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 at the System on August 3, 2022.

<u>The following individuals were in attendance:</u>

<u>Committee Members:</u> Elizabeth Chetney, David Keefe, Christopher Morin, Nicholas Smirensky

<u>Board Members:</u> Juliet Benaquisto, Phyllis Harrington, Eric Iberger, Jennifer Longtin, Oliver Robinson

<u>Risk Committee Advisors:</u> Sean Atkinson (via telephone), Peter Cosgrove (via telephone), Steven Huber (via telephone)

<u>NYSTRS' Staff:</u> Thomas Lee, Don Ampansiri, Matt Albano, Han Yik

The meeting was called to order by C. Morin, Chair at 8:38 a.m.

The following items were discussed:

1. Approval of the minutes of April 27, 2022

   Upon motion of N. Smirensky, seconded by E. Chetney and unanimously carried, the meetings minutes of the April 27, 2022 were approved.

2. Investment Risk Update and Risk Management KRI Dashboard

   M. Albano reviewed the investment risk update and the risk management key risk indicator dashboard (Appendix A).

3. Climate Risk KPI presentation

   H. Yik gave an update on NYSTRS' climate action plan, including steps taken and strategy moving forward (Appendix B).

There being no further business, and with unanimous consent, the Committee adjourned at 9:13 a.m.

Respectfully submitted,

[redacted]

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Thomas K. Lee

Appendix A

Investment Risk Update

Risk Management

Risk Committee Meeting: August 3, 2022

Matt Albano, CFA
Risk Officer

Public market data as of 5/31/2022; Private asset data as of 3/31/2022

Investment Risk - Key Risk Indicators

Updates:

- The Stressed Contingency Funding Liquidity has remained in "Tolerance" this quarter, a result of continued market volatility keeping the liquid asset classes closer to their lower bounds
  - **Risk Mitigation**
    - Staff continues to meet weekly on asset allocation, monitoring current market volatility impacts on the KRIs

- The plan Funded Ratio has moved into "Tolerance" as of 6/30/2021 with an overfunded ratio of 113%
  - **Risk Mitigation**
    - Staff continues to engage with stakeholders and monitor legislature updates

- Total Plan Risk; Tail Risk; and Risk Contributions by Asset Class, Sector, Geography, and Factor are as expected

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%	4.7%
Short Term Liquidity (Liquidity)	<= 1 Month	1 - 2 Months	>= 2 Months	3.3 Months
Medium Term Liquidity (Liquidity)	<= 10 Months	10 - 12 Months	>= 12 Months	12.4 Months
Stressed Contingency Funding Liquidity (Liquidity)	<= 18 Months	18 - 24 Months	>= 24 Months	19 Months
Stressed Long Term Liquidity (Liquidity)	<= 3 Years	3 - 5 Years	>= 5 Years	7.2 Years
Funded Ratio: Market Value of Total Plan Assets (Unfunded Liability)	<80% or >120%	80 - 90% or 110 - 120%	90 - 110%	113.0% (6/30/2021)
ECR Volatility (Unfunded Liability)	Δ +/- >3%	Δ +/- 2 - 3%	Δ +/- 2%	0.49% (6/30/2021) (Proposed)
ECR Level (Unfunded Liability)	<4% or >17%	4 - 6% or 12 - 17%	6 - 12%	10.29% (6/30/2021) (Proposed)
Actuarial Valuation: Quinquennial 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 (10/28/2021)

Risk Management
Investment Risk Board Report
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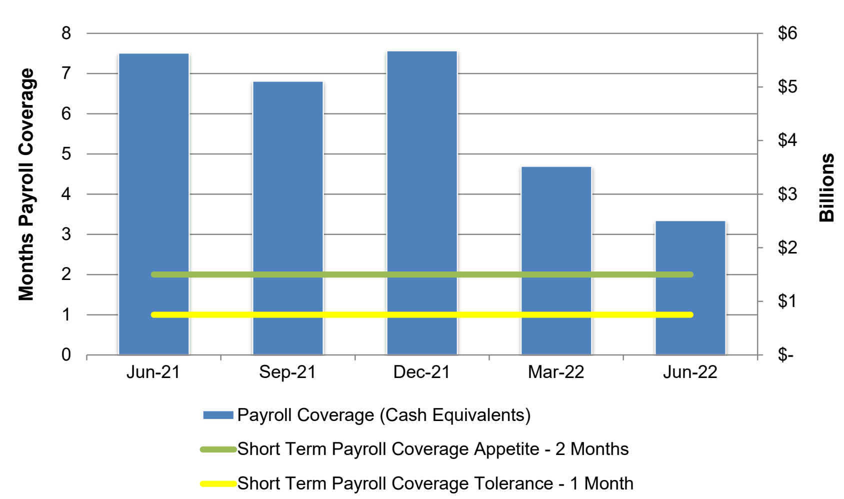
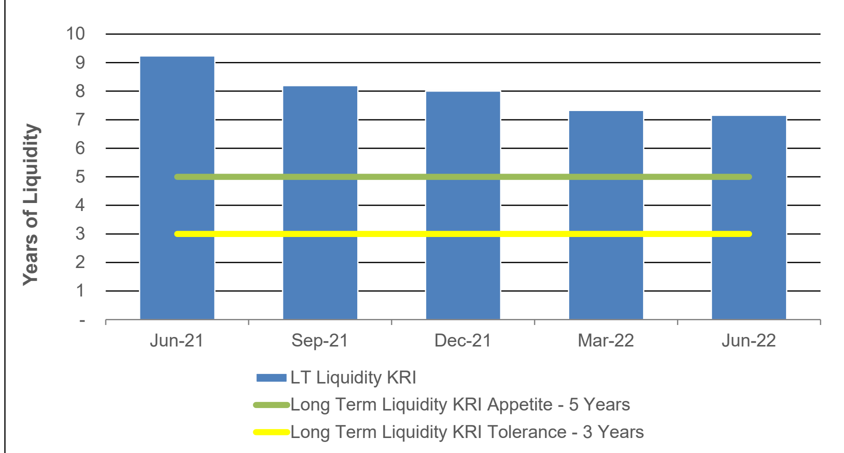
Funding Liquidity - Short Term Payroll Coverage

Short Term Liquidity KRI (Months)	Current Qtr.	Appetite	Tolerance	Outside Tolerance
	3.3	>= 2 months	1-2 months	<=1 month



Stressed Long Term Funding Liquidity - Allocation to Liquid Assets

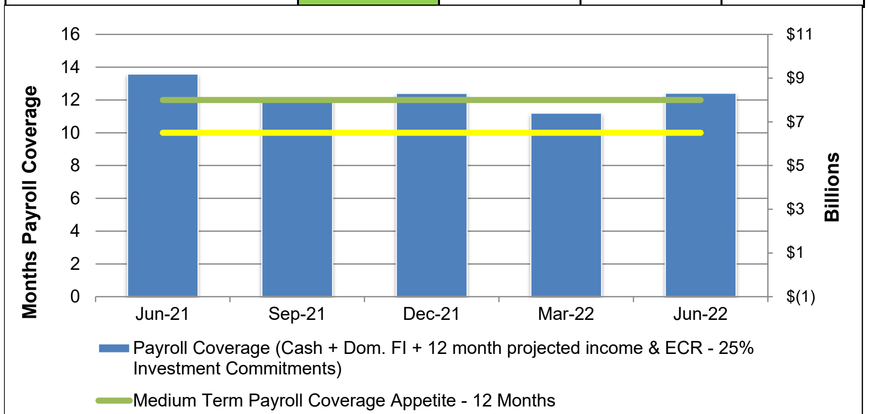
Stressed Long Term Liquidity KRI (Years)	Current Qtr.	Appetite	Tolerance	Outside Tolerance
	7.2	>=5 Years	3-5 Years	<=3 Years



The Stressed Long Term Liquidity KRI assumes a hypothetical 40% portfolio loss then calculates years of required cash flow coverage from remaining public market assets and 12 months *estimated net cash flows (*includes stressed projections for: portfolio income, employer contributions and unfunded capital calls)

Funding Liquidity - Medium Term Payroll Coverage

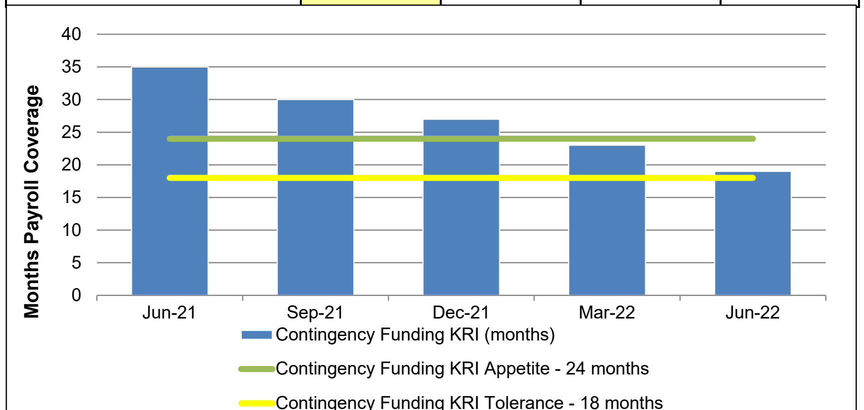
Medium Term Liquidity KRI (Months)	Current Qtr.	Appetite	Tolerance	Outside Tolerance
	12.4	>=12 months	10-12 months	<=10 months



Domestic Fixed Income included in payroll coverage observe the minimum allocation bound. Capital calls of 25% are indicative of a "non-stressed" market environment. Income and employer contributions are 12 month projections from the most recent quarter date depicted.

Stressed Funding Liquidity - Contingency Funding Plan

Stressed Contingency Funding Liquidity KRI (Months)	Current Qtr.	Appetite	Tolerance	Outside Tolerance
	19.0	>=24 months	18-24 months	<=18 months



The Stressed Contingency Funding Liquidity KRI seeks to evaluate how many months of payroll can be made during a GFC like scenario before NYSTRS' CFP is triggered. GFC loss is experienced over 12 months with asset classes returning capital market assumptions years 2-5. Employer contributions are capped at 17%.

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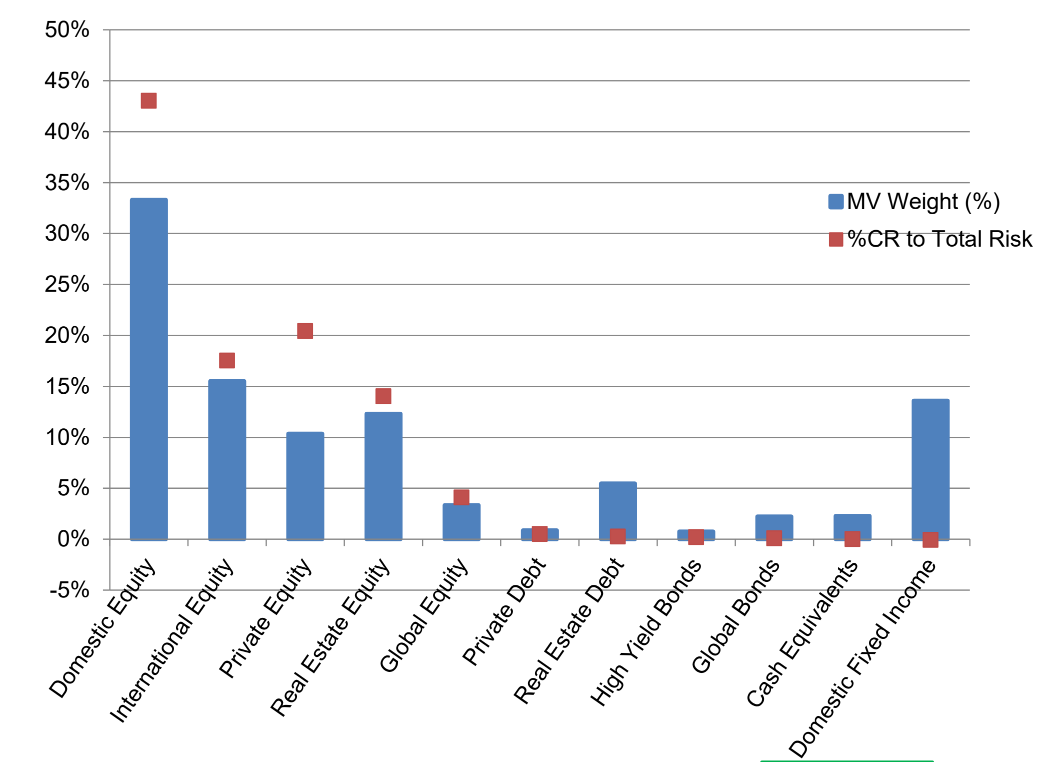
Total Predicted Risk by Asset Class

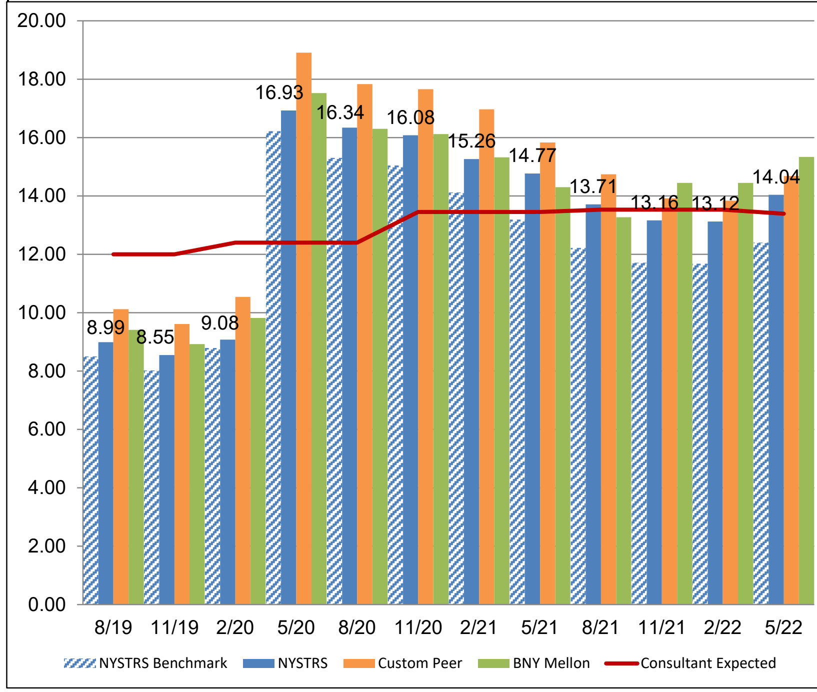
Asset class contributions to Total Predicted Risk are in line with expectations, with equity investments being the largest contributors.



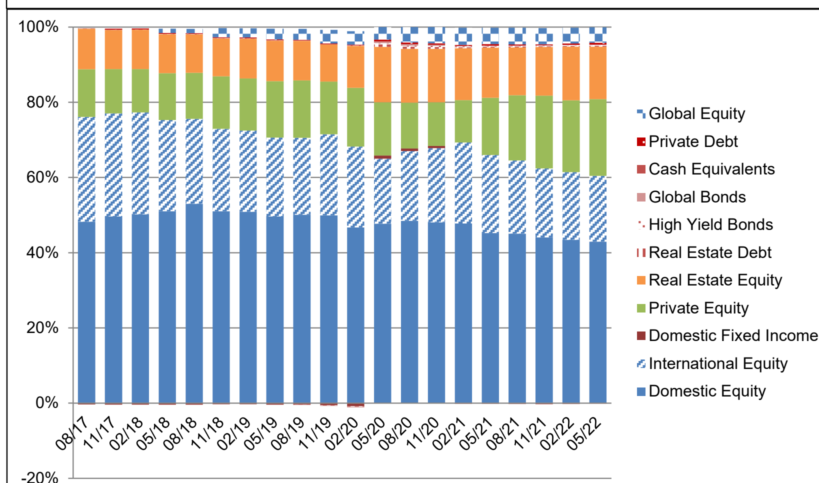
Portfolio Name		Market Value (Millions $)	Weight (%)	%CR to Total Risk	Total Plan Risk Cont.	Total Predicted Risk
Total Portfolio	***$***	***137,787***	***100%***	***100%***	***14.04***	***14.04***
Domestic Equity	$	45,881	33.30%	43.03%	6.04	18.81
International Equity	$	21,371	15.51%	17.52%	2.46	17.74
Private Equity	$	14,268	10.36%	20.41%	2.87	32.40
Real Estate Equity	$	16,972	12.32%	14.02%	1.97	19.66
Global Equity	$	4,586	3.33%	4.08%	0.57	17.77
Private Debt	$	1,195	0.87%	0.50%	0.07	10.46
Real Estate Debt	$	7,543	5.47%	0.25%	0.04	2.82
High Yield Bonds	$	1,042	0.76%	0.19%	0.03	5.11
Global Bonds	$	3,068	2.23%	0.08%	0.01	3.58
Cash Equivalents	$	3,137	2.28%	0.00%	0.00	0.04
Domestic Fixed Income	$	18,723	13.59%	-0.08%	-0.01	4.01

Total Predicted Risk and Peer Comparison

Long term expected risk target 13.39%; short term predicted risk 14.04%



Historical Total Predicted Risk Contribution



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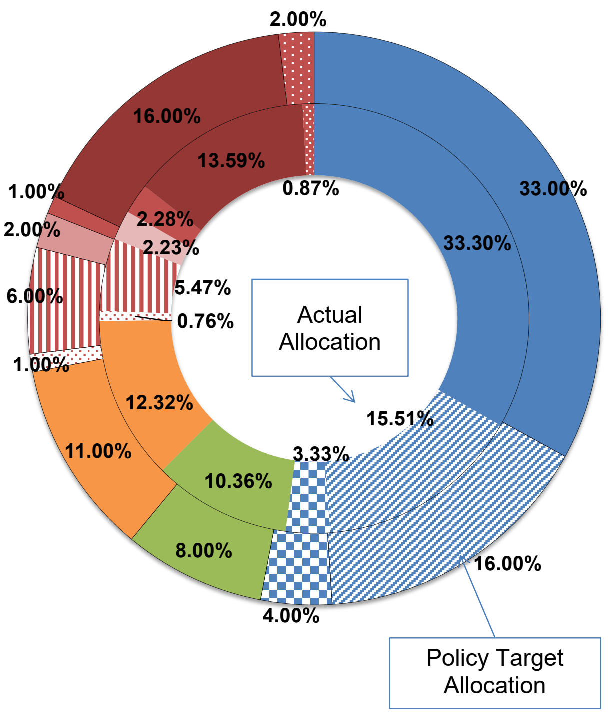
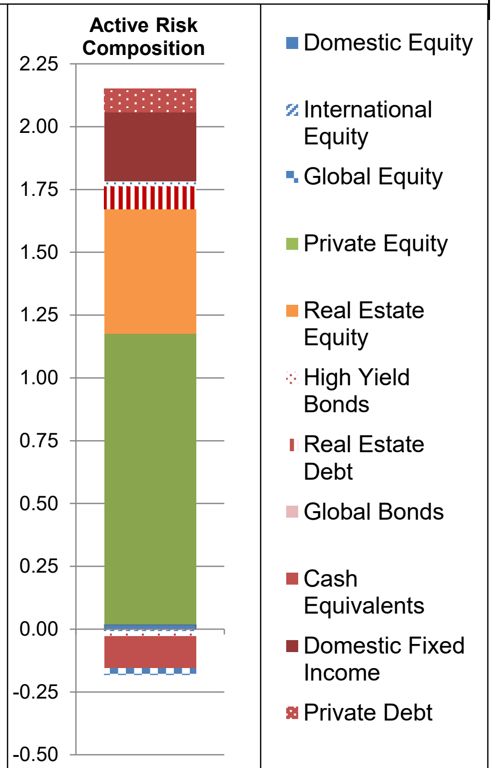
Active Predicted Risk

Active predicted risk 1.97; an increase of 23 bps from last quarter.





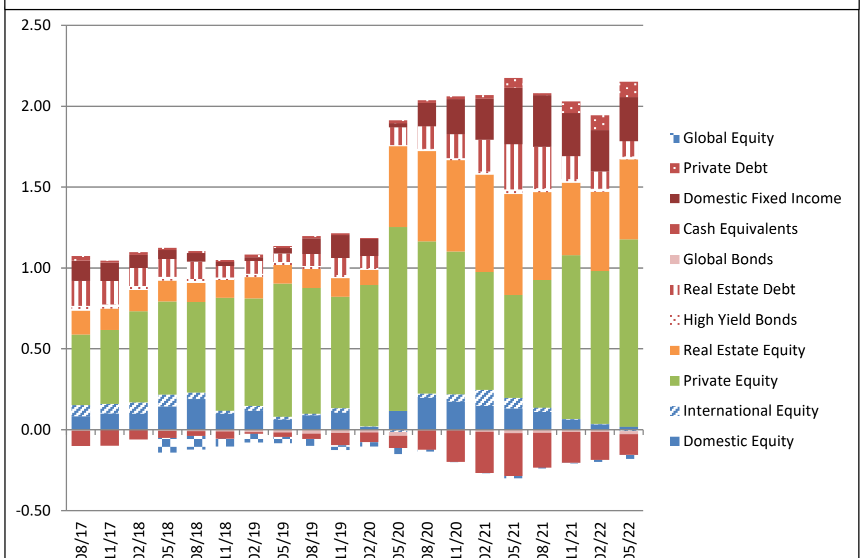
Portfolio Name	Weight (%)	BMK Weight (%)	Active Weight (%)	Active Risk Cont.	% CR to Active Risk	Active Predicted Risk
Total Portfolio	***100%***	***100%***	***0%***	***1.97***	***100%***	***1.97***
Domestic Equity	33.30%	33.00%	0.30%	0.02	0.9%	0.08
International Equity	15.51%	16.00%	-0.49%	-0.01	-0.4%	0.39
Global Equity	3.33%	4.00%	-0.67%	-0.03	-1.3%	2.08
Private Equity	10.36%	8.00%	2.36%	1.16	58.8%	9.36
Real Estate Equity	12.32%	11.00%	1.32%	0.49	25.1%	6.17
High Yield Bonds	0.76%	1.00%	-0.24%	0.02	0.9%	0.32
Real Estate Debt	5.47%	6.00%	-0.53%	0.09	4.7%	1.96
Global Bonds	2.23%	2.00%	0.23%	-0.02	-0.9%	0.55
Cash Equivalents	2.28%	1.00%	1.28%	-0.13	-6.5%	0.04
Domestic Fixed Income	13.59%	16.00%	-2.41%	0.27	13.9%	1.22
Private Debt	0.87%	2.00%	-1.13%	0.09	4.8%	6.84

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.

Historical Active Risk Contribution



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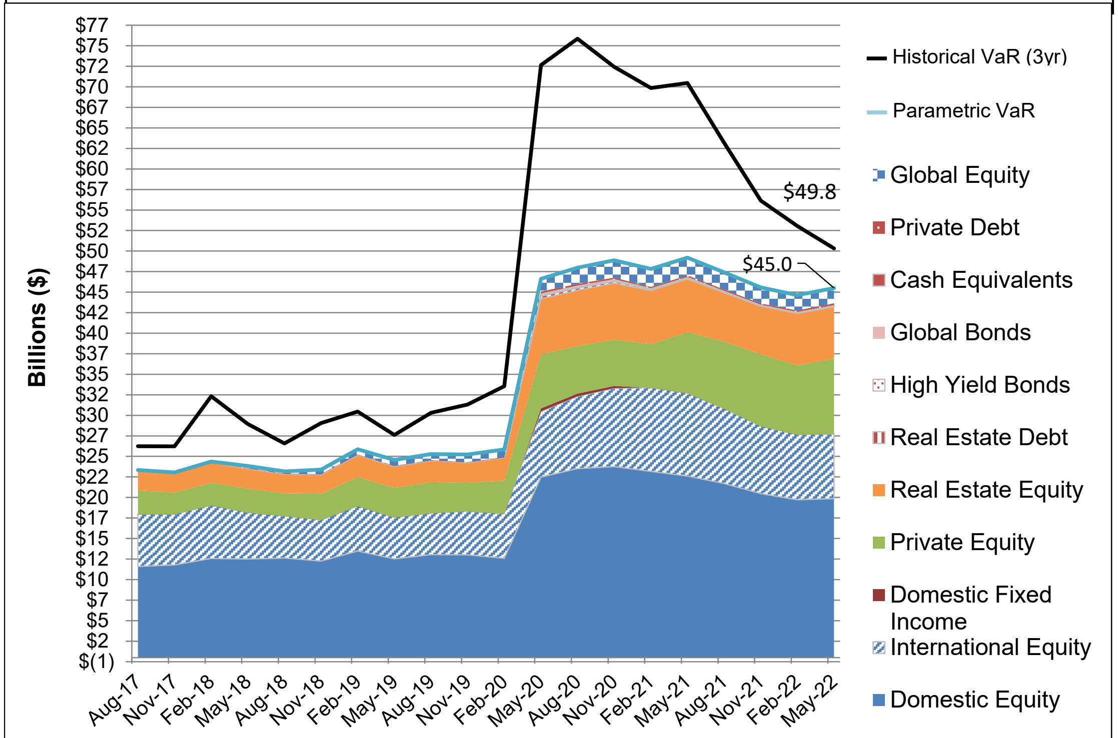
Value at Risk Contribution by Asset Class

VaR metrics remain elevated as a result of recent market volatility. 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
Total Portfolio	***$52,222***	***-$7,222***	***$45,000***	***100%***
Domestic Equity	$20,073		$19,361	43.03%
International Equity	$8,821		$7,883	17.52%
Private Equity	$10,755		$9,186	20.41%
Real Estate Equity	$7,763		$6,311	14.02%
High Yield Bonds	$124		$84	0.19%
Real Estate Debt	$495		$114	0.25%
Global Bonds	$256		$38	0.08%
Cash Equivalents	$3		$0	0.00%
Domestic Fixed Income	$1,746		-$38	-0.08%
Private Debt	$291		$225	0.50%
Global Equity	$1,896		$1,836	4.08%

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.

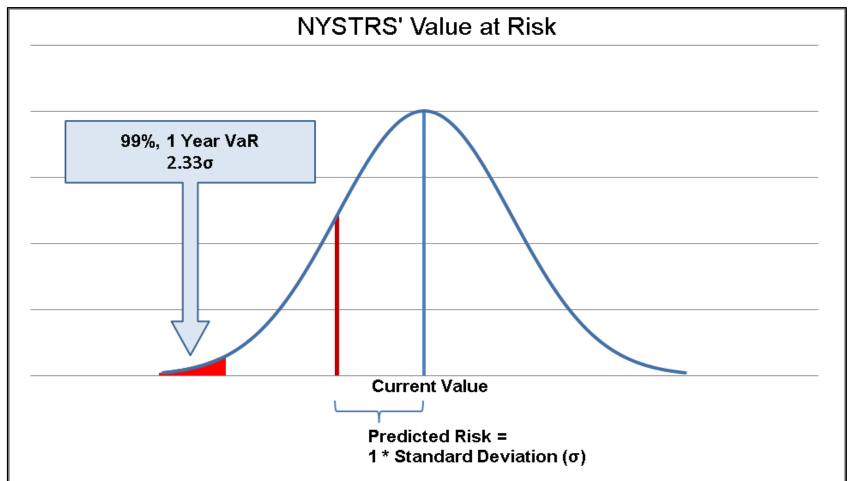
Methods Used:

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

Drawbacks:

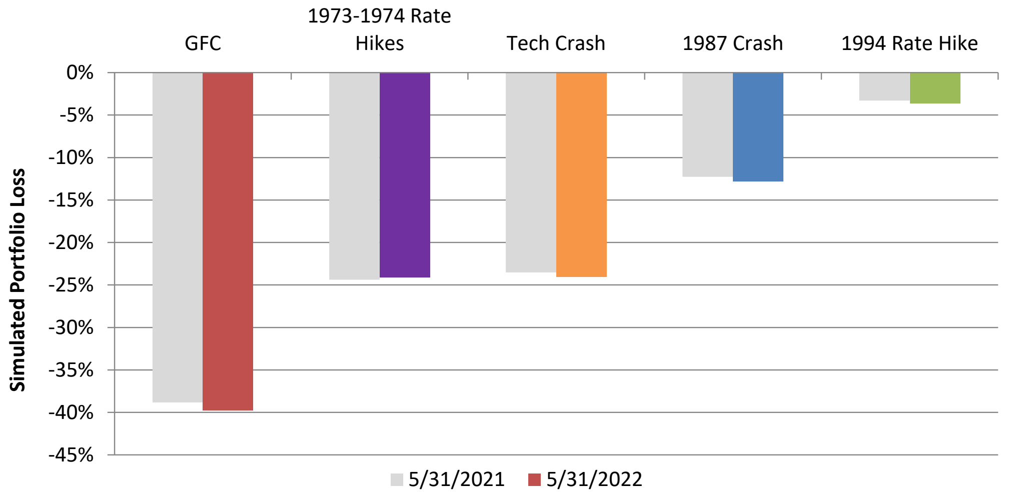
Parametric VaR assumes asset returns are normally distributed which may not be realistic. This could underestimate the VaR due to unfavorable asset returns having a higher chance of occurring in real life.

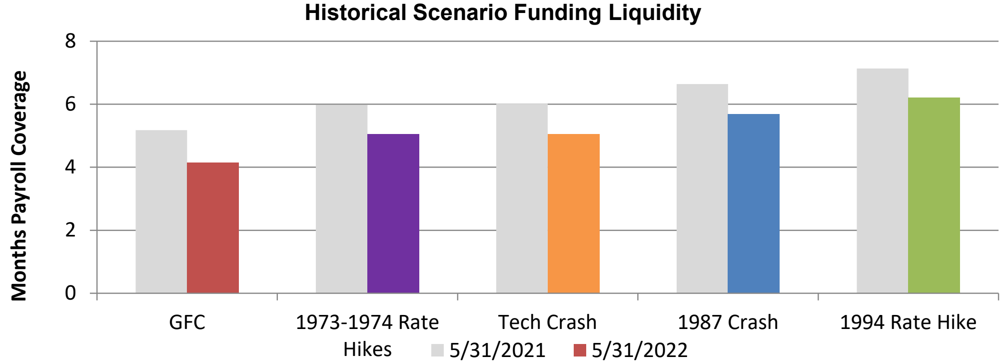
Historical Simulation VaR assumes past returns are indicative of future returns which may not be realistic. The specific return period analyzed directly impacts results which may or may not capture typical volatility, market extremes, or cyclicality.

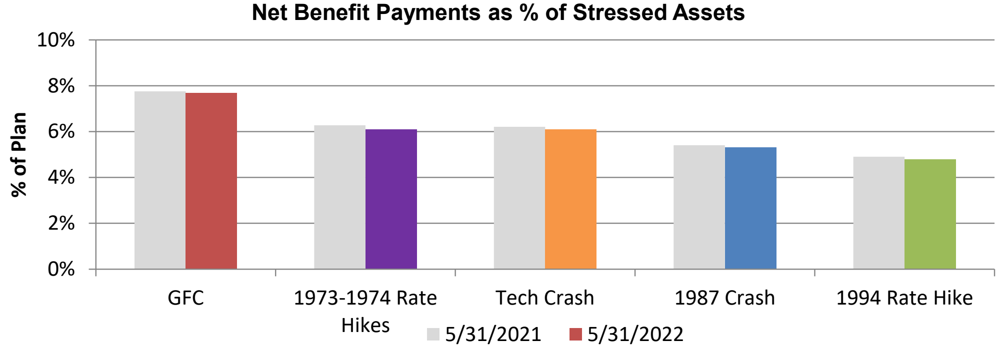


Historical Scenario Analysis

Scenario analysis is in line with expectations. Net Benefit Payments as a % of Assets in the most severe scenario is approximately 7%.







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

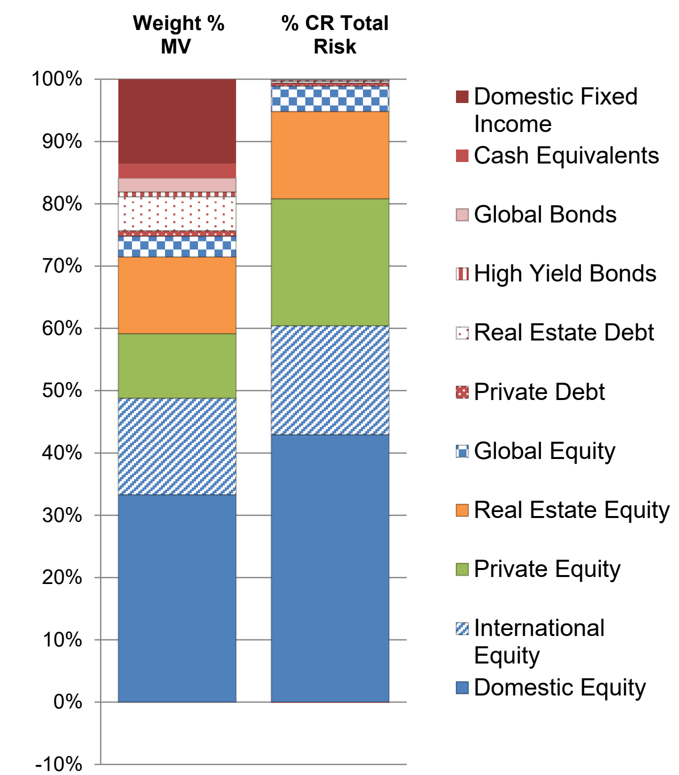
Funding Liquidity:
The middle chart depicts how each historical scenario would impact funding liquidity after a one-time rebalance to target policy weights. Cash and U.S. Treasury coverage represents how much of each asset could be used to make payroll before lower asset allocation bounds were breached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

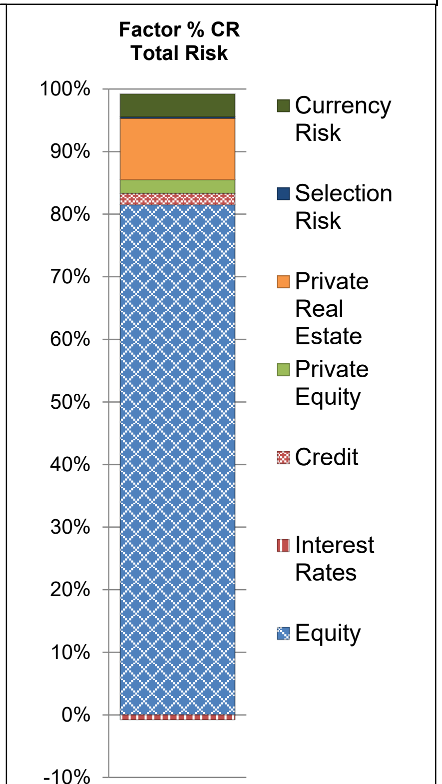
Funding Liquidity Assumptions	Months Coverage	
	5/31/2021	5/31/2022
Cash + U.S. Treasuries	3.4 to 5.3	3.4 to 5.5
Portfolio Income/Maturities	8.7	7.9
Employer Contributions	2.7	2.6
Capital Calls	-9.5	-9.8
Total Payroll Coverage	**5 to 7**	**4 to 6**

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 &

Total Predicted Risk by Risk Factor

As expected, equity markets are the largest contributor to the Plan's total risk while interest rates slightly diversify away risk.





Risk Source	Total Plan Risk Cont.	%CR to Total Risk	BMK Risk Cont.	BMK %CR to Total Risk	% CR to Active Risk
Total Risk	***14.04***	***100%***	***12.40***	***100.00%***	***100%***
Local Market Risk	13.52	96.27%	11.96	96.49%	95.94%
Common Factor Risk	13.48	96.00%	11.90	96.02%	90.19%
Equity	11.62	82.77%	10.15	81.91%	65.80%
Interest Rates	-0.11	-0.76%	-0.10	-0.80%	4.72%
Credit	0.25	1.81%	0.35	2.84%	-3.74%
Private Equity	0.32	2.26%	0.12	0.97%	20.92%
Private Real Estate	1.39	9.93%	1.38	11.10%	2.49%
Selection Risk	0.04	0.27%	0.06	0.47%	5.74%
Currency Risk	0.52	3.73%	0.44	3.51%	4.06%

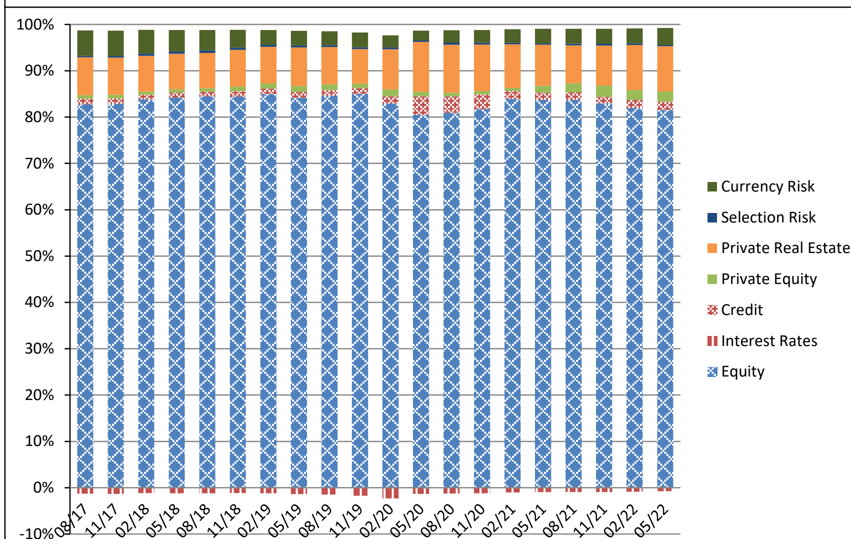
Risk Factors:
Risk factors are characteristics shared by a group of securities that influence their risk and return as well as their correlations.

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.

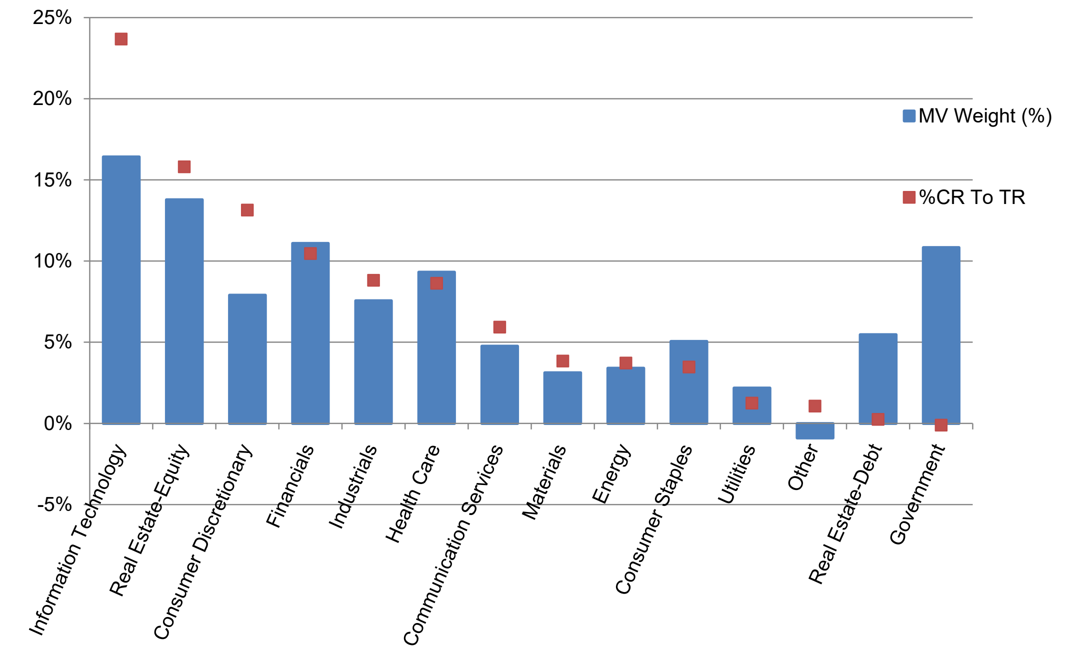
Observations:
As expected, Total Plan risk is primarily driven by the equity markets and NYSTRS' exposure to interest rates reduces Total Plan risk.

Historical Risk Factor Contribution to Total Risk



Sector Concentration

Sector contribution to risk is in line with expectations.



		Mkt Value (Mil $)	Weight (%)	Total Plan Risk Cont.	% CR to Total Risk	Total Predicted Risk
Total Portfolio	***$***	***137,787***	***100%***	***14.04***	***100%***	***14.04***
Information Technology	$	22,619	16.42%	3.32	23.68%	21.89
Real Estate-Equity	$	18,988	13.78%	2.22	15.80%	19.43
Consumer Discretionary	$	10,889	7.90%	1.85	13.15%	24.88
Financials	$	15,280	11.09%	1.47	10.46%	14.63
Industrials	$	10,408	7.55%	1.24	8.81%	17.29
Health Care	$	12,838	9.32%	1.21	8.63%	15.45
Communication Services	$	6,565	4.76%	0.83	5.94%	19.30
Materials	$	4,303	3.12%	0.54	3.84%	19.16
Energy	$	4,696	3.41%	0.52	3.72%	23.60
Consumer Staples	$	6,959	5.05%	0.49	3.48%	11.36
Utilities	$	3,009	2.18%	0.18	1.25%	11.57
Other	$	(1,242)	-0.90%	0.15	1.07%	20.88
Real Estate-Debt	$	7,543	5.47%	0.04	0.25%	2.82
Government	$	14,931	10.84%	-0.01	-0.10%	4.00

"Other" primarily consists of Cash, Private Equity fund liabilities; fund of funds; derivatives; and asset backed securities.

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.

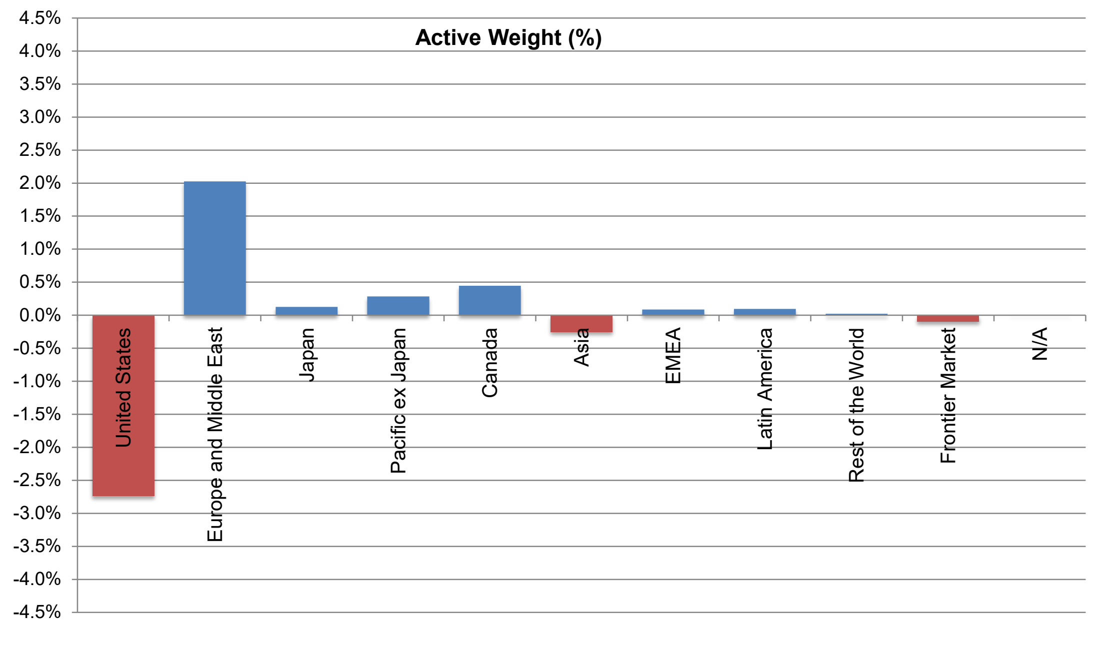
Defensive sectors such as Utilities, and Consumer Staples tend to be more stable and less volatile regardless of the condition of the overall financial markets. Because these sectors are not highly correlated with the business cycle, they are also known as "non-cyclical". Cyclical sectors such as Consumer Discretionary and Materials tend to be correlated with the business cycle and can be more volatile than defensive sectors. [1]

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.

[1]Investopedia

Geographic Region Concentration

Total developed and emerging market regions are within 1.0% of benchmark.



Observations:
As expected, the largest contribution on a geographic basis comes from NYSTRS exposure to U.S. investments.

Geographic Region*		Mkt Value (Mil $)	Weight (%)	Bmk Weight (%)	Active Weight (%)	Total Plan Risk Cont.	Total Predicted Risk
Total Portfolio	***$***	***137,787***	***100%***	***100%***	***0%***	***14.04***	***14.04***
Total Developed	**$**	**128,779**	**93.46%**	**93.32%**	**0.14%**	**13.11**	**14.05**
United States	$	103,995	75.48%	78.21%	-2.74%	10.37	13.93
Europe and Middle East	$	15,354	11.14%	9.12%	2.03%	1.87	18.97
Japan	$	3,801	2.76%	2.63%	0.12%	0.29	15.30
Pacific ex Japan	$	2,571	1.87%	1.58%	0.28%	0.30	19.22
Canada	$	3,058	2.22%	1.77%	0.44%	0.29	15.19
Total Emerging	**$**	**8,210**	**5.96%**	**6.03%**	**-0.07%**	**0.90**	**19.27**
Asia	$	6,539	4.75%	5.00%	-0.25%	0.64	18.30
EMEA	$	779	0.57%	0.48%	0.09%	0.12	33.70
Latin America	$	893	0.65%	0.55%	0.10%	0.13	30.82
Total Other	**$**	**798**	**0.58%**	**0.65%**	**-0.07%**	**0.03**	**6.64**
Rest of the World	$	530	0.38%	0.36%	0.02%	0.00	2.53
Frontier Market	$	268	0.19%	0.29%	-0.10%	0.02	19.35
N/A	$	0	0.00%	0.00%	0.00%	0.01	-

*See appendix for countries included in each geographic region.

Glossary:

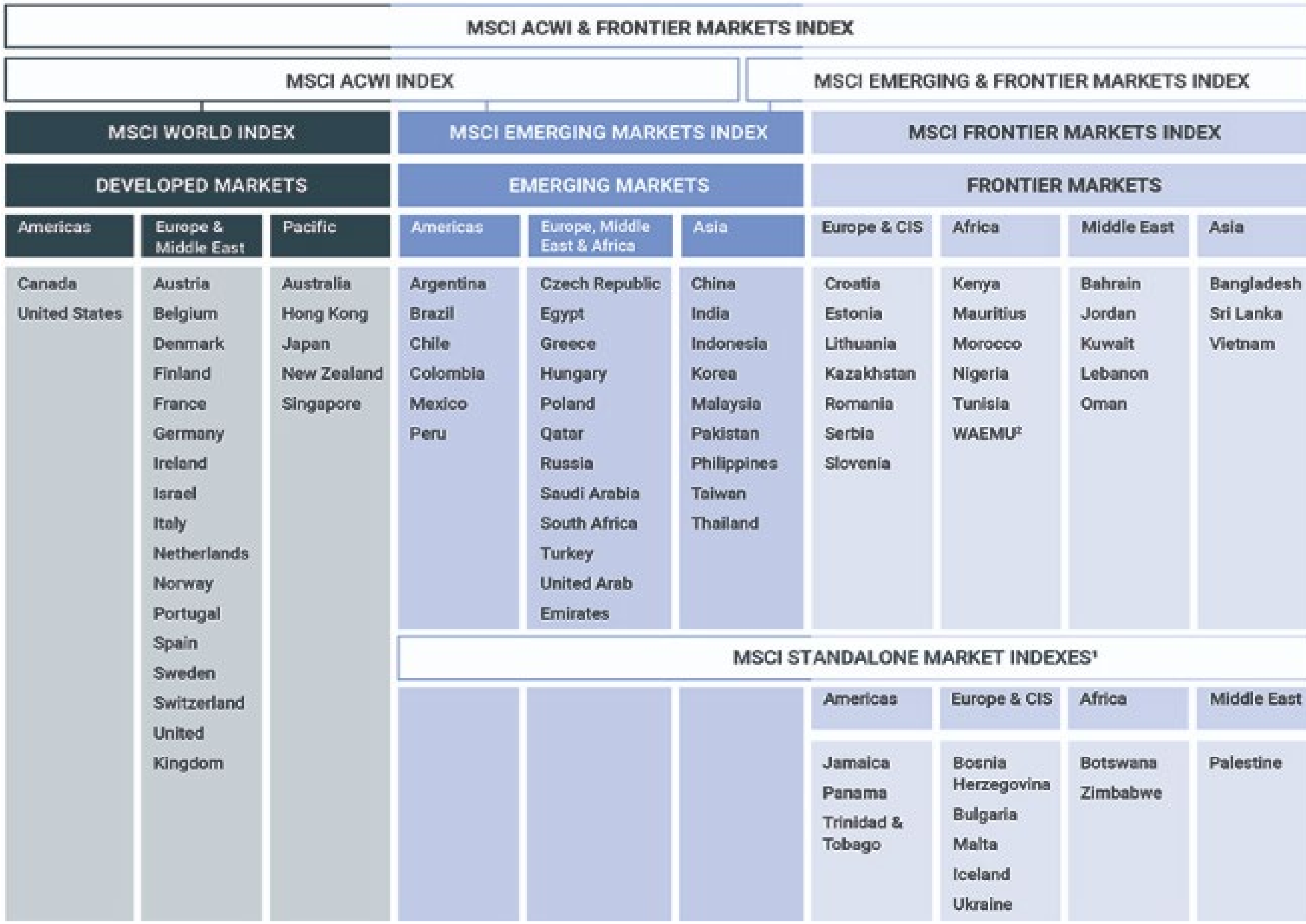
%CR to Active Risk: Percent of Plan's Active Predicted Risk contributed by each component. This column sums to 100%.
%CR to Total Risk: Percent of Plan's Total Predicted Risk contributed by each component. Negative numbers imply a diversification benefit. This column sums to 100%.
Active Predicted Risk: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

Appendix:



*MSCI.com/market-classification

Appendix B

NYSTRS' CLIMATE RISK KEY PERFORMANCE INDICATORS

RISK COMMITTEE: AUGUST 3, 2022

Matthew Albano, CFA
Risk Officer

Han Yik
Senior Advisor ED/CIO – Stewardship

NYSTRS' CLIMATE ACTION PLAN OVERVIEW & UPDATE

NYSTRS' CLIMATE ACTION PLAN OVERVIEW

On December 28, 2021, NYSTRS' Board adopted a resolution to divest securities that generate more than 10% of revenue from thermal coal, and to restrict purchases of:

- NYSTRS' ten largest holdings in oil and gas producers based on revenue or potential emissions
- NYSTRS' ten largest holdings in thermal coal producers based on potential emissions
- Companies that generate more than 10% of revenue from oil sands

NYSTRS' "Restricted List" contains 25 companies in total that have been prioritized for climate transition assessment and corporate engagement.

NYSTRS' ACTIONS TAKEN IN THE FIRST HALF OF 2022

- March 2022 - NYSTRS' staff sent formal notification to each company on the restricted list asking for a response outlining: sustainability policies, GHG reduction efforts, climate governance, and details on any recent climate related shareholder proposals.

- April 2022 - NYSTRS' became a signatory of Climate Action 100+, an investor-led initiative focused on corporate engagement and climate benchmarking.

- May 2022 - NYSTRS Investment Risk Staff began an assessment of the restricted list company's climate transition efforts

- June 2022, Han Yik joined NYSTRS as Senior Advisor to the Executive Director & Chief Investment Officer – Stewardship.

NYSTRS' CLIMATE RISK KEY PERFORMANCE INDICATORS

NYSTRS' CLIMATE KEY PERFORMANCE INDICATORS

- Serve as the foundation for discussion during corporate engagement
- Solidify the belief that proactive preparation for transitioning to a lower carbon economy is important.
- Staff utilized the Climate Action 100+ Net Zero Benchmark as a framework for developing the KPIs.

NYSTRS' CLIMATE KEY PERFORMANCE INDICATORS

1. Reduction Target(s): To assess if short, medium, and long-term GHG reduction targets, or Net Zero by 2050 pledges have been established.

2. Decarbonization Strategy: To assess if there are clearly defined action plans that align with proposed reduction targets.

3. Climate Governance – Executive Compensation: – To assess executive compensation alignment with stated climate goals, further supporting a firm-wide adoption of a transition plan.

4. Climate Governance – Board Oversight: To assess whether a firm's board has clear oversight of climate change and sufficient capabilities to manage climate risk and opportunities.

5. Standardized Disclosure: To assess whether the firm follows best practice Task Force on Climate-related Financial Disclosures (TCFD) as it pertains to climate reporting and disclosure.

NYSTRS' CLIMATE KPI STRATEGY

- Transparency: Allow the companies we invest in and the public to know what our KPIs are
- Measurable: KPIs are both reportable and measurable, to allow for monitoring and measuring success of engagement
- Actionable: Successful engagement (using KPIs to judge success) can lead to removal from the 'Restricted List'; unsuccessful engagement can lead to divestment

QUESTIONS?

NEW YORK STATE
TEACHERS' RETIREMENT SYSTEM

INVESTMENT COMMITTEE MEETING
August 3, 2022

INVESTMENT COMMITTEE MEETING
NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

A meeting of the Investment Committee of the Retirement Board of the New York State Teachers' Retirement System was held at the System on August 3, 2022. Nicholas Smirensky, Chair, called the meeting to order at 9:13 a.m.

ATTENDANCE:

Investment Committee Members
Elizabeth Chetney, David Keefe, Jennifer Longtin, Christopher Morin, Nicholas Smirensky

Board Members
Juliet Benaquisto, Phyllis Harrington, Eric Iberger, Oliver Robinson

Staff
Thomas Lee, Margaret Andriola, Gerald Yahoudy, Don Ampansiri, Ken Kasper, Richard Young, Ed Rezny, Miriam Dixon, Michael Federici, Mike Gregoire, Dave Gillan, Paul Cummins, Danny Malavé, Matt Albano, Aaron VanDerwiel, Vijay Madala, Kathy Ebert, Han Yik, Emily Ekland, Brad Woolworth, Heidi Brennan, Kevin Maloney, Nathan Lee, Bridget Seager, Jeff Shubert, Stacey Lesser Meehan

System Consultants

Callan – Tom Shingler

StepStone – Jose Fernandez (via telephone), Scott Schwind

Visitor

Donna Martin (via telephone)

Approval of Minutes

A. Approval of Minutes of April 27, 2022 Investment Committee Meeting

There being no changes or corrections and upon motion of J. Longtin, seconded by E. Chetney and unanimously carried, the minutes of the April 27, 2022 Investment Committee meeting were approved.

Staff Updates

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. 16-17)
5. Private Equity/Debt Update (Appendix E, p. 18)
6. Callan Update

T. Shingler from Callan reviewed the asset allocation recommendations given to the Board at the April meeting (Appendix F, pp. 19-32).

Presentations

A. Private Equity/Private Debt Annual Review

S. Schwind and J. Fernandez from StepStone presented the annual review of the private equity and debt portfolios.

Upon motion of J. Longtin, seconded by O. Robinson and unanimously carried, the Committee went into Executive Session at 11:20am to hear an overview of an upcoming Real Estate investment and to hear a Fixed Income manager presentation.

B. Fixed Income Presentation – Nomura Corporate Research and Asset Mgt (NCRAM)

M. Federici and A. VanDerwiel recommended a NCRAM to manage a broad high yield total return mandate. Steve Kosten, Heather Grantham and Dan Keating from NCRAM gave a presentation to the Committee.

Upon motion of J. Longtin, seconded by O. Robinson and unanimously carried, the Committee came out of Executive Session at 12:20pm.

Policy Review and Action

A. Consent Agenda Item #1 (Appendix G, p. 33)

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 Consent Agenda Recommendation items together with one motion:

Upon motion of J. Longtin, seconded by E. Chetney and unanimously carried, the Committee voted to recommend the following resolutions to the Board:

1. Renew Agreements (consent agenda items)

- Baillie Gifford Overseas Limited

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Baillie Gifford Overseas Limited to manage a portion of the System's assets as an active ACWI ex-US international equity manager for a period of one year, effective September 15, 2022.

