they also incur tracking error when compared to the cap-weighted benchmark, the MSCI USA Index. Staff will review with the Board the current benchmark as well as other alternatives for US Equities at the next discussion of Global Equity benchmarks.

Summary

Global equity markets performed well in the first quarter of 2023 on an absolute basis, after experiencing negative performance during 2022. COAERS' Global Equity portfolio posted its second consecutive positive quarter for the year, and all equity mandates posted positive absolute returns over the same period. Overall, cap-weighted equity indexes continued their concentration around the largest names, which caused COAERS diversifying strategies to be a drag on performance. As the main growth engine within COAERS' overall portfolio, the current balance of equity mandates continues to provide a balanced mix of broad market exposure and active strategies. The current results, combined with the growing concentration of public equity indices, make the case to continue to seek out diversifying assets, especially growth assets as defined within a functional portfolio.

Glossary

- Collective investment trust (CIT): COAERS owns shares in a pooled fund that is sponsored by a bank or trust company and is open only to institutional investors. As such, it is not considered a security under US law and is governed instead by federal and/or state banking laws.

- Exchange Traded Fund (ETF): COAERS owns shares in a pooled fund that is sponsored by a bank or trust company. ETFs are traded on an exchange, and as such they offer intraday liquidity since they can be bought and sold intraday through a brokerage firm.

- Futures: COAERS owns futures on stock indices and bonds. Ownership of a future represents a contractual obligation to take delivery of the underlying stock index, bond, gold warrant, etc., at an agreed upon price and at a future date.

- Limited partnership (LP): COAERS is a limited partner in a legal entity that invests according to a pre-determined strategy and is managed by a general partner.

- Mutual fund (MF): COAERS owns shares in a pooled fund of both institutional and retail investors that is managed by a registered investment advisor according to US securities laws.

- Separately managed account (SMA): the underlying shares are owned directly by COAERS, and the manager has authorization to trade that account.

- Warrant: COAERS owns warrants on gold bars. The warrants are registered with the Commodity Exchange Inc. (COMEX) and are claims on individual gold bars stored in vaults throughout the United States.

Appendix

Global Equity: US Equities (Strategic Benchmark: MSCI USA Net Index)

- **Newton Capital Dynamic US Equity (DUSE):** this strategy seeks to outperform the broad US equity market while taking comparable amounts of risk by dynamically allocating between stocks, bonds, and cash. The strategy invests primarily in cash instruments and may also use modest amounts of borrowing using futures and options to control risk. The strategy is managed by Newton Investment Management in a separately managed account. The manager's performance benchmark is the S&P 500, a market cap weighted US large cap index.

- **Mellon Capital Scientific Beta Maximum Decorrelation:** this strategy seeks to outperform the broad US equity market while minimizing the volatility of the portfolio. Utilizing US large cap stocks, the portfolio weights are optimized by focusing on the pair-wise correlation contributions to the portfolio. The strategy is managed by Mellon Capital and is held as shares of a collective investment trust (CIT) in which securities lending is not permitted. The manager's performance benchmark is the S&P 500, a market cap weighted US large cap index.

- **Mellon Scientific Beta Inflation Plus:** this strategy seeks to construct an equity portfolio that reacts positively to inflation surprises while maintaining the broad market exposure. The portfolio utilizes the constituents of the S&P 500 large cap stock index and weights the stocks based on their inflation sensitivities. The manager's performance benchmark is the Scientific Beta US Inflation Plus Index, a US large cap equity index weighted according to inflation sensitivities. The investment is managed by Legal & General Investment Management Americas (LGIMA), which is based in Chicago, Illinois and has a UK parent. It is managed in a separately managed account.

- **NISA S&P 500 Index Futures:** this strategy seeks to track the total return of the S&P 500 large cap stock index through the purchase of S&P 500 futures. The account is fully collateralized with Treasury bills and as a result no leverage is incurred. The mandate is managed through a separately managed account and benchmarked to the S&P 500. The investment manager is NISA Investment Advisors, which is based in St. Louis, Missouri.

- **NISA S&P 500 Index Options:** this strategy seeks to add leveraged equity exposure by buying S&P 500 Index options that are 10% in-the-money with an expiration of approximately three months. The purchase of the options is fully funded, and the leverage is provided though the option contract. The mandate is managed through a separately managed account and benchmarked to the S&P 500. The investment manager is NISA Investment Advisors, which is based in St. Louis, Missouri.

- **LGIMA MSCI USA Index Fund:** this fund seeks to track the total return of the MSCI USA index. The performance benchmark is the MSCI USA, a market cap weighted US large cap and mid cap equity index. The investment is managed by Legal & General Investment Management Americas (LGIMA), which is based in Chicago, Illinois and has a UK parent. It is held as shares of a collective investment trust (CIT) in a share class where securities lending is not permitted.

- **TOBAM Maximum Diversification USA:** this strategy seeks to outperform the MSCI USA Index on a risk-adjusted basis by constructing a more diversified portfolio. Maximum Diversification USA utilizes TOBAM's patented Diversification Ratio to quantify portfolio diversification and then to maximize the ratio. By maximizing the diversification of a portfolio, risk-adjusted returns are improved as the portfolio is better compensated for each unit of risk. TOBAM is based in Paris, France, but is also registered with the SEC in the US. TOBAM manages the strategy in a separately managed account.

- **State Street MSCI USA Equal Weight Index:** this strategy seeks to track the total return of the MSCI USA Large Cap Equal Weighted Index. The manager's performance benchmark is the MSCI USA Equal Weighted Index, an equally weighted US large cap equity index. The investment is managed by State Street Global Advisors (SSGA), which is based in Boston, MA. The strategy is executed in a separately managed account.

- **State Street MSCI USA Small Cap Index Fund:** this fund seeks to track the total return of the MSCI USA Small Cap index. The performance benchmark is the MSCI USA Small Cap Index, a market cap weighted US small cap equity index. The investment is managed by State Street Global Advisors (SSGA), which is based in Boston, MA. It is held as shares of a collective investment trust (CIT) in a share class where securities lending is not permitted.

<u>Global Equity: Developed Market Equities (Strategic Benchmark: MSCI World ex-USA Net USD Index)</u>

- **1607 Capital Partners International Equities:** this strategy invests in shares of closed end mutual funds that trade at a discount to their net asset value. The manager's performance benchmark is a 90%/10% blend of the MSCI EAFE Net Index and the MSCI EM Net Index, respectively. The account is managed by 1607 Capital Partners of Richmond, Virginia and structured as a separately managed account (SMA) in which securities lending is not permitted.

- **Newton Capital Dynamic ex-US Equity (DEXUS) Fund:** this fund seeks to outperform the broad global ex-US equity market while taking comparable amounts of risk by dynamically allocating between stocks, bonds, and cash. The fund invests primarily in cash instruments and may also use modest amounts of borrowing using futures and options to control risk. The strategy is managed by Newton Investment Management and is held as shares of a collective investment trust (CIT) in which securities lending is not permitted. The manager's performance benchmark is the MSCI All Country World Index ex-USA, a market cap weighted index of global large cap stocks domiciled outside the US.

- **NISA EAFE Equity Futures:** this strategy seeks to track the total return of the MSCI EAFE equity index through the purchase of EAFE equity futures. The account is fully collateralized with Treasury bills and as a result no leverage is incurred. The mandate is managed through a separately managed account and benchmarked to the MSCI EAFE Equity Index. The MSCI EAFE Equity Index includes large and mid-cap stocks from 21 developed nations around the world, excluding the United States and Canada. The investment manager is NISA Investment Advisors, which is based in St. Louis, Missouri.

- **NISA Hedged EAFE Equity Futures:** this strategy seeks to track the total return of the MSCI EAFE equity hedged to USD index through the purchase of EAFE equity futures and the sale of foreign currency futures. The account is fully collateralized with Treasury bills and as a result no leverage is incurred. The mandate is managed through a separately managed account and benchmarked to the MSCI EAFE Hedged to USD Equity Index. The MSCI EAFE Equity Hedged to USD Index includes large and mid-cap stocks from 21 developed nations around the world, excluding the United States and Canada. The investment manager is NISA Investment Advisors, which is based in St. Louis, Missouri.

- **NTAM Developed International Small Cap (DISC) Fund:** this fund seeks to track the returns of the MSCI World ex-US Small Cap Index, a market cap weighted index representing small cap equities in all 23 Developed Markets (DM) countries except the US. The investment is made via shares in a mutual fund managed by Northern Trust Asset Management, which is based in Chicago, Illinois. The manager's performance benchmark is the MSCI World ex US Small Cap Index.

- **Walter Scott EAFE Equities:** this strategy holds 40-50 high quality large cap international (90-100% in developed markets and up to 10% in emerging markets) stocks with good long-term fundamentals and reasonable valuation. The investment is structured as a separately managed account (SMA) managed by Walter Scott & Co., a firm based in Edinburgh, Scotland. The manager's performance benchmark is the MSCI EAFE Net Index.

<u>Global Equity: Emerging Market Equities (Strategic Benchmark: MSCI EM Net USD Index)</u>

- **Baillie Gifford Emerging Market Equities Fund:** this fund holds 60-70 high quality emerging market stocks with strong long-term growth prospects and attractive valuation. The investment is held as shares of a mutual fund managed by Baillie Gifford & Co., a firm based in Edinburgh, Scotland. The manager's performance benchmark is the MSCI Emerging Markets Net index.

- **NISA EM Equity Futures:** this strategy seeks to track the total return of the MSCI EM stock index through the purchase of EM equity futures. The account is fully collateralized with Treasury bills and as a result no leverage is incurred. The mandate is managed through a separately managed account and benchmarked to the MSCI EM Equity Index. The MSCI EM Equity Index includes large and mid-cap stocks from 26 emerging market countries. The investment manager is NISA Investment Advisors, which is based in St. Louis, Missouri.

- **LGIMA MSCI EM Index Fund:** this fund seeks to track the total return of the MSCI Emerging Markets (EM) Index. The manager's performance benchmark is the MSCI EM, a market cap weighted index comprised of 26 emerging economies' large cap and mid cap companies. The investment is managed by Legal & General Investment Management Americas (LGIMA), which is based in Chicago, Illinois and has a UK parent. It is held as shares of a collective investment trust (CIT) in a share class where securities lending is not permitted.

8. Receive report on updated Asset/Liability Study

Presented by Christopher Hanson, RVK and David Stafford

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 8:
Receive report on updated Asset/Liability Study

AGENDA ITEM OBJECTIVE
The Committee will receive a presentation on the Asset/Liability study.

RELEVANCE TO STRATEGIC PLAN
This agenda item is central to **COAERS Strategic Plan Goal 1: Achieve and maintain a funding level that ensures the long-term sustainability of the retirement system.** The Asset/Liability study is also an action item included in this goal under the investment program strategic objectives.

RECOMMENDATION FOR COMMITTEE ACTION
At the Committee's discretion.

BACKGROUND
The Investment Policy Statement requires the Board to conduct an Asset/Liability Study at least every five years or in the event of a significant change in the System's contribution policy or liabilities. Given the passage of legislation changing the System's contribution policy, RVK has updated the Asset/Liability Study presented at the February IC meeting. Staff will review key takeaways as well as the next steps, and RVK will present the results of the updated August 2023 Asset/Liability Study.

The attached study covers a twenty-year period and has been prepared by RVK specifically for COAERS to:

- Present projected valuation results with respect to the funded status of the Plan.
- Present projected benefit payments of the Plan.
- Investigate asset mixes to determine those that best serve to protect and increase funding levels while providing adequate liquidity for benefit payments.

ATTACHMENTS
1. Staff Presentation on Asset/Liability Study Before and After SB 1444
2. Staff Asset/Liability Study Memo
3. RVK 2023 Asset/Liability Study Executive Summary
4. RVK 2023 Asset/Liability Study

COAERS
CITY OF AUSTIN
EMPLOYEES' RETIREMENT SYSTEM

Asset Liability Study Comparisons: Before and After SB 1444

Christopher Hanson
Executive Director
August 25, 2023

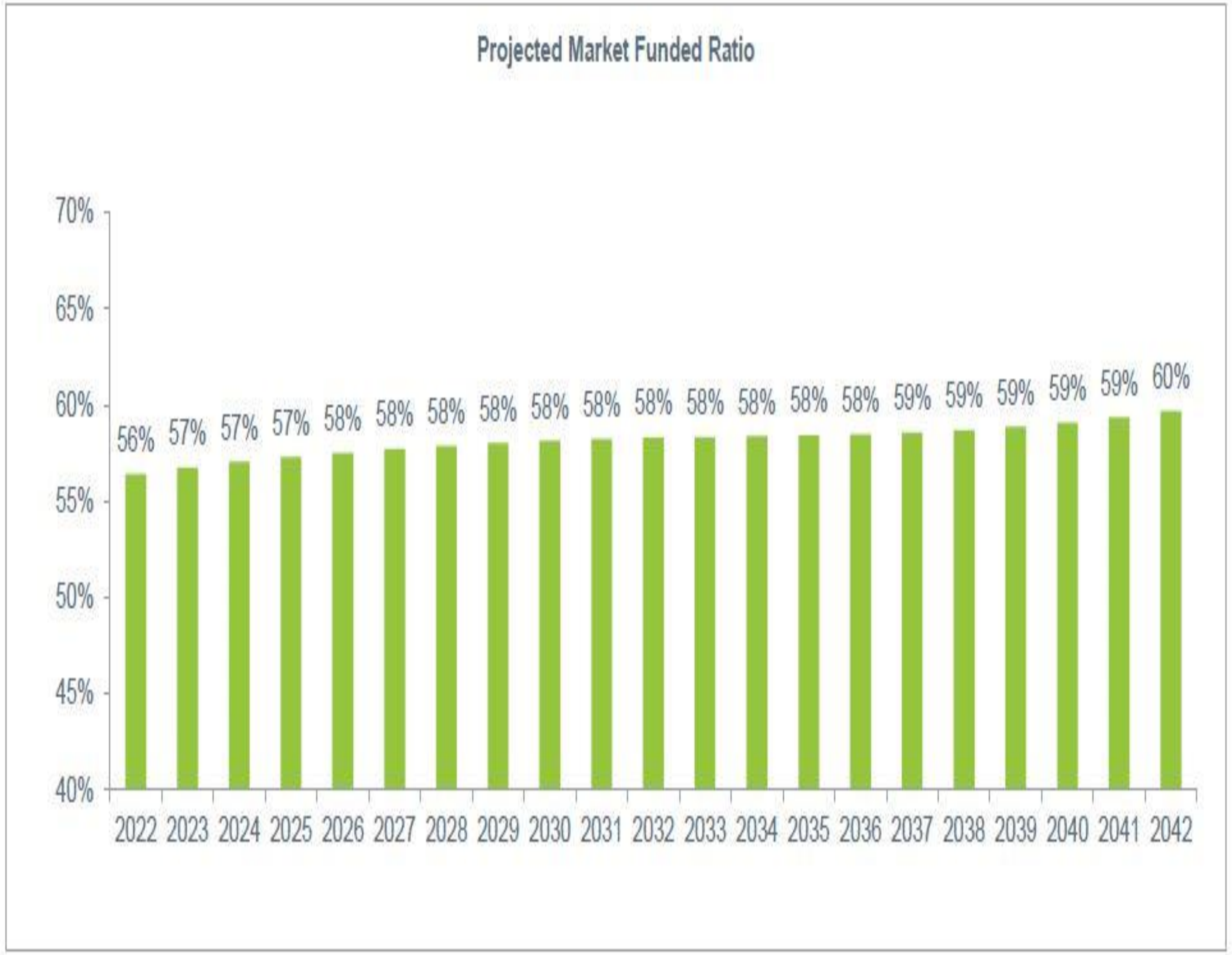
KEY TAKEAWAYS

- System funded ratio improves across all scenarios with the passage of SB 1444
- The System's unfunded actuarial accrued liabilities (UAAL) trend significantly lower with the passage of SB 1444 at the end of the projection period
- Future net cash flows are significantly better after passage of SB 1444
- Should long-term investment performance results tend closer to RVK's assumptions, additional policy steps would be prudent
- Additional portfolio diversification could provide better risk-adjusted returns

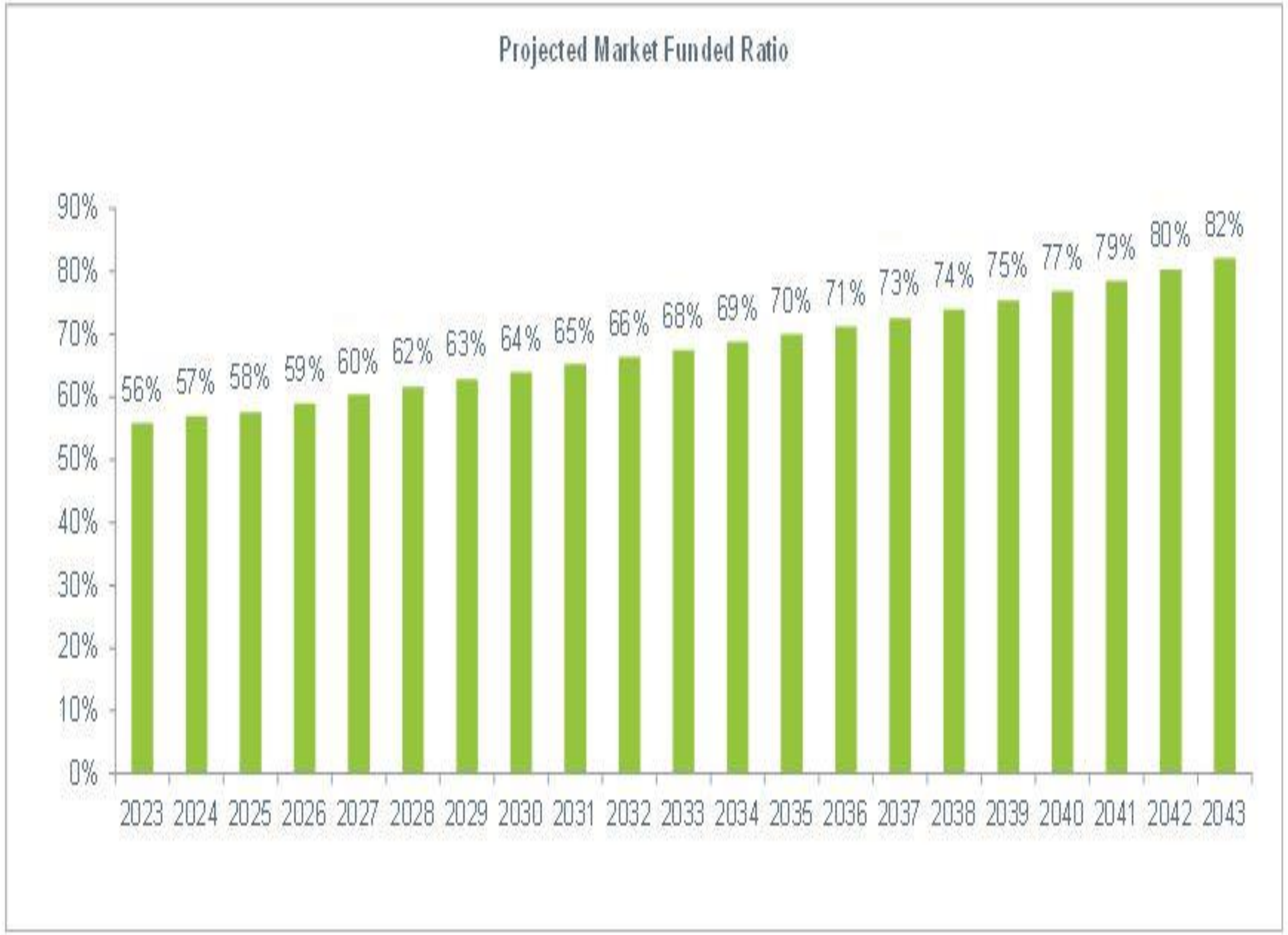
COAERS

System Funding – Deterministic Assumed Rate of Return

BEFORE



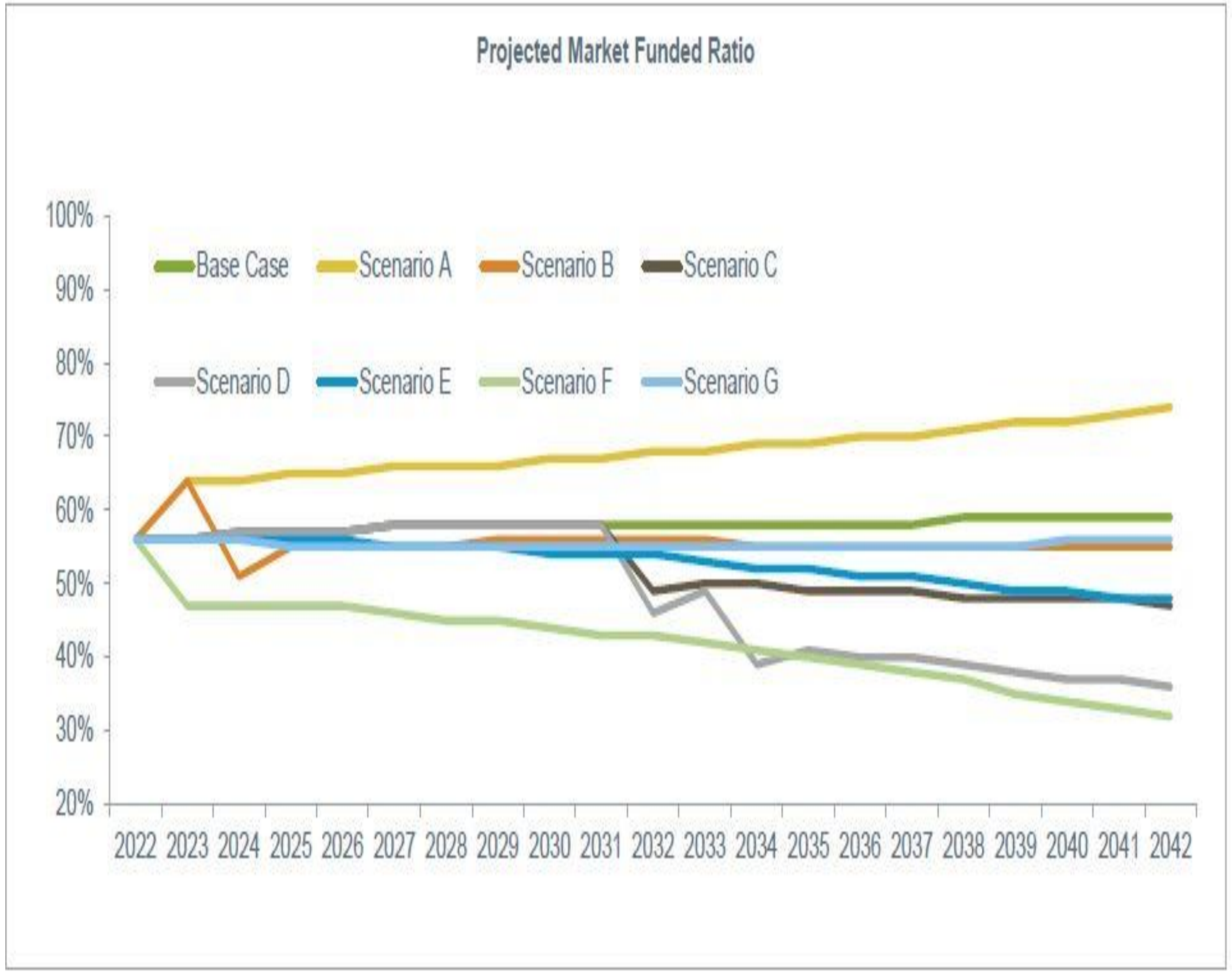
AFTER



(see page 15 of RVK Asset Liability Study)

System Funding – Sensitivity Analysis

BEFORE



AFTER

(see pages 17-18 of RVK Asset Liability Study)

System Funding – Stochastic Modeling

BEFORE

10 Years	Market Funded Ratio in Year 10		
	50th	5th	95th
100% Fixed Income	41%	30%	55%
60/40	48%	26%	85%
Current Target	50%	24%	97%
W/PC & PE	52%	24%	102%
100% Equity	53%	19%	133%

20 Years	Market Funded Ratio in Year 20		
	50th	5th	95th
100% Fixed Income	21%	5%	41%
60/40	35%	2%	102%
Current Target	39%	1%	127%
W/PC & PE	43%	1%	141%
100% Equity	48%	0%	223%

AFTER

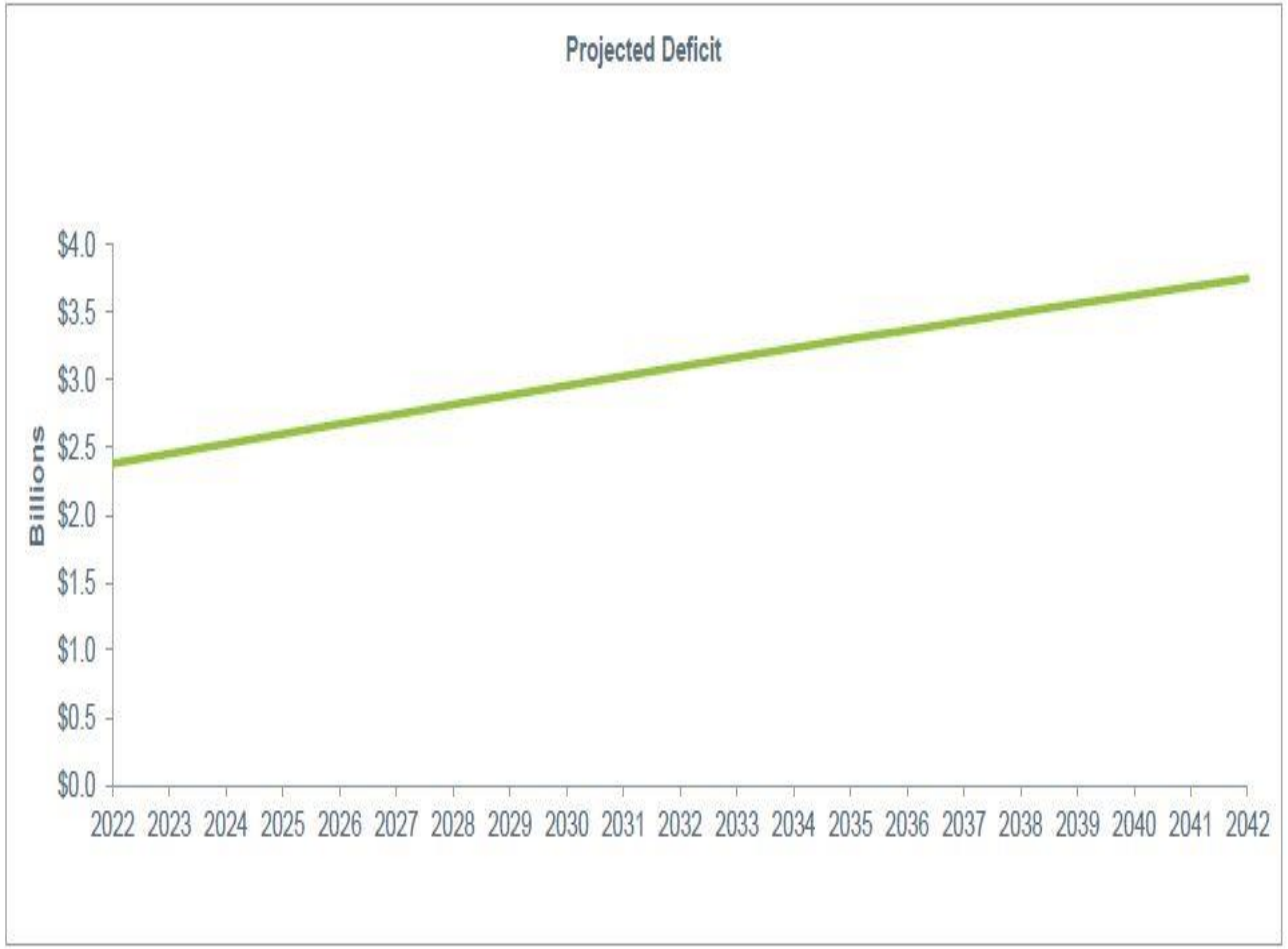
10 Years	Market Funded Ratio in Year 10		
	50th	5th	95th
100% Fixed Income	52%	41%	65%
60/40	60%	37%	98%
Current Target	62%	35%	109%
Potential Target	62%	36%	108%
W/PC & PE	63%	36%	111%
100% Equity	66%	30%	145%

20 Years	Market Funded Ratio in Year 20		
	50th	5th	95th
100% Fixed Income	46%	29%	68%
60/40	65%	27%	125%
Current Target	69%	25%	151%
Potential Target	70%	26%	150%
W/PC & PE	72%	26%	160%
100% Equity	79%	19%	250%

(see page 27 of RVK Asset Liability Study)

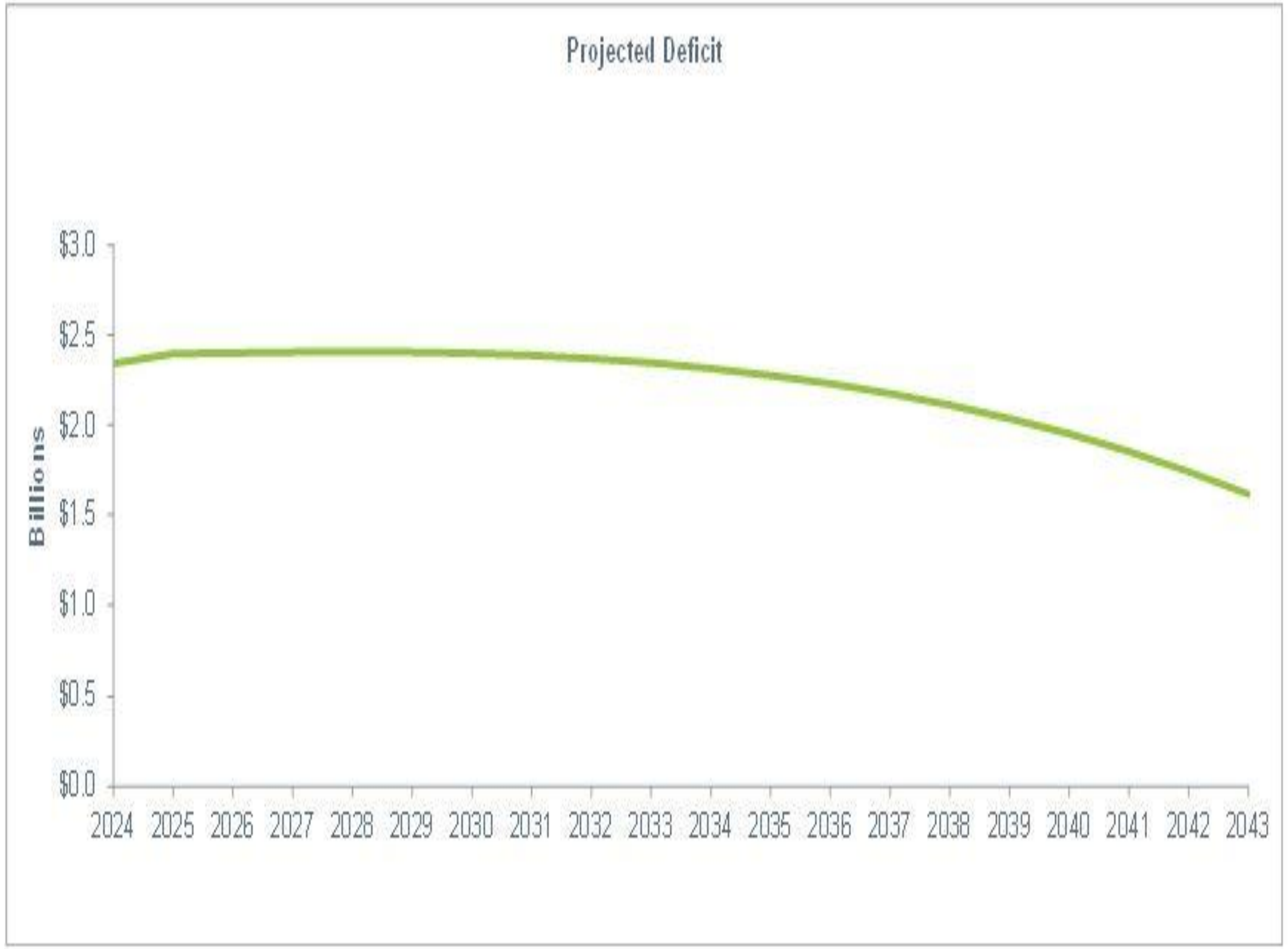
System Funding – UAAL

BEFORE



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Deficit	$2.4	$2.5	$2.5	$2.6	$2.7	$2.7	$2.8	$2.9	$3.0	$3.0	$3.1	$3.2	$3.2	$3.3	$3.4	$3.4	$3.5	$3.6	$3.6	$3.7	$3.8

AFTER



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Deficit	$2.3	$2.3	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.3	$2.3	$2.3	$2.2	$2.2	$2.1	$2.0	$2.0	$1.9	$1.7	$1.6

(see page 14 of RVK Asset Liability Study)

System Cash Flows

BEFORE

As % of Market Value

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Net Cash Flow	2.1%	2.3%	2.6%	2.8%	3.0%	3.2%	3.4%	3.6%	3.8%	3.9%	4.1%	4.2%	4.2%	4.2%	4.1%	4.1%	3.9%	3.8%	3.6%	3.5%	3.3%

AFTER

As % of Market Value

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Net Cash Flow	1.8%	0.3%	0.3%	0.8%	1.1%	1.4%	1.6%	1.8%	2.0%	2.1%	2.3%	2.4%	2.5%	2.5%	2.4%	2.4%	2.3%	2.1%	2.0%	1.8%	1.7%

(see page 12 of RVK Asset Liability Study)

Long-Term Investment Performance

RVK's capital market assumptions are lower than the System's assumed rate of return and investment performance that is closer to RVK's assumptions would likely require additional policy considerations

RVK

Memorandum

To	City of Austin Employees' Retirement System
From	RVK, Inc.
Subject	Asset/Liability Study – Executive Summary
Date	July 6, 2023

Introduction

The purpose of this memorandum is to summarize the key inferences we draw from the Asset/Liability ("A/L") study of the City of Austin Employees' Retirement System ("COAERS" or the "System"). While this memorandum refers directly to points raised within the study, we emphasize that a full understanding of the A/L study and its implications requires a close review of the study in its entirety.

Background and Key Conclusions

As of the fiscal year ending December 31, 2021, the date of the most recent actuarial valuation and the start date of the projections in this study, the System was approximately 71% funded (on a market value basis). **This study assumes a 15.6% loss on the COAERS portfolio for calendar year 2022**. Assuming a 2022 return of -15.6%, we estimate the funded ratio has fallen to 56%. This equates to a funding shortfall of approximately $2.3 billion.

This updated study reflects changes to the contribution policy recently enacted by legislation. The proposed contribution policy is a material improvement over the existing policy, with projected stochastic modeling showing funded status moving up from 39% to 69% for the current Target Allocation. While the 20-year stochastic projections still do show a notable underfunded status, it is important to note that these projections assume a 6.1% average return over the period (compared to the actuarial assumed rate of 6.75%) and no further changes to investment or contribution policy.

