

North Dakota Teachers'  
Fund for Retirement

# Plan Management Policy Score Update

Based on the July 1, 2022 Actuarial Valuation

April 27, 2023 / Matt Strom / Brad Ramirez

# Agenda

**Policy Score – Summary**

**Background**

**Policy Score – Detail**

**Other Commentary**

# Summary Score based on July 1, 2022 Actuarial Valuation

## Composite summary score equal to 6

**Assessment:**

Summary score of 11 to 14:

**Objectives being met or likely to be met**

Summary score of 7 or 10:

**Objectives may be met over longer period**

Summary score of 4 to 6:

**Continue to monitor**

Summary score of 0 to 3:

**Changes should be considered**

**Based on a summary score of 6: Orange**



The summary score has decreased from a prior score of 9 based on last year's valuation results and poor returns for FY 2022.

# Background

# Plan Funding Policy vs. Plan Management Policy

## The funding policy sets actuarially sound contribution rates

- TFFR's funding policy serves as a benchmark, which compares the actuarially determined contribution rate to the fixed employer contribution rate
- Actuarially determined contribution is equal to Normal Cost plus 21-year amortization of Unfunded Accrued Liability (as of 7/1/2022)
  - Amortization targets 100% funding in 21 years
  - Based on the 30-year closed period that began on July 1, 2013

## The plan management policy monitors the ongoing plan health

- Objective criteria have been established to evaluate health of TFFR
- Market volatility and contribution inadequacy risks are illustrated through stochastic modeling
- Board is able to evaluate the probabilities of future funded ratios
- Serves as advance warning tool

The TFFR plan management policy is a more robust way to evaluate the ongoing health and sustainability of TFFR.

# Using the Plan Management Policy

## **The Policy Score is updated subsequent to each valuation and experience study**

- Provides context for likelihood of future positive or negative events
  - For example, if the funded ratio is projected to be at an unacceptable level with a high likelihood, the Board can explore ways to address this
- Will be part of the actuarial analysis of proposed legislation
  - Will proposed legislation improve, retain, or worsen the Policy Score?

**The July 1, 2022 Policy Score is determined on the basis of:**

- The July 1, 2022 actuarial valuation
- The Horizon Actuarial Services, LLC *Survey of Capital Market Assumptions (2022 Edition)*

# Stochastic Modeling of Investment Return

- Modeling of future simulated return trials is based on:
  - The Horizon Survey of Capital Market Assumptions (2022 Edition)
    - This survey compiles and averages the capital market assumptions of 40\* investment consultants
  - The table shows TFFR’s current target asset allocation (approved by TFFR and SIB in October 2022) mapped to asset classes from the survey

	Asset Class	Target Allocation
Fixed/Alternative	US Core	18.0%
	Real Estate	9.0%
	High Yield	8.0%
	Commodities/Timber	1.3%
	Infrastructure	7.7%
	Cash	1.0%
Equity	US Large Cap	23.0%
	US Small Cap	4.0%
	International Developed	14.9%
	Emerging Markets	3.1%
	Private Equity	10.0%

\* Our analysis is based upon the 24 respondents that provided “long-term” (20+ years) assumptions

# Capital Market Assumptions

	Asset Class	Expected Return*	Standard Deviation	Target Allocation	Weighted Return
Fixed/Alternative	US Core	3.65%	5.36%	18.0%	0.66%
	Real Estate	7.32%	17.00%	9.0%	0.66%
	High Yield	5.43%	9.90%	8.0%	0.43%
	Commodities/Timber	5.86%	17.78%	1.3%	0.08%
	Infrastructure	8.18%	16.63%	7.7%	0.63%
	Cash	2.00%	1.12%	1.0%	0.02%
Equity	US Large Cap	7.82%	16.33%	23.0%	1.80%
	US Small Cap	8.98%	20.34%	4.0%	0.36%
	International Developed	8.67%	18.09%	14.9%	1.30%
	Emerging Markets	10.67%	23.92%	3.1%	0.33%
	Private Equity	12.50%	22.13%	10.0%	1.25%
	<b>Total</b>			<b>100.0%</b>	<b>7.52%</b>
	Adjustment to Geometric				(0.66%)
	<b>Total Long-term Return</b>				<b>6.86%</b>