- Global REIT Managers

RESOLVED, That the Executive Director and Chief Investment Officer, or his designees, is authorized to renew the agreements with the entities below to manage a portion of the System's assets as Global Real Estate Public Securities managers benchmarked to the FTSE EPRA/NAREIT Developed unhedged index for a period of one year:

Entity:	Renew for a period of one year effective as of:
Heitman, L.L.C.	August 7, 2022
Brookfield Investment Management Inc.	August 15, 2022
AEW Capital Management, L.P.	September 12, 2022
Dimensional Fund Advisors, L.P.	September 22, 2022

- Prima Capital Advisors

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's contract with Prima Capital Advisors LLC to manage a portion of the System's real estate portfolio, as a manager of US CMBS and private real estate debt, for a period of one year, commencing on August 13, 2022.

- Leading Edge

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Leading Edge Investment Advisors to manage a portion of the System's equity portfolio as a manager of managers for a global equity strategy, for a period of one year, effective November 22, 2022.

- T. Rowe Associates, Inc.

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's agreement with T. Rowe Price Associates, Inc. to manage a portion of the System's equity portfolio as a domestic equity enhanced index manager for a period of one year, effective October 30, 2022.

- William Blair and Company

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's contract with William Blair & Company, LLC to manage a portion of the System's equity portfolio as an active ACWI ex US international manager for a period of one year commencing September 22, 2022.

2. Resolution on Nomura Corporate Research and Asset Mgt

Upon motion of J. Longtin, seconded by C. Morin and unanimously carried, the Committee voted to recommend the following resolution to the Board:

> RESOLVED, That, subject to the satisfactory completion of due diligence, the Executive Director and Chief Investment Officer is authorized to contract with Nomura Corporate Research and Asset Management, Inc. to manage a portion of the System's fixed income portfolio in a High Yield fixed income mandate benchmarked to the ICE BofA U.S. High Yield Constrained Index and to allocate an initial funding of up to $150 million to such manager in one or more tranches; and be it further
>
> RESOLVED That the Executive Director and Chief Investment Officer, or his designees, are authorized to execute such documents and to take such actions as may be necessary or required to implement the foregoing resolution.

3. Resolution on Investment Discretion

Upon motion of J. Longtin, seconded by C. Morin and unanimously carried, the Committee voted to recommend the following resolution to the Board:

> WHEREAS, The Retirement Board approved the delegations of investment authority set forth in the section of the Investment Policy Manual entitled "Delegation of Investment Authority" at its October 2021 meeting; and
>
> WHEREAS, Said section shall be subject to annual review and renewal at the regular meeting of the Retirement Board in July of each calendar year; be it
>
> RESOLVED, That the delegations of investment authority set forth in said section of the Investment Policy Manual are reauthorized and reconfirmed as the principal items of investment authority delegated to the Executive Director and Chief Investment Officer.

4. Resolution on Asset Allocation

Upon motion of J. Longtin, seconded by C. Morin and unanimously carried, the Committee voted to recommend the following resolution to the Board:

RESOLVED, That the System's asset allocation targets and rebalancing ranges in the System's Asset Allocation shall be continued without changes and shall be as follows, effective immediately:

Asset Class	**Range**	**Target**
Domestic Equity	29 – 37%	33%
International Equity	11 – 19%	15%
Global Equity	0 – 8%	4%
Domestic Fixed Income	12 – 20%	16%
Real Estate Equity	6 – 16%	11%
Real Estate Debt	2 – 10%	6%
Private Equity	4 – 14%	9%
Private Debt	0.5 – 5%	2%
Global Bonds	0 – 4%	2%
High Yield Bonds	0 – 3%	1%
Short Term Investments (Cash Equivalents)	0 – 4%	1%

There being no further business and with unanimous consent, the Committee adjourned at 12:22 p.m.

Respectfully submitted,

[redacted]

Thomas K. Lee

Appendix A

Investment Committee Executive Summary

Office of the CFO: Investment Operations Department

Investment Committee Meeting: August 3, 2022

Margaret Andriola, CIPM, CPA
Chief Financial Officer

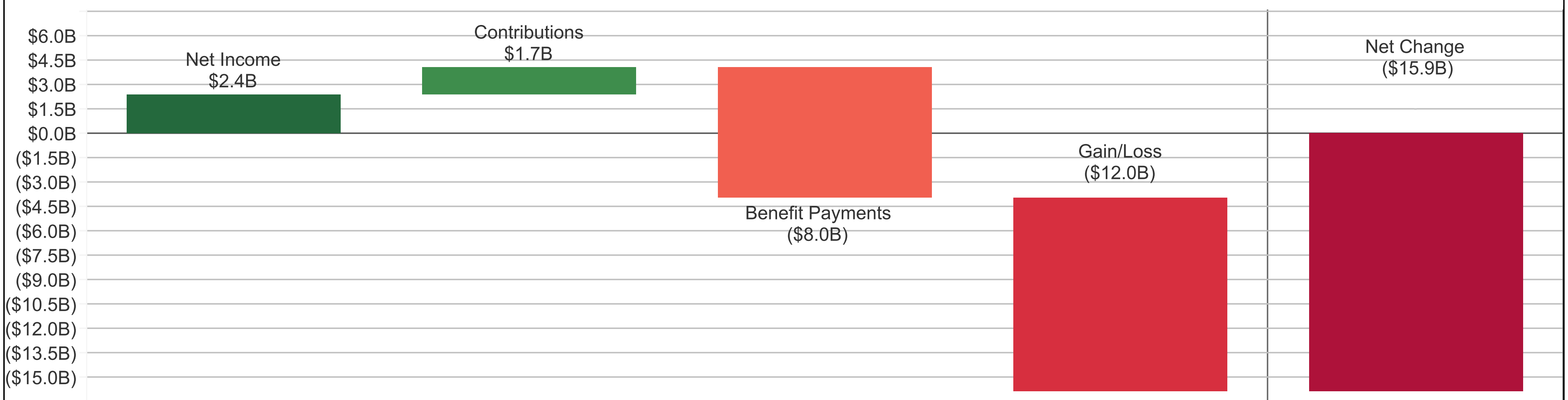
Investment Committee Executive Summary

Market Value Summary ('000s)

Asset Category	Asset Class	June 30, 2022 Net Asset Value	June 30, 2022 % Net Asset Value	March 31, 2022 Net Asset Value	March 31, 2022 % Net Asset Value	June 30, 2021 Net Asset Value	June 30, 2021 % Net Asset Value
Equity	Domestic Equity	$41,996,869	32.2%	$50,367,368	34.6%	$50,079,272	34.2%
	International Equity	$19,595,506	15.0%	$22,707,432	15.6%	$24,874,433	17.0%
	Global Equity	$4,226,308	3.2%	$4,925,344	3.4%	$5,109,716	3.5%
	Real Estate Equity	$16,263,924	12.5%	$17,211,717	11.8%	$14,863,611	10.2%
	Private Equity	$14,626,286	11.2%	$14,561,238	10.0%	$14,783,219	10.1%
	Asset Category Subtotal	**$96,708,893**	**74.1%**	**$109,773,099**	**75.4%**	**$109,710,251**	**75.0%**
Fixed Income	Domestic Fixed Income	$18,358,958	14.1%	$19,183,766	13.2%	$18,903,460	12.9%
	Global Bonds	$2,889,172	2.2%	$3,053,009	2.1%	$3,218,723	2.2%
	High Yield	$974,221	0.7%	$1,072,273	0.7%	$950,049	0.6%
	Real Estate Debt	$7,776,017	6.0%	$7,924,667	5.4%	$7,442,476	5.1%
	Private Debt	$1,445,050	1.1%	$1,320,108	0.9%	$1,163,794	0.8%
	Cash & Short Term Debt	$2,272,389	1.7%	$3,171,553	2.2%	$4,936,522	3.4%
	Asset Category Subtotal	**$33,715,807**	**25.9%**	**$35,725,376**	**24.6%**	**$36,615,025**	**25.0%**
	Total Plan	**$130,424,700**	**100.0%**	**$145,498,475**	**100.0%**	**$146,325,276**	**100.0%**

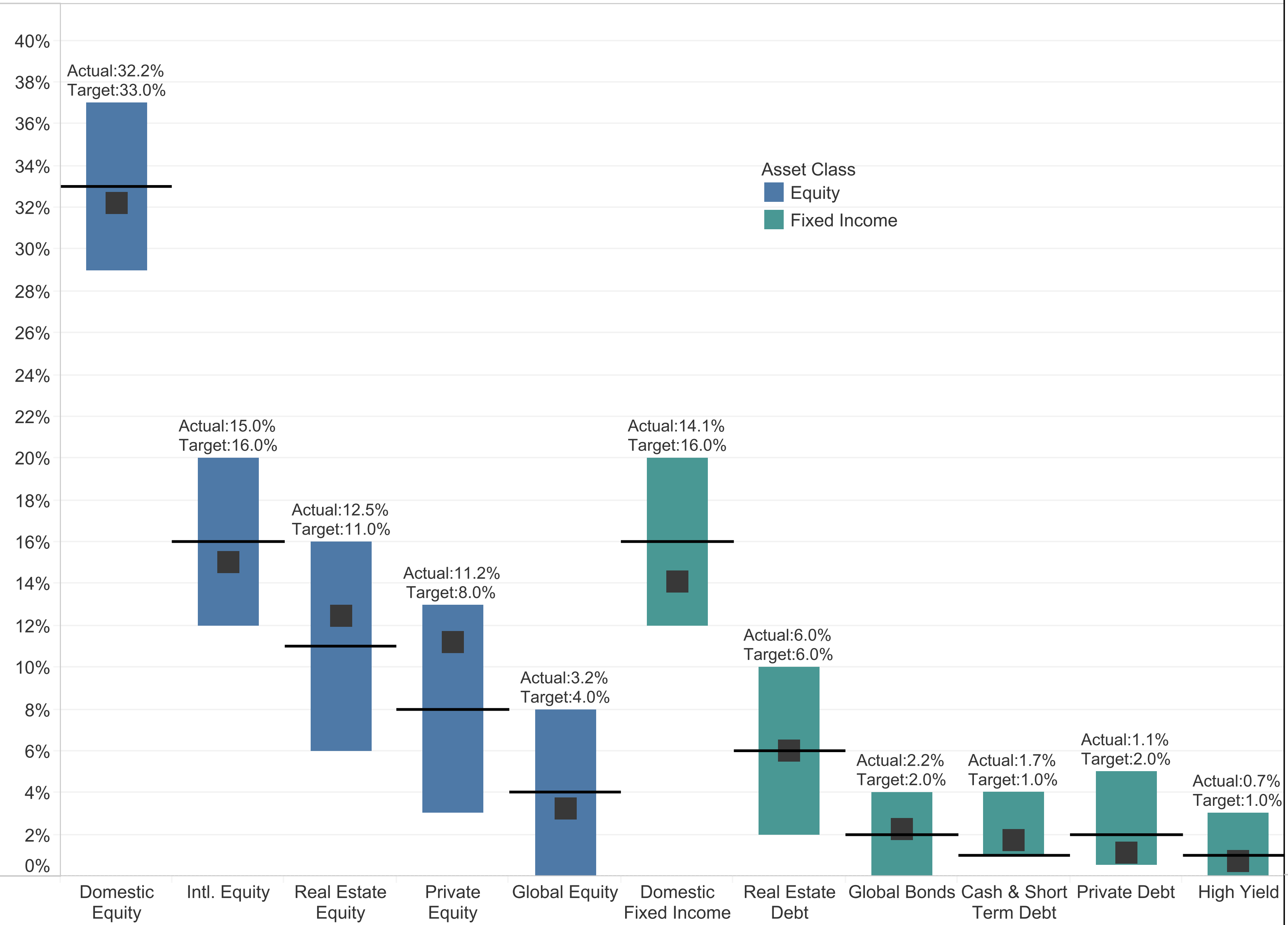
Due to rounding, numbers may not sum to 100%.

Components of Change in Total Investments
FYTD: 7/1/2021 to 6/30/2022
$146.3B to $130.4B

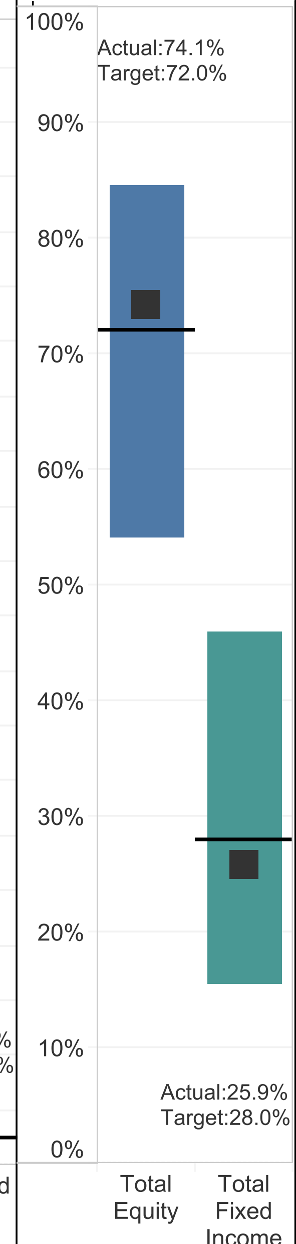


Investment Committee Executive Summary

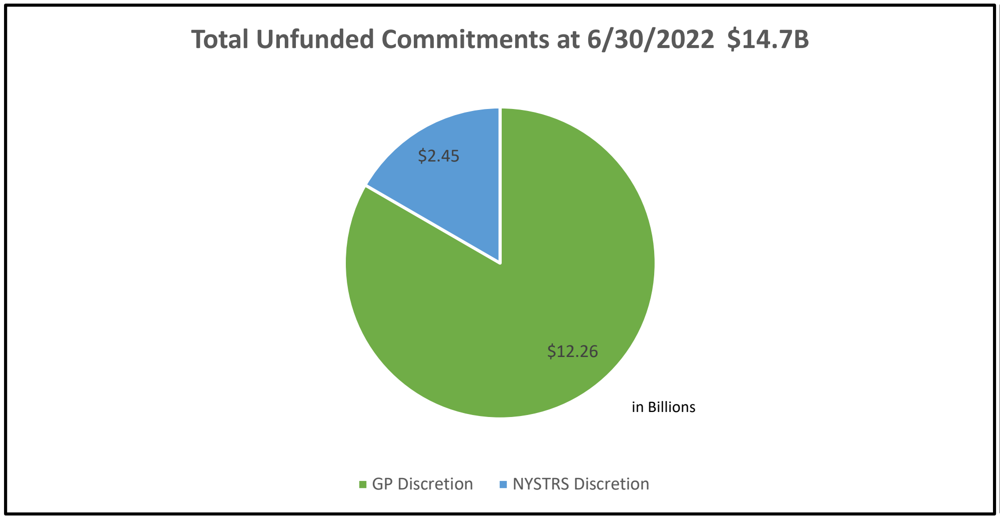
NYSTRS' Asset Allocation: $130.4B (June 30, 2022)

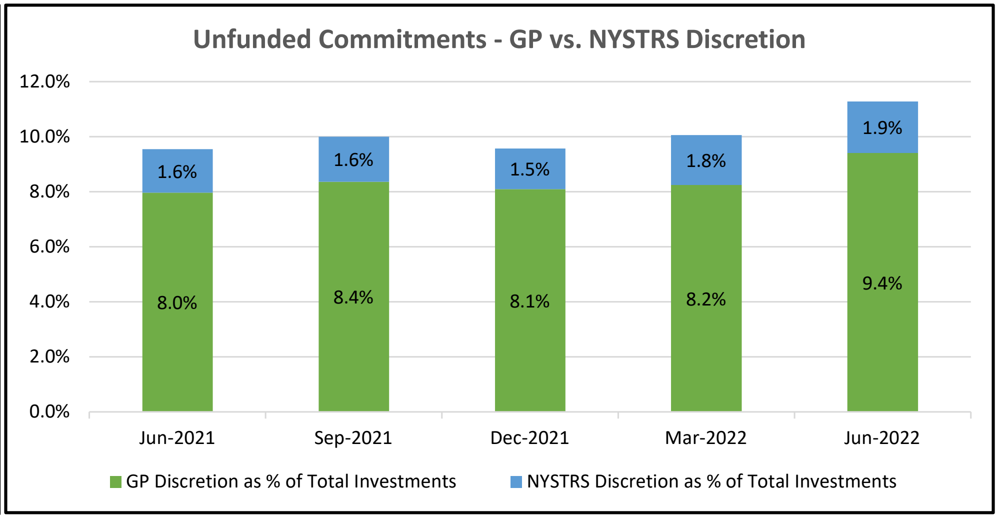


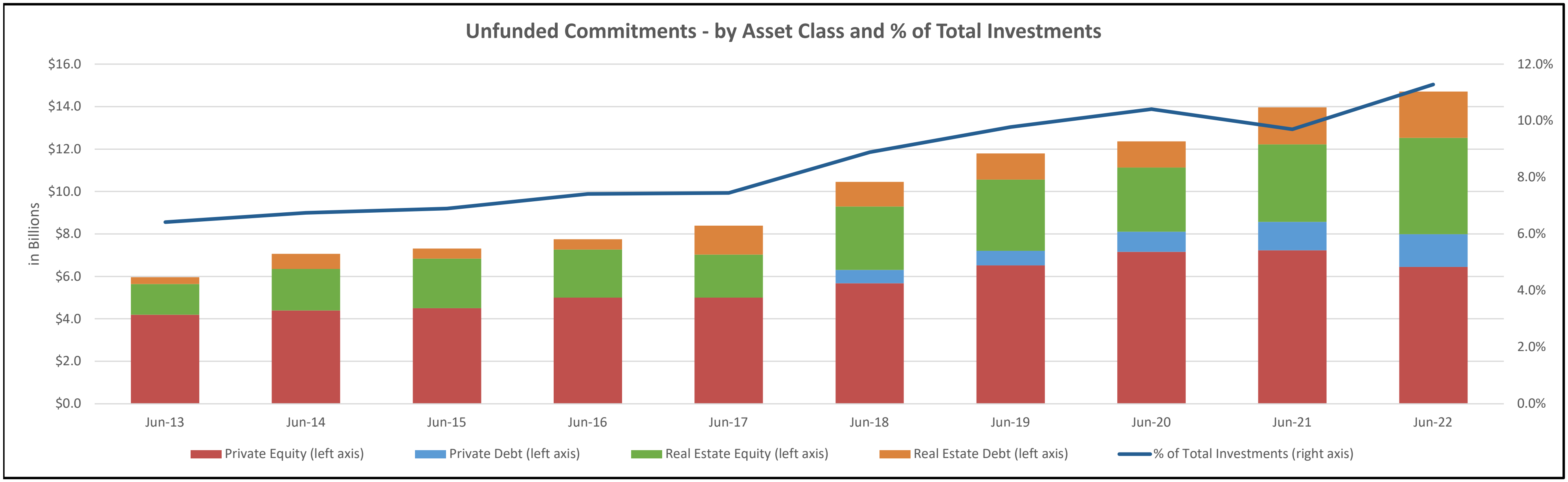
Equity vs. Debt



Unfunded Commitments - Private Assets

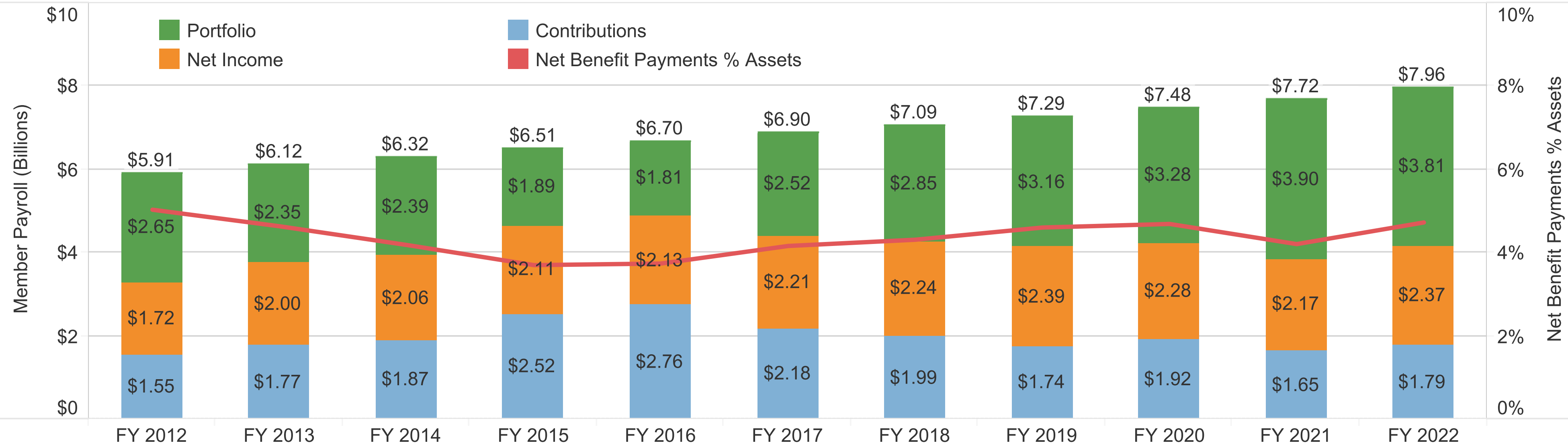




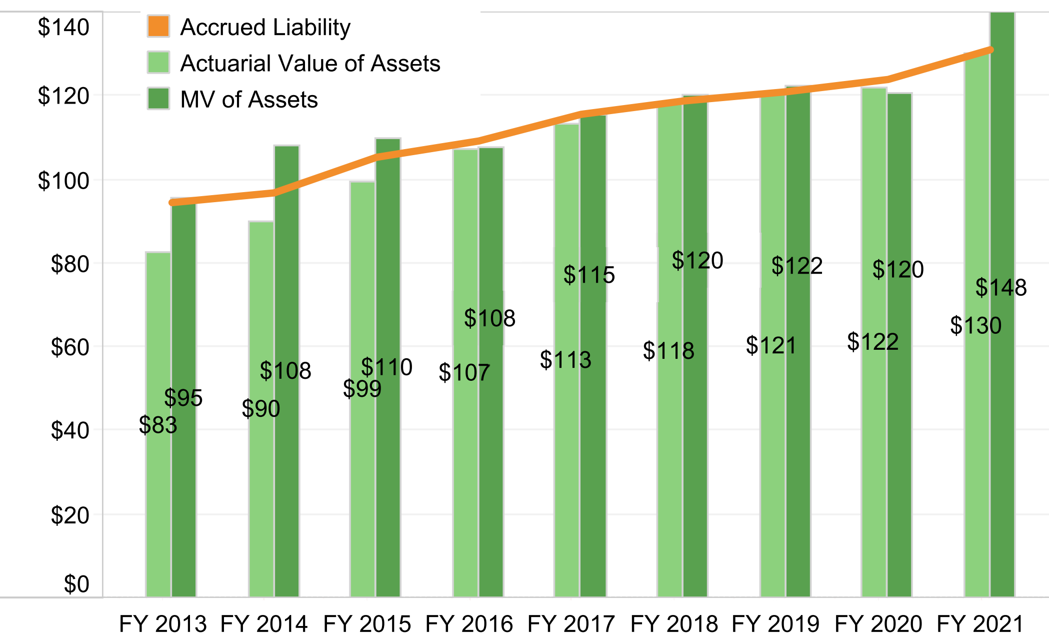


Investment Committee Executive Summary

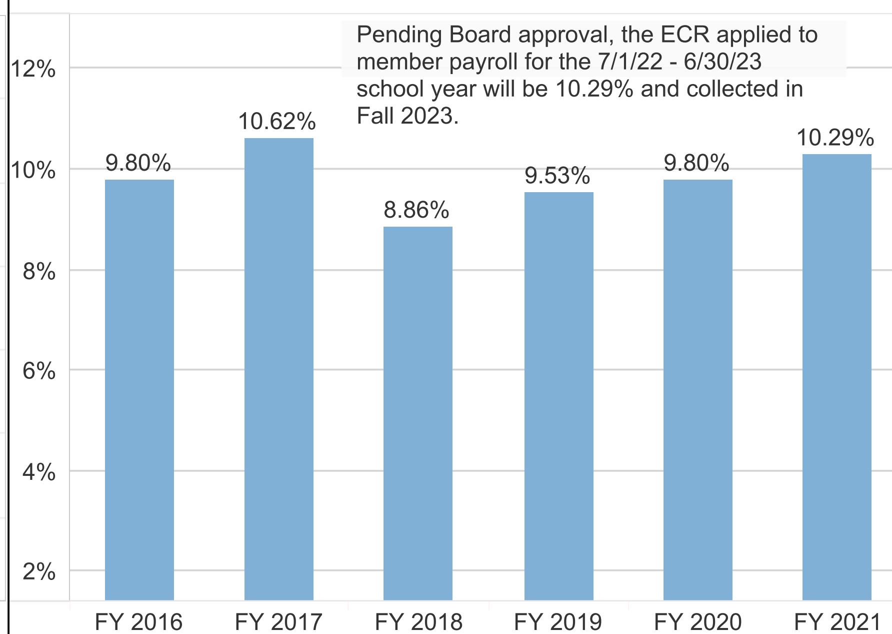
Member Payroll Funding Sources



Assets & Actuarial Accrued Liability



Employer Contribution Rate



Investment Committee Executive Summary

Public Market Performance as of June 30, 2022

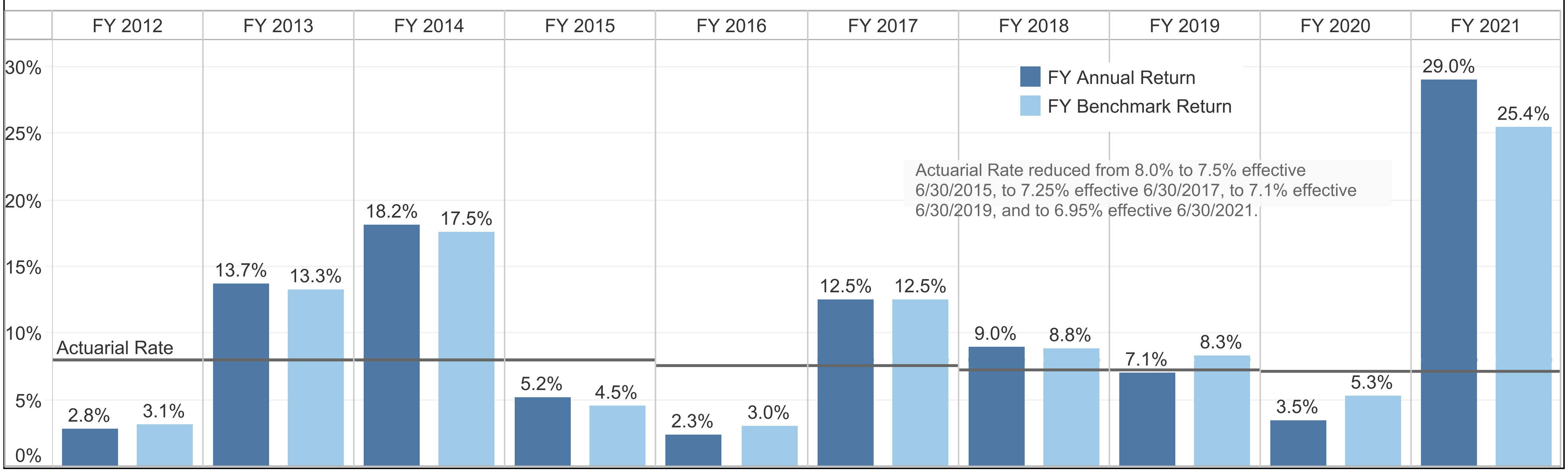
	Current QTR	
Asset Class	Net Return	Excess Return
Domestic Equity	-16.0%	0.0%
International Equity	-13.7%	0.0%
Global Equity	-14.3%	1.4%
Private Equity	N/A	N/A
Real Estate Equity	-15.4%	2.6%
Domestic Fixed Income	-3.1%	1.6%
Global Bonds	-5.4%	-0.4%
High Yield Bonds	-9.2%	0.3%
Private Debt	N/A	N/A
Real Estate Debt	-4.1%	-0.8%
Short Term	0.2%	0.1%

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

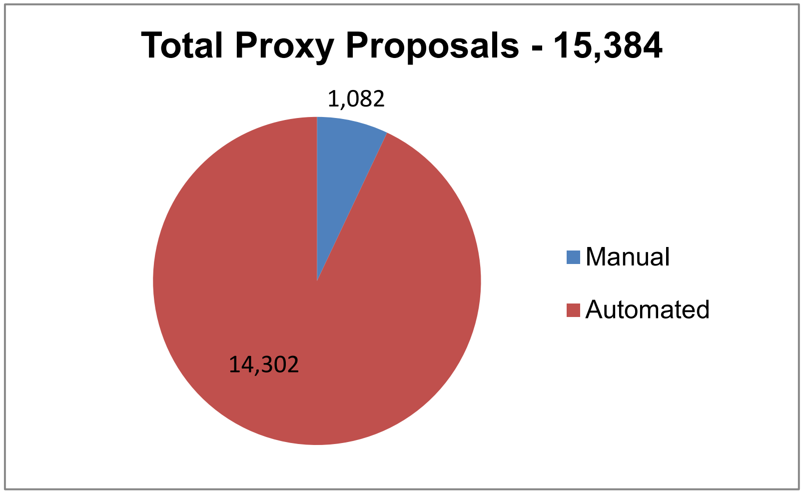
Total Fund Performance as of March 31, 2022

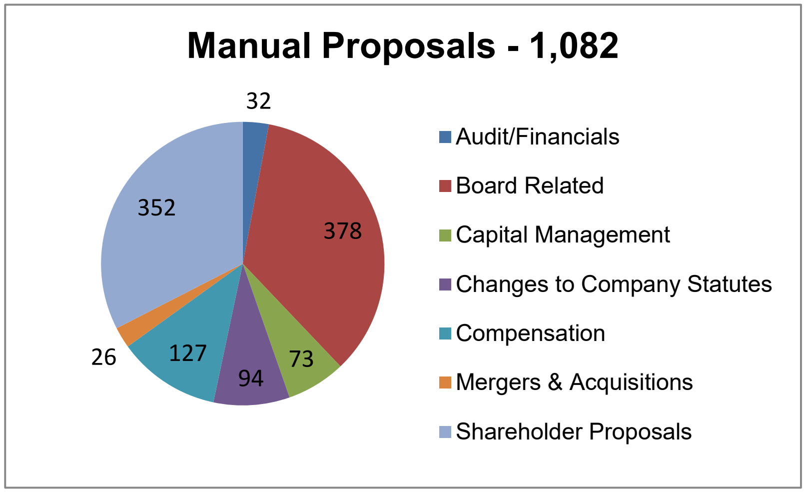
	QTR		FYTD		10YR	
Asset Class	Net Return	Excess Return	Net Return	Excess Return	Net Return	Excess Return
Domestic Equity	-4.7%	0.0%	5.8%	-0.1%	14.3%	-0.1%
International Equity	-5.8%	-0.3%	-6.9%	-0.3%	6.1%	0.5%
Global Equity	-6.5%	-1.2%	-3.0%	-2.8%	N/A	N/A
Private Equity	-0.8%	2.6%	9.1%	-1.2%	17.1%	-2.6%
Real Estate Equity	2.9%	-4.3%	17.8%	-4.9%	11.3%	1.2%
Domestic Fixed Income	-4.9%	1.1%	-5.3%	0.6%	1.8%	-0.4%
Global Bonds	-5.1%	0.6%	-5.3%	0.4%	N/A	N/A
High Yield Bonds	-4.3%	0.3%	-2.9%	0.1%	N/A	N/A
Private Debt	2.0%	1.4%	10.1%	6.1%	N/A	N/A
Real Estate Debt	-2.2%	2.3%	-1.2%	2.6%	4.5%	0.7%
Short Term	0.0%	0.0%	0.1%	0.1%	0.7%	0.3%
Total Fund	**-3.4%**	**0.1%**	**2.6%**	**-0.3%**	**9.8%**	**0.1%**

Annual Performance



Proxy Voting Summary: 4/1/2022 - 6/30/2022





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 generally supports independent directors outside of management, gender diversity on boards, and considers related party transactions.

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: 44, Environment: 42, Governance: 137, Other: 12, and Social: 117

Public Equity MD Update
Investment Committee August 3, 2022

Portfolio Values			
Portfolio Values (000)	**06/30/22**	**06/30/21**	**Difference**
Domestic Equity	**$41,996,869**	**$50,079,272**	**($8,082,403)**
International Equity	**$19,595,506**	**$24,874,433**	**($5,278,927)**
Global Equity	**$4,226,308**	**$5,109,716**	**($883,408)**
Total Public Equity	**$65,818,683**	**$80,063,421**	**($14,244,738)**

Asset Allocation			
Asset Allocation	**Range**	**Target**	**Actual 06/30/22**
Domestic:	**29-37%**	**33.0%**	**32.2%**
International:	**12-20%**	**16.0%**	**15.0%**
Global:	**0-8%**	**4.0%**	**3.2%**

Public Equity Portfolio Values:

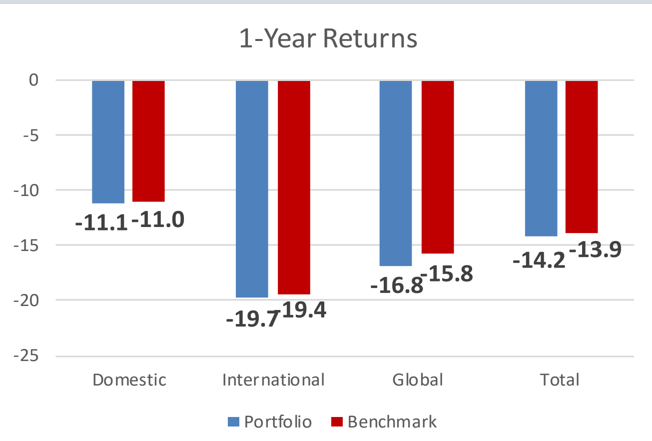
- During the one-year period ended 06/30/22:
  - o $2.9B (including dividends swept) was raised from domestic equities.
  - o $509M was raised from international equities.
  - o $50M was raised from global equities.

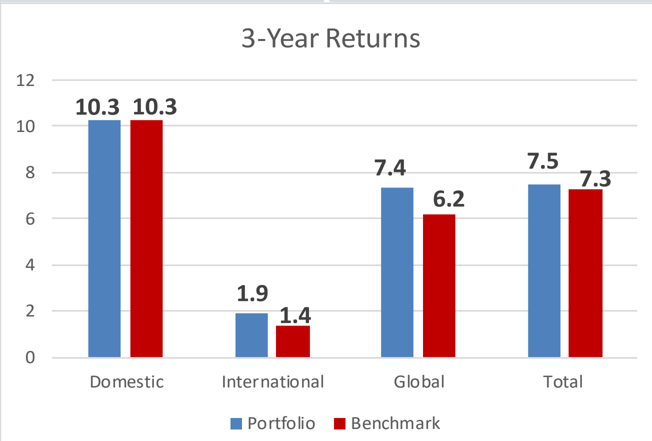
- Hence, the public equity portfolio decreased in value by $10.7B for the one-year period.

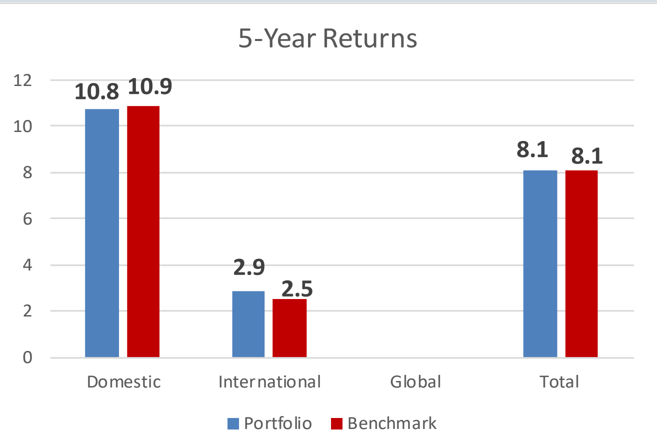
Asset Allocation

- Public equities asset classes ended a volatile quarter modestly below target but well within their asset allocation ranges.

- $148.6M was raised from the domestic portfolio during the quarter.







Commentary:

- All managers remain in good standing and are mostly performing within our range of expectations.
- Difficult 12-month period for growth strategies in the international and global sleeves. Value and quantitative strategies, including internally managed, have generated positive excess returns.
- No material performance impact during the quarter from thermal coal divestment.
- Contracting for GSAM India strategy completed.
- One new staff member recruited for the external team.

Fixed Income MD Update
Investment Committee Meeting: August 3, 2022

Sector/Portfolio	Mkt Val $B	Asset Allocation %			Absolute Return %					Excess Return vs. Benchmark %				
		NAV	Target	Range	Qtr	FYTD	1-Yr	3-Yr	5-Yr	Qtr	FYTD	1-Yr	3-Yr	5-Yr
Dom. Fixed Income	18.36	14.1	16	12-20	-3.1	-8.3	-8.3	-0.5	0.9	1.6	2.1	2.1	0.4	0.0
Short-Term Bond	2.27	1.7	1	1-4	0.2	0.3	0.3	0.7	1.2	0.1	0.2	0.2	0.3	0.4
Global Bonds	2.89	2.2	2	0-4	-5.4	-10.4	-10.4	-0.9	1.5	-0.4	0.0	0.0	0.6	0.5
High Yield	0.97	0.7	1	0-3	-9.2	-11.8	-11.8	-0.2		0.3	0.4	0.4	-0.2	

- All portfolios remain within asset allocation ranges; gradually adding funding to high yield towards 1% target
- Fixed income markets had the worst 3, 6, and 12-month periods in at least 30 years; US dollar assets were less negative
- **Dom. Fixed Income**: Excess return from lower rate risk (duration) and security selection that offset corporate overweight[1]
- **Short-Term Bond**: Benefitting from higher money market rates; remains diversified, high-quality and liquid
- **Global Bonds**: Underperformance largely due to corporate overweight and US dollar-denominated sovereign bonds
- **High Yield**: Excess return mostly from small cash allocation; benefited from underweight to insurance and brokerages

Macroeconomic/Geopolitical Risks

- High inflation is leading central banks to rapidly unwind pandemic support; one result is extreme currency moves
- Russia/Ukraine war (short/long-term considerations)
- China: COVID zero-tolerance policy and property market concerns
- US housing: after a 20%+ increase in home prices, higher mortgage rates are a risk to values and activity levels

- Team: 2 Investment Officers joined (1 internal and 1 external hire); 1 search in process; Girls Who Invest summer intern

[1]Domestic Fixed Income duration was -1.4 years vs. benchmark and -1.0 year excl. maturities under 1 year; quarterly returns were similar for both

Commercial Real Estate (CRE) Investments - Managing Director Update

CRE Equity	6/30/22 Value	Target	Range	Actual	w/Commit
	$16,264	11%	6%-16%	12.5%	15.4%

Performance for Periods Ended March 31, 2022

Strategy (Inception Date)	Net Asset Value	Current Quarter	1 Year	5 Year	10 Year	Since Inception
Direct Properties (2/90)	$6,713	7.2%	27.1%	9.2%	11.8%	9.9%
Core Funds (7/85)	$1,880	5.8%	19.1%	5.6%	7.8%	7.0%
Value Added (12/89)	$1,412	5.7%	50.2%	21.5%	19.0%	12.5%
Opportunistic (3/99)	$2,547	4.0%	28.1%	11.6%	11.7%	11.5%
U.S. RE Securities (7/95)	$3,266	-4.9%	21.3%	10.8%	10.3%	12.1%
Global RE Securities (9/17)	$1,627	-3.1%	16.2%	-	-	7.2%
Timber (12/98)	$284	2.9%	12.2%	5.3%	5.7%	4.4%
Total CRE Equity Portfolio	**$17,729**	**2.9%**	**25.5%**	**10.3%**	**11.3%**	**8.7%**
NCREIF-ODCE (Spliced)	-	7.1%	27.3%	9.5%	10.1%	7.0%

Return Drivers:

- The one-year return was driven by the strong performance in the industrial and multi-family sectors driven by continued strong tenant demand driving increases in rental rates coupled with strong investor demand for those property types. Public market returns detracted from performance relative to the private asset benchmark as the capital markets reacted to interest rate increases to combat rising inflation.

Appendix D

Market Conditions

- Commercial property values softened across the board in June with a private property sector value reduction of approximately 4%. Industrial posted a 6% property value reduction, demonstrating a moderation of the record growth the sector has experienced recently.
- Demand fundamentals in multi-family remain solid, especially in sunbelt markets that experienced greater than 15% annual rent growth over the past year. Steep rent increases, along with inflationary pressures on consumer prices have led to affordability concerns in certain markets.

Portfolio Focus:

- Acquisitions is focused on sectors with long term demand expectations such as industrial and multifamily as well as niche sectors that benefit from long term macro drivers including cold storage and life science office.
- In the multifamily space, our focus is on markets that do not have affordability concerns due to lower rents to household income ratios.

Second Quarter Investment Activity:

- The System closed on $400 million of commitments to funds with diversified US middle market and global opportunistic strategies and closed on acquisition of The Berkman, a Class A, newly-constructed, 350-unit multifamily asset in Rochester, MN, adjacent to the Mayo Clinic's St Mary's Campus.

Commercial Real Estate (CRE) Investments - Managing Director Update

CRE Debt	6/30/22 Value	Target	Range	Actual	w/Commit
	$7,776	6%	2%-10%	6.0%	7.5%

Performance for Periods Ended March 31, 2022

Strategy (Inception Date)	Net Asset Value	Current Quarter	1 Year	5 Years	10 Years	Since Inception
First Mortgages (7/85)	$3,267	-2.6%	-1.3%	3.8%	4.2%	8.0%
Commercial MBS (4/01)	$2,167	-4.6%	-2.4%	3.1%	3.5%	4.7%
Core Plus Strategies (8/04)	$1,824	0.6%	5.0%	5.4%	5.8%	5.3%
Opportunistic Debt (9/01)	$562	1.5%	7.8%	6.7%	10.3%	0.8%
Total CRE Debt Portfolio	**$7,820**	**-2.2%**	**0.2%**	**4.2%**	**4.5%**	**7.9%**
Giliberto-Levy Custom Index (Spliced)	-	-4.5%	-1.4%	3.8%	3.9%	8.1%

Return Drivers:

- Negative returns for the quarter were driven by an increase in market lending rates which affected the System's core fixed rate debt portfolio. Despite the mark downs in value, the System's mortgage portfolio is expected to be held to maturity with no expectations of default. The portfolio has a weighted average maturity of 2.0 years with a coupon of 3.89%.

Market Conditions:

- U.S. treasury yields have increased approximately 150 basis points during 2022 and credit spreads have slightly widened on first mortgage loans. As a result, current first mortgage interest rates have rebounded from their historic lows a year ago, where 10-year loans where pricing in the 2.50%-2.75% range, versus today where coupons are in the 4.50%-4.75% range.
- Yields on investment grade SASB and conduit CMBS securities have increased, resulting in all in yields in excess of 4.75%.
- Private bridge and senior mezzanine loans are now providing net yields in excess of 6.50% when pricing along the forward SOFR curve.

Portfolio Focus:

- The System is actively pursuing first mortgages on high quality, new vintage, stabilized assets with interest rates in the 4.50%-4.75% range.
- We continue to focus on senior mezzanine and bridge lending to supplement yields on the first mortgage and CMBS portfolios, while providing floating rate loans to take advantage of a rising SOFR curve.
- Will look to add investment grade CMBS debt, primarily on single asset/single borrower bonds that have current yields in excess of 4.75%.

Second Quarter Investment Activity:

- The System funded approximately $175 million to primarily single asset/single borrower investment grade CMBS during the quarter.

Private Equity/Debt MD Update
Investment Committee
August 3, 2022

Appendix E

Private Equity – 8% Target (3-13%)

- 6/30/22 - $14.6bn or approx. 11.2% vs. target
- $6.45bn unfunded

Performance (as of 3/31/22, time-weighted)

Yrs	TWReturn	S&P500 +5%
QTR	-0.8%	-3.4%
1	23.7%	20.6%
3	23.5%	23.9%
5	20.3%	21.0%
10	17.1%	19.6%
15	13.2%	15.3%
20	14.9%	14.2%

Private Debt – 2% Target (0.5-5%)

- 6/30/22 - $1.45bn or approx. 1.1% vs. target
- $1.5bn unfunded

Performance (as of 3/31/22, time-weighted)

Yrs	TWReturn	S&P/LSTA +3%
QTR	2.0%	0.6%
1	15.3%	6.3%
3	10.4%	7.2%

Market Overview:

- Fundraising has slowed; continue to have a strong pipeline of high-quality opportunities; Staff remains selective and focused mainly on re-ups.
- Deal activity is moderating due to continued macro concerns and valuation gap between buyer and seller expectations has begun to emerge.
- Private debt markets continue to grow; attractive opportunities particularly in the lower/middle market, largely avoiding the upper end of the market which is highly competitive and more sponsor oriented.

Other Items:

- Team – recent internal promotions.
- Supplemental consultant RFP cancelled.
- PE target allocation proposal.
- StepStone annual strategic review.

Callan

Appendix F

August 3, 2022

New York State Teachers' Retirement System

Callan Update on Asset Allocation and Markets

Jay Kloepfer
Capital Market Research

Tom Shingler
Fund Sponsor Consulting

Millie Viqueira
Fund Sponsor Consulting

Angel Haddad
Fund Sponsor Consulting

Recommendation: NYSTRS Current and Proposed Target Allocations and Ranges

Asset Class	Current Target	Current Target Range Allocations	Proposed Target	Recommended Target Range
Domestic Equity	33%	29 - 37%	33%	29 - 37%
International Equity	16%	12 - 20%	15%	11 - 19%
Global Equity	4%	0 - 8%	4%	0 - 8%
Domestic Fixed Income	16%	12 - 20%	16%	12 - 20%
Real Estate Equity	11%	6 - 16%	11%	6 - 16%
Real Estate Debt	6%	2 - 10%	6%	2 - 10%
Private Equity	8%	3 - 13%	9%	4 - 14%
Private Debt	2%	0.5 - 5.0%	2%	0.5 - 5.0%
Global Bonds	2%	0 - 4%	2%	0 - 4%
High Yield Bonds	1%	0 - 3%	1%	0 - 3%
Short Term Investments (Cash Equivalents)	1%	1 - 4%	1%	0- 4%

Note that a floor of 0% on the target range does not imply that the target allocation can be eliminated without Board approval.

- Proposed asset allocation target and range changes noted in red.
- International Equity target reduced by a percentage point and range adjusted accordingly.
- Private Equity target raised by a percentage point and range adjusted accordingly.
- International Equity target reduced due to lower expected returns and opportunity set versus Private Equity; this change can be made without impacting the use of the leeway clause.
- This proposed incremental change also moves Private Equity's target allocation closer to the actual allocation.

What Are We Talking to Our Public Fund Clients About?

Inflation and interest rates—the elephants in the room (and the equity market)

- Inflation is top of mind as the CPI-U is up 9.1% year-over-year through June.
- The Fed began raising rates in March with a 25 bps hike, followed by 50 bps in May and 75 bps in June.
  - The FOMC expects the Fed Funds rate to reach 3.25%-3.5% by December 2022, so 175 bps more
  - Yield on the Aggregate index rose from 1.75% to 3.72%
- However, the stock market replaced inflation as the greatest concern in conversations during 2Q22
  - No place to hide in the first half of 2022: the S&P 500 down 20%, Aggregate down 10.4%
- Questions on what to do now:
  - How does an Aggregate fixed income yield of ~4% change the demand for yield substitutes: IG credit, bank loans, high yield, private debt? Maybe even real estate and infrastructure?
  - Rebalancing: natural outcome of a market downturn, except when everything goes down
  - Alternatives: now over target allocations
    - *Denominator effect: plunge in stocks and bonds is immediate*
    - *How much will private market returns be impacted? When will we know?*
    - *Will overweights influence demand for alternatives?*
- 2Q continued the wave of public DB plan asset allocation studies and deep dives into asset class implementation.
  - 2020-21 gains drove improvements in funded status. How much will be given back?
  - Low projected returns mean downward pressure on actuarial discount rates. Moving to lower discount rates has not typically led to substantial changes in asset allocation.
  - How will inflation impact large public plans?
  - Several large public plans subject to “basket clauses” have seen restrictions lessened on alternatives. Interest has been focused on private equity, private debt, and infrastructure.

Customized NYSTRS Capital Market Projections – 10-Year Time Horizon

NYSTRS Asset Allocation Model 2022-2031- Target and Recommended Mix

Asset Class	Target Weight	Recommended	PROJECTED RETURN 10-Year Geometric Return	PROJECTED RISK Annualized Standard Deviation
Public Equity	**53.0%**	**52.0%**		
Broad US Equity (1)	33.0%	33.0%	6.60%	17.95%
Global Ex-US Equity (2)	16.0%	15.0%	6.80%	20.50%
Global Equity (3)	4.0%	4.0%	6.85%	18.25%
Private Market Equity	**19.0%**	**20.0%**		
Real Estate Equity (4)	11.0%	11.0%	6.75%	16.80%
Private Equity	8.0%	9.0%	8.00%	27.60%
Private Debt	**2.0%**	**2.0%**		
Private Debt	2.0%	2.0%	5.50%	14.60%
Fixed Income	**25.0%**	**25.0%**		
Core U.S. Fixed Income	16.0%	16.0%	1.75%	3.75%
Global Fixed Income (5)	2.0%	2.0%	1.20%	3.10%
Real Estate Debt (6)	6.0%	6.0%	3.40%	4.65%
High Yield	1.0%	1.0%	3.90%	10.75%
Cash Equivalents	**1.0%**	**1.0%**		
Cash Equivalents	1.0%	1.0%	1.20%	0.90%
Inflation			2.25%	1.50%
Total Fund	**100.0%**	**100.0%**		
Single-Period Arithmetic Return	6.84%	6.87%		
10-Year Geometric Return	**6.12%**	**6.15%**		
Annualized Standard Deviation	13.33%	13.39%		

(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 = 55% broad US, 45% global ex-US

(4) Real estate equity = 55% core real estate, 30% non-core real estate, 15% REITs

(5) Global fixed income = 60% non-US developed market bonds, 40% core US fixed income

(6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt

Source: Callan LLC

Projection set customized to reflect specific NYSTRS strategies:

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

Current target projected return of 6.12% compounded over 10 years, at a risk (standard deviation) of 13.33%

- Recommend: shift 1% from international equity to private equity

Customized NYSTRS Capital Market Projections – 20-Year Time Horizon

NYSTRS Asset Allocation Model 2022-2041 - Target and Recommended Mix

Asset Class	Target Weight	Recommended	PROJECTED RETURN 20-Year Geometric Return	PROJECTED RISK Annualized Standard Deviation
Public Equity	**53.0%**	**52.0%**		
Broad US Equity (1)	33.0%	33.0%	7.15%	17.95%
Global Ex-US Equity (2)	16.0%	15.0%	7.30%	20.50%
Global Equity (3)	4.0%	4.0%	7.40%	18.25%
Private Market Equity	**19.0%**	**20.0%**		
Real Estate Equity (4)	11.0%	11.0%	7.20%	16.80%
Private Equity	8.0%	9.0%	8.45%	27.60%
Private Debt	**2.0%**	**2.0%**		
Private Debt	2.0%	2.0%	6.10%	14.60%
Fixed Income	**25.0%**	**25.0%**		
Core U.S. Fixed Income	16.0%	16.0%	2.65%	3.75%
Global Fixed Income (5)	2.0%	2.0%	2.10%	3.10%
Real Estate Debt (6)	6.0%	6.0%	4.10%	4.65%
High Yield	1.0%	1.0%	4.60%	10.75%
Cash Equivalents	**1.0%**	**1.0%**		
Cash Equivalents	1.0%	1.0%	1.70%	0.90%
Inflation			2.25%	1.50%
Total Fund	**100.0%**	**100.0%**		
Single-Period Arithmetic Return	7.43%	7.45%		
20-Year Geometric Return	**6.74%**	**6.76%**		
Annualized Standard Deviation	13.33%	13.39%		

(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 = 55% broad US, 45% global ex-US
(4) Real estate equity = 55% core real estate, 30% non-core real estate, 15% REITs
(5) Global fixed income = 60% non-US developed market bonds, 40% core US fixed income
(6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt

Source: Callan LLC

Projection set customized to reflect specific NYSTRS strategies:

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

Current target projected return of 6.74% compounded over 20 years, at a risk (standard deviation) of 13.33%

- Recommend: shift 1% from international equity to private equity

Customized NYSTRS Capital Market Projections – 30-Year Time Horizon

NYSTRS Asset Allocation Model 2022-2051 - Target and Recommended Mix

Asset Class	Target Weight	Recommended	PROJECTED RETURN 30-Year Geometric Return	PROJECTED RISK Annualized Standard Deviation
Public Equity	**53.0%**	**52.0%**		
Broad US Equity (1)	33.0%	33.0%	7.60%	19.95%
Global Ex-US Equity (2)	16.0%	15.0%	7.80%	20.50%
Global Equity (3)	4.0%	4.0%	7.90%	18.25%
Private Market Equity	**19.0%**	**20.0%**		
Real Estate Equity (4)	11.0%	11.0%	7.45%	16.80%
Private Equity	8.0%	9.0%	8.90%	27.60%
Private Debt	**2.0%**	**2.0%**		
Private Debt	2.0%	2.0%	6.80%	14.60%
Fixed Income	**25.0%**	**25.0%**		
Core U.S. Fixed Income	16.0%	16.0%	3.50%	3.75%
Global Fixed Income (5)	2.0%	2.0%	2.95%	3.10%
Real Estate Debt (6)	6.0%	6.0%	4.70%	4.65%
High Yield	1.0%	1.0%	5.25%	10.75%
Cash Equivalents	**1.0%**	**1.0%**		
Cash Equivalents	1.0%	1.0%	2.15%	0.90%
Inflation			2.25%	1.50%
Total Fund	**100.0%**	**100.0%**		
Single-Period Arithmetic Return	7.92%	7.95%		
30-Year Geometric Return	**7.26%**	**7.28%**		
Annualized Standard Deviation	13.33%	13.39%		

(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 = 55% broad US, 45% global ex-US

(4) Real estate equity = 55% core real estate, 30% non-core real estate, 15% REITs

(5) Global fixed income = 60% non-US developed market bonds, 40% core US fixed income

(6) Real estate debt = 80% commercial mortgages/20% private mezzanine debt

Source: Callan LLC

Projection set customized to reflect specific NYSTRS strategies:

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

Current target projected return of 7.26% compounded over 30 years, at a risk (standard deviation) of 13.33%

- Recommend: shift 1% from international equity to private equity

Leeway Clause Impact for Current Versus Proposed Target

Source: NYSTRS

Estimated Leeway

Current Policy Target	Allocation	Estimated Leeway	Add 1% to Private Equity	Allocation	Estimated Leeway
Domestic Equity	33%	0.00%	Domestic Equity	33%	0.00%
International Equity	16%	6.00%	International Equity	15%	5.00%
Global Equity (1)	4%	1.80%	Global Equity (1)	4%	1.80%
Real Estate Equity (2)	11%	0.00%	Real Estate Equity (2)	11%	0.00%
Private Equity	8%	8.00%	Private Equity	9%	9.00%
	72%	15.80%		72%	15.80%
Domestic Fixed Income	16%	0.00%	Domestic Fixed Income	16%	0.00%
High Yield Bonds (3)	1%	1.00%	High Yield Bonds (3)	1%	1.00%
Global Bonds (4)	2%	1.10%	Global Bonds (4)	2%	1.10%
Real Estate Debt (2)	6%	0.00%	Real Estate Debt (2)	6%	0.00%
Private Debt	2%	2.00%	Private Debt	2%	2.00%
Cash Equivalents	1%	0.00%	Cash Equivalents	1%	0.00%
	28%	4.10%		28%	4.10%
	100%	19.90%		100%	19.90%
Other (5)		1.75%	Other (5)		1.75%
Leeway Assets (6)		21.65%	Leeway Assets (6)		21.65%
Available Leeway		3.35%	Available Leeway		3.35%

Notes:

(1) Assumes Global Equity is split 55% domestic 45% 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 68% of the Real Estate Equity asset class and 28% of the Real Estate Debt asset class contributing to the 10% limit based on actual amounts as of 12/31/2021.

