

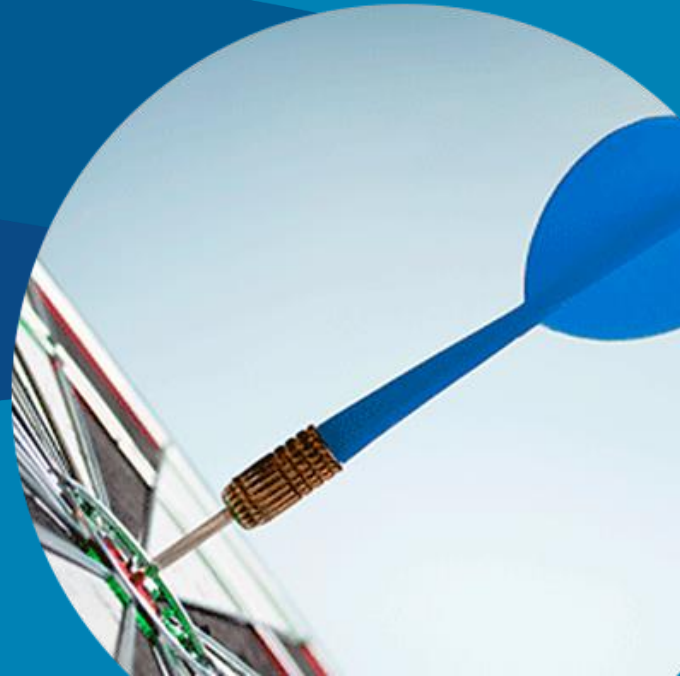


North Dakota Teachers' Fund for Retirement Plan Management Policy Score Update Based on the July 1, 2023 Actuarial Valuation

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Purpose

- Additional advance warning metric regarding plan sustainability (or unsustainability)
- Supplements valuation measures of contribution sufficiency
 - Actuarially determined contribution
 - Time to full funding
- Valuation metrics based on single outcome if all goes as planned
- Plan Management Policy Score attempts to take broader view of the realm of possibilities and gauge resilience
- Advances the fulfillment of fiduciary duties of the Board

Scoring Metrics

- Current funded ratio (3)
- Downside funded ratio in 2030 (3)
- Target funded ratio in 2040 (4)
- Improvement in funded ratio over a 10-year period (2)
- Ability to recover from/withstand a market downturn (2)



Approach

- Perform stochastic simulation of investment returns
- Investment return mean and standard deviation determined using
 - 2023 Horizon Survey of Capital Market Assumptions (20+ years) by asset class
 - Survey of 42 investment consultants (27 provided 20+ year assumptions)
 - TFFR asset allocation
 - Same approach used by prior actuary, apples to apples for trend purposes

Scoring Perspective

- **Highly sensitive to current capital market expectations and recent returns**
- Sensitive to valuation assumptions (experience studies, etc)
- Fixed data points 2030/2040 will start to take on different meaning as time passes
- Most informative piece of information is long-term trend of this score
 - need to maintain the context
- Another gauge on the dash, not the only one

Asset Allocation and Capital Market Assumptions Used

	Asset Class	Target Allocation	Weighted Return	Expected Return	Standard Deviation
Equity	US Large Cap	23.0%	1.99%	8.67%	16.64%
	US Small Cap	4.0%	0.39%	9.72%	20.51%
	International Developed	14.9%	1.40%	9.38%	18.26%
	Emerging Markets	3.1%	0.35%	11.39%	23.87%
	Private Equity	10.0%	1.28%	12.77%	22.57%
Fixed	US Core	18.0%	0.89%	4.93%	5.85%
	High Yield	8.0%	0.56%	7.03%	10.01%
Alt/Other	Real Estate	9.0%	0.67%	7.48%	16.72%
	Commodities/Timber	1.3%	0.09%	6.55%	18.02%
	Infrastructure	7.7%	0.65%	8.38%	17.10%
	Cash	1.0%	0.03%	3.23%	1.09%