**Portfolio Standard Deviation:**

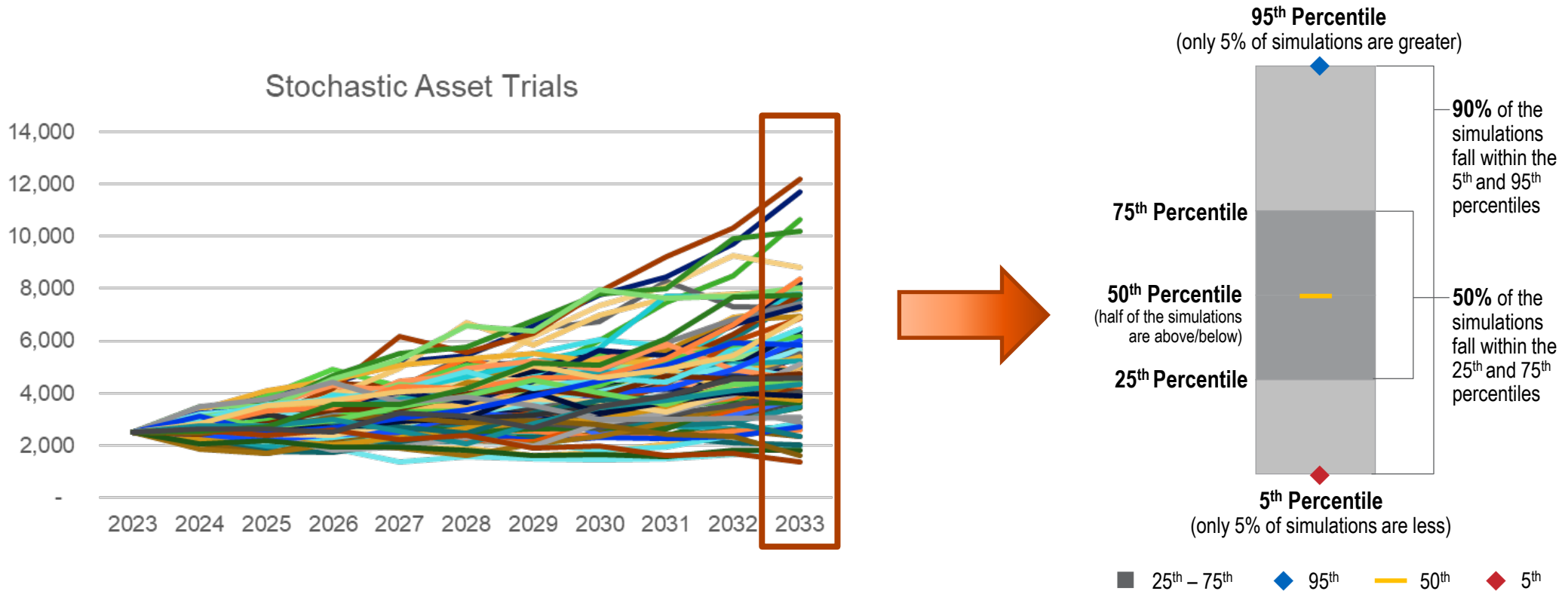
**12.18%**

\* Based on 20-year arithmetic assumptions and reflects long-term inflation of 2.45%



# Summarizing Stochastic Results

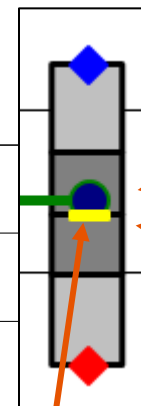
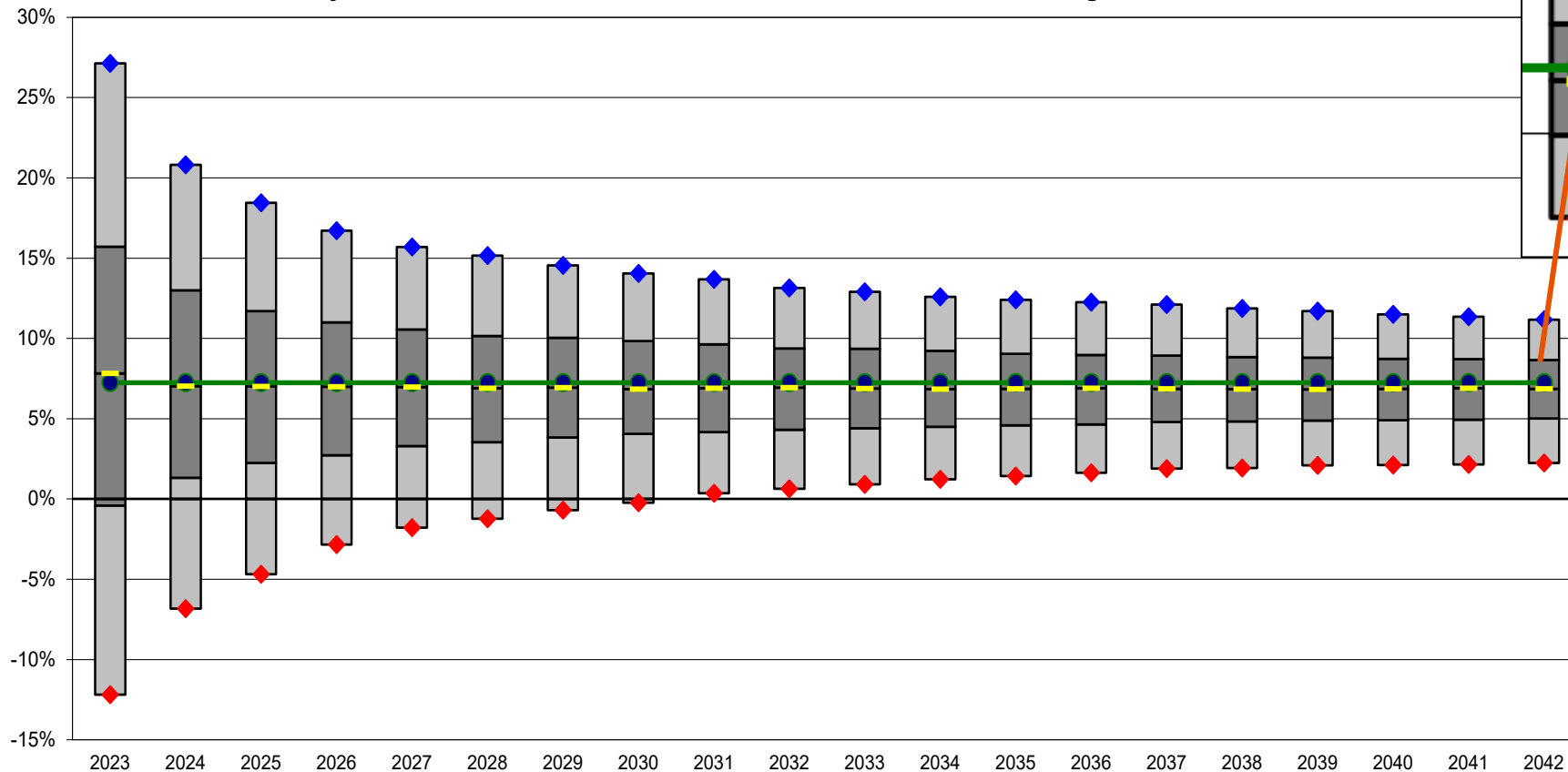
- The individual trials are grouped into percentiles and summarized as a range



- The median is represented by the yellow line at the center of the distribution
- The dark gray shaded rectangle represents 50% of all outcomes around the median
- The large, light gray rectangle (inclusive of the dark gray area) represents 90% of all outcomes
- Other percentile results/probabilities are calculated from the underlying data