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

(4) Assumes 55% of Global Bonds are foreign or below investment grade.

(5) Includes securities held 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 12/31/2021.

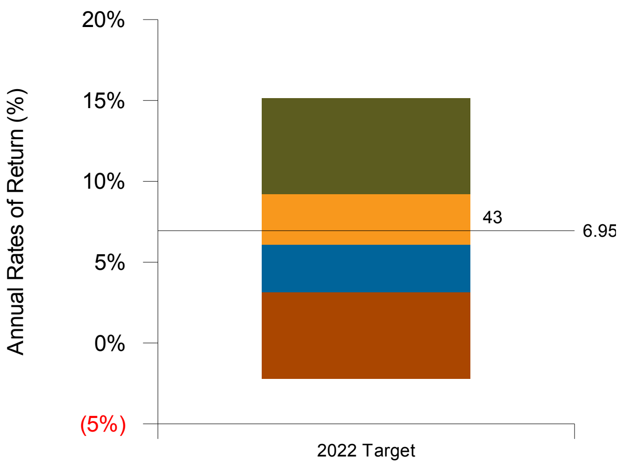
(6) Estimated Leeway percentages are based on assumptions and historical data, and are not intended to precisely predict future percentages. Actual Leeway was 20.87% as of 12/31/21.

Source: NYSTRS Office of the CFO/Investment Operations Department

Range of Projected Rates of Return vs. 6.95% Assumed Return

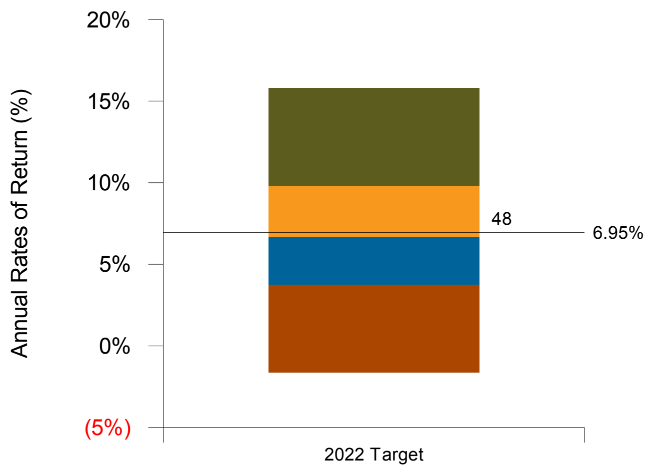
Probability of Exceeding 0% and 6.95% Over Ten, Twenty and Thirty Years

Range of Projected Rates of Return
Projection Period: 10 Years
Optimization Set: 2022 10-Year



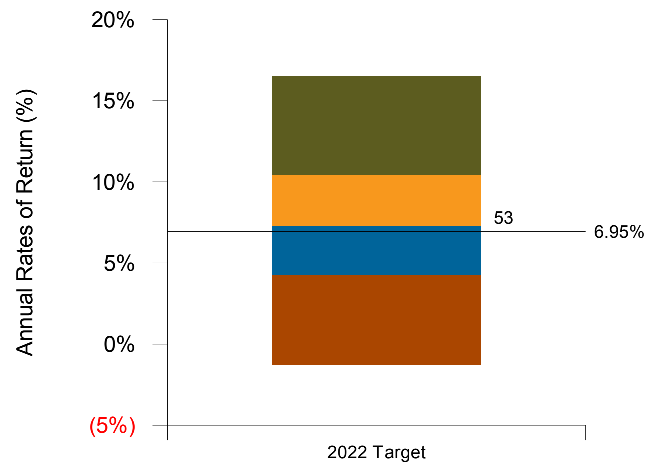
2.5th Percentile	15.1%
25th Percentile	9.2%
Median	6.1%
75th Percentile	3.1%
97.5th Percentile	(2.2%)
Prob > 6.95%	43%
Prob > 0%	92%

Range of Projected Rates of Return
Projection Period: 20 years
Optimization Set: 2022 20-Year



2.5th Percentile	15.8%
25th Percentile	9.8%
Median	6.7%
75th Percentile	3.7%
97.5th Percentile	(1.6%)
Prob > 6.95%	48%
Prob > 0%	94%

Range of Projected Rates of Return
Projection Period: 30 Years
Optimization Set: 2022 30-Year

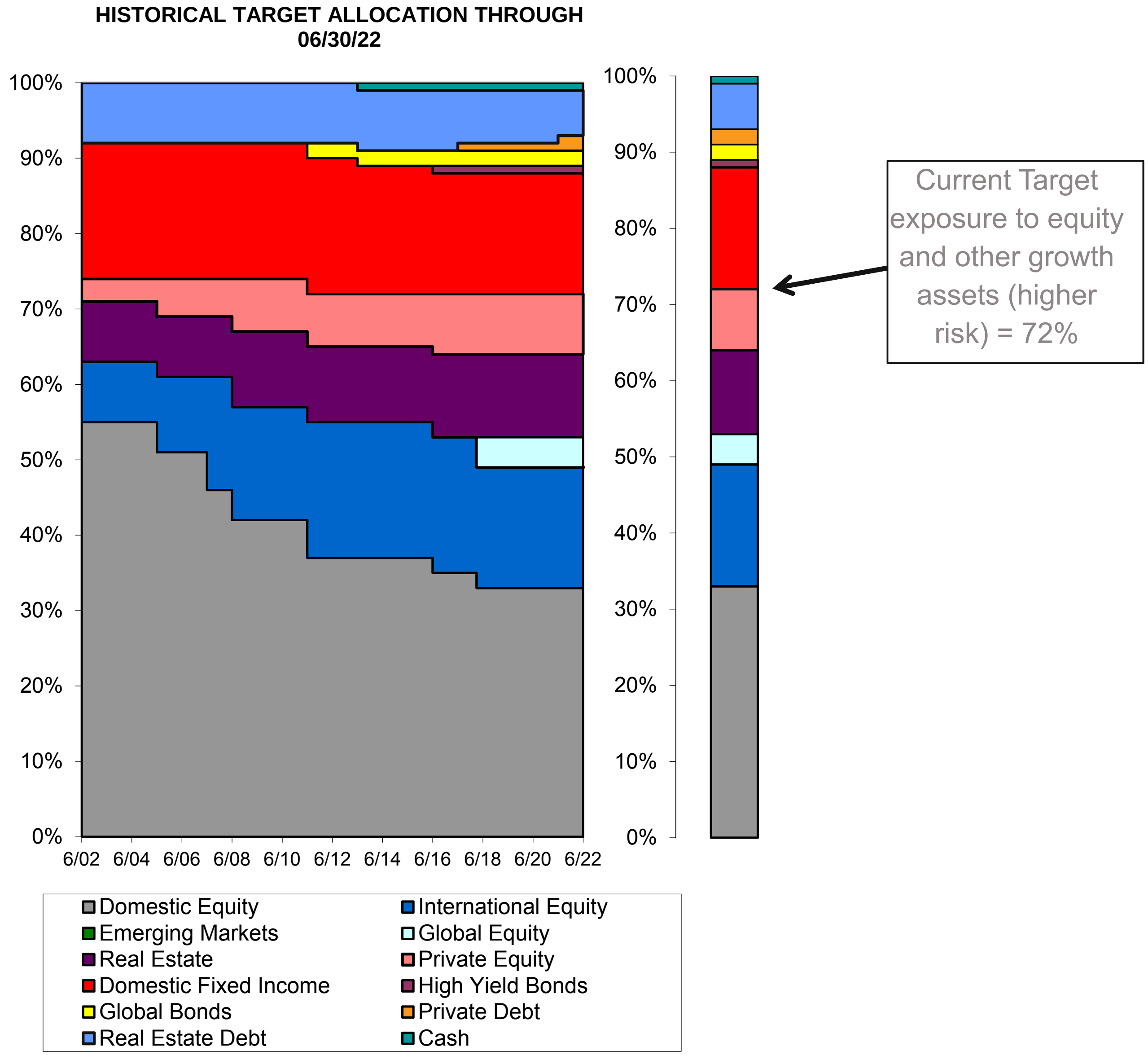


2.5th Percentile	16.5%
25th Percentile	10.4%
Median	7.3%
75th Percentile	4.3%
97.5th Percentile	(1.3%)
Prob > 6.95%	53%
Prob > 0%	95%

Source: Callan LLC

NYSTRS Asset Allocation Target Over Time

- NYSTRS' target asset allocation has evolved steadily over past twenty years
- Diversifying strategies have been added or increased, funded primarily from domestic equity
  - International equity
  - Private equity
  - Global equity
  - Global fixed income
  - Real estate
  - Private debt
  - High Yield bonds
- Current target equity allocation = 72%, illustrated by the line in the chart



Source: Office of the CFO/Investment Operations Department

Callan

Appendix: Callan Update

Callan Institute Events

Upcoming conferences, workshops, and webinars

Callan College

Intro to Alternatives

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with alternative investments like private equity, hedge funds, and real estate and how they can play a key role in any portfolio. In our "Callan College" on Alternatives, you will learn about the importance of allocations to alternatives, and how to consider integrating, evaluating, and monitoring them.

Join our next VIRTUAL session via Zoom (2 sessions, 3 hours each):
August 24-25, 2022

Intro to Investments—Learn the Fundamentals

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with basic investment theory, terminology, and practices.

Join our next VIRTUAL session via Zoom (3 sessions, 2–3 hours each):
September 20–22, 2022

Mark Your Calendar

2022 October Regional Workshops

October 18, 2022
Denver

October 20, 2022
San Francisco

Callan Institute's 2023 National Conference

April 2-4, 2023
Scottsdale, Arizona

Watch your email for further details and an invitation.

Webinars & Research Café Sessions

Market Intelligence

October 14, 2022 – 9:30am (PT)

Content Calendar—Callan Institute

4Q22 Webinar Topics:
- Market Intelligence
- Regional Workshop Recap
- ESG Survey
- Research Café (TBD)

1Q22 Webinar Topics:
- Capital Markets Assumptions
- Market Intelligence

3Q22 Webinar Topics:
- Market Intelligence
- Corporate DB Webinar
- Research Café (ESG)

2Q22 Webinar Topics:
- Market Intelligence
- Regional Workshop Recap
- Research Café: ESG Interview Series
- Pension Risk Transfer

Callan College | Conference / Workshop | Publication | Webinar | Research Café

Callan Updates

Firm updates by the numbers, as of June 30, 2022

Total Associates: ~200

Ownership

– 100% employees
– 67% of employees are equity owners
– 55% of shareholders identify as women or minority

Total General and Investment Consultants: more than 55

Total Specialty and Research Consultants: more than 80

Total CFA/CAIA/FRMs: more than 55

Total Institutional Investor Clients: more than 475

Assets Under Advisement: more than $4 trillion

Key Hires

– Craig Chaikin, SVP, Denver Consulting
– Emily Hylton, SVP, Atlanta Consulting
– Christina Mays, VP, Real Assets Consulting
– Nicole Wubbena, SVP, Global Manager Research

"Callan has been offering alternatives investment consulting services for more than 30 years. The demand for our services is greater than ever as institutional investors increase their allocations to alternative investments. As a result, we've been expanding our already robust research resources and capabilities to support them." — Pete Keliuotis, EVP, Callan's Alternatives Consulting Group

Disclaimers

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This report may consist of statements of opinion, which are made as of the date they are expressed and are not statements of fact.

Reference to or inclusion in this report of any product, service or entity should not be construed as a recommendation, approval, affiliation or endorsement of such product, service or entity by Callan.

Past performance is no guarantee of future results.

The statements made herein may include forward-looking statements regarding future results. The forward-looking statements herein: (i) are best estimations consistent with the information available as of the date hereof and (ii) involve known and unknown risks and uncertainties such that actual results may differ materially from these statements. There is no obligation to update or alter any forward-looking statement, whether as a result of new information, future events or otherwise. Undue reliance should not be placed on forward-looking statements.

Appendix G

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

Investment Committee Meeting August 3, 2022

COMMITTEE MEMBERS
N. Smirensky, Chair
Elizabeth Chetney, David Keefe, Jennifer Longtin, Ruth Mahoney, Christopher Morin

AGENDA p. 25

Approval of Minutes

A. Approval of Minutes of April 27, 2022 Investment Committee Meeting pp. 26-30

UPDATES

A. Investment Committee Executive Summary – M. Andriola pp. 31-37
B. Managing Director Updates
   1. Public Equities Update – P. Cummins p. 38
   2. Fixed Income Update – M. Federici p. 39
   3. Real Estate Update – D. Gillan pp. 40-41
   4. Private Equity/Debt Update – G. Yahoudy p. 42
C. Callan – Consultant Update pp. 43-56

PRESENTATIONS

A. Private Equity/Private Debt Annual Review - StepStone pp. 57-79
B. Fixed Income Manager Presentation (**motion for Executive Session**) pp. 80-145

INVESTMENT COMMITTEE ACTION REQUIRED

A. **Consent Agenda Recommendation Items 1 a-f** pp. 146-
   1. Renew Agreements
      a. Baillie Gifford Overseas Limited p. 146
      b. Global REIT Managers (AEW, Brookfield, DFA, Heitman) p. 147
      c. Prima Capital Advisors p. 148
      d. Leading Edge p. 149
      e. T. Rowe Associates, Inc. p. 150
      f. William Blair and Company p. 151
   2. Resolution on Nomura Corporate Research and Asset Mgt. Inc. 152
   3. Annual Review & ReAuthorization of Delegated Investment Authority
      a. Resolution on Investment Discretion p. 153
      b. Investment Discretion section of IPM pp. 154-159
   4. Resolution on Asset Allocation p. 160

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

Disability Review Committee Meeting

A meeting of the Disability Review Committee of the Retirement Board was held at the System on August 3, 2022. The meeting was called to order at 12:22 p.m. by Elizabeth Chetney, Chair.

The following individuals were in attendance:

Committee Members: Juliet Benaquisto, Elizabeth Chetney, Eric Iberger, David Keefe, Oliver Robinson

Board Members: Jennifer Longtin, Christopher Morin, Phyllis Harrington, Nicholas Smirensky

Upon motion of E. Iberger, seconded by O. Robinson and unanimously carried, the meeting minutes of April 27, 2022 were approved.

E. Chetney, Chair, reported that the System's Medical Board had met monthly over the prior three months and that a disability denial resolution and a disability rescission resolution would be brought to the Board at the Board meeting on August 3, 2022.

With unanimous consent, the Committee adjourned at 12:24 p.m.

Respectfully submitted,

[redacted]

Thomas K. Lee

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

Ethics Committee Meeting

A meeting of the Ethics Committee of the Retirement Board was held at the System on August 3, 2022. The meeting was called to order by Christopher Morin, Chair, at 12:24 p.m.

The following individuals were in attendance:

Committee Members: Juliet Benaquisto, Christopher Morin, Oliver Robinson, Thomas Lee, Don Ampansiri

Board Members: Elizabeth Chetney, Phyllis Harrington, Eric Iberger, David Keefe, Jennifer Longtin, Nicholas Smirensky

NYSTRS Staff: Matt Albano

Upon motion of O. Robinson seconded by J. Benaquisto, the minutes from the April 27, 2022 meeting were approved.

M. Albano gave an update on the conflicts of interest policy.

C. Morin asked the Committee if any discussion was needed on the EDCIO quarterly disclosures. The Committee agreed no further discussion was needed. There being no further business, the meeting unanimously adjourned at 12:25 p.m.

Respectfully submitted,

[redacted]

Thomas K. Lee

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

Executive Committee Meeting

A meeting of the Executive Committee of the Retirement Board of the New York State Teachers' Retirement System was held at the System on August 3, 2022.

The following individuals were in attendance:

Committee Members: Phyllis Harrington, David Keefe, Christopher Morin, Oliver Robinson

Board Members: Juliet Benaquisto, Elizabeth Chetney, Eric Iberger, Jennifer Longtin, Nicholas Smirensky

NYSTRS Staff: Thomas Lee, Don Ampansiri, Yiselle Ruoso

The meeting was called to order by D. Keefe, Chair, at 1:32 p.m. The following items were discussed:

1. Approval of minutes from April 27, 2022, May 18, 2022, June 9, 2022, June 17, 2022 meetings

   Upon motion of O. Robinson, seconded by P. Harrington and unanimously carried, the minutes of the April 27, 2022, May 18, 2022, June 9, 2022, June 17, 2022 meetings were approved.

2. Legislative Program

   D. Ampansiri and Y. Ruoso provided a review of the System's 2022 Legislative Program together with legislation of significant interest to the System and a look at the proposed 2023 Legislative Program (Appendix A). The 2023 Legislative Program will be presented for recommendation to the Committee and to the Board at the October 2022 meeting.

3. Signatory Authority

   A. The Committee reviewed the annual warrant report and updated signer's chart.

   B. Signatory Grids

      1. Updated Financial and Legal Document and Warrant Grids

The Committee reviewed updated financial and legal document and warrant signatory grids (Appendix B and C).

2. Resolution Identifying Financial and Legal Document Signatories

Upon motion of P. Harrington, seconded by O. Robinson and unanimously carried, the Committee voted to recommend the following resolution to the Board:

WHEREAS, The Retirement Board has by resolution amended and restated the resolution of January 27, 2022 entitled Delegation Resolution - Financial and Legal Document Execution, providing for the delegation by the Executive Director and Chief Investment Officer of the authority to approve and execute financial and legal documents to other employees of the Retirement System; and

WHEREAS, The Retirement Board has by resolution adopted at its regular meeting on October 26, 1995, amended and restated periodically thereafter, and most recently on January 27, 2022, identifying those employees of the Retirement System that have been delegated such authority; and

WHEREAS, It is necessary to periodically update said resolution by identifying those employees of the Retirement System to whom such authority may be delegated; now therefore be it

RESOLVED, That the employees authorized to approve and execute financial and legal documents of said resolution are identified by department, management level within the organization and by name in the attachment entitled Signatory Authorization Grid- Financial and Legal Documents (Appendix B); and be it

RESOLVED, the attachment entitled Signatory Authorization Grid- Financial and Legal Documents sets forth the approvals and signatures needed to approve and execute financial and legal documents; and be it

RESOLVED, That this authorization shall remain in effect for individuals who are promoted within their department; and be it

RESOLVED, That between regular meetings of the Retirement Board, the Executive Director and Chief Investment Officer shall have the authority to designate in writing any such additional employees as may be required by business necessity to serve on an interim basis until the next regular meeting of the Retirement Board; and be it

RESOLVED, That this delegation shall be reviewed by the Retirement Board no less than annually; and be it further

RESOLVED, That this resolution shall take effect August 3, 2022 and, upon taking effect, shall supersede the identifying resolution previously adopted by the Retirement Board on January 27, 2022

3. Resolution Identifying Warrant Signatories

Upon motion of O. Robinson, seconded by P. Harrington and unanimously carried, the Committee voted to recommend the following resolution to the Board:

WHEREAS, The Retirement Board has by resolution adopted at its regular meeting on October 26, 1995, amended and restated periodically thereafter, and most recently on January 27, 2022 and as further amended concurrent with this resolution, provided for the delegation by the Executive Director and Chief Investment Officer of the authority to execute warrants to other employees of the Retirement System; and

WHEREAS, It is necessary to implement said resolution by identifying those employees of the Retirement System to whom such authority may be delegated; be it

RESOLVED, That the signatories authorized to execute administrative, real estate investment, and fixed income, equity security and alternative investment warrants as provided in Parts II, III, IV, V and VI respectively of said resolution are identified by signatory group, organizational level within the organization and by name in the attached Signatory Authorization Grid (Appendix C) dated August 3, 2022; and be it further

RESOLVED, That this authorization shall remain in effect for individuals that are promoted within or move among the designated signatory groups, and be it further

RESOLVED, That, between regular meetings of the Retirement Board, the Executive Director and Chief Investment Officer shall have the authority to designate in writing any such additional “A”, “B”, “C”, “D”, “E”, “F”, and “G” signatories as may be required by business necessity to serve on an interim basis until the next regular meeting of the Retirement Board; and be it further

RESOLVED, That this delegation shall be reviewed by the Retirement Board no less than annually; and be it further

RESOLVED, That this resolution shall take effect August 3, 2022 and, upon taking effect, shall supersede the identifying resolution previously adopted on January 27, 2022.

4. Finance Report

The Committee members reviewed the Statement of Fiduciary Net Position, Statement of Changes in Fiduciary Net Position and Administrative Fund (Appendix D).

There being no further business, the Committee adjourned at 1:52 p.m.

Respectfully submitted,

[redacted]

Thomas K. Lee

Appendix A

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM
Memorandum

TO: Retirement Board

FROM: D. Ampansiri, Jr./Y. Ruoso/K. Vrbanac

RE: 2022 Legislative Update and 2023 First Look

DATE: July 26, 2022

CC: T. Lee

Annually at the summer meeting of the Retirement Board, staff provides a summary of legislation of significant interest for the Legislative Session ending in June of the current year and a first look at the System's Legislative Program for the following year.

Included with this memo are the following: the 2022 Legislation of Interest to NYSTRS chart, the NYSTRS 2022 Legislative Program grid, a recap of the two-year legislative cycle (2021 & 2022) and a first look at the 2023 Proposed Legislative Program.

2022 Legislative Session Data

- 1009 bills were approved by both the Senate and Assembly
- As of this writing, there are 476 chapters (bills enacted into law)

Proposed 2023 Program

As currently envisioned, NYSTRS 2023 Legislative Program will carry forward bills from the 2022 Legislative Program not acted on by the Legislature. Program bills 21-4 (Reinstates Transfer of Reserves) would be carried forward as program bill 23-1:

23-1 Reinstates the transfer of reserves for members transferring between public retirement systems with 10 or more years of credited service.

As of this writing, the following program bill has passed both houses and we are awaiting delivery to the Governor:

22-6 Allows retirees of the New York State Teachers' Retirement System who suspend retirement the option of a benefit recalculation after 2 years of service.

<u>2022 Legislation of Interest</u>

The 2022 Legislation of Interest to NYSTRS chart reflects bills which have either passed both houses of the Legislature and/or been signed into law. Since the last update at the April Board meeting, one to note is the following:

> **Chapter 234 of the Laws of 2022** – Extends provisions of Chapter 77 of the Laws of 2021 to grant public employees four hours of excused leave to receive the COVID-19 vaccination; extends this provision until December 31, 2023. **Signed by the Governor on June 28, 2022.**

The System continues to monitor legislation impacting the plan. Of note, the following two have passed both houses of the Legislature and are awaiting delivery to the Governor:

> **S8532A/ A9668A** ➡ This legislation amends Retirement and Social Security Law Section 177 to increase the percentage of assets which may be invested under the "basket clause" from 25% to 35%.
>
> **S6619B/A7730A** ➡ This legislation amends the Retirement and Social Security Law to change the age at which reductions to the ordinary death benefit commence for active members (NYSTRS and NYSLRS).
>
> Currently, the ordinary death benefit is reduced by four percent per year commencing at age 61. This bill would change the age at which reductions commence to age 62 for members with a date of membership prior to April 1, 2012 and to age 63 for members with a date of membership on or after April 1, 2012.
>
> The post-retirement death benefit for affected members, which is based on the ordinary death benefit, would be increased as well.

2022 LEGISLATION OF INTEREST TO NYSTRS

Senate No. Assembly No.	Subject	Introduced By

I. BUDGET

S8006C A9006C (Part HH)	Amends Retirement and Social Security Law to waive the income limitations and approval under Section 211, to allow a retiree to be employed and earn compensation in a position at a school district or BOCES without any impact on retirement status, suspension or diminution of their retirement allowance. Effective immediately (4/9/22) and expires on June 30, 2023. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)
S8006C A9006C (Part SS)	Amends Retirement and Social Security Law to permit the employee contribution rate for Tier 6 members to be calculated using a member's annual base wages for contributions to be made during FYs ending 6/30/23 and 6/30/24. Compensation earned for extracurricular programs, or any other pensionable earnings paid in addition to the annual base wages, will not be included in the employee contribution rate determination. Implementation date: school year July 1, 2022. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)
S8006C A9006C (Part TT)	Amends Retirement and Social Security Law to reduce the 10-year vesting requirement for Tier 5 and Tier 6 members to 5-year vesting for purposes of eligibility for a service retirement benefit or a deferred vested retirement benefit. Effective immediately. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)
S8006C A9006C (Part PP)	Amends Executive Law and Military Law to establish the veterans' services law and replaces the term "division" with "department of veterans' services"; makes technical changes to existing law. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)

S8006C A9006C (Part WW)	Amends Open Meetings Law to allow a public body, in their discretion, to use videoconferencing, regardless of declaration of emergency. Requires rules/resolution to be adopted by the public body. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)
S8006C A9006C (Part QQ)	Amends Executive Law to enact the "Ethics Commission Reform Act of 2022" to administer, enforce and interpret New York state's ethics and lobbying laws in government; amends the state Annual Disclosure form. Effective July 8, 2022. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 56 of the Laws of 2022]**	Budget Article VII (ELFA)
S8008C A9008C (Part R)	Amends Civil Rights Law to require all "state agencies" to update applicable forms and data systems to include a gender "X" option. Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 58 of the Laws of 2022]**	Budget Article VII (TED)

II. APPROPRIATIONS

S8715 A9766	Provides emergency appropriations to various State departments and agencies to allow certain payments due from April 1 to April 7, 2022 be made absent enactment of the Budget. **Governor Program #9** Last Action: 04/04/22 Passed Senate 04/04/22 Passed Assembly **04/04/22 Delivered to Governor** **04/04/22 Signed by the Governor** **[Chapter 174 of the Laws of 2022]**	Krueger Weinstein

III. AMENDMENTS TO THE RETIREMENT AND SOCIAL SECURITY LAW

S8532A A9668A	Amends Section 177 to increase the percentage of assets which may be invested in under the "basket clause" from 25% to 35%. This amendment is applicable to city and state public pension plans. Last Action: 05/23/22 Passed Senate 05/31/22 Passed Assembly 05/31/22 Returned to Senate	Jackson Abbate
S6619B A7730A	Changes the age at which reductions to the ordinary death benefit commence for active members (NYSTRS and NYSLRS). Currently, the ordinary death benefit is reduced by four percent per year commencing at age 61. This bill would change the age at which reductions commence to age 62 for members with a date of membership prior to April 1, 2012 and to age 63 for members with a date of membership on or after April 1, 2012. The post-retirement death benefit for affected members, which is based on the ordinary death benefit, would be increased as well. **Comptroller Program Bill #1** Last Action: 05/11/22 Passed Senate 05/23/22 Passed Assembly 05/23/22 Returned to Senate	Gounardes Abbate
S9294A A10416	Allows any participant in the World Trade Center rescue, recovery or cleanup operation, who was disabled between September 11, 2017 and September 11, 2021, to file an application with the Workers' Compensation Board for reconsideration before September 11, 2026. Last Action: 05/24/22 Passed Senate 05/24/22 Passed Assembly 05/24/22 Returned to Senate	Gounardes Niou
S9119 A10022	Provides accidental death benefits to the statutory beneficiaries of all public employees (state and local) who worked on or after March 1, 2020, contracted COVID-19 and dies of COVID-19 on or before December 31, 2024. Last Action: 06/02/22 Passed Senate 06/03/22 Passed Assembly 06/03/22 Returned to Senate	Gounardes Abbate
S6022B A5278B	Allows veterans with "qualifying conditions" which includes PTSD, traumatic brain injury, military sexual trauma and discharged LGBT veterans to receive credit for military service. Last Action: 06/01/22 Passed Assembly 06/02/22 Passed Senate 06/02/22 Returned to Assembly	Hoylman Barrett

IV. AMENDMENTS TO THE EDUCATION LAW

S4783A A6331A	Establishes the "Teachers' Fossil Fuel Divestment Act" requiring the NYSTRS Board to create an exclusion list of coal producers and oil and gas producers and provides timeframes for divesting any investments in companies included on the exclusion list; requires reporting to the legislature. Last Action: 01/05/22 Referred to CS 01/05/22 Referred to GE	Brisport Kelles

V. AMENDMENTS TO THE CIVIL SERVICE LAW

S8529 A9513	Extends provisions of Chapter 77 of the Laws of 2021 to grant public employees four hours of excused leave to receive the COVID-19 vaccination; extends until December 31, 2023. Last Action: 05/11/22 Passed Assembly 05/23/22 Passed Senate **06/22/22 Delivered to Governor** **06/28/22 Signed by the Governor** **[Chapter 234 of the Laws of 2022]**	Gounardes Fall
S907A A1871	Permits state employees up to four hours of excused leave without loss of pay to donate blood and permits employers to require proof of the donation. Last Action: 03/22/22 Passed Senate 05/03/22 Passed Assembly 05/03/22 Returned to Senate	Sanders Dinowitz
S8748 A9771	Implements the terms of a collective bargaining agreement for certain public employees (agency police service units) that was ratified by the membership for the period of April 1, 2019 to March 31, 2023 and the period of April 2, 2021 to April 1, 2023. NOTE: this did not impact the salary for the max salary death benefit calculation Last Action: 04/08/22 Passed Senate 04/08/22 Passed Assembly **04/09/22 Delivered to Governor** **04/09/22 Signed by the Governor** **[Chapter 60 of the Laws of 2022]**	Jackson Abbate

VI. PUBLIC OFFICERS LAW

S7623A A8591	Extended the current authorization for state and local government entities to meet remotely, as long as the public has the ability to view or listen, until the current declared state of emergency ends. Chapter 417 of 2021 expired Jan 15, 2022 and Chapter 1 extended the authority. Last Action: 01/11/22 Passed Assembly 01/11/12 Passed Senate **01/12/22 Delivered to Governor** **01/14/22 Signed by the Governor, Approval Memo 1** **[Chapter 1 of the Laws of 2022]**	Gaughran Thiele
S8464A A8934B	Updates outdated gender language that refers to the Governor as a "man" and corrects this reference by adding "their". Last Action: 05/05/22 Passed Assembly 05/23/22 Passed Senate 05/23/22 Returned to Assembly **07/11/22 Delivered to Governor** **07/21/22 Signed by the Governor** **[Chapter 408 of the Laws of 2022]**	Kaplan Sayegh
S190 A5469	Clarifies that the name of retirees receiving a public employees' retirement benefit are subject to disclosure under FOIL, while the name of any beneficiaries are not disclosable. Last Action: 03/22/22 Passed Assembly 05/17/22 Passed Senate 05/17/22 Returned to Assembly	Kaplan Englebright

VII. SECURITY

S7786 A8793	Amends State Technology Law to update certain definitions to be consistent with other statutes and clarifies notification and protocol of a breach or network security breach for certain state agencies. Last Action: 01/31/22 Passed Senate 01/31/22 Passed Assembly **02/24/22 Delivered to Governor** **02/24/22 Signed by the Governor** **[Chapter 107 of the Laws of 2022]**	Krueger Otis

VIII. OTHERS

S123A A5913A	Amends Executive Law to establish a statewide campaign for acceptance, inclusion, tolerance and understanding diversity. Effective April 1, 2023. Last Action: 03/30/22 Passed Assembly 03/31/22 Passed Senate 03/31/22 Returned to Assembly	Kaplan Lavine

S812B A2035B	Amends Executive Law to establish a toll free confidential hotline for complaints of workplace sexual harassment. Last Action: 03/01/22 Passed Assembly 03/07/22 Passed Senate **03/15/22 Delivered to Governor** **03/16/22 Signed by the Governor** **[Chapter 138 of the Laws of 2022]**	Biaggi Niou
S8288 A9277	Amends Executive Law to rename the office of the advocate for people with developmental disabilities to the chief disability officer and move the office from the Department of State to the Executive Chamber. Last Action: 02/28/22 Passed Senate 03/15/22 Passed Assembly **03/18/22 Delivered to Governor** **03/18/22 Signed by the Governor** **[Chapter 170 of the Laws of 2022]**	Skoufis Steck
S5870 A7101	Amends Executive law to prohibit employers from releasing employee personnel records as a retaliatory action against employees who file a complaint, civil or criminal action or judicial or administrative proceeding. Last Action: 03/01/22 Passed Senate 03/02/22 Passed Assembly **03/15/22 Delivered to Governor** **03/16/22 Signed by the Governor** **[Chapter 140 of the Laws of 2022]**	Gounardes Gonzales-Rojas
S9209 A10234	Amends General Obligations Law to clarify that a power of attorney executed by the principal on or after June 13, 2021, and signed by the agents of the principal at a later date, are valid and enforceable. Last Action: 06/01/22 Passed Senate 06/03/22 Passed Assembly 06/03/22 Returned to Senate	Hoylman Weinstein
S7780 A8691	Amends Executive Law to establish electronic notarization through the use of communication technology that will enable the notary public to meet with individuals to sign documents. The electronic notarization system is scheduled to be online January 31, 2023. Electronic notarization was allowed temporarily through Executive Order during the COVID-19 state of emergency. Last Action: 01/20/22 Passed Senate 02/07/22 Passed Assembly **02/24/22 Delivered to Governor** **02/24/22 Signed by the Governor** **[Chapter 104 of the Laws of 2022]**	Skoufis Rozic

NYSTRS 2022 LEGISLATIVE PROGRAM GRID

Subject	2021 Bill No.	Sponsor	Com. Ref.	Report 1st/2nd	3RD Rdg.	Passed	To Gov.	Gov.'s Action
22-4 Reinstates the transfer of reserves for members transferring between certain public retirement systems with 10 or more years of credited service. Cost - No Cost	S6537 (Not tracked as Same as bills) A10474	Reichlin-Melnick Abbate	1/05/22 CS 5/27/22 Rules	6/01/22 Rules				
22-6 Allows retirees of the New York State Teachers' Retirement System who suspend retirement the option of a benefit recalculation after 2 years of service. Cost - Negligible	S9296 A7184A	Ryan Burke	5/13/22 CS 1/05/22 GE	5/16/22 Rules 3/23/22 5/23/22 W&M 6/02/22 Rules 6/03/22 Rules	5/16/22 Cal.1405 6/03/22 Cal. 688	5/23/22 6/03/22		

July 26, 2022

Committees: GE = Assembly Governmental Employees;
CS = Senate Civil Service and Pensions

New York State Teachers' Retirement System
10 Corporate Woods Drive
Albany, New York 12211-2395
(800) 348-7298 or (518) 447-2900
NYSTRS.org

2021/2022 NYSTRS Legislative Recap

Bill Numbers	Subject	Program or Chapter Number	Cost
S6569 A6662	Increases the minimum retirement allowance for members of the New York State Teachers' Retirement System who retired prior to July 1, 1980.	**Chapter 541 of the Laws of 2021**	
S6512 A6663	Limits the maximum amount Tier 6 members joining the New York State Teachers' Retirement System on or after July 1, 2022 may borrow to 50% of the member's contributions or $50,000, whichever is less and makes technical corrections related thereto.	**Chapter 370 of the Laws of 2021**	
S6513 A7181	Allows the New York State Teachers' Retirement System to accept alternate methods of postal mail for the submittal of forms and applications.	**Chapter 329 of the Laws of 2021**	
S6537 A10474	Reinstates the transfer of reserves for members transferring between certain public retirement systems with 10 or more years of credited service.	22-4	No Cost
S6618 A7182	Affords the 10% death benefit to New York State Teachers' Retirement System members regardless of age in the third and subsequent year following retirement.	**Chapter 376 of the Laws of 2021**	
S9296 A7184A	Allows retirees of the New York State Teachers' Retirement System who suspend retirement and return to work the option of a benefit recalculation after 2 years of service.	**05/23/22 – Passed Senate 06/03/22 – Passed Assembly Cost – Negligible Pending Delivery to the Governor.**	

New York State Teachers' Retirement System
10 Corporate Woods Drive
Albany, New York 12211-2395
(800) 348-7298 or (518) 447-2900
NYSTRS.org

Proposed 2023 Legislative Program

Bill No.	Bill Purpose
23-1	Reinstates the transfer of reserves for members transferring between certain public retirement systems with 10 or more years of credited service.

New York State Teachers' Retirement System

Appendix B

Signatory Authorization Grid - Financial and Legal Documents

Effective as of August 3, 2022

		Designees	
Department	**Executive**	**Deputy / Managers / Counsel**	**Assistant Managers / Counsel**
Administration	Miriam Dixon	Rebecca Kannan Jason Freeman	Shana Gainey
Fixed Income	Michael Federici	Aaron Vanderwiel	Joseph Wood (1)
Information Technology	Michael Gregoire	Vijay Madala Mark Gallagher Sarah Garrand	N/A
Internal Audit	Kenneth Kasper	N/A	Bruce Woolley Lei Zhang
Member Relations	Edward Rezny	Michael Contento Beth Dellea Erica Mortimore Shannon Bonesteel Heidi Brennan Heidi Travis	Colleen Laven Andy Whitney Cori Bichteman Timothy Mack
Office of the Actuary	Richard Young	Melody Prangley	N/A
Office of the Chief Financial Officer	Margaret Andriola	Christopher O'Grady	Christopher Brown David Robertson Tedd Johnson
Office of the General Counsel	N/A	Don Ampansiri Ben Lee Yiselle Ruoso	Janet Graham Adam Kinney Morgan Anderson
Private Equity	Gerald Yahoudy	Brad Woolworth Nicholas Chladek	N/A
Public Equities	Paul Cummins	David Tessitore Nathan Lee	Jennifer Wilcox
Real Estate	David Gillan	Kevin Maloney Michael Morrell Jason Kearney Adrean Kreig	Andrew Bartell
Risk Management	N/A	Matthew Albano	Matthew Tice

(1) New/promoted manager. Becomes eligible upon completion of new manager review period.

Changes from Prior Grid

Department	Name	Comments
Additions:		
Office of the General Counsel	Morgan Anderson	Added as a signatory
Office of the CFO	Tedd Johnson	Added as a signatory
Deletions:		
Office of the CFO	Noreen Jones	Separated from employment
Office of the General Counsel	Joseph Indelicato	Separated from employment
Other:		
Office of the CFO	Margaret Andriola	Promoted to Chief Financial Officer
Office of the Actuary	Melody Prangley	Completed new manager review period
Real Estate	Adrean Kreig	Promoted to Manager of CRE Equity Investments
Real Estate	Jason Kearney	Promoted to Manager of CRE Debt Investments

Appendix C

New York State Teachers' Retirement System

Signatory Authorization Grid - Disbursement Warrants

Effective as of August 3, 2022

Signatory Group		Executive	Deputy / Managers / Counsel	Assistant Managers / Counsel	Other Professionals
A	All Types	Richard Young	Don Ampansiri Ben Lee Yiselle Ruoso Melody Prangley Matthew Albano	Janet Graham Adam Kinney Matthew Tice	N/A
Signatory Group		**Executive**	**Deputy / Managers**	**Assistant Managers**	**Other Professionals**
B	Real Estate	David Gillan	Kevin Maloney Michael Morrell Jason Kearney Adrean Kreig	Andrew Bartell	N/A
C	Fixed Income	Michael Federici	Aaron VanDerwiel	Joseph Wood (1)	Dawn Sherman Mark Wood Michael Wollner Christina Vasto Danielle Bondi (2)
D	Public Equities	Paul Cummins	David Tessitore Nathan Lee	Jennifer Wilcox	N/A
E	Private Equity	Gerald Yahoudy	Brad Woolworth Nicholas Chladek	N/A	N/A
F	Finance	Margaret Andriola	Christopher O'Grady	Tedd Johnson David Robertson Christopher Brown	N/A
G	Employee Payroll	Miriam Dixon	Rebecca Kannan	Shana Gainey	N/A

(1) New/promoted manager. Becomes eligible upon completion of new manager review period.

(2) New/promoted staff. Becomes eligible upon completion of probationary review period.

Changes from Prior Grid

Group	Name	Comments
Additions:		
A	Morgan Anderson	Added as a signatory
C	Christina Vasto	Hired as an Investment Officer
C	Danielle Bondi	Hired as an Investment Officer
Deletions:		
A	Joseph Indelicato	Separated from employment
C	James Bone	Separated from employment
C	Endurance Aku	Transferred to the Private Equity Department
F	Noreen Jones	Separated from employment
Other:		
A	Melody Prangley	Completed new manager review period
B	Adrean Kreig	Promoted to Manager of CRE Equity Investments
B	Jason Kearney	Promoted to Manager of CRE Debt Investments
C	Michael Wollner	Completed promoted employee review period
F	Margaret Andriola	Promoted to Chief Financial Officer

Signatory Group Authority

		Approver	Authorizer	
Type of Disbursement	**Warrant Type**	**Any Amount**	**Any Amount**	**Under Threshold***
Real Estate	B	B Group	A Group	B Group (Exec)
Fixed Income	C	C Group	A Group	C Group (Exec)
Public Equities	D	D Group	A Group	D Group (Exec)
Private Equity	E	E Group	A Group	E Group (Exec)
Finance	F	F Group	A Group	F Group
Employee Payroll	G	G Group	A Group	G Group (Exec)

***The threshold for authorizing warrants is $250,000**

Signatories cannot sign as approver and authorizer on the same warrant

NEW YORK STATE
TEACHERS' RETIREMENT SYSTEM

MEMORANDUM

Appendix D

TO: T. Lee

FROM: Office of the CFO / Finance Department

DATE: August 3, 2022

SUBJECT: Retirement Board Package

Attached are the System's annual financial statements and related schedules for the years ended June 30, 2022 and 2021.

The following is a list of the documents included:

1. Statements of Fiduciary Net Position (Unaudited)[1,2]
2. Statements of Changes in Fiduciary Net Position (Unaudited) [1,2]
3. Schedules of Income, Expenses and Changes in Fund Balance-Administrative Fund (Unaudited)

[1]Based on estimated 6/30/22 final quarter Real Estate and Private Equity values.
[2]Excludes current year amounts to be determined under GASB 68 for Net Pension Liability, Deferred In-flows of Resources, Deferred Out-flows of Resources, and Pension Expense.

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM
Statements of Fiduciary Net Position (Unaudited)
June 30, 2022 and 2021

Assets	**2022**	**2021**
Investments at fair value:		
Domestic equity	$ 41,961,629,092	$ 50,050,654,367
International equity	19,509,374,580	24,795,558,789
Global equity	4,218,622,930	5,097,104,581
Real estate equity [1]	16,254,443,374	14,844,614,740
Private equity [1]	14,626,286,052	14,783,218,541
Domestic fixed income	18,271,844,042	18,815,502,009
High-yield bonds	958,586,276	941,986,598
Global bonds	2,950,256,319	3,305,959,142
Real estate debt [1]	7,798,522,268	7,460,772,375
Private debt [1]	1,445,050,016	1,163,794,311
Cash equivalents	2,269,278,079	4,959,962,276
Total investments [1]	130,263,893,028	146,219,127,729
Receivables:		
Employer	1,668,377,024	1,581,828,057
Member	135,357,011	135,357,010
Investment income	291,344,466	264,854,424
Investment sales	157,375,348	319,989,166
Total receivables	2,252,453,849	2,302,028,657
Other assets:		
Securities lending collateral, invested	709,826,877	481,018,120
Member loans	232,474,760	236,943,584
Net investment in capital assets	20,722,456	22,962,299
Miscellaneous assets	11,232,853	18,348,506
Total other assets	974,256,946	759,272,509
Total assets [1]	133,490,603,823	149,280,428,895
Deferred outflows of resources:		
Changes in net OPEB liability	10,703,193	10,903,816
Changes in net pension liability [2]	21,766,822	21,766,822
Total deferred outflows of resources	32,470,015	32,670,638
Liabilities		
Securities lending collateral, due to borrowers	707,886,736	479,186,334
Investment purchases payable	278,471,685	450,377,457
Mortgage escrows and deposits, net of investments	12,895,063	6,755,136
Net OPEB liability	34,792,089	47,187,493
Other liabilities [2]	138,777,508	144,584,452
Total liabilities [2]	1,172,823,081	1,128,090,872
Deferred inflows of resources:		
Changes in net OPEB liability	13,229,678	4,276,117
Changes in net pension liability [2]	32,275,181	32,275,181
Total deferred inflows of resources	45,504,859	36,551,298
Net position restricted for pensions	**$ 132,304,745,898**	**$ 148,148,457,363**

[1] Based on estimated 6/30/22 final quarter Real Estate and Private Equity values

[2] Excludes current year amounts under GASB 68 for Net Pension Liability, Deferred In-Flows of Resources and Deferred Out-Flows of Resources.

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM
Statements of Changes in Fiduciary Net Position (Unaudited)

For the Years Ended June 30, 2022 and 2021

Additions:	**2022**	**2021**
Investment income:		
Net (depreciation) appreciation in fair value of investments [1]	$ (12,042,910,077)	$ 31,499,852,616
Interest	785,225,205	762,391,476
Dividends	1,442,148,917	1,306,812,592
Real estate, net operating income	525,001,378	416,859,947
Securities lending, gross earnings	4,006,442	3,455,670
Other (net)	10,969,283	17,061,309
	(9,275,558,852)	34,006,433,610
Less: Investment expenses	399,564,207	339,539,658
Securities lending:		
Broker rebates	(522,779)	(2,848,968)
Management fees	613,227	871,469
(Appreciation) depreciation on collateral	(108,355)	862,955
Net investment income [1]	(9,675,105,152)	33,668,008,496
Contributions:		
Employer	1,708,592,141	1,618,436,863
Member	158,958,136	159,874,222
Transfers	8,684,549	10,024,610
Total contributions	1,876,234,826	1,788,335,695
Net (deductions) additions [1]	(7,798,870,326)	35,456,344,191
Deductions:		
Retirement benefit payments, periodic	7,895,256,952	7,659,950,076
Beneficiary payments	66,612,636	57,571,222
Return of contributions	16,754,318	14,379,199
Administrative expenses [2]	66,217,233	55,491,711
Total deductions	8,044,841,139	7,787,392,208
Net (decrease) increase in net position [1]	(15,843,711,465)	27,668,951,983
Net position restricted for pensions, beginning of year	148,148,457,363	120,479,505,380
Net position restricted for pensions, end of year	**$ 132,304,745,898**	**$ 148,148,457,363**

[1] Based on estimated 6/30/22 final quarter Real Estate and Private Equity values

[2] Excludes current year amounts to be determined under GASB 68 for Pension Expense

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM
Administrative Fund
Schedules of Income, Expenses and Changes in Fund Balance (Unaudited)

Years Ended June 30, 2022 and 2021

	2022	2021	Increase (Decrease)
Administrative Income:			
Contributions from employers	$ 44,155,335	$ 44,145,659	$ 9,676
Allocation of investment income	24,027,527	24,124,447	(96,920)
Loan delinquency charges	25,918	24,950	968
Loan service charges	282,060	246,840	35,220
Other (net)	1,728	17,677	(15,949)
Total income	68,492,568	68,559,573	(67,005)
Administrative Expenses:			
Salaries and benefits:			
Salaries	36,037,941	35,141,172	896,769
Civil service	57,000	50,000	7,000
Employees' retirement	4,662,885	4,382,766	280,119
Health and dental insurance	6,018,703	6,418,421	(399,718)
OPEB contribution	6,000,000	6,261,000	(261,000)
Overtime salaries	28,337	12,207	16,130
Social Security	2,510,841	2,461,337	49,504
Total salaries and benefits	55,315,707	54,726,903	588,804
Building occupancy expenses:			
Building, grounds and equipment	1,814,893	1,680,176	134,717
Depreciation - building and improvement	1,950,407	1,995,584	(45,177)
Depreciation - equipment	146,168	188,708	(42,540)
Office supplies and expenses	163,931	113,710	50,221
Utilities and municipal assessments	1,126,525	910,821	215,704
Total building occupancy expenses	5,201,924	4,888,999	312,925
Computer expenses:			
Depreciation - computer micro	1,107,940	1,378,703	(270,763)
Computer hardware and software	4,027,120	4,349,573	(322,453)
Computer maintenance and supplies	43,860	64,631	(20,771)
Total computer expenses	5,178,920	5,792,907	(613,987)
Personnel and meeting expenses:			
Board - meetings, travel and education	72,132	28,132	44,000
Delegates' meeting	5,454	3,142	2,312
Pre-retirement seminars	(2,564)	370	(2,934)
Professional development	635,733	561,280	74,453
Travel	68,408	2,640	65,768
Other personnel expenses	116,034	64,916	51,118
Total personnel and meeting expenses	895,197	660,480	234,717

Professional and governmental services:	2022	2021	Increase (Decrease)
Auditors - financial	$ 482,396	$ 61,112	$ 421,284
Auditors - insurance department	—	138,904	(138,904)
Medical examinations	96,309	93,717	2,592
Postage	804,020	779,598	24,422
Professional fees and services	1,218,136	688,009	530,127
Publications	129,594	152,460	(22,866)
Statutory custodian charges	136,250	130,000	6,250
Total professional and governmental services	2,866,705	2,043,800	822,905
Total administrative expenses[1]	69,458,453	68,113,089	1,345,364
Net (decrease) increase	(965,885)	446,484	(1,412,369)
Administrative fund balance, beginning of year	62,806,523	62,360,039	446,484
Administrative fund balance, end of year	$ 61,840,638	$ 62,806,523	$ (965,885)

[1] Administrative expenses on the Statements of Changes in Fiduciary Net Position for the years ended June 30, 2022 and 2021 include a reconciliation of other postemployment contribution expense to OPEB expense and employees retirement contribution expense to pension expense for ($3,241,220) and ($12,621,378), respectively.

NEW YORK STATE
TEACHERS' RETIREMENT SYSTEM

A meeting of the Trustees of the New York State Teachers' Retirement System Retired Employee Health Benefits Trust was held at the System on August 3, 2022.

ATTENDANCE:

Present: Juliet Benaquisto, Elizabeth Chetney, Phyllis Harrington, Eric Iberger, David Keefe, Jennifer Longtin, Christopher Morin, Oliver Robinson, Nicholas Smirensky

NYSTRS staff: Thomas Lee, Don Ampansiri, Richard Young

The meeting was called to order by D. Keefe at 1:52 p.m.

1. Approval of Minutes of October 28, 2021

Upon motion of J. Longtin, seconded by O. Robertson and unanimously adopted by the Trustees, the minutes of the October 28, 2021 meeting were approved.

2. Report on Actuarially Determined Contribution for the Retired Employees Health Benefits Trust for the 2022-2023 Fiscal Year

The Trustees were provided with a copy of the report prepared by Cheiron (attached as Appendix A).

3. Resolution Authorizing the Contribution to the Retired Employees Health Benefits Trust for the 2022-2023 Fiscal Year

J. Longtin offered the following resolution, seconded by P. Harrington and unanimously carried by the Trustees:

WHEREAS, Governmental Accounting Standards Board ("GASB") Statements 74 and 75 have established certain standards for the reporting of the System's liabilities to provide health care benefits to its current and future retired employees and their eligible dependents;

WHEREAS, Said GASB Statements afford certain advantages to the reporting of such liabilities when such liabilities are pre-funded through a trust which satisfies the requirements for a trust under the GASB Statements; and

WHEREAS, The System established a Trust Agreement for the New York State Teachers' Retirement System Retired Employee Health Benefits Trust in November 2007, be it

RESOLVED, That the System's Executive Director and Chief Investment Officer or his designee, is authorized to deposit, or cause to be deposited, into such trust, a total of $6,394,396 in contributions for the 2022-2023 fiscal year.

4. Review of Trust Financial Statements

The Trustees reviewed financial statements and related supplemental schedule for the Trust for the period ending June 30, 2022 and 2021 (attached as Appendix B).

There being no further business, the meeting concluded at 1:54 p.m.

Respectfully submitted,

[redacted]

____

Thomas K. Lee

Classic Values, Innovative Advice

Appendix A

New York State Teachers' Retirement System

Other Postemployment Benefits (OPEB) for NYSTRS Staff Plan

Actuarially Determined Contribution, Funding Ratios, and Budget Projections for Fiscal Year July 1, 2022 through June 30, 2023

Produced by Cheiron

July 2022

Updated with June 30, 2022 Assets

Celebrating 20 years

TABLE OF CONTENTS

Letter of Transmittal

July 18, 2022

Mr. Richard Young, Actuary
New York State Teachers' Retirement System
10 Corporate Woods Drive
Albany, NY 12211-2395

Dear Richard:

The purpose of this letter is to determine the Actuarially Determined Contribution (ADC) from July 1, 2022 through June 30, 2023, associated funding ratios, and to provide projections of the ADC from July 1, 2023 through June 30, 2027 for the post-employment benefits provided by the New York State Teachers' Retirement System (NYSTRS). This letter is for the use of the NYSTRS in determining contributions in accordance with applicable law and accounting requirements.

In preparing our letter, we relied on information (some oral and some written) supplied by the Plan. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

Future actuarial measurements may differ significantly from the current measurements presented in this letter due to such factors as the following: plan experience differing from that anticipated by the assumptions, changes in assumptions, and changes in plan provisions or applicable law.

This report does not contain any adjustments for the potential impact of the COVID-19 pandemic. We anticipate the virus will impact both mortality and claims in the short term, as well as potentially other demographic experience. However, the net impact is not determinable at this time.

This letter and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this letter. This letter does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This letter was prepared for the NYSTRS for the purposes described herein for determining budgeted contributions. Other users of this letter are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron

Michele Domash, FSA, MAAA
Principal Consulting Actuary

Margaret A. Tempkin, FSA, EA, MAAA
Principal Consulting Actuary

SECTION I – ACTUARIALLY DETERMINED CONTRIBUTION

Actuarially Determined Contribution for Fiscal Year July 1, 2022 through June 30, 2023

Table I-1 below provides a summary of the key results used to determine the Actuarially Determined Contribution (ADC) for the Fiscal Year ending June 30, 2023, as well as the impact of contributing the ADC for fiscal year from July 1, 2022 through June 30, 2023.

The ADC consists of the normal cost of the Plan plus an amortization payment. The normal cost and actuarial liability was determined using the long-term funding rate of return. The annual amortization payment is determined as the unfunded liability amortized over a closed 30-year period from July 1, 2016, 24 years remaining as of June 30, 2022, calculated as a percentage of payroll.

Table I-1
New York State Teachers' Retirement System
Other Postemployment Benefits

Determination of ADC		
Discount Rate	**6.50%**	**6.50%**
Valuation Year	**June 30, 2021**	**June 30, 2022**
Actuarial Liability	$ 100,662,725	$ 106,354,619
Actual/Expected Assets	65,870,637	57,507,625
Actual Unfunded Actuarial Liability	$ 34,792,088	$ 48,846,994
Estimated Funded Ratio	65.4%	54.1%
Actuarially Determined Contribution (ADC)	**July 1, 2021 - June 30, 2022**	**July 1, 2022 - June 30, 2023**
Normal Cost adjusted for timing	$ 3,167,363	$ 3,483,944
Amortization of the unfunded actuarial liability adjusted for timing	2,172,493	2,910,452
Total Actuarially Determined Contribution (ADC)	$ 5,339,856	$ 6,394,396
Amortization Period for Unfunded Actuarial Liability	25	24
Budgeted Contributions for Fiscal Year Ending	$ 6,000,000	$ 6,394,396
Projected Funding Ratios at July 1, 2023		
Contribute ADC		$ 6,394,396
Projected Actuarial Liability		$ 111,875,161
Projected Assets (assuming 6.5% return)		62,484,218
Estimated Unfunded Actuarial Liability at July 1, 2023		$ 49,390,943
Estimated Funded Ratio		55.9%

SECTION I – ACTUARIALLY DETERMINED CONTRIBUTION

The liability as of July 1, 2022 reflects the same assumptions used in the valuation as of the June 30, 2021 measurement date. The census has been updated to reflect changes from June 30, 2020 to June 30, 2021. Table I-2 below details the impact of these changes.

