NORTH Dakota Be Legendary. | Teachers' Fund For Retirement
RETIREMENT & INVESTMENT

ND TFFR Board Meeting
Thursday, April 27, 2023, 1:00 p.m.
WSI Board Room (In Person)
1600 E Century Ave, Bismarck, ND
Click here to join the meeting

UPDATAED AGENDA

I. CALL TO ORDER AND ACCEPTANCE OF AGENDA

A. Pledge of Allegiance
B. Executive Summary

II. ACCEPTANCE OF MINUTES (March 23, 2023) - *Board Action*

III. ACTUARIAL SERVICES PRESENTATIONS – (120 minutes)[1] –Ms. Murtha

A. Presentation 1 (30 minutes)
B. Presentation 2 (30 minutes)
C. Presentation 3 (30 minutes)
D. Board Discussion & Selection (30 minutes) – *Board Action*

(Break)

IV. GOVERNANCE (60 minutes)

A. Plan Management Policy Score *(Board Action)* – Segal
B. TFFR Member Communications Survey *(Informational)* – Segal
C. 2023 Legislative Session Update *(Informational)* – Ms. Murtha
D. 23-24 Board Calendar and Education Plan *(Board Action)* – Ms. Murtha
E. Pioneer Project Update *(Informational)* – Mr. Roberts
F. Outreach Update *(Informational)* – Mr. Roberts
G. TFFR Benchmark Discussion *(Board Action)* – Mr. Anderson

V. REPORTS (30 minutes) - *Board Action*

A. Annual Public Pension Plan Comparison Report (6/30) - Mr. Roberts
B. Executive Limitations/Staff Relations Report – Ms. Murtha

VI. OTHER BUSINESS

A. Board Reading Materials – Material References Included
B. Next Meeting:
    1. TFFR GPR Committee – May 9, 2023, at 3:30 p.m.
    2. TFFR Board Retreat – June 22, 2023, at 1:00 p.m.

VII. ADJOURNMENT

[1] Executive Session pursuant to N.D.C.C. 44-04-19.2(6) and 54-44.4-10(2) to sequester competitors during a competitive bidding process and to receive and discuss exempt proposal procurement information during a competitive bidding process.

Any individual requiring an auxiliary aid or service, please contact the Retirement and Investment Office (701) 328-9885 at least three (3) days prior to the scheduled meeting.

EXECUTIVE SUMMARY

TFFR Regular Meeting

April 27, 2023 – 1:00pm CT

I. **Agenda:** The **April Board meeting will be in person at the WSI board room, a link will be provided so that Board members and the public may join via video conference.** The board member video link is included in the email with the Board materials.

II. **Minutes (Board Action):** The March 23, 2023, Board meeting minutes are included for review and approval.

III. **Actuarial Services Presentations (Board Action):** Finalists for the TFFR actuarial services contract will present to the Board. Executive Sessions are needed for the finalist interviews and for Board deliberation.

IV. **A. Plan Management Policy Score Update (Board Action):** Segal will provide a brief background on the purpose of the Plan Management Policy Review and Score; and present an updated TFFR Plan Management Policy Score for Board acceptance.

B. TFFR Member Communications Survey (Information): Segal will provide a presentation on a TFFR member survey that staff intends to facilitate with the assistance of Segal.

C. 2023 Legislative Session Update (Information): Ms. Murtha will present to the Board the status of bills under consideration by the legislature that may have an impact to the TFFR program.

D. 2023-2024 Board Calendar and Education Plan (Board Action): Ms. Murtha will present a proposed 2023-2024 Board Calendar and Education plan for Board approval.

E. Pioneer Project Update (Information): Mr. Roberts will provide an update on staff efforts related to implementation of the Pioneer Project.

F. Outreach Update (Information): Mr. Roberts will provide an update on staff efforts related to outreach efforts.

G. TFFR Benchmark Discussion (Board Action): Staff will present information on and recommend changes to the private market benchmark weights.

V. **Reports (Board Action):** Staff will present a report that compares key plan characteristics of the TFFR Plan with the results a 2022 public funds survey conducted by NASRA (National Association of State Retirement Administrators) for Board acceptance as well as a report on Executive limitations/staff relations.

Adjournment.

NORTH DAKOTA TEACHERS' FUND FOR RETIREMENT
MINUTES OF THE
MARCH 23, 2023, BOARD MEETING

BOARD MEMBERS PRESENT:	Dr. Rob Lech, President Mike Burton, Vice President Kirsten Baesler, State Supt. DPI Thomas Beadle, State Treasurer Cody Mickelson, Trustee Mel Olson, Trustee Jordan Willgohs, Trustee
STAFF PRESENT:	Jayme Heick, Retirement Programs Spec Missy Kopp, Exec Assistant Denise Leingang-Sargeant, Member Specialist Sarah Mudder, Communications/Outreach Dir. Jan Murtha, Exec. Dir. Chad Roberts, DED/CRO Sara Seiler, Supvr. of Internal Audit Rachelle Smith, Retirement Assistant Stephanie Schilling, Retirement Programs Spec Dottie Thorsen, Internal Auditor Tami Volkert, Compliance Specialist Denise Weeks, Retirement Program Mgr.
OTHERS PRESENT:	Dean DePountis, Atty. General's Office Brad Ramirez, Segal Matt Strom, Segal

CALL TO ORDER:

Dr. Lech, President of the Teachers' Fund for Retirement (TFFR) Board of Trustees, called the meeting to order at 1:02 p.m. on Thursday, March 23, 2023. The meeting was held in the WSI Board Room, 1600 E Century Avenue, Bismarck.

THE FOLLOWING MEMBERS WERE PRESENT REPRESENTING A QUORUM: SUPT. BAESLER, MR. BURTON, DR. LECH, MR. MICKELSON, MR. OLSON, AND MR. WILLGOHS.

ACCEPTANCE OF AGENDA:

The Board considered the agenda for the March 23, 2023, meeting.

IT WAS MOVED BY MR. OLSON AND SECONDED BY MR. BURTON AND CARRIED BY A VOICE VOTE TO APPROVE THE AGENDA AS DISTRIBUTED.

AYES: SUPT. BAESLER, TREASURER BEADLE, MR. BURTON, MR. MICKELSON, MR. WILLGOHS, MR. OLSON, AND DR. LECH
NAYS: NONE
MOTION CARRIED

Ms. Murtha introduce Sarah Mudder, the new Communications and Outreach Director.

MINUTES:

The Board considered the minutes of the January 26, 2023, TFFR Board meeting.

IT WAS MOVED BY MR. MICKELSON AND SECONDED BY MR. OLSON AND CARRIED BY A VOICE VOTE TO APPROVE THE JANUARY 26, 2023, MINUTES AS DISTRIBUTED.

AYES: MR. MICKELSON, MR. OLSON, TREASURER BEADLE, MR. BURTON, SUPT. BAESLER, MR. WILLGOHS, AND DR. LECH
NAYS: NONE
MOTION CARRIED

EDUCATION:

Public Sector Retirement Plans:

Mr. Ramirez, Segal, provided education on Alternative Plan Designs. Information for the presentation came from the NCPERS 2023 Public Retirement Systems Study. Topics discussed included statistics about public plan members, different features of defined benefit (DB) plans, different plan types, and statistics about participation in the different types of public sector plans. According to the survey, in 2022 60% of respondents lowered the actuarial assumed rate of return and 34% raised the benefit age/service requirement. Other changes implemented by public plans include increased employee contributions, lengthened amortization periods to improve affordability and shortened amortization periods to improve funding status. Mr. Ramirez shared information about Cost-of-Living Adjustments (COLAs) in public plans and shared case studies that illustrate different retirement plan options used in other public settings. Board discussion followed.

GOVERNANCE:

2023 Legislative Session Update:

Ms. Murtha reviewed the bills that staff are tracking in relation to the TFFR program. HB 1150 which provides an exemption from the TFFR plan to military veterans has passed both chambers and has been sent to the Governor. HB 1219 is the TFFR technical changes bill which makes is more attractive for retirees to return to work by changing the annual hour limit rule and critical shortage area (CSA) requirement. SB 2258 expands the CSA in a way that would nullify the annual hour limit rule. 1219 passed the house and was sent to the Senate. The committee recommended a do pass, and it went to the floor but was sent back to the committee. Staff have been reaching out to figure out why this happened but have not found an answer. Staff provided testimony to the committee on 2258. The RIO budget bill passed the Senate with all of our requests. The first House committee hearing was held with additional committee work occurring today. Board discussion followed.

Pioneer Project Update:

Mr. Roberts provided an update on the Pioneer Project. The project is running on schedule. There will be an overlap of Pilot 2 and 3, so staff will have additional meetings for that overlap period. The project is currently within budget, however an additional unforeseen cost of $23,800 was approved by the Executive Steering Committee (ESC) on March 7, 2023. During development of the data integration and migration plan for the existing historical records in

our FileNet system, an additional cost of $47,600 was put forward by the vendor. The vendor and TFFR disagreed as to the interpretation of a requirement in the RFP process that led to this cost increase from the vendor. After negotiation, the vendor agreed to reduce the cost by 50%. Board discussion followed.

120-Day Waiver Review:

Ms. Murtha provided information about the procedure used in approving the waiver of the 120-day waiting period for processing refund of account requests. While reviewing this process, staff observed that there was a lack of clarity in the plan governing documents. Ms. Murtha reviewed the rules in statute, administrative rules, and TFFR policy for this waiver process. If the Board wants to continue to delegate authority to the Deputy Executive Director/Chief Retirement Officer (DED/CRO), staff recommends that an appeals process be added to the Board policy. After Board discussion, members agreed that the DED/CRO should continue to approve these waivers. The Board will work to clarify their policy on this process.

The Board recessed at 2:36 p.m. and reconvened at 2:45 p.m.

REPORTS:

Quarterly Investment Report:

Mr. Anderson provided the investment performance report for the quarter ended December 31, 2022. Mr. Anderson reviewed the economic factors that impact investment performance. TFFR's ten-year average return shows that the effort of good governance and implementation has added value to the fund. Mr. Anderson explained the effort staff is making to increase the ability to rebalance more frequently which should improve asset allocation returns. TFFR remains in the top quartile when compared to peer plans in both an allocation and implementation basis. Board discussion followed.

Pres. Lech left the meeting at 3:17 p.m. to attend a legislative hearing.

Annual Retirement Trends Report:

Mr. Roberts provided the Annual Retirement Trends Report as of February 2023. Of the 11,870 active TFFR members, 818 are currently eligible to retire. In the last ten years an average of 1,008 teachers have been eligible to retire each year with an average of 377 who actually retired each year. Approximately 2,000 to 2,200 active members are projected to retire in the next 10 years which averages about 220 per year. Board discussion followed.

Quarterly TFFR Ends Report:

Mr. Roberts reviewed the quarterly TFFR Ends report. The report summarizes and provides metrics for performance of the TFFR program to demonstrate that the program is adhering to policies and expectations. Key areas covered by the report are membership data and contributions, member services, account claims, and trust fund evaluation.

Quarterly Internal Audit Report:

Ms. Seiler reviewed the Internal Audit (IA) Activities report for the quarter ended December 31, 2022. At their February 15, 2023, meeting, the SIB Audit Committee approved the second

quarter audit activities. IA completed the Executive Limitations audit and is sufficiently satisfied that the ED was in compliance with SIB Governance Executive Limitations policies. IA performed an employee exit review which occurs when there is a sudden resignation or separation of employment. IA reviews files to see if anything needs to be addressed. The GASB 68 Schedules audit was completed with no materials findings. IA continues to work with the consultant on the IA Business Process review. The review is on track to be completed and presented to the Audit Committee in May 2023.

