

December 2023

BUILDING THE TRUST

Investment Management



**Teacher Retirement System of
Texas**

1000 Red River Street
Austin, Texas
78701-2698

**TEACHER RETIREMENT SYSTEM OF TEXAS MEETING
BOARD OF TRUSTEES
AND
INVESTMENT MANAGEMENT COMMITTEE**

*(Committee Chair and Members: Mr. Corpus, Chair; Mr. Hollingsworth; Mr. Elliott,
Ms. Sissney and Mr. Walls, Jr.)*

*All or part of the December 7, 2023, meeting of the TRS Investment Management Committee and Board of Trustees may be held by telephone or video conference call as authorized under Sections 551.130 and 551.127 of the Texas Government Code. The Board intends to have a quorum and the presiding officer of the meeting physically present at the following location, which will be open to the public during the open portions of the meeting: **1000 Red River, Austin, Texas 78701 in the TRS East Building, 5th Floor, Boardroom.***

The open portions of the December 7, 2023, meeting are being broadcast over the Internet. Access to the Internet broadcast and agenda materials of the meeting is provided at www.trs.texas.gov. A recording of the meeting will be available at www.trs.texas.gov.

**AGENDA
December 7, 2023 – 1:30 p.m.**

1. Call roll of Committee members.
2. Consider the approval of the proposed minutes of the September 2023 committee meeting – Committee Chair.
3. CIO Update including Fleet Strategy; Talent Management; Accomplishments; Notices, Key Dates and Upcoming Events – Jase Auby.
4. Discuss the Third Quarter 2023 Performance Review – Steve Voss, Mike McCormick and Mike Comstock, AON.
5. Review of Investment Operations - Kendall Courtney.
6. Annual Review of Risk and Portfolio Management and Strategic Asset Allocation Kickoff – James Nield, Mark Telschow and Mike Simmons.
7. Review of Strategic Asset Allocation best practices and key elements of an effective asset allocation process – Steve Voss and Mike McCormick, AON.

NOTE: The Board of Trustees (Board) of the Teacher Retirement System of Texas will not consider or act upon any item before the Investment Management Committee (Committee) at this meeting of the Committee. This meeting is not a regular meeting of the Board. However, because the full Committee constitutes a quorum of the Board, the meeting of the Committee is also being posted as a meeting of the Board out of an abundance of caution.

Minutes of the Investment Management Committee September 14, 2023

The Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas met on Thursday, September 14, 2023, in the boardroom located on the Fifth Floor in the East Building of TRS' offices located at 1000 Red River Street, Austin, Texas, 78701.

Committee members present:

Mr. David Corpus, Chair
Mr. John Elliott
Mr. Jarvis V. Hollingsworth
Mrs. Nanette Sissney
Mr. Robert H. Walls, Jr.

Other TRS Board Members present:

Ms. Brittny Allred
Mr. Mike Ball
Mr. James D. Nance
Mr. Elvis Williams

Others present:

Brian Guthrie, TRS
Andrew Roth, TRS
Heather Traeger, TRS
Jase Auby, TRS
Amanda Jenami, TRS
Don Green, TRS
Katy Hoffman, TRS
Mohan Balachandran, TRS
James Nield, TRS
Stephen Kim, TRS
Katherine Farrell, TRS
Suzanne Dugan, Cohen Milstein
Dr. Keith Brown, Board Advisor
Steve Vos, AON
Mike McCormick, AON.

Investment Management Committee Acting-Chair, Ms. Nanette Sissney, called the meeting to order at 10:04 a.m.

1. Call roll of Committee members.

Ms. Farrell called the roll. A quorum was present, Mr. Corpus joined later in the meeting.

2. Consider the approval of the proposed minutes of the July 2023, Investment Management Committee meeting – Chair David Corpus.

On a motion by Mr. Walls, seconded by Mr. Elliott, the committee approved the proposed minutes for the July 2023 Investment Management Committee meeting as presented.

3. CIO Update including Fleet Strategy; Talent Management; Accomplishments; Notices; Awards and Key Dates and Upcoming Events and Market Update – Jase Auby and Mohan Balachandran.

Mr. Jase Auby provided a high level review noting the performance into the second quarter of 2023 as positive on absolute returns as well as positive alpha. He reported the attrition levels in the IMD have abated and are normalizing for 2023. He said 64 percent of the asset classes had positive returns, dominated by equity. He said there was quite a lot of variability with U.S. long Treasury bonds with a negative 7 percent return. He said as we continue to emerge from COVID will continue to see quite a lot of volatility in a lot of different asset classes.

Mr. Auby stated this year for TRS was a tough year compared to peers. He reported TRS as having a 4.0 percent return, where the benchmark had 3.5 percent, versus the peer median of 7.1 percent return. There was further discussion over the past year, three years and five as to performance, benchmarks, asset allocation and peers.

Mr. Auby then turned to the special topic, artificial intelligence (AI). Mr. Mohan Balachandran reviewed the AI efforts at TRS. He said it is being used in two different ways on the public market side. One is to identify patterns and the other is to extract sentiment from transcripts on management calls. He said on the private market side there are investments being considered on the real estate and venture capital side. He said with AI the risk is leaking confidential information. He noted the agency was working on an AI policy but concluded with it is a powerful tool that needs to be embraced with safeguards in place.

4. Discuss the Second Quarter 2023 Performance Review – Steve Voss and Mike McCormick, Aon.

Mr. Mike McCormick began by noting equities have driven positive performance for the Trust. He said 70 percent of risk is coming from global equity piece. He reported the Trust had about a \$1 billion a quarter in net cash outflows and over five years, it is about \$20 billion net outflows, offset by almost \$60 billion in investment earnings for the trailing five-year period, ending the period just short of \$190 billion. Mr. Steve Voss said 13 out of 20 of the last quarters, IMD has generated returns on a net-of-fee basis that outperformed the benchmark. He noted all of these returns were generated within the risk tolerance bounds as stated in the IPS.

5. Review of the Semi-annual Risk Report – James Nield and Stephen Kim.

Mr. James Nield began by noting the Trust is operating in compliance with all of the policies and procedures. He provided further review on three of these metrics: drawdown risk, tracking error,

and securities lending. Mr. Stephen Kim reviewed the Trust asset allocation for the core asset groups noting they stayed relatively constant. He highlighted the allocation to stable value at 21.8 percent compared to the benchmark at 19.4 percent. He said the Trust had a net asset allocation leverage of negative 5.2 percent. He reported stable value contributed negative 3.6 percent of Trust VaR, primarily due to government bonds allocation, the strongest diversifying asset class in the Trust.

Mr. Nield reported at the end of the second quarter, securities lending generated \$6.7 million for the Trust. He said the earnings have increased over the last year and a half due to the rising interest rates providing additional yield for the Trust. Mr. Nield then discussed the different uses of the government bonds in the Trust.

There being no more business before the Investment Management Committee, the committee adjourned at 3:17 p.m.

Approved by the Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas on December __ 2023.

Katherine H. Farrell
Secretary to the Board of Trustees
Teacher Retirement Systems of Texas

Date

CIO Update

Jase Auby, Chief Investment Officer

December 2023



CIO Update

IMD at a Glance



Priorities

- **Performance.** Trust ended the third quarter of 2023 with a 1-year return of 7.1% and +186 bp of excess return. The 3-year return is 6.1% with +155 bp of excess return.
- **Alpha.** 3-year excess return (+155 bp) is highest alpha achieved in last fifteen years
- **Strategic Asset Allocation.** Research and analysis underway across internal investment teams and external partners
- **Summits.** Hosted Strategic Partnership Network (SPN) Public Summit and Legal Summit in Austin
- **Annual Planning.** Engaged in annual priority-setting and capital-planning processes in preparation for 2024

Key Dates and Upcoming Events

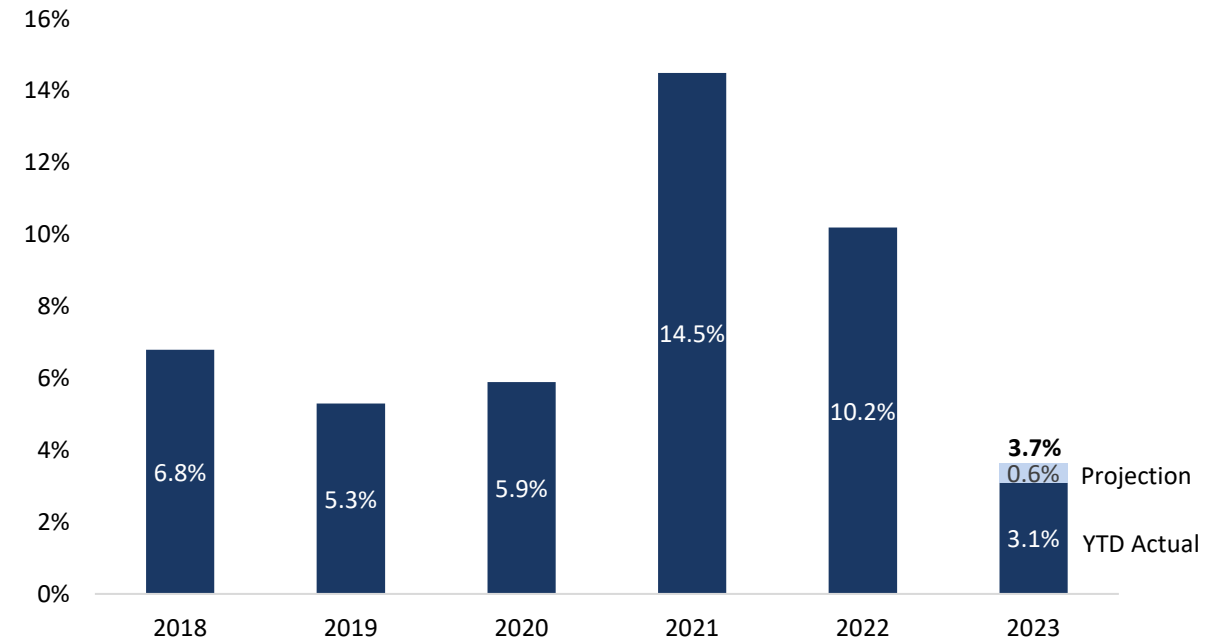
Event	Location	Dates
IMD Town Hall	Austin, TX	January 17, 2024
TRS Emerging Manager Conference	Virtual	February 28, 2024
Council of Institutional Investors (CII) Spring Conference	Washington, DC	March 4-6, 2024

People

Snapshot as of November 2023

IMD FTEs	239
Contractors	8
Secondees	5

Attrition Trend 2018 – 2023 (As of November 2023)



CIO Update

IMD Awards

Institutional Investor: Partnership of the Year
Jean-Benoit Daumerie, External Public Markets



With Intelligence Allocator Prizes: Idea of the Year
Steven Wilson, External Public Markets

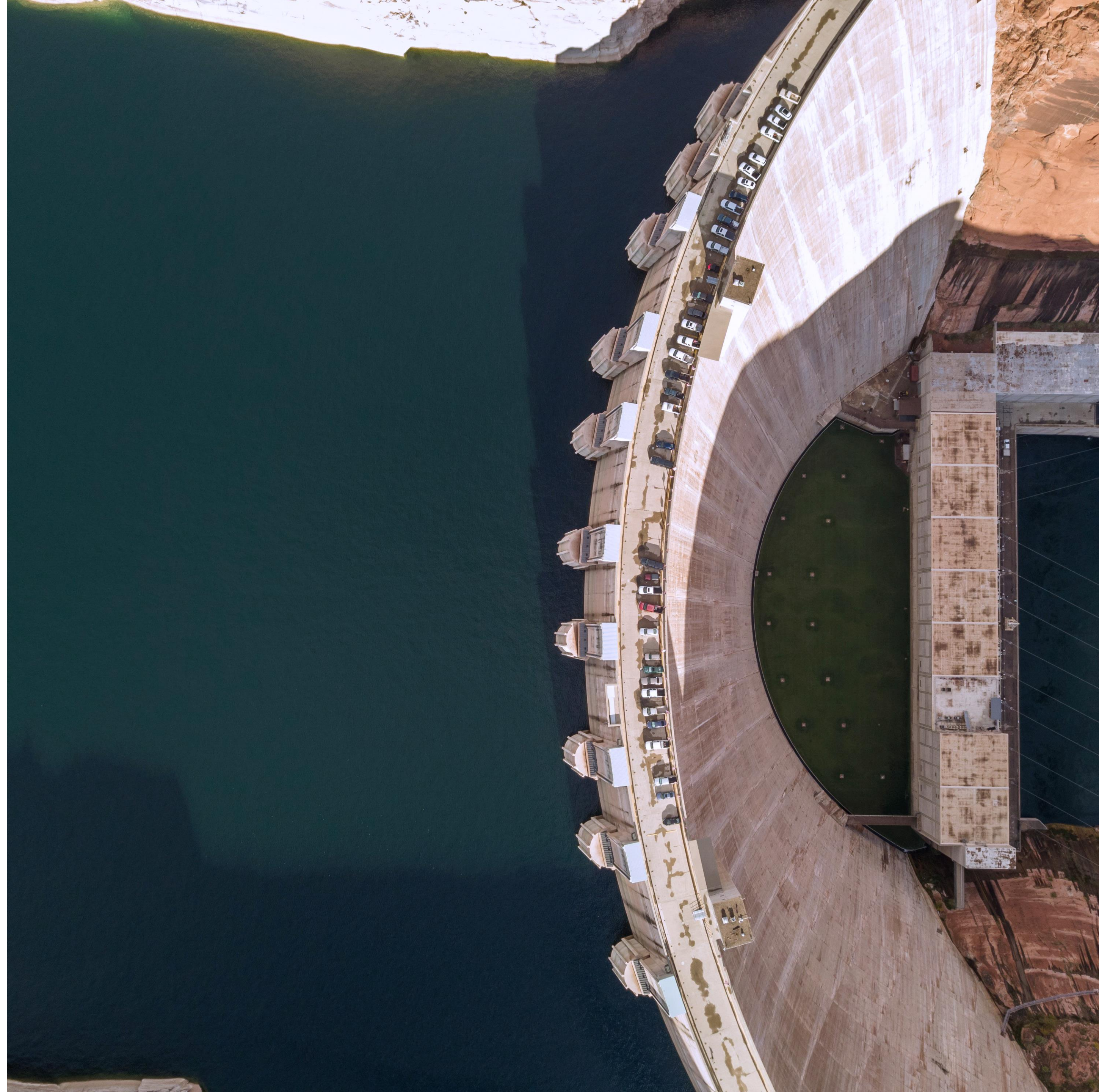




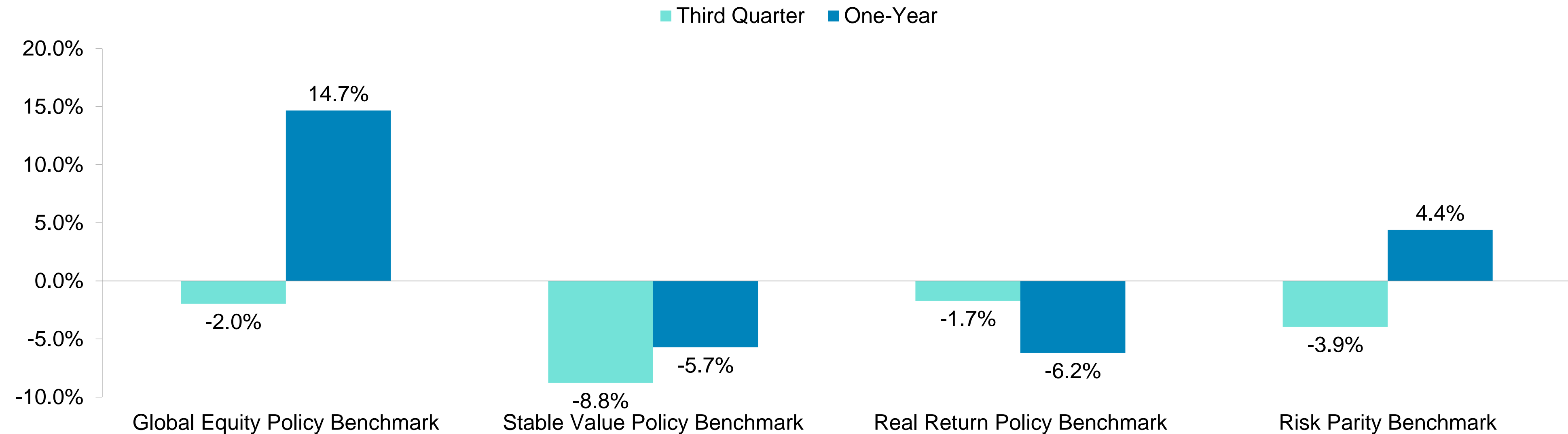
Teacher Retirement System of Texas

Performance Review:
Third Quarter 2023

Investment advice and consulting services provided by Aon Investments USA, Inc.
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Summary



In Q3 2023, global equity markets fell. Sovereign bond yields increased amidst expectations of interest rates staying higher for longer.

Global equities fell -2.0% for the quarter, however they returned 14.7% over a trailing 1-year period

The U.S. Federal Reserve (Fed) increased its benchmark interest rate by 25bps to a range of 5.25%-5.5% over the quarter, representing the highest level in more than 22 years. The Federal Open Market Committee (FOMC) indicated that inflation remained “elevated” and that the economy was growing at a “moderate pace”. Fed chair Jerome Powell signaled that future Fed decisions would be based on “careful assessments” on a “meeting by meeting” basis.

TRS returned -2.7% for the quarter which was 0.8 percentage points above its benchmark

–Outperformance at the asset class level for Global Equity, Risk Parity, Stable Value, and Real Return were the primary drivers for relative results.