Total Weighted Return 8.30%
 Adjusted to Geometric -0.91%

Total Long-Term Return
 Standard Deviation

7.39%
 12.28%

Prior Year Result

6.86%
 12.18%

Replication of Prior Year Results

Score = 7

1	Current year funded ratio is 69%	If current ratio is 90% or higher: +3 If current ratio is between 80% to 90%: +2 If current ratio is between 70% to 80%: +1 If current ratio is less than 70%: +0	Prior year: +0 based on funded ratio of 68% +0
2	32% probability of funded ratio <65% in 2030	Under 65% funded ratio with less than 20% probability: +3 Under 65% funded ratio with less than 30% probability: +2 Under 65% funded ratio with less than 40% probability: +1 Under 65% funded ratio with more than 40% probability: +0	Prior year: +1 based on 35% probability of funded ratio <65% in 2030 +1
3	50% probability of funded ratio >85% in 2040	85% or higher with more than 50% probability: +4 (50% probability) 80% or higher with more than 50% probability: +3 (55% probability) 75% or higher with more than 50% probability: +2 (60% probability) 70% or higher with more than 50% probability: +1 (65% probability) Not more than 70% with more than 50% probability: +0	Prior year: +3 based on 52% probability of funded ratio >85% in 2040 +4
4	55% probability of improvement over 10 years	Funded ratio improves by +5% over 10 years with 66% probability: +2 Funded ratio improves by +5% over 10 years with 50% probability: +1 Ratio does not improve by +5% over 10 years with 50% probability: +0	Prior year: +1 based on 55% probability of improvement over 10 years +1
5	49% probability of recovering from market downturn*	Funded ratio improves by +5% over 10 years with 50% probability: +2 Funded ratio improves by +5% over 10 years with 33% probability: +1 Ratio does not improve by +5% over 10 years with 33% probability: +0	Prior year: +1 based on 42% probability of recovering from market downturn +1

+7

* 1,710 scenarios contain -10% average or worse over 2 years (in the first 10 years), 751 of which "recover."

Plan Experience During FY 2023

- 7% fair value return during 2023
 - As expected, no anticipated change in score
- Total payroll growth 1.5% compared to 3.25% assumed
 - Puts more pressure on contributory payroll
 - Slight negative impact on score
- Overall changes in scoring expected from plan experience are negligible, primary change is from capital markets

Current Results – July 1, 2023 Valuation

Score = 9

1	Current year funded ratio is 69%	If current ratio is 90% or higher: +3 If current ratio is between 80% to 90%: +2 If current ratio is between 70% to 80%: +1 If current ratio is less than 70%: +0	Prior year: +0 based on funded ratio of 68% +0
2	27% probability of funded ratio <65% in 2030	Under 65% funded ratio with less than 20% probability: +3 Under 65% funded ratio with less than 30% probability: +2 Under 65% funded ratio with less than 40% probability: +1 Under 65% funded ratio with more than 40% probability: +0	Prior year: +1 based on 35% probability of funded ratio <65% in 2030 +2
3	61% probability of funded ratio >85% in 2040	85% or higher with more than 50% probability: +4 (61% probability) 80% or higher with more than 50% probability: +3 (65% probability) 75% or higher with more than 50% probability: +2 (70% probability) 70% or higher with more than 50% probability: +1 (74% probability) Not more than 70% with more than 50% probability: +0	Prior year: +3 based on 52% probability of funded ratio >85% in 2040 +4
4	63% probability of improvement over 10 years	Funded ratio improves by +5% over 10 years with 66% probability: +2 Funded ratio improves by +5% over 10 years with 50% probability: +1 Ratio does not improve by +5% over 10 years with 50% probability: +0	Prior year: +1 based on 55% probability of improvement over 10 years +1
5	54% probability of recovering from market downturn*	Funded ratio improves by +5% over 10 years with 50% probability: +2 Funded ratio improves by +5% over 10 years with 33% probability: +1 Ratio does not improve by +5% over 10 years with 33% probability: +0	Prior year: +1 based on 42% probability of recovering from market downturn +2

+9

* 1,377 scenarios contain -10% average or worse over 2 years (in the first 10 years), 743 of which "recover."

Evolution of the Plan Policy Score

Valuation Year	Score	Notable Events	Geometric Mean Used in Simulation
2019	6	First Score	7.47%
2019	7	Post-experience study changes	7.47%
2020	6	Market return FY 2020 = 3%	7.25%
2021	9	Market return FY 2021 = 26%	6.77%
2022	7	Market return FY 2022 = -6%	6.86%
2023	9	Market return FY 2023 = 7%	7.39%



Summary

- Increased optimism from capital market assumptions projects better outcomes for TFFR
- Will need sustained optimism from investment consultants to maintain current relatively strong policy score

Actuary's Qualifications

- We believe the recommended set of actuarial assumptions should present a more accurate portrayal of TFFR's financial condition and should reduce the magnitude of future experience gains and losses.
- The study was conducted in accordance with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board
- Dana and Paul meet the Qualification Standards of the American Academy of Actuaries