



NEW YORK STATE TEACHERS' RETIREMENT SYSTEM  
10 Corporate Woods Drive Albany, New York

Risk Committee Meeting

April 24, 2024

Committee Members

Ruth Mahoney, Chair

Paul Farfaglia, Oliver Robinson, Nicholas Smirensky

Call to Order by Chair

**AGENDA** p. 1

- A. Approval of minutes from January 24, 2024 pp. 2-3
- B. Compliance Program Update – M. Tice pp. 4-6
- C. Investment Risk Report – R. Ranado pp. 7-18
- D. Information Security and update – J. Rosenberg pp. 19-29  
(motion for **Executive Session** pursuant to Open Meetings Law §108 (3) for a discussion of NYSTRS IT security **and** Law §105 (1) (f) to discuss personnel matters)
- E. Quarterly Review of Risk Management Team (**Executive Session**)

NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
10 CORPORATE WOODS DRIVE, ALBANY NY

Risk Committee Meeting

A meeting of the Risk Committee of the Retirement Board of the New York State Teachers' Retirement System was held on January 24, 2024. The meeting was called to order at 8:30 a.m. by Ruth Mahoney, Chair, and she welcomed Paul Farfaglia as the newest member of the Risk Committee.

The following individuals were in attendance:

Committee Members: Elizabeth Chetney, Paul Farfaglia, Ruth Mahoney, Oliver Robinson, Nicholas Smirensky

Board Members: Juliet Benaquisto (via WebEx), Eric Iberger, David Keefe (via WebEx)

NYSTRS' Staff: Thomas Lee, Don Ampansiri, Matt Albano, John Rosenburg, Matt Tice, Ryan Warren, Ryan Ranado, Rick Jensen

Risk Advisors: Sean Atkinson (via WebEx), Steve Huber (via WebEx), Peter Cosgrove (via WebEx)

Visitors via WebEx: McCyril Espanol, WithIntelligence; Alvaro Carrillo and Mitchell King, BlackRock

Visitor in Person: Kimberly Palermo, Omni Research

The following items were discussed:

1. Approval of the minutes of October 25, 2023

Upon motion of N. Smirensky, seconded by E. Chetney and unanimously carried, the meeting minutes of the October 25, 2023 were approved.

2. Information Security Update

Upon motion of N. Smirensky, seconded by P. Farfaglia and unanimously carried, the Committee went into Executive Session at 8:31 a.m. to hear an information security update provided by J. Rosenburg.

Upon motion of P. Farfaglia, seconded by N. Smirensky and unanimously carried, the Committee came out of Executive Session at 8:40 a.m.

3. Enterprise Risk and Compliance Update

M. Albano and M. Tice reviewed the Enterprise Risk and Compliance Update reports (Appendix A, pp. 3-16)

4. Investment Risk Key Risk Indicators and Investment Risk Report

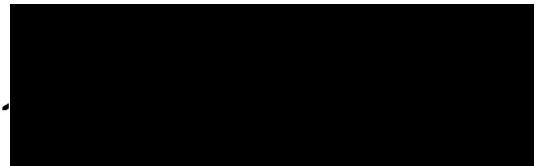
M. Albano and R. Ranado reviewed the risk management key risk indicators dashboard (Appendix B, pp. 17-28).

5. Quarterly Review of Risk Management Team

Upon motion of B. Chetney, seconded by P. Farfaglia and unanimously carried, the Committee went into Executive Session at 8:51 p.m. to discuss personnel matters.

There being no further business, and with unanimous consent, the Committee came out of Executive Session and adjourned at 9:03 a.m.

Respectfully submitted,

A large black rectangular redaction box covering the signature of Thomas K. Lee.

Thomas K. Lee

# Enterprise Risk and Compliance Update

*Risk Committee, April 2024*



Matthew Albano, CFA, Chief Risk Officer  
Matthew Tice, Manager, Enterprise Risk and Compliance

# ***Compliance Update***



# Regulatory Items Requiring Board Action

April Meeting	Regulatory Item	Owner
	Transfer of Reserves & Pension Reserve Factors*	Actuary
	Annual Operating Budget Approval	Administration

July Meeting	Regulatory Item	Owner
	Adoption of the Annual Employer Contribution Rate	Actuary
	Signatory Approval	Finance
	Annual Investment Asset Allocation	Executive

\*Requirement not met; no action needed

*Period of **December** Through **March**: All **51** required regulatory items due were completed by departments*



# Investment Risk Update

## Risk Management

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**Risk Committee Meeting: April 24, 2024**

**Matthew Albano, CFA, Chief Risk Officer**

**Ryan Ranado, CFA, Assistant Director, Investment Risk Management**

Public market data as of 02/29/2024; Private asset data as of 12/31/2023



**Risk Management  
Investment Risk Board Report April 2024**

**Investment Risk - Key Risk Indicators**

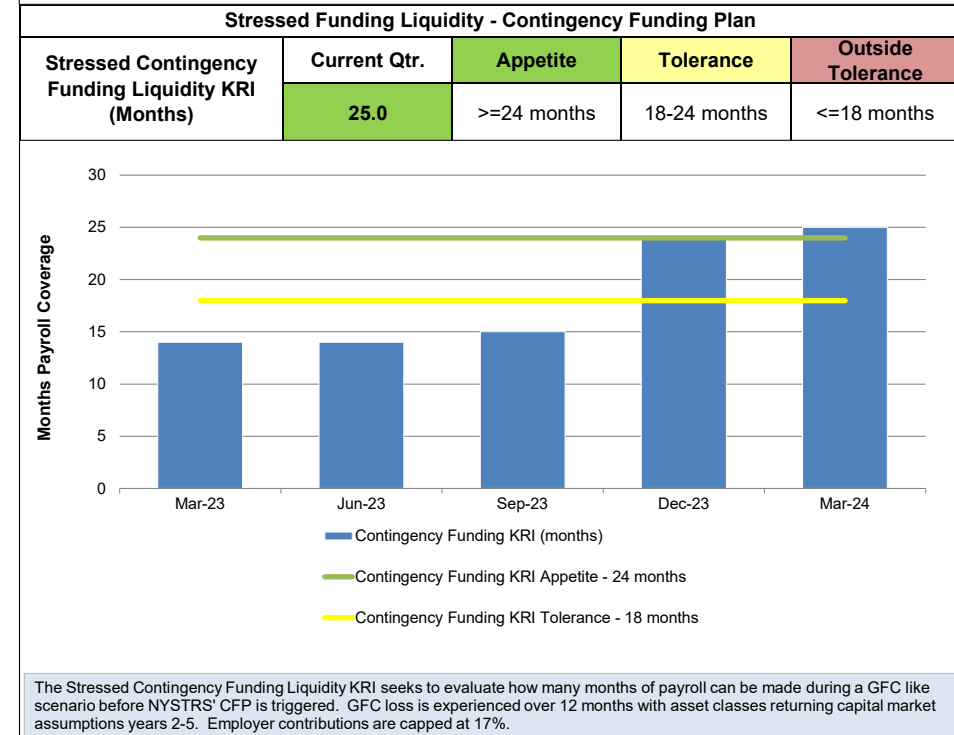
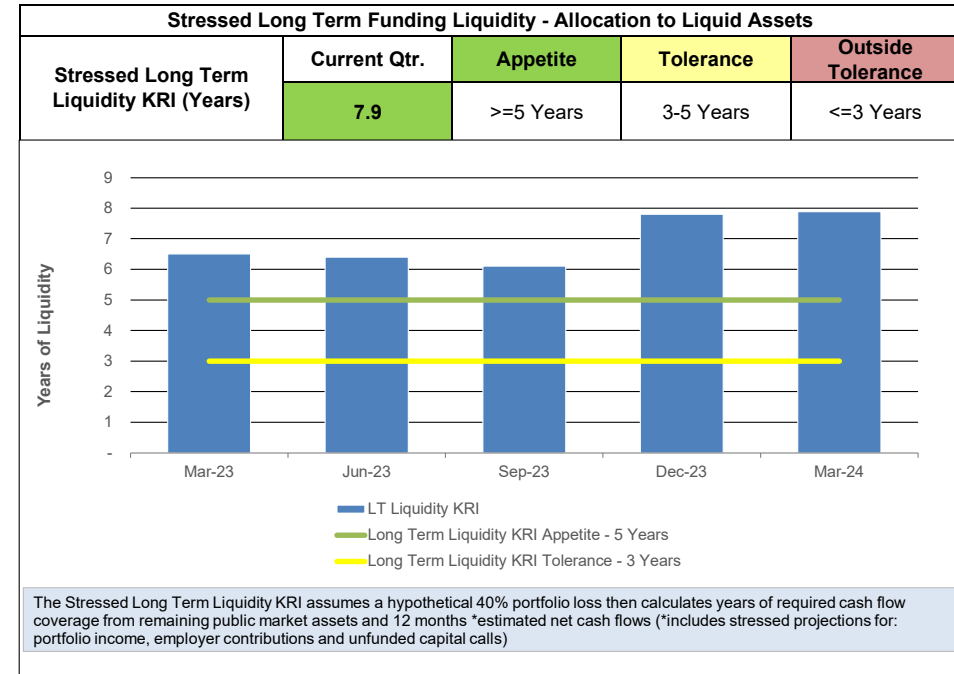
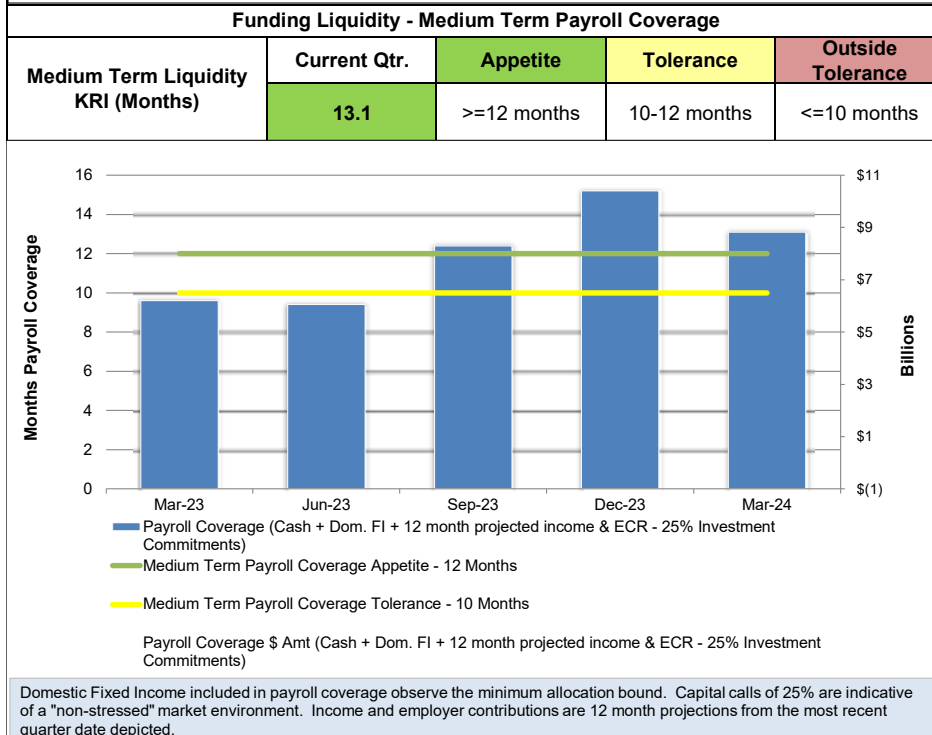
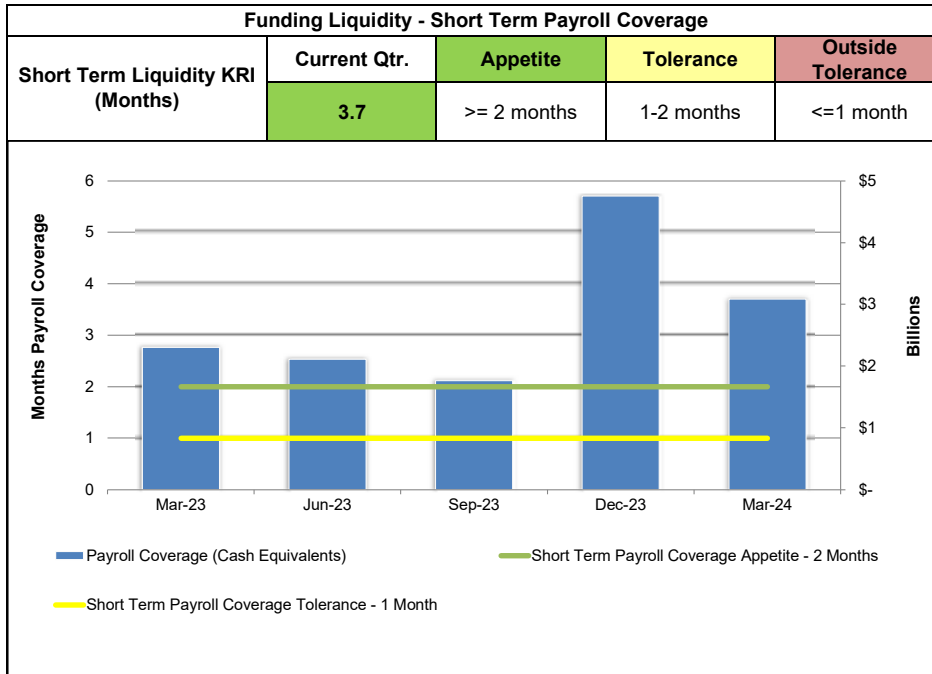
Updates:

- All Liquidity KRI's remain within our "Risk Appetite".
- Staff continues to work towards target asset allocation levels.
- Total Plan Risk; Tail Risk; and Risk Contributions by Asset Class, Sector, Geography, and Factor are as expected.
  - Reductions in Total Risk and Active Risk were primarily the result of the Private Equity allocation moving closer to target.

Key Risk Indicator	Outside Tolerance	Risk Tolerance	Risk Appetite	Current Assessment
Asset Allocation (Market Risk Management)	One or More Asset Classes Out of Bounds	One or More Asset Classes Outside of Policy During Transition Period	All Asset Classes within Policy Range	All Asset Classes within Policy Range
Net Benefit Payments as % of Assets (Liquidity)	>10%	>5 - 10%	<= 5%	4.42%
Short Term Liquidity (Liquidity)	<= 1 Month	1 - 2 Months	>= 2 Months	3.7 Months
Medium Term Liquidity (Liquidity)	<= 10 Months	10 - 12 Months	>= 12 Months	13.1 Months
Stressed Contingency Funding Liquidity (Liquidity)	<= 18 Months	18 - 24 Months	>= 24 Months	25 Months
Stressed Long Term Liquidity (Liquidity)	<= 3 Years	3 - 5 Years	>= 5 Years	7.9 Years
Funded Ratio: Market Value of Total Plan Assets (Unfunded Liability)	<80% or >120%	80 - 90% or 110 - 120%	90 - 110%	97.4% (6/30/2022)
ECR Volatility (Unfunded Liability)	$\Delta$ +/- >3%	$\Delta$ +/- 2 - 3%	$\Delta$ +/- 2%	-0.53% (6/30/2022)
ECR Level (Unfunded Liability)	<4% or >17%	4 - 6% or 12 - 17%	6 - 12%	9.76% (6/30/2022)
Actuarial Valuation: Periodic Full Scope Audit (Valuation Process)	Replicated Liabilities >4% of NYSTRS' Calculation	Replicated Liabilities 1 - 4% of NYSTRS' Calculation	Replicated Liabilities <=1% of NYSTRS' Calculation	0.04% (4/16/2019)
Actuarial Valuation: Annual Independent Review (Valuation Process)	Adverse Opinion	Modified Opinion	Unmodified Opinion	Unmodified Opinion (10/26/2023)



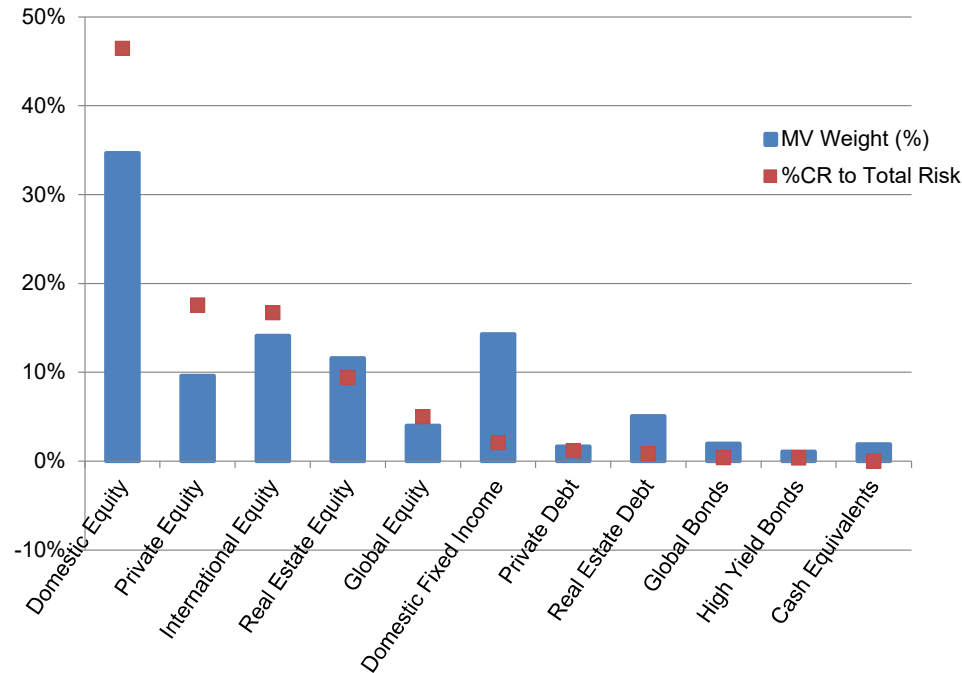
## Risk Management Investment Risk Board Report April 2024



## Risk Management Investment Risk Board Report April 2024

**Total Predicted Risk by Asset Class**

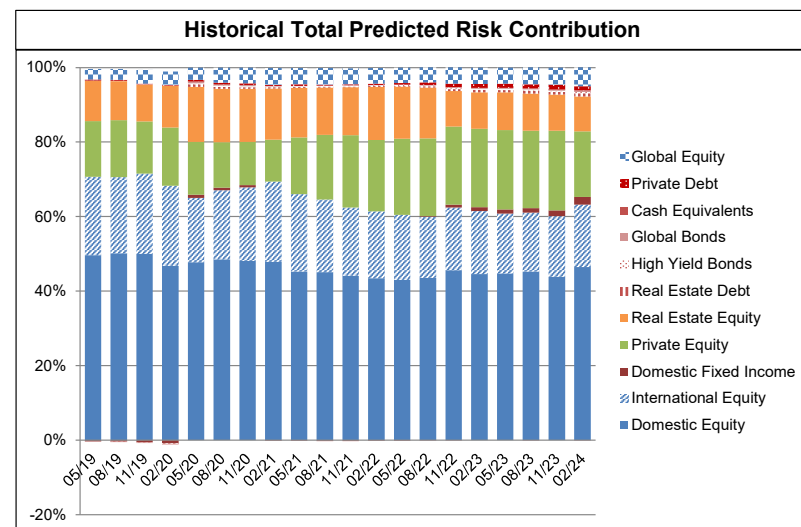
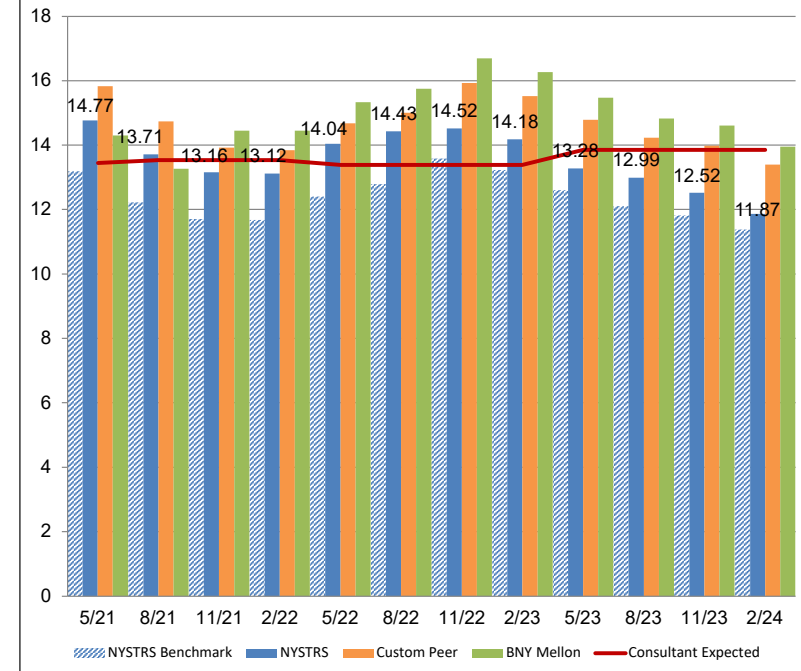
Total Plan Risk dropped to 11.87 from 12.52 last quarter, primarily due to Private Equity getting closer to target. Asset class contributions to Total Predicted Risk are in line with expectations, with equity investments being the largest contributors.



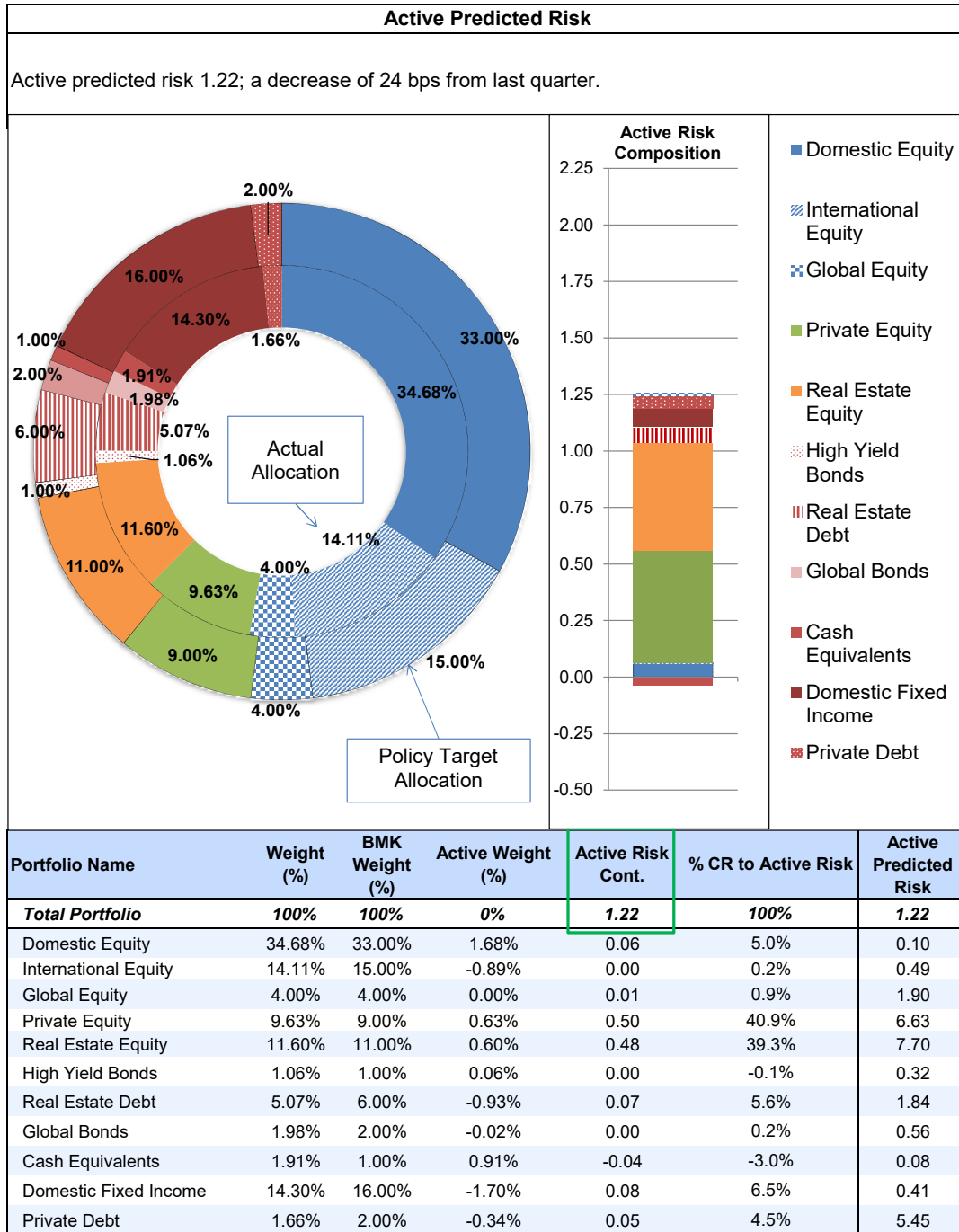
Portfolio Name	Market Value (Millions \$)	Weight (%)	%CR to Total Risk	Total Plan Risk Cont.	Total Predicted Risk
<b>Total Portfolio</b>	<b>\$ 139,932</b>	<b>100%</b>	<b>100%</b>	<b>11.87</b>	<b>11.87</b>
Domestic Equity	\$ 48,530	34.68%	46.45%	5.51	16.51
Private Equity	\$ 13,474	9.63%	17.58%	2.09	26.71
International Equity	\$ 19,743	14.11%	16.70%	1.98	15.61
Real Estate Equity	\$ 16,236	11.60%	9.41%	1.12	11.83
Global Equity	\$ 5,590	4.00%	5.01%	0.60	15.35
Domestic Fixed Income	\$ 20,012	14.30%	2.09%	0.25	6.07
Private Debt	\$ 2,316	1.66%	1.19%	0.14	9.95
Real Estate Debt	\$ 7,100	5.07%	0.83%	0.10	3.86
Global Bonds	\$ 2,769	1.98%	0.38%	0.05	5.63
High Yield Bonds	\$ 1,485	1.06%	0.36%	0.04	5.45
Cash Equivalents	\$ 2,677	1.91%	0.00%	0.00	0.08

**Total Predicted Risk and Peer Comparison**

Long term expected risk target 13.86%; short term predicted risk 11.87%



## Risk Management Investment Risk Board Report April 2024



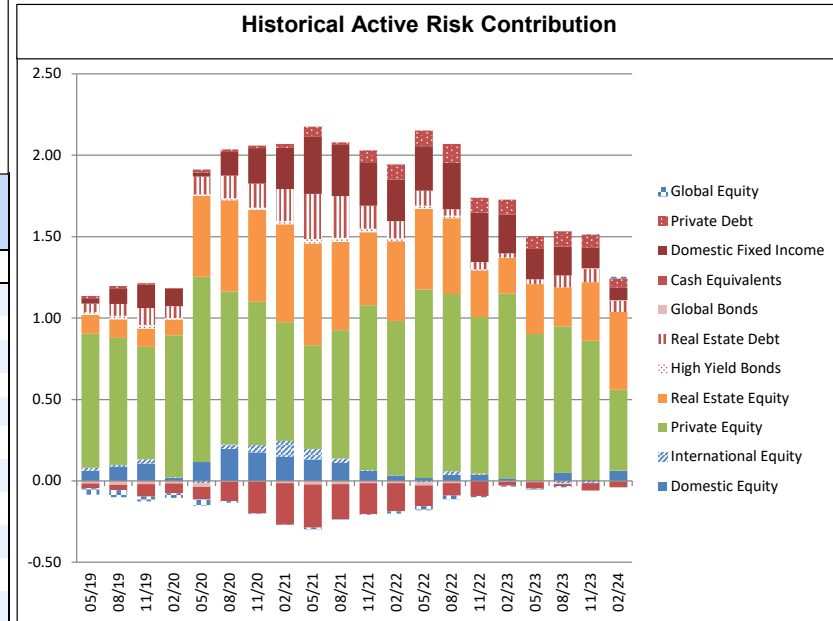
#### Active Predicted Risk:

Active Predicted Risk is defined as the expected volatility of excess returns, and results from differences between actual portfolio weights and holdings vs. policy weights and holdings. Excess returns may be positive or negative.

#### Observations:

Active Risk for the Fund is largely controlled by limiting the difference between the actual and policy benchmark (target) weights for each asset class.

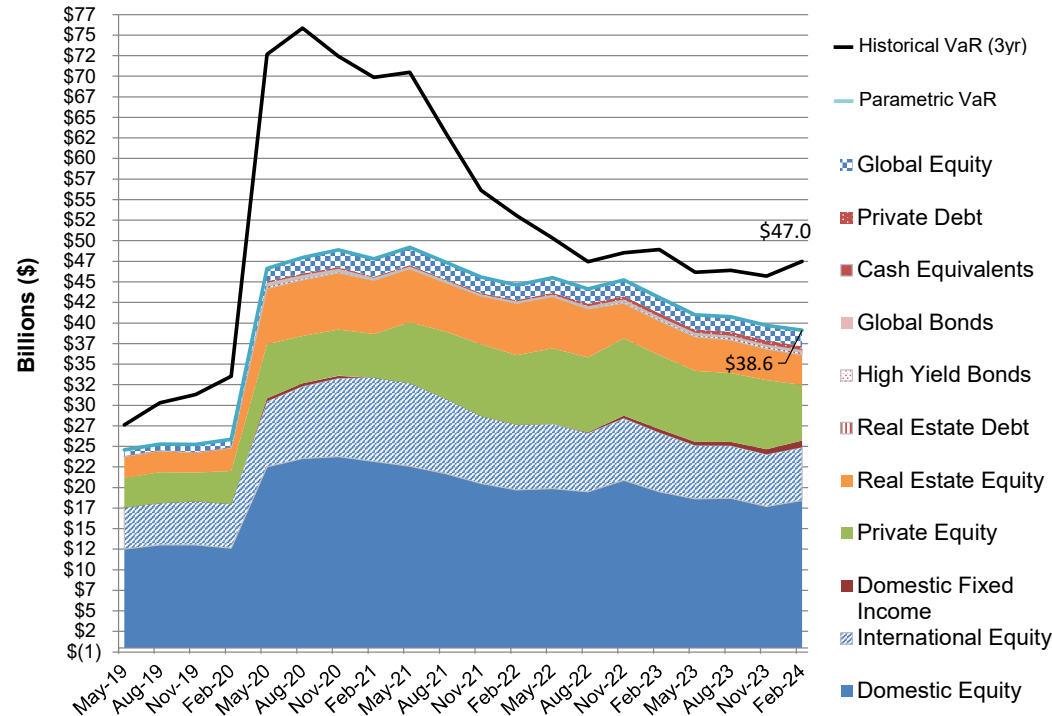
Benchmarking issues associated with private market portfolios also affect the measurement of 'active' risk. We see this most significantly with NYSTRS' private equity portfolio.



# Risk Management Investment Risk Board Report April 2024

## Value at Risk Contribution by Asset Class

VaR metrics remain elevated as a result of recent market volatility, but have been slowly coming down. NYSTRS' strong liquidity position provides significant downside protection against realized portfolio losses.



Portfolio Name	Total Portfolio VaR	Diversification Benefit	\$ Contribution to VaR (millions)	%Contribution to VaR
<b>Total Portfolio</b>	<b>\$45,194</b>	<b>-\$6,569</b>	<b>\$38,626</b>	<b>100%</b>
Domestic Equity	\$18,634		\$17,941	46.45%
International Equity	\$7,170		\$6,450	16.70%
Private Equity	\$8,371		\$6,792	17.58%
Real Estate Equity	\$4,467		\$3,633	9.41%
High Yield Bonds	\$188		\$140	0.36%
Real Estate Debt	\$638		\$322	0.83%
Global Bonds	\$362		\$147	0.38%
Cash Equivalents	\$5		\$0	0.00%
Domestic Fixed Income	\$2,826		\$806	2.09%
Private Debt	\$536		\$458	1.19%
Global Equity	\$1,996		\$1,937	5.01%

### Value at Risk:

Value at Risk (VaR) is an estimate of the maximum portfolio loss over a specified time period and confidence interval given normal market conditions. VaR can be expressed in % loss or dollar terms. In this analysis, we use a 1 year time horizon and a 99% confidence interval. VaR can also be stated as: There is a 99% chance that the portfolio's market value will not lose more than [VaR amount] over the next year.

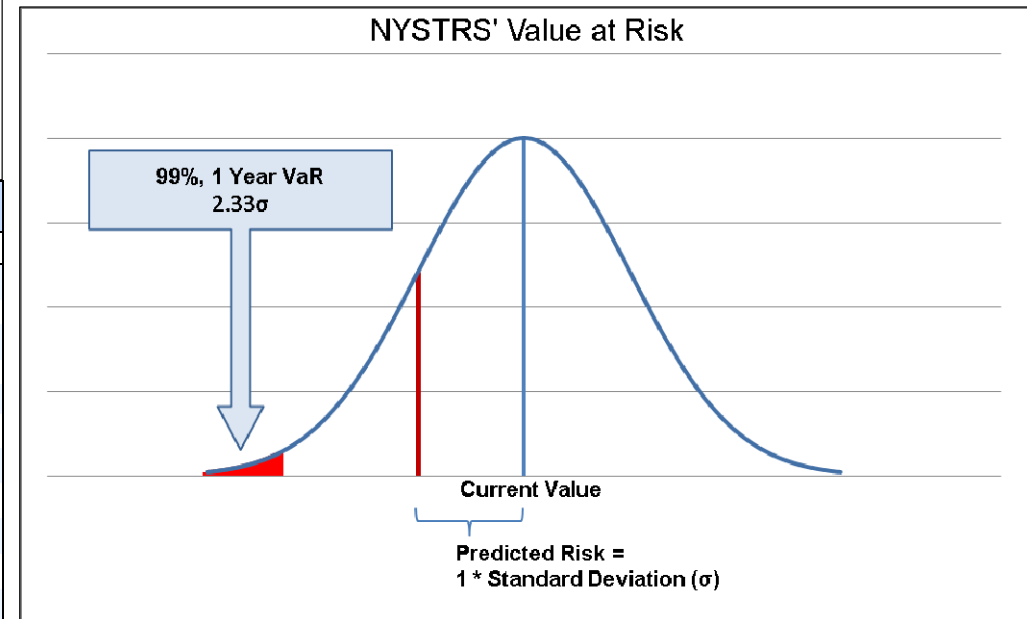
### Methods Used:

- *Parametric VaR*:  $99\%VaR(\$) = 2.33\sigma * \text{Portfolio Market Value}$
- *Historical Simulation VaR*:  $99\%VaR(\$) = \text{Simulated P\&L of portfolio utilizing empirical daily risk factor/price changes. 3 year lookback period (756 trading days) observed.}$

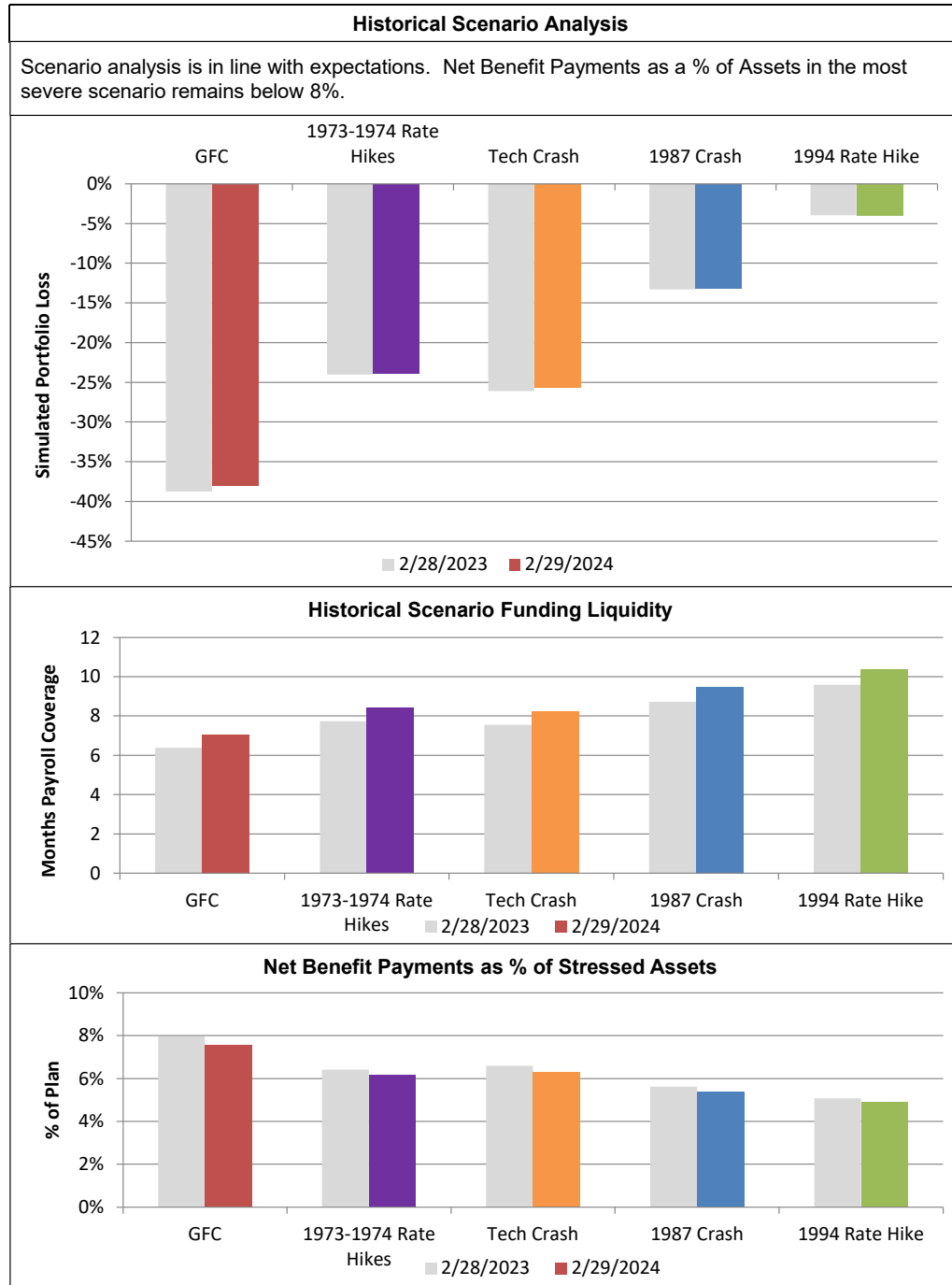
### Drawbacks:

Parametric VaR assumes asset returns are normally distributed which may not be realistic. This could underestimate the VaR due to unfavorable asset returns having a higher chance of occurring in real life.

Historical Simulation VaR assumes past returns are indicative of future returns which may not be realistic. The specific return period analyzed directly impacts results which may or may not capture typical volatility, market extremes, or cyclicity.



## Risk Management Investment Risk Board Report April 2024



### Scenario Analysis

A scenario analysis seeks to determine how a portfolio may be affected by subjecting it to various historical or hypothetical market conditions.

### Historical Scenarios:

The following historical scenarios apply market conditions experienced during their respective timeframes to NYSTRS' current portfolio as an instantaneous shock with no ability to rebalance or otherwise manage assets during the event. Simulated losses are illustrated on the chart to the top left. High level scenario inputs are provided below for context:

Historical Scenario	Domestic Equity	UST Yields: 2y/5y/10y (bps)	Credit Spreads: AA/BB/CCC (bps)
Global Financial Crisis: (9/30/07-3/4/09)	-54%	-308/-226/-115	+234/+849/+3779
1973-1974 Stagflation & Rate Hikes: (1/1/73-8/31/74)	-35%	+347(1y)/+239/+158	LIBOR +334
Tech Crash & Recession: (1/9/00-3/12/03)	-47%	-488/-387/-281	-13/+244/+1151
1987 Stock Market Crash: (8/3/87-11/30/87)	-27%	Unchanged	Unchanged
1994 US Rate Hike: (1/31/94-12/13/94)	-6%	+162/+152/+131	+2/+36/+0

### Funding Liquidity:

The middle chart depicts how each historical scenario would impact funding liquidity after a one-time rebalance to target policy weights. Cash and Domestic Fixed Income coverage represents how much of each asset could be used to make payroll before lower asset allocation bounds were breached and additional rebalancing was required. The attribution of each payroll coverage asset and cash flow component (in months coverage) is as follows:

Funding Liquidity Assumptions	Months Coverage	
	2/28/2023	2/29/2024
Cash + Domestic Fixed Income	5.6 to 8.8	6 to 9.3
Portfolio Income/Maturities	6.7	6.3
Employer Contributions	3.0	2.9
Capital Calls	-9.0	-8.2
<b>Total Payroll Coverage</b>	<b>6 to 10</b>	<b>7 to 10</b>

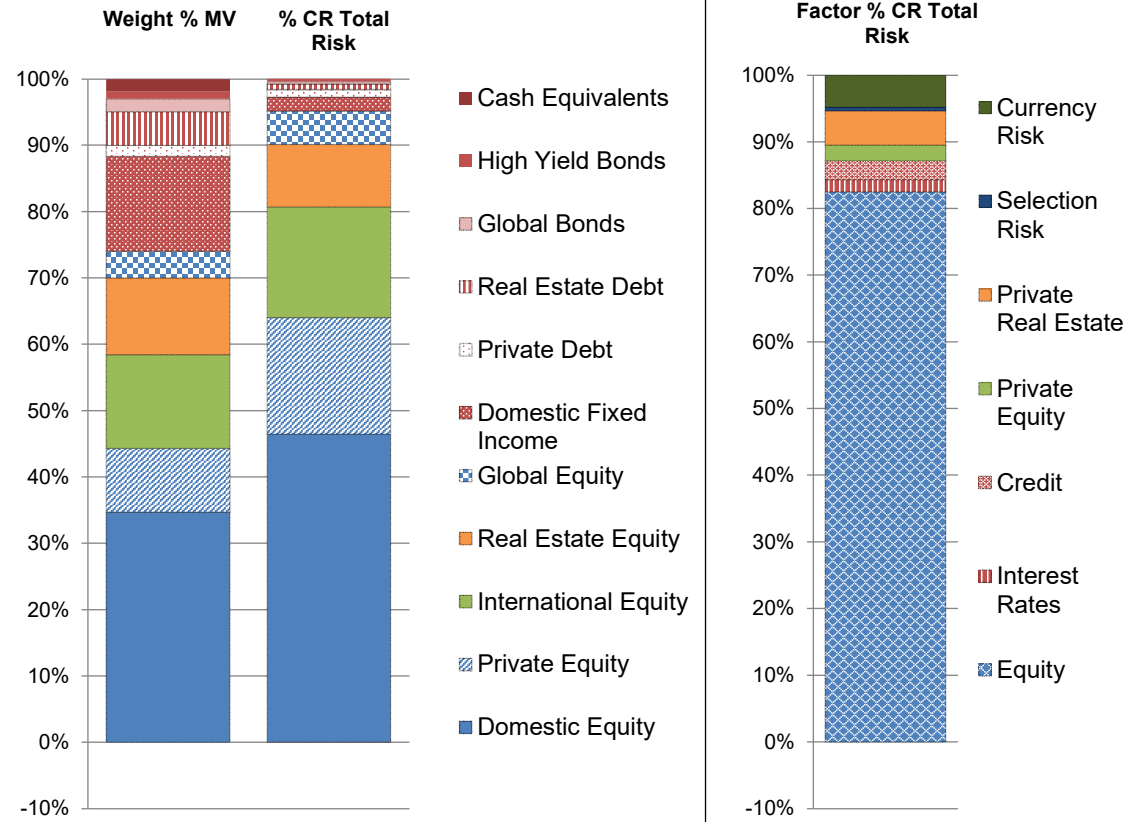
### Net Benefit Payments as % of Assets:

The bottom chart depicts how each historical scenario would impact net benefit payments as a percentage of assets. Figures are representative of each scenarios market bottom and do not incorporate expected cash flows or market recovery. (\*Net Benefit Payments=Annual Benefit Payments-Employer & Employee Contributions)

## Risk Management Investment Risk Board Report April 2024

### Total Predicted Risk by Risk Factor

As expected, equity markets are the largest contributor to the Plan's total risk.



### Risk Factors:

Risk factors are characteristics shared by a group of securities that influence their risk and return as well as their correlations.

The five risk factor groups used for this analysis (equity, interest rates, credit, private equity, and private real estate) can be further decomposed into underlying factors such as industry, style, interest rate term structure, and geography. Each factor has an expected volatility and correlation with the other risk factors.

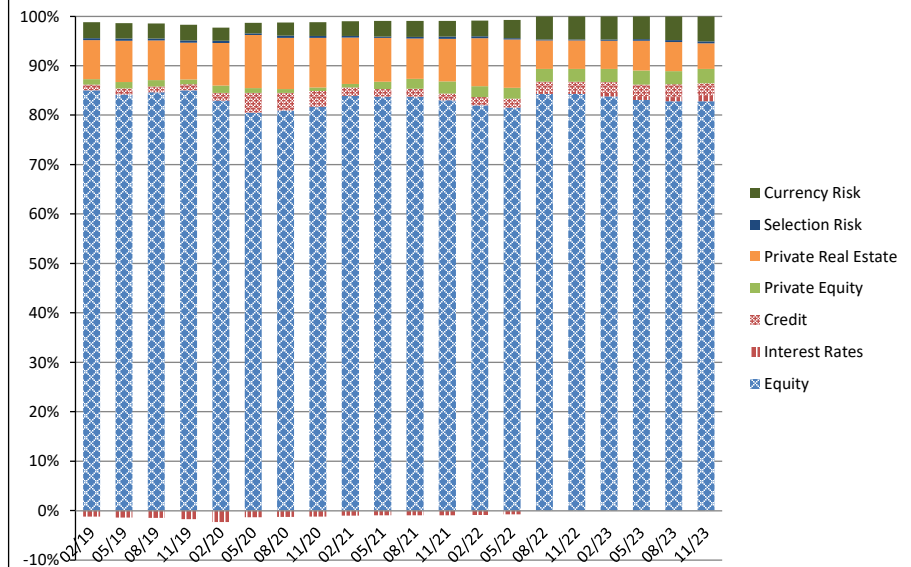
All of NYSTRS holdings are modeled according to their exposures to individual risk factors.

