

State Teachers Retirement System of Ohio



Economic Assumptions for the June 30, 2024 Actuarial Valuation



February 15, 2024

Presented by
Mike Noble, FSA
Bonnie Rightnour, FSA

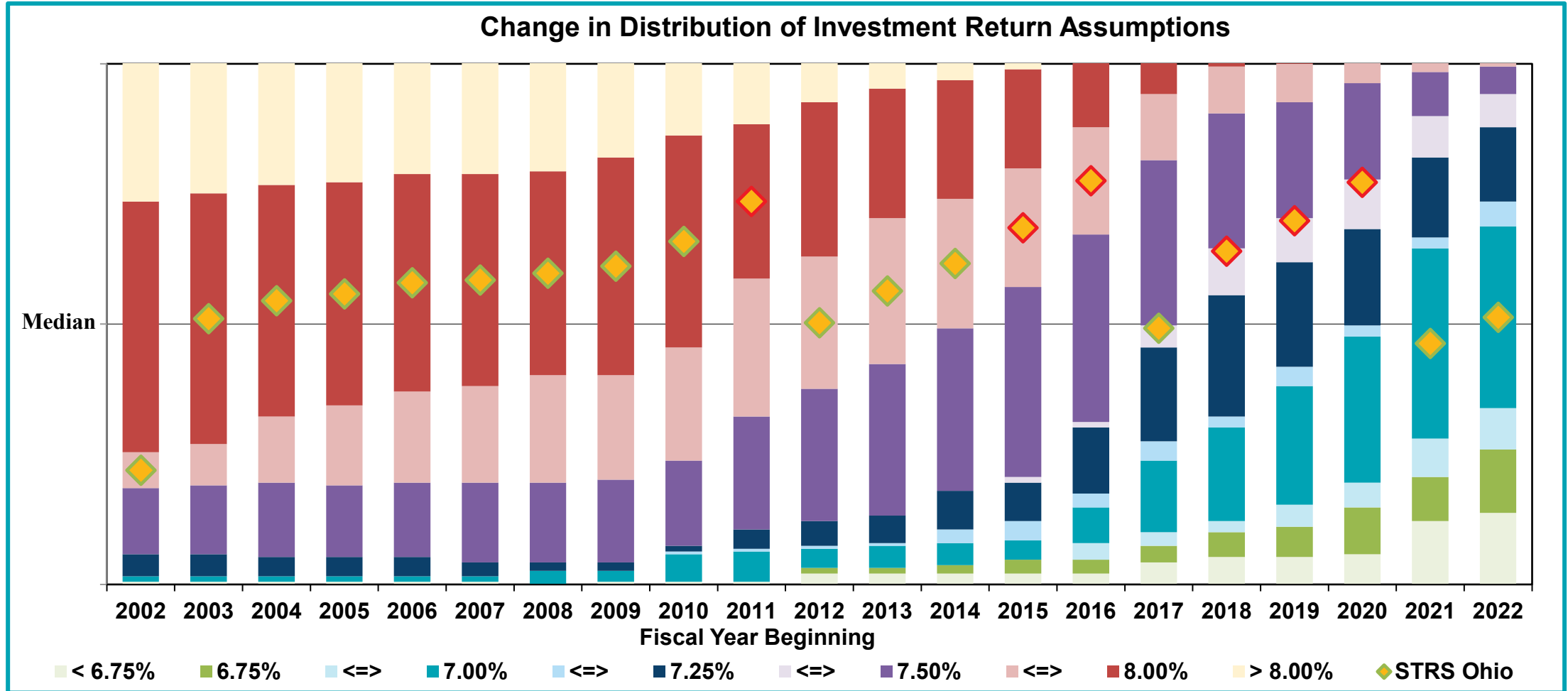




- Economic assumptions are reviewed annually
 - Discount rate, inflation, salary scale, payroll growth
 - Updated as needed to reflect current market expectations
 - Not dependent on accumulation of data
- STRS Ohio reviews demographic assumptions every 5 years
 - Next review will follow the June 30, 2026 actuarial valuation



- In setting economic assumptions, the Board should decide...
 - Whether any recent observed changes in the economic environment are representative of a long-term trend
 - If not, should assumptions chase annual expectation movements?
 - If so, how much do you change?
 - How important is it to be aligned with peer systems?