Strategic Asset Allocation

Taking the next step from the Asset/Liability (AL) Study, the Committee and Board will consider the Strategic Asset Allocation. Important considerations resulting from the AL Study and passage of SB 1444 for this process include:

1. The new contribution policy improves future net cash flows and would allow the System to consider a reasonable reduction in total fund liquidity
2. Additional private markets allocation could improve the risk-return profile of the Fund
3. The Fund could take slightly more risk through a portfolio which could include private credit and private equity

(see page 23 of RVK Asset Liability Study)

RVK

	100% FI	60/40	Current Target	Potential Target	W/PC & PE	100% Eq
Global Equity	0	60	56	53	47	100
US Agg Fixed Income	100	40	0	0	0	0
COAERS Fixed Income	0	0	21	21	19	0
COAERS Real Assets	0	0	15	15	15	0
COAERS Multi-Asset	0	0	7	0	0	0
Private Credit	0	0	0	10	10	0
Private Equity	0	0	0	0	8	0
Cash Equivalents	0	0	1	1	1	0
Total	100	100	100	100	100	100
Capital Appreciation	0	60	60	63	65	100
Capital Preservation	100	40	24	22	20	0
Alpha	0	0	0	0	0	0
Inflation	0	0	16	15	15	0
Expected Arithmetic Return	4.0	6.3	6.8	6.9	7.1	7.8
Expected Risk (Standard Deviation)	5.0	10.3	12.0	11.7	12.2	16.4
Expected Compound Return	3.9	5.8	6.1	6.3	6.4	6.6
Expected Sharpe Ratio	0.30	0.37	0.36	0.38	0.38	0.32
RVK Expected Eq Beta (LCUS Eq = 1)	0.07	0.61	0.71	0.69	0.71	0.97
RVK Liquidity Metric (T-Bills = 100)	85	88	85	77	70	90

In reviewing the Asset/Liability Study as presented by RVK, Staff notes to the Committee the following key takeaways:

Contribution Policy – As discussed previously, the actuarially determined employer contribution (ADEC) rate policy is significantly better than a fixed rate contribution policy. This can be seen through an increasing market value funding ratio throughout the deterministic projection period (p. 15). Importantly, the ADEC increases contributions during periods of poor market experience that significantly improve outcomes in the stochastic modelling process where even in 5th percentile scenarios the System does not fully deplete its assets (p. 25, 26).

Expected Returns – Staff notes that the efficient frontier of investable portfolios, including those that include private markets strategies, in the stochastic analysis all have estimated compound returns that are below the System's assumed rate of return (p. 24). The effects of these lower assumptions can be seen in the deterministic scenario analysis (p. 17) and stochastic analysis (p. 25). Staff notes that these lower return assumptions are based on capital market assumptions, which tend to have a high degree of uncertainty and should be viewed as a general guidepost for assessing the risk and return profile of the Fund. Additionally, Staff notes that the ADEC policy still leads to improved market value funded ratios over the projection period in the median stochastic scenario for all portfolios except for 100% fixed income (p. 27).

Risk – The stochastic analysis shows the deleterious effects of pursuing too much or not enough risk in the investment program. Too little risk is likely to lead to lower returns over time while too much risk is likely to lead to larger maximum losses for the Fund. The range of diversified portfolios included in the stochastic analysis range from 9-13% expected volatility and suggest that the Fund may be able to bear marginally more risk through a differentiated portfolio of growth investments, which could include private credit and private equity (p. 24).

Asset Allocation – The study suggests, based on RVK capital market assumptions, that additional private markets exposure could help improve the risk and return profile of the Fund. This can be seen through the improved convexity shown in the stochastic analysis with marginally better upside and downside outcomes (p. 26, 27). Staff notes that appropriate sizing of any such allocations should carefully consider the liquidity needs of the System, which have improved with the new contribution policy, among other important factors.

Liquidity – The study suggests that the System can take on significant amounts of illiquidity in its investments under the deterministic analysis (p. 13). When incorporating portfolio volatility, payout ratios also decrease in the median scenarios, but increase significantly in the 5th percentile scenarios to levels which would imply a need for a measured approach to investing in less liquid strategies (p. 28-30).

Memorandum

To	City of Austin Employees' Retirement System
From	RVK, Inc.
Subject	Asset/Liability Study – Executive Summary
Date	August 25, 2023

Introduction

The purpose of this memorandum is to summarize the key inferences we draw from the Asset/Liability ("A/L") study of the City of Austin Employees' Retirement System ("COAERS" or the "System"). While this memorandum refers directly to points raised within the study, we emphasize that a full understanding of the A/L study and its implications requires a close review of the study in its entirety.

Background and Key Conclusions

As of the fiscal year ending December 31, 2021, the date of the most recent actuarial valuation and the start date of the projections in this study, the System was approximately 71% funded (on a market value basis). **This study assumes a 15.6% loss on the COAERS portfolio for calendar year 2022**. Assuming a 2022 return of -15.6%, we estimate the funded ratio has fallen to 56%. This equates to a funding shortfall of approximately $2.3 billion.

This updated study reflects changes to the contribution policy recently enacted by legislation. The proposed contribution policy is a material improvement over the existing policy, with projected stochastic modeling showing funded status moving up from 39% to 69% for the current Target Allocation. While the 20-year stochastic projections still do show a notable underfunded status, it is important to note that these projections assume a 6.1% average return over the period (compared to the actuarial assumed rate of 6.75%) and no further changes to investment or contribution policy.

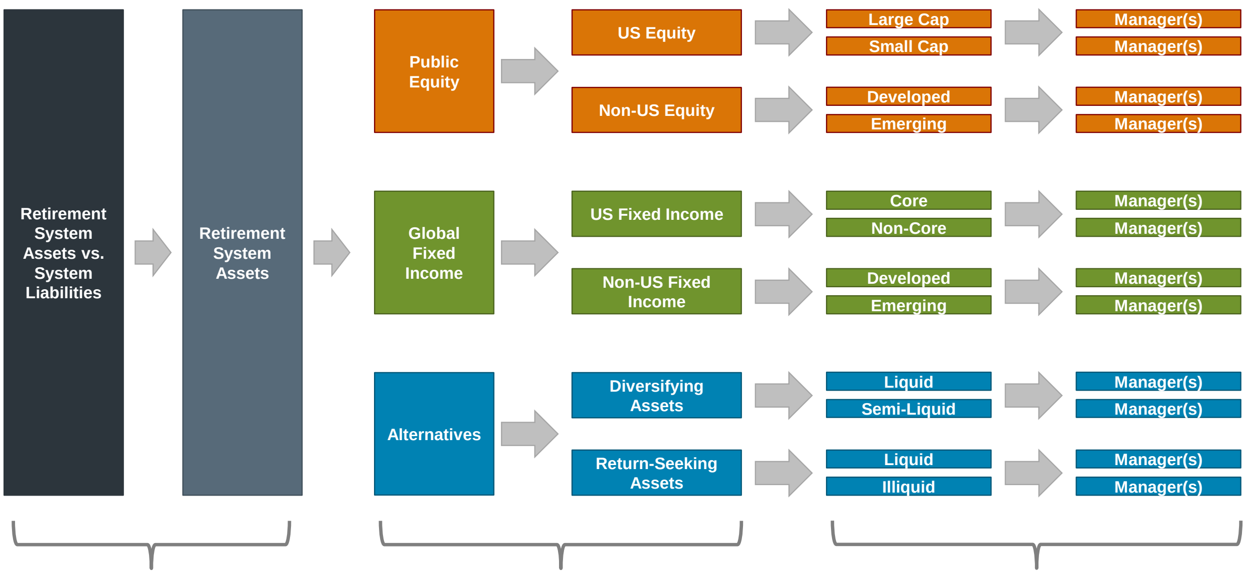
As highlighted below, this study suggests that continued diversification in the investment of the System's assets is desirable. The study, however, suggests caution in assuming that increased pursuit of higher expected returns, through even more aggressive (and hence even more volatile) asset allocations, is always beneficial. High expected return and high expected risk approaches also bring increased risk of large declines in the value of the System's assets and increased volatility in required contributions, with potential strains on System liquidity.

The Purpose of an Asset/Liability Study

The central purpose of an A/L study is to examine the probable future consequences, over extended periods of time, of applying alternative asset allocation strategies to the System's investment assets in order to fund the liabilities created by the benefit provisions of the System. A/L studies are unique in their ability to combine in a single analysis the three critical factors that drive the financial health of the System—benefit policy (liabilities), contribution policy, and investment strategy (asset allocation). Certainly, this type of forward-looking study cannot indicate with any reliability what will happen in any given year over this extended period of time, and its insights are dependent on the assumptions used. However, we have high conviction that the results of the study paint a highly reliable view of the core long-term trends in the System's financial health.

Best practice, in our judgment, is to take the general direction suggested as most appropriate by this study with its unique consideration of liabilities, contribution policy and trending liquidity needs and refine it in an asset allocation study where implementing the System's structure can reflect the pragmatic considerations of investing in the capital markets present at any given point in time.

While this study does not suggest modifying the risk profile of the current asset allocation strategy, refinements to asset allocation and asset class structure will be evaluated as the Board moves through the activities and decision points from left to right in the below investment decision framework.



Asset/Liability Study

- Assesses health of Plan
- Models general risk and return parameters
- Links Investment Policy, Contribution Policy, and Benefit Policy

Asset Allocation Study

- Models specific targets to asset classes
- Used to select overall target allocation
- Uses passive assumptions

Asset Class Structure Studies

- Implementation guide with targets to sub-asset classes
- Mix of active and passive investments determined
- Optimal mix of managers

Deterministic versus Stochastic

In this study, we examined a series of related questions associated with this central purpose, projecting future outcomes under two distinctly different methodologies:

1. a **deterministic** basis (all underlying assumptions, liabilities, contributions and most critically investment returns, are achieved precisely and without variance in each and every year); and

2. a **stochastic** basis (outcomes for investment returns vary each year according to estimated volatility with contribution *requirements* following suit while *actual* contribution policy and liabilities remains in their current form).

Key Results

Below you will find a series of important findings, forecasts, and conclusions drawn from the body of the study. While the remarks are presented here to allow a quick assessment of some of the key findings, they represent only a sampling of the fundamental elements of the study. We emphasize that a solid understanding of each element requires that they be reviewed as they are presented in the study itself within their surrounding context (please note the frequent page references to the full study). This is especially important to understanding the findings which represent *probable, but not certain,* outcomes as analyzed in the stochastic section of the study.

At the Outset:

- As of December 31, 2021 (the date of the actuarial valuation used to model liabilities), the System's market value funded ratio (available assets to fund benefit obligations) was 71% (page 6). We project this has fallen to approximately 56% as of December 31, 2022 based on a -15.6% return for the year.

- The number of active members currently exceeds the number of benefit receiving inactive members by approximately 42%. Over time, the inactive population is projected to grow relative to the active member population ending the projection period with active members exceeding the inactive members by less than 5% in 2042 (page 8). The study assumes a level active population over the projection period. The maturing demographics of the System is an important factor when considering the findings on System risk/return options and the projected status of System liquidity below.

Deterministic Analysis: A deterministic analysis assumes full certainty about the future, in particular, certainty of investment returns. Its virtues are that it is simple and that the findings reflect what will happen if the future turns out to be precisely as forecasted—no better, but also no worse.

- As a result of an increasing number of beneficiaries and inflation, benefit payments to System participants are expected to increase by 114% over the next 20 years (page 9). Annual increases are projected to average approximately 4%.

- Total annual dollar contributions (employer and employee) are expected to increase through the projection period by approximately 101% (page 10). Please note however, that precise actuarially required rates as they unfold are the purview of the System's actuary and are affected by factors other than investment returns and resulting asset values of the System.

- Aggregate benefit payments are expected to increase by about 114% over the next 20 years and remain roughly constant as a percentage of System assets before beginning to decline again near the end of the projection period (pages 9 and 13). While increasing payout ratios can be a concern, they remain relatively healthy and sustainable on an absolute basis during this period. This is an important and positive indication, because increased payout ratios, if they rise sufficiently high, can potentially impose liquidity constraints on the management of the portfolio (inhibiting the ability of the System to invest with a long-term horizon), therefore limiting the opportunity to invest in less liquid asset classes regardless of the return or risk reducing diversification benefits they offer.

- As assets grow each and every year without exception at the assumed rate of return (6.75%), the funding ratio on a market value basis is expected to gradually increase to approximately 82% by 2042 from the current value of 56% (page 15).

- The System would need to experience annual returns in excess of 11.2% over the next 10 years or 8.2% over the next 20 years without exception in each and every year in order to reach full funding (page 16). Achieving such lofty returns on such a sustained basis is extremely unlikely in our judgment and underscores our conclusion that investment returns alone cannot move the System to full funding.

- Investment strategies that introduce increasing volatility in the System's returns over the next 20 years result in lower funded ratios in 20 years. Scenarios C (-10% in 2032 and +10% in 2033) and D (beginning in 2032 and assumes a return pattern of -15%, +15%, -15%, +15%) shown on page 17 of the full study illustrate this point. These scenarios show decreases in ending projected funded ratios at 73% and 60%, respectively. The key conclusion from this part of the study is that volatility – specifically declines and subsequent recoveries in the Plan's assets – and *when* they occur can have a significant effect on cumulative plan contributions.

- Experiencing a return of 75 basis points below the System's current assumed rate of return of 6.75% (i.e., 6.00%) each year for the 20 year projection period (Scenario E) would result in a decline in the projected market funding ratio to 74% in year 20 versus 82% at the current assumed rate of return (page 17). Given the widely shared concerns about the prospects for a low return environment in the capital markets over the foreseeable future, this is a conclusion that should be thoroughly understood and appreciated. In the event that capital markets do not support returns commensurate with the assumed rate of return, reliance on contributions to complete the payout of the System's liabilities effectively increases, especially in later years.

- Finally, Scenario G assumes returns of 6.75% per year, just as the base case. However, in this scenario, the expected return is met but achieved in an environment where wage inflation is projected to be 5.00% per year rather than the base projection of 2.50%. This scenario, particularly relevant currently, generates a significantly higher projected actuarial accrued liability, approximately 35% higher than the base case. This requires substantially higher contributions during the projection period, $1.3 billion more during the period. As observed in the previous scenarios, the return pattern matters. This scenario shows that inflation also plays a material role in the outcome of the System going forward. Stated more directly, persistently high inflation (1) increases Plan liabilities, (2) raises employer contribution costs, and (3) weakens the financial health of the System.

Stochastic Analysis: Unlike a deterministic analysis, a stochastic analysis does not assume an unvarying stream of expected investment returns year after year. Instead, it reflects the realistic view that pension plan investment returns are—like the investment markets themselves—volatile and always uncertain. This means that there are a range of possible outcomes for the System; some are more likely, others less likely, but still possible.

The deterministic approach is useful for gauging the general direction of change and associated consequences, but adding the element of uncertainty—more specifically year to year variability in the performance of the capital markets and the value of the System's assets over time—can offer additional insights, albeit along with considerable complexity.

Uncertainty in future investment returns is taken into account via a stochastic analysis of six different investment approaches (in the table below and on page 23) ranging from highly conservative (low risk, asset protective) to highly aggressive (high return-seeking with substantial associated risk), including the Target Allocation of the System. The reason for testing such a broad range of approaches is that at the heart of the System's situation is a simple question that is difficult to answer: whether the System is better off following a strategy that:

(A) Falls in the general category of higher prospective return with greater risk (i.e. potential for more widely varying outcomes – good or bad), or

(B) Falls in the general category of lower prospective return with concomitantly lower risk (i.e. a tighter band of likely outcomes).

	100% FI	60/40	Current Target	Potential Target	W/PC & PE	100% Eq
Global Equity	0	60	56	53	47	100
US Agg Fixed Income	100	40	0	0	0	0
COAERS Fixed Income	0	0	21	21	19	0
COAERS Real Assets	0	0	15	15	15	0
COAERS Multi-Asset	0	0	7	0	0	0
Private Credit	0	0	0	10	10	0
Private Equity	0	0	0	0	8	0
Cash Equivalents	0	0	1	1	1	0
Total	100	100	100	100	100	100
Capital Appreciation	0	60	60	63	65	100
Capital Preservation	100	40	24	22	20	0
Alpha	0	0	0	0	0	0
Inflation	0	0	16	15	15	0
Expected Arithmetic Return	**4.0**	**6.3**	**6.8**	**6.9**	**7.1**	**7.8**
Expected Risk (Standard Deviation)	**5.0**	**10.3**	**12.0**	**11.7**	**12.2**	**16.4**
Expected Compound Return	**3.9**	**5.8**	**6.1**	**6.3**	**6.4**	**6.6**
Expected Sharpe Ratio	0.30	0.37	0.36	0.38	0.38	0.32
RVK Expected Eq Beta (LCUS Eq = 1)	0.07	0.61	0.71	0.69	0.71	0.97
RVK Liquidity Metric (T-Bills = 100)	85	88	85	77	70	90

Essential to answering this question is to ask precisely how the System and its broader constituencies define what "better off" means. The metrics we use for each to determine whether the System is "better off" under one approach versus another are as follows:

(1) The effect on funding ratio (and thus on contribution rates which decline with higher funding ratios).

(2) The effect on System liquidity (i.e. the System's ability to pay annual benefits without major disruption of its strategic asset allocation, the driver of its investment strategy).

(3) The effect on the trend line and stability of annual contributions.

(4) The risk of large, sudden, and highly disruptive short-term declines in the System's assets over the course of time and the associated effects on contributions and potentially investment decisions as well.

The results of this analysis are displayed on pages 25 through 31 of the accompanying A/L study. For purposes of this summary, the consequences of choosing A versus B, as described on the prior page, is summarized most clearly in the tables on pages 26 and 27 of the study (copied below followed by explanatory comments).

20 Years	Probability of Full Funding	Probability of < 56% (Current) Funding	Probability of < 40% Funding	Probability of Asset Depletion	Maximum 1 Year Investment Loss
100% Fixed Income	0%	76%	26%	0%	-15%
60/40	13%	37%	17%	0%	-30%
Current Target	21%	34%	17%	0%	-32%
Potential Target	22%	32%	16%	0%	-31%
W/PC & PE	24%	31%	16%	0%	-32%
100% Equity	37%	31%	19%	0%	-42%

20 Years	Market Funded Ratio in Year 20			Cumulative Employer Contributions Year 20 (Billions)			Payout Ratios		
							Year 20	Years 1 to 20	
	50th	5th	95th	50th	5th	95th	Median	Peak	Trough
100% Fixed Income	46%	29%	68%	$5.6	$6.0	$5.2	14%	22%	9%
60/40	65%	27%	125%	$5.3	$5.9	$3.8	10%	24%	5%
Current Target	69%	25%	151%	$5.2	$5.8	$3.6	9%	26%	4%
Potential Target	70%	26%	150%	$5.2	$5.8	$3.6	9%	25%	4%
W/PC & PE	72%	26%	160%	$5.1	$5.8	$3.5	9%	25%	4%
100% Equity	79%	19%	250%	$4.9	$5.8	$3.4	8%	33%	3%

The results of the stochastic analysis assume the new contribution policy and no changes are made to the benefit or investment policies throughout the projection period.

- The diversified and 100% equity portfolios result in median expected funding ratios at the end of the 20 year study period that are higher than current funding level (79%) (pages 26 and 27). The 100% Fixed Income portfolio results in a median projected funded ratio well below current levels at 46%.

- None of the portfolios show a likely probability of full funding in 20 years (page 26). The 100% Fixed Income portfolio shows no probability of full funding in 20 years with a value of 0%. The other portfolios show probabilities ranging from 13% to 37%.

- The 100% Fixed Income portfolio shows a median payout ratio of 14%, this is not sustainable (page 29). None of the other portfolios show a significant probability of extreme median payout ratios over the next 20 years (pages 28 and 29). However, each of the portfolios do indicate liquidity may be a concern at some point in the future following a market decline. Each of the portfolios has about a 25% probability of payout ratios exceeding 15% at some point during the projection period. High payout ratios severely limit the System's ability to invest in illiquid strategies and may inhibit the System's ability to invest with a long-term focus reducing the potential return opportunities. In short, a heavy reliance on illiquid investments risks could turn even normal asset value declines into disruptive events.

- The cumulative cost of providing the System's benefits is met through a combination of contributions and the investment returns on those contributions. The 100% Fixed Income portfolio will require the largest future increase in contributions (i.e., the direct funding of benefits) (pages 30 and 31).
- The 100% Equity portfolio does appear to have the highest *probability* of producing full funding by 2042 at 37% (page 26). *However*, it also has a maximum theoretical one-year portfolio decline of 42%—a loss of almost one half of the System's assets, significant we

believe by any standard. This likelihood of notably larger one year declines within the study period gives pause to the desirability of a far more aggressive approach simply from a quantitative viewpoint. It also suggests it may be a strategy that is extremely difficult for decision makers to sustain over a long period of time. Declines in the total fund market value of this magnitude are a disruptive event from all aspects of System management. Yet, the benefit of such an aggressive approach that makes it superficially attractive can only be realized with any probability if the aggressive and highly volatile approach is maintained for several decades through good times, bad times, and unnerving times. Furthermore, this type of strategy could prove difficult to maintain in future years should demographic (early retirement incentives for example) or financial events create higher liquidity demands on the System. For all these reasons, it is not an approach that should be seriously considered without full recognition of the significant risks.

- In aggregate, the above comments support the continued utilization of a diversified investment approach.

- Once again, we state for emphasis, the proposed contribution policy leads to far superior (although not ideal) outcomes compared to the existing policy. The median projected funded ratio for the Current Target assuming the proposed policy is 69%.

Final Comments

This A/L study shows that the System is currently underfunded. The System can best strive to meet its objectives through the continued use of an efficiently diversified investment portfolio that is compensated for the risks taken and focuses on maintaining reasonable liquidity. **However, outcomes achieving full funding in the projection period are limited due to the contribution policy.** The study is not supportive of a long-term, ultra-conservative approach. The increasing potential for large one-year declines suggests that there is likely a limit to the net benefits of adding increased risk in pursuit of additional return.

Progress should be monitored periodically through studies such as these, particularly if the System encounters a sustained period of lower returns in the capital markets (and thus for the System's assets) as well as material changes in contribution policy or benefit levels. Additionally, given the System's vulnerability to severe market drawdowns, a robust risk management framework should be considered.

Additionally, this study assumes no further changes are made to the benefit policy at any point during the 20 year projection period. Such changes would fall outside the reach of an Asset/Liability study. However, we do note that even small changes to the benefit policy can have a meaningful long-term impact on the likely future outcomes of the System. While difficult to predict, it is somewhat likely that changes to the contribution, benefit, and investment policy would be examined should the System's actual experience skew too far in any direction – positive or negative.

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Acknowledgements

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Introduction

RVK, Inc. (RVK) has prepared this report for the City of Austin Employees' Retirement System (COAERS) to:

- Present projected valuation results with respect to the funded status of the System.
- Present projected benefit payments of the System.
- Investigate asset mixes to determine those which best serve to protect and increase funding levels, while providing adequate liquidity for benefit payments.

The valuation projections are shown using both a deterministic and stochastic process.

The deterministic process provides an open group analysis of projected valuation results based on a fixed set of future assumptions (see summary in the Assumptions and Methods section of this report).

The stochastic process provides an open group analysis of projected valuation results under many capital market environments based on expected asset returns and inflation, and their expected volatility. Using a Monte Carlo simulation technique, both assets and liabilities are assumed to vary stochastically, linked together by changes in inflation. Expected values, variances of the returns and inflation, and correlations are used to generate 2,000 trials to produce a distribution of potential outcomes. A stochastic analysis can answer questions about the best/worst case outcomes along with the probability of such outcomes.

Introduction (continued)

What is an Asset/Liability Study?

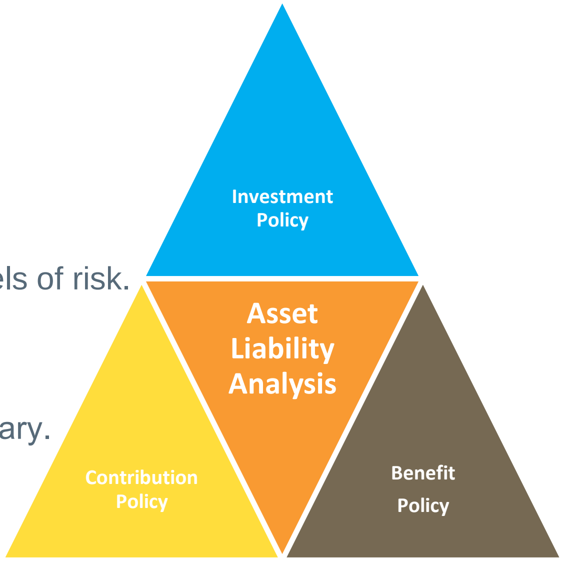
- Investment programs and the strategy they seek to implement (Investment Policy) do not exist in a vacuum. They seek to satisfy one or more investment objectives and operate within a system framework that includes the investment objectives (Benefit Policy) and system funding (Contribution Policy).

- The purpose of an Asset/Liability Study is to examine how well alternative investment strategies (i.e., differing asset allocations) address the objectives served by the System (the System's "liabilities") in the context of the System's funding streams (the System's Contribution Policy). It is the only standard analysis that fully links all three aspects of the System's key financial drivers.

- In doing so, it creates an important "guidepost" for the actual asset allocation for the System; the asset allocation chosen by the System's fiduciaries will likely reflect the nature of the liabilities but also numerous other factors including risk preferences, liquidity, implementation constraints, etc.

- For the COAERS Asset/Liability Study, we assume the objectives are:

    1. Fund all participants' benefits over time.
    2. Assure sufficient liquidity to pay benefits at all times.
    3. Foster a stable contribution stream consistent with objectives 1 and 2.
    4. Achieve adequate returns without accepting unnecessary or imprudent levels of risk.



An Asset/Liability Study is NOT . . .

- An actuarial study of the COAERS liabilities—that is the purview of the System's actuary.

- A prescription for System benefits—that is the purview of the elected representatives.

- An assessment of the affordability of contribution levels—that is the purview of the elected officials and their constituents.

- The sole determinant of the final asset allocation adopted for the System—there are a number of factors, including insights from an Asset/Liability Study, which will bear on the optimal asset allocation.

Introduction (continued)

Asset/Liability Studies in Practice . . .

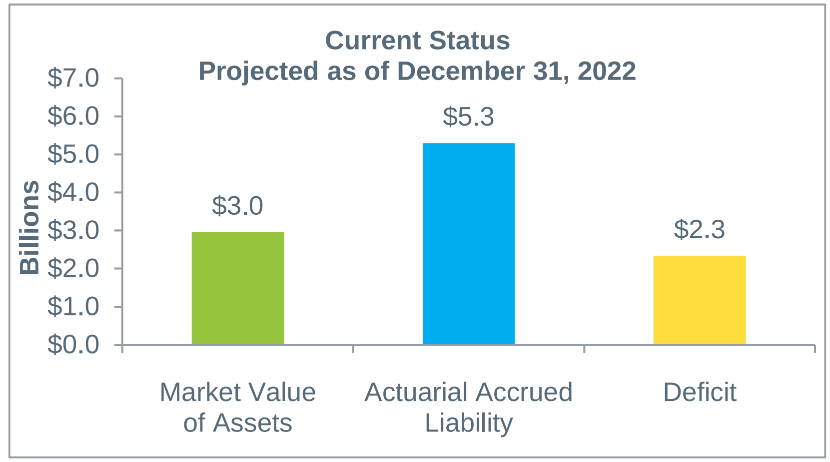
- Begin with a forecast of the financial liabilities (i.e., benefit obligations).
- Include a baseline estimation of the financial contributions to the System over time.
- Compare alternative investment strategies (i.e., total fund asset allocations to the System's financial needs).
- Draw conclusions regarding how well various investment strategies satisfy the System's financial needs.

This Asset/Liability Study . . .

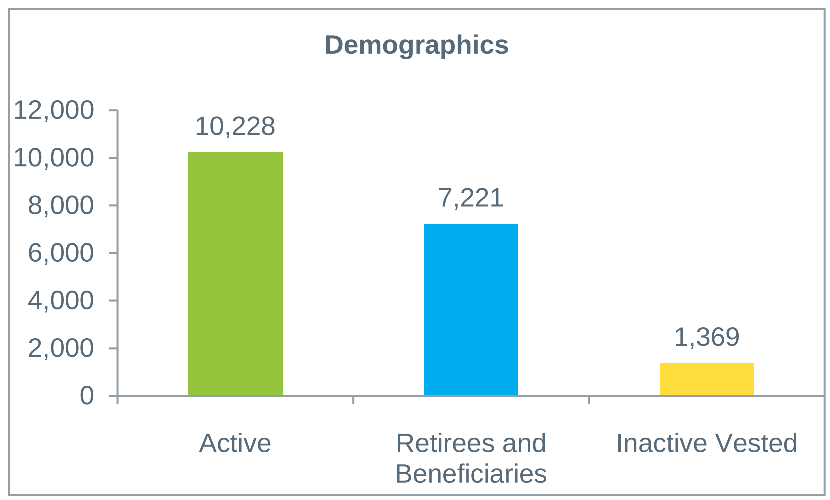
- Uses data from the December 31, 2021 Actuarial Valuation of the City of Austin Employees' Retirement System (COAERS) provided by GRS to project pension liabilities over a 20 year period.
- Uses the actuarial cost method and the actuarial assumptions described in the December 31, 2021 Actuarial Valuation prepared by GRS.
- Compares these specific investment strategies—(A) the current Target Allocation, (B) a conservative illustrative portfolio (100% Fixed Income), (C) a 60/40 portfolio, (D) a potential target, (E) a diversified portfolio with private credit and private equity, and (F) an aggressive illustrative portfolio (100% Equity).
- Assumes the System's current benefit policy throughout the entire projection period—changes to the benefit policy are the purview of the elected representatives.
- Compares the System's current funding policy with expected statutory changes beginning with the 2024 plan year.
- Does not assume any actuarial or investment adjustments that may take place in future years.

Current Status

System Summary	December 31, 2021 (Valuation Date)	December 31, 2022 Projection*
Market Value of Assets	$3.6 billion	$3.0 billion
Actuarial Accrued Liability	$5.0 billion	$5.3 billion
Deficit	$1.5 billion	$2.3 billion
Market Value Funded Ratio	71%	56%



Demographics	Members (Valuation Date)
Active Members	10,228
Retirees and Beneficiaries	7,221
Inactive Vested	1,369
Total	**18,818**



*Based on a 2022 total portfolio return of -15.6%.

RVK

Deterministic Analysis

This section provides an analysis of the System's assets, liabilities, funded status, and benefit payments based on a fixed set of future assumptions. Each analysis that follows in this deterministic section rests on the critical assumptions below and must be read and interpreted with them in mind. The deterministic assumptions are as follows:

1. Current System provisions (see Summary of Benefit Provisions in Section F of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS).

2. The participant data used in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.

3. Projected rate of return on System assets -15.6% for 2022. Thereafter, assumes the actuarial assumed rate of return on System assets of 6.75%.

4. Employer and Employee contributions in all years are assumed to be:

    - Employer – Normal cost, plus amortization of unfunded liabilities, subject to corridor restrictions with 2-year phase-in.
    - Employee – For 2022 and 2023: 8.0%,.2024: 9.0%, 2025 and thereafter: 10.0% of projected payroll. Additional employee contributions of up to 2.0% are required beginning in 2024 under certain corridor measurements.

5. Asset Valuation Method equal to the market value of assets less a five-year phase in of the excess (shortfall) between expected investment return and actual income.

6. Assumes demographic experience projected in accordance with the assumptions used in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS, and updates from the Risk Sharing Valuation Study as of December 31, 2022.

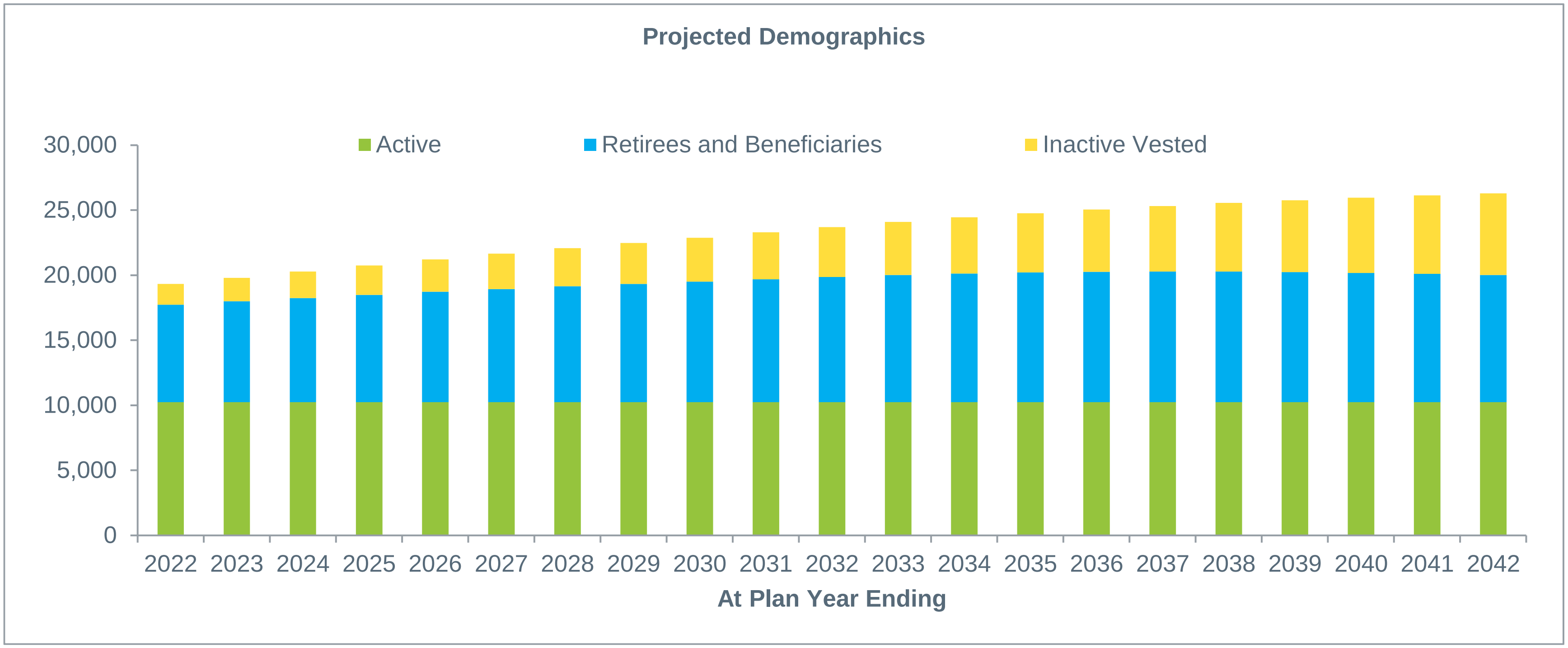
7. Assumes 4.5% base wage inflation for 2022, and 2.50% thereafter.

8. Open group analysis: level active population. New active participants entering the System are assumed to have the age, pay, and gender characteristics of recently hired participants.

Deterministic Analysis (continued)

Demographics

Following is the projected number of active and inactive participants at the end of each System year from 2021 through 2042 (2021 is actual). These projections are based on an open group analysis assuming a level active member population. Using the actuary's assumptions for death, termination, retirement, and disability, current participants are assumed to leave the System in the future. The number of total inactive participants (Retirees and Beneficiaries and Vested Inactive) increases by approximately 50% during the projection period.