# Investment Return

Projected Cumulative Investment Return for Plan Years Ending June 30



7.25%

6.9%

**Investment simulation based on CMAs shows long-term geometric return lower than current assumption**

◆ 95th	27.1%	20.8%	18.4%	16.7%	15.7%	15.2%	14.5%	14.0%	13.7%	13.1%	12.9%	12.6%	12.4%	12.3%	12.1%	11.9%	11.7%	11.5%	11.3%	11.2%
— 75th	15.7%	13.0%	11.7%	11.0%	10.6%	10.2%	10.0%	9.8%	9.6%	9.4%	9.4%	9.2%	9.0%	9.0%	8.9%	8.8%	8.8%	8.7%	8.7%	8.7%
— 50th	7.8%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.8%	6.9%	6.9%	6.9%	6.8%	6.9%	6.9%	6.9%	6.9%	6.8%	6.9%	6.9%	6.9%
— 25th	-0.4%	1.3%	2.2%	2.7%	3.3%	3.5%	3.8%	4.0%	4.2%	4.3%	4.4%	4.5%	4.6%	4.6%	4.8%	4.8%	4.9%	4.9%	4.9%	5.0%
◆ 5th	-12.2%	-6.8%	-4.7%	-2.8%	-1.8%	-1.2%	-0.7%	-0.2%	0.4%	0.6%	0.9%	1.2%	1.4%	1.6%	1.9%	1.9%	2.1%	2.1%	2.2%	2.3%
●	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%

● Current investment return assumption

# Policy Score Detail

# Metrics for Plan Management Policy Scoring System

## The Policy Score is based on the following metrics\*

- **Current funded ratio**

- The Fund's current funded ratio is one of the most visible metrics and a high current funded ratio should be recognized in the scoring

- **Downside funded ratio in 2030**

- In the short-term, the Fund should avoid an “undesirable” funded ratio with relatively high probability

- **Target funded ratio in 2040**

- Over a longer term, the Fund should be on the path to achieving its goals with reasonable probability

- **Improvement in funded ratio over a 10-year period**

- Regardless of where the Fund sits today, it should seek an increasing funded ratio over time

- **Ability to recover from/withstand a market downturn**

- In situations where the financial markets experience a downturn, the scoring should recognize when the funded ratio improves relative to the impact after the downturn

\* For purposes of the Policy scoring, the market value of assets is used when determining the funded ratio.

# Policy Scoring System

1	Based on current year funded ratio	If current ratio is 90% or higher: <b>+3</b> If current ratio is between 80% to 90%: <b>+2</b> If current ratio is between 70% to 80%: <b>+1</b> If current ratio is less than 70%: <b>+0</b>
2	Downside funded ratio in 2030	Under 65% funded ratio with less than 20% probability: <b>+3</b> Under 65% funded ratio with less than 30% probability: <b>+2</b> Under 65% funded ratio with less than 40% probability: <b>+1</b> Under 65% funded ratio with more than 40% probability: <b>+0</b>
3	Target funded ratio in 2040	85% or higher with more than 50% probability: <b>+4</b> 80% or higher with more than 50% probability: <b>+3</b> 75% or higher with more than 50% probability: <b>+2</b> 70% or higher with more than 50% probability: <b>+1</b> Not more than 70% with more than 50% probability: <b>+0</b>
4	Improvement over 10 years	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>
5	Ability to recover from market downturn*	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>

\* "Market downturn" defined as a two-year compound average return of -10% or worse.

# Policy Scoring System (*continued*)

## Total summary score ranges from 0 to 14

- Metrics focus on funded ratio measures
- Summary “health” is summed up as follows:
  - **Green** (score of 11 to 14) indicates “*objectives being met or likely to be met*”
  - **Yellow** (score of 7 to 10) indicates “*objectives may be met over longer period*”
  - **Orange** (score of 4 to 6) indicates “*continue to monitor*”
  - **Red** (score of 0 to 3) indicates “*changes should be considered*”



# Policy Scoring System (*continued*)

1	Current year funded ratio is <u>68%</u>	If current ratio is 90% or higher: <b>+3</b> If current ratio is between 80% to 90%: <b>+2</b> If current ratio is between 70% to 80%: <b>+1</b> If current ratio is less than 70%: <b>+0</b>	<i>Prior year: +1 based on funded ratio of 76%</i>	<b>+0</b>
2	<u>35%</u> probability of funded ratio <65% in 2030	Under 65% funded ratio with less than 20% probability: <b>+3</b> Under 65% funded ratio with less than 30% probability: <b>+2</b> Under 65% funded ratio with less than 40% probability: <b>+1</b> Under 65% funded ratio with more than 40% probability: <b>+0</b>	<i>Prior year: +2 based on 24% probability of funded ratio &lt;65% in 2030</i>	<b>+1</b>
3	<u>52%</u> probability of funded ratio >80% in 2040	85% or higher with more than 50% probability: <b>+4</b> (46% probability) 80% or higher with more than 50% probability: <b>+3</b> (52% probability) 75% or higher with more than 50% probability: <b>+2</b> (57% probability) 70% or higher with more than 50% probability: <b>+1</b> (62% probability) Not more than 70% with more than 50% probability: <b>+0</b>	<i>Prior year: +4 based on 56% probability of funded ratio &gt;85% in 2040</i>	<b>+3</b>
4	<u>55%</u> probability of improvement over 10 years	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>		<b>+1</b>
5	<u>42%</u> probability of recovering from market downturn*	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>		<b>+1</b>
				<hr/>
				<b>+6</b>

\* 1,178 scenarios contain -10% average or worse over 2 years (in the first 10 years), 490 of which “recover”.

# Notable Differences from Prior Analysis

- The 2022 Horizon Survey CMAs result in a comparable 50<sup>th</sup> percentile long-term geometric return compared to the 2021 study
  - 6.86% in 2022 versus 6.77% in the 2021 study
- The market value return for the plan year ended June 30, 2022, was –6.1% compared to the assumed rate of 7.25%. This resulted in a significantly lower July 1, 2022, funded ratio than projected in the prior year
  - 67.5% actual funded ratio compared to a 77.0% projected funded ratio
  - A market return of –6.1% or worse was expected to occur about one-in-eight<sup>1</sup> times, based on the capital market assumptions used in the prior year
- The net result is that the probabilities on which the scoring is based worsened for Criteria 1, 2 and 3 compared to the prior analysis

<sup>1</sup> A –6.1% single year return corresponds with the 13th percentile based on the 2022 Horizon Survey assumptions.



# Other Commentary

# Other External Factors

- Other factors outside of TFFR could have an effect on the directional trend of future Policy Scores, such as projected economic conditions, typical market cycles, and the North Dakota economy.
- The stochastic projections on which most of the scoring elements are based rely on composite capital market expectations of several investment consulting firms, generally from Q1 2022.
- Capital market assumptions collected from several investment consultants as of Q1 2023 depict a much more optimistic outlook on portfolio returns, largely driven by higher interest rates.