Source: The Public Plans Database as of October 30, 2023



- Discount Rate
 - Inverse relationship with actuarial liability
 - Increase in rate = decrease in actuarial liability
 - Decrease in rate = increase in actuarial liability
 - Linear relationship with the interest cost on remaining Unfunded Actuarial Liability
 - A higher discount rate will increase the risk of underperformance in future years



- Inflation assumption
 - Used as a building block for salary scale and payroll growth
 - Implicitly used in the development of the discount rate
- Salary Scale
 - A higher assumption will increase the normal cost of benefits and actuarial liability since projected benefits are expected be larger in the future



- Payroll growth
 - Inflation is a component of this assumption
 - This assumption also reflects the growth/decline in the covered population
 - Increase to assumption = decrease to amortization period
 - Decrease to assumption = increase to amortization period

Assumption Change Impact



	Baseline	Discount Rate Change +0.25%	Discount Rate Change -0.25%	Inflation* +0.25%	Payroll Growth -0.25%
Actuarial Liability (\$ millions)	\$105,204	- \$2,588	+ \$2,670	+ \$370	No change
Normal Cost Rate	10.66%	- 0.61%	+ 0.62%	+ 0.39%	No change
Funding Period (years)	11.2	- 1.6	+ 1.6	+ 0.3	+ 0.1
Treadwater Rate (MVA basis)	22.15%	- 1.64%	+ 1.57%	+ 0.55%	No change

* Includes Individual Salary Growth plus Total Payroll Growth

Economic Assumptions - Factors to Consider



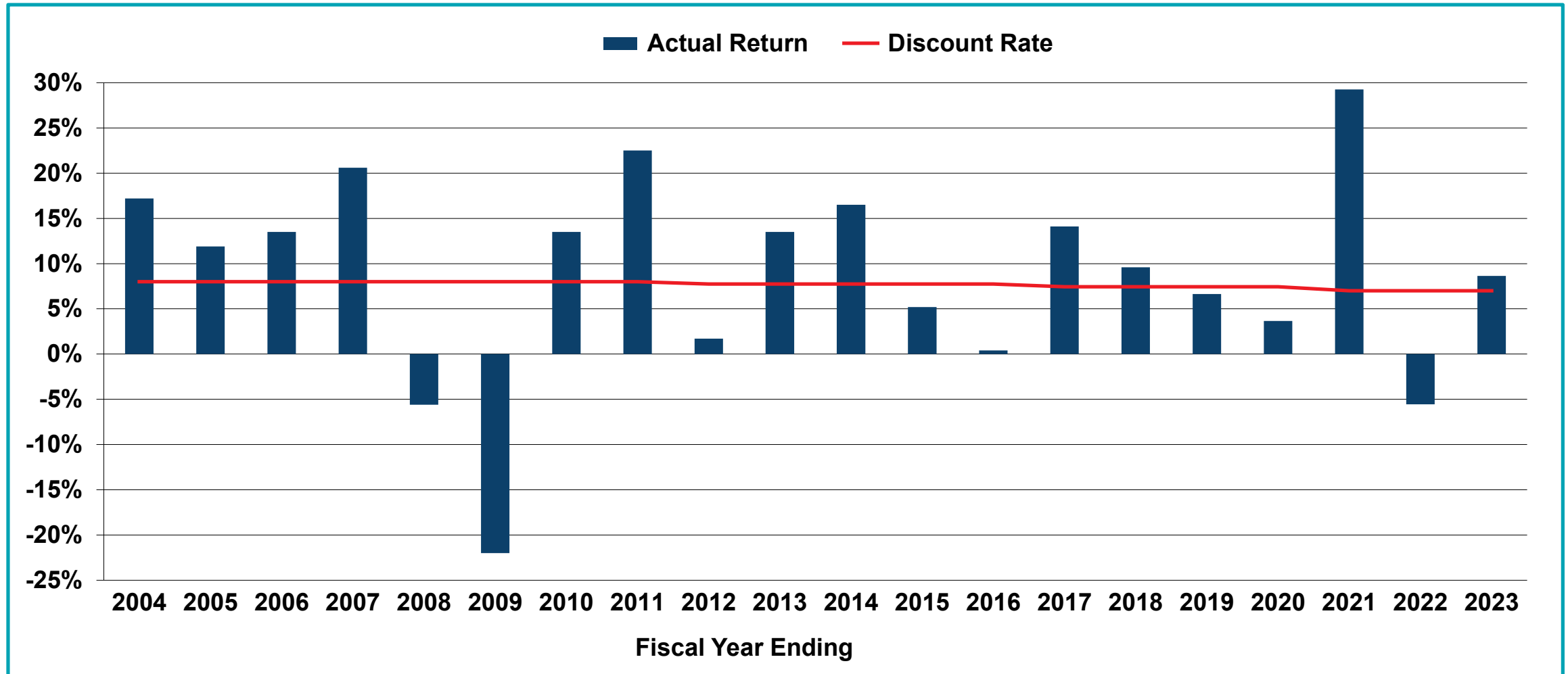
1. Historical Experience
2. Industry Trends
3. Regulatory/Professional Standards
4. Board's Risk Tolerance/Preference
5. Plan Dynamics
6. Future Expectations