### Observations:

As expected, Total Plan risk is primarily driven by the equity markets.

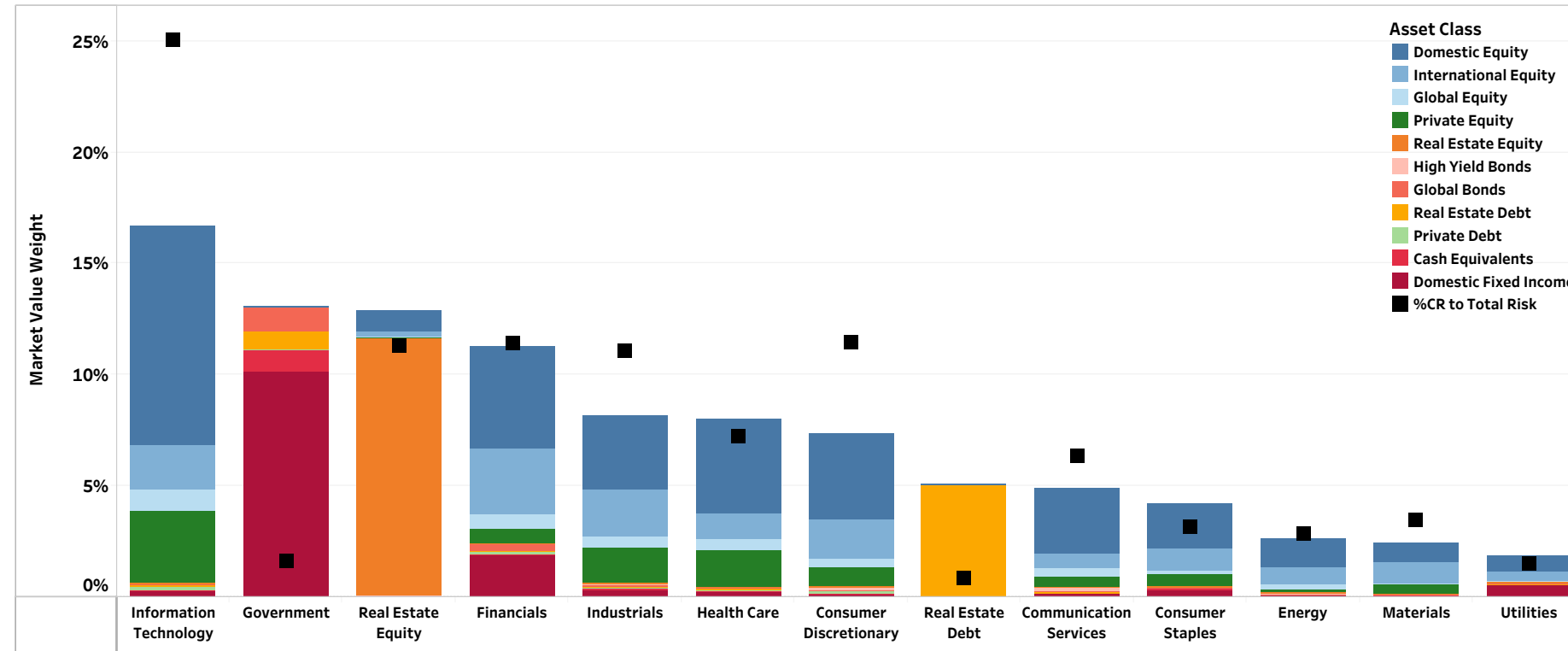
Risk Source	Total Plan Risk Cont.	%CR to Total Risk	BMK Risk Cont.	BMK %CR to Total Risk	% CR to Active Risk
<b>Total Risk</b>	<b>11.87</b>	<b>100%</b>	<b>11.38</b>	<b>100.00%</b>	<b>100%</b>
Local Market Risk	11.29	95.15%	10.82	95.07%	98.75%
Common Factor Risk	11.23	94.61%	10.75	94.43%	88.07%
Equity	9.79	82.51%	8.65	76.01%	44.65%
Interest Rates	0.22	1.82%	0.30	2.61%	3.71%
Credit	0.34	2.83%	0.37	3.28%	-1.08%
Private Equity	0.28	2.33%	0.13	1.17%	24.34%
Private Real Estate	0.61	5.13%	1.29	11.36%	16.46%
Selection Risk	0.06	0.54%	0.07	0.64%	10.68%
Currency Risk	0.58	4.85%	0.56	4.93%	1.25%

### Historical Risk Factor Contribution to Total Risk



## Risk Management Investment Risk Board Report April 2024

### Sector Concentration By Asset Class



#### Observations:

Sector contribution to risk is in line with expectations. Information Technology continues to drive an outsized contribution to total risk relative to its weight in the portfolio.

#### Sectors:

In developing the sector schedule, NYSTRS began with industry recognized sectors used by MSCI and S&P. Five custom sectors were added to this base to accommodate the Fund's allocation to Government, Real Estate Debt, Real Estate Equity, Cash and "Other" investments.

The bar chart representing weight for each sector was then further divided by asset class; with shades of blue denoting public equity asset classes, red denoting public fixed income asset classes, green denoting private equity and debt, and orange denoting real estate equity and debt.

Defensive sectors such as Utilities, and Consumer Staples tend to be more stable and less volatile regardless of the condition of the overall financial markets. Because these sectors are not highly correlated with the business cycle, they are also known as "non-cyclical". Cyclical sectors such as Consumer Discretionary and Materials tend to be correlated with the business cycle and can be more volatile than defensive sectors.

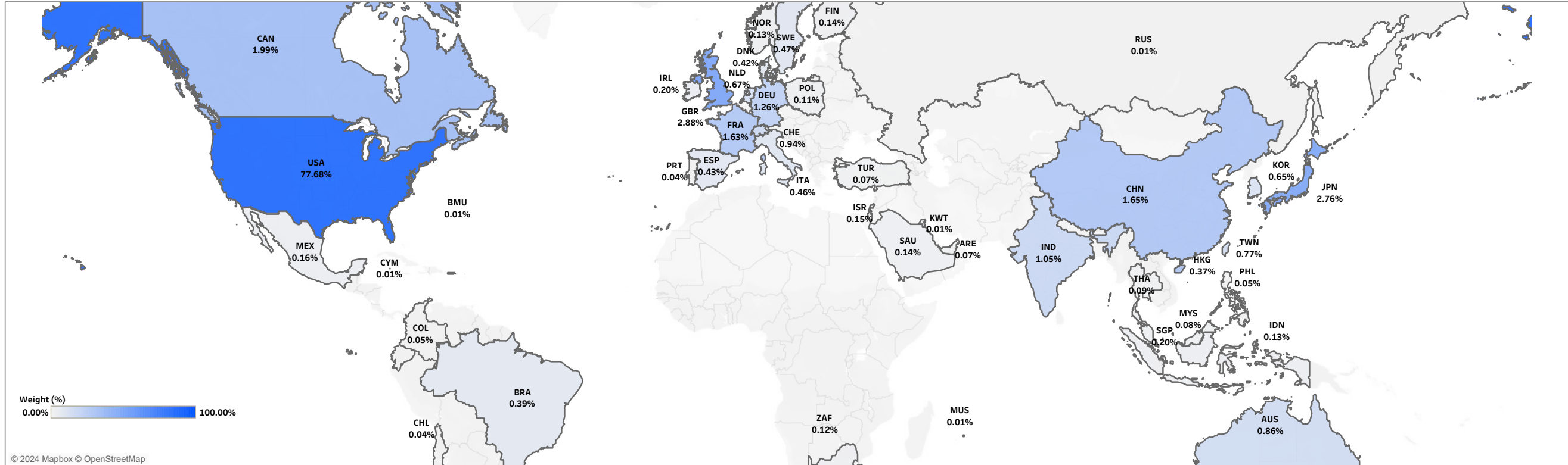
These characteristics can be seen in the chart. The risk contribution by the defensive sectors is less than their market value allocation and the risk contribution by the cyclical sectors is higher than their market value allocation.

NYSTRS Sector	Mkt Value (Mil)	Weight (%)	Portfolio Risk Contribution	(%) CR to Total Risk	Total Risk
<b>Total Portfolio</b>	\$139,932	100.00%	11.87	100.00%	11.87
<b>Information Technology</b>	\$23,312	16.66%	2.97	25.01%	20.08
<b>Real Estate-Equity</b>	\$17,989	12.86%	1.34	11.31%	12.45
<b>Government</b>	\$17,211	12.30%	0.19	1.58%	5.69
<b>Financials</b>	\$15,655	11.19%	1.35	11.40%	13.40
<b>Industrials</b>	\$11,816	8.44%	1.31	11.03%	16.34
<b>Health Care</b>	\$11,381	8.13%	0.85	7.20%	13.39
<b>Consumer Discretionary</b>	\$10,578	7.56%	1.36	11.46%	19.41
<b>Real Estate-Debt</b>	\$7,099	5.07%	0.10	0.83%	3.86
<b>Communication Services</b>	\$6,780	4.85%	0.75	6.36%	18.26
<b>Consumer Staples</b>	\$6,088	4.35%	0.38	3.17%	10.77
<b>Energy</b>	\$3,943	2.82%	0.34	2.83%	19.87
<b>Materials</b>	\$3,581	2.56%	0.41	3.44%	17.57
<b>Utilities</b>	\$2,616	1.87%	0.18	1.49%	12.38
<b>Other</b>	\$1,875	1.34%	0.34	2.86%	29.82

## Risk Management Investment Risk Board Report April 2024

**Observations:**  
As expected, the largest contribution on a geographic basis comes from NYSTRS exposure to U.S. investments. Total developed and emerging market regions are within 1.0% of the benchmark.

### Weight % By Country



Geographic Region	Market Value (Mil)	Weight (%)	BMK Weight (%)	Active Weight (%)	Total Plan Risk Contr..	Total Predicted Risk	(%) CR to Total Risk
<b>Total Portfolio</b>	\$139,932	100.00%	100.00%	0.00%	11.87	11.87	100.00%
<b>Total Developed</b>	\$131,382	93.89%	93.67%	0.22%	11.14	11.88	93.87%
<b>United States</b>	\$108,700	77.68%	79.02%	-1.34%	8.83	11.52	74.37%
<b>Europe and Middle East</b>	\$13,984	9.99%	9.01%	0.99%	1.47	16.72	12.43%
<b>Japan</b>	\$3,866	2.76%	2.72%	0.04%	0.33	18.08	2.78%
<b>Pacific ex Japan</b>	\$2,041	1.46%	1.37%	0.09%	0.25	20.97	2.12%
<b>Canada</b>	\$2,788	1.99%	1.56%	0.44%	0.26	14.80	2.17%
<b>Total Emerging</b>	\$7,824	5.59%	5.70%	-0.10%	0.70	15.79	5.89%
<b>Asia</b>	\$6,259	4.47%	4.73%	-0.26%	0.52	15.58	4.34%
<b>EMEA</b>	\$669	0.48%	0.45%	0.03%	0.07	21.88	0.62%
<b>Latin America</b>	\$895	0.64%	0.51%	0.13%	0.11	26.01	0.92%
<b>Total Other</b>	\$724	0.52%	0.64%	-0.12%	0.02	6.63	0.17%
<b>Rest of the World</b>	\$494	0.35%	0.36%	-0.01%	0.01	4.25	0.04%
<b>Frontier Market</b>	\$230	0.16%	0.27%	-0.11%	0.01	17.81	0.12%



## Risk Management Investment Risk Board Report April 2024

### Glossary:

**%CR to Active Risk:** Percent of Plan's Active Predicted Risk contributed by each component. This column sums to 100%.

**%CR to Total Risk:** Percent of Plan's Total Predicted Risk contributed by each component. Negative numbers imply a diversification benefit. This column sums to 100%.

**Active Predicted Risk:** Asset class portfolios' Active Predicted Risk compared to its respective benchmark.

**Active Risk Cont.:** Absolute contribution to Plan's Active Predicted Risk from each asset class portfolio. This column sums to the Plan's Active Predicted Risk.

**Active Weight (%):** Difference between the Plan's current weight and the Plan's benchmark policy weight.

**BMK %CR to Total Risk:** Percent of Total Predicted Risk for the Plan's Policy Benchmark contributed by each component. This column sums to 100%.

**BMK Risk Cont.:** Absolute contribution to Total Predicted Risk for Plan's Policy Benchmark from each Risk Factor group.

**Total Predicted Risk:** Individual components' distinct Total Predicted Risk.

**Total Plan Risk Cont.:** Absolute contribution to Plan's Total Predicted Risk from each component. Negative numbers imply a diversification benefit. This column sums to the Plan's Total Predicted Risk.

**Total Portfolio VaR:** The expected loss to a specified degree of confidence (99%) when subjected to a historical stress simulation. Also could be stated as there is a 99% chance that the total portfolio or individual asset classes' market value will not lose more than the [VaR amount] over the next year.

**Diversification Benefit:** The benefit achieved by owning a diversified portfolio comprised of assets with correlations < 1.

### Notes:

BNY Mellon Peer Median; >\$10B: BNY Mellon Total Public Fund > \$10B median allocation.

- 41 public pension funds with an average plan size of \$41.6B. Aggregate assets of \$1,706.1B.

NYSTRS Custom Peer Group Median: NYSTRS' custom peer group used during annual asset allocation study. Allocation data provided by Pension Fund Date Exchange, Ltd. (PFDE).

- 5 public pension funds with an average plan size of \$160B and median plan size of \$99B.

- California State Teacher' Retirement System
- New Jersey Division of Investment
- Oregon Public Employees' Retirement Fund
- State Board of Administration of Florida
- State Teachers Retirement System of Ohio

## Risk Management Investment Risk Board Report April 2024

### Appendix:

MSCI ACWI & FRONTIER MARKETS INDEX									
MSCI ACWI INDEX					MSCI EMERGING & FRONTIER MARKETS INDEX				
MSCI WORLD INDEX			MSCI EMERGING MARKETS INDEX			MSCI FRONTIER MARKETS INDEX			
DEVELOPED MARKETS			EMERGING MARKETS			FRONTIER MARKETS			
Americas	Europe & Middle East	Pacific	Americas	Europe, Middle East & Africa	Asia	Europe	Africa	Middle East	Asia
Canada	Austria	Australia	Brazil	Czech Republic	China	Croatia	Kenya	Bahrain	Bangladesh
United States	Belgium	Hong Kong	Chile	Egypt	India	Estonia	Mauritius	Jordan	Pakistan
	Denmark	Japan	Colombia	Greece	Indonesia	Iceland	Morocco	Oman	Sri Lanka
	Finland	New Zealand	Mexico	Hungary	Korea	Lithuania	Nigeria		Vietnam
	France	Singapore	Peru	Kuwait	Malaysia	Kazakhstan	Tunisia		
	Germany			Poland	Philippines	Romania	WAEMU <sup>2</sup>		
	Ireland			Qatar	Taiwan	Serbia			
	Israel			Saudi Arabia	Thailand	Slovenia			
	Italy			South Africa					
	Netherlands			Turkey					
	Norway			United Arab Emirates					
	Portugal								
	Spain								
	Sweden								
	Switzerland								
	United Kingdom								
MSCI STANDALONE MARKET INDEXES <sup>1</sup>									
						Americas	Europe	Africa	Middle East
						Argentina	Bosnia Herzegovina	Botswana	Lebanon
						Jamaica	Bulgaria	Zimbabwe	Palestine
						Panama	Malta		
						Trinidad & Tobago	Ukraine		

\*MSCI.com/market-classification



NEW YORK STATE TEACHERS' RETIREMENT SYSTEM  
10 Corporate Woods Drive Albany, New York

Investment Committee Meeting

April 24, 2024

COMMITTEE MEMBERS

Nicholas Smirensky, Chair  
Juliet Benaquisto, Eric Iberger, David Keefe, Jennifer Longtin, Ruth Mahoney

**AGENDA** pp. 30-31

- A. Approval of Minutes of January 24, 2024 pp. 32-38

**PRESENTATIONS**

- A. Public Equities Discussion-Ariel Investments, John W. Rogers, Jr. and Henry Mallari-D'Auria pp. 39-42  
B. Asset Allocation Review – Tom Shingler, Jay Kloepfer (Callan) pp. 43-70  
C. USD Emerging Market Debt Implementation – M. Federici pp. 71-88

- Break for Lunch -

- D. Duration Management with Treasury Futures pp. 89-109  
E. Discussion on REIT Asset Mgt (motion for Executive Session pursuant to Open Meetings Law Section 105(1)(f) to discuss employment history and status of a particular person or corporation) pp.110-115

**STAFF UPDATES**

- A. Investment Committee Executive Summary – M. Andriola pp. 116-124  
B. Managing Director Updates
  - Public Equities Update – P. Cummins p. 125
  - Fixed Income Update – M. Federici p. 126
    - Long Term Bond Portfolio Update – A. VanDerwiel pp. 127-161
  - Real Estate Update – D. Gillan pp. 162-164
  - Private Equity/Debt Update – G. Yahoudy p. 165

## **INVESTMENT COMMITTEE ACTION REQUIRED**

- A. **Consent Agenda Recommendation Item #1** pp. 166-170
1. Renew Agreements
    - Adelante Capital Management LLC p. 166
    - Goldman Sachs Asset Mgt India Equity Strategy p. 167
    - J.P. Morgan Chase Bank NA (Securities Lending) p. 168
    - LSV Asset Management p. 169
    - Wellington Management Company LLP p. 170

### **Informational Reports**

1. EDCIO Investment Discretion Report pp. 171-173
2. Mail Vote Quarterly Board Report p. 174

**NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
INVESTMENT COMMITTEE MEETING  
January 24, 2024**

INVESTMENT COMMITTEE MEETING  
NEW YORK STATE TEACHERS' RETIREMENT SYSTEM  
10 Corporate Woods Drive, Albany NY

A meeting of the Investment Committee of the Retirement Board was held at the System on January 24, 2024. Nicholas Smirensky, Chair, called the meeting to order at 9:03 a.m.

ATTENDANCE

Investment Committee

Elizabeth Chetney, Eric Iberger, David Keefe (via WebEx), Jennifer Longtin, Ruth Mahoney, Nicholas Smirensky

Board Members

Juliet Benaquisto (via WebEx), Paul Farfaglia, Phyllis Harrington (via WebEx), Oliver Robinson

Staff

Thomas Lee, Don Ampansiri, Dave Gillan, Kathy Ebert, Gerald Yahoudy, Miriam Dixon, Richard Young, Vijay Madala, Beth Dellea, Paul Cummins, Michael Federici, Danny Malavé, Matt Albano, Margaret Andriola, Emily Ekland, Han Yik, Chris Brown, Kevin Maloney, Heidi Brennan, Aaron VanDerwiel, Sarah Garrand, Matt Pinchinat, Binoop Uni, Bruce Woolley, Renee Ong, Ben Keezer, Wanette Alston, Jeff Schubert, Stacey Lesser Meehan

System Consultants

Callan: In person - Tom Shingler, Lauren Sertich  
Via WebEx - Jay Kloepfer, Kevin Machiz

StepStone: Via WebEx – Scott Schwind

NYSTRS' Risk Advisor: Via WebEx – Peter Cosgrove

Visitors

In Person: Vik Sawhney - Blackstone  
Kim Palermo and Anin Kofi-Addo – Omni Research

Via WebEx: McCyril Espanol, WithIntelligence; Dorien Nunez, Omni Research; Gregg Gethard, PEI Media; Gar Chung, Financial Investment News; Alvaro Carrillo and Mitchell King - BlackRock

## Approval of Minutes

### A. Approval of Minutes of October 25, 2023 Investment Committee Meeting

There being no additions or corrections to the minutes of the October 25, 2023 meeting, the minutes were approved with a motion made by R. Mahoney, seconded by E. Iberger and unanimously carried.

The Committee heard reports and updates from staff and reviewed the following information regarding the System's investments and performance:

### Review of Investments

1. Investment Committee Executive Summary (Appendix A, pp. 7-13)
2. Public Equities Update (Appendix B, p. 14)
3. Fixed Income Update (Appendix C, p. 15)
4. Real Estate Update (Appendix D, pp. 16-18)
5. Private Equity/Debt Update (Appendix E, p. 19)
6. Consultant Update

T. Shingler and J. Kloepfer from Callan gave an update on capital market projections and an update on the Callan organization.

### Presentations

#### A. Real Estate Macro Markets Discussion

Vik Sawhney, Blackstone's Chief Administrative Officer and Global Head of Institutional Client Solutions, participated in a question and answer interview with Dave Gillan, from NYSTRS' Real Estate Department. Conversation covered Mr. Sawhney's views on economic conditions, credit markets, global

markets, geographic expectations and how culture is managed at Blackstone.

B. Emerging Market Debt

M. Federici and R. Ong gave a presentation on the evolution of and outlook for emerging markets.

Policy Review and Action

A. Consent Agenda Recommendation Items (Appendix F, pp. 20-21)

N. Smirensky asked the Committee members if any of the consent agenda items should be moved to regular discussion items. Hearing no objections, the Committee proceeded to move the Consent Agenda Recommendation items (#1-2) together with one motion.

Upon motion of J. Longtin, seconded by R. Mahoney and unanimously carried by the Committee, the following consent agenda item resolutions were moved and unanimously recommended to the Retirement Board:

1. Renew Consultant

- Callan – General Investment Consultant

RESOLVED, That the Executive Director and Chief Investment Officer, or designees, is authorized to renew the System's contract with Callan LLC for a period of one year, commencing May 1, 2024, (A) to act as a general investment consultant and (i) advise on asset allocation and manager research & monitoring, and (ii) provide Board & staff education, at an annual fee not to exceed \$523,362; and (B) if required by the System, to provide individual fund due diligence for alternative investments, including private equity and private debt, at fees not to exceed \$35,000 per domestic fund and \$45,000 per international fund.



## 2. Renew Managers

- AEW Capital Management

RESOLVED, That the System's Executive Director and Chief Investment Officer is authorized to renew the agreement with AEW Capital Management, LP to manage a portion of the System's portfolio to be actively invested in the securities of real estate investment trusts ("REITs") and real estate operating companies ("REOCs") for a period of one year, effective April 15, 2024.

- Ariel Investments LLC

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Ariel Investments LLC to manage a portion of the System's assets as an MSCI ACWI ex-US international equity manager for a period of one year, effective April 10, 2024.

- Arrowstreet

WHEREAS, Arrowstreet Capital LP was hired as an international equity manager on July 18, 2017 and as a global equity manager on March 26, 2019; now be it therefore

RESOLVED, That, the Executive Director and Chief Investment Officer is authorized to renew the agreement with Arrowstreet Capital LP for a period of one year, effective March 26, 2024, to manage (i) a portion of the System's assets as an international equity manager benchmarked to the MSCI ACWI ex-US index, and (ii) a portion of the System's assets as a global equity manager benchmarked to the MSCI ACWI index.

- Bank of NY Mellon (Securities Lending)

RESOLVED, the Executive Director and Chief Investment Officer is authorized to renew the agreement with The Bank of New York Mellon to act as an agency securities lender for a portion of the System's public securities assets for a period of one year, effective March 17, 2024.

- Black Rock Financial Management, Inc. (CMBS)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Black Rock Financial Management, Inc. to manage a portion of the System's assets in Commercial Mortgage Backed Securities ("CMBS"), for a period of one year, effective April 3, 2024.

- Cohen & Steers Capital Mgt – Multi Strategy

RESOLVED, That the System's Executive Director and Chief Investment Officer is authorized to renew the agreement with Cohen & Steers Capital Management, Inc. to manage a portion of the System's portfolio to be actively invested in the securities of real estate investment trusts ("REITs") and real estate operating companies ("REOCs") for a period of one year, effective February 12, 2024.

- Columbia Management Investment Advisers LLC

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Columbia Management Investment Advisers, LLC to manage a portion of the System's assets as an active U.S. high yield manager benchmarked to the ICE BofAML BB-B US High Yield Constrained Index (HUC4) (f/k/a Bank of America Merrill Lynch BB-B U.S. High Yield Constrained Index) for a period of one year, effective March 6, 2024.

- PGIM, Inc.

RESOLVED, That the Executive Director and Chief Investment Officer, or designee, is authorized to renew the agreement with PGIM, INC. to manage a portion of the System's assets as an active U.S. high yield manager benchmarked to the Bloomberg US High Yield 1% Issuer Capped Index (I09038US) for a period of one year, effective February 21, 2024.

- J.P. Morgan Investment Management Inc.

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with J.P. Morgan Investment Management Inc. to manage a portion of the System's assets as an active U.S. high yield manager benchmarked to the ICE BofAML BB-B US High Yield Constrained Index (HUC4) (f/k/a Bank of America Merrill Lynch BB-B U.S. High Yield Constrained Index) for a period of one year, effective March 5, 2024.

- Principal Real Estate Investors

RESOLVED, That the System's Executive Director and Chief Investment Officer is authorized to renew the agreement with Principal Real Estate Investors, LLC to manage a portion of the System's portfolio to be actively invested in the securities of real estate investment trusts ("REITs") and real estate operating companies ("REOCs") for a period of one year, effective February 11, 2024

- Raith Capital Partners

RESOLVED, That the System's Executive Director and Chief Investment Officer is authorized to renew the agreement with Raith Capital Partners, LLC to act as a Debt separate account advisor and in such role to advise on the acquisition, management and exit of public and private opportunistic commercial real estate debt opportunities for a period of one year, effective February 7, 2024.

- RhumbLine Advisors

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with RhumbLine Advisors LP to manage a portion of the System's assets as a passive international equity manager, benchmarked to the MSCI ACWI ex-US Index, for a period of one year commencing March 30, 2024.

- Xponance (f/k/a FIS Group)

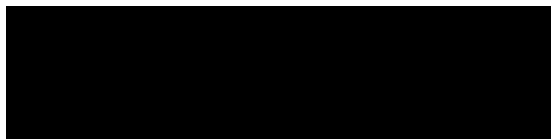
RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Xponance (formerly known as FIS Group, Inc. with a name change to Xponance effective 4/1/20) to manage a portion of the System's assets as a manager of international equity managers, benchmarked to the ACWI ex-US Index, for a period of one year commencing April 25, 2024.

#### Informational reports

- The Committee reviewed the following informational reports: EDCIO Investment Discretion Report (Appendix G, pp. 22-26) and Mail Vote Quarterly Board Report (Appendix H, p. 27).

There being no further business, and upon motion of J. Longtin, seconded by R. Mahoney and unanimously carried, the Committee adjourned at 12:05 p.m.

Respectfully submitted,



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Thomas K. Lee

# Ariel Investments

Public Equities Discussion  
NYSTRS Investment Committee  
April 24, 2024



Ariel Investments is a Chicago-based asset manager, founded in 1983. In 2011, Ariel launched its international and global strategies, managed from the firm’s New York City office. NYSTRS has been an investor in the actively managed international equity strategy since May 2017. The investment’s market value was \$350M at the end of March 2024. In August 2023, Henry Mallari-D’Auria succeeded Rupal Bhansali as the lead portfolio manager for the strategy.

NYSTRS Performance net of fees (as of March 31, 2024)

	CYTD	FYTD	1-Year	3-Year	5-Year	Since Inception
Ariel Investments	4.93%	9.12%	11.24%	4.17%	5.48%	4.90%
MSCI ACWI ex-US Benchmark	4.69%	10.56%	13.26%	1.94%	5.97%	5.62%
<b>Excess Return</b>	<b>0.25%</b>	<b>-1.45%</b>	<b>-2.02%</b>	<b>2.24%</b>	<b>-0.49%</b>	<b>-0.73%</b>

Ariel’s strategy is characterized by fundamental bottom-up stock selection featuring deep industry knowledge, and rigorous vetting of stocks held in the portfolio, with a focus on capital preservation.

Ariel believes that a patient investor, who buys stocks of under-appreciated but profitable companies with strong business models, will outperform the market in the long run.

Today’s discussion will focus on various topics including market outlook and strategy, investment philosophy and process, and firm culture.





**John W. Rogers, Jr.**  
Founder, Chairman,  
Co-CEO, and Chief  
Investment Officer

Lead Portfolio Manager: Ariel Fund.

Co-Portfolio Manager: Ariel Small Cap Value, Ariel Small Cap Value Concentrated, Ariel Small/Mid Cap Value, Ariel Mid Cap Value, Ariel Appreciation Fund.

John's passion for investing began at age 12 when his father began buying him stocks as Christmas and birthday gifts. His interest in equities grew at Princeton University, where he majored in economics, and over the two-plus years he worked as a stockbroker for William Blair & Company.

In 1983, John founded Ariel to focus on patient, value investing within small- and medium-sized companies. While our research capabilities have expanded across the globe, patience is still the disciplined approach that drives the firm today.

Early in his career, John's investment acumen brought him to the forefront of media attention and culminated in him being selected as co-mutual fund manager of the year by Sylvia Porter's Personal Finance magazine as well as an all-star mutual fund manager by USA TODAY. Furthermore, John has been highlighted alongside legendary investors Warren Buffett, Sir John Templeton, and Ben Graham in the distinguished book: The World's 99 Greatest Investors by Magnus Angenfelt.

His professional accomplishments extend to the boardroom where he is a member of the board of directors of NIKE, The New York Times Company, and Ryan Specialty Group Holdings. John also serves on the board of trustees of the University of Chicago.

Additionally, he is a member of the American Academy of Arts and Sciences, and a director of the Robert F. Kennedy Center for Justice and Human Rights.

In 2008, John was awarded Princeton University's highest honor, the Woodrow Wilson Award, presented each year to the alumnus or alumna whose career embodies a commitment to national service. Following the election of President Barack Obama, John served as co-chair for the Presidential Inaugural Committee 2009, and more recently, he joined the Barack Obama Foundation's board of directors.

John received an AB in economics from Princeton University, where he was also captain of the varsity basketball team.





## Henry Mallari-D'Auria, CFA

Executive Vice President, Chief Investment Officer, Global and Emerging Markets Equities

Lead Portfolio Manager: Ariel International (DM), Ariel International (DM/EM), Ariel Global, Ariel Emerging Markets Value, Ariel Emerging Markets Value ex-China, Ariel International Fund, Ariel Global Fund.

Co-Portfolio Manager: Ariel Global Concentrated

Bringing nearly 40 years of experience, Henry serves as Ariel's Chief Investment Officer of Global and Emerging Markets Equities. He is responsible for overseeing the global and emerging markets value research effort and portfolio management activities. Specifically, he handles portfolio construction and design of our non-U.S. portfolios and funds and sets the strategic direction of those capabilities. Additionally, Henry sits on the firm's Executive Committee.

For over 20 years, Henry was the chief investment officer and portfolio manager of AllianceBernstein's (AB) Emerging Markets Value Equity and Next 50 Emerging Markets Fund. During that time, Henry also served as Co-CIO of international value equities at AB for nearly a decade. Henry held various leadership positions across global and emerging markets investing at AB, including his roles as head of the global value research department, director of research of small cap value equities and director of research of emerging markets value equities.

Earlier in his career, he served as an analyst at the launch of AB's emerging markets value portfolio, and previously served as a vice president and sell-side analyst at PaineWebber.

Henry holds a BA in economics from Trinity College, where he sits on the Board of Trustees, and is a CFA Charterholder.



April 24, 2024



## **New York State Teachers' Retirement System**

2024 Asset Allocation Review

Important Disclosures regarding the use of this document are included at the end of this document. These disclosures are an integral part of this document and should be considered by the user.

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### **Tom Shingler**

Fund Sponsor Consulting

### **Angel Haddad**

Fund Sponsor Consulting

### **Jay Kloepfer**

Capital Market Research

### **Kevin Machiz, CFA, FRM**

Capital Market Research



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## Setting Strategic Asset Allocation Policy

**The cornerstone of a prudent process for pension plan fiduciaries is a careful and thorough examination of their long-term strategic plan**

- Asset allocation is the single most important decision fiduciaries make with regard to investment policy
- AA is the primary determinant of the expected level of return, and AA defines the range of potential results or volatility of the investment program. This evaluation of volatility includes the potential to experience drawdowns in the capital markets
- Asset allocation policy acknowledges the goals and risk tolerance for the investor and aligns these goals to potential outcomes for both the policy target and potential alternative asset mixes
- AA process:
  - Explicitly acknowledge change and uncertainty in the capital markets
  - Establish reasonable rate-of-return and risk expectations for individual investments
  - Establish reasonable rate-of-return and risk expectations for investment portfolios
  - Confirm an investment policy to meet return and risk objectives in relation to goals

**Callan and NYSTRS Staff began the annual asset allocation review process in January that is being presented today. NYSTRS' IPM States:**

**NYSTRS' asset allocation and underlying asset class policy benchmarks are reviewed and recommended by the Executive Director and Chief Investment Officer to the Retirement Board for approval annually.**

# 2024 Callan Capital Market Projections – Standard Set, 10 Year Horizon

## Risk and return: 2024–2033

Asset Class	Index	PROJECTED RETURN			PROJECTED RISK		2023 - 2032			vs 2023	
		1-Year Arithmetic	10-Year Geometric*	Real	Standard Deviation	Projected Yield	1-Year Arithmetic	10-Year Geometric*	Standard Deviation	Geometric* Delta	Std Dev Delta
<b>Equities</b>											
Broad U.S. Equity	Russell 3000	8.85%	7.65%	5.15%	17.40%	1.95%	8.75%	7.35%	18.05%	0.30%	-0.65%
Large Cap U.S. Equity	S&P 500	8.70%	7.50%	5.00%	17.00%	2.00%	8.60%	7.25%	17.75%	0.25%	-0.75%
Small/Mid Cap U.S. Equity	Russell 2500	9.80%	7.70%	5.20%	22.00%	1.75%	9.60%	7.45%	22.15%	0.25%	-0.15%
Global ex-U.S. Equity	MSCI ACWI ex USA	9.65%	7.65%	5.15%	21.40%	3.70%	9.45%	7.45%	21.25%	0.20%	0.15%
Developed ex-U.S. Equity	MSCI World ex USA	9.25%	7.50%	5.00%	20.15%	3.75%	9.00%	7.25%	20.15%	0.25%	0.00%
Emerging Market Equity	MSCI Emerging Markets	10.65%	7.70%	5.20%	25.60%	3.55%	10.45%	7.45%	25.70%	0.25%	-0.10%
<b>Fixed Income</b>											
Short Duration Gov't/Credit	Bloomberg 1-3 Yr G/C	4.25%	4.25%	1.75%	2.40%	3.70%	3.75%	3.80%	2.30%	0.45%	0.10%
Core U.S. Fixed	Bloomberg Aggregate	5.25%	5.25%	2.75%	4.25%	4.70%	4.25%	4.25%	4.10%	1.00%	0.15%
Long Government	Bloomberg Long Gov	6.20%	5.40%	2.90%	13.75%	4.80%	4.55%	3.70%	13.50%	1.70%	0.25%
Long Credit	Bloomberg Long Cred	6.85%	6.30%	3.80%	11.90%	6.20%	5.75%	5.20%	11.75%	1.10%	0.15%
Long Government/Credit	Bloomberg Long G/C	6.55%	6.00%	3.50%	11.70%	5.55%	5.20%	4.65%	11.40%	1.35%	0.30%
TIPS	Bloomberg TIPS	5.10%	5.05%	2.55%	5.40%	4.30%	4.10%	4.00%	5.30%	1.05%	0.10%
High Yield	Bloomberg High Yield	7.30%	6.80%	4.30%	11.75%	8.45%	6.75%	6.25%	11.75%	0.55%	0.00%
Global ex-U.S. Fixed	Bloomberg GI Agg xUSD	3.60%	3.15%	0.65%	9.80%	2.70%	2.70%	2.25%	9.80%	0.90%	0.00%
Emerging Market Sovereign Debt	EMBI Global Diversified	6.75%	6.35%	3.85%	10.65%	7.70%	6.25%	5.85%	10.65%	0.50%	0.00%
<b>Alternatives</b>											
Core Real Estate Equity	NCREIF ODCE	6.85%	6.00%	3.50%	14.00%	4.00%	6.60%	5.75%	14.20%	0.25%	-0.20%
Private Infrastructure	MSCI Glb Infra/FTSE Dev Core 50/50	7.30%	6.35%	3.85%	15.20%	4.80%	7.15%	6.15%	15.45%	0.20%	-0.25%
Private Equity	Cambridge Private Equity	12.15%	8.75%	6.25%	27.60%	0.00%	11.95%	8.50%	27.60%	0.25%	0.00%
Private Credit	Cambridge Senior Debt Index	8.40%	7.40%	4.90%	15.70%	7.40%	8.00%	7.00%	15.50%	0.40%	0.20%
Hedge Funds	Callan Hedge FoF Database	6.25%	6.05%	3.55%	8.20%	0.00%	5.80%	5.55%	8.45%	0.50%	-0.25%
Commodities	Bloomberg Commodity	5.45%	3.90%	1.40%	18.05%	3.00%	5.05%	3.50%	18.00%	0.40%	0.05%
<b>Cash Equivalents</b>											
	90-Day T-Bill	3.00%	3.00%	0.50%	0.90%	3.00%	2.75%	2.75%	0.90%	0.25%	0.00%
<b>Inflation</b>											
	CPI-U		2.50%		1.60%			2.50%	1.60%	0.00%	0.00%

Note that return projections for public markets assume index returns with no premium for active management.

\* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Source: Callan LLC

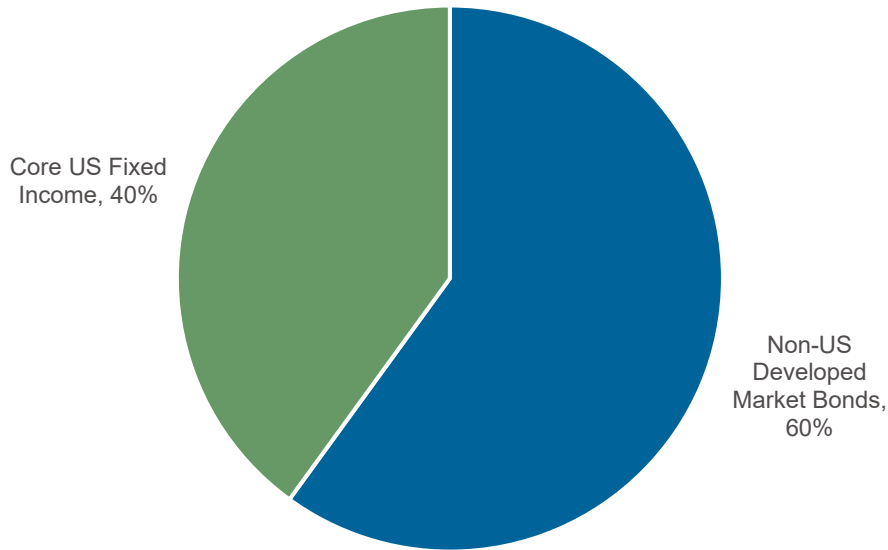
# 2024–2033 Callan Capital Markets Assumptions Correlations

Correlation Matrix		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1	Broad U.S. Equity	1.00																					
2	Large Cap U.S. Equity	1.00	1.00																				
3	Small/Mid Cap U.S. Equity	0.91	0.87	1.00																			
4	Global ex-US Equity	0.79	0.75	0.86	1.00																		
5	Developed ex-U.S. Equity	0.73	0.70	0.81	0.99	1.00																	
6	Emerging Market Equity	0.84	0.81	0.88	0.97	0.92	1.00																
7	Short Duration G/C	0.04	0.05	0.01	0.02	0.04	-0.01	1.00															
8	Core U.S. Fixed	0.08	0.09	0.03	0.04	0.06	0.00	0.78	1.00														
9	Long Government/Credit	0.22	0.23	0.19	0.21	0.21	0.19	0.69	0.88	1.00													
10	TIPS	-0.03	-0.02	-0.05	-0.05	-0.04	-0.07	0.55	0.70	0.58	1.00												
11	High Yield	0.75	0.74	0.74	0.73	0.71	0.74	0.13	0.15	0.26	0.06	1.00											
12	Global ex-U.S. Fixed	0.12	0.12	0.11	0.13	0.14	0.10	0.50	0.50	0.52	0.40	0.16	1.00										
13	EM Sovereign Debt	0.61	0.59	0.60	0.63	0.61	0.65	0.17	0.23	0.32	0.11	0.62	0.17	1.00									
14	Core Real Estate Equity	0.34	0.33	0.33	0.34	0.33	0.33	0.17	0.22	0.22	0.12	0.30	0.14	0.22	1.00								
15	Private Infrastructure	0.47	0.47	0.47	0.46	0.45	0.47	0.14	0.18	0.24	0.08	0.34	0.18	0.32	0.65	1.00							
16	Private Equity	0.80	0.79	0.77	0.78	0.76	0.76	-0.04	-0.04	0.11	-0.12	0.55	0.07	0.44	0.46	0.52	1.00						
17	Private Credit	0.68	0.67	0.67	0.67	0.64	0.68	0.04	0.06	0.17	-0.05	0.55	0.11	0.47	0.26	0.27	0.65	1.00					
18	Hedge Funds	0.59	0.60	0.50	0.50	0.50	0.50	0.28	0.39	0.42	0.23	0.50	0.24	0.47	0.24	0.31	0.34	0.47	1.00				
19	Commodities	0.20	0.20	0.20	0.20	0.20	0.20	-0.04	-0.05	-0.03	0.00	0.18	0.05	0.15	0.16	0.15	0.16	0.14	0.17	1.00			
20	Cash Equivalents	-0.03	-0.02	-0.07	-0.08	-0.08	-0.08	0.27	0.16	0.09	0.14	-0.03	0.10	-0.02	0.02	-0.04	-0.04	-0.04	0.00	-0.02	1.00		
21	Inflation	0.00	0.00	0.02	0.01	0.00	0.02	-0.20	-0.22	-0.27	0.25	-0.03	-0.12	-0.04	0.20	0.10	0.04	-0.04	-0.01	0.35	0.02	1.00	

Source: Callan

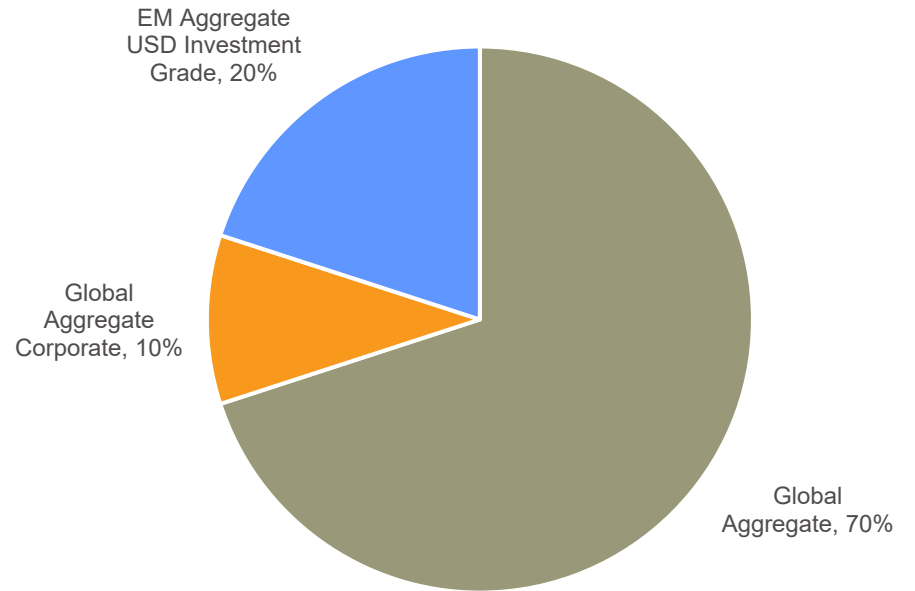
# Proposed Global Fixed Income Structure Assumptions

Current Global Fixed Income



Expected Return = 4.30%  
 Expected Risk = 3.70%  
 Projected Yield = 3.50%

Proposed Global Fixed Income



Expected Return = 4.75%  
 Expected Risk = 3.95%  
 Projected Yield = 4.15%

NYSTRS' fixed income portfolio uses both internal and external management:

- Core US Fixed Income is managed internally and includes a portion of US-dollar denominated emerging markets debt; Global Fixed Income is managed externally as is High Yield

Non-US dollar fixed income currency exposure hedged to US dollar in Callan assumption.