# Other External Factors (*continued*)

- Based on Segal Marco Advisor's Q1 2023 capital market assumptions, the 50<sup>th</sup> percentile 20-year geometric return is **7.25% compared to 6.86%** using the 2022 Horizon Survey.
  - This nearly 40bp increase in the level of returns would improve the Policy Score metrics that are based on projected returns.
  - Criteria 2: 35% probability of funded ratio <65% in 2030 improves to 33%
    - No change in score
  - Criteria 3: 52% probability of funded ratio >80% in 2040 improves to 52% probability of funded ratio >85% in 2040
    - **Increases score** for Criteria 3 by **+1** from +3 to +4
  - Criteria 4: 55% probability of improvement over 10 years improves to 59%
    - No change in score
  - Criteria 5: 42% probability of recovering from market downturn improves to 44%
    - No change in score

# Other External Factors (*continued*)

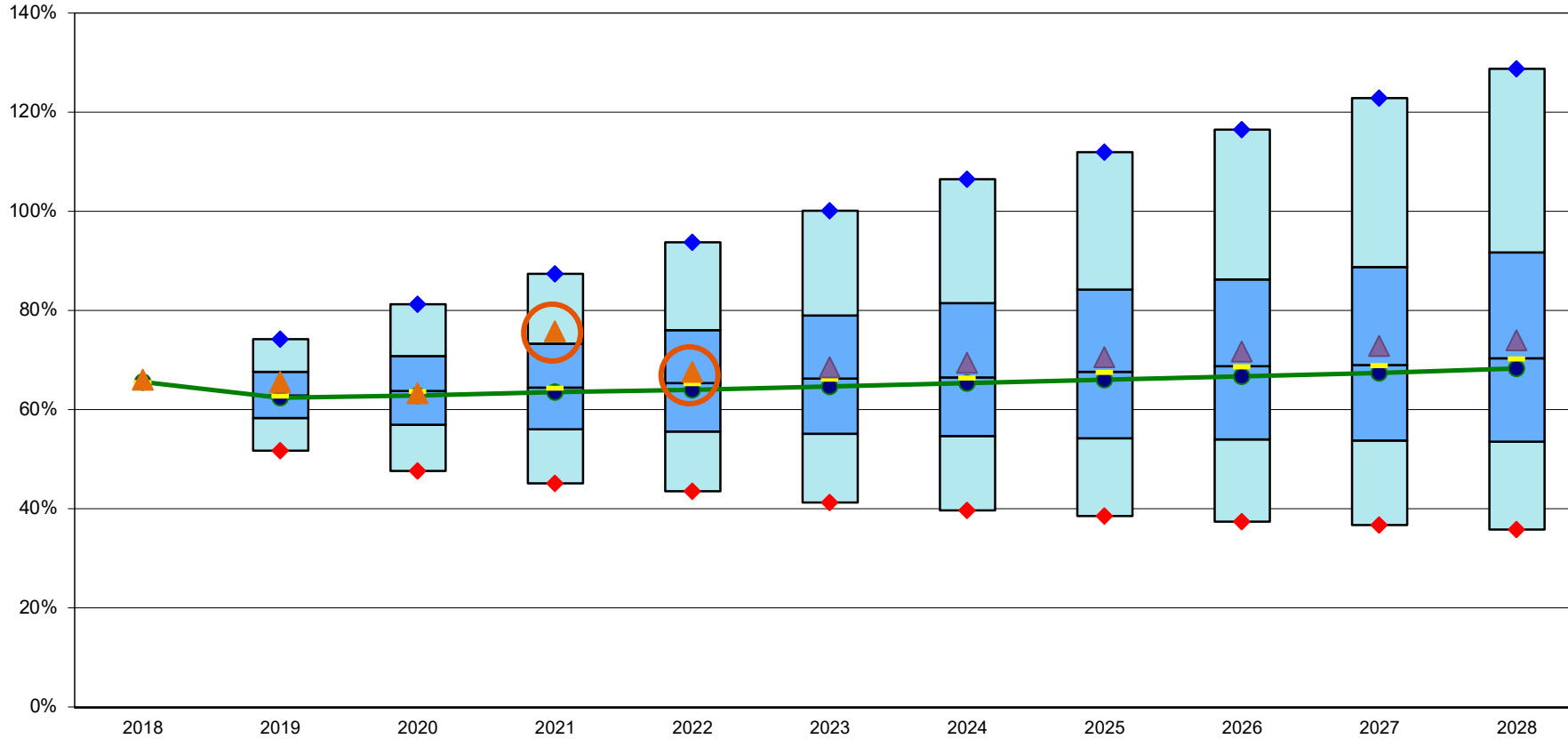
- There are other external forces not explicitly factored into the capital market assumptions, which may have a short-term impact on the Policy score:
  - The plan’s funded status does not reflect short-term market fluctuations, as it is based on the market values on the last day of the plan year.
  - The projections on which this analysis was based do not include any possible short-term or long-term impacts on mortality of the covered population that may emerge after July 1, 2022.
  - If inflation continues to increase in the short-term, the impact on the US equity market is likely to be a mixed bag, but history shows a correlation to high inflation and lower returns for the overall market in most periods, with increases in volatility.
    - Rising interest rates is one factor that tends to mitigate that correlation.

# Other External Factors (*continued*)

- NDSU released an economic outlook report in November 2022 with predictions for the 2023 calendar year.
  - Total wages and salaries are forecasted to continue to grow in the near term.
  - Labor force contracted in the third quarter of 2023, but this trend is not expected to continue.
  - Gross State Product (GSP) is expected to return to a growth in the upcoming quarters. However, the prior economic outlook models projected an increase in GSP, which did not transpire.
- The collapse of the Silicon Valley Bank (SVB) has had a significant impact not only on the United States but on businesses and countries around the world.
  - The failure of SVB has led to a loss of confidence in the United States' ability to maintain its position as a leader in technology and finance and raises some question of the United States' ability to maintain its global influence.