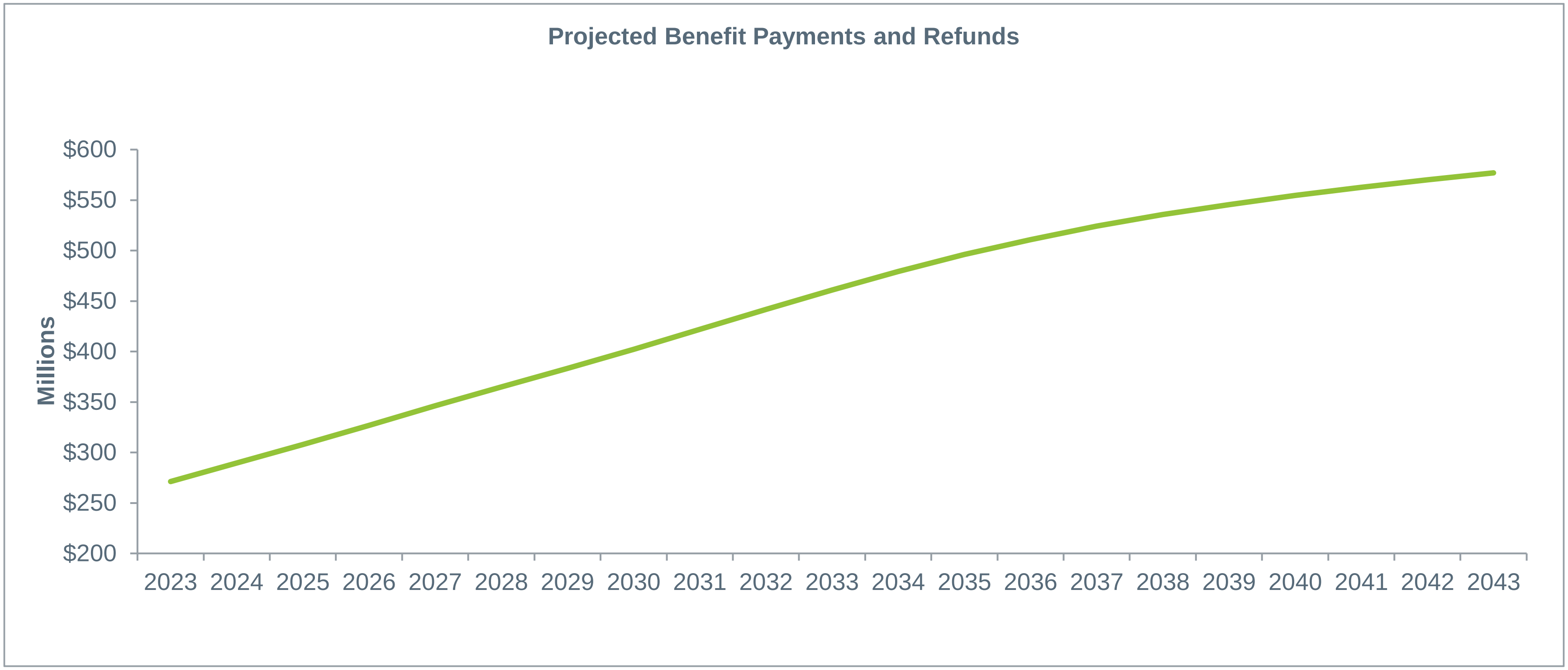


Total Population	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Annual Percent Change	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Deterministic Analysis (continued)

Benefit Payments and Refunds

The System's projected annual benefit payments are shown in the chart below. The projected benefit payments are expected to increase by about 114% over the projection period.



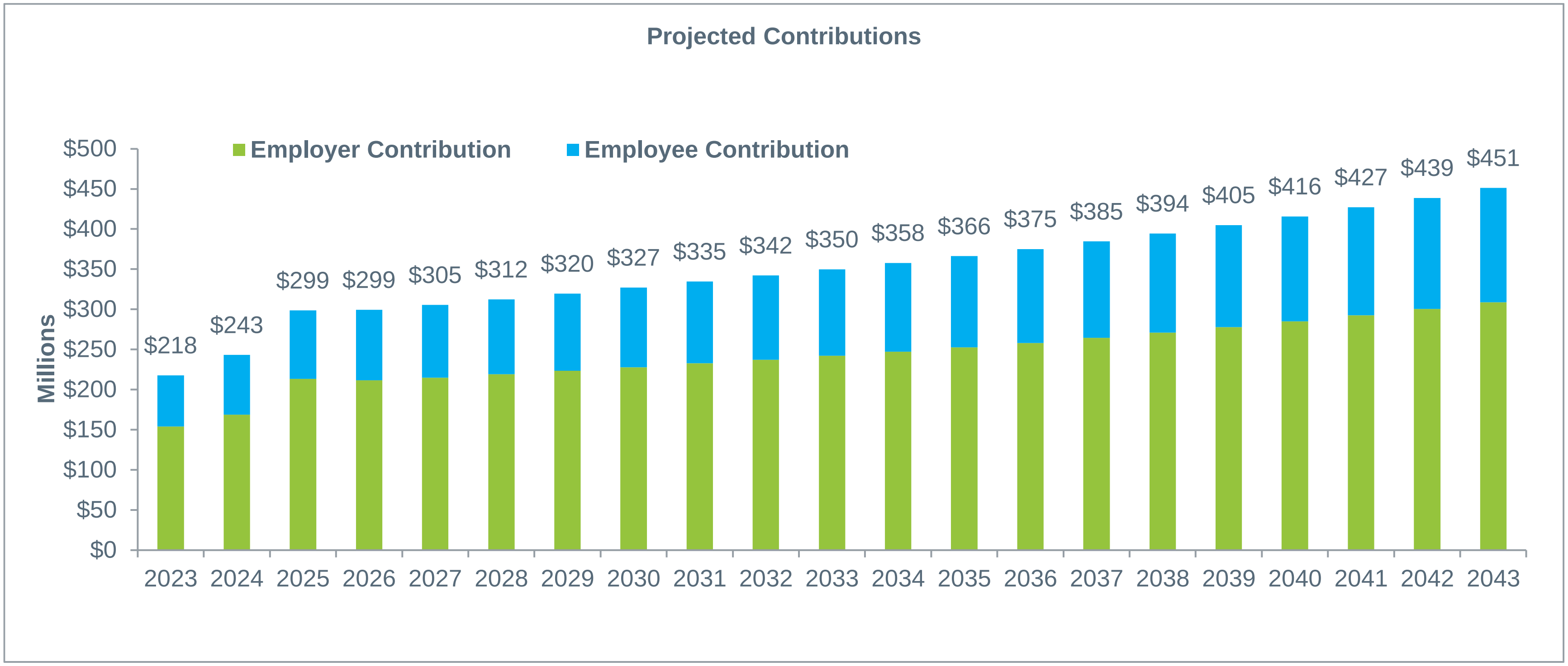
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Benefit Payments	$271	$290	$308	$327	$346	$365	$383	$402	$422	$442	$461

	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Benefit Payments	$479	$496	$511	$524	$536	$546	$555	$563	$570	$577

Deterministic Analysis (continued)

Contributions ($)

The System's projected contributions, expressed as total dollar contributions, are shown in the chart below. The results assume the contribution policy remains unchanged, and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years.

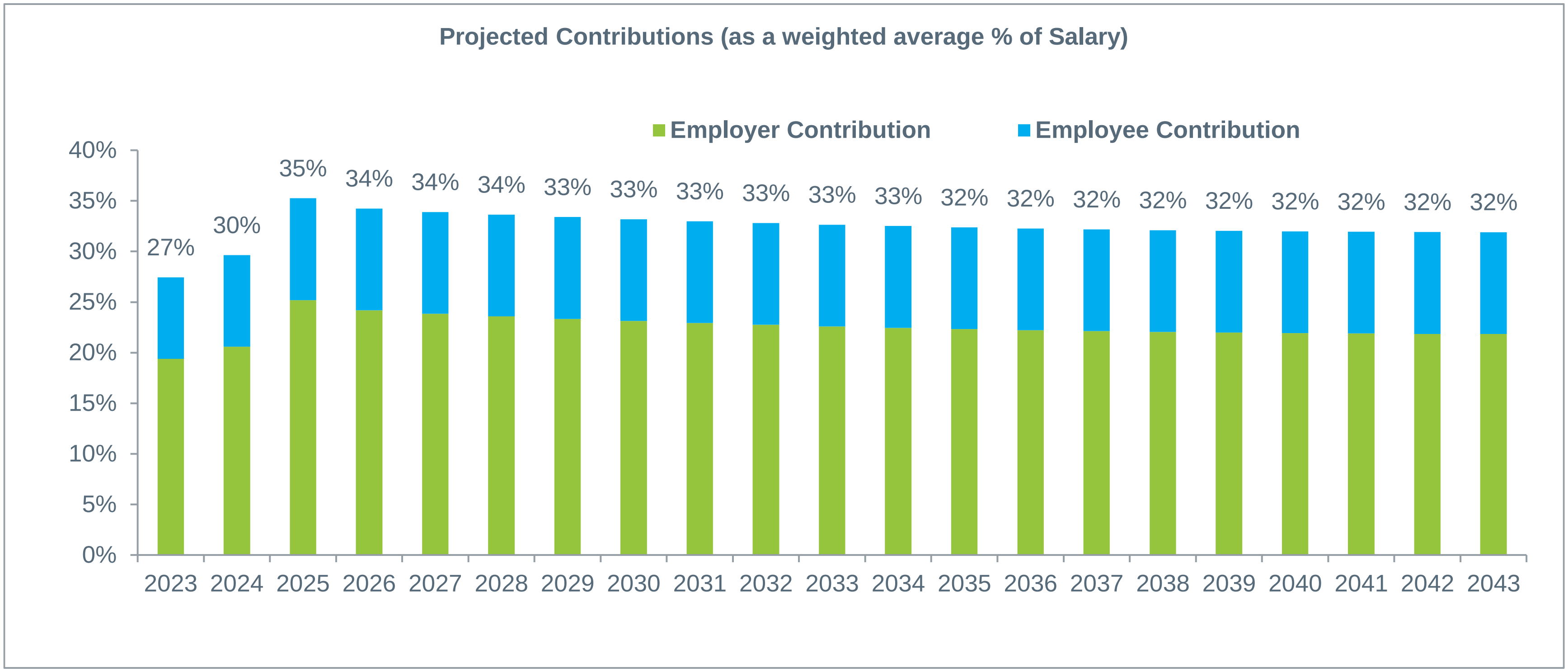


	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Employer	$154	$169	$213	$211	$215	$219	$223	$228	$233	$237	$242	$247	$252	$258	$264	$271	$278	$285	$293	$301	$309
Employee	$64	$74	$85	$88	$91	$93	$96	$99	$102	$105	$108	$111	$114	$117	$120	$124	$127	$131	$134	$138	$142
Total	$218	$243	$299	$299	$305	$312	$320	$327	$335	$342	$350	$358	$366	$375	$385	$394	$405	$416	$427	$439	$451

Deterministic Analysis (continued)

Contributions (weighted average percentage of salary)

The System's projected contributions, expressed as a weighted average percentage of salary, are shown in the chart below. The results assume the contribution policy remains unchanged, and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years.



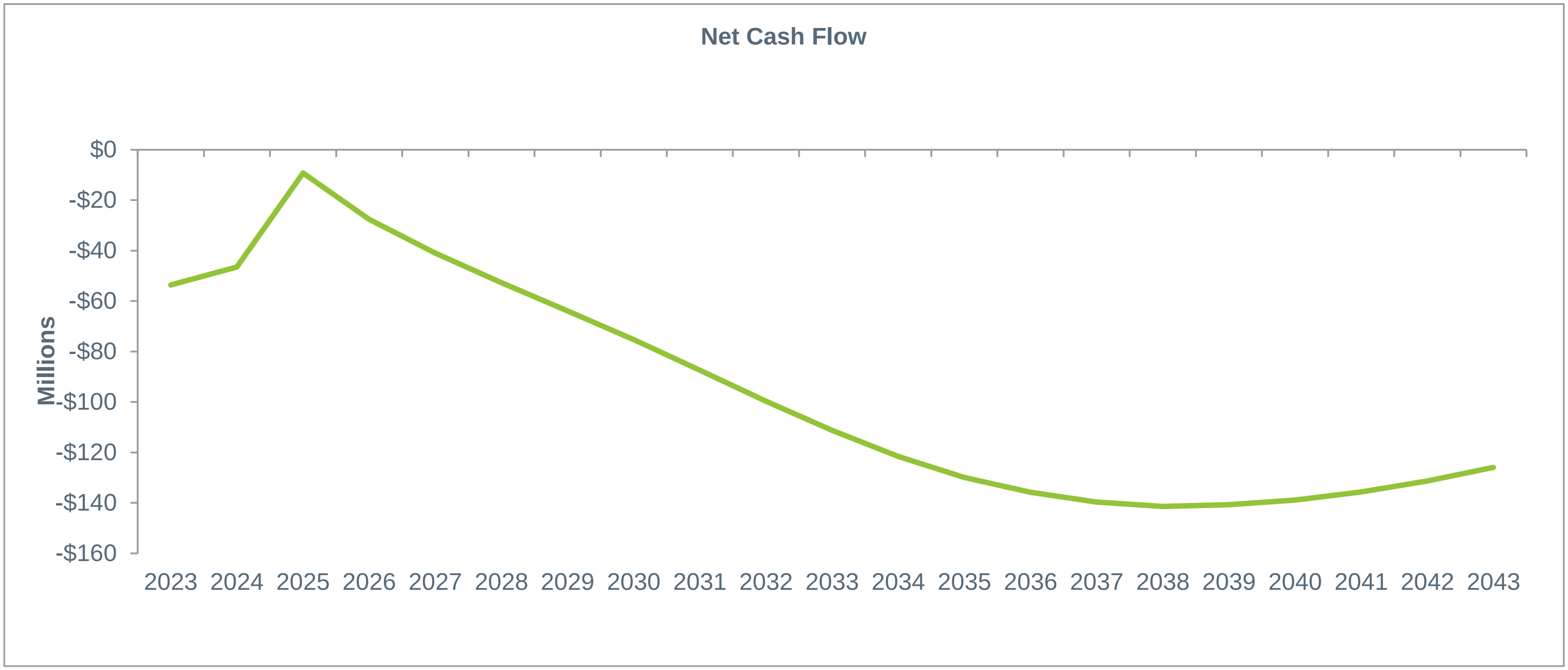
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Employer	19%	21%	25%	24%	24%	24%	23%	23%	23%	23%	23%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
Employee	8%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

RVK

Deterministic Analysis (continued)

Net Cash Flow (Contributions – Benefit Payments)

The System's projected net cash flow is shown in the chart below. The results assume the contribution policy remains unchanged, and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years.



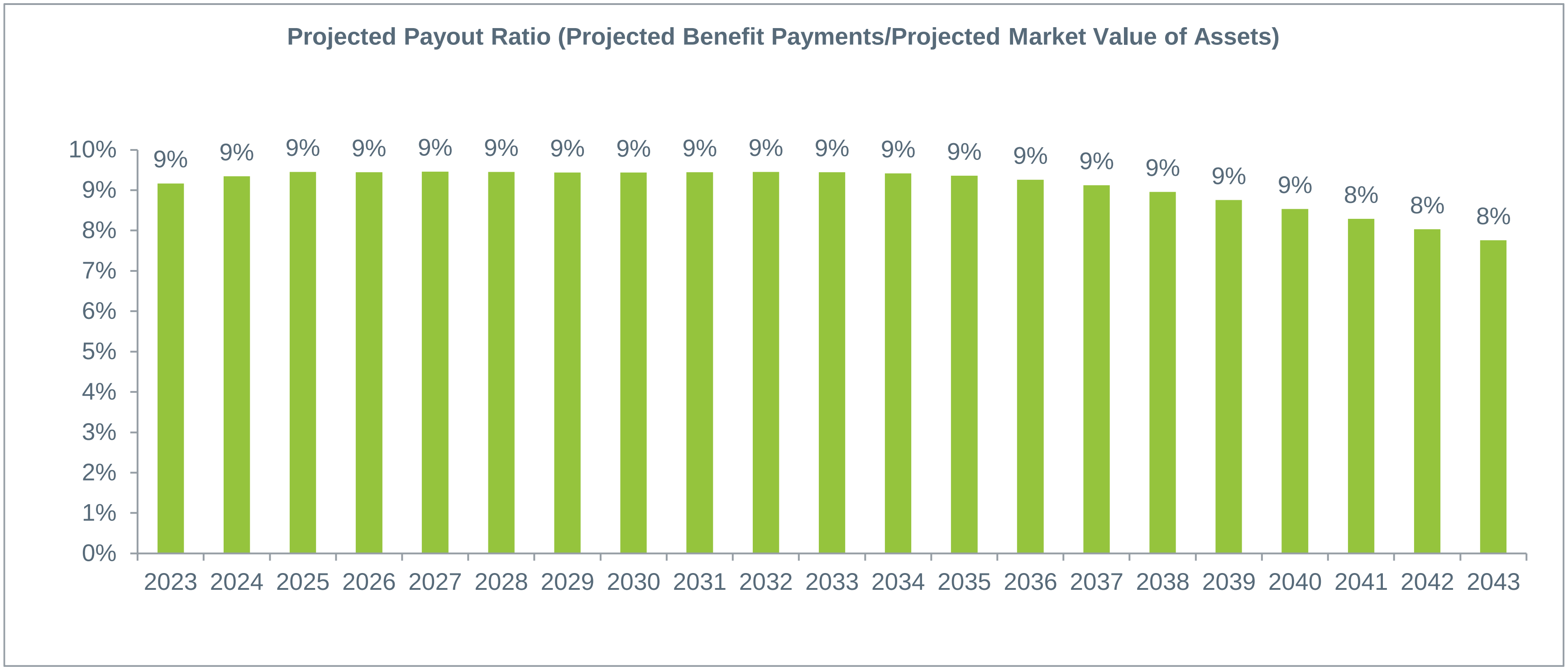
As % of Market Value

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Net Cash Flow	1.8%	0.3%	0.3%	0.8%	1.1%	1.4%	1.6%	1.8%	2.0%	2.1%	2.3%	2.4%	2.5%	2.5%	2.4%	2.4%	2.3%	2.1%	2.0%	1.8%	1.7%

Deterministic Analysis (continued)

Payout Ratio (benefit payments/market value of assets)

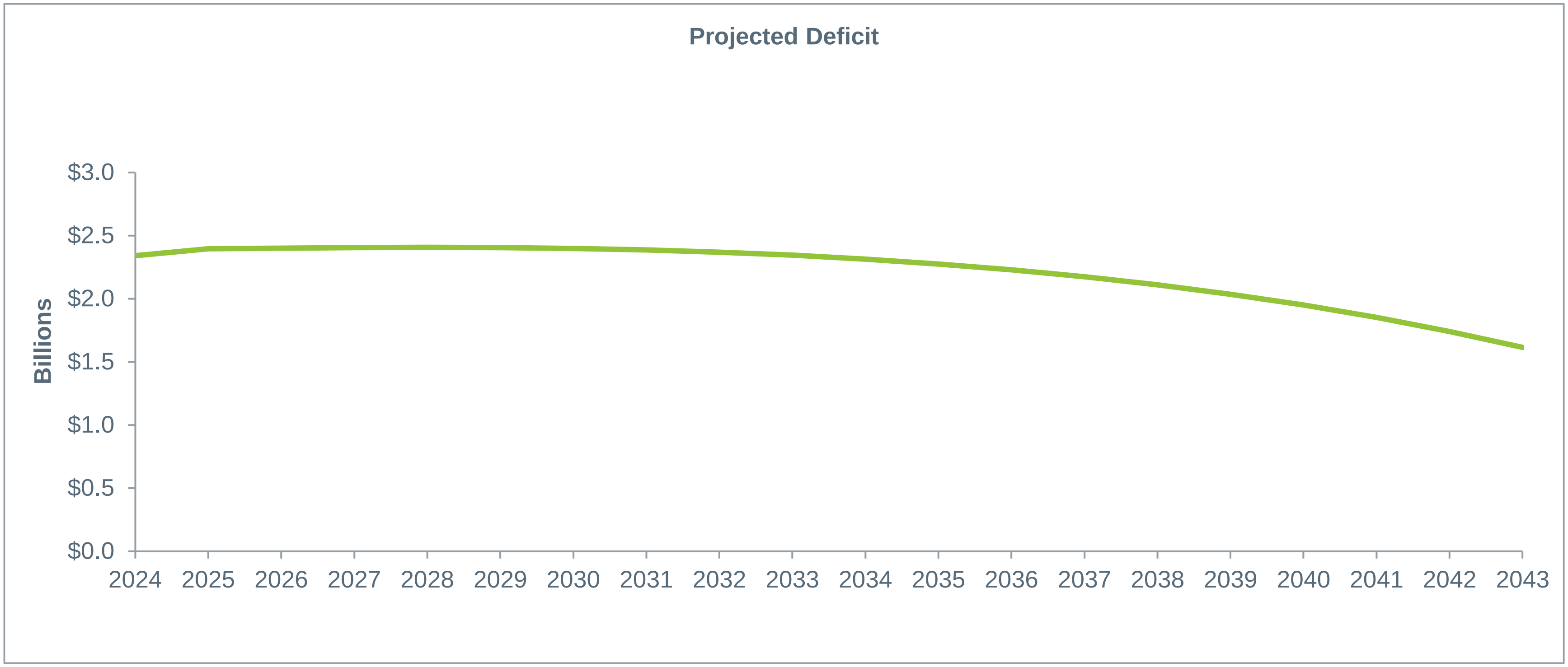
The System's projected payout ratios are shown in the chart below. The payout ratio is expected to remain constant through the end of the projection period. The results assume the contribution policy remains unchanged and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years.



Deterministic Analysis (continued)

Deficit (market value of assets – actuarial accrued liabilities)

The System's projected deficit of assets is shown in the chart below. The results assume the contribution policy remains unchanged, and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years. The disparity between the market value of assets and System liabilities is expected to decrease by the end of the projection period by 31%.

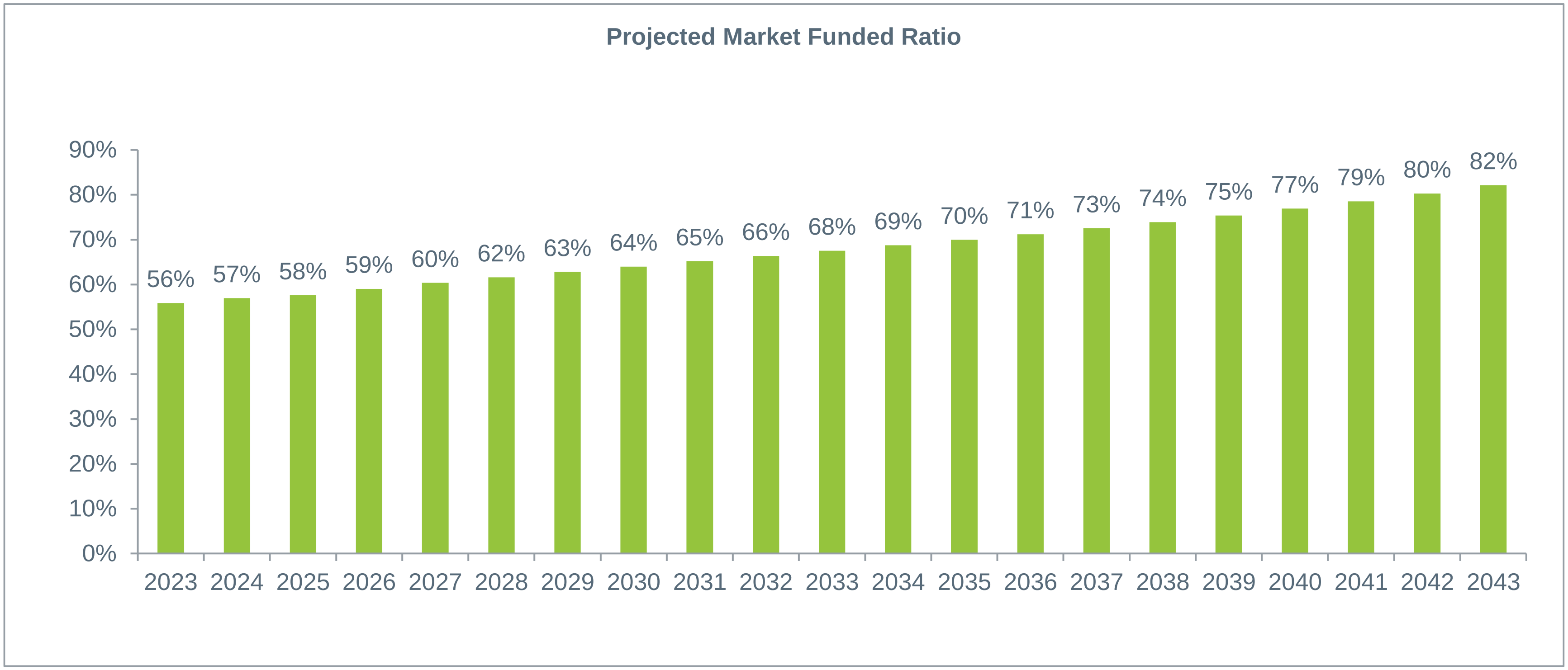


	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Deficit	$2.3	$2.3	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.3	$2.3	$2.3	$2.2	$2.2	$2.1	$2.0	$2.0	$1.9	$1.7	$1.6

Deterministic Analysis (continued)

Market Funded Ratio (market value of assets/actuarial accrued liability)

The System's projected market funded ratio is shown in the chart below. The System is expected to end the projection period at approximately 82% funded. The results assume the contribution policy remains unchanged, and that the System's assets return precisely the actuarially assumed rate each year without exception for all projection years.

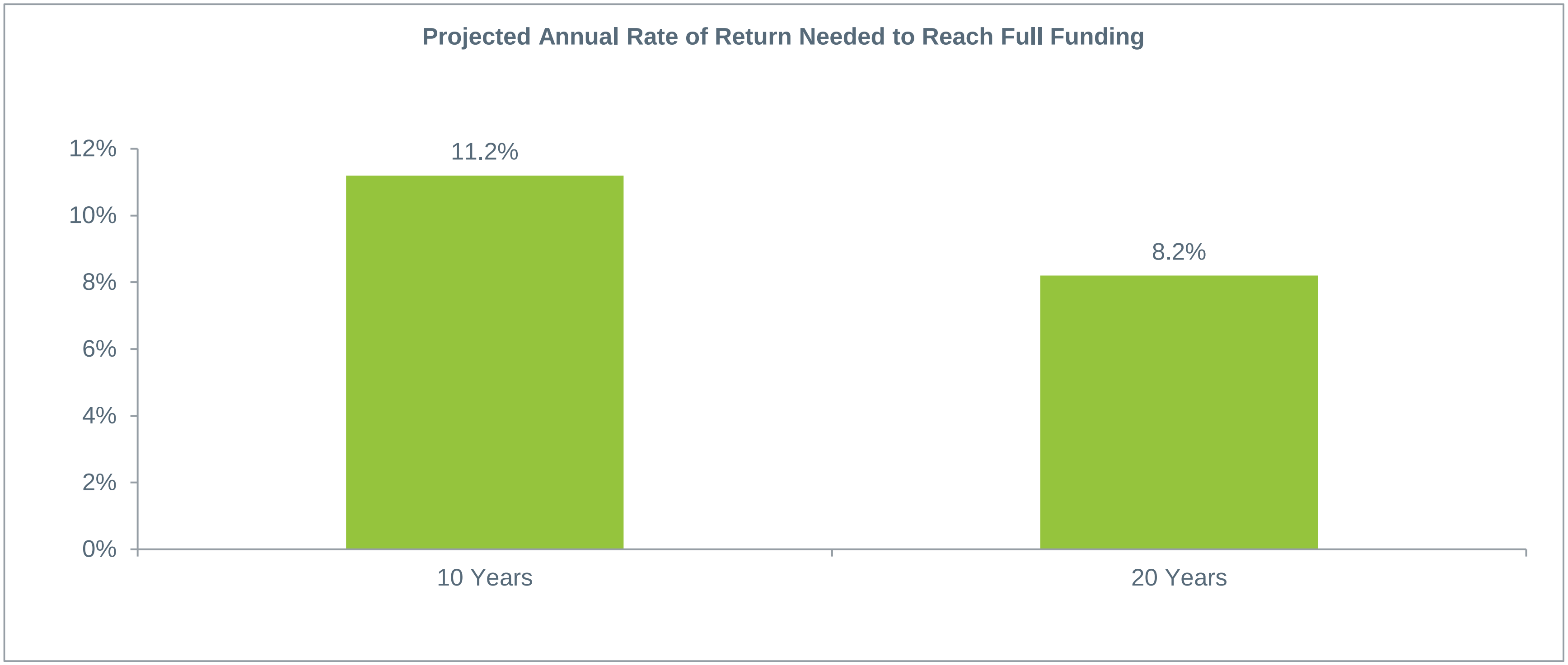


Deterministic Scenario Analysis

Full Funding Implied Returns

The figure below shows the projected investment return for the total fund needed to bring the System to 100% funding (on a market value basis) in 10 and 20 years, respectively. The results assume all other actuarial assumptions are precisely met over the time periods shown and that these returns are earned for every year, without variance.

Actuarially assumed rate of return – **6.75%**



Deterministic Scenario Analysis (continued)

Sensitivity Analysis

The figure below summarizes the outcomes of the following deterministic scenarios. The Base Case represents the analysis completed in the Deterministic Analysis section of this report, assuming an asset return of -15.6% in 2022, and assumes the current actuarially assumed rate of return (6.75%). The results assume all other actuarial assumptions are precisely met over the time periods shown and that these returns are earned for every year, without variance.

A. **V Shaped Recovery** – The V scenario assumes a return of +20% in 2023 followed by the assumed rate of return thereafter (6.75%).
B. **W Shaped Market Event** – The W scenario assumes a return of +20% in 2023, -15% in 2024, +15% in 2025 followed by the assumed rate of return thereafter (6.75%).
C. **Future V Shaped Market Event** – This scenario assumes a return of -10% in 2032, +10% in 2033, and the assumed rate of return (6.75%) in all other projection years.
D. **Future W Shaped Market Event** – This scenario assumes a return of -15% in 2032, +15% in 2033, -15% in 2034, +15% in 2035, and the assumed rate of return (6.75%) in all other projection years.
E. **6.00%** – Assets earn 6.00% each and every year after 2022.
F. **Loss then Low** – 10% loss in 2023 followed by a lower return environment (6.00%).
G. **Persistent Inflation** – Assets earn 6.75% each and every year (after 2022) but wage inflation is 5.00% per year during the 20-year projection period.

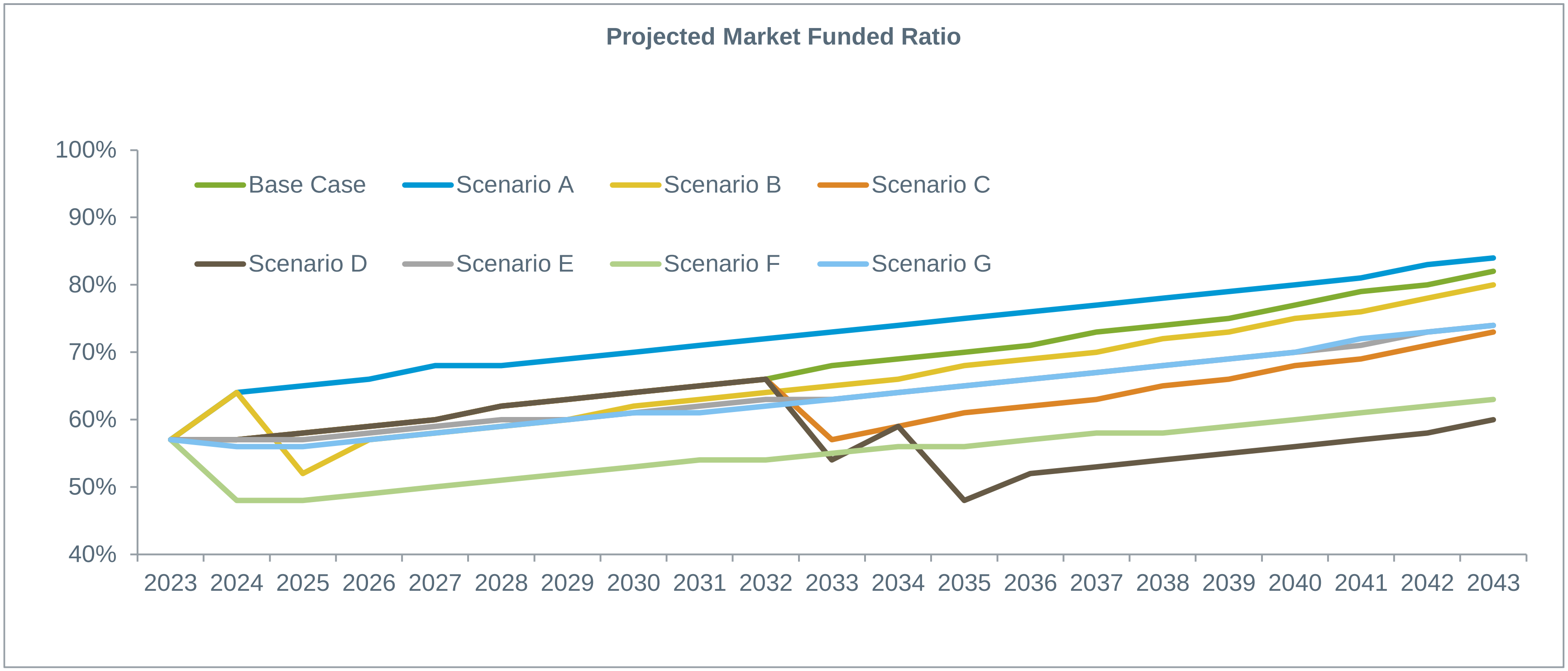
	Value in 2043							
	Base Case	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	Scenario G
Projected Payout Ratio	8%	8%	8%	9%	11%	9%	10%	8%
Projected Employer Contributions (millions)	$308.9	$258.3	$332.5	$348.7	$348.7	$348.7	$348.7	$449.5
Projected Employee Contributions (millions)	$138.3	$138.3	$138.3	$138.3	$138.3	$138.3	$138.3	$217.4
Projected Actuarial Accrued Liabilities (billions)	$9.1	$9.1	$9.1	$9.1	$9.1	$9.1	$9.1	$12.2
Projected Market Value of Assets (billions)	$7.4	$7.6	$7.3	$6.6	$5.4	$6.7	$5.7	$9.1
Projected Surplus/(Deficit) (billions)	($1.6)	($1.5)	($1.8)	($2.4)	($3.6)	($2.4)	($3.3)	($3.2)
Projected Market Funded Ratio	82%	84%	80%	73%	60%	74%	63%	74%
	20 Year Cumulative Total (2023-2042)							
Projected Cumulative Employer Contributions (billions)	$4.79	$4.12	$4.93	$5.11	$5.12	$5.13	$5.33	$5.94
Projected Cumulative Employee Contributions (billions)	$2.12	$2.12	$2.12	$2.12	$2.12	$2.12	$2.12	$2.75
% Change from Base Case	--	-14%	3%	7%	7%	7%	11%	24%

RVK

Deterministic Scenario Analysis (continued)

Sensitivity Analysis

The figure below summarizes the projected funded ratio for the scenarios shown on the previous page. The results assume all other actuarial assumptions are precisely met over the time periods shown and that these returns are earned for every year, without variance.



Stochastic Analysis

In the previous section of this report, we assumed the System operated going forward with certain knowledge of the future investment returns earned by the System's assets. This section introduces the element of uncertainty in those future investment returns. This part of the analysis examines System assets and liabilities under many capital market environments based on expected future asset returns and inflation, and their expected volatility. Using a Monte Carlo simulation technique, both assets and liabilities are assumed to vary stochastically, linked together by changes in inflation.