For the trailing twelve months, TRS returned 7.1% versus the benchmark return of 5.2%

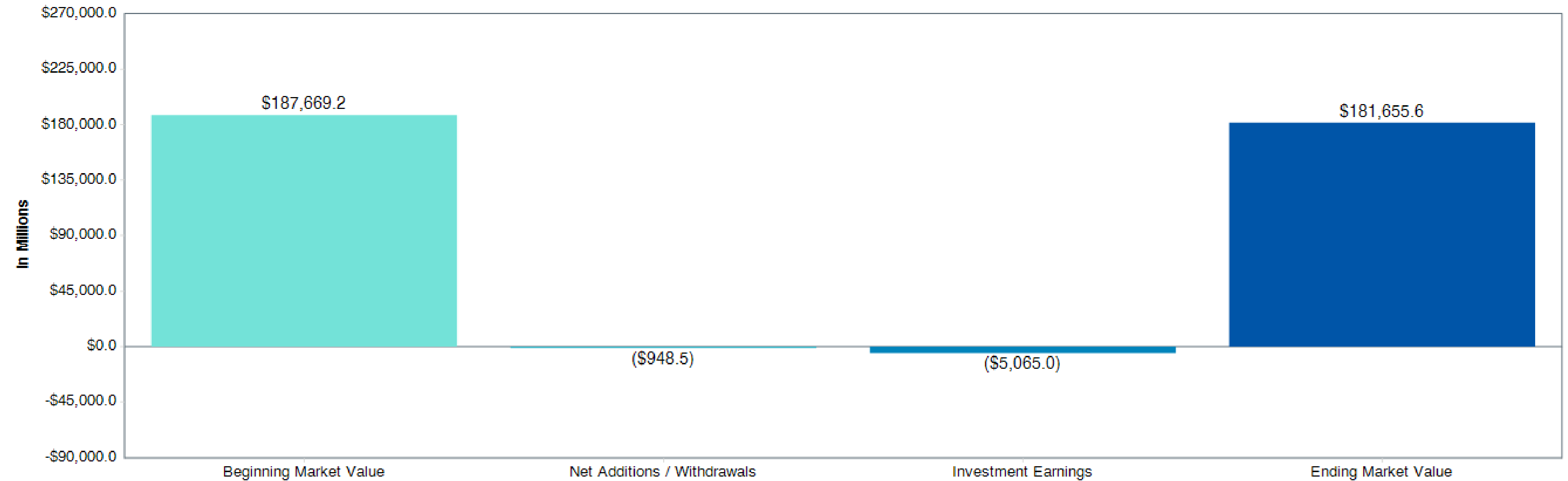
–Outperformance from the Stable Value, Real Return and Risk Parity asset classes were the primary drivers of relative performance

1. Market Summary – Third Quarter 2023

	Third Quarter	YTD	One Year	Three Years	Five Years	Ten Years
Global Equity:						
TF USA Benchmark	-3.2%	12.6%	20.7%	9.6%	9.3%	11.4%
TRS Non-US Developed Benchmark	-4.3	6.6	23.7	5.9	3.4	3.8
TRS Emerging Markets Benchmark	-3.1	4.0	11.1	-1.9	0.5	2.0
HFRI Fund of Funds Composite Index	0.5	2.8	4.6	3.8	3.4	3.3
State Street Private Equity Index (quarter lagged)	1.8	5.2	3.8	19.7	14.4	13.3
Global Equity Policy Benchmark	-2.0	7.3	14.7	10.0	8.1	8.4
Stable Value:						
Bloomberg Barclays Long Treasury Index	-11.8%	-8.6%	-9.1%	-15.7%	-2.8%	0.8%
HFRI Fund of Funds Conservative Index	1.5	3.5	5.0	5.7	4.1	3.5
Absolute Return Benchmark	2.4	7.0	9.1	5.4	4.7	3.8
90 Day U.S. Treasury Bill	1.4	3.8	4.7	1.8	1.7	1.1
Stable Value Policy Benchmark	-8.8	-5.7	-5.7	-10.9	-1.1	1.4
Real Return:						
Bloomberg Barclays U.S. TIPS Index	-2.6%	-0.8%	1.2%	-2.0%	2.1%	1.7%
NCREIF ODCE (quarter lagged)	-2.9	-11.0	-10.7	7.0	5.6	7.8
Energy, Natural Resources & Infrastructure Benchmark	1.1	5.3	6.1	14.2	6.9	--
Goldman Sachs Commodities Index	16.0	7.2	10.9	29.5	5.6	-2.5
Real Return Policy Benchmark	-1.7	-6.6	-6.2	9.0	6.0	6.6
Risk Parity:						
Risk Parity Benchmark	-3.9%	-0.9%	4.4%	-2.8%	1.0%	2.7%
TRS Policy Benchmark	-3.5%	0.9%	5.2%	4.6%	5.4%	6.5%

2. Market Value Change

From July 1,2023 to September 30,2023

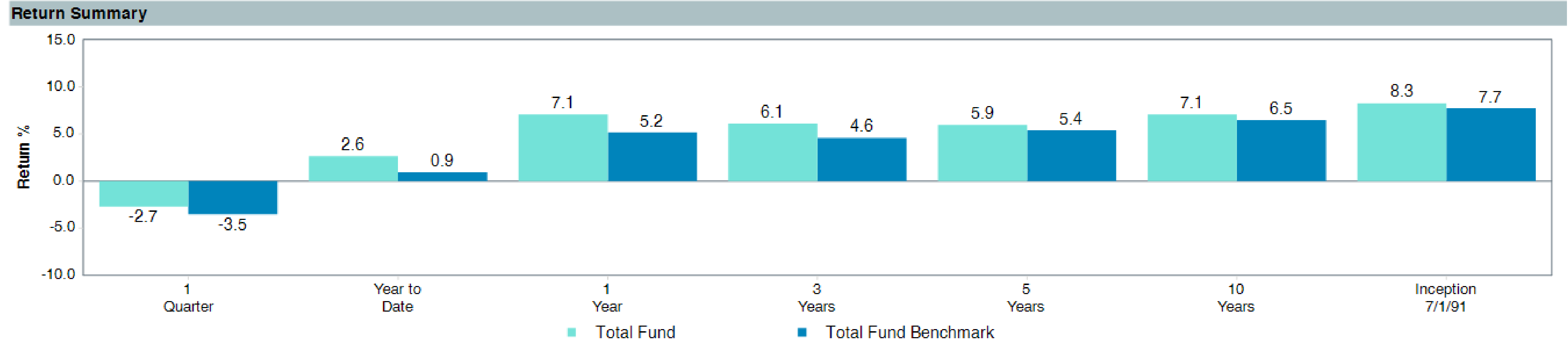


Summary of Cash Flows					
	1 Quarter	Year to Date	1 Year	3 Years	5 Years
Total Fund					
Beginning Market Value	187,669,161,066	179,746,129,720	173,277,443,496	162,655,736,486	153,125,720,361
+ Additions / Withdrawals	-948,545,000	-2,865,741,510	-3,849,319,463	-12,529,564,630	-20,344,564,795
+ Investment Earnings	-5,064,994,124	4,775,233,732	12,227,497,909	31,529,450,086	48,874,466,375
= Ending Market Value	181,655,621,941	181,655,621,941	181,655,621,941	181,655,621,941	181,655,621,941

3. Asset Allocation Detail

	Market Value \$ in millions) as of 9/30/2023		Interim Policy Target	Relative to Interim Policy Target	Long Term Policy Target	Long Term Policy Ranges
	(\$)	(%)				
Investment Exposure	--	105.9%	104.0%	+1.2%	104.0%	93-115%
Total U.S.A.	\$28,887	15.9%	16.8%	-0.9%	18.0	13-23%
Non-U.S. Developed	\$21,150	11.6%	12.1%	-0.5%	13.0	8-18%
Emerging Markets	\$14,820	8.2%	8.3%	-0.1%	9.0	4-14%
Private Equity	\$32,727	18.0%	17.2%	+0.8%	14.0	9-19%
Global Equity	\$97,584	53.7%	54.3%	-0.6%	54.0	47-61%
Government Bonds	\$23,265	12.8%	14.9%	-2.1%	16.0	0-21%
Stable Value Hedge Funds	\$9,805	5.4%	4.6%	+0.8%	5.0	0-10%
Absolute Return	\$5,815	3.2%	0.0%	+3.2%	0.0	0-20%
Stable Value	\$38,885	21.4%	19.5%	+1.9%	21.0	14-28%
Real Estate	\$30,024	16.5%	16.2%	+0.3%	15.0	10-20%
Energy, Natural Resource and Inf.	\$12,872	7.1%	6.6%	+0.5%	6.0	1-11%
Commodities	\$715	0.4%	0.0%	+0.4%	0.0	0-5%
Real Return	\$43,610	24.0%	22.8%	+1.2%	21.0	14-28%
Risk Parity	\$12,270	6.8%	7.4%	-0.6%	8.0	0-13%
Risk Parity	\$12,270	6.8%	7.4%	-0.6%	8.0	0-13%
Cash	\$4,537	2.5%	2.0%	+0.5%	2.0	0-7%
Asset Allocation Leverage	-\$15,231	-8.4%	-6.0%	-2.4%	-6.0	--
Net Asset Allocation	-\$10,694	-5.9%	-4.0%	-1.9%	-4.0	--
Total Fund	\$181,656	100.0%		---	100.0%	--

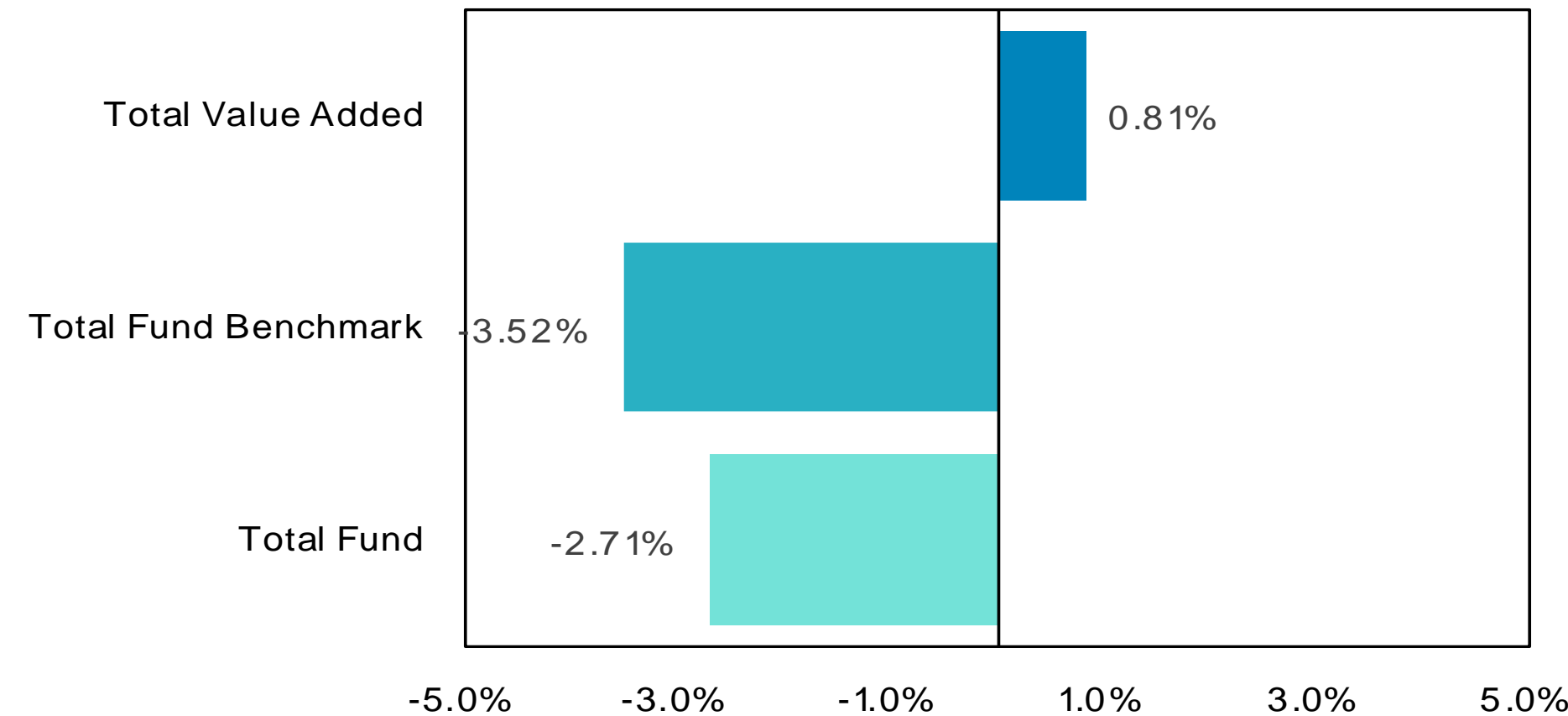
4. Total TRS Performance Ending 9/30/2023



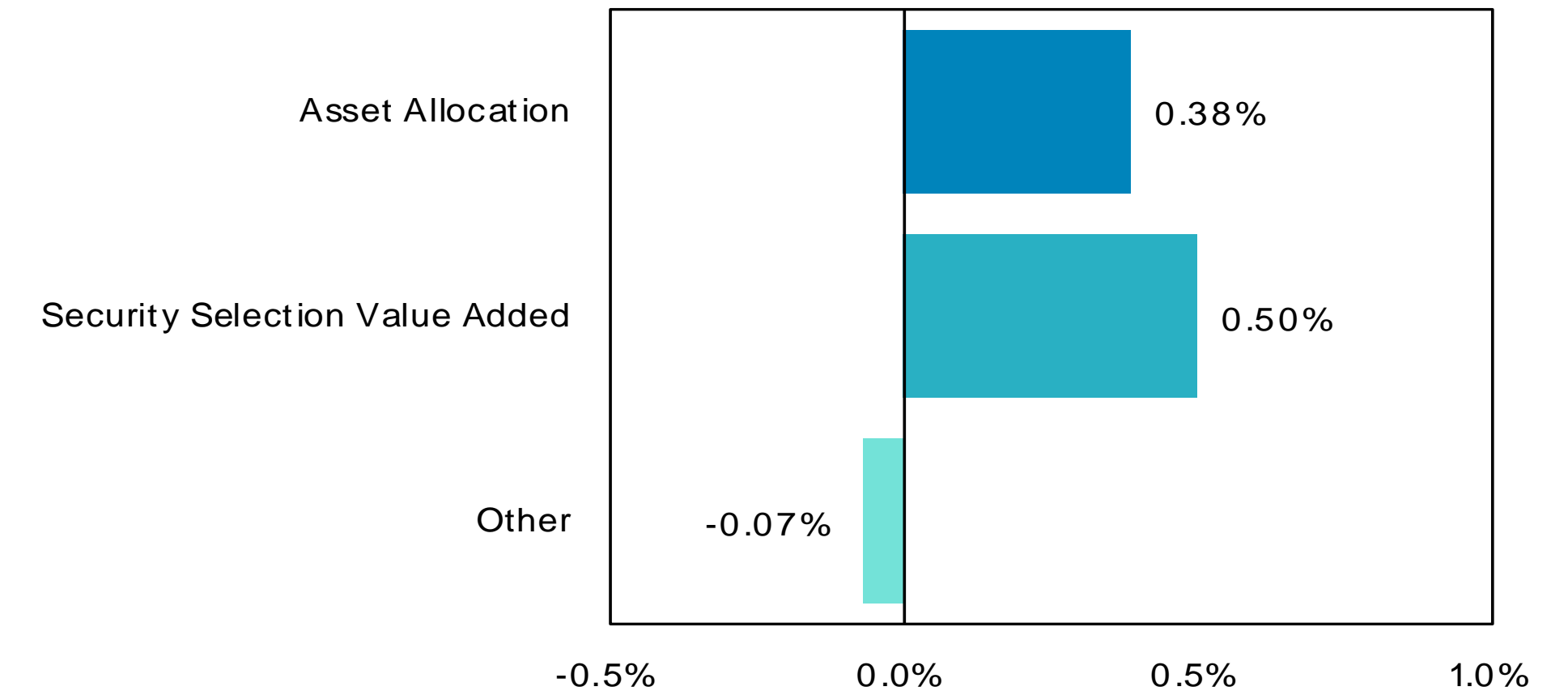
5. Total Fund Attribution – One Quarter Ending 9/30/2023