# Comparison to Prior Projections

Projected MVA Funded Percentage as of July 1



**From the perspective of earlier stochastic modeling, the 2021 valuation was an 80<sup>th</sup> percentile result. As of 2022, TFFR dropped, but is still above the 50<sup>th</sup> percentile result.**

◆ 95th	66%	74%	81%	87%	94%	100%	107%	112%	116%	123%	129%
— 75th	66%	68%	71%	73%	76%	79%	81%	84%	86%	89%	92%
— 50th	66%	63%	64%	64%	65%	66%	66%	68%	69%	69%	70%
— 25th	66%	58%	57%	56%	56%	55%	55%	54%	54%	54%	54%
◆ 5th	66%	52%	48%	45%	43%	41%	40%	39%	38%	37%	36%
●	66%	62%	63%	63%	64%	65%	65%	66%	67%	67%	68%
▲	66%	66%	63%	76%	68%						
▲						68%	69%	70%	72%	73%	74%

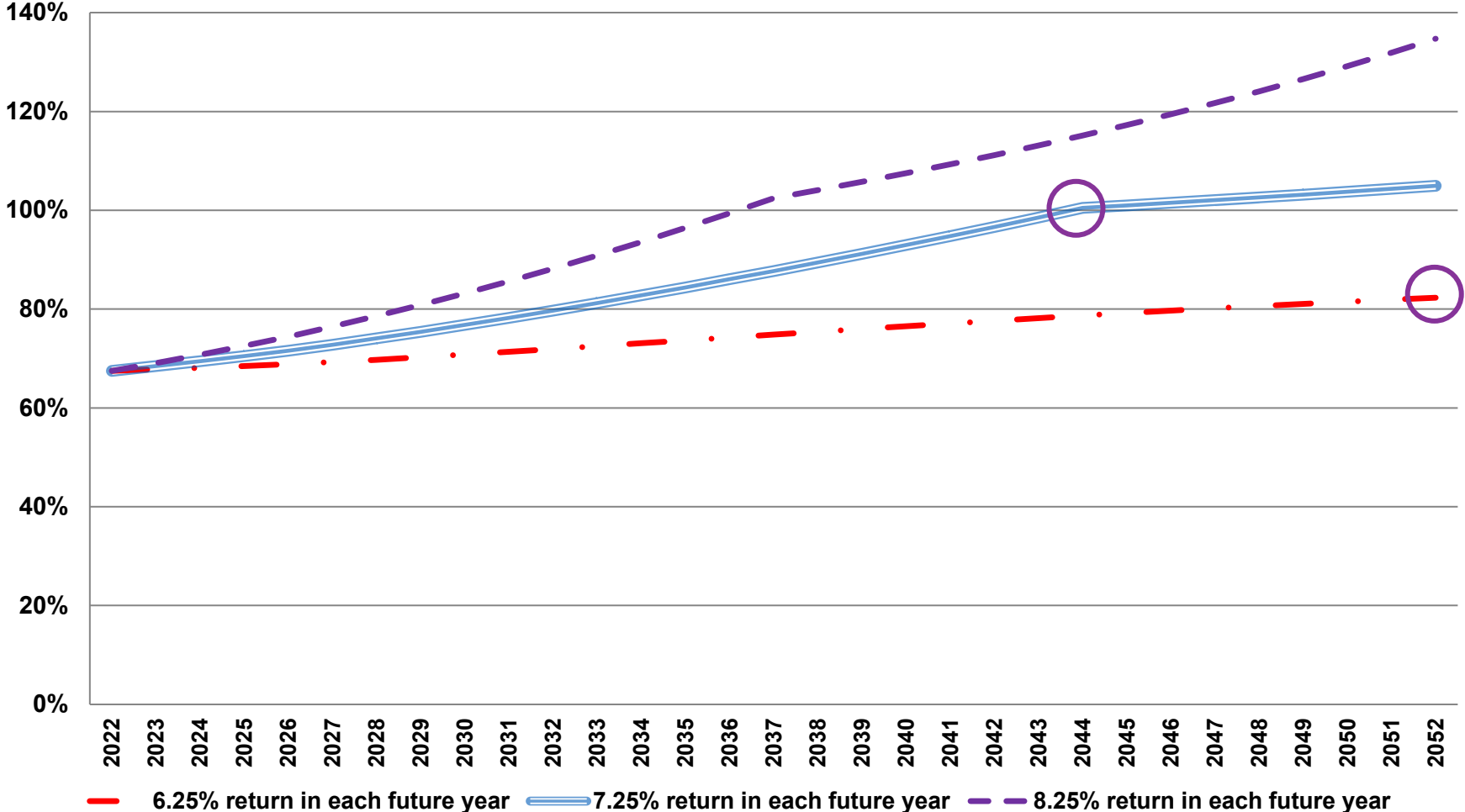
● Deterministic projection from July 1, 2018 actuarial valuation using alternate 7.25% investment return assumption