Actual implementation may differ, for example in reducing country concentration or permitting below-investment grade exposures

Source: Callan LLC 10-Year Capital Market Assumptions

# No Changes Recommended For the Current Target after AA Review

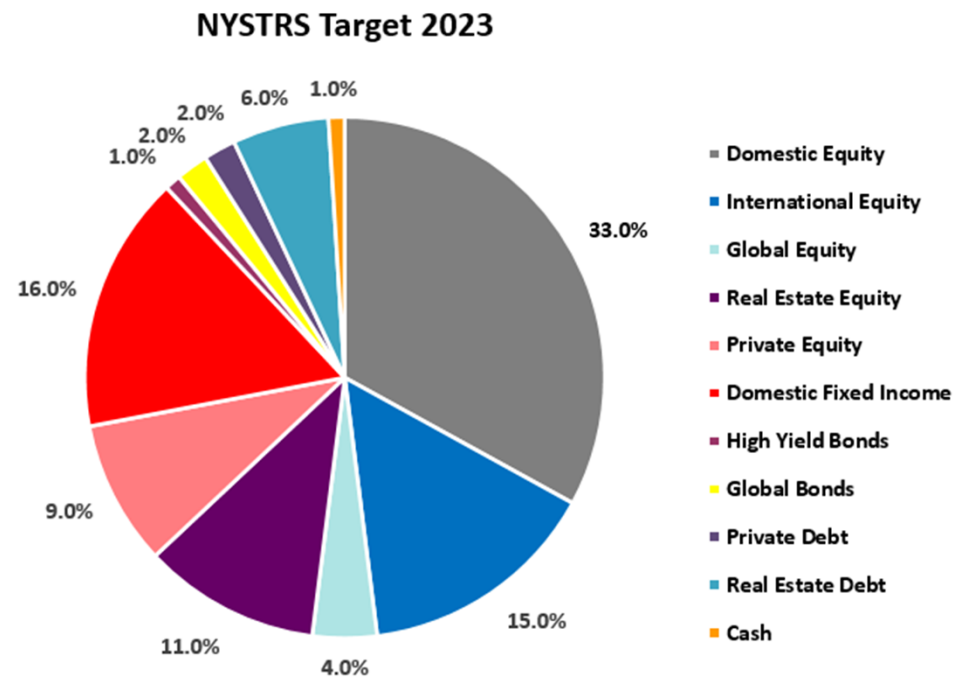
Callan and NYSTRS Staff considered whether to recommend asset allocation changes over the course of the past three months, including in three IIC meetings

The focus was on scenarios exploring incremental derisking, that reduce public equity and add to debt asset classes; these changes could reduce expected volatility, increase portfolio efficiency, and increase yield but would also reduce the overall portfolio expected return

Callan does not recommend any change to the Current Target asset allocation

- Current actual allocation is not at policy target; focus on rebalancing to policy target in liquid asset classes, including specifically bringing core fixed income up to target

Callan supports the recommendation to adjust the implementation of global fixed income



# NYSTRS Target, Actual and Alternative Asset Mixes – 10-Year Time Horizon

Asset Class	Target Weight	Actual 12/31/2023	Current Target w/Proposed Global FI	PROJECTED RETURN		PROJECTED RISK	
				Single-Period Arithmetic Return	10-Year Geometric Return	Annualized Standard Deviation	Projected Yield
<b>Public Equity</b>	<b>52.0%</b>	<b>51.3%</b>	<b>52.0%</b>				
Broad US Equity (1)	33.0%	33.5%	33.0%	8.85%	7.65%	17.40%	2.00%
Global Ex-US Equity (2)	15.0%	14.0%	15.0%	9.60%	7.65%	21.15%	3.70%
Global Equity (3)	4.0%	3.8%	4.0%	9.15%	7.85%	17.85%	2.65%
<b>Private Market Equity</b>	<b>20.0%</b>	<b>21.6%</b>	<b>20.0%</b>				
Real Estate Equity (4)	11.0%	12.1%	11.0%	8.20%	7.15%	16.15%	2.90%
Private Equity	9.0%	9.5%	9.0%	12.15%	8.75%	27.60%	0.00%
<b>Private Debt</b>	<b>2.0%</b>	<b>1.6%</b>	<b>2.0%</b>				
Private Debt	2.0%	1.6%	2.0%	8.40%	7.40%	15.70%	7.40%
<b>Fixed Income</b>	<b>25.0%</b>	<b>22.6%</b>	<b>25.0%</b>				
Core U.S. Fixed Income	16.0%	14.1%	16.0%	5.25%	5.25%	4.25%	4.70%
Global Fixed Income (5)	2.0%	2.0%	0.0%	4.30%	4.30%	3.70%	3.50%
Real Estate Debt (6)	6.0%	5.4%	6.0%	6.45%	6.45%	5.00%	4.00%
High Yield	1.0%	1.1%	1.0%	7.30%	6.80%	11.75%	8.45%
Proposed Global Fixed Income (7)	0.0%	0.0%	2.0%	4.75%	4.75%	3.95%	4.15%
<b>Cash Equivalents</b>	<b>1.0%</b>	<b>2.9%</b>	<b>1.0%</b>				
Cash Equivalents	1.0%	2.9%	1.0%	3.00%	3.00%	0.90%	3.00%
<b>Inflation</b>					2.50%	1.60%	
<b>Total Equity (% of Portfolio)</b>	<b>72.0%</b>	<b>72.9%</b>	<b>72.0%</b>				
<b>Total Debt (% of Portfolio)</b>	<b>28.0%</b>	<b>27.1%</b>	<b>28.0%</b>				
<b>US Equity (% of Public Equity)</b>	<b>68.1%</b>		<b>68.1%</b>				
<b>Total Fund</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>				
<b>Single-Period Arithmetic Return</b>	8.31%	8.29%	8.32%				
<b>10-Year Geometric Return</b>	<b>7.70%</b>	<b>7.66%</b>	<b>7.70%</b>				
<b>Annualized Standard Deviation</b>	13.15%	13.19%	13.17%				
<b>Projected Yield</b>	2.95%	2.88%	2.97%				
<b>Sharpe Ratio</b>	0.36	0.35	0.36				

- (1) Broad US equity = 85% large cap, 15% mid and small cap
- (2) Global ex-US equity = 75% developed markets, 25% emerging markets
- (3) Global Equity = 60% broad US, 40% global ex-US
- (4) Real Estate Equity = 55% core, 30% non-core, 15% REITs
- (5) Global fixed income = 60% non-US developed market, 40% core US
- (6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt
- (7) Proposed GFI = 70% global, 10% global corporate, 20% emerging debt USD IG

Non-US dollar fixed income currency exposure hedged to US dollar in Callan assumption.

Source: Callan LLC

# NYSTRS Target, Actual and Alternative Asset Mixes – 20-Year Time Horizon

Asset Class	Target Weight	Actual 12/31/2023	Current Target w/Proposed Global FI	PROJECTED RETURN		PROJECTED RISK	
				Single-Period Arithmetic Return	20-Year Geometric Return	Annualized Standard Deviation	Projected Yield
<b>Public Equity</b>	<b>52.0%</b>	<b>51.3%</b>	<b>52.0%</b>				
Broad US Equity (1)	33.0%	33.5%	33.0%	9.00%	7.75%	17.40%	2.00%
Global Ex-US Equity (2)	15.0%	14.0%	15.0%	9.80%	7.80%	21.15%	3.70%
Global Equity (3)	4.0%	3.8%	4.0%	9.35%	8.00%	17.85%	2.65%
<b>Private Market Equity</b>	<b>20.0%</b>	<b>21.6%</b>	<b>20.0%</b>				
Real Estate Equity (4)	11.0%	12.1%	11.0%	8.50%	7.40%	16.15%	2.90%
Private Equity	9.0%	9.5%	9.0%	12.35%	8.90%	27.60%	0.00%
<b>Private Debt</b>	<b>2.0%</b>	<b>1.6%</b>	<b>2.0%</b>				
Private Debt	2.0%	1.6%	2.0%	8.40%	7.40%	15.70%	7.40%
<b>Fixed Income</b>	<b>25.0%</b>	<b>22.6%</b>	<b>25.0%</b>				
Core U.S. Fixed Income	16.0%	14.1%	16.0%	5.20%	5.20%	4.25%	4.70%
Global Fixed Income (5)	2.0%	2.0%	0.0%	4.45%	4.45%	3.70%	3.50%
Real Estate Debt (6)	6.0%	5.4%	6.0%	6.40%	6.40%	5.00%	4.00%
High Yield	1.0%	1.1%	1.0%	7.30%	6.80%	11.75%	8.45%
Proposed Global Fixed Income (7)	0.0%	0.0%	2.0%	4.80%	4.80%	3.95%	4.15%
<b>Cash Equivalents</b>	<b>1.0%</b>	<b>2.9%</b>	<b>1.0%</b>				
Cash Equivalents	1.0%	2.9%	1.0%	3.00%	3.00%	0.90%	3.00%
<b>Inflation</b>					2.50%	1.60%	
<b>Total Equity (% of Portfolio)</b>	<b>72.0%</b>	<b>72.9%</b>	<b>72.0%</b>				
<b>Total Debt (% of Portfolio)</b>	<b>28.0%</b>	<b>27.1%</b>	<b>28.0%</b>				
<b>US Equity (% of Public Equity)</b>	<b>68.1%</b>		<b>68.1%</b>				
<b>Total Fund</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>				
<b>Single-Period Arithmetic Return</b>	8.44%	8.41%	8.44%				
<b>20-Year Geometric Return</b>	<b>7.82%</b>	<b>7.79%</b>	<b>7.82%</b>				
<b>Annualized Standard Deviation</b>	13.15%	13.19%	13.17%				
<b>Projected Yield</b>	2.95%	2.88%	2.97%				
<b>Sharpe Ratio</b>	0.37	0.36	0.37				

- (1) Broad US equity = 85% large cap, 15% mid and small cap
- (2) Global ex-US equity = 75% developed markets, 25% emerging markets
- (3) Global Equity = 60% broad US, 40% global ex-US
- (4) Real Estate Equity = 55% core, 30% non-core, 15% REITs
- (5) Global fixed income = 60% non-US developed market, 40% core US
- (6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt
- (7) Proposed GFI = 70% global, 10% global corporate, 20% emerging debt USD IG

Non-US dollar fixed income currency exposure hedged to US dollar in Callan assumption.

Source: Callan LLC

# NYSTRS Target, Actual and Alternative Asset Mixes – 30-Year Time Horizon

Asset Class	Target Weight	Actual 12/31/2023	Current Target w/Proposed Global FI	PROJECTED RETURN		PROJECTED RISK	
				Single-Period Arithmetic Return	30-Year Geometric Return	Annualized Standard Deviation	Projected Yield
<b>Public Equity</b>	<b>52.0%</b>	<b>51.3%</b>	<b>52.0%</b>				
Broad US Equity (1)	33.0%	33.5%	33.0%	9.10%	7.85%	17.40%	2.00%
Global Ex-US Equity (2)	15.0%	14.0%	15.0%	9.90%	7.90%	21.15%	3.70%
Global Equity (3)	4.0%	3.8%	4.0%	9.40%	8.10%	17.85%	2.65%
<b>Private Market Equity</b>	<b>20.0%</b>	<b>21.6%</b>	<b>20.0%</b>				
Real Estate Equity (4)	11.0%	12.1%	11.0%	8.75%	7.65%	16.15%	2.90%
Private Equity	9.0%	9.5%	9.0%	12.45%	9.00%	27.60%	0.00%
<b>Private Debt</b>	<b>2.0%</b>	<b>1.6%</b>	<b>2.0%</b>				
Private Debt	2.0%	1.6%	2.0%	8.40%	7.40%	15.70%	7.40%
<b>Fixed Income</b>	<b>25.0%</b>	<b>22.6%</b>	<b>25.0%</b>				
Core U.S. Fixed Income	16.0%	14.1%	16.0%	5.10%	5.15%	4.25%	4.70%
Global Fixed Income (5)	2.0%	2.0%	0.0%	4.55%	4.60%	3.50%	3.50%
Real Estate Debt (6)	6.0%	5.4%	6.0%	6.35%	6.40%	5.00%	4.00%
High Yield	1.0%	1.1%	1.0%	7.30%	6.80%	11.75%	8.45%
Proposed Global Fixed Income (7)	0.0%	0.0%	2.0%	4.95%	4.95%	3.95%	4.15%
<b>Cash Equivalents</b>	<b>1.0%</b>	<b>2.9%</b>	<b>1.0%</b>				
Cash Equivalents	1.0%	2.9%	1.0%	3.00%	3.00%	0.90%	3.00%
<b>Inflation</b>					2.50%	1.60%	
<b>Total Equity (% of Portfolio)</b>	<b>72.0%</b>	<b>72.9%</b>	<b>72.0%</b>				
<b>Total Debt (% of Portfolio)</b>	<b>28.0%</b>	<b>27.1%</b>	<b>28.0%</b>				
<b>US Equity (% of Public Equity)</b>	<b>68.1%</b>		<b>68.1%</b>				
<b>Total Fund</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>				
<b>Single-Period Arithmetic Return</b>	8.52%	8.50%	8.52%				
<b>30-Year Geometric Return</b>	<b>7.90%</b>	<b>7.87%</b>	<b>7.90%</b>				
<b>Annualized Standard Deviation</b>	13.15%	13.19%	13.17%				
<b>Projected Yield</b>	2.95%	2.88%	2.97%				
<b>Sharpe Ratio</b>	0.37	0.37	0.37				

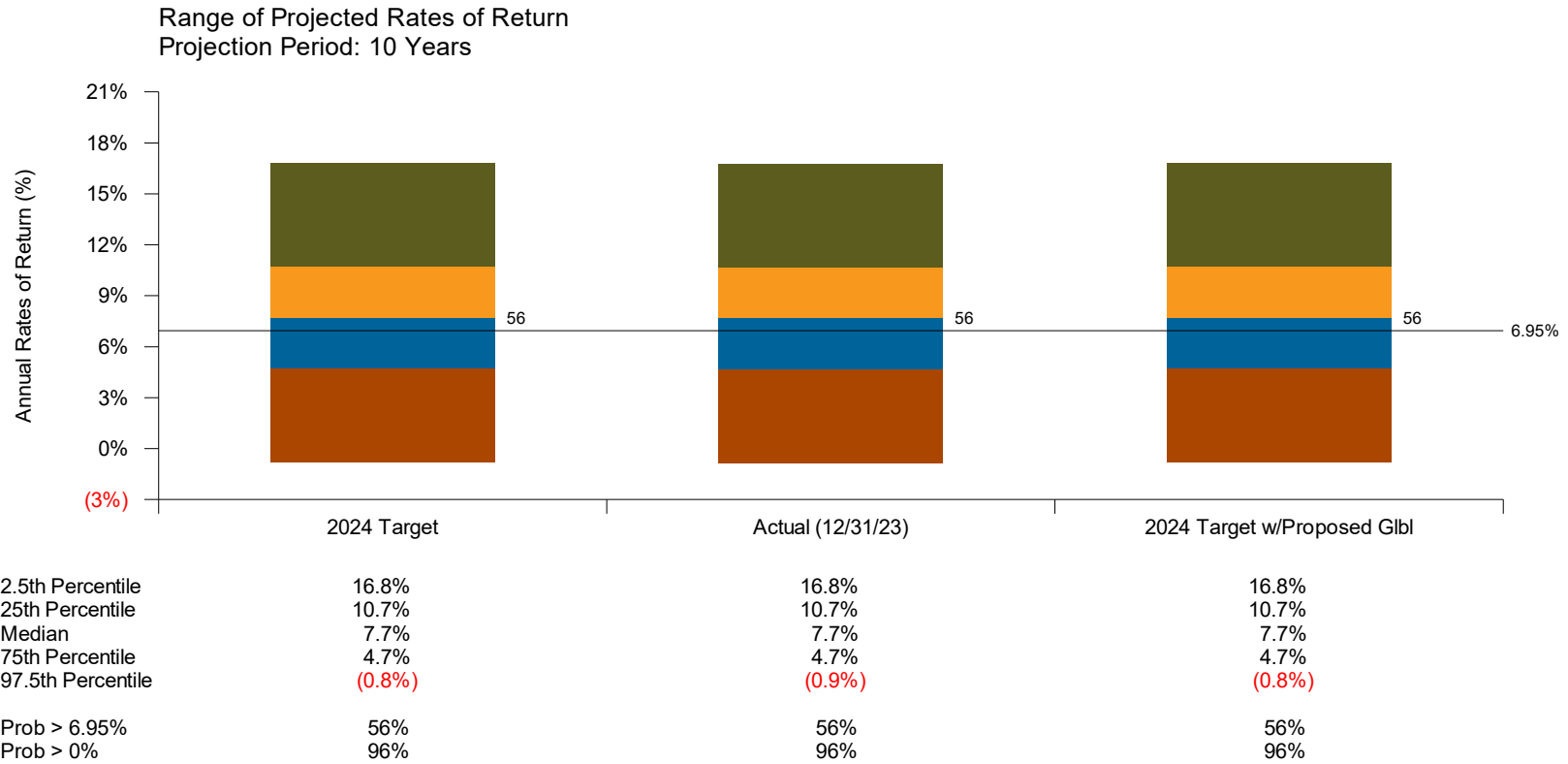
- (1) Broad US equity = 85% large cap, 15% mid and small cap
- (2) Global ex-US equity = 75% developed markets, 25% emerging markets
- (3) Global Equity = 60% broad US, 40% global ex-US
- (4) Real Estate Equity = 55% core, 30% non-core, 15% REITs
- (5) Global fixed income = 60% non-US developed market, 40% core US
- (6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt
- (7) Proposed GFI = 70% global, 10% global corporate, 20% emerging debt USD IG

Non-US dollar fixed income currency exposure hedged to US dollar in Callan assumption.

Source: Callan LLC



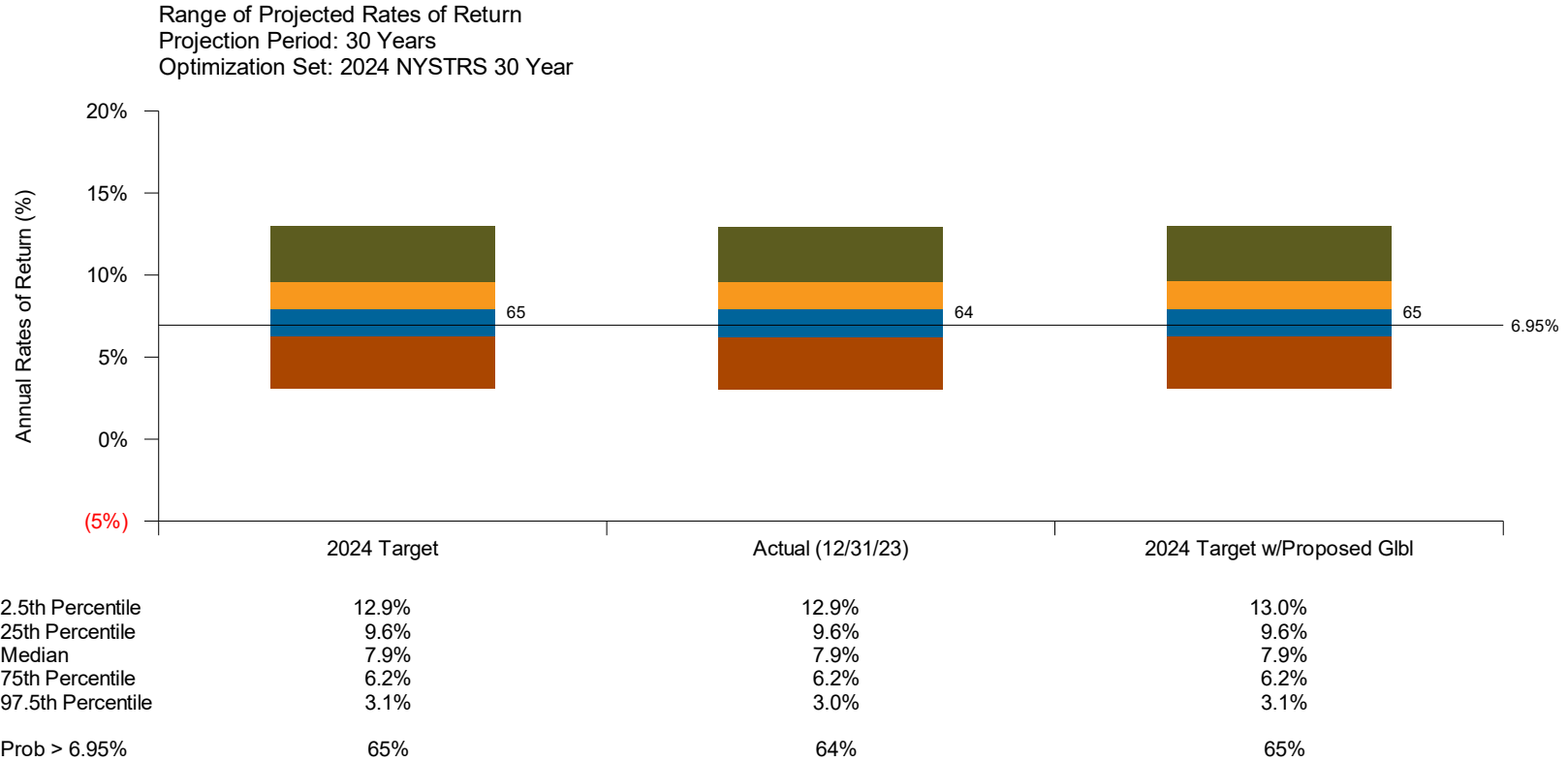
# Range of Return Comparison – 10-Year Time Horizon



- Over a 10-Year horizon, results are similar across mixes

Source: Callan LLC

# Range of Return Comparison – 30-Year Time Horizon



- Over a 30-Year horizon, results are similar across mixes

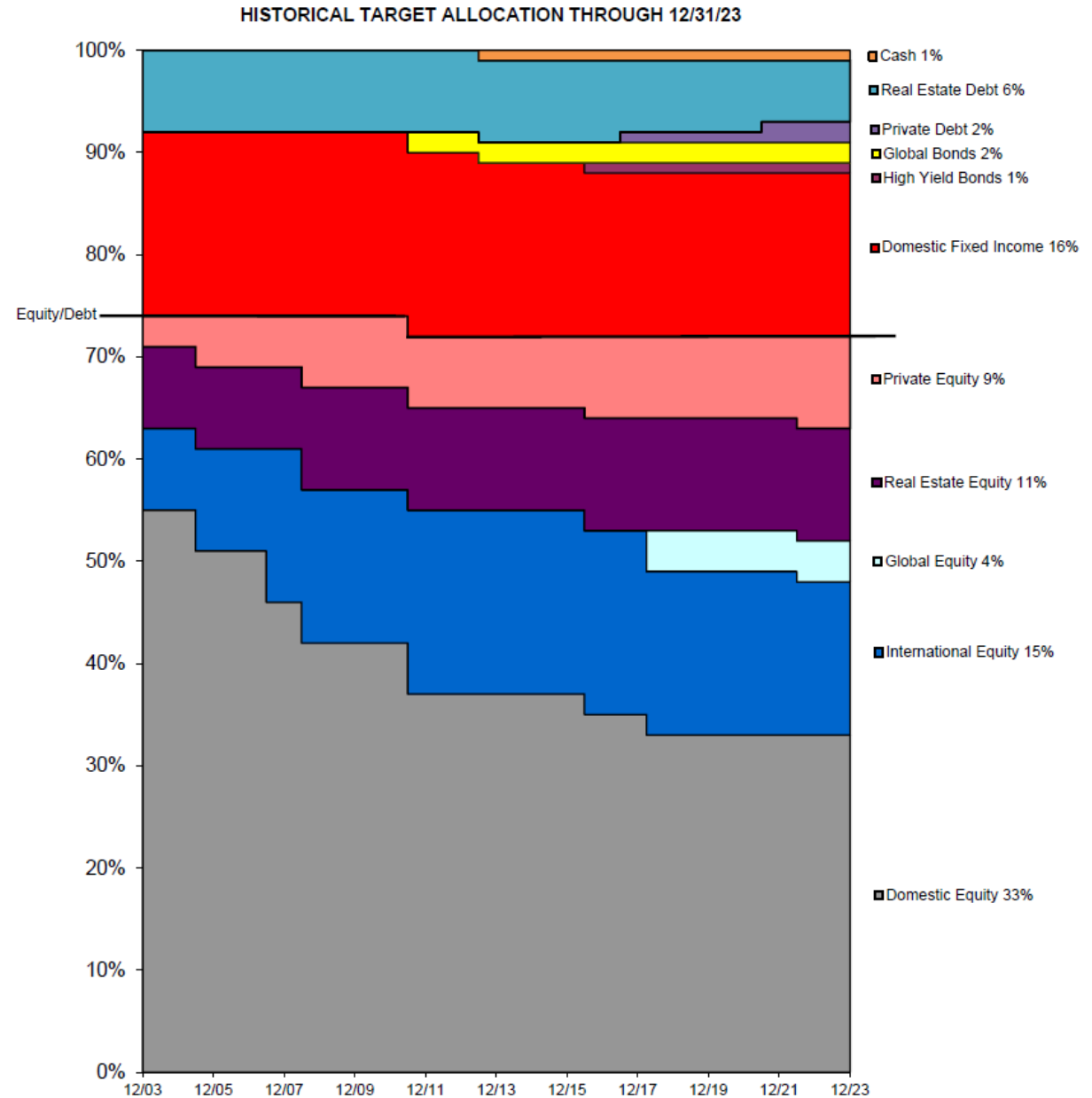
Source: Callan LLC

# NYSTRS Asset Allocation Target Over Time

NYSTRS' target asset allocation has evolved steadily over the past two decades

- Diversifying strategies have been added or increased, funded primarily from domestic equity
  - International equity
  - Private equity
  - Real estate equity
  - Global equity
  - Global fixed income
  - Private credit
  - High Yield bonds

Importantly, NYSTRS has maintained a deliberate allocation to high-quality fixed income over time



Source: Office of the CFO/Investment Operations Department

## Leeway Clause Estimate

<i>Current Policy Target</i>	<i>Allocation</i>	<i>Estimated Leeway</i>
Domestic Equity	33%	0.00%
International Equity	15%	6.01%
Global Equity (1)	4%	0.67%
Real Estate Equity (2)	11%	0.79%
Private Equity	9%	9.00%
	72%	16.47%
Domestic Fixed Income	16%	0.00%
High Yield Bonds (3)	1%	1.00%
Global Bonds (4)	2%	1.50%
Real Estate Debt (2)	6%	0.20%
Private Debt	2%	2.00%
Cash Equivalents	1%	0.00%
	28%	4.70%
	100%	21.17%
Other (5)		1.11%
Leeway Assets (6)		22.28%
Available Leeway		12.72%
<b>Leeway at 12/31/23</b>		<b>21.58%</b>

Notes:

(1) Assumes Global Equity is split 58% domestic 42% international.

(2) Only a portion of the Real Estate Equity and Debt asset classes --- Directly Owned Properties and Real Estate Funds --- contribute to the 10% limit for Real Estate. Estimated Leeway was calculated with 80% of the Real Estate Equity asset class and 36% of the Real Estate Debt asset class contributing to the 10% limit based on actual amounts as of 12/31/2023.

(3) Assumes 100% of High Yield Bonds are below investment grade.

(4) Assumes 75% of Global Bonds are foreign or below investment grade.

(5) Includes securities with a market capitalization less than \$1B, foreign securities held in domestic portfolios, equity holdings more than 2% of fund assets, domestic fixed income securities below investment grade, and applicable securities lending collateral as of 12/31/2023.

(6) Estimated Leeway percentages are based on assumptions and historical data, and are not intended to precisely predict future percentages. Actual Leeway was 21.58% as of 12/31/23.

Callan

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**Appendix**

# Customized NYSTRS Capital Market Projections – 30-Year Time Horizon

## NYSTRS Correlation Matrix

Correlation Matrix	Broad US	Glb ex US	Glbl Eq	RE Eq	Priv Eq	Priv Cred	Core Fix	Glbl Fix	EMD	RE Debt	Hi Yield	Cash	Infl	New GFI
Broad US Equity	<b>1.00</b>													
Global ex-US Equity (NYSTRS)	0.78	<b>1.00</b>												
Global Equity	0.95	0.93	<b>1.00</b>											
Real Estate Equity	0.56	0.57	0.60	<b>1.00</b>										
Private Equity	0.80	0.77	0.83	0.68	<b>1.00</b>									
Private Credit	0.68	0.66	0.71	0.46	0.65	<b>1.00</b>								
Core US Fixed	0.08	0.04	0.07	0.09	-0.04	0.06	<b>1.00</b>							
Global Fixed Income	0.12	0.11	0.12	0.11	0.03	0.10	0.80	<b>1.00</b>						
EMD	0.61	0.63	0.65	0.35	0.44	0.47	0.23	0.22	<b>1.00</b>					
Real Estate Debt	0.76	0.74	0.80	0.68	0.86	0.60	0.38	0.39	0.52	<b>1.00</b>				
High Yield	0.75	0.73	0.79	0.49	0.55	0.55	0.15	0.18	0.62	0.63	<b>1.00</b>			
Cash Equivalents	-0.03	-0.08	-0.06	-0.03	-0.04	-0.04	0.16	0.14	-0.02	0.04	-0.03	<b>1.00</b>		
Inflation	0.00	0.01	0.01	0.18	0.04	-0.04	-0.22	-0.18	-0.04	-0.05	-0.03	0.02	<b>1.00</b>	
Proposed Global FI	0.34	0.33	0.35	0.24	0.20	0.27	0.80	0.93	0.54	0.55	0.40	0.11	-0.18	<b>1.00</b>

Projection set customized to reflect specific NYSTRS strategies:

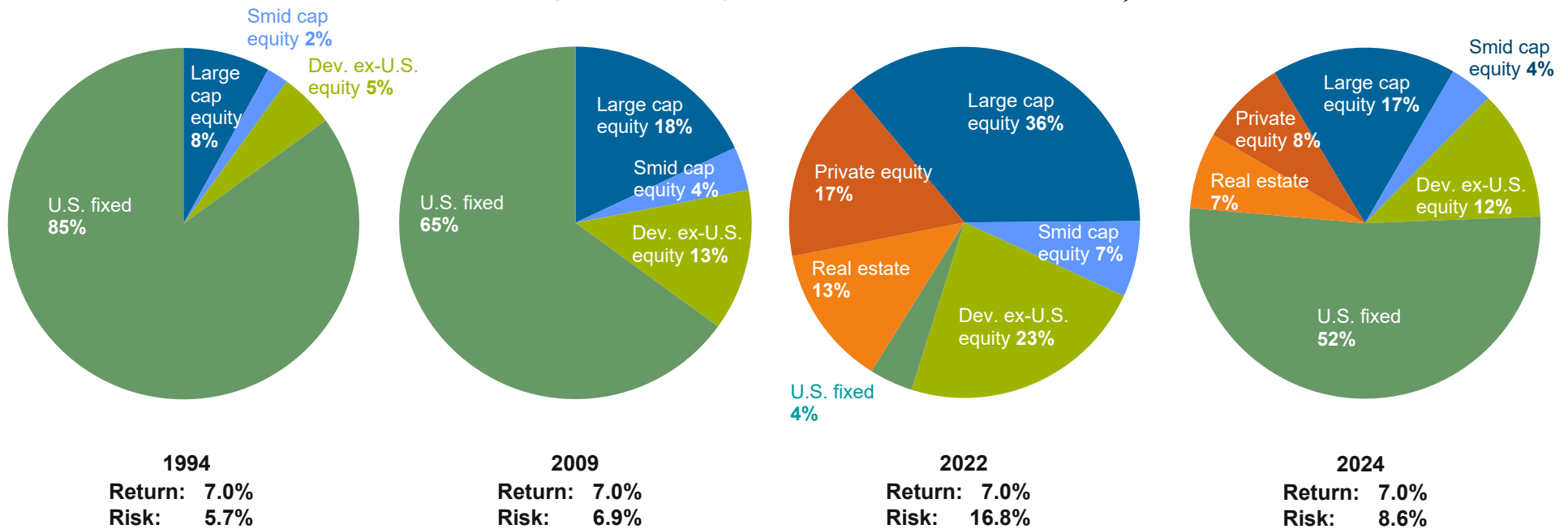
- Real estate equity, real estate debt, global fixed income

Proposed Global FI = 70% global aggregate, 10% global corporate, 20% emerging debt USD IG

Source: Callan LLC

# 7% Expected Returns Over Past 30 Years

## Increasing Complexity



## Increasing Risk

In 1994, our return expectation for broad U.S. fixed income was 6.2%.

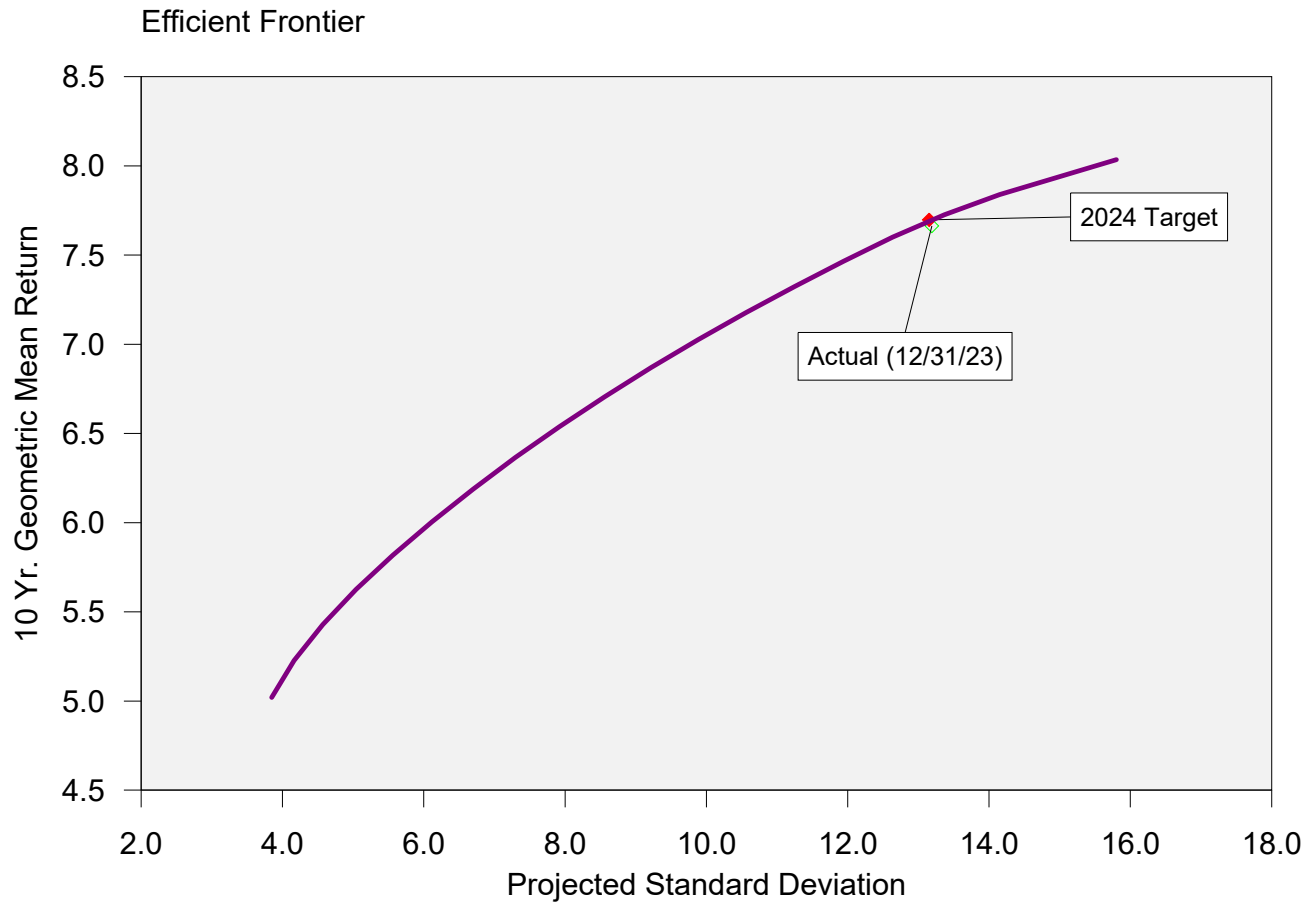
Just 15% in return-seeking assets was required to earn a 7% projected return.

15 years later, an institutional investor would have needed an additional 20% of the portfolio in public equities for a total of 35% to achieve a 7% projected return.

In 2022 an investor was required to include 96% in return-seeking assets (including 30% in private markets investments) to earn a 7% projected return at almost 3x the volatility compared to 1994.

Today's 7% expected return portfolio is much more reasonable than it was just two years ago. The allocation to fixed income jumps to 52%, while risk is essentially cut in half. Private markets investments are also cut in half.

# Efficient Frontier Analysis



- The Current Target is on the constrained efficient frontier. The actual asset allocation, as of 12/31/23, is slightly below the constrained efficient frontier

Constrained efficient frontier shown. Constraints include current 28% total exposure to illiquid asset classes, 5% maximum Private Debt, 6% maximum Real Estate Debt, and 25% maximum Private Equity relative to total Public Equity.

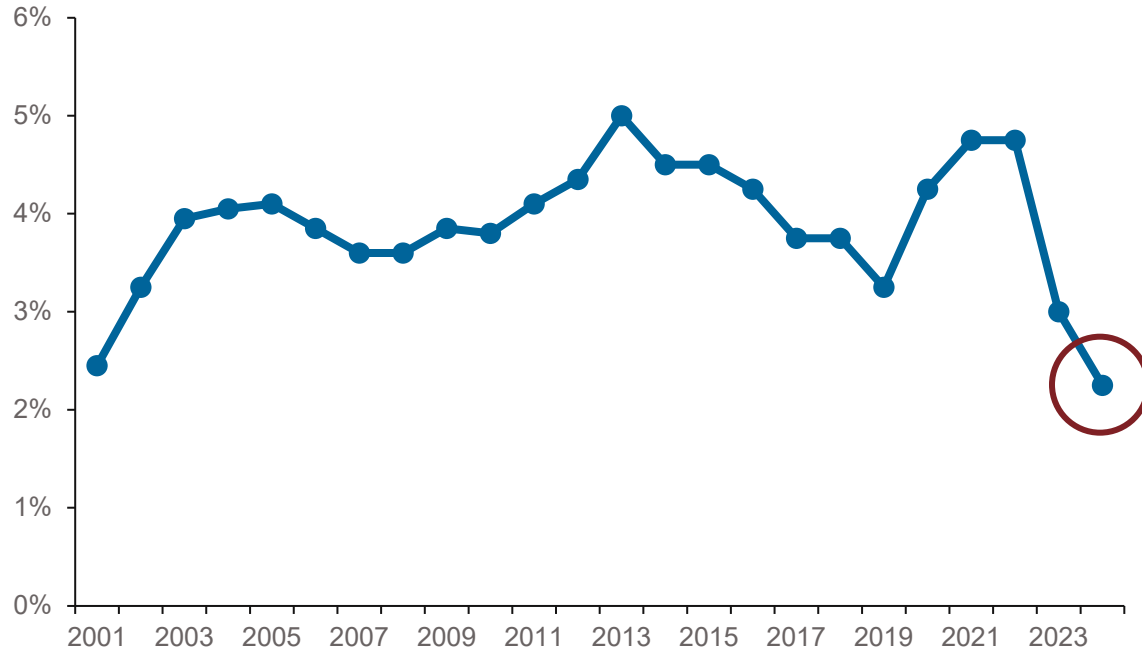
Source: Callan LLC



# Callan's Equity Risk Premia Forecasts Over Time

S&P 500 forecast minus Bloomberg Aggregate forecast

Forecasted Equity Risk Premium vs. Bonds

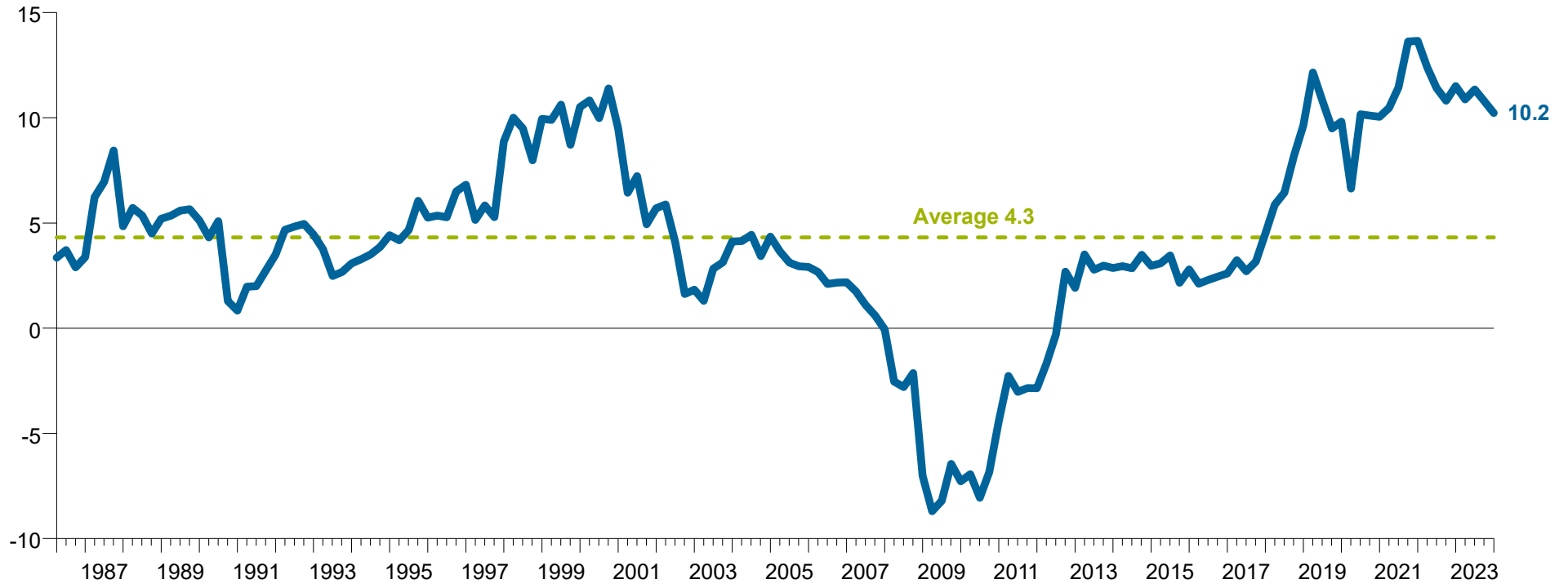


Callan's forecasted return spread between the S&P 500 and the Bloomberg Aggregate (2.25%) is the narrowest since 2000.

Forecasts are annualized over 10 years.

# Historical Equity Risk Premium Over Bonds

S&P 500 Rolling 40 Quarter Excess Return Relative to Bloomberg Aggregate

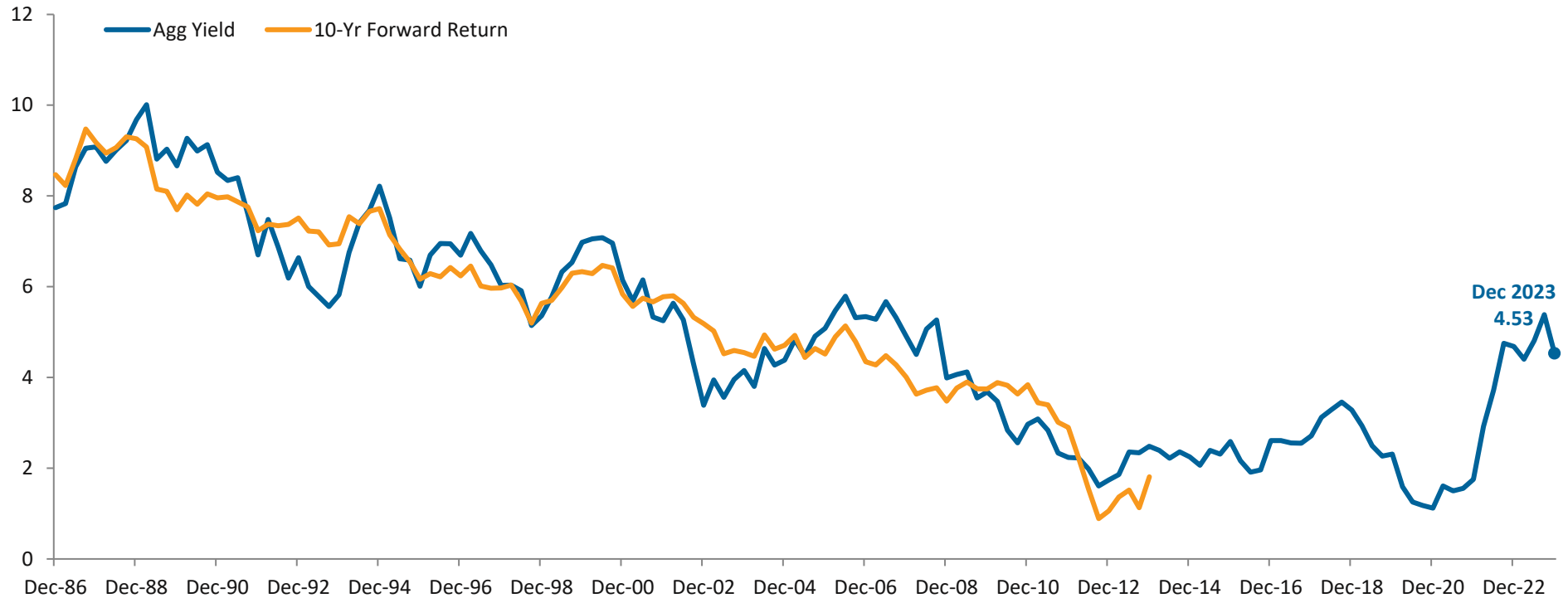


- Our 2.25% equity risk premium over core bonds is low relative to the historical average of 4.3%, but the premium has been volatile and 2.25% is within the historical range

Sources: Bloomberg, S&P Dow Jones Indices

# Starting Yield Strongly Predicts Forward Returns

Bloomberg Aggregate Index Starting Yield vs. 10-Year Forward Return



- There is a strong relationship between starting yields and subsequent 10-Year returns.
- Yield on the Bloomberg Aggregate Index was 4.53% as of December 31, 2023.