Table I-2
New York State Teachers' Retirement System
Liability Change Review

	Actuarial Liability	Normal Cost	ADC
Expected Liability 7/1/2022 *- All assumptions exactly realized*	**$ 105,663,266**	**$ 3,233,077**	**$ 5,321,167**
Actual Liability 7/1/2022 *- Census updates and expected claims*	**$ 106,354,619**	**$ 3,483,944**	**$ 6,394,397**

Recommended Assumption Changes:

None

SECTION II – ASSET DEVELOPMENT

Table II-1 below provides the projection of the plan assets to June 30, 2023, reflecting actual June 30, 2022 assets, assumed contributions based on the June 30, 2023 budgeted contributions and expected benefit payments. Assets are assumed to have an annual expected return of 6.50% from June 30, 2022 to June 30, 2023. Projections are shown below in *italics*.

Table II-1
Reconciliation of OPEB Assets

Fiscal Year Ending	June 30, 2023	June 30, 2022	June 30, 2021
Additions			
Contributions received			
Employer	*$ 6,394,396*	$ 6,000,000	$ 6,261,000
Government reimbursements	*0*	0	0
Benefit recipient healthcare premiums	*0*	0	0
Total contributions	*$ 6,394,396*	$ 6,000,000	$ 6,261,000
Net investment income	*3,786,349*	(9,584,492)	14,534,551
Total Additions	*$ 10,180,746*	$ (3,584,492)	$ 20,795,551
Deductions			
Benefit Payments	*$ 5,149,153*	$ 4,834,885	$ 4,527,278
Administrative expense	*55,000*	(56,365)	19,915
Other	*0*	0	0
Total Deductions	*$ 5,204,153*	$ 4,778,520	$ 4,547,193
Net increase in net position	***$ 4,976,593***	**$ (8,363,012)**	**$ 16,248,358**
Net position restricted to OPEB			
Beginning of Year	$ 57,507,625	$ 65,870,637	$ 49,622,279
End of Year	*$ 62,484,218*	$ 57,507,625	$ 65,870,637

SECTION III – BUDGET PROJECTIONS

Projection Results

The following three tables provide projections of the actuarial liabilities, Actuarially Determined Contributions (ADC), and other results for the Fiscal Years Ending June 30, 2023 through June 30, 2028. As with all forecasts, actual results will vary from these estimates, based upon demographic experience and enrollment, actual yield on assets and actual program trends. Actual results will reflect actual census, actual claims experience, discount rate, and asset performance.

Table III–1 shows results based upon actual assets as of June 30, 2022. For June 30, 2022 to June 30, 2027, future assets are assumed to increase at the same discount rate as the liabilities, 6.50%.

The middle section of Table III–1 shows projected results based upon actual assets as of June 30, 2022, assuming that investment yields are 3.50% greater than the discount rate or 10.00% per annum.

The bottom section of Table III –1 shows projected results based upon actual assets as of June 30, 2022, assuming that investment yields are 2.50% less than the discount rate or 4.00% per annum.

Definition of ADC

The ADC consists of the normal cost of the Plan plus an amortization payment. The normal cost and actuarial liability were determined using the long-term funding rate of return. The annual amortization payment is determined as the unfunded liability amortized over a closed 30-year period from July 1, 2016, calculated as a percentage of payroll. The amortization period as of July 1, 2022 is 24 years. The amortization period is reduced one year each year with 19 years remaining as of July 1, 2027.

SECTION III – BUDGET PROJECTIONS

Table III-1
New York State Teachers' Retirement System
Other Postemployment Benefits

Determination of ADC - Constant Discount Rate						
Discount Rate for Liabilities	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Investment Return on Assets	-14.38%	6.50%	6.50%	6.50%	6.50%	6.50%
Valuation Year	**June 30, 2022**	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**
Actuarial Liability	$ 106,354,619	$ 111,875,161	$ 117,281,233	$ 122,868,152	$ 128,797,278	$ 134,775,358
Estimated Assets	57,507,625	62,484,218	67,096,092	71,920,052	76,861,751	82,031,982
Estimated Unfunded Actuarial Liability at July 1,	$ 48,846,994	$ 49,390,943	$ 50,185,141	$ 50,948,100	$ 51,935,527	$ 52,743,376
Funded Ratio	54.1%	55.9%	57.2%	58.5%	59.7%	60.9%
Actuarially Determined Contribution (ADC)	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**	**June 30, 2028**
Normal Cost	$ 3,483,944	$ 3,634,788	$ 3,773,370	$ 3,926,118	$ 4,095,600	$ 4,248,215
Amortization of the unfunded actuarial liability	2,910,452	3,026,480	3,168,214	3,320,284	3,501,610	3,687,858
Total Actuarially Determined Contribution as of June 30,	**$ 6,394,396**	**$ 6,661,268**	**$ 6,941,584**	**$ 7,246,402**	**$ 7,597,210**	**$ 7,936,073**
Determination of ADC - Higher Returns						
Discount Rate for Liabilities	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Investment Return on Assets	-14.38%	10.00%	10.00%	10.00%	10.00%	10.00%
Valuation Year	**June 30, 2022**	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**
Actuarial Liability	$ 106,354,619	$ 111,875,161	$ 117,281,233	$ 122,868,152	$ 128,797,278	$ 134,775,358
Estimated Assets	57,507,625	64,523,021	71,404,555	78,728,455	86,402,373	94,537,036
Estimated Unfunded Actuarial Liability at July 1,	$ 48,846,994	$ 47,352,140	$ 45,876,678	$ 44,139,697	$ 42,394,905	$ 40,238,322
Funded Ratio	54.1%	57.7%	60.9%	64.1%	67.1%	70.1%
Actuarially Determined Contribution (ADC)	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**	**June 30, 2028**
Normal Cost	$ 3,483,944	$ 3,634,788	$ 3,773,370	$ 3,926,118	$ 4,095,600	$ 4,248,215
Amortization of the unfunded actuarial liability	2,910,452	2,901,550	2,896,218	2,876,581	2,858,360	2,813,495
Total Actuarially Determined Contribution as of June 30,	**$ 6,394,396**	**$ 6,536,338**	**$ 6,669,588**	**$ 6,802,699**	**$ 6,953,960**	**$ 7,061,710**
Determination of ADC - Lower Returns						
Discount Rate for Liabilities	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Investment Return on Assets	-14.38%	4.00%	4.00%	4.00%	4.00%	4.00%
Valuation Year	**June 30, 2022**	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**
Actuarial Liability	$ 106,354,619	$ 111,875,161	$ 117,281,233	$ 122,868,152	$ 128,797,278	$ 134,775,358
Estimated Assets	57,507,625	61,027,930	64,102,650	67,316,223	70,579,293	74,008,231
Estimated Unfunded Actuarial Liability at July 1,	$ 48,846,994	$ 50,847,231	$ 53,178,583	$ 55,551,929	$ 58,217,985	$ 60,767,127
Funded Ratio	54.1%	54.6%	54.7%	54.8%	54.8%	54.9%
Actuarially Determined Contribution (ADC)	**June 30, 2023**	**June 30, 2024**	**June 30, 2025**	**June 30, 2026**	**June 30, 2027**	**June 30, 2028**
Normal Cost	$ 3,483,944	$ 3,634,788	$ 3,773,370	$ 3,926,118	$ 4,095,600	$ 4,248,215
Amortization of the unfunded actuarial liability	2,910,452	3,115,716	3,357,191	3,620,315	3,925,187	4,248,885
Total Actuarially Determined Contribution as of June 30,	**$ 6,394,396**	**$ 6,750,504**	**$ 7,130,561**	**$ 7,546,433**	**$ 8,020,787**	**$ 8,497,100**

APPENDIX A – MEMBERSHIP INFORMATION

Participant Member Data as of June 30, 2021:

Census Date	6/30/2020	6/30/2021	% Change
Active Employees:			
Count	351	374	6.55%
Average Age	46.1	46.2	0.28%
Average Service	11.3	10.9	-3.10%
Covered Payroll	$ 32,176,950	$ 34,391,448	6.88%
Inactives:			
Retirees*	281	283	0.71%
Average Age	69.0	69.4	0.55%
Surviving Spouses	19	16	-15.79%
Average Age	83.0	82.4	-0.68%
Spouses of Retirees	122	127	4.10%
Average Age	68.3	68.5	0.37%

*2 deferred retirement as of 6/30/2021 treated as "retired" for valuation purposes

Active Employee Data by Age and Service as of June 30, 2021:

Eligible Active Employees as of June 30, 2021 Years of Service										
Age Group	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total
Under 25	3	0	0	0	0	0	0	0	0	**3**
25 to 29	18	2	0	0	0	0	0	0	0	**20**
30 to 34	20	12	0	1	0	0	0	0	0	**33**
35 to 39	22	20	4	3	1	0	0	0	0	**50**
40 to 44	8	25	8	10	2	0	0	0	0	**53**
45 to 49	11	10	11	10	1	0	0	0	0	**43**
50 to 54	9	19	13	10	9	6	5	0	0	**71**
55 to 59	6	4	6	18	10	6	8	2	0	**60**
60 to 64	7	1	4	4	5	4	2	1	2	**30**
65 to 69	1	1	1	0	3	1	0	0	1	**8**
70 & up	1	0	0	1	0	0	0	0	1	**3**
Total	**106**	**94**	**47**	**57**	**31**	**17**	**15**	**3**	**4**	**374**

APPENDIX A – MEMBERSHIP INFORMATION

Retirees as of June 30, 2021			
Age Group	**Males**	**Females**	**Total**
Under 50	0	1	1
50 to 54	0	0	0
55 to 59	6	21	27
60 to 64	17	50	67
65 to 69	18	42	60
70 to 74	24	39	63
75 to 79	20	22	42
80 to 84	8	6	14
85 to 89	4	4	8
90 to 94	0	0	0
95 to 99	0	1	1
100 & Over	0	0	0
Under Age 65	**23**	**72**	**95**
Age 65 and Older	**74**	**114**	**188**
Total	**97**	**186**	**283**

Status Reconciliation				
	Active	**Retired**	**Surviving SP**	**Total**
Members on June 30, 2020	**351**	**281**	**19**	**651**
Deceased		(6)	(4)	(10)
Surviving Spouse Added			1	1
Added Records				0
Terminations	(5)			(5)
Retired Coverage Waived				0
Retired Coverage Deferred	(1)	1		0
Retired Elected Coverage	(8)	8		0
Newly Waived Coverage	(2)			(2)
Return to Work	1	(1)		0
Newly Elected Coverage	4			4
New Hires	34			34
Members on June 30, 2021	**374**	**283**	**16**	**673**

*Treated as "Retired" for valuation purposes

Distribution of Plan Coverage as of June 30, 2021			
Plan	**Single**	**Family**	**Total**
Empire Plan	191	231	422
CDPHP	74	128	202
MVP	13	17	30
Pre-85 Empire	0	0	0
Waived Medical	19	0	19
Total	297	376	**673**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Economic and Health Economic Assumptions

1. **Expected Return on Plan Assets:** 6.50% per annum consistent with the discount rate effective July 1, 2022

2. **Discount Rate:** 6.50% per annum effective July 1, 2021

3. **Health Cost Trends:** Health care trend assumptions used were developed using the Society of Actuaries (SOA) Long-Run Medical Cost Trend Model version 2020_b. The following assumptions were applied in this model as below:

Trend Assumption Inputs	
Variable	**Rate**
Rate of Inflation	2.60%
Rate of Growth in Real Income/GDP per capita 2029+	1.70%
Extra Trend due to Taste/Technology 2029+	1.10%
Expected Health Share of GDP 2029	20.0%
Health Share of GDP Resistance Point	25.0%
Year for Limiting Cost Growth to GDP Growth	2040

The SOA Long-Run Medical Cost Trend Model and its baseline projection are based on an econometric analysis of historical U.S. medical expenditures and the judgments of experts in the field. The long-run baseline projection and input variables have been developed under the guidance of the SOA Project Oversight Group. Sample medical trends are listed in the table below.

On the next page are the year-by-year trends applied for Non-Medicare and Medicare costs, Medicare Part B premiums and a blended trend. The blended trend reflects the portion of Medicare costs associated with health care claims versus Medicare Part B reimbursement.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Fiscal Year Ending June 30,	Non-Medicare Claims and Premium Trends	Medicare Claims and Premium Trends	Medicare Part B Premium Trends	Blended Medicare Claims and Premiums Trends
2022	7.40%	8.45%	3.50%	7.41%
2023	7.10%	8.10%	3.50%	7.13%
2024	6.80%	7.75%	3.50%	6.86%
2025	6.58%	7.37%	3.50%	6.56%
2026	6.36%	7.00%	3.50%	6.27%
2027	6.15%	6.62%	3.50%	5.96%
2028	5.93%	6.24%	3.50%	5.66%
2029	5.71%	5.87%	3.50%	5.37%
2030	5.49%	5.49%	3.50%	5.07%
2031	5.49%	5.49%	3.50%	5.07%
2032	5.11%	5.11%	3.50%	4.77%
2033	4.92%	4.92%	3.50%	4.62%
2034	4.80%	4.80%	3.50%	4.53%
2035	4.73%	4.73%	3.50%	4.47%
2036	4.67%	4.67%	3.50%	4.42%
2037	4.63%	4.63%	3.50%	4.39%
2038	4.60%	4.60%	3.50%	4.37%
2039	4.57%	4.57%	3.50%	4.35%
2040	4.46%	4.46%	3.50%	4.26%
2041+	4.34%	4.34%	3.50%	4.16%

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

4. **Retiree Premiums:** No retiree premiums are required to enroll in coverage for those who retired before July 1, 1985. For those eligible retirees who retire on or after July 1, 1985, retirees pay a premium equal to the percentage dictated in the following rate schedule of the medical premium paid by the System for the Empire Plan and 10% of the vision plan premiums, subject to a maximum contribution cap less the value of any amortized banked sick days.

Effective Period	Contribution Percentage
January 1, 2020 to December 31, 2023	14%
January 1, 2024 and after	15%

In addition, if a retiree opts to enroll in a plan other than Empire, 100% of the excess if any, of premium over the Empire Plan premium is paid by the retiree.

After a 3-month extended coverage period, surviving spouses: pay 25% of the premium cost if the retiree had 10 or more years of service, otherwise the surviving spouse pays the full premium cost.

The fully insured premiums paid to NYSHIP are blended for actives, non-Medicare retirees and Medicare retirees. Such premiums include medical benefits, prescription drugs, vision, and Part B Medicare premium reimbursement (page 19 for Medicare Part B amounts).

	Effective 1/1/2021		Effective 1/1/2022	
Plan	Single Coverage	Family Coverage	Single Coverage	Family Coverage
Empire Plan	$10,058.64	$24,862.56	$11,056.56	$27,361.80
CDPHP	$9,511.32	$23,212.80	$9,808.20	$23,922.12
MVP	$9,448.56	$21,736.08	$9,682.32	$22,240.08
Vision	$114.12	$249.96	$202.80	$459.24

5. **Annual Maximums:** Retiree contributions are subject to an annual maximum that varies based upon salary at retirement. The maximums below are effective January 1, 2020. Each subsequent year, the annual maximum will cumulatively increase based on the amounts shown in the table below.

Salary	Annual Maximum	Annual Maximum Increases
Up to $40,000	$2,250	$300
$40,001 - $60,000	$2,550	$400
$60,001 - $90,000	$2,925	$550
$90,001 and above	$3,225	$600

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

6. **Maximum Retiree Contributions:** The annual retiree contribution maximum based on salary at retirement is assumed to increase $100 per year after 2025.

7. **Banked Sick Pay Credit:** Retirements after April 1, 1991 are eligible to have unused sick leave converted into a credit to offset retiree premiums otherwise owed to enroll in the health plan. Sick Leave Credit = (Daily Pay x Sick Leave)/Life Expectancy. For the valuation, participants are assumed to accrue 4.74 days of unused sick days per year. Upon retirement, all employees are assumed to use 100% of sick pay credit.

   Sick Leave is subject to the following maximums.

   Non-Management Employees:

Effective Period	Sick Leave Maximum
April 1, 1991 to January 7, 2004	165 Days
January 8, 2004 to December 31, 2020	185 Days
January 1, 2021 and after	200 Days

   Management Employees are subject to a sick leave maximum of 165 days. Effective January 1, 2021, the maximum for Management Employees increased to 200 Days.

8. **Life Expectancy:** Expected future lifetime based on mortality table calculated in months determined at retirement age. Calculations prior to December 31, 2020 are based on the 1983 Life Expectancy Table. Effective January 1, 2021, the calculation will be based on the 1999 Life Expectancy Table. Effective January 1, 2024, the calculation will be based on the most current life expectancy factors available as of that date. Samples of the Life Expectancy Months calculated are shown in the table below.

	Life Expectancy Tables		
Age	1983	1999	2015
45	342	446	480
50	308	389	424
55	271	337	371
60	232	288	321
65	192	241	273
70	154	197	226
75	119	155	181
80	89	119	140

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Demographic Assumptions

1. **Rates of Retirement:**

Age	Rate (%)	Previous Rate (%)
Under 45	0.00	0.00
45 to 54	0.25	0.25
55	20.00	20.00
56	14.00	20.00
57	15.00	15.00
58	16.00	15.00
59	17.00	15.00
60	20.00	20.00
61	25.00	10.00
62	30.00	25.00
63	40.00	25.00
64	25.00	20.00
65	20.00	20.00
66 to 69	10.00	10.00
70+	100.00	100.00

2. **Rates of Withdrawal:**

Years of Service	Rate (%)	Previous Rate (%)
0	15.00	14.0
1	12.00	13.6
2	9.00	9.7
3	8.00	7.8
4	7.00	6.2
5	6.00	4.3
6	5.00	4.1
7	4.75	4.0
8	4.50	3.9
9	4.25	3.8
10	3.75	1.7
11	3.25	1.7
12	2.75	1.6
13	2.25	1.6
14	1.75	1.5
15+	1.00	1.0

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

3. **Rates of Mortality:**

   Pre-Retirement Mortality: The Pub-2010 General Employee Headcount-Weighted Mortality table [PubG.H-2010 Employee] as published by the Society of Actuaries with an 98.75% adjustment for both males and females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2020. All pre-retirement deaths are assumed ordinary deaths.

   Healthy Retirees (Healthy Annuitants): The Pub-2010 General Healthy Retiree Headcount-Weighted Mortality table [PubG.H-2010 Healthy Retiree] as published by the Society of Actuaries with a 98.75% adjustment for both males and females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2020.

   Beneficiaries (Healthy Annuitants): Pub-2010 General Contingent Survivors Headcount-Weighted Mortality [PubG.H-2010 Contingent Survivors] as published by the Society of Actuaries with a 98.75% adjustment for both males and females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2020.

   Disabled Retirees (Disabled Annuitants): The Pub-2010 General Disabled Retiree Headcount-Weighted Mortality table [PubG.H-2010 Disabled Retiree] as published by the Society of Actuaries with a 98.75% adjustment for both males and females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2020.

4. **Rate of Disability:** No disability was assumed.

5. **Rate of Payroll Increase:** 3.00% per annum

6. **Salary Increase Rate:**

Years of Service	Rate (%)	Years of Service	Rate (%)	Years of Service	Rate (%)
0	8.00	7	4.10	13	3.50
1	8.00	8	4.00	14	3.40
2	7.00	9	3.90	15	3.30
3	6.00	10	3.80	16	3.20
4	5.00	11	3.70	17	3.10
5	4.50	12	3.60	18+	3.00
6	4.20				

7. **Participation and Coverage Election:** 100% of future eligible service retirees were assumed to elect coverage. 0% of future inactive vested retirees were assumed to retain eligibility for and elect coverage.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

8. **Dependents:** Demographic data was provided for spouses of current retirees. Of those future retirees who elect to continue their health coverage at retirement, 70% of males, and 40% of females were assumed to have an eligible spouse who also opts for health coverage at that time. For future retirees, male retirees are assumed to be two years older than their female spouses. For future retirees, female retirees are assumed to be two years younger than their male spouses. 75% of surviving spouses of actives with 10 or more years of service and 0% of surviving spouses with less than 10 years of service were assumed to elect coverage.

9. **Rationale for Demographic and Economic Assumptions:** The actuarial assumptions for the New York State Teachers' Retirement System are the same assumptions that were used for the valuation dated June 30, 2021, which were reviewed and considered reasonable, except for those changes listed below.

10. **Changes Since Last Valuation:**

    None

11. **Disclosures Regarding Models Used:**

    a. **Valuation Software**

       Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate the liabilities, normal costs, and projected benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have a basic understanding of it and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of ProVal that would affect this actuarial valuation.

    b. **SOA Long-Run Medical Cost Trend Model**

       The SOA Long-Run Medical Cost Trend Model and its baseline projection are based on an econometric analysis of historical U.S. medical expenditures and the judgments of experts in the field. The long-run baseline projection and input variables have been developed under the guidance of the SOA Project Oversight Group.

       The trends selected from 2020 to 2023 were based on short-term expectations for medical cost increases based on current market conditions.

       We have reviewed the baseline assumptions for the model and found them to be reasonable and consistent with the other economic assumptions used in the valuation, except we are limiting medical costs to the rate of growth in GDP after the year 2040.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

We have relied on the Society of Actuaries as the developer of the Model. We have reviewed the Model and have a basic understanding of the Model and have used the Model in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of the Model that would affect this report.

12. **Determination of Discount Rate:** In the table below, we reflect Horizon's Survey of Capital Market Assumptions 2021 Edition as one recognized benchmark of the long-term returns and utilize those in the determination of the weighted average arithmetic yield amounts.

OPEB Trust Asset Allocation	Weight	20 Year - Arithmetic	Standard Deviation
US Equity - Large Cap	37.50%	7.96%	16.42%
US Equity - Small/Mid Cap	12.50%	9.01%	20.17%
Non-US Equity - Developed	21.25%	8.79%	18.32%
Non-US Equity - Emerging	3.75%	10.78%	24.33%
US Corporate Bonds - Core	7.50%	3.38%	5.52%
US Treasuries (Cash Equivalents)	17.50%	1.91%	1.30%
	100.00%	6.97%	12.71%
Weighted Average Geometric		**6.22%**	
Selected Long-Term Return		**6.50%**	

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Claim and Expense Assumptions

Medical, prescription drug, Medicare Part B reimbursement and vision costs for the year beginning July 1, 2021 are shown in the table below for retirees and spouses at selected ages. These costs are net of deductibles and other benefit plan cost-sharing provisions. These claims are derived from actual blended premiums and allocated using Cheiron's aging factors to each age and by gender. No aging factors were applied to the Medicare Part B premium reimbursement when developing these rates. The below claim curves were trended forward to 7/1/2022 – 6/30/2023 using the trend factors listed above on page 10.

Average Claim and Expense Assumptions:

For Fiscal Year 7/1/2021 - 6/30/2022:

Age	Male	Female
40	$6,966	$11,564
45	$9,156	$12,343
50	$11,902	$14,292
55	$15,204	$17,321
60	$19,063	$20,328
64	$22,551	$21,109
65	$7,509	$7,259
70	$8,365	$7,658
75	$8,748	$7,959
80	$8,865	$8,150
85	$8,872	$8,233

The following benefit changes are effective 1/1/2022 for the NYSHIP plans, which were determined to be immaterial to the assumed claim costs:

- Empire Plan:
    - Out-of-Pocket Maximum for medical expenses increased from $5,500/$11,100 to $5,650/$11,300.
    - Out-of-Pocket Maximum for Rx expenses increased from $3,000/$6,000 to $3,050/$6,100.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Methodology

The actuarial valuation is conducted using the one-year look-back with the measurement date being one year prior to the end of the applicable fiscal year. Census and claims data are gathered as of June 30, 2021, which are used in the actuarial valuation performed as of July 1, 2021 with results rolled forward to June 30, 2022. We have determined that the use of such data in this manner does not materially affect the results.

The Entry Age Actuarial Cost Method was used to value the Plan's actuarial liabilities and to set the normal cost. Under this method, the normal cost rate is the percentage of pay contribution which would be sufficient to fund the Plan benefits if it were paid from each member's entry into the Plan until termination or retirement. The unfunded liability is amortized over a closed 30-year period as of July 1, 2016. There are 24 years remaining as of July 1, 2022. The amortization method is a level percentage of pay.

The medical, pharmacy, and vision claims and expenses costs for fiscal year ending 2021 were developed using the average of NYSTRS premium rates for the calendar year 2020 and calendar year 2021. From this data, we developed per person per month (PPPM) costs for actives and retiree non-Medicare Eligible (NME), and for retiree Medicare Eligible (ME). We then adjusted those using Cheiron's age curves. Medical and pharmacy claims and expenses costs include a 19.0% load for anticipated children of pre-Medicare retirees. Medicare-eligible program costs valued include medical, pharmacy and associated administrative costs, plus Medicare Part B premium reimbursements (at $148.50 per month in 2021) provided under the Plan.

The Plan is assumed to be in compliance with the Patient Protection and Affordability Care Act (PPACA) and the Health Care and Education Reconciliation Act (HCERA) of 2010 as of the valuation date.

Actuarial Value of Assets

The actuarial value of assets is set equal to the market value of assets.

Changes Since Last Valuation

None

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Eligibility:

A retiree is eligible for retiree health benefits only if all of the following requirements are met:

1. Must have worked for at least 10 years for the System,
2. Retired directly from System employment, and
3. Commence receipt of a pension from the New York State and Local Employees' Retirement System (ERS).

In order to maintain benefits coverage, eligible retirees enroll in the Plan and pay monthly premiums owed.

Spouses Covered: Surviving spouses of active employees are eligible to continue to enroll in the Plan if the retiree had 10 or more years of service at the time of death. Eligible spouses continue coverage by paying 25% of the cost of coverage in premiums. Also, in the event of the death of a retiree, surviving spouses are eligible to continue to enroll in the Plan by paying 25% of the cost of coverage in premiums.

Benefits Covered:

The retiree health plan offered to eligible employees of the New York State Teachers' Retirement System includes medical, prescription drugs, vision, and Medicare Part B reimbursement. Eligible retirees can elect coverage for themselves, their spouses, and dependent children.

Medical and Prescription Drug Benefits:

Each of the plans offered includes medical coverage (inpatient facility, outpatient facility, physician and surgeon services, and other related care) and prescription drug benefits. We include a side-by-side comparison of key coverage. Upon reaching eligibility for Medicare (generally at age 65), the Plan coordinates with Medicare being primary before the Plan pays benefits.

Dental Benefits:

None offered

Vision Benefits:

Included

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Medicare Part B Reimbursement:

Medicare Part B premiums are reimbursed by the State and are included in the blended premiums charged by the State. The standard 2021 Medicare Part B premiums are $148.50 per month per Medicare beneficiary covered. Higher premiums apply for those retirees having a gross income of $88,000 per individual or $176,000 for a married couple. In 2021, individuals with income between $88,000 to $111,000 or married couples with income between $176,000 to $222,000, the Part B monthly premium amount would be the Standard premium + $59.40 = $207.90 per month. The standard 2022 Medicare Part B premiums are $170.10 per month per Medicare beneficiary covered. Higher premiums apply for those retirees having a gross income of $91,000 per individual or $182,000 for a married couple. In 2022, individuals with income between $91,000 to $114,000 or married couples with income between $182,000 to $228,000, the Part B monthly premium amount would be the Standard premium + $68.00 = $238.10 per month.

Premiums to Enroll in Coverage:

No retiree premiums apply for those retirees who retired before July 1, 1985, and who enroll in the Plan.

For retirements on or after July 1, 1985:

- Non-Medicare and Medicare retirees pay the same amount.
- Retirees contribute an amount equal to the percentage dictated in the following rate schedule of the medical premium paid by the System, subject to a maximum retiree contribution related to pay at retirement. Retirees pay 10% of the vision plan premium.

Effective Period	Contribution Percentage
January 1, 2020 to December 31, 2023	14%
January 1, 2024 and After	15%

- If a retiree chooses a plan other than the Empire Plan, 100% of the excess if any, of any premium over the Empire Plan premium.
- Sick time conversion* is used to offset premiums otherwise owed by retirees.
- Retirees with a deferred vested benefit pay 50% of the premium cost for single coverage and 65% of the premium cost for family coverage.
- After a 3-month extended coverage period, surviving spouses: pay 25% of the premium cost if the employee had 10 or more years of service, otherwise, the surviving spouse pays the full premium cost.

* For retirements on or after April 1, 1991, retirees are eligible to have unused sick leave converted into a credit to offset retiree premiums otherwise owed to enroll in the retiree health plan. Sick Leave Credit is determined as daily pay times the number of sick leave days, divided by life expectancy. Daily Pay is defined as the daily rate of pay at retirement. Sick Leave Days are the number of unused sick leave at retirement. Life Expectancy is determined in months at retirement using factors established by the Plan.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

New York State Teachers' Retirement System					
Plan:	**Empire Plan PPO**	**CDPHP HMO**	**BlueShield of Northeastern NY**	**EmblemHealth HMO**	**MVP HMO**
In-Network (INN) Benefits					
Deductible (Ded) (Individual/Family)	$0 / $0	$0 / $0	$0 / $0	$0 / $0	$0 / $0
Coinsurance maximum (Individual/Family)	$3,750 / $3,750 (combined with OON)	0%	0%	0%	0%
Out-of-Pocket Max (Individual/Family)	$3,000 / $6,000 (Rx) $5,550 / $11,100 (Medical)	$8,550 / $17,100	$3,000 / $6,000	$6,850 / $13,700	$6,350 / $12,700
Preventive Care	No Charge	No Charge	No Charge	No Charge	No Charge
Office Visit (OV) - Primary Care (PCP)	$25 Copay	$20 Copay	$10 Copay	$5 Copay/ no charge for dep child visit	$25 Copay/$10 for dep child visit (up to age 26 yrs)
OV - Specialist Care Provider (SCP)	$25 Copay	$20 Copay	$18 Copay	$10 Copay/ no charge for dep child visit	$25 Copay
Hospital Emergency Room (ER)	$100 copay	$50 Copay	$100 Copay	$75 Copay	$75 Copay
Outpatient Surgery	Total fees: $25 Copay/office surgery; $95 Copay/outpatient surgery (for hospital, office, or facility)	Hospital or Outpatient Surgery Facility fees: $75 Copay/visit Physician fee: $20 Copay/visit	Hospital or Outpatient Surgery Facility fees: $100 Copay/visit Physician fee: $18 Copay/visit	Facility fees: No charge Physician fee: $5 Copay/PCP visit and $10 Copay/specialist visit	Hospital or Outpatient Surgery Facility fees: $25 Copay/visit Physician fee: $25 Copay/PCP visit and $25 Copay/specialist visit
Hospital Inpatient	No charge for facility or for Physician	No charge for facility or for Physician	No charge for facility or for Physician	No charge for facility or for Physician	No charge for facility or for Physician
Out-of-Network (OON) Benefits					
Deductible (Individual/Family)	$1,250 / $1,250	Not covered	Not covered	Not covered	Not covered
Coinsurance	Inpatient: 10% Outpatient: Greater of 10% or $75 copay	Not covered	Not covered	Not covered	Not covered
Coinsurance maximum (Individual/Family)	$3,750 / $3,750 (combined with OON)	Not covered	Not covered	Not covered	Not covered
Office Visits (PCP) & (SCP)	20% Coin	Not covered	Not covered	Not covered	Not covered
Prescription Drugs					
Deductible (Rx Only) (Individual/Family)	$3,000 / $6,000 (does not apply to Empire Plan Medicare Rx)				
Out-of-Pocket Max (INN Rx Only) (Individual/Family)	$2,850 / $5,700				
Retail (1-30 Days) - Generic/Formulary /Non-Form. Copay	$5 / $30 / $60	$5 / $30 / $50	$5 / $30 / $60	$5 / $20 / Not Covered	$0 / $30 / $50
Network Pharmacy (31-90 Days) - Generic/Formulary /Non-Form. Copay	$10 / $60 / $120				
Mail Order (31-90 Days) - Generic/Form. /Non-Form. Copay	$5 / $55 / $110	$10 / $60 / $100	$12.50 / $75 / $150	$7.50 / $30 / Not Covered	$0 / $75 / $125
Specialty - Generic/Formulary /Non-Form. Copay	Variable	Variable	Variable	Variable	Retail covered - $0 / $30 / $50
Selected INN Detail Benefits					
Skilled Nursing Care	No charge	No charge	No charge	No charge	No charge
Advanced Imaging (CT, MRI, PET)	$25 Copay/office visit	$20 Copay/visit	$18 Copay/visit	No charge	Office - $25 Copay/procedure; Facility - $25 Copay/procedure;
Rehabilitation services	$25 Copay/visit	No charge for inpatient	No charge for inpatient (45 day limit)	No charge for inpatient (30 day annual limit combined therapies)	Inpatient: No charge for inpatient (2 month limit per condition)
Home Health	No charge	No charge	No charge	No charge	$25 Copay/visit
Ambulance	$70 Copay	$50 Copay	$100 Copay	No charge	$50 Copay
DME	No charge	20% Coin	50% Coin	No charge	50% Coin

APPENDIX D – GLOSSARY OF TERMS

1. Actuarially Determined Contribution

A target or recommended contribution for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

2. Actuarial Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of projected benefits, which will not be paid by future Normal Costs.

3. Actuarial Present Value (Present Value)

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, Social Security, marital status, etc.),
b. multiplied by the probability of the occurrence of the event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

As a simple example: assume you owe $100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you would not be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is:

Amount		Probability of Payment		1/ (1+Discount Rate)		Present Value
$100	x	(1 - .01)	x	1/(1+.1)	=	$90

4. Actuarial Valuation

The determination as of a valuation date of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for the Plan.

5. Actuarial Value of Assets

The value of cash, investments and other property belonging to a plan as used by the actuary for the purpose of an Actuarial Valuation. For this plan market value of assets are used.

APPENDIX D – GLOSSARY OF TERMS

6. Actuarial Valuation Date

The date as of which an actuarial valuation is performed. This date may be up to 24 months prior to the measurement date and up to 30 months prior to the employer's reporting date.

7. Amortization

The portion of the Plan contribution, which is designed to pay interest on and to amortize the Unfunded Actuarial Liability.

8. Discount Rate

The estimated long-term interest yield on the investments that are expected to be used to finance the payment of benefits, with consideration given to the nature and mix of current and expected investments and the basis used to determine the Actuarial Value of Assets.

9. Entry Age Actuarial Cost Method

The actuarial cost method required for GASB 74 and 75 calculations. Under this method, the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages.

10. Funded Ratio

The Actuarial Value of Assets expressed as a percentage of the Actuarial Liability.

11. Normal Cost

That portion of the Actuarial Present Value of the Plan benefits and expenses, which is allocated to a valuation year by the Actuarial Cost Method.

12. Per Person Cost Trend, i.e., Healthcare Cost Trend Rate

The rate of change in per capita health claims costs over time as a result of factors such as medical inflation, utilization of healthcare services, plan design, and technological developments.

13. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.

NEW YORK STATE
TEACHERS' RETIREMENT SYSTEM

MEMORANDUM

TO: T. Lee — Appendix B

FROM: Office of the CFO / Finance Department

DATE: August 3, 2022

SUBJECT: Retirement Board Package - OPEB Trust

Attached are the quarterly OPEB Trust financial statements and related supplemental schedule for the years ended June 30, 2022 and 2021.

The following is a list of the documents included:

1. Statements of Fiduciary Net Position (unaudited)
2. Statements of Changes in Fiduciary Net Position (unaudited)
3. Diversification of Investments
4. Fund Performance

New York State Teachers' Retirement System Retired Employee Health Benefits Trust
(Administered by New York State Teachers' Retirement System)
Statements of Fiduciary Net Position (Unaudited)

June 30, 2022 and 2021

	2022	2021
Assets:		
Investments at fair value:		
Mutual funds	$ 57,507,625	$ 65,927,002
Total investments	57,507,625	65,927,002
Total assets	**57,507,625**	**65,927,002**
Liabilities:		
Accounts payable	—	56,365
Total liabilities	—	56,365
Net position restricted for other postemployment health benefits	**$ 57,507,625**	**$ 65,870,637**

Office of the CFO/ Finance Department
August 3, 2022

New York State Teachers' Retirement System Retired Employee Health Benefits Trust
(Administered by New York State Teachers' Retirement System)
Statements of Changes in Fiduciary Net Position (Unaudited)

For the Years Ended June 30, 2022 and 2021

	2022	2021
Additions:		
Investment income:		
Net (depreciation) appreciation in fair value of investments	$ (10,884,538)	$ 13,407,337
Dividends	1,300,046	1,127,214
Net investment (loss) income	(9,584,492)	14,534,551
Contributions:		
Employer	6,000,000	6,261,000
Total contributions	6,000,000	6,261,000
Total (deductions) additions	(3,584,492)	20,795,551
Deductions:		
Other postemployment benefit payments	4,834,885	4,527,278
Professional fees and services	(56,365)	19,915
Total deductions	4,778,520	4,547,193
Net (decrease) increase	(8,363,012)	16,248,358
Net position restricted for other postemployment health benefits		
Beginning of year	65,870,637	49,622,279
End of year	**$ 57,507,625**	**$ 65,870,637**

Office of the CFO/ Finance Department
August 3, 2022

New York State Teachers' Retirement System Retired Employee Health Benefits Trust
(Administered by New York State Teachers' Retirement System)
Diversification of Investments

June 30, 2022 and 2021

Investment Type*	2022	Percent	2021	Percent	Increase (Decrease)	Target Percent
Short-term:						
Federal Money Market Fund	$ 129,594	0.23	$ 99,620	0.15	$ 29,974	1.00
Domestic fixed income securities:						
Total Bond Market Index Institutional Fund	15,678,494	27.26	15,783,565	23.94	(105,071)	24.00
Domestic equities:						
Total Stock Market Index Institutional Fund	27,361,878	47.58	33,706,399	51.13	(6,344,521)	50.00
International equities:						
International Stock Index Institutional Fund	14,337,659	24.93	16,337,418	24.78	(1,999,759)	25.00
Total investments	**$ 57,507,625**	**100.00**	**$ 65,927,002**	**100.00**	**$ (8,419,377)**	**100.00**

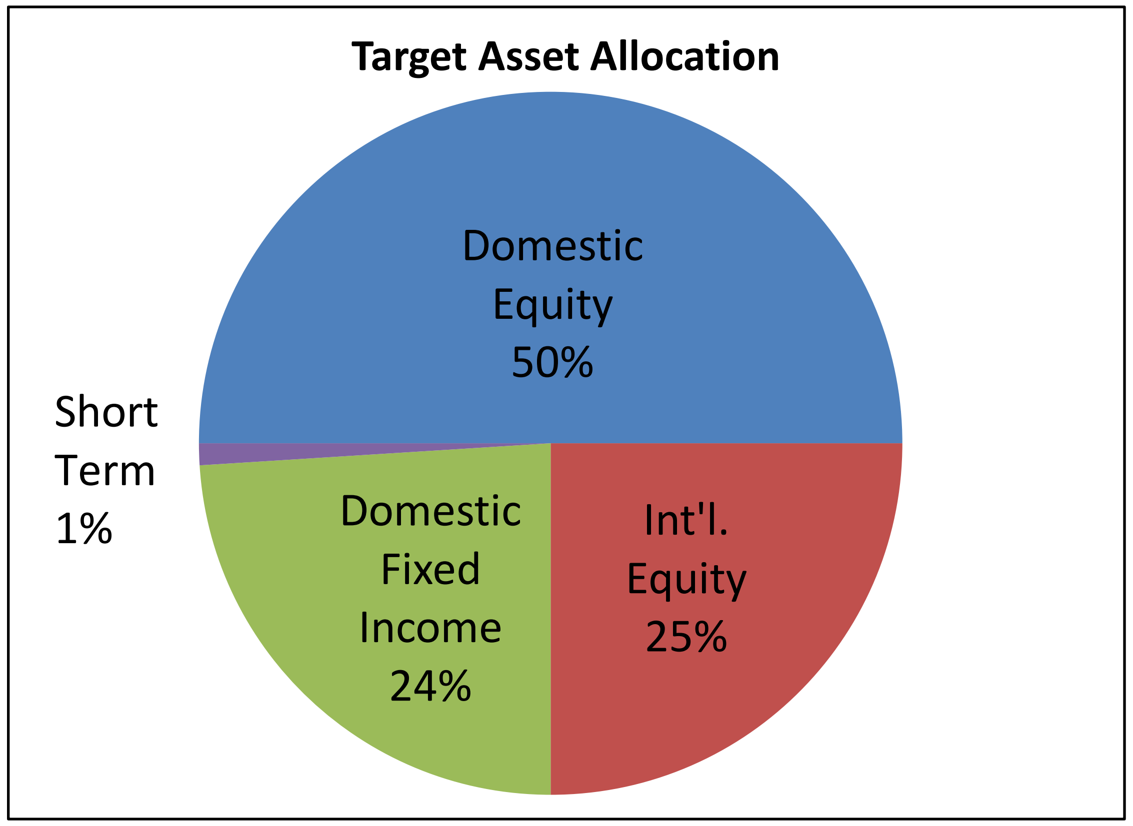
*All investments are held with Vanguard

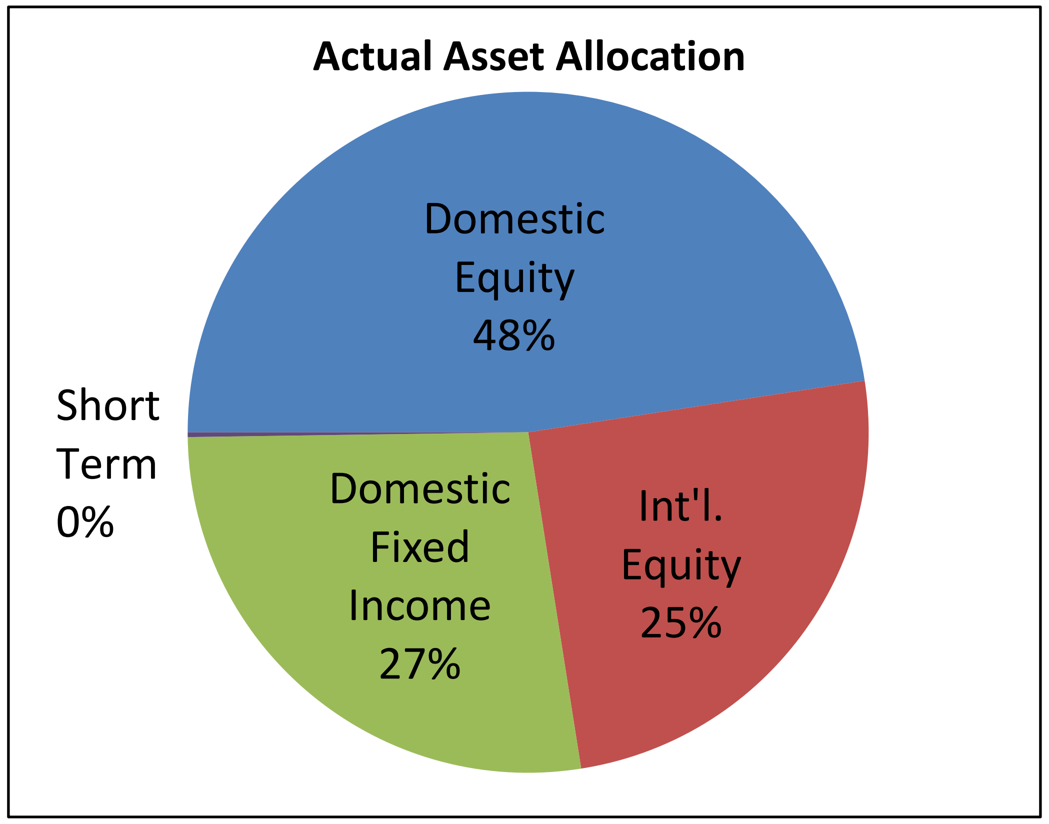
Office of the CFO/ Finance Department
August 3, 2022

New York State Teachers' Retirement System
Retired Employee Health Benefits Trust
as of June 30, 2022

Fund Performance[1]

	Market Value	Quarter	FYTD	1 Year	3 Years	5 Years	10 Years	Inception Return	Inception Date
Domestic Equity[2]	$ 27,361,878	-16.84%	-14.24%	-14.24%	9.14%	10.41%	12.49%	9.26%	04/30/2008
CRSP US Total Market[3]		-16.85%	-14.22%	-14.22%	9.17%	10.44%	12.52%	9.27%	
International Equity[4]	$ 14,337,659	-12.85%	-18.92%	-18.92%	2.03%	2.74%	5.19%	1.63%	04/30/2008
FTSE Global All Cap ex US[5]		-14.08%	-19.27%	-19.27%	1.42%	2.54%	4.85%	1.35%	
Domestic Fixed Income	$ 15,678,494	-4.71%	-10.39%	-10.39%	-0.92%	0.86%	1.49%	2.86%	04/30/2008
Bloomberg Cap. US Agg. Float Adj.		-4.73%	-10.37%	-10.37%	-0.91%	0.90%	1.56%	2.92%	
Short Term	$ 129,594	0.16%	0.17%	0.17%	0.53%	1.01%	0.57%	0.56%	04/30/2008
iMoney Net Money Fund Avg/Taxable		0.07%	0.08%	0.08%	0.41%	0.82%	0.45%	0.41%	
Total Portfolio	$ 57,507,625	-12.66%	-14.13%	-14.13%	5.14%	6.29%	7.67%	6.81%	04/30/2008





Footnotes:

[1]Returns for periods greater than 1 year are annualized. All returns are time-weighted rates of return and reflect the deduction of fund expense ratios, purchase or redemption fees, and any advisory service fees.

[2]Effective 5/31/21, the Domestic Equity portfolio was transferred from the Institutional Index fund to the Vanguard Total Stock Market Index fund.

[3]S&P 500 Index through 5/31/21, and the CRSP US Total Market Index thereafter.

[4]The Benchmark for the Vanguard Total International Stock Index Fund was the MSCI EAFE + Emerging Markets Index through 12/15/2010; MSCI ACWI ex USA IMI Index through 6/2/2013; and FTSE Global All Cap ex US Index thereafter.

[5]MSCI EAFE Index through 10/31/11, MSCI ACWI Ex-US Index through 5/31/21, and the FTSE Global All Cap ex US Index thereafter.

Office of the CFO/Investment Operations Department
August 3, 2022

NEW YORK STATE
TEACHERS' RETIREMENT SYSTEM

BOARD MEETING
August 3, 2022

TABLE OF CONTENTS

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM
ALBANY, NEW YORK

A MEETING OF THE NEW YORK STATE TEACHERS' RETIREMENT BOARD was held at the System on August 3, 2022. David Keefe, called the meeting to order at 3:00 p.m. and led the group in the Pledge of Allegiance.

ATTENDANCE

Present: Juliet Benaquisto, Elizabeth Chetney, Phyllis Harrington, Eric Iberger, David Keefe, Jennifer Longtin, Christopher Morin, Oliver Robinson, Nicholas Smirensky and Thomas K. Lee

A. Introduction of Visitors

T. Lee introduced the following visitors: Donna Martin, Albany NY (via telephone); John Daley, NYSSBA.

B. Correspondence

None.

C. Approval of April 28, 2022 and June 23, 2022 Board Meeting Minutes

There being no changes or corrections and upon motion of N. Smirensky, seconded by J. Longtin and unanimously carried, the minutes of the April 28, 2022 and June 23, 2022 Board meeting minutes were approved.

Committee Reports/Action Items

A. Audit Committee

1. Chairman's report

O. Robinson, Chair, reported that the Committee had last met on June 8 and heard risk management and audit reports and the results of an IT risk assessment.

B. Disability Review Committee

1. Disability Denial Resolution (R1)

E. Iberger offered the following resolution, seconded by J. Benaquisto and unanimously carried by the Board:

> WHEREAS, After reviewing the medical information submitted in connection with the following members, the Medical Board has determined the members are not incapacitated for the performance of gainful employment and has recommended the members' applications be denied, be it
>
> RESOLVED, That the applications for retirement on account of disability submitted by the following members be denied as recommended by the Medical Board:

[redacted]

2. Disability Rescission Resolution (R2)

O. Robinson offered the following resolution, seconded by J. Benaquisto and unanimously carried by the Board:

> WHEREAS, After reviewing the physician's report of the following annuitants who have retired for disability, the Medical Board believes they are improved and no longer incapacitated for the performance of all gainful employment, and recommended they be restored to active membership, therefore, be it
>
> RESOLVED, That upon recommendation of the Medical Board, the action taken in retiring the following members for disability be rescinded and they be restored to active membership on the date indicated:

EmplID	Date Retired	Date Restored
[redacted]	3/10/2020	8/4/2022

C. Ethics Committee

C. Morin, Chair reported that the Committee had met earlier in the day to hear an update on the conflicts of interest policy and to hear a report on the ED&CIO quarterly disclosures.

D. Executive Committee

1. Resolution Identifying Financial and Legal Document Signatories (R3)

E. Chetney offered the following resolution, seconded by P. Harrington and unanimously carried by the Board:

WHEREAS, The Retirement Board has by resolution amended and restated the resolution of January 27, 2022 entitled Delegation Resolution - Financial and Legal Document Execution, providing for the delegation by the Executive Director and Chief Investment Officer of the authority to approve and execute financial and legal documents to other employees of the Retirement System; and

WHEREAS, The Retirement Board has by resolution adopted at its regular meeting on October 26, 1995, amended and restated periodically thereafter, and most recently on January 27, 2022, identifying those employees of the Retirement System that have been delegated such authority; and

WHEREAS, It is necessary to periodically update said resolution by identifying those employees of the Retirement System to whom such authority may be delegated; now therefore be it

RESOLVED, That the employees authorized to approve and execute financial and legal documents of said resolution are identified by department, management level within the organization and by name in the attachment entitled Signatory Authorization Grid- Financial and Legal Documents (Appendix A,p. 10); and be it

RESOLVED, the attachment entitled Signatory Authorization Grid- Financial and Legal Documents sets forth the approvals and signatures needed to approve and execute financial and legal documents; and be it

RESOLVED, That this authorization shall remain in effect for individuals who are promoted within their department; and be it

RESOLVED, That between regular meetings of the Retirement Board, the Executive Director and Chief Investment Officer shall have the authority to designate in writing any such additional employees as may be required by business necessity to serve on an interim basis until the next regular meeting of the Retirement Board; and be it

RESOLVED, That this delegation shall be reviewed by the Retirement Board no less than annually; and be it further

RESOLVED, That this resolution shall take effect August 3, 2022 and, upon taking effect, shall supersede the identifying resolution previously adopted by the Retirement Board on January 27, 2022.

2. Resolution Identifying Warrant Signatories (R4)

N. Smirensky offered the following resolution, seconded by J. Longtin and unanimously carried by the Board:

WHEREAS, The Retirement Board has by resolution adopted at its regular meeting on October 26, 1995, amended and restated periodically thereafter, and most recently on January 27, 2022 and as further amended concurrent with this resolution, provided for the delegation by the Executive Director and Chief Investment Officer of the authority to execute warrants to other employees of the Retirement System; and

WHEREAS, It is necessary to implement said resolution by identifying those employees of the Retirement System to whom such authority may be delegated; be it

RESOLVED, That the signatories authorized to execute administrative, real estate investment, and fixed income, equity security and alternative investment warrants as provided in Parts II, III, IV, V and VI respectively of said resolution are identified by signatory group, organizational level within the organization and by name in the attached Signatory Authorization Grid (Appendix B, p. 11) dated August 3, 2022; and be it further

RESOLVED, That this authorization shall remain in effect for individuals that are promoted within or move among the designated signatory groups, and be it further

RESOLVED, That, between regular meetings of the Retirement Board, the Executive Director and Chief Investment Officer shall have the authority to designate in writing any such additional “A”, “B”, “C”, “D”, “E”, “F”, and “G” signatories as may be required by business necessity to serve on an interim basis until the next regular meeting of the Retirement Board; and be it further

RESOLVED, That this delegation shall be reviewed by the Retirement Board no less than annually; and be it further

RESOLVED, That this resolution shall take effect August 3, 2022 and, upon taking effect, shall supersede the identifying resolution previously adopted on January 27, 2022.

E. Investment Committee

1. Consent Agenda Item A (Appendix C, pp. 12-13)

Upon motion J. Longtin, seconded by O. Robinson and unanimously carried, the following resolutions were moved and approved together as consent agenda items:

A. Renew Agreements

- Baillie Gifford Overseas Limited (R5)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Baillie Gifford Overseas Limited to manage a portion of the System's assets as an active ACWI ex-US international equity manager for a period of one year, effective September 15, 2022.

- Global REIT Managers (R6)

RESOLVED, That the Executive Director and Chief Investment Officer, or his designees, is authorized to renew the agreements with the entities below to manage a portion of the System's assets as Global Real Estate Public Securities managers benchmarked to the FTSE EPRA/NAREIT Developed unhedged index for a period of one year:

Entity:	Renew for a period of one year effective as of:
Heitman, L.L.C.	August 7, 2022
Brookfield Investment Management Inc.	August 15, 2022
AEW Capital Management, L.P.	September 12, 2022
Dimensional Fund Advisors, L.P.	September 22, 2022

- Prima Capital Advisors (R7)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's contract with Prima Capital Advisors LLC to manage a portion of the System's real estate portfolio, as a manager of US CMBS and private real estate debt, for a period of one year, commencing on August 13, 2022.

- Leading Edge (R8)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the agreement with Leading Edge Investment Advisors to manage a portion of the System's equity portfolio as a manager of managers for a global equity strategy, for a period of one year, effective November 22, 2022.

- T. Rowe Price Associates, Inc. (R9)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's agreement with T. Rowe Price Associates, Inc. to manage a portion of the System's equity portfolio as a domestic equity enhanced index manager for a period of one year, effective October 30, 2022.

- William Blair and Company (R10)

RESOLVED, That the Executive Director and Chief Investment Officer is authorized to renew the System's contract with William Blair & Company, LLC to manage a portion of the System's equity portfolio as an active ACWI ex US international manager for a period of one year commencing September 22, 2022.

2. Resolution on Nomura Corporate Research and Asset Mgt (R11)

P. Harrington offered the following resolution, seconded by J.

Longtin and unanimously carried by the Board:

RESOLVED, That, subject to the satisfactory completion of due diligence, the Executive Director and Chief Investment Officer is authorized to contract with Nomura Corporate Research and Asset Management, Inc. to manage a portion of the System's fixed income portfolio in a High Yield fixed income mandate benchmarked to the ICE BofA U.S. High Yield Constrained Index and to allocate an initial funding of up to $150 million to such manager in one or more tranches; and be it further

RESOLVED That the Executive Director and Chief Investment Officer, or his designees, are authorized to execute such documents and to take such actions as may be necessary or required to implement the foregoing resolution.

3. Resolution on Investment Discretion (R12)

J. Longtin offered the following resolution, seconded by O. Robinson

and unanimously carried by the Board:

WHEREAS, The Retirement Board approved the delegations of investment authority set forth in the section of the Investment

Policy Manual entitled “Delegation of Investment Authority” at its October 2021 meeting; and

WHEREAS, Said section shall be subject to annual review and renewal at the regular meeting of the Retirement Board in July of each calendar year; be it

RESOLVED, That the delegations of investment authority set forth in said section of the Investment Policy Manual are reauthorized and reconfirmed as the principal items of investment authority delegated to the Executive Director and Chief Investment Officer.

4. Resolution on Asset Allocation (R13)

J. Longtin offered the following resolution, seconded by J. Benaquisto

and unanimously carried by the Board:

RESOLVED, That the System’s asset allocation targets and rebalancing ranges in the System’s Asset Allocation shall be revised as follows, effective immediately:

Asset Class	**Range**	**Target**
Domestic Equity	29 – 37%	33%
International Equity	11 – 19%	15%
Global Equity	0 – 8%	4%
Domestic Fixed Income	12 – 20%	16%
Real Estate Equity	6 – 16%	11%
Real Estate Debt	2 – 10%	6%
Private Equity	4 – 14%	9%
Private Debt	0.5 – 5%	2%
Global Bonds	0 – 4%	2%
High Yield Bonds	0 – 3%	1%
Short Term Investments (Cash Equivalents)	0 – 4%	1%

F. Risk Committee

C. Morin, Chair, reported that the Committee had met earlier, had heard reports on investment risk update, the KRI dashboard and climate risk KPIs.