The Discount Rate Assumption



1. Historical STRS Ohio Experience

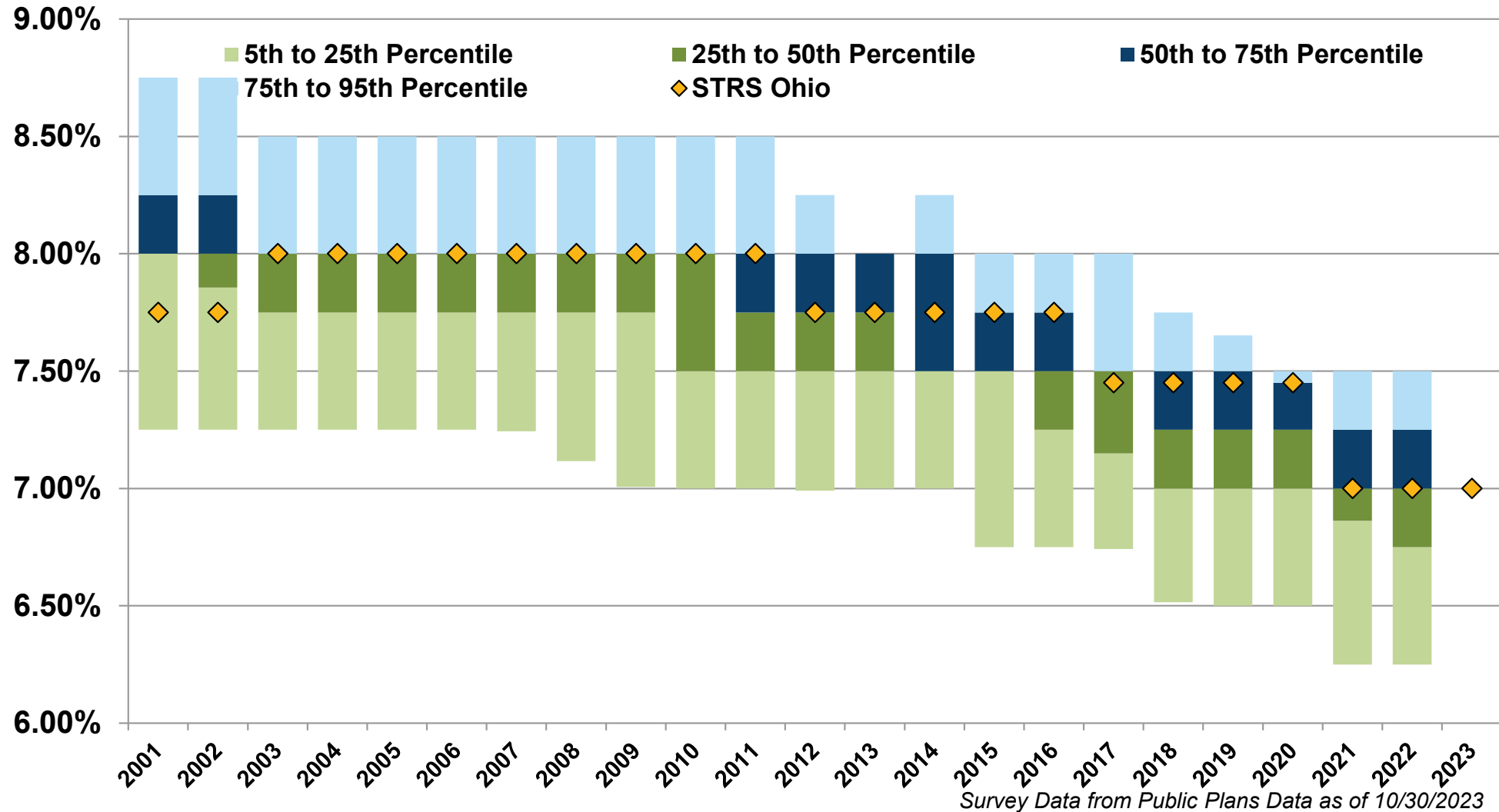


**7.94% is the time weighted annual net return over the 20-year period ending 12/31/2023*

2. Industry Trends



Discount Rate



3. Regulatory/Professional Standards

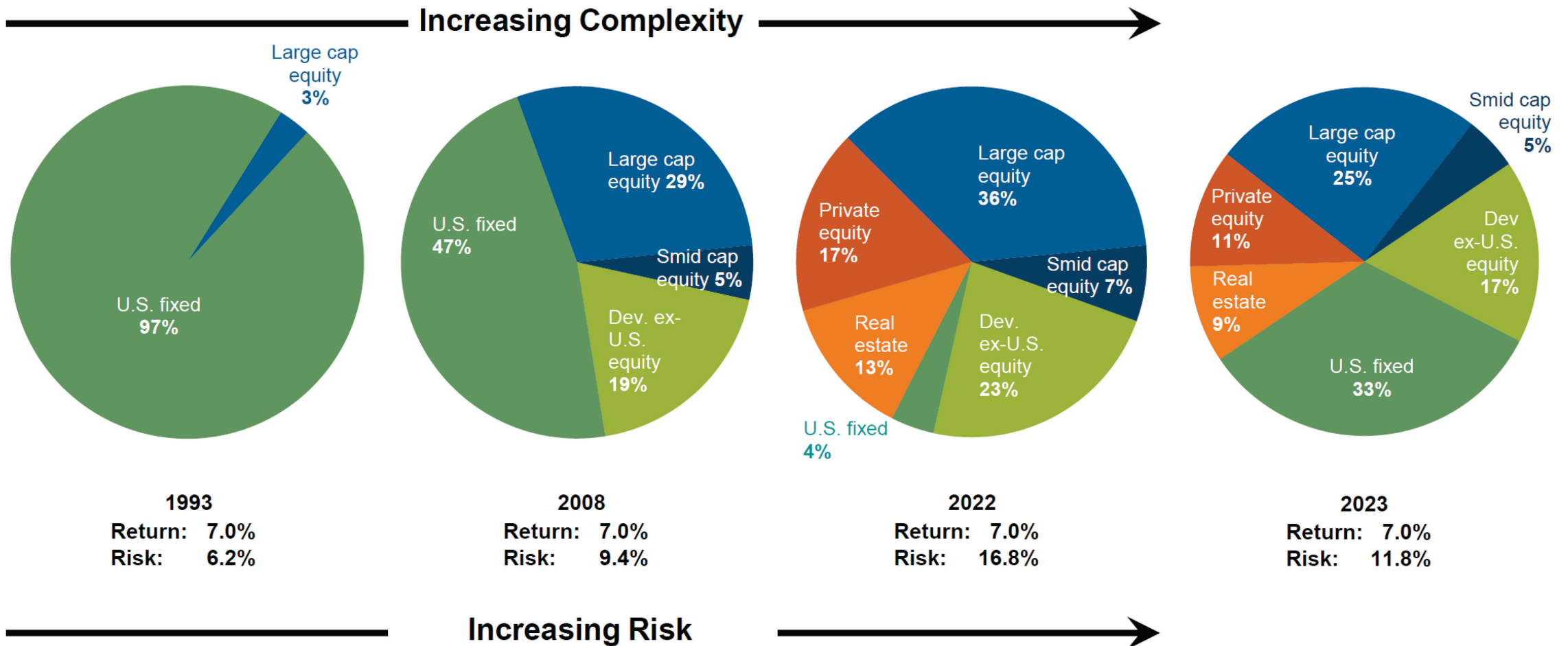


- Regulatory
 - Currently none apply (Federal or State level)
- Professional
 - Actuarial Standard of Practice (ASOP) 27
 - Disclosure requirement if selected assumption conflicts with the actuaries' professional judgement
 - ASOP 4
 - Must disclose Reasonable Actuarially Determined Contribution and funded status based on assumptions deemed to be reasonable