Source: Bloomberg

# Projected Fixed Income Returns

10-year projections

	Income Return	+ Capital Gain/Loss	+ Credit Default	+ Roll Return	=	2024 Expected Return	2023 Expected Return	Change vs. 2023	2022 Expected Return	Change vs. 2022
<b>Cash</b>	<b>3.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>		<b>3.00%</b>	<b>2.75%</b>	<b>0.25%</b>	<b>1.20%</b>	<b>1.80%</b>
<b>1-3 Year Gov/Credit</b>	<b>3.70%</b>	<b>0.40%</b>	<b>-0.10%</b>	<b>0.25%</b>		<b>4.25%</b>	<b>3.80%</b>	<b>0.45%</b>	<b>1.50%</b>	<b>2.75%</b>
1-3 Year Government	3.50%	0.40%	0.00%	0.25%		4.15%	3.60%			
1-3 Year Credit	4.20%	0.40%	-0.20%	0.25%		4.65%	4.00%			
<b>Intermediate Gov/Credit</b>	<b>4.30%</b>	<b>0.30%</b>	<b>-0.10%</b>	<b>0.25%</b>		<b>4.75%</b>	<b>4.10%</b>	<b>0.65%</b>	<b>1.70%</b>	<b>3.05%</b>
Intermediate Gov	3.90%	0.30%	0.00%	0.25%		4.45%	4.00%			
Intermediate Credit	4.90%	0.40%	-0.30%	0.25%		5.25%	4.25%			
<b>Aggregate</b>	<b>4.70%</b>	<b>0.40%</b>	<b>-0.10%</b>	<b>0.25%</b>		<b>5.25%</b>	<b>4.25%</b>	<b>1.00%</b>	<b>1.75%</b>	<b>3.50%</b>
Government	4.20%	0.40%	0.00%	0.25%		4.85%	3.95%			
Securitized	4.50%	0.60%	0.00%	0.25%		5.35%	4.25%			
Credit	5.55%	0.20%	-0.40%	0.25%		5.60%	4.70%			
<b>Long Duration Gov/Credit</b>	<b>5.70%</b>	<b>-0.10%</b>	<b>-0.20%</b>	<b>0.60%</b>		<b>6.00%</b>	<b>4.65%</b>	<b>1.35%</b>	<b>1.80%</b>	<b>4.20%</b>
Long Government	4.80%	0.00%	0.00%	0.60%		5.40%	3.70%			
Long Credit	6.20%	-0.20%	-0.30%	0.60%		6.30%	5.20%			
<b>TIPS</b>	<b>4.30%</b>	<b>0.50%</b>	<b>0.00%</b>	<b>0.25%</b>		<b>5.05%</b>	<b>4.00%</b>	<b>1.05%</b>	<b>1.25%</b>	<b>3.80%</b>
<b>Global ex-U.S. Fixed</b>	<b>2.70%</b>	<b>0.30%</b>	<b>-0.10%</b>	<b>0.25%</b>		<b>3.15%</b>	<b>2.25%</b>	<b>0.90%</b>	<b>0.80%</b>	<b>2.35%</b>
<b>High Yield</b>	<b>8.45%</b>	<b>0.20%</b>	<b>-2.10%</b>	<b>0.25%</b>		<b>6.80%</b>	<b>6.25%</b>	<b>0.55%</b>	<b>3.90%</b>	<b>2.90%</b>
<b>Emerging Markets Debt</b>	<b>7.70%</b>	<b>0.30%</b>	<b>-1.90%</b>	<b>0.25%</b>		<b>6.35%</b>	<b>5.85%</b>	<b>0.50%</b>	<b>3.60%</b>	<b>2.75%</b>
<b>Bank Loans</b>	<b>8.15%</b>	<b>0.00%</b>	<b>-1.60%</b>	<b>0.00%</b>		<b>6.55%</b>	<b>6.10%</b>	<b>0.45%</b>	<b>4.60%</b>	<b>1.95%</b>

# Equity Forecasts

## Overview

### Fundamental Relationship

$$\text{Equity Return} = \text{Capital Appreciation} + \text{Income} + \text{+/- Valuation Adjustment}$$

The diagram illustrates the components of Equity Return. It is broken down into three main parts: Capital Appreciation, Income, and +/- Valuation Adjustment. Capital Appreciation is further broken down into Real Earnings Growth + Inflation. Income is broken down into Dividend Yield + Net Share Buybacks.

Building up U.S. equity (S&P 500) returns from long-term fundamentals, we arrive at 7.50%

- Real earnings growth is linked to real GDP growth over long horizons; we forecast **2.50%** over the next decade
- Inflation (CPI-U) forecasted at **2.50%** over the next ten years
  - *Slightly above the Fed's inflation target of 2%*
  - *Realized inflation over past quarter century has been 2.5%*
  - *In line with the market-based forecast of breakeven inflation (yield difference between Treasuries and TIPS)*
- Income return of **2.50%** from dividend yield and share buybacks
- Equity valuations are in line with historical norms so no valuation adjustment
- Small premium for Global ex-U.S. over U.S. stems from emerging market growth potential

# Equity Forecasts

## Building block model

Index	Forecasted Dividend Yield	Net Buyback Yield	Inflation	Real Earnings Growth	Valuation Adjustment	Total Expected Return
S&P 500	2.00%	0.50%	2.50%	2.50%	0.00%	7.50%
Russell 2500	1.75%	0.00%	2.50%	3.45%	0.00%	7.70%
MSCI World ex USA	3.75%	0.00%	2.00%	1.75%	0.00%	7.50%
MSCI Emerging Markets	3.55%	-2.90%	3.25%	3.80%	0.00%	7.70%

Our return expectations for US large cap (S&P 500) and non-US Developed markets (MSCI World ex-US) are the same, but the paths to those returns are different

U.S. companies tend to deliver more return from earnings growth than from return of capital via dividends or buybacks

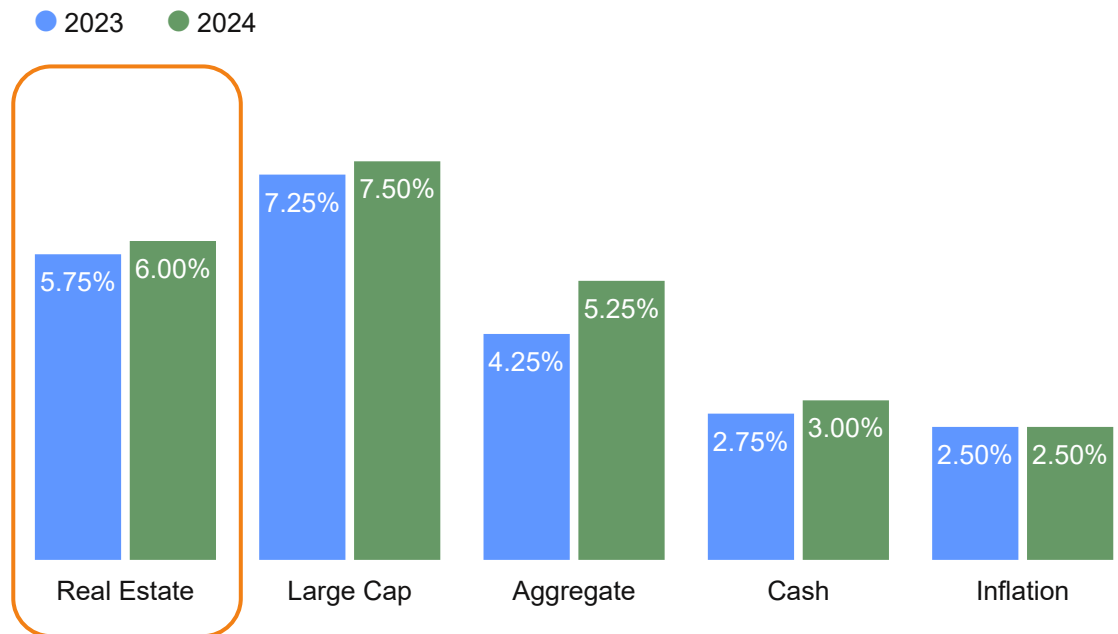
- Non-U.S. developed companies have the opposite relationship
- Emerging market companies tend to deliver strong earnings growth, which is somewhat offset by net issuance of shares as these companies issue stock to support growth

# Core Real Estate

## Background

- Real estate has characteristics of equity (ownership and appreciation) and bonds (income from rents). Real estate returned -8.4% for the year ended September 30, 2023, on an unlevered property basis
- While real estate, especially within offices, is expected to continue facing headwinds in the short-term, recent price declines could make more attractive entry points available for long-term investors
- Slight increase in real estate returns compared to last year.

## Return Projections



**2024 real estate return projection: 6%**  
(up 25 bps)

Source: Callan, NCREIF NPI index

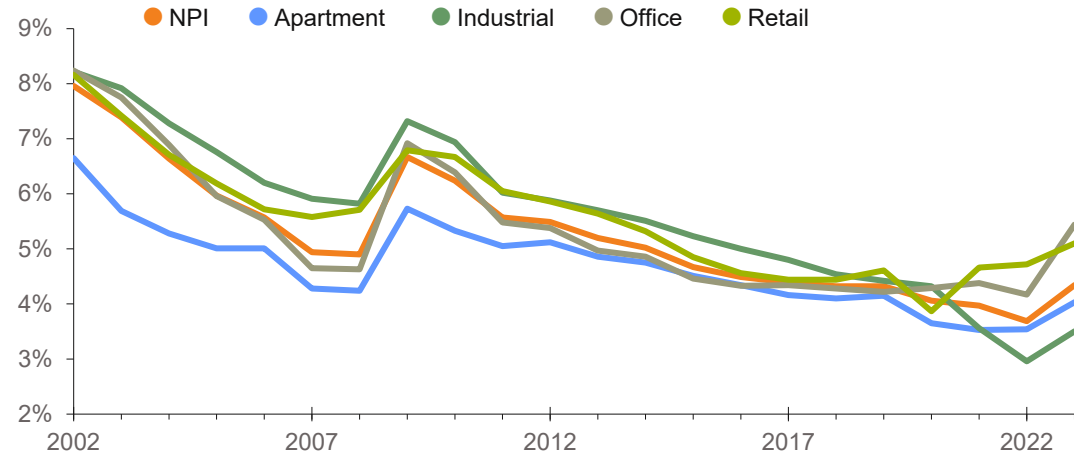
# Core Real Estate

**6%** core real estate compound return (net of fees)

- Return calculations assume 5.4% cost of leverage and 0.5x debt-to-equity (33% loan-to-value)

Income Return (unlevered property)	5.1%
Appreciation (unlevered property)	1.0%
<b>Total Return (before leverage)</b>	<b>6.1%</b>

Annual Cap Rates (through September 30, 2023)



Callan Return Assumptions (unlevered property returns)

	Office	Retail	Industrial	Apartments	Other	NPI Index
Income	5.7%	5.6%	4.3%	5.1%	5.8%	5.1%
Appreciation	0.0%	0.4%	2.3%	0.6%	0.9%	1.0%
<b>Total Return</b>	<b>5.7%</b>	<b>6.0%</b>	<b>6.6%</b>	<b>5.7%</b>	<b>6.7%</b>	<b>6.1%</b>

Source: NCREIF Property Index (NPI) cap rates correspond to unlevered property valuations

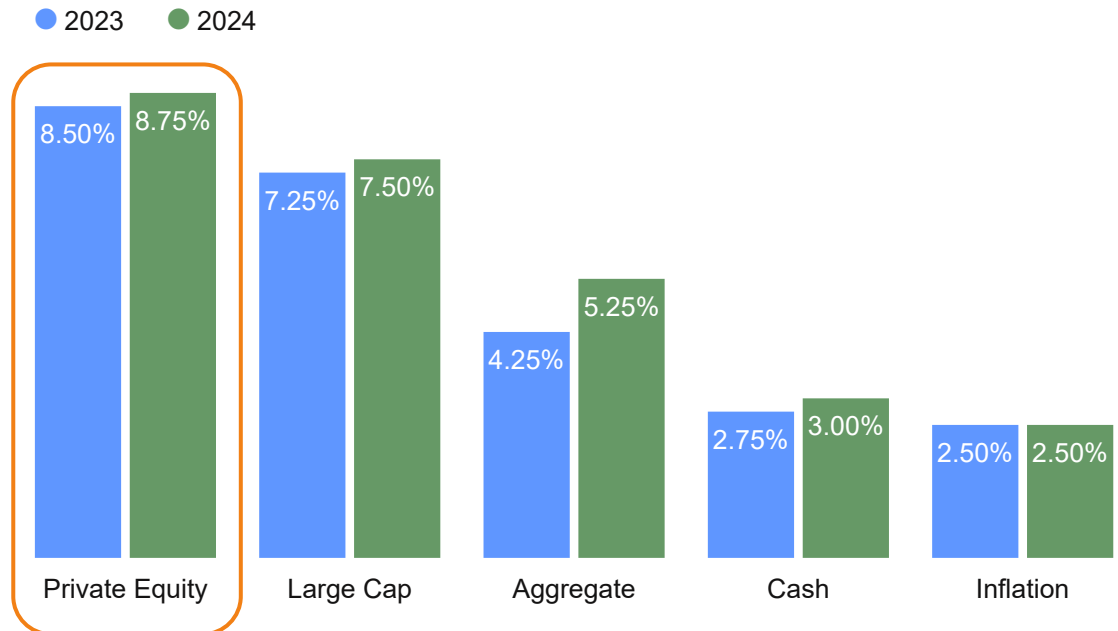


# Private Equity

## Background

- The private equity market in aggregate is driven by many of the same economic factors as public equity markets. However, we expect private equity to experience some write-downs that have not yet been reflected in performance.
- Private equity performance expectations rose in line with public equity expectations.
- We see tremendous disparity between the best- and worst-performing private equity managers.
- The ability to select skillful managers could result in realized returns significantly greater than projected here.

## Return Projections



**2024 private equity return projection:**  
8.75% (up 25 bps)

Source: Callan

# Private Credit

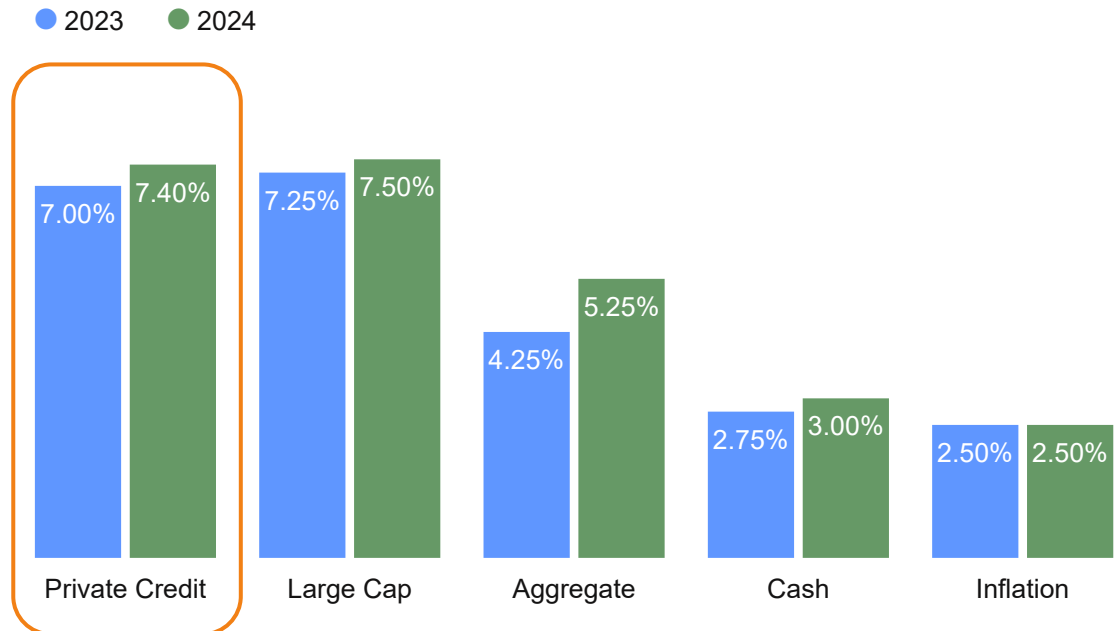
## Background

- Return projection is anchored on middle market direct lending where yields have risen along with public fixed income yields.
- While banks are no longer major investors in this market, there is strong appetite from institutional and retail investors.

**2024 private credit return projection:**  
**7.4%** (up 40 bps)

Unlevered Yield	9.5%
Leverage	0.85x
Levered Yield	12.9%
Loss Ratio	2.4%
Net Arithmetic	8.5%
<b>Net Compound Return</b>	<b>7.4%</b>

## Return Projections



Source: Callan  
Return calculation assumes 5.5% cost of leverage and 1.3% unlevered loss ratio

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Past performance is no guarantee of future results.

## US Dollar Emerging Market Debt Portfolio Implementation

<b>Mandate:</b>	NYSTRS US Dollar Emerging Market Debt
<b>Benchmark:</b>	Bloomberg EM USD Aggregate Investment Grade – 10% Country Cap (custom)
<b>Investment Style:</b>	Generate an average total rate of return that meets or exceeds the benchmark through security selection and positioning in country, credit, curve, and duration.
<b>Managers:</b>	Internally managed
<b>Recommendation:</b>	\$500 million portfolio

### **SUMMARY**

- NYSTRS Fixed Income recommends establishing an internally managed US dollar Emerging Market Debt (EMD) strategy with 20% of the System's 2% Global Bond allocation.
- The proposed benchmark is fully contained in the NYSTRS Global Bonds benchmark and partially in our Domestic bond benchmark, so the securities are already in our investable universe<sup>1</sup>. The EMD strategy will result in a strategic overweight to emerging market debt within Global Bonds.
- The EMD strategy will focus on non-US investment grade rated government, government-related, and corporate bonds that offer a credit spread over US Treasuries. An initial guideline allowing up to 10% of the portfolio to be invested in BB-rated government and government-related securities could enhance returns and increase country diversification.
- There are no implementation, capacity, or capability hurdles for internal management of EMD. The portfolio can be funded in \$250 million increments initially invested in US Treasuries.

### **BACKGROUND**

NYSTRS fixed income assets totaled \$26.6 billion as of December 31<sup>st</sup>, 2023 with an asset allocation target of 20% of total System assets. This includes the internally managed Domestic and Short-Term Bond portfolios and the externally managed US High Yield, Global Bond, and Carbon Transition strategies.

The overall Global Bond strategy is currently near its 2% asset allocation target. A \$500 million EMD portfolio would represent approximately 20% of the Global Bonds allocation or 0.4% of total System assets.

Portfolio	Target	Currency	Manager
Domestic (LTB)	16.0%	USD only	NYSTRS Fixed Income
Short-Term Bond	1.0%	USD only	NYSTRS Fixed Income
US High Yield	1.0%	USD only	4 External Managers
Global Bond Allocation	2.0%		
Global Agg	1.4%	27 (hedged)	3 External Managers
Carbon Transition	0.2%	13 (hedged)	2 External Managers
EMD (proposed)	0.4%	USD only	NYSTRS Fixed Income
Total	20%		

The Global Bond allocation includes 3 portfolios benchmarked to the Bloomberg Global Aggregate Index (Global Agg), which comprises the largest investment-grade bond universe with \$65 trillion in

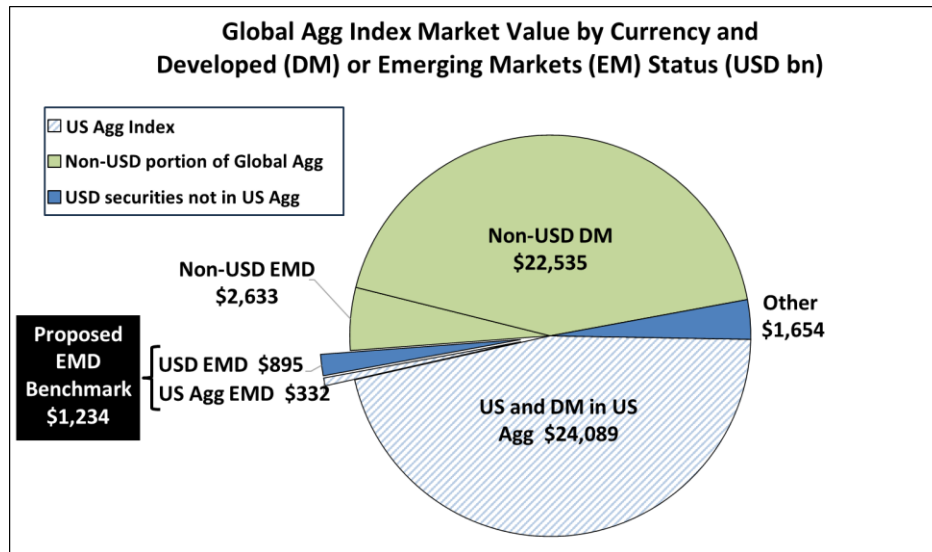
<sup>1</sup> The Global Bond benchmark is the Bloomberg Global Aggregate Float Adjusted Index ex-CNY (USD hedged), which does not currently include Chinese Yuan-denominated (CNY) debt and significantly reduces non-USD currency exposure.

## US Dollar Emerging Market Debt Portfolio Implementation

market value and nearly 30 thousand securities. In 2023, the NYSTRS board approved a Carbon Transition strategy with 2 external portfolios benchmarked to a corporate bond subset of the Global Agg index.

Similar to Carbon Transition, the EMD strategy will be managed against a subset of the Global Agg index—the US dollar emerging market portion. This will result in a Global Bond allocation that is roughly split 70/10/20% between full Global Agg, Carbon Transition corporates, and EMD. While the Global Agg and Carbon Transition portfolios are mostly hedged back to dollars with currency forwards, the US dollar denominated securities solely comprising the EMD portfolio will not require any hedging.

Besides being fully contained in the Global Agg index, approximately 27% (\$332b of \$1.23tr) EMD benchmark is contained in NYSTRS internally managed Domestic Long-Term Bond (LTB) benchmark.<sup>2</sup> The remaining 73% of the EMD benchmark can also be purchased in LTB as Leeway Clause assets.<sup>3</sup>



### **BENCHMARK INVESTABILITY**

#### Sector composition

The proposed EMD benchmark is a custom-built index—the Bloomberg EM USD Aggregate Investment Grade – 10% Country Cap. The benchmark includes 3 main sectors—government, government-related, and corporate bonds. The overall index and sector weights and characteristics are shown below. One important point to note is that the EMD benchmark does not include any securitized bonds, while the Global Agg is comprised of 13.9% securitized<sup>4</sup>.

<sup>2</sup> The EMD benchmark has a \$500mm minimum outstanding compared to \$300mm for the Global Agg; this results in the Global Agg containing about \$136b more in EM US dollar market value.

<sup>3</sup> Note that all bonds from non-US issuers in the Global Bond portfolios are already classified as Leeway. Based on 12/31/23 values, converting 20% of Global Bonds to EMD would result in a small increase in Leeway assets as a percent of total System assets (from 21.58% to 21.75%).

<sup>4</sup> 84% of the securitized in the Global Agg are US mortgage-backed securities (MBS), asset-backed securities (ABS), etc.

## US Dollar Emerging Market Debt Portfolio Implementation

	<b>Mkt Val \$Bn</b>	<b>Wgt</b>	<b>Securities</b>	<b>Yield %</b>	<b>Duration Yr</b>	<b>Spread bp</b>
<b>Government</b>	557.4	45.2%	314	5.42	8.33	110
<b>Govt-Related</b>	391.6	31.7%	549	5.45	5.82	108
<b>Corporates</b>	285.5	23.1%	408	5.75	5.47	139
<b>Financials</b>	80.0	6.5%	128	5.79	2.95	131
<b>Industrial</b>	187.6	15.2%	255	5.66	6.53	135
<b>Utility</b>	18.0	1.5%	25	6.45	5.53	217
<b>Total</b>	1,234	100.0%	1,271	5.50	6.84	116

Overall, the EMD benchmark is diversified across sectors. Compared to the overall Global Agg index, the EMD benchmark has a higher weight for government-related (31.7% vs.15.0%). Including state-owned firms (under government-related), the EMD benchmark is more heavily weighted to commodity and energy producers. Technology firms also have a higher weight in the EMD benchmark versus the overall Global Agg. As discussed below, the portfolio weight for financial issuers in the portfolio will likely be lower than the 6.5% benchmark weight.

### Security Registration Type

Another consideration is Securities and Exchange Commission (SEC) registration, which requires certain levels of disclosure, filing costs, and time before securities can be sold to US investors. The table below shows the EMD benchmark broken down by registration status. About 29% of the EMD benchmark is comprised of securities that are SEC registered. Another 54% of the index is 144A securities, which have a “safe harbor” exemption from SEC registration<sup>5</sup>. Only large institutional investors can purchase 144A securities by identifying as a Qualified Institutional Buyer (QIB). NYSTRS maintains its QIB status, and both our internal and external portfolios hold 144A securities.

<b>Sector</b>	<b>Percent of Securities</b>			<b>Market Value Weight</b>		
	<b>Sec-Reg</b>	<b>144A</b>	<b>Reg S Only</b>	<b>Sec-Reg</b>	<b>144A</b>	<b>Reg S Only</b>
<b>Government</b>	53%	43%	4%	48.0%	49.3%	2.7%
<b>Govt-Related</b>	9%	49%	42%	9.6%	58.5%	31.9%
<b>Corporates</b>	17%	55%	28%	19.9%	56.9%	23.1%
<b>Financials</b>	0%	38%	63%	0.0%	41.1%	58.9%
<b>Industrial</b>	26%	61%	12%	29.4%	61.2%	9.5%
<b>Utility</b>	8%	84%	8%	10.4%	83.6%	6.0%
<b>Total</b>	22%	49%	29%	29.3%	53.8%	17.0%

The last category in the table is Reg S-only securities, which are also exempt from SEC registration. Reg S securities pose additional burdens on US investors, with the most important being a required 40-day “seasoning” period after issuance before purchases are allowed. In general, the portfolio will likely purchase less Reg S-only securities since they cannot be purchased in the new issue market.

Reg S-only securities comprise a manageable 17% of the overall benchmark, but 59% of financial company issuance. However, nearly half of the 59% are Sukuk (or Islamic) bonds, a security type that we are unlikely to add to the portfolio. Most of the rest of the Reg S-only financials are issuers in China, Saudi Arabia, and the UAE. As discussed below, we have simultaneously set the benchmark limit to 10% for each of these countries, so there is clearly enough issuance to still get the country exposure outside of financials.

<sup>5</sup> In most cases, 144A securities are dually issued with Reg S securities. In those cases, a US-based investor such as NYSTRS selects the 144A security when the securities are newly offered. It is possible to later convert a 144A holding to Reg S, which may be done to take advantage of the lower trading costs and better liquidity in Reg S EMD bonds.

## US Dollar Emerging Market Debt Portfolio Implementation

### Countries

The benchmark includes bonds from 28 countries. A common feature of EMD benchmarks is to limit individual country weights and the effect of a 10% cap is shown in the table. The cap lowers the combined weight of Chinese and Saudi Arabian issuers to 20% versus 31% if uncapped.

For some countries in the table (shaded in grey), the market values only include investment grade corporate or government-related bonds where the government is rated high yield. This includes 3 large EM countries—Brazil, Colombia, and South Africa.

Permitting up to 10% BB-rated securities would allow the inclusion of the government debt of these 3 countries and 13 others. These off-benchmark securities would widen the investable market value by \$240 billion, which is equivalent to about 20% of the benchmark. The total investable country list increases from 28 to 41 with nearly 75% of the exposure in Brazil, Colombia, Oman, Dominican Republic, and South Africa. See *the appendix for a full list of BB countries and market values. The 10% is also discussed in the Risks section below.*

Country	Sov Rating	Uncapped		10% Cap	
		Mkt Val	Wgt %	Mkt Val	Wgt %
China	A+	228.4	18.5	123.6	10.0
Saudi Arabia	A+	152.6	12.4	123.6	10.0
Mexico	BBB	117.7	9.5	123.6	10.0
UAE	AA	110.2	8.9	123.6	10.0
Indonesia	BBB	101.3	8.2	119.8	9.7
Korea	AA	83.3	6.7	98.5	8.0
Qatar	AA	63.7	5.2	75.3	6.1
Chile	A-	63.5	5.1	75.1	6.1
Philippines	BBB	35.5	2.9	42.0	3.4
Panama	BBB-	30.2	2.4	35.8	2.9
India	BBB-	29.7	2.4	35.1	2.8
Peru	BBB	26.3	2.1	31.1	2.5
Malaysia	A-	24.5	2.0	28.9	2.3
Israel	A+	21.5	1.7	25.5	2.1
Brazil	BB	21.3	1.7	25.1	2.0
Hungary	BBB	19.6	1.6	23.1	1.9
Romania	BBB-	17.5	1.4	20.7	1.7
Taiwan	AA	15.7	1.3	18.6	1.5
Uruguay	BBB	15.0	1.2	17.8	1.4
Kuwait	A+	12.8	1.0	15.2	1.2
Poland	A-	12.7	1.0	15.0	1.2
Kazakhstan	BBB	12.1	1.0	14.3	1.2
Thailand	BBB+	9.0	0.7	10.7	0.9
South Africa	BB-	7.4	0.6	8.7	0.7
Bermuda	A	2.5	0.2	2.9	0.2
Colombia	BB+	1.0	0.1	1.2	0.1
Jordan	B+	0.5	0.0	0.6	0.0
Bahrain	B+	0.5	0.0	0.6	0.0

### **FIXED INCOME TEAM CAPABILITY**

In addition to securitized bonds, NYSTRS Fixed Income manages US dollar assets in the 3 main sectors of the EMD portfolio—government, government-related, and corporates. Responsibilities for the sectors is split up among staff with each person acting as analyst/trader/portfolio manager. This model will transfer to the EMD portfolio and the team is already familiar with a subset of EMD issuers. We hold several EM securities in the Domestic bond portfolio (including 4 of the top 10 EMD corporate issuers).

Fixed Income has several sources for macroeconomic, geopolitical, sector, industry, and issuer level research. These include finished research reports and communication with our external global bond managers, investment bank counterparties, credit ratings firms, and specialized research providers. In addition, the team has access to raw news and large datasets from a range of platforms and providers. This allows for both instant, ad-hoc analysis and the production of refreshable reports using transformed and modeled data.

Fixed Income already utilizes the trading and portfolio management tools needed to manage EMD. This includes several trading platforms for various sectors and the Aladdin order management, risk, performance, and portfolio management tools. In addition, Fixed Income is in the process of onboarding a new system that will show all new bond issues in the market and enable electronic orders (versus voice and messaging). This system will cover bonds in both our LTB and the EMD portfolios.

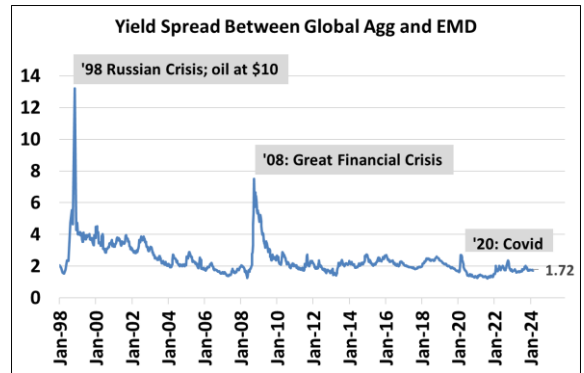
## US Dollar Emerging Market Debt Portfolio Implementation

Finally, Fixed Income is skilled at analyzing the relative value of a bond to make buy/sell decisions. This includes comparisons against an issuer's other bonds and similar issuers. At the simplest level, the proposed EMD strategy is a US dollar credit portfolio like the Domestic bond portfolio.

### **BENEFITS OF AN EMD STRATEGY**

- **Better long-term return outlook**—As a replacement for a portion of the Global Agg portfolios, EMD offers a total yield that is about 170bp higher with only modest additional duration (0.22 years). Since the end of 1997, EMD has an annualized return of 6.2% versus 3.3% for the Global Agg<sup>6</sup>. As discussed in the Risks section, EMD volatility is now equivalent to the overall Global Agg.

Index	Rating	Yield	Spread	Duration
EMD w/10% Cap	A2/A3	5.51	116	6.85
EM w/no Cap	A2/A3	5.57	108	6.63
Global Agg	AA3/A1	3.82	40	6.63
Global ex-USD		2.86	35	7.05
Global Credit	A2/A3	4.87	94	5.97
US Agg	AA2/AA3	4.80	40	6.21



- **Maintain focus on high quality credit**—While the Global Agg has a 2 notch higher credit rating due to the inclusion of the AAA and AA DM government bonds, the EMD benchmark remains investment grade. In general, the overall credit quality of EMD has improved over time and overall debt burdens are much lower in emerging markets versus developed markets.
- **Overall allocation benefits**—Callan's 10-year asset allocation model shows that including EMD increases the Global Bond allocation returns from 4.30% to 4.75% while annualized risk increases from 3.70% to 3.95%. In risk-adjusted terms, the Global Bond sharp ratio increases from 0.35 to 0.44. That is a significant effect for a roughly \$500 million re-allocation.
- **Simpler Implementation**—Compared to other strategies, EMD is a less complicated portfolio to manage internally. In contrast to managing a full Global Agg portfolio, the US dollar EMD portfolio does not require currency hedging with forwards and has little complications with trading hours outside of Eastern Standard Time. The lower security (1,273) and issuer count (438) is easier for the team to manage versus the figures for the Global Agg (29,492 and 3,961, respectively).
- **Management fee savings**—An internal portfolio does not have management fees based on asset levels. Converting some Global Bond exposure to internally managed was one the goals of the Investment Infrastructure project (Aladdin). The current Global Bond management fees are approximately 19bp per year. A small portion of the fee savings may be offset by costs such as index licensing (up to \$20,000 per year) or additional staff. Future growth of the EMD strategy may lead to further management fee savings.

<sup>6</sup> Performance since the end of 1997 is cited as that is the commencement of the proposed EMD benchmark. One important note is that this excludes the large negative performance and volatility during the Asian Financial Crisis of 1997 but does include the EM-wide effects of the Russian default in 1998.



US Dollar Emerging Market Debt Portfolio Implementation

**STRATEGY RISKS & MITIGANTS**

Risks	Mitigants
<p>EMD has <b>higher volatility</b> versus the Global Agg and has experienced periodic crises with contagion between countries. Since the end of 1997, overall EMD volatility is an annualized 7.4% versus 3.3% for the Global Agg.</p>	<ul style="list-style-type: none"> <li>- 10-year EMD volatility declined to 6.5%, while it increased to 3.9% for the Global Agg</li> <li>- The magnitude and contagion aspect of EM crises have declined over the decades.</li> <li>- Unlike the Global Agg (before hedging), there is no currency volatility in EMD.</li> <li>- The portfolio will focus on higher quality; the prohibition on below BB ratings currently rules out trouble spots such as Argentina, Venezuela, and Turkey.</li> <li>- Initially, the BB portion will be capped at 10% with a 5% country limit and no high yield below BB will be permitted. No corporate high yield (including BB) will be allowed.</li> </ul>
<p>There are <b>difficult to invest portions of the benchmark</b>, which leads to tracking error. These include Reg S-only (17% of index) and Islamic bonds (1.8%). Reg S-only bonds are added to the benchmark before the 40-day seasoning period.</p>	<ul style="list-style-type: none"> <li>- The portfolio will be actively managed, so some degree of tracking error is expected.</li> <li>- Our portfolio construction tools help model and trade to reach tracking error targets.</li> <li>- By establishing the portfolio with US Treasuries, Fixed Income can gradually and more cost-effectively switch the portfolio to desirable portions of EMD.</li> <li>- Reg S-only securities can be added after the 40-day seasoning period.</li> <li>- Some 144A securities may be converted to more liquid Reg S.</li> </ul>
<p><b>Country concentration risk</b> may pose a problem in terms of geopolitical or headline risk.</p>	<ul style="list-style-type: none"> <li>- Country concentration risk is reduced with the 10% benchmark cap plus potential internal limits on a permissible overweight on top of that, such as 5%. The actual China weight may be lower given that over half the market are Reg S-only bonds.</li> <li>- Fixed Income will monitor for these risks, but they can't be fully eliminated.</li> </ul>
<p>There is an overall <b>higher commodity exposure</b> inherent in EM investing.</p>	<ul style="list-style-type: none"> <li>- Fixed Income will need to monitor and stress test the portfolio holdings for overall commodity risk with available tools, such as Aladdin.</li> </ul>
<p>US dollar EMD has <b>high trading costs</b> versus other debt. EMD secondary market bid/ask price spreads are 40-50bp versus to low single digits for US Treasuries and 13-19bp for US corporates<sup>7</sup>.</p>	<ul style="list-style-type: none"> <li>- Fixed Income minimizes trade costs with turnover generally at or below 10%</li> <li>- EMD is fully dollar based without currency trading costs (unlike Global Bonds).</li> <li>- Adding new issue bonds that offer a concession can help offset transaction costs.</li> <li>- Fixed Income can minimize trading costs with electronic trading platforms for small trades and by starting with an all-US Treasury portfolio to patiently build the portfolio.</li> <li>- The EMD benchmark has a \$500mm minimum for issue sizes to improve liquidity</li> </ul>

<sup>7</sup> For example, 40-50bp of bid/ask spreads can reduce yield to maturity by 4-5bp on a 10-year bond.

US Dollar Emerging Market Debt Portfolio Implementation

Appendix

BB-Rated High Yield Bonds

Government and Government-Related Only

*Shading indicates countries with bonds in the proposed EMD investment-grade benchmark (the sovereign is rated investment-grade)*

<u>Country</u>	<u>Market Val</u>	<u>Wgt %</u>	<u>Mean Yield</u>
Brazil	49.6	20.7	6.2
Colombia	44.3	18.5	7.5
Oman	28.6	11.9	5.8
Dominican Rep	23.7	9.9	6.6
South Africa	20.4	8.5	7.4
UAE	11.4	4.8	6.0
China	9.2	3.9	6.2
Costa Rica	8.3	3.4	6.6
Morocco	7.9	3.3	6.4
Guatamala	7.1	2.9	6.2
Paraguay	5.9	2.5	6.1
Ivory Coast	4.5	1.9	7.9
Azerbaijan	3.8	1.6	6.2
Trin. & Tob.	3.2	1.3	6.0
India	2.9	1.2	6.8
Serbia	2.8	1.2	6.0
Uzbekistan	2.1	0.9	7.2
Armenia	1.1	0.4	7.1
Indonesia	1.0	0.4	6.9
Georgia	0.9	0.4	6.3
Kazakhstan	0.7	0.3	5.9
Mexico	0.4	0.2	9.3
<b>Total</b>	<b>239.9</b>	<b>100.0</b>	<b>6.6</b>

# Emerging Market Debt Portfolio Implementation

**NYSTRS Investment Committee Meeting**  
**April 24, 2024**

**Presented by Michael Federici, CFA**  
Managing Director of Fixed Income



# Proposal Summary

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- Internally managed Investment Grade US Dollar Emerging Markets portfolio
- Under current Global Bond Allocation
- Benchmark: Bloomberg EM USD Aggregate Investment Grade – 10% Country Cap
- Amount: \$500 million within Global Bonds allocation
  - Split into 2 fundings of \$250 million
  - Funding initially invested in US Treasuries to patiently build the portfolio
- Potential allowance of 10% BB high yield exposure to decrease concentration



# Background

- NYSTRS Fixed Income
  - \$26.6b as of 12/31/23
  - Internally managed
    - Domestic (LTB)
    - Short-Term Bond
  - Externally managed
    - Global Agg
    - Carbon Transition

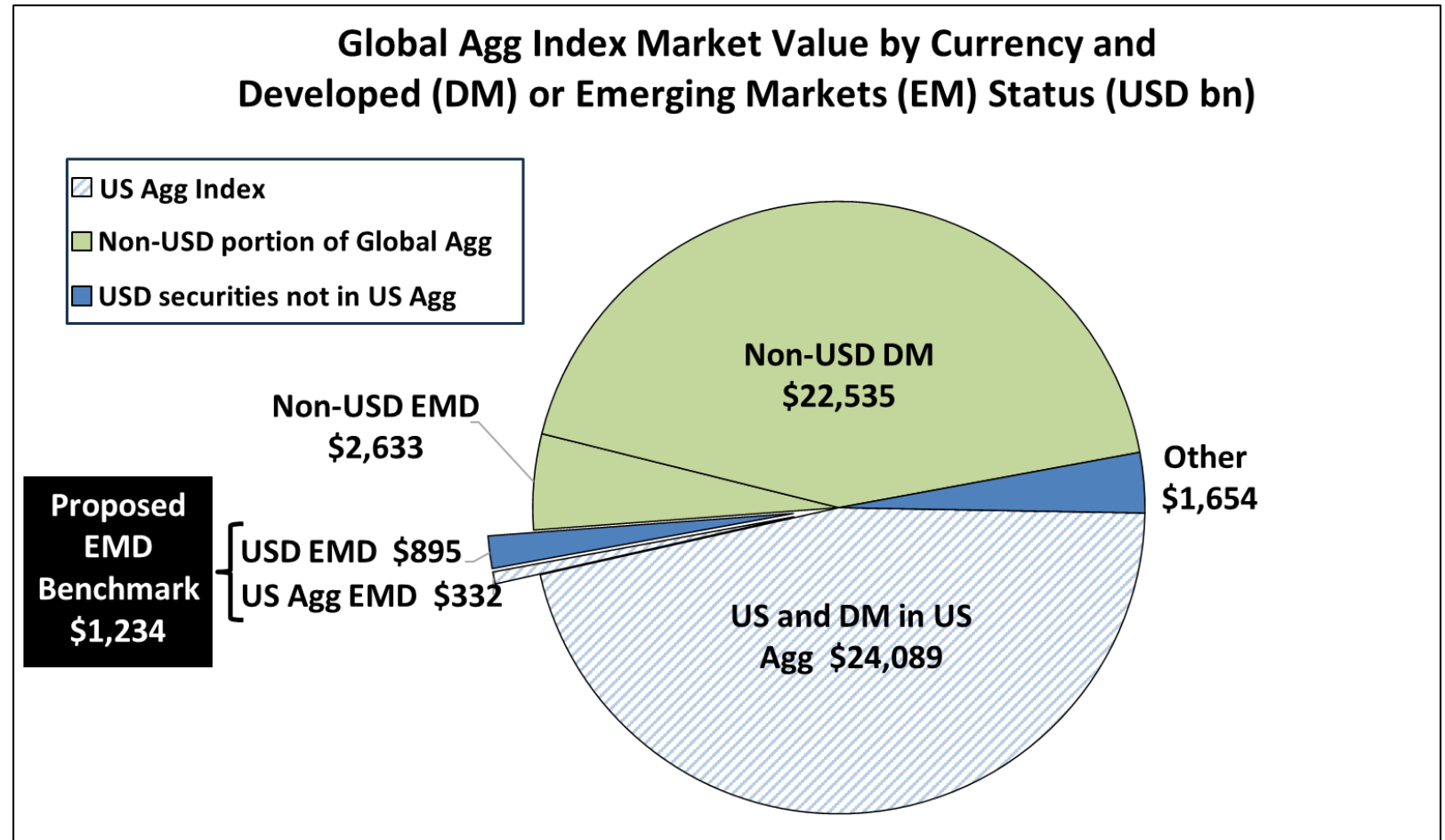
Portfolio	Target	Currency	Manager
Domestic (LTB)	16.0%	USD only	NYSTRS Fixed Income
Short-Term Bond	1.0%	USD only	NYSTRS Fixed Income
US High Yield	1.0%	USD only	4 External Managers
Global Bond Allocation	2.0%		
Global Agg	1.4%	27 (hedged)	3 External Managers
Carbon Transition	0.2%	13 (hedged)	2 External Managers
<i>EMD (proposed)</i>	<i>0.4%</i>	<i>USD only</i>	<i>NYSTRS Fixed Income</i>
Total	20%		



***Proposed EMD Portfolio: internally managed and under Global Bonds***

# Benchmark: Bloomberg EM USD Aggregate Investment Grade – 10% Country Cap

- A subset of the Global Agg<sup>1</sup> and a partial subset of the US Agg
- \$1.2tr market value (equiv. to high yield)
- EMD increases “leeway clause” assets by 0.2%<sup>2</sup>



<sup>1</sup>The EMD benchmark has a \$500 million minimum issue requirement, which signifies more liquidity; that compares to \$300 million for the Global Agg

<sup>2</sup>Note that approximately 60% of the Global Bond portfolio is already classified as leeway

# Benchmark Investability: Sectors

- 3 Sectors—Government, Govt-Related, Corporates
- Main differences from our other benchmarks:
  - No securitized (mortgages, etc.) and Govt-Related weight is higher
  - More heavily weighted to commodity and energy
  - Financials (banks, etc.) weight will likely be lower for a few reasons

	Mkt Val \$Bn	Wgt	Securities	Yield %	Duration Yr	Spread bp
Government	557.4	45.2%	314	5.42	8.33	110
Govt-Related	391.6	31.7%	549	5.45	5.82	108
Corporates	285.5	23.1%	408	5.75	5.47	139
Financials	80.0	6.5%	128	5.79	2.95	131
Industrial	187.6	15.2%	255	5.66	6.53	135
Utility	18.0	1.5%	25	6.45	5.53	217
Total	1,234	100.0%	1,271	5.50	6.84	116



***Takeaway: No major concerns with benchmark sector composition***

# Benchmark Investability: SEC Registration

- SEC registration status places restrictions on bond purchases by US-based investors
- The main restriction faced by NYSTRS is for “Reg S-only” securities (17% of index)
  - Can not be purchased until 40-days of “seasoning” after being newly offered
  - Portfolio will likely buy less Reg S-only, especially financials (59% Reg S-only)

Sector	Percent of Securities			Market Value Weight		
	Sec-Reg	144A	Reg S Only	Sec-Reg	144A	Reg S Only
Government	53%	43%	4%	48.0%	49.3%	2.7%
Govt-Related	9%	49%	42%	9.6%	58.5%	31.9%
Corporates	17%	55%	28%	19.9%	56.9%	23.1%
Financials	0%	38%	63%	0.0%	41.1%	58.9%
Industrial	26%	61%	12%	29.4%	61.2%	9.5%
Utility	8%	84%	8%	10.4%	83.6%	6.0%
<b>Total</b>	<b>22%</b>	<b>49%</b>	<b>29%</b>	<b>29.3%</b>	<b>53.8%</b>	<b>17.0%</b>



***Takeaway: SEC registration will modestly affect portfolio composition compared to the benchmark, but over 80% of the universe is not affected***