Executive Limitations/Staff Relations:

Mr. Roberts provided an update on staffing at RIO. The Investment Accountant position was posted and extended to reach more candidates. Interviews were completed for a summer Legal Intern. Current projects include the TFFR Pioneer Project, TFFR Actuarial Services request for proposal (RFP), Legacy Fund Asset Allocation study, and Northern Trust Initiative. The ERCC is beginning the process for the annual review of the ED. Surveys will be sent to Board members for their feedback. The ERCC is also collecting survey data related to the performance of the DED/CRO from the Board to assist the ED in the performance review of this position.

IT WAS MOVED BY MR. OLSON AND SECONDED BY MR. MICKELSON AND CARRIED BY A ROLL CALL VOTE TO ACCEPT THE QUARTERLY INVESTMENT, ANNUAL RETIREMENT TRENDS, QUARTERLY TFFR ENDS, QUARTERLY INTERNAL AUDIT, AND EXECUTIVE LIMITATIONS/STAFF RELATIONS REPORTS.

AYES: MR. WILLGOHS, MR. BURTON, MR. MICKELSON, MR. OLSON, AND TREASURER BEADLE
NAYS: NONE
ABSENT: SUPT. BAESLER AND DR. LECH
MOTION CARRIED

ADJOURNMENT:

With no further business to come before the Board, Vice Pres. Burton adjourned the meeting at 4:22 p.m.

Prepared by,

Missy Kopp, Assistant to the Board

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MEMORANDUM

TO: **TFFR Board**
FROM: **Jan Murtha, Executive Director**
DATE: **April 20, 2023**
RE: **Actuarial Services RFP**

At its January 2023 meeting, the Board approved an RFP for actuarial services and approved RIO staff to initiate procurement process for such services, subject to approval by the Board. Staff reviewed proposals as described in the RFP and have requested finalists to appear before the Board at its April meeting for Board selection and award issuance.

Three finalists will present to the Board. It is recommended that the presentation and selection discussion be held in executive session pursuant to N.D.C.C. 44-04-19.2(6) and 54-44.4-10(2) so as to sequester competitors during a competitive bidding process and to receive and discuss exempt proposal procurement information during a competitive bidding process.

The presentation materials will be provided to board members via a secure link.

BOARD ACTION REQUESTED: Move to enter into Executive Session pursuant to N.D.C.C. 44-04-19.2(6) and 54-44.4-10(2) to sequester competitors during a competitive bidding process and to receive and discuss exempt proposal procurement information during a competitive bidding process.

Confidential materials will be sent to Board members via secure link.

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

Segal

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

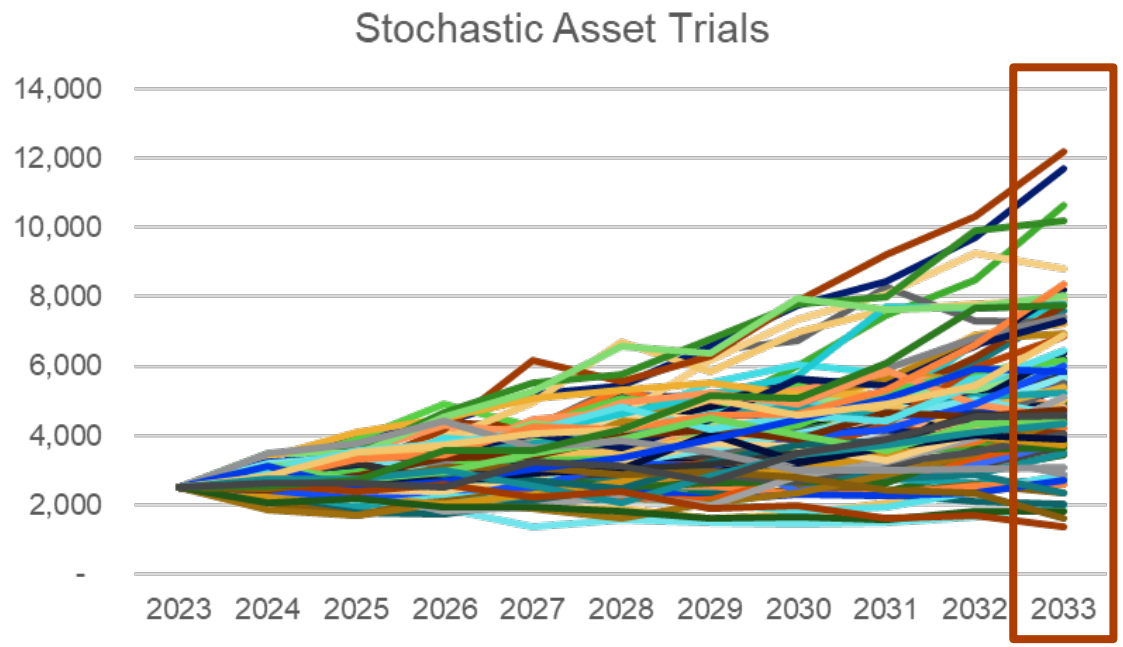
	Asset Class	Expected Return*	Standard Deviation	Target Allocation	Weighted Return
Fixed/Alternative	US Core	3.65%	5.36%	18.0%	0.66%
	Real Estate	7.32%	17.00%	9.0%	0.66%
	High Yield	5.43%	9.90%	8.0%	0.43%
	Commodities/Timber	5.86%	17.78%	1.3%	0.08%
	Infrastructure	8.18%	16.63%	7.7%	0.63%
	Cash	2.00%	1.12%	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%
	Total			**100.0%**	**7.52%**
	Adjustment to Geometric				(0.66%)
	Total Long-term Return				**6.86%**

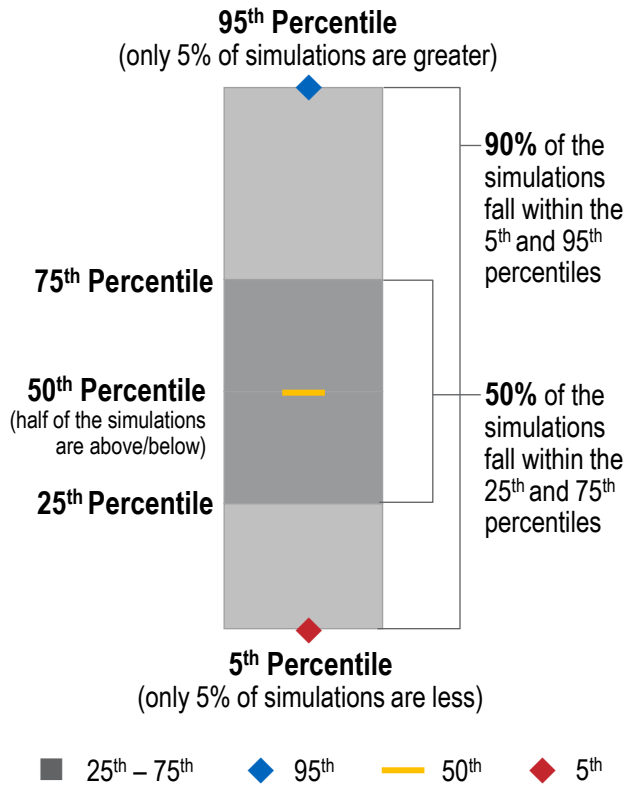
Portfolio Standard Deviation:
12.18%

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

Summarizing Stochastic Results

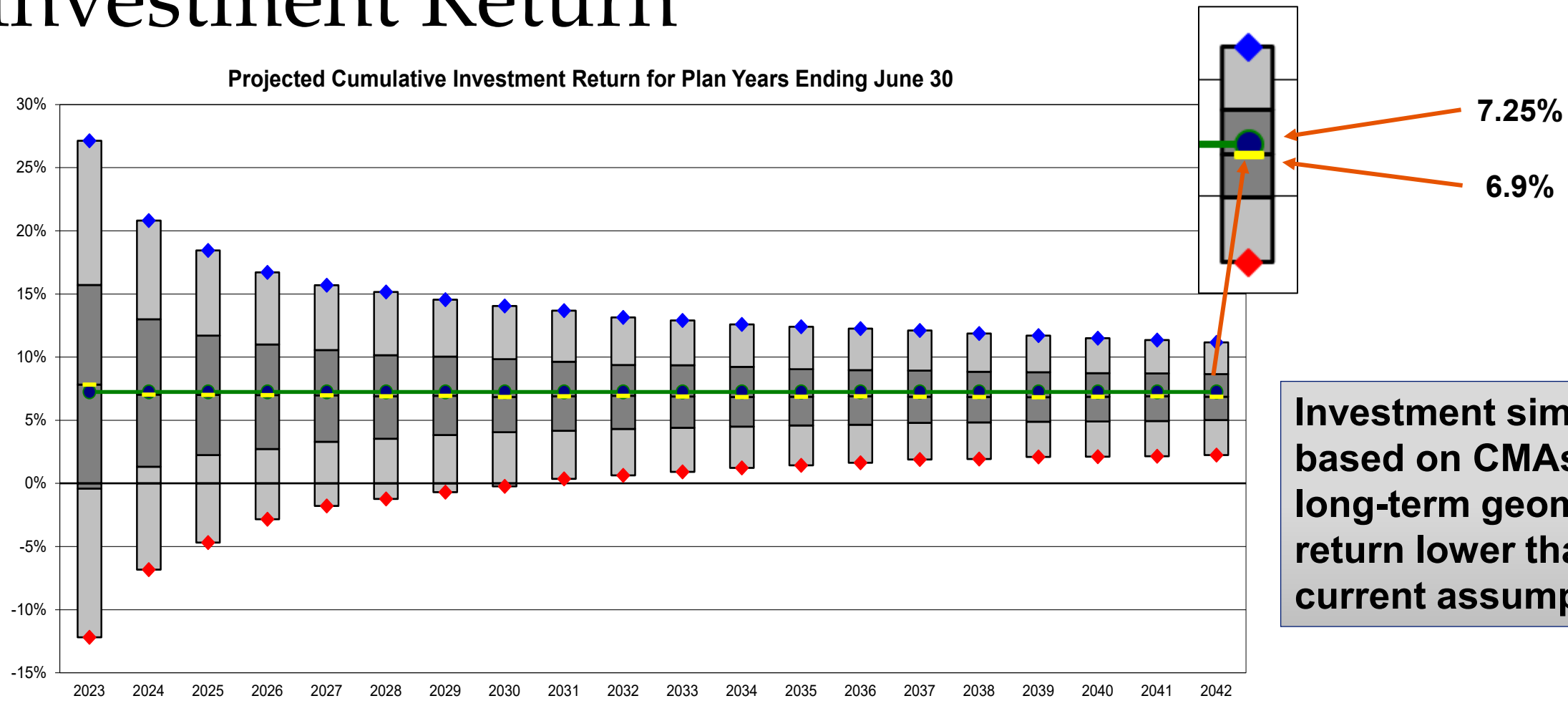
- The individual trials are grouped into percentiles and summarized as a range





  - 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



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
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

Investment simulation based on CMAs shows long-term geometric return lower than current 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: **+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**
2	Downside funded ratio 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**
3	Target funded ratio in 2040	85% or higher with more than 50% probability: **+4** 80% or higher with more than 50% probability: **+3** 75% or higher with more than 50% probability: **+2** 70% or higher with more than 50% probability: **+1** Not more than 70% with more than 50% probability: **+0**
4	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**
5	Ability to recover from market downturn*	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**