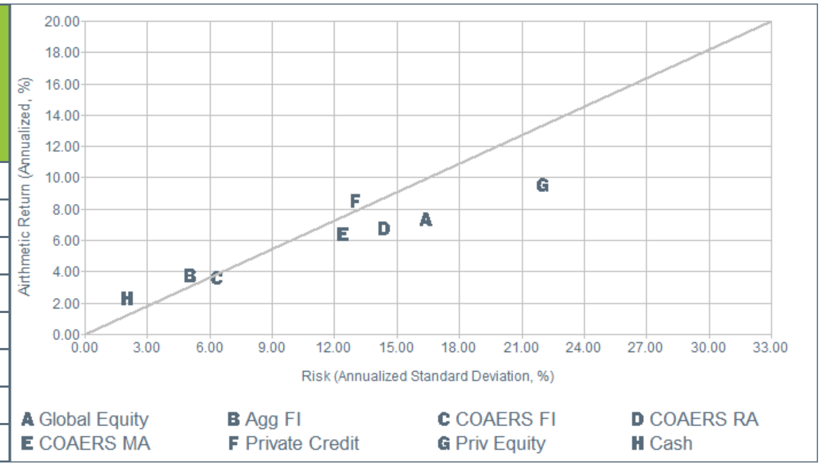
Using the current expected values and variances of the returns and inflation, along with their correlations, 2,000 trials are generated to produce a distribution of results. A stochastic analysis can answer questions about the best/worst case outcomes along with the probability of such outcomes. This is contrasted with the deterministic analysis that provides an expected value if all current System assumptions are exactly met.

Stochastic Analysis (continued)

Long-Term Return and Risk Assumptions

In order to perform a stochastic analysis and create asset allocation alternatives, it is necessary to estimate, for each asset class, its probable return and risk. The expected returns are our best estimates of the average annual percentage increases in values of each asset class over a prospective long period of time (RVK assumptions are based on a 20 year horizon), and assumed to be normally distributed. The risk of an asset class is measured by its standard deviation, or volatility. If asset returns are normally distributed, two-thirds (67%) of all returns are expected to lie within one standard deviation on either side of the mean. For example, we expect Global Equity to return, annually on average, 7.85% with a standard deviation of 16.40%, meaning that two-thirds of the time we expect its return to lie between -8.55% (= 7.85 – 16.40) and 24.25% (= 7.85 + 16.40). Moreover, we expect 95% of all return outcomes to lie within two standard deviations of the mean return, implying only a one-in-twenty chance that the return on Global Equity will either fall below -24.95% or rise above 40.65%. The risk and return assumptions used in this study are outlined in the below table and chart. RVK's capital markets assumptions reflect passive investments (where possible) and are net of investment management fees.

Asset Class	Arithmetic Return Assumption	Geometric/ Compound Return Assumption	Standard Deviation Assumption
Global Equity	7.85	6.62	16.40
US Agg Fixed Income	4.00	3.88	5.00
COAERS Fixed Income	4.00	3.81	6.29
COAERS Real Assets	7.08	6.11	14.53
COAERS Multi-Asset	6.87	6.17	12.32
Private Credit	8.00	7.23	13.00
Private Equity	10.00	7.86	22.00
Cash Equivalents	2.50	2.48	2.00



Assumptions noted as COAERS are custom assumptions based on COARERS' implementation of the asset class.
COAERS Fixed Income = 75% US Agg Fixed Income, 25% US Long Duration Government Fixed Income.
COAERS Real Assets = 33% each Core Real Estate, US REITs, and listed Infrastructure.
COAERS Multi-Asset = 56% Global Equity, 21% US Agg Fixed Income, 10% US REITs, 5% Listed Infrastructure, 7% GTAA, and 1% Cash.

Stochastic Analysis (continued)

Correlation Between Asset Classes

Creating a diversified portfolio of asset classes enables the investor to achieve a high rate of return while minimizing volatility of the portfolio. As defined on the previous page, volatility is “risk” or standard deviation. By minimizing the volatility of a portfolio, we produce asset returns that vary less from year to year. Diversification exists because the returns of different asset classes do not always move in the same direction, at the same time, or with the same magnitude. Correlation values are between 1.00 and –1.00. If returns of two asset classes rise or fall at the same time and in the same magnitude, they have a correlation value of 1.00. Conversely, two asset classes that simultaneously move in opposite directions, and in the same magnitude, have a correlation value of –1.00. A correlation of zero indicates no relationship between returns. The assumed correlations are largely based on historical index data, with some qualitative analysis applied. For instance, where appropriate, we weight current history more heavily. The correlation matrix used in this study is shown below:

	Global Equity	US Agg Fixed Income	COAERS Fixed Income	COAERS Real Assets	COAERS Multi-Asset	Private Credit	Private Equity	Cash Equivalents
Global Equity	1.00	0.12	-0.01	0.84	0.97	0.80	0.81	-0.08
US Agg Fixed Income	0.12	1.00	0.94	0.02	0.25	-0.18	-0.06	0.28
COAERS Fixed Income	-0.01	0.94	1.00	-0.15	0.11	-0.30	-0.18	0.21
COAERS Real Assets	0.84	0.02	-0.15	1.00	0.89	0.82	0.73	-0.08
COAERS Multi-Asset	0.97	0.25	0.11	0.89	1.00	0.83	0.81	-0.07
Private Credit	0.80	-0.18	-0.30	0.82	0.83	1.00	0.84	-0.12
Private Equity	0.81	-0.06	-0.18	0.73	0.81	0.84	1.00	-0.21
Cash Equivalents	-0.08	0.28	0.21	-0.08	-0.07	-0.12	-0.21	1.00

The fact that the correlations shown in the table are nearly all positive does not imply that these asset classes do not diversify one another. Their correlations are significantly less than 1.00, meaning we expect a measurable number of instances when the underperformance of one or more of the asset classes will be offset by the outperformance of others. This point is demonstrated on the following pages, which illustrate that diversification into less correlated asset classes can decrease the expected overall volatility of a portfolio.

RVK

Stochastic Analysis (continued)

Efficient Portfolios

Each frontier portfolio (optimal allocation) is created using target rates of return both above and below the projected rate of return for the current allocation. This range illustrates the trade-off between return and risk; additional return can only be achieved by undertaking additional risk. The table below shows the possible optimal allocations given the selected asset classes and their constraints listed under “Min” and “Max.”

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target
Global Equity	**46**	**66**	46	46	46	46	46	46	46	46	46	52	56
COAERS Fixed Income	**16**	**33**	32	33	33	33	31	28	26	23	20	16	21
COAERS Real Assets	**10**	**20**	10	10	10	10	10	10	10	10	12	10	15
COAERS Multi-Asset	**2.5**	**10**	3	3	3	3	3	3	3	3	3	3	7
Private Credit	**0**	**10**	0	2	5	8	10	10	10	10	10	10	0
Private Equity	**0**	**10**	0	0	0	0	1	3	6	8	10	10	0
Cash Equivalents	**0**	**10**	10	6	3	1	0	0	0	0	0	0	1
Total			100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			48	50	53	55	58	61	63	66	68	73	60
Capital Preservation			42	40	37	34	31	29	26	24	20	17	24
Alpha			0	0	0	0	0	0	0	0	0	0	0
Inflation			10	10	10	10	10	10	10	10	12	10	16
Expected Arithmetic Return			**6.0**	**6.2**	**6.3**	**6.5**	**6.6**	**6.8**	**6.9**	**7.1**	**7.2**	**7.4**	**6.8**
Expected Risk (Standard Deviation)			**9.3**	**9.5**	**9.8**	**10.1**	**10.4**	**10.9**	**11.3**	**11.8**	**12.3**	**13.0**	**12.0**
Expected Compound Return			**5.6**	**5.8**	**5.9**	**6.0**	**6.1**	**6.2**	**6.3**	**6.5**	**6.5**	**6.6**	**6.1**
Expected Sharpe Ratio			0.38	0.39	0.39	0.40	0.39	0.39	0.39	0.39	0.38	0.38	0.36
RVK Expected Eq Beta (LCUS Eq = 1)			0.55	0.57	0.58	0.60	0.62	0.64	0.67	0.69	0.72	0.76	0.71
RVK Liquidity Metric (T-Bills = 100)			87	85	82	80	77	75	73	71	69	70	85

Stochastic Analysis (continued)

Efficient Portfolios

The table shows the current Target Allocation and highlights five additional portfolios (100% Fixed Income, 60/40 (60% global equity and 40% US aggregate fixed income), a Potential Target, W/PC & PE, and 100% Equity) for consideration throughout this study.

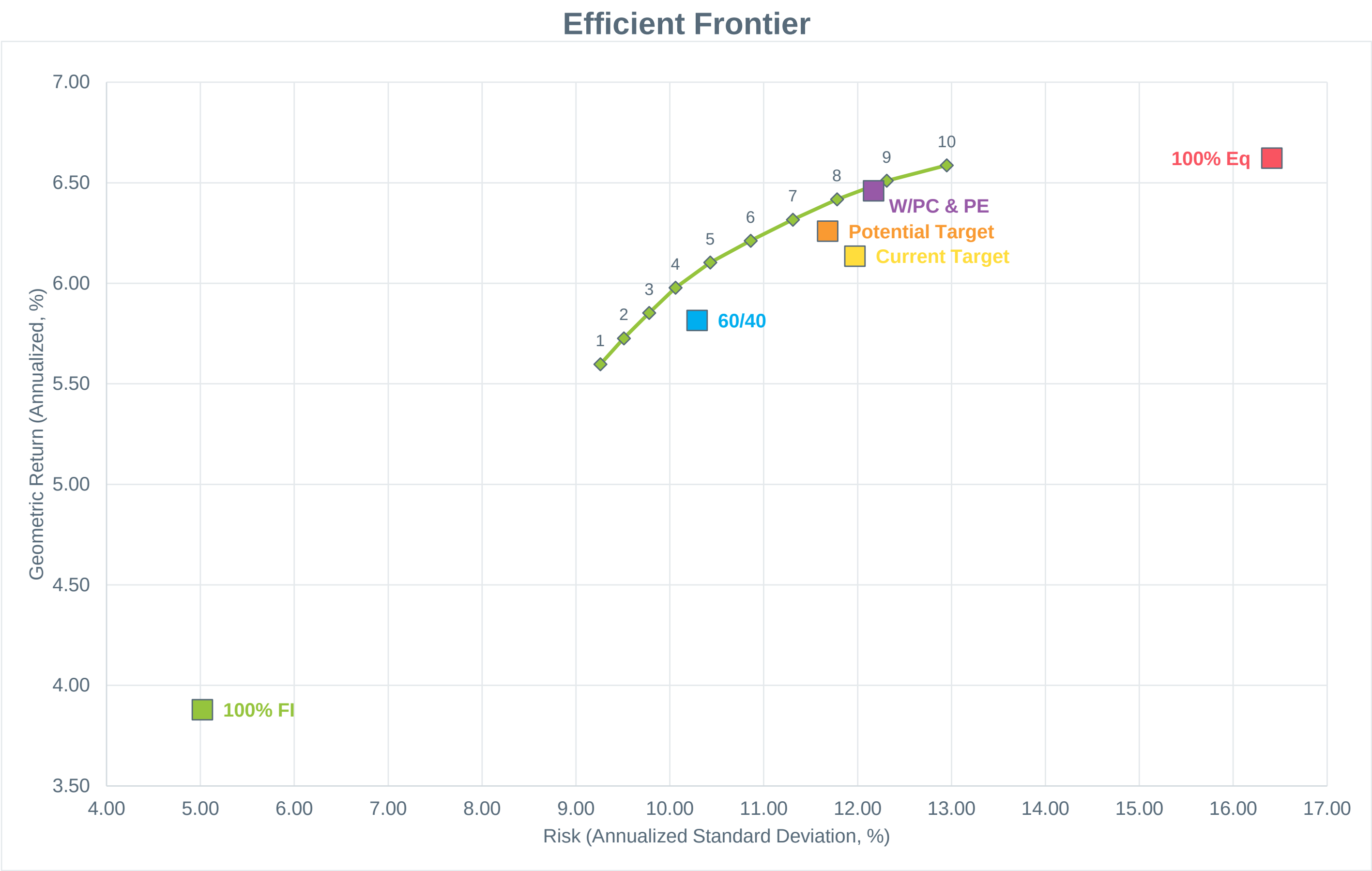
	100% FI	60/40	Current Target	Potential Target	W/PC & PE	100% Eq
Global Equity	0	60	56	53	47	100
US Agg Fixed Income	100	40	0	0	0	0
COAERS Fixed Income	0	0	21	21	19	0
COAERS Real Assets	0	0	15	15	15	0
COAERS Multi-Asset	0	0	7	0	0	0
Private Credit	0	0	0	10	10	0
Private Equity	0	0	0	0	8	0
Cash Equivalents	0	0	1	1	1	0
Total	100	100	100	100	100	100
Capital Appreciation	0	60	60	63	65	100
Capital Preservation	100	40	24	22	20	0
Alpha	0	0	0	0	0	0
Inflation	0	0	16	15	15	0
Expected Arithmetic Return	**4.0**	**6.3**	**6.8**	**6.9**	**7.1**	**7.8**
Expected Risk (Standard Deviation)	**5.0**	**10.3**	**12.0**	**11.7**	**12.2**	**16.4**
Expected Compound Return	**3.9**	**5.8**	**6.1**	**6.3**	**6.4**	**6.6**
Expected Sharpe Ratio	0.30	0.37	0.36	0.38	0.38	0.32
RVK Expected Eq Beta (LCUS Eq = 1)	0.07	0.61	0.71	0.69	0.71	0.97
RVK Liquidity Metric (T-Bills = 100)	85	88	85	77	70	90

RVK

Stochastic Analysis (continued)

Efficient Frontier

The risk of each alternative allocation is plotted against the horizontal axis, while the return is measured on the vertical axis. Each measure is based on RVK's 20 year capital markets assumptions. The line connecting the points represents all the optimal portfolios subject to the given constraints and is known as the "efficient frontier." The upward slope of the efficient frontier indicates the direct relationship between return and risk.

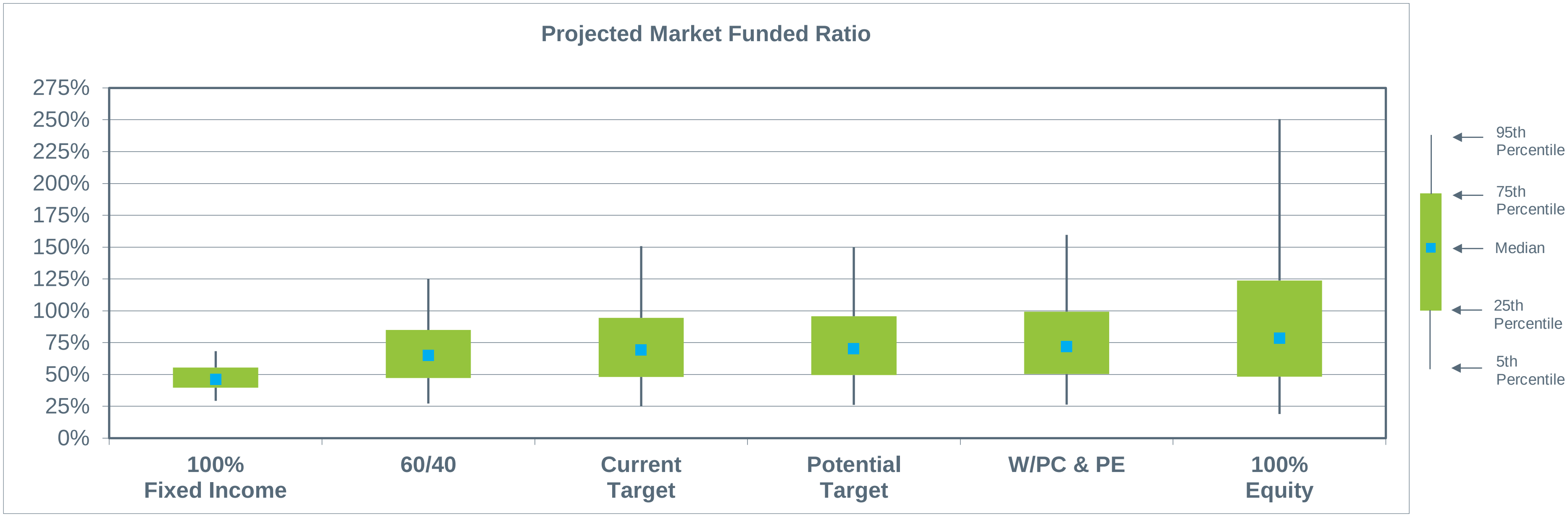


RVK

Stochastic Analysis (continued)

Projected Market Funded Ratio (market value of assets/actuarial accrued liability); **20 Years**

The graph below shows the distribution of possible market funded ratios twenty years from now, assuming the five different asset mixes highlighted on the prior pages. The results assume the existing contribution policy and assumes investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go.



	100% Fixed Income		60/40		Current Target		Potential Target		W/PC & PE		100% Equity	
	Unfunded Liability (Bil)	Funded Ratio	Unfunded Liability	Funded Ratio	Unfunded Liability (Bil)	Funded Ratio	Unfunded Liability (Bil)	Funded Ratio	Unfunded Liability (Bil)	Funded Ratio	Unfunded Liability (Bil)	Funded Ratio
5th Percentile	$6.3	29%	$6.6	27%	$6.8	25%	$6.6	26%	$6.6	26%	$7.3	19%
25th Percentile	$5.5	40%	$4.7	47%	$4.7	48%	$4.5	50%	$4.5	50%	$4.7	48%
50th Percentile	$4.8	46%	$3.1	65%	$2.8	69%	$2.7	70%	$2.5	72%	$1.9	79%
75th Percentile	$4.1	55%	$1.4	85%	$0.5	94%	$0.4	96%	$0.1	99%	($2.2)	124%
95th Percentile	$2.9	68%	($2.2)	125%	($4.6)	151%	($4.5)	150%	($5.5)	160%	($13.8)	250%

Stochastic Analysis (continued)

Projected Market Funded Ratio and Maximum 1 Year Investment Loss (market value of assets/actuarial accrued liability)

The tables below show the probability that the System will be at various funding levels for each of the five different asset mixes highlighted on the prior pages. The tables also illustrate the maximum 1 year investment loss each portfolio is expected to experience during the given time period. The results assume the existing contribution policy and assumes investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go.

5 Years	Probability of Full Funding	Probability of < 56% (Current) Funding	Probability of < 40% Funding	Probability of Asset Depletion	Maximum 1 Year Investment Loss
100% Fixed Income	0%	64%	0%	0%	-13%
60/40	0%	43%	4%	0%	-27%
Current Target	2%	41%	5%	0%	-32%
Potential Target	1%	41%	5%	0%	-31%
W/PC & PE	2%	40%	5%	0%	-32%
100% Equity	8%	39%	10%	0%	-42%

10 Years	Probability of Full Funding	Probability of < 56% (Current) Funding	Probability of < 40% Funding	Probability of Asset Depletion	Maximum 1 Year Investment Loss
100% Fixed Income	0%	70%	3%	0%	-13%
60/40	4%	40%	8%	0%	-27%
Current Target	8%	38%	10%	0%	-32%
Potential Target	8%	37%	9%	0%	-31%
W/PC & PE	9%	37%	9%	0%	-32%
100% Equity	19%	37%	15%	0%	-42%

20 Years	Probability of Full Funding	Probability of < 56% (Current) Funding	Probability of < 40% Funding	Probability of Asset Depletion	Maximum 1 Year Investment Loss
100% Fixed Income	0%	76%	26%	0%	-15%
60/40	13%	37%	17%	0%	-30%
Current Target	21%	34%	17%	0%	-32%
Potential Target	22%	32%	16%	0%	-31%
W/PC & PE	24%	31%	16%	0%	-32%
100% Equity	37%	31%	19%	0%	-42%

Stochastic Analysis (continued)

Drawing Inferences

The tables below compare the projected market funded ratios five, ten, and twenty years from now, under the median (50th percentile), worst-case (5th percentile), and best-case (95th percentile) scenarios, assuming the five different asset mixes highlighted on the prior pages. The table also displays for comparative purposes the median, peak, and trough projected payout ratios and cumulative contributions for the five asset mixes being examined.

5 Years	Market Funded Ratio in Year 5			Cumulative Employer Contributions Year 5 (Billions)			Payout Ratios		
	50th	5th	95th	50th	5th	95th	Year 5 Median	Years 1 to 5 Peak	Years 1 to 5 Trough
100% Fixed Income	54%	46%	63%	$1.2	$1.3	$1.1	11%	13%	9%
60/40	58%	42%	82%	$1.2	$1.3	$1.1	10%	14%	7%
Current Target	59%	40%	89%	$1.2	$1.3	$1.1	10%	15%	7%
Potential Target	59%	40%	88%	$1.2	$1.3	$1.1	10%	15%	7%
W/PC & PE	60%	40%	90%	$1.2	$1.3	$1.1	10%	15%	6%
100% Equity	61%	35%	107%	$1.2	$1.3	$1.0	10%	17%	5%

10 Years	Market Funded Ratio in Year 10			Cumulative Employer Contributions Year 10 (Billions)			Payout Ratios		
	50th	5th	95th	50th	5th	95th	Year 10 Median	Years 1 to 10 Peak	Years 1 to 10 Trough
100% Fixed Income	52%	41%	65%	$2.5	$2.6	$2.3	12%	16%	9%
60/40	60%	37%	98%	$2.4	$2.6	$2.0	11%	17%	7%
Current Target	62%	35%	109%	$2.4	$2.6	$1.9	10%	18%	6%
Potential Target	62%	36%	108%	$2.4	$2.6	$1.9	10%	18%	6%
W/PC & PE	63%	36%	111%	$2.4	$2.6	$1.9	10%	18%	6%
100% Equity	66%	30%	145%	$2.3	$2.6	$1.8	10%	21%	4%

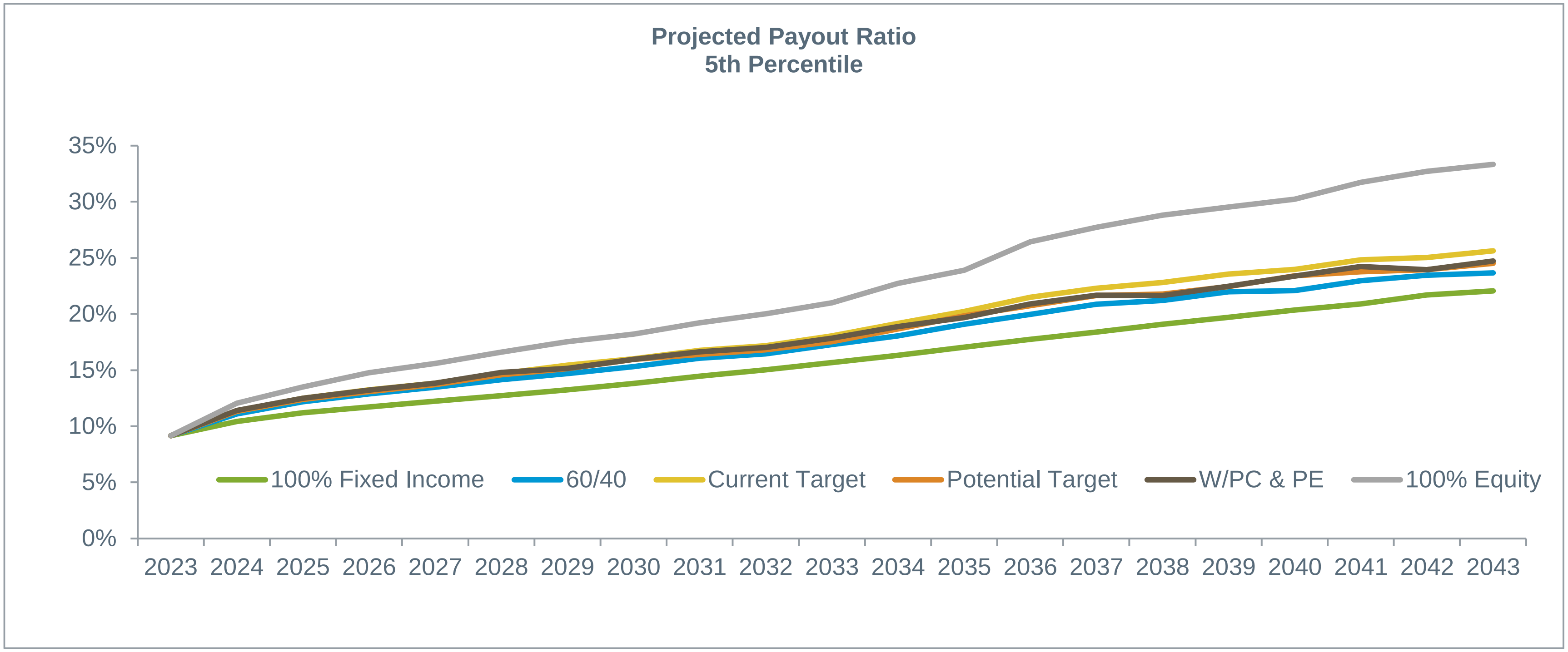
20 Years	Market Funded Ratio in Year 20			Cumulative Employer Contributions Year 20 (Billions)			Payout Ratios		
	50th	5th	95th	50th	5th	95th	Year 20 Median	Years 1 to 20 Peak	Years 1 to 20 Trough
100% Fixed Income	46%	29%	68%	$5.6	$6.0	$5.2	14%	22%	9%
60/40	65%	27%	125%	$5.3	$5.9	$3.8	10%	24%	5%
Current Target	69%	25%	151%	$5.2	$5.8	$3.6	9%	26%	4%
Potential Target	70%	26%	150%	$5.2	$5.8	$3.6	9%	25%	4%
W/PC & PE	72%	26%	160%	$5.1	$5.8	$3.5	9%	25%	4%
100% Equity	79%	19%	250%	$4.9	$5.8	$3.4	8%	33%	3%

RVK

Stochastic Analysis (continued)

Projected Payout Ratio (expected benefit payments/market value of assets) – 5th Percentile

The graph below displays 5th percentile payout ratios over the next twenty years, assuming the five different asset mixes highlighted on the prior pages. The results assume the existing contribution policy and assumes investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go, and the payout ratio is 100% thereafter.

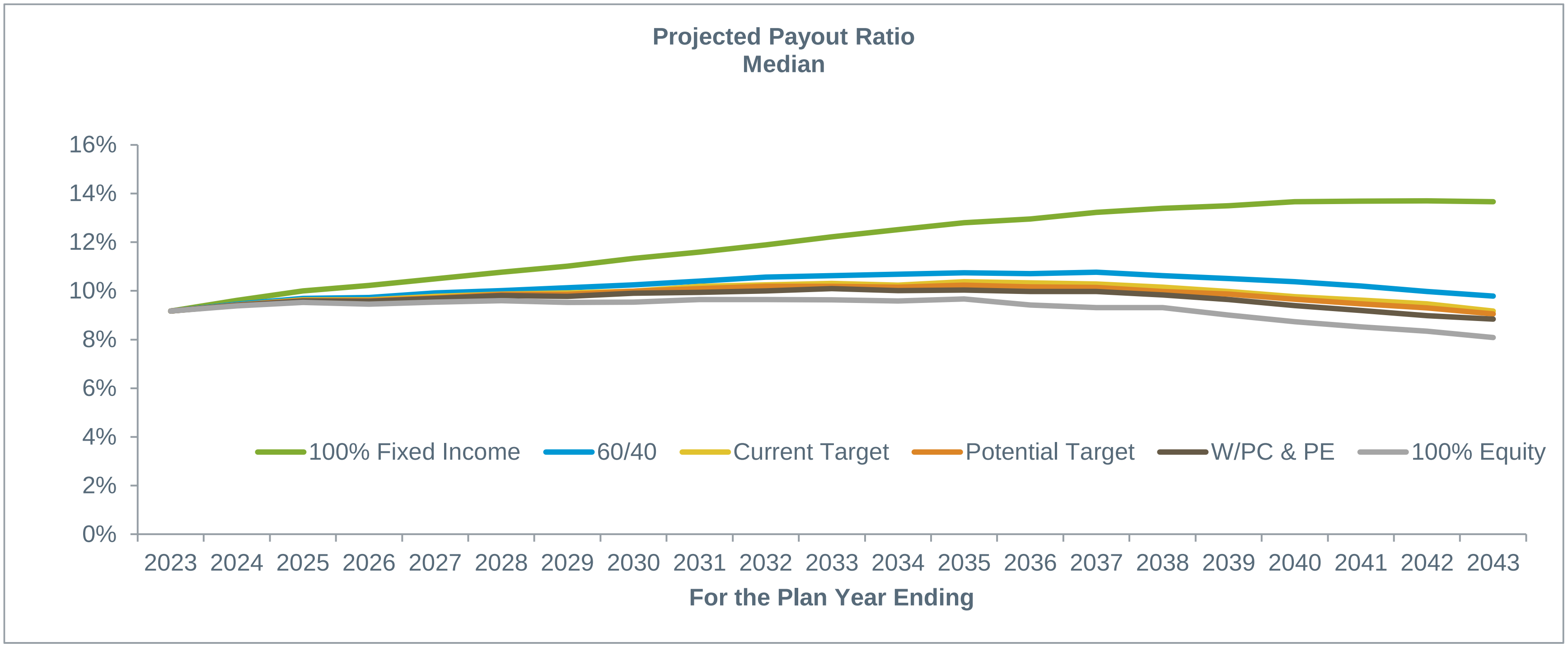


	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
100% Fixed Income	9%	10%	11%	12%	12%	13%	13%	14%	14%	15%	16%	16%	17%	18%	18%	19%	20%	20%	21%	22%	22%
60/40	9%	11%	12%	13%	13%	14%	15%	15%	16%	16%	17%	18%	19%	20%	21%	21%	22%	22%	23%	23%	24%
Current Target	9%	11%	13%	13%	14%	15%	15%	16%	17%	17%	18%	19%	20%	21%	22%	23%	24%	24%	25%	25%	26%
Potential Target	9%	11%	12%	13%	14%	15%	15%	16%	16%	17%	18%	19%	20%	21%	22%	22%	22%	23%	24%	24%	25%
W/PC & PE	9%	11%	12%	13%	14%	15%	15%	16%	17%	17%	18%	19%	20%	21%	22%	22%	22%	23%	24%	24%	25%
W/PC & PE	9%	12%	13%	15%	16%	17%	18%	18%	19%	20%	21%	23%	24%	26%	28%	29%	30%	30%	32%	33%	33%

Stochastic Analysis (continued)

Projected Payout Ratio (expected benefit payments/market value of assets) – Median

The graph below displays median payout ratios over the next twenty years, assuming the five different asset mixes highlighted on the prior pages. The results assume the existing contribution policy and assumes investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go, and the payout ratio is 100% thereafter.

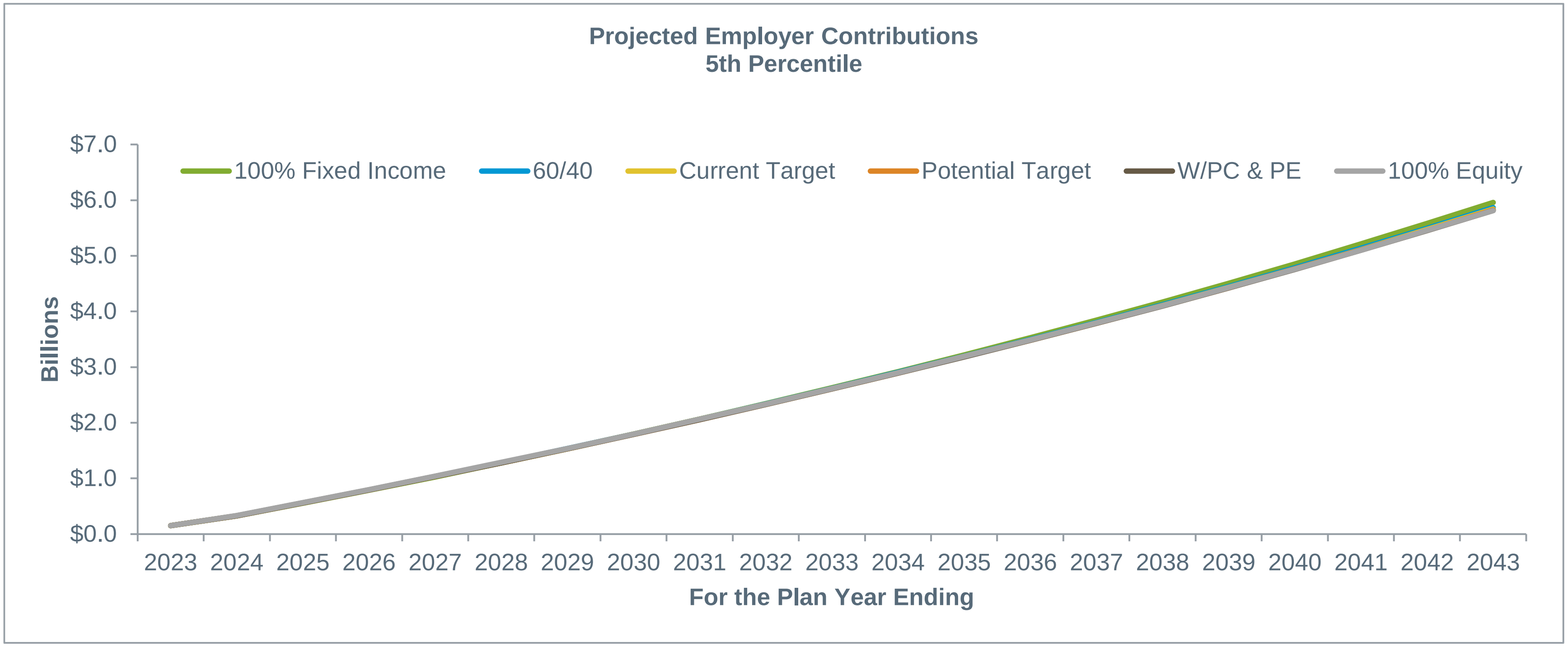


	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
100% Fixed Income	9%	10%	10%	10%	11%	11%	11%	11%	12%	12%	12%	13%	13%	13%	13%	13%	13%	14%	14%	14%	14%
60/40	9%	9%	10%	10%	10%	10%	10%	10%	10%	11%	11%	11%	11%	11%	11%	11%	11%	10%	10%	10%	10%
Current Target	9%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	9%	9%
Potential Target	9%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	9%	9%	9%
W/PC & PE	9%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	9%	9%	9%	9%
100% Equity	9%	9%	10%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	9%	9%	9%	9%	9%	9%	8%	8%

Stochastic Analysis (continued)

Cumulative Employer Contributions to Date – 5th Percentile

The graph and table below show the 5th percentile projected cumulative employer contributions over the next twenty years assuming the five different asset mixes highlighted on the prior pages. The results assume the existing contribution and investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go.