# Benchmark Investability: Countries

- 28 countries in IG EMD benchmark
  - Shading: high yield governments, so values represent investment grade companies
- Apply a 10% country cap (right columns)
  - Common in EM investing
  - Mostly applies to China and Saudi
  - Unlikely that we'll own the entire list

***Takeaway: A 10% cap spreads out country risk, but the NYSTRS team will still need to monitor for specific headline, geopolitical, and macro risks***

Country	Sov Rating	Uncapped		10% Cap	
		Mkt Val	Wgt %	Mkt Val	Wgt %
China	A+	228.4	18.5	123.6	10.0
Saudi Arabia	A+	152.6	12.4	123.6	10.0
Mexico	BBB	117.7	9.5	123.6	10.0
UAE	AA	110.2	8.9	123.6	10.0
Indonesia	BBB	101.3	8.2	119.8	9.7
Korea	AA	83.3	6.7	98.5	8.0
Qatar	AA	63.7	5.2	75.3	6.1
Chile	A-	63.5	5.1	75.1	6.1
Philippines	BBB	35.5	2.9	42.0	3.4
Panama	BBB-	30.2	2.4	35.8	2.9
India	BBB-	29.7	2.4	35.1	2.8
Peru	BBB	26.3	2.1	31.1	2.5
Malaysia	A-	24.5	2.0	28.9	2.3
Israel	A+	21.5	1.7	25.5	2.1
Brazil	BB	21.3	1.7	25.1	2.0
Hungary	BBB	19.6	1.6	23.1	1.9
Romania	BBB-	17.5	1.4	20.7	1.7
Taiwan	AA	15.7	1.3	18.6	1.5
Uruguay	BBB	15.0	1.2	17.8	1.4
Kuwait	A+	12.8	1.0	15.2	1.2
Poland	A-	12.7	1.0	15.0	1.2
Kazakhstan	BBB	12.1	1.0	14.3	1.2
Thailand	BBB+	9.0	0.7	10.7	0.9
South Africa	BB-	7.4	0.6	8.7	0.7
Bermuda	A	2.5	0.2	2.9	0.2
Colombia	BB+	1.0	0.1	1.2	0.1
Jordan	B+	0.5	0.0	0.6	0.0
Bahrain	B+	0.5	0.0	0.6	0.0



# Benchmark Investability: Adding BB Rated

- Permitting up to 10% BB-rated initially
  - BB is highest quality tier of high yield
  - Could reduce country concentration in benchmark
- Govt and Govt-Related only – no corporates
  - Adds 20% (\$240b) on top of benchmark value
  - Adds 16 countries, including Brazil and Colombia
  - Shading: additions where Govt debt is already in benchmark, but BB rated adds some Govt-Related

Country	Market Val	Wgt %	Mean Yield
Brazil	49.6	20.7	6.2
Colombia	44.3	18.5	7.5
Oman	28.6	11.9	5.8
Dominican Rep	23.7	9.9	6.6
South Africa	20.4	8.5	7.4
UAE	11.4	4.8	6.0
China	9.2	3.9	6.2
Costa Rica	8.3	3.4	6.6
Morocco	7.9	3.3	6.4
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Paraguay	5.9	2.5	6.1
Ivory Coast	4.5	1.9	7.9
Azerbaijan	3.8	1.6	6.2
Trin. & Tob.	3.2	1.3	6.0
India	2.9	1.2	6.8
Serbia	2.8	1.2	6.0
Uzbekistan	2.1	0.9	7.2
Armenia	1.1	0.4	7.1
Indonesia	1.0	0.4	6.9
Georgia	0.9	0.4	6.3
Kazakhstan	0.7	0.3	5.9
Mexico	0.4	0.2	9.3
<b>Total</b>	<b>239.9</b>	<b>100.0</b>	<b>6.6</b>



# Fixed Income Team Capability

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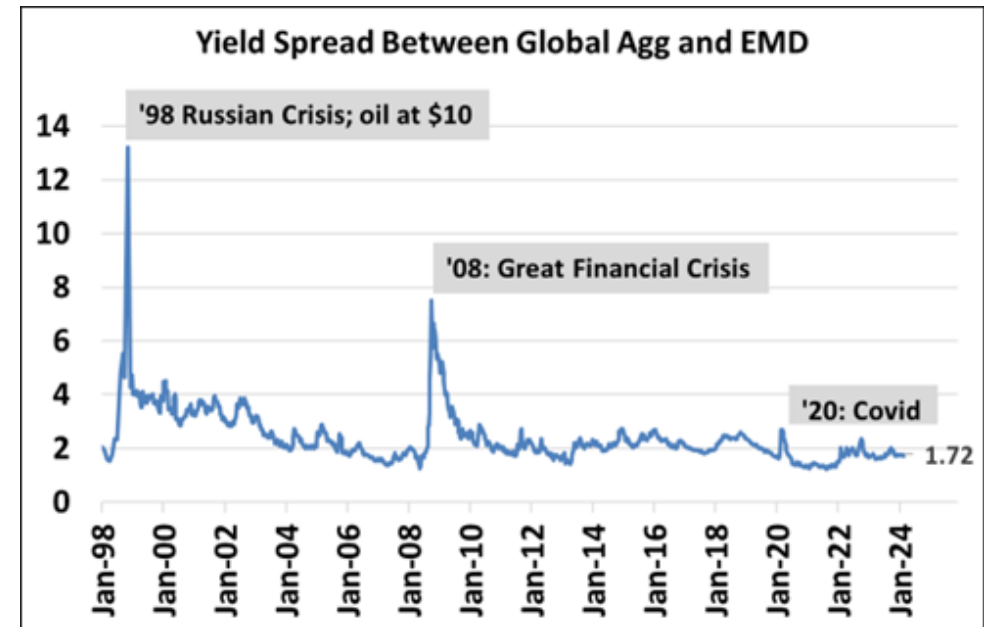
- Team already familiar with US credit markets
- Research sources—macroeconomic, geopolitical, sector, industry, and issuer level
  - Published research and 1-1 meetings with
    - Investment bank counterparties
    - External global bond managers
    - Credit rating agencies
    - Specialized research providers
  - Raw news and large datasets sources for direct research
    - Ad hoc analysis and refreshable reports on modeled data
- Trading and portfolio management tools
  - Same tools used currently; adding DirectBooks for new issues



# EMD Strategy Benefits

- Better long-term return outlook
  - Compared to full Global Agg
- Maintains focus on higher quality credit
- Overall allocation benefits
- Simpler implementation
- Management Fee Savings

Index	Rating	Yield	Spread	Duration
EMD w/10% Cap	A2/A3	5.51	116	6.85
EM w/no Cap	A2/A3	5.57	108	6.63
Global Agg	AA3/A1	3.82	40	6.63
Global ex-USD		2.86	35	7.05
Global Credit	A2/A3	4.87	94	5.97
US Agg	AA2/AA3	4.80	40	6.21



# EMD Strategy Risks

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- EMD has **higher volatility** and has experienced periodic crises and contagion. Since 1998, EMD volatility was 2.3x that of the Global Agg (7.4% vs. 3.3% annualized).  
*Mitigant: Crisis frequency has declined; the volatility ratio declined to 1.7x over last 10 years (6.5% vs. 3.9%)*
- The Reg S-only **portions of the benchmark are less investable**  
*Mitigant: Reg S-only is only 17% of the benchmark & includes securities that we are less likely to seek to own*
- **Country concentration risk** accompanied by geopolitical or headline risk.  
*Mitigant: Concentration can be reduced with a 10% country cap and adding BB-rated*
- There is an overall **higher commodity exposure** inherent in EM investing.  
*Mitigant: Commodity risk will be part of Fixed Income's monitoring and analytics*
- US dollar EMD has relatively **high trading costs**  
*Mitigant: The Fixed Income team seeks to minimize portfolio turnover with a focus on new issue bonds; there will be no currency trading costs to hedge back to USD*



# Duration Management with Treasury Futures

Dawn Sherman

Matthew Hernandez



# Introduction & Basics

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- Derivatives: financial instruments whose values are “derived” from another financial instrument
- Treasury Futures: Standardized exchange-traded contracts for the purchase and sale of government bonds for future delivery
- Duration: Measure of bond price sensitivity to interest rate changes
- Key Rate Duration: Sensitivity to specific maturities (5Y, 10y, etc.)
- Notional Value: The total face value of the futures contract
- Margin: A deposit amount backing any futures holdings



# Investment Policy Manual

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- “The use of derivatives is currently limited to the Covered Call Option Program and Futures-Based Rebalancing. These programs are used in the System’s internally managed domestic equity portfolios.”
- “The use of exchange traded equity index futures has also been authorized to minimize asset allocation risk, minimize implementation costs and improve efficiencies when rebalancing the domestic equity portfolio.”
- ***Proposed update to IPM: Language to explicitly permit the trading of Treasury Futures in internally managed Fixed Income portfolios***



# Benefits of Treasury Futures

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- More easily increase/decrease overall and key rate duration
- Additional source of liquidity for a large portfolio like NYSTRS
- Manage around monthly benchmark duration extensions
- Can separate credit spread management from Treasury duration
- Low cost & faster trading alternative to cash bonds
- Contracts with different maturities allow flexibility and liquidity



# Treasury Future Key Specifics

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- Treasury Futures closely track cash bonds.
- Contracts expire on a quarterly cycle.
- CBOT (Chicago Board of Trade) exchange trading hours are 23 hours/day (18:00-17:00)
- Initial margin is required at purchase & maintenance margin is required to maintain the position.
- Note: Futures do represent *implicit* leverage, but NYSTRS' use will not be for *explicit* leverage or speculation

# Underlying Cash Treasuries

- Futures prices move in lockstep with specific cash Treasury notes and bonds
  - Differences in value between futures and cash Treasuries are quickly eliminated
- First notice: The date when holders of futures positions can be forced to deliver (or take delivery) an underlying Treasury security
  - *NYSTRS Fixed Income will always close positions before the first notice date*

- Table: The US Treasury notes most closely tied to the current 10-year futures contract

US 10YR NOTE (CBT)Jun24 Price 108-04+

Prices in Decimals Private Bond Small Issue

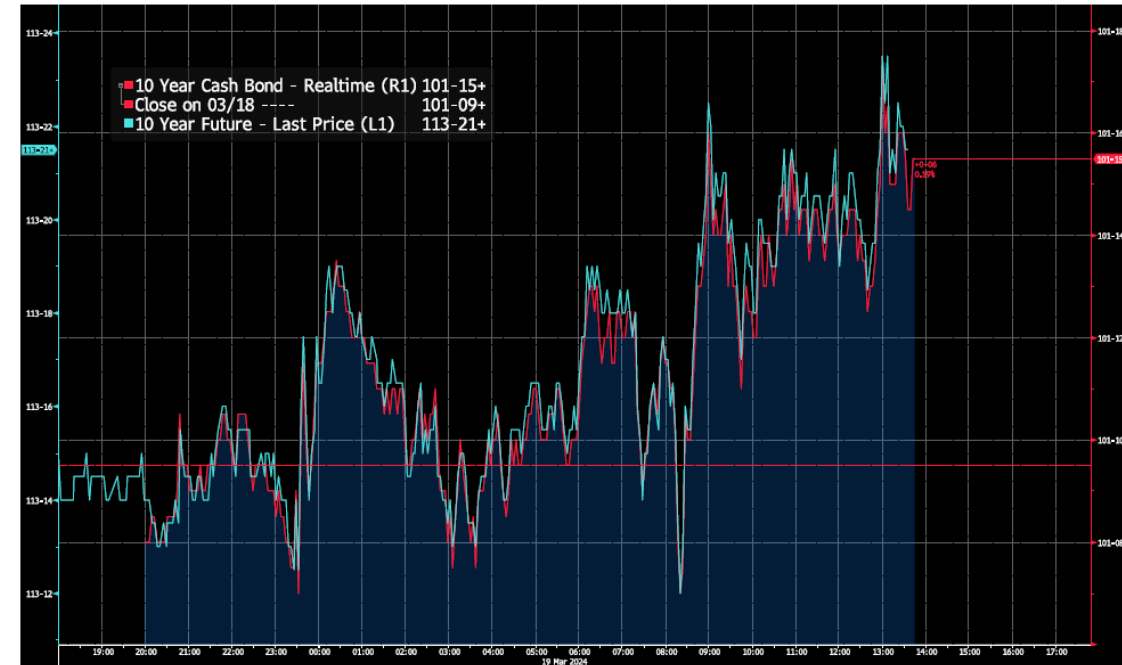
Sort By Implied Repo Decreasing

Cash Security	Price	Source	Conven Yield
<b>Adjust Value</b>			
1) T 4 $\frac{1}{4}$ 02/28/31	97-28 $\frac{1}{4}$	BGN	4.6118
2) T 4 01/31/31	96-14+	BGN	4.6125
3) T 3 $\frac{3}{4}$ 12/31/30	95-01 $\frac{1}{4}$	BGN	4.6165
4) T 4 $\frac{1}{8}$ 03/31/31	97-04 $\frac{1}{4}$	BGN	4.6106
5) T 1 $\frac{5}{8}$ 05/15/31	82-06 $\frac{3}{4}$	BGN	4.5926



# Cash Bonds vs Future – 1 month & Intraday

- Over 1-month (left chart) and intraday (right chart) periods, futures move in lockstep with cash Treasury notes



# Margin Requirements

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- If the initial margin falls below the maintenance margin, NYSTRS would be required to deposit additional funds or securities collateral.
- Margin requirements can vary based on market volatility
- Current margin requirements by contract per \$100,000:

Margin Type	2-Y	5-Y	10-Y	10-Y Ultra	Long Bond	30Y Ultra
Initial	\$1,320	\$1,540	\$2,337	\$3,080	4,290	\$6,545
Maintenance	\$1,200	\$1,400	\$2,125	\$2,800	3,900	\$5,950



# Trading Costs

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- Trading costs (commission fees, exchange fees)
  - Example: 10-Year Futures (per \$100,000 contract value):

• Clearing House Fee	\$ 0.80
• National Futures Assoc. Fees	\$ <u>0.02</u>
• Total Fees	\$ 0.82
• Bid/Ask spread	\$ <u>15.63</u>
• Total Cost	\$16.45
- Market data & platform fees: \$135/month per user



# Ex: Fixed Income Added 0.1yr of Duration

- As Treasury yields increased, Fixed Income increased duration by adding longer maturity Treasuries

	Cash Bonds	Treasury Futures
Number of Trades	16	2
BUYS	9	2
SELLS	7	-
Total Trade Volume	\$370mm	\$185mm (notional)
Margin	-	\$6.6mm (cash or securities)
Trade Execution Time	45 minutes	2 minutes
Duration Added	0.1yr	0.1yr
30 Year Bonds (par)	\$60mm	-
10 Year Bonds (par)	\$125mm	-
30 Year Treasury (Contracts)	-	470 (WN)
10 Year Treasury (Contracts)	-	1510 (TY)

# Collaboration with NYSTRS IOD & Risk

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- Rules will get coded into Aladdin to allow seamless trade operating and risk controls
  - Pre-Trade – IOD will handle; Issuer limits & positions limits
  - Post-Trade – Risk will act as a last line of defense
- Position limits and controls:
  - IOD will manage margin requirements
  - Risk will determine notional value of securities as percent of AUM and continuously monitor
- Compliance oversight and monitoring:
  - Process will continue to operate the same, the only difference being this is a new security type.





# Risk Management Framework

Risks	Mitigants
Market Risk	Continuous monitoring of market conditions and portfolio management
Interest Rate	Continuous monitoring of overall and key rate duration exposure
Margin Management Risk	Internal NYSTRS communication and with futures broker; monitoring volatility
Counterparty Risk (defaults)	Exchange traded and same day settlement minimizes the risk
Trading Error	Pre & post trade controls and limits; employee training
Basis Risk (futures price diverging from cash Treasuries)	Monitoring (especially during high volatility periods)
Delivery Risk	Pre & Post Trade Controls; training, system warnings



# Implementation

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- Timeline – Board approval of necessary IPM updates
  - Potentially before the October board meeting
- Systems – Aladdin integration, futures platform TBD
- Strategy – Duration Management
- Performance monitoring and reporting set-up
- US markets only at this point



# Conclusion

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- Treasury futures will help NYSTRS Fixed Income more easily manage portfolio duration in an efficient and cost-effective manner
- Treasury futures derive their value from and move in lockstep with US Treasury notes and bonds
- Aspects such as first notice, margin requirements and the various risks can be managed collaboratively by the NYSTRS Fixed Income, Investment Operations, and Risk teams
- Enabling Treasury futures will require forthcoming IPM updates and system and operational set-ups over the next few months



Thank you!  
Q&A



# Appendix

**Exhibit 1 – Deliverable Grades for Treasury Note and Bond Futures**

	Contract Size (\$ Face Value)	Deliverable Grade
Ultra Bond (UB)	100,000	Treasury bonds. Remaining term to maturity: at least 25 years.
Bond (ZB)	100,000	Treasury bonds. Remaining term to maturity: at least 15 years and less than 25 years.
Ultra 10-Year Note (TN)	100,000	Treasury notes. Remaining term to maturity: at least 9 years 5 months and not more than 10 years.
10-Year Note (ZN)	100,000	Treasury notes. Remaining term to maturity: at least 6 years 6 months and not more than 10 years.
5-Year Note (ZF)	100,000	Treasury notes. Original term to maturity: not more than 5 years 3 months. Remaining term to maturity: at least 4 years 2 months.
3-Year Note (Z3N)	200,000	Treasury notes. Original term to maturity: not more than 5 years 3 months. Remaining term to maturity: at least 2 years 9 months and not more than 3 years.
2-Year Note (ZT)	200,000	Treasury notes. Original term to maturity: not more than 5 years 3 months. Remaining term to maturity: at least 1 year 9 months and not more than 2 years.



# Appendix

## Measuring Volatility (As of October 30, 2017)

	Coupon	Maturity	Duration (Yrs)	BPV (per mil)
2-Yr Note	1-1/2%	10/31/19	1.978	\$196
3-Yr Note	1-5/8%	10/15/20	2.896	\$287
5-Yr Note	2%	10/31/22	4.783	\$473
7-Yr Note	2-1/4%	10/31/24	6.516	\$645
10-Yr Note	2-1/4%	08/15/27	8.794	\$863
30-Yr Bond	2-3/4%	08/15/47	20.241	\$1,946

*E.g., this suggests that if the yield on the 30-year bond were to rise by a single basis point (0.01%), the price should decline by some \$1,946 per \$1 million face value unit.*



# Appendix

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Exchange	Product Name	Code	Margin	% of notional
CBT	2 YEAR TREASURY NOTE FUTURES	TU	\$1,150	0.58%
CBT	3 YEAR TREASURY NOTE FUTURE	3YR	\$1,600	0.80%
CBT	5 YR TREASURY NOTE FUTURES	FV	\$1,400	1.40%
CBT	10Y TREASURY NOTE FUTURES	TY	\$2,125	2.13%
CBT	ULTRA 10-YEAR U S TREASURY NOTE FUT	UXY	\$2,800	2.80%
CBT	30 YR U.S. TREASURY BOND FUTURES	US	\$3,900	3.90%
CBT	20-YEAR U.S. TREASURY BOND FUTURES	TWE	\$4,550	4.55%
CBT	LONG TERM U.S. TREASURY BOND FUTURE	WN	\$5,950	5.95%



# Appendix

Product Details					Fees		
Region	Exchange	Exchange Platform	Asset Class	Product Group	Product CCY	Clearing House Fee	NFA Fees in USD
AMERICAS	CBOT	Electronic	FIXED INCOME	10-Year US Treasury Futures	USD	0.8	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	2-Year/3-Year US Treasury Futures	USD	0.65	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	2-Year US Treasury Options	USD	0.85	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	20-Year/30-Year US Treasury Futures	USD	0.87	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	30-Year US Treasury Options	USD	0.85	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	30-Years US Treasury Bond Futures	USD	0.87	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	5-Year US Treasury Futures	USD	0.65	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	5-Year US Treasury Options	USD	0.85	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	US Treasury Options	USD	0.85	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	Ultra 10YR Treasury Options	USD	0.85	0.02
AMERICAS	CBOT	Electronic	FIXED INCOME	Ultra Bond US Treasury Futures	USD	0.95	0.02
AMERICAS	CME	Pit	FIXED INCOME	SOFR 3M 1YR MID CURVE OPTIONS	USD	0.75	0.02
AMERICAS	CME	Pit	FIXED INCOME	SOFR Futures	USD	0.7	0.02
AMERICAS	CME	Electronic	FIXED INCOME	SOFR Futures	USD	1.25	0.02
AMERICAS	CME	Pit	FIXED INCOME	SOFR OPTIONS	USD	0.75	0.02
AMERICAS	CME	Electronic	FIXED INCOME	SOFR OPTIONS	USD	0.89	0.02



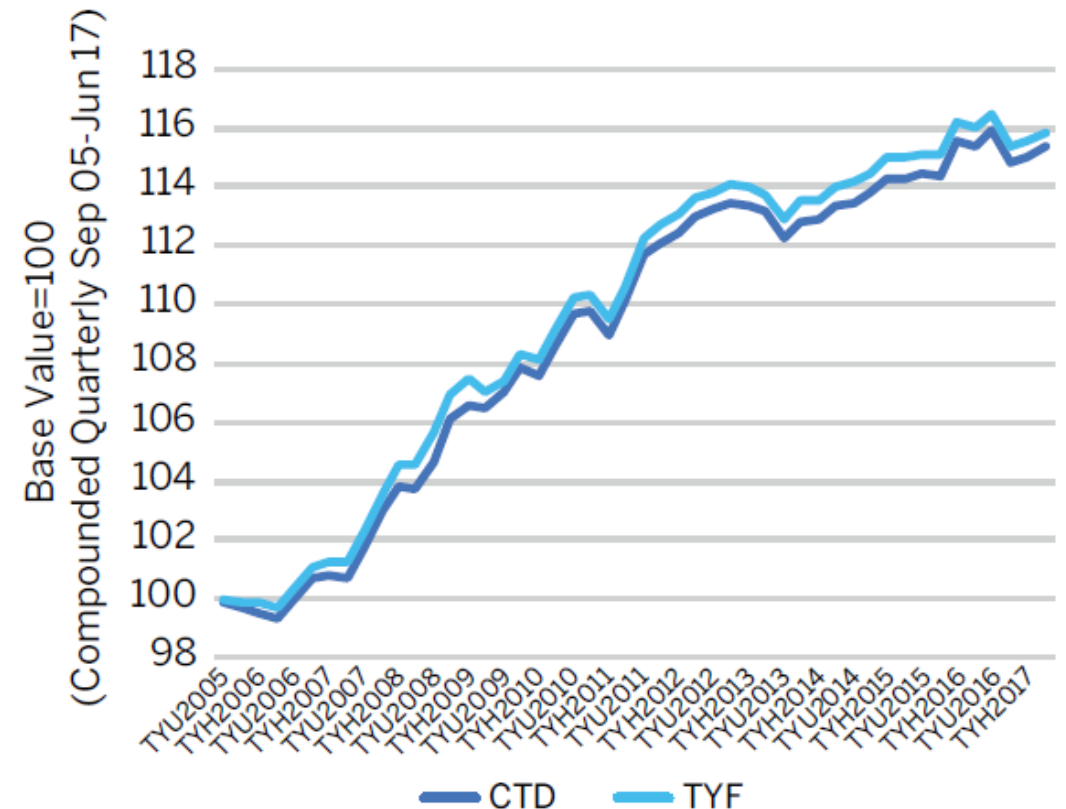


# Appendix

- The combined 10-year Treasury futures and repo positions produced average annual returns of 4.85%, compared to 4.71% for CTD Treasury notes.
- The futures and repo positions produced average annual returns 14 basis points higher than the CTD note positions.
- Treasury futures provide a means to similar returns with access to broad and deep pools of liquidity that are comparable, if not superior, to the OTR cash notes and bonds, which are generally considered the most liquid in the cash markets (by extension, more liquid than CTD notes).



Compounded Quarterly-September 2005 through June 2017 Contracts



# Appendix

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	<b>2-3/8%-8/24</b>	<b>1-7/8%-8/24</b>
<b>Futures Price</b>	125-085	125-085
<b>x CF</b>	0.8072	0.7807
<b>x \$1,000</b>	\$1,000	\$1,000
<b>Principal Invoice</b>	\$101,114.41	\$97,794.87
<b>Cash Price</b>	(\$101,234.38)	(\$98,031.25)
<b>Delivery Gain/Loss</b>	<b>(\$119.97)</b>	<b>(\$236.38)</b>

- Analysis suggests that a loss of \$119.97 may be associated with the delivery of the 2-3/8% of 8/24 while an even larger loss of \$236.38 might be associated with the delivery of the 1-7/8% of 8/24. Thus, we might conclude that the 2-3/8% of 8/24 note is cheaper or more economic to deliver than the 1-7/8% of 8/24.

# **Investment Committee Executive Summary**

## **Office of the CFO: Investment Operations Department**

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**Investment Committee Meeting: April 24, 2024**

**Margaret Andriola, CIPM, CPA**  
**Chief Financial Officer**



# Investment Committee Executive Summary

## Market Value Summary ('000s)

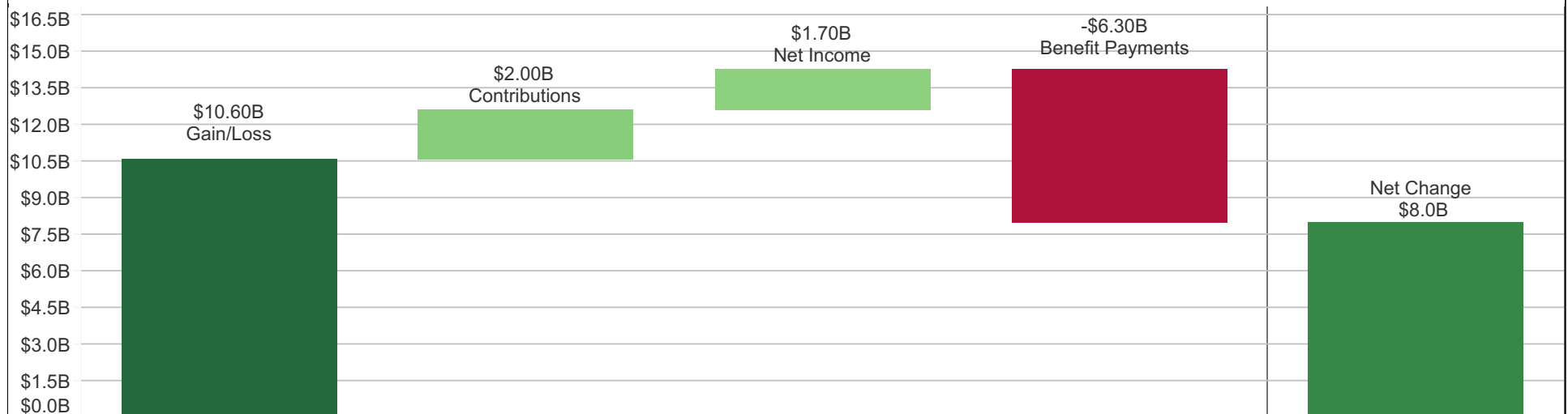
Asset Category	Asset Class	March 31, 2024		December 31, 2023		March 31, 2023	
		Net Asset Value	% Net Asset Value	Net Asset Value	% Net Asset Value	Net Asset Value	% Net Asset Value
Equity	Domestic Equity	\$49,670,401	34.7%	\$46,352,658	33.5%	\$43,913,364	33.2%
	International Equity	\$20,437,198	14.3%	\$19,422,325	14.0%	\$19,253,326	14.6%
	Global Equity	\$5,790,704	4.0%	\$5,301,686	3.8%	\$4,634,117	3.5%
	Real Estate Equity	\$16,170,578	11.3%	\$16,782,617	12.1%	\$16,518,879	12.5%
	Private Equity	\$13,739,987	9.6%	\$13,166,925	9.5%	\$14,425,621	10.9%
	<b>Asset Category Subtotal</b>	<b>\$105,808,868</b>	<b>73.9%</b>	<b>\$101,026,211</b>	<b>72.9%</b>	<b>\$98,745,306</b>	<b>74.8%</b>
Debt	Domestic Fixed Income	\$20,612,335	14.4%	\$19,462,470	14.1%	\$17,571,336	13.3%
	Global Bonds	\$2,807,653	2.0%	\$2,814,976	2.0%	\$2,710,005	2.1%
	High Yield	\$1,502,090	1.0%	\$1,482,376	1.1%	\$1,214,585	0.9%
	Real Estate Debt	\$7,465,361	5.2%	\$7,443,472	5.4%	\$8,073,659	6.1%
	Private Debt	\$2,273,279	1.6%	\$2,189,990	1.6%	\$1,833,473	1.4%
	Cash & Short Term Debt	\$2,634,037	1.8%	\$4,079,787	2.9%	\$1,940,012	1.5%
<b>Asset Category Subtotal</b>	<b>\$37,294,755</b>	<b>26.1%</b>	<b>\$37,473,070</b>	<b>27.1%</b>	<b>\$33,343,070</b>	<b>25.2%</b>	
<b>Total Plan</b>		<b>\$143,103,623</b>	<b>100.0%</b>	<b>\$138,499,280</b>	<b>100.0%</b>	<b>\$132,088,376</b>	<b>100.0%</b>

Due to rounding, numbers may not sum to 100%

## Components of Change in Total Investments

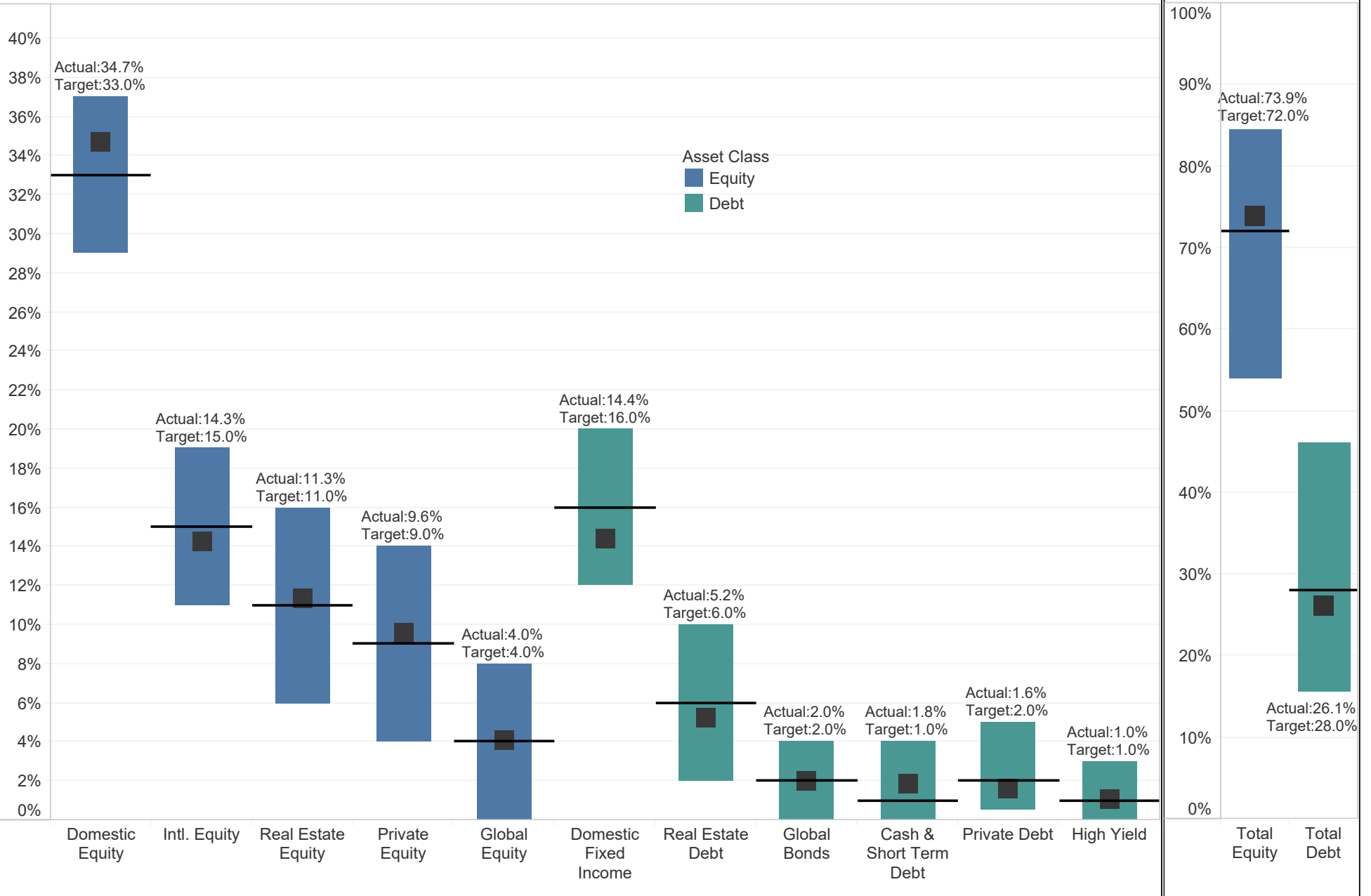
FYTD: 7/1/2023 to 3/31/2024

\$135.1B to \$143.1B



# Investment Committee Executive Summary

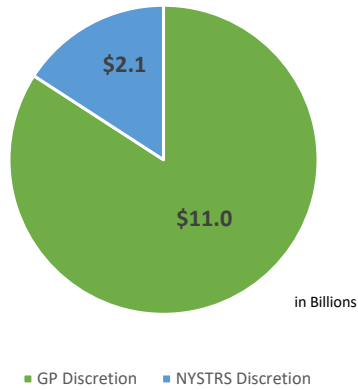
## NYSTRS' Asset Allocation: \$143.1B (March 31, 2024)



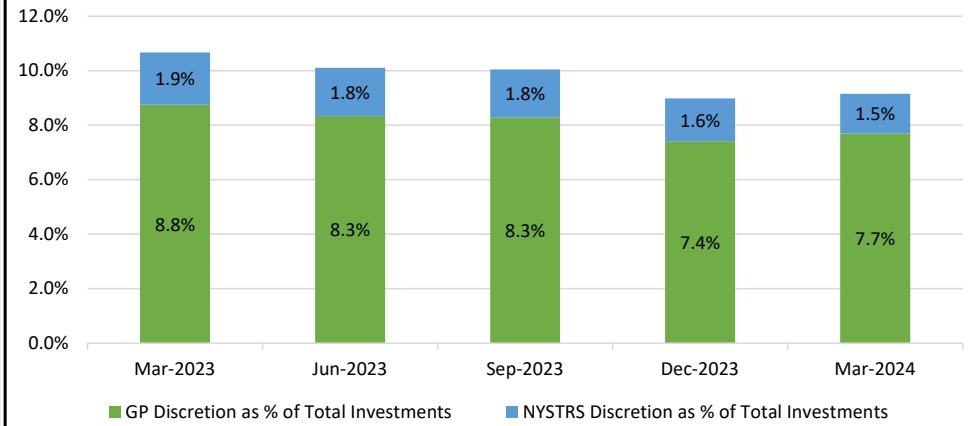
# Investment Committee Executive Summary

## Unfunded Commitments - Private Assets

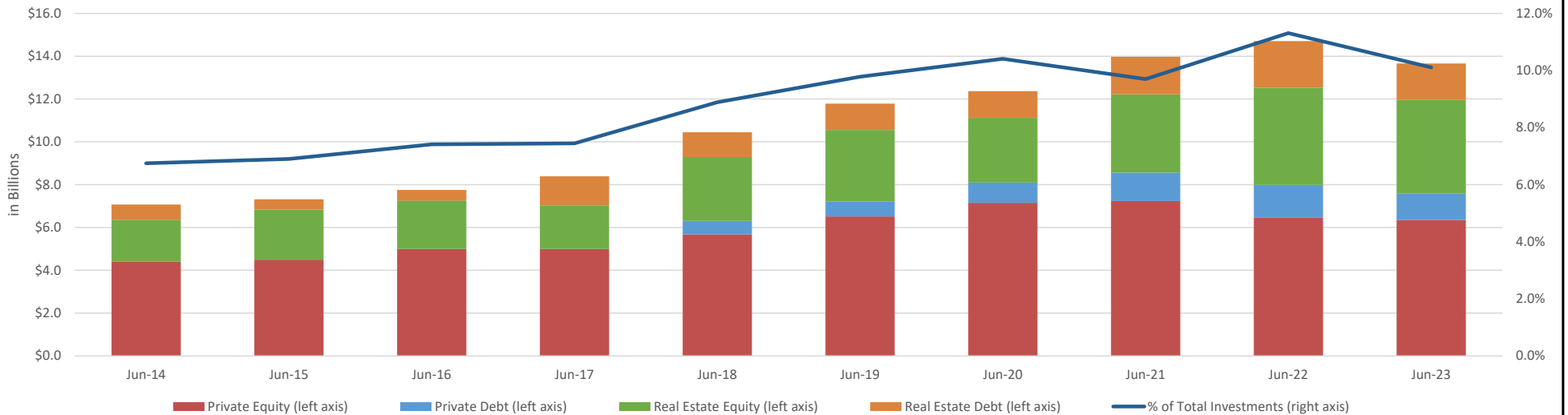
Total Unfunded Commitments at 3/31/2024 \$13.1B



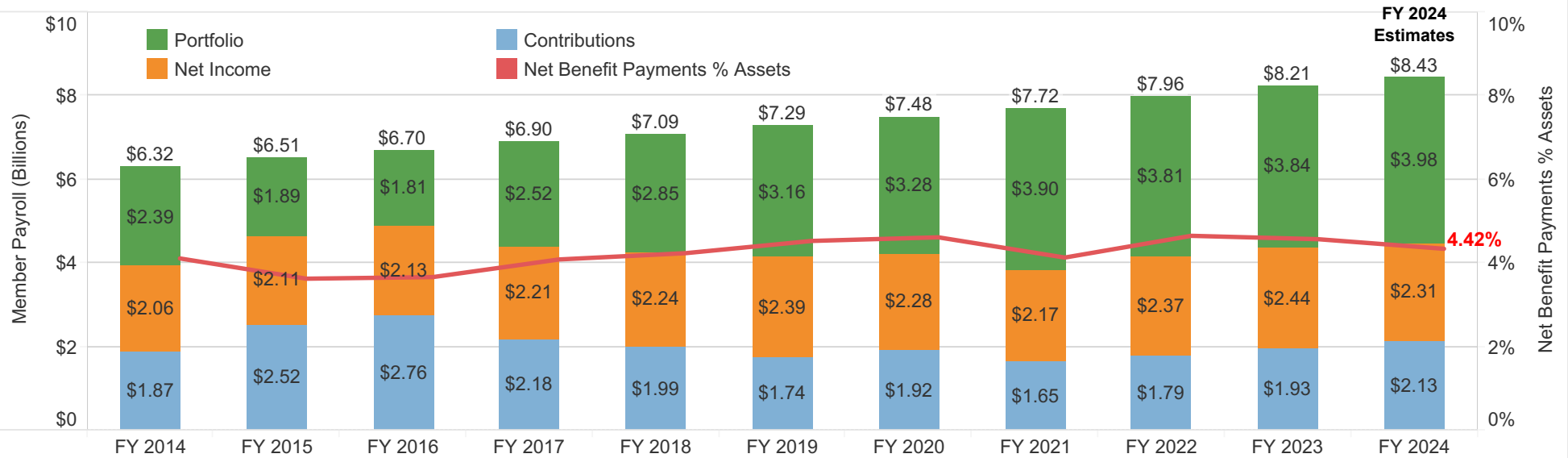
Unfunded Commitments - GP vs. NYSTRS Discretion



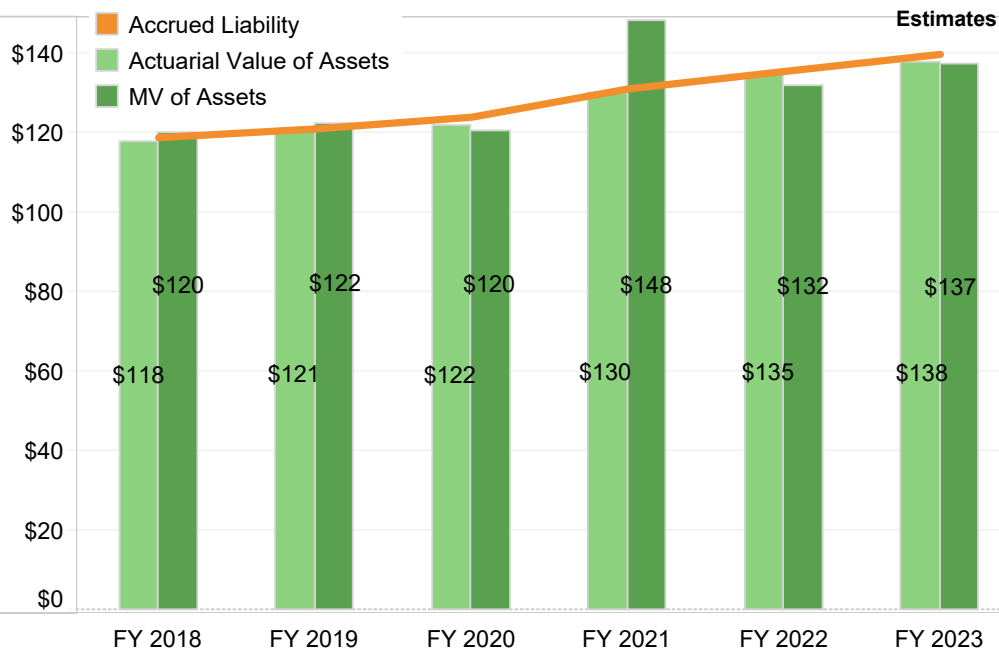
Unfunded Commitments - by Asset Class and % of Total Investments



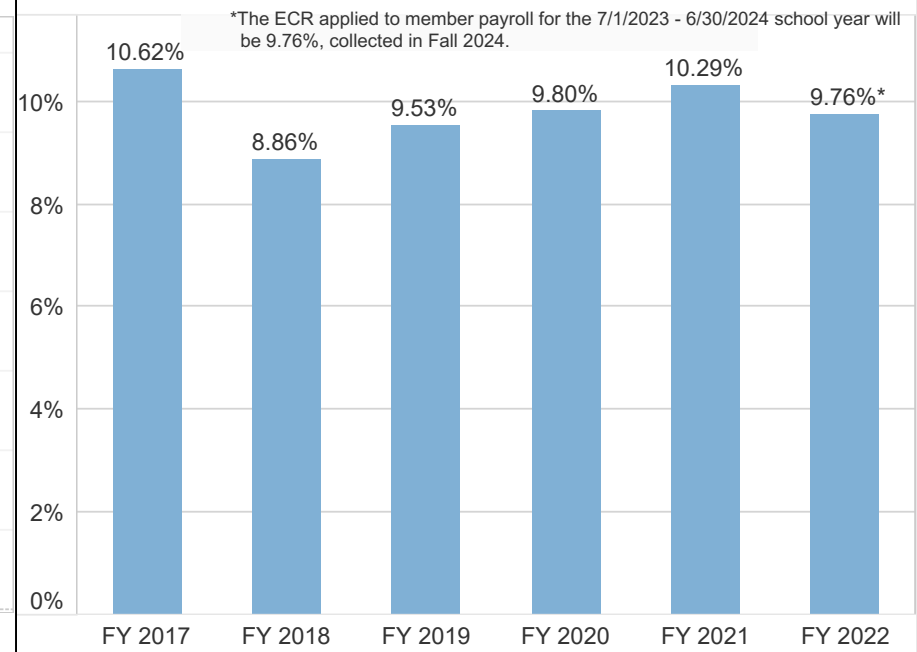
## Member Payroll Funding Sources



## Assets & Actuarial Accrued Liability



## Employer Contribution Rate



# Investment Committee Executive Summary

## Public Market Performance as of March 31, 2024

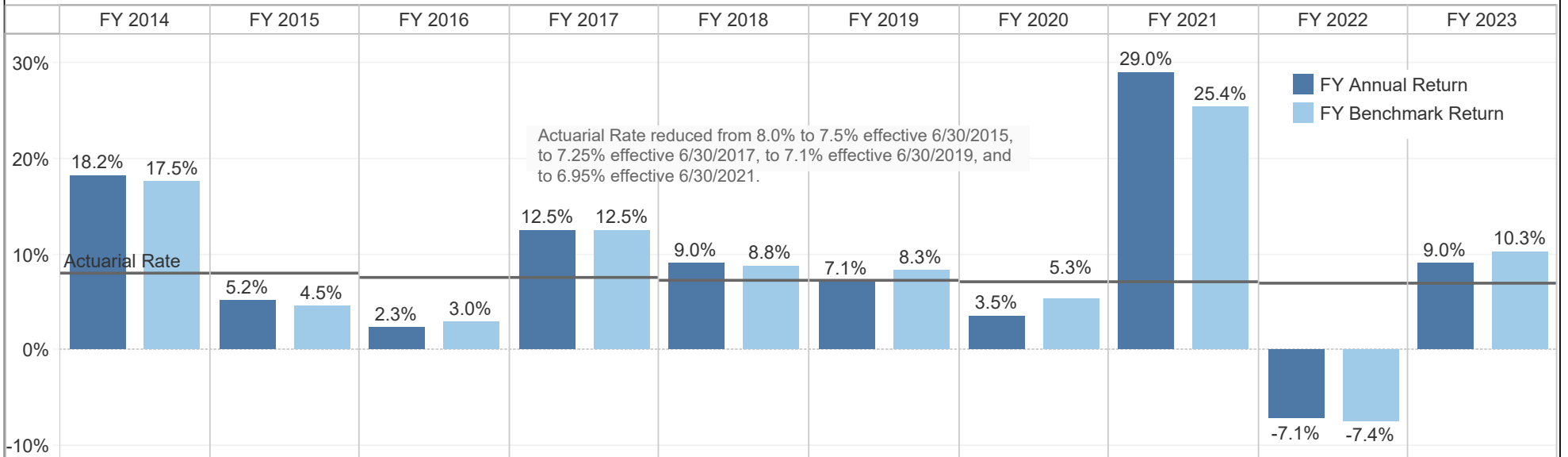
Asset Class	Current QTR	
	Net Return	Excess Return
Domestic Equity	10.5%	0.2%
International Equity	5.2%	0.5%
Global Equity	9.1%	0.9%
Private Equity	N/A	N/A
Real Estate Equity	-0.5%	-0.2%
Domestic Fixed Income	-0.5%	0.2%
Global Bonds	-0.3%	0.0%
High Yield Bonds	1.3%	0.0%
Private Debt	N/A	N/A
Real Estate Debt	2.8%	0.6%
Short Term	1.3%	0.1%
<b>Total Public Markets</b>	<b>6.1%</b>	<b>0.3%</b>

RE Equity is REITs only and RE Debt is CMBS only.  
For additional performance information see Supplemental Materials.