* “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 68%	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: **+1** based on funded ratio of 76%*	**+0**
2	35% 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: **+2** based on 24% probability of funded ratio <65% in 2030*	**+1**
3	52% probability of funded ratio >80% in 2040	85% or higher with more than 50% probability: **+4** (46% probability) 80% or higher with more than 50% probability: **+3** (52% probability) 75% or higher with more than 50% probability: **+2** (57% probability) 70% or higher with more than 50% probability: **+1** (62% probability) Not more than 70% with more than 50% probability: **+0**	*Prior year: **+4** based on 56% probability of funded ratio >85% in 2040*	**+3**
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**		**+1**
5	42% probability of recovering from market downturn*	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**		**+1**
				+6

* 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 50th 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[1] 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

[1] 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 50th 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

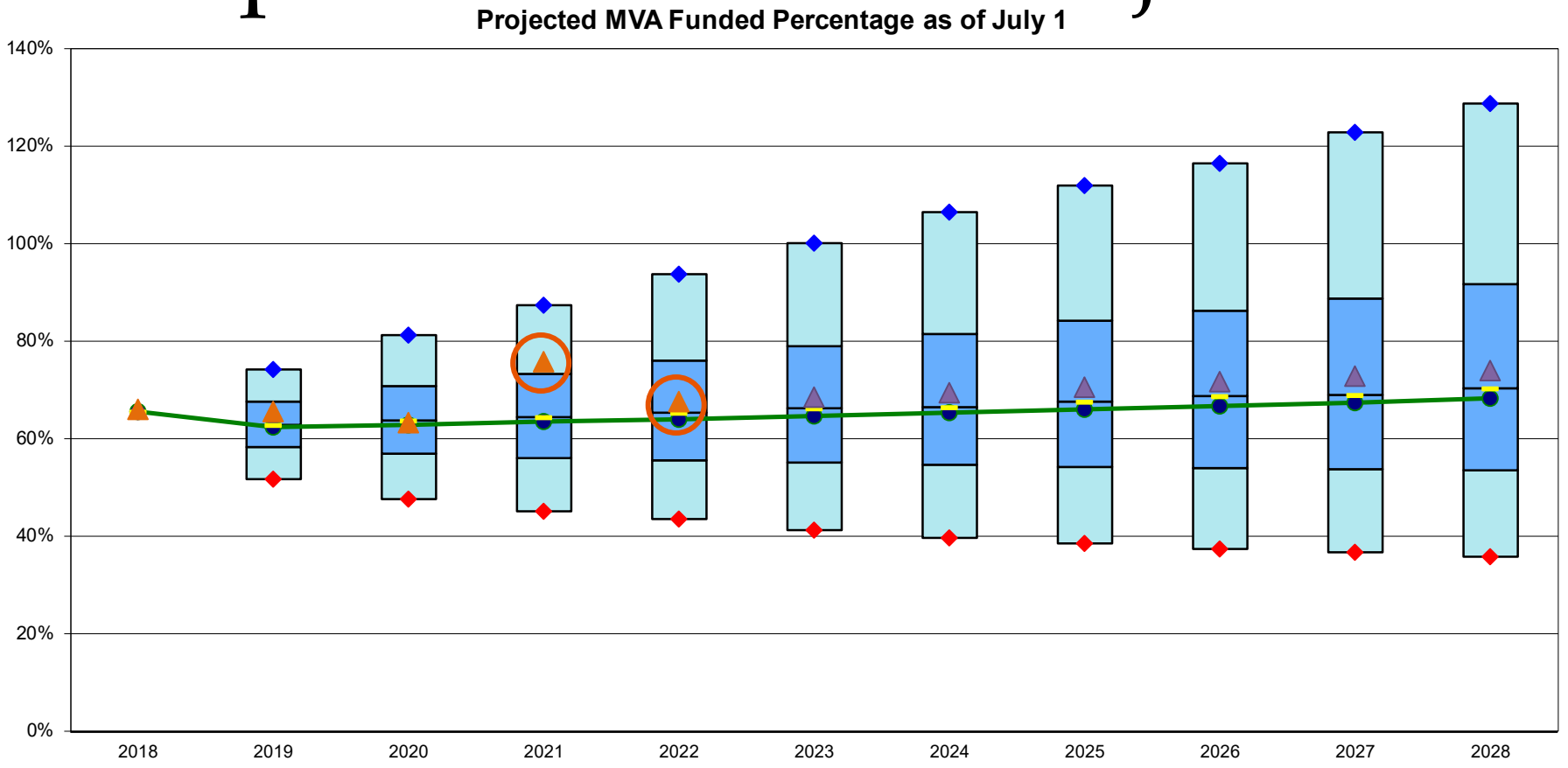
Other External Factors *(continued)*

- 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



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
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%

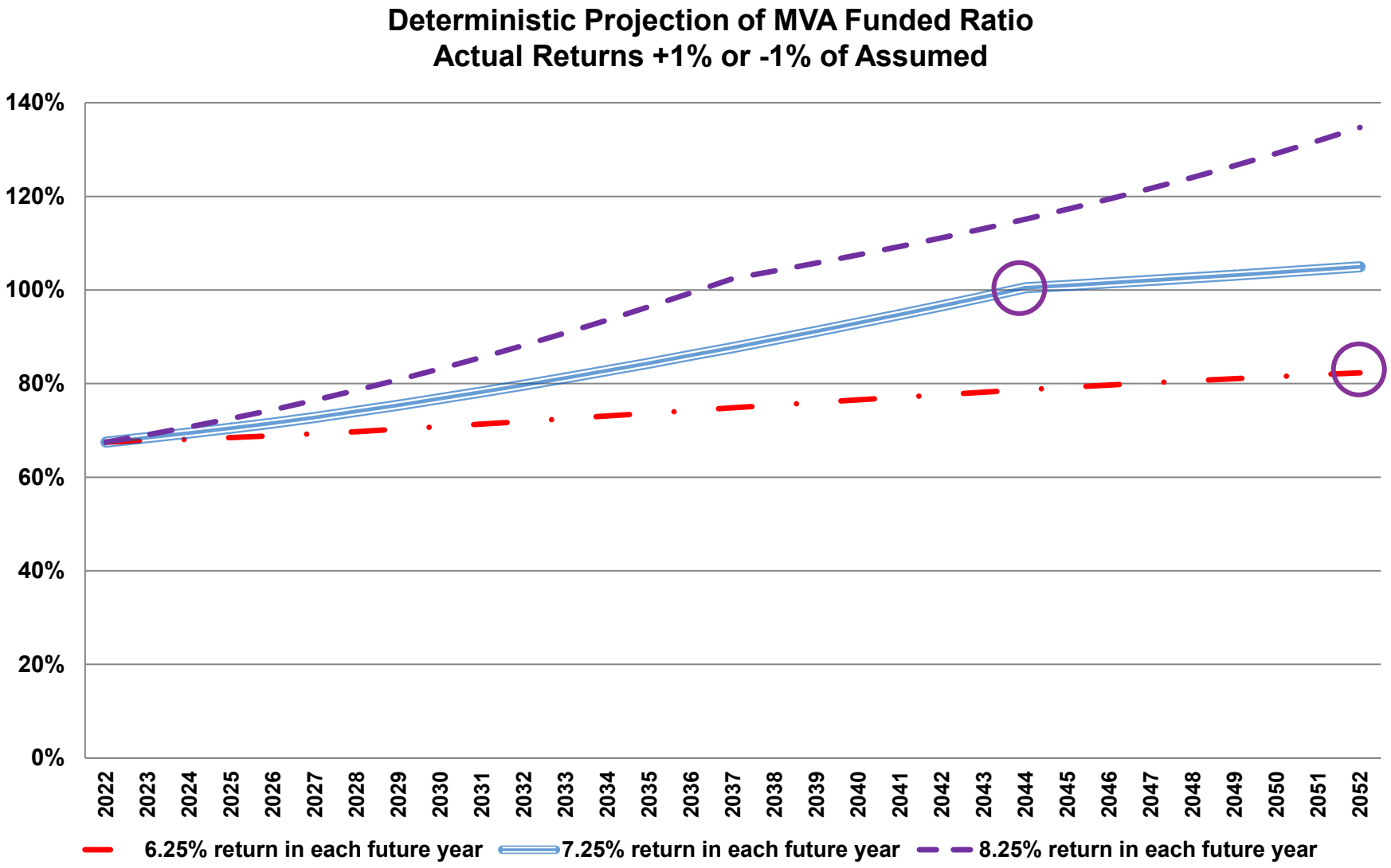
● Deterministic projection from July 1, 2018 actuarial valuation using alternate 7.25% investment return assumption

▲ Actual results from 2018 through 2022

▲ Deterministic projection from July 1, 2022 actuarial valuation

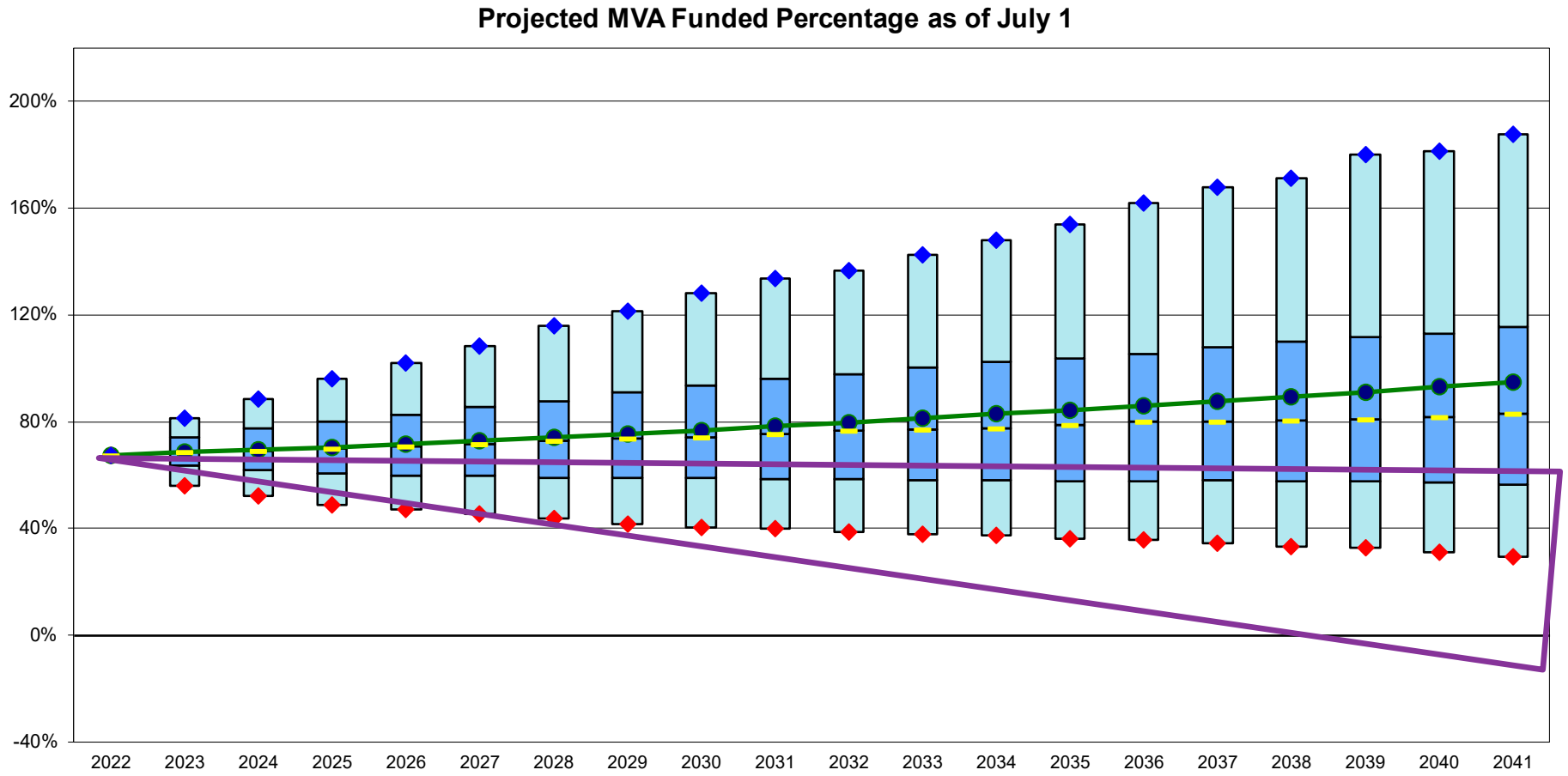
From the perspective of earlier stochastic modeling, the 2021 valuation was an 80th percentile result. As of 2022, TFFR dropped, but is still above the 50th percentile result.