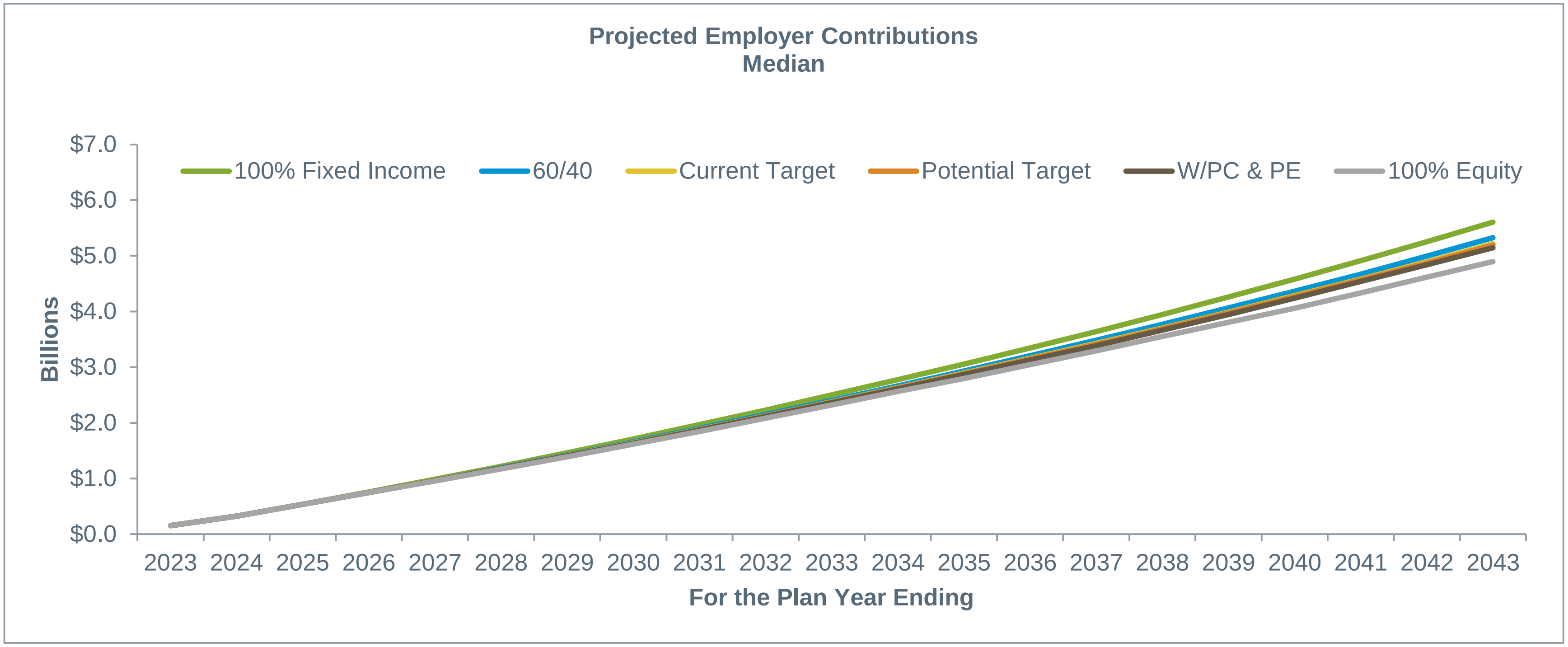


	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
100% Fixed Income	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.2	$4.5	$4.9	$5.2	$5.6	$6.0
60/40	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.9
Current Target	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
Potential Target	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
W/PC & PE	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
100% Equity	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8

Stochastic Analysis (continued)

Cumulative Employer Contributions to Date – Median

The graph and table below show the median projected cumulative employer contributions over the next twenty years assuming the five different asset mixes highlighted on the prior pages. The results assume the existing contribution and investment policies remain unchanged for all projection years. Should assets be depleted in any trial, the model assumes the System becomes pay as you go.



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
100% Fixed Income	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.2	$4.5	$4.9	$5.2	$5.6	$6.0
60/40	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.9
Current Target	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
Potential Target	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
W/PC & PE	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8
100% Equity	$0.2	$0.3	$0.6	$0.8	$1.0	$1.3	$1.5	$1.8	$2.1	$2.3	$2.6	$2.9	$3.2	$3.5	$3.8	$4.1	$4.4	$4.8	$5.1	$5.5	$5.8

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Appendix: Assumptions and Methods

Actuarial Valuation Assumptions and Methods: At the beginning of each projection year, an actuarial valuation is performed to determine employer contributions. The assumptions used in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS were utilized in all years. These methods and assumptions are summarized below:

Actuarial Cost Method	Entry Age Normal Actuarial Cost Method. Funding policies and methods are described in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
Liability Discount Rate	6.75% per year, compounded annually.
Administrative Expenses	0.51% of payroll.
Inflation	General inflation of 2.50% per year, compounded annually.
Future Pay Increases	Future pay increases as described on page E-4 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
Retirement	Rates of retirement as described on page E-2 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
Mortality	Rates of mortality as described on page E-1 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
Disability	Rates of disablement as described on page E-4 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
Withdrawal	Rates of other withdrawal as described on page E-3 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
DROP Participation	As described on page E-4 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.
COLA's	None assumed.

Appendix: Assumptions and Methods (continued)

Actuarial Valuation Assumptions and Methods: (continued)

Asset Valuation Method	Five-year smoothing method described on page E-6 of the COAERS December 31, 2021 Actuarial Valuation prepared by GRS.

Appendix: Assumptions and Methods (continued)

Projection Assumptions (used in the deterministic and stochastic asset/liability projections): These projections begin with the System's participant population as of December 31, 2021, as provided by GRS. The System's population is projected forward and assumed to change as a result of employment separation, death, disability, and retirement, as predicted by the assumptions used in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS (and described on the prior pages). New members are assumed to enter the System such that the active population remains level throughout the projection. Employee compensation is projected into the future in accordance with the assumptions described on the prior pages. Investment returns are projected into the future in accordance with the assumptions described below.

Employer Contributions	Normal cost, plus amortization of unfunded liabilities, subject to corridor restrictions with 2-year phase-in.
Member Contributions	Current Policy: 8.0% of projected pay. New Policy: For 2022 and 2023: 8.0%,.2024: 9.0%, 2025 and thereafter: 10.0% of projected payroll. Additional employee contributions of up to 2.0% are required beginning in 2024 under certain corridor measurements.
New Entrants	New employees are assumed to join the System such that the active population remains level throughout the projection. New employees entering the System are assumed to have age, pay, and gender characteristics of recently hired participants.
Rate of Return on Assets	Deterministic Analysis: For 2022, actual return of -15.6%. Thereafter, 6.75%, compounded annually. Stochastic Analysis: For 2022, actual return of -15.6%. Thereafter, returns on the portfolio are based on the expected returns of each asset class and the correlations between each class which are detailed in the Stochastic Analysis section of this report.
Base Wage Component	Deterministic Analysis: in accordance with actuarial assumptions. Stochastic Analysis: Increases that vary with inflation.

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Appendix: Assumptions and Methods (continued)

Promotion & Productivity Wage Component	Increases in accordance with actuarial assumptions.
Inflation	For 2022, 4.5%. Thereafter**,** 2.50% per year with a standard deviation of 3.00%.
Other	All other projection assumptions and methods are the same as those used in the COAERS December 31, 2021 Actuarial Valuation prepared by GRS, with minor exceptions. Due to system restraints, the following method used by GRS in their actuarial valuation as of December 31, 2021, was approximated: 1. The Asset Valuation Method was approximated by a 55/45 weighting of the Expected Actuarial Value and Market Value of assets.

9. Discuss and consider investment program including goals, strategy, and allocation:

A. Asset Allocation Study

B. Private credit

C. Functionally focused portfolio allocation

9A. Asset Allocation Study

Presented by David Kushner, David Stafford and RVK

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 9:
Discuss and consider investment program including goals, strategy, and allocation:

A. Asset Allocation Study

AGENDA ITEM OBJECTIVE
The Committee will receive a presentation on the Asset Allocation Study.

RELEVANCE TO STRATEGIC PLAN
This agenda item is central to **COAERS Strategic Plan Goal 1: Achieve and maintain a funding level that ensures the long-term sustainability of the retirement system.** Asset allocation studies help determine the appropriate structuring of the Fund's investments, which is the most important decision in determining long-term returns. This item is also an action item under the investment program strategic objectives.

RECOMMENDATION FOR COMMITTEE ACTION
Staff recommends that the Committee refer to the Board approval of the "Potential Target" portfolio and direct Staff and Consultant to formulate associated policy, governance, education, and implementation for the Board's future consideration.

BACKGROUND
Staff and RVK will present on concepts related to an updated Asset Allocation Study. These presentations will thematically discuss the impact of broadening the opportunity set of investments included in the Strategic Asset Allocation. Additionally, these presentations will present a "Potential Target" portfolio which includes an allocation to Private Credit for discussion and consideration by the Committee.

ATTACHMENT
1. Staff Asset Allocation Study Memo
2. RVK Asset Allocation Study Memo
3. RVK Presentation: Asset Allocation Study 2023-08

COAERS

Staff Memo on RVK Asset Allocation Study

In reviewing the Asset Allocation Study as presented by RVK, Staff notes to the Committee the following key takeaways:

- The inclusion of Private Credit as shown in "Frontier 2" shifts the efficient frontier up and to the left, suggesting better risk adjusted returns than portfolios that do not include private credit. Staff believes that the inclusion of Private Credit in the Strategic Asset Allocation could be a nearer-term consideration for the Board.
- The additional inclusion of Private Equity as shown in "Frontier 3" allows for higher returns with similar risk to be earned in portfolios with greater than 10% volatility. Given the more significant governance, implementation timelines and resource requirements, Staff believes that the inclusion of Private Equity in the Strategic Asset Allocation could be a longer-term consideration for the Board.
- The "Potential Target" portfolio has a variety of attractive attributes when compared to the "Current Target" as adopted in the Investment Policy Statement:
    - Expected compound annual returns are higher alongside lower expected risk;
    - Higher portfolio diversification with more distinct sources of returns and risk, including less reliance on public equities which currently are the primary driver of both risk and return for the Fund;
    - Elimination of Multi-Asset which has been difficult to effectively implement and has provided limited diversification;
    - Slightly better outcomes for the total Fund through Monte Carlo and stochastic modeling.

Staff Recommendation:

Staff recommends that the Committee refer to the Board approval of the "Potential Target" portfolio and direct Staff and Consultant to formulate associated policy, governance, education, and implementation for the Board's future consideration.

RVK

Memorandum

To	City of Austin Employees' Retirement System Investment Committee
From	RVK, Inc.
Subject	Asset Allocation Study
Date	August 25, 2023

Executive Summary

This memorandum outlines the asset allocation study to be presented at the City of Austin Employees' Retirement System Investment Committee meeting on August 25, 2023. The study analyzes varying asset class mixes utilizing RVK's 2023 capital markets assumptions through numerous lenses. Forward-looking estimates are provided for efficient portfolios established using a mean-variance optimization framework under the assumption of high-level portfolio constraints in addition to the Current Target and a Potential Target.

The goal of this study is to allow the Investment Committee to gauge the tradeoffs across a number of asset class mixes and evaluate the introduction of select private asset classes in pursuit of a long-term strategic allocation that can improve System funding health.

RVK is supportive of moving the System's long-term strategic allocation to the "Potential Target" portfolio outlined in the asset allocation study. We acknowledge that additional details associated with governance and policy updates, specific implementation plans, and general education on specific private credit strategies would be forthcoming and preempt rebalancing to this new target, should it be approved by the Board.

Asset Allocation Study Outline

The study includes an overview of the inputs into the mean-variance optimization modeling process. These include forward-looking capital markets assumptions for all asset classes utilized within the study and their estimated correlations with one another. These are long-term forward-looking estimates evaluated over a 10 to 20-year horizon. Additionally, monte carlo simulations are provided for all efficient frontiers and associated portfolios. The study is outlined below:

- Frontier 1 outlines the current asset classes utilized by the System in addition to plotting the Current Target.
- Frontier 2 introduces private credit as a potential asset class. It plots the Current Target in addition to a Potential Target, which includes an allocation of 10% to private credit. RVK and Staff note this is an aspirational allocation to private credit, and not something that is likely to be achieved in full in short order but believe is a realistic landing point if pursued.
- Frontier 3 introduces private equity as a potential asset class. While in the short-term this is not an asset class being considered for adoption, its potential benefits are worth highlighting for future discussions.

RVK

August 25, 2023

Asset Allocation Study

City of Austin Employees' Retirement System

RVK 2023 Capital Markets Assumptions

Asset Class	Arithmetic Return Assumption	Geometric Return Assumption	Standard Deviation Assumption
Global Equity	7.85%	6.62%	16.40%
COAERS Fixed Income	4.00%	3.81%	6.29%
COAERS Real Assets	7.08%	6.11%	14.53%
COAERS Multi-Asset	6.87%	6.17%	12.32%
Private Credit	8.00%	7.23%	13.00%
Private Equity	10.00%	7.86%	22.00%
Cash Equivalents	2.50%	2.48%	2.00%

Table 1 - Correlation Matrix

	Global Equity	COAERS Fixed Income	COAERS Real Assets	COAERS Multi-Asset	Private Credit	Private Equity	Cash Equivalents
Global Equity	1.00	-0.01	0.84	0.97	0.80	0.81	-0.08
COAERS Fixed Income	-0.01	1.00	-0.17	0.10	-0.29	-0.18	0.17
COAERS Real Assets	0.84	-0.17	1.00	0.90	0.82	0.73	-0.08
COAERS Multi-Asset	0.97	0.10	0.90	1.00	0.84	0.80	-0.08
Private Credit	0.80	-0.29	0.82	0.84	1.00	0.84	-0.12
Private Equity	0.81	-0.18	0.73	0.80	0.84	1.00	-0.21
Cash Equivalents	-0.08	0.17	-0.08	-0.08	-0.12	-0.21	1.00

COAERS Fixed Income = 75% US Agg Fixed Income, 25% US Long Duration Government Fixed Income.
COAERS Real Assets = 33% each Core Real Estate, US REITs, and listed Infrastructure.
COAERS Multi-Asset = 56% Global Equity, 21% US Agg Fixed Income, 10% US REITs, 5% listed Infrastructure, 7% GTAA (Global 60/40), and 1% Cash.
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Efficient Frontier 1

- **Frontier 1** evaluates the current targeted asset class exposures

Frontier 1

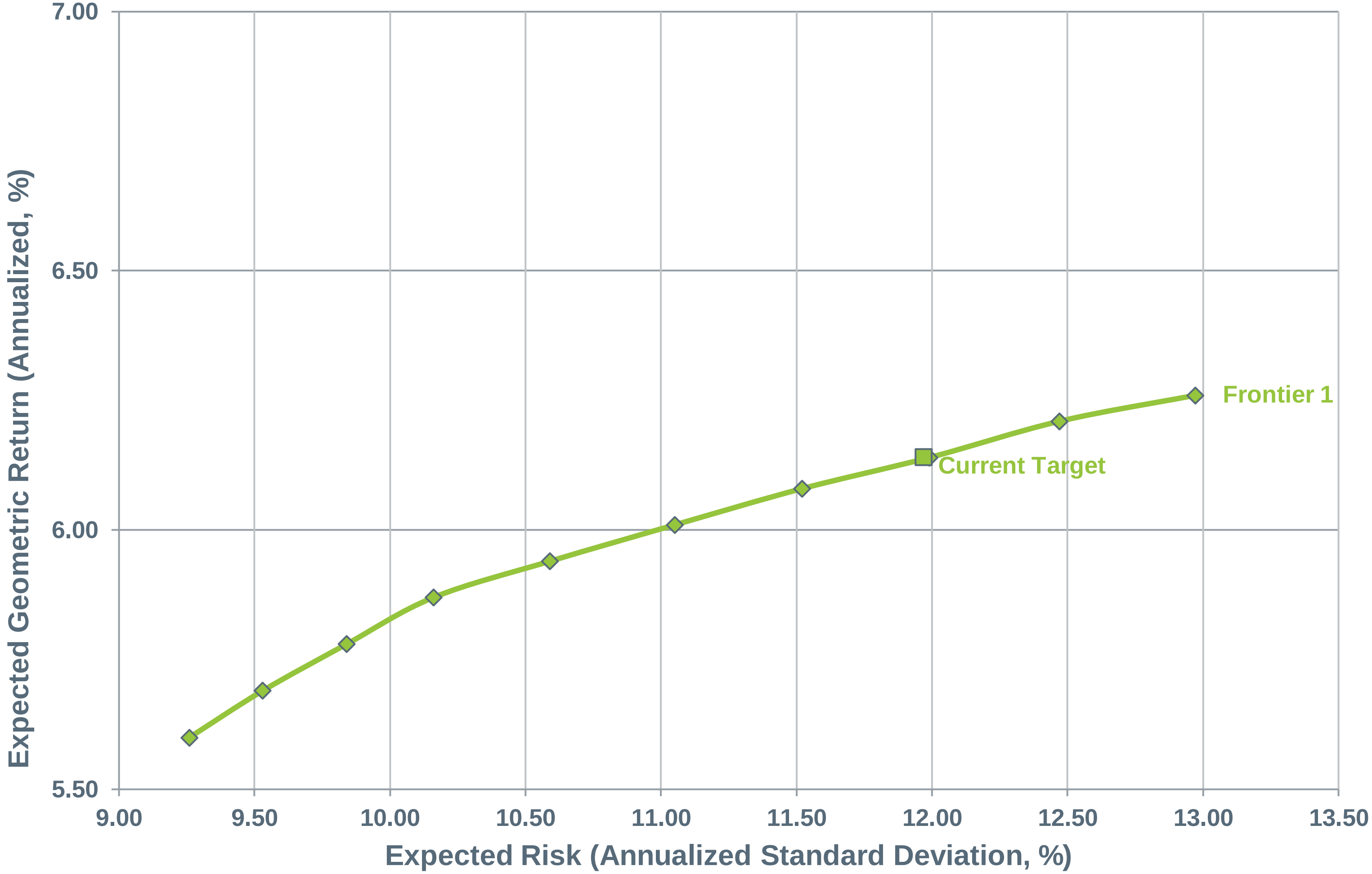
	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target
Global Equity	**46**	**66**	46	46	46	46	47	50	53	56	59	66	56
COAERS Fixed Income	**16**	**33**	32	33	33	33	30	27	24	21	18	16	21
COAERS Real Assets	**10**	**20**	10	12	15	17	20	20	20	20	20	15	15
COAERS Multi-Asset	**2.5**	**10**	3	3	3	3	3	3	3	3	3	3	7
Private Credit	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0
Cash Equivalents	**1**	**10**	10	6	4	1	1	1	1	1	1	1	1
Total			100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			48	48	48	48	48	51	54	57	60	68	60
Capital Preservation			42	40	38	35	32	29	26	23	20	18	24
Alpha			0	0	0	0	0	0	0	0	0	0	0
Inflation			10	12	15	17	20	20	20	20	20	15	16
Expected Arithmetic Return			**6.00**	**6.12**	**6.23**	**6.35**	**6.46**	**6.58**	**6.70**	**6.81**	**6.93**	**7.04**	**6.80**
Expected Risk (Standard Deviation)			**9.26**	**9.53**	**9.84**	**10.16**	**10.59**	**11.05**	**11.52**	**11.99**	**12.47**	**12.97**	**11.97**
Expected Compound Return			**5.60**	**5.69**	**5.78**	**5.87**	**5.94**	**6.01**	**6.08**	**6.14**	**6.21**	**6.26**	**6.14**
Expected Sharpe Ratio			0.38	0.38	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.35	0.36
RVK Expected Eq Beta (LCUS Eq = 1)			0.54	0.56	0.57	0.59	0.61	0.64	0.67	0.70	0.73	0.76	0.70
RVK Liquidity Metric (T-Bills = 100)			87	86	85	84	84	84	84	84	84	86	85

Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

RVK

Efficient Frontier Graph – Frontier 1

- **Frontier 1** evaluates the current targeted asset class exposures



Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

Efficient Frontier 2

- **Frontier 2** evaluates the current targeted asset class exposures, removes Multi-Asset and introduces Private Credit.

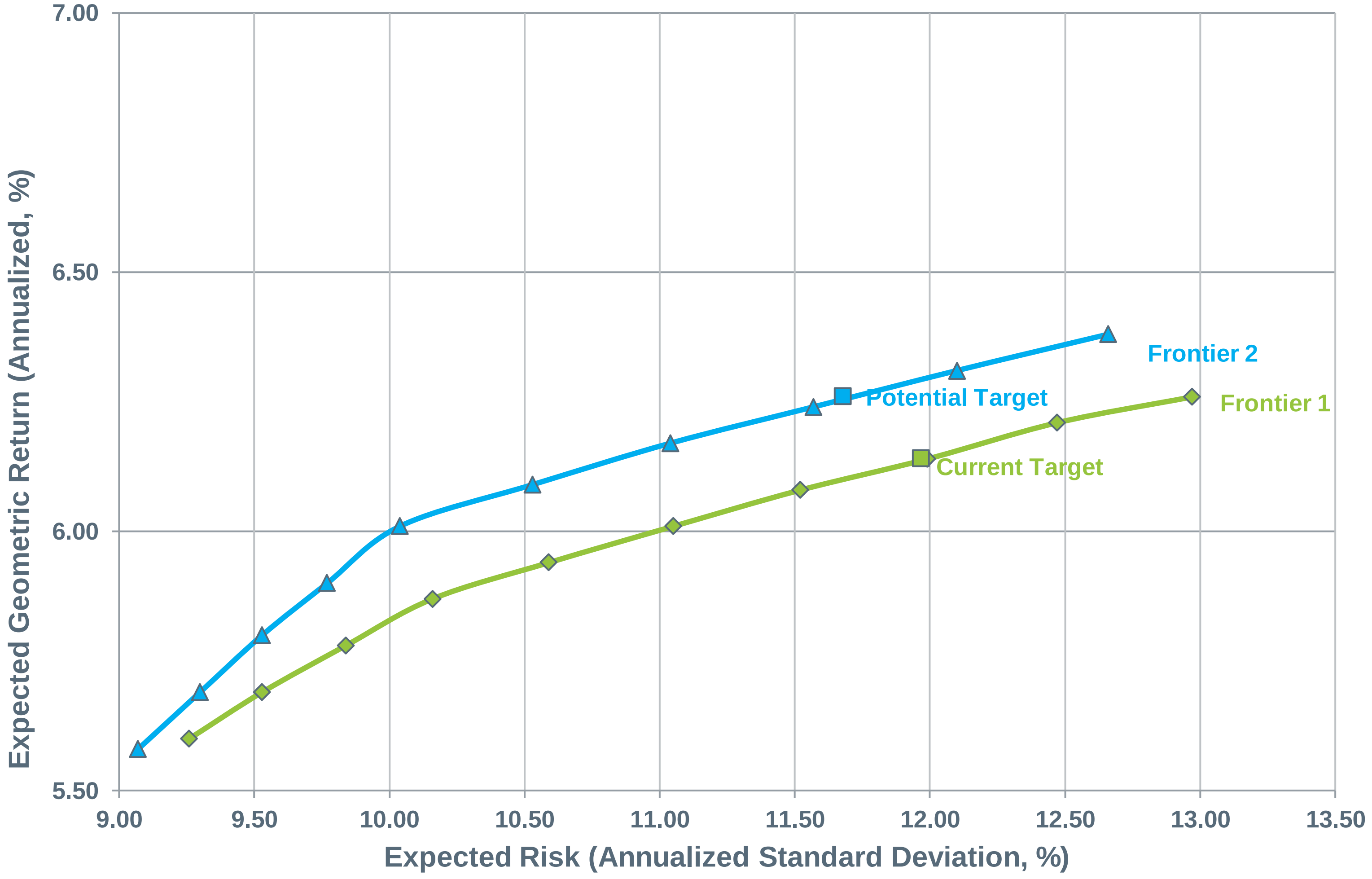
Frontier 2

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target
Global Equity	**46**	**66**	46	46	46	46	46	46	46	50	53	63	56	53
COAERS Fixed Income	**16**	**33**	33	33	33	33	32	28	24	21	18	16	21	21
COAERS Real Assets	**10**	**20**	10	10	10	10	11	15	19	18	18	10	15	15
COAERS Multi-Asset	**0**	**0**	0	0	0	0	0	0	0	0	0	0	7	0
Private Credit	**0**	**10**	1	3	6	8	10	10	10	10	10	10	0	10
Cash Equivalents	**1**	**10**	10	8	5	3	1	1	1	1	1	1	1	1
Total			100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			47	49	52	54	56	56	56	60	63	73	60	63
Capital Preservation			43	41	38	36	33	29	25	22	19	17	24	22
Alpha			0	0	0	0	0	0	0	0	0	0	0	0
Inflation			10	10	10	10	11	15	19	18	18	10	16	15
Expected Arithmetic Return			**5.97**	**6.10**	**6.22**	**6.35**	**6.48**	**6.61**	**6.74**	**6.86**	**6.99**	**7.12**	**6.80**	**6.89**
Expected Risk (Standard Deviation)			**9.07**	**9.30**	**9.53**	**9.77**	**10.04**	**10.53**	**11.04**	**11.57**	**12.10**	**12.66**	**11.97**	**11.68**
Expected Compound Return			**5.58**	**5.69**	**5.80**	**5.90**	**6.01**	**6.09**	**6.17**	**6.24**	**6.31**	**6.38**	**6.14**	**6.26**
Expected Sharpe Ratio			0.38	0.39	0.39	0.39	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.38
RVK Expected Eq Beta (LCUS Eq = 1)			0.53	0.54	0.56	0.57	0.58	0.61	0.64	0.67	0.70	0.74	0.70	0.68
RVK Liquidity Metric (T-Bills = 100)			86	84	82	80	78	77	76	76	76	78	85	77

Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

Efficient Frontier 2

- **Frontier 2** evaluates the current targeted asset class exposures, removes Multi-Asset and introduces Private Credit.



Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

Efficient Frontier 3

- **Frontier 3** evaluates the current targeted asset class exposures, removes Multi-Asset, introduces Private Credit & Private Equity.

Frontier 3

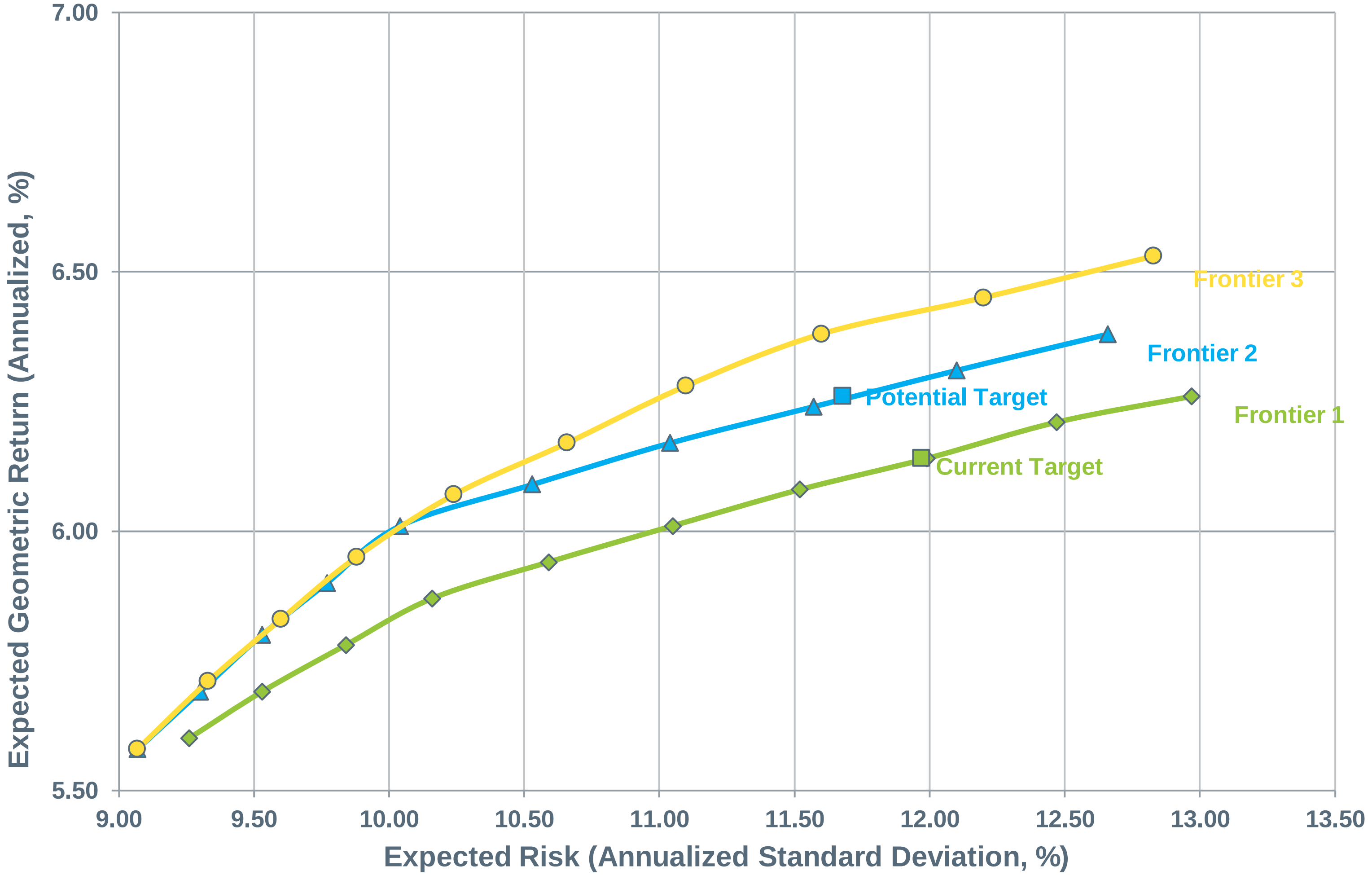
	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target
Global Equity	**46**	**66**	46	46	46	46	46	46	46	46	46	55	56	53
COAERS Fixed Income	**16**	**33**	33	33	33	33	31	29	27	23	19	16	21	21
COAERS Real Assets	**10**	**20**	10	10	10	10	10	10	10	12	16	10	15	15
COAERS Multi-Asset	**0**	**0**	0	0	0	0	0	0	0	0	0	0	7	0
Private Credit	**0**	**10**	1	4	6	9	10	10	10	10	10	10	0	10
Private Equity	**0**	**8**	0	0	0	0	2	4	6	8	8	8	0	0
Cash Equivalents	**1**	**10**	10	7	5	2	1	1	1	1	1	1	1	1
Total			100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			47	50	52	55	58	60	62	64	64	73	60	63
Capital Preservation			43	40	38	35	32	30	28	24	20	17	24	22
Alpha			0	0	0	0	0	0	0	0	0	0	0	0
Inflation			10	10	10	10	10	10	10	12	16	10	16	15
Expected Arithmetic Return			**5.97**	**6.12**	**6.26**	**6.41**	**6.56**	**6.70**	**6.85**	**7.00**	**7.14**	**7.29**	**6.80**	**6.89**
Expected Risk (Standard Deviation)			**9.07**	**9.33**	**9.60**	**9.88**	**10.24**	**10.66**	**11.10**	**11.60**	**12.20**	**12.83**	**11.97**	**11.68**
Expected Compound Return			**5.58**	**5.71**	**5.83**	**5.95**	**6.07**	**6.17**	**6.28**	**6.38**	**6.45**	**6.53**	**6.14**	**6.26**
Expected Sharpe Ratio			0.38	0.39	0.39	0.40	0.40	0.40	0.39	0.39	0.38	0.37	0.36	0.38
RVK Expected Eq Beta (LCUS Eq = 1)			0.53	0.55	0.56	0.57	0.60	0.62	0.65	0.67	0.70	0.74	0.70	0.68
RVK Liquidity Metric (T-Bills = 100)			86	84	81	79	77	75	73	71	70	72	85	77

Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

RVK

Efficient Frontier 3

- **Frontier 3** evaluates the current targeted asset class exposures, removes Multi-Asset, introduces Private Credit & Private Equity.



Risk-Free Rate used in Sharpe Ratio calculation is 2.50%.