## Total Fund Performance as of December 31, 2023

Asset Class	QTR		FYTD		10YR	
	Net Return	Excess Return	Net Return	Excess Return	Net Return	Excess Return
Domestic Equity	11.8%	0.0%	8.1%	0.1%	11.7%	-0.1%
International Equity	9.7%	0.0%	5.9%	0.3%	4.3%	0.5%
Global Equity	10.1%	-0.9%	7.4%	0.2%	N/A	N/A
Private Equity	2.3%	-10.6%	1.7%	-8.8%	14.7%	-2.3%
Real Estate Equity	0.7%	5.7%	-2.1%	4.9%	8.1%	1.4%
Domestic Fixed Income	6.1%	-0.7%	3.5%	0.1%	1.6%	-0.2%
Global Bonds	7.0%	0.4%	4.5%	0.3%	2.6%	0.3%
High Yield Bonds	6.7%	-0.4%	7.1%	-0.2%	N/A	N/A
Private Debt	2.9%	-0.7%	5.6%	-2.3%	N/A	N/A
Real Estate Debt	2.2%	-2.4%	2.0%	-1.3%	3.7%	0.4%
Short Term	1.4%	0.1%	2.8%	0.2%	1.4%	0.3%
<b>Total Fund</b>	<b>7.1%</b>	<b>-1.0%</b>	<b>4.5%</b>	<b>-0.6%</b>	<b>7.8%</b>	<b>-0.2%</b>

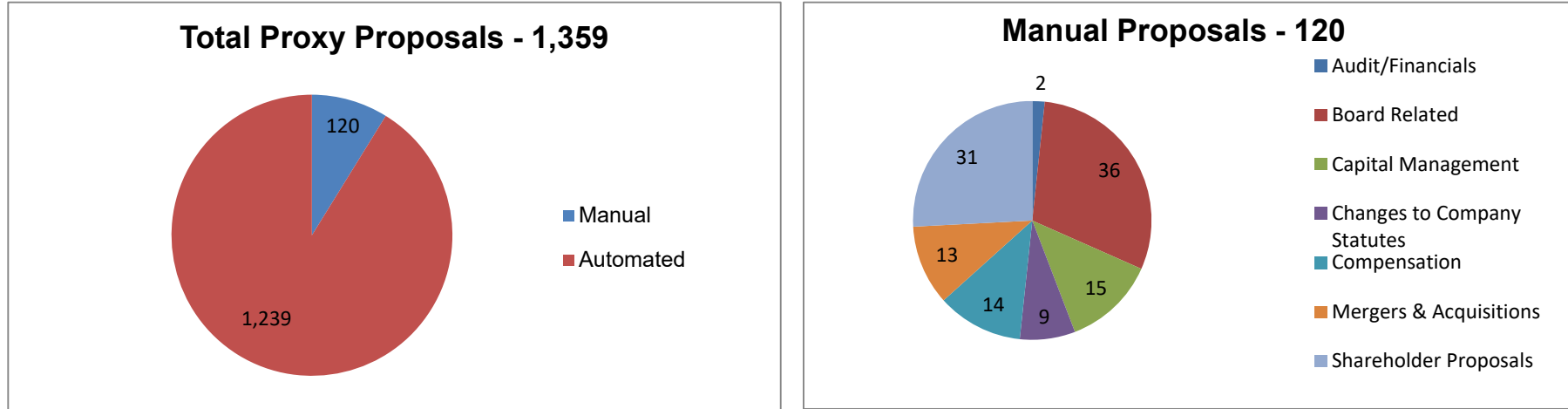
## Annual Performance





# Investment Committee Executive Summary

## Proxy Voting Summary: 1/1/2024 - 3/31/2024



The System has implemented automated voting for those issues that can reliably be voted according to established policy without review. Those requiring review are voted manually utilizing research provided by our proxy advisory service to support the decision. In general, the System supports corporate management if management's position appears reasonable, is not detrimental to the long range economic prospects of the company, and does not tend to diminish shareholder rights. Should a sensitive issue arise which is not included in the established guidelines, the Executive Director and Chief Investment Officer or his designee is authorized to exercise best judgment in voting such issue.

**Audit/Financials** - The System may oppose auditor selection if there are concerns about objectivity.

**Board Related** - The System supports independent and diverse directors.

**Capital Management** - The System generally supports proposals that provide the company with flexibility provided they do not limit shareholder rights.

**Changes to Company Statutes** - The System generally supports proposals relating to bylaw or organizational changes provided they do not limit shareholder rights.

**Compensation** - The System generally supports reasonable compensation plans which are tied to objective performance measures. Stock option plans should be used to motivate corporate personnel.

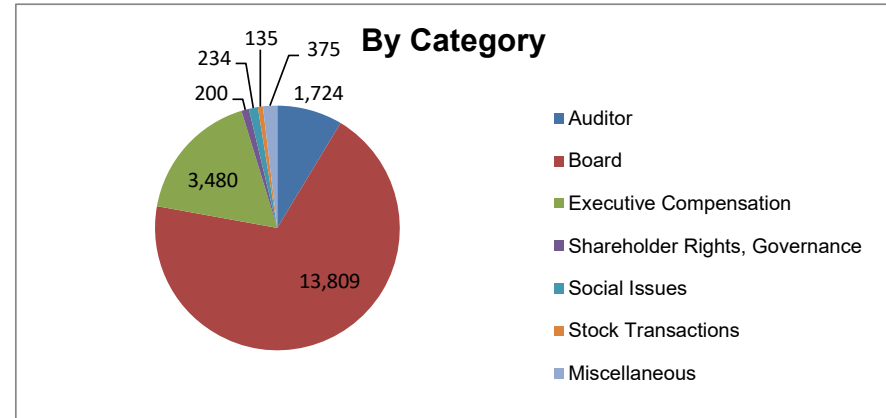
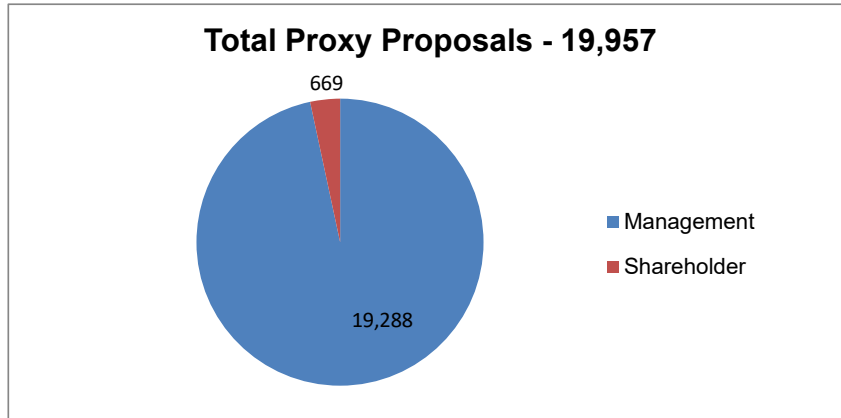
**Mergers & Acquisitions** - Proposals are reviewed on a case by case basis.

**Shareholder Proposals** (type & number) - Compensation: 1, Environment: 7, Governance: 8, Social: 11, and Other: 4



## Investment Committee Executive Summary

### Annual Proxy Voting Report: 1/1/2023 - 12/31/2023 Domestic and Canadian Portfolios



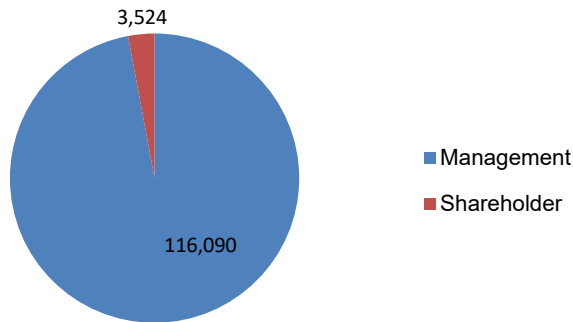
	Proposals	For	% For	Against	% Against	Abstain	% Abstain
Management	19,288	17,955	93.1%	1,316	6.8%	17	0.1%
Shareholder Proposals	669	384	57.4%	179	26.8%	106	15.8%
	<b>19,957</b>	<b>18,339</b>	<b>91.9%</b>	<b>1,495</b>	<b>7.5%</b>	<b>123</b>	<b>0.6%</b>
Auditor	1,724	1,720	99.8%	1	0.1%	3	0.1%
Board	13,809	12,783	92.6%	1,022	7.4%	4	0.0%
Executive compensation	3,480	3,173	91.2%	299	8.6%	8	0.2%
Shareholder Rights, Governance	200	121	60.5%	70	35.0%	9	4.5%
Social Issues	234	137	58.5%	28	12.0%	69	29.5%
Stock Transactions	135	116	85.9%	12	8.9%	7	5.2%
Miscellaneous	375	289	77.1%	63	16.8%	23	6.1%
	<b>19,957</b>	<b>18,339</b>	<b>91.9%</b>	<b>1,495</b>	<b>7.5%</b>	<b>123</b>	<b>0.6%</b>

The Statistics above represent proposals presented at 1,761 meetings for the companies in the System's domestic equity and Canadian portfolios. Meetings and proposals at companies held in multiple portfolios are counted once.

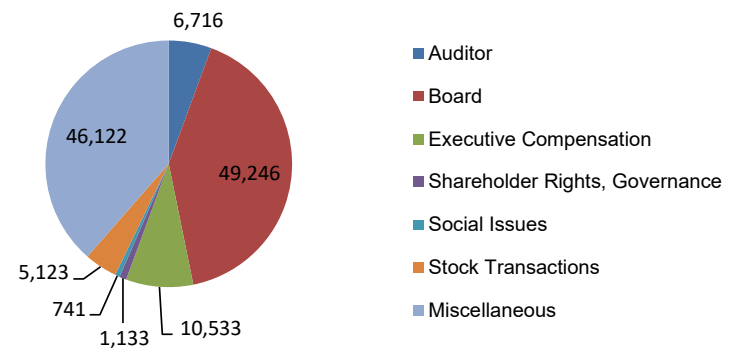
## Investment Committee Executive Summary

### Annual Proxy Voting Report: 1/1/2023 - 12/31/2023 External Managers - International and Global Equities

**Total Proxy Proposals - 119,614**



**By Category**



	Proposals	For	% For	Against	% Against	Abstain	% Abstain
Management	116,090	100,840	86.9%	13,272	11.4%	1,978	1.7%
Shareholder Proposals	3,524	1,976	56.1%	1,392	39.5%	156	4.4%
	<b>119,614</b>	<b>102,816</b>	<b>85.9%</b>	<b>14,664</b>	<b>12.3%</b>	<b>2,134</b>	<b>1.8%</b>
Auditor	6,716	6,574	97.9%	86	1.3%	56	0.8%
Board	49,246	42,416	86.1%	5,615	11.4%	1,215	2.5%
Executive compensation	10,533	8,519	80.9%	1,905	18.1%	109	1.0%
Shareholder Rights, Governance	1,133	884	78.0%	234	20.7%	15	1.3%
Social Issues	741	282	38.1%	421	56.8%	38	5.1%
Stock Transactions	5,123	4,102	80.1%	996	19.4%	25	0.5%
Miscellaneous	46,122	40,039	86.8%	5,407	11.7%	676	1.5%
	<b>119,614</b>	<b>102,816</b>	<b>85.9%</b>	<b>14,664</b>	<b>12.3%</b>	<b>2,134</b>	<b>1.8%</b>

The statistics above represent proposals presented at 10,843 meetings for the companies in the System's externally managed, international and global equity portfolios. Meetings and proposals at companies held in multiple portfolios are counted for each portfolio.



# Public Equity MD Update

## Investment Committee April 24, 2024

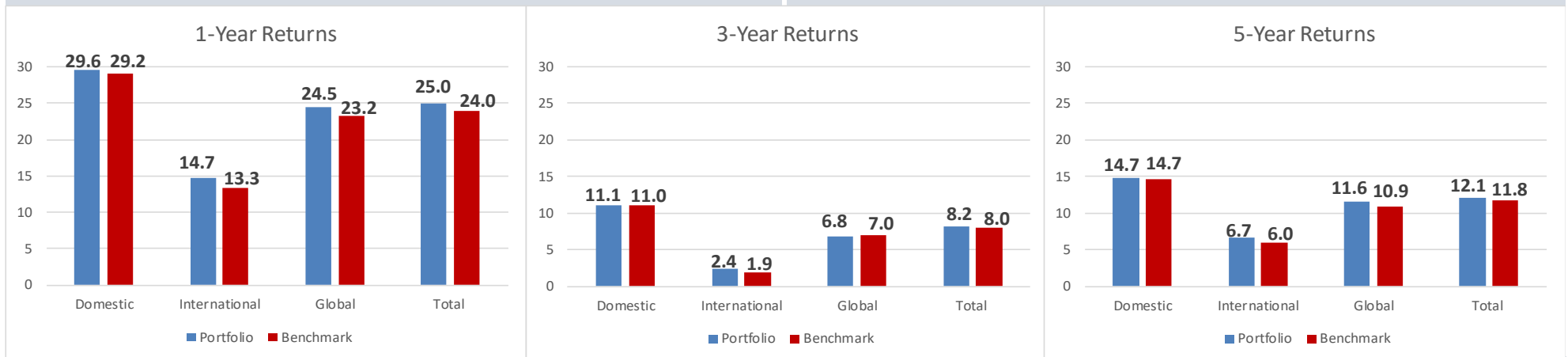
Portfolio Values				Asset Allocation			
Portfolio Values (000)	03/31/24	03/31/23	Difference	Asset Allocation	Range	Target	Actual 03/31/24
Domestic Equity	\$49,670,401	\$43,913,364	\$5,757,037	Domestic:	29-37%	33.0%	34.7%
International Equity	\$20,437,198	\$19,253,326	\$1,183,872	International:	11-19%	15.0%	14.3%
Global Equity	\$5,790,704	\$4,634,117	\$1,156,587	Global:	0-8%	4.0%	4.0%
<b>Total Public Equity</b>	<b>\$75,898,303</b>	<b>\$67,800,807</b>	<b>\$8,097,496</b>				

### Public Equity Portfolio Values:

- Driven by strong market returns, the portfolio ended the quarter at \$75.9B, an increase of \$8.1B from March 2023.
- During the one-year period:
  - o \$6.0B (including dividends swept) was raised from domestic equities.
  - o \$1.25B was raised from international equities.

### Asset Allocation

- The public equities asset classes remain close to their respective targets and well within their asset allocation ranges.
- The domestic equities allocation was above target at the end of the period.
- \$1.29B was raised from domestic equities during the quarter.



### Commentary:

- Overall portfolio performance, both absolute and relative, has been very strong for the one-year period.
- The System's quantitative active strategies, including internally managed, are collectively performing exceptionally well.
- We continue to closely monitor Ariel Investments for the change in lead portfolio manager.
- A vacancy on our external strategies team has been filled.



# Fixed Income MD Update

## Investment Committee Meeting: April 24, 2024

	Sector/Portfolio	Mkt Val \$B	Asset Allocation %			Net Returns %					Excess Returns %				
			Actual	Target	Range	Qtr	FYTD	1Y	3Y Ann	5Y Ann	Qtr	FYTD	1Y	3Y Ann	5Y Ann
Internal	Dom. Fixed Income	20.6	14.4	16	12-20	-0.49	3.02	2.18	-1.62	0.70	0.23	0.36	0.41	0.77	0.28
	Short-Term Bond	2.6	1.8	1	0-4	1.35	4.15	5.47	2.77	2.14	0.09	0.31	0.43	0.31	0.33
External	Global Bonds	2.8	2.0	2	0-4	-0.31	4.18	3.63	-1.90	0.93	-0.01	0.24	-0.07	0.14	0.47
	High Yield	1.5	1.0	1	0-3	1.26	8.46	9.80	2.24	3.89	-0.05	-0.30	-0.33	0.17	-0.09

- **Market:** Treasury yields increased and credit spreads declined to near record low levels in the quarter amid higher growth expectations and elevated inflation readings
  - **Allocation:** Purchased a net \$1.4bn in Domestic with a focus on Treasuries and Mortgages over Corporates; added duration<sup>1</sup>
  - **Domestic:** Total returns of -0.5%; outperformed by 23bp (mostly from duration and yield curve positioning)
  - **Short-Term:** High quality short maturity returning 5.5% annualized; reduced elevated balance from previous quarter
  - **Global:** Overall flat excess returns with negative from duration and curve and positive from sector positioning
  - **High Yield:** underperformed as negative from duration and curve outweighed positive from security selection
- 
- **Policy:** Expectations for Fed rate cuts have been pared back amid strong growth indicators and persistently higher inflation
  - **Inflation:** CPI excluding food and energy (core) has re-accelerated to 4% annualized rate so far in 2024
  - **Growth:** Overall, 2024 GDP growth expectations have increased from <1% to 2.2% and most macro datapoints support that
  - **Credit:** Investment grade and high yield spreads are near record lows amid diminished recession risk and strong balance sheets
- 
- **New Economic Charts** in Board Appendix Materials – Christina Vasto

<sup>1</sup>Domestic Fixed Income duration was -0.2 year vs. benchmark at the end of the quarter

# NYSTRS Long-Term Bond Portfolio

**NYSTRS Investment Committee Meeting**  
**April 24, 2024**

**Presented by Aaron VanDerwiel, CFA**  
Deputy Managing Director of Fixed Income  
Joined NYSTRS August 2004



# Long-Term Bond Portfolio (LTBP)\* Agenda

- **Team, Objectives, Process & Tools**
- **Historical Metrics**
- **Recent Evolution**



\* Also referred to as “Domestic Fixed Income”, “Core Fixed Income”, “U.S. Agg”

# LTBP Team

## **Dawn Sherman**

## **Investment Officer 3**

**January 2000**

Dawn began her career as an intern before a successful stint in managing the system's short-term bond portfolio and monitoring the securities lending program. Currently, her main role is evaluating, monitoring and trading treasury, agency, and mortgage-backed securities for the LTBP. She holds a bachelor's degree from RPI's Lally School of Management.

## **Mark Wood**

## **Investment Officer 3**

**February 2007**

Mark is responsible for managing the system's cash portfolio, monitoring security lending programs, and assisting in the evaluation, monitoring and trading of interest rate and securitized products for the LTBP. He holds a bachelor's degree in Economics from Binghamton University.

## **Michael Wollner**

## **Investment Officer 2**

**May 2018**

Mike formerly assisted on the short-term portfolio before moving to the corporate credit team in early 2020 where he currently performs credit and relative value analysis along with corporate bond trading. He previously worked as a credit analyst in the commercial banking department at NBT Bank and holds a bachelor's degree in Economics from Union College.

## **Joseph Wood, CFA**

## **Manager of Fixed Income**

**November 2021**

Joe's primary responsibility is managing the corporate bond sleeve of the LTBP. He brought 20+ years of experience in analyst and portfolio manager roles at money managers, insurance firms, and a stint in energy trading. He holds an MBA from Rice University and a BFA from the University of Houston.





# LTBP Objectives

- **Generate cash flow while preserving capital**
- **Provide NYSTRS with liquidity if/when needed**
- **Augment diversification and stability to NYSTRS overall investment portfolio**
- **Over a market cycle, earn a total rate of return that meets or exceeds the benchmark**
- **To achieve these objectives, the LTBP is:**
  - *A diversified portfolio of high-quality securities across several fixed income sectors*
  - *Managed for capital preservation, income, and liquidity while responsive to yield and/or spread opportunities*



# LTBP Process

- **The LTBP is actively managed by duration/key rate durations, maturity, sector, industry, credit quality, issuer, and security**
- **The benchmark (BM) is the Bloomberg U.S. Aggregate Bond Float Adjusted Index**
- **NYSTRS weekly internal asset allocation and cash flow meetings**
- **Based upon weight versus target, monthly investment into or out of the LTBP to adhere to asset allocation rebalancing**
- **Fixed Income holds monthly meetings to review:**
  - *Portfolio characteristics on absolute basis and relative to benchmark*
  - *Sector weights, duration, yield, spread, coupon*
  - *Assess relative value opportunities to determine what is trading rich/cheap*
  - *How to best spend/raise cash given current holdings and relative value outlook*
  - *Team communicates throughout the month to monitor progress and discuss market movements*



# LTBP Process

## U.S. Treasuries

45.3% / \$9.3bn

- Purchase bonds that add diversification to existing holdings
- Selectively add exposure out the curve when getting compensated for interest rate risk

## Corporate Bonds

27.4% / \$5.6bn

- Perform fundamental credit analysis to determine issuer soundness followed by relative valuation
- Review current holdings and positioning to establish fit within portfolio

## Agency Mortgage-Backed Securities

19.9% / \$4.1bn

- Purchase government sponsored/ government guaranteed specified mortgage pass-throughs
- Analyze pool characteristics in an effort to mitigate prepayment risk / extension risk

## Government Related

5.8% / \$1.2bn

- Review supranational, sovereign and agency new issues including government guaranteed, government owned with no guarantee and government sponsored
- Assess the relative value of high-quality issuers that offer spread to U.S. government bonds as well as some diversification benefit

## Asset Backed Securities

1.9% / \$0.4bn

- AAA-rated with robust structural protections allow yield pick-up without taking undue credit risk
- Rely on underlying assets for payment not credit of the originator, seller or servicer



# Fixed Income Tools

- **Bloomberg:** News, research, portfolio management, primary market research, secondary market quotes/levels, analytics, valuation
- **Aladdin:** Order Management System, Portfolio Management & Risk Management tool
- **MacroBond:** Macroeconomic and aggregate financial time series data, analytics and charting
- **Moody's & CreditSights:** Fundamental research & analysis portals w/access to analysts
- **Sell Side Research:** JPM, BAC, GS, MS, CITI, BMO, NWG, BACR, TD, among others
- **Investment Publications:** CFA Institute, FIASI, PMR, LCD News, WSJ, etc.
- **External Manager Calls & Research:**
  - BlackRock, PIMCO, GSAM, JP Morgan, Loomis Sayles, Nomura, PGIM, Wellington, CMIA
  - Continuous meetings with other external fixed income managers with no current mandate
- **Net Roadshow:** Internet roadshows from bond issuers
- **Direct Books:** Corporate bond primary issuance information, ordering and allocation
- **Electronic Trading Systems:** MarketAxess, Bloomberg, TradeWeb



# LTBP Historical Duration

*Duration measures interest rate risk*

**The LTBP has historically, but not always, taken less interest rate risk than its benchmark**

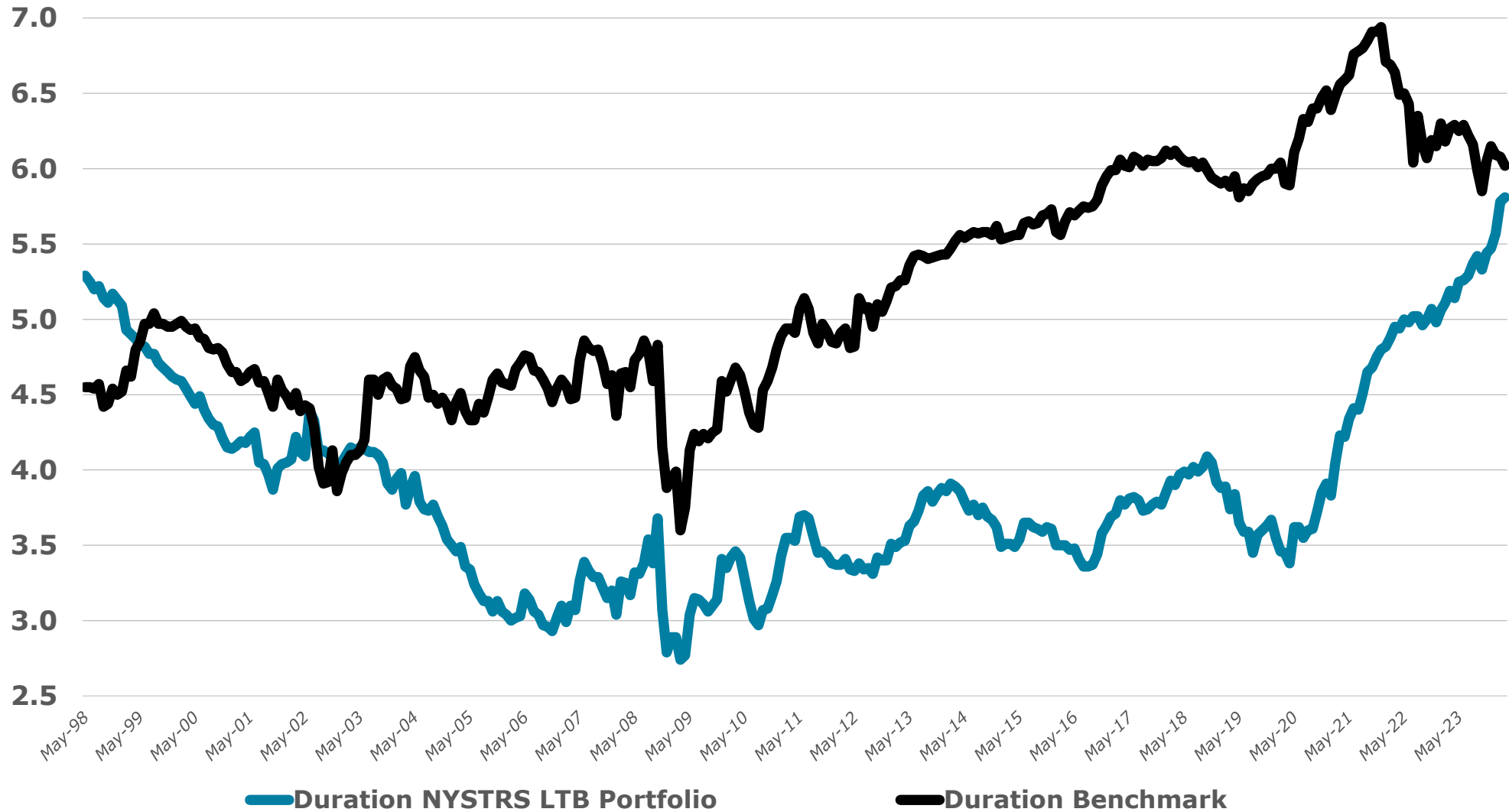
**Two main drivers of the LTBP duration underweight versus the benchmark:**

- 1. The benchmark does not hold securities that mature in <1 year whereas the LTBP has typically held these securities until maturity***
- 2. From the late-1990s until 2021, NYSTRS Fixed Income did not purchase U.S. Treasury or corporate bonds with maturities >10 years while ~20% of the benchmark was composed of these securities***



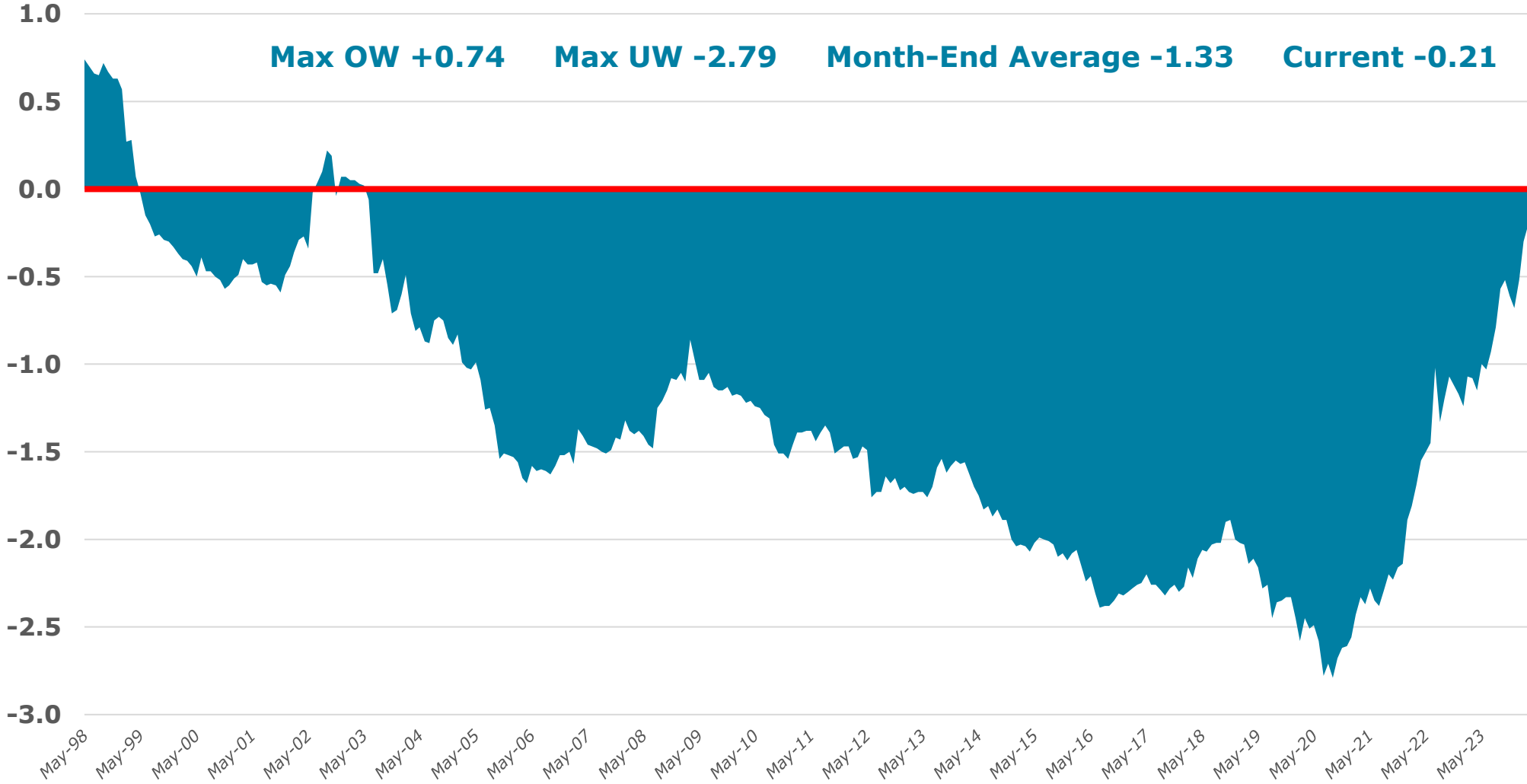
# Historical Duration: LBTP versus BM

05/29/1998-03/28/2024



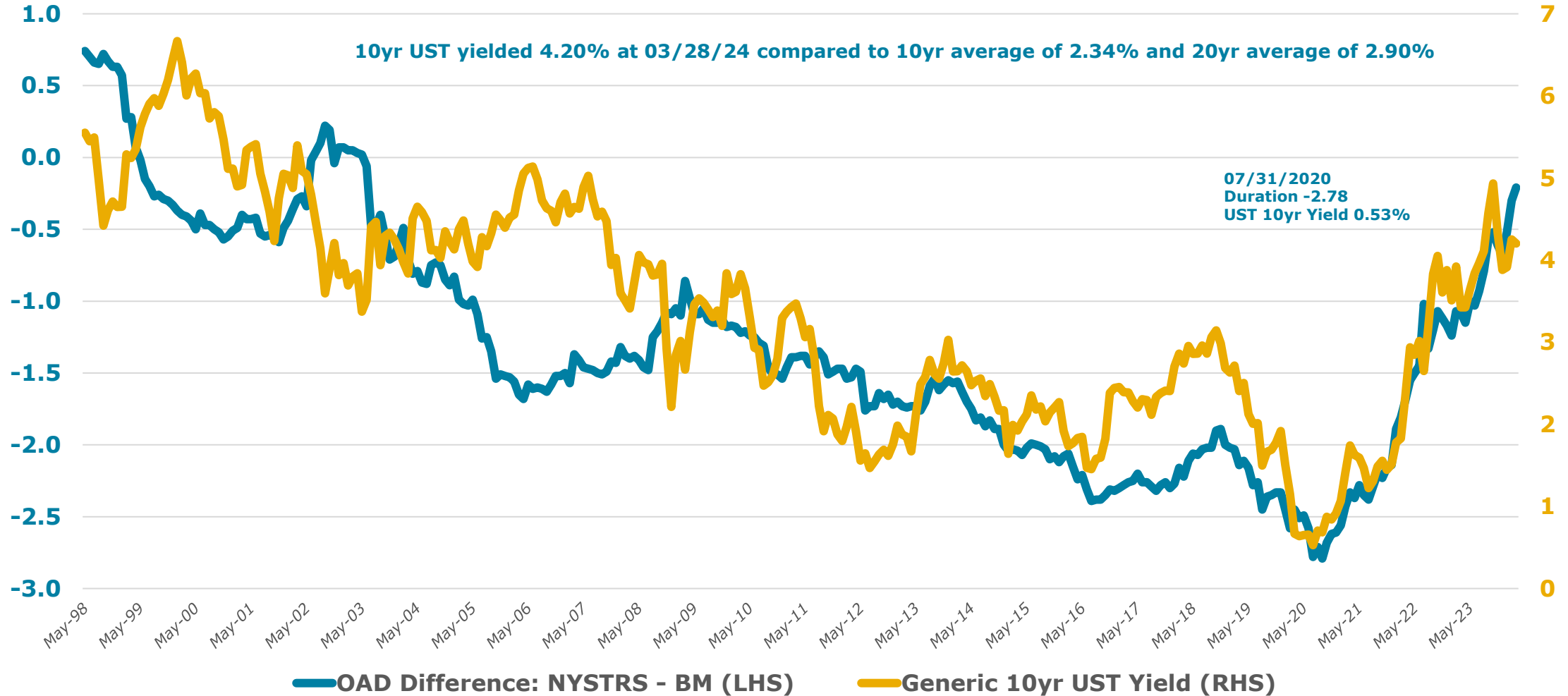
# Historical Duration Difference: LBTP versus BM

05/29/1998-03/28/2024



# Historical Duration Difference Compared Against 10YR US Treasury Yield

05/29/1998-03/28/2024





# Reduced Overweight to <1YR Securities

06/29/2012 – 03/28/2024

## LTBP % Maturities <1 Year



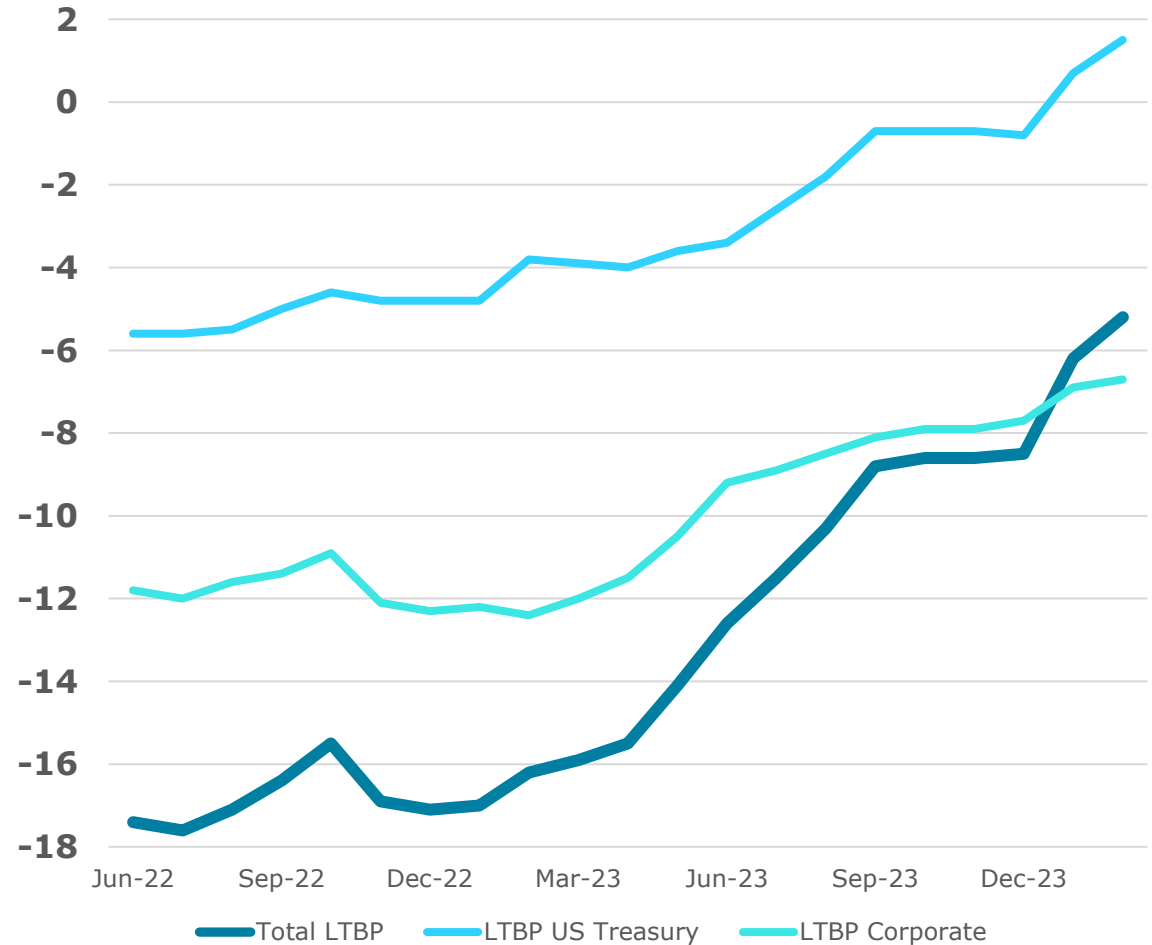
# Adding Long Maturity (10YR+) Treasuries & Corporates

06/30/2022 to 03/38/2024

## 10-Year + Securities as a Percent of LTBP

	June 2022	March 2024
<b>Total Portfolio</b>	<b>22.1%</b>	<b>35.6%</b>
<b>MBS Pass-Through</b>	<b>16.9%</b>	<b>19.5%</b>
<b>Treasuries</b>	<b>3.0%</b>	<b>10.8%</b>
<b>Corporates</b>	<b>1.9%</b>	<b>4.9%</b>

LTBP 10yr+ MV% versus Benchmark



# Managing Key Rate Durations

12/31/2021 versus 03/28/2024

		Total	6 Month	1 year	3 year	5 year	7 year	10 year	20 year	30 year
Dec 31, 2021	LTBP	4.74	0.04	0.25	0.63	0.94	1.27	1.12	0.49	0.02
	BM	6.73	0.02	0.27	0.66	0.78	0.91	1.13	1.75	1.22
	Diff	-1.99	+0.02	-0.02	-0.03	+0.16	+0.36	-0.01	-1.26	-1.20
March 28, 2024	LTBP	5.81	0.02	0.12	0.80	0.81	1.23	0.82	1.60	0.42
	BM	6.02	0.01	0.14	0.87	0.80	0.86	0.79	1.50	1.05
	Diff	-0.21	+0.01	-0.02	-0.07	+0.01	+0.36	+0.03	+0.10	-0.63



# Managing Sector Durations

06/30/2022 versus 03/28/2024

		US Treasuries	Corporates	Securitized	Government Related
06/30/2022	LTBP	4.88	5.15	5.55	3.77
	BM	6.35	7.56	6.01	5.48
	Diff	-1.47	-2.42	-0.46	-1.70
03/28/2024	LTBP	6.40	6.15	4.76	3.39
	BM	5.97	6.94	5.29	5.21
	Diff	+0.43	-0.79	-0.53	-1.82



# Deliberate Shift in Characteristics

06/30/2022 versus 03/28/2024

- Invested into LTBP since June 2022 to move closer to asset allocation target
- Reduced Treasury and Mortgage-Backed underweights and corporate bond overweight
- As US Treasury yields have risen, added duration to reduce underweight
- Yield to maturity almost matches the benchmark after under-yielding historically
- The coupon has increased but not as fast as the benchmark
- Continue to maintain a high-quality and liquid portfolio

LTBP Characteristics	3/28/2024			Change in Difference from 06/30/22	6/30/2022		
	Portfolio	Benchmark	Difference		Portfolio	Benchmark	Difference
Market Value \$	\$20,564,804				\$19,622,540		
Treasuries MV%	45.3%	45.2%	0.1%	2.2%	42.8%	44.9%	-2.1%
MBS Pass-Through MV%	19.9%	19.8%	0.1%	2.6%	17.7%	20.2%	-2.5%
Corporates MV%	27.4%	27.1%	0.3%	-5.9%	32.7%	26.5%	6.2%
Yield to Maturity	4.84%	4.85%	-0.01%	0.17%	3.52%	3.70%	-0.18%
Maturity Years	11.26	12.38	-1.12	2.12	8.88	12.12	-3.24
Duration	5.81	6.02	-0.21	1.30	5.03	6.54	-1.51
Option Adjusted Spread	38	36	2	8	49	55	-6
Coupon	2.99	3.23	-0.24	-0.12	2.38	2.50	-0.12
Moody's Rating	Aa2	Aa2	None	No Change	Aa2	Aa2	None



# Corporate Bond Characteristics

06/30/2022 versus 03/28/2024

- Significantly reduced overweight versus benchmark
- Increased duration and maturity years with contribution to duration unchanged
- Yield to maturity difference has narrowed materially
- Spreads have tightened but reduced shortfall versus benchmark
- Continue to remain up-in-quality, defensive, and lower duration versus benchmark

Corporate Bond Characteristics	3/28/2024			Change in Difference from 06/30/22	6/30/2022		
	Portfolio	Benchmark	Difference		Portfolio	Benchmark	Difference
Market Value \$	\$5,631,657				\$6,463,048		
Market Value %	27.4%	27.1%	0.3%	-5.8%	32.7%	26.5%	6.1%
Financial MV%	9.5%	8.9%	0.6%	-0.3%	9.6%	8.7%	0.9%
Industrial MV%	13.9%	15.8%	-1.9%	-4.9%	18.6%	15.6%	3.0%
Utility MV%	4.0%	2.4%	1.5%	-0.8%	4.5%	2.2%	2.3%
Yield to Maturity	5.20%	5.34%	-0.14%	0.39%	4.14%	4.67%	-0.53%
Maturity Years	9.08	11.45	-2.37	3.28	6.48	12.13	-5.65
Duration	6.15	6.94	-0.79	1.63	5.15	7.56	-2.42
Duration Contribution	1.68	1.88	-0.2	0.13	1.68	2.01	-0.33
Option Adjusted Spread	77	87	-10	30	114	154	-40
Coupon	3.32	4.11	-0.79	-0.07	2.88	3.60	-0.72
Spread Duration	6.32	7.11	-0.79	1.67	5.28	7.73	-2.46
Moody's Rating	A2	A3	+1 notch	No Change	A2	A3	+1 notch



# Corporate Bond Activity

06/30/2022 - 03/28/2024

Corporate Bond Activity	07/01/23-03/28/24	FY 2022-2023
Principal Bought	\$718,856,429	\$769,192,934
Principal Sold	\$176,847,065	\$1,060,011,225
Net Investment	\$542,009,364	(\$290,818,291)
Yield Bought	5.67%	5.33%
Yield Sold	5.22%	4.37%
Maturity Bought	17.5	18.8
Maturity Sold	4.9	3.8
Option Adjusted Spread Bought	141	170
Option Adjusted Spread Sold	78	58
Coupon Bought	5.37%	4.89%
Coupon Sold	3.60%	3.29%
Rating Bought	A3	A3
Rating Sold	A3	A2
> 10 Year Bought only		
Principal	\$275,668,303	\$358,374,371
Yield	5.65%	5.24%
Option Adjusted Duration	14.6	15
Option Adjusted Spread	123	154
Rating	A3	A2

- Finding relative value opportunities in credit
- Picking up yield primarily through credit spread
- Remaining credit quality neutral
- Adding duration where appropriate



# Securitized Bond Characteristics

06/30/2022 versus 03/28/2024

- 1.8% of the benchmark was CMBS whereas the LTBP has historically held none
- Adding MBS exposure from October 2022 when the current coupon spread widened
- Higher coupon specified pools as mortgage rates increased with origination in higher coupons
- Purchasing high quality, prime consumer segment ABS with 2.5 to 5.0 year effective maturity
- First rate sponsors in auto loan, credit card, device payment plans and one rate recovery bond