Additional Thoughts



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)*



	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

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.

Appendix

Monte Carlo Simulation – Roll of Two Dice

Outcomes From a Single Throw

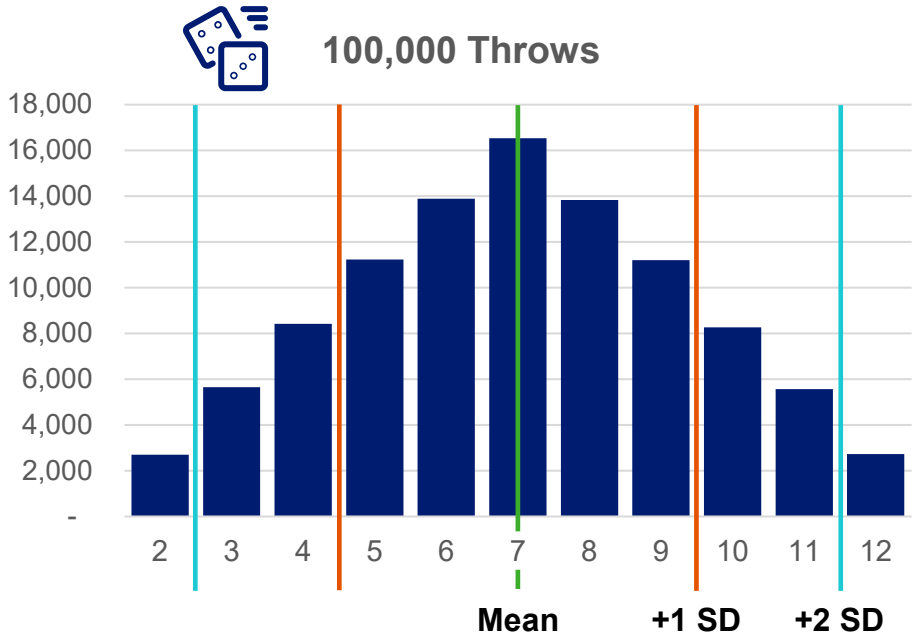
	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

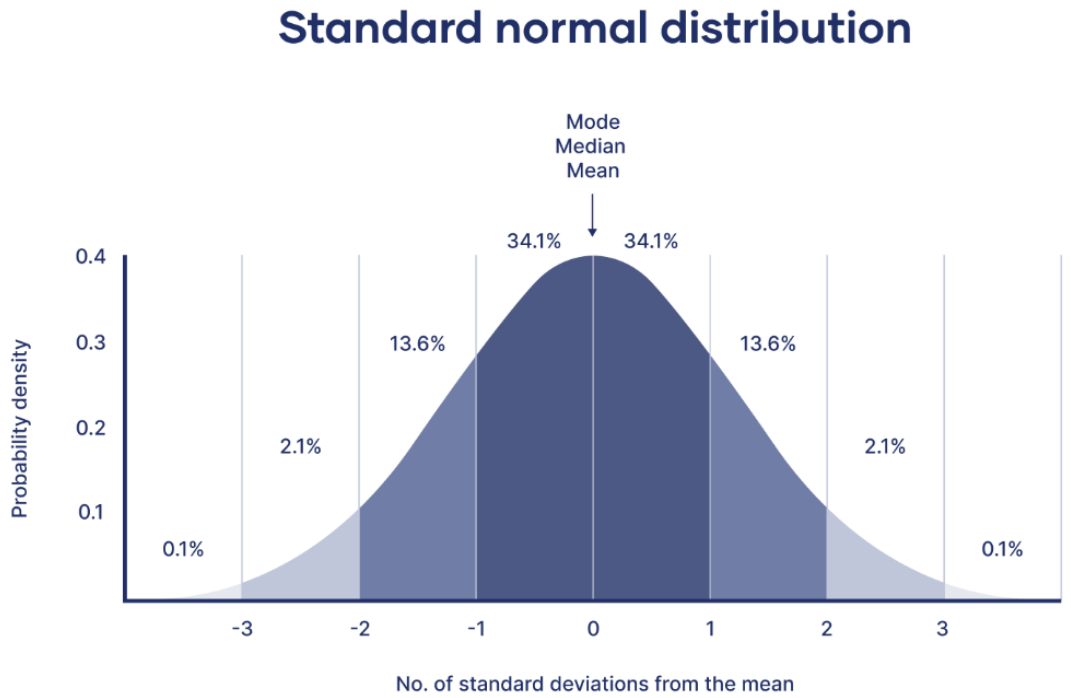
Number of Dice Throws

#	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
Mean			6.50	6.99	7.00	7.00	7.00
Std Dev			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

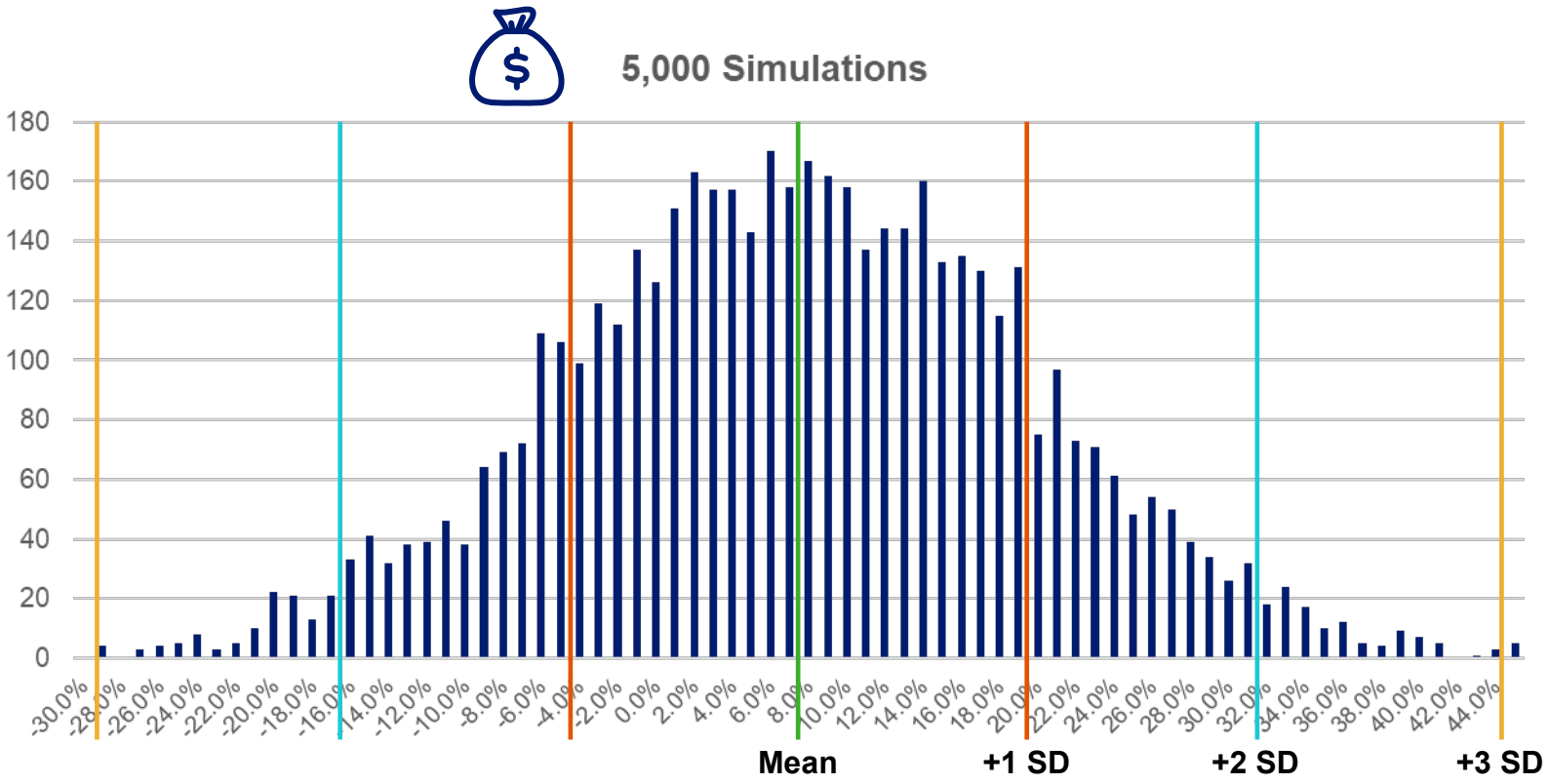
Monte Carlo Simulation – Roll of Two Dice





- 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



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 76%	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**	**+1**
2	24% 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**	**+2**
3	56% probability of funded ratio >80% in 2040	85% or higher with more than 50% probability: **+4** (56% probability) 80% or higher with more than 50% probability: **+3** (60% probability) 75% or higher with more than 50% probability: **+2** (64% probability) 70% or higher with more than 50% probability: **+1** (69% probability) Not more than 70% with more than 50% probability: **+0**	**+4**
4	57% 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**	**+1**
5	42% probability of recovering from market downturn*	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**	**+1**
			+9

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

* 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%
	Total			**100.0%**	**7.57%**
	Adjustment to Geometric				(0.80%)
	Total Long-term Return				**6.77%**