Total Fund vs. Total Fund Benchmark

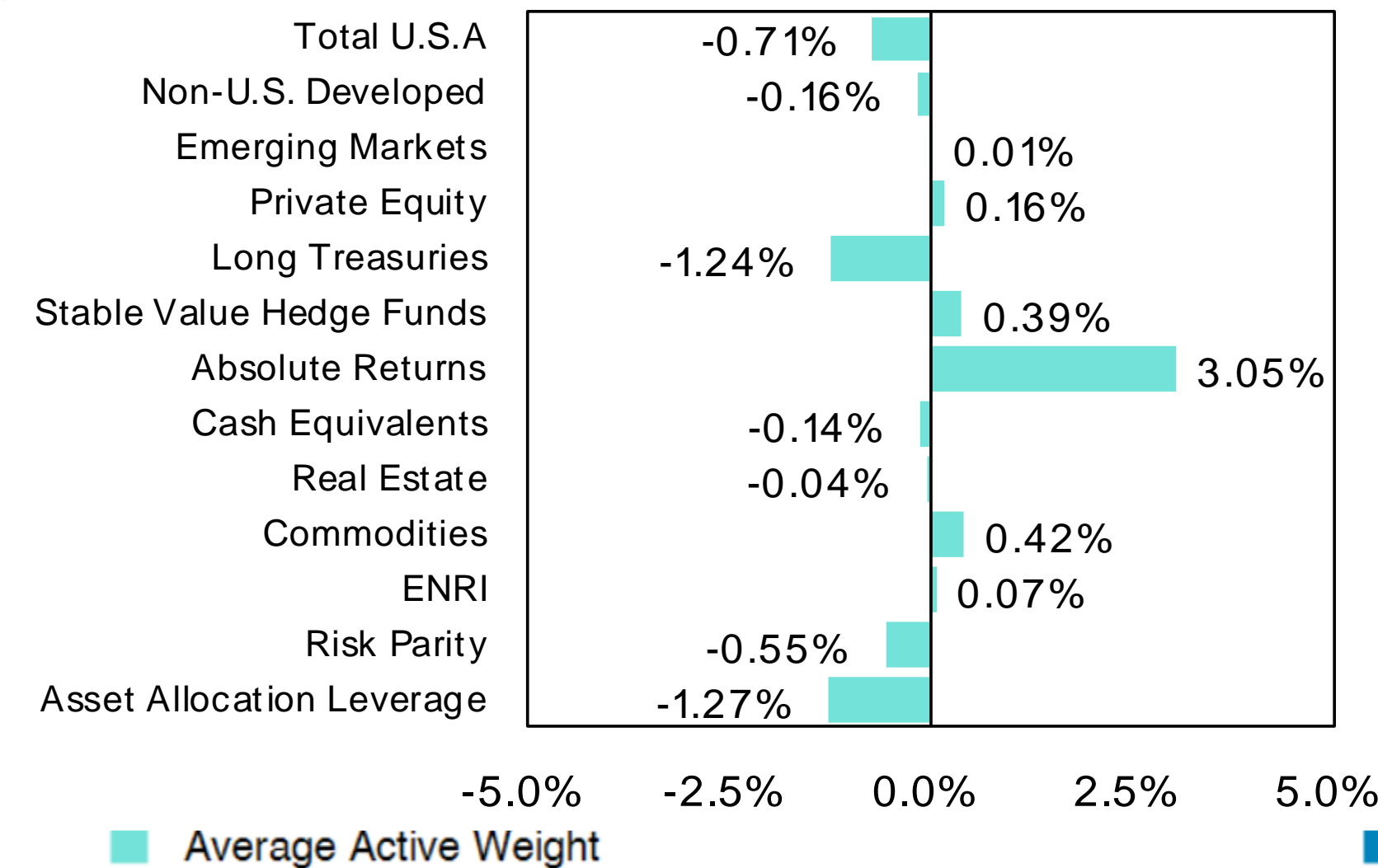
Total Fund Performance



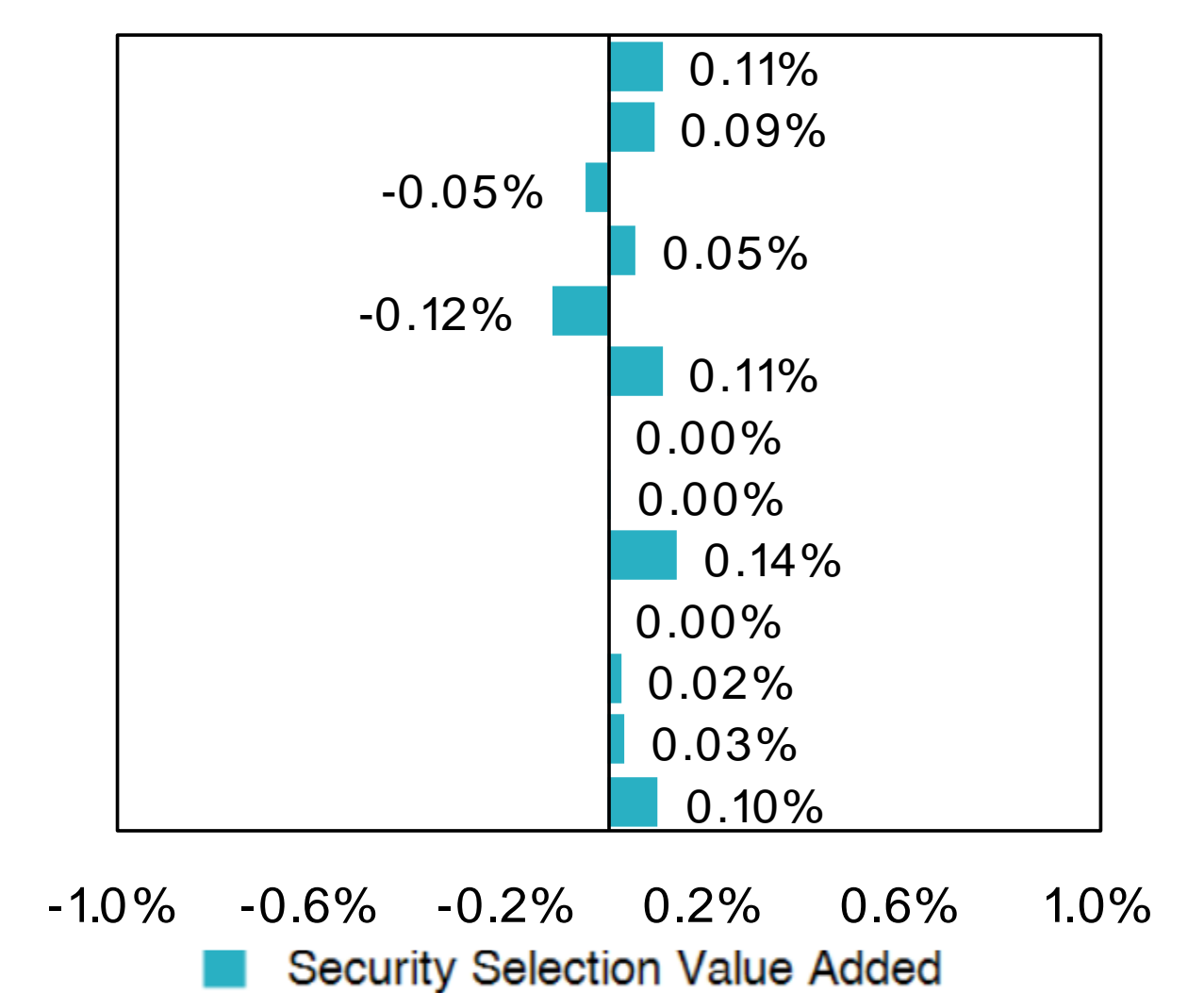
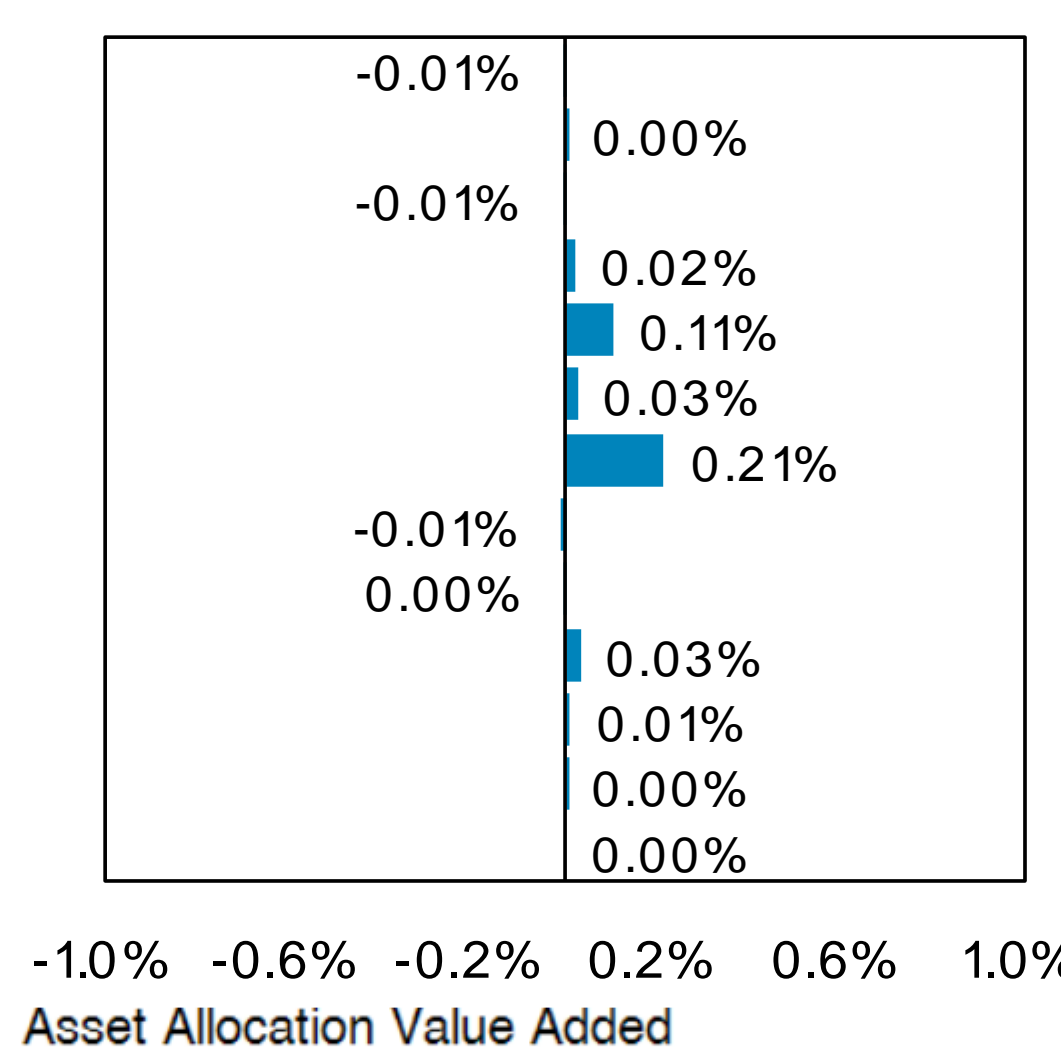
Total Value Added: 0.81%



Total Asset Allocation: 0.38%



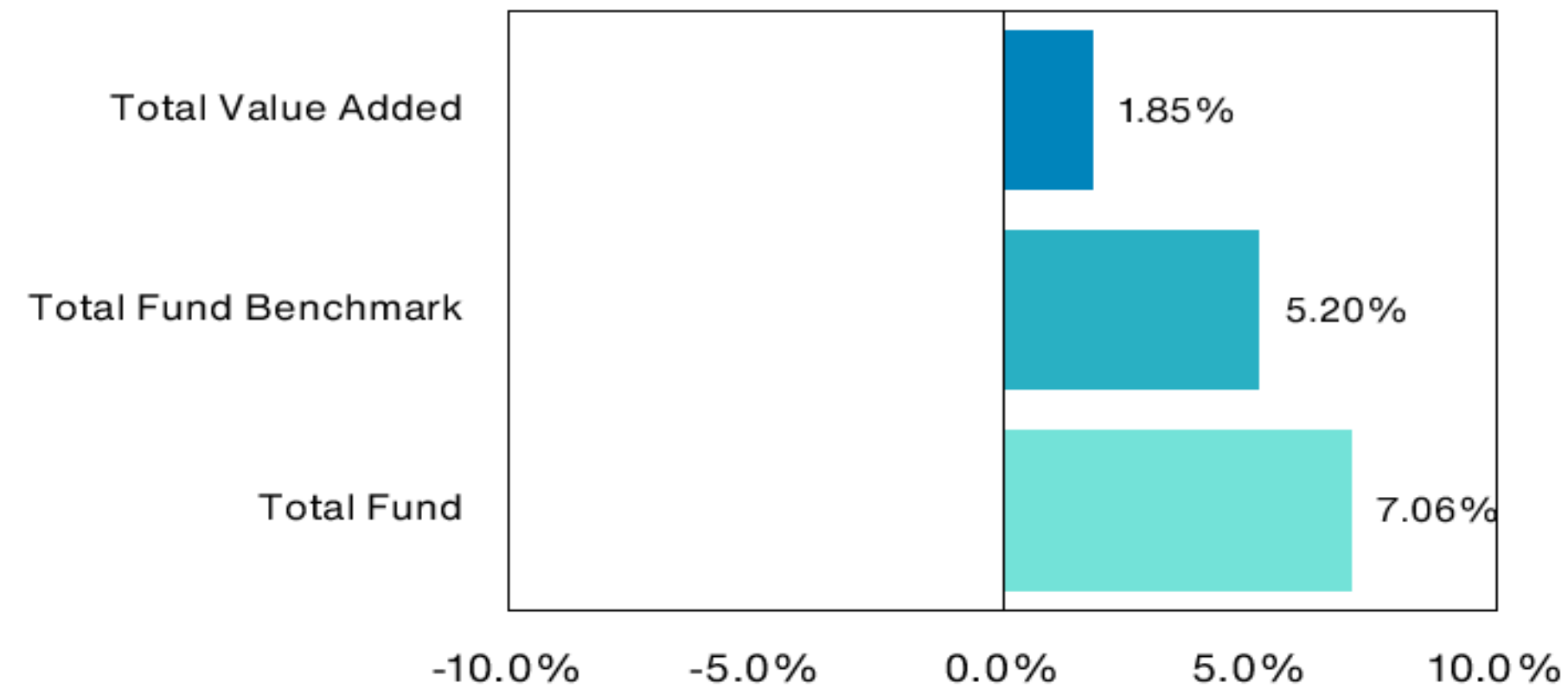
Total Security Selection Value Added: 0.50%



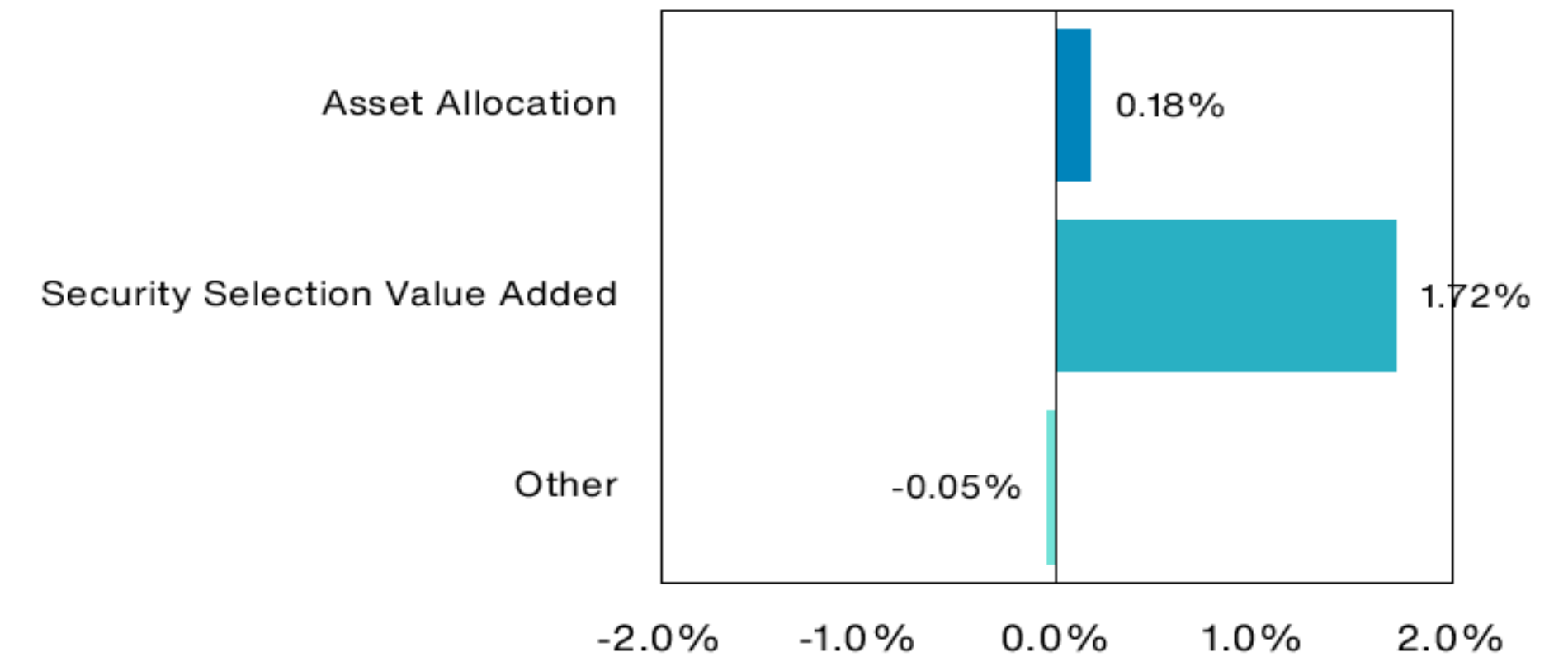
5. Total Fund Attribution – One Year Ending 9/30/2023

Total Fund vs. Total Fund Benchmark

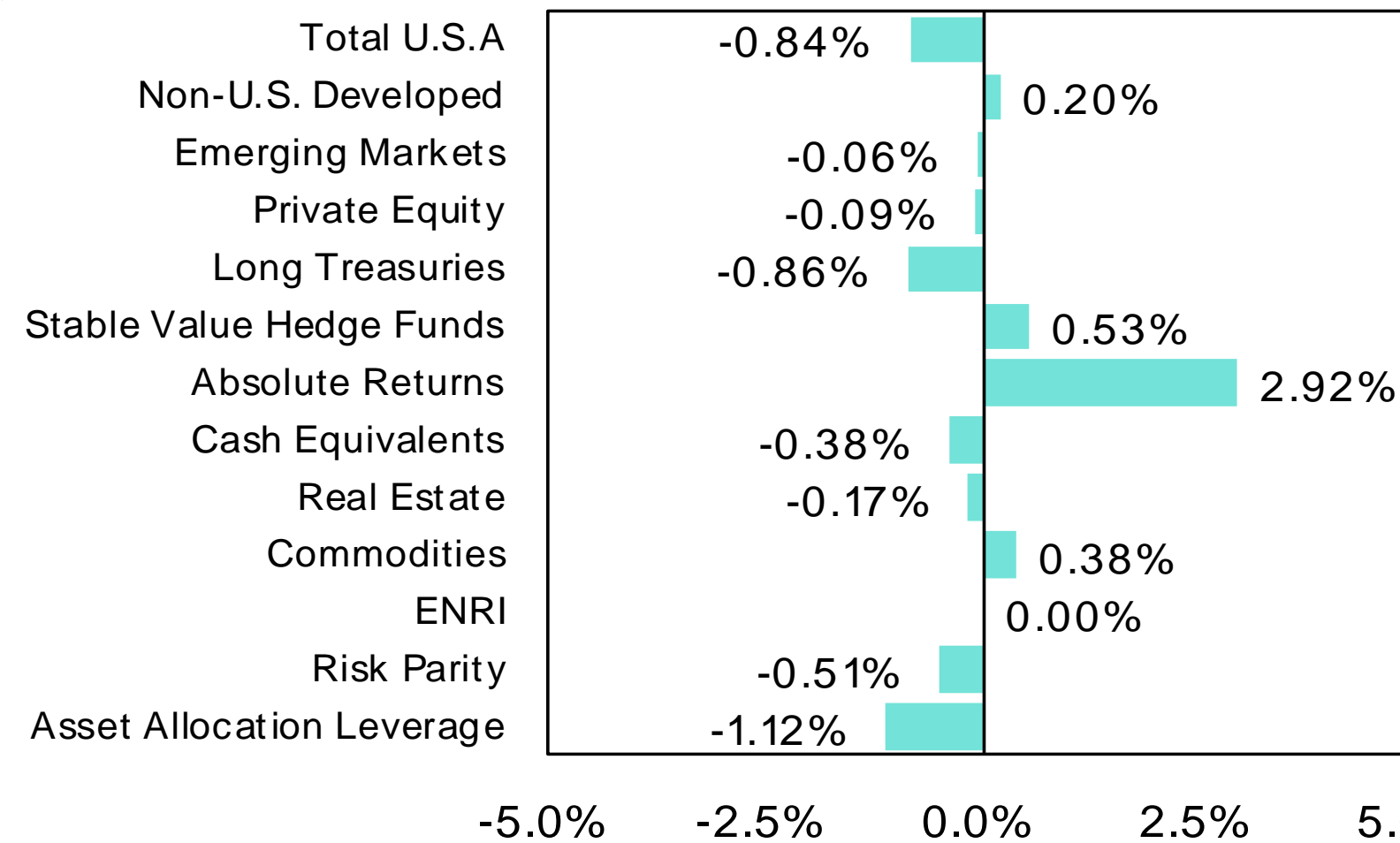
Total Fund Performance



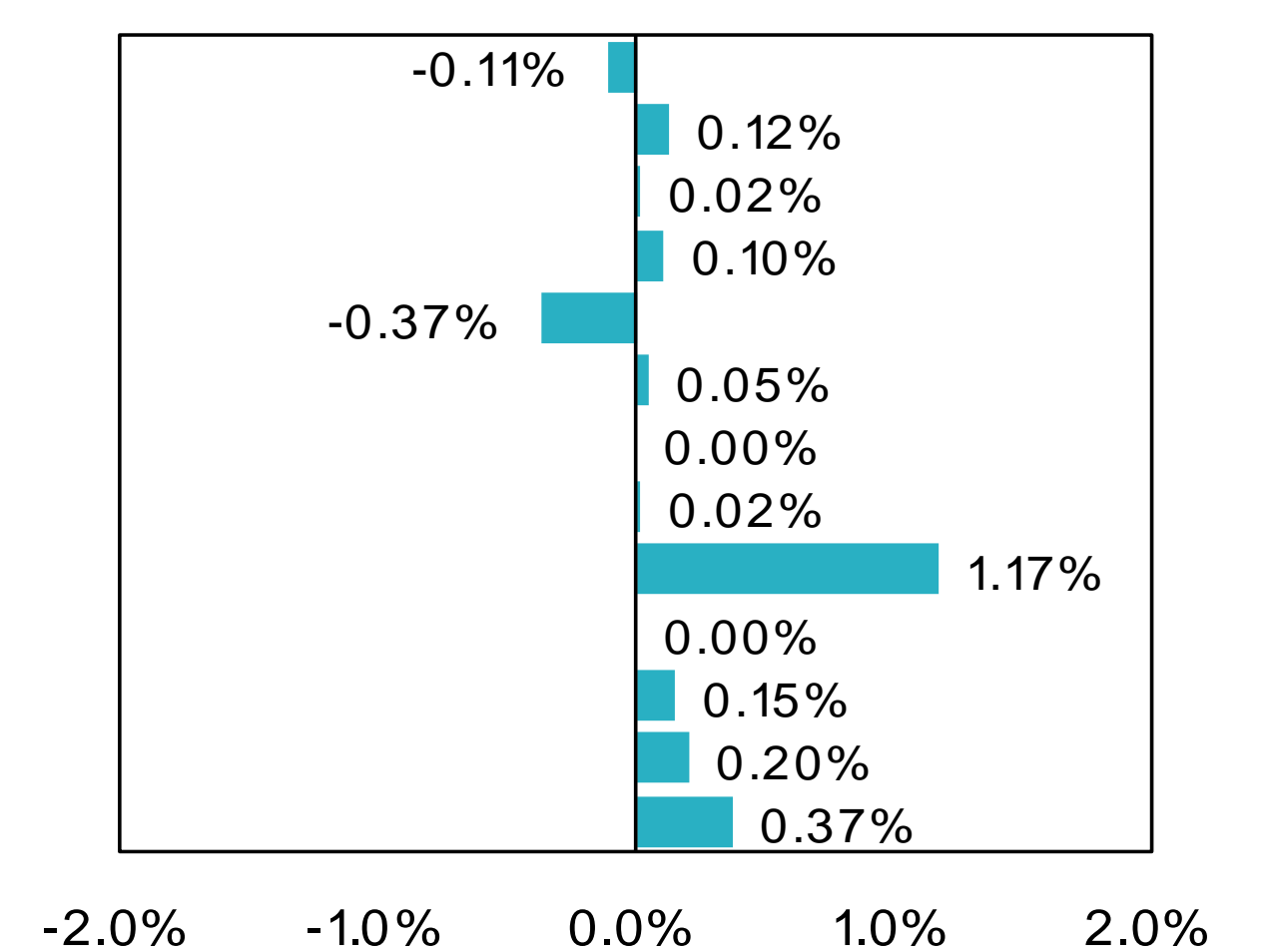
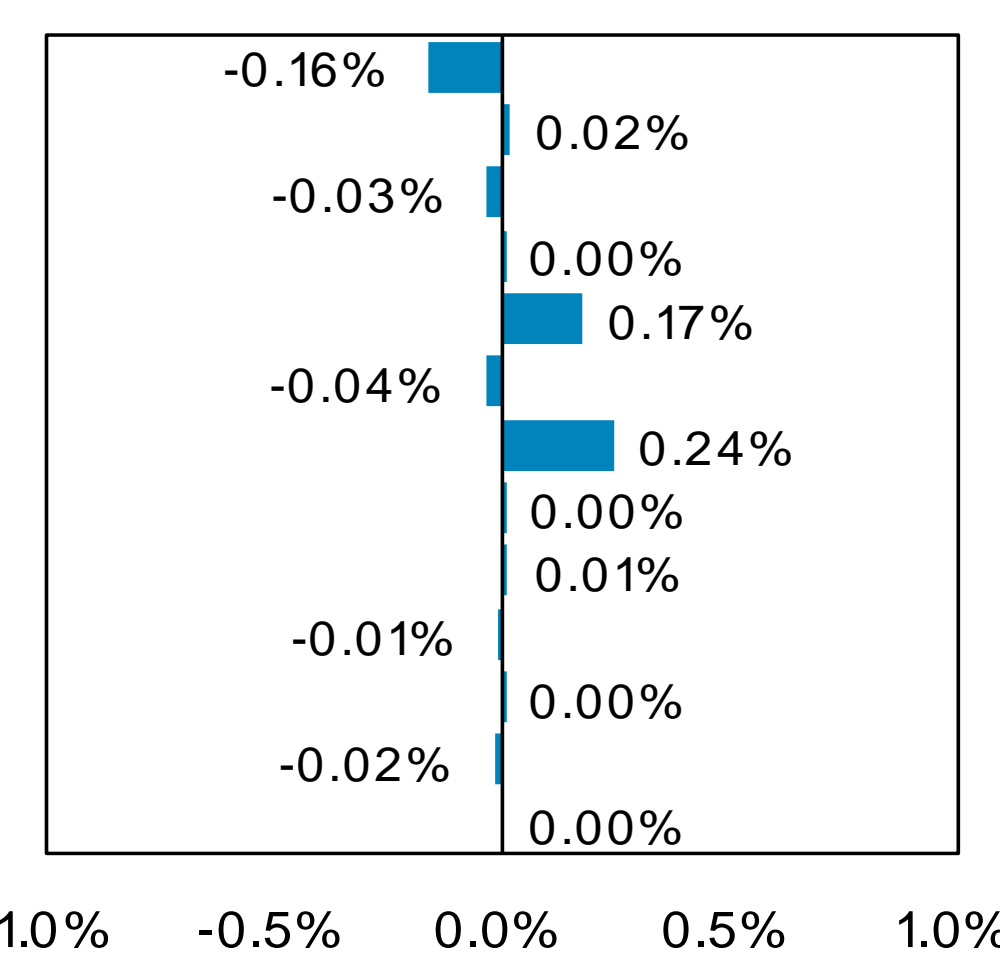
Total Value Added: 1.85%