Monte Carlo Simulation – Frontier 1

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

1 Year	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target
1st Percentile	-19.45	-19.71	-20.24	-20.76	-21.25	-22.49	-23.72	-25.03	-26.57	-29.22	-25.34	-22.94
5th Percentile	-9.79	-10.02	-10.31	-10.54	-11.10	-11.76	-12.49	-13.16	-13.95	-15.02	-13.35	-11.44
25th Percentile	-0.71	-0.79	-0.92	-1.01	-1.21	-1.49	-1.73	-1.95	-2.16	-2.42	-2.01	-1.11
50th Percentile	**5.63**	**5.72**	**5.82**	**5.85**	**5.91**	**6.03**	**6.12**	**6.17**	**6.25**	**6.45**	**6.20**	**6.27**
75th Percentile	12.31	12.56	12.83	13.13	13.48	13.89	14.43	14.85	15.24	15.87	14.88	14.09
95th Percentile	22.57	23.09	23.66	24.37	25.08	26.13	27.09	28.11	29.12	30.50	28.18	26.11
99th Percentile	30.77	31.55	32.33	33.17	34.08	35.49	36.98	38.46	39.83	42.07	38.81	35.45
3 Years												
1st Percentile	-8.99	-9.15	-9.33	-9.50	-9.88	-10.74	-11.51	-12.39	-13.20	-14.72	-12.46	-10.70
5th Percentile	-3.86	-3.96	-4.12	-4.26	-4.43	-4.89	-5.33	-5.80	-6.26	-7.07	-5.90	-4.62
25th Percentile	1.85	1.86	1.85	1.81	1.74	1.64	1.52	1.44	1.30	1.09	1.38	1.97
50th Percentile	**5.64**	**5.75**	**5.82**	**5.89**	**5.94**	**6.04**	**6.11**	**6.18**	**6.26**	**6.37**	**6.21**	**6.33**
75th Percentile	9.36	9.52	9.69	9.85	10.09	10.35	10.65	10.91	11.21	11.62	10.96	10.60
95th Percentile	15.09	15.43	15.81	16.17	16.58	17.16	17.72	18.27	18.85	19.60	18.36	17.24
99th Percentile	19.04	19.44	19.83	20.35	20.98	21.82	22.50	23.23	24.14	25.19	23.47	21.78
5 Years												
1st Percentile	-5.69	-5.79	-5.91	-6.10	-6.28	-6.96	-7.48	-8.03	-8.79	-10.32	-8.27	-6.77
5th Percentile	-1.85	-1.91	-2.00	-2.09	-2.26	-2.63	-2.99	-3.39	-3.75	-4.49	-3.46	-2.46
25th Percentile	2.54	2.58	2.57	2.57	2.54	2.48	2.38	2.29	2.18	1.98	2.23	2.74
50th Percentile	**5.55**	**5.65**	**5.73**	**5.82**	**5.90**	**5.98**	**6.05**	**6.12**	**6.18**	**6.29**	**6.11**	**6.24**
75th Percentile	8.55	8.72	8.88	9.04	9.20	9.43	9.67	9.90	10.13	10.45	9.95	9.69
95th Percentile	12.84	13.12	13.43	13.70	14.08	14.52	14.95	15.40	15.86	16.48	15.51	14.67
99th Percentile	16.48	16.84	17.21	17.58	18.02	18.74	19.37	19.96	20.65	21.54	20.15	18.86
10 Years												
1st Percentile	-2.03	-2.10	-2.15	-2.25	-2.42	-2.77	-3.17	-3.57	-4.05	-4.98	-3.62	-2.56
5th Percentile	0.28	0.27	0.24	0.20	0.11	-0.14	-0.35	-0.61	-0.88	-1.39	-0.68	0.09
25th Percentile	3.47	3.51	3.55	3.59	3.57	3.51	3.46	3.41	3.34	3.22	3.38	3.77
50th Percentile	**5.56**	**5.64**	**5.72**	**5.80**	**5.87**	**5.94**	**6.01**	**6.07**	**6.15**	**6.22**	**6.09**	**6.21**
75th Percentile	7.72	7.86	7.99	8.12	8.27	8.44	8.62	8.79	8.96	9.21	8.84	8.69
95th Percentile	10.81	11.03	11.28	11.49	11.74	12.09	12.44	12.76	13.10	13.56	12.82	12.28
99th Percentile	13.08	13.32	13.56	13.84	14.18	14.62	15.11	15.60	16.03	16.72	15.69	14.84

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

RVK

Monte Carlo Simulation – Frontier 1

The table below shows the **percentage** chance of achieving or exceeding the given return for each portfolio on Frontier 1 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target
Target 0%	73	72	72	72	71	71	71	70	70	69	70	72
Target 2%	65	65	65	65	65	65	64	64	64	63	64	66
Target 4%	57	57	57	57	57	57	57	57	58	58	57	59
Target 6.5%	46	47	47	47	48	48	49	49	49	50	49	49
Target 6.75%	**45**	**46**	**46**	**47**	**47**	**47**	**48**	**48**	**48**	**49**	**48**	**48**
Target 7%	44	45	45	46	46	46	47	47	48	48	47	47
3 Years												
Target 0%	84	84	84	83	83	82	82	81	80	79	81	83
Target 2%	74	74	74	74	74	73	73	72	72	71	72	75
Target 4%	61	62	62	62	62	62	62	62	62	62	62	64
Target 6.5%	44	45	45	46	46	47	48	48	49	49	48	49
Target 6.75%	**42**	**43**	**44**	**44**	**45**	**45**	**46**	**47**	**47**	**48**	**47**	**47**
Target 7%	40	41	42	43	43	44	45	45	46	47	46	46
5 Years												
Target 0%	89	89	89	89	88	87	87	86	85	84	86	88
Target 2%	79	79	79	79	78	77	77	76	76	75	76	79
Target 4%	64	64	64	65	65	65	64	64	64	64	64	67
Target 6.5%	42	43	44	45	45	46	47	47	48	49	47	48
Target 6.75%	**40**	**41**	**42**	**42**	**43**	**44**	**45**	**46**	**46**	**47**	**46**	**46**
Target 7%	38	39	40	41	41	42	43	44	45	45	44	44
10 Years												
Target 0%	96	96	96	96	95	95	94	93	93	91	93	95
Target 2%	87	87	87	87	87	86	85	84	84	82	84	87
Target 4%	69	70	70	71	71	70	70	70	70	69	70	73
Target 6.5%	38	39	41	42	42	44	45	46	47	47	46	47
Target 6.75%	**35**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**43**	**44**
Target 7%	33	34	35	36	37	39	40	41	42	43	41	41

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

Monte Carlo Simulation – Frontier 2

The table below shows the expected return by percentile for each portfolio on Frontier 2 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Potential Target
1st Percentile	-18.32	-18.26	-18.23	-18.19	-18.20	-18.89	-19.19	-20.87	-22.56	-26.14	-22.94
5th Percentile	-9.14	-9.10	-9.07	-9.04	-9.06	-9.44	-9.91	-10.68	-11.42	-12.74	-11.44
25th Percentile	-0.24	-0.15	-0.07	0.01	0.07	-0.12	-0.37	-0.62	-0.88	-1.13	-1.11
50th Percentile	**5.93**	**6.04**	**6.15**	**6.25**	**6.37**	**6.39**	**6.44**	**6.59**	**6.73**	**6.96**	**6.27**
75th Percentile	12.30	12.43	12.56	12.70	12.88	13.27	13.62	14.18	14.69	15.49	14.09
95th Percentile	22.47	22.63	22.79	22.96	23.27	24.06	25.02	26.20	27.39	29.00	26.11
99th Percentile	30.94	31.15	31.36	31.54	31.80	32.89	34.24	36.00	37.59	40.30	35.45
3 Years											
1st Percentile	-8.61	-8.57	-8.52	-8.46	-8.41	-8.67	-8.91	-9.75	-10.85	-13.20	-10.70
5th Percentile	-3.45	-3.36	-3.28	-3.22	-3.19	-3.43	-3.74	-4.26	-4.79	-5.65	-4.62
25th Percentile	2.09	2.17	2.27	2.36	2.43	2.38	2.30	2.20	2.08	1.83	1.97
50th Percentile	**5.74**	**5.85**	**5.96**	**6.06**	**6.17**	**6.22**	**6.32**	**6.42**	**6.53**	**6.65**	**6.33**
75th Percentile	9.49	9.62	9.73	9.85	9.99	10.22	10.47	10.79	11.11	11.60	10.60
95th Percentile	14.92	15.06	15.22	15.37	15.57	16.05	16.56	17.21	17.88	18.96	17.24
99th Percentile	18.94	19.08	19.24	19.40	19.60	20.34	20.98	21.95	22.86	24.09	21.78
5 Years											
1st Percentile	-5.38	-5.34	-5.28	-5.21	-5.16	-5.35	-5.59	-6.20	-6.93	-8.99	-6.77
5th Percentile	-1.57	-1.50	-1.41	-1.34	-1.27	-1.42	-1.57	-1.97	-2.36	-3.27	-2.46
25th Percentile	2.69	2.78	2.88	2.97	3.05	3.00	2.96	2.85	2.76	2.56	2.74
50th Percentile	**5.65**	**5.75**	**5.85**	**5.95**	**6.05**	**6.12**	**6.20**	**6.28**	**6.38**	**6.49**	**6.24**
75th Percentile	8.50	8.62	8.73	8.85	8.98	9.17	9.36	9.64	9.90	10.30	9.69
95th Percentile	12.56	12.71	12.86	13.00	13.15	13.52	13.89	14.42	14.98	15.73	14.67
99th Percentile	15.65	15.77	15.92	16.04	16.22	16.85	17.37	18.08	18.71	19.88	18.86
10 Years											
1st Percentile	-1.91	-1.83	-1.78	-1.70	-1.64	-1.72	-1.94	-2.43	-2.95	-4.11	-2.56
5th Percentile	0.20	0.28	0.37	0.47	0.53	0.45	0.31	0.05	-0.26	-0.82	0.09
25th Percentile	3.46	3.56	3.66	3.75	3.85	3.86	3.84	3.80	3.74	3.57	3.77
50th Percentile	**5.53**	**5.63**	**5.74**	**5.84**	**5.95**	**6.03**	**6.09**	**6.18**	**6.27**	**6.32**	**6.21**
75th Percentile	7.64	7.75	7.87	7.97	8.08	8.25	8.41	8.61	8.83	9.11	8.69
95th Percentile	10.55	10.69	10.81	10.93	11.07	11.36	11.66	12.03	12.40	13.00	12.28
99th Percentile	12.64	12.78	12.93	13.06	13.23	13.60	13.93	14.45	14.94	15.76	14.84

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

RVK

Monte Carlo Simulation – Frontier 2

The table below shows the **percentage** chance of achieving or exceeding the given return for each portfolio on Frontier 2 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Potential Target
Target 0%	74	74	75	75	75	75	74	73	73	72	72
Target 2%	66	67	67	67	68	67	67	67	66	66	66
Target 4%	58	58	59	59	59	59	59	59	59	59	59
Target 6.5%	47	48	48	49	49	50	50	50	51	52	49
Target 6.75%	**46**	**47**	**47**	**48**	**48**	**48**	**49**	**49**	**50**	**51**	**48**
Target 7%	45	46	46	47	47	47	48	48	49	50	47
3 Years											
Target 0%	86	86	86	86	87	86	85	84	84	82	83
Target 2%	75	76	77	77	77	77	77	76	75	74	75
Target 4%	62	63	64	64	65	65	65	65	65	64	64
Target 6.5%	44	45	46	47	47	48	49	49	50	51	49
Target 6.75%	**43**	**44**	**44**	**45**	**46**	**47**	**47**	**48**	**49**	**49**	**47**
Target 7%	41	42	43	43	44	45	46	47	47	48	46
5 Years											
Target 0%	90	90	91	91	91	91	90	89	88	87	88
Target 2%	80	80	81	81	82	82	81	80	79	78	79
Target 4%	65	66	67	67	68	68	68	68	68	67	67
Target 6.5%	42	43	44	45	46	47	48	48	49	50	48
Target 6.75%	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**47**	**48**	**46**
Target 7%	37	38	39	41	42	43	43	45	46	47	44
10 Years											
Target 0%	96	96	96	96	96	96	96	95	94	93	95
Target 2%	87	88	88	89	89	89	89	88	87	85	87
Target 4%	69	71	72	73	73	73	73	73	73	72	73
Target 6.5%	38	39	41	42	43	44	45	46	47	48	47
Target 6.75%	**35**	**36**	**38**	**39**	**40**	**41**	**42**	**44**	**45**	**46**	**44**
Target 7%	32	33	35	36	37	38	40	41	42	44	41

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

RVK

Monte Carlo Simulation – Frontier 3

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

1 Year	1	2	3	4	5	6	7	8	9	10	Potential Target
1st Percentile	-17.53	-17.54	-17.49	-17.51	-18.01	-18.91	-19.84	-20.53	-21.22	-23.80	-22.94
5th Percentile	-9.21	-9.16	-9.08	-9.04	-9.28	-9.62	-10.02	-10.49	-11.14	-12.48	-11.44
25th Percentile	-0.40	-0.31	-0.20	-0.11	-0.13	-0.17	-0.22	-0.34	-0.55	-0.93	-1.11
50th Percentile	**5.63**	**5.75**	**5.87**	**6.00**	**6.17**	**6.30**	**6.43**	**6.52**	**6.65**	**6.90**	**6.27**
75th Percentile	12.10	12.22	12.37	12.53	12.77	13.15	13.48	13.90	14.36	15.13	14.09
95th Percentile	22.23	22.44	22.65	22.85	23.35	24.00	24.63	25.35	26.44	28.13	26.11
99th Percentile	30.04	30.33	30.61	30.84	31.56	32.64	33.65	34.82	36.36	38.72	35.45
3 Years											
1st Percentile	-9.59	-9.53	-9.40	-9.27	-9.54	-10.18	-10.61	-10.98	-11.34	-13.51	-10.70
5th Percentile	-3.54	-3.46	-3.39	-3.30	-3.40	-3.57	-3.82	-4.04	-4.40	-5.46	-4.62
25th Percentile	1.94	2.04	2.14	2.24	2.29	2.26	2.26	2.23	2.13	1.91	1.97
50th Percentile	**5.59**	**5.71**	**5.82**	**5.93**	**6.03**	**6.13**	**6.25**	**6.38**	**6.49**	**6.59**	**6.33**
75th Percentile	9.37	9.51	9.65	9.78	9.98	10.21	10.46	10.72	11.02	11.47	10.60
95th Percentile	14.92	15.08	15.24	15.40	15.72	16.12	16.60	17.12	17.74	18.71	17.24
99th Percentile	19.12	19.30	19.49	19.67	20.10	20.65	21.25	21.84	22.60	24.02	21.78
5 Years											
1st Percentile	-5.70	-5.63	-5.55	-5.48	-5.67	-6.12	-6.54	-6.79	-7.02	-8.82	-6.77
5th Percentile	-1.80	-1.70	-1.61	-1.51	-1.53	-1.66	-1.85	-2.02	-2.23	-3.02	-2.46
25th Percentile	2.67	2.78	2.88	2.99	3.05	3.05	3.06	3.06	2.99	2.78	2.74
50th Percentile	**5.51**	**5.64**	**5.75**	**5.87**	**6.02**	**6.14**	**6.26**	**6.37**	**6.47**	**6.55**	**6.24**
75th Percentile	8.43	8.57	8.70	8.84	9.03	9.28	9.51	9.73	9.95	10.33	9.69
95th Percentile	12.67	12.82	12.98	13.13	13.40	13.76	14.12	14.49	14.97	15.78	14.67
99th Percentile	15.81	15.98	16.14	16.32	16.64	17.19	17.63	18.13	18.72	19.82	18.86
10 Years											
1st Percentile	-2.32	-2.20	-2.10	-1.99	-2.11	-2.37	-2.60	-2.83	-3.04	-4.32	-2.56
5th Percentile	0.36	0.46	0.56	0.66	0.67	0.56	0.44	0.33	0.23	-0.39	0.09
25th Percentile	3.41	3.51	3.62	3.74	3.81	3.83	3.87	3.87	3.84	3.68	3.77
50th Percentile	**5.52**	**5.64**	**5.76**	**5.88**	**5.99**	**6.11**	**6.21**	**6.29**	**6.37**	**6.44**	**6.21**
75th Percentile	7.62	7.75	7.88	8.01	8.18	8.36	8.56	8.75	8.93	9.26	8.69
95th Percentile	10.51	10.65	10.78	10.94	11.16	11.45	11.75	12.06	12.39	13.00	12.28
99th Percentile	12.48	12.63	12.78	12.94	13.22	13.62	13.98	14.43	14.95	15.66	14.84

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

Monte Carlo Simulation – Frontier 3

The table below shows the **percentage** chance of achieving or exceeding the given return for each portfolio on Frontier 3 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Potential Target
Target 0%	74	74	74	75	75	75	74	74	74	72	72
Target 2%	66	66	67	67	67	67	67	67	67	66	66
Target 4%	57	58	58	59	59	59	60	60	60	60	59
Target 6.5%	46	47	47	48	48	49	50	50	51	51	49
Target 6.75%	**45**	**46**	**46**	**47**	**47**	**48**	**49**	**49**	**50**	**51**	**48**
Target 7%	44	45	45	46	46	47	48	49	49	50	47
3 Years											
Target 0%	85	85	85	86	86	86	85	85	84	83	83
Target 2%	75	75	76	77	77	77	76	76	76	75	75
Target 4%	61	62	63	64	64	65	65	65	65	64	64
Target 6.5%	43	44	45	46	47	48	48	49	50	51	49
Target 6.75%	**42**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**48**	**49**	**47**
Target 7%	40	41	42	42	43	45	45	46	47	48	46
5 Years											
Target 0%	90	91	91	92	91	91	91	90	89	88	88
Target 2%	80	80	81	82	82	82	81	81	81	79	79
Target 4%	64	65	66	67	68	68	68	69	68	68	67
Target 6.5%	41	42	43	44	45	47	48	49	50	50	48
Target 6.75%	**39**	**40**	**41**	**42**	**43**	**44**	**46**	**47**	**48**	**48**	**46**
Target 7%	36	37	39	40	41	42	44	45	46	47	44
10 Years											
Target 0%	96	96	97	97	97	96	96	96	95	94	95
Target 2%	87	88	88	89	89	89	89	89	88	86	87
Target 4%	68	70	71	72	73	73	74	74	74	72	73
Target 6.5%	37	39	40	42	43	45	46	48	49	49	47
Target 6.75%	**34**	**36**	**37**	**39**	**40**	**42**	**44**	**45**	**46**	**47**	**44**
Target 7%	31	33	34	36	37	39	41	42	43	45	41

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

RVK

9B. Private credit

Presented by David Kushner

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 9:
Discuss and consider investment program including goals, strategy, and allocation:

B. Private credit

AGENDA ITEM OBJECTIVE
The Committee will receive a presentation from Staff related to Private Credit.

RELEVANCE TO STRATEGIC PLAN
This agenda item is central to **COAERS Strategic Plan Goal 1: Achieve and maintain a funding level that ensures the long-term sustainability of the retirement system.** Considering differentiating assets plays a vital role in controlling the expected risk and return levels of the Fund. Pursuing a highly diversified portfolio is a central tenet of the Strategic Asset Allocation process.

RECOMMENDATION FOR COMMITTEE ACTION
At the Committee's discretion.

BACKGROUND
The Asset Allocation Recommendation on the Committee Agenda includes an allocation to Private Credit. Staff will review previous information provided to the Committee relating to Private Credit and provide additional information regarding this investment strategy in the context of the current Asset Allocation Study.

ATTACHMENT
1. Staff presentation Private Credit in Strategic Asset Allocation

Private Credit in Strategic Asset Allocation

David Kushner
Chief Investment Officer

August 25, 2023

PRIVATE CREDIT OVERVIEW

- Background Information
- Asset Allocation
- Portfolio Construction

PRIVATE CREDIT BACKGROUND INFORMATION

Private Credit Education

Definition and Characteristics

Private credit refers to debt financing provided by non-bank institutions that are not traded on the public market.

Characteristics

- Investments span a wide range of sub-strategies and collateral types
- High current income component
- Limited dependence on capital gains through price appreciation
- Limited liquidity
- Less efficient, more complex opportunity set than public fixed income
- More defensive profile than public fixed income driven by stronger lender protections
- Bespoke investment structures are typical
- Lower levels of risk and return than private equity
- Higher fees than public fixed income, lower fees than private equity

Sub-strategies include direct lending, asset-backed debt, real estate debt, specialty finance, special situations, and distressed debt, among several other private credit sub-strategies.

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Source: RVK presentation to IC May 19, 2023

Private Credit Education

Benefits and Risks

Benefits

- High and stable cash yields
- Superior risk-adjusted returns vs public fixed income
- Defensive profile with greater lender protections compared to public fixed income
- Bespoke investments are typical
- Low to moderate correlation to other asset classes
- Wide variety of sub-strategies and collateral types
- Diversification available across risk and return targets, geographies, and use of fund-level leverage
- Portfolios can be tailored to meet investors' specific risk/return needs and objectives

Risks

- Long-term, illiquid fund structures
- Lower return potential than some other alternative strategies like private equity
- Occasional use of fund-level leverage
- Higher fees than public fixed income
- Recent record fundraising has driven increased competition
- Managers within over-crowded sub-strategies have recently become "price-takers"
- In some congested markets, lender protections have weakened

Private Credit offers investors portfolio-level diversification and a high risk-adjusted yield with limited dependence on asset price appreciation.

RVK

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Source: *RVK presentation to IC May 19, 2023*

Private Credit – Why Now?

Private Credit: Attributes | Positive Attributes Relative to Fixed Income and Equities

1. **Attractive Risk-Adjusted Returns**
   - Trading liquidity for consistent outperformance of broader fixed income markets
2. **Income Generation**
   - Recurring distributions or compounding and de-risking returns through reinvestment
3. **Downside Protection**
   - Through placement in borrowers' capital structures and structuring/documentation
4. **Alignment of Interests**
   - Source, structure, and hold vs allocation through market syndication; Control documents
5. **Lower Correlation**
   - Floating rates and low Loan-to-Value lessen correlation to fixed income and equity markets

1. Uncertainty regarding direction of interest rates
2. Most loans have periodic interest rate resets
3. Many loans have interest rate floors
4. Strong covenants favor lenders
5. Based on CMAs, higher expected return, lower expected volatility

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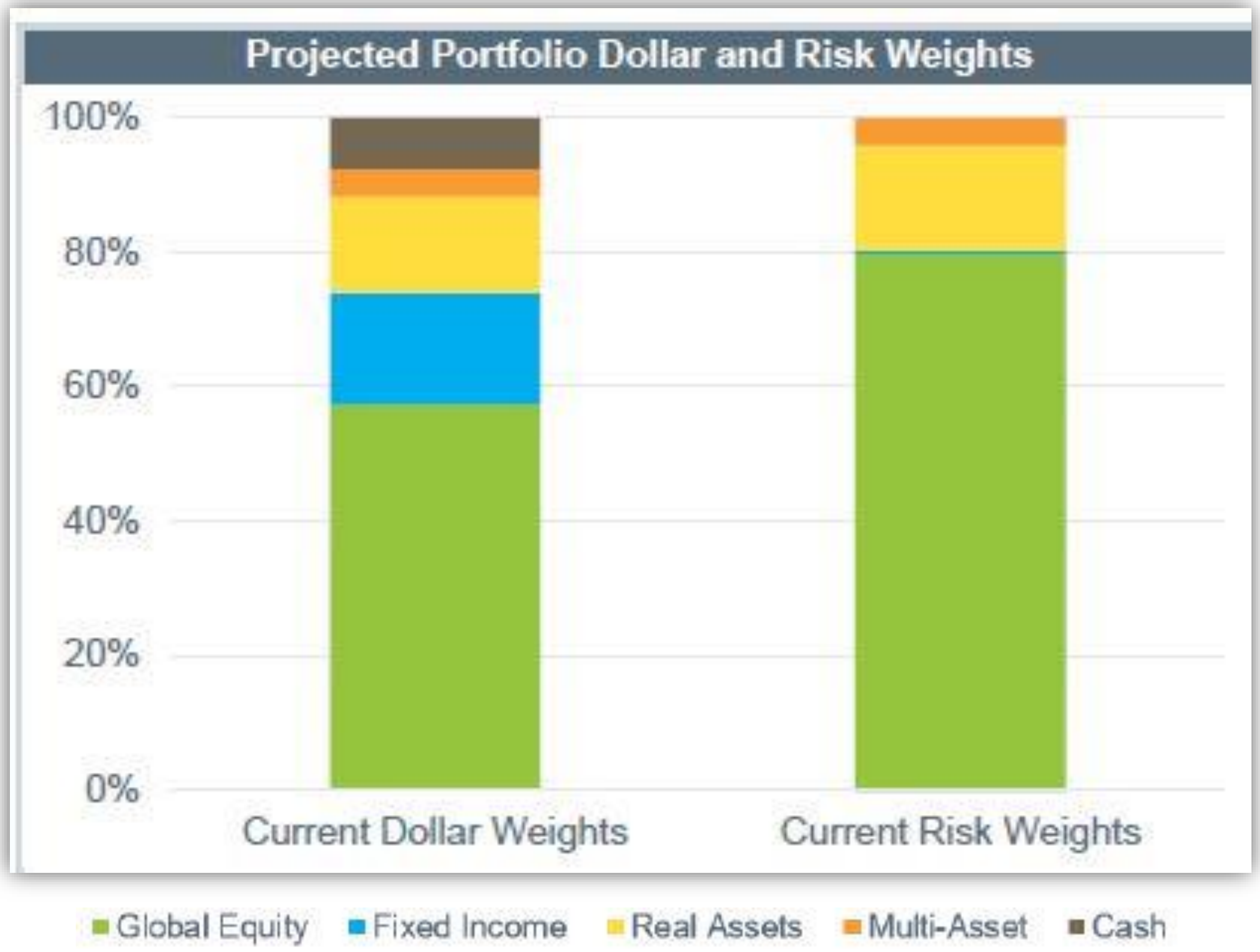
Private Credit – Why Now?

Dislocations in the lending markets (i.e., banks reducing loan portfolios, increased regulatory requirements, weak public market alternatives) are creating opportunities in Private Credit, particularly in Direct Lending

PRIVATE CREDIT ASSET ALLOCATION



COAERS Risks are highly concentrated in equities:

1. Global Equity is less than 60% of the total allocation but 80% of total Fund risk.
2. Real Estate and Multi-Asset both include equity mandates (REITs and Global 60/40 passive) which increase the true Global Equity risk weight to 90% or greater.

Private Credit: Correlations

Private Credit Strategies Have Historically Exhibited Minimal Positive Correlation To Private Equity and Public Income & Equity Indices

HISTORICAL CORRELATIONS OF PRIVATE CREDIT STRATEGIES TO PRIVATE EQUITY & PUBLIC MARKET EQUIVALENTS

	CA SENIOR DEBT	CA SUBORDINATED CAPITAL	CREDIT SUISSE LEVERAGED LOAN	BAML US HIGH YIELD	BLOOMBERG AGG BONDS	S&P 500
CA SENIOR DEBT	1.00	0.17	0.43	0.37	-0.11	0.29
CA SUBORDINATED CAPITAL	0.17	1.00	0.29	0.29	-0.24	0.54
CA PE &VC	0.19	0.75	0.40	0.40	-0.26	0.61

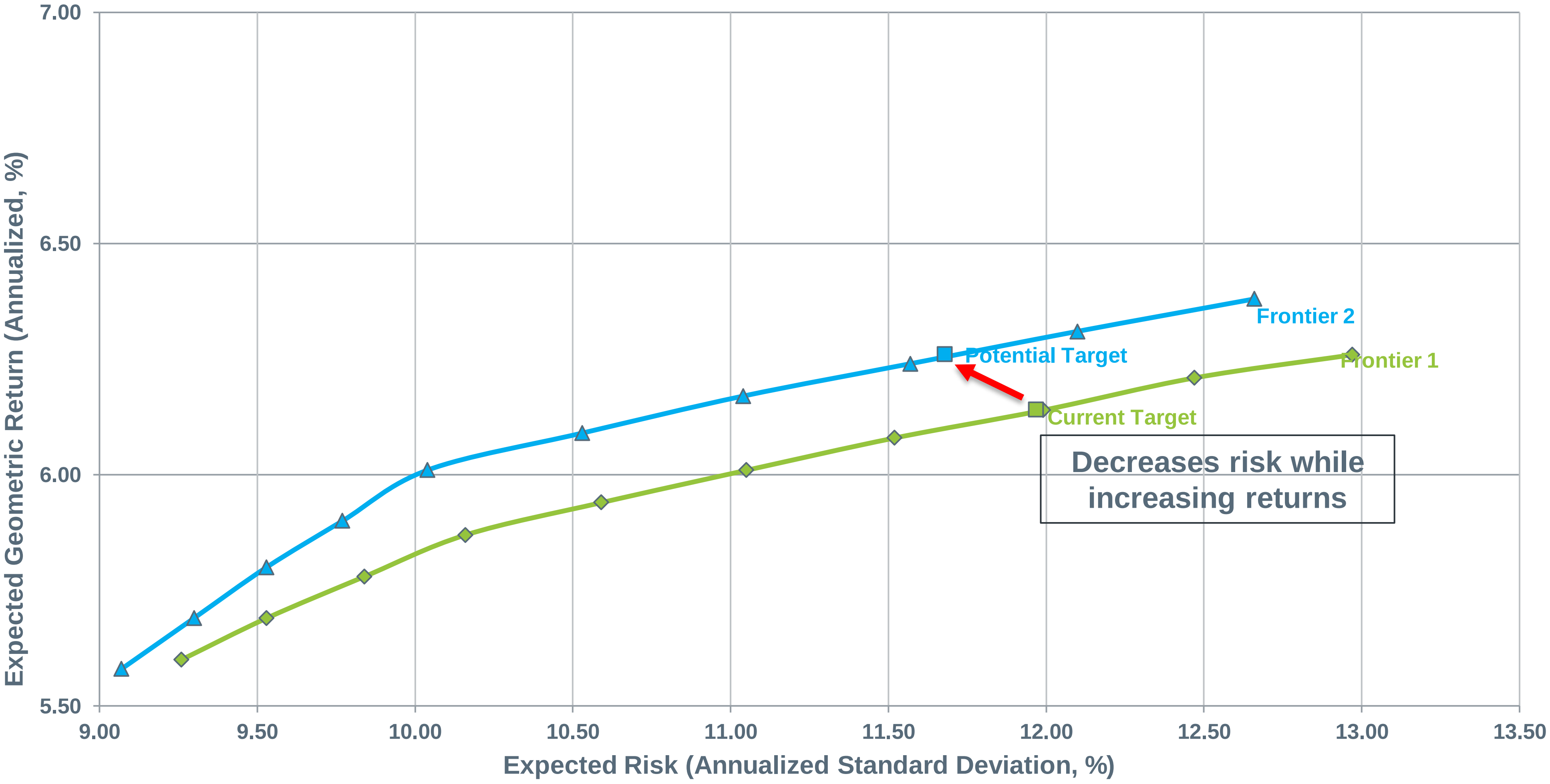
Source: Cambridge Associates LLC Private Investments Database

Notes: Correlations are generated for the time periods ending March 31, 2022. Includes funds formed in the vintage years 1996-2022. Color codes used to indicate degree of correlation: green (positive correlation) and red (negative correlation). Credit Suisse Leveraged Loan Index is often used as a Public Market Equivalent (PME) to CA Senior Debt. BAML US High Yield refers to the Bank of America Merrill Lynch U.S. High Yield Master II Index, which is often used as a PME to CA Subordinated Capital. Bloomberg Agg Bonds refers to the Bloomberg Aggregate Bond Index.

Source: Cambridge Associates

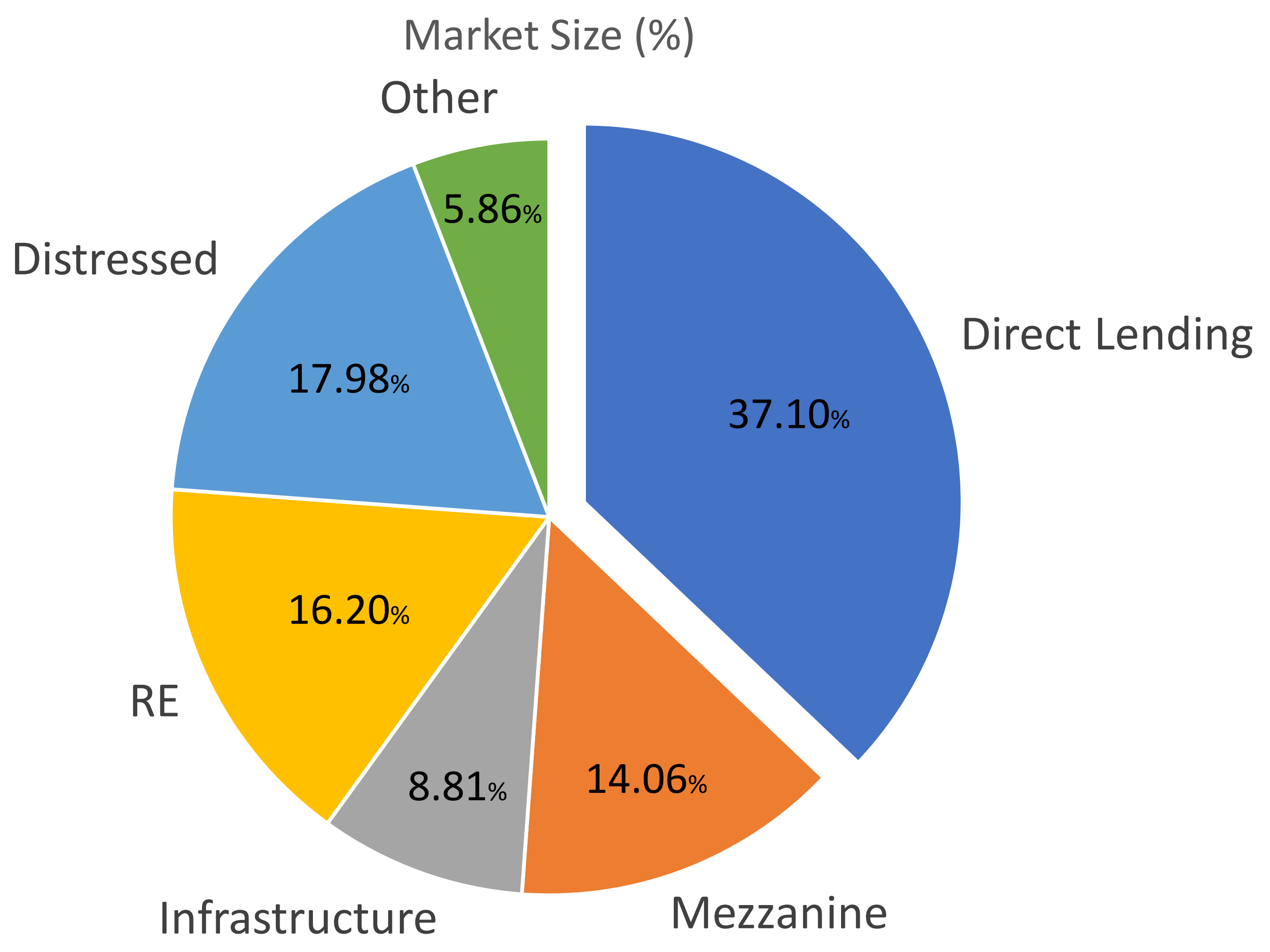
Efficient Frontier 2

- **Frontier 2** evaluates the current targeted asset class exposures, removes Multi-Asset and introduces Private Credit.



PRIVATE CREDIT
PORTFOLIO CONSTRUCTION

Private Credit Strategies

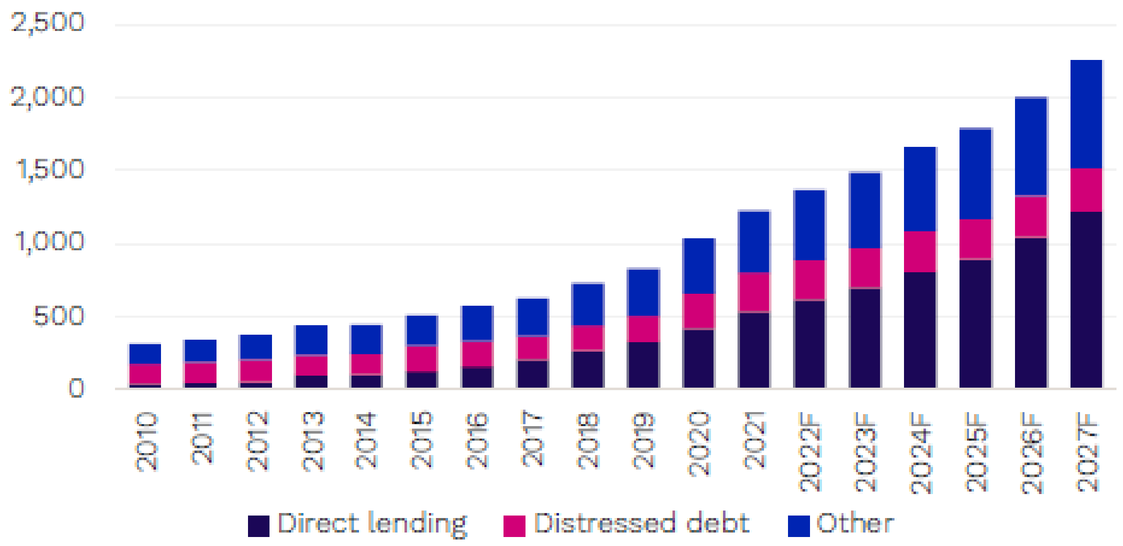


Source: Entrust Global

Direct Lending

- Direct lending leads the other sub-strategies in AUM and in recent fundraising efforts
- As its name implies, direct lending involves customized loans (most of the time floating rate loans) that are negotiated directly with the borrower and can range from senior secured notes to junior unsecured loans
- Floating rate notes provide low duration (interest rate risk) exposures due to the resetting of the loans' interest rates on a periodic basis
- Direct Lending can be a more efficient and a diversifying credit risk given that COAERS currently does not have direct floating rate credit exposure

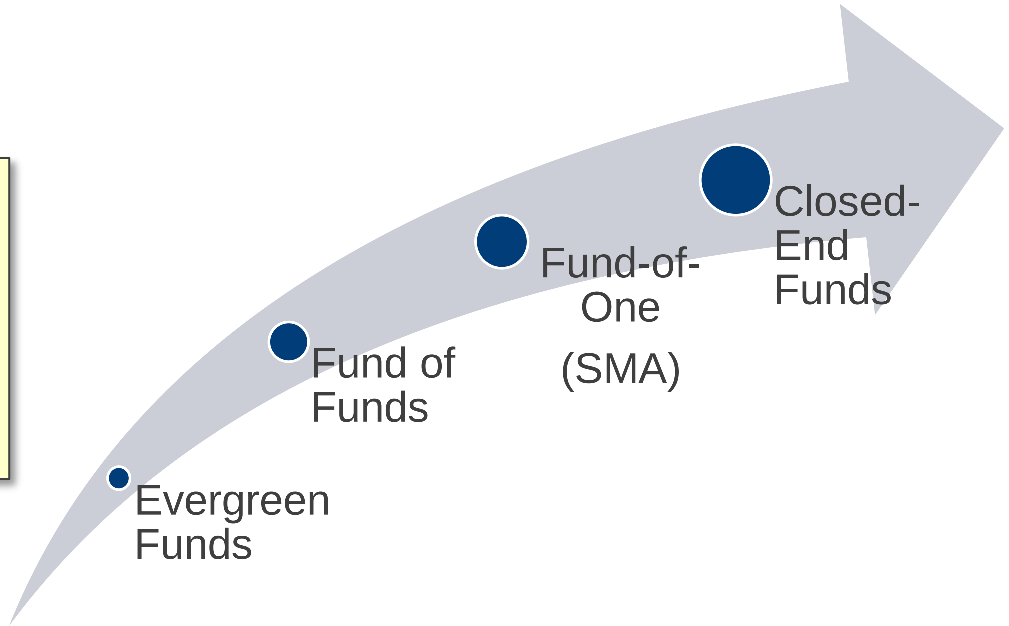
Fig. 1.1: Global private debt assets under management ($bn) by sub-strategy, 2010 – 2027F



Different Implementation Structures

- A Private Credit program can be structured to suit the investor's preferences by utilizing implementation structures such as evergreen funds, closed-end ("drawdown") funds, fund-of-ones (SMAs*), fund of funds, etc.
- While COAERS has historically used evergreen structures for their liquidity, the benefits and risks of other implementation styles should also be considered

With COAERS' current capabilities, evergreen funds represent the simplest way to implement; other options have increasing complexity



Implementing with Evergreen Funds

- Evergreen funds provide perpetual investment exposure by continually reinvesting cash flows and typically offer better liquidity profiles than closed-end funds
- Evergreen funds can also mitigate or eliminate the J-Curve, which refers to investors experiencing negative returns shortly after committing capital and then experiencing positive returns later during the life of the fund

Benefits	Drawbacks & Risks
Greater liquidity than closed-end funds	Significantly smaller universe than closed-end funds
Familiarity (already invest in similar vehicles)	Liquidity may be restricted after initial investment (lock-up)
Natural recycling of more predictable cash flows	Redemption can include “slow pay” which may take years
May reduce blind pool risk	Some credit opportunities not suited to evergreen structure

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Source: Staff presentation to IC May 19, 2023

Drawdown vs Evergreen

- Drawdown funds have a limited life of the fund, typically 4-8 years, and require reinvestment into the manager's next fund to maintain the exposure
- Private credit evergreen funds provide ongoing exposure to the stated strategy because the funds continually reinvest cash distributions and acquire new investments, similar to COAERS existing investments with IFM

	Drawdown Fund	Evergreen Fund
Fund Life	6-8 Years	Perpetual
Liquidity	With underlying fund liquidity events	Typically Quarterly with notice
Income Distributions	Quarterly	Quarterly; can be reinvested
Due Diligence	Prior to Each Fund Investment	Prior to Initial Investment; Ongoing maintenance

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Source: Staff presentation to IC April 21, 2023

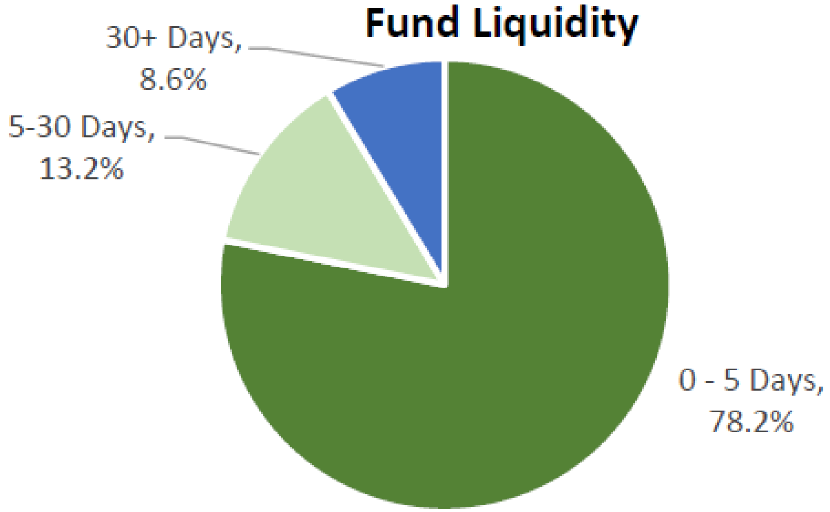
Private Credit Benchmarks

- Several Private Credit benchmarks can be implemented that will be consistent with COAERS' overall benchmarking approach

Type of Benchmark	Example	Benefits	Considerations
Stated Objective	Public benchmark (Global Agg) + Premium	Consistent with investment beliefs	May need updating should risk profile change
Private Credit Funds Benchmark	Burgiss Private Credit Funds Index	Covers many private credit funds	Though benchmark is not directly investable, the invested fund may influence benchmark
Public Benchmark	Bloomberg US Corporate Investment Grade	Reflects similar corporate lending	Tracking Error

Liquidity & Sizing

- The current liquidity within Global Equity and Fixed Income would allow COAERS to liquidate nearly all the current holdings in both asset classes in less than 10 business days
- Staff believes this liquidity is more than ample to continue funding benefits and that the Fund should exchange some liquidity for an improved risk-return profile and greater diversification



Sample Neutral Allocations within a Functionally Focused Portfolio

Illustrative Portfolio	Min.	Neutral	Max.
Growth Portfolio	60%	70%	80%
Global Public Equities	45%	55%	65%
Private Credit	0%	10%	15%
Private Equity	0%	5%	10%
Diversifying Portfolio	10%	29%	35%
Long Duration US Treasuries	10%	20%	30%
Core Real Estate and Infrastructure	5%	9%	15%
TIPS	0%		10%
Commodities	0%		10%
Liquidity Portfolio	-10%	1%	10%
US Dollar Cash	0%	1%	10%
Foreign Currency Cash	0%		5%
Short Duration Fixed Income	0%		5%

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Where Does Direct Lending Fit?