Portfolio Standard Deviation:
12.43%

* 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.*

Gathering ND-TFFR participant feedback

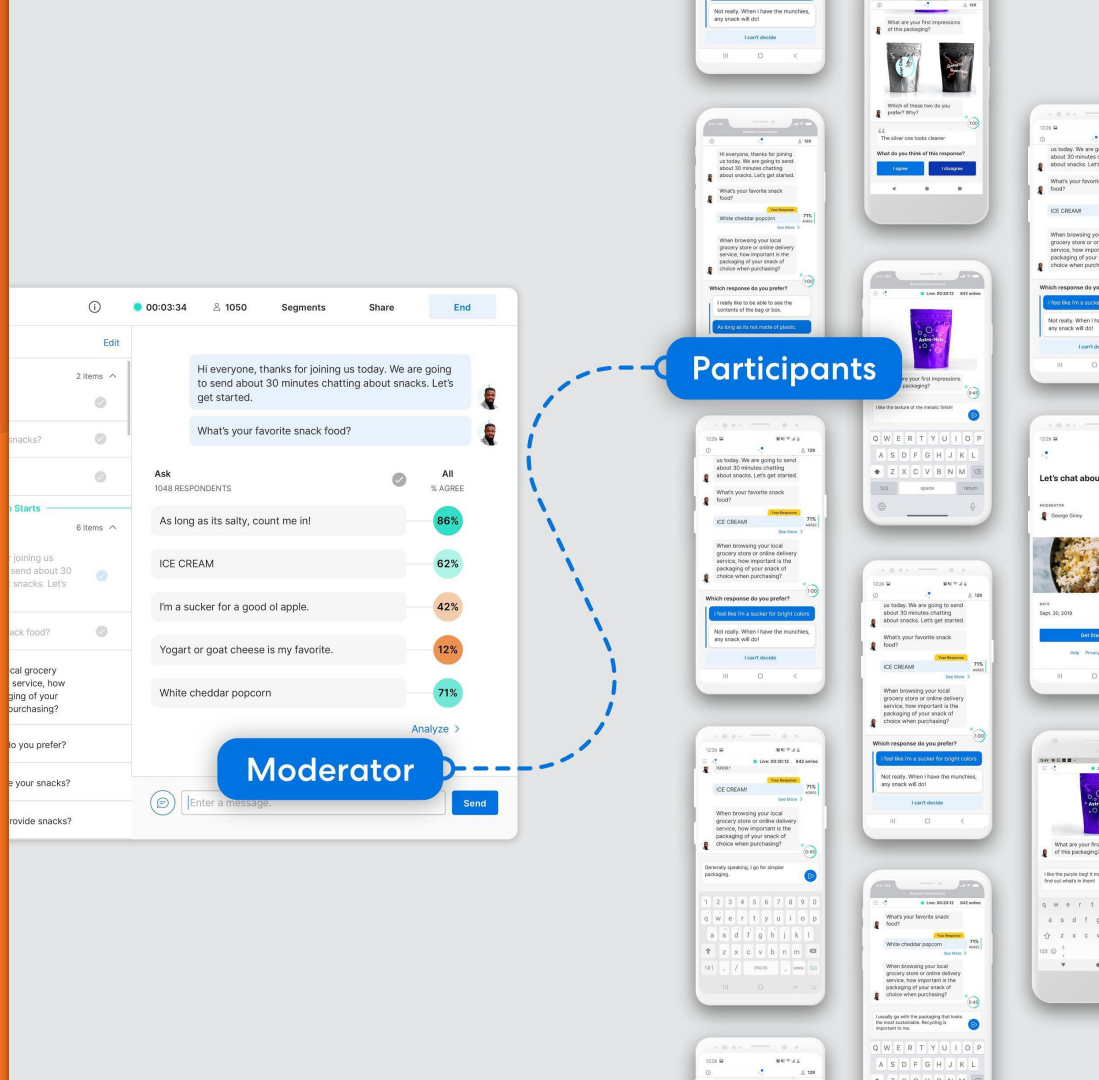
April 27, 2023

SEGAL BENZ

Our objectives

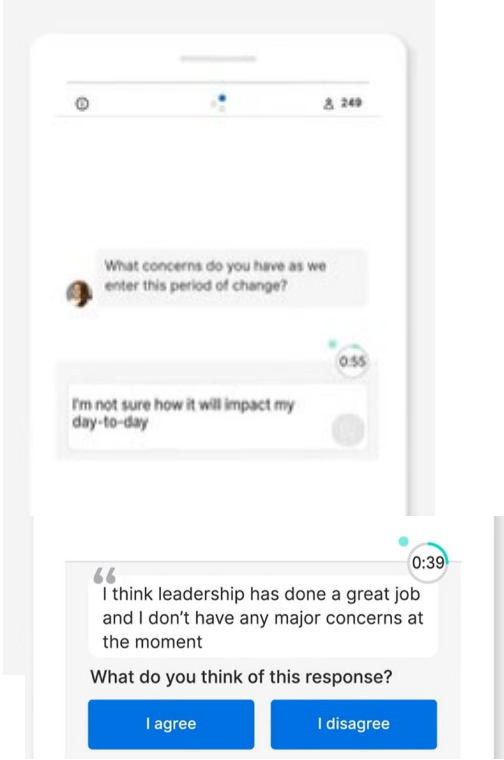
1) Collect feedback from ND-TFFR participants to learn:
   - What they understand about their benefits
   - How much they value their benefits
   - Communication preferences
2) Determine if demographic differences impact responses
3) Learn what language participants use to discuss their benefits

Introducing Remesh

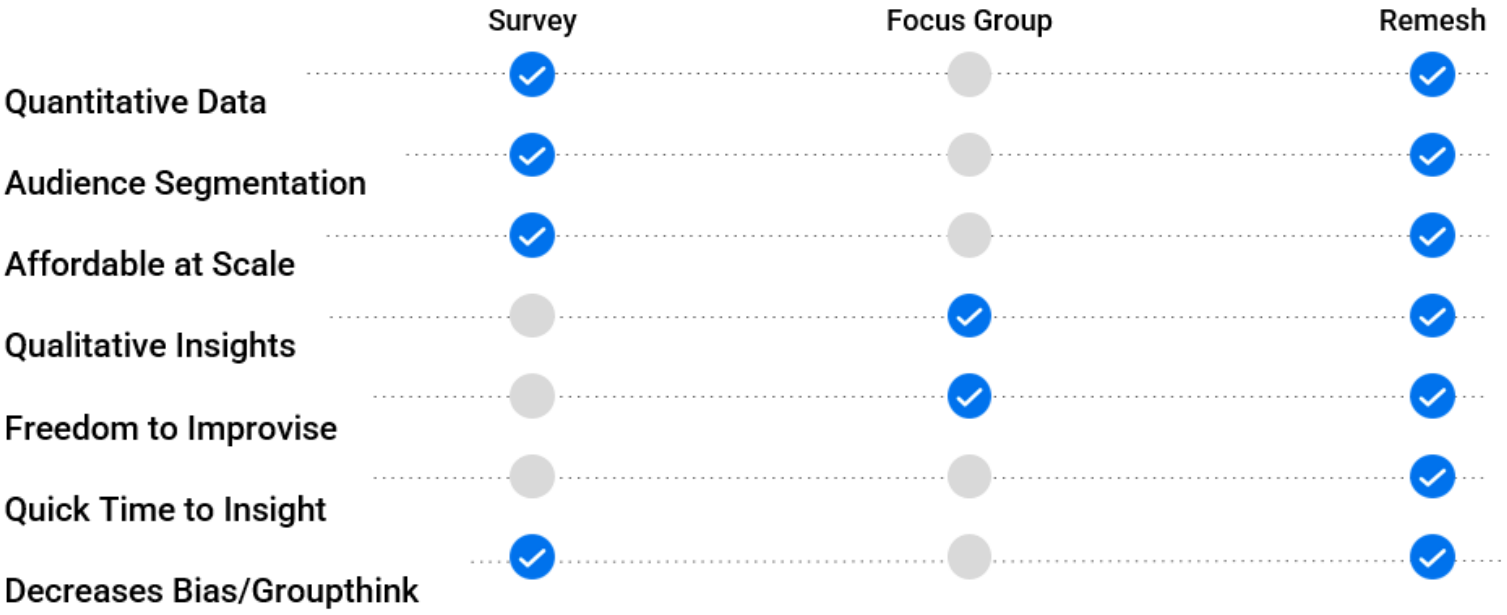


Innovations in participant research

- Platform supports a live conversation with up to 1,000 participants at one time.
- Participants join using a laptop, tablet, or mobile device. They answer questions in their own words and then vote on other respondents' answers.
- Responses are anonymous but can be segmented
- The open-ended, unstructured data is analyzed and displayed immediately, allowing employers to take action quickly based on the feedback.



How do the methods compare?



After the Live session: Use Flex

- Participants will respond to each question at their own pace without the pressure of a timer.
- After answering the open-ended questions in their own words, participants vote on answers from other participants (in Live session and earlier in the Flex session) – to indicate their agreement and disagreement.
- Participants are shown one question at a time and must answer all questions to progress through the conversation.
- Results are combined with the responses from the live session.

Sample questions

Sample onboarding questions

How old are you?
- Less than 34
- 35-54
- 55+

How long have you been teaching in North Dakota?
- Less than 5 years
- 5-10 years
- 11-20 years
- More than 20 years

In which environment have you done most of your teaching?
- Pre-K
- Elementary school
- Middle school
- High school

What is your gender?
- Female
- Male
- Non-binary/Other

Sample poll questions

How well do you understand your ND-TFFR benefits?
- Very well
- Somewhat
- Not at all

Are you confident that your ND-TFFR pension plan will provide you a secure and stable retirement?
- Yes
- No
- I don't know

How many years do you have to work before you're vested in the ND-TFFR pension?
- Vesting happens immediately
- 1 year
- 5 years
- 7 years
- I don't know

Do you know how much your employer contributes to your ND-TFFR pension account?
- Yes
- No
- I'm already receiving my pension benefit

Do you know when you are eligible to retire and begin receiving your ND-TFFR pension benefit?
- Yes
- No
- I'm already receiving my pension benefit

Do you know how much interest is earned on money contributed by your employer?
- Yes
- No
- I'm retired, so no additional interest is being earned

Do you know how much you'll receive each month once you begin receiving your ND-TFFR pension benefit?
- Yes
- No
- I'm already receiving my pension benefit

Do you know how to find out how much you'll receive each month once you begin receiving your ND-TFFR pension benefit?
- Yes
- No
- I'm already receiving my pension benefit

Sample open-ended questions

- Please describe in your own words what benefits you receive from the ND-TFFR program.
- How did you learn about the ND-TFFR program?
- What is a pension?
- What is a beneficiary?
- When you think about your finances, please share in as much detail as possible what your current concerns are.
- Please describe in your own words what an ideal retirement looks like.
- What questions do you have about the ND-TFFR program?

Sample ranking questions

Please rank how you would like to receive education about the ND-TFFR program.

- Email
- Website
- Meeting or webinar
- 1:1 session in person or on the phone
- Podcast or video
- Social media

Please rank the importance of each of the items below to the success of your retirement.

- ND-TFFR pension
- Personal savings or investments
- Spouse’s retirement plan(s)
- Health savings account
- Social Security

Project plan

Activity	Date(s)
Focus Group invitation • Draft 1 to ND-TFFR • Edits to Segal Benz • Final • Sent via email by ND-TFFR	 • Monday, April 24 • Friday, April 28 • Monday, May 1 • Tuesday, May 2
Focus Group discussion guide • Draft 1 to ND-TFFR • Edits to Segal Benz • Draft 2 to ND-TFFR • Edits to Segal Benz • Final • Programmed	 • Monday, May 1 • Tuesday, May 2 • Wednesday, May 3 • Thursday, May 4 • Friday, May 5 • Monday, May 8
LIVE Focus Group session	Tuesday, May 9 at 4:00 p.m.
FLEX Focus Group open	Wednesday, May 10 at 7:00 a.m.
FLEX Focus Group ends	Friday, May 19 at 11:59 p.m.
Results presentation (includes both LIVE and FLEX)	Monday, June 5 (Time TBD)

Thank you!

STRATEGY REVIEW

North Dakota Retirement and Investment

LOOKING AHEAD TO #BELEGENDARY

Jan Murtha, Executive Director

TFFR Board – April 27, 2023

NORTH Dakota
Be Legendary.


CURIOSITY
GROWTH MINDSET
BUILDING A BETTER FUTURE
FOR NORTH DAKOTA

Retirement and Investments Core Priorities

HORIZON-BASED TRANSFORMATION

2023 LEGISLATIVE SESSION

Strategic Planning Initiatives Realized

HB 1088

- SIB Member Composition Bill – House conceded to Senate Amendments with Amendments (4/19)
- Two Experts, Two Legislators (voting) from Advisory Board. OMB Director to replace Insurance Commissioner

HB 1219

- TFFR Board Bill for Pension System Pioneer Project – Unanimously passed both House and Senate, signed by Governor on 4/10.
- Made statutory changes the aid in development and implementation of Pioneer Project.

SB 2022

- RIO's Budget Bill – Passed both House and Senate, signed by Governor 4/21.
- 9 new FTE's, funding for temporary employees, interns, equity. Includes statutory authorization for Talent Management plan with incentive compensation.