4. The Board's Risk Preference



Hypothetical Asset Mix Needed to Achieve a 7% Expected Return

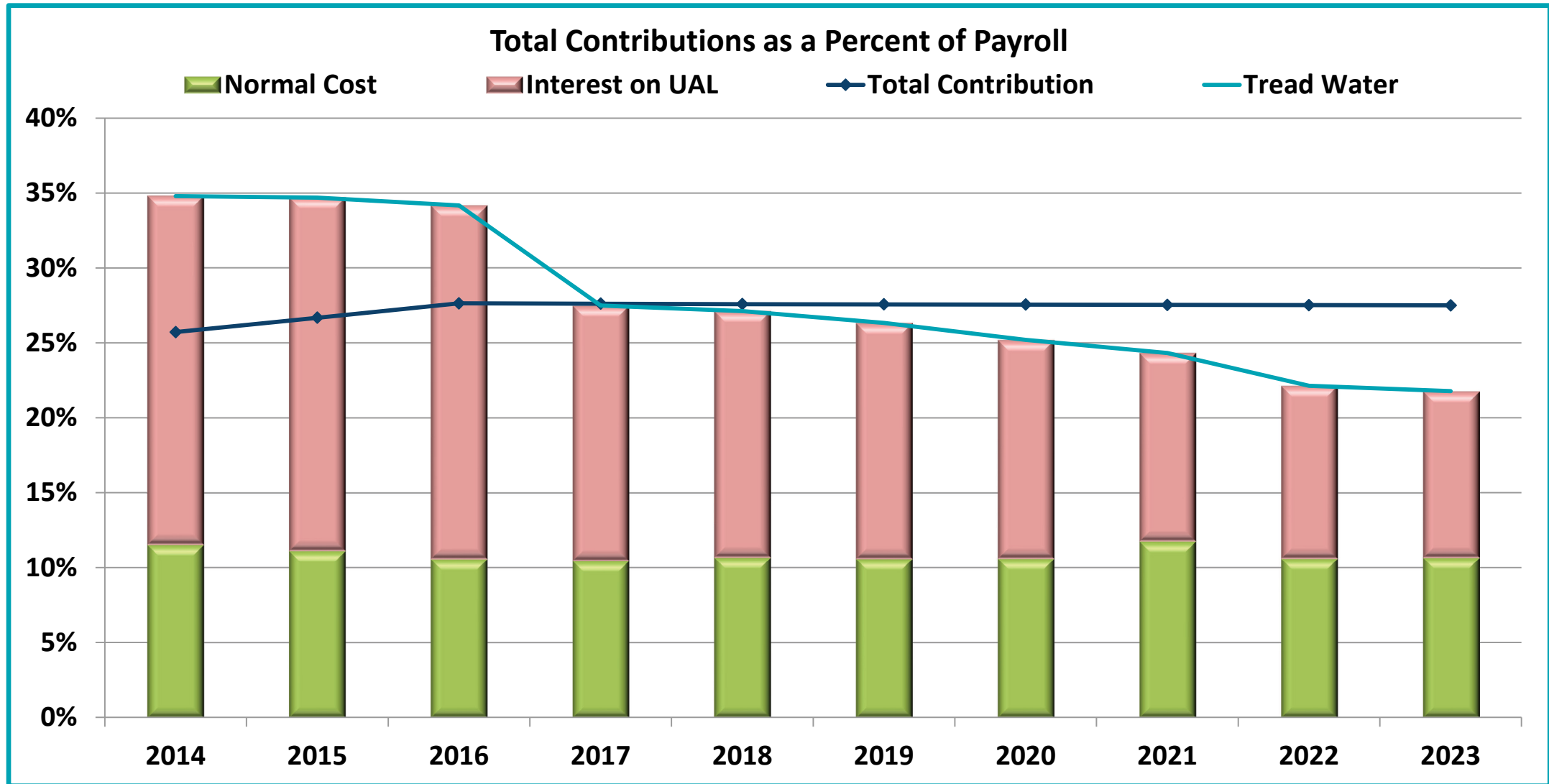


5. Plan Dynamics



- Contributions are statutorily capped
- Contributions are now more than “Tread-Water” costs