Staff Reports/Action Items

A. Old Business

None.

B. New Business

1. Litigation Report

D. Ampansiri discussed the Litigation report, a copy of which is annexed hereto and made a part hereof as Appendix D, pp. 14-18.

2. Member Relations

All Board members received a Retirement Summary Report and Loan Report prior to the meeting, copies of which are annexed hereto and made a part hereof as Appendix E, pp. 19-25. E. Rezny reported that the Delegates' Meeting will be held November 6-7 and will be a hybrid meeting, offering in-person and virtual participation. S. Bonesteel provided a quality assurance update of the monthly retirement file reviews.

3. Investment Infrastructure Modernization Project

M. Andriola provided an update on the project, which has been completed and implemented. Process review continues.

4. Actuarial Valuation Report

This report was made available to Board members prior to the meeting and is attached hereto as Appendix F, pp. 26-112.

5. Employer Contribution Rate Update

R. Young and M. Prangley gave a presentation to the Board on the employer contribution rate, a copy of which is attached hereto as Appendix G, pp. 113-145.

a. Resolution on Employer Contribution Rate (R14)

N. Smirensky offered the following resolution, seconded by J. Longtin and unanimously carried by the Board:

WHEREAS, The Actuary has presented to the Board the calculations based upon the June 30, 2021 actuarial valuation of the Retirement System's assets and liabilities, therefore, be it

RESOLVED, That the employer rate of contribution levied in the school year 2023-24 shall be 10.29% of the 2022-23 member payroll and shall be comprised as follows:

Normal Rate, 9.89% of payroll, credited to the Pension Accumulation Fund

Group Life Insurance Rate, 0.13% of payroll, credited to the Group Life Insurance Fund

Expense Rate, 0.26% of payroll, credited to the Expense Fund

Excess Benefit Plan Rate, 0.01% of payroll, credited to the Excess Benefit Plan Fund

There being no further business, the meeting unanimously adjourned at 4:30 p.m.

Respectfully submitted,

[redacted]

Thomas K. Lee

New York State Teachers' Retirement System

Signatory Authorization Grid - Financial and Legal Documents

Effective as of August 3, 2022

		Designees	
Department	**Executive**	**Deputy / Managers / Counsel**	**Assistant Managers / Counsel**
Administration	Miriam Dixon	Rebecca Kannan Jason Freeman	Shana Gainey
Fixed Income	Michael Federici	Aaron Vanderwiel	Joseph Wood (1)
Information Technology	Michael Gregoire	Vijay Madala Mark Gallagher Sarah Garrand	N/A
Internal Audit	Kenneth Kasper	N/A	Bruce Woolley Lei Zhang
Member Relations	Edward Rezny	Michael Contento Beth Dellea Erica Mortimore Shannon Bonesteel Heidi Brennan Heidi Travis	Colleen Laven Andy Whitney Cori Bichteman Timothy Mack
Office of the Actuary	Richard Young	Melody Prangley	N/A
Office of the Chief Financial Officer	Margaret Andriola	Christopher O'Grady	Christopher Brown David Robertson Tedd Johnson
Office of the General Counsel	N/A	Don Ampansiri Ben Lee Yiselle Ruoso	Janet Graham Adam Kinney Morgan Anderson
Private Equity	Gerald Yahoudy	Brad Woolworth Nicholas Chladek	N/A
Public Equities	Paul Cummins	David Tessitore Nathan Lee	Jennifer Wilcox
Real Estate	David Gillan	Kevin Maloney Michael Morrell Jason Kearney Adrean Kreig	Andrew Bartell
Risk Management	N/A	Matthew Albano	Matthew Tice

(1) New/promoted manager. Becomes eligible upon completion of new manager review period.

Changes from Prior Grid

Department	Name	Comments
Additions:		
Office of the General Counsel	Morgan Anderson	Added as a signatory
Office of the CFO	Tedd Johnson	Added as a signatory
Deletions:		
Office of the CFO	Noreen Jones	Separated from employment
Office of the General Counsel	Joseph Indelicato	Separated from employment
Other:		
Office of the CFO	Margaret Andriola	Promoted to Chief Financial Officer
Office of the Actuary	Melody Prangley	Completed new manager review period
Real Estate	Adrean Kreig	Promoted to Manager of CRE Equity Investments
Real Estate	Jason Kearney	Promoted to Manager of CRE Debt Investments

New York State Teachers' Retirement System

Signatory Authorization Grid - Disbursement Warrants

Effective as of August 3, 2022

Signatory Group		Executive	Deputy / Managers / Counsel	Assistant Managers / Counsel	Other Professionals
A	All Types	Richard Young	Don Ampansiri Ben Lee Yiselle Ruoso Melody Prangley Matthew Albano	Janet Graham Adam Kinney Matthew Tice	N/A
Signatory Group		**Executive**	**Deputy / Managers**	**Assistant Managers**	**Other Professionals**
B	Real Estate	David Gillan	Kevin Maloney Michael Morrell Jason Kearney Adrean Kreig	Andrew Bartell	N/A
C	Fixed Income	Michael Federici	Aaron VanDerwiel	Joseph Wood (1)	Dawn Sherman Mark Wood Michael Wollner Christina Vasto Danielle Bondi (2)
D	Public Equities	Paul Cummins	David Tessitore Nathan Lee	Jennifer Wilcox	N/A
E	Private Equity	Gerald Yahoudy	Brad Woolworth Nicholas Chladek	N/A	N/A
F	Finance	Margaret Andriola	Christopher O'Grady	Tedd Johnson David Robertson Christopher Brown	N/A
G	Employee Payroll	Miriam Dixon	Rebecca Kannan	Shana Gainey	N/A

(1) New/promoted manager. Becomes eligible upon completion of new manager review period.

(2) New/promoted staff. Becomes eligible upon completion of probationary review period.

Changes from Prior Grid

Group	Name	Comments
Additions:		
A	Morgan Anderson	Added as a signatory
C	Christina Vasto	Hired as an Investment Officer
C	Danielle Bondi	Hired as an Investment Officer
Deletions:		
A	Joseph Indelicato	Separated from employment
C	James Bone	Separated from employment
C	Endurance Aku	Transferred to the Private Equity Department
F	Noreen Jones	Separated from employment
Other:		
A	Melody Prangley	Completed new manager review period
B	Adrean Kreig	Promoted to Manager of CRE Equity Investments
B	Jason Kearney	Promoted to Manager of CRE Debt Investments
C	Michael Wollner	Completed promoted employee review period
F	Margaret Andriola	Promoted to Chief Financial Officer

Signatory Group Authority

		Approver	Authorizer	
Type of Disbursement	**Warrant Type**	**Any Amount**	**Any Amount**	**Under Threshold***
Real Estate	B	B Group	A Group	B Group (Exec)
Fixed Income	C	C Group	A Group	C Group (Exec)
Public Equities	D	D Group	A Group	D Group (Exec)
Private Equity	E	E Group	A Group	E Group (Exec)
Finance	F	F Group	A Group	F Group
Employee Payroll	G	G Group	A Group	G Group (Exec)

***The threshold for authorizing warrants is $250,000**

Signatories cannot sign as approver and authorizer on the same warrant

Appendix C

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

Quarterly Retirement Board Meeting August 3, 2022

Call to Order by President

Agenda pp. 228-229

A. Introduction of Visitors
B. Correspondence - none
C. Approval of Minutes of April 28, 2022 and June 23, 2022 Board Meetings pp. 230-239

Committee Reports & Action Items

A. Audit Committee
   1. Chairman's report
B. Disability Review Committee
   1. Disability Denial Resolution (R1, p. 240)
   2. Disability Rescission Resolution (R2, p. 241)
C. Ethics Committee
   1. Chairman's report
D. Executive Committee
   1. Chairman's report
   2. Resolution Identifying Financial and Legal Document Signatories (R3, p. 242)
   3. Resolution Identifying Warrant Signatories (R4, p. 243)
E. Investment Committee
   1. **Consent Agenda Item A 1-6** pp. 244-249
      A. Renew Agreements:
         1. Baillie Gifford Overseas Limited (R5, p. 244)
         2. Global REIT Managers (AEW, Brookfield, DFA, Heitman) (R6, p. 245)
         3. Prima Capital Advisors (R7, p. 246)
         4. Leading Edge (R8, p. 247)
         5. T. Rowe Associates, Inc. (R9, p. 248)
         6. William Blair and Company (R10, p. 249)
   2. Resolution on Nomura Corporate Research and Asset Mgt Inc. (R11, p. 250)
   3. Resolution on Investment Discretion (R12, p. 251)
   4. Resolution on Asset Allocation (R13, p. 252)
F. Risk Committee
   1. Chairman's report

Staff Reports

A. Old Business
B. New Business
    1. Litigation Report – D. Ampansiri pp. 253-257
    2. Member Relations Update – E. Rezny pp. 258-264
        a. Quality Assurance Update – S. Bonesteel pp. 265-274
    3. Investment Infrastructure Modernization Project Update – M. Andriola pp. 275-280
    4. Actuarial Valuation Report – R. Young pp. 281-367
    5. Employer Contribution Rate – R. Young pp. 368-400
        a. Resolution on Employer Contribution Rate (R14, p. 401)

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

Memorandum

TO: Retirement Board

FROM: Don Ampansiri, Jr., Janet A. Graham

RE: Status of System Litigation as of July 26, 2022

DATE: July 26, 2022

CC: T. Lee, Y. Ruoso

UPDATE ON PENDING LAWSUITS SINCE THE LAST REPORT

Securities Litigation:

In re The Chemours Company Securities Litigation
Action commenced: 12/9/19

CURRENT STATUS: On May 16, 2022, the parties filed a joint stipulation with the Court consenting to a dismissal of the case, in which the parties expressly "agree[d] that the Parties and their respective counsel have fully complied with the requirements of Rule 11 of the Federal Rules of Civil Procedure with respect to all aspects of this litigation." On May 19, 2022, the Court entered the parties' stipulation and ordered the parties to appear for a status conference on August 2, 2022 to evaluate their compliance with Rule 11 in accordance with the Private Securities Litigation Reform Act's mandatory review provision.

Background:

On December 9, 2019, NYSTRS filed a motion for appointment as lead plaintiff in the federal securities class action In re The Chemours Company Securities Litigation, Case: 1:19-CV-01911-CFC (D. Del.). The complaint was filed on October 8, 2019, on behalf of purchasers of common stock of The Chemours Company ("Chemours") between February 16, 2017, and August 1, 2019.

Chemours was formed in July 2015 as a spin-off from E.I. du Pont de Nemours and Company ("DuPont"). Under the spin-off, DuPont divested to Chemours the assets and liabilities associated with its Performance Chemicals division, as well as numerous liabilities associated with other DuPont divisions.

This securities class action is based on securities fraud claims and focuses on Chemours' alleged misrepresentations and understatements to investors about the extent of Chemours' environmental liabilities, including legacy DuPont liabilities.

Benefits Litigation:

Jean M. Andre v. New York State Teachers' Retirement System & Greece Central School District
Action commenced: 8/6/21

CURRENT STATUS: NYSTRS responded to the petition. We are awaiting the Court's decision in the matter.

Summary of the case/background information:

Petitioner, a Tier 4 member, challenged the System's determination reducing her service credit by 2 months due to an employer reporting error by Greece Central School District. Petitioner was employed on a part-time basis for the school year 2005-06 but the district incorrectly reported her for a full year of service credit. System staff discovered the error when finalizing the calculation for Petitioner's pension benefits. The correction to her service credit brings her below the 30-year threshold for an unreduced benefit. As Petitioner is 59 years old, she is subject to as much as 15% reduction (pro-rated by month) to her pension benefits.

Subsequent to the above determination, staff further discovered a second reporting error; this time from East Irondequoit School District. The district incorrectly reported Petitioner for full years of service credit for 1997-98 and 1998-99 when she was in fact a part-time employee. This error resulted in a loss of an additional 4 months of service credit, thus leaving Petitioner with a total service credit of 29 years, 3 months. The System issued an amended Final Determination letter addressing this new finding and allowed the Petitioner to seek to amend her petition to include this further/additional reduction and/or seek to add the District as a party to the action.

Petitioner, however, does not dispute that she worked part-time during the at-issue years but rather argues that the System should be enjoined from correcting the error after her date of retirement. Statute (Education Law Section 525) and caselaw are both well settled on this matter and not only supports, but also mandates, that upon discovery of error in records (irrespective of timing) the System "shall correct such error". Nonetheless, Petitioner is seeking an order to grant her the additional/at-issue months and bring her above the 30-year threshold. The Attorney General's office is representing NYSTRS in this action.

Bernice Curry-Malcolm v. New York State Teachers' Retirement System
Action commenced: 10/28/19
Favorable Article 78 decision: 12/2/20

CURRENT STATUS: On February 4, 2022, the Appellate Division in the Fourth Department unanimously affirmed the decision of the Supreme Court to dismiss the petition against NYSTRS. On March 30, 2022, Petitioner filed an appeal directly to the Court of Appeals.

On April 7, 2022, the Attorney General responded on behalf of NYSTRS, stating that the appeal should be dismissed because there is no basis for an appeal as of right. The Fourth Department's decision did not include a two-justice dissent nor does the appeal raise a substantial constitutional question directly involved in these orders. We are awaiting the Court's decision.

On June 15, 2022, the Court of Appeals dismissed the appeal. Petitioner has until September 12, 2022, to ask the Court for permission to appeal.

Summary of the case/background information:

Petitioner, a Tier 4 member, challenged the System's determination that excluded for pension purposes all salary and service credit under a settlement agreement with Honeoye Falls-Lima School District as not pensionable (monies paid for time not worked), as well as excluding paid administrative leave from Rochester Central School District (leave tied to resignation).

The decision:

The Court noted the System relied on employer reports regarding Petitioner's earnings, her leave of absence and termination. The Court further noted the System relied on the terms of the settlement agreement entered into between Petitioner and the District. The Court found that "as the determinations made by NYSTRS were rational and not arbitrary or capricious, this Court finds no reason to disturb them."

These 2 cases relate to the same legal issue, and the parties are represented by the same attorney:

1. Frank DeVenuto v. New York State Teachers' Retirement System & New York State Teachers' Retirement System Board

Action commenced: 4/12/22

CURRENT STATUS: NYSTRS responded to the petition. Petitioner has until August 12, 2022, to submit a reply.

Summary of the case/background information:

Petitioner, a Tier 4 retiree, challenged the System's determination on whether the position of Driver Education Coordinator is a reportable position to the System and, accordingly, whether earnings for this position are includable in the calculation of the member's final average salary. The System determined Driver & Traffic Safety Education, as a program implemented in New York State schools in partnership between the New York State Education Department and the Department of Motor Vehicles, was partially pensionable due to the instructional component required for those directly involved in teaching the program. The position of Driver Education Coordinator does not have an instructional component in the services rendered. Based on our findings, the Coordinator position is predominantly intended to schedule classes, maintain records, manage communications and any other administrative duties to accomplish program objectives. As such, the System determined the position of Driver Education Coordinator does not meet the basic guidelines for reportability.

Petitioner contends the duties of the Coordinator with the Driver Education instruction program should be includable in the pension calculation.

2. Peter Macedo v. New York State Teachers' Retirement System & New York State Teachers' Retirement System Board

Action commenced: 4/12/22

CURRENT STATUS: NYSTRS responded to the petition. Petitioner has until August 12, 2022, to submit a reply.

Summary of the case/background information:

Petitioner, a Tier 4 retiree, challenged the System's determination on whether the position of Driver Education Coordinator is a reportable position to the System and, accordingly, whether earnings for this position are includable in the calculation of the member's final average salary. The System determined Driver & Traffic Safety Education, as a program implemented in New York State schools in partnership between the New York State Education Department and the Department of Motor Vehicles, was partially pensionable due to the instructional component required for those directly involved in teaching the program. The position of Driver Education Coordinator does not have an instructional component in the services rendered. Based on our findings, the Coordinator position is predominantly intended to schedule classes, maintain records, manage communications and any other administrative duties to accomplish program objectives. As such, the System determined the position of Driver Education Coordinator does not meet the basic guidelines for reportability.

Petitioner contends the duties of the Coordinator with the Driver Education instruction program should be includable in the pension calculation.

LAWSUITS COMMENCED SINCE THE LAST REPORT

Andrea Loscalzo v. New York State Teachers' Retirement System

Action commenced: 7/18/22

Summary of the case/background information:

Petitioner, a Tier 4 member, is challenging the System's determination excluding for pension purposes all salary and service credit under a settlement agreement with Greenburgh-Graham Union Free School District (District). Notwithstanding that Petitioner rendered no further service to the District following entry into the settlement, the papers contend such payments should be considered regular compensation and as such should be includable in the pension calculation. NYSTRS legal staff will work with the Attorney General to respond to the petition.

LAWSUITS WITH NO UPDATES SINCE THE LAST REPORT

NONE

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

TO: Retirement Board

FROM: E. Rezny

CC: T. Lee

SUBJECT: Retirement Summary Report

DATE: July 13, 2022

The following is a summary of actions of the Benefits Department since the last report to the Retirement Board.

Members for whom retirement processing was finalized, by category:

Service	1,180
Deferred	31
Disability	4
Total	1,215

Retirement benefits finalized with an Alternative Option: 18

Retirees paid a lump sum in lieu of a retirement benefit pursuant to Education Law §537 certified by the Actuary to be of actuarial equivalent value to their benefit: 19

Revision of retirement benefits and retroactive adjustments to date of retirement: 208

A list of each group of members and retirees is available upon request to members of the Retirement Board.

New York State Teachers' Retirement System

MEMORANDUM

TO: Retirement Board

FROM: Thomas K. Lee

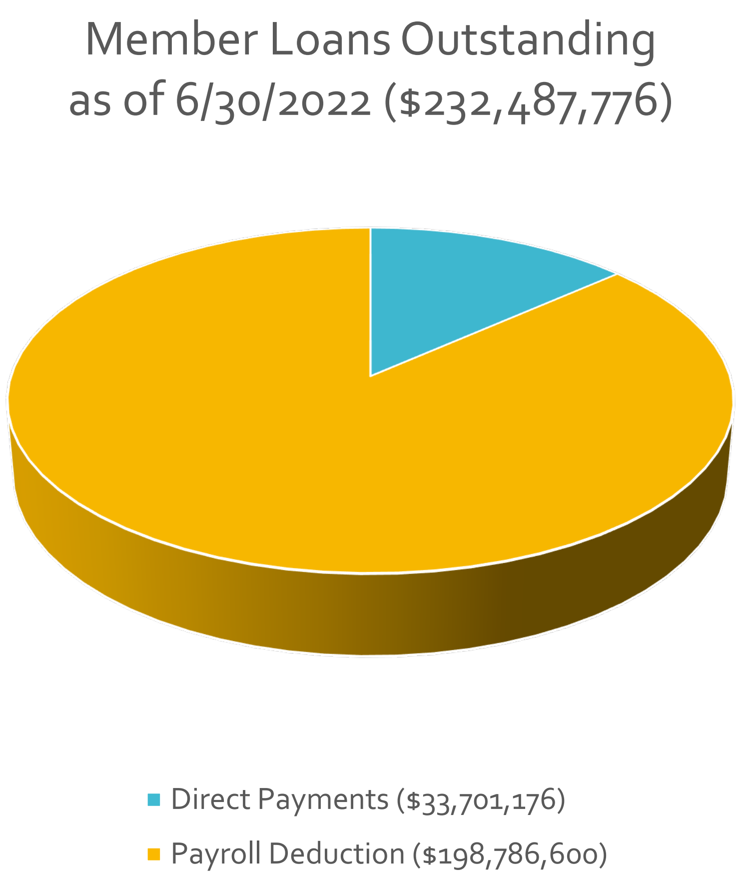
SUBJECT: Member Loans

DATE: August 03, 2022

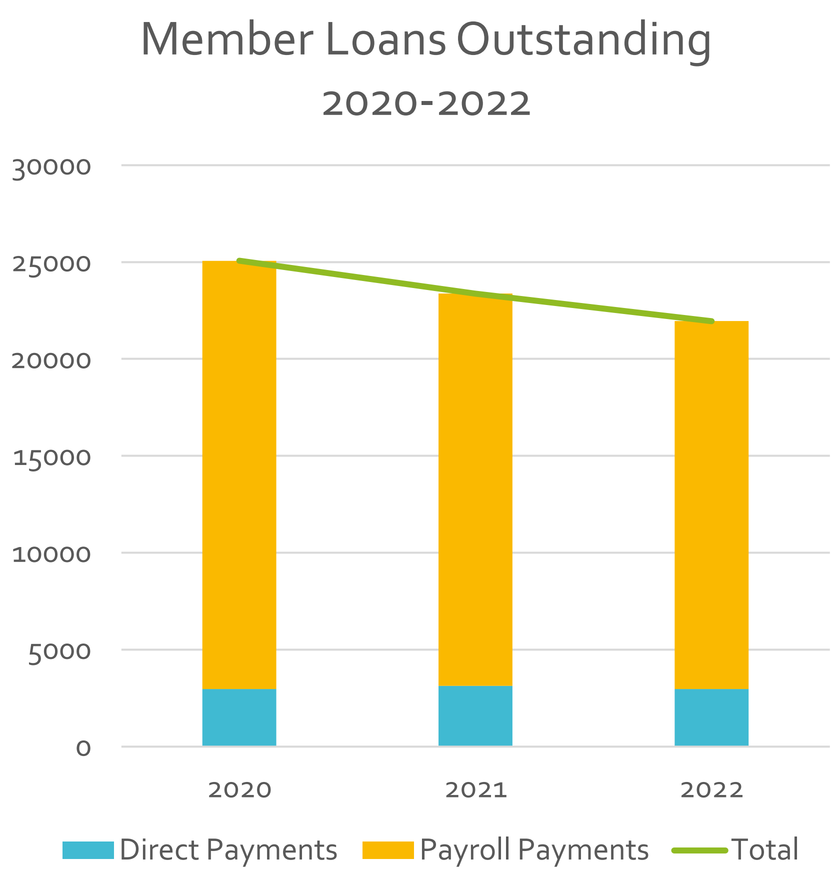
Total Loans Outstanding	**June 30, 2022**	**June 30, 2021**	**Increase(Decrease)**
Direct Payments	2,966	3,137	(171)
Payroll Deductions	18,985	20,231	(1,246)
Total	**21,951**	**23,368**	**(1,417)**
Direct Payments	$ 33,701,176	$ 33,550,901	$ 150,275
Payroll Deductions	198,786,600	203,410,678	(4,624,078)
Total	**$232,487,776**	**$236,961,579**	**($4,473,803)**

Delinquent Loans	**No.**	**%**	**No.**	**%**
One Month	67	0.3	105	0.4
Two Months	39	0.2	45	0.2
Three Months	24	0.1	33	0.1
Total	**130**	**0.6**	**183**	**0.7**

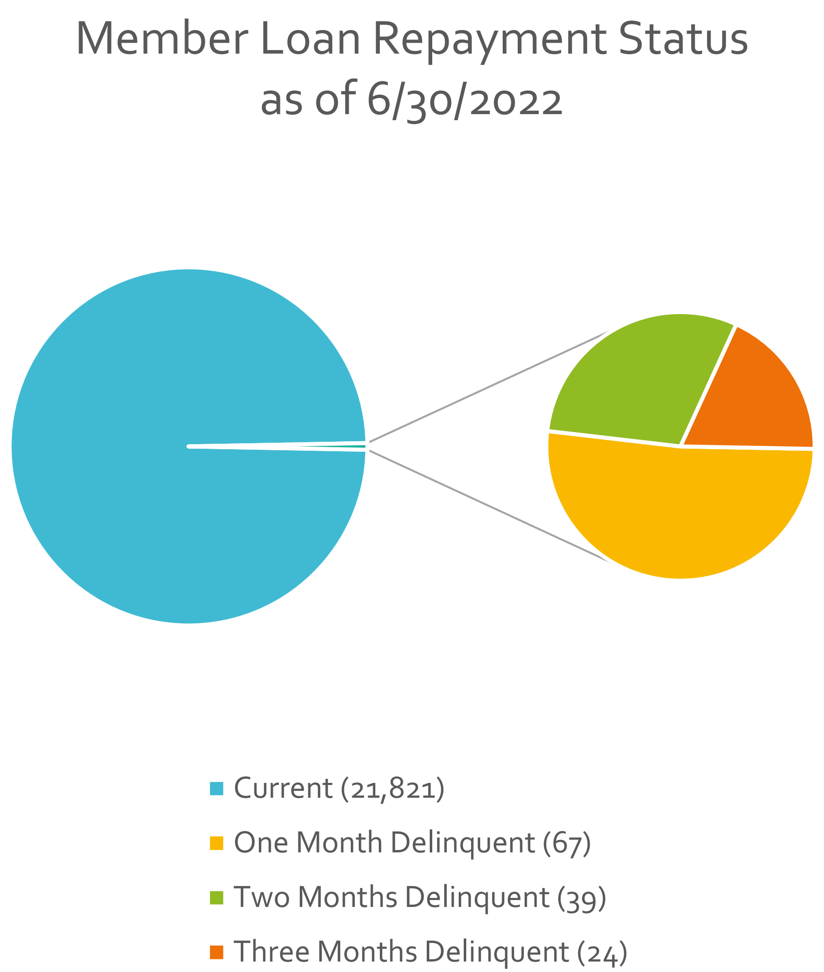
Loans Issued Annually	**June 30, 2022**	**June 30, 2021**	**Increase(Decrease)**
Direct Payments	226	169	57
Payroll Deductions	9,217	8,147	1,070
Total	**9,443**	**8,316**	**1,127**
Direct Payments	$ 1,953,012	$ 1,356,317	$ 596,695
Payroll Deductions	76,306,481	65,246,503	11,059,978
Total	**$78,259,493**	**$66,602,820**	**$11,656,673**

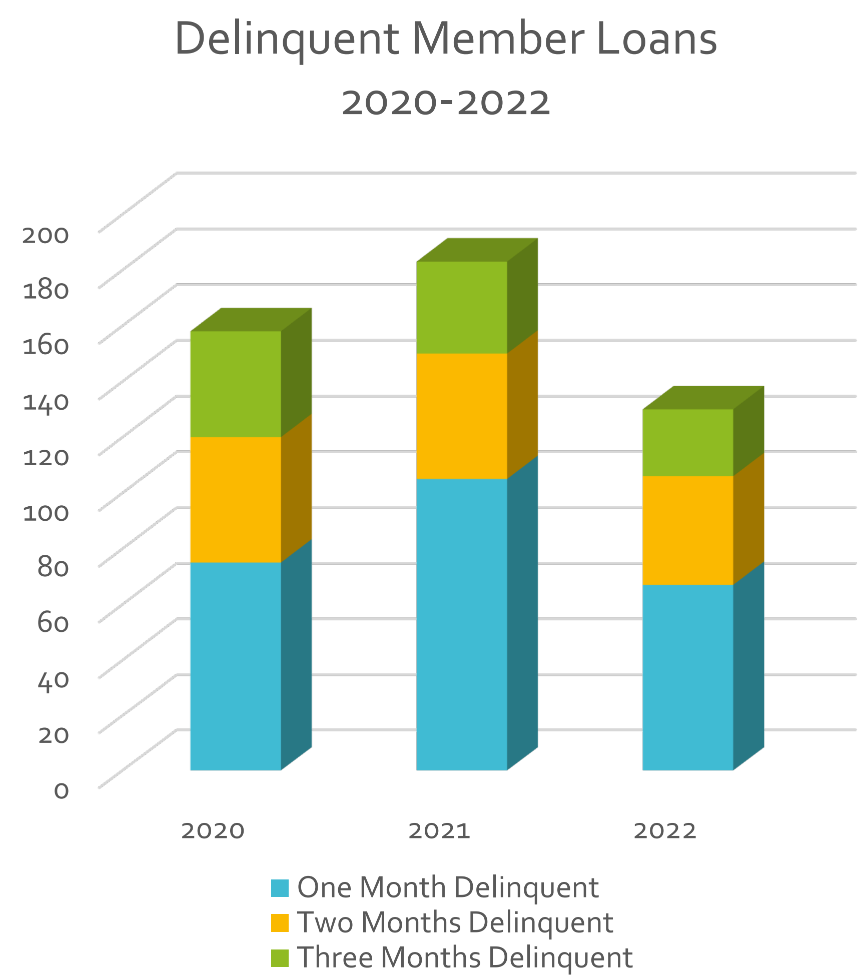


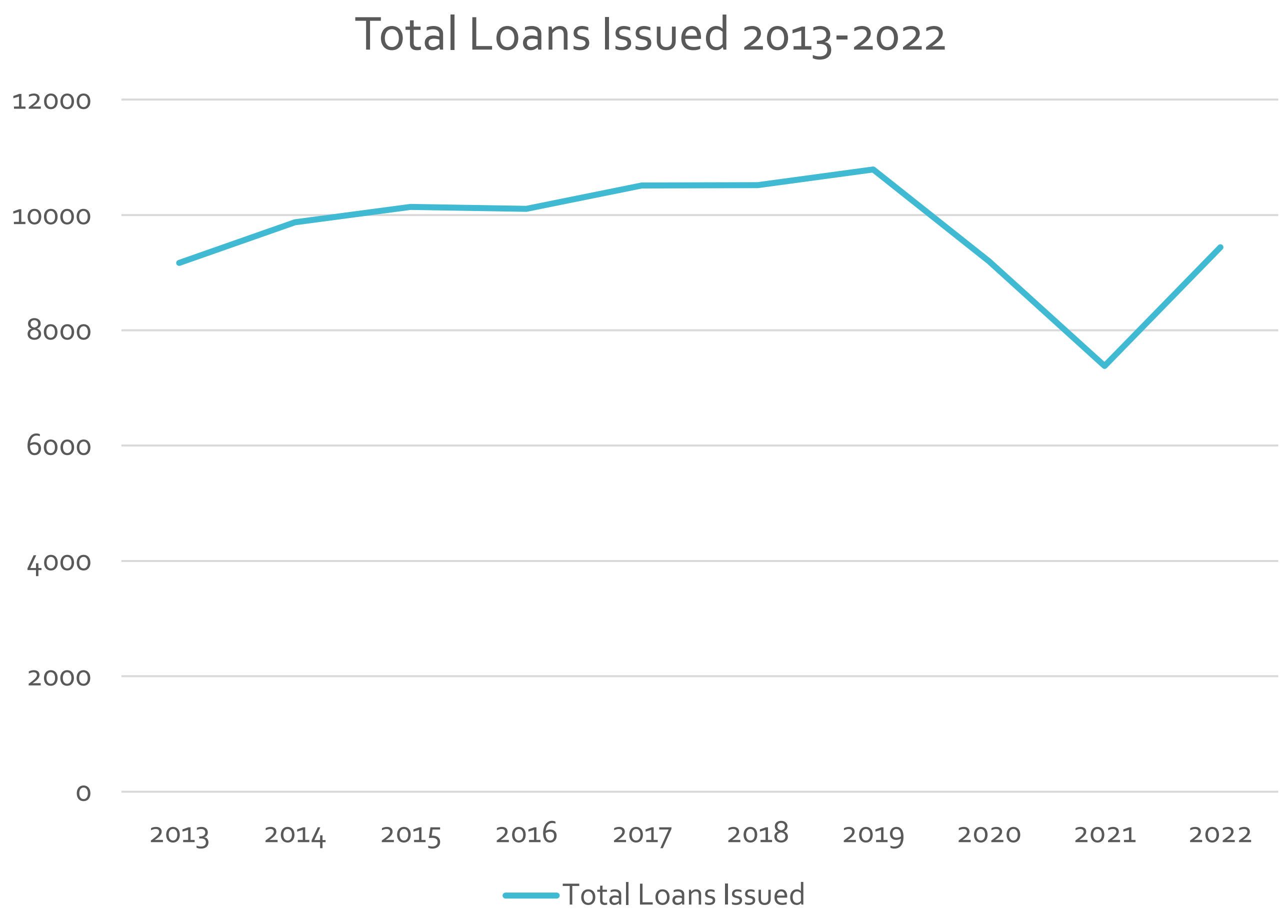
Member Loans Outstanding
as of 6/30/2022 ($232,487,776)
Direct Payments ($33,701,176)
Payroll Deduction ($198,786,600)



Member Loans Outstanding
2020-2022
30000
25000
20000
15000
10000
5000
0
2020
2021
2022
Direct Payments
Payroll Payments
Total


Member Loan Repayment Status
as of 6/30/2022
Current (21,821)
One Month Delinquent (67)
Two Months Delinquent (39)
Three Months Delinquent (24)


Delinquent Member Loans
2020-2022
200
180
160
140
120
100
80
60
40
20
0
2020
2021
2022
One Month Delinquent
Two Months Delinquent
Three Months Delinquent


Total Loans Issued 2013-2022
12000
10000
8000
6000
4000
2000
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Total Loans Issued

New York State Teachers' Retirement System
DRAFT - 2022 Annual Delegates Meeting Agenda
A Hybrid Event: At Saratoga Springs City Center & Via Cvent

SUNDAY, NOVEMBER 6

8:00 a.m.-3:10 p.m.	**Delegate Check-in** *Registration for this year's meeting was required in advance. If you attend in person, stop by our check-in desk to pick up your nametag. Only delegates properly reported by their employer may vote in Monday's election. All voting will occur electronically through Cvent—the hybrid platform. Attendees should have the Cvent app installed on their mobile device or accessible through their tablet's web browser.* **Note:** *Staff from NYSTRS' Tax and Legal Departments are available for questions in person or virtually.*	Meeting Room 1
	Internet Café *If you attend in person, computers with Internet access are available for your use. However you attend, though, take time today to search the Unclaimed Funds page at NYSTRS.org for people you know.*	Meeting Room 1
	Information Center *Meet 1-on-1 with System staff (in person or virtually) to discuss general membership and benefit information.*	Room A
8:45-9:15 a.m.	**Feedback Forum: Mobile App** *NYSTRS' mobile app (available through Apple's App Store or the Google Play Store) provides valuable features for you as a member and a delegate. We look forward to hearing your suggestions, though, on how we can make the app even better. Delegates will have a chance to enroll in this focus group in advance.*	Rooms B/C
9:30-10:10 a.m.	**Key Retirement Decisions You Must Make** *Selecting your retirement date and your benefit payment option are two of the biggest decisions you will make. We will guide you through the important considerations and the process for filing for retirement.*	Main Hall
	Social Security Information *We will review key Social Security benefit information, including collecting your Social Security early vs. waiting until full retirement age; the calculation of cost-of-living adjustments; and post-retirement earnings limits.*	Rooms B/C
10:30-11:10 a.m.	**How You Can Receive All the Service Credit for Which You Are Eligible** *Your work as a teacher is just one of the ways to earn service credit toward your benefit calculation. Learn how to apply for other credit (e.g., prior service; military service; transfer; reinstatement).*	Main Hall
	Earnings After Retirement *Hear how state laws and executive orders have changed the rules governing earnings after retirement and what members need to know if they plan to work after retirement. We'll cover the Section 212 earnings limit, Section 211 waivers, and suspending your retirement benefit under Section 503.11.*	Rooms B/C
11:30 a.m.-12:10 p.m.	**Using NYSTRS Resources Throughout Your Membership** *There are so many tools NYSTRS offers to help you as a member (e.g., our website, MyNYSTRS account, annual Benefit Profile, benefits consultations, online PREP materials, publications, videos, mobile app, Pension Education Toolkit). Discover how to best use these resources to guide you throughout your membership.*	Main Hall
	Social Security Information (Repeat)	Rooms B/C

12:15-1:15 p.m. — *BREAK*

1:30-2:10 p.m.	**Why Pensions Matter More Than Ever** *The retirement outlook for many Americans is getting more and more challenging. As a NYSTRS member who participates in a defined benefit plan and is also eligible for Social Security coverage, you are much more likely to enjoy a well-deserved retirement. Hear the latest news and research in this retirement industry update.*	Main Hall
2:30-3:10 p.m.	**NYSTRS' Year in Review and the Long-Term Stability of the System** *It's been another busy year at NYSTRS. Catch up on everything that's new and improved. We'll also review the financial strength and stability of the System and explain our approach to long-term success.*	Main Hall
3:30-4:30 p.m.	**Delegate-Board/Staff Discussion**	Main Hall

NYSUT RECEPTION FOLLOWS ADJOURNMENT

New York State Teachers' Retirement System

DRAFT - 2022 Annual Delegates Meeting Agenda

A Hybrid Event: At Saratoga Springs City Center & Via Cvent

Monday, November 7

8:00-10:10 a.m.	**Delegate Check-in** ***(continued)***	Meeting Room 1
	Internet Café	Meeting Room 1
	Information Center	Room A
8:30-9:10 a.m.	**How You Can Receive All the Service Credit for Which You Are Eligible** ***(REPEAT)***	Main Hall
	Earnings After Retirement ***(REPEAT)***	Rooms B/C
9:30-10:10 a.m.	**Using NYSTRS Resources Throughout Your Membership** ***(REPEAT)***	Main Hall
	Key Retirement Decisions You Must Make ***(REPEAT)***	Rooms B/C
10:30 a.m.	**Election of Teacher Board Member** ◆ Adoption of Rules of Procedure ◆ Election of Chairperson & Secretary ◆ Election of Teacher Board Member	Main Hall

ACTUARIAL VALUATION REPORT

as of

JUNE 30, 2021

New York State Teachers' Retirement System

Office of the Actuary
July 26, 2022

NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

Actuarial Valuation Report
as of June 30, 2021

TABLE OF CONTENTS

APPENDICIES

Actuarial Valuation Report
as of June 30, 2021

A. INTRODUCTION

This report presents to the New York State Teachers' Retirement System ("NYSTRS" or "the Retirement System") Retirement Board the results of the annual actuarial valuation of assets and liabilities of the Retirement System as of June 30, 2021. Employer contributions are made by participating employers in accordance with an actuarially determined employer contribution rate. The rate is determined by an actuarial valuation made each June 30th. Members contribute in accordance with a fixed-rate schedule as required by statute. NYSTRS' funding objective is to ensure that sufficient assets are being accumulated to pay all current and future benefits as they become due.

The purpose of this report is to summarize the determination of the Employer Contribution Rate which will be applied to member salaries earned during the July 1, 2022 to June 30, 2023 fiscal year and to review the funded status of the Retirement System. Use of the valuation results contained herein for purposes other than those stated above may not be appropriate.

B. EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate to be applied to member salaries for the July 1, 2022 to June 30, 2023 fiscal year and collected in the fiscal year ending June 30, 2024 consists of four components. These components may be described as follows:

> The **Normal Rate** represents the annual cost of accruing active member benefits as well as actuarial gains and losses. The active member component includes the cost of benefits accruing on account of retirement, withdrawal, disability, death (except for the first $50,000 of death benefits which are funded by the group life insurance rate) and the cost-of-living benefit provided during retirement. The Normal Rate is calculated in accordance with the Aggregate Actuarial Cost Method. The Aggregate Method is a reasonable and appropriate actuarial funding method for an ongoing plan and is designed to provide that sufficient assets are accumulated to pay current benefits as well as accrue assets that will be needed to pay future benefits.
>
> The **Expense Rate** is a pay-as-you-go rate representing the administrative cost of the Retirement System for the fiscal year July 1, 2023 to June 30, 2024 and is set during the budget process.

The **Group Life Insurance Rate** is a pay-as-you-go rate representing the expected benefit payments of the first $50,000 of member death benefits for the fiscal year July 1, 2023 to June 30, 2024.

The **Excess Benefit Plan Rate** is a pay-as-you-go rate representing the Excess Benefit Fund's need for contributions to cover expected benefit payments in excess of the Internal Revenue Code Section 415 limits for the fiscal year July 1, 2023 to June 30, 2024.

The actuarially computed Employer Contribution Rate to be applied to the member salaries for the fiscal year ending June 30, 2023 is **10.29%**. The Employer Contribution Rates determined by the actuarial valuations as of June 30, 2021 and June 30, 2020 and the changes between the two are summarized below:

	As of 6/30/2021	As of 6/30/2020	Change
Normal Rate	9.89%	9.41%	0.48%
Expense Rate	0.26	0.26	0.00
Group Life Insurance Rate	0.13	0.13	0.00
Excess Benefit Plan Rate	0.01	0.00	0.01
Employer Contribution Rate	**10.29%**	**9.80%**	**0.49%**

The actuarial assumptions in use for the June 30, 2021 actuarial valuation were developed based upon Retirement System experience and established tables. New demographic and economic assumptions were adopted by the Retirement Board on October 28, 2021 and are first used in the actuarial valuation as of June 30, 2021 presented here. In accordance with Sections 501, 508 and 517 of the Education Law, the Retirement Board has the authority to adopt the actuarial assumptions as recommended by the Actuary.

The actual employer contributions made by participating employers during the fiscal year ending June 30, 2021 were equal to the employer contributions determined in accordance with the applicable annual actuarial valuation.

C. GAIN/LOSS IN THE EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate of 10.29% represents a 49 basis point increase from the prior year's rate of 9.80%.

NORMAL RATE

The Normal Rate component of the Employer Contribution Rate (ECR) of 9.89% represents a 48 basis point increase over the prior year's rate of 9.41%. This change can be broken down as follows in the chart below. Note that a positive entry represents an actuarial loss, which is an increase in the ECR. A negative entry represents an actuarial gain, which is a decrease in the ECR.

Salary/Service:	This gain is due to actual salary and service lower than expected.	-0.10
Investment Experience	The recognition of prior investment gains and losses over a five-year period in accordance with the asset valuation method resulted in a net investment gain.	-3.64
New Entrants:	New entrants join the Retirement System as Tier 6 members with a long-term expected normal rate of approximately 4.3% which results in downward pressure on the Normal Rate.	-0.08
Withdrawal:	Withdrawal experience produced a loss.	+0.02
Mortality:	Members are living slightly longer than expected and receiving benefits for a longer period.	+0.04
Retirement:	Retirement benefit amount and retirement age experience produced a loss.	+0.13
Pension Payments:	Actual payments to retirees were less than expected.	-0.07
Cost of Living Adjustment:	The actual COLA increase of 1.4% was higher than the expected increase of 1.3%.	+0.02
Actuarial Assumption Changes:	Increase due to revision of assumptions – full demographic and economic assumptions study was completed prior to this valuation.	+4.50
Miscellaneous:	Decrease due to other sources of gain and loss (e.g. programming adjustments, overlap of assumptions, disability, transfers, etc.)	-0.34
TOTAL CHANGE IN THE NORMAL RATE		**0.48%**

OTHER COMPONENTS

The **Expense Rate** is set during the budget process. As of June 30, 2021, the expense rate remains at 0.26%.

The **Group Life Insurance Fund Rate** is unchanged from the previous year. Contributions collected have been more than sufficient to cover payments over the past several years, resulting in an accumulated Group Life Insurance Fund of approximately $454 million as of June 30, 2021. The Group Life Insurance Rate is being held constant, however, in anticipation of rising payouts in the future due to the growth in the number of retirees eligible for the post-retirement death benefit (Tiers 2 through 6) and the inactive member death benefit (Tiers 2 through 6).

The **Excess Benefit Plan Rate** is increased to 0.01%. This rate represents the Excess Benefit Fund's need for contributions to cover retirement benefits paid in excess of the Internal Revenue Code Section 415 limits. These payments are made exclusively from the Excess Benefit Plan. This fund was established in accordance with the Excess Benefit Plan which received final IRS approval in August 2001. The fund has accumulated assets of approximately $2.8 million as of June 30, 2021. The rate has been set to 0.01% this year to increase the fund balance.

D. EMPLOYER CONTRIBUTION RATE HISTORY

The following chart summarizes the Employer Contribution Rate for the last 20 years. The complete Employer Contribution Rate history is presented in Appendix 15.

Salary Year	*Employer Contribution Rate*	*Salary Year*	*Employer Contribution Rate*
2003-2004	2.52 %	2013-2014	16.25 %
2004-2005	5.63	2014-2015	17.53
2005-2006	7.97	2015-2016	13.26
2006-2007	8.60	2016-2017	11.72
2007-2008	8.73	2017-2018	9.80
2008-2009	7.63	2018-2019	10.62
2009-2010	6.19	2019-2020	8.86
2010-2011	8.62	2020-2021	9.53
2011-2012	11.11	2021-2022	9.80
2012-2013	11.84	2022-2023	10.29 *

* Pending adoption by the Retirement Board at its August 2022 Board Meeting.

E. EMPLOYER CONTRIBUTION RATE CHANGE

The Employer Contribution Rate has increased this year from 9.80% to 10.29%, representing an increase of 5%, primarily attributable to the increase in the Normal Rate component which increased from 9.41% to 9.89%. The rate of return on the System's market value of assets for the fiscal year ending June 30, 2021 was 29.0%. The System's current five-year market value rate of return rose to 11.9%, an increase from last year's 6.8%. The June 30, 2021 actuarial valuation resulted in an increase in the normal rate, however, due to the revision of the actuarial assumptions. The increase in the cost generated by the change in assumptions was largely offset by the System's investment gain. These two items accounted for most of the change in the employer contribution rate.

The Normal Rate component of the Employer Contribution Rate is calculated in accordance with the Aggregate Actuarial Cost Method, as required by statute (New York State Education Law Section 517). Under the Aggregate Actuarial Cost Method gains and losses resulting from differences between actual and expected experience, as well as changes to assumptions or plan provisions, are not separately amortized but are spread as part of the normal cost calculation, over the expected future working lifetime of active members. The Aggregate Method is a reasonable and appropriate actuarial cost method to use for ongoing plan funding purposes and is consistent with the System's goal of accumulating sufficient assets to pay benefits as they come due.

F. MEMBER DATA

The member data for the annual actuarial valuation was determined as of June 30, 2021.

	June 30, 2021	June 30, 2020
Active Members and Members not yet receiving benefits	259,158	261,232
Retired Members receiving monthly benefits	169,068	166,008
Beneficiaries receiving monthly benefits	6,722	6,561
Total	434,948	433,801

The number of retirements over each of the last ten years is as follows:

Fiscal Year	*Number of Retirements*	*Fiscal Year*	*Number of Retirements*
2011-2012	6,033	2016-2017	6,396
2012-2013	6,330	2017-2018	6,416
2013-2014	6,547	2018-2019	6,890
2014-2015	6,161	2019-2020	7,642
2015-2016	6,245	2020-2021	7,617

Historical member statistics, including statistics specific to retired members, appear in the appendices to this report. Additional member statistics may also be found in the Retirement System's most recent Annual Report.

G. FUNDED STATUS

As of June 30, 2021, the actuarial value of plan assets, including GLIF assets, was equal to $130.2 billion. The accrued pension benefit liability calculated in accordance with the Entry Age Normal Cost Method, including GLIF liabilities, was equal to $131.1 billion. These two values produced a funded ratio of 99.3% as of June 30, 2021. If the market value of plan assets is used instead of the actuarial value of plan assets, the funded ratio as of June 30, 2021 would be equal to 113.0%.

For purposes of this funded ratio calculation, the plan liabilities have been calculated in accordance with the Entry Age Normal Cost Method as required by Governmental Accounting Standards Board (GASB) Statement No. 67. The Retirement System is funded in accordance with the Aggregate Cost Method. GASB Statement No. 67 requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded ratio calculation for all plans, regardless of the cost method being used for funding purposes. Both Aggregate and Entry Age Normal are appropriate contribution allocation procedures for purposes of ongoing plan funding and are widely accepted actuarial cost methods.

The funded ratios provided here are an appropriate measurement of the System's funded status. While the funded ratios will fluctuate from year to year, a funded ratio of 100% is desirable and indicative of a well-funded System. The primary reason for this healthy funded ratio is that the Retirement System has collected the actuarially required contribution annually from employers. This is the primary feature that separates well-funded Systems from poorly-funded ones. A funded ratio of 100% does not, however, imply that future contributions will not be required. It says that now the System has assets equal to the present value of its liabilities accrued to date.

The funded status measurement provided here is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the System's benefit obligations such as in a plan termination situation.

A history of the Retirement System's funded status is provided in Appendix 4 of this report.

H. ACTUARIAL EXPERIENCE

Each year the Office of the Actuary completes an experience study to regularly monitor the reasonableness and appropriateness of the actuarial assumptions used in the actuarial valuation. Changes are recommended when warranted. Assumptions are typically revised every five years. These assumptions are used to estimate the probability a member will cease teaching due to retirement, withdrawal, disability, or death. In addition, the assumptions are used to estimate future salary increases, future investment earnings, future projected COLA's, and the probability of death for retired members and beneficiaries. A listing of the actuarial assumptions is provided in Appendix 18. A summary of the results of the most recent five-year experience study is contained in Appendix 11. The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021 and effective with the current actuarial valuation of the Retirement System's assets and liabilities as of June 30, 2021. Specific details regarding the development of these actuarial assumptions can be found in the report entitled "*Report on the 2021 Recommended Actuarial Assumptions*".

I. ASSET ALLOCATION

The Retirement Board, in consultation with Retirement System staff and the System's external investment consultant Callan, annually reviews the asset allocation to determine if any changes are warranted. The only asset allocation change made between June 30, 2021 and the time of this report was a reduction of 1% in Real Estate Debt (decreasing the allocation percentage to 6%) and an increase of 1% in Private Debt (increasing the allocation percentage to 2%). The asset allocation target equity-to-fixed income split was not changed.

System asset values are frequently reviewed, and assets are periodically rebalanced in line with the asset allocation targets and ranges.

The Callan first quarter 2022 long-term capital market projections analysis estimates that the system's asset allocation will produce a long-term expected annual geometric rate of return of 7.3% on a 30-year time horizon, and a geometric annual rate of return of 6.7% on a 20-year time horizon.

The Retirement System's asset allocation, including targets and ranges, can be found in Appendix 13. Historical rate of return information can be found in Appendix 12. Detailed investment information is available in the System's Annual Report.

J. NEW LEGISLATION

The following significant legislation affecting the Retirement System was signed into law during the 2021 Legislative Session:

Extension of the COVID-19 Death Benefit:

Chapter 78 of the Laws of 2021 extended the COVID-19 Death Benefit that was enacted last year to December 31, 2022. The COVID-19 death benefit enables the beneficiary of an eligible active member who died of COVID-19 to elect to receive the accidental death benefit (annuity of 50% of salary) instead of the ordinary active death benefit (generally a lump sum of three times salary plus a refund of member contributions).

The following significant legislation affecting the Retirement System was signed into law during the 2022 Legislative Session and will be reflected in the June 30, 2022 actuarial valuation. None of these items have a material impact on plan costs.

Chapter 56 of the Laws of 2022 (effective April 9, 2022, enacted as part of the State budget)

5-Year Vesting:

Reduces the number of years of credited service required for vesting from ten years to five years for Tier 5 and 6 members for purposes of eligibility for a service retirement benefit or a deferred-vested retirement benefit.

Tier 6 Employee Contribution Rate Temporary Change:

For employee contributions to be made during the two fiscal years ending June 30, 2023 and June 30, 2024, the employee contribution rate for Tier 6 members will be determined using only a member's annual base wages. Compensation earned for extracurricular programs, or any other pensionable earnings paid in addition to the annual base wages will not be included in the employee contribution rate determination, as it ordinarily would.

Temporary Waiver of the Earnings-After-Retirement Limit:

A retiree may be employed and earn compensation in a position at a school district or board of cooperative educational services (BOCES) without suspension or diminution of their retirement allowance. Earnings received from April 9, 2022 to June 30, 2023 will not be applied to the standard Section 212 earnings-after-retirement limit of $35,000 in New York State public employment per calendar year. Post-retirement employment with a charter school, community college, SUNY, or any other NYS public employment is not covered by this law and is still subject to the $35,000 calendar year earnings limitation. Retirees who are age 65 or greater are not subject to any earnings-after-retirement limit.

K. ASSESSMENT OF RISK

Included in Appendix 14 is an Assessment of Risk. The purpose of this exhibit is to provide various plan maturity measures, as well as illustrate the hypothetical Employer Contribution Rate with varying actuarial assumptions. The charts also illustrate the significance of the assumptions on the valuation results, and the potential impact of modifying them.

L. FUTURE EXPECTATIONS

The next employer contribution rate will be based upon the actuarial valuation as of June 30, 2022. The capital markets experienced negative returns during the fiscal year ending June 30, 2022. The System's main domestic equity index, the S&P1500, returned -11.0% for the fiscal year. The System's main international equity index, the ACWI ex-US, returned -19.4% for the fiscal year. The System's fixed income index, the Barclay's US Aggregate Float Adjusted Bond index, returned -10.4% for the fiscal year. The System's finalized investment rate of return for the fiscal year ending June 30, 2022 will not be available until October of 2022. Based on the performance of these benchmarks, however, the System will have a loss on investments for the fiscal year, and the System's five-year rate of return will substantially decrease from last year's 11.9%.

M. CERTIFICATION

This actuarial valuation relies on member data provided by the participating employers to the Retirement System's administrative staff. The administrative and actuarial staff review this data for reasonability and completeness as well as reconcile it against prior data. In addition, the valuation relies on financial data provided by the Retirement System's Finance Department. Data is reviewed by the Retirement System's independent auditors as part of the annual audit. We believe the data to be reasonable and appropriate for purposes of this valuation.

The benefits recognized in this actuarial valuation are prescribed by New York State statute (Article 11 of the Education Law and Articles 11, 14, 15, 18, 19, and 20 of the Retirement and Social Security Law) and are summarized in Appendix 19. All benefits are included in the actuarial valuation.

Future actuarial measurements such as the funded ratio and employer contribution rate may differ significantly from the current measurements presented in this report due to such factors as: future experience that differs significantly from that predicted by the actuarial assumptions; changes in the actuarial assumptions or methods; and changes in plan provisions or applicable law.

The actuarial methods, calculations, and actuarial assumptions are in accordance with standards of practice prescribed by the Actuarial Standards Board and generally accepted actuarial principles and procedures. The actuarial assumptions, as adopted by the Retirement Board and used in determining the liabilities and costs, are internally consistent and reasonably related to actual and anticipated future experience of the Retirement System. The undersigned are members of the American Academy of Actuaries and the Society of Actuaries and meet the qualification standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

[redacted]

Richard A. Young, ASA, EA, MAAA, FCA
Chief Actuary

[redacted]

Melody Prangley, FSA, EA, MAAA, FCA
Deputy Chief Actuary

New York State Teachers' Retirement System
Office of the Actuary
July 26, 2022

RECONCILIATION OF THE MARKET VALUE OF ASSETS

From June 30, 2020 to June 30, 2021

Totals may not add, due to rounding.

		Market Value (in thousands)
1	Market Value of Assets as of June 30, 2020	$120,479,505
2	Contributions and Transfers	
	Employer Contributions	1,618,437
	Member Contributions	159,874
	Net Transfers in/(out)	10,025
		1,788,336
3	Net Investment Income/(Loss)	33,668,008
4	Distributions	
	Benefit Payments	7,731,900
	Administrative Expenses	55,492
		7,787,392
5	Market Value of Assets as of June 30, 2021	$148,148,457

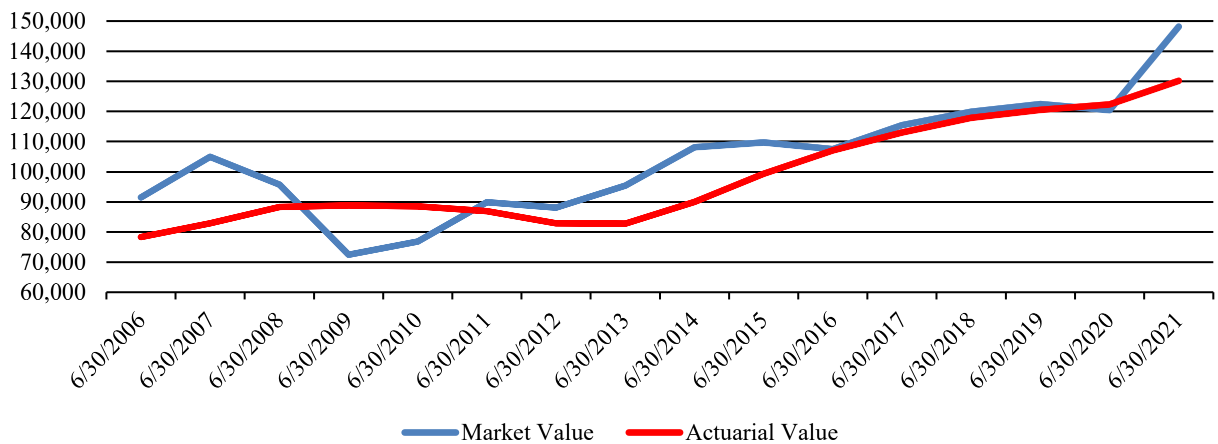
APPENDIX 2

COMPARISON OF MARKET VALUE TO ACTUARIAL VALUE OF ASSETS
(In Millions)

Assets include GLIF assets. The Retirement System's actuarial asset valuation method was changed effective with the June 30, 2007 and June 30, 2015 actuarial valuations.