NORTH
Dakota
Be Legendary.™

2023-2025 Legislative Session RIO Bill Tracker

Bill #	Topic	Description	Sponsor	Hearing Date	Committee	Status	Position
HB 1040	Closing DB Plan	Closing DB Plan (eff. 12/31/24)	Legislative Management: Weisz, Bosch, Boschee, Lefor, Mitskog, Vigesaa, Burckhard, Klein, Piepkorn, Schaible, Wanzek			Passed House 2/22 77 yeas / 16 nays Passed Senate 4/4 29 yeas / 18 nays (rereferred to Approps) Do Pass as amended 9-6-1 Passed Senate 4/21 28 yeas / 19 nays	Neutral
HB 1088	SIB	SIB Membership changes	SIB	**04/19-12:00 p.m. Conference Committee**	Senate I&B and House Govn't & VA	Amended by House.Reduced experts to 1 from 2, changed experience language; Legacy Advisory Board would be a voting member; and two legislative members. Passed House 1/25 80 yeas/ 11 nays. 2/8 Senate I&B amended to original version except making Legacy Advisory member voting member and an amendment to replace the Insruance Commissioner with the OMB Director on the Advisory Board. Senate I&B passed amendment 5-0-0. Passed Senate 3/10 46 yeas / 0 nays Return to House 3/13 04/07 Conf Committees appointed	Support - Original Version
HB 1150	Veteran Exemption for TFFR	Allows veterans with at least 20 years of military service to opt out of the TFFR in their first year of teaching	Thomas, Bekkedahl, Heinert, Meyer, O'Brien, Pyle, Richter, Ruby, Schaible, Schreiber-Beck, Vedaa			Passed House 1/19 54 yeas/ 37 nays- 2/13 Referred to Senate State & Local Passed Senate 03/14 27 yeas / 18 nays **3/23 Signed by Governor**	Oppose
HB 1183	PERS retirement for law enforcement	Amends description of participants.	Rep. Porter, Sen. Axtman, Rep. Dockter, Rep. Heinert, Rep. Karls, Rep. Kasper, Sen. Larson, Rep. Louser, Rep. Motschenbacher, Rep. Ostlie, Rep. Ruby, Rep. Schauer			2/22 Passed House 84 yeas 7 nays 04/10 Passed Senate, 32 yeas/14 nays and returned to House 04/12 Concurred, Passed House, 87 yeas/5 nays **04/19 Signed by Governor**	Monitor
HB 1216	ND Development Fund	Commerce Dept. funds to promote economic development.	Rep, Nathe			Passed House 1/25 91 yeas 0 nays. Passed Senate 3/9 45 yeas / 1 nay Returned to House 3/10 04/03 House Concurred, Passed House 88 yeas / 2 nays **04/11 Signed by Governor**	Monitor
HB 1219	TFFR	TFFR Changes	Reps. Kempenich, Conmy, Kreidt Sen. Schaible			Passed House 2/7 94 yeas/0 nays. 04/05 Passed Senate, 47 yeas / 0 nays 04/05 Returned to House **04/11 Signed by Governor**	Support
HB 1227	Legacy Fund	Requiring a cost-benefit analysis for a measure or policy affecting the Legacy Fund.	Reps. Kempenich, Bosch, Cory, Mock, Swiontek, Thomas, Vigesaa Sens. Klein, Meyer, Patten			Passed House 1/20 89 yeas/ 0 nays. Passed Senate 3/10 47 yeas / 0 nays **3/15 Signed by Governor**	Neutral
HB 1278	SIB	Requiring contracts with custodians/managers include required written support of fossil fuel and ag industries in state.	Reps. Satrom, Grueneich, Headland, Lefor, S. Olson, Ostlie, Schauer, Steiner Sens. Conley, Wanzek			Passed House 2/20 92 yeas / 1 nays. Amended to support investment program. 03/30 - Failed Senate 10 yeas / 36 nays	Oppose original Version; support amended version.
HB 1285	Agency	Prohibiting executive branch agency bill submissions without legislator or legislative committee sponsor.	Reps. Toman, Christensen, Heilman, Henderson, Prichard			Passed House 2/21 80 yeas / 14 nays 03/30 Failed Senate 10 yeas / 36 nays	Monitor

HB 1309	PERS	Plan design changes for law enforcement	Rep. Boschee, Sen. Braunberger, Sen. Cleary, Sen. Dever, Rep. Heinert, Rep. Martinson, Rep. Nathe, Sen. Roers, Rep. Ruby, Rep. Schneider			Passed House 2/21. 87 yeas, 7 nays. 04/04 Passed Senate, 45 yeas / 2 nays 04/05 Returned to House 04/06 House concurred, Passed House, 89 yeas/3 nays **04/13 Signed by Governor**	Monitor
HB 1321	PERS Board	Changing PERS Board makeup	Reps. Kasper, Dockter, Lefor, Louser, D. Ruby, M. Ruby, Steiner, Vigesaa, Weisz Sen. Hogue			Passed House 2/21 79 yeas / 15 nays 03/28 Failed Senate 14 yeas / 33 nays	Monitor
HB 1345	Procurement	State may give priority to companies that support state's ag & energy industries when procuring contracts.	Reps. Satrom, Grueneich, Hagert, Headland, Kiefert, Ostlie, Steiner Sen. Conley, Erbele, Lemm, Wanzek			Passed House 2/20 85 yeas / 8 nays 03/30 - Failed Senate 12 yeas / 34 nays	Monitor
HB 1368	Investments	Prohibiting investments and contracts with companies that boycott Israel.	Reps. K. Anderson, Bellew, M. Ruby, Strinden, Timmons, Tveit Sens. Clemens, Kannianen, Myrdal			Passed House 2/20 86 yeas / 7 nays 03/29 Passed Senate 43 yeas / 3 nays 04/04 House Concurred, Passed House 87 yeas / 4 nays **04/07 Signed by Governor**	Oppose original Version; support amended version.
HB 1379	Legacy Earnings Streams	Modifies Legacy Fund Earnings streams	Reps. Lefor, Bosch, Dockter, Headland, Nathe, Novak, O'Brien Sens. Bekkedahl, Hogue, Rummel, Sorvaag	**04/21-2:30 pm**	**conference committee**	Passed House 2/22 77 yeas / 16 nays 04/11 Senate amended 04/12 Senate passed, 46 yeas/0 nays, Emergency Clause carried 04/12 House Refued to Concur 04/17 Both Conf Comm Appointed	Monitor
HB 1429	SIB	ESG and Proxy Voting requirements with Study.	Reps. Novak, Koppelman, Louser, J. Olson, S. Olson, M. Ruby, Thomas, Sen. Elkin, Magrum, Rummel	04/17- 9:00 a.m. Conf Committee	House IB&L	Passed House 93 yeas / 0 nays 03/30 Passed Senate 42 yeas / 4 nays 04/07 Both Conf Committees appointed 04/20 Passed House, 89 yeas / 1 nay 04/20 Senate CC reported back, amended 4/21 Passed Senate 44 yeas / 3 nays	Oppose original version; support amended version.
HB 1532	TFFR	Bill provides funding for private school attendance. Amendment re: establish educ reimbursement; provide for study and report, to provide an appropriation.	Reps, Cory, Kasper, Kempenich, Lefor, Nathe, Porter,Strinden, Sens. Beard, Burckhard, Meyer, Wobbema, Hogue			Passed House 2/21 54 yeas / 40 nays 3/23 Amendment adopted, referred to Appropriations 04/11 Passed Senate, 27 yea/19 nay 04/13 Passed House, 51 yeas/41 nays **04/17 Sent to Governor**	Monitor
HB 1539	TFFR	Amends and reenacts NDCC relating to the duties of the employee benefits program committee. Repeal sections 54-35-02.3 and 54-35-02.4 re: employee benefits program committee.	Rep. Weisz, Rep. Lefor, Rep. M. Ruby, Rep. Vigesaa	04/17 Bill Hearing - 10:30am	Senate S&LG	Delayed Bill. 04/13 Passed House, 90 yeas/0 nays **04/20 Amendment adopted, passed Senate 42 yeas/4 nays, Returned to House**	Oppose
SB 2015	Budget bill	OMB Budget Bill	Senate Appropriations	**04/20 - 2:30 p.m.**	**House Approps - Gov't Ops**	Passed Senate 2/21 40 yeas / 6 nays	Monitor
SB 2022	Budget bill	RIO's Budget	Senate Appropriations			2/20 Passed Senate, 45 yeas / 2 nays 04/11 Passed House, 86 yeas / 4 nays, Emergency clause carried, returned to Senate. 04/13 Senate laid over one legislative day 04/17 Passed Senate 44 yeas/2 nays **04/19 Sent to Governor**	Support

SB 2070	Teacher Permitting	Extends the length of time non-certified teachers can be permitted	Senate State and Local Govt - Roers, Barta, Braunberger, Cleary, Estenson, Lee			Passed Senate 1/26 47 yeas / 0 nays 03/20 Passed House 92 years / 0 nays **03/27 Signed by Governor**	Monitor
SB 2164	PERS Board	Changing how legislative members of PERS Board are appointed	Sen. Dever Reps. Brandenburg, Hatlestad, D. Johnson, Monson, Schauer			1/30 Passed Senate, 47 yeas / 0 nays 4/11 Passed House, 74 yeas / 15 nays, Retured to Senate **04/20 Senate refused to concur, app'ed conf committee**	Monitor
SB 2165	Energy Commission	Funds to clean sustainable engery fund/ BND	Sen. Patten, Rep. Bosch, Sen. Kannianen, Sen. Kessel, Rep. Novak, Rep. Porter			Passed Senate 2/21 40 yeas / 6 nays Passed House 3/15 93 yeas / 0 nays **03/23 Signed by Governor**	Monitor
SB 2196	Infrastructure Revolving Loan Fund	Resets terms of the infrastructure revolving loan fund.	Sen. Patten, Sen. Beard, Sen. Bekkedahl, Sen. Kannianen, Rep. Olson, Rep. Richter	**04/24-10:00 a.m. Conf Comm**	Senate E&NR	Passed Senate 1/23 47 yeas/ 0 nays 03/28 Passed House 81 Yeas / 10 Nays 03/28 Returned to Senate 03/31 Senate refused to concur 04/03 both conf committees appt	Monitor
SB 2233	BND	Auditing practices of certain funds under management of BND	Sen. Klein, Sen. Bekkedahl, Sen. Hogue, Rep. Lefor, Rep. Vigesaa			Passed Senate 1/24 46 yeas/ 0 nays 03/17 Passed House 92 yeas / 0 nays **03/28 Signed by Governor**	Monitor
SB 2239	PERS Plan	Changing PERS contribution rates and appropriating $250M to the fund	Sens. Cleary, Dever Rep. Boschee			Passed Senate 2/21 34 yeas / 13 nays **04/17 House rpt'ed back, Do Not Pass, placed on calendar**	Support
SB 2258	TFFR	Expands scope of Critical Shortage area qualification for rehired retirees	Sens. Paulson, Beard Reps. Heilman, Hoverson, Louser			Passed Senate 2/1 47 yeas 0 nays 03/29 Failed House 2 yeas / 88 nays	Neutral
SB 2284	TFFR	Defines "probationary teacher" and "weapon," and modifies weighting factors and transition maximums, and an increase in per student payments, to provide for legislative study.	Sen. Schaible, Sen. Elkin, Rep. Heinert, Rep. Nathe			02/20 Senate passed, 47 yeas/0 nays 03/29 - Amendments added that impact agency relating to a study. 03/30 - House Education reported back, do pass, amendment placed on calendar. 03/31 House amendment adopted, referred to Appro. 04/19 Rpt'ed back, do pass. **04/20 Amendment adopted, placed on calendar, Passed House, 76 yeas/16 nays**	Monitor
SB 2330	Legacy Fund	Legacy earnings definition and change in Legacy Fund IPS percentages.	Sens. Klein, Hogan, Meyer Reps. Bosch, Kreidt	**04/21-2:00 pm**	**Senate I&B**	2/15 Passed Senate, 43 yeas / 3 nays 04/12 Amendment adopted, Passed House, 90 yeas / 0 nays, Emergency Clause Carried 04/13 Returned to Senate **04/17 Senate refused to concur** **04/19 Both conf committees appt'ed**	Support
HCR 3033	Legacy Fund	Legacy fund earnings definition constitutional amendment	Reps. Mock, Hagert, Ista, Kempenich, Kreidt, Schatz Sens. Cleary, Meyer			Passed House 3/14 67 yeas / 24 nays 04/04 Senate I&B reported back, do not pass. 04/05 Amendment adopted, placed on calendar 04/10 Senate adopted as amended, 45 yeas / 1 nay 04/13 House Refued to Concur, Appointed Conf Comm 04/17 Senate Conf Comm Appt'ed **04/20 House Rpt'ed back, placed on calendar**	Monitor