▲ Actual results from 2018 through 2022

▲ Deterministic projection from July 1, 2022 actuarial valuation

# Additional Thoughts

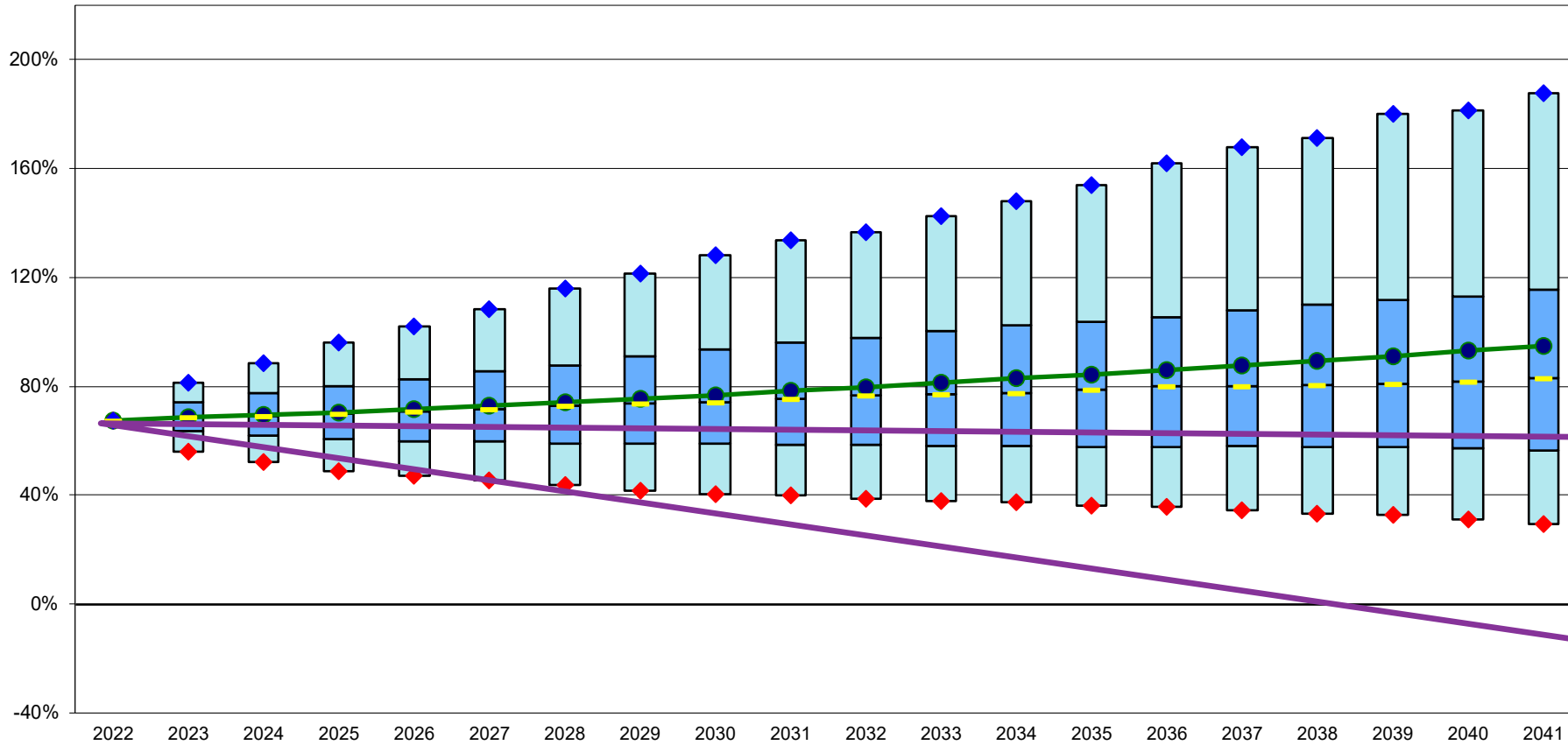
Deterministic Projection of MVA Funded Ratio  
Actual Returns +1% or -1% of Assumed



In the spirit of “market uncertainty,” as presented with the July 1, 2022, actuarial valuation, sustained average returns of 1% below the 7.25% assumption would delay full funding beyond the end of the projection period.

# Additional Thoughts (*continued*)

Projected MVA Funded Percentage as of July 1



The bottom quartile stochastic results show a best-case of a mild decline in the funded percentage over the next 20 years, with a worst-case of steady decline.

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
◆ 95th	68%	81%	89%	96%	102%	108%	116%	122%	128%	134%	137%	142%	148%	154%	162%	168%	171%	180%	181%	188%
— 75th	68%	74%	77%	80%	83%	85%	88%	91%	94%	96%	98%	100%	102%	104%	105%	108%	110%	112%	113%	115%
— 50th	68%	69%	69%	70%	71%	72%	73%	74%	74%	75%	77%	77%	78%	79%	80%	80%	81%	81%	82%	83%
— 25th	68%	64%	62%	61%	60%	60%	59%	59%	59%	58%	58%	58%	58%	58%	58%	58%	58%	58%	57%	56%
◆ 5th	68%	56%	52%	49%	47%	45%	44%	42%	40%	40%	39%	38%	37%	36%	36%	34%	33%	33%	31%	29%
●	68%	68%	69%	70%	72%	73%	74%	75%	77%	78%	80%	81%	83%	84%	86%	88%	89%	91%	93%	95%

● Baseline deterministic projection using current 7.25% investment return assumption