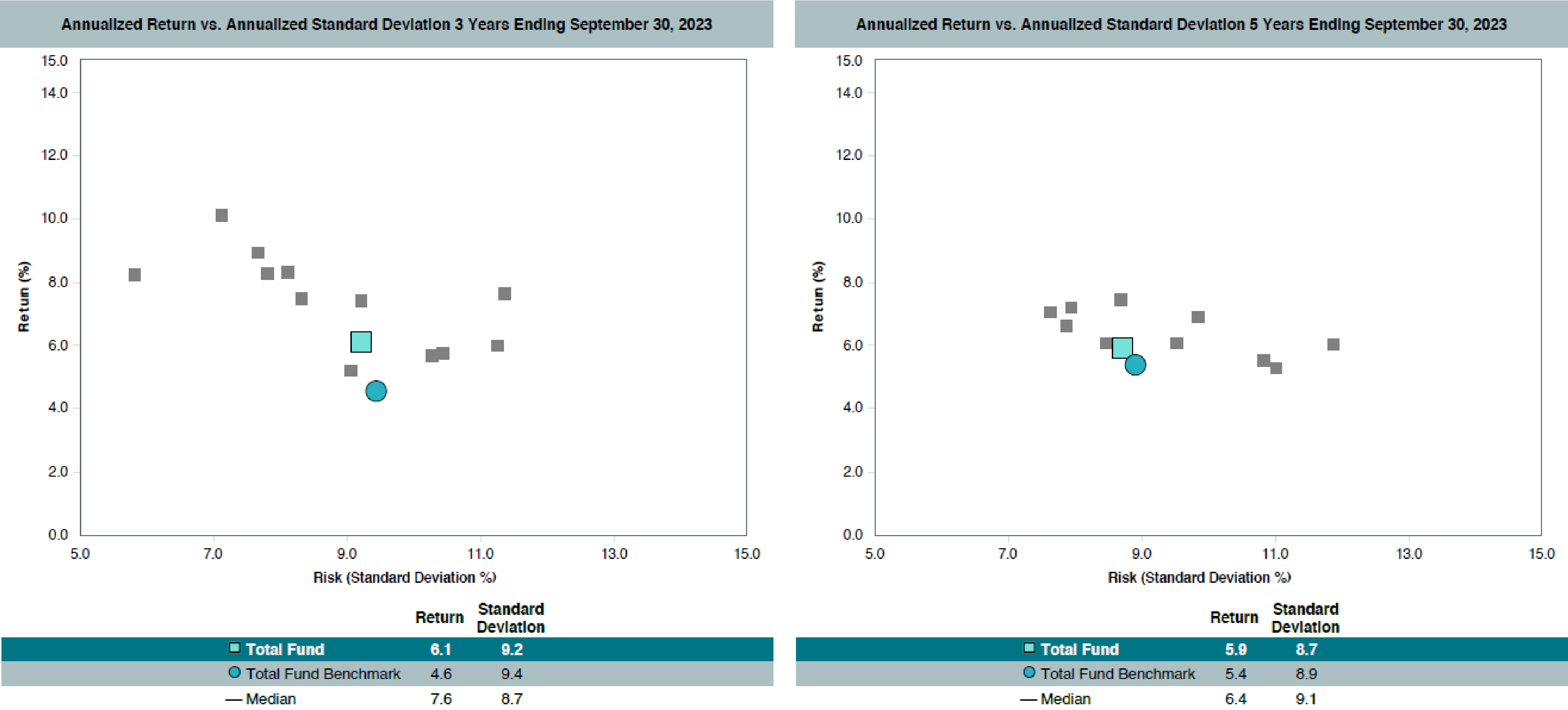
Total Asset Allocation: 0.18%



Total Security Selection Value Added: 1.72%



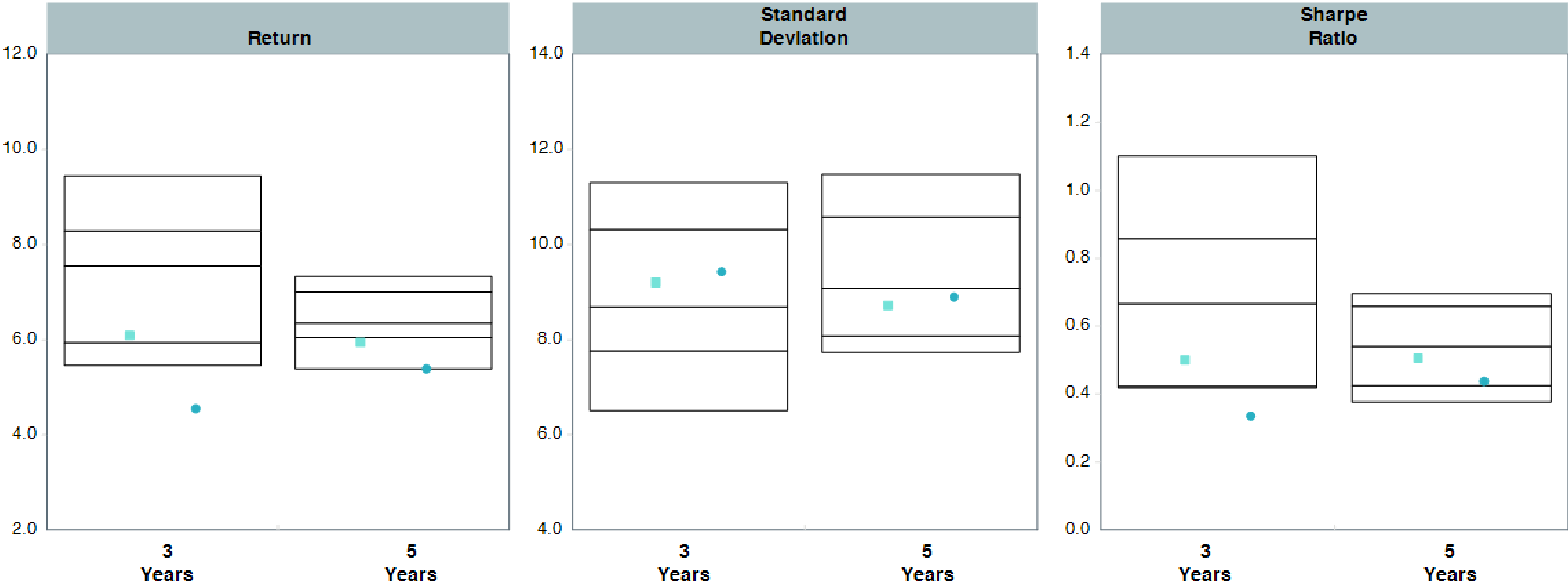
6. Risk Profile: Total Fund Risk-Return vs. Peers



Note: Public Plan peer group composed of 12 and 10 public funds, for 3- and 5-year periods, with total assets in excess of \$10B as of 9/30/2023. An exhibit outlining the asset allocation of the peer portfolios is provided in the appendix of this report.

6. Risk Profile: Trailing 3-Year and 5-Year Risk Metrics Peer Comparison

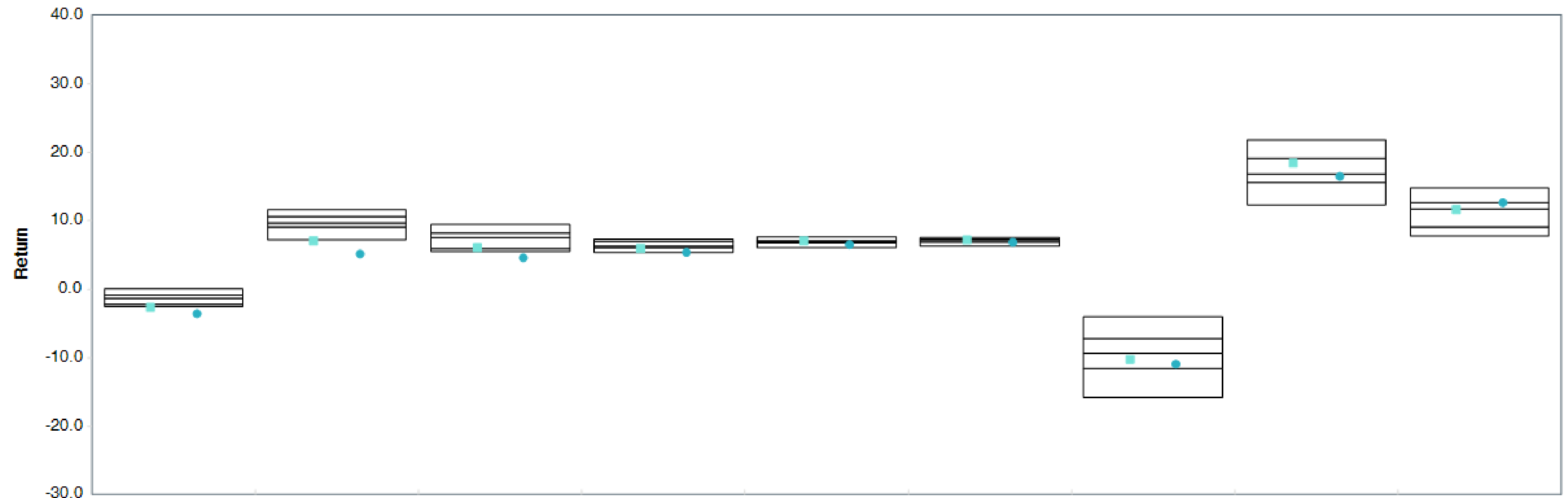
Total Fund vs. All Public Plans > \$10B



	3 Years		5 Years		3 Years		5 Years		3 Years		5 Years	
■ Total Fund	6.1	(73)	5.9	(80)	9.2	(37)	8.7	(56)	0.5	(68)	0.5	(62)
● Total Fund Benchmark	4.6	(100)	5.4	(95)	9.4	(35)	8.9	(53)	0.3	(100)	0.4	(74)
5th Percentile	9.5		7.3		11.3		11.5		1.1		0.7	
1st Quartile	8.3		7.0		10.3		10.6		0.9		0.7	
Median	7.6		6.4		8.7		9.1		0.7		0.5	
3rd Quartile	5.9		6.0		7.8		8.1		0.4		0.4	
95th Percentile	5.5		5.4		6.5		7.7		0.4		0.4	
Population	12		10		12		10		12		10	

Parentheses contain percentile rankings.

6. TRS Performance vs. Peers (>\$10 Billion) as of 9/30/2023



	1 Quarter	1 Year	3 Years	5 Years	10 Years	20 Years	2022	2021	2020
■ Total Fund	-2.7 (99)	7.1 (96)	6.1 (73)	5.9 (80)	7.1 (34)	7.2 (48)	-10.3 (60)	18.5 (31)	11.6 (52)
● Total Fund Benchmark	-3.5 (100)	5.2 (99)	4.6 (100)	5.4 (95)	6.5 (91)	6.8 (77)	-10.9 (71)	16.5 (67)	12.6 (25)
5th Percentile	0.1	11.6	9.5	7.3	7.6	7.6	-4.0	21.8	14.8
1st Quartile	-0.8	10.6	8.3	7.0	7.1	7.3	-7.2	19.2	12.6
Median	-1.3	9.8	7.6	6.4	6.8	7.2	-9.4	16.8	11.7
3rd Quartile	-2.2	9.2	5.9	6.0	6.7	6.8	-11.6	15.6	9.1
95th Percentile	-2.5	7.3	5.5	5.4	6.1	6.3	-15.9	12.3	7.8
Population	19	17	12	10	9	7	26	39	38

Parentheses contain percentile rankings.

7. IPS Stated Trust Return Objectives ending 9/30/2023

	Five Year	Seven Year	Ten Year	Twenty Year
Total Fund	5.9	7.1	7.1	7.2
Total Fund Benchmark	5.4	6.4	6.5	6.8
Difference	+0.5	+0.7	+0.6	+0.4
Total Fund	5.9	7.1	7.1	7.2
Assumed Rate of Return	7.2	7.4	7.6	7.8
Difference	-1.3	-0.3	-0.5	-0.6
Total Fund	5.9	7.1	7.1	7.2
CPI + 5%	9.2	8.7	7.9	7.7
Difference	-3.3	-1.6	-0.8	-0.5

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

8. Global Equity: Performance Summary Ending 9/30/2023

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Total Global Equity	-1.5	7.5	14.7	10.0	7.5	8.2
Total Global Equity Benchmark	-2.0	7.3	14.7	10.0	8.1	8.4
<i>Difference</i>	<i>+0.5</i>	<i>+0.2</i>	<i>0.0</i>	<i>0.0</i>	<i>-0.6</i>	<i>-0.2</i>
Total U.S. Equity	-2.5	11.0	20.0	11.0	8.3	10.0
Total U.S. Equity Benchmark	-3.2	12.6	20.7	9.6	9.3	11.4
<i>Difference</i>	<i>+0.7</i>	<i>-1.6</i>	<i>-0.7</i>	<i>+1.4</i>	<i>-1.0</i>	<i>+0.6</i>
Non-U.S. Equity	-3.6	6.8	19.5	2.9	2.7	3.8
Non-U.S. Equity Benchmark	-3.8	5.6	18.6	2.8	2.3	3.2
<i>Difference</i>	<i>+0.2</i>	<i>+1.2</i>	<i>+0.9</i>	<i>+0.1</i>	<i>+0.4</i>	<i>+0.6</i>
Non-U.S. Developed	-3.5	8.3	24.9	5.3	3.2	4.4
TRS Non-U.S. Developed Benchmark	-4.3	6.6	23.7	5.9	3.4	3.8
<i>Difference</i>	<i>+0.8</i>	<i>+1.7</i>	<i>+1.2</i>	<i>-0.6</i>	<i>-0.2</i>	<i>+0.6</i>
Emerging Markets	-3.7	4.7	11.5	-0.7	1.7	2.9
TRS Emerging Market Benchmark	-3.1	4.0	11.1	-1.9	0.5	2.0
<i>Difference</i>	<i>-0.6</i>	<i>+0.7</i>	<i>+0.4</i>	<i>+1.2</i>	<i>+1.2</i>	<i>+0.9</i>



Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Investment advice and consulting services provided by Aon Investments USA Inc.

8. Global Equity: Performance Summary Ending 9/30/2023 (cont'd)

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Total Public Equity	-3.1	8.6	19.8	6.5	5.2	6.4
Public Equity Benchmark	-3.6	8.7	19.7	5.9	5.5	6.7
<i>Difference</i>	<i>+0.5</i>	<i>-0.2</i>	<i>+0.1</i>	<i>+0.6</i>	<i>-0.3</i>	<i>-0.3</i>
Total Private Equity	1.8	5.0	5.1	18.4	13.3	13.7
Private Equity Benchmark	1.4	3.8	4.3	19.5	14.5	13.3
<i>Difference</i>	<i>+0.4</i>	<i>+1.2</i>	<i>+0.8</i>	<i>-1.1</i>	<i>-1.2</i>	<i>+0.4</i>

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

9. Stable Value: Performance Summary Ending 9/30/2023

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Total Stable Value	-6.7	-4.3	-4.2	-7.7	0.4	3.1
Total Stable Value Benchmark	-8.8	-5.7	-5.7	-10.9	-1.1	1.4
<i>Difference</i>	<i>+2.1</i>	<i>+1.4</i>	<i>+1.3</i>	<i>+3.2</i>	<i>+1.5</i>	<i>+1.7</i>
Total Government Bonds	-12.6	-10.5	-11.4	-16.8	-3.3	0.7
Treasury Benchmark	-11.8	-8.6	-9.1	-15.7	-2.8	0.8
<i>Difference</i>	<i>-0.8</i>	<i>-1.9</i>	<i>-2.3</i>	<i>-1.1</i>	<i>-0.5</i>	<i>-0.1</i>
Stable Value Hedge Funds	3.7	5.0	5.9	9.3	6.6	6.1
Hedge Funds Benchmark	1.5	3.5	5.0	5.7	4.1	3.5
<i>Difference</i>	<i>+2.2</i>	<i>+1.5</i>	<i>+0.9</i>	<i>+3.6</i>	<i>+2.5</i>	<i>+2.6</i>
Absolute Return	3.5	10.1	13.2	9.3	7.7	9.3
Absolute Return Benchmark	2.4	7.0	9.1	5.4	4.7	3.8
<i>Difference</i>	<i>+1.1</i>	<i>+3.1</i>	<i>+4.1</i>	<i>+3.9</i>	<i>+3.0</i>	<i>+5.5</i>

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

10. Real Return: Performance Summary Ending 9/30/2023

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Total Real Return	-0.9	-2.1	-0.7	12.6	8.5	8.6
Real Return Benchmark	-1.7	-6.6	-6.2	9.0	6.0	6.6
<i>Difference</i>	<i>+0.8</i>	<i>+4.5</i>	<i>+5.5</i>	<i>+3.6</i>	<i>+2.5</i>	<i>+2.0</i>
Real Estate	-2.1	-5.1	-4.2	11.8	9.1	10.6
Real Estate Benchmark	-2.9	-11.0	-10.7	7.0	5.6	7.8
<i>Difference</i>	<i>+0.8</i>	<i>+5.9</i>	<i>+6.5</i>	<i>+4.8</i>	<i>+3.5</i>	<i>+2.8</i>
Energy, Natural Resources, and Infrastructure	1.6	6.4	8.6	15.1	7.3	--
Energy and Natural Res. Benchmark	1.1	5.3	6.1	14.2	6.9	--
<i>Difference</i>	<i>+0.5</i>	<i>+1.1</i>	<i>+2.5</i>	<i>+0.9</i>	<i>+0.4</i>	
Commodities	4.3	-6.6	10.0	6.7	-1.6	-3.6
Commodities Benchmark	16.0	7.2	10.9	29.5	5.6	-2.5
<i>Difference</i>	<i>-11.7</i>	<i>-13.8</i>	<i>-0.9</i>	<i>-22.8</i>	<i>-7.2</i>	<i>-6.1</i>

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

11. Risk Parity: Performance Summary Ending 9/30/2023

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Total Risk Parity	-3.5	1.1	7.4	-0.9	0.8	3.4
Risk Parity Benchmark	-3.9	-0.9	4.4	-2.8	1.0	2.7
<i>Difference</i>	+0.4	+2.0	+3.0	+1.9	-0.2	+0.7