 - Prior to 2017, contributions were below Tread-Water which is often called Negative Amortization
- Plan has significant negative cash flows
- Political environment to enhance benefits

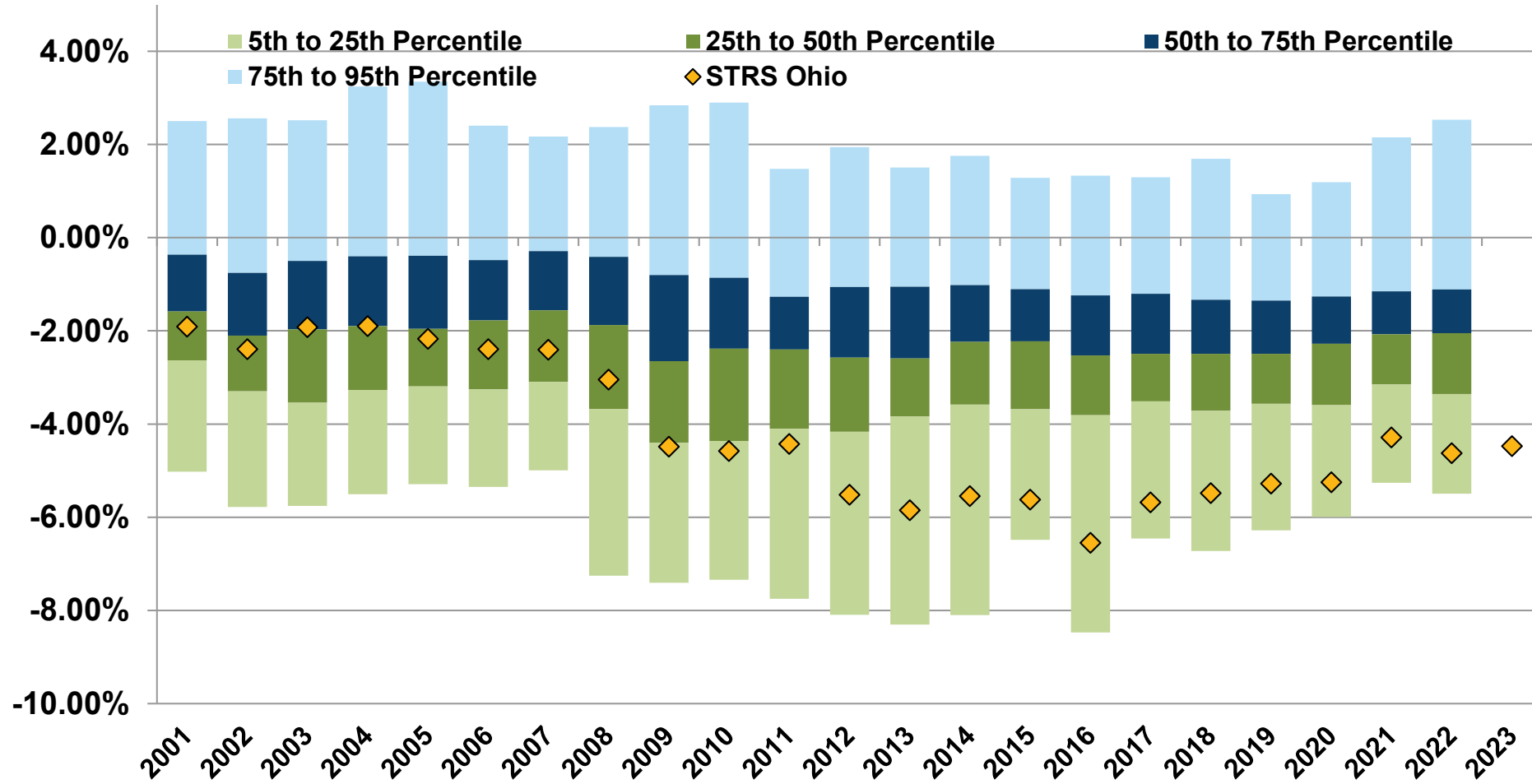
Tread-Water (Normal Cost + Interest on the UAL)