Fiscal Year Ending	Market Value	Actuarial Value	Fiscal Year Ending	Market Value	Actuarial Value
6/30/2006	91,492.20	78,335.8	6/30/2014	108,155.1	90,007.1
6/30/2007	104,912.9	82,858.9	6/30/2015	109,718.9	99,301.8
6/30/2008	95,769.3	88,254.7	6/30/2016	107,506.1	107,039.2
6/30/2009	72,471.8	88,805.5	6/30/2017	115,468.4	113,059.7
6/30/2010	76,844.9	88,544.4	6/30/2018	119,915.5	117,859.5
6/30/2011	89,889.7	86,892.2	6/30/2019	122,477.5	120,586.9
6/30/2012	88,056.3	82,871.4	6/30/2020	120,479.5	122,400.5
6/30/2013	95,367.0	82,742.5	6/30/2021	148,148.5	130,173.8

Market Value vs. Actuarial Value
(in Millions)



ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS

(In Thousands)

The actuarial present value of future benefits (PVB) is the present value of retirement and ancillary benefit payments, excluding group life insurance benefits. The PVB is the present value of the benefit payments that the Retirement System is expected to pay in the future to current retirees and active and inactive (vested) members. The PVB is based upon both service and salary projected to retirement.

	June 30, 2021	**June 30, 2020**
Present Value of Benefits Currently Being Paid:		
Service Retirement Benefits	$68,662,650	$65,897,141
Disability Retirement Benefits	413,056	375,951
Death Benefits	2,523	2,083
Survivor Benefits	1,169,906	1,150,016
Cost-of-Living Allowance	5,052,489	4,889,298
Total Present Value of Benefits Presently Being Paid	75,300,623	72,314,489
Present Value of Benefits Payable in the Future to Current Active Members:		
Service Retirement Benefits	65,619,677	60,165,966
Disability Retirement Benefits	632,570	238,303
Termination Benefits	1,735,183	2,298,335
Death and Survivor Benefits	501,731	439,006
Cost-of-Living Allowance	1,490,590	1,346,999
Total Active Member Liabilities	69,979,750	64,488,609
Present Value of Benefits Payable in the Future to Current Inactive (Vested) Members:		
Retirement Benefits	492,184	426,494
Death Benefits	269	346
Cost-of-Living Allowance	41,246	35,125
Total Vested Liabilities	533,698	461,965
Unclaimed Funds	24,600	22,012
Total Actuarial Present Value of Future Benefits	**$145,838,672**	**$137,287,075**

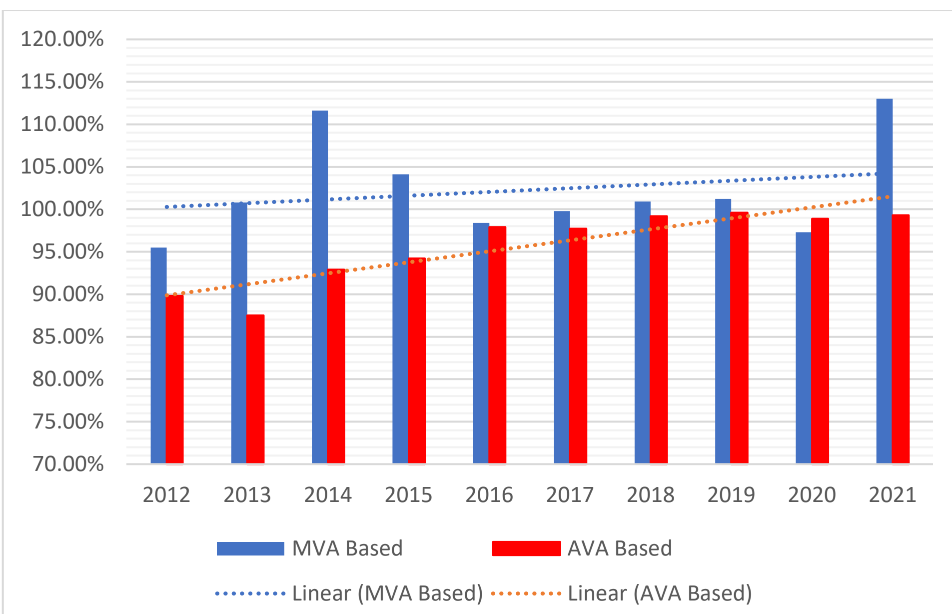
Note: Totals may not sum due to rounding

FUNDING PROGRESS

The actuarial accrued liability is the portion of the actuarial present value of future benefits that is attributable to service rendered as of the valuation date. To assess the funding progress of a retirement system, a comparison between the actuarial value of assets and the actuarial accrued liabilities is made over time.

Funding Progress (In Millions)

Fiscal Year Ended	Market Value of Assets (MVA)	Actuarial Value of Assets (AVA)[1]	Actuarial Accrued Liability	Percent Funded Based on: MVA	AVA
2012	$88,056.3	$82,871.4	$92,250.9	95.5%	89.8%
2013	95,367.0	82,742.5	94,583.8	100.8	87.5
2014	108,155.1	90,007.1	96,904.5	111.6	92.9
2015	109,718.9	99,301.8	105,401.8	104.1	94.2
2016	107,506.1	107,039.2	109,305.1	98.4	97.9
2017	115,468.4	113,059.7	115,672.5	99.8	97.7
2018	119,915.5	117,859.5	118,861.1	100.9	99.2
2019	122,477.5	120,586.9	121,049.3	101.2	99.6
2020	120,479.5	122,400.4	123,801.7	97.3	98.9
2021	148,148.5	130,173.8	131,077.4	113.0	99.3



[1] The Retirement System's asset valuation method was changed effective with the June 30, 2015 actuarial valuation.

APPENDIX 5

EMPLOYER CONTRIBUTION RATE

2021 Valuation

6.95% Interest

Normal Rate	9.89%
Group Life Insurance Rate	0.13
Excess Benefit Plan Rate	0.01
Expense Rate	0.26
Computed Contribution Rate as of June 30, 2021	10.29%

APPENDIX 5 (Cont'd)

NORMAL RATE CALCULATION

2021 Valuation

6.95% Interest

Liabilities

Active Tier 1	
Service Pension	$74,904,754
Disability Pension	0
Vested Pension	0
Active Death over $50,000	1,337,022
Death Benefit After 10-Yr Withdrawal over $50,000	0
Annuity Savings Fund	1,789,224
COLA	586,167
Total	$78,617,167
Active Tier 2	
Service Pension	$88,940,033
Post Retired Death over $50,000	78,125
Disability Pension	28,302
Post Disabled Death over $50,000	96
Vested Pension	0
Active Death over $50,000	403,526
Death Benefit After 10-Yr Withdrawal over $50,000	0
COLA	1,043,712
Total	$90,493,794
Active Tier 3	
Service Pension	$660,293,086
Post Retired Death over $50,000	388,262
Disability Pension	581,755
Post Disabled Death over $50,000	2,544
Refund on Active Death	698,518
Active Death over $50,000	1,892,495
Refund on Quit	2,417
Vested Pension	4,159,085
Death Benefit After 10-Yr Withdrawal over $50,000	0
Refund on Death after Vested Withdrawal	0
COLA	10,869,172
Total	$678,887,334

APPENDIX 5 (Cont'd)

NORMAL RATE CALCULATION (Cont'd)

2021 Valuation

6.95% Interest

Liabilities (Cont'd)

Active Tier 4	
Service Pension	$59,155,993,000
Post Retired Death over $50,000	36,159,652
Disability Pension	526,377,457
Post Disabled Death over $50,000	2,513,134
Refund on Active Death	42,072,949
Active Death over $50,000	300,340,708
Refund on Quit	10,586,799
Vested Pension	1,259,057,921
Death Benefit After 10-Yr Withdrawal over $50,000	1,405,976
Refund on Death after Vested Withdrawal	409,385
COLA	1,262,749,400
Total	$62,597,666,381

Active Tier 5	
Service Pension	$1,385,774,465
Post Retired Death over $50,000	1,141,997
Disability Pension	25,346,234
Post Disabled Death over $50,000	107,744
Refund on Active Death	4,996,210
Active Death over $50,000	14,619,103
Refund on Quit	23,296,805
Vested Pension	70,503,314
Death Benefit After 10-Yr Withdrawal over $50,000	246,340
Refund on Death after Vested Withdrawal	124,000
COLA	38,751,701
Total	$1,564,907,913

Active Tier 6	
Service Pension	$3,625,449,382
Post Retired Death over $50,000	3,907,787
Disability Pension	80,220,478
Post Disabled Death over $50,000	343,888
Refund on Active Death	23,144,145
Active Death over $50,000	56,563,118
Refund on Quit	167,110,789
Vested Pension	196,080,105
Death Benefit After 10-Yr Withdrawal over $50,000	798,555
Refund on Death after Vested Withdrawal	497,129
COLA	132,987,342
Total	$4,287,102,718

APPENDIX 5 (Cont'd)

NORMAL RATE CALCULATION (Cont'd)

2021 Valuation

6.95% Interest

Liabilities (Cont'd)

Retirees	
Retired Pension	$68,584,303,406
Retired Annuity	78,346,109
Disability Pension	412,637,705
Disability Annuity	418,295
Beneficiary Pension	1,157,641,212
Beneficiary Annuity	6,203,774
DBA Pension	5,856,550
DBA Annuity	204,914
Post Retired Death over $50,000	2,046,375
COLA	4,879,126,820
Catch-Up, Prior §532 Supp & Escalation	173,361,697
Total	$75,300,146,857
Vesteds	
Inactive Vested	$492,184,206
Death Benefit After 10-Yr Withdrawal over $50,000	268,520
Active Vested	625,230,522
Death Benefit After 10-Yr Withdrawal over $50,000	873,621
COLA	84,766,723
Total	$1,203,323,592
TIAA	
Service Pension	$1,302,595
Disability Pension	15,559
Vested Pension	30,841
Active Death over $50,000	17,008
COLA	81,147
Total	$1,447,150
Miscellaneous	
Incurred Death but not Paid	$11,478,943
Unclaimed Non-Member Funds	24,599,871
Total	$36,078,814
Total Liabilities	$145,838,671,720

APPENDIX 5 (Cont'd)

NORMAL RATE CALCULATION (Cont'd)

2021 Valuation

6.95% Interest

Assets for Valuation

Current Total Assets (excluding contributions receivable)		$146,431,272,296
Less:	Expense Fund	62,806,524
Less:	Group Life Insurance Fund	453,669,551
Plus:	(Employer Contributions Receivable as of June 30, 2021[1]) x $(1.0695)^{-7/24}$	
	= (1,581,828,057) x $(1.0695)^{-7/24}$	1,551,130,048
Plus:	(Member Contributions Receivable as of June 30, 2021[1]) x $(1.0695)^{-7/24}$"	
	= (135,357,010) x $(1.0695)^{-7/24}$	132,730,182
	Adjusted Market Value of Assets for Normal Rate	$147,598,656,451
Less:	5 Year Smoothing Adjustment	17,878,506,606
	Actuarial Value of Assets for Normal Rate Valuation Purposes	$129,720,149,845

Receivables

Employer Contributions Receivable from Normal Rate in 2022-2023 Fiscal Year[2]	
(2021-2022 Salaries) x (2020 Normal Rate) x $(1.0695)^{(1+7/24)}$	
= (16,464,394,260) x (0.0941) x $(1.0695)^{(1+7/24)}$	$1,420,507,491
Present Value of Future Member Contribuitons[3]	
(Tier 5 Present Value of Future Employee Contributions) x $(1.0695)^{-7/24}$	
= (276,289,172) x $(1.0695)^{-7/24}$	270,927,320
(Tier 6 Present Value of Future Employee Contributions) x $(1.0695)^{-7/24}$	
= (1,833,445,324) x $(1.0695)^{-7/24}$	1,797,864,263
Total Receivables	$3,489,299,074

[1] Employer and Member Contributions Receivables are based on the 2020-2021 Member Paybase and are collected in 3 installments on September 15, October 15, and November 15 of 2021. The discount represents the time value of money to the measurement date.

[2] Employer Contributions Receivable is estimated based on projected 2021-2022 Member Salaries for the closed group population used to value the plan's liabilities and is collected in 3 installments on September 15, October 15, and November 15 of 2022. The discount represents the time value of money to the measurement date.

[3] The Present Values of Future Member Contributions are estimated for the closed group population used to value the plan's liabilities. These member contributions are collected in the years 2022-2023 and beyond and have an additional discount factor applied to adjust for the timing of the actual payments on September 15, October 15, and November 15 of each prospective year.

APPENDIX 5 (Cont'd)

NORMAL RATE CALCULATION (Cont'd)

2021 Valuation

6.95% Interest

Present Value of Future Salaries (PVFS)

	Total PVFS[1]		
Tier 1	$26,746,785		
Tier 2	35,037,746		
Tier 3	202,919,505		
Tier 4	102,025,392,249		
Tier 5	7,893,976,355		
Tier 6	35,473,040,089		
	$145,657,112,729		
2021-2022 Discounted Salary	15,394,478,036		
Net PVFS	$130,262,634,693	x $(1.0695)^{-7/24}$ =	$127,734,671,234

Normal Rate

$$\frac{\text{Total Liabilities} - (\text{Assets} + \text{Receivables})}{\text{Present Value of Future Salaries}}$$

$$= \frac{\$12{,}629{,}222{,}801}{\$127{,}734{,}671{,}234}$$

= 9.887075%

= 9.89% (rounded)

[1] The Present Value of Future Salaries includes billable salaries starting with the 2022-2023 salary year. The billable salaries for the years 2020-2021 and 2021-2022 are excluded from the PVFS because a Normal Rate applicable to the 2020-2021 and 2021-2022 billable salary years has already been determined. The expected contributions thereon are included in the assets as receivables. Contributions are expected to be received on September 15, October 15, and November 15 of 2021 and 2022, respectively. Therefore, the total PVFS is discounted 3.5 months to the measurement date.

GROUP LIFE INSURANCE FUND
(GLIF)
2021 Valuation
6.95% Interest

GLIF Balance as of June 30, 2020	**$348,660,803**
Benefit Payments During 2020-2021	19,836,074
Contributions During 2020-2021	22,065,122
GLIF Net Investment Income During 2020-2021	102,779,700
(Based on 2020-2021 Market Value of Assets Rate of Return of 29%)	
GLIF Balance as of June 30, 2021	**$453,669,551**
Benefit Payments During 2021-2022	21,000,000
Contributions During 2021-2022	22,065,169
GLIF Net Investment Income During 2021-2022	31,888,098
(Based on estimated Market Value of Assets Rate of Return of 6.95%)	
Estimated GLIF Balance as of June 30, 2022	**$486,622,818**

Calculation of the GLIF Rate for the June 30, 2021 Actuarial Valuation:

Expected Salaries for the 2021-2022 Fiscal Year	$17,211,000,000
GLIF Rate	0.13%
Expected Contributions for the 2022-2023 Fiscal Year	$22,374,300

Note that the GLIF Rate is currently maintained at 0.13%. This contribution rate, along with investment income, is expected to cover the expected GLIF benefit payment for the current year. In future years, when the expected GLIF benefit payments are larger than the GLIF Rate of 0.13%, the GLIF Balance will begin to be used.

EXCESS BENEFIT PLAN FUND

2021 Valuation

Excess Benefit Plan Balance as of June 30, 2020	**$3,175,296**
Final Adjustment for the Fiscal Year Ending June 30, 2020	72,910
Benefit Payments During 2020-2021	405,000
Contributions During 2020-2021	4,344
Net Investment Income During 2020-2021[1] (Including miscellaneous adjustments)	0
Excess Benefit Plan Balance as of June 30, 2021	**$2,847,550**
Final Adjustment for the Fiscal Year Ending June 30, 2021	378,501
Benefit Payments During 2021-2022	500,000
Contributions During 2021-2022	0
Net Investment Income During 2021-2022[1] (Including miscellaneous adjustments)	0
Estimated GLIF Balance as of June 30, 2022	**$2,726,051**

Calculation of the Excess Benefit Plan Rate for the June 30, 2021 Actuarial Valuation:
Set the Excess Benefit Plan Rate at 0.01% to increase the balance in the fund.

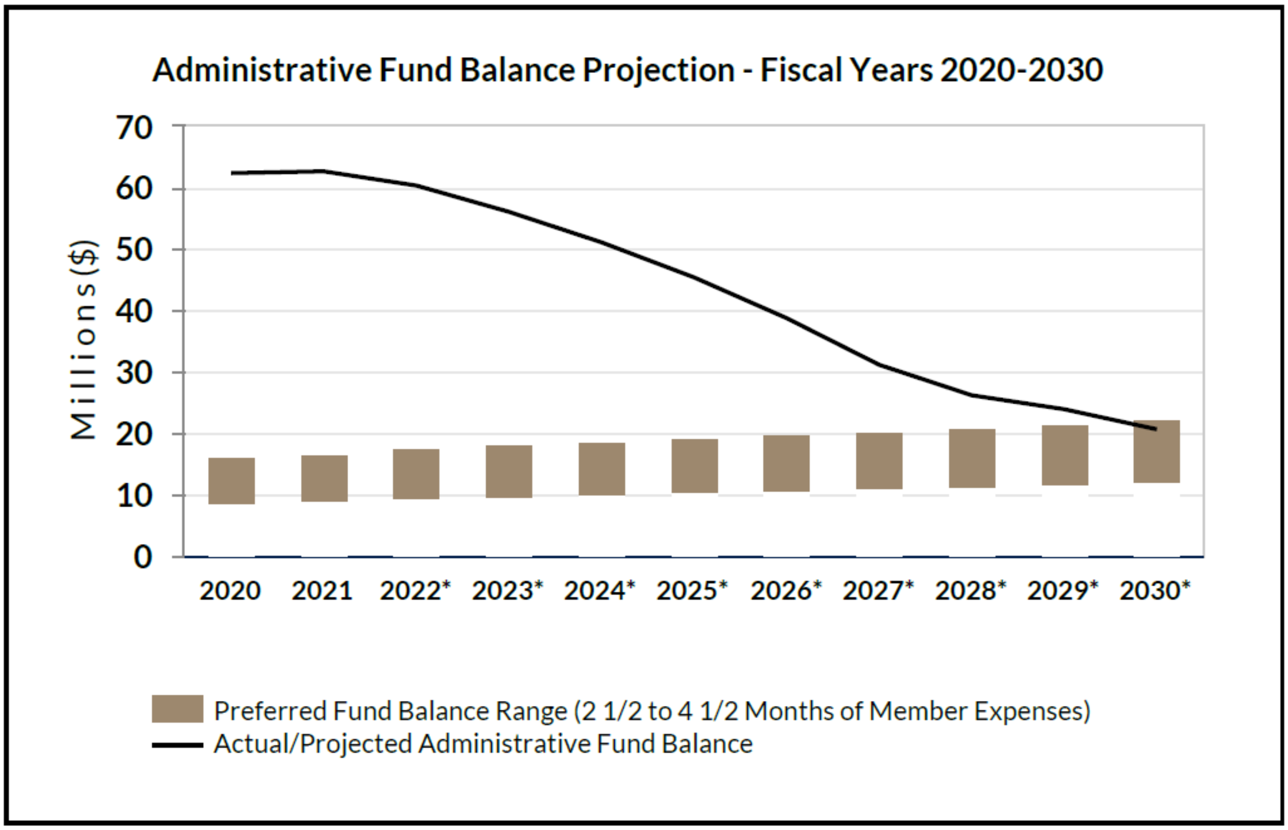
[1] Fund is in a zero-interest checking account.

Administrative Rate and Employer Contributions[1]

The administrative portion (Rate) of the Employer Contribution Rate is adopted annually by the Retirement Board in the amount necessary to defray Retirement Administration related expenses for the following fiscal year. The first step in determining the rate is to divide the projected Retirement Administration related expenses by the projected member payroll. Consideration is also given to the overall status of the fund balance.

Based on the fall collection period for employer contributions, the preferred fund balance has been established to be 2 ½ to 4 ½ months of estimated member-related expenses. Since 2009, the fund balance has exceeded the preferred range due to prudent spending and cost containment initiatives. To bring the fund balance gradually back down within the preferred range, the administrative rate was lowered from 0.27% to 0.26% during the 2018-2019 fiscal year. The 2022-2023 fiscal year will be the fourth year that employer contributions will be collected at the 0.26% rate.

A forecast analysis of expenses was performed. This forecast projects maintaining the Administrative Rate at 0.26% through 2026. The administration fund balance projection includes long term projections, and therefore is likely to change over time. The Board will be kept informed as balances and rates become more accurate.



*Projected fund balance.

Collections Based on Member Payroll – Fiscal Years 2017 - 2024

Annual Member Payroll *(dollars in thousands)*		Employer Contribution	Employer Contributions *(dollars in thousands)*		% Increase (Decrease) in
Year	Amount	Rate (%)	Year Collected	Amount	Contributions
2023-24	$17,696,000 *	0.26% *	2024-25	$46,010 *	1.40% *
2022-23	17,452,000 *	0.26	2023-24	45,375 *	1.40 *
2021-22	17,211,000 *	0.26	2022-23	44,749 *	1.40 *
2020-21	16,973,207	0.26	2021-22	44,130 **	1.63
2019-20	16,973,200	0.26	2020-21	43,421	(1.30)
2018-19	16,691,600	0.26	2019-20	43,994	2.76
2017-18	16,288,900	0.27	2018-19	42,812	2.76
2016-17	15,846,700	0.27	2017-18	41,664	2.66

* *Estimated*

** *Reflects employer contributions based on actual member payroll.*

[1] This entire section comes from the NYSTRS 2022-23 Operating Budget Report

ASSET VALUATION METHOD

Development of Smoothing Adjustment

FYE	Market Value	Contributions	Benefit Payments	Average Market Value[1]
6/30/2016	105,357,811,418	2,726,314,201	6,780,291,815	
6/30/2017	113,516,789,802	2,165,955,433	6,984,647,124	103,399,706,288
6/30/2018	118,230,310,625	1,994,973,683	7,169,609,705	111,345,091,308
6/30/2019	120,617,512,667	1,738,012,513	7,381,558,565	115,770,623,539
6/30/2020	118,887,899,173	1,920,343,091	7,575,286,123	118,190,112,628
6/30/2021	146,431,272,296	1,653,676,471	7,787,392,208	116,165,557,236

FYE	Actual Gain/(Loss)[2]	Expected Gain/(Loss)[3]	Unexpected Gain/(Loss)[4]	Smoothing Adjustment[5]
6/30/2016	2,392,354,248			
6/30/2017	12,951,891,658	7,754,977,972	5,196,913,686	
6/30/2018	9,928,010,678	8,072,519,120	1,855,491,558	
6/30/2019	8,023,178,506	8,393,370,207	(370,191,701)	
6/30/2020	3,923,634,378	8,391,497,997	(4,467,863,619)	
6/30/2021	33,668,008,496	8,247,754,564	25,420,253,932	**17,878,506,606**

[1] Average Market Value = Market Value$_{\text{(previous yr.)}}$ – (.5 x Benefit Payments) + ((8.5/12) x Contributions)

[2] Actual Gain/(Loss) = Net Investment Income

[3] Expected Gain/(Loss) = 7.5% x Average Market Value for fiscal years ending 6/30/2016 and 6/30/2017
Expected Gain/(Loss) = 7.25% x Average Market Value for fiscal years ending 6/30/2018 and 6/30/2019
Expected Gain/(Loss) = 7.10% x Average Market Value for fiscal years ending on or after 6/30/2020

[4] Unexpected Gain/(Loss) = Actual Gain/(Loss) – Expected Gain/(Loss)

[5] Smoothing Adjustment = (.20 x Unexpected Gain/(Loss) 6/30/2018)
+ (.40 x Unexpected Gain/(Loss) 6/30/2019)
+ (.60 x Unexpected Gain/(Loss) 6/30/2020)
+ (.80 x Unexpected Gain/(Loss) 6/30/2021)

APPENDIX 6

HYPOTHETICAL LONG-TERM NORMAL RATE CALCULATION BASED ON NEW ENTRANT NORMAL RATE AS OF JUNE 30, 2021

The long-term expected normal rate has been determined based on the new entrant population for the year ending June 30, 2021. The new entrant population of **9,582 Tier 6 members** is defined to be members with the following characteristics:

1. date of membership between 7/1/2020 and 6/30/2021;
2. active as of 6/30/2021; and
3. no more than 1 year of NYS service as of 6/30/2021.

New Entrant Normal Rate as of June 30, 2021

The New Entrant Normal Rates determined under the benefit structures of Tiers 4, 5 and 6 using the member data for the current class of new entrants and the actuarial assumptions in the **June 30, 2021** actuarial valuation are as follows:

Valuation Rate of Interest: **6.95%**	Valued as Tier 4 Benefit Structure	Valued as Tier 5 Benefit Structure	Valued as Tier 6 Benefit Structure
(1) Present Value of Future Benefits (PVB)	$ 374,775,316	$ 328,655,410	$ 269,019,876
(2) Present Value of Future Member Contributions (PVFC)	48,745,830	105,571,813	139,543,397
(3) Present Value of Future Salaries (PVFS)	2,999,113,587	3,016,337,502	3,016,337,502
(4) Long Term Normal Cost of Benefit Structure as a Percent of Salary: (1) / (3)	12.5%	10.9%	8.9%
(5) Member's Share of the Normal Cost: (2) / (3)	1.6%	3.5%	4.6%
(6) Employer's Share of the Normal Cost: (4) - (5)	**10.9%**	**7.4%**	**4.3%**
Sensitivity Analysis[1] Valuation Rate of Interest: **5.95%**	Valued as Tier 4 Benefit Structure	Valued as Tier 5 Benefit Structure	Valued as Tier 6 Benefit Structure
(1) Present Value of Future Benefits (PVB)	$ 468,835,412	$ 413,734,912	$ 338,428,629
(2) Present Value of Future Member Contributions (PVFC)	49,796,647	111,174,781	145,851,373
(3) Present Value of Future Salaries (PVFS)	3,158,243,143	3,176,422,320	3,176,422,320
(4) Long Term Normal Cost of Benefit Structure as a Percent of Salary: (1) / (3)	14.8%	13.0%	10.7%
(5) Member's Share of the Normal Cost: (2) / (3)	1.6%	3.5%	4.6%
(6) Employer's Share of the Normal Cost: (4) - (5)	**13.2%**	**9.5%**	**6.1%**

History

As of June 30, 2021, and the 4 prior years, the long-term expected normal rates for new entrants determined under the benefit structures for Tiers 4, 5 and 6 are as follows:

Valuation Year	Employer Normal Rate from the Valuation	New Entrant Employer Normal Rate			Sensitivity Analysis[1]			Number of New Entrants[2]
		Tier 4	Tier 5	Tier 6	Tier 4	Tier 5	Tier 6	
2017[3]	10.23%	10.6%	7.6%	4.7%	13.0%	9.8%	6.7%	11,061
2018[4]	8.47%	9.4%	6.8%	4.2%	11.6%	8.8%	6.0%	11,759
2019[5]	9.14%	9.6%	6.9%	4.4%	11.8%	9.0%	6.1%	11,529
2020	9.41%	9.7%	7.1%	4.4%	11.9%	9.1%	6.2%	9,797
2021[6]	9.89%	10.9%	7.4%	4.3%	13.3%	9.5%	6.1%	9,582

These rates represent the employers' costs only, not the total cost of the benefit structure which is in part funded by member contributions and excludes the Expense, GLIF and Excess Benefit Fund rates.

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[1] New Entrant Normal Rate determined using an interest rate that is 1.0% below the actuarial assumed rate of return and the valuation salary scale arithmetically reduced by 0.50%.

[2] Number of new entrants processed through the valuation.

[3] Actuarial assumed rate of return of 7.25%.

[4] Definition of new entrants changed to exclude new members who have more than one year of service because they are transfers in from another retirement system and are older with higher salary. Also, the Present Value of Future Salaries was changed to no longer exclude the current year's salary for the purposes of the New Entrant Normal Rate.

[5] Actuarial assumed rate of return revised from 7.25% to 7.10%.

[6] Actuarial assumed rate of return revised from 7.10% to 6.95%.

MEMBER RECONCILIATION

ACTIVE MEMBERS:

	Male	Female	Total
June 30, 2020	61,140	200,092	**261,232**
Changes During Year:			
Added	2,276	7,844	**10,120**
Withdrawn	1,141	3,262	**4,403**
Retired	1,614	6,003	**7,617**
Died	69	105	**174**
June 30, 2021	60,592	198,566	**259,158**

MEMBERS RETIRED FOR:

	Service*			Disability**			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2020	49,207	114,697	**163,904**	437	1,667	**2,104**	49,644	116,364	**166,008**
Changes During Year:									
Retired	1,599	5,938	**7,537**	15	65	**80**	1,614	6,003	**7,617**
Died	1,773	2,579	**4,352**	38	90	**128**	1,811	2,669	**4,480**
Lump Sum	13	63	**76**	0	0	**0**	13	63	**76**
Restored to Active Membership	0	0	**0**	0	1	**1**	0	1	**1**
June 30, 2021	49,020	117,993	**167,013**	414	1,641	**2,055**	49,434	119,634	**169,068**

*Also includes vested retirees.
**Includes 15 males and 34 females retired for disability who receive a service benefit.

BENEFICIARIES OF DECEASED:

	Service Annuitants			Disability Annuitants			Active Members			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2020	1,491	4,702	**6,193**	108	160	**268**	20	80	**100**	1,619	4,942	**6,561**
Changes During Year:												
Added	178	394	**572**	8	5	**13**	1	2	**3**	187	401	**588**
Died	130	289	**419**	3	4	**7**	0	1	**1**	133	294	**427**
June 30, 2021	1,539	4,807	**6,346**	113	161	**274**	21	81	**102**	1,673	5,049	**6,722**

SUMMARY:

	Male	Female	Total
Active Members	60,592	198,566	**259,158**
Retired Members	49,434	119,634	**169,068**
Beneficiaries	1,673	5,049	**6,722**
Total	111,699	323,249	**434,948**

APPENDIX 8

DISTRIBUTION OF ACTIVE MEMBERS

Distribution by Age as of June 30, 2021

Age as of Last Birthday	Male	Female	Total
15-19	24	64	88
20-24	1,454	5,366	6,820
25-29	4,711	15,838	20,549
30-34	6,420	21,853	28,273
35-39	7,613	25,392	33,005
40-44	9,701	30,374	40,075
45-49	10,066	29,782	39,848
50-54	9,916	31,129	41,045
55-59	6,104	21,244	27,348
60-64	2,924	12,378	15,302
65-69	1,144	3,876	5,020
70-74	378	1,010	1,388
75-79	101	199	300
80-84	24	51	75
85 or older	12	10	22
Total	60,592	198,566	259,158
Average Age (Years – Months)	44-4	44-4	44-4

Distribution by Age and Tier of Membership as of June 30, 2021

Age as of Last Birthday	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
15-19	0	0	0	0	0	88	88
20-24	0	0	0	0	0	6,820	6,820
25-29	0	0	0	71	182	20,296	20,549
30-34	0	0	0	3,304	4,585	20,384	28,273
35-39	0	0	0	19,598	3,152	10,255	33,005
40-44	0	0	0	31,123	1,222	7,730	40,075
45-49	0	0	0	32,950	881	6,017	39,848
50-54	0	0	1	35,041	807	5,196	41,045
55-59	0	0	36	23,398	606	3,308	27,348
60-64	0	4	588	12,475	356	1,879	15,302
65-69	5	93	396	3,588	197	741	5,020
70-74	89	93	71	851	59	225	1,388
75-79	50	7	11	182	9	41	300
80-84	18	5	3	35	3	11	75
85 or older	7	0	0	11	2	2	22
Total	169	202	1,106	162,627	12,061	82,993	259,158
Average Age (Years – Months)	74-11	69-11	64-5	48-9	39-9	35-11	44-4

APPENDIX 8 (Cont'd)

Distribution of Active Members by Age and New York State Service as of June 30, 2021

Male

Age as of Last Birthday	< 10 Years NYS	10+ Years NYS	Total
15-19	24	0	24
20-24	1,454	0	1,454
25-29	4,711	0	4,711
30-34	5,973	447	6,420
35-39	3,855	3,758	7,613
40-44	2,644	7,057	9,701
45-49	1,881	8,185	10,066
50-54	1,543	8,373	9,916
55-59	1,130	4,974	6,104
60-64	746	2,178	2,924
65-69	431	713	1,144
70-74	191	187	378
75-79	51	50	101
80-84	13	11	24
85 or older	10	2	12
Total	24,657	35,935	60,592

Female

Age as of Last Birthday	< 10 Years NYS	10+ Years NYS	Total
15-19	64	0	64
20-24	5,366	0	5,366
25-29	15,837	1	15,838
30-34	20,193	1,660	21,853
35-39	13,319	12,073	25,392
40-44	10,012	20,362	30,374
45-49	8,313	21,469	29,782
50-54	7,975	23,154	31,129
55-59	5,015	16,229	21,244
60-64	2,687	9,691	12,378
65-69	991	2,885	3,876
70-74	331	679	1,010
75-79	68	131	199
80-84	13	38	51
85 or older	6	4	10
Total	90,190	108,376	198,566

Distribution of Active Members by Total Service as of June 30, 2021

Years of Service	Male	Female	Total
0-4	15,379	52,973	68,352
5-9	8,781	35,287	44,068
10-14	7,336	26,946	34,282
15-19	9,941	31,657	41,598
20-24	10,475	29,587	40,062
25-29	5,975	14,716	20,691
30-34	2,113	5,930	8,043
35+	592	1,470	2,062
Total	60,592	198,566	259,158
Average Service (Years – Months)	13-5	12-4	12-7

Distribution of Active Members by Total Service and Tier of Membership as of June 30, 2021

Age as of Last Birthday	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
0-4	25	15	16	3,851	2,663	61,782	68,352
5-9	10	26	45	17,667	5,341	20,979	44,068
10-14	13	21	92	29,955	4,006	195	34,282
15-19	11	23	72	41,423	41	28	41,598
20-24	11	10	139	39,888	7	7	40,062
25-29	6	15	147	20,519	3	1	20,691
30-34	19	13	119	7,891	0	1	8,043
35+	74	79	476	1,433	0	0	2,062
Total	169	202	1,106	162,627	12,061	82,993	259,158
Average Service (Years – Months)	29-6	26-3	29-3	18-0	7-4	2-8	12-7

Total and Average Earnings by Tier of Membership for Active Members as of June 30, 2021

	Total Earnings	Average Earnings*	Average Earnings* of Full-Time Members
Tier 1	$13,651,770	$105,828	$121,204
Tier 2	$15,104,288	$100,028	$113,710
Tier 3	$101,014,360	$103,711	$109,682
Tier 4	$13,264,857,451	$93,212	$96,400
Tier 5	$615,597,127	$65,163	$70,968
Tier 6	$2,733,916,488	$45,126	$57,199
Total	$16,744,141,484	$78,392	$86,307

*Average earnings calculated using only those active members with earnings during the 2020 – 21 school year.

APPENDIX 9
HISTORICAL MEMBER STATISTICS

Active Members and Annuitants 1925-2021

As of June 30	Active Members	Retirees & Beneficiaries
1925	29,057	1,815
1930	39,663	2,732
1935	45,031	3,919
1940	48,193	4,771
1945	52,359	5,637
1950	56,504	6,374
1955	71,273	7,897
1960	99,555	10,796
1965	129,543	16,043
1970	186,914	22,700
1975	227,038	35,252
1980	203,330	46,812
1985	178,516	57,366
1990	195,194	69,127
1995	199,398	82,459
2000	224,986	100,839
2005	260,356	125,325
2010	285,774	141,716
2015	267,715	158,458
2020	261,232	172,569
2021	259,158	175,790

Number of Active Members by Tier

As of June 30	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Total
2002	35,601	15,121	19,674	172,438	-	-	242,834
2003	28,327	14,463	19,083	185,374	-	-	247,247
2004	22,986	13,947	18,835	198,747	-	-	254,515
2005	17,901	13,210	18,535	210,710	-	-	260,356
2006	13,621	12,084	18,173	220,532	-	-	264,410
2007	10,838	10,178	17,743	231,286	-	-	270,045
2008	8,630	8,171	17,007	241,093	-	-	274,901
2009	6,943	6,752	16,111	250,532	-	-	280,338
2010	5,582	5,706	14,942	255,966	3,578	-	285,774
2011	3,814	4,137	12,690	247,530	12,264	-	280,435
2012	2,756	3,253	11,180	239,199	19,969	916	277,273
2013	1,968	2,447	9,450	231,258	19,452	8,753	273,328
2014	1,439	1,810	7,753	222,545	19,124	17,368	270,039
2015	1,116	1,348	6,222	214,020	18,878	26,131	267,715
2016	832	974	4,920	204,912	18,540	36,172	266,350
2017	607	720	3,881	195,226	17,722	46,605	264,761
2018	446	546	2,993	186,581	16,499	57,525	264,590
2019	349	403	2,276	178,516	14,595	67,378	263,517
2020	249	282	1,638	170,306	13,040	75,717	261,232
2021	169	202	1,106	162,627	12,061	82,993	259,158

RETIREMENT STATISTICS

Members Retired in 2020-2021 for:

	Service*	Disability
Number Retired	**7,537**	**80**
Age at Retirement:		
Average	61 yrs. 5 mos.	50 yrs. 7 mos.
Median	61 yrs. 6 mos.	50 yrs. 5 mos.
Years of Service:		
Average	26 yrs. 3 mos.	19 yrs. 8 mos.
Median	28 yrs. 0 mos.	19 yrs. 7 mos.
Benefit**:		
Average	$49,145	$30,076
Median	$50,322	$29,292
Final Average Salary (FAS):		
Average	$91,713	$82,312
Median	$92,370	$81,431
Benefit as % of FAS***:		
Average	49.22%	35.79%
Median	53.33%	33.33%

Members Retired in 2020-2021 for Service* with:

	Less Than 10 Yrs. Svc.	10 or More Yrs. and Less Than 20 Yrs. Svc.	20 or More Yrs. and Less Than 30 Yrs. Svc.	30 or More Yrs. Svc.
Number Retired	**300**	**1,063**	**2,739**	**3,435**
Age at Retirement:				
Average	61 yrs. 10 mos.	62 yrs. 6 mos.	63 yrs. 1 mo.	59 yrs. 9 mos.
Median	61 yrs. 1 mo.	62 yrs. 6 mos.	62 yrs. 9 mos.	58 yrs. 9 mos.
Years of Service:				
Average	7 yrs. 3 mos.	15 yrs. 0 mos.	24 yrs. 1 mo.	33 yrs. 2 mos.
Median	7 yrs. 5 mos.	15 yrs. 1 mo.	24 yrs. 0 mos.	32 yrs. 2 mos.
Benefit**:				
Average	$4,228	$12,601	$40,194	$71,515
Median	$3,469	$9,373	$38,928	$68,202
Final Average Salary (FAS):				
Average	$37,676	$53,927	$87,629	$111,382
Median	$35,013	$43,546	$86,738	$105,626
Benefit as % of FAS***:				
Average	10.72%	22.79%	45.24%	63.94%
Median	10.19%	22.78%	45.11%	63.00%

*Also includes vested retirees.
**The Maximum, even though the member may have chosen an option.
***The average and median of individual benefits as percentages of final average salary.

All Retirees as of June 30, 2021 Retired for:

	Service*	Disability
Number Retired	**167,062**	**2,006**
Age at Retirement:		
Average	59 yrs. 1 mo.	49 yrs. 7 mos.
Median	58 yrs. 1 mo.	50 yrs. 4 mo.
Age Attained as of June 30, 2021:		
Average	73 yrs. 6 mos.	66 yrs. 0 mos.
Median	73 yrs. 0 mos.	66 yrs. 8 mos.
Years of Service:		
Average	27 yrs. 8 mos.	18 yrs. 4 mos.
Median	30 yrs. 1 mo.	17 yrs. 6 mos.
Benefit**:		
Average	$43,943	$21,895
Median	$44,371	$20,128
Final Average Salary (FAS):		
Average	$76,245	$60,585
Median	$74,290	$57,459
Benefit as % of FAS***:		
Average	53.53%	35.40%
Median	60.00%	33.33%

All Retirees as of June 30, 2021 Retired for Service* with:

	Less Than 10 Yrs. Svc.	10 or More Yrs. and Less Than 20 Yrs. Svc.	20 or More Yrs. and Less Than 30 Yrs. Svc.	30 or More Yrs. Svc.
Number Retired	**5,028**	**23,795**	**49,609**	**88,630**
Age at Retirement:				
Average	60 yrs. 5 mos.	59 yrs. 3 mos.	60 yrs. 4 mos.	58 yrs. 3 mos.
Median	59 yrs. 7 mos.	57 yrs. 11 mos.	60 yrs. 8 mos.	57 yrs. 2 mos.
Years of Service:				
Average	7 yrs. 4 mos.	14 yrs. 5 mos.	24 yrs. 7 mos.	34 yrs. 3 mos.
Median	7 yrs. 5 mos.	14 yrs. 5 mos.	25 yrs. 0 mos.	34 yrs. 0 mos.
Benefit**:				
Average	$4,284	$9,894	$34,636	$60,543
Median	$3,662	$7,699	$32,190	$56,730
Final Average Salary (FAS):				
Average	$40,764	$44,098	$72,423	$89,028
Median	$37,190	$37,215	$68,258	$83,944
Benefit as % of FAS***:				
Average	10.54%	21.79%	47.53%	67.85%
Median	10.17%	20.96%	48.00%	67.11%

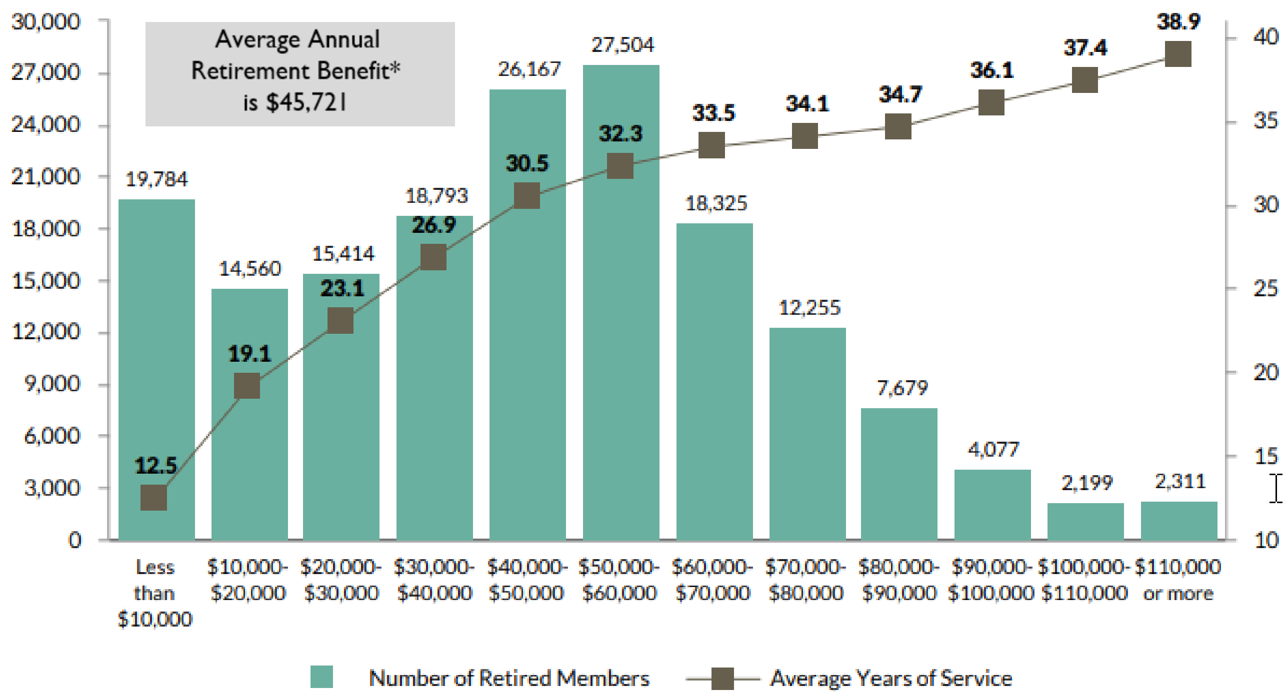
*Also includes vested retirees.
**The Maximum, even though the member may have chosen an option.
***The average and median of individual benefits as percentages of final average salary.

Retired Members' Characteristics* by Year of Retirement

Retired in Fiscal Year Ended	Number of Retired Members	Average Age at Retirement (yrs. – mos.)	Average Service at Retirement (yrs. – mos.)	Average Final Average Salary	Average Maximum Annual Benefit
2012	6,033	60-9	26-3	$82,461	$45,759
2013	6,330	60-10	25-6	81,987	44,768
2014	6,547	61-0	25-4	84,545	44,978
2015	6,161	60-11	25-4	84,362	44,487
2016	6,245	61-2	25-0	84,308	44,215
2017	6,396	61-3	25-0	85,242	45,049
2018	6,416	61-1	25-1	86,910	45,725
2019	6,890	61-0	25-1	87,085	45,713
2020	7,642	61-4	25-8	90,228	48,273
2021	7,617	61-5	26-3	91,713	49,145

*Averages are for service and vested retirees

DISTRIBUTION OF THE ANNUAL BENEFIT* OF ALL RETIRED MEMBERS — as of June 30, 2021



*Maximum annual retirement benefit including supplementation and COLA.

2017 – 2021 Experience Study (Based on Appendix 18 Assumptions)

I. Active Member Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
20 – 24	0	1.11	0.00	1	1.90	0.53
25 – 29	11	3.86	2.85	8	7.83	1.02
30 – 34	6	8.26	0.73	12	17.52	0.68
35 – 39	10	15.53	0.64	29	31.64	0.92
40 – 44	19	22.89	0.83	46	45.89	1.00
45 – 49	53	33.65	1.58	61	68.52	0.89
50 – 54	43	44.78	0.96	89	94.52	0.94
55 – 59	45	49.08	0.92	102	119.74	0.85
60 – 64	41	43.17	0.95	96	110.3	0.87
65 – 69	19	23.86	0.80	74	53.08	1.39
70 – 74	8	9.01	0.89	24	18.82	1.28
75 – 79	2	3.50	0.57	5	8.44	0.59
	257	258.70	0.99	547	578.20	0.95

II. Disability Retirement Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
30 – 34	2	0.46	4.35	9	2.28	3.95
35 – 39	9	5.78	1.56	21	15.78	1.33
40 – 44	18	14.78	1.22	53	47.32	1.12
45 – 49	26	28.99	0.90	87	93.01	0.94
50 – 54	37	43.48	0.85	152	145.62	1.04
55 – 59	10	21.38	0.47	72	97.01	0.74
60 – 64	5	6.87	0.73	22	36.92	0.60
65 – 69	2	1.32	1.52	2	4.71	0.42
70 – 74	0	0.11	0.00	0	0.01	0.00
75 – 79	0	0	0.00	0	0.00	0.00
	109	123.17	0.88	418	442.95	0.94

APPENDIX 11 (Cont'd)

III. Withdrawal Rates

Service	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
0 – 4	6,786	6,324.55	1.07	21,989	20,549.31	1.07
5 – 9	1,186	1,081.34	1.10	5,009	4,656.87	1.08
10 – 14	611	543.49	1.12	2,948	2,708.41	1.09
15 – 19	387	380.40	1.02	1,210	1,135.10	1.07
20 – 24	193	183.73	1.05	486	461.11	1.05
25 – 29	70	68.18	1.03	116	123.16	0.94
30 +	20	21.91	0.91	45	30.80	1.46
	9,253	8,603.60	1.08	31,803	29,664.76	1.07

IV. Retirement Rates

With at Least 5 Years of Service and Less Than 20 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	138	137.43	1.00	919	922.73	1.00
60 – 64	287	301.56	0.95	1,716	1,681.76	1.02
65 – 69	293	303.83	0.96	1,146	1,056.85	1.08
70 – 74	83	96.37	0.86	200	199.99	1.00
75 – 79	15	26.77	0.56	40	44.37	0.90
	816	865.96	0.94	4,021	3,905.70	1.03

With at Least 20 Years of Service and Less Than 30 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	472	428.30	1.10	1,830	1,723.81	1.06
60 – 64	917	914.49	1.00	5,154	5,061.18	1.02
65 – 69	387	369.25	1.05	2,439	2,310.31	1.06
70 – 74	66	57.54	1.15	317	290.16	1.09
75 – 79	11	11.17	0.98	58	47.71	1.22
	1,853	1,780.75	1.04	9,798	9,433.17	1.04

APPENDIX 11 (Cont'd)

With at Least 30 Years of Service

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
55 – 59	2,023	1,957.97	1.03	5,484	5,364.19	1.02
60 – 64	1,146	1,078.49	1.06	3,217	3,085.54	1.04
65 – 69	395	371.80	1.06	1,063	965.96	1.10
70 – 74	80	69.67	1.15	253	220.14	1.15
75 – 79	15	13.25	1.13	51	49.19	1.04
	3,659	3,491.18	1.05	10,068	9,685.02	1.04

V. Healthy Annuitant Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
54 & Under	0	0.00	0.00	3	0.00	0.00
55 – 59	40	27.77	1.44	86	71.80	1.20
60 – 64	112	99.34	1.13	251	241.69	1.04
65 – 69	398	350.83	1.13	698	658.32	1.06
70 – 74	917	844.34	1.09	1,169	1,098.45	1.06
75 – 79	1,180	1,227.66	0.96	1,457	1,466.18	0.99
80 – 84	1,599	1,558.37	1.03	1,877	1,776.71	1.06
85 – 89	2,182	1,986.25	1.10	2,644	2,435.12	1.09
90 – 94	1,609	1,468.39	1.10	2,789	2,796.36	1.00
95 - 99	495	466.09	1.06	1,609	1,551.58	1.04
100 - 104	65	60.62	1.07	384	377.15	1.02
105 +	5	3.81	1.31	43	41.40	1.04
	8,602	8,093.47	1.06	13,010	12,514.76	1.04

APPENDIX 11 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
54 & Under	0	0.28	0.00	2	0.24	8.33
55 – 59	3	1.02	2.94	0	1.18	0.00
60 – 64	3	3.54	0.85	2	4.75	0.42
65 – 69	19	11.37	1.67	17	17.02	1.00
70 – 74	34	28.94	1.17	49	50.88	0.96
75 – 79	37	43.17	0.86	101	111.55	0.91
80 – 84	60	68.87	0.87	204	201.35	1.01
85 – 89	151	119.01	1.27	311	321.66	0.97
90 – 94	138	123.95	1.11	389	391.72	0.99
95 - 99	66	66.56	0.99	257	250.10	1.03
100 - 104	17	16.43	1.03	53	58.02	0.91
105 +	2	1.95	1.03	9	11.26	0.80
	530	485.09	1.09	1,394	1,419.73	0.98

VII. Disability Mortality Rates

Age	Male			Female		
	Actual	Expected	A/E	Actual	Expected	A/E
44 & Under	6	0.41	14.63	7	2.10	3.33
45 – 49	3	1.52	1.97	14	5.36	2.61
50 - 54	2	3.14	0.64	35	14.45	2.42
55 – 59	9	6.42	1.40	22	25.78	0.85
60 – 64	6	5.98	1.00	38	30.46	1.25
65 – 69	8	12.94	0.62	44	39.49	1.11
70 – 74	18	19.32	0.93	41	40.08	1.02
75 – 79	35	17.04	2.05	34	28.57	1.19
80 – 84	12	12.16	0.99	32	20.68	1.55
85 – 89	15	11.65	1.29	17	19.07	0.89
90 +	6	3.29	1.82	24	21.19	1.13
	120	93.87	1.28	308	247.23	1.25

APPENDIX 11 (Cont'd)

VIII. Salary Scale (Dollars in Thousands)[1]

Duration	Previous Year's Salaries	Actual Salaries	Expected Salaries	Actual/Expected
1	$1,713,287	$2,340,618	$1,898,151	1.233
2	1,767,040	1,889,069	1,910,877	0.989
3	1,738,467	1,831,378	1,857,205	0.986
4	1,660,331	1,734,004	1,756,963	0.987
5	1,570,676	1,638,113	1,652,037	0.992
6	1,520,244	1,584,451	1,593,216	0.994
7	1,528,468	1,587,673	1,598,624	0.993
8	1,638,481	1,700,103	1,711,721	0.993
9	1,881,206	1,951,857	1,963,603	0.994
10	2,184,576	2,261,873	2,278,513	0.993
11	2,481,774	2,573,089	2,586,257	0.995
12	2,825,661	2,923,288	2,941,230	0.994
13	3,105,156	3,208,878	3,228,121	0.994
14	3,359,616	3,465,518	3,487,281	0.994
15	3,600,669	3,711,601	3,731,733	0.995
16	3,901,029	4,013,699	4,036,395	0.994
17	4,063,303	4,174,192	4,198,205	0.994
18	4,132,895	4,243,111	4,263,907	0.995
19	4,064,154	4,171,096	4,188,110	0.996
20	3,809,254	3,886,140	3,920,865	0.991
21	3,388,930	3,457,281	3,484,837	0.992
22	3,039,478	3,096,826	3,122,759	0.992
23	2,684,726	2,733,650	2,755,871	0.992
24	2,376,077	2,418,429	2,437,142	0.992
25	2,078,735	2,111,559	2,130,704	0.991
26	1,892,987	1,919,261	1,938,987	0.990
27	1,743,729	1,767,819	1,785,055	0.990
28	1,639,617	1,663,727	1,677,328	0.992
29	1,557,356	1,576,580	1,592,396	0.990
30	1,284,432	1,253,071	1,312,561	0.955
31	984,902	975,525	1,005,979	0.970
32	765,623	752,465	781,701	0.963
33	543,704	532,096	554,796	0.959
34	380,556	374,628	388,167	0.965
35	273,598	271,093	278,933	0.972
36	196,232	190,121	199,980	0.951
37	139,565	135,957	142,161	0.956
38	104,604	101,753	106,518	0.955
39	79,700	75,053	81,159	0.925
40	259,770	249,017	264,549	0.941
Total	**$77,960,610**	**$80,545,664**	**$80,844,600**	**0.996**

[1] Totals may not sum due to rounding.

APPENDIX 12

RATES

Investment Rate of Return on
Market and Actuarial Value of Assets as of June 30, 2021

Annualized Rates of Return over the Last	Based Upon Market Value of Assets	Based Upon Actuarial Value of Assets[1]
1 Year	29.0%	11.7%
3 Years	12.6%	8.6%
5 Years	11.9%	8.9%
10 Years	10.1%	8.9%
15 Years	8.1%	8.5%
20 Years	7.8%	7.0%
25 Years	8.5%	8.9%
30 Years	9.2%	

[1] The Retirement System's asset valuation method was changed effective with the June 30, 2007 and June 30, 2015 actuarial valuations.

Inflation as of June 30, 2021

Annualized Inflation over the Last	Inflation Assumption		COLA Benefit	
	Actual	Expected[2]	Actual	Expected
1 Year	2.62%	2.2%	1.4%	1.3%
3 Years	2.01%	2.2%	1.1%	1.3%
5 Years	2.15%	2.2%	1.2%	1.3%

[2] The annual assumption for estimating future COLA benefit payments was set at 1.3% effective with the June 30, 2019 actuarial valuation, updated from 1.5%. The COLA increase is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore, the estimate of inflation for the COLA benefit is the result of analyzing available CPI data for the last 25 years with percentages bounded between 2.0% and 6.0% and reduced by 50%. The COLA benefit began in 2001.