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

12. Cash Equivalents: Performance Summary Ending 9/30/2023

	Third Quarter	YTD	One Year	Three Year	Five Year	Ten Year
Cash Equivalents	1.6	4.8	5.8	2.6	2.1	2.4
Cash Benchmark	1.4	3.8	4.7	1.8	1.7	1.1
<i>Difference</i>	+0.2	+1.0	+1.1	+0.8	+0.4	+1.3

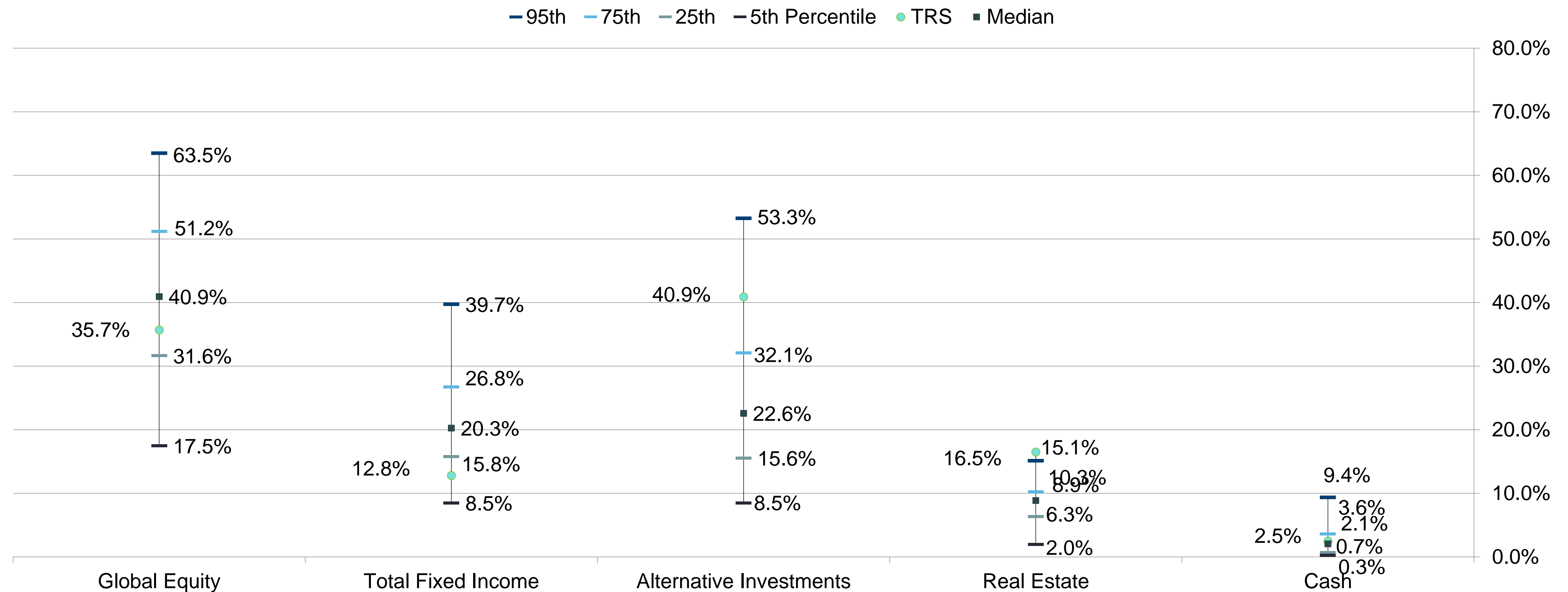
Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Appendix – Supplemental Reporting



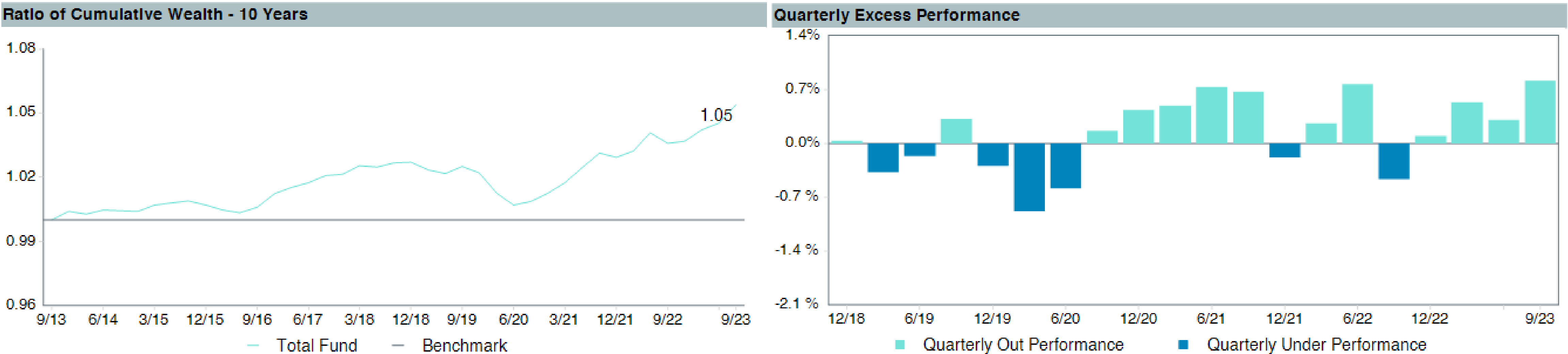
TRS Commitment Levels vs. Peers (>\$10 Billion) as of 9/30/2023

- The chart below depicts the asset allocation of peer public funds with assets greater than \$10 billion.
 - The ends of each line represent the 95th and 5th percentile of exposures, the middle light blue and grey lines represent the 25th and 75th percentile of exposures, the purple square represents the median, and the green dot represents TRS exposure.

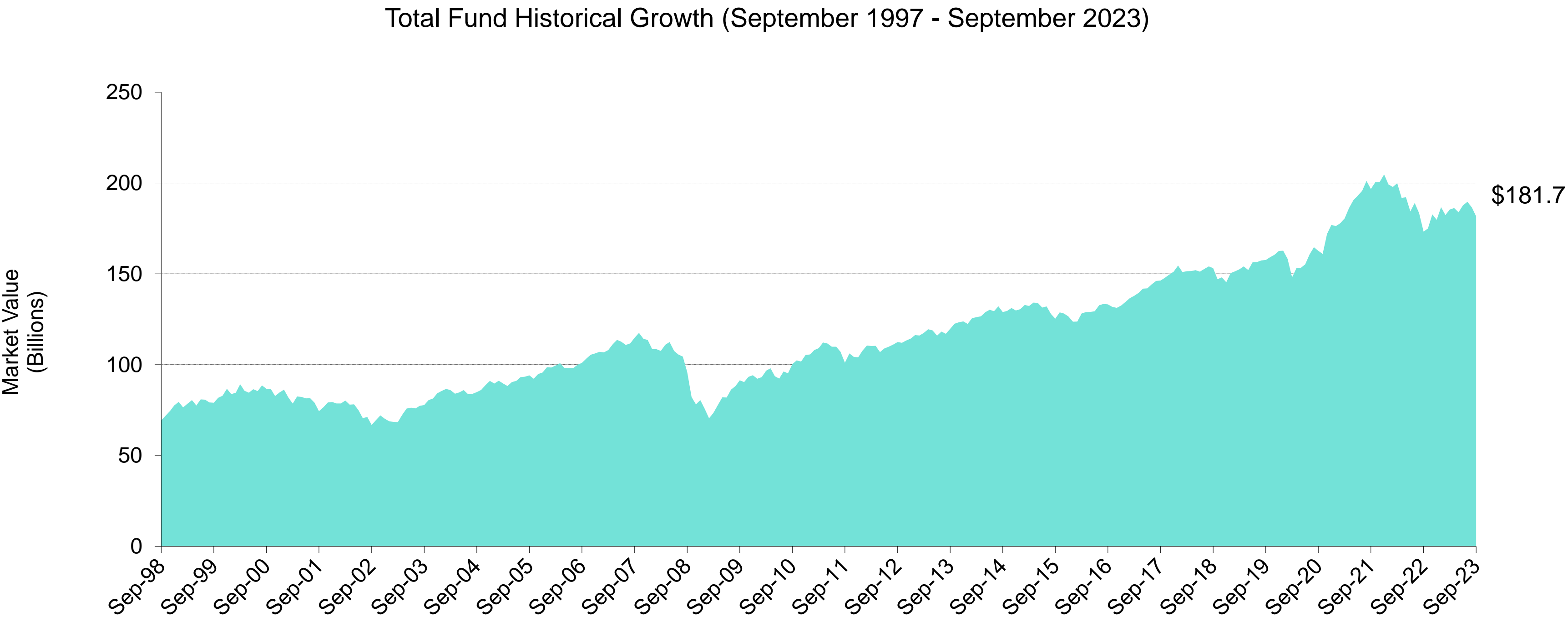


Historical Excess Performance Ending 9/30/2023

Total Fund vs. Total Fund Benchmark



TRS Asset Growth



External Manager Program: Public Equity Performance as of 9/30/2023

	Allocation (\$ in billions)	Third Quarter	YTD	One Year	Three Year	Five Year
EP Total Global Equity	\$28.6	-3.0	8.9	19.2	7.9	7.0
EP Global Equity Benchmark	--	-3.5	9.0	19.4	6.0	5.9
<i>Difference</i>	--	+0.5	-0.1	-0.2	+1.9	+1.1
EP U.S.A.	\$10.8	-2.1	10.0	17.0	11.7	9.3
EP U.S.A. Benchmark	--	-3.2	12.6	20.7	9.6	9.3
<i>Difference</i>	--	+1.1	-2.6	-3.7	+2.1	0.0
EP Non-U.S. Developed	\$6.5	-3.9	10.1	27.9	4.9	4.9
MSCI EAFE + Canada Policy Index	--	-4.3	6.6	23.7	5.9	3.4
<i>Difference</i>	--	+0.4	+3.5	+4.2	-1.0	+1.5
EP Emerging Markets	\$5.6	-3.9	4.2	11.2	1.1	3.4
MSCI Emerging Markets Policy Index	--	-3.1	4.0	11.1	-1.9	0.5
<i>Difference</i>	--	-0.8	+0.2	+0.1	+3.0	+2.9
EP World Equity	\$5.8	-2.6	10.7	22.7	11.9	9.0
EP World Equity Benchmark	--	-3.5	10.0	20.4	7.1	6.8
<i>Difference</i>	--	+0.9	+0.7	+2.3	+4.8	+2.2

External Manager Program: Stable Value/Total Program Performance as of 9/30/2023

	Allocation (\$ in billions)	Third Quarter	YTD	One Year	Three Year
EP Total Stable Value	\$9.8	3.7	5.0	5.9	9.3
EP Stable Value Benchmark	--	1.5	3.5	5.0	5.7
<i>Difference</i>	--	+2.2	+1.5	+0.9	+3.6
Total External Public Program	\$45.3	-2.1	7.1	14.7	7.2
EP External Public Benchmark	--	-2.8	7.0	14.7	5.0
<i>Difference</i>	--	+0.7	+0.1	0.0	+2.2

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Public Strategic Partnership Program (SPN): Performance as of 9/30/2023

	Allocation (\$ in billions)	Third Quarter	YTD	One Year	Three Year
Public Strategic Partnership	\$6.8	-6.0	2.4	10.4	0.5
Public SPN Benchmark	--	-5.9	3.5	10.8	-0.6
<i>Difference</i>	--	<i>-0.1</i>	<i>-1.1</i>	<i>-0.4</i>	<i>+1.1</i>
BlackRock	\$2.4	-5.7	3.8	11.9	1.3
JP Morgan	\$2.4	-6.7	0.9	8.1	0.2
Morgan Stanley	\$2.1	-5.5	2.5	11.3	-0.1

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Benchmarks

Total Fund Performance Benchmark – 16.8% MSCI U.S.A. IMI, 12.1% MSCI EAFE plus Canada Index, 8.3% MSCI Emerging Markets Index, 17.2% State Street Private Equity Index (1 quarter lagged), 14.9% Blmb. Barc. Long Term Treasury Index, 4.6% HFRI FoF Conservative Index, 2.0% Citigroup 3 Mo. T-Bill Index, 16.2% NCREIF ODCE Index (1 quarter lagged), 6.6% Energy and Natural Resources Benchmark, 7.4% Risk Parity Benchmark, and -6.0% Asset Allocation Leverage Benchmark.

Global Equity Benchmark – 30.8% MSCI U.S.A. IMI, 22.3% MSCI EAFE plus Canada Index, 15.3% MSCI Emerging Markets Index, and 31.6% State Street Private Equity Index (1 quarter lagged)

- TF U.S. Equity Benchmark - MSCI U.S.A. Investable Markets Index (IMI)
- Emerging Markets Equity Benchmark – MSCI Emerging Markets Index
- Non-US Developed Equity Benchmark– MSCI EAFE + Canada Index
- Private Equity Benchmark - State Street Private Equity Index (1 quarter lagged)

Benchmarks (cont'd)

Stable Value Benchmark – 76.3% Blmb. Barc. Long Term Treasury Index and 23.7% HFRI FoF Conservative Index

- US Treasuries Benchmark – Bloomberg Barclays Long Term Treasury Index
- Stable Value Hedge Funds – HFRI Fund of Funds (FoF) Conservative Index
- Absolute Return Benchmark - SOFR + 4%

Real Return Benchmark – 71.0% NCREIF ODCE Index and 29.0% Energy & Natural Resources Benchmark

- Real Estate Benchmark – NCREIF ODCE Index (1 quarter lagged)
- Energy and Natural Resources Benchmark – 75% Cambridge Associates Natural Resources Index (reweighted) and 25% quarterly Seasonally-Adjusted Consumer Price Index (1 quarter lagged)
- Commodities Benchmark – Goldman Sachs Commodity Index

- Risk Parity Benchmark – 100% HFR Risk Parity Vol 12 Institutional Index

Description of Performance Attribution

- A measure of the source of the deviation of a fund's performance from that of its policy benchmark. Each bar on the attribution graph represents the contribution made by the asset class to the total difference in performance. A positive value for a component indicates a positive contribution to the aggregate relative performance. A negative value indicates a detrimental impact. The magnitude of each component's contribution is a function of (1) the performance of the component relative to its benchmark, and (2) the weight (beginning of period) of the component in the aggregate.
- The individual Asset Class effect, also called **Selection Effect**, is calculated as
$$\text{Actual Weight of Asset Class} \times (\text{Actual Asset Class Return} - \text{Asset Class Benchmark Return})$$
- The bar labeled **Allocation Effect** illustrates the effect that a Total Fund's asset allocation has on its relative performance. Allocation Effect calculation = $(\text{Asset Class Benchmark Return} - \text{Total Benchmark Return}) \times (\text{Actual Weight of Asset Class} - \text{Target Policy Weight of Asset Class})$.
- The bar labeled **Other** is a combination of Cash Flow Effect and Benchmark Effect:
 - **Cash Flow Effect** describes the impact of asset movements on the Total Fund results. Cash Flow Effect calculation = $(\text{Total Fund Actual Return} - \text{Total Fund Policy Return}) - \text{Current Selection Effect} - \text{Current Allocation Effect}$
 - **Benchmark Effect** results from the weighted average return of the asset classes' benchmarks being different from the Total Funds' policy benchmark return. Benchmark Effect calculation = $\text{Total Fund Policy Return} - (\text{Asset Class Benchmark Return} \times \text{Target Policy Weight of Asset Class})$
- **Cumulative Effect**
Cumulative Effect calculation = $\text{Current Effect } t \times (1 + \text{Cumulative Total Fund Actual Return } t-1) + \text{Cumulative Effect } t-1 \times (1 + \text{Total Fund Benchmark Return } t)$

Disclaimers and Notes



Disclaimers and Notes

Disclaimers:

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- The client portfolio data presented in this report have been obtained from the custodian. Aon has compared this information to the investment managers' reported returns and believes the information to be accurate. Aon has not conducted additional audits and cannot warrant its accuracy or completeness. This document is not intended to provide, and shall not be relied upon for, accounting and legal or tax advice.
- Refer to Hedge Fund Research, Inc. www.hedgefundresearch.com for more information on HFR indices

Notes:

- The rates of return contained in this report are shown on an after-fees basis unless otherwise noted. They are geometric and time weighted. Returns for periods longer than one year are annualized.
- Universe percentiles are based upon an ordering system in which 1 is the best ranking and 100 is the worst ranking.
- Due to rounding throughout the report, percentage totals displayed may not sum up to 100.0%. Additionally, individual fund totals in dollar terms may not sum up to the plan totals.

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200 E. Randolph Street
Suite 700
Chicago, IL 60601
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Investment Operations Update

Kendall Courtney, Managing Director
Head of Investment Operations

December 2023

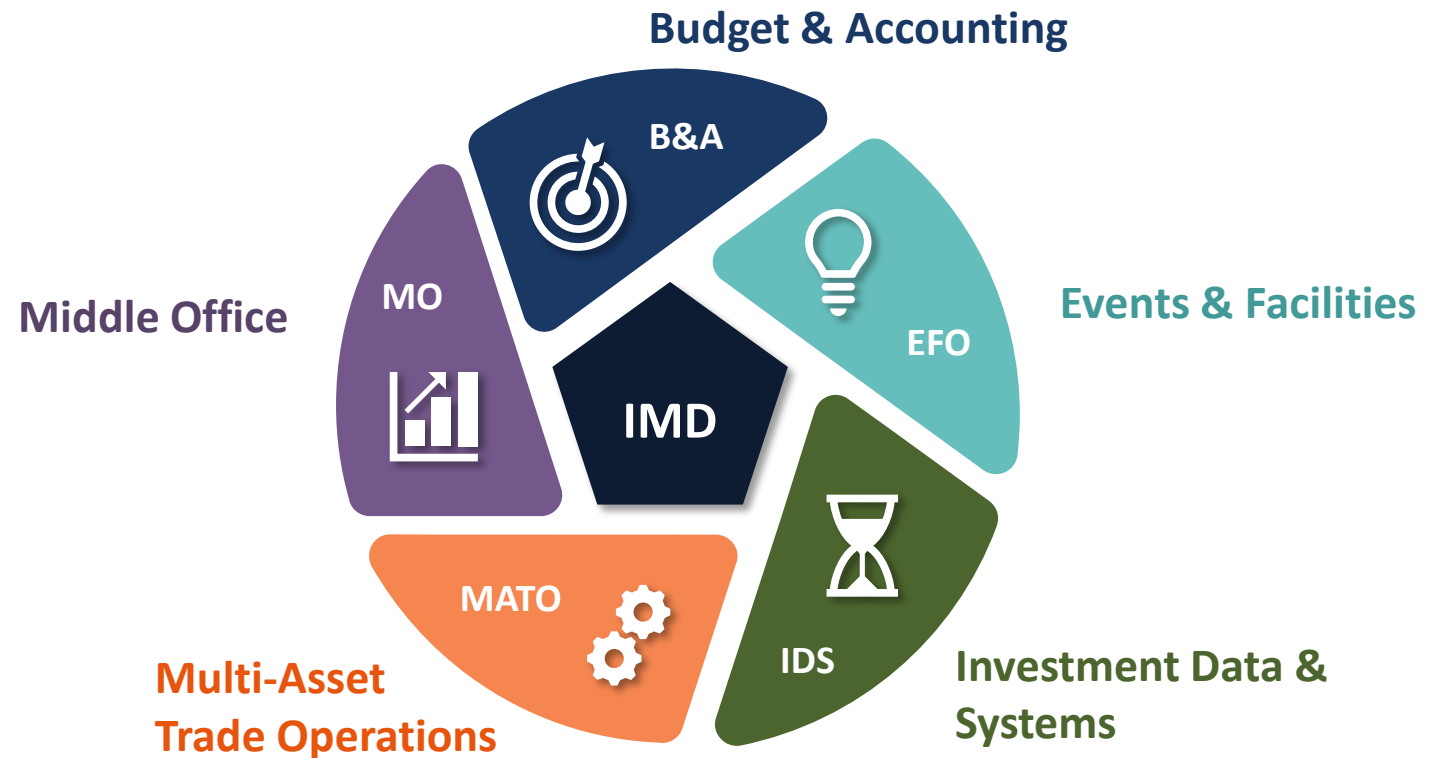


Agenda

- I. Mission
- II. Organization Structure
- III. Role in the Trust
- IV. Priority Updates
- V. Accomplishments

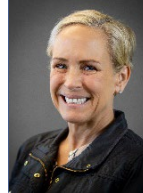
Investment Operations Mission

- Our mission is to manage a scalable operating model to support:
 - Execution of all investment decisions
 - Execution of all investment division business services



Investment Operations Organization

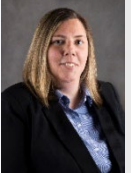
Head of Investment Operations



Kendall Courtney
Managing Director
BA, Mathematics, University of Texas
MBA, St. Edwards University

Leadership Team with **28 Years** Average Direct Experience

Head of Multi-Asset Trade Operations



Kerry Skehan
Investment Manager
BA, Management
MS, Management,
Southern Nazarene Univ.