TFFR Board Calendar and Education Plan 2023-24

JULY 20, 2023 – 1 pm
Election of Officers
Annual TFFR Program Review
Annual Governance Policy Review Report
Qtrly Investment Report (3/31)
Qtrly Audit Services Report (6/30)
Qtrly TFFR Ends Report (6/30)
Administrative Rules
Educ: Investments (manager selection process, due diligence, watch list) – RIO

SEPTEMBER 21, 2023 – 1 pm
Qrtly & Annual Investment Report (6/30)
Annual Audit Services Report (6/30)
Annual Technology Report (6/30)
Annual Budget and Expense Report (6/30)
Annual TFFR Ends Report (6/30)
Administrative Rules
Educ: Cybersecurity - NDIT

November 16, 2023 – 1 pm
Strategic Communication Plan
2023 Actuarial Valuation Report
Annual Retiree Reemployment Report
Qtrly Investment Report (9/30)
Qtrly Audit Services Report (9/30)
Qtrly TFFR Ends Report (9/30)
Administrative Rules
Educ: Actuarial Issues & Trends - Actuary

JANUARY 25, 2024 – 1 pm
2023 GASB Report
Annual Retirement Ends Report (6/30)
Qtrly Audit Services Report (12/31)
Qtrly TFFR Ends Report (12/31)
Educ: Open Meetings & Records - AGO

MARCH 21, 2024 – 1 pm
Agency Strategic Plan Review
Qtrly Investment Report (12/31)
Annual Retirement Trends Report (6/30)
Educ: Fiduciary Duties & Ethics - AGO

APRIL 25, 2024 – 1 pm
2024-25 Board Calendar and Educ Plan
Plan Management Policy Update
Annual Pension Plan Comparison Report
Qtrly TFFR Ends Report (3/31)
Qtrly Audit Services Report (3/31)
Educ: TBD

JUNE 13, 2024 – 1 pm
Board Retreat – 2025 Legislative Session Planning

NOTE: Agenda items or education topics may be rearranged if needed.

SIB & TFFR Board/Committee Calendar 2023-24

July 2023
July 12, 2023 – SIB ERCC @ 10:00 AM
July 13, 2023 – SIB GPR @ 10:00 AM
July 14, 2023 – Investment Comm @ 9:00 AM
July 20, 2023 – TFFR @ 1:00 PM
July 21, 2023 – SIB @ 8:30 AM

August 2023
August 10, 2023 – TFFR GPR @ 10:00 AM
August 11, 2023 – Investment Comm @ 9:00 AM
August 11, 2023 – SIB GPR @ 2:00 PM
August 22, 2023 – SIB Audit Committee @ 2:30 PM
August 25, 2023 – SIB @ 8:30 AM

September 2023
September 8, 2023 – Investment Comm @ 9:00 AM
September 12, 2023 – SIB Securities @ 10:00 AM
September 14, 2023 – SIB GPR @ 10:00 AM
September 21, 2023 – TFFR @ 1:00 PM
September 22, 2023 – SIB @ 8:30 AM
September 28, 2023 – SIB ERCC @ 10:00 AM

October 2023
October 12, 2023 – SIB GPR @ 10:00 AM
October 13, 2023 – Investment Comm @ 9:00 AM
October 27, 2023 – SIB @ 8:30 AM

November 2023
November 2, 2023 – SIB ERCC @ 10:00 AM
November 7, 2023 – TFFR GPR @ 3:30 PM
November 8, 2023 – SIB GPR @ 10:00 AM
November 9, 2023 – Investment Comm @ 9:00 AM
November 14, 2023 – SIB Audit Committee @ 2:30 PM
November 16, 2023 – TFFR @ 1:00 PM
November 17, 2023 – SIB @ 8:30 AM

December 2023
December 5, 2023 – SIB Securities @ 10:00 AM
December 8, 2023 – Investment Comm @ 9:00 AM
December 15, 2023 – SIB @ 8:30 AM (tentative)

January 2024
January 9, 2024 – SIB ERCC @ 10:00 AM
January 11, 2024 – Investment Comm @ 9:00 AM
January 18, 2024 – SIB GPR @ 10:00 AM
January 25, 2024 – TFFR @ 1:00 PM
January 26, 2024 – SIB @ 8:30 AM

February 2024
February 6, 2024 – TFFR GPR @ 3:30 PM
February 7, 2024 – SIB ERCC @ 10:00 AM
February 9, 2024 – Investment Comm @ 9:00 AM
February 15, 2024 – SIB Audit Committee @ 2:30 PM
February 23, 2024 – SIB @ 8:30 AM

March 2024
March 8, 2024 – Investment Comm @ 9:00 AM
March 12, 2024 – SIB Securities @ 10:00 AM
March 13, 2024 – SIB ERCC @ 10:00 AM
March 14, 2024 – SIB GPR @ 10:00 AM
March 21, 2024 – TFFR @ 1:00 PM
March 22, 2024 – SIB @ 8:30 AM

April 2024
April 12, 2024 – Investment Comm @ 9:00 AM
April 16, 2024 – SIB ERCC @ 10:00 AM
April 18, 2024 – SIB GPR @ 10:00 AM
April 25, 2024 – TFFR @ 1:00 PM
April 26, 2024 – SIB @ 8:30 AM

May 2024
May 1, 2024 – TFFR GPR @ 3:30 PM
May 7, 2024 – SIB ERCC @ 10:00 AM
May 8, 2024 – SIB GPR @ 10:00 AM
May 9, 2024 – SIB Audit Committee @ 2:30 PM
May 10, 2024 – Investment Comm @ 9:00 AM
May 17, 2024 – SIB @ 8:30 AM

June 2024
June 11, 2024 – SIB Securities @ 10:00 AM
June 13, 2024 – TFFR Board Retreat @ 1:00 PM
June 14, 2024 – Investment Comm @ 9:00 AM

TFFR Calendar & Education Plan to follow

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MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad R. Roberts, DED/CRO**
DATE: **April 17, 2023**
RE: **April 2023 Pioneer Project Update**

Project Status

Pilot 2 elaboration began on January 9, 2023. This elaboration phase is projected to last through May 18, 2023. In addition to the design of modules such as dual member enrollment and service retirement benefit calculation, the vendor and TFFR staff are also conducting meetings to develop the new file scanning and document management process for the system.

In addition to the design of specific modules identified for each pilot, we are also presently working with the vendor and NDIT on the data mapping and migration project. This is a project that identifies and properly categorizes all historical membership and transactional data in the current pension administration system up until the point of cutover to the new pension administration system. At that time, all data will be converted to the proper layout for the new system to operate from.

Beginning May 1, 2023, and lasting into July 2023, we will also be working with NDIT and the vendor on an imaged document migration project from the existing system to the new system. This project properly identifies, categorizes, and defines existing imaged documents used in the current system so that they can be migrated to the new system at cutover.

Pilot 3 elaboration is tentatively scheduled to begin April 3, 2023. As Pilot 2 is not scheduled to conclude until May 18, 2023, this creates approximately six weeks of overlap of design and elaboration sessions for Pilot 2 and Pilot 3 and an increased workload on staff beyond even the added workload of normal duties and Pilot 2 sessions. We are working to accommodate the overlap to keep the project on schedule and avoid any development delays further in the project schedule. Pilot 3 is scheduled to be complete on July 10, 2023. Pilot 3 and Pilot 4 are not expected to have an overlap period affording TFFR staff more capacity to handle the surge in end of year business activities.

There are four total pilot phases of the elaboration stage of the project with the last pilot scheduled to be complete in the 4th quarter of 2023. The project is still planned to “go live” in the fourth quarter of 2024.

Budget Status

During the initial development of the project and acceptance of the vendor’s original proposal, there was a cost of $92,000.00 budgeted for and assigned to the purchase of Microsoft SharePoint licenses and servers to maintain a document and knowledge repository for the system. After deliberation and discussion with the vendor and NDIT, it has been determined we

no longer need this licensing from the vendor as the existing State license for the SharePoint product is sufficient. This will result in a credit memo of $92,000.00 for the project which will be allocated to the contingency/management reserve fund of the project. This savings will fully offset the $23,800 additional cost for the image migration reported at the March 2023 meeting.

Unanticipated Issues

The vendor has experienced some turnover in staff assigned to the project. So far, the vendor has been able to supplement the vacancies with staff from other projects. A recent resignation from the vendor has caused a delay in the development of a module scheduled as part of Pilot 2. This delay was caused due to the vendor not having a readily assignable back-up resource. It is expected this delay will be short-lived and time can be found in the present schedule to make up the design meetings, but it may create some delay in the timeline for development of Pilot 2.

The vendor has made RIO leadership aware of pending civil litigation in Federal Court regarding their unemployment insurance product line. This litigation is related to the Federal indictment of two of the vendor's executives for intellectual property related theft. This litigation is in the early stages of the legal process. The effects of the litigation on the company, if the vendor is not successful in their defense, is unknown currently. The vendor and its' executive team is readily accessible for a meeting with the Board at the June 2023 Board Retreat to provide in-depth discussion on this topic if the Board desires.

BOARD ACTION REQUESTED: Information Only.

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MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad Roberts, DED/CRO**
DATE: **April 17, 2023**
RE: **April 2023 Board Meeting Outreach Programs Update**

Summary

This report provides a summary of member outreach programming conducted and customer service contacts for the 3rd QTR of FY2023. It also identifies outreach events TFFR staff will be participating in or conducting in the coming months.

A new component of this report is metric reporting for direct member contacts in the form of e-mails, phone calls and walk-ins. January 2023 saw a surge in customer service contacts, as compared to February and March, mostly attributable to the change in federal and state tax withholding forms to comply with IRS regulations.

RIO is developing a GovDelivery web-based platform to be deployed soon. This new platform will create a streamlined and efficient system to disseminate messaging, newsletters, updates, and other communications from all agency disciplines including TFFR services.

Customer Service Metrics

CONTACT TYPE	JANUARY 2023	FEBRUARY 2023	MARCH 2023
PHONE CALL	1,002	676	693
E-MAIL	534	478	520
WALK-IN	14	9	11

Events Completed

- Business Manager Info-Mixers - Virtual
  - January 2023 – Topic: Teacher Retirement Process
  - March 2023 – Topic: Employer Models

- New Business Manager Workshop – Virtual
  - February 2023
  - Topics Covered:
    - Reportable and non-reportable salary
    - Submitting TFFR reports
    - New member enrollments
    - Terminations and retirements
    - Employer payment plan models

Upcoming Events

- NDSBA Business Manager Brunch and Learn
  - April 2023 - Topic: TFFR Update, Legislative Update, PAS Update

- Business Manager Info-Mixers - Virtual
    - April 2023 – Topic: Year-end Reporting

- ND Association of School Business Managers Conference
    - May 11, 2023
    - Speaker slot

- NDTFFR Retirement Seminar
    - July TBD, 2023

- ND Retired Teacher Association Conference
    - September 12-13, 2023
    - Speaker Slot

- ND Council of Educational Leaders – In Person
    - October TBD, 2023
    - TFFR information booth
    - Speaker slot TBD

- ND School Board Association Conference – In Person
    - October TBD, 2023
    - TFFR Information booth
    - Speaker slot TBD

BOARD ACTION REQUESTED: Information only.