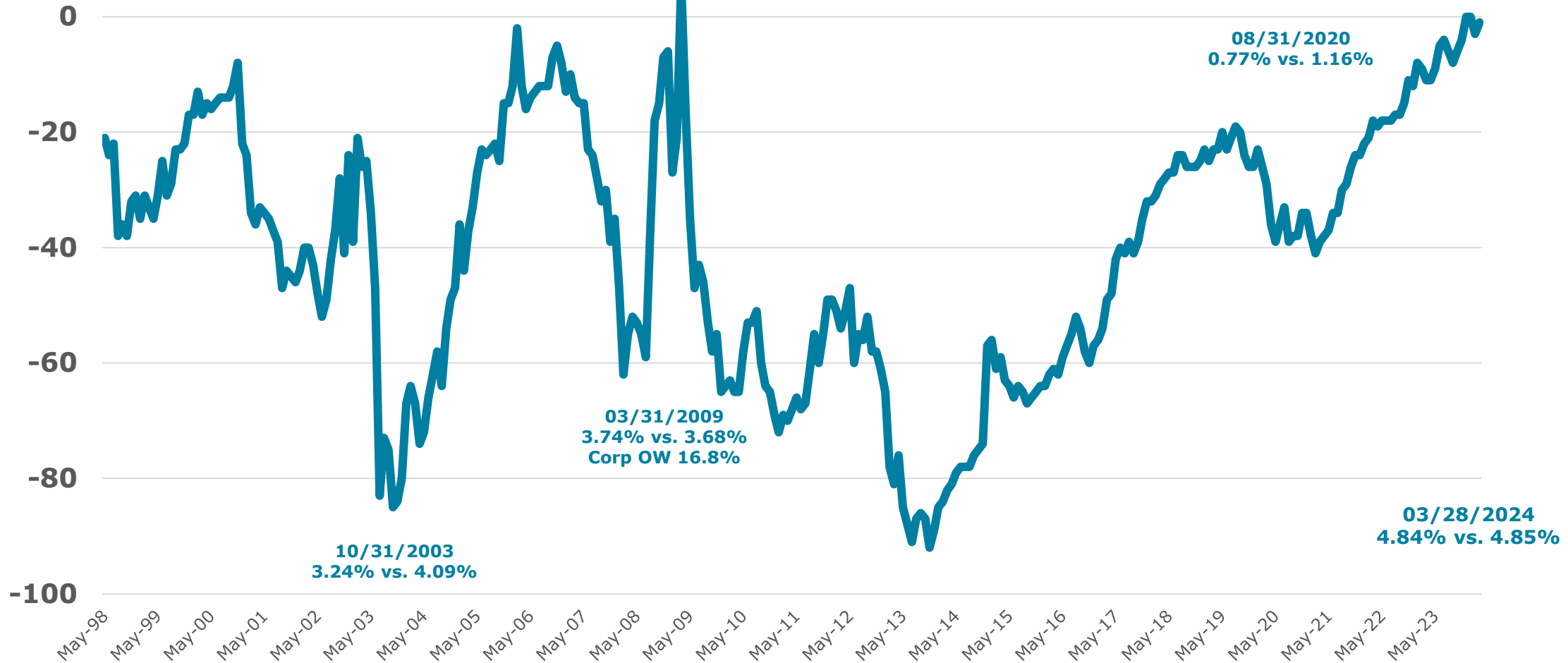
Securitized Bond Characteristics	3/28/2024			Change in Difference from 06/30/22	6/30/2022		
	Portfolio	Benchmark	Difference		Portfolio	Benchmark	Difference
Market Value %	21.7%	22.1%	-0.4%	3.4%	18.9%	22.7%	-3.8%
MBS Pass-Through	19.9%	19.8%	0.1%	2.6%	17.7%	20.2%	-2.5%
ABS	1.8%	0.5%	1.3%	0.6%	1.1%	0.4%	0.7%
Yield to Maturity	5.19%	5.10%	0.09%	0.05%	3.80%	3.76%	0.04%
MBS Pass-Through	5.19%	5.10%	0.09%	0.00%	3.82%	3.73%	0.09%
ABS	5.23%	5.17%	0.06%	0.14%	3.48%	3.56%	-0.08%
Weighted Average Life	6.91	7.27	-0.36	-0.16	7.64	7.84	-0.20
MBS Pass-Through	7.3	7.61	-0.31	-0.05	7.97	8.23	-0.26
ABS	2.51	3.24	-0.73	-0.71	2.53	2.55	-0.02
Option Adjusted Spread	57	47	10	9	50	49	1
MBS Pass-Through	57	42	15	8	50	43	7
ABS	55	56	-1	-9	61	53	8
Coupon	3.97	3.37	0.60	0.28	3.05	2.73	0.32
MBS Pass-Through	3.99	3.36	0.63	0.25	3.10	2.72	0.38
ABS	3.81	4.36	-0.55	-1.10	2.37	1.82	0.55





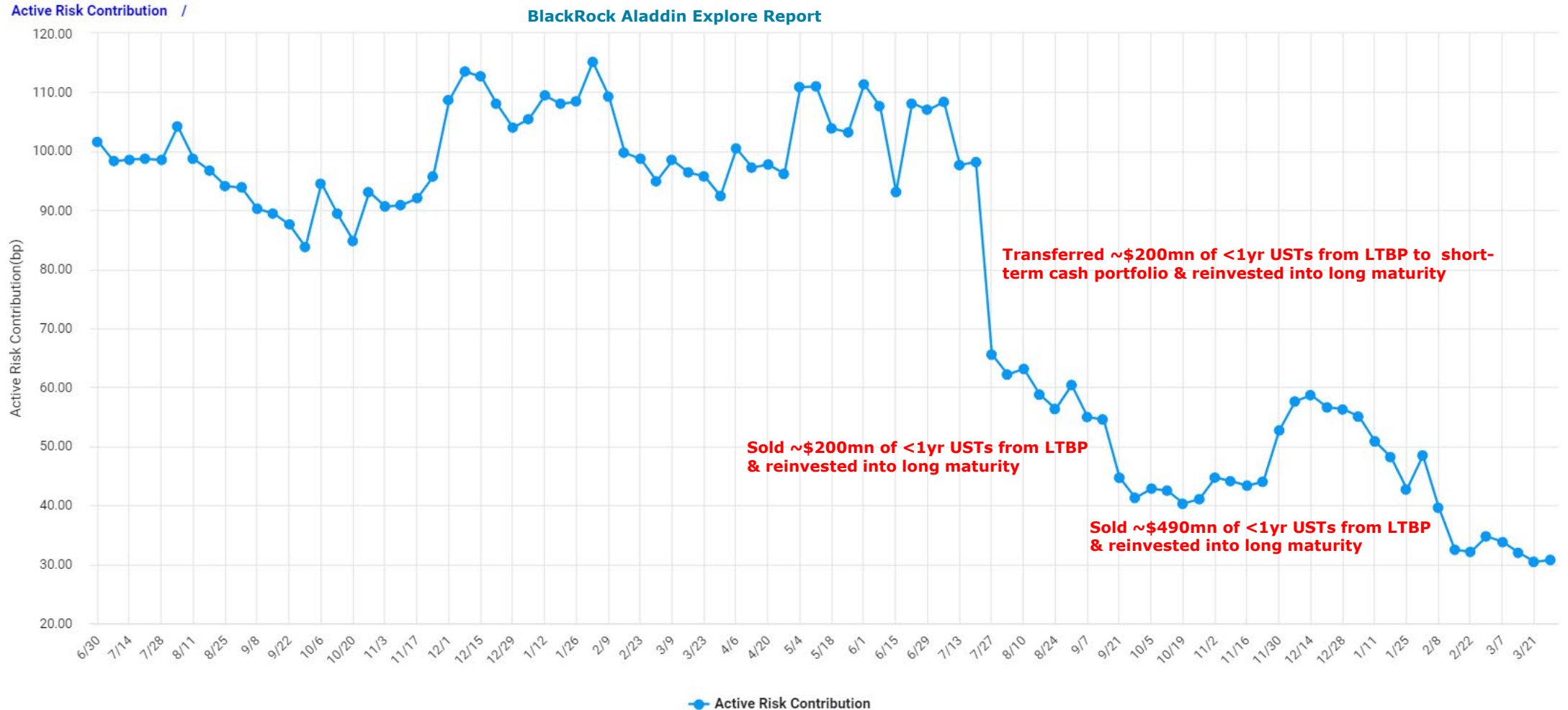
# LBTP versus BM Yield Shortfall

( in basis points)  
05/29/1998-03/28/2024



# Reduction in Tracking Error

06/30/2022 to 03/28/2024



# Conclusion

- **Significantly reduced tracking error risk**
- **Eliminated yield shortfall versus benchmark**
- **Increased coupon and hence portfolio income**
- **Maintaining high-quality, liquid portfolio**
- **Respond to yield and/or spread opportunities from a relative value and risk-return basis**



# Questions?

## **Definitions:**

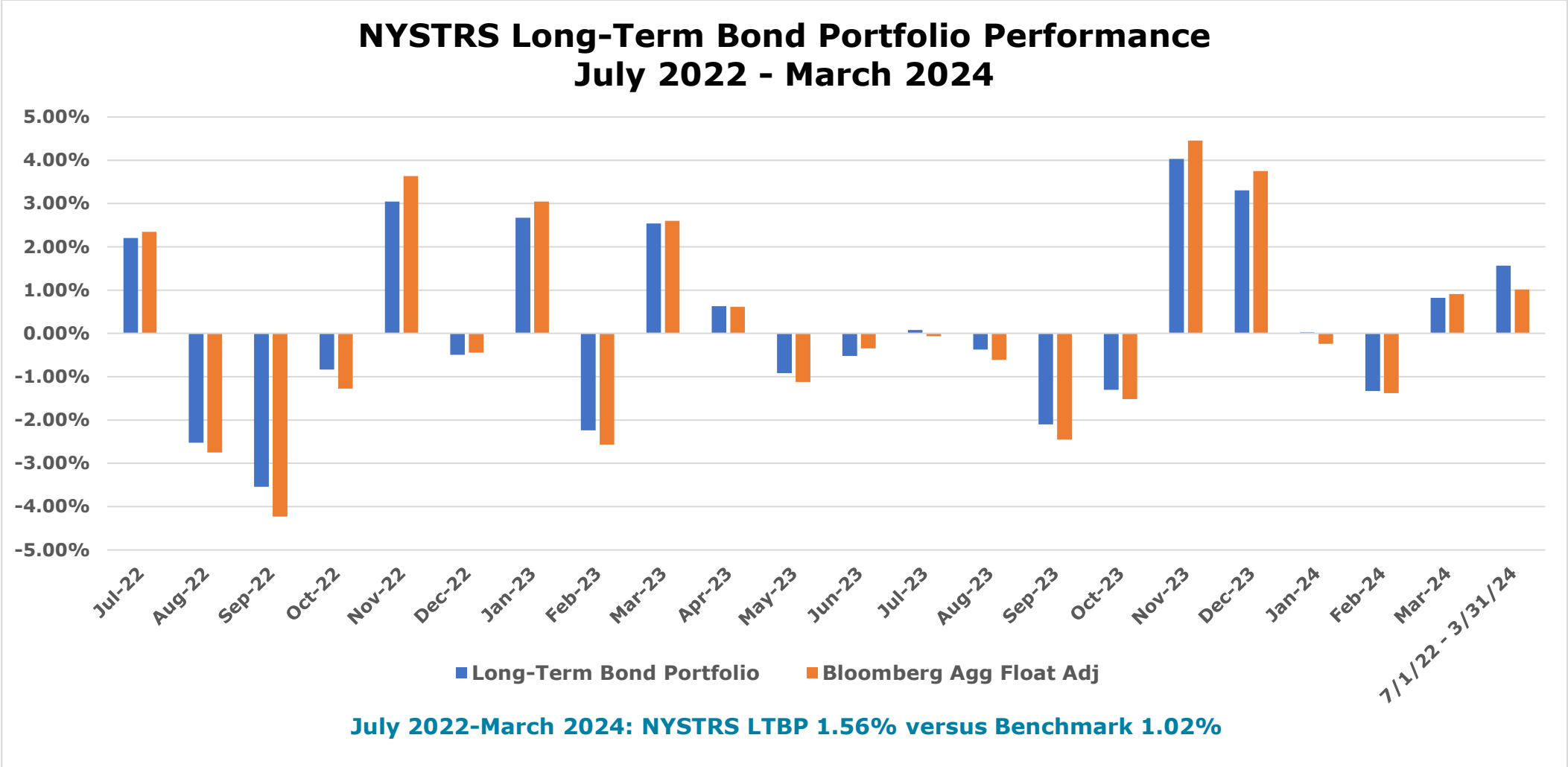
- **U.S. Aggregate Float-Adjusted Index:** *Excludes US agency debentures held in the Federal Reserve SOMA account*
- **Duration:** *measures price sensitivity to changes in interest rates; also measures in years how long it takes for an investor to be repaid the bond's price by the bond's total cash flows*
- **Option-Adjusted Spread:** *the spread over the risk-free rate of return to account for credit risk and embedded options in a security*
- **Spread Duration:** *measures price sensitivity to changes in credit spread*
- **Tracking Error:** *risk in an investment portfolio that is due to active management decisions made by the portfolio manager*
- **MBS Pass Through:** *A bundle of home loans bought from banks that originate them and structured as trusts in which mortgage payments are collected and passed through to investors*

**Data Sources:** *Aladdin, Bloomberg PORT, FactSet, CMS BondEdge, LTBP Corporate Activity Spreadsheet*



# Appendix - Monthly Returns versus BM

July 2022 – March 2024



# Appendix – Callan Capital Market Assumptions

## Increased Expected Return Assumptions for U.S. Aggregate

### Projected Fixed Income Returns

10-year projections

	Income Return	+ Capital Gain/Loss	+ Credit Default	+ Roll Return	= 2024 Expected Return	2023 Expected Return	Change vs. 2023	2022 Expected Return	Change vs. 2022
Cash	3.00%	0.00%	0.00%	0.00%	3.00%	2.75%	0.25%	1.20%	1.80%
1-3 Year Gov/Credit	3.70%	0.40%	-0.10%	0.25%	4.25%	3.80%	0.45%	1.50%	2.75%
1-3 Year Government	3.50%	0.40%	0.00%	0.25%	4.15%	3.60%			
1-3 Year Credit	4.20%	0.40%	-0.20%	0.25%	4.65%	4.00%			
Intermediate Gov/Credit	4.30%	0.30%	-0.10%	0.25%	4.75%	4.10%	0.65%	1.70%	3.05%
Intermediate Gov	3.90%	0.30%	0.00%	0.25%	4.45%	4.00%			
Intermediate Credit	4.90%	0.40%	-0.30%	0.25%	5.25%	4.25%			
<b>Aggregate</b>	<b>4.70%</b>	<b>0.40%</b>	<b>-0.10%</b>	<b>0.25%</b>	<b>5.25%</b>	<b>4.25%</b>	<b>1.00%</b>	<b>1.75%</b>	<b>3.50%</b>
Government	4.20%	0.40%	0.00%	0.25%	4.85%	3.95%			
Securitized	4.50%	0.60%	0.00%	0.25%	5.35%	4.25%			
Credit	5.55%	0.20%	-0.40%	0.25%	5.60%	4.70%			
Long Duration Gov/Credit	5.70%	-0.10%	-0.20%	0.60%	6.00%	4.65%	1.35%	1.80%	4.20%
Long Government	4.80%	0.00%	0.00%	0.60%	5.40%	3.70%			
Long Credit	6.20%	-0.20%	-0.30%	0.60%	6.30%	5.20%			
TIPS	4.30%	0.50%	0.00%	0.25%	5.05%	4.00%	1.05%	1.25%	3.80%
Global ex-U.S. Fixed	2.70%	0.30%	-0.10%	0.25%	3.15%	2.25%	0.90%	0.80%	2.35%
High Yield	8.45%	0.20%	-2.10%	0.25%	6.80%	6.25%	0.55%	3.90%	2.90%
Emerging Markets Debt	7.70%	0.30%	-1.90%	0.25%	6.35%	5.85%	0.50%	3.60%	2.75%
Bank Loans	8.15%	0.00%	-1.60%	0.00%	6.55%	6.10%	0.45%	4.60%	1.95%

Callan

3

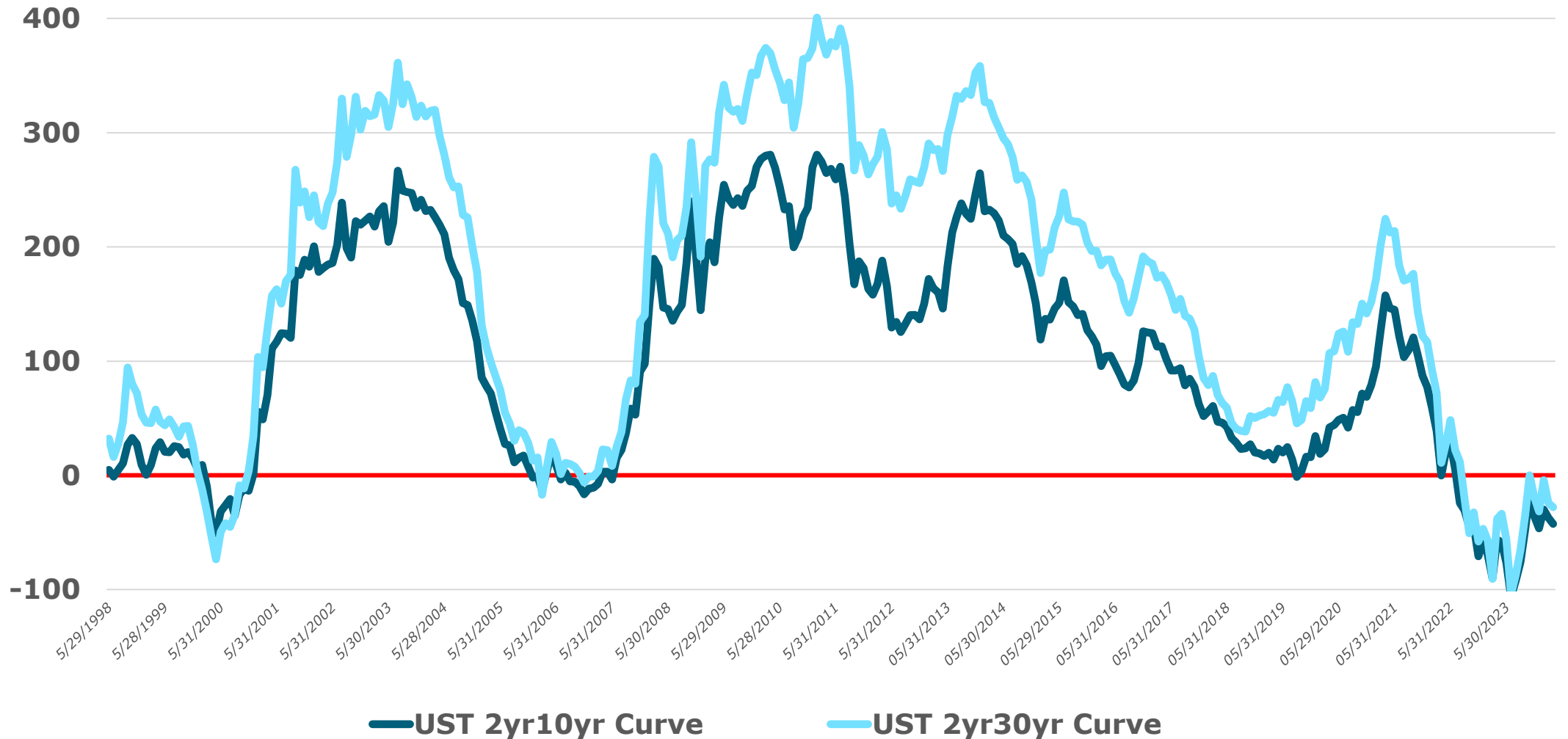


# Appendix – Callan Bloomberg Aggregate Yield vs. Subsequent 10-Year Return

Starting yield levels are a strong predictor of subsequent 10-yr returns for the Bloomberg Aggregate index

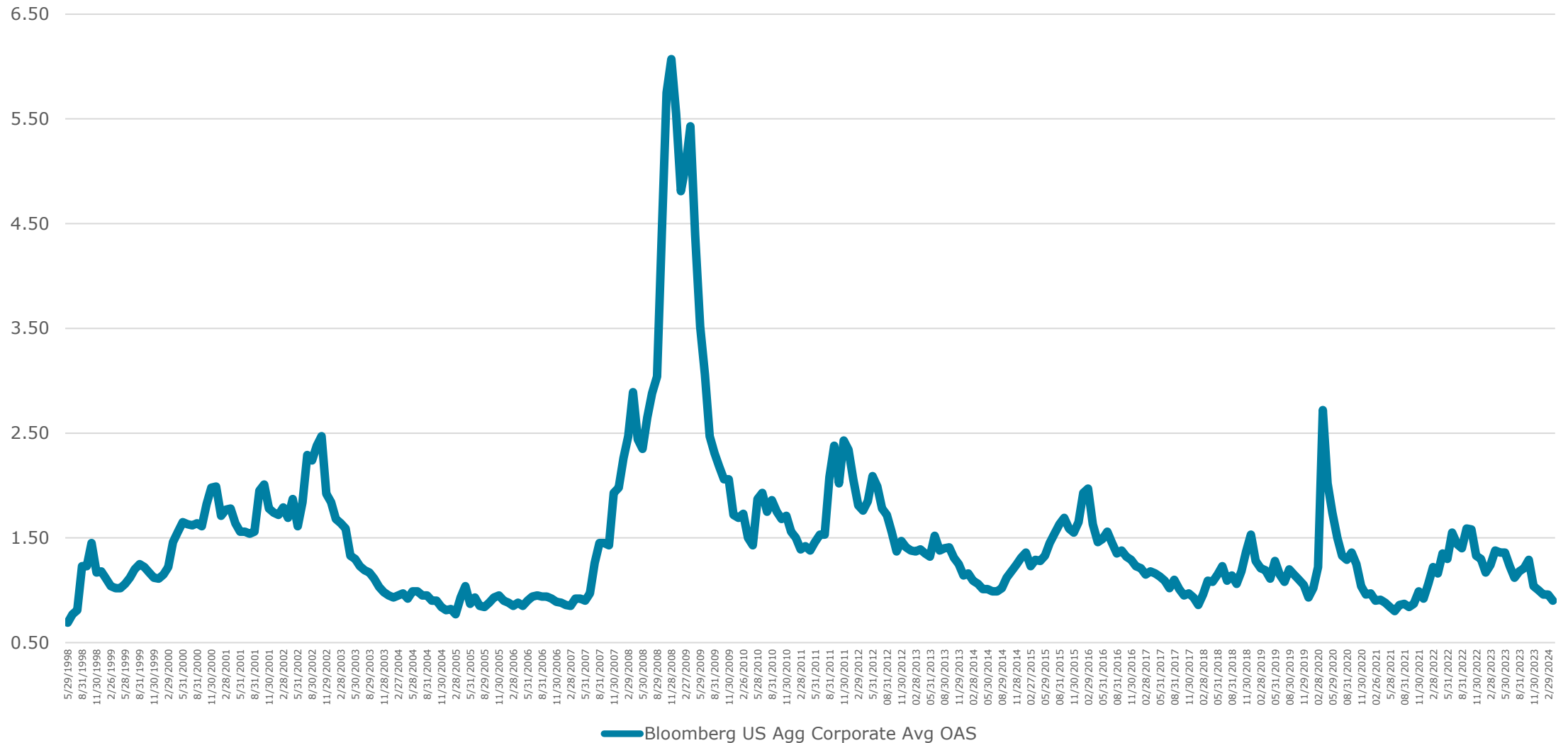


# Appendix – U.S. Treasury Curves (in basis points)

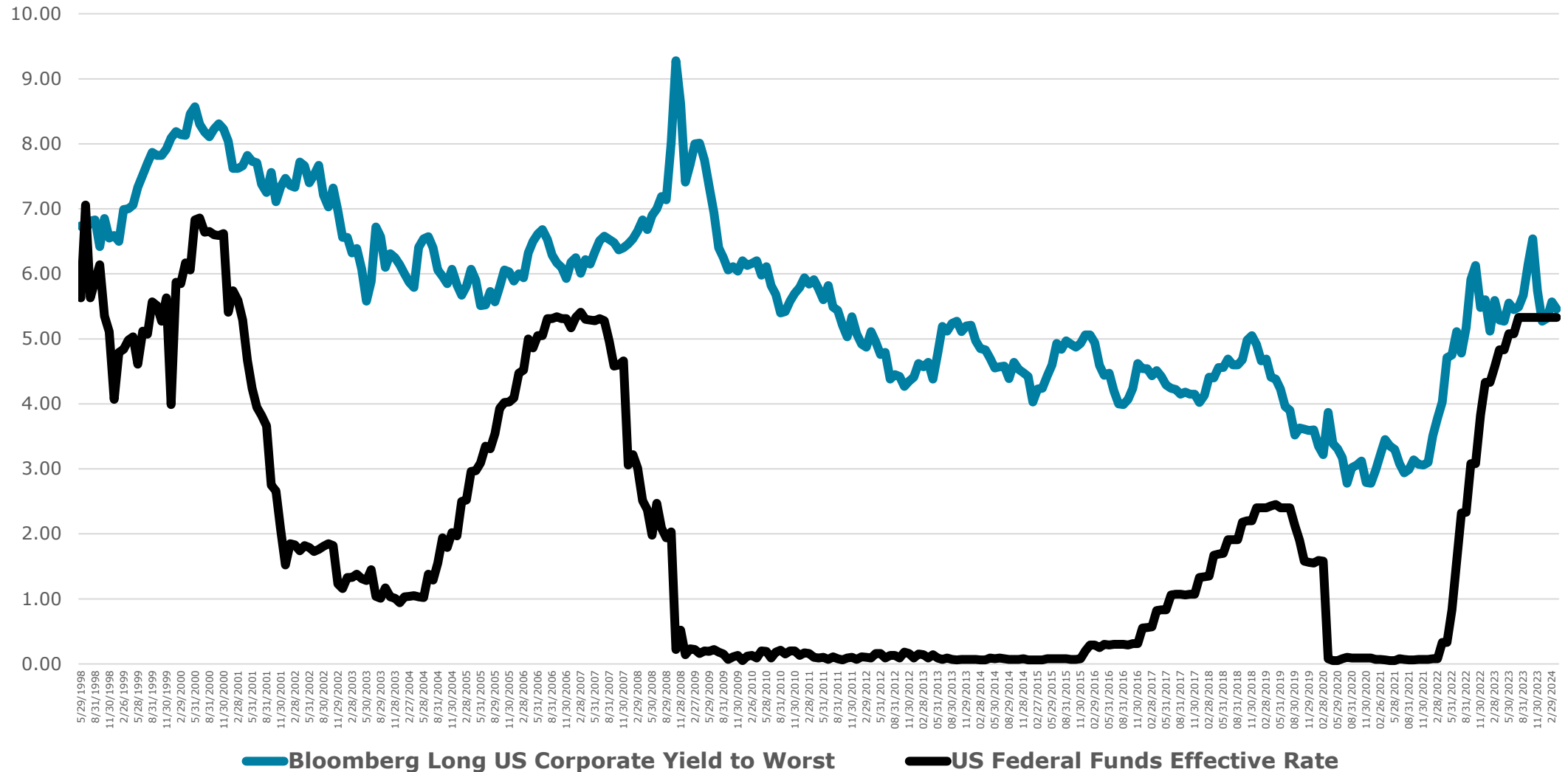




# Appendix – US Agg Corporate Average Spread



# Appendix – Corporate Bond Yields vs. US Fed Funds



# Appendix - U.S. Treasuries

- Offer safety of principal, coupon income and liquidity
- Purchase bonds that add diversification to existing holdings
- Selectively add exposure out the curve when getting compensated for interest rate risk
- Participate in U.S. Treasury Bond auctions when appropriate
- Utilize electronic trading to buy/sell in the secondary market
- When conditions are appropriate, divest front-end U.S. Treasury holdings and reinvest proceeds out the curve to add duration and/or manage key rate durations
- *Yields currently attractive versus 10- & 20-year averages*
- *However, the 2s/10s & 2s/30s Treasury curves remain inverted*



# Appendix - Corporate Bonds

- Add exposure primarily through the primary market
- Review current holdings and positioning to establish fit
- Perform fundamental credit analysis to review issuer soundness
- Analyze new issue price and concession versus secondary market
- Utilize secondary trades to divest/add to held bonds or procure new positions offering relative value and/or diversification
- Review relative value opportunities by sector, issuer, curve, etc.
- Execute on swap opportunities to pick up yield, spread and possibly improve credit quality and/or liquidity
- Monitor credit portfolio characteristics, relative issuer weights and duration, rating actions, credit events, and performance



# Appendix – Agency Mortgage-Backed Securities

- Purchase government sponsored/ government guaranteed specified mortgage pass-throughs
- Analyze pool characteristics in an effort to mitigate prepayment risk / extension risk
  - Characteristics include geography, loan size, loan to value, borrower credit score, weighted average coupon, loan age, third-party origination, etc.
- Review specified pool spread to treasuries, option-adjusted spreads on a historical basis and versus high quality corporates
- Pay-ups can vary given market technicals
- LTBP Agency MBS holdings are diverse by vintage, term, coupon, weighted average life, geography, etc.
- Do not invest in the TBA (To-Be-Announced) market due to uncertainty as the security is not designated at time of trade



# Appendix - Asset-Backed Securities

- Primarily purchase consumer asset-backed securities: credit card payments, auto receivables & cellular phone device payments
- Top issuers held: Verizon, Toyota, Ford, GM, Honda, American Express, Bank of America, Chase, Capital One
  - Recently purchased Stranded Cost Utility ABS also known as a Rate Reduction Bond (EIX – Southern California Edison)
- AAA-rated with robust structural protections allow yield pick-up without taking undue credit risk
- Rely on underlying assets for payment and not on the credit of the originator, seller or servicer to redeem bonds
- Review deal spread, weighted average life, expected maturity, servicer, collateral, credit enhancement, credit trends, etc.



# Appendix – Government Related

- Review supranational, sovereign and agency new issues including government guaranteed, government owned with no guarantee and government sponsored
- Assess the relative value of high-quality issuers that offer some spread to U.S. government bonds as well as some diversification benefits
- Overweight to government agency bonds with largest exposure to Fannie Mae debentures, Tennessee Valley Authority, Korea Development Bank and Swedish Export Credit
- Overweight to Supranational issuers which are institutions that promote economic cooperation, e.g. development banks
- In Local Authority sub-sector, only own Canadian provincial debt and have no exposure to municipal issuers due to idiosyncratic issues, limited benchmark exposure and lack of liquidity in most names
- Have a large underweight to sovereign sub-sector as currently only invested in one Canadian Government bond



# Appendix - Internal Investment Committee 03/09/22

- **The Fixed Income Department sought to clarify and alter their management of the LTBP duration relative to the benchmark**
- **Proposed to more deliberately manage the LTBP key rate durations according to market conditions**
- **Reduce LTBP duration shortfall versus the benchmark while maintaining an overall underweight if appropriate**
- **Further expand the opportunity set beyond long U.S. Treasuries by adding fundamentally strong corporate bonds with tenors >10 years**
- **Continue to manage the LTBP for liquidity, capital preservation and generation of cash flow while simultaneously responding to yield and spread opportunities further out the curve when attractive on a risk-return / relative value basis**







# Commercial Real Estate (CRE) Investments - Managing Director Update

<b>CRE Equity</b>	<b>3/31/24 Value</b>	<b>Target</b>	<b>Range</b>	<b>Actual</b>	<b>w/Commit</b>	
	<b>\$16,171</b>	<b>11%</b>	<b>6%-16%</b>	<b>11.3%</b>	<b>13.7%</b>	
<b>Performance for Periods Ended December 31, 2023</b>						
<b>Strategy (Inception Date)</b>	<b>Net Asset Value</b>	<b>Current Quarter</b>	<b>1 Year</b>	<b>5 Year</b>	<b>10 Year</b>	<b>Since Inception</b>
Direct Properties (2/90)	\$6,532	-2.8%	-8.3%	5.2%	8.2%	9.2%
Core Funds (7/85)	\$1,512	-5.2%	-12.1%	-0.3%	3.8%	6.0%
Value Added (12/89)	\$1,611	-4.1%	-8.0%	12.0%	15.5%	11.6%
Opportunistic (3/99)	\$3,165	-0.8%	-1.5%	8.0%	9.0%	10.7%
U.S. RE Securities (7/95)	\$2,326	14.0%	15.0%	8.6%	8.5%	11.0%
Global RE Securities (9/17)	\$1,050	15.7%	11.2%	4.3%	-	2.9%
Timber (12/98)	\$227	17.8%	27.1%	10.6%	7.8%	5.3%
<b>Total CRE Equity Portfolio</b>	<b>\$16,423</b>	<b>0.7%</b>	<b>-2.9%</b>	<b>5.9%</b>	<b>8.1%</b>	<b>8.1%</b>
NCREIF-ODCE (Spliced)	-	-5.0%	-12.7%	4.3%	6.7%	6.2%

## Return Drivers:

- While all property types had value declines due to the current interest rate environment, office and malls continued to have the greatest decline due to lack of tenant demand for space, lack of investor interest, and lack of financing for maturing debt and/or transactions. Multi-family and Industrial assets also had appraised value declines over the past year but continue to have more positive outlooks due to secular trends (i.e. renting for longer & online shopping). The NYSTRS' portfolio materially wrote down values of our NYC, San Francisco, and Seattle office properties.

## Market Conditions:

- While the NCREIF ODCE index is down 12.7% year over year, average sale price on closed transactions is up across most sectors other than office and malls, suggesting investor flight to safety based on multifamily, industrial and data center projected go-forward fundamentals.
- While the last months of 2023 saw a rapid drop in base rates and tightening credit spreads, the lower cost of debt did little to spur market transactions.
- With nearly \$1 trillion in commercial mortgages maturing in 2024, there is an expected pickup in distressed transactions. Although, like 2023, lenders continue to do short term (1-2 year) loan extensions to "kick the can down the road", because they don't want to foreclose on mall and office assets to take back on their own balance sheets.
- Data centers continue to have the strongest demand fundamentals and are expected to be the biggest winner of Artificial Intelligence momentum. NYSTRS' has an allocation to these centers (primarily in the public markets); however staff have concerns going-forward due to pricing, access to power and the risk of short-term obsolescence of the structures.

## Portfolio Focus:

- During the first quarter of 2024, the System closed on a \$100 million commitment to a non-core strategy investing with small and emerging investment managers with a target of 50% of investments to be made with women and minority owned partners.
- Acquisitions remains focused on only the highest conviction opportunities in sectors and geographies with durable long term demand drivers.



# Commercial Real Estate (CRE) Investments - Managing Director Update

<b>CRE Debt</b>	<b>3/31/24 Value</b>	<b>Target</b>	<b>Range</b>	<b>Actual</b>	<b>w/Commit</b>	
	<b>\$7,465</b>	<b>6%</b>	<b>2%-10%</b>	<b>5.2%</b>	<b>6.4%</b>	
<b>Performance for Periods Ended December 31, 2023</b>						
<b>Strategy (Inception Date)</b>	<b>Net Asset Value</b>	<b>Current Quarter</b>	<b>1 Year</b>	<b>5 Years</b>	<b>10 Years</b>	<b>Since Inception</b>
First Mortgages (7/85)	\$2,268	1.8%	3.1%	3.0%	3.5%	7.7%
Commercial MBS (4/01)	\$2,494	4.0%	6.4%	1.8%	2.7%	4.3%
Core Plus Strategies (8/04)	\$2,052	0.8%	-1.9%	2.7%	4.6%	3.3%
Opportunistic Debt (9/01)	\$691	2.1%	5.8%	5.3%	7.6%	1.2%
<b>Total CRE Debt Portfolio</b>	<b>\$7,505</b>	<b>2.2%</b>	<b>3.1%</b>	<b>2.9%</b>	<b>3.7%</b>	<b>7.6%</b>
GL Custom Index (Spliced)	-	4.7%	5.9%	2.7%	3.3%	7.7%

## Return Drivers:

- Commercial mortgage debt secured by office properties continued to struggle as tenant demand declined forcing owners to offer lower rent and more concessions impacting property level cash flow and values. The weaker office loan metrics resulted in increased credit spreads and value declines for existing mortgage positions... even as treasury yields declined during the 4<sup>th</sup> calendar quarter. Our portfolio's heavier weight to long held office debt compared to the benchmark resulted in the underperformance over the past year relative to the benchmark. In December, the system took ownership of an asset (Seattle office property) at a value materially below the principal balance of the 2013 originated loan.

## Market Conditions:

- Owners and lenders will need to address a significant volume (approximately \$1.5 trillion out of a total \$4.7 trillion outstanding) of U.S. mortgages maturing in the next two years.
- Interest rates were volatile during the 4<sup>th</sup> quarter 2023 with the 5-year U.S. Treasury yield declining 86 basis points to 3.85% at year end. In 2024, the 5-year U.S. Treasury yield rose as the FOMC retains a defensive policy to continue to address inflation concerns.
- Competition for stabilized first mortgage investments increased in 2024 resulting in lenders offering lower spreads (offset by increased treasury yields) and a demand for more prepayment flexibility.
- Five-year and ten-year first mortgage investments currently provide yields in the 5.75%-6.25% range.
- Investment grade CMBS securities currently provide yields in the 5.75%-7.00% range.
- Private senior mezzanine and bridge loans currently provide net yields in excess of 8.00%.

## Portfolio Focus:

- Continue to pursue first mortgage investments on high-quality, new vintage, stabilized assets with strong borrowers.
- Pursue CMBS and mezzanine/bridge positions on high quality assets focused on taking advantage of higher rates on the short end of the curve.

## Investment Activity:

- During the 1<sup>st</sup> quarter 2024, the System closed on a \$200 million first mortgage on a stabilized multifamily asset in Cambridge, MA, a \$300 million upside to the Prima Separate Account targeting public/private investments, and a \$100 million commitment to a non-core debt strategy investing with small and emerging investment managers with target of 50% of investments to be made with women and minority owned partners..



## Commercial Real Estate (CRE) Investments - Managing Director Update Performance Relative to Blended Benchmarks

<b>Equity Real Estate Performance for Periods Ended <u>December 31, 2023</u></b>						
<b>Strategy (Inception Date)</b>	<b>Net Asset Value</b>	<b>Current Quarter</b>	<b>1 Year</b>	<b>5 Year</b>	<b>10 Year</b>	<b>Since Inception</b>
Direct Properties (2/90)	\$6,532	-2.8%	-8.3%	5.2%	8.2%	9.2%
Core Funds (7/85)	\$1,512	-5.2%	-12.1%	-0.3%	3.8%	6.0%
Value Added (12/89)	\$1,611	-4.1%	-8.0%	12.0%	15.5%	11.6%
Opportunistic (3/99)	\$3,16	-0.8%	-1.5%	8.0%	9.0%	10.7%
U.S. RE Securities (7/95)	\$2,326	14.0%	15.0%	8.6%	8.5%	11.0%
Global RE Securities (9/17)	\$1,050	15.7%	11.2%	4.3%	-	2.9%
Timber (12/98)	\$227	17.8%	27.1%	10.6%	7.8%	5.3%
<b>Total CRE Equity Portfolio</b>	<b>\$16,423</b>	<b>0.7%</b>	<b>-2.9%</b>	<b>5.9%</b>	<b>8.1%</b>	<b>8.1%</b>
<b>Blended Benchmark*</b>	<b>-</b>	<b>-0.8%</b>	<b>-6.9%</b>	<b>3.0%</b>	<b>6.1%</b>	<b>6.1%</b>

<b>Debt Real Estate Performance for Periods Ended <u>December 31, 2023</u></b>						
<b>Strategy (Inception Date)</b>	<b>Net Asset Value</b>	<b>Current Quarter</b>	<b>1 Year</b>	<b>5 Years</b>	<b>10 Years</b>	<b>Since Inception</b>
First Mortgages (7/85)	\$2,268	1.8%	3.1%	3.0%	3.5%	7.7%
Commercial MBS (4/01)	\$2,494	4.0%	6.4%	1.8%	2.7%	4.3%
Core Plus Strategies (8/04)	\$2,052	0.8%	-1.9%	2.7%	4.6%	3.3%
Opportunistic Debt (9/01)	\$691	2.1%	5.8%	5.3%	7.6%	1.2%
<b>Total CRE Debt Portfolio</b>	<b>\$7,505</b>	<b>2.0%</b>	<b>3.1%</b>	<b>2.9%</b>	<b>3.7%</b>	<b>7.6%</b>
<b>Blended Benchmark*</b>	<b>-</b>	<b>4.7%</b>	<b>5.2%</b>	<b>2.4%</b>	<b>3.1%</b>	<b>7.7%</b>

\* The Blended Benchmarks used here represent the market-value weighted average of the underlying benchmarks for each of the strategies. The System's Real Estate Policy benchmark is the NCREIF-ODCE for the Real Estate Equity Portfolio, and the Giliberto-Levy Custom Index for the Real Estate Debt Portfolio.

# Private Equity/Debt MD Update

## April 24, 2024

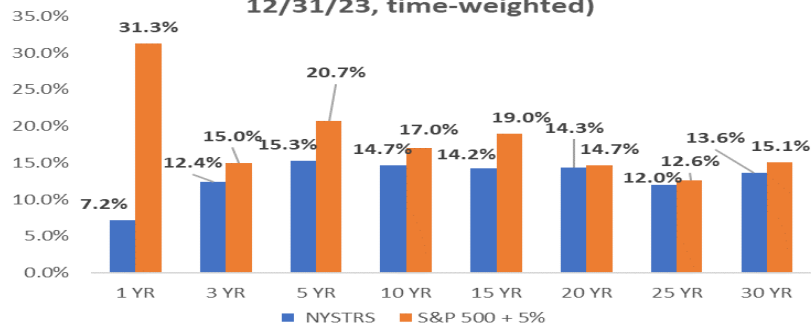
### Private Equity – 9% Target (4-14%)

- 3/31/24 - \$13.8bn or approx. 9.6% vs. target
- \$5.5bn unfunded

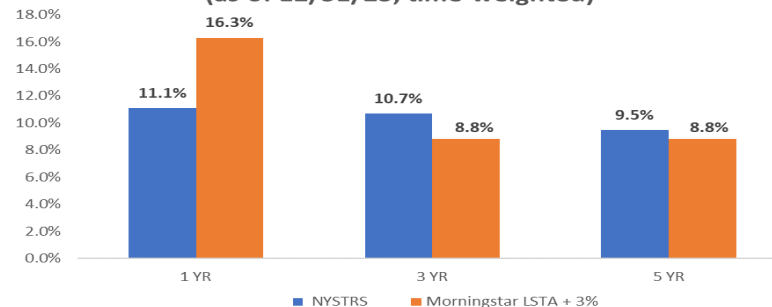
### Private Debt – 2% Target (0.5-5%)

- 3/31/24 - \$2.3bn or approx. 1.6% vs. target
- \$1.6bn unfunded

NYSTRS Private Equity Performance (as of 12/31/23, time-weighted)



NYSTRS Private Debt Performance (as of 12/31/23, time-weighted)



### Market Overview:

- Deal activity picked up in Q4 of CY23 and has continued through Q1 CY24. NYSTRS PE and PD portfolios have benefited from increased distributions.
- Private debt markets continue to be a major source of financing for buyouts although public market activity has increased leading to increased competition and more borrower friendly terms, particularly in the large end of the market.
- NYSTRS Portfolio Valuations – 12/31 quarterly returns – PE and PD were up 2.3% and 2.9% respectively from 9/30.

### Other Items:

- Investment Fellows – Second fellow joined the team in February.
- Annual Review – StepStone will present at the July Board meeting.

Investment Committee Meeting April 24, 2024

**RESOLUTION RENEWING ADELANTE CAPITAL  
MANAGEMENT LLC**

RESOLVED, That the System's Executive Director and Chief Investment Officer is authorized to renew the agreement with Adelante Capital Management LLC to manage a portion of the System's portfolio, to be actively invested in the securities of real estate investment trusts ("REITs") and real estate operating companies ("REOCs"), for a period of one year, effective July 1, 2024.

Investment Committee Meeting April 24, 2024

**RESOLUTION RENEWING GOLDMAN SACHS ASSET MANAGEMENT, LP**

RESOLVED, That, the Executive Director and Chief Investment Officer, or designee, is authorized to renew the agreement with Goldman Sachs Asset Management, L.P. to manage a portion of the System's assets as an active India equity manager benchmarked to the MSCI India IMI Index for a period of one year commencing July 5, 2024.

Investment Committee Meeting April 24, 2024

**Resolution Renewing JPMorgan Chase Bank, N.A.**

RESOLVED, the Executive Director and Chief Investment Officer is authorized to renew the agreement with JPMorgan Chase Bank, N.A., to act as an agency securities lender for a portion of the System's public securities assets for a period of one year, effective July 1, 2024.

Investment Committee Meeting April 24, 2024

## **RESOLUTION RENEWING LSV ASSET MANAGEMENT**

WHEREAS, LSV Asset Management was hired as an international equity manager on July 25, 2011 and as a global equity manager on February 15, 2018; now be therefore:

RESOLVED, That, the Executive Director and Chief Investment Officer is authorized to renew the agreement with LSV Asset Management for a period of one year, effective July 25, 2024, to manage (i) a portion of the System's assets as an international equity manager benchmarked to the MSCI ACWI ex-US index, and (ii) a portion of the System's assets as a global equity manager benchmarked to the MSCI ACWI index.



Investment Committee Meeting April 24, 2024

**RESOLUTION RENEWING WELLINGTON MANAGEMENT COMPANY, LLP**

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Wellington Management Company, LLP to manage a portion of the System's fixed income portfolio in a Global Aggregate fixed income mandate benchmarked to the Bloomberg Global Aggregate Float Adjusted ex CNY Bond Index in U.S. Dollars hedged to the U.S. Dollar for a period of one year, effective June 20, 2024.



**NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
ED&CIO Investment Discretion Exercised**

**TO:** Retirement Board  
**FROM:** T. Lee  
**SUBJECT:** Quarterly Report of Executive Director and Chief Investment Officer Investment Discretion Exercised January - March 2024

**Fixed Income**

<b>Period</b>	<b>Action Taken</b>	<b>Amount</b>
Q/E 3/31/24	Net cash reallocated <b>into</b> internally managed Long-Term Bonds	\$1,381.2 M

**Public Equities**

<b>Period</b>	<b>Action Taken</b>	<b>Amount</b>
Q/E 3/31/2024	Net cash reallocated <b>out of</b> internally managed domestic equity portfolios	\$1.29B



**NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
ED&CIO Investment Discretion Exercised**

SUBJECT: Quarterly Report of Executive Director and Chief Investment Officer Investment Discretion Exercised January - March 2024

**Real Estate - New Commitments**

<b>Date of Internal Inv. Comm. Approval</b>	<b>Investment Name</b>	<b>Amount</b>	<b>New or Renew</b>
Jan 30 2024	Prima	\$300M	Renew
March 1 2024	GCM RE Equity Investment Partners 2024-1	\$100M	Renew
March 1 2024	GCM RE Debt Investment Partners 2024-1	\$100M	Renew

**Real Estate**

<b>Period</b>	<b>Action Taken</b>	<b>Amount</b>
	- None -	



**NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
ED&CIO Investment Discretion Exercised**

SUBJECT: Quarterly Report of Executive Director and Chief Investment Officer Investment Discretion Exercised January - March 2024

**Private Equity/Debt – New Commitments**

<b>Date of Internal Inv. Comm. Approval</b>	<b>Investment Name</b>	<b>Amount</b>	<b>New or Renew</b>
March 28 2024	Sterling Group Partners VI	\$200M	Renew
March 28 2024	Crestline Direct Lending IV	\$200M	New



**NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
Board Mail Votes**

**TO:** Retirement Board  
**FROM:** T. Lee  
**SUBJECT:** Quarterly Board Report of Mail Votes<sup>i</sup> for the period January – March 2024

<b>Date</b>	<b>Type</b> (Full Board Vote or Investment Committee Vote)	<b>Transaction</b>
03/04/2024	Full Board	Collective Bargaining Agreement 2024-2029

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<sup>i</sup> "...The Board may act by a unanimous vote of its members taken by mail and/or e-mail and other electronic means approved by the System, or by telephone confirmed by mail and/or other electronic means approved by the System, on occasional matters determined by the President to be non-controversial in nature so as not to require a special meeting of the Board but having circumstances which make it impractical to delay action until the next annual or stated meeting of the Board..." from NYSTRS' Bylaws



NEW YORK STATE TEACHERS' RETIREMENT SYSTEM  
10 Corporate Woods Drive Albany, New York

Audit Committee Meeting

April 24, 2024

COMMITTEE MEMBERS

Oliver Robinson, Chair

Juliet Benaquisto, Phyllis Harrington, Eric Iberger, Jennifer Longtin

AGENDA p. 175

Call to Order by Chair

- A. Approve Minutes of the January 24, 2024 Meeting pp. 176-177
- B. Plan to Audit the Financial Statements for the Fiscal Year Ending June 30, 2024 - Plante Moran pp. 178-194
- C. Report on Audits of NYSTRS Wholly Owned Real Estate Investment Accounts – CohnReznick pp. 195-215
  - June 30, 2023 and December 31, 2023 Audit Results
  - December 31, 2024 Audit Plan
- D. Results of IT Risk Assessment, Vulnerability Assessment and Penetration Testing - Linea Secure (Motion to go into **Executive Session** pursuant to Open Meetings Law §105 and §108 to discuss IT security matters) pp. 216-223
- E. Internal Audit Update pp. 224-237
- F. Executive Session (motion for **Executive Session** pursuant to Section 105(1) (f) of the Open Meetings Law to discuss personnel matters)

NEW YORK STATE  
TEACHERS' RETIREMENT SYSTEM  
Audit Committee Meeting

A meeting of the Audit Committee of the New York State Teachers' Retirement System was held at the System on January 24, 2024.

Committee Members: Juliet Benaquisto (via WebEx), Phyllis Harrington (via WebEx), Eric Iberger, Jennifer Longtin, Oliver Robinson

Board Members: Elizabeth Chetney, Paul Farfaglia, David Keefe (via WebEx), Nicholas Smirensky

NYSTRS Staff: Thomas K. Lee, Don Ampansiri, Kathy Ebert, Bruce Woolley, Lei Zhang, Darlene Dempsey, Teddi Kaczmarek, Nick Jansen

Audit Committee Advisor: Sue Landauer (via WebEx)

Visitor During Open Session: Anin Kofi-Addo, Omni Research

O. Robinson, Chair, called the meeting to order at 1:59 p.m.

1. Approval of Minutes from December 13, 2023

Upon motion of J. Longtin seconded by J. Benaquisto and unanimously carried, the Committee approved the minutes of the December 13, 2023 meeting.

2. Interim Internal Audit Report for the period July 1, 2023 to December 31, 2023

K. Ebert and B. Woolley reviewed the interim Internal Audit report.

3. Internal Audit Plan for the year ending December 31, 2024

K. Ebert presented the Internal Audit plan for the audit of the year ending December 31, 2024.

4. Resolution to Approve the Internal Audit Plan

Upon motion of J. Longtin, seconded by E. Iberger and unanimously

carried, the Audit Committee approved the following resolution:

WHEREAS, System staff has presented to the Audit Committee of the Retirement Board a proposed internal audit plan for the year ending December 31, 2024, a copy of which is annexed hereto and made a part hereof as Appendix A, attached; be it

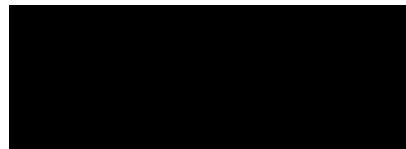
RESOLVED, That the Internal Audit Plan for the year ending December 31, 2024 is approved as presented.

5. Executive Session

Upon motion of J. Longtin, seconded by E. Iberger and unanimously carried, the Committee went into Executive Session at 2:37 p.m. to discuss personnel matters. With unanimous consent, the Committee came out of Executive Session at 2:54 p.m.

There being no further business, and with unanimous consent, the meeting adjourned at 2:54 p.m.

Respectfully submitted,



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Thomas K. Lee





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Wealth Management.

# **NYSTRS Audit Committee Pre-Audit Communication - Fiscal year 2024 audits**

**Representing Plante Moran:  
Manju Patnaik, Jake Talarek**



# Your Team Here Today



**Jean Young, CPA**  
**Co-Engagement Partner**

- 30+ years of experience
- A leader in the firm' governmental and PERS practice areas, with a specialty serving large state-wide entities



**Manju Patnaik, CPA**  
**Senior Manager**

- 16 + years of experience
- Member of the firm' governmental and PERS practice areas, with a specialty serving large state-wide plans



**Jake Talarek, CPA**  
**Manager**

- 5 + years of experience
- Member of the firm' governmental and PERS practice areas, with a specialty serving GASB pension and RHC plans



# Agenda



- Pre-Audit Communication
  - Audits to Perform
  - Auditor Responsibilities
  - Identification of Significant Risks
  - Plante Moran's Approach to Internal Control
  - Materiality Concept
  - Audit Timeline
  - Audit Committee Member Views
- Questions



# Pre-Audit Communication



# Pre-Audit Communication

## Plante Moran will perform an audit and express an opinion on the following statements:

- NYSTRS basic Financial Statements as of and for the year ended June 30, 2024
- NYSTRS Annual Comprehensive Financial Report (ACFR) as of and for the year ended June 30, 2024
- Separately issued audit of the NYSTRS Retired Employee Health Benefits Trust as of and for the year ended June 30, 2024
- Audit in accordance with GASB 68 of the Schedules of Collective Pension Amounts and Employer Allocations for the measurement year ended June 30, 2024
- Actuarial review opinion suitable for publication in the ACFR



# Pre-Audit Communication

## Auditor Responsibilities

- Express an opinion about whether the financial statements prepared by management are fairly presented, in all material respects, in accordance with GAAP
- Communicate noncompliance with provisions of laws and regulations that have a material effect on the financial statements that come to our attention



# Pre-Audit Communication

## Identification of Significant Risks

- Appropriate valuation of investments, particularly the alternative investment that do not have readily establish market values
- Accuracy of participant census data and the assumptions underlying the determination of the total pension liability under GASB 67
- Areas where there is potential for management to override controls



# Pre-Audit Communication

## Plante Moran's Approach to Internal Control

- Narratives/Questionnaires
- Observation and inspection of procedures
- Effectiveness of controls over investment valuation
- No opinion on effectiveness of internal controls

## Materiality Concept

We place greater emphasis on those items that have, on a relative basis, more importance to the financial statements and greater possibilities of material error than with those items of lesser importance or those in which the possibility of material error is remote.





# Audit Timeline

- November 2023 – May 2024 – Planning and preliminary information gathering phase and risk assessment phase
- November 2023 – May 2024 – Employer Payroll Census Audits to be completed with samples selected in November 2023
- June/July 2024 – perform control walkthroughs, interim work, retiree census testing, benefit eligibility testing
- August- October 2024– perform year end audit procedures, October 2024 - Actuarial review opinion suitable for publication in the ACFR
- October 2024 – issuance of audit opinion for NYSTRS basic financial statements and NYSTRS Retired Employee Health Benefits Trust
- November 2024 – complete testing of schedules of Collective Pension Amounts and Employer Allocations in accordance with GASB 68
- December 2024 – issuance of report in accordance with GASB 68
- December 2024 – issuance of opinion on NYSTRS ACFR
- December 2024– procedures on NYSTRS PAFR



# New Audit Standards

## SAS 143 – Auditing Accounting Estimates and Related Disclosures

- This new standard has increased our requirement for documentation relating to management estimates used to determine accounting balances like the fair value of the harder-to-value investments and the total pension liability.

## SAS 145 – Understanding the Entity and Its Environment and Assessing the Risks of Material Misstatement

- We have always been responsible for gaining and understanding of internal controls, but this standard has expanded on that and increased requirements as a result we have updated our control walkthrough forms and our IT specialists will be taking a closer look at IT controls



# New Accounting Standards

## GASB 96 – Subscription-Based Information Technology Agreements

- This Statement provides guidance on the accounting and financial reporting for subscription-based information technology arrangements (SBITAs) for government end users (governments). We don't expect this accounting standard to have an impact on the System.



# Questions?

**We greatly appreciate the opportunity  
to serve you!**



# Contact Information:

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Engagement Partner

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517.336.7458

Manju Patnaik, CPA

Senior Manager

[Manju.Patnaik@plantemoran.com](mailto:Manju.Patnaik@plantemoran.com)

248.223.3768

Jake Talarek, CPA

Manager

[Jake.Talarek@plantemoran.com](mailto:Jake.Talarek@plantemoran.com)

248.223.3762

March 15, 2024

Audit Committee  
New York State Teachers' Retirement System  
10 Corporate Woods Drive  
Albany, NY 12211

Dear Audit Committee Members:

We are in the process of planning for the audit of the financial statements of New York State Teachers' Retirement System ("NYSTRS") for the year ended June 30, 2024.

We expect to issue audit opinions on the following:

- NYSTRS basic financial statement as of and for the year ended June 30, 2024.
- NYSTRS Annual Comprehensive Financial Report (ACFR) as of and for the year ended June 30, 2024
- NYSTRS Retired Employee Health Benefits Trust as of and for the year ended June 30, 2024
- Audit in accordance with GASB 68 of the Schedule of Employer Allocations and Schedule of Pension Amounts by Employer for the measurement year ended June 30, 2024

An important aspect of planning for the audit is communication with those who have responsibility for overseeing the strategic direction of the NYSTRS and obligations related to the accountability of the NYSTRS. At NYSTRS, these responsibilities and obligations are held by the Audit Committee, collectively and individually; therefore, it is important for us to communicate with each of you in your role as a member of the Audit Committee.

As part of this communication process, we have spoken at length with Oliver Robinson, Audit Committee Chair regarding our responsibilities under generally accepted auditing standards and the planned scope and timing of our audit. The purpose of this letter is to provide each of you with a summary of those discussions and to provide you with the opportunity to communicate with us on matters that may impact our audit.

### **Our Responsibility Under Generally Accepted Auditing Standards**

As stated in our engagement letter addressed to Kathy Ebert and dated March 11, 2024, our responsibility, as described by professional standards, is to express an opinion about whether the financial statements prepared by management with your oversight are fairly presented, in all material respects, in conformity with U.S. generally accepted accounting principles. Our audit of the financial statements does not relieve you or management of your responsibilities.

## Overview of the Planned Scope and Timing of the Audit

Jean Young is the engagement partner responsible for supervising our services performed as part of this engagement. Our audit fieldwork will include three phases. The planning and preliminary information-gathering phase will occur during January and continue through March 2024; the risk assessment phase in March through June 2024; and the rest of our audit procedures will be performed during July through October 2024. The procedures related to the ACFR and the Schedule of Employer Allocations and Schedule of Pension Amounts by Employer for the measurement year ended June 30, 2024 will occur in November through December 2024.

To plan an effective audit, we must identify significant risks of misstatement in the financial statements, including those related to changes in the financial reporting framework or changes in the entity's environment, financial condition, or activities, and design procedures to address those risks.

Because management is in a unique position to perpetrate fraud due to its ability to manipulate accounting records and prepare fraudulent financial statements by overriding controls that otherwise appear to be operating effectively, generally accepted auditing standards require that we always consider this to be a significant risk. In addition, we identified the following significant risks of misstatement:

- Appropriate valuation of investments, particularly the alternative investments that do not have readily established market values.
- Accuracy of participant census data and the assumptions underlying the determination of actuarial valuations, including accuracy of information reported by participating employers

In response to these identified significant risks, we will perform the following:

- Testing of journal entries recorded in the general ledger and other adjustments made in the preparation of the financial statements.
- Testing of all investments on a sample basis to address NYSTRS valuation estimates, control testing on the valuation assertion for your harder to value investments which includes a deep dive into NYSTRS internal controls over valuation.
- Detailed testing at select participating employers will be performed to address active census accuracy and completeness (employer audits). We will also perform certain detailed testing of retiree census data at the System and perform analytical procedures to certain other aspects of census data. We will test significant assumptions underlying the actuarial valuations and incorporate Plante Moran's internal actuary staff to review those actuarial valuations and assumptions.

We will gain an understanding of accounting processes and key internal controls through a review of the accounting procedures questionnaires and control procedures questionnaires prepared by management. We will confirm through observation and inspection procedures that accounting procedures and controls included in the questionnaires have been implemented. In addition, we plan to perform testing of the effectiveness of controls over valuation of investments for harder to value investments, such as NAV and Level 3 investments. We will not express an opinion on the effectiveness of internal control over financial reporting; however, we will communicate significant deficiencies and material weaknesses identified in connection with our audit to the Audit Committee and management.

The concept of materiality is inherent in our work. We place greater emphasis on those items that have, on a relative basis, more importance to the financial statements and greater possibilities of material error than with those items of lesser importance or those in which the possibility of material error is remote.

We plan to use the work of fair value specialist and actuary to assist in obtaining sufficient appropriate evidence related to our evaluation of the fair value of investments that are harder to value and actuarial assumptions used for reporting of the pension under GASB 67.

### **Information from You Relevant to Our Audit**

An important aspect of this communication process is the opportunity for us to obtain from you information that is relevant to our audit. Your views about any of the following are relevant to our audit:

- NYSTRS's objectives and strategies and the related business risks that may result in material misstatements
- Matters that you consider warrant particular attention during the audit and any areas where you want to request additional procedures be undertaken
- Significant communications between NYSTRS and regulators
- Understanding of NYSTRS's relationships and transactions with related parties that are significant to NYSTRS and any concerns regarding those relationships or transactions
- The attitudes, awareness, and actions concerning:
  - NYSTRS's internal control and its importance to NYSTRS, including how the Audit Committee oversees the effectiveness of internal control and the detection or possibility of fraud
  - The detection or possibility of fraud, including whether Audit Committee has knowledge of any actual, suspected, or alleged fraud affecting NYSTRS
  - Any significant unusual transactions NYSTRS has entered into
- The actions of the Audit Committee in response to developments in accounting standards, regulations, laws, previous communications from us, and other related matters and the effect of such developments on, for example, the overall presentation, structure, and content of the financial statements, including the following:
  - The relevance, reliability, comparability, and understandability of the information presented in the financial statements
  - Whether all required information has been included in the financial statements and whether such information has been appropriately classified, aggregated or disaggregated, and presented



- Other information included in the annual comprehensive financial report comprises introductory, statistical, actuarial and investment sections and the entirety of the Popular Annual Financial Report (PAFR). In connection with our audit of the basic financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements or the other information otherwise appears to be misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.


Management expects that final versions of the ACFR and PAFR will be provided to us in November and December, respectively. We will request management provide a written representation that the final version of the documents will be provided to us when available, and prior to issuance by NYSTRS, in order for us to complete necessary procedures.

If you have any information to communicate to us regarding the above or any other matters you believe are relevant to the audit, or if you would like to discuss the audit in more detail, please call Jean at 517-336-7458 or via email at [jean.young@plantemoran.com](mailto:jean.young@plantemoran.com) or Michelle at 248.223.3520 or via email at [michelle.watterworth@plantemoran.com](mailto:michelle.watterworth@plantemoran.com).

Thank you for your time and consideration in this important aspect of the audit process. You can expect to hear from us again after the completion of our audit when we will report to you the significant findings from the audit.

Very truly yours,

**Plante Moran, PC**



Jean Young, CPA  
Engagement Partner



Michelle Watterworth, CPA  
Colleague Partner

**NY  
STRS**

# **New York State Teachers' Retirement System (NYSTRS)**

**June 30, 2023 and December 31, 2023, Audit Results and  
June 30, 2024, Audit Plan**

**Presented to: The Audit Committee of NYSTRS  
April 24, 2024**

April 8, 2024

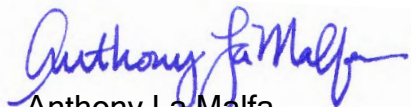
Dear Members of the Audit Committee:

Thank you for the opportunity to provide professional services to the New York State Teachers' Retirement System ("NYSTRS"), an organization we are proud to serve. We look forward to meeting with you on April 24, 2024, to discuss the results of our audits of the financial statements as of and for the years ended June 30, 2023, and December 31, 2023, and to discuss our plan to perform the audits of the financial statements as of and for the year ending June 30, 2024. This meeting will serve as a forum to validate our understanding of key issues, confirm your expectations, and make certain that our efforts are aligned with your expectations. We welcome your suggestions regarding areas of special concern and ideas to aid us in presenting the most appropriate and valuable reports to you.

Our audits are designed to express an opinion on the financial statements. We will consider NYSTRS's current and emerging business needs, along with an assessment of risks that could materially affect the financial statements and design our audit procedures accordingly. Our audits will be conducted with the objectivity and independence that you and the entire Board of Trustees expect. Rest assured that our unceasing commitment to quality is and will be reflected in every aspect of our work.

The attached report outlines the scope of our work and key considerations affecting the audits of the 2023/2024 financial statements. If you have questions or comments on this material, please contact me anytime at (646) 448-5470 or at [Anthony.LaMalfa@CohnReznick.com](mailto:Anthony.LaMalfa@CohnReznick.com).

We look forward to working with you this year.



Anthony La Malfa  
Partner, Commercial Real Estate  
CohnReznick LLP

**Entities/Reports with June 30 year ends:**

- Merritt 7 Venture, LLC
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which Sentinel Realty Advisors Corporation is Investment Advisor
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which Cabot Properties, Inc. is Investment Advisor
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which BentallGreenOak (US) LP is Investment Advisor

**Entities/Reports with December 31 year ends:**

- Adirondack Timber Company, Inc. I and Subsidiary
- Knickerbocker Barrington Place LLC
- RSQ Tower LLC
- Knickerbocker Park Point LLC
- Knickerbocker Longwood LLC
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) Residential Portfolio Managed by CBRE Investment Management
- Knickerbocker Fourth & Madison, LLC (new for December 31, 2023, however will be audited as of 2024)

## Audit Results - June 2023 and December 2023

- We have completed (substantially completed for certain entities) our audits of the financial statements as of and for the years ended June 30, 2023, and December 31, 2023. The audits have been conducted in accordance with auditing standards generally accepted in the United States (“GAAS”).
- The objective of our audits was to obtain reasonable assurance about whether the financial statements are free from material misstatement.
- We have issued (intend to issue for certain entities) unmodified opinions on each of the financial statements as of and for the years ended June 30, 2023, and December 31, 2023.

### Additional Services Provided:

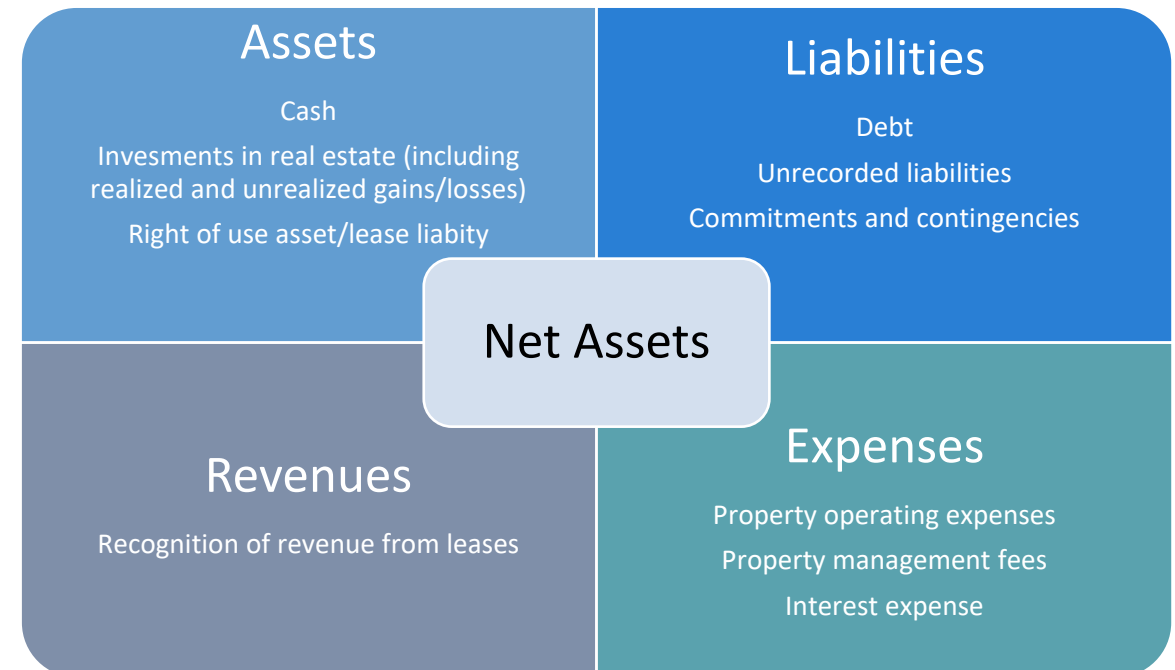
- We have prepared the annual Return of Organization Exempt From Income Tax (Form 990) and U.S. Return of Partnership Income (Form 1065) and have filed with the Internal Revenue Service and other state regulatory compliance filings for the year ended December 31, 2023.
- We intend to prepare the annual Return of Organization Exempt From Income Tax (Form 990) and U.S. Return of Partnership Income (Form 1065) to be filed with the Internal Revenue Service and other state regulatory compliance filings for the year ended June 30, 2024.

## Areas of Audit Emphasis

We considered the following factors during the planning and performance of our audit procedures:

- Accounting policies and procedures and internal controls
- Information systems and related controls
- Significant operating risks, including fraud risk factors
- Relationship of current versus prior year financial and non-financial data
- Changes on operations and environmental factors

Our areas of audit emphasis included, but were not limited to, the following:



# Required Communications – June 2023 and December 2023

Required Discussion Item	Comments
<b>Auditors’ Responsibilities under Generally Accepted Auditing Standards (GAAS)</b>	<p>As communicated in our engagement letter, our responsibilities include:</p> <ul style="list-style-type: none"> <li>• Forming and expressing an opinion about whether the financial statements, prepared by management, are presented fairly, in all material respects, in accordance with accounting principles generally accepted in the United States.</li> <li>• Planning and performing our audit to obtain reasonable, rather than absolute, assurance about whether the financial statements are free of material misstatement.</li> <li>• Consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control over financial reporting. Accordingly, as part of our audit, we considered internal controls solely for the purpose of determining our audit procedures and not to provide any assurance concerning such internal controls.</li> <li>• Communicating significant matters related to the audit that are, in our professional judgement, relevant to your responsibilities in overseeing the financial reporting process. However, we are not required to design procedures for the purpose of identifying other matters to communicate to you.</li> </ul> <p>Our audit does not relieve you or management of your responsibilities.</p> <p>We have substantially completed the audits of the financial statements of as of and for the years ended June 30, 2023 and December 31, 2023, in accordance with GAAS and intend to issue unmodified opinions.</p>
<b>Planned Scope and Timing of the Audit</b>	<p>We conducted our audit consistent with the planned scope and timing we previously communicated to you during our proposal process and in our engagement letter.</p>

# Required Communications – June 2023 and December 2023

Required Discussion Item	Comments
<b>Compliance with All Ethics Requirements Regarding Independence</b>	The engagement teams, others in our firm, as appropriate, and our firm as a whole, have complied with all relevant ethical requirements regarding independence.
<b>Significant Risks</b>	<p>Significant risks related to our audits are as follows:</p> <ul style="list-style-type: none"> <li>• Management override of internal controls</li> <li>• Fair value of investments in real estate</li> <li>• Fair value of debt instruments</li> <li>• Improper revenue recognition (presumed risk of fraud)</li> </ul>
<b>Significant Accounting Policies</b>	Management has the responsibility to select and use appropriate accounting policies. The significant accounting policies are described in Note 2 to the financial statements. During the years ended June 30, 2023, the entities adopted “ASU 2016-02”, Leases, which did not have a material impact on the financial statements. The ASU revises accounting guidance on lease accounting and supersedes all previous leasing standards. The new standard requires lessees to record a right-of-use asset and a lease liability for all leases with a term greater than 12 months and to classify such leases as either finance or operating leases.
<b>Significant Accounting Estimates</b>	<p>Accounting estimates are an integral part of the financial statements prepared by management and are based on management’s current judgments. Those judgments are normally based on knowledge and experience about past and current events and assumptions about future events. Certain accounting estimates are particularly sensitive because of their significance to the financial statements and because of the possibility that future events affecting them may differ markedly from management’s current judgments. We evaluated the key factors and assumptions used to develop these estimates in determining that they are reasonable in relation to the financial statements taken as a whole.</p> <p>The most sensitive estimates affecting the financial statements were:</p> <ul style="list-style-type: none"> <li>• Fair value of investments in real estate</li> <li>• Fair value of debt instruments</li> </ul>



# Required Communications – June 2023 and December 2023

Required Discussion Item	Comments
<b>Financial Statement Disclosures</b>	<p>Certain financial statement disclosures are particularly sensitive because of their significance to financial statement users. The most sensitive disclosures affecting the financial statements were:</p> <ul style="list-style-type: none"> <li>• Summary of Significant Accounting Policies</li> <li>• Fair Value Measurements</li> <li>• Leases</li> <li>• Related Party Transactions</li> </ul> <p>The disclosures in the financial statement are neutral, consistent, and clear.</p>
<b>Significant Unusual Transactions</b>	<p>For purposes of this communication, professional standards require us to communicate to you significant unusual transactions identified during our audit.</p> <p>There were no significant unusual transactions identified.</p>
<b>Identified or Suspected Fraud</b>	<p>During the course of the audits, we perform procedures, including inquiries of management and others involved in the financial reporting process, designed to identify actual or suspected instances of fraud.</p> <p>There were no actual or suspected instances of fraud identified.</p>
<b>Significant Difficulties Encountered During the Audit</b>	<p>We encountered no significant difficulties in dealing with management in performing and completing the audit.</p>

# Required Communications – June 2023 and December 2023

Required Discussion Item	Comments
<b>Uncorrected and Corrected Misstatements</b>	<p>For purposes of this communication, professional standards also require us to accumulate all known and likely misstatements identified during the audit, other than those that we believe are trivial, and communicate them to the appropriate level of management. Further, professional standards require us to also communicate the effect of uncorrected misstatements related to prior periods on the relevant classes of transactions, account balances or disclosures, and the financial statements as a whole. There were no uncorrected financial statement misstatements noted.</p> <p>In addition, professional standards require us to communicate to you all material, corrected misstatements that were brought to the attention of management as a result of our audit procedures. There were no material, corrected financial statement misstatements.</p>
<b>Disagreements with Management</b>	<p>For purposes of this letter, professional standards define a disagreement with management as a matter, whether or not resolved to our satisfaction, concerning a financial accounting, reporting, or auditing matter, which could be significant to the financial statements or the auditor’s report.</p> <p>No such disagreements arose during the course of the audit.</p>
<b>Circumstances that Affect the Form and Content of the Auditor’s Report</b>	<p>There were no circumstances that affected the form and content of the auditor’s report regarding the entities. We expect to issue unmodified opinions.</p>

# Required Communications – June 2023 and December 2023

Required Discussion Item	Comments
<b>Representations Requested from Management</b>	We will request certain representations from management and the investment advisors that will be included in a letter to us, all of which are expected to be dated prior to June 30, 2024.
<b>Management’s Consultations with Other Accountants</b>	In some cases, management may decide to consult with other accountants about auditing and accounting matters. Management informed us that, and to our knowledge, there were no consultations with other accountants regarding auditing and accounting matters.
<b>Other Significant Matters, Findings, or Issues</b>	During the course of our interactions, we discussed a variety of matters, including the application of accounting principles and auditing standards, operating conditions affecting the entity, and operating plans and strategies that may affect the risks of material misstatement. None of the matters discussed resulted in a condition to our retention.

# Looking forward: Audit Plan – June 2024

## Entities/Reports with June 30 year ends:

- Merritt 7 Venture, LLC
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which Sentinel Realty Advisors Corporation is Investment Advisor
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which Cabot Properties, Inc. is Investment Advisor
- Combined financial statements of That Portion of the New York State Teachers' Retirement System (NYSTRS) for which BentallGreenOak (US) LP is Investment Advisor



# COHNREZNICK'S COMMITMENT TO YOU

- To provide forward-thinking solutions, service that exceeds expectations, and create opportunity, value, and trust for our clients, our people, and our communities.
- We will be a firm of excellence and innovation – providing invaluable services and insights to our clients; fostering a workplace culture that develops leaders and values diversity; and working to make our communities better.

Meeting the **challenges**. Providing **value**.

# SERVICES AND DELIVERABLES TO NYSTRS

## Financial Statements Audits

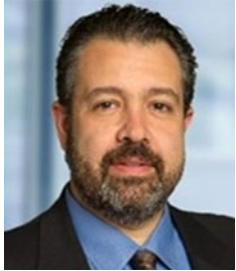
- Express an opinion on the financial statements as of and for the year ending June 30, 2024.
- Communicate matters in accordance with AU-C 265, “Communicating Internal Control Related Matters Identified in an Audit.”

## Non-attest services

- Prepare Federal Form 990, Federal Form 1065, and other state regulatory compliance filings as of and for the year ended June 30, 2024, and assist management with e-filing the returns.

# KEY MEMBERS OF THE ENGAGEMENT TEAM

## Resources



Anthony La Malfa, CPA  
Lead Engagement Partner



Courtney Klinga, CPA  
Real Estate Audit Senior Manager



E.J. Edelman, CPA/ABV, CGMA, MAI  
Director Valuation Advisory Services



Ron Kaplan, CPA  
Commercial Real Estate Industry Leader  
Account Executive



Lori Rothe Yokobosky, CPA MST  
Lead Tax Partner



Sima Wolfson, CPA  
Exempt Organizations Tax Services Manager

# AUDIT PLAN CONSIDERATIONS



## Understanding and Evaluating Controls

- Review accounting policies and procedures
- Understand the design of internal controls and perform walkthroughs of key processes:
  - Revenue
  - Expenses
  - Leases
  - Valuation
  - Financial reporting and closing



## Significant Risks

- Management override of controls
- Internal controls over financial reporting
- Fair value of investments in real estate and debt instruments
- Improper revenue recognition risk



## Key Audit Areas

- Rental revenue
- Operating expenses
- Property management fees
- Realized and unrealized gains/losses
- Debt and interest expense



# KEY AUDIT PROCEDURES

To ensure that our audit procedures will effectively address the risks associated with the areas identified we will:

- Obtain an understanding of the significant financial reporting and accounting processes, the important business strengths and risks, and controls to monitor operations.
- Obtain an understanding of general controls over information systems.
- Evaluate the design of internal controls, including any changes in internal controls, over the key financial processes.
- Test the valuations of investments and debt instruments.
- Perform a search for unrecorded liabilities to ensure expenses are recorded in the proper period.
- On a sample basis, agree revenue and expense transactions to supporting documentation.
- Test year-end reconciliations and rollforward schedules of key audit areas.
- Perform preliminary and final analytical reviews.
- Evaluate key factors and assumptions used by management to develop significant estimates.
- Independently confirm with third parties select year-end balances.
- Evaluate management's assumptions about the ability to continue as a going concern.

# CYBERSECURITY CONSIDERATIONS

- **Increased cybersecurity risks**
  - Usage of remote workflows
  - Surge and sophistication of cyber attacks
  - Risks & vulnerabilities in third party vendors
- **Audit considerations**
  - Obtain an understanding of the IT General Controls
  - Perform walkthroughs of selected controls to determine the operating effectiveness of those controls
- **Information security**
  - The audit team will use Converge or Sharefile to transmit documents during the engagement for enhanced security.



# TIMETABLE OF AUDIT SERVICES – JUNE 2024

	APR	MAY	JUNE	JULY	AUG	SEPT	OCT - DEC
Pre-planning meeting with audit committee and management							
Audit design and planning							
Year-end field work							
Present drafts of the financial statements and if applicable, management letter, to audit committee							
Issue financial statements and if applicable, management letter							

# RESPONSIBILITIES

## Management's Responsibilities\*

- The preparation and fair presentation of the consolidated financial statements in accordance with accounting principles generally accepted in the United States of America (“GAAP”).
- Designing, implementing, and maintaining of internal controls relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error, fraudulent financial reporting, misappropriation of assets or violations of laws, governmental regulations, grant agreements, or contractual agreements.
- Accepting responsibility for nonattest services, including identifying the proper party with the skills, knowledge, and experience to oversee the nonattest services provided.
- Informing us of any known or suspected fraud affecting the entity involving management, employees with significant role in internal control and others where fraud could have a material effect on the financials.
- Ensuring the accuracy and completeness of all information provided.
- The audit of the consolidated financial statements does not relieve management or those charged with governance of their responsibilities.

## Auditor's Responsibilities\*

- Communicating with those charged with governance the responsibilities of CohnReznick regarding the consolidated financial statements audit and an overview of the planned scope and timing of the audit.
- Obtaining from those charged with governance information relevant to the audit.
- Providing those charged with governance with timely observations arising from the audit that are significant and relevant to their responsibility to oversee the financial reporting process.
- Promoting effective two-way communication between the auditor and those charged with governance.
- Communicating effectively with management and third parties.
- Forming and expressing an opinion about whether the consolidated financial statements that have been prepared by management, with the oversight of governance, are prepared, in all material respects, in accordance with the applicable financial reporting framework.
- Establish the overall audit strategy and audit plan, including the nature, timing, and extent of procedures necessary to obtain sufficient appropriate audit evidence.

*\*The complete terms of our mutual responsibilities are included in our engagement letter.*

# EFFECTIVE ACCOUNTING AND AUDITING UPDATES

Accounting		
Effective Date for the Organization	Pronouncement Number	Description
Through December 31, 2024	FASB ASU 2022-06	FASB Codification - FASB Accounting Standards Updates, FASB Accounting Standards Updates - Accounting Standards Update No. 2022-06 – Reference Rate Reform (Topic 848) – Deferral of the Sunset Date of Topic 848
January 1, 2023, and July 1, 2023	FASB ASU 2016-13	Financial Instruments—Credit Losses (Topic 326) Measurement of Credit Losses on Financial Instruments (see summary on page 22)
Auditing		
Effective Beginning Date for the Organization	Auditing Standards Number	Description
January 1, 2024	Auditing Standard 145	Understanding the Entity and Its Environment and Assessing the Risks of Material Misstatement

# UPCOMING ACCOUNTING AND AUDITING UPDATES

## Accounting

Effective Beginning Date for the Organization	Pronouncement Number	Description
January 1, 2025 (early adoption permitted)	FASB ASU 2023-05	Business Combinations—Joint Venture Formations (Subtopic 805-60) - Recognition and Initial Measurement

# Internal Audit Update

Audit Committee

April 24, 2024



# REPORT HIGHLIGHTS

## Investment Discretion

### Engagement Objectives

The objective of this engagement was to provide reasonable assurance that the approval thresholds for the Executive Director and Chief Investment Officer investment discretion as defined by the IPM were not circumvented.

### Risk

There are several factors that are considered when concluding on the assessed risk and integrity of the controls in an area. This process has a risk of circumventing the investment discretion thresholds defined by the Retirement Board’s Investment Policy Manual.

As a result of this audit, the risks were assessed as low.

### Background

#### Responsible Units

- The Executive Director/Chief Investment Officer (ED/CIO)
- Internal Investment Committee (IIC)
- Managing Directors of Public Equities, Fixed Income, Real Estate and Private Equity (MD)
- Investment Operations (IOD)

The ED/CIO, upon the IIC recommendation, has the authority to engage new investments for public markets portfolio of up to \$1 billion and alternative investments of up to \$300 million. IOD is responsible for disbursing system funds based on instructions from MDs and upon signatory approval.

See the Report Highlights-Appendix for details regarding the scope of the audit.

### Project Facts

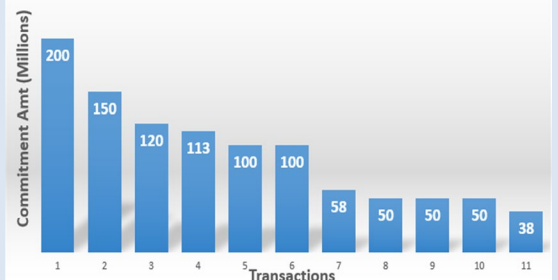
**Audit Period:** 1/1/2023 – 12/31/2023

#### Numbers at a Glance

	Public Markets	Alternative Investment
# of New Commitments with Discretion Exercised	None *	11
Threshold per IPM	\$1 Billion	\$300 Million

\*Three new Fund Managers were submitted for Board approval. Discretion was not exercised.

Discretion Exercised for 11 Alternative Investment





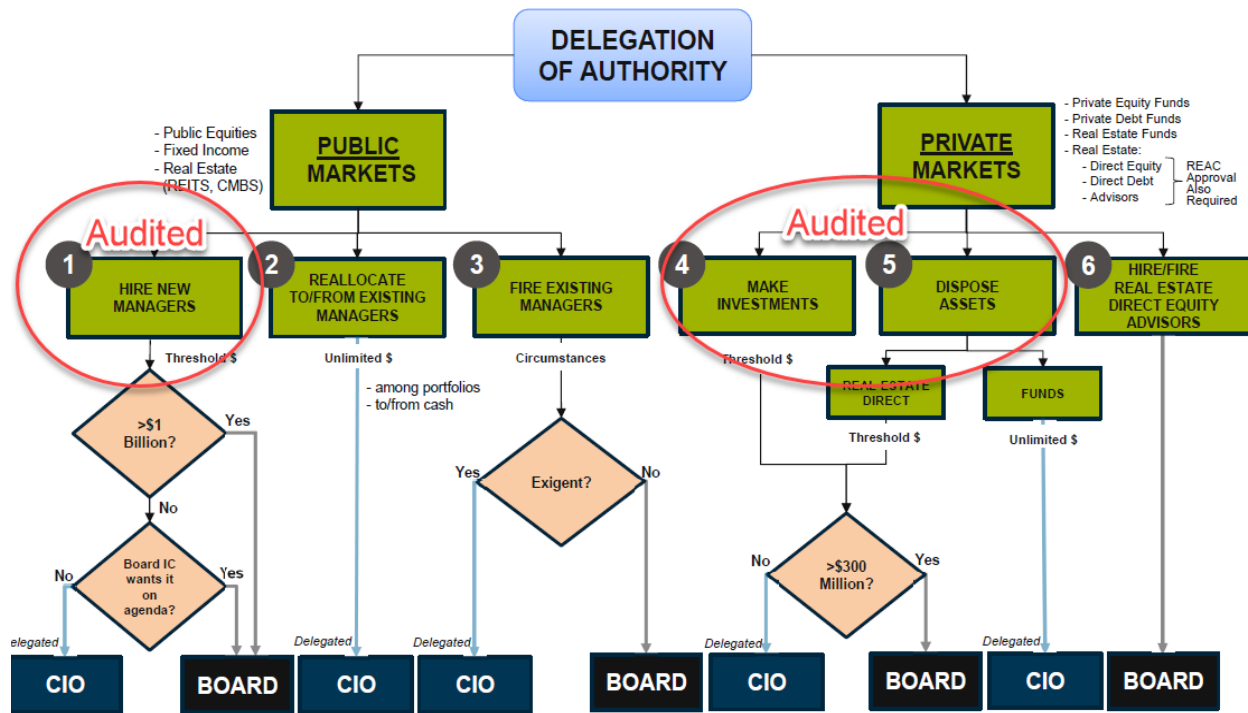
# REPORT HIGHLIGHTS

## Investment Discretion

Appendix:

This chart was extracted from Callan’s Investment Discretion training to the Retirement Board presentation on December 13, 2022.

### Delegation of Authority



Source: NYSTRS

Callan

# REPORT HIGHLIGHTS

## Direct Deposit

### Engagement Objectives

The objective of this engagement was to provide reasonable assurance that processes and controls were designed effectively and working as intended to ensure direct deposit information entered by staff for a benefit recipient was accurate.

### Risk

There is a risk the member may not receive their payments if staff act upon an unauthorized direct deposit form or enter information incorrectly.

As a result of this audit, the risk was assessed as low.

### Background

#### Responsible Departments & Units

Quality Assurance Department

- Resource Unit

Member Benefits Department

- Service, Deferred Retirement (SR) Unit
- Retired Death Benefits (RDB) Unit
- Death, Disability (DD) Unit

Resource, SDR, RDB, and DD are responsible for entering and updating benefit recipient direct deposit information.

Finance Department

- Cash Control (CC)

CC is responsible for updating direct deposit information for rejected bank transactions.

This engagement did not include entries made by members using their MyNYSTRS account.

### Project Facts

#### Audit Period

January 1, to December 31, 2023

#### Numbers at a Glance

During the period:

- 1,656 benefit recipients with new direct deposits established by NYSTRS staff.
- 4,106 benefit recipients with direct deposits changed by NYSTRS staff.

# REPORT HIGHLIGHTS

## Participating Employer Reviews

### Engagement Objectives

The objective of this engagement was to provide reasonable assurance that processes and controls used to verify underlying payroll and personnel information reported by a sample of participating employers was accurate and complete as well as adhered to System policies and procedures, *Rules and Regulations*, and statute.

### Risk

There is a risk that salary, service, or demographic information used to calculate benefits and develop assumptions to determine pension liabilities may not be accurate or complete.

As a result of this audit, the risk was assessed as low.

### Background

#### Responsible Departments & Units

Member & Employer Services

- Employer Reporting Unit
- Terminating Employees Unit

Responsible for reviewing and posting salary and service information received from participating employers each month.

Members and staff rely on the accuracy of this payroll information to perform a variety of tasks that include:

- Annual member profile statement that provide an estimate of future benefits
- Annual bill to each participating employer to fund the System
- Compute benefits, such as, retirement, death, refunds of contributions, and loans
- Calculate the actuarial pension liability
- Respond to Freedom of Information requests

This audit meets the requirements of the AICPA for there to be effective controls over financial reporting that verify the underlying payroll and personnel records of participating employers.

### Project Facts

#### Audit Period

Fiscal year ending June 30, 2023

#### Numbers at a Glance

823 participating employers reported over 2.6 million records for over 250,000 members.

Annual reporting process alerted Member & Employer staff to:

- Adjust over 18,000 records
- Review an additional 84,000 records for potential adjustments

#### Sample

- 20 employers; over 9,700 members; 100,000 transactions
- Reviewed payroll information for 670 members, 6,500 transactions

# REPORT HIGHLIGHTS

## Pension Calculation “Mismatch” Report

### Engagement Objectives

The objective of this engagement was to perform a review of the controls implemented to address the deficiencies in the benefit calculations identified by the “Mismatch” report were working as intended and process and controls to review the “Mismatch” report resulted in revised retirement benefits and process improvements, where applicable.

### Risk

There are several factors that are considered when concluding on the assessed risk and integrity of the controls in an area. This process has a risk of reputational harm if benefits are not processed in an accurate and timely manner. As a result of this audit, the risk was assessed as low.

### Background

The Pension Calculation Rewrite Project was designed to convert the existing retirement benefit program to a programming language supported by the System’s IT dept. The original purpose of the “Mismatch” report was used to test the accuracy of the new program. However, the report identified 1,300 differences in salary or service used in a retirement benefit not previously discovered.

### Responsible Departments & Units

#### Quality Assurance (QA)

Responsible for reviewing cases identified on the “Mismatch” report, determining the root cause of the errors, and collaborating with departments to develop process improvements, where necessary.

#### Member Benefits

- Service, Deferred Retirement (SR) Unit
- Estimates, Refunds, & Retiree Services (ERRS) Unit

Responsible for implementing controls to ensure benefit calculations are accurate and in compliance with statute.

### Project Facts

#### Audit Period

“Mismatch” report generated in August 2022 (retirements from Sept. 1990 through Dec. 2021)

#### Numbers at a Glance

Final Benefits Calculated between 2005 and 2022	127,752
Differences in salary or service identified on “Mismatch” report	1,300
Potential Change in Annual Retirement Benefit more than \$120	183
Review of Benefits in Progress	14
Review of Benefits Completed	169
Administrative Errors in Benefit	40

9 automated controls and 7 manual reviews designed to address deficiencies.