- Trade support & settlement for all assets: securities, derivatives, cash and collateral

Head of Middle Office



Kelly Newhall
Investment Manager
BBA, Marketing,
University of Texas

- Supports data and services between trade operations and portfolio management

Head of Investment Data & Systems



David Cox
Investment Manager
BBA, Information Systems,
Baylor University

- Ensures the IMD has the technology, data and automation for portfolio management

Head of Budget & Accounting



Stephen Machicek, CPA
Investment Manager
BS, Accounting,
Univ. of Texas at El Paso

- Provides business services for IMD and provides portfolio management services

Head of Events & Facilities



Gay Clifton
Associate
BS, Advertising,
University of Texas

- Executes all IMD events, meetings, and facilities management

55

Staff

19

Masters Degrees

4

CPAs

2

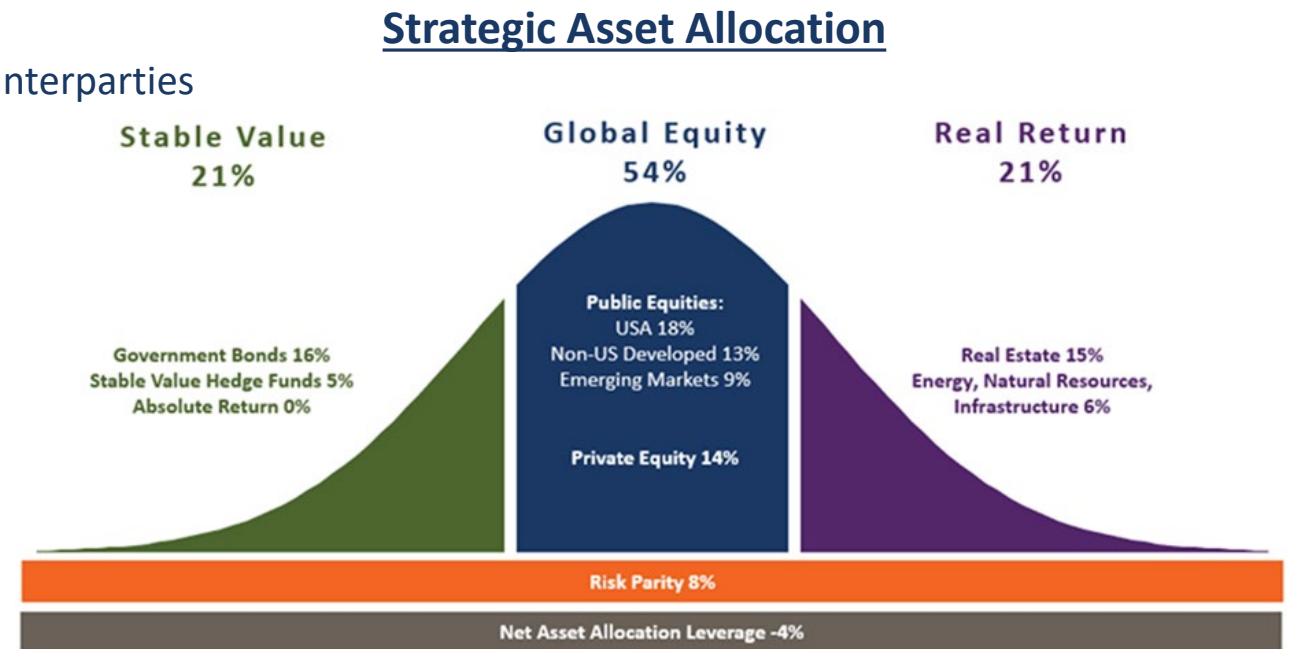
CFAs

15

Technical Designations

Investment Operations Role in Strategic Asset Allocation

- Provide data needed for inputs
- Develop plan and lead implementation
 - Readies new accounts, benchmarks, markets
 - Implements new asset types, leverage sources, counterparties
 - Coordinates transitions, transfers
 - Confirms testing, controls, readiness
 - Updates and develops new reporting



Investment Operations

Global Reach, Breadth, and Impact

- Global Reach and Breadth

**SETTLE
\$754 BILLION**

Settled \$754 billion,
over **176 thousand**
transactions across **56**
markets

\$19.1 BILLION

Internal Transition
Management team led
\$19.1 billion in transfers
across **126** different
accounts

**DELIVER
293**

daily custom
reports

**MANAGE
9,000+**

data fields, **139**
technology data
feeds

145

145 investment
applications
and services
managed

- Impact

**\$6.4
MILLION**

Collected \$6.4
million in tax
reclaims

**SAVED
\$34.7
MILLION**

in Relief at
Source tax
savings

**\$21.3
MILLION**

Received in
revenue from
securities lending
program

**GENERATED
\$135 MILLION**

by investing cash in State
Street short-term
investment fund

**\$16.3 MILLION
SAVED**

by implementing
enhanced custody (since
inception 2018)

Priority Update: State Street Custody Contract

We executed our custody contract, effective 9/1/23, continuing our 20-year partnership

- Key Contract Changes
 - Enhanced Legal Protections
 - Enhanced Service Rights
 - Decreased Costs
- State Street Dedicated Goals
 - Cost Efficient
 - Risk Controlled
 - Culturally and Strategically Aligned
- Be back in 3 years
- Specific Service Improvements
 - Increased accountability at all levels
 - Enhanced derivative and collateral management services
 - Central security master and account master data map
 - Integration of core platforms
 - Enhanced governance and procedures for middle office
 - Specific investment accounting enhancements to the general ledger interface

Priority Update: Investment Data Modernization (IDM) Program

- The strategic goal of this program is to modernize TRS' data management systems with industry standard solutions that provide reliable data in support of investment decision making.

Key Milestones	Milestone	Original Date	New Date	Status
	Investment Data Governance Office Launched	6/31/22	8/1/22	complete
	Systems & Platform RFP			
	RFP Posted	3/10/23	7/14/23	complete
	Proposals Due	4/24/23	8/21/23	complete
	Evaluations Due	5/5/23	10/09/23	complete
	Demos Complete	5/19/23	12/14/23	on track
	Vendor Selected	6/23/23	2/12/24	on track
	Contract Negotiation Completed	8/17/23	8/13/24	on track
	Full Implementation	Q3 2025	Q4 2026	on track
	Professional Managed Advisory Service RFP Completed	4/17/24	2/22/24	on track
	Investment Data Hub Implemented	Q4 2025	Q4 2026	on track
	Intelligent Document Processing Implemented	Q2 2025	Q2 2026	on track

Accomplishments & Priorities

2023 Accomplishments

- State Street Custody Contract
- Investment Decision Implementations
 - Securities Lending Liquidity Tool
 - New Asset Types/Trade Processes:
 - Interest Rate Swaps
 - Overnight Repos
 - Peer-to-Peer Repos
 - Internal OTC Derivatives
 - Foreign Bonds as Collateral at FCM
- Analytics and Technology Initiatives
 - Power BI Dashboards
 - Cash and Transition Databases
- Tax Service Enhancements
- Alpha Move

2024 Priorities

- State Street Enhancements
- IDM Vendor Selection, Contract Negotiation and Implementation
- 2024 SAA Implementation
- Process Automation Team Launch
- T+1 Settlement Readiness
- Investment Operations Dashboard
- Data Quality Enhancements
- Investment Practices & Performance Evaluation

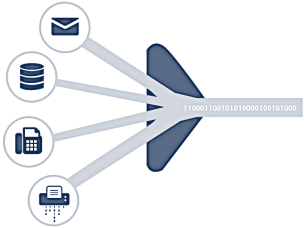
APPENDIX

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Investment Data Modernization: The Solution

Based on the strategic assessment, business and technical analysis, industry trends, and peer feedback, the program team is focusing on five key pillars to modernize our investment data platform for asset monitoring and fiduciary oversight.

Master Data Management (MDM)



Summary: Implement a fit-for-purpose Master Data Management (MDM) solution

- Manages **gold source data** for the enterprise
- Centralizes management of **all market data** across asset classes with robust mapping and data lineage capabilities
- Enable **rapid data ingestion and validation** process to deliver consumption ready data to enterprise stakeholder when needed
- **Standard and flexible distribution** capabilities allows for achieving

Investment Book of Record (IBOR/OMS)



Summary: Implement an Investment Book of Record (IBOR) platform

- Serves as a source for **real-time intra-day** portfolio views to support **investment decision-making**
- **Optimizes the operating model** by automating Middle Office functions leading to **enhanced support to the Front Office**
- Provides **greater transparency** across the investment lifecycle to better manage risk and exposure
- Tightly reconciled, IBOR data serves as a **central control point** across all platforms and service providers (e.g., Accounting, Custody, portfolio management)

Parallel Investment Accounting Book



Summary: Implement a Parallel Investment Accounting Book

- Serves as a valuation source for beginning of day IBOR
- **Provides independent verification of Custodian's accounting records**
- Can leverage Intelligent Document Management to provide shadow NAV for private markets
- Tightly reconciled, ABOR data serves as a **central control point** to TRS accounting

Intelligent Document Processing (IDP)



Summary: Leverage automation for ingesting digitized investment documents

- Provides ability to **extract and store** previously inaccessible investment data (i.e., meta data) and transform it into **searchable and consumable formats**
- **Front Office** will leverage **semi- and unstructured data sets** to gain new investment and risk insights.
- Centralized storage enables **stronger governance and enforcement** of user access controls and will reduce the risk of operating off varying versions of the same data.
- Allows for better records management with the ability to store and query data **about** the documents

Data Hub



Summary: Implement a Data Hub design which supports the future investment data solutions as a key element of the overall technology ecosystem strategy

- Provides **centralized secure access** to tightly integrated, reliable, and aggregated **investment data** for enterprise consumption
- Utilizes a **strong data management and governance foundation** to improve data operations and provide fit-for-purpose data
- Enables **self-service** capabilities and provides for standardization of data delivery

Investment Operations

Multi-Asset Trade Operations

Head of Multi-Asset Trade Operations



Kerry Skehan
Investment Manager
MS, Management,
Southern Nazarene University

5 Masters Degrees,
1 CIMA
13 years of average direct experience

Derivative Operations



Vitaliy Klebanov
Associate
MSFS,
Georgetown University



Yohan Skaria
Associate
BS, Economics,
College of Staten Island



Talon Grimm
Sr. Analyst
BA, Finance,
University of Washington



Angela Hyde
Sr. Analyst
MBA,
University of Houston

Cash Operations



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Associate
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de Cagayan

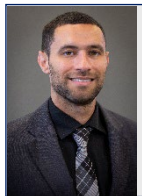
Security Operations



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BA, International Studies,
Washington College



Jonathan Jusino Dejesus
Sr. Analyst
BS, Finance,
SUNY Albany



Brenden Reilly
Analyst
BS, Business Administration
University of Nebraska-
Lincoln



Geldon Vllahu
Associate
MS, Mathematics,
Fairfield University

Investment Operations

Middle Office

Head of Middle Office



Kelly Newhall
Investment Manager
BBA, Marketing,
University of Texas

6 Masters Degrees
1 CFA
1 CPA
12 years of average direct experience

IBOR/ Portfolio Management Services



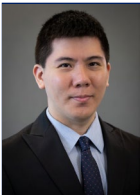
Jeff Batas
Sr. Associate
MBA,
University of Texas



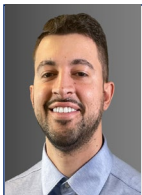
Maz Rohani
Sr. Associate
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Binghamton University



Gideon Bellflower
Associate
MBA,
Texas State University



Jason Jeng, CFA
Associate
BBA, Finance,
University of Texas



Ryker Ford
Sr. Analyst
MS, Business Analytics,
University of Nevada



Anita Wong
IDM Contractor
BS, Actuarial Science,
University of Texas



Hudson Kuczaj
Analyst
MS, Finance
University of Texas
Hire Date: 7/1/2024



**Vacant – Middle Office,
IDM FTE**

Account Services



Matthew Napoliello
Associate
BBA, Business Admin,
Loyola University
Maryland



Tina Ding, CPA
Sr. Analyst
MS, Accounting,
Texas A&M University



**Vacant – Middle Office,
IDM FTE**

Investment Operations

Investment Data & Systems

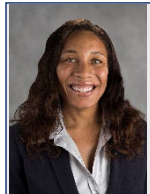
Head of Investment Data & Systems



David Cox
Investment Manager
BBA, Information Systems,
Baylor University

4 Masters Degrees
5 Cert Scrum Master, 2 Cert Product Owners, 2 PMPs, 1 MCP, 1 SAFe 5
19 years of average direct experience

Investment Data, Governance, Quality Assurance, Process Automation, Metadata Management



Lisa Peavy
Sr. Associate
MS, Recreation
Texas State University



Nick Wulff-Gonzalez
Associate
BA, Econ & Poly Sci.,
Florida International University



Tom Shields
IDM Contractor
MS, Instructional Design &
Educational Technology
Texas A&M University



**Vacant – Data Analyst,
IDM FTE**



William Herring
Analyst
BBA, Finance/MIS
University of Texas
Hire Date: 7/1/2024



Vacant - Data Librarian

Partner Relationship Management & Enterprise Risk



Barbara Forssell
Sr. Associate
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Texas A&M University



Andrea Drummond, CSM
Associate
BS, International Business,
Oklahoma State University

Analytics & Product Development



Peter Parchesky
Associate
BBA, Finance Technology.
Dean College



Yangers Puentes
Sr. Associate
BA, Math/Computer Sci,
BA, Business Admin,
Havana University

Trading Systems Admin & Support



Roy Kurian
Sr. Associate
MS, Computer Science,
Bharathidasan University



**Vacant – OMS Admin,
IDM FTE**



Philip Nacamuli
Associate
MS, Analytics & Data Science
Rutgers University



Vacant – BI Developer

Investment Operations

Budget & Accounting

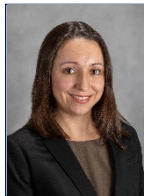
Head of Performance & Analytics



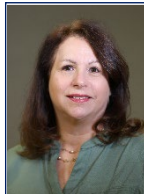
Stephen Machicek, CPA
Investment Manager
BS, Accounting,
Univ. of Texas at El Paso

3 Masters Degrees
3 CPAs
1 CFA, 1 CISA
3 CTCMs
14 years of average direct experience

Trust Acct & Private Markets



Kate Rhoden, CFA, CISA, CPA
Sr. Associate
BBA, Finance & Accounting,
University of Texas
at San Antonio



Wendy Lorfing,
Analyst
MS, Accounting,
Texas A&M University

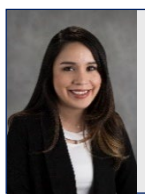


Gladys Aurelio-Schuck
Analyst
BS, Accounting,
Loyola Marymount
University

Budget, Travel & Public Mkts



Greg Reisman, CPA
Sr. Associate
MPA, Accounting,
University of Texas



Grace Muraida
Analyst



Sanchez Salvador
Analyst
MA,
Houston-Tillotson
University

Procurement & Contract Management



Kristi Vorce
Associate



David Moran
Analyst
BS,
Texas Tech University



Jacqueline Lichtenberger
Analyst
BSA, Biology,
University of Texas



**Vacant - Contract Mgmt.
Specialist**

Investment Operations

Events & Facilities


Head of Performance & Analytics




Gay Clifton
Associate
BS, Advertising,
University of Texas

13 years of average direct experience

Events



Salem Hilton
Contractor



Alysia Palladino
Contractor

Facilities



Hugo Rangel
Assistant

Annual Update to the Board Risk and Portfolio Management

James Nield, Chief Risk Officer
Mark Telschow, Director, RPM Portfolios
Mike Simmons, Director, Trust Strategy

December 2023



Risk and Portfolio Management (RPM) mandates

1. Risk Management

- Risk signals
- Risk monthly
- Battle plans

Board
Report



2. RPM Portfolios

- Build repeatable processes
- Create scalable solutions
- Generate alpha

Internalize
Portfolios



3. Trust Management

- Rebalance exposure
- Optimize balance sheet

Finance
Liquidity



4. Trust Strategy

- Inform decision making
- Research macro environment

Strategize
(SAA)



TRS Risk and Portfolio Management Group



James Nield, CFA, FRM
Chief Risk Officer
*MBA, Finance,
 New York University
 BS, Finance,
 Pennsylvania State University*



Mark Telschow, CFA
Director
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 University of Texas*



Stephen Kim
Director
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 University of Texas,
 BS, Computer Science,
 Dartmouth College*



Mike Simmons, CFA
Director
*MPA, Accounting,
 University of Texas
 BBA, Finance,
 Texas A&M University*



Hasim Mardin, FRM
Director
*MS, Economics,
 University of Texas*



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Investment Manager
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 MBA, Chicago Booth
 School of Business*



Melissa Jerkins, PhD
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 BS, Abilene Christian University*



Chris Pan
Investment Manager
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Steven Lambert
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*MBA, Finance,
 Northeastern University
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Andrew Arts
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Alex Zhang, PhD
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 BS, Mathematical Finance,
 Hofstra University*



Deral Robison
Analyst
*BS, Finance, Analytics & Technology,
 Trinity University*



Melissa Juranek
Assistant
*BBA, Management,
 University of Texas*

11

Average years of direct
 investment experience

18

Advanced degrees
 and certifications

Positive alpha for RPM Portfolios



- **Government Bonds** (\$21.5b): Passively managed U.S. Treasury portfolio
- **Risk Parity** (\$12.3b): Balanced risk exposure implemented both internally and via external managers