PRIVATE MARKETS BENCHMARK WEIGHTS

INVESTMENT TEAM

APRIL 21, 2023

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CURRENT WEIGHT METHOD

- **Static weights**
  - Benchmark weights reflect full weight of asset allocation targets
- Majority of performance attribution allocation effects are non-discretionary
  - Capital calls are not at the discretion of RIO staff
  - A large portion of private market weight differences are due to non-discretionary fluctuation in public markets (can't rebalance private markets)
- Active return performance becomes distorted and non-discretionary
- Significant portion of performance attribution is perpetually attributed to these non-discretionary differences in weights
- Non-discretionary active weights create incentives to uneconomically buy or liquidate in the secondary markets
- Current benchmark system makes plan level incentive system very difficult to implement

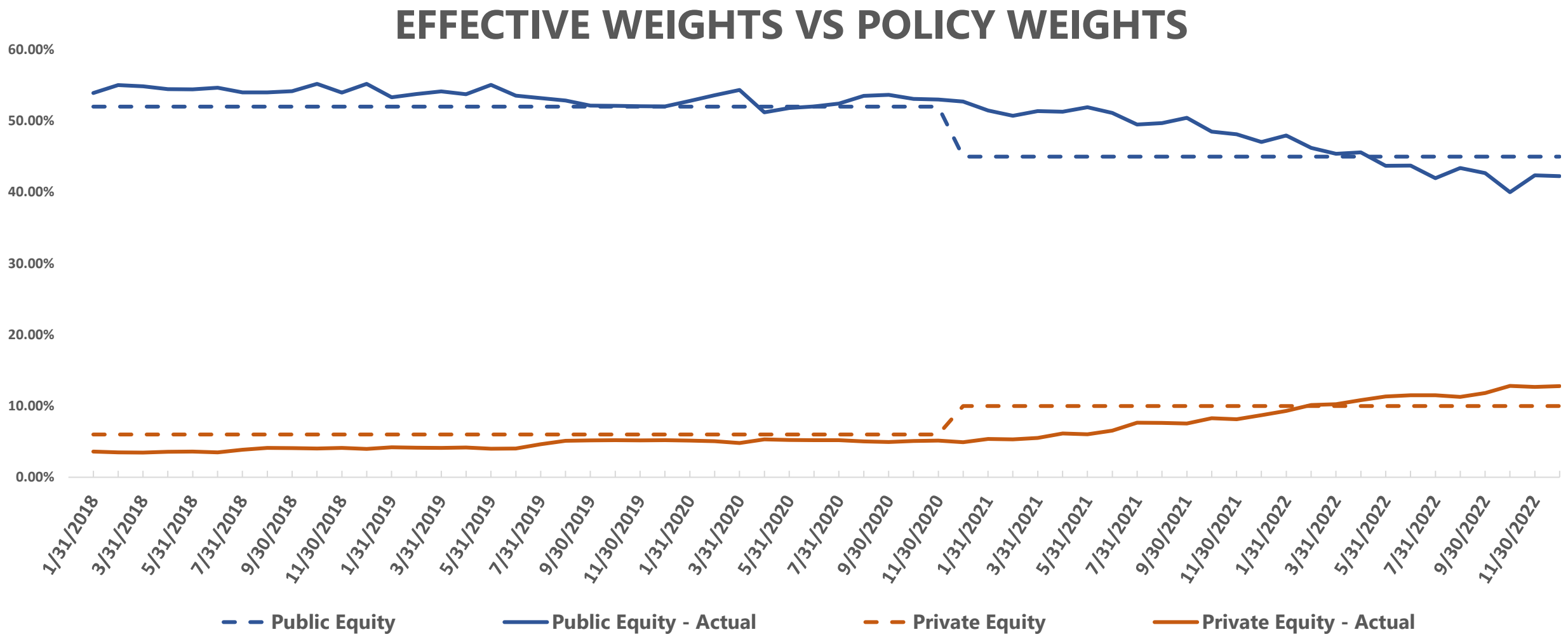
ASSET CLASS	PORTFOLIO WEIGHT	BENCHMARK WEIGHT	DIFFERENCE
PUBLIC EQUITIES	42%	45%	-3%
PRIVATE EQUITY	13%	10%	3%
FIXED INCOME	25%	26%	-1%
REAL ASSETS	19%	18%	1%
CASH	1%	1%	0%
TOTAL PORTFOLIO	100%	100%	

ACTIVE RETURN IMPACT[1]

STATIC BENCHMARK	~0.40%
REBALANCE OPPORTUNITY	~0.20%
	~0.60%

1. TFFR 1 yr active return impact; has averaged 0.46% per year for five years

EFFECTIVE WEIGHTS VS POLICY WEIGHTS

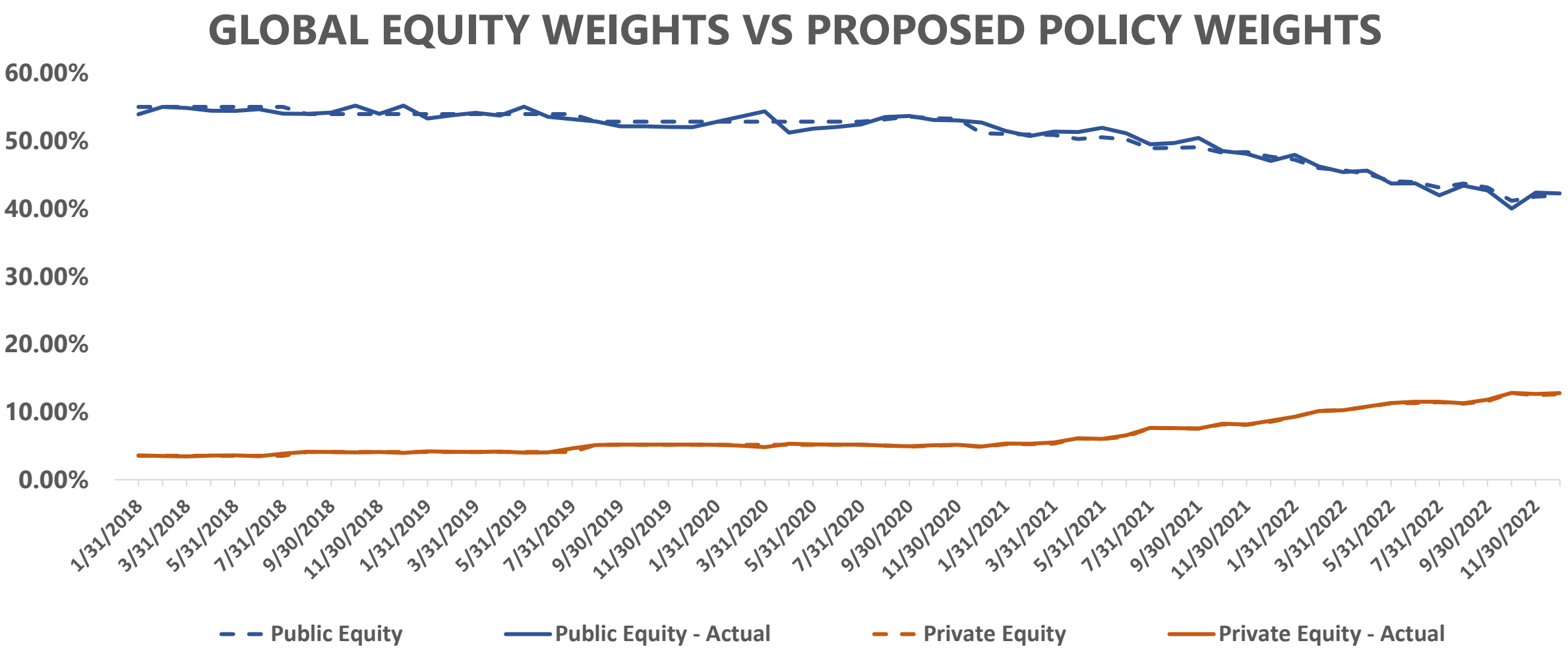


PROPOSED WEIGHT METHOD

- **Dynamic weights**
  - Benchmark weights adjust to reflect actual weights of private markets
  - Rebalance private equity to public equity and real assets 50% to fixed income and 50% to public equity
- Performance attribution allocation effects will be discretionary
  - Rebalancing decisions will drive asset allocation effects
- Incentives are aligned
- Method used by several public funds including State of Wisconsin, Mosers, and Washington State Investment Board
- Important for a growing changing program

ASSET CLASS	PORTFOLIO WEIGHT	CURRENT BENCHMARK WEIGHT	NEW BENCHMARK WEIGHT	DIFFERENCE
PUBLIC EQUITIES	42%	45%	42%	0%
PRIVATE EQUITY	13%	10%	13%	0%
FIXED INCOME	25%	26%	25%	0%
REAL ASSETS	19%	18%	19%	0%
CASH	1%	1%	1%	0%
TOTAL PORTFOLIO	100%	100%	100%	

GLOBAL EQUITY PORTFOLIO VERSUS POLICY WEIGHTS



RECOMMENDATION

- Change to portfolio weight equal to a benchmark weight where private equity rebalances thru public equity and real asset rebalance thru half fixed income and half equity. Client funds would continue to define asset target weights and rebalance corridors in policy
- Restate the 2022 fiscal year based on this performance method, also keep a performance measurement using the old system for comparison
- When a benchmark consultant is hired, also choose an appropriate benchmark for the private markets rather than benchmark it against its own performance

MOTION:

Change benchmark target weight methodology to one where benchmark target weights are adjusted monthly to reflect the actual exposure to private markets with offsetting adjustments made to public equities and public fixed Income.

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Teachers' Fund For Retirement

RETIREMENT & INVESTMENT

TFFR Board Meeting April 27, 2023

Chad R. Roberts, MAc

FY2021 PUBLIC FUND SURVEY

- **Survey conducted by the National Association of State Retirement Administrators**
  - Survey is comprised of FY2021 data collected from participants in FY2022
  - Survey was participated in by 128 public pension systems, up from 119 participants in FY2020 survey
  - Participants in the survey represent 88% of all state and local government DB plans
  - Survey results do not include FY2022 data, All data related to NDTFFR is FY21 data for direct comparison pruposes

ECONOMIC FACTORS AFFECTING PLANS

The significant declines and ongoing volatility in the markets which began in the February of 2020 continues to impact funds in unpredictable ways beyond the end of 2021, the terminus of this survey.

The S&P 500 dropped by 1/3 between February and March 2020, then surging up 65%+ by the end of 2020. This surge led to the median pension fund investment return being 25.8% by the end of FY2021.

Both U.S. and Global equity markets saw sharp declines beginning January 2022. As of October 2022, the S&P 500 is down 20%+ YTD. Fixed income indices are down 10%+ as well.

The median public pension fund return was -9.6% for the end of FY2022 according to Callan

ACTUARIAL FUNDING LEVELS

- Funding ratio is the most recognized measure of plan's financial health
- Determined by dividing actuarial value of assets by liabilities
- Both fully funded and underfunded plans rely on