Net Cash Flow (NCF) Rate



Net Cash Flow Rate



Survey Data from Public Plans Data as of 10/30/2023

Negative Cash Flows



When cash flows in = cash flows out – a volatile return averaging 7% over 10 years matches a flat return of 7%

Starting Assets **\$ 83,669** Market Cycle **downup**
 Starting NCF **0.0%**

Year	Net Cash Flow	Level Returns		Volatile Returns	
		Returns	Assets	Returns	Assets
1	\$ -	7.00%	\$89,526	-3.5%	\$80,736
2	\$ -	7.00%	\$95,793	-6.5%	\$75,484
3	\$ -	7.00%	\$102,498	-10.0%	\$67,906
4	\$ -	7.00%	\$109,673	5.0%	\$71,301
5	\$ -	7.00%	\$117,350	7.0%	\$76,290
6	\$ -	7.00%	\$125,565	11.0%	\$84,682
7	\$ -	7.00%	\$134,354	13.0%	\$95,691
8	\$ -	7.00%	\$143,759	17.0%	\$111,958
9	\$ -	7.00%	\$153,822	20.5%	\$134,909
10	\$ -	7.00%	\$164,590	22.0%	\$164,589

reported return = **7.00%** = time weighted = **7.00%**

actual return = **7.00%** = dollar weighted = **7.00%**

10-year Asset Loss/(Gain) **\$0** or **0%**



Negative Cash Flows



With STRS's negative net cash flow profile – the same volatile returns create a shortfall of \$16.5 billion

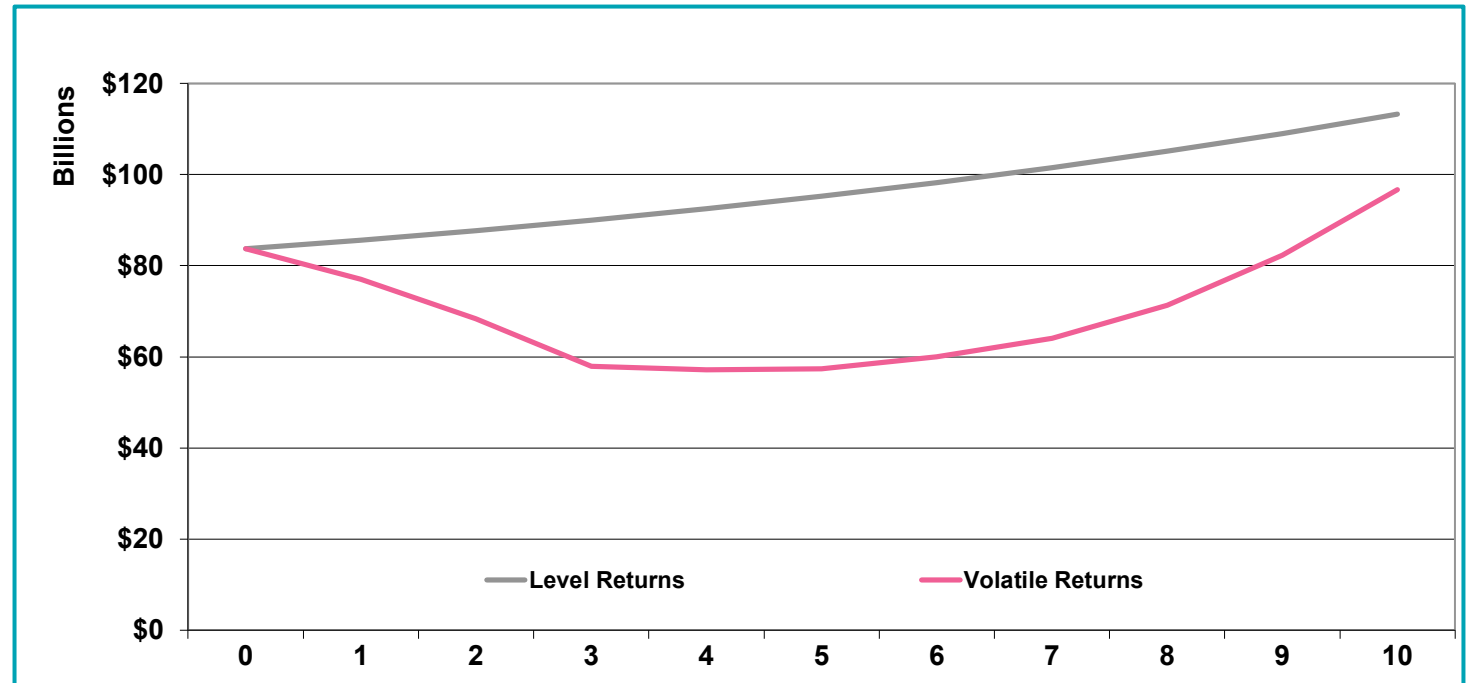
Starting Assets **\$ 83,669** Market Cycle **downup**
 Starting NCF **A**