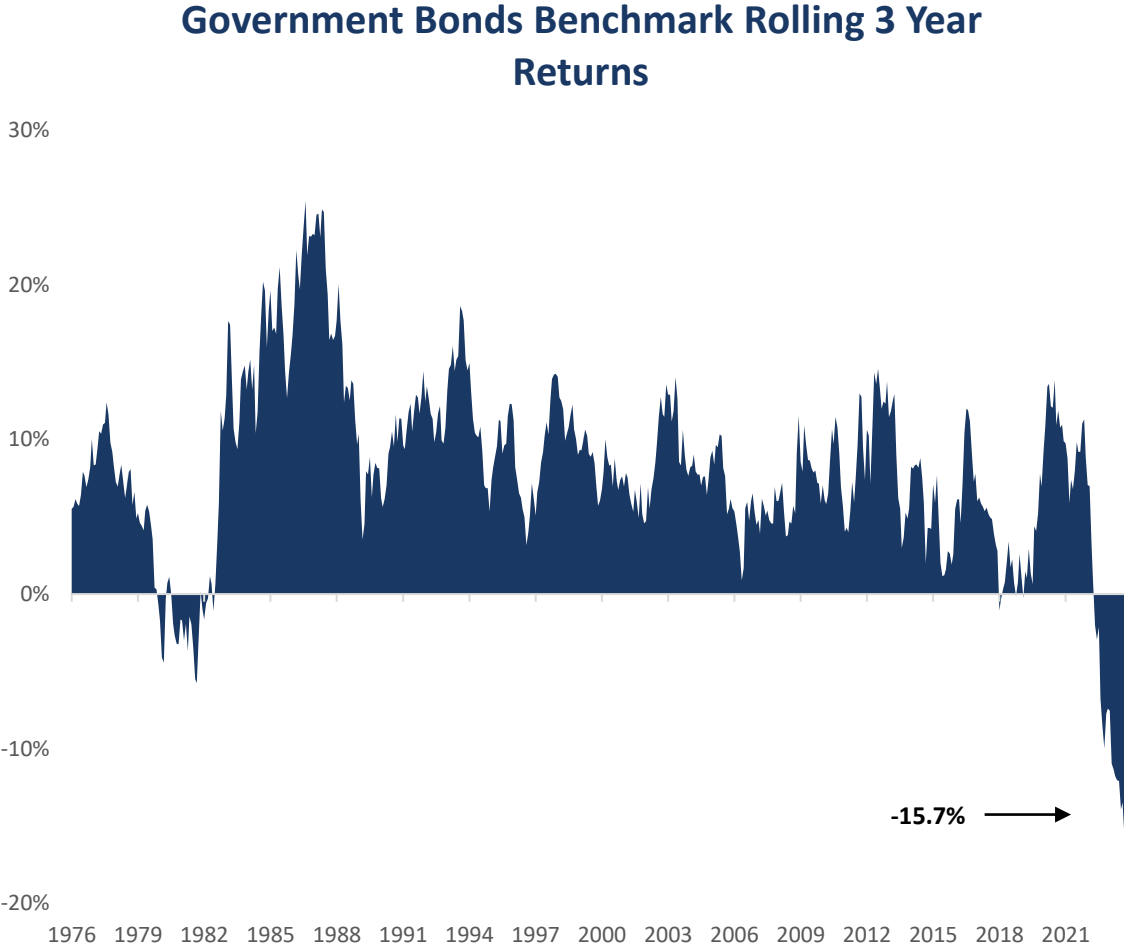
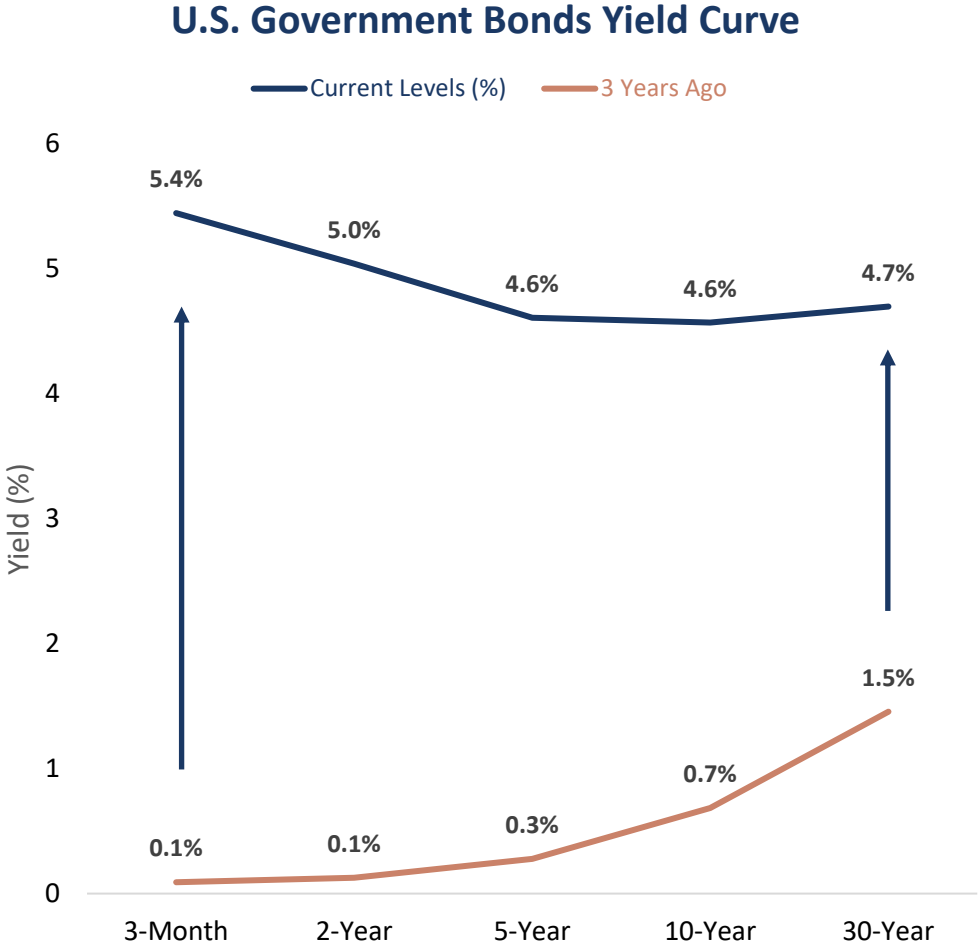
Portfolio Returns

	1-Year		3-Year	
	Return	Excess	Return	Excess
Gov Bonds ex-Repo Costs	-9.0%	0.1%	-15.7%	0.0%
Government Bonds	-11.2	-2.1	-16.5	-0.8
Risk Parity	7.4%	3.0%	-0.9%	1.9%
Internal Risk Parity	8.3	3.9	-1.3	1.5
External Risk Parity	5.8	1.4	0.3	3.1



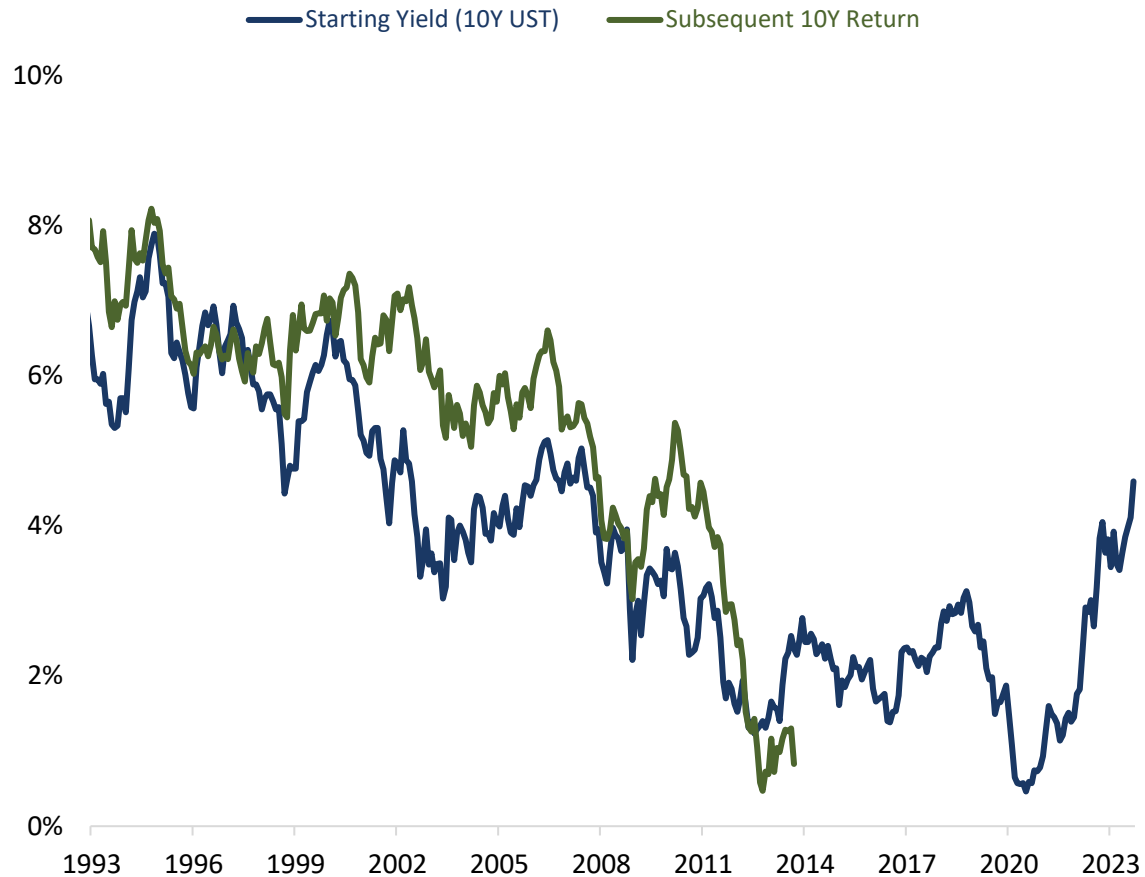
- Risk Parity assets are primarily managed internally to save on fees and to enhance liquidity

Government Bonds struggled as rates have risen



Government Bonds outlook has improved

10-Year Government Bond Yields



SAA Considerations: Government Bonds

Provide an expected return over cash

Offer lower expected return than other assets

Serve as a source of liquidity

Face an inverted yield curve

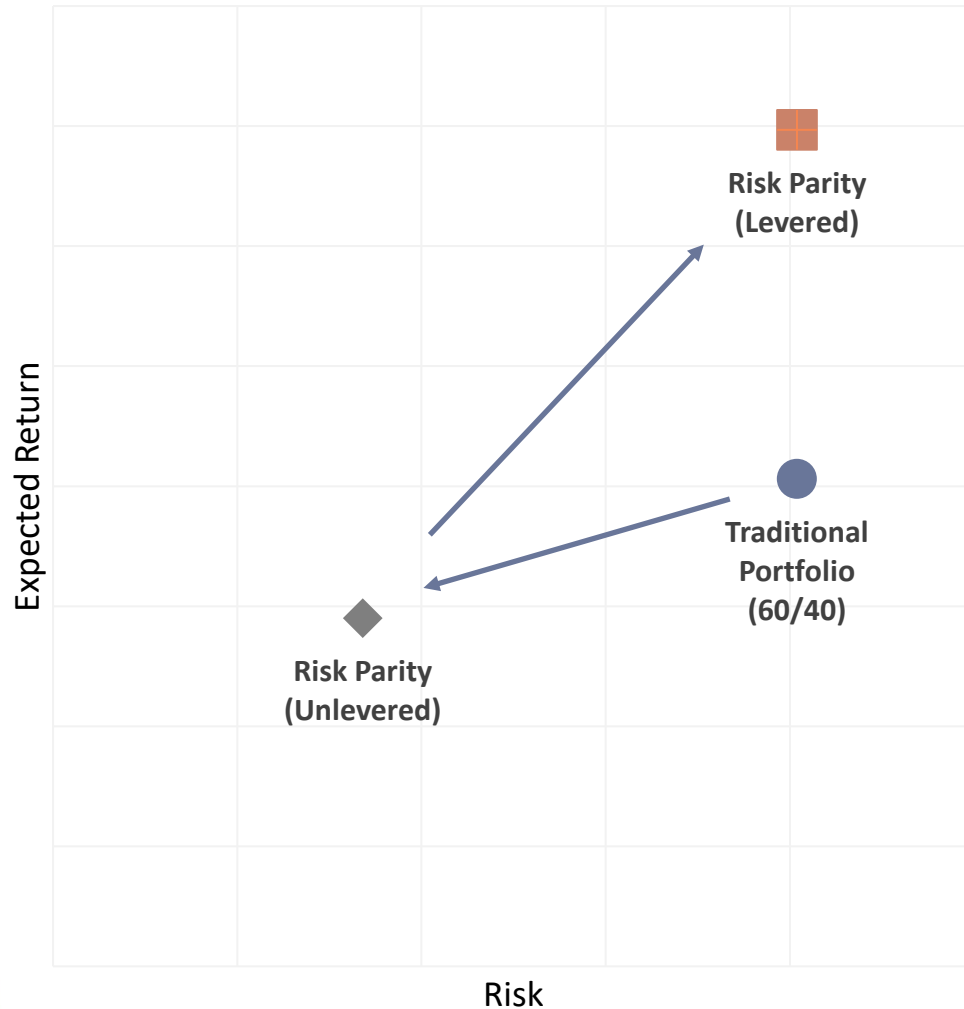
Enable cost-efficient financing

Add volatility with increased duration

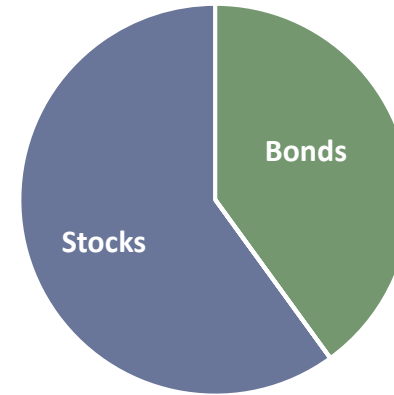
Act as a diversifier during many stress periods

React negatively to rising inflation

Risk Parity uses diversification to enhance risk and return profile

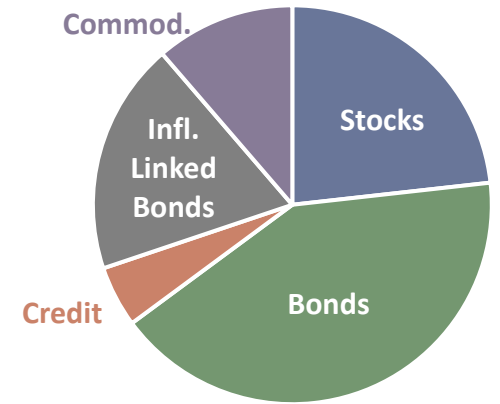


60/40

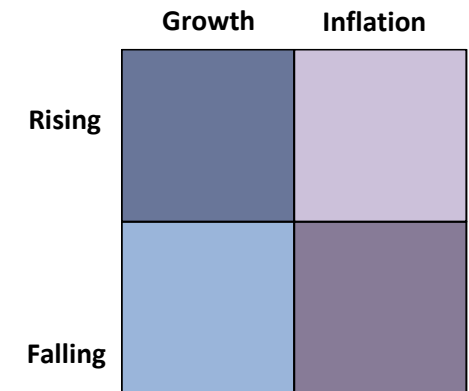
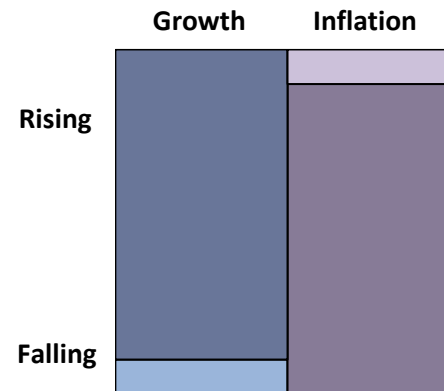


Asset Allocation

Risk Parity

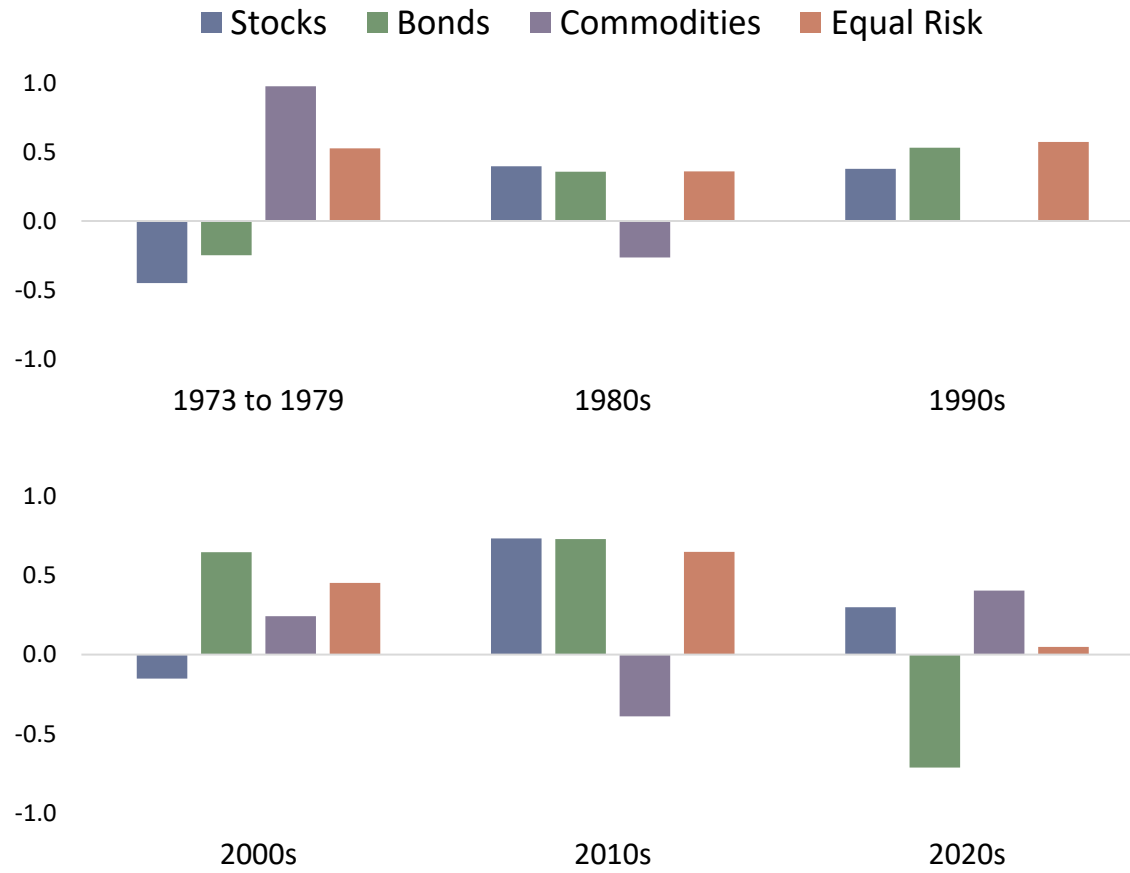


Risk Contribution



Risk Parity provides structural benefits

Risk-Adjusted Returns by Decade



SAA Considerations

Provides exposure to additional asset classes

Experiences losses when risk premiums widen

Diversifies across environmental regimes

Struggles to keep up with best performing asset

Serves as a secondary asset allocation

Reduces risk at potentially inopportune times

Offers source of efficient, liquid capital

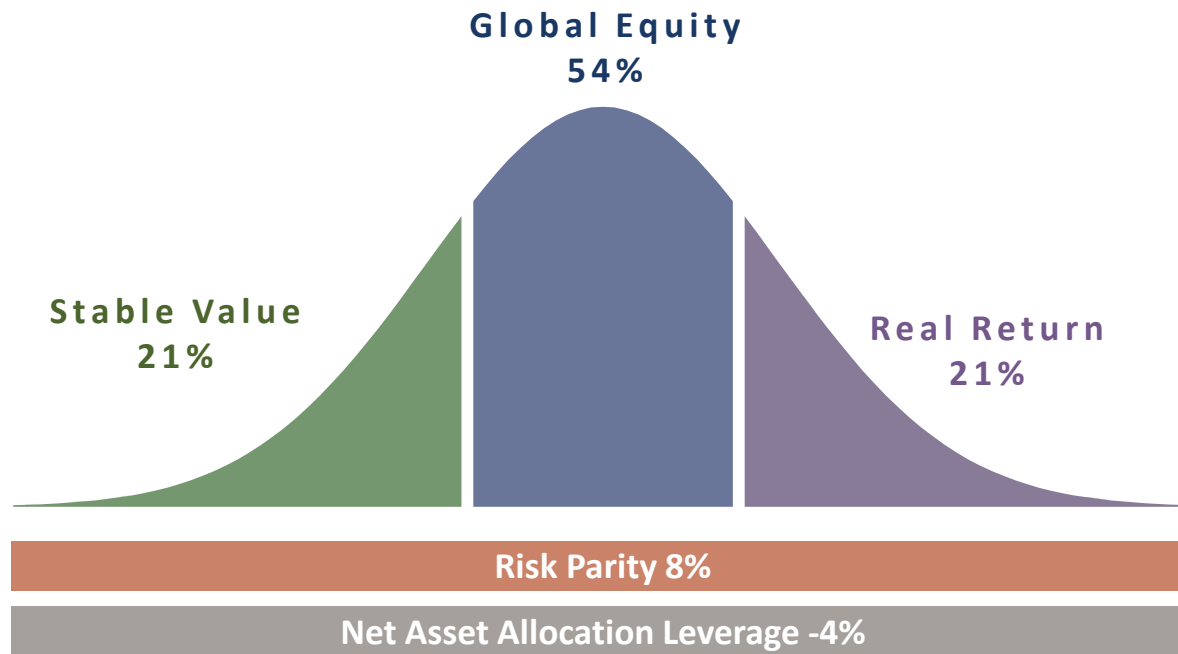
Requires use of leverage

Trust Strategy and Strategic Asset Allocation (SAA)