- In a standard Strategic Asset Allocation (SAA) context Private Credit is typically reflected under one of the following categories:
  - ➢Fixed Income
  - ➢Alternatives
  - ➢Private Credit (stand alone)

- In a Functional Portfolio context Private Credit strategies tend to cross between Growth and Diversifiers
  - ➢Direct Lending could fall in Diversifiers due to sources of return, including
    - ✓Current income (interest payments)
    - ✓Floating rate notes
    - ✓Original Issue Discounts (OID)
    - ✓Loan origination fees
    - ✓Fixed maturities

Private Credit Diligence

- At the May IC Meeting, the Committee directed Staff and Consultant to look at the current private credit market and assess potential opportunities
- Staff and Consultant have met several times to discuss the range of opportunities, potential managers and funds, as well as portfolio construction and pacing
- Staff has reviewed a significant number of managers and funds across a variety of private credit strategies
- While most of the offerings have not met Staff and Consultant's thresholds for further Committee discussion, a couple of opportunities are still being researched with the possibility of presentation at the November Committee meeting

Recommendation and Next Steps

- With the portfolio identified in the recent Asset Allocation Study, Staff suggests implementing no more than one-third of the recommended allocation in Private Credit (up to 3% of total fund) in the next several months in anticipation of additional conversations regarding benchmarking, structure, resources and other considerations
- Funding will be determined at time of execution with recommendation expected in November pending the continued due diligence by Staff
- Before taking the next steps related to the due diligence efforts, Staff seeks Investment Committee feedback that continued efforts related to private credit are supported by the Committee

9C. Functionally focused portfolio allocation

Presented by David Stafford

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COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 9:
Discuss and consider investment program including goals, strategy, and allocation:

B. Functionally focused portfolio allocation

AGENDA ITEM OBJECTIVE
The Committee will receive a presentation discussing the Asset Allocation Study using a functionally focused portfolio approach.

RELEVANCE TO STRATEGIC PLAN
This agenda item is central to **COAERS Strategic Plan Goal 4: Identify and implement leading practices in board governance, pension administration, and investment management.**

RECOMMENDATION FOR COMMITTEE ACTION
At the Committee's discretion.

BACKGROUND
Setting the Fund's asset allocation parameters is the most important decision in determining total Fund risk and returns over the long term. There are several different frameworks that investors use in this decision-making process. Currently, the System uses the standard asset class definitions to set parameters for the Fund's Strategic Asset Allocation.

Staff will lead a discussion on how the outputs from the Asset Allocation Study fit into a functionally focused portfolio approach as a way to counteract some of the shortcomings of mean-variance optimization. This will include discussing the liquidity needs for the System, the amount of growth-oriented investments, the mix of growth oriented investments, and the mix of diversifying exposures.

ATTACHMENT
1. Staff Presentation: Mean Variance Optimization Through a Functional Lens

Mean Variance Optimization Through a Functional Lens

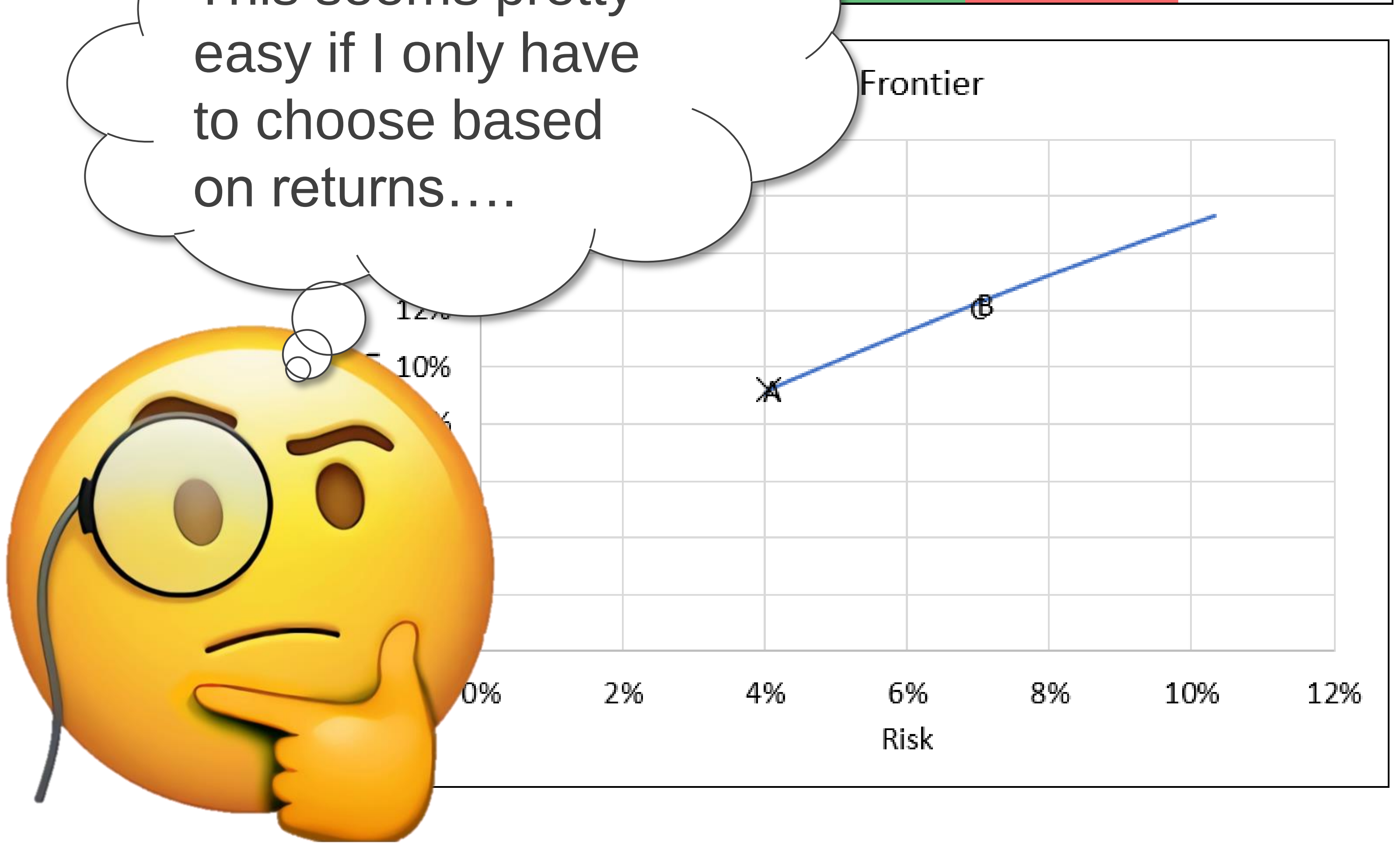
David Stafford
Deputy Chief Investment Officer

Take a Trip Back in Time….

Optimization Results
Irrational Exuberance of the 1990's

	Optimized Portfolio	Team A	Team B	Team C
Stocks	**25%**	25%	50%	50%
Bonds	**28%**	25%	20%	15%
Real Estate	**27%**	35%	20%	15%
Cash	**20%**	15%	10%	20%
Difference from Optimized Porfolio:		-8%	-25%	-25%

	Optimized Portfolio	Team A	Team B	Team C
Expected Return	9.1[illegible]	9.15%	12.22%	12.07%
E[illegible]	[illegible]	4.10%	7.10%	7.00%
[illegible]	[illegible]	2.23	1.72	1.72
[illegible]	[illegible]	[illegible].029	-0.540	-0.537



- Remember back to the October 2022 Board Workshop where Staff led an exercise with Trustees on portfolio optimization

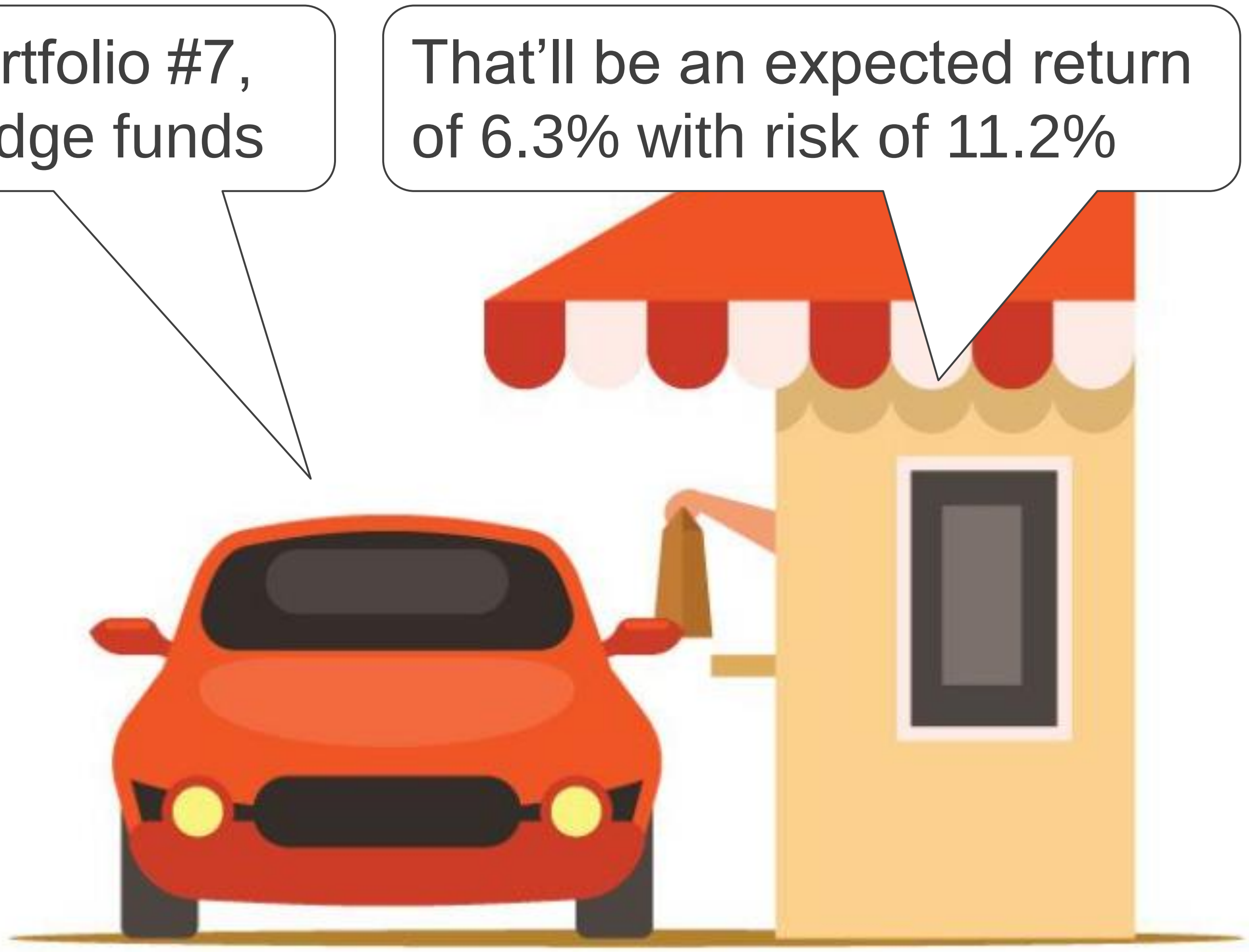
- *Lessons Learned:*
  - *MVO uses assumptions for returns, risk and correlations*
  - *The output of an MVO process is dependent on these assumptions and any constraints placed on the model*
  - *The model will allocate to "corner portfolios" and maximize the investments with the best assumptions*
  - *Expectations will be different from reality*
  - *Use judgment and common sense in interpreting these outputs*

Rethinking the Asset Allocation Process

- Most asset allocation approaches rely on mean variance optimization (MVO), which seeks to maximize the risk-return of the portfolio based on a set of assumptions and constraints
- This approach gives the illusion of precision through mathematical modelling of imprecise, and often incorrect, capital market assumptions

The Asset Allocation Drive-Thru

	Min	Max	1	2	3	4	5	6	7	8	9	10	Target
Global Equity	**46**	**66**	46	46	46	46	46	46	46	46	46	51	56
COAERS Fixed Income	**16**	**33**	31	33	31	27	23	20	18	16	16	16	21
COAERS Real Assets	**10**	**20**	10	10	10	10	10	10	10	10	10	10	15
COAERS Multi-Asset	**2.5**	**10**	3	3	3	3	3	3	3	3	3	3	7
Private Credit	**0**	**10**	0	0	1	4	8	10	10	10	10	10	0
Private Equity	**0**	**10**	0	0	0	0	0	1	4	7	10	10	0
Multi-Strategy Hedge Funds	**0**	**10**	0	0	0	0	0	0	0	0	0	0	0
Managed Futures FoF	**0**	**10**	0	5	10	10	10	10	10	9	6	0	0
Commodities	**0**	**10**	0	0	0	0	0	0	0	0	0	0	0
Cash Equivalents	**0**	**10**	10	4	0	0	0	0	0	0	0	0	1
Total			100	100	100	100	100	100	100	100	100	100	100



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Rethinking the Asset Allocation Process

- Thinking about asset allocation through a functional portfolio approach, the decision-making process could be revamped to think about Growth, Diversification, and Liquidity in a broader context

- Applying this approach would lead to a different decision-making process to build the asset allocation such as:

   1. Determining the liquidity needs of the System to ensure it can meet its obligations
   2. Choosing the right amount of Growth investments to set the total risk of the Fund
   3. Choosing the right mix of Growth investments to maximize returns
   4. Choosing the right mix of Diversifying investments to improve risk-adjusted returns

Mean Variance Optimization Output

- This presentation applies this philosophy to the output from the Frontier 2 of the Asset Allocation Study with a keen focus on the "Potential Target"
- The "Potential Target" portfolio makes the below meaningful changes:
  - New allocation of 10% to Private Credit
  - Eliminates the 7% allocation to Multi-Asset
  - Reduces Global Equity by 3%

Frontier 2

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target
Global Equity	46	66	46	46	46	46	46	46	46	50	53	63	56	53
COAERS Fixed Income	16	33	33	33	33	33	32	28	24	21	18	16	21	21
COAERS Real Assets	10	20	10	10	10	10	11	15	19	18	18	10	15	15
COAERS Multi-Asset	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Private Credit	0	10	1	3	6	8	10	10	10	10	10	10	0	10
Cash Equivalents	1	10	10	8	5	3	1	1	1	1	1	1	1	1
Total			100	100	100	100	100	100	100	100	100	100	100	100

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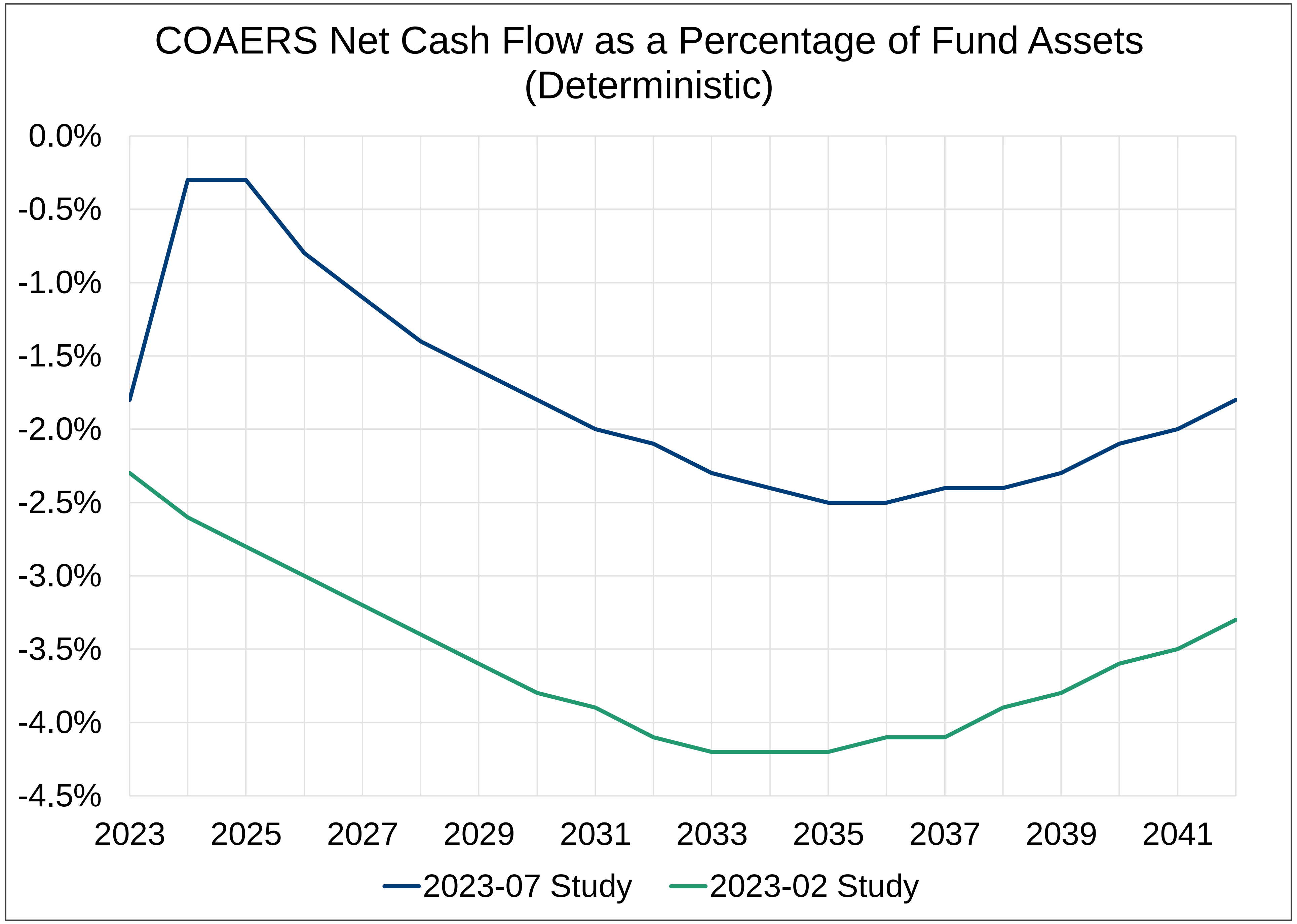
Source: RVK Asset Allocation Study 2023-08

Step 1: Determine the Liquidity Needs of the System

- New contribution policy has resulted in materially lower net cash outflows for the Fund in the new Asset/Liability Study
- The Board can consider a range of options when establishing the liquidity allocation such as targeting one month of benefit payments or a percentage of trust AUM
- Currently, Staff estimates the Fund has a yield of 3.3%, which is more than ample to pay for benefits and operating needs without having to sell any investments
- The Fund's yield is expected to increase to approximately 3.8% under the "Potential Target"



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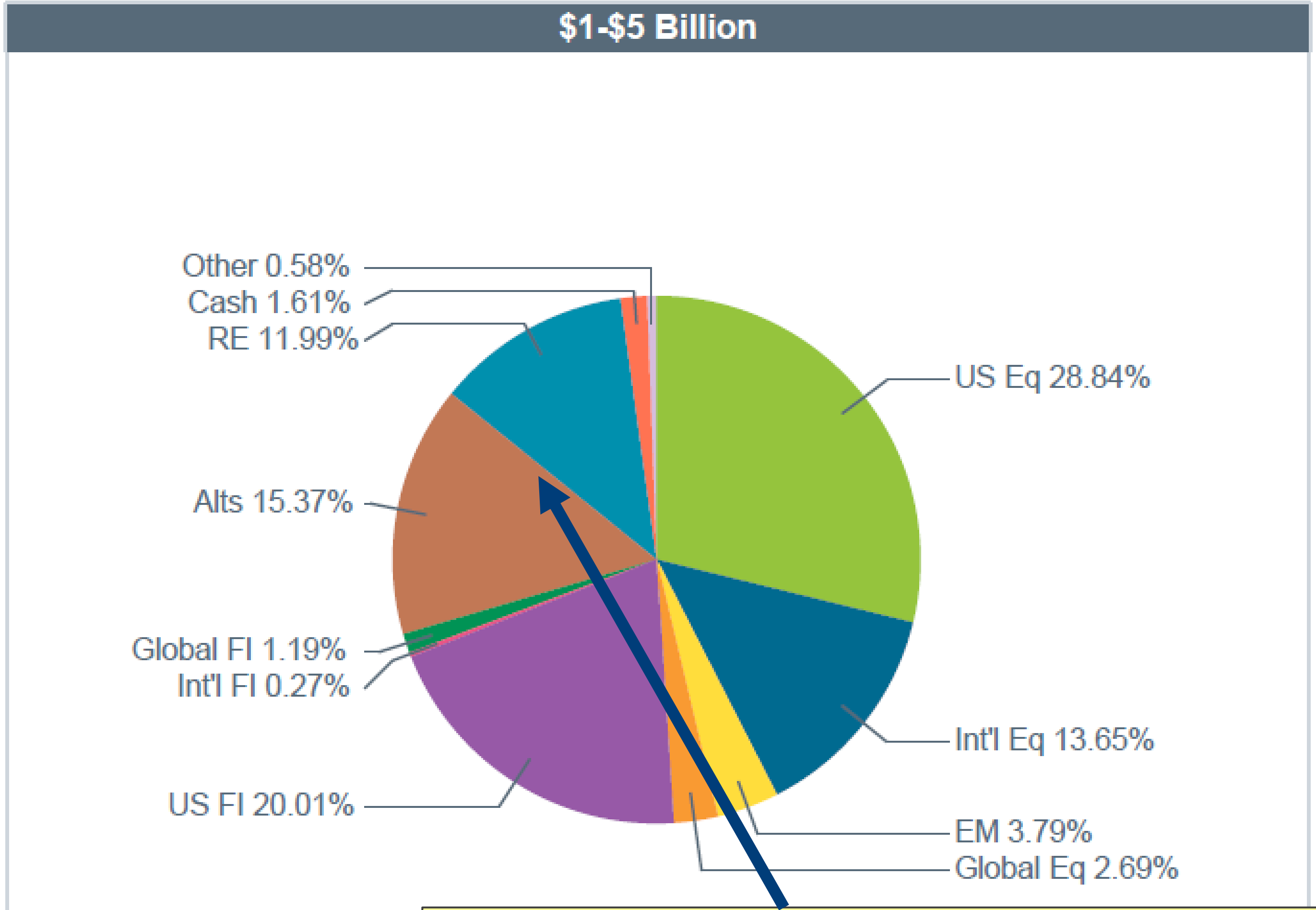
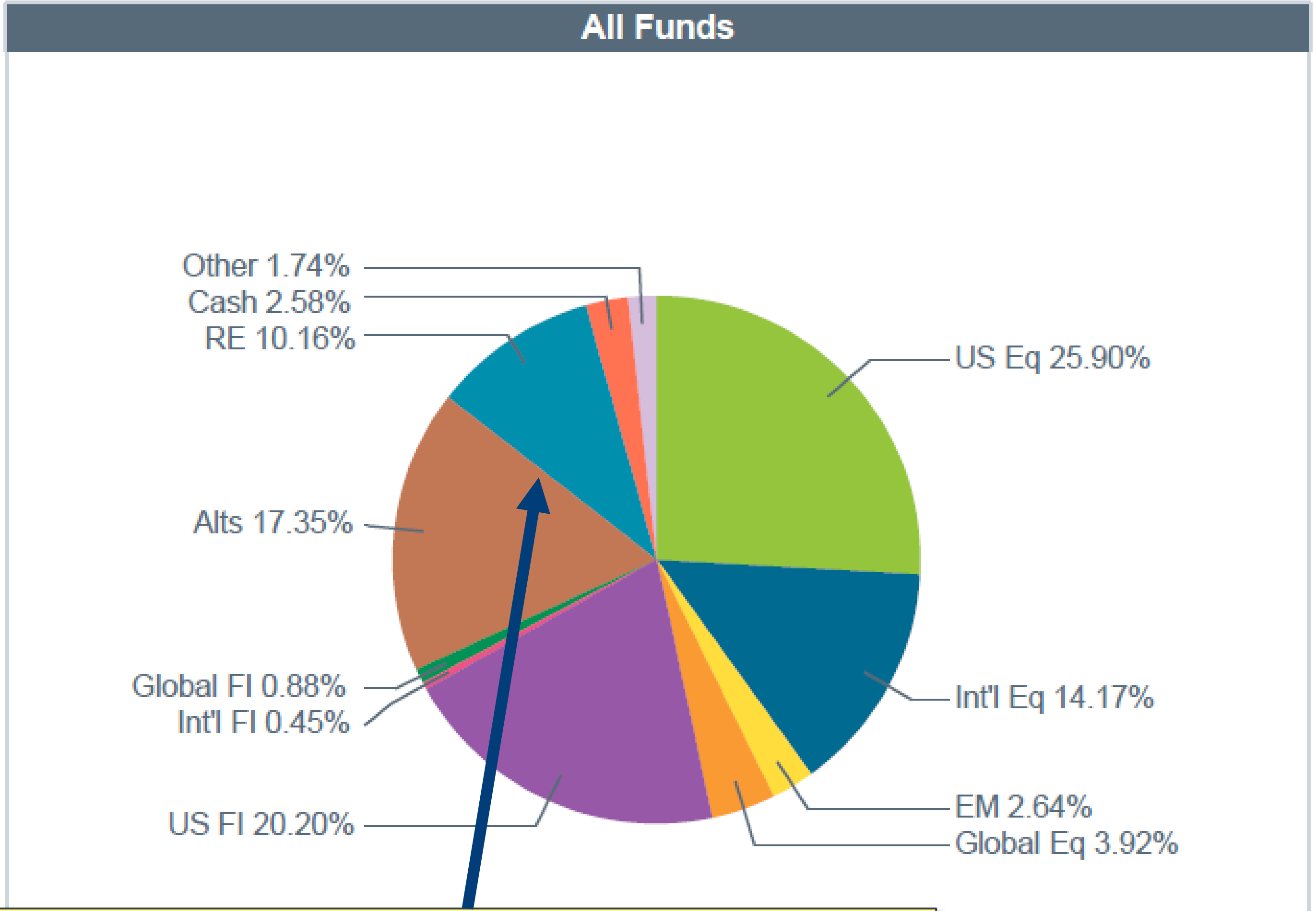
Less Liquid Investments

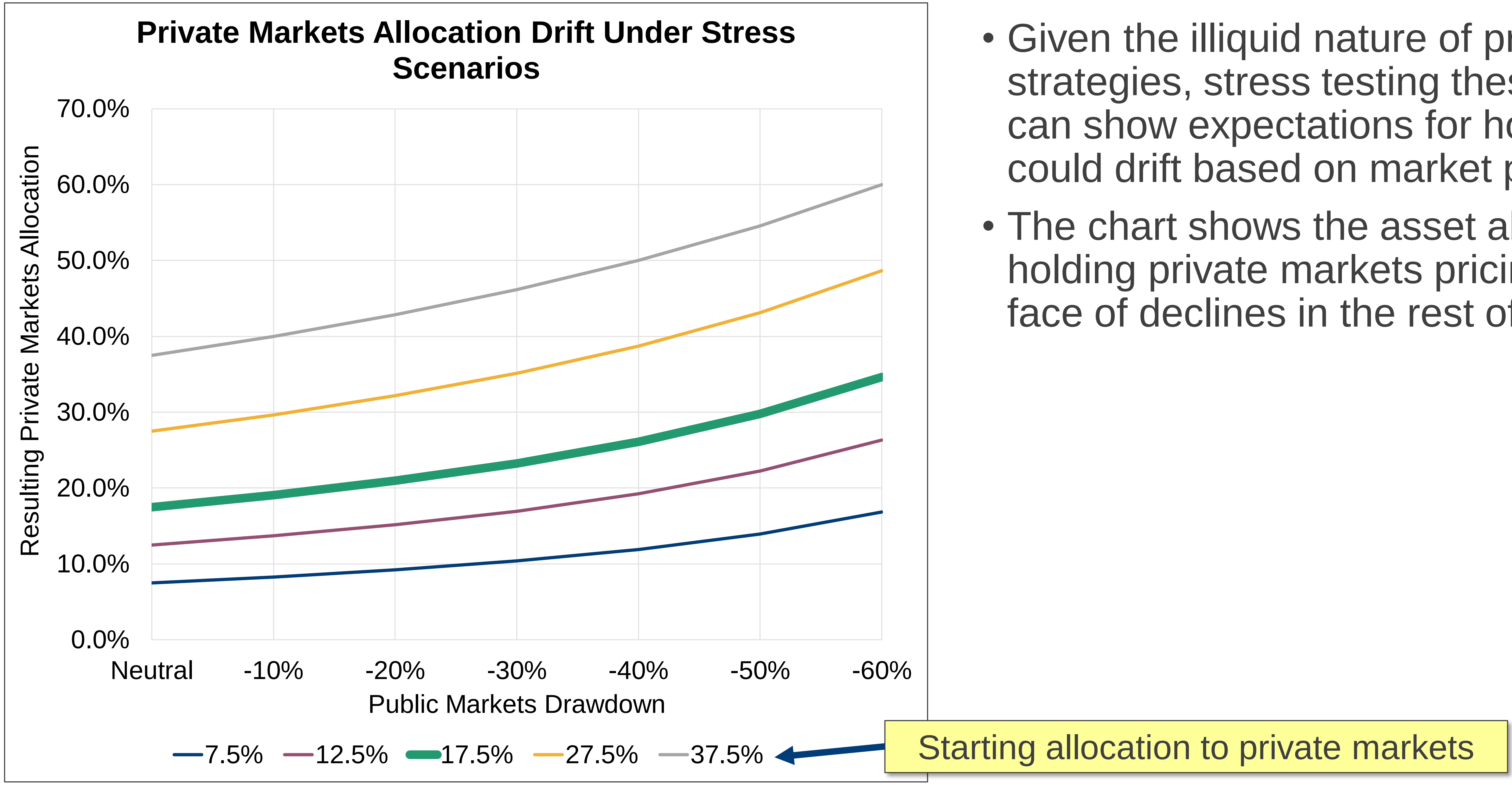
- These lower cash needs increase the Fund’s ability to invest in less liquid investment strategies should there be attractive opportunities, all else equal
- The “Potential Target” portfolio brings private market investments to ~17.5% of the Fund from current levels of ~7.5%





Peer pension plans average allocations to private markets strategies of 20-30% (proxied here as alternatives and real estate)

Stress Testing Private Markets Allocations



- Given the illiquid nature of private market strategies, stress testing these investments can show expectations for how allocations could drift based on market pricing
- The chart shows the asset allocation drift of holding private markets pricing steady in the face of declines in the rest of the portfolio