APPENDIX 12 (Cont'd)

RATES OF RETURN

Annual Rates of Return through June 30, 2021

Year Ending June 30th	Annual Rate of Return	Year Ending June 30th	Annual Rate of Return
1983	37.1%	2006	11.8%
1984	-4.8%	2007	19.4%
1985	31.3%	2008	-6.3%
1986	28.4%	2009	-20.5%
1987	14.6%	2010	12.1%
1988	-1.5%	2011	23.2%
1989	16.8%	2012	2.8%
1990	11.4%	2013	13.7%
1991	8.3%	2014	18.2%
1992	13.0%	2015	5.2%
1993	13.6%	2016	2.3%
1994	1.8%	2017	12.5%
1995	19.3%	2018	9.0%
1996	18.8%	2019	7.1%
1997	22.0%	2020	3.5%
1998	21.5%	2021	29.0%
1999	14.0%		
2000	6.8%		
2001	-5.7%		
2002	-6.8%		
2003	4.0%		
2004	16.1%		
2005	10.6%		

APPENDIX 13

ASSET ALLOCATION

The table below displays the Retirement System's asset allocation targets, ranges, and actual allocation percentages for the June 30, 2021 actuarial valuation. A slight revision to the asset allocation was adopted by the Retirement Board on July 28, 2021, moving 1% out of Real Estate Debt (decreasing its target to 6%) and into Private Debt (increasing its target to 2%). System asset values are frequently reviewed, and assets are periodically rebalanced in line with the asset allocation targets and ranges.

	Target	**Range**	**Actual**
Equity			
Domestic Equity	33%	29 – 37%	34.2%
International Equity	16%	12 – 20%	17.0%
Global Equity	4%	0 – 8%	3.5%
Real Estate Equity	11%	6 – 16%	10.2%
Private Equity	8%	3 – 13%	10.1%
Total Equity	***72%***		***75.0%***
Debt			
Domestic Fixed Income	16%	12 – 20%	12.9%
High-Yield Bonds	1%	0 – 3%	0.6%
Global Bonds	2%	0 – 3%	2.2%
Real Estate Debt	6%	2 – 10%	5.1%
Private Debt	2%	0.5 – 5%	0.8%
Cash Equivalents	1%	0 – 4%	3.4%
Total Debt	***28%***		***25.0%***

Changes to the Asset Allocation between June 30, 2020 and June 30, 2021

None.

APPENDIX 14

ASSESSMENT OF RISK

ACTUARIAL STANDARDS OF PRACTICE NO. 51

NYSTRS is exposed to the following significant risks that can impact the plan's future financial condition, including the plan's funded status and employer contribution rates.

1. **Investment risk** – the potential that investment returns on System assets will be different than expected. If future returns are less than expected, employers will be required to contribute greater amounts. The System currently has 72% of its targeted asset allocation in equity investments, and 28% in fixed income instruments.

2. **Longevity and other demographic risks** – the potential that mortality or other demographic experience will be different than expected. Increases in longevity, for example, imply that retirees are living longer than expected. Retirees living longer than expected translates into more years of benefit payments and increasing costs to the plan. Actuarial assumption studies were used to develop the actuarial assumptions used in the valuation. The System's actuarial valuation uses base annuitant mortality rates which are developed from Society of Actuary (SOA) tables as well as our own member experience. Generationally-applied mortality improvement developed by the SOA is then applied to these base rates to account for anticipated future mortality improvement. Another demographic risk concerns the ages at which members retire. Generally, the earlier members retire, the greater the expense for the plan, as more years of benefit payments will be required. Typically, these types of changes emerge slowly over time and assumptions are periodically revised to reflect them.

3. **Assumption Modification risk** – the potential that plan experience begins to deviate significantly from the actuarial assumptions, and the assumptions are modified to better reflect recent experience and better predict expected future experience. The most impactful of the actuarial assumptions is the assumed investment rate of return. Even a small change in the plan's assumed rate of return will have a large impact on the employer contribution rate.

4. **Contribution risk** – the potential that employers will fail to make the actuarially determined contribution. In accordance with statute and case law, employers are required to contribute at the actuarially determined employer contribution rate as adopted by the Retirement Board and have historically done so. If this rate were to quickly climb precipitously high, however, this would put a significant amount of stress on school district budgets.

5. **Interest rate risk** – the risk that interest rates in the economy, specifically inflation, will greatly increase. Only one part of the System's benefit structure is inflation-related; that is the System's COLA benefit. The COLA is greatly controlled, however, in that both the COLA percentage and the amount to which it is applied are both capped. The COLA percentage, defined as one-half of the increase in the CPI, cannot exceed 3%. Additionally, the COLA is only granted to the first $18,000 of annual benefit. Because of these limitations the System is not at great risk of substantial increase in liability due to an increase in inflation.

6. **Benefit change risk** – the risk for the provisions of the plan to be changed such that the funding is changed materially. In addition to the actual payments to and from the plan being changed, future valuation measurements can also be impacted.

A. Plan Maturity Measurements

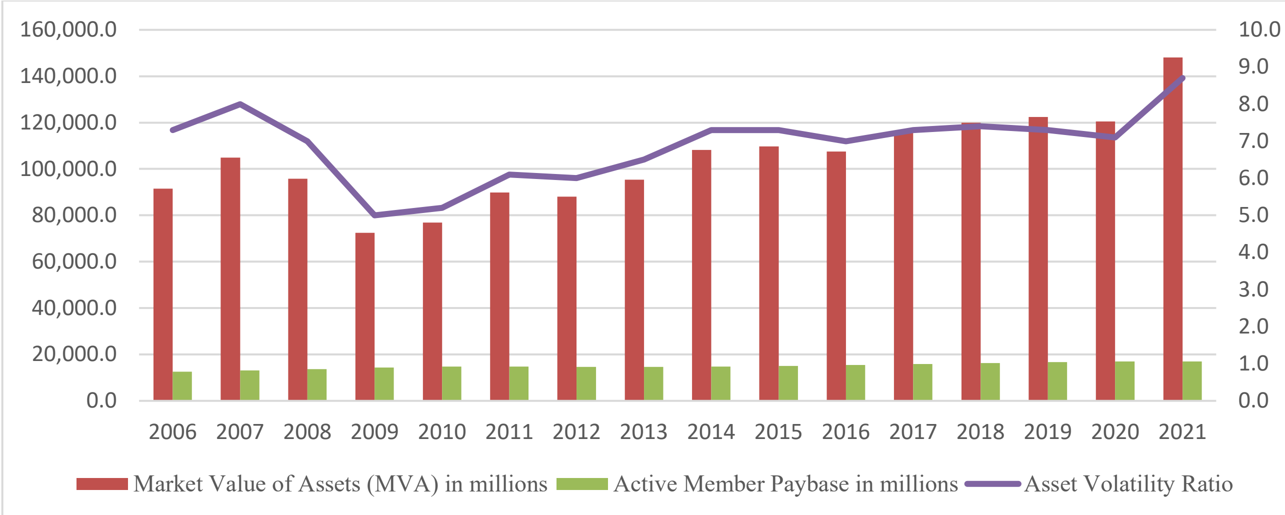
1. Asset Volatility Ratio

The asset volatility ratio is the market value of assets of the plan divided by the active member payroll. As a plan matures, its assets typically increase. The greater a plan's assets are relative to payroll, the more vulnerable the Plan is to investment volatility. NYSTRS' asset volatility ratio increased from 7.1 as of June 30, 2020 to 8.7 as of June 30, 2021 due to the substantial investment gain over the 2021 fiscal year. An asset volatility ratio of 8.7 implies that if the assets return 10% less than expected, there is an increase to the amount remaining to be funded equal to 87% of member pay base. This does NOT imply, however, that the employer contribution rate would increase by 87%. Asset gains and losses are smoothed in the valuation, and liabilities remaining to be funded are spread over the present value of future members' salaries, which have a mitigating effect.

Recent years of relatively good performance and experience have driven the ECR down to a relatively low point, leaving it susceptible to large increases following poor performance.

A higher asset volatility ratio is also indicative of a plan having a high level of assets, which is clearly a good result and preferable to having a low level of assets.

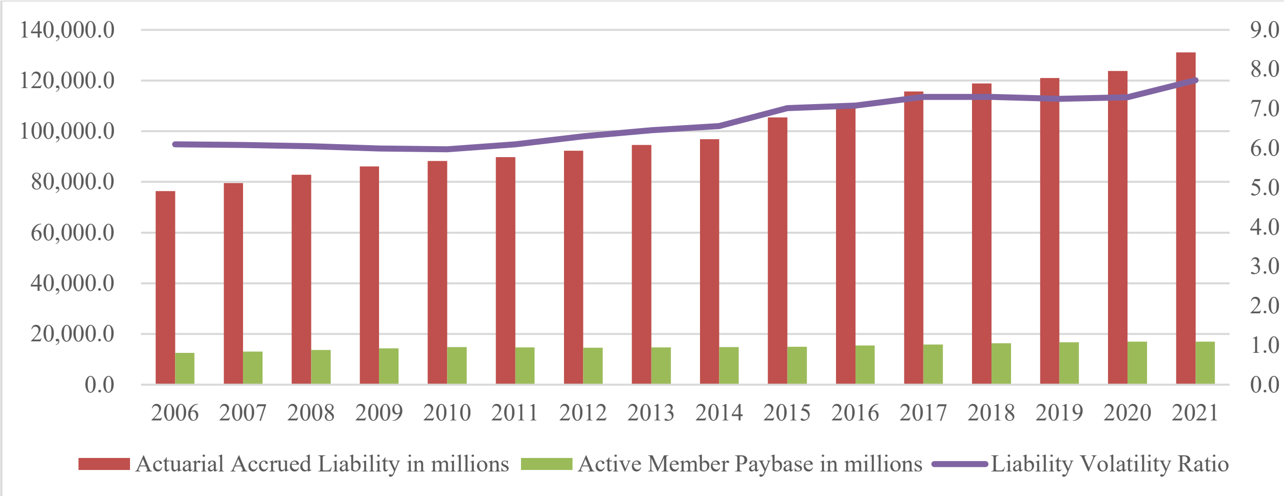
Fiscal Year Ending June 30th	**Market Value of Assets (in millions)**	**Active Member Paybase (in millions)**	**Asset Volatility Ratio**
2006	91,492.2	12,518.0	7.3
2007	104,912.9	13,083.0	8.0
2008	95,769.3	13,690.1	7.0
2009	72,471.8	14,366.4	5.0
2010	76,844.9	14,792.1	5.2
2011	89,889.7	14,732.9	6.1
2012	88,056.3	14,640.8	6.0
2013	95,367.0	14,647.8	6.5
2014	108,155.1	14,771.3	7.3
2015	109,718.9	15,021.4	7.3
2016	107,506.1	15,431.0	7.0
2017	115,468.4	15,846.7	7.3
2018	119,915.5	16,288.9	7.4
2019	122,477.5	16,691.6	7.3
2020	120,479.5	16,973.2	7.1
2021	148,148.5	16,973.2	8.7



2. *Liability Volatility Ratio*

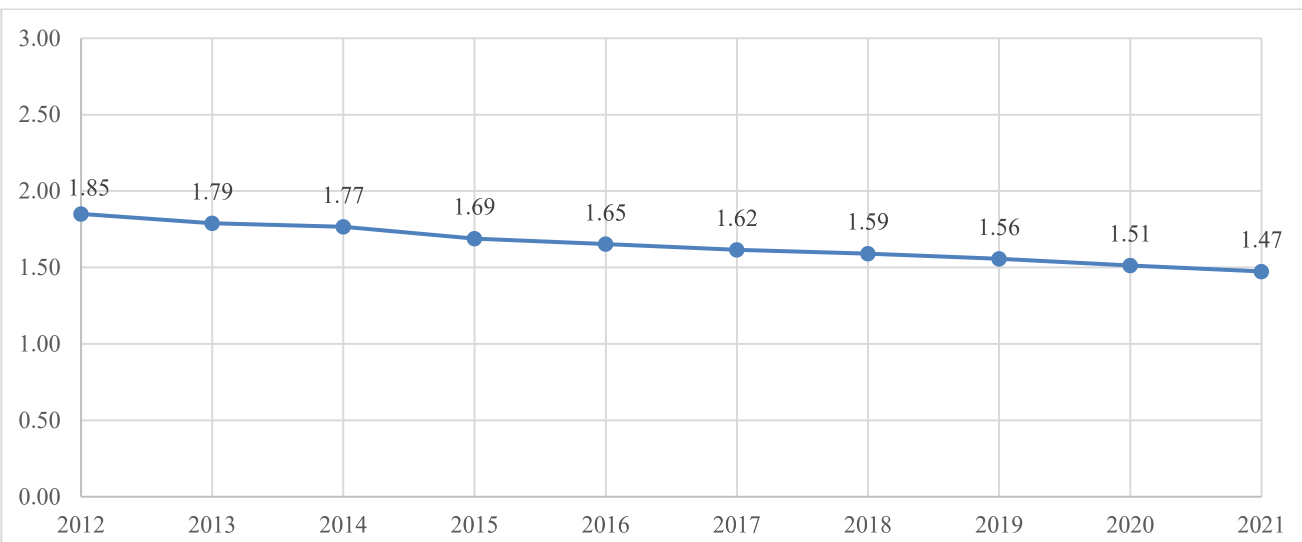
The liability volatility ratio is the actuarial accrued liability using the Entry Age Normal Actuarial funding method divided by the active member payroll. Changes in assumptions such as reducing the assumed rate of return and improving mortality assumptions can have a significant impact on a plan's liability. For plans with a high liability volatility ratio, these changes are more significant than for plans with low ratios. However, as plans naturally mature, it is expected that their liability volatility ratios will grow as well.

Fiscal Year Ending June 30th	Actuarial Accrued Liability (in millions)	Active Member Paybase (in millions)	Liability Volatility Ratio
2006	76,353.0	12,518.0	6.1
2007	79,537.2	13,083.0	6.1
2008	82,777.5	13,690.1	6.0
2009	86,062.0	14,366.4	6.0
2010	88,318.8	14,792.1	6.0
2011	89,824.9	14,732.9	6.1
2012	92,250.9	14,640.8	6.3
2013	94,583.8	14,647.8	6.5
2014	96,904.5	14,771.3	6.6
2015	105,401.8	15,021.4	7.0
2016	109,305.1	15,431.0	7.1
2017	115,672.5	15,846.7	7.3
2018	118,861.1	16,288.9	7.3
2019	121,049.3	16,691.6	7.3
2020	123,801.7	16,973.2	7.3
2021	131,077.4	16,973.2	7.7



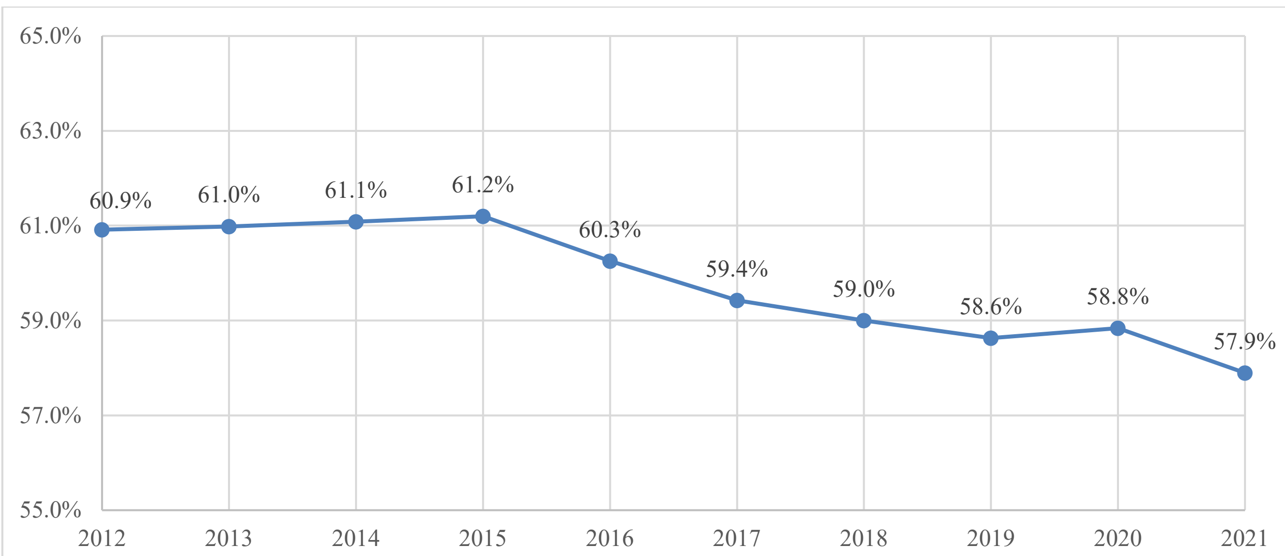
3. Active-to-Retiree Ratio

This is the ratio of active members to retired and inactive members. This ratio is typically very high in a plan's early years and declines over time. As a plan matures, and life expectancies increase over time, the percentage of retirees increases, and this ratio decreases. However, in an actuarially advanced-funded System like ours this decrease is much less of a concern than for a system like Social Security, in which active worker contributions are directly paid to retirees, with no designed pre-funding of future benefits.



We can also compare the ratio of the retiree accrued liability to the System's total accrued liability. A new pension plan begins with this ratio at zero and as the plan matures, this ratio would be expected to grow. The NYSTRS ratio has been between 58 and 61% over the last ten years.

Fiscal Year Ending June 30th	Accrued Liability (AL) for Retired Members and Beneficiaries (in millions)	Total AL for All Members (in millions)	Ratio of Retired AL to Total AL
2012	56,197.6	92,250.9	60.9%
2013	57,681.9	94,583.8	61.0%
2014	59,190.2	96,904.5	61.1%
2015	64,504.9	105,401.8	61.2%
2016	65,858.4	109,305.1	60.3%
2017	68,736.2	115,672.5	59.4%
2018	70,128.9	118,861.1	59.0%
2019	70,969.1	121,049.3	58.6%
2020	72,839.6	123,801.7	58.8%
2021	75,887.8	131,077.4	57.9%



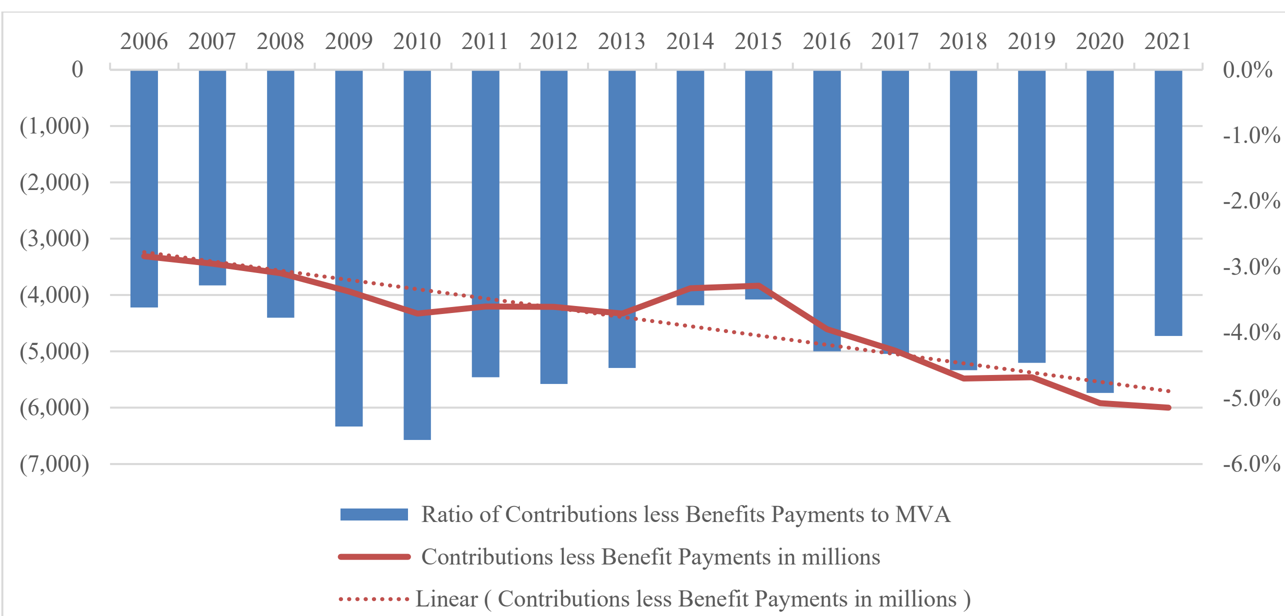
4. Cash Flow Ratio

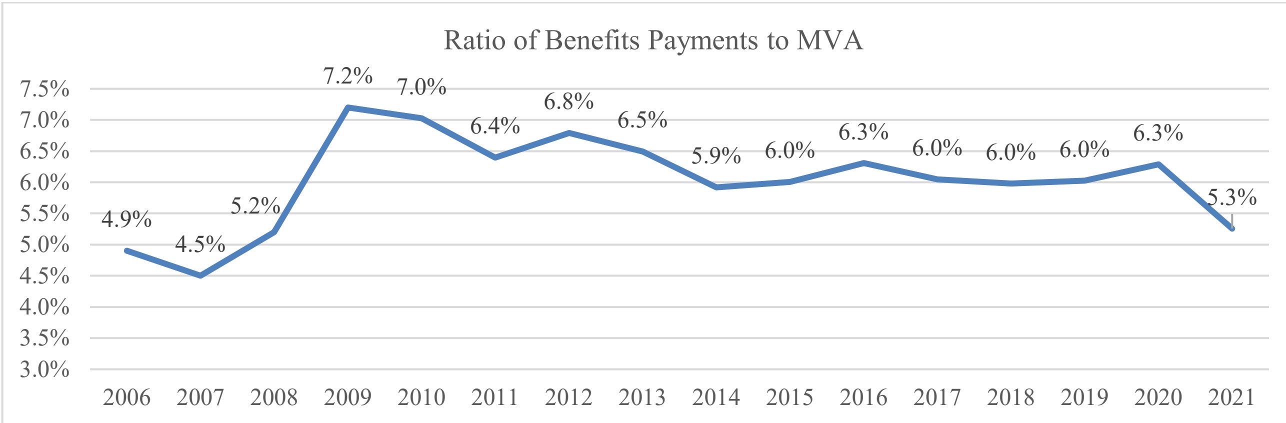
The net cash flow ratio is the ratio of the net cash flow in and out of the System divided by the market value of plan assets. Net cash flow for purposes of this ratio is defined as contributions in minus benefit payments and expenses out; it does not include investment income or appreciation. The System is in a negative cash flow position and has been for many years. Negative cash flow does not indicate a plan is in trouble or has been poorly managed. The objective of pre-funding is to create a negative cash flow and in fact it would be expected for a plan to mature into a negative cash flow. Additionally plans that are well-funded will have low contribution rates even as their benefit payroll is high. Many public sector plans have a negative cash flow.

APPENDIX 14 (Cont'd)

Significantly negative cash flow makes a plan more sensitive to near term investment returns, particularly negative returns. When investments lose money and net cash flow is negative, it is more difficult for plans to recover from a poor investment return, as the invested asset base is lower. Therefore, plans will need an even higher return to recover.

Fiscal Year Ending June 30th	Market Value of Assets (in millions)	Employer and Member Contributions (in millions)	Benefit Payments including Administrative Expenses (in millions)	Contributions less Benefit Payments (in millions)	Ratio of Contributions less Benefits Payments to MVA
2006	91,492.2	1,174.6	4,484.7	(3,310)	-3.6%
2007	104,912.9	1,279.7	4,722.4	(3,443)	-3.3%
2008	95,769.3	1,368.4	4,980.3	(3,612)	-3.8%
2009	72,471.8	1,283.5	5,217.9	(3,934)	-5.4%
2010	76,844.9	1,070.9	5,399.9	(4,329)	-5.6%
2011	89,889.7	1,545.9	5,751.5	(4,206)	-4.7%
2012	88,056.3	1,771.3	5,980.0	(4,209)	-4.8%
2013	95,367.0	1,868.3	6,194.1	(4,326)	-4.5%
2014	108,155.1	2,522.5	6,399.2	(3,877)	-3.6%
2015	109,718.9	2,751.7	6,588.1	(3,836)	-3.5%
2016	107,506.1	2,175.2	6,780.3	(4,605)	-4.3%
2017	115,468.4	1,995.0	6,984.6	(4,990)	-4.3%
2018	119,915.5	1,688.8	7,169.6	(5,481)	-4.6%
2019	122,477.5	1,920.3	7,381.6	(5,461)	-4.5%
2020	120,479.5	1,653.7	7,575.3	(5,922)	-4.9%
2021	148,148.5	1,788.3	7,787.4	(5,999)	-4.0%




Ratio of Benefits Payments to MVA
7.5%
7.0%
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6.0%
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4.5%
4.0%
3.5%
3.0%
4.9%
4.5%
5.2%
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2019
2020
2021

B. Risk Assessment Methods – Sensitivity Analysis

Valuation results are highly dependent on the actuarial assumptions used to project future events. If actual experience emerges differently from the assumptions used in the valuation process, actuarial gains or losses will result, and future Employer Contribution Rates will be higher or lower. In this section, results of a sensitivity analysis are presented to illustrate how deviations in specific assumptions would have changed the current Employer Contribution Rate of 10.29%.

The results displayed here, except for those for the investment return, are the impact of altering each assumption individually, without accounting for possible correlation between assumptions. Therefore, these results are presented to provide an illustration of the impact that a change in a key assumption may have on valuation results.

Assumption	Adjustment	Adjusted Employer Contribution Rate
Current		10.29%
Valuation Rate of Interest[1]	Decrease from 6.95% to 6.70%	13.38%
Valuation Rate of Interest[1]	Decrease from 6.95% to 6.45%	16.56%
Valuation Rate of Interest[1]	Decrease from 6.95% to 5.95%	23.21%
Salary Scale	Decrease of 10%	9.33%
Salary Scale	Increase of 10%	11.23%
Service Retirement Rates	Decrease of 10%	9.58%
Service Retirement Rates	Increase of 10%	10.88%
Healthy Annuitant Mortality	Decrease of 10%	12.02%
Healthy Annuitant Mortality	Increase of 10%	8.70%
Active Mortality	Decrease of 10%	10.31%
Active Mortality	Increase of 10%	10.27%

[1] The sensitivity analysis assumes that the salary scale assumption would be decreased by one-half of the reduction in the investment return assumption. In a scenario in which there was a significant reduction in the System's assumed rate of return it's likely that future projected salaries would be impacted as well. For example, the salary scale is reduced by 0.125% when the assumed rate of return is reduced by 0.25%.

APPENDIX 15

HISTORY OF THE EMPLOYER CONTRIBUTION RATE

Salary Year	Employer Contribution Rate	Salary Year	Employer Contribution Rate	Salary Year	Employer Contribution Rate
1921-22	5.10 %	1956-57	10.90 %	1991-92	6.64 %
1922-23	5.10	1957-58	11.20	1992-93	8.00
1923-24	5.20	1958-59	13.40	1993-94	8.41
1924-25	5.20	1959-60	14.00	1994-95	7.24
1925-26	5.20	1960-61	18.35	1995-96	6.37
1926-27	5.20	1961-62	18.55	1996-97	3.57
1927-28	5.20	1962-63	19.55	1997-98	1.25
1928-29	5.30	1963-64	21.13	1998-99	1.42
1929-30	5.50	1964-65	17.67	1999-00	1.43
1930-31	5.50	1965-66	17.70	2000-01	0.43
1931-32	5.50	1966-67	17.72	2001-02	0.36
1932-33	5.50	1967-68	18.50	2002-03	0.36
1933-34	5.50	1968-69	18.80	2003-04	2.52
1934-35	5.60	1969-70	18.60	2004-05	5.63
1935-36	5.70	1970-71	18.80	2005-06	7.97
1936-37	5.80	1971-72	18.80	2006-07	8.60
1937-38	5.93	1972-73	18.80	2007-08	8.73
1938-39	6.03	1973-74	18.80	2008-09	7.63
1939-40	6.13	1974-75	18.80	2009-10	6.19
1940-41	6.23	1975-76	19.40	2010-11	8.62
1941-42	6.33	1976-77	19.40	2011-12	11.11
1942-43	6.43	1977-78	20.40	2012-13	11.84
1943-44	6.53	1978-79	21.40	2013-14	16.25
1944-45	7.10	1979-80	22.49	2014-15	17.53
1945-46	7.20	1980-81	23.49	2015-16	13.26
1946-47	7.50	1981-82	23.49	2016-17	11.72
1947-48	7.80	1982-83	23.49	2017-18	9.80
1948-49	8.00	1983-84	22.90	2018-19	10.62
1949-50	8.40	1984-85	22.80	2019-20	8.86
1950-51	8.80	1985-86	21.40	2020-21	9.53
1951-52	9.60	1986-87	18.80	2021-22	9.80
1952-53	9.90	1987-88	16.83	2022-23	10.29
1953-54	9.90	1988-89	14.79		
1954-55	10.30	1989-90	6.87		
1955-56	10.40	1990-91	6.84	**Average**	**10.90%**

APPENDIX 16

HISTORY OF THE MEMBER CONTRIBUTION RATE

Membership Year	Required Contribution
1921	4%
1948	5% (new members - 1948 and after)
1948	Voluntary 4% could be contributed (all members eligible)
1951	If member elected special retirement allowance: 4% went to 6.5%, 5% went to 8% (all members eligible)
1957	If member elected 1/120th plan: 6.5% went to 9%, 8% went to 11% (all members eligible)
1968	0%
1976	3% (new members - 1976 and after)
2000	3% employee contribution ceases after ten years of service or membership
2010	3.5% throughout career for members joining 1/1/2010 – 3/31/2012
2012	Throughout career for members joining on or after 4/1/2012: - 3.0% if salary less than or equal to $45,000 - 3.5% if salary greater than $45,000 and less than or equal to $55,000 - 4.5% if salary greater than $55,000 and less than or equal to $75,000 - 5.75% if salary greater than $75,000 and less than or equal to $100,000 - 6.0% if salary greater than $100,000 and less than or equal to $179,000 ($179,000 amended in 2019 to increase to $200,000 in 2020, $225,000 in 2021 and $250,000 in 2022 and thereafter)

As of August 1, 1921, when the Retirement System was established, members contributed 4% of salary. These contributions were used to fund a separate annuity, separate from the regular pension. New members on or after July 1, 1948 were required to contribute 5% of salary. Additional contributions, not in excess of 4% of salary, were permitted during the five-year period beginning July 1, 1948.

Under the provisions of a law passed in 1950, members could elect before July 1, 1951, or within one year of their date of membership, if later, to contribute towards a special service retirement allowance that would allow them to retire up to five years earlier. If their rate of contribution had been 4%, their new rate would be 6.5%. If their rate of contribution had been 5%, their new rate would be 8%. In 1956, an amendment was passed which provided additional benefits for service in excess of 25 years, but not in excess of 35 years, for those members who elected to contribute an additional 2.5% or 3% of their salaries. This increased the rate of contribution to 9% or 11% depending on whether the member's rate of contribution had been 6.5% or 8%.

HISTORY OF THE MEMBER CONTRIBUTION RATE (Cont'd)

Throughout the 1960's the advent of the "take-home pay" program effectively reduced the required contribution rate to zero for many members. As of July 1, 1968, all members were no longer required to make contributions, nor permitted to make voluntary contributions unless they had been making them previously.

The law that created Tier 3 in 1976 reinstated member contributions and required members who joined the System after July 26, 1976 to contribute 3% of their annual salary. This money, however, helps fund the member's pension and does not fund a separate annuity as before. Effective October 1, 2000, however, in accordance with Chapter 126 of the Laws of 2000, the 3% required member contribution ceases upon the attainment of the earlier of 10 years of service credit or 10 years of membership.

In accordance with Tier 5, enacted in 2009, members joining on or after January 1, 2010 and prior to April 1, 2012 must contribute 3.5% of salary throughout their working career towards the funding of their pension.

Tier 6, enacted in 2012, requires members joining on or after April 1, 2012 to contribute between 3.0% and 6.0% of salary throughout their working career towards the funding of their pension. The contribution percentage for Tier 6 members can vary during their working career depending on the salary received two years prior to the year of contribution.

APPENDIX 17

ACTUARIAL VALUATION INFORMATION

1. Actuarial Cost Method

The cost method used to determine the liabilities and normal cost in this valuation is the Aggregate Cost Method. This funding method is required by statute, specifically Section 517 of the New York State Education Law.

Each year a normal rate percentage is developed as a level percentage of total member compensation. This percentage equals the portion of the actuarial present value of projected benefits which exceeds the actuarial value of assets divided by one percent of the present value of future compensation of the active members, as of the valuation date.

The cost of the first $50,000 of member death benefits, Retirement System administrative expenses, and benefits in excess of the IRC §415 limits are each determined using the pay-as-you-go method, which is not considered to be an actuarial cost method.

Each year, actuarial gains and losses will occur because actual experience will vary from the actuarial assumptions. All gains and losses are automatically amortized as part of the normal rate calculation, over the expected future working lifetime of active members.

The average expected future working lifetime for our active population as determined by the actuarial valuation as of June 30, 2021 is 12.56 years.

2. Asset Valuation Method

The actuarial value of assets for the normal rate is determined by recognizing each year's net investment income/loss more than (or less than) 6.95% at a rate of 20% per year, until fully recognized after five years.

The actuarial value of assets for the expense, group life insurance, and excess benefit plan rates is equal to the fair market value of assets, excluding contributions receivable.

3. Actuarial Assumptions

The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021 and were effective with the June 30, 2021 actuarial valuation. Specific details regarding the development of the actuarial assumptions can be found in the "*Report on the 2021 Recommended Actuarial Assumptions*."

The withdrawal rates are the assumed rates of termination of employment from all causes other than death, disability, or retirement. The withdrawal rates vary by gender and service.

ACTUARIAL VALUATION INFORMATION (Cont'd)

The healthy annuitant mortality rates are the assumed rates of death for service and deferred retired members and beneficiaries. The healthy annuitant mortality rates vary by gender and age. Future mortality improvement was projected on a generational basis using the Society of Actuaries Mortality Projection Scale MP-2020.

The salary scale is the assumed annual rate of increase in future compensation. The rates are based upon salary experience for members, vary by service, and are independent of the member's gender. Inflation, merit, and productivity increases are included in these rates. The assumed inflation component is 2.4%.

APPENDIX 18

PRESENT ACTUARIAL ASSUMPTIONS

Actuarial assumptions have been developed based upon actual member experience. Various actuarial and graduation techniques are applied to experience data and tables are developed. Standard actuarial tables are also used as appropriate. An experience study is performed annually, and assumptions are revised when warranted. The current actuarial assumptions were adopted by the Retirement Board on October 28, 2021. Specific details regarding the development of the present actuarial assumptions can be found in the "*Report on the 2021 Recommended Actuarial Assumptions*".

The NYSTRS Office of the Actuary utilizes ProVal, a widely used actuarial valuation software program leased from Winklevoss Technologies (WinTech), to calculate liabilities and projected benefit payments. We have audited the results produced by this model to a limited degree consistent with Actuarial Standards of Practice (ASOP) No. 56 and believe the software to be appropriate for the purposes for which it has been used.

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APPENDIX 18 (Cont'd)

I. Active Member Mortality Rates

Males		Females	
Age	Rate	Age	Rate
20	0.000326	20	0.000132
21	0.000292	21	0.000124
22	0.000249	22	0.000105
23	0.000215	23	0.000096
24	0.000189	24	0.000099
25	0.000173	25	0.000101
26	0.000189	26	0.000114
27	0.000206	27	0.000116
28	0.000223	28	0.000131
29	0.000252	29	0.000145
30	0.000269	30	0.000171
31	0.000298	31	0.000185
32	0.000314	32	0.000197
33	0.000340	33	0.000209
34	0.000353	34	0.000232
35	0.000376	35	0.000240
36	0.000396	36	0.000259
37	0.000412	37	0.000277
38	0.000438	38	0.000291
39	0.000448	39	0.000316
40	0.000467	40	0.000326
41	0.000494	41	0.000347
42	0.000518	42	0.000366
43	0.000550	43	0.000395
44	0.000582	44	0.000413
45	0.000633	45	0.000442
46	0.000683	46	0.000482
47	0.000743	47	0.000523
48	0.000816	48	0.000568
49	0.000891	49	0.000616
50	0.000988	50	0.000668
51	0.001090	51	0.000733
52	0.001197	52	0.000811
53	0.001327	53	0.000884
54	0.001463	54	0.000968

I. Active Member Mortality Rates
(cont'd.)

Males		Females	
Age	Rate	Age	Rate
55	0.001605	55	0.001063
56	0.001769	56	0.001156
57	0.001948	57	0.001255
58	0.002146	58	0.001369
59	0.002363	59	0.001485
60	0.002605	60	0.001611
61	0.002875	61	0.001748
62	0.003162	62	0.001902
63	0.003461	63	0.002066
64	0.003789	64	0.002259
65	0.004146	65	0.002472
66	0.004515	66	0.002719
67	0.004918	67	0.003002
68	0.005349	68	0.003342
69	0.005822	69	0.003748
70	0.006313	70	0.004225
71	0.006838	71	0.004789
72	0.007406	72	0.005454
73	0.008017	73	0.006216
74	0.008674	74	0.007116
75	0.009408	75	0.008144
76	0.010787	76	0.009388
77	0.012380	77	0.010829
78	0.014221	78	0.012490
79	0.016338	79	0.014393

APPENDIX 18 (Cont'd)

II. Disability Retirement Rates

Males Age	Males Rate	Females Age	Females Rate
30	0.000007	30	0.000004
31	0.000031	31	0.000018
32	0.000060	32	0.000048
33	0.000100	33	0.000140
34	0.000131	34	0.000225
35	0.000156	35	0.000242
36	0.000183	36	0.000212
37	0.000220	37	0.000191
38	0.000261	38	0.000202
39	0.000297	39	0.000252
40	0.000324	40	0.000330
41	0.000353	41	0.000415
42	0.000378	42	0.000468
43	0.000439	43	0.000566
44	0.000519	44	0.000684
45	0.000610	45	0.000758
46	0.000680	46	0.000788
47	0.000724	47	0.000841
48	0.000772	48	0.000961
49	0.000878	49	0.001145
50	0.001035	50	0.001325
51	0.001225	51	0.001528
52	0.001395	52	0.001608
53	0.001480	53	0.001611
54	0.001435	54	0.001527
55	0.001287	55	0.001454
56	0.001060	56	0.001270
57	0.000845	57	0.001121
58	0.000721	58	0.001012
59	0.000655	59	0.000956
60	0.000642	60	0.000848
61	0.000617	61	0.000749
62	0.000581	62	0.000684
63	0.000536	63	0.000591
64	0.000485	64	0.000551

APPENDIX 18 (Cont'd)

II. Disability Retirement Rates
(cont'd.)

Males		Females	
Age	Rate	Age	Rate
65	0.000430	65	0.000476
66	0.000373	66	0.000258
67	0.000317	67	0.000178
68	0.000264	68	0.000169
69	0.000215	69	0.000152
70	0.000172	70	0.000131
71	0.000135	71	0.000107
72	0.000104	72	0.000083
73	0.000078	73	0.000060
74	0.000058	74	0.000042
75	0.000042	75	0.000028
76	0.000030	76	0.000018
77	0.000021	77	0.000011
78	0.000014	78	0.000006
79	0.000009	79	0.000004

APPENDIX 18 (Cont'd)

III. Withdrawal Rates

Males		Females	
Duration	Rate	Duration	Rate
0	0.281672	0	0.276603
1	0.139639	1	0.125667
2	0.103566	2	0.091900
3	0.082839	3	0.070395
4	0.061281	4	0.054609
5	0.046733	5	0.048608
6	0.040304	6	0.044007
7	0.033875	7	0.039406
8	0.027446	8	0.034805
9	0.021017	9	0.030204
10	0.017586	10	0.025604
11	0.015753	11	0.022445
12	0.012379	12	0.018454
13	0.009004	13	0.014464
14	0.008712	14	0.010474
15	0.008419	15	0.009808
16	0.007735	16	0.008100
17	0.007052	17	0.006392
18	0.006368	18	0.004683
19	0.005078	19	0.004300
20	0.005000	20	0.004251
21	0.004633	21	0.003896
22	0.004265	22	0.003883
23	0.003897	23	0.003869
24	0.003530	24	0.003856
25	0.003162	25	0.002475
26	0.003058	26	0.002156
27	0.002953	27	0.001836
28	0.002848	28	0.001516
29	0.002744	29	0.001230
30	0.002639	30	0.001223
31	0.002534	31	0.001217
32+	0.002430	32+	0.001210

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

a) With at Least 5 Years of Service and Less Than 20 Years of Service

Males Age	Males Rate	Females Age	Females Rate
55	0.016895	55	0.022034
56	0.018138	56	0.020920
57	0.018949	57	0.021583
58	0.020392	58	0.024243
59	0.023948	59	0.028714
60	0.032544	60	0.036747
61	0.053559	61	0.049865
62	0.076575	62	0.098737
63	0.086291	63	0.099499
64	0.101429	64	0.108244
65	0.135241	65	0.134619
66	0.165359	66	0.157206
67	0.171258	67	0.157651
68	0.162524	68	0.149321
69	0.168459	69	0.157048
70	0.178411	70	0.169309
71	0.168561	71	0.166236
72	0.175182	72	0.149874
73	0.204473	73	0.130584
74	0.205761	74	0.131818
75	0.201031	75	0.170940
76	0.223684	76	0.208633
77	0.250000	77	0.178744
78	0.259259	78	0.105960
79	0.243243	79	0.115385
80+	1.000000	80+	1.000000

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

b) With at Least 20 Years of Service and Less Than 30 Years of Service

Males Age	Males Rate	Females Age	Females Rate
55	0.036912	55	0.048946
56	0.038733	56	0.048932
57	0.042465	57	0.050278
58	0.045650	58	0.055984
59	0.053792	59	0.066847
60	0.074850	60	0.085816
61	0.137343	61	0.124821
62	0.317298	62	0.344649
63	0.291193	63	0.320354
64	0.264522	64	0.270180
65	0.284814	65	0.306632
66	0.326565	66	0.343562
67	0.323741	67	0.335230
68	0.287004	68	0.312155
69	0.316940	69	0.294658
70	0.345833	70	0.276159
71	0.274390	71	0.258438
72	0.244094	72	0.248951
73	0.316327	73	0.231388
74	0.314286	74	0.202817
75	0.222222	75	0.232824
76	0.200000	76	0.283422
77	0.206897	77	0.291667
78	0.214286	78	0.243590
79	0.148148	79	0.170732
80+	1.000000	80+	1.000000

APPENDIX 18 (Cont'd)

IV. Service Retirement Rates

c) With at Least 30 Years of Service

Males Age	Males Rate	Females Age	Females Rate
55	0.357369	55	0.360457
56	0.308100	56	0.328854
57	0.270702	57	0.285005
58	0.275266	58	0.281178
59	0.296323	59	0.303384
60	0.311082	60	0.329377
61	0.310642	61	0.358157
62	0.319459	62	0.383599
63	0.319013	63	0.361017
64	0.297225	64	0.336647
65	0.311052	65	0.345155
66	0.340284	66	0.361702
67	0.325405	67	0.339678
68	0.291372	68	0.289690
69	0.274286	69	0.270671
70	0.259067	70	0.268173
71	0.238434	71	0.269377
72	0.223404	72	0.255354
73	0.224806	73	0.220085
74	0.262136	74	0.204420
75	0.294872	75	0.182796
76	0.254902	76	0.157205
77	0.200000	77	0.175258
78	0.178571	78	0.222973
79	0.184615	79	0.253012
80+	1.000000	80+	1.000000

V. Healthy Annuitant Mortality Rates

Males		Females	
Age	Rate	Age	Rate
55	0.002062	55	0.001763
56	0.002298	56	0.001932
57	0.002558	57	0.002104
58	0.002850	58	0.002284
59	0.003160	59	0.002461
60	0.003492	60	0.002642
61	0.003850	61	0.002833
62	0.004238	62	0.003026
63	0.004643	63	0.003239
64	0.005097	64	0.003476
65	0.005594	65	0.003756
66	0.006160	66	0.004075
67	0.006809	67	0.004460
68	0.007562	68	0.004926
69	0.008430	69	0.005489
70	0.009446	70	0.006169
71	0.010632	71	0.006976
72	0.012012	72	0.007929
73	0.013614	73	0.009050
74	0.015459	74	0.010362
75	0.020078	75	0.013227
76	0.022872	76	0.015184
77	0.026050	77	0.017425
78	0.029647	78	0.019982
79	0.033736	79	0.022903
80	0.038367	80	0.026219
81	0.043643	81	0.029999
82	0.049675	82	0.034278
83	0.056541	83	0.039141
84	0.064371	84	0.044654

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

V. Healthy Annuitant Mortality Rates (Cont'd)

Males Age	Males Rate	Females Age	Females Rate
85	0.073241	85	0.050874
86	0.083220	86	0.057876
87	0.094351	87	0.065733
88	0.106789	88	0.074568
89	0.120557	89	0.084462
90	0.135736	90	0.109847
91	0.152258	91	0.124150
92	0.169997	92	0.139945
93	0.188712	93	0.157256
94	0.208207	94	0.175838
95	0.228238	95	0.195482
96	0.256135	96	0.216617
97	0.278405	97	0.238632
98	0.300930	98	0.261262
99	0.323597	99	0.284370
100	0.346058	100	0.307717
101	0.368382	101	0.331284
102	0.390636	102	0.355062
103	0.412527	103	0.378941
104	0.433960	104	0.402553
105	0.454672	105	0.425814
106	0.474623	106	0.448404
107	0.493810	107	0.470342
108	0.511957	108	0.491432
109	0.529320	109	0.511431
110	0.530405	110	0.530405
111	0.548187	111	0.548187
112	0.557992	112	0.557992
113	0.558942	113	0.558942
114	0.559950	114	0.559950

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

V. Healthy Annuitant Mortality Rates (Cont'd)

Males		Females	
Age	Rate	Age	Rate
115	0.560902	115	0.560902
116	0.560959	116	0.560959
117	0.561015	117	0.561015
118	0.561015	118	0.561015
119	0.561015	119	0.561015
120	1.000000	120	1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

VI. Survivor and Beneficiary Mortality Rates

Males Age	Males Rate	Females Age	Females Rate
1	0.000403	1	0.000145
2	0.000403	2	0.000145
3	0.000403	3	0.000145
4	0.000403	4	0.000145
5	0.000403	5	0.000145
6	0.000403	6	0.000145
7	0.000403	7	0.000145
8	0.000403	8	0.000145
9	0.000403	9	0.000145
10	0.000403	10	0.000145
11	0.000403	11	0.000145
12	0.000403	12	0.000145
13	0.000403	13	0.000145
14	0.000403	14	0.000145
15	0.000403	15	0.000145
16	0.000403	16	0.000145
17	0.000403	17	0.000145
18	0.000403	18	0.000145
19	0.000403	19	0.000145
20	0.000403	20	0.000134
21	0.000387	21	0.000125
22	0.000360	22	0.000116
23	0.000333	23	0.000106
24	0.000306	24	0.000097
25	0.000302	25	0.000099
26	0.000338	26	0.000114
27	0.000360	27	0.000128
28	0.000383	28	0.000144
29	0.000420	29	0.000160
30	0.000442	30	0.000175

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

VI. Survivor and Beneficiary Mortality Rates (Cont'd)

Males		Females	
Age	Rate	Age	Rate
31	0.000479	31	0.000204
32	0.000498	32	0.000218
33	0.000530	33	0.000244
34	0.000559	34	0.000255
35	0.000599	35	0.000279
36	0.000621	36	0.000300
37	0.000651	37	0.000317
38	0.000677	38	0.000346
39	0.000712	39	0.000360
40	0.000740	40	0.000383
41	0.000764	41	0.000405
42	0.000798	42	0.000425
43	0.000841	43	0.000456
44	0.000883	44	0.000487
45	0.000935	45	0.000518
46	0.001001	46	0.000552
47	0.001068	47	0.000597
48	0.001151	48	0.000647
49	0.001237	49	0.000699
50	0.001339	50	0.000767
51	0.001459	51	0.000839
52	0.001585	52	0.000916
53	0.001729	53	0.001017
54	0.001890	54	0.001111
55	0.004211	55	0.003011
56	0.004591	56	0.003214
57	0.004992	57	0.003415
58	0.005427	58	0.003623
59	0.005881	59	0.003842
60	0.006353	60	0.004095

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VI. Survivor and Beneficiary Mortality Rates (Cont'd)

Males Age	Males Rate	Females Age	Females Rate
61	0.006847	61	0.004376
62	0.007355	62	0.004709
63	0.007893	63	0.005081
64	0.008469	64	0.005515
65	0.009119	65	0.006007
66	0.009879	66	0.006574
67	0.010764	67	0.007228
68	0.011791	68	0.007991
69	0.012977	69	0.008882
70	0.014348	70	0.009913
71	0.015914	71	0.011099
72	0.017714	72	0.012469
73	0.019770	73	0.014025
74	0.022137	74	0.015798
75	0.024837	75	0.017811
76	0.027914	76	0.020084
77	0.031432	77	0.022658
78	0.035426	78	0.025572
79	0.039971	79	0.028889
80	0.045158	80	0.032661
81	0.051057	81	0.036972
82	0.057759	82	0.041889
83	0.065291	83	0.047505
84	0.073728	84	0.053910
85	0.083113	85	0.061218
86	0.093445	86	0.069540
87	0.104717	87	0.078933
88	0.117043	88	0.089461
89	0.130367	89	0.101045
90	0.144705	90	0.113634

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

VI. Survivor and Beneficiary Mortality Rates (Cont'd)

Males Age	Males Rate	Females Age	Females Rate
91	0.160306	91	0.127095
92	0.177295	92	0.141336
93	0.195554	93	0.157256
94	0.214933	94	0.175838
95	0.235173	95	0.195482
96	0.256846	96	0.216617
97	0.279223	97	0.238632
98	0.301941	98	0.261262
99	0.324803	99	0.284370
100	0.347403	100	0.307717
101	0.369814	101	0.331284
102	0.392154	102	0.355062
103	0.414131	103	0.378941
104	0.435647	104	0.402553
105	0.456440	105	0.425814
106	0.476468	106	0.448404
107	0.495730	107	0.470342
108	0.513947	108	0.491432
109	0.531378	109	0.511431
110	0.545110	110	0.530405
111	0.548187	111	0.548187
112	0.557992	112	0.557992
113	0.558942	113	0.558942
114	0.559950	114	0.559950
115	0.560902	115	0.560902
116	0.560959	116	0.560959
117	0.561015	117	0.561015
118	0.561015	118	0.561015
119	0.561015	119	0.561015
120	1.000000	120	1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

VII. Disabled Annuitant Mortality Rates

Males Age	Males Rate	Females Age	Females Rate
30	0.004652	30	0.003422
31	0.004963	31	0.003769
32	0.005272	32	0.004129
33	0.005569	33	0.004505
34	0.005877	34	0.004881
35	0.006163	35	0.005259
36	0.006456	36	0.005634
37	0.006751	37	0.006015
38	0.007059	38	0.006401
39	0.007371	39	0.006802
40	0.007705	40	0.007219
41	0.008073	41	0.007660
42	0.008491	42	0.008131
43	0.008966	43	0.008652
44	0.009542	44	0.009236
45	0.010203	45	0.009899
46	0.010984	46	0.010640
47	0.011887	47	0.011491
48	0.012917	48	0.012463
49	0.014064	49	0.013571
50	0.015343	50	0.014803
51	0.016424	51	0.015537
52	0.017566	52	0.016336
53	0.018749	53	0.017181
54	0.019960	54	0.018046
55	0.021172	55	0.018866
56	0.022361	56	0.019608
57	0.023488	57	0.020231
58	0.024557	58	0.020721
59	0.025566	59	0.021082

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VII. Disabled Annuitant Mortality Rates (Cont'd)

Males Age	Males Rate	Females Age	Females Rate
60	0.026516	60	0.021350
61	0.027415	61	0.021532
62	0.028313	62	0.021709
63	0.029236	63	0.021906
64	0.030182	64	0.022166
65	0.031154	65	0.022529
66	0.032187	66	0.023039
67	0.033281	67	0.023732
68	0.034485	68	0.024639
69	0.035810	69	0.025784
70	0.037301	70	0.027188
71	0.039017	71	0.028858
72	0.040985	72	0.030823
73	0.043225	73	0.033071
74	0.045778	74	0.035661
75	0.048700	75	0.038596
76	0.051973	76	0.041899
77	0.055667	77	0.045616
78	0.059793	78	0.049768
79	0.064417	79	0.054392
80	0.069552	80	0.059522
81	0.075256	81	0.065190
82	0.081539	82	0.071412
83	0.088386	83	0.078249
84	0.095845	84	0.085710
85	0.103866	85	0.093862
86	0.112482	86	0.102354
87	0.121693	87	0.111003
88	0.131659	88	0.119794
89	0.144125	89	0.128685

Society of Actuaries Mortality Improvement Scale MP-2020 is applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VII. Disabled Annuitant Mortality Rates (Cont'd)

Males		Females	
Age	Rate	Age	Rate
90	0.157863	90	0.137873
91	0.171906	91	0.147449
92	0.186069	92	0.157607
93	0.200252	93	0.168645
94	0.214573	94	0.180687
95	0.229208	95	0.195482
96	0.256135	96	0.216617
97	0.278405	97	0.238632
98	0.300930	98	0.261262
99	0.323597	99	0.284370
100	0.346058	100	0.307717
101	0.368382	101	0.331284
102	0.390636	102	0.355062
103	0.412527	103	0.378941
104	0.433960	104	0.402553
105	0.454672	105	0.425814
106	0.474623	106	0.448404
107	0.493810	107	0.470342
108	0.511957	108	0.491432
109	0.529320	109	0.511431
110	0.530405	110	0.530405
111	0.548187	111	0.548187
112	0.557992	112	0.557992
113	0.558942	113	0.558942
114	0.559950	114	0.559950
115	0.560902	115	0.560902
116	0.560959	116	0.560959
117	0.561015	117	0.561015
118	0.561015	118	0.561015
119	0.561015	119	0.561015
120	1.000000	120	1.000000

Society of Actuaries Mortality Improvement Scale MP-2020 will be applied on a generational basis to base table rates.

APPENDIX 18 (Cont'd)

VIII. Salary Scale

Duration	Rate	Duration	Rate
0	1.1231	20	1.0293
1	1.1079	21	1.0283
2	1.0814	22	1.0274
3	1.0683	23	1.0265
4	1.0582	24	1.0257
5	1.0518	25	1.0250
6	1.0480	26	1.0243
7	1.0459	27	1.0237
8	1.0447	28	1.0230
9	1.0438	29	1.0225
10	1.0430	30	1.0219
11	1.0421	31	1.0214
12	1.0409	32	1.0210
13	1.0396	33	1.0204
14	1.0380	34	1.0200
15	1.0364	35	1.0195
16	1.0347	36	1.0191
17	1.0332	37	1.0186
18	1.0317	38	1.0183
19	1.0305	39	1.0183
		40	1.0184

IX. Valuation Rate of Interest Assumption

The interest rate for valuation purposes is a level 6.95%. This valuation rate of interest is made up of a 2.4%[1] annual rate of inflation and a 4.55% real rate of return. The valuation rate of interest assumption represents our best estimate of the anticipated annual rate of return on plan assets over a long-term horizon.

The valuation rate of interest assumption is developed based upon the Retirement System's specific asset allocation, and capital market assumptions, based upon recommendations from Callan, the System's investment consultant. Using expected returns and standard deviations for each asset class, and including anticipated correlation between the classes, a long-term anticipated rate of return is developed. Callan's expected annual rate of return for the total portfolio using a 20-year horizon is 7.48% on an arithmetic basis and 6.76% on a geometric basis. Using a 30-year horizon, the expected annual rate of return for the total portfolio is 8.01% on an arithmetic basis and 7.32% on a geometric basis.