Year	Net Cash Flow	Level Returns		Volatile Returns	
		Returns	Assets	Returns	Assets
1	\$ (3,833.8)	7.00%	\$85,560	-3.5%	\$76,970
2	\$ (3,774.4)	7.00%	\$87,645	-6.5%	\$68,314
3	\$ (3,710.9)	7.00%	\$89,942	-10.0%	\$57,935
4	\$ (3,646.6)	7.00%	\$92,465	5.0%	\$57,096
5	\$ (3,594.7)	7.00%	\$95,220	7.0%	\$57,372
6	\$ (3,525.8)	7.00%	\$98,238	11.0%	\$59,969
7	\$ (3,460.8)	7.00%	\$101,535	13.0%	\$64,085
8	\$ (3,400.4)	7.00%	\$105,125	17.0%	\$71,302
9	\$ (3,342.8)	7.00%	\$109,026	20.5%	\$82,249
10	\$ (3,285.7)	7.00%	\$113,259	22.0%	\$96,715

reported return = **7.00%** = time weighted = **7.00%**

actual return = **7.00%** = dollar weighted = **5.61%**

10-year Asset Loss/(Gain) **\$16,544** or **-15%**

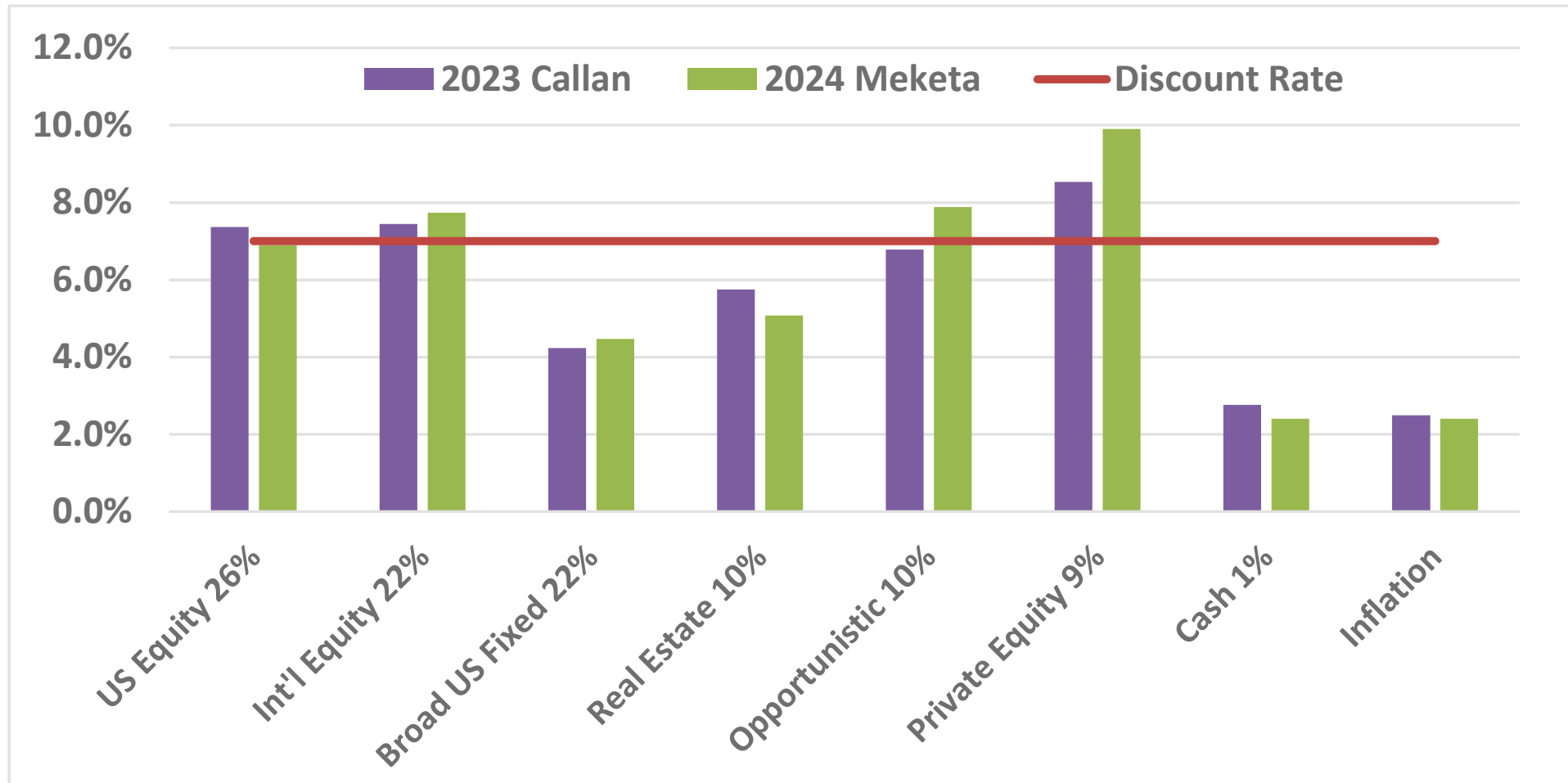


6. Future Expectations



- The most important factor to consider
- Review Meketa's expectations
- Review industry-wide expectations

STRS Ohio Investment Consultant Expectations



Horizon Annual Survey



- AJ Gallagher
- Alan Biller and Co Consulting
- Aon
- The Atlanta Consulting Group
- Bank of New York Mellon
- BlackRock
- Buck
- Callan Associates
- Cambridge Associates
- CapTrust
- Envestnet
- Goldman Sachs Asset Management
- Graystone Consulting
- Invesco
- IPS, LLC
- Janney Montgomery Scott, LLC
- J.P. Morgan Asset Management
- Marquette Associates
- Meketa Investment Group
- Mercer
- Merrill
- Milligan
- Morgan Stanley
- NEPC
- PFM Asset Management, LLC
- Principal
- Research Affiliates, LLC
- Research Affiliates, LLC
- Royal Bank of Canada
- RVK
- Segal Marco Advisors
- SEI
- Sellwood Consulting
- Truist Investment Advisory
- UBS
- The Vanguard Group
- Verus
- Voya Investment Management
- Wells Fargo
- Willis Towers Watson
- Wilshire



Consultant	Nominal Inflation	Real	Standard Deviation	
Meketa (10-year), 2024 Assumptions	7.04%	2.40%	4.64%	11.76%
Meketa (10-year), 2023 Assumptions	7.84%	2.50%	5.34%	12.33%
Callan (10-year), 2023 Assumptions	7.17%	2.50%	4.67%	12.78%
Horizon (10-year), 2023 Assumptions	7.31%	2.50%	4.81%	11.84%
Horizon (20-year), 2023 Assumptions	7.61%	2.40%	5.21%	11.84%



Inflation Assumptions





- Inflation
 - Currently 2.5% per year
 - Inflation continues to be volatile
 - Calendar Year 2020 – 1.36%
 - Decade from 2010 to 2020 average was 1.69%
 - Calendar Year 2021 – 7.04%
 - Calendar Year 2022 – 6.45%