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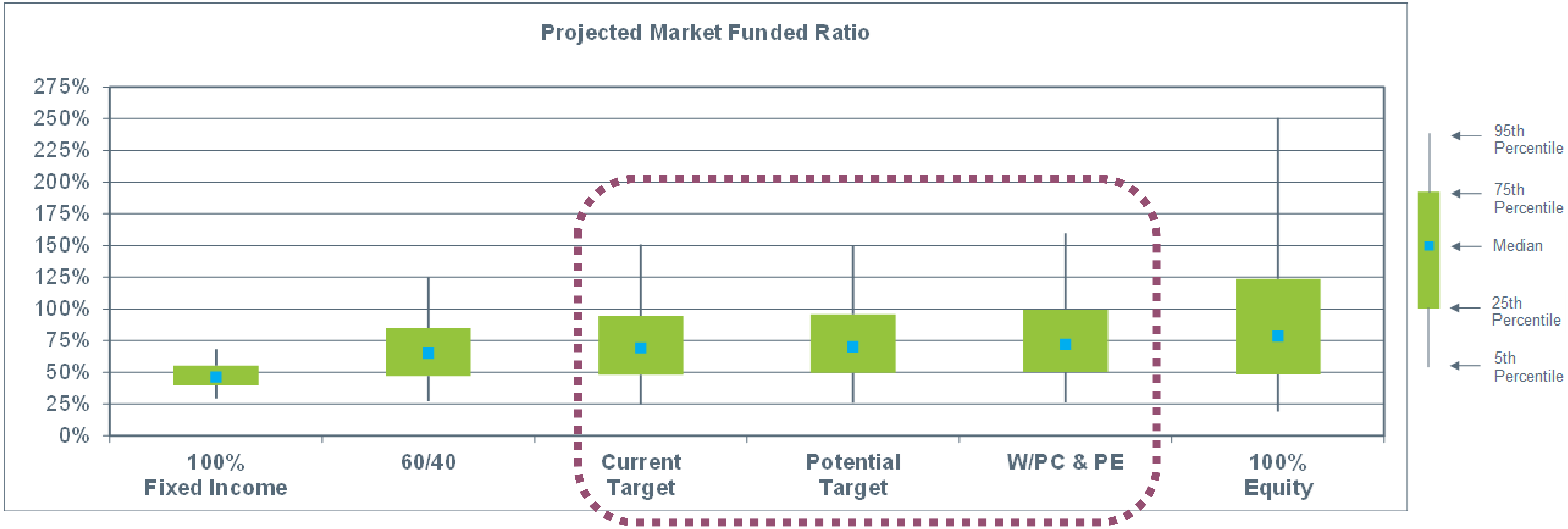
Step 2: Determining the Right Amount of Growth Assets

- The Asset/Liability Study suggests that a modest increase in Growth Assets could lead to an improvement in expected outcomes, if well implemented



Increasing growth assets with additional allocations to private markets increases positive outcomes with similar downside

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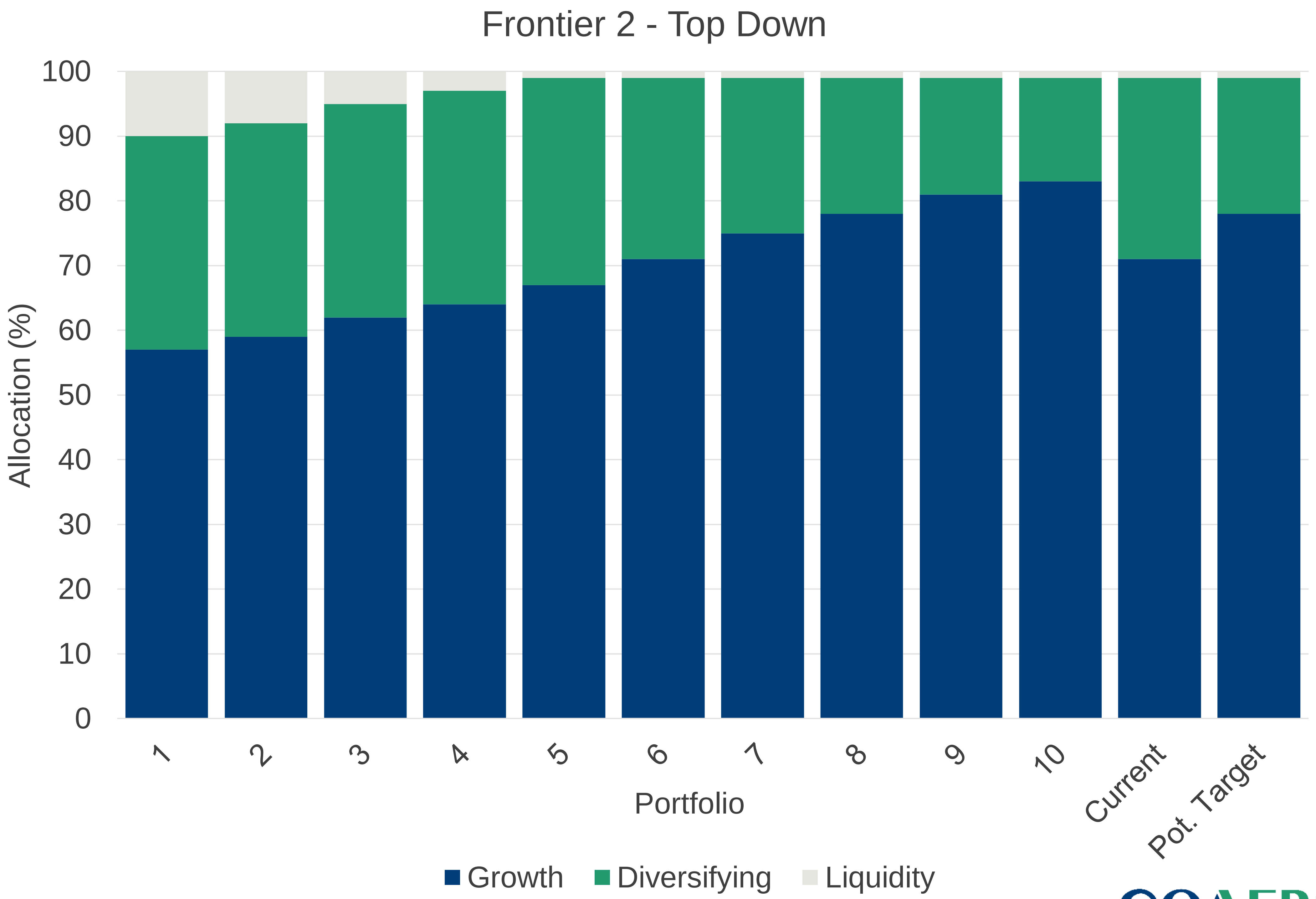
Top-Down Classification of MVO Output

- A top-down, broad categorization of the MVO output suggests that Growth investments peak at 83% across the diversified set of portfolio outputs that are consistent with a prudent risk profile for the Fund (9-13% volatility)
- It's important to note that many investments don't fit well in a single bucket and may serve multiple portfolio roles to varying degrees

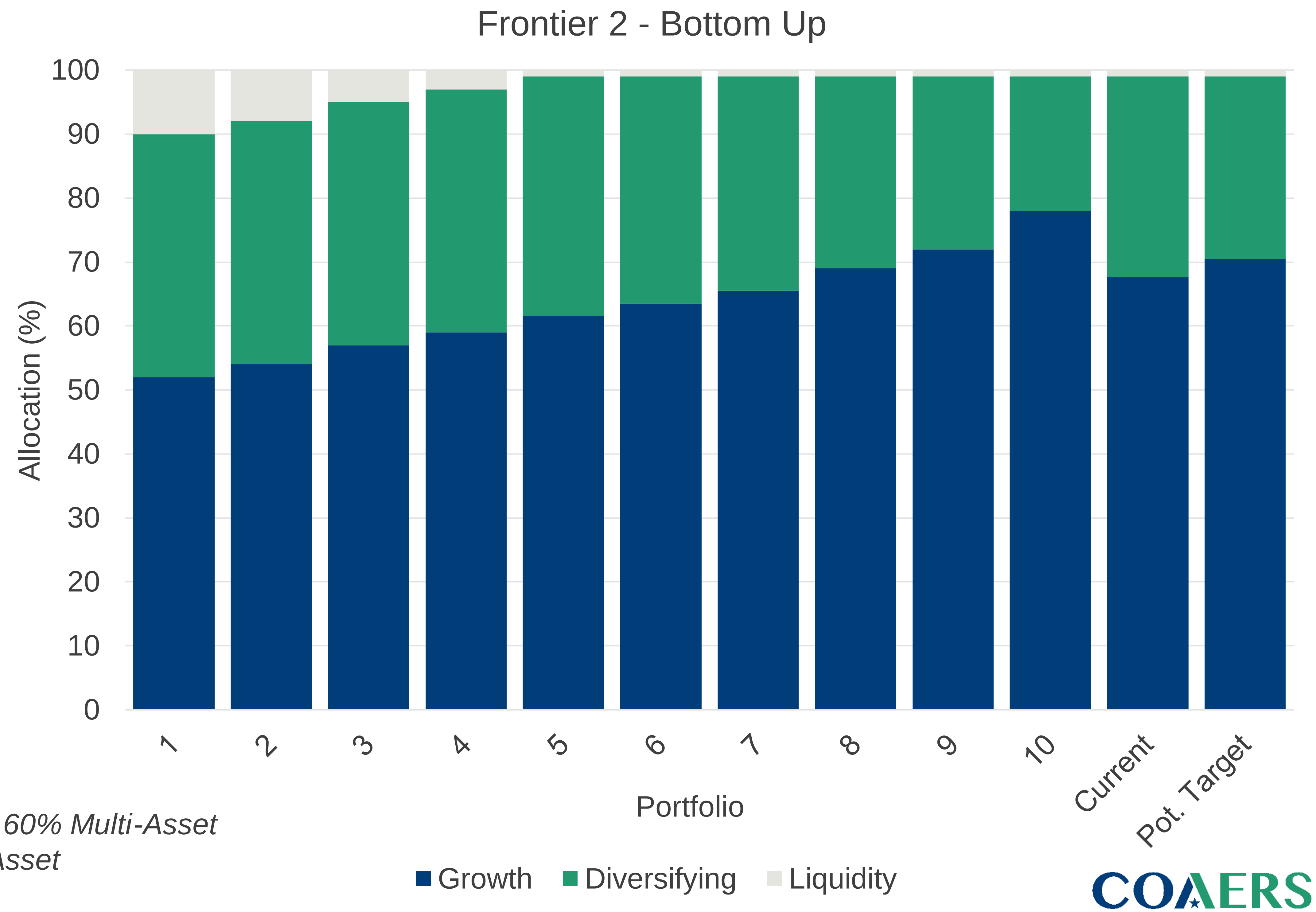


Growth: Global Equities, Real Assets, Private Credit
Diversifying: Fixed Income, Multi-Asset
Liquidity: Cash & Equivalents

Bottom-Up Classification of MVO Output

- Using a bottom-up approach that looks at underlying implementation, Growth assets peak at 78%
- A key benefit of a Functionally Focused Approach is that policy can be written in a way that considers the underlying characteristics of investments which can be as granular as desired

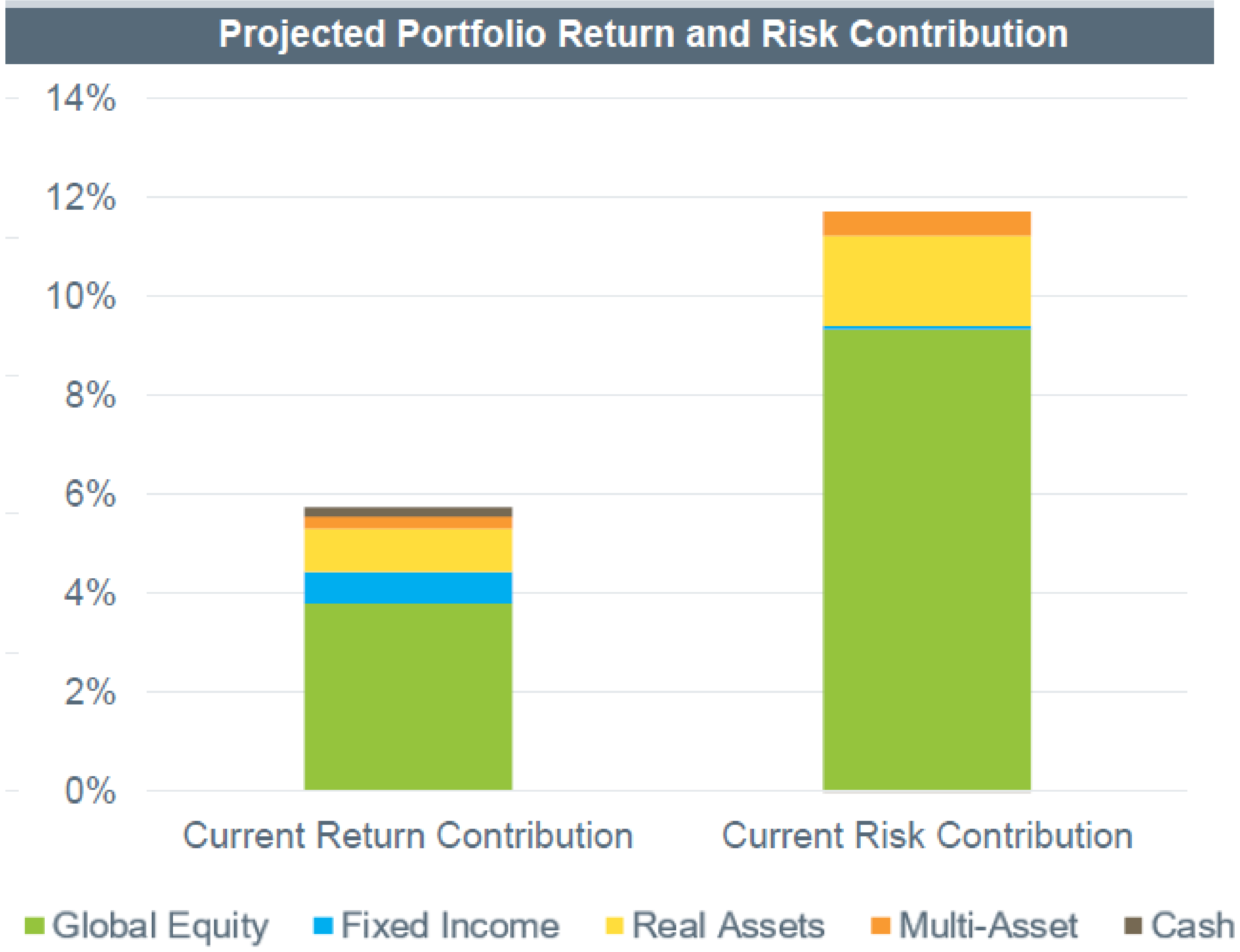
- *Q: What is the right level of granularity for policy, oversight, benchmarking and governance of the Fund's asset allocation?*



Growth: Global Equities, Real Asset Equities, Private Credit, 60% Multi-Asset
Diversifying: Fixed Income, Private Real Assets, 40% Multi-Asset
Liquidity: Cash & Equivalents

COAERS

Step 3: Considering the Mix of Growth Assets

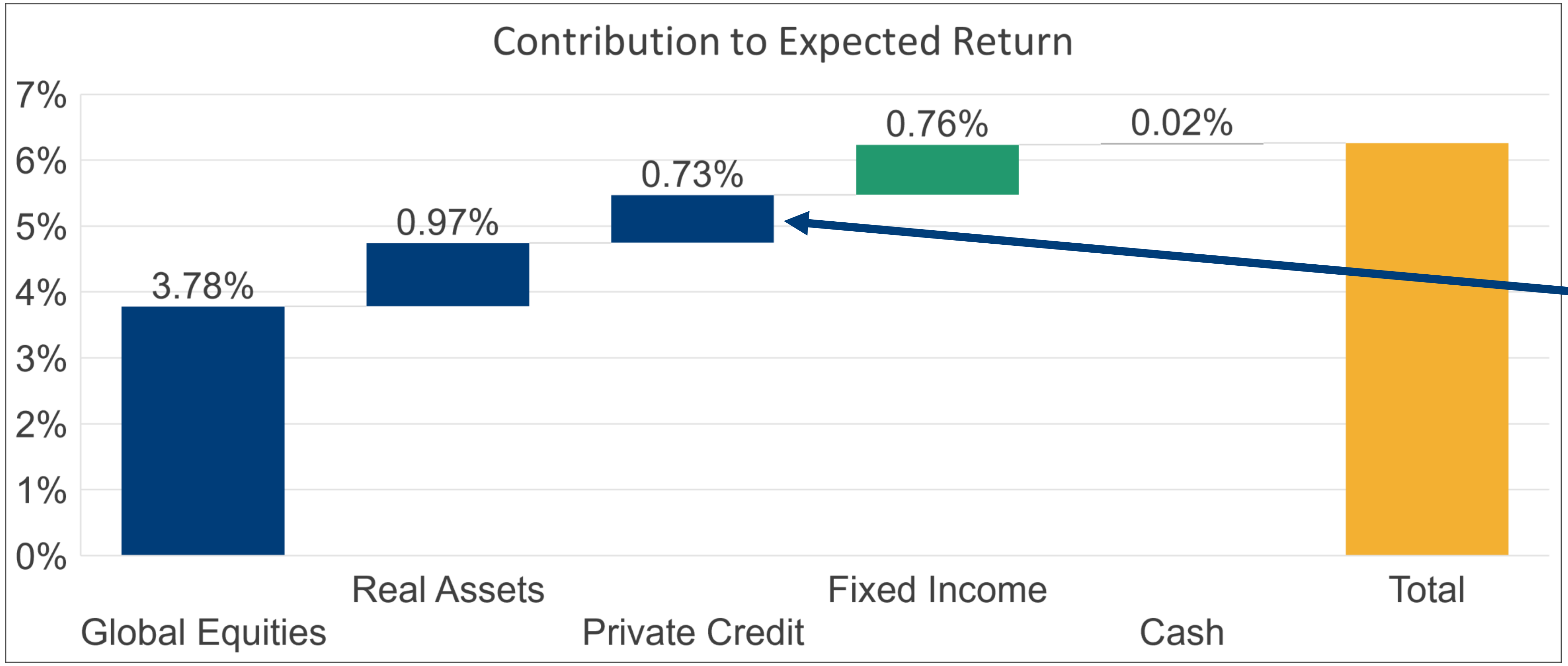


- In considering the mix of growth-oriented investments by the Fund, **nearly all the expected risk and return is contributed by publicly listed Global equities**
- Improving diversification of the Fund could be attained by not only building effective portfolio hedges, but also by building a diversified set of growth drivers

- ***Key Point:*** *Reducing reliance on public equity risk and return is prudent to consider*

Step 3: Considering the Mix of Growth Assets

- Including additional sources of return to limit reliance on Global Equities could prudently increase diversification and increase expected returns
- Private Credit investments could introduce a new return source for the Fund that is primarily driven by credit spreads, which the Fund has limited exposure to currently



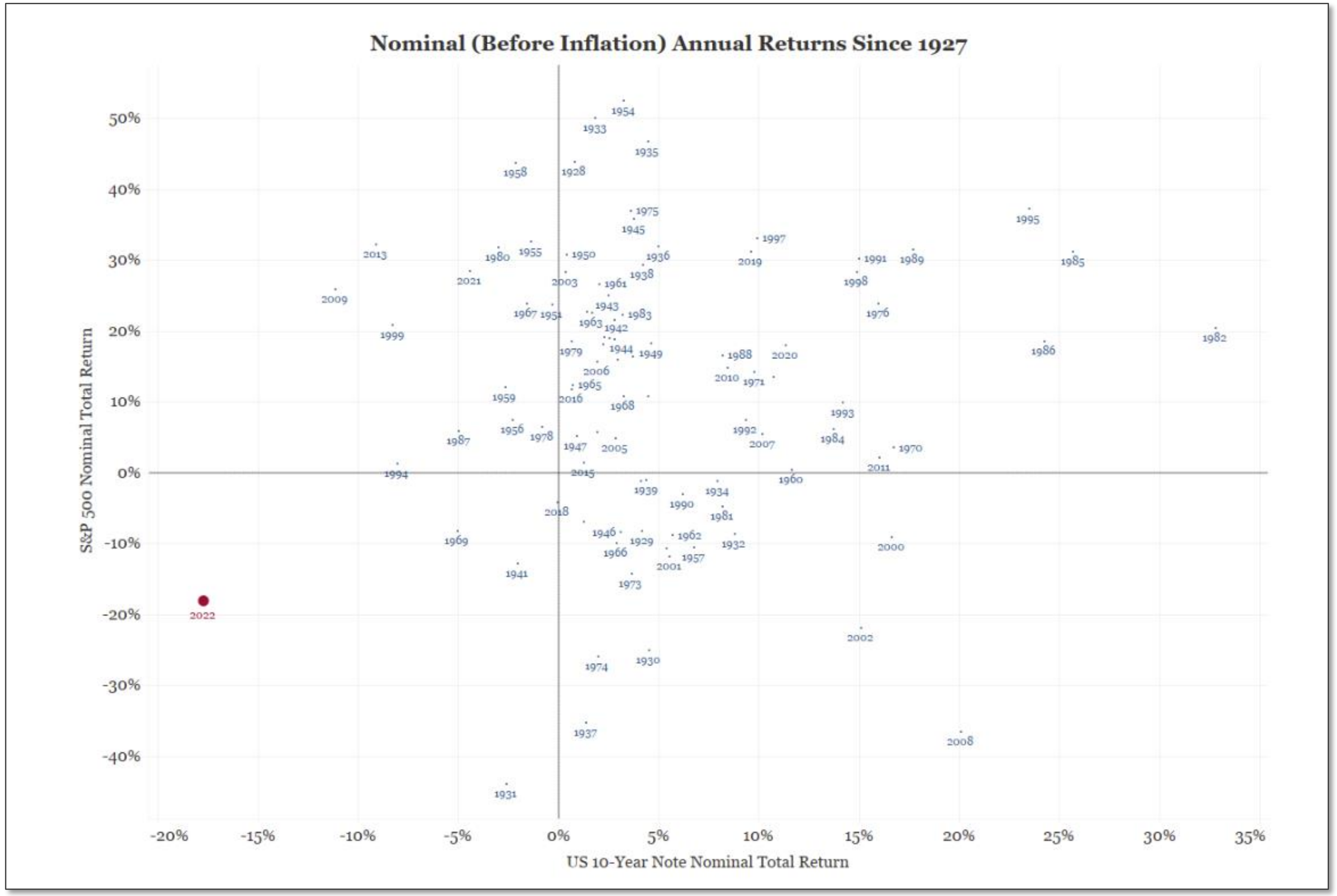
A 10% allocation to Private Credit punches above its weight in contributing returns to the total Fund

Source: Staff analysis of capital market assumptions

Step 4: Consider the Mix of Diversifying Strategies

- “Potential Target” has a lower allocation to diversifying assets, which increases the appropriateness of a “hedgy” mix of investment grade fixed income strategies
- Should rates stay higher for longer, it may be prudent to discuss and consider the implementation of the Fixed Income asset class including sub-asset class structuring
- In some regimes (like the current one), Cash & Equivalents can also serve as a diversifying exposure providing stable values

Step 4: Consider the Mix of Diversifying Strategies



- The “Potential Target” portfolio drops Multi-Asset given historical challenges in implementing these mandates and the limited diversification benefits
- In 2022, two of the most significant risks born by the Fund (equity beta and fixed income rate duration) became highly correlated and showed the shortfall of Multi-Asset mandates

Conclusions

- Applying a Functionally Focused lens to the Asset Allocation Study and “Potential Target”, Staff believes that the resulting outputs are reasonable

- **Key takeaways from this exercise include:**

- Under the new ADEC policy, the Fund can bear more illiquidity
- Increasing the allocation to a more diversified set of growth assets is expected to lead to better outcomes for the System:
  - Expected risk is lower by increasing portfolio efficiency
  - Expected returns increase and so does the portion of returns coming from income
- Sub-asset class structuring and the choice of diversifying investments are important topics to discuss further

10. Receive update on general investment consultant RFP

Presented by Christopher Hanson

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 10:
Receive update on general investment consultant RFP

AGENDA ITEM OBJECTIVE
The objective of this agenda item is to update the Committee on the general investment consultant RFP process.

RELEVANCE TO STRATEGIC PLAN
This agenda item is an action item for **COAERS Strategic Plan Goal 4: Identify and implement leading practices in board governance, pension administration, and investment management.** Going to the marketplace periodically to ensure that COAERS is receiving best-in class investment consulting services is an industry best practice.

RECOMMENDATION FOR COMMITTEE ACTION
For informational purposes only; no action required.

BACKGROUND
During the May Investment Committee meeting, Staff discussed the upcoming RFP for the general investment consultant. Staff will provide the Committee an update on the process and the expectation to deliver a draft RFP for the Committee to consider at its November meeting.

11. Receive report on custody bank

Presented by Kelly Doggett and David Kushner

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 11:
Receive report on Custody Bank

AGENDA ITEM OBJECTIVE
The Committee will review Staff's report on the System's custody bank BNY Mellon.

RELEVANCE TO STRATEGIC PLAN
This agenda item is part of the core competency set forth in the **COAERS Strategic Plan** "***Dependable Operations:*** *Managing the financial and operational commitments of the system within appropriate measurable standards."* Committee review of the custodian helps ensure that Trustees monitor the performance and stability of the custodian to optimize COAERS' operational effectiveness and ensure staff's ability to support evolving pension administration needs.

RECOMMENDATION FOR COMMITTEE ACTION
At the Committee's discretion.

BACKGROUND
Best practices for fiduciaries require the regular evaluation of key service providers, including those engaged in custodial services for the System. Custodial services include asset custody and safekeeping, settlement, and administration of securities as well as asset servicing such as income collection and corporate actions. Staff has provided their assessment of the services BNY Mellon provides to COAERS.

ATTACHMENT
1. Staff Report on 2023 BNY Mellon Custodian Review

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EMPLOYEES' RETIREMENT SYSTEM

Staff Report on COAERS' Custodial Review

Summary Rating: **Satisfactory**

Firm Information: The Bank of New York Mellon (BNYM) is the largest US custodian bank and securities services company, with $44.3 trillion in assets under custody as of December 2022. BNYM is considered a systemically important bank by the Financial Stability Board and carries a Long-Term Counterparty Risk Rating of Aa2 by Moody's rating service.

COAERS, through an RFP process conducted in 2020, retained BNYM to provide custodial services beginning on January 1, 2021. As custodian, BNYM provides traditional services such as account recordkeeping, performance calculation and reporting, asset safekeeping, trade settlement and cash management services including income, tax reclaim and corporate action processing.

Observations: COAERS' evaluation of BNYM included independent ratings of BNYM's custodial services by investment and finance staff, as well as inquiries of COAERS' external investment managers.

The following service categories were rated as follows:

Category		Rating				
	Rating	1	2	3	4	5
Relationship Management & Client Service	3					
Global Institutional Accounting	3					
Custody Account Activation	4					
Cash Management & FX Services	4					
Global Risk Solutions	3					
NEXEN	4					
OVERALL RATING		**SATISFACTORY**				

Opportunities: Staff noted the following opportunities BNYM should address to improve service delivery.

> **Client Communications:** BNYM's communications with appropriate stakeholders should be an area of focus. Staff identified lapses in client communications between BNYM and COAERS or its investment managers which detracted from service delivery.

Staff Turnover/ Offshoring: Staff noted turnover in critical positions has negatively impacted service delivery. Additionally, staff and managers both indicate offshoring of service teams has resulted in both communication and service delays.

Performance Attribution Reporting: NEXEN's performance attribution could be improved with customizable templates created by BNYM's Global Risk Solutions team. Staff is working with BNYM's GRS team in conjunction with investment's risk system analysis to build relevant templates for attribution reporting.

Appendix

Relationship Management and Client Service

	Rating	1	2	3	4	5
Relationship Management & Client Service	**3**					
Client Communications	2					
Inquiry Responsiveness	3					
Issue Resolution skill and time	3					
Internal Accountability	3					
Access to Specialists	3					
Training	3					
Executive Engagement	3					
Staff Turnover	2					

Overall, Relationship Management and Client Service are rated satisfactory by Staff, and interactions with BNYM staff are productive and timely. In addition to day-to-day communications, COAERS and BNYM conduct monthly update meetings to discuss any service issues or process questions as well as plan for upcoming initiatives. These updates allow for direct discussions and planning between COAERS and the respective team leads at BNYM.

The review highlighted two areas of opportunity for BNYM to improve. Specifically, there were lapses in communicating staff or process changes at BNYM to COAERS and/or investment managers. Compounding the issue is increased offshoring of teams and functions at BNYM which has contributed to temporary communication issues and service delays as relationships and contacts between BNYM service teams and COAERS or its investment managers are established. While these instances were not common, we encourage BNYM to communicate any changes in BNYM staffing or processes that affect COAERS or its investment managers in a direct and timely manner.

BNY Client Advisory Council

BNYM has formally invited COAERS to join BNYM's Investment Analytics Client Forum/ Advisory Board. The Forum is composed of 30 client representatives representing BNYM custodial clients. The group's mission is to facilitate communication between BNYM's executive and leadership teams and their custodial clients regarding strategic issues and topics of interest to the investment community. Membership offers COAERS the opportunity to influence decision-making at the highest level of BNYM management, as well as build relationships with industry peers.

Global Institutional Accounting

	Rating	1	2	3	4	5
Global Institutional Accounting	3					
Asset Pricing & Accounting	3					
Accounting Platform	5					
G/L Mapping	5					
Accounting Support	3					
Monthly Close Process	3					
Monthly Reporting	3					
GASB Regulatory Reporting	3					
Audit Support	3					
Income Processing	3					
Corporate Action Processing	3					
Proxy Services	3					
Class Action Processing	3					
Tax Reclamations	3					
Inquiry Responsiveness	3					
Issue Resolution skill and time	3					

None of the criteria evaluated by Staff indicated lapses in the services provided. Additionally, the COAERS finance team indicated the accounting platform and related functionality provided through NEXEN is an improvement over the prior custodian experience.

Custody Account Activation

	Rating	1	2	3	4	5
Custody Account Activation	4					
Account Opening & Setup	4					
Account Maintenance	4					
Inquiry Responsiveness	4					
Issue Resolution skill and time	4					

COAERS and investment managers indicated high satisfaction with BNYM's account opening team and their processes. However, two international managers experienced difficulties setting up proxy voting during the initial account set up. While these issues proved to be manager specific, COAERS instituted a new account opening checklist and review process to ensure account opening procedures are followed in the future.

Cash Management & FX Services

	Rating	1	2	3	4	5
Cash Management & FX Services	4					
Cash Transfer Processes	4					
Reconciliations	4					
Short-Term Cash Investment Vehicles	4					
Foreign Exchange Processing	4					
Inquiry Responsiveness	4					
Issue Resolution skill and time	4					

COAERS and investment managers indicated high satisfaction with BNYM’s cash management and FX services teams and their processes. BNYM’s cash transfer process and controls are automated through NEXEN, which provides online transfer request processing and required approvals for each transfer request. The automated nature of the transfer process has improved COAERS’ internal processes and controls. In addition, COAERS benefits from BNYM’s short term investment fund (STIF) into which excess cash balances are swept from investment accounts. The STIF provides a competitive net yield and provides the mechanism by which COAERS tracks and reconciles investment income and account transfers. COAERS also utilizes BNYM’s Liquidity Direct portal to invest a portion of cash asset balances into money market funds selected from a range of available funds through the portal.

Finally, several of COAERS’ international equity managers engage BNYM’s FX services team to trade foreign currencies either in the spot or forwards markets. Per transaction cost analysis provided by Abel Noser, BNYM is rated satisfactory with transaction costs in line with peers.

Global Risk Solutions

	Rating	1	2	3	4	5
Global Risk Solutions	3					
Performance Measurement	3					
Performance Attribution & Analytics	2					
Peer Benchmarking Data	4					
Performance Reporting Support	4					
Compliance Monitoring	3					
Inquiry Responsiveness	4					
Issue Resolution skill and time	4					
Training	3					

COAERS’ overall evaluation of BNYM’s portfolio characteristics, performance and risk reporting capabilities is satisfactory. However, NEXEN’s performance attribution could be improved with customizable templates created by BNYM’s Global Risk Solutions team. Staff is working with BNYM’s GRS team in conjunction with investment’s risk system analysis to build relevant templates for attribution reporting.

NEXEN Custody Accounting and Reporting Platform

	Rating	1	2	3	4	5
NEXEN	**4**					
On-line portal availability	**5**					
Administrator - User Controls	**5**					
Inquiry Responsiveness	**3**					
Issue Resolution skill and time	**4**					
Training	**3**					

BNYM's NEXEN reporting system meets Staff's analysis and reporting needs. Further, NEXEN's SOC 1 compliant reporting has helped Staff improve and streamline reporting requirements for the annual audit and ACFR reviews.

In summary, COAERS' staff rates BNYM's performance of custodial services as satisfactory and service delivery by BNYM has been consistent with expectations. Staff has built and maintains good relationships with key BNYM staff on the various service teams including accounting, performance reporting, cash management and custody account teams.

12. Receive key meeting takeaways and call for future agenda items

Presented by Committee Chair Liu

COAERS

COMMITTEE MEETING
Agenda Item Information Sheet

AGENDA ITEM 12:
Review key meeting takeaways and call for future agenda items

AGENDA ITEM OBJECTIVE
This standing agenda item provides Trustees the opportunity to review the key takeaways from the meeting.

RELEVANCE TO STRATEGIC PLAN
This agenda item meets **COAERS Strategic Plan Goal 4: Identify and implement leading practices in board governance, pension administration, and investment management.** It is an industry best practice to review key meeting takeaways to summarize what was accomplished at the meeting as well as ensure Staff has clear direction on further work and future agenda items.

RECOMMENDATION FOR COMMITTEE ACTION
Trustees will review key meeting takeaways and delineate next steps.

COAERS
CITY OF AUSTIN
EMPLOYEES' RETIREMENT SYSTEM

2023 Investment Committee Work Plan

Scheduled Quarterly Meetings

1. February meeting
   - ✓ Quarterly review of investment performance, positioning, strategy, and implementation
   - ✓ Quarterly reports on Premier Lists, delegated authority, manager fees, cash movements
   - ✓ Annual review of Investment Risk Framework process
   - ✓ Annual review of Investment Policy Statement (IPS)/Investment Implementation Policy (IIP)
   - ✓ Annual review of investment goals, assumptions, guidelines, and policies
   - ✓ Annual review of Premier List for Multi-Asset
   - ✓ Discuss and consider Asset/Liability Study
   - ✓ PRB Investment Practices and Performance Evaluation: Scope and RFI

2. April meeting (new)
   - ✓ Discuss and consider Asset Allocation Study
   - ✓ (new) Education on Functionally Focused Asset Allocation
   - ✓ (new) Education on Private Markets

3. May meeting
   - ✓ Quarterly review of investment performance, positioning, strategy, and implementation
   - ✓ Quarterly reports on Premier Lists, delegated authority, manager fees, cash movements
   - ✓ Annual review of Premier Lists for Fixed Income and Cash and Equivalents
   - ✓ (moved to August)Discuss and consider investment program goals and strategy, including policies and governance (Education on Functionally Focused Asset Allocation)
   - ✓ Annual review of Investment Consultant
   - ✓ PRB Investment Practices and Performance Evaluation: Consultant options

4. August meeting
   - ✓ Quarterly review of investment performance, positioning, strategy, and implementation
   - ✓ Quarterly reports on Premier Lists, delegated authority, manager fees, cash movements
   - ✓ Annual review of Premier List for Global Equities
   - ✓ Discuss and consider Asset/Liability Study
   - ✓ Discuss and consider Asset Allocation Study
   - ✓ Discuss and consider investment program goals and strategy, including policies and governance
   - ~~Discussion and consideration of General Consultant RFP and timeline~~
   - ✓ Review of Custody Bank

5. November meeting
   - Quarterly review of investment performance, positioning, strategy, and implementation
   - Quarterly reports on Premier Lists, delegated authority, manager fees, cash movements
   - Annual review of Premier List for Real Assets
   - Annual review of Investment budget

CITY OF AUSTIN EMPLOYEES' RETIREMENT SYSTEM

Investment Committee
2023 Work Plan

- Discuss and consider investment program goals and strategy, including policies and governance
- CEM Benchmark report
- PRB Investment Practices and Performance: Evaluation Report
- Discussion and consideration of General Consultant RFP and timeline
- Discuss Committee work plan for 2024