# Appendix

# Monte Carlo Simulation – Roll of Two Dice

Outcomes From a Single Throw

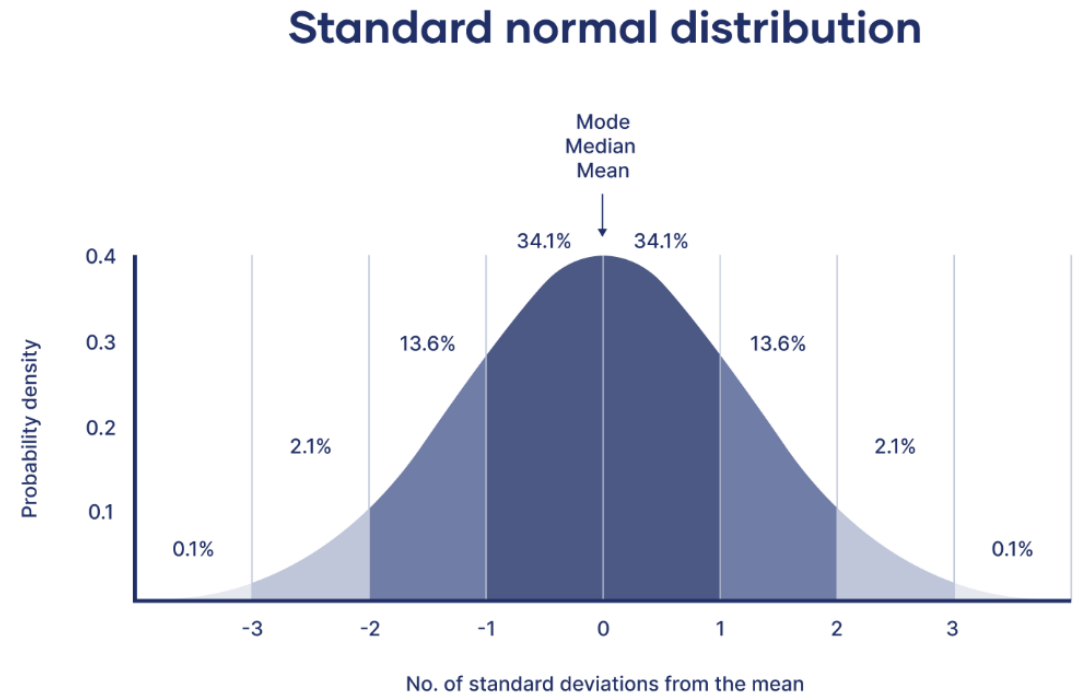
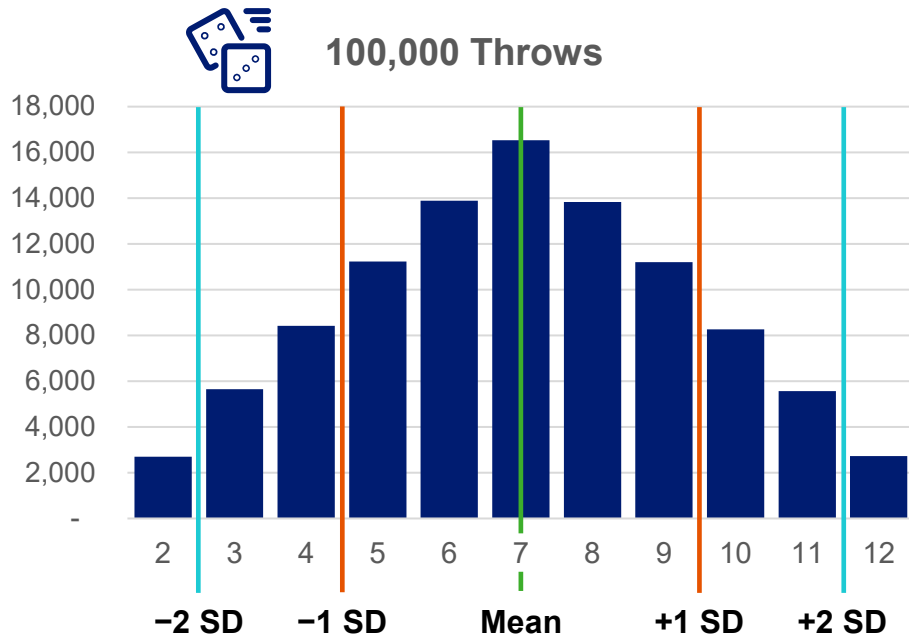
	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Number of Dice Throws

#	Probability		10	100	1,000	10,000	100,000
2	1/36 or 2.78%	Expected	0	3	28	278	2,778
		Actual	0	2	22	253	2,694
5	4/36 or 11.11%	Expected	1	11	111	1,111	11,111
		Actual	0	19	123	1,104	11,230
7	6/36 or 16.66%	Expected	2	17	166	1,666	16,666
		Actual	1	12	168	1,677	16,533
7+	21/36 or 58.33%	Expected	6	58	583	5,833	58,333
		Actual	4	54	587	5,847	58,119
<b>Mean</b>			6.50	6.99	7.00	7.00	7.00
<b>Std Dev</b>			2.22	2.33	2.37	2.41	2.41

- The most likely outcome is a 7; occurs six times in 36 possible outcomes
- The least likely outcome is either a 2 or 12; either result occurs only one time
- The probability of rolling a 7 or higher is 58%; 21 total outcomes
- As the number of throws increases, the actual outcomes converge to expected