 - Calendar Year 2023 – 3.35%
 - Twenty-year period ending 2023 average was 2.57%
- Payroll Growth (inflation plus productivity growth)
 - Currently at 3.0%



- Has no affect on determining STRS's liabilities
- Impacts STRS's future contribution income which impacts the funding period
- Continued 30+ year trend of declining birth rate and declining school attendance
 - Voucher program changes may create further drag yet to be an established trend
- Grinnell's Analysis: *“best estimate may be a decline in teaching population of 0.25% to 0.50% per year”*



- No Changes to Economic Assumptions for FYE 2025
- Maintain assumptions
 - Discount Rate at 7.0%
 - Price Inflation at 2.5%
 - Payroll Growth at 3.0%
- Rationale
 - Significant economic uncertainties
 - Long-term trends have not been established
 - Economic assumptions should not chase annual expectation movements

Required Disclosures



The purpose of this presentation is to discuss funding policy and economic actuarial assumptions for the State Teachers Retirement System of Ohio. This presentation is for the use of the Board and System staff.

In preparing our presentation, we relied on information, some oral and some written, supplied by the State Teachers Retirement System of Ohio. 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.

Unless otherwise specified, the actuarial assumptions, data, and methods are those used in the preparation of the Actuarial Valuation Report as of June 30, 2023.

The assumptions reflect our understanding of the likely future experience of the System, and the assumptions as a whole represent our best estimate for the future experience of the System. The results of this presentation are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the true cost of the System could vary from our results.

We hereby certify that, to the best of our knowledge, this presentation 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 presentation. This presentation does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This presentation was prepared exclusively for the State Teachers Retirement System of Ohio for the purpose described herein. Other users of this presentation are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Michael Noble, FSA

Bonnie Rightnour, FSA