Additionally, stochastic simulation projections were performed for the System by Cheiron, an actuarial consulting firm. In the stochastic simulation modeling, over five-thousand different future investment outcomes were generated based on the System's specific asset allocation. In one simulation set, the Callan capital market assumption projections were used, while in another simulation set the Horizon Actuarial Survey capital market assumption projections were used. Horizon annually surveys investment consultants and provides data with respect to the average of all their investment return expectations by asset class. For the 2021 Horizon survey, 16 different investment consultants provided long-term (20-year) investment return forecasts.

- The stochastic simulation run using Callan's 20-year projection capital market assumptions produced a return set with a distribution that had a 50th percentile return of 6.7% in 20 years. The returns' 25th to 75th percentile range was 4.7% to 8.7%.

- The stochastic simulation run using Callan's 30-year projection capital market assumptions produced a return set with a distribution that had a 50th percentile return of 7.2% in 30 years. The returns' 25th to 75th percentile range was 5.2% to 9.2%.

- The stochastic simulation run using the Horizon Survey's 20-year projection capital market assumptions produced a return set with a distribution that had a 50th percentile return of 6.7% in 20 years. The returns' 25th to 75th percentile range was 4.9% to 8.6%.

For a complete explanation of the rationale behind the System's valuation rate of interest assumption, please refer to the "*Report on the 2021 Recommended Actuarial Assumptions*".

X. Other Assumptions

Projected COLA Assumption

The annual percentage for estimating future COLA benefit payments is 1.3%.[2]

IRC Section 415(b) and 401(a)(17)

For purposes of the normal rate, the limitations under IRC Section 415(b) were not reflected due to immateriality. The IRC Section 401(a)(17) limit for the fiscal year ending June 30, 2021 was reflected for members with a membership date on or after July 1, 1996.

Retirement Rates

Retirement Rates for terminated vested members (no earnings in the fiscal year and entitled to a vested benefit, not yet retired): 100% at the age of 55 or current age if later.

Marriage Assumptions

None

Tier 6 Pensionable Salary Limit

Tier 6 Pensionable earnings are limited to the current Governor's salary of $225,000 per year and $250,000 in 2021, which is then assumed to increase annually by the assumed rate of inflation of 2.4%.

Maximum Salary for Tier 2-6 Death Benefits

The Tier 2 to Tier 6 maximum Salary allowable under Section 130 of the Civil Service Law as of June 30, 2021 is $191,018. It is assumed to increase annually by the assumed annual rate of inflation of 2.4%.

[1] The average annual rate of increase in the Consumer Price Index (CPI) for the last 30 years ending with March 31, 2021 was 2.27%.

[2] The COLA percentage is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore, the estimate of inflation for the COLA benefit is the result of analyzing available CPI data with percentages bounded between 2.0% and 6.0% and reduced by 50%.

APPENDIX 19

SUMMARY OF BENEFIT PROVISIONS

1. Membership

With certain limited exceptions, membership is mandatory for all full-time New York State public school teachers and administrators, outside New York City. Membership is optional for certain teachers/administrators eligible for the Optional Retirement Program and teachers employed on other than a full-time basis and for certain employees of the State University of New York, community colleges, and the State Education Department. Generally, the membership of any non-vested person will terminate when seven years have elapsed since (s)he last rendered at least 20 days of credited service in a school year.

Tiers are determined by a member's most recent date of membership in the Retirement System as follows:

Tier 1:	Membership prior to 7/1/1973;
Tier 2:	Membership 7/1/1973 – 7/26/1976*;
Tier 3:	Membership 7/27/1976* – 8/31/1983;
Tier 4:	Membership 9/1/1983 – 12/31/2009;
Tier 5:	Membership 1/1/2010 – 3/31/2012;
Tier 6:	Membership on or after 4/1/2012.

*The end date for Tier 2 and the start date for Tier 3 differs from what is in the law due to a court case known as the Oliver decision, making the start date of the new tier the date that it was signed into law.

Tier 3 members are entitled to receive the benefits of either Tier 3 or Tier 4; however, they may not mix the provisions of the two tiers. For valuation purposes, Tier 3 members are assumed to receive the Tier 4 benefit at retirement, as that is generally always the larger benefit.

2. Final Average Salary (FAS)

For Tiers 1-5, FAS is generally the average of the three highest consecutive full years of regular salary, whenever they occurred in the salary history, for duties involving the supervision and instruction of students.

For Tier 6 members, the FAS calculation is based on 5 years. Pensionable earnings can be no more than the Governor's salary, which is $250,000 as of 1/1/2022.

Certain other restrictions apply to pensionable earnings that can be used in the FAS calculation. There are also limits on the year-over-year percentage increase in salary used in calculating FAS.

3. Service Retirement

The service retirement benefits are payable for life generally as follows:

Tier 1:

Non-Contributory Plan

For Tier 1 members with a date of membership prior to July 1, 1970 the benefit is generally calculated as:

For New York State service *prior to* 7/1/1959 and *all out-of-state service*:
$1/100^{th}$ of final average salary (FAS) per year for each of the first 25 years of service, plus $1/120^{th}$ of FAS per year for each of the next 10 years of service, plus $1/140^{th}$ of FAS per year for each year of NYS service in excess of 35, *plus*

For New York State service *subsequent to* 7/1/1959:

$1/50^{th}$ of final average salary (FAS) per year for each of the first 25 years of NYS service, plus $1/60^{th}$ of FAS per year for each of the next 10 years of NYS service, plus $1/70^{th}$ of FAS per year for each year of NYS service in excess of 35.

Non-Contributory Plan members generally may retire at:

- Age 55 with 20 years of total service or
- Any age with 35 years of total service.

Career Plan

If 20 or more years of NYS service: 2% of final average salary (FAS) per year of NYS service after July 1, 1959, plus 1.8% of FAS per year of NYS service prior to that date, plus 1% of FAS per year of out-of-state service. Out-of-state service is allowed only up to a maximum of 10 years, and only to the extent that it does not raise the total service credit to greater than 35 years. The maximum pension permitted is 75% of FAS.

If less than 20 years of NYS service, the above formula is used except the benefit is reduced by 5% for each year of service less than 20, subject to a maximum reduction of 50%.

Career Plan members generally may retire at:

- Age 55 with 2 years of NYS service or
- Any age with 35 years of total service.

The provisions of Article 19 of the Retirement and Social Security Law, effective July 11, 2000, provides to eligible Tier 1 and 2 members additional service credit of one-twelfth of a year of service for each year of retirement credit as of the date of retirement or death, up to a maximum of two additional years. The maximum pension, as a result of Article 19, can be 79% of FAS.

Tier 2: Computed under the Tier 1 Career Plan formula, but may be reduced for early retirement, as noted below.

Tier 2 members generally may retire at:

- Age 62 with 5 years of service, or
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 3: 1⅔% of FAS per year of NYS service (if less than 20 years) or 2% of FAS per year of NYS service (if 20 to 30 years). There is no additional benefit for more than 30 years of service. At age 62 the benefit is reduced by 50% of the primary Social Security benefit accrued while in NYS public employment. A member may be eligible for automatic cost-of-living adjustments.

Tier 3 members generally may retire at:

- Age 62 with 5 years of service, or
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 1/15th for each of the first 2 years under age 62 and 1/30th for each of the next 5 years.

Tier 4: 1⅔% of FAS per year of NYS service (if less than 20 years), or 2% of FAS per year of NYS service (if 20 to 30 years), plus 1½% of FAS per year of NYS service in excess of 30 years.

Tier 4 members generally may retire at:

- Age 62 with 5 years of service, or
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 5: 1⅔% of FAS per year of NYS service (if less than 25 years), or 2% of FAS per year of NYS service (if 25 to 30 years), plus 1½% of FAS per year of NYS service in excess of 30 years.

Tier 5 members generally may retire at:

- Age 62 with 10 years of service, or
- Age 57 with 30 years of service, or
- Age 55 with 10 years of service, with benefit reduced by 6⅔% for each of the first 2 years under age 62 and 5% for each of the next 5 years.

Tier 6: 1⅔% of FAS per year of NYS service (if less than 20 years), 1.75% of FAS per year of NYS service (if credited with 20 years) or 35% plus 2% per year of NYS service in excess of 20 years (if beyond 20 years).

Tier 6 members generally may retire at:

- Age 63 with 10 years of service, or
- Age 55 with 10 years of service, with benefit reduced by 6.5% for each year under age 63.

4. Disability Retirement

Generally, a member with at least 10 years of service may qualify for a disability retirement benefit of the smaller of 1) 1⅔% of FAS per year of projected service to age 60 or 2) ⅓ of FAS; but the benefit shall not be less than 1⅔% of FAS per year of completed service.

5. Death Benefits

a) Active Service

The Tier 1 death benefit is generally equal to the greater of 1) 3 times annual salary after 36 years of service (proportionately reduced for less than 36 years) or 2) for members who are at least age 55 with 20 years of service, the pension reserve calculated under a prior, lower service retirement formula.

Under legislation enacted in 2000, all Tier 2-6 members will be covered by the Paragraph 2 Death Benefit, unless they selected Paragraph 1 (see Tier 1 Calculation above) and it is greater than Paragraph 2. All members joining on or after Jan. 1, 2001, will be covered by the Paragraph 2 Death Benefit. The benefit is one year's salary[1] after a year of service, increasing to a maximum of three years' salary after three years or more of service. The benefit is reduced after age 60 by 4% per year, up to a maximum reduction of 40% at age 70. (Reductions begin at age 61; age is not rounded, and the reduction is not prorated.) Under Paragraph 2, if the in-service death benefit is in effect when a member retires, coverage may continue after retirement. The benefit would be:

- 1st Year: 50% of the death benefit in effect at retirement;
- 2nd Year: 25% of the benefit at retirement; and,
- 3rd & Ensuing Years: 10% of the benefit in effect at retirement (or at age 60, if the member retires after age 59). To be eligible for the continued coverage in retirement, the member must retire within one year of leaving the payroll and not be employed (other than NYSTRS service) between the member's cease-teaching date and retirement date.

b) Not in Active Service

The death benefit for members of all tiers with at least ten years of service credit who die when not in active service is equal to one-half the active member death benefit.

6. Deferred Retirement

Tiers 1-4:
A member with at least 5 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. A member with at least five, but less than ten years of service credit, has the choice of receiving a refund of their member contributions with interest or a deferred service retirement benefit. A member with ten or more years of service credit will receive the deferred service retirement benefit.

[1] The law limits the amount of salary that can be used in the calculation of the Paragraph 2 Death Benefit.

Tiers 5 and 6:

A member with at least 10 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. Members with less than 10 years of credited service who cease teaching may receive a refund of their contributions with interest.

7. Member Contributions

Certain Tier 1 and 2 members may elect to contribute to receive an additional benefit upon retirement. Tier 3 and 4 members are required to contribute 3% of pay to fund a portion of their benefit. Effective October 1, 2000, such contributions cease upon the attainment of the earlier of 10 years of service credit or 10 years of membership.

Tier 5 members are required to contribute 3.5% of their salary throughout their active membership.

Tier 6 members are required to contribute throughout their active membership. From 4/1/2012 through 3/31/2013, all Tier 6 members were required to contribute 3.5%. Beginning 4/1/2013 members are required to contribute in accordance with the following schedule:

Salary	Contribution Rate
$45,000 and less	3.00%
More than $45,000 to $55,000	3.50%
More than $55,000 to $75,000	4.50%
More than $75,000 to $100,000	5.75%
More than $100,000 to $250,000 (the limit currently equal to the NYS governor's salary)	6.00%

For purposes of administration, a Tier 6 member's contribution rate in any given year is based on regular compensation earned two years prior. During the member's first three years of membership, the member will contribute a percentage based on a salary projection provided by the employer.

8. Cost-of-Living Adjustment (COLA)

A permanent, annually adjusted cost-of-living benefit is provided to both current and future retired members. This benefit was first paid commencing September 2001, and is increased every September thereafter, to retired members who meet one of the following eligibility criteria:

- Age 62 and retired for 5 years, or
- Age 55 and retired for 10 years, or
- Retired for 5 years under a disability retirement.

The annual COLA percentage is equal to 50% of the increase in the annual CPI; not to exceed 3% nor be lower than 1%. It is applied to the first $18,000 of annual benefit. Additionally, commencing September 2000, members retired before 1997 are eligible for a "Catch-Up" supplemental benefit upon satisfaction of the above eligibility criteria.

Appendix G

PRESENTATION TO THE BOARD:

FINAL EMPLOYER CONTRIBUTION RATE

RICHARD A. YOUNG, CHIEF ACTUARY

MELODY PRANGLEY, DEPUTY CHIEF ACTUARY

AUGUST 3, 2022

EMPLOYER CONTRIBUTION RATE (ECR)

June 30, 2021 Actuarial Valuation

10.29% of pay

ECR COMPONENTS

June 30, 2021 Valuation	
Normal Rate	9.89%
Expense Rate	0.26%
Group Life Rate	0.13%
Excess Benefit Plan Rate	0.01%
Estimated ECR	10.29%

WHEN THE 10.29% ECR APPLIES

Will be multiplied by 2022 – 2023 fiscal year member salaries

Will be collected during the 2023 – 2024 fiscal year (Sept/Oct/Nov 2023)

2023

September	October	November

EMPLOYER DOLLARS CONTRIBUTED

Collected in:	Amount	ECR
Fall 2018	$1.6 billion	9.80%
Fall 2019	$1.8 billion	10.62%
Fall 2020	$1.5 billion	8.86%
Fall 2021	$1.6 billion	9.53%
Fall 2022	$1.7 billion*	9.80%
Fall 2023	$1.8 billion*	10.29%

* estimated

ECR ACTUARIAL GAIN/LOSS

Previous 6/30/2020 ECR		**9.80%**
Factors Which Increased the ECR (Actuarial Loss)		
Actuarial Assumptions	Change in assumptions	4.50%
Mortality	Members living slightly longer than expected	0.04%
Withdrawal	Withdrawal experience	0.02%
Retirement	Retirement experience	0.13%
	Total Increase in ECR	4.69%
Factors Which Decreased the ECR (Actuarial Gain)		
Net Investment Gain	Investment return greater than expected	3.64%
Salary/Service	Salary/Service data coming in lower than expected	0.10%
New Entrants	Tier 6 normal rate lower than current normal rate	0.08%
Pension Payments	Actual payment and COLA different than expected	0.05%
Miscellaneous	Net increase due to miscellaneous sources (e.g. valuation program, transfers in/out, Excess Benefit Plan rate, etc.)	0.33%
	Total Decrease in ECR	4.20%
Overall Net Increase in the ECR (Actuarial Loss)		**0.49%**
FINAL 6/30/2021 ECR		**10.29%**

PRELIMINARY 6/30/2022 ASSETS

MARKET VALUE OF ASSETS

As of:	Market Value of Assets (in Billions)
June 30, 2018	$119.9
June 30, 2019	$122.5
June 30, 2020	$120.5
June 30, 2021	$148.2
June 30, 2022*	$132.3

Five-Year Period 2017 – 2022 (in Billions)		
Benefit Payments and Expenses	Employer Contributions Collected	Member Contributions Collected
$38.0	$8.2	$0.7

*Based on estimated 6/30/2022 Real Estate and Private Equity values.

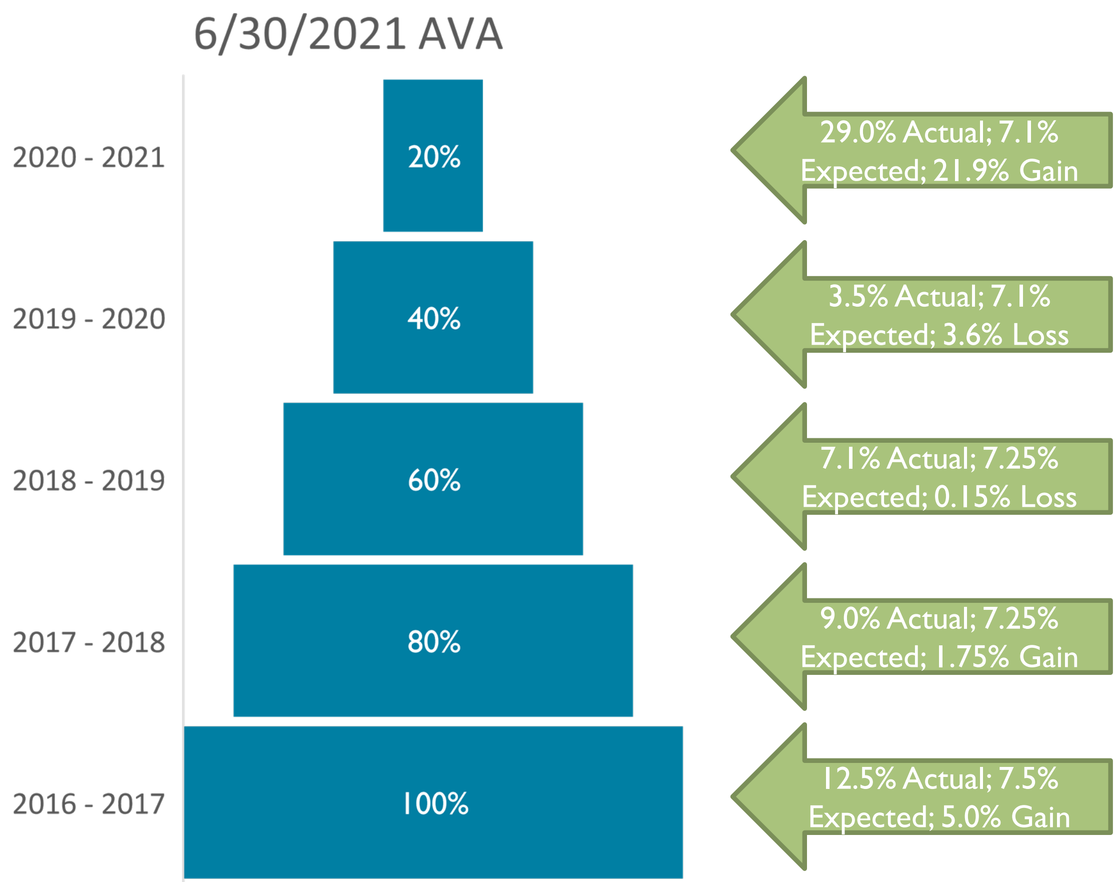
5-Year Rate of Return as of June 30, 2021

Fiscal Year	Market Value Rate of Return (net of fees)
2016 – 2017	12.5%
2017 – 2018	9.0%
2018 – 2019	7.1%
2019 – 2020	3.5%
2020 – 2021	29.0%
5-year average:	**11.9%**

- 5-year geometric average: $[(1.125)x(1.09)x(1.071)x(1.035)x(1.29)]^{(1/5)} - 1 =$ 11.9 %

ACTUARIAL VALUE OF ASSETS (AVA)

- AVA smoothes the effects of short-term market volatility
- NYSTRS' AVA method:
  - 5-year smoothing
  - The difference between expected and actual return is recognized 20% per year



THE FISCAL YEAR JUST COMPLETED

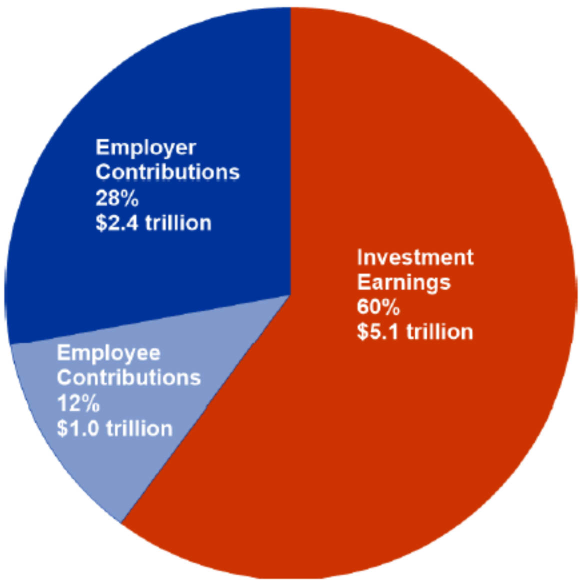
- NYSTRS long-term target investment return is 6.95%
- Capital market returns for the 2021–22 fiscal year were negative for both equity (US and international) and fixed income
- 2021–22 fiscal year benchmark rates of return:

Domestic Equity Index	S&P 1500	-11.0%
International Equity Index	ACWI ex-US	-19.4%
Fixed Income Index	Barclay's US Aggregate	-10.4%

NYSTRS' 2022 rate of return finalized in October 2022

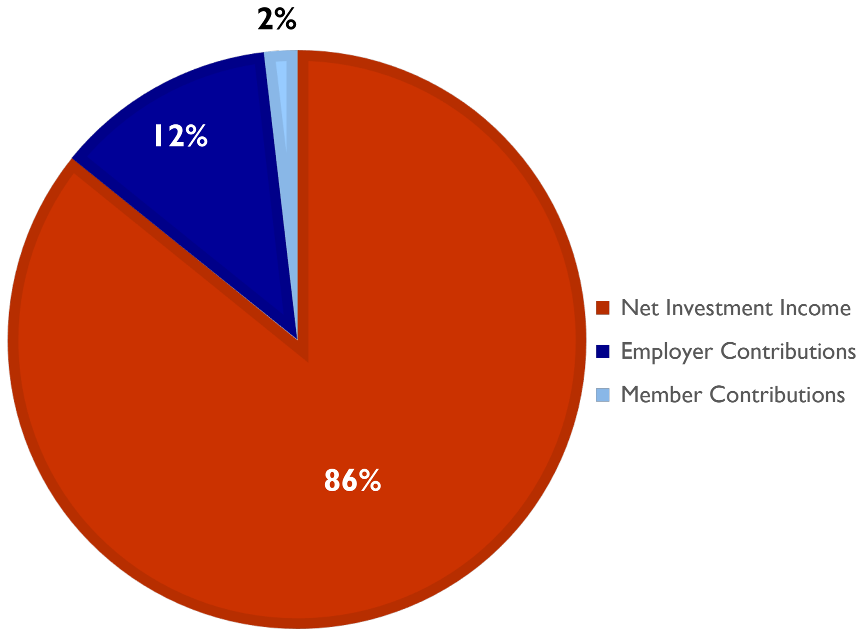
RECENT NASRA SURVEY – THREE SOURCES OF INCOME

NASRA Public Plan Database 1990 - 2020



Compiled by NASRA based on U.S. Census Bureau data

NYSTRS 7/1/1991 – 6/30/2021



THIRTY-YEAR ASSET SUMMARY: 1992 - 2022

Employer Contributions
$32.3 billion

Member Contributions
$4.7 billion

Investment Income
$207.8* billion

NY STRS

Benefit Payments and
Expenses $140.4 billion

Approximate Market Value of Assets- 1992: $27.9 B
Approximate Market Value of Assets- 2022: $132.3 B*

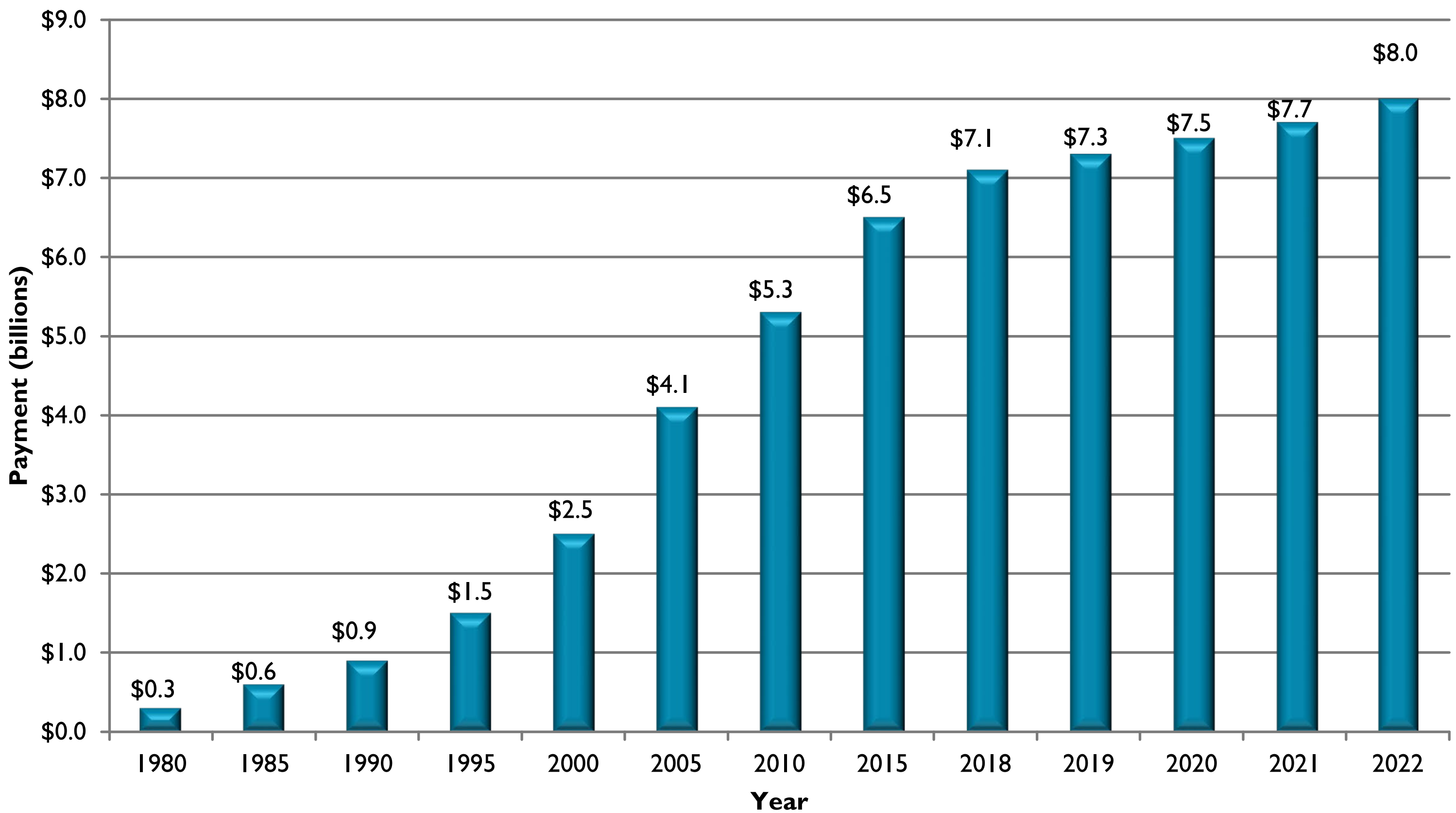
*Based on estimated 6/30/2022 Real Estate and Private Equity values.

NYSTRS Funded Ratio History

Funded Ratio is the ratio of plan assets to accrued liabilities

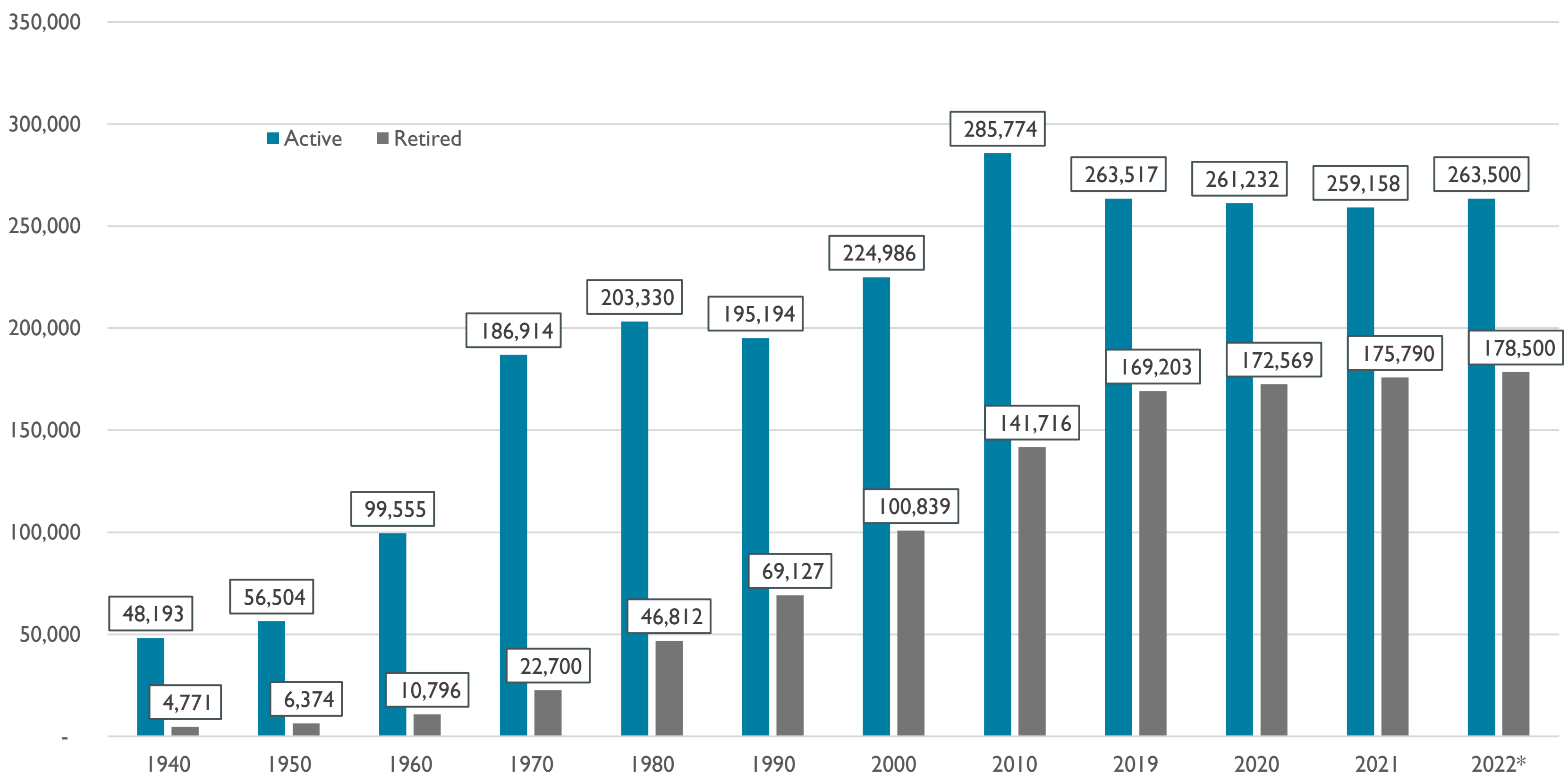
FYE	Funded Ratio Based on MVA	Funded Ratio Based on AVA
6/30/2016	98.4%	97.9%
6/30/2017	99.8%	97.7%
6/30/2018	100.9%	99.2%
6/30/2019	101.2%	99.6%
6/30/2020	97.3%	98.9%
6/30/2021	113.0%	99.3%

ANNUAL BENEFIT PAYMENTS



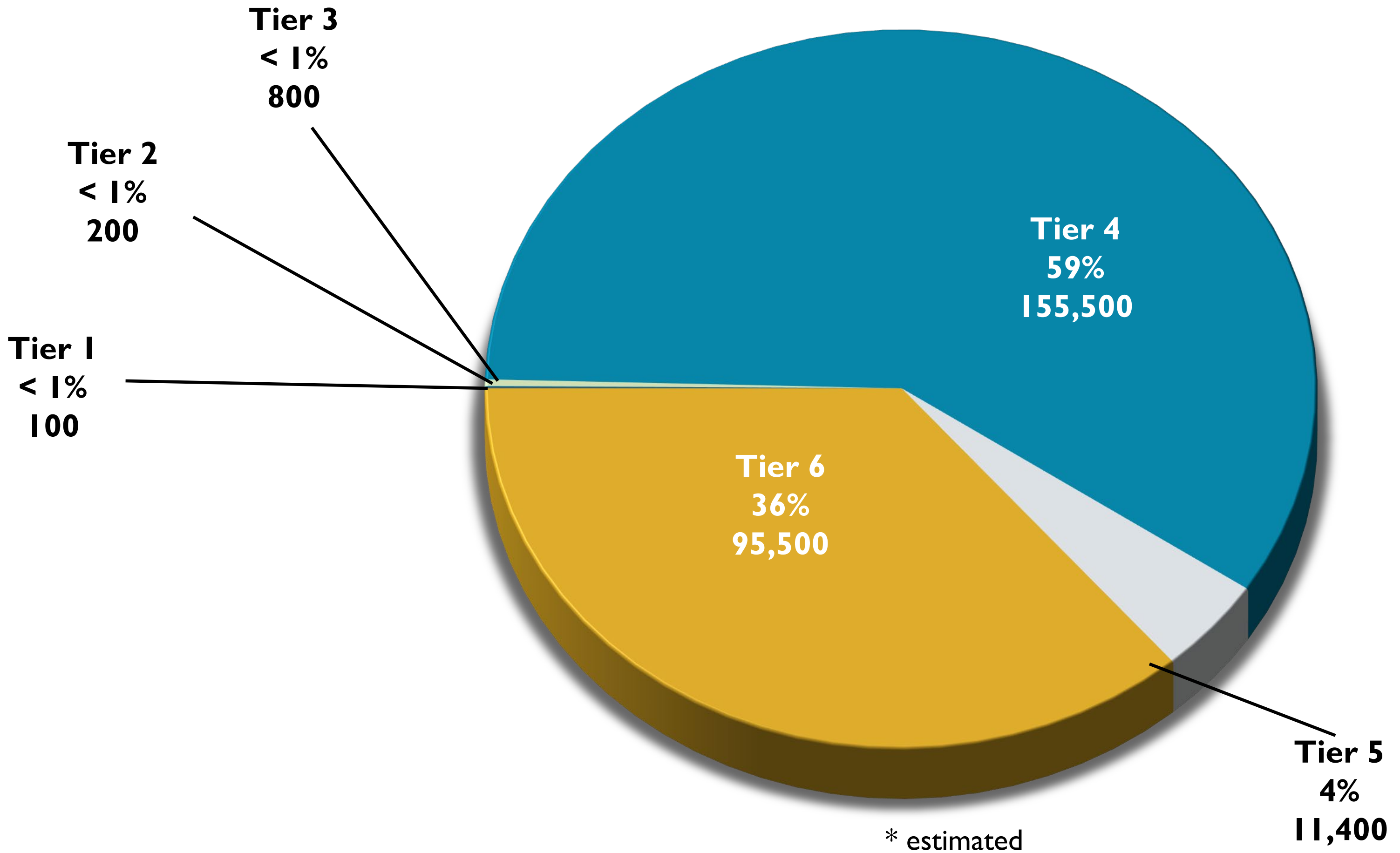
PRELIMINARY 6/30/2022 DATA

ACTIVE AND RETIRED MEMBER COUNTS



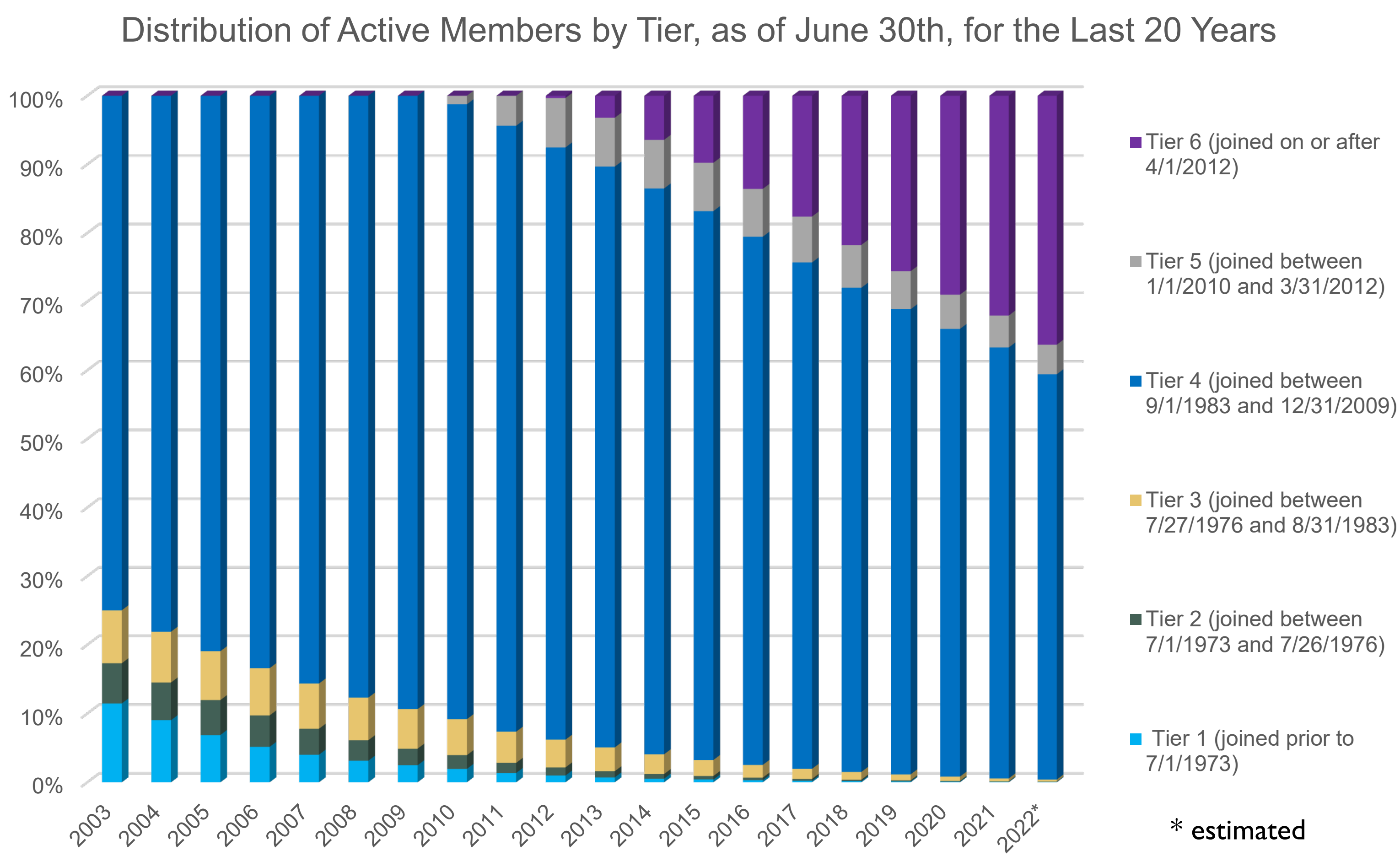
* estimated

DISTRIBUTION OF ACTIVE MEMBERS BY TIER AS OF JUNE 30, 2022*



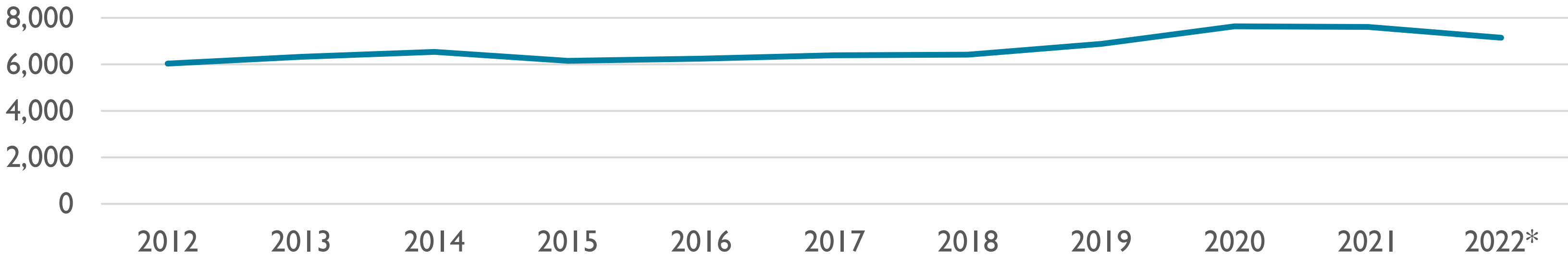
* estimated

DISTRIBUTION OF ACTIVE MEMBERS BY TIER



* estimated

NUMBER OF RETIREMENTS



Retired in Fiscal Year Ended	Number of Service Retirements	Number of Disabled Retirements	Total Number of Retirements
2012	5,915	118	6,033
2013	6,202	128	6,330
2014	6,432	115	6,547
2015	6,031	130	6,161
2016	6,121	124	6,245
2017	6,299	97	6,396
2018	6,301	115	6,416
2019	6,792	98	6,890
2020	7,531	111	7,642
2021	7,537	80	7,617
2022*	7,050	105	7,155

* Not yet finalized

MONTHLY COLA INCREASE

	Commencing September 2022	Commencing September 2021
CPI Percentage Change for Year ended March 31	8.54%	2.62%
Applicable COLA Percentage	3.0%	1.4%
Maximum Monthly COLA Increase based on Annual Benefit Amount of $18,000	$45.00	$21.00
Cumulative Maximum Monthly COLA (back to Sept. 2001)	$444.00	$399.00

Cost-of-living benefits are paid to eligible retired members (generally the later of age 62 and retired for 5 years) and are increased each September. The annual COLA percentage is equal to 50% of the increase in the annual CPI, not to exceed 3% nor be lower than 1%. It is applied to the first $18,000 of the maximum annual benefit.

RISK MEASURES AS OF JUNE 30, 2021

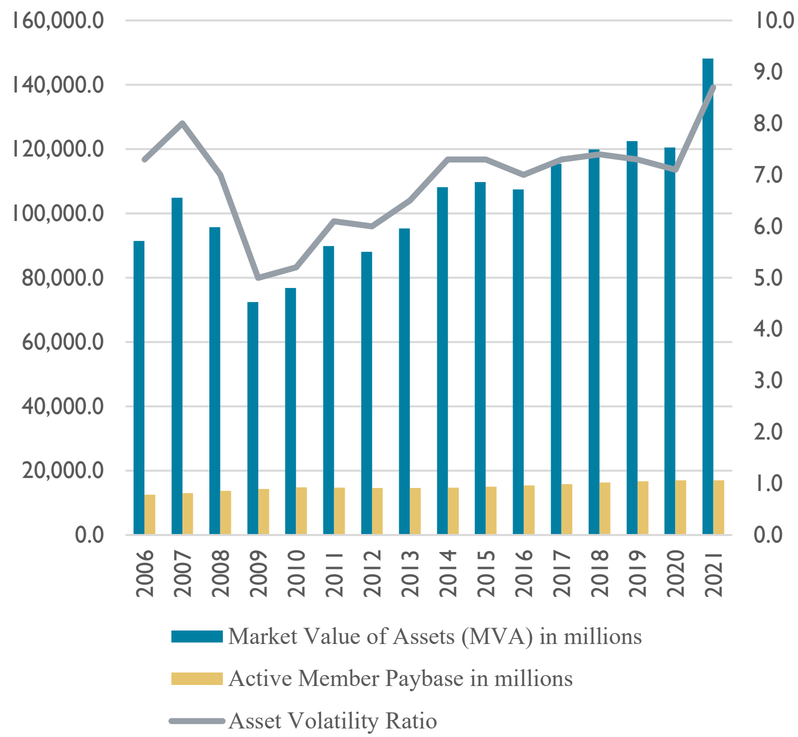
ACTUARIAL STANDARD OF PRACTICE NO. 51

ACTUARIAL STANDARD OF PRACTICE 51

- ASOP 51 requires various risk disclosures when measuring pension plan obligations and calculating pension contributions.
- It is important to understand how measurements may change over time and when more follow-up analysis is required.
- The 6/30/2021 NYSTRS risk measures are all indicative of, and consistent with, a well-funded Retirement System.

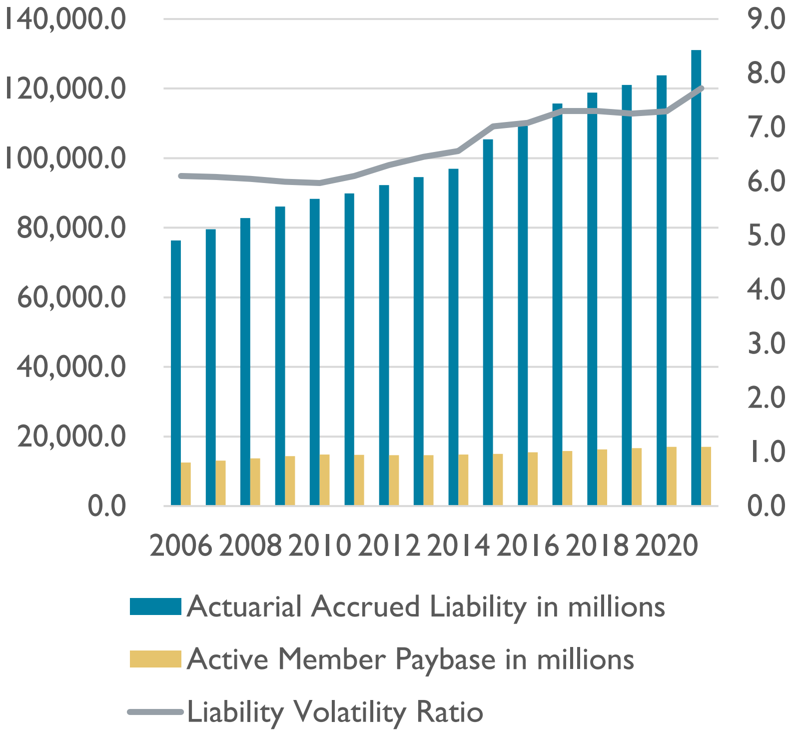
ASSET VOLATILITY RATIO

- Asset Volatility Ratio = market value of assets divided by the active member payroll.
- The greater a plan's assets are relative to payroll, the more prone the plan is to ECR swings due to investment volatility.
- A higher AVR is also indicative of a higher level of assets, which is certainly preferable to a lower level of assets.



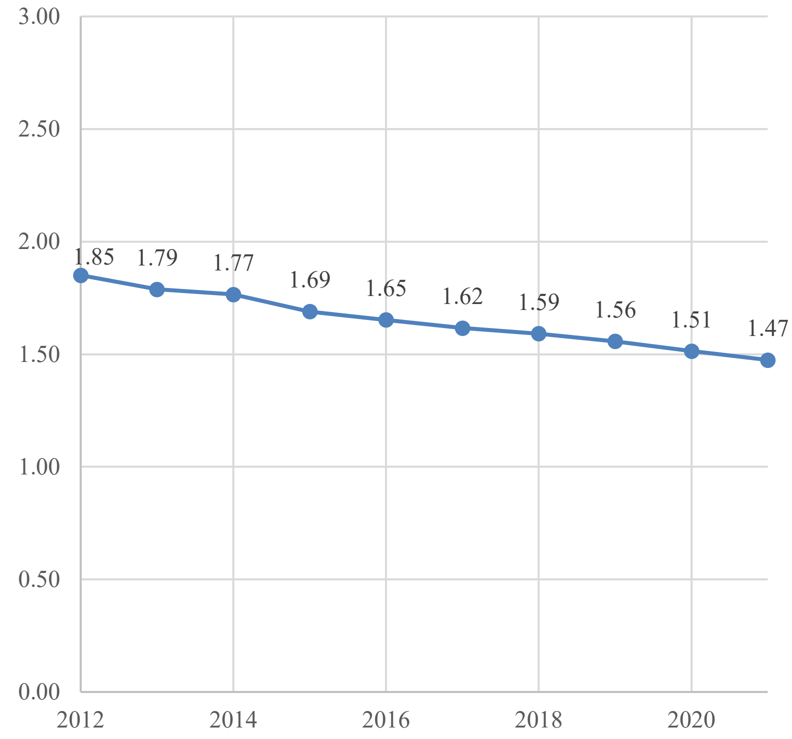
LIABILITY VOLATILITY RATIO

- Liability Volatility Ratio = accrued liability using the Entry Age Normal funding method divided by the active member payroll.
- The greater a plan's actuarial liabilities are relative to payroll, the more prone the plan is to ECR swings due to assumption changes.
- As plans mature, it is expected that their liability volatility ratio will grow as well.



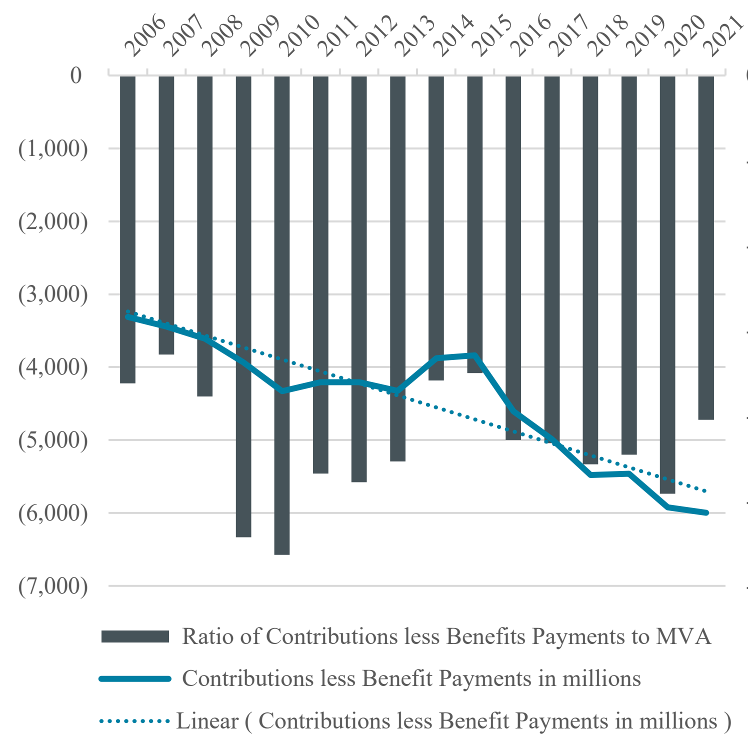
ACTIVE-TO-RETIREE RATIO

- Ratio = active member count divided by retired member count
- Average 2021 ratio across the public retirement system universe was 1.34 compared to the NYSTRS ratio of 1.47

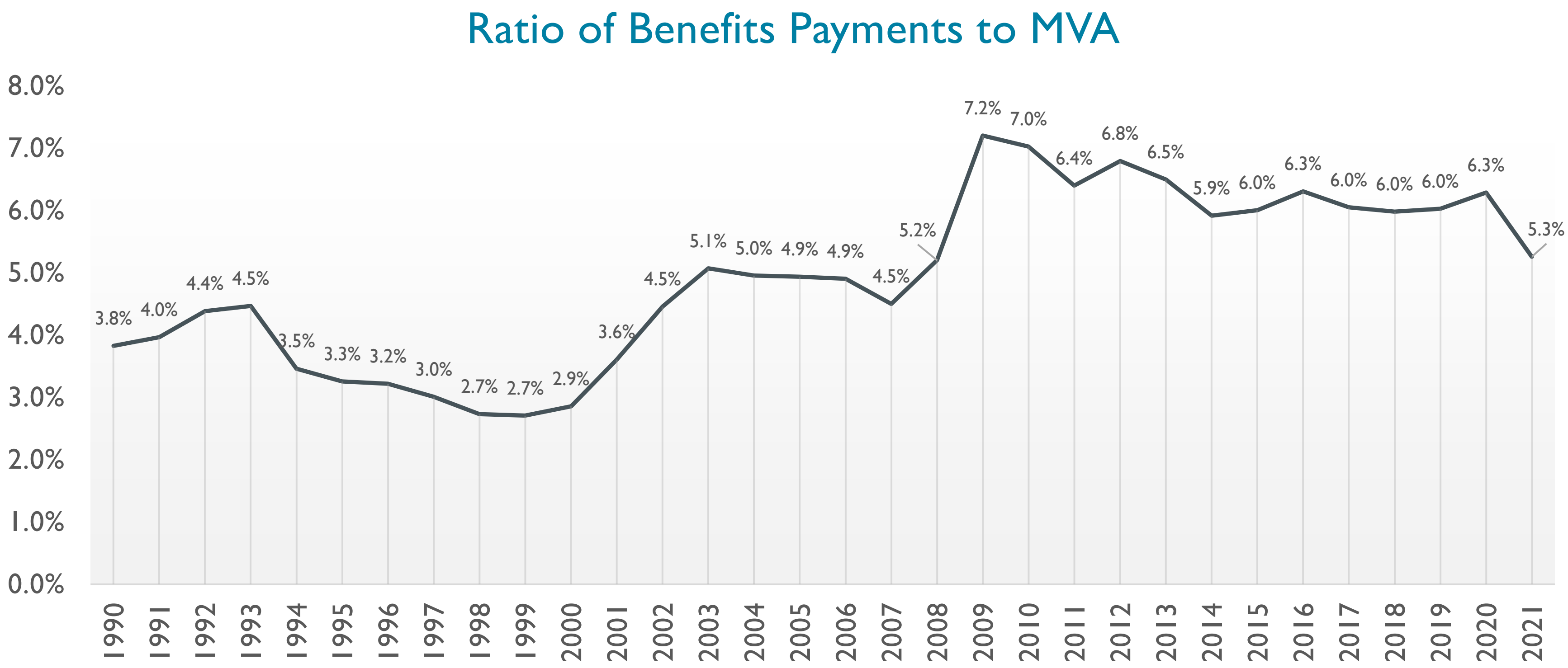


CASH FLOW RATIO

- Cash flow ratio = net cash flow (benefits and expenses less contributions) divided by the market value of plan assets.
- Plans often pay out more in benefits than they receive in contributions, leading to negative net cash flows.
- Negative cash flow does not indicate a plan has been poorly managed. A well funded plan will naturally reach a negative cash flow position.
- Most public plans have negative cash flow.



CASH FLOW RATIO (CONT.)



SENSITIVITY ANALYSIS

Assumption	Adjustment	Adjusted ECR
Current		10.29%
Assumed Rate of Return	Decrease from 6.95% to 6.70%	13.38%
Assumed Rate of Return	Decrease from 6.95% to 6.45%	16.56%
Salary Scale	Decrease of 10%	9.33%
Salary Scale	Increase of 10%	11.23%
Service Retirement Rates	Decrease of 10%	9.58%
Service Retirement Rates	Increase of 10%	10.88%
Healthy Annuitant Mortality	Decrease of 10%	12.02%
Healthy Annuitant Mortality	Increase of 10%	8.70%

- The ECR is sensitive to changes in the actuarial assumptions and is most sensitive to changes in the assumed rate of return assumption.
- Prolonged periods of experience different than expected can lead to notable increases in the ECR.

ACTUARIAL STANDARD OF PRACTICE 4

The Actuarial Standards Board (ASB) has issued a revision to Actuarial Standard of Practice No. 4 (ASOP 4) entitled "Measuring Pension Obligations and Determining Pension Plan Costs or Contributions." ASOP 4 is an existing standard of practice that provides guidance while performing work for pension plans.

Effective for NYSTRS with the June 30, 2023 actuarial valuation report (issued in July 2024).

Key Change

An additional requirement was added to calculate and disclose a "Low-Default-Risk Obligation Measure," (LDROM) which is the value of liabilities using an interest rate derived from low-default-risk fixed income securities.

Examples of interest rates that meet these requirements are:

- U.S. Treasury yields;
- Yields on corporate or tax-exempt general obligation municipal bonds that receive one of the two highest ratings given by a recognized ratings agency;
- Rates implicit in settlement of pension obligations and purchases of annuities from insurance companies.

ACTUARIAL STANDARD OF PRACTICE 4

The LDROM is a ***current*** market-based liability. This is different than our funded ratio liability which is measured using our long-term assumed rate of return.

This will likely result in a plan liability which is higher, and therefore a funded ratio which is lower, than what we currently report. It will very much depend on what fixed income security rates are at the time.

This will NOT replace how we currently report our funded ratio. This will be an additional measurement.

No one, including the Actuarial Standards Board, is suggesting that this is a better funded ratio measurement; just a different one.

COMING SOON

- Complete the 6/30/2022 data creation process with the fall fill in September.
- Calculate preliminary actuarial valuation results and report an estimated range for the next ECR to the Board in October.

QUESTIONS?