# Monte Carlo Simulation – Roll of Two Dice

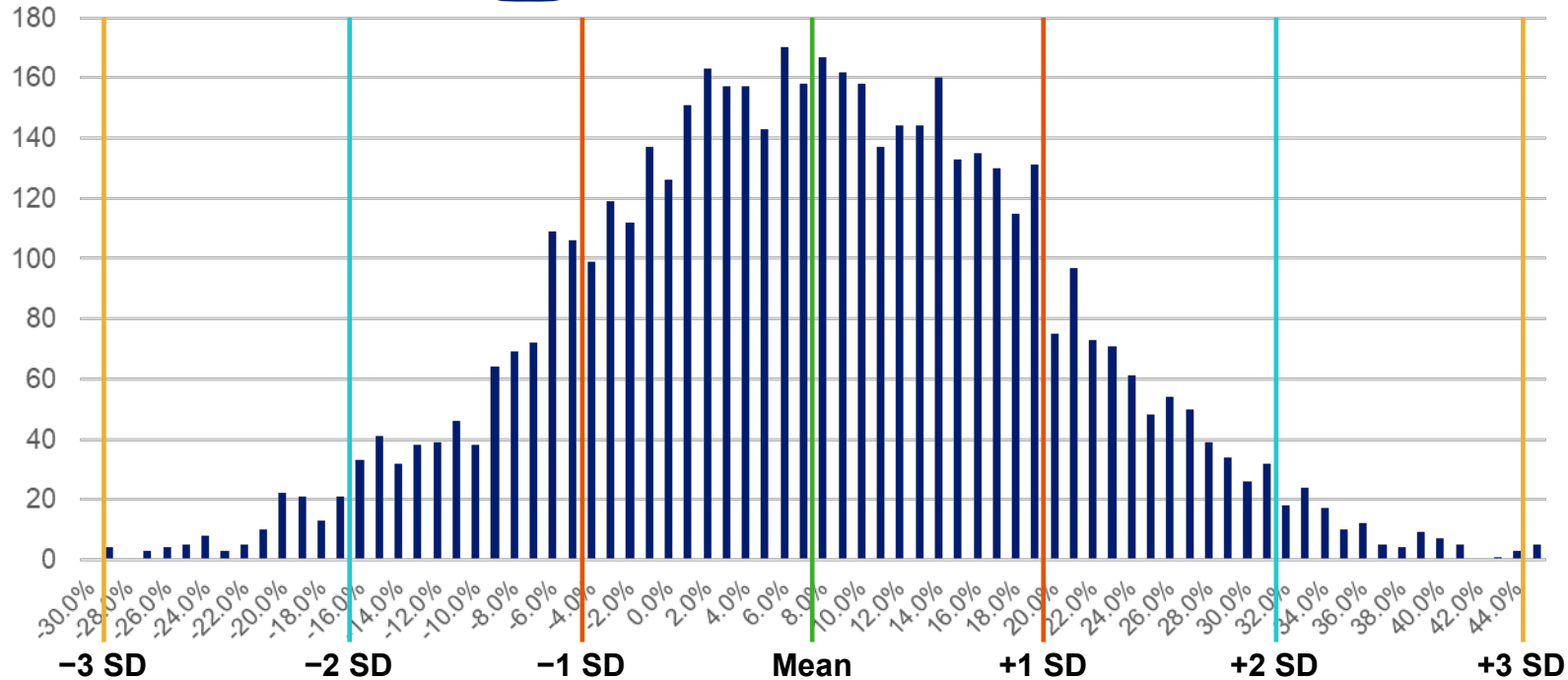


- A histogram of 100,000 throws of two dice resembles a standard normal curve
  - 68.2% of outcomes fall between 1 standard deviation from the mean
    - Rolls of 5, 6, 7, 8 or 9 account for 66.5% of outcomes
  - 95.4% of outcomes fall between 2 standard deviations from the mean
    - Rolls of 3 through 11 account for 94.8% of outcomes

# Monte Carlo Simulation – 1-year Portfolio Return



5,000 Simulations



**In any single year the portfolio mean is approximately 7.5% with a standard deviation of 12.2%.**

- Based on the capital market assumptions, mean return is 7.5% in any single year
  - 68.2% “chance” of a portfolio return falling between -4.7% and 19.7%
  - 95.4% “chance” of a portfolio return falling between -16.9% and 31.9%
  - 99.6% “chance” of a portfolio return falling between -29.1% and 44.1%

# Capital Market Assumptions – Correlation Matrix

Asset Class		1	2	3	4	5	6	7	8	9	10	11
Fixed/Alternative	1 US Core	1.00										
	2 Real Estate	0.25	1.00									
	3 High Yield	0.41	0.51	1.00								
	4 Commodities/Timber	0.07	0.26	0.38	1.00							
	5 Infrastructure	0.28	0.49	0.60	0.44	1.00						
	6 Cash	0.13	(0.02)	(0.09)	(0.01)	(0.02)	1.00					
Equity	7 US Large Cap	0.18	0.59	0.65	0.35	0.63	(0.08)	1.00				
	8 US Small Cap	0.13	0.59	0.65	0.36	0.61	(0.10)	0.90	1.00			
	9 International Developed	0.18	0.54	0.63	0.42	0.65	(0.07)	0.82	0.77	1.00		
	10 Emerging Markets	0.16	0.46	0.62	0.43	0.59	(0.06)	0.71	0.69	0.79	1.00	
	11 Private Equity	0.11	0.49	0.56	0.34	0.57	(0.07)	0.75	0.75	0.70	0.63	1.00

# Prior Policy Scoring as of June 30, 2021

1	Current year funded ratio is <u>76%</u>	If current ratio is 90% or higher: <b>+3</b> If current ratio is between 80% to 90%: <b>+2</b> If current ratio is between 70% to 80%: <b>+1</b> If current ratio is less than 70%: <b>+0</b>	<b>+1</b>
2	<u>24%</u> probability of funded ratio <65% in 2030	Under 65% funded ratio with less than 20% probability: <b>+3</b> Under 65% funded ratio with less than 30% probability: <b>+2</b> Under 65% funded ratio with less than 40% probability: <b>+1</b> Under 65% funded ratio with more than 40% probability: <b>+0</b>	<b>+2</b>
3	<u>56%</u> probability of funded ratio >80% in 2040	85% or higher with more than 50% probability: <b>+4</b> (56% probability) 80% or higher with more than 50% probability: <b>+3</b> (60% probability) 75% or higher with more than 50% probability: <b>+2</b> (64% probability) 70% or higher with more than 50% probability: <b>+1</b> (69% probability) Not more than 70% with more than 50% probability: <b>+0</b>	<b>+4</b>
4	<u>57%</u> probability of improvement over 10 years	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>	<b>+1</b>
5	<u>42%</u> probability of recovering from market downturn*	Funded ratio improves by +5% over 10 years with 66% probability: <b>+2</b> Funded ratio improves by +5% over 10 years with 50% probability: <b>+1</b> Ratio does not improve by +5% over 10 years with 50% probability: <b>+0</b>	<b>+1</b>

From the Plan Management Policy Score Update Presentation Dated April 21, 2022

**+9**

\* 1,288 scenarios contain -10% average or worse over 2 years (in the first 10 years), 543 of which “recover”.

# 2021 Capital Market Assumptions & Target Allocation

	Asset Class	Expected Return*	Standard Deviation	Target Allocation	Weighted Return	
Fixed/Alternative	US Core	3.4%	5.5%	18.0%	0.61%	
	Real Estate	7.7%	17.6%	9.0%	0.69%	
	High Yield	5.5%	9.9%	8.0%	0.44%	
	Commodities/Timber	5.5%	17.3%	1.6%	0.09%	
	Infrastructure	8.1%	17.0%	7.4%	0.60%	
	Cash	1.9%	1.3%	1.0%	0.02%	
Equity	US Large Cap	8.0%	16.4%	21.6%	1.72%	
	US Small Cap	9.0%	20.2%	5.4%	0.49%	
	International Developed	8.8%	18.3%	13.5%	1.19%	
	Emerging Markets	10.8%	24.3%	4.5%	0.49%	
	Private Equity	12.3%	22.3%	10.0%	1.23%	
	<b>Total</b>			<b>100.0%</b>	<b>7.57%</b>	<b>Portfolio Standard Deviation: 12.43%</b>
	Adjustment to Geometric				(0.80%)	
	<b>Total Long-term Return</b>				<b>6.77%</b>	

\* Based on 20-year arithmetic assumptions and reflects long-term inflation of 2.24%

# Caveats

- *The projections are based on the results of the July 1, 2022, actuarial valuation performed for the Board of Trustees of the North Dakota Teachers' Fund for Retirement. The actuarial valuation report has information on the plan provisions, data, methods and assumptions used in the valuation.*
- *Projections, by their nature, are not a guarantee of future results. The projections modeled are intended to serve as estimates of future financial outcomes that are based on the information available to us at the time the modeling is undertaken and completed, and the agreed-upon assumptions and methodologies described herein. Emerging results may differ significantly if the actual experience proves to be different from these assumptions or if alternate methodologies are used.*
- *Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.*