Review of 2019 Strategic Asset Allocation Study recommendation

2019 SAA three themes:

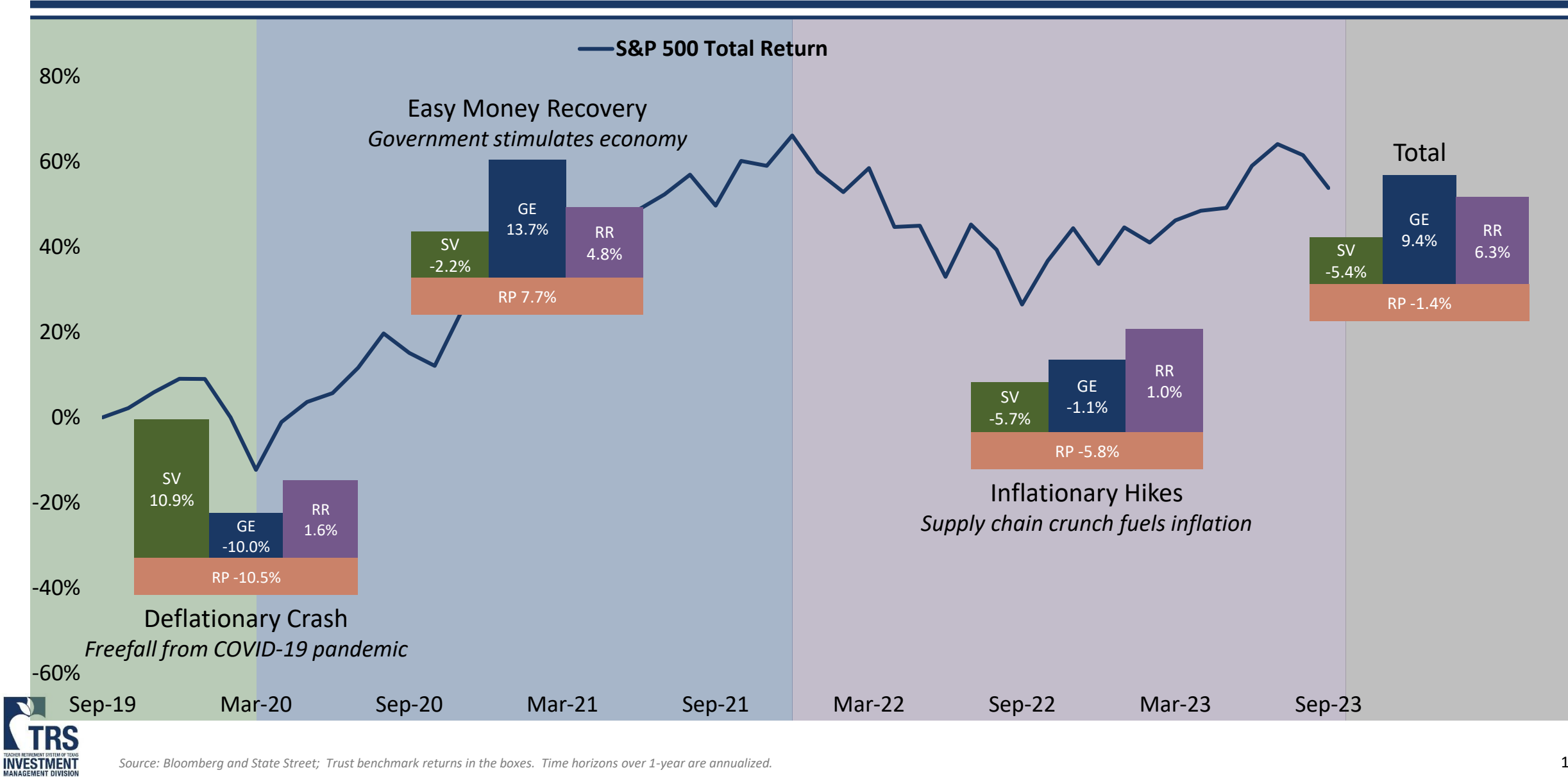
1. Increase Allocation to Private Markets
2. More Efficient
3. More Balance











Strategic Asset Allocation		Change
USA	18%	-
Non-US Developed	13%	-
Emerging Markets	9%	-
Directional Hedge Funds	0%	-4%*
Private Equity	14%	+1%
Total Global Equity	54%	-3%
US Treasuries – Long	16%	+5%
Stable Value Hedge Funds	5%	+1%
Total Stable Value	21%	+6%
Real Estate	15%	+1%
US TIPS	0%	-3%
ENRI	6%	+1%
Total Real Return	21%	-1%
Risk Parity	8%	+3%
Investment Exposure	104%	+5%
Cash	2%	+1%
Asset Allocation Leverage	-6%	-6%
Net Asset Allocation Leverage	-4%	-5%

*Directional Hedge Funds were moved into other asset classes

A lot has happened since the last SAA



What else has changed?

		Sept 2019	Sept 2023	Change
S&P		2,976	4,288	+44%
Cash Rate		1.8%	5.5%	+3.7%
CPI		256	307	+20%
Milk		2.25	3.58	+59%
Eggs		1.40	5.43	+288%
Gasoline		2.59	3.60	+39%
Median Home		269,100	351,500	+31%
IMD FTEs		176	236	+60

Where do things stand today?

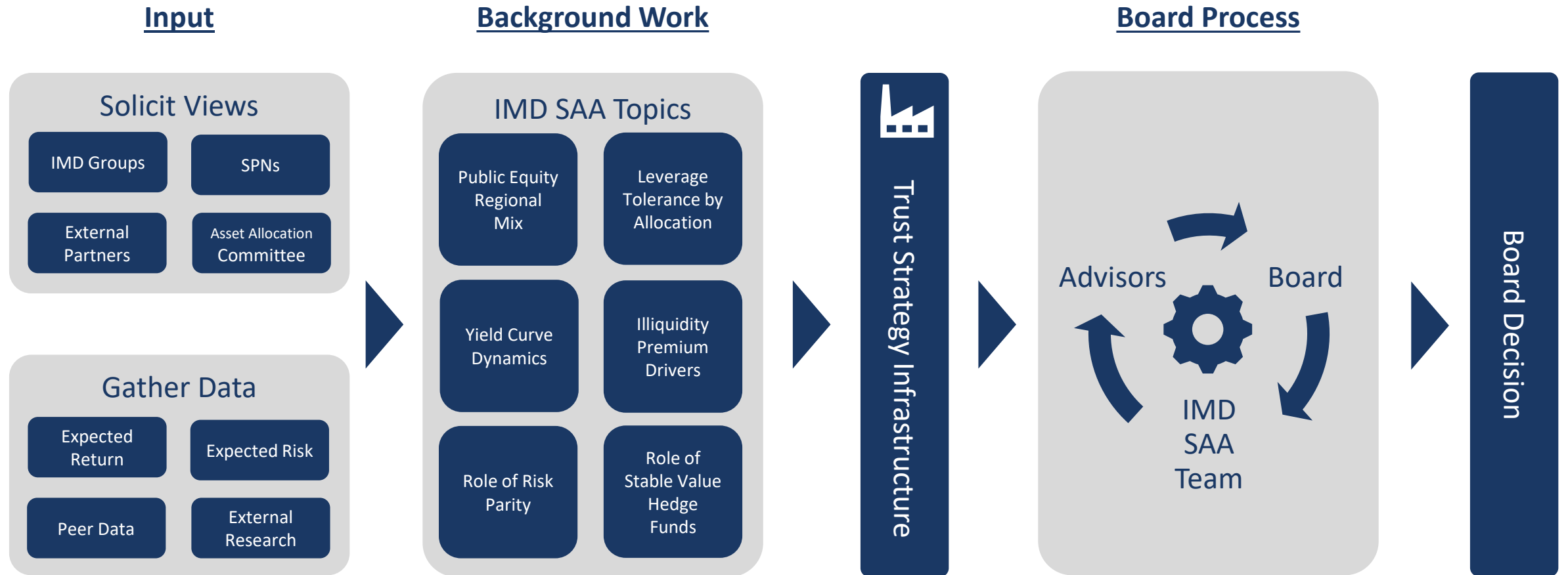
- Inflation is still elevated and moderating
- Fed nearing end of hiking cycle
- Growth is strong
- Positive real rates
- Rise of the retail investor
- Generative artificial intelligence
- Rising geopolitical risk
- Hybrid work environment

Looking forward, SAA objectives remain the same

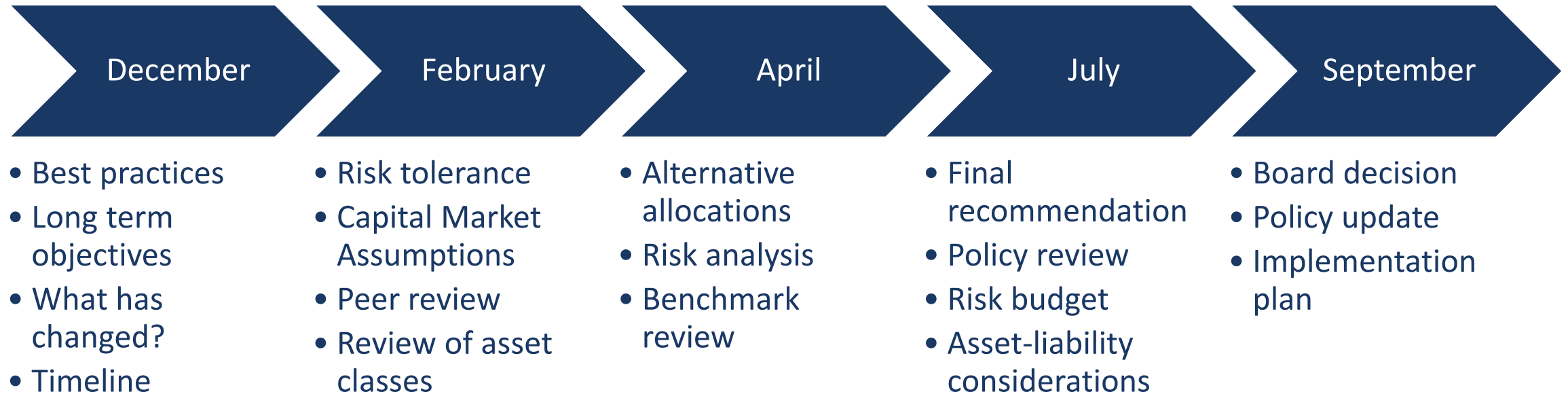
Achieve Trust Primary Goals

- Control risk through proper diversification of asset classes and by establishing long-term risk and return expectations; and
- As applicable to the pension plan, achieve a long-term rate of return that:
 - Exceeds the assumed actuarial rate of return of 7% adopted by the Board;
 - Exceeds the long-term rate of inflation by an annualized 5%; and
 - Exceeds the return of the Fund Policy Benchmark

2024 SAA Process Map



Proposed Board Timeline





Overview of the Strategic Asset Allocation Process

Teacher Retirement System of Texas

December 2023

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The Importance of Asset Allocation

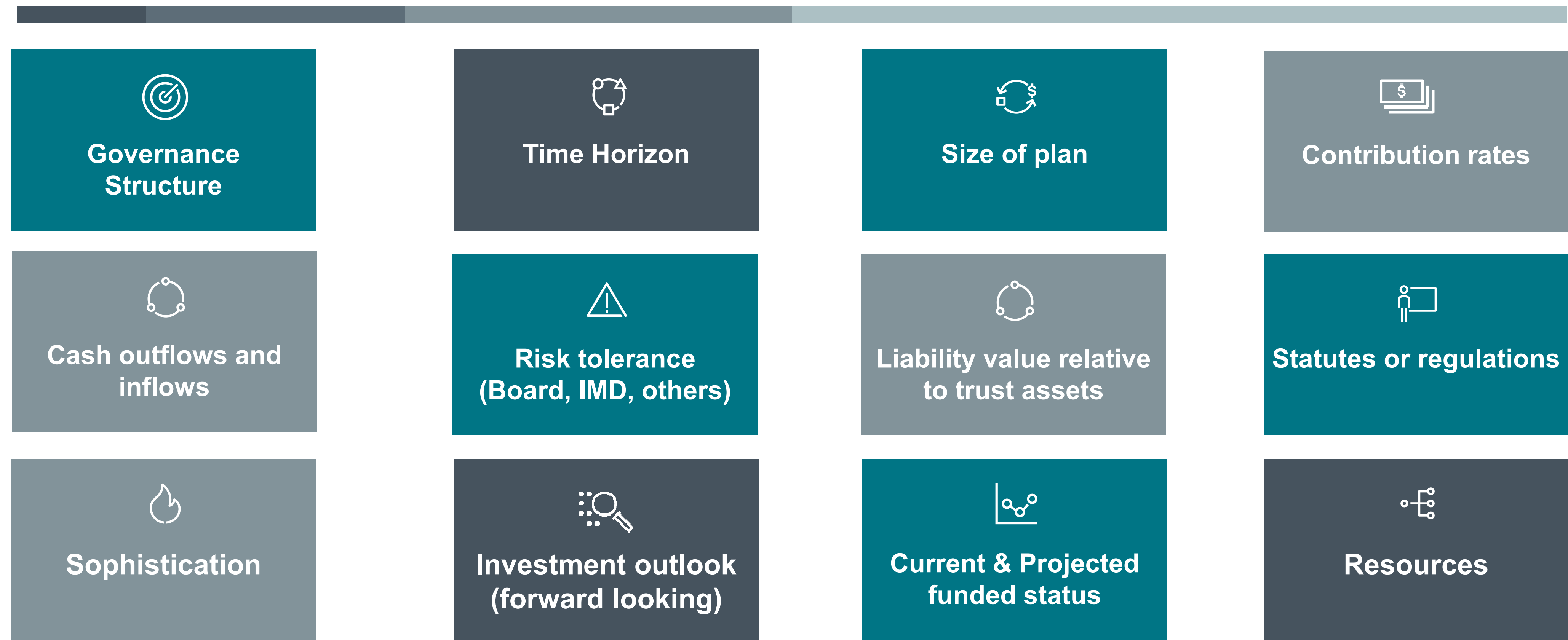
- Asset allocation is one of the most important decisions the Board of Trustees will make, as it is the primary determinant of the risk and return that will be experienced into the future
- Widely cited research attesting to this include
 - An article published in Financial Analysts Journal in 1986, Gary Brinson, Randolph Hood, and Gilbert Beebower
 - In terms of return variation, they found that more than 90% (i.e., 93.6%) of that variation could be explained by the initial strategic asset allocation decision*
 - An article published in Financial Analysts Journal in 2000, Roger Ibbotson and Paul Kaplan
 - They found that asset allocation explains over 90% of fund variation, 40% of variation among funds, and roughly 100% of nominal return*
- The process employed by TRS, which we consider to be best practice, where the IMD—working in conjunction with advisors, consultants, strategic partners, and others—proposes a target allocation, which the Board may accept, with or without modifications

The Importance of Regular Reviews of Asset Allocation

Since asset allocation is such an important decision, a thorough review of long term targets is necessary from time to time.			
Our clients typically review asset allocation formally on average every 3 - 5 years (or when circumstances change)	Per section 1.6 of the TRS investment policy: <i>The Investment Division will assist the Board in engaging in an asset-liability study for the pension plan at least once every five (5) years to review asset classes, return-risk assumptions, and correlation of returns with applicable benchmarks and across asset classes.</i>	Previous reviews of asset allocation took place in 2007, 2009, 2014, and 2019	The Investment Policy Statement, which includes the allocation targets and ranges, is reviewed biennially, but major changes in allocation targets have not been common

Factors that Influence Asset Allocation Decisions

Factors that may influence differences in asset allocation across institutional investors



Best Practices in Reviewing Strategic Asset Allocation Overview

In our experience, we would consider as best practice a review of asset allocation that followed the steps listed below. The following slides provide additional detail of each step, as well as IMD's process for considering each item

1	Objectives	Update / Review Long-Term Objectives	<ul style="list-style-type: none">• What are long term goals?• What has changed?• What level of risk is tolerable?
2	Assumptions	Develop Forward Looking Capital Market Assumptions	<ul style="list-style-type: none">• Which asset classes to add or eliminate?• Develop return, risk, correlation assumptions
3	Portfolios	Evaluate Alternative Portfolios / Model Results	<ul style="list-style-type: none">• Determine metrics for comparing alternatives• Review benchmarks and ranges• Consider practices of peers• Evaluate interaction of the assets and liabilities through stochastic analysis
4	Issues	Consider Implementation Issues	<ul style="list-style-type: none">• Active vs. passive; currency hedging; internal vs. external• Review risk budgets• Incorporate investor competitive advantages
5	Adoption	Adopt a New Policy Asset Allocation & Commitment Ranges	<ul style="list-style-type: none">• Review current target relative to alternatives• Formally adopt a new target in IPS
6	Monitoring	Implementation and Monitoring	<ul style="list-style-type: none">• Design plan for implementation of any changes• Monitor compliance with new targets and ranges over time

Beyond Best Practice: What is Necessary for a Successful Outcome?



Documentation Thorough documentation before, during, and after the strategic asset allocation process is complete



Transparency Internal investment teams / consultants need to provide open access to assumptions, research, models and other critical inputs



Education Know contemporary best practices; conduct independent research; hold educational sessions throughout process



Active Participation All key stakeholders need to actively participate: Board members; internal investment teams; the executive office; consultants

At the end of the process the Board will need to opine on a new / modified strategic asset allocation

Following the key elements outlined in this presentation should provide the Board what it needs to make an informed, well reasoned decision

Appendix



Step 1: Best Practices in Reviewing Strategic Asset Allocation



We have conducted reviews of investor asset allocation for many institutions and the following steps are generally indicative of a process we would consider a best in class and thorough review of asset allocation.

1) Update/Review Long-Term Objectives

- What circumstances have changed since the last AA review?
- What are the long term goals and objectives of the plan?
- What level of risk can the investor tolerate?
- What does the liability stream look like and what are the contribution levels?
- What are the current actuarial assumptions?
- What changes in circumstances may be on the horizon?
- How might we define reward and risk of a portfolio?
 - Weigh the average outcome vs. the impact of very bad outcomes?
 - Sharpe ratio?
 - Total return?
 - Actual long-term return vs. actuarial assumed return?

Step 2: Best Practices in Reviewing Strategic Asset Allocation



2) Develop Forward Looking Capital Market Assumptions

- What current asset classes should be evaluated?
- Which asset classes should be considered for addition or subtraction?
- Develop / Determine set of expected returns, risk, and correlations for various asset classes
- Test reasonableness of assumptions and explore alternatives

Step 3: Best Practices in Reviewing Strategic Asset Allocation



3) Evaluate Alternative Portfolios / Model Results

- Determine metrics for comparing alternative portfolios (risk adjusted returns, median expected return, downside risk, etc.)
- Determine liquidity tolerance
- Ensure diversification across a number of different compensated risks
- Consider alternate asset allocation targets
- Evaluate interaction of the assets and liabilities through stochastic analysis
- Review asset class benchmarks
- Review ranges around asset class targets
- Review allocation targets and strategies used by peer investors
- Model impact of various economic scenarios on both asset portfolios and projected benefit payments
- Consider alternative portfolio construction approaches (risk based, etc.)

Step 4: Best Practices in Reviewing Strategic Asset Allocation



4) Consider Implementation Issues

- Use of active versus passive strategies
- Risk targets / budgeting
- Mix of internal and external management
- Ability to access the asset class (investible market size, manager access issues)
- Exploit competitive advantages

Step 5: Best Practices in Reviewing Strategic Asset Allocation



5) Adopt a New Target Asset Allocation

- Review current allocation target relative to suitable alternatives
- Adopt a new target allocation (or keep previous targets)
- Review plan for implementation of any changes
- Update IPS to reflect any changes in asset allocation targets, ranges, benchmarks, or risk budgets

Step 6: Best Practices in Reviewing Strategic Asset Allocation



6) Implementation and Monitoring

- Execute on plan (time horizon for implementation will vary significantly based on liquidity of asset classes involved and magnitude of changes)
- Monitor actual portfolio to ensure compliance with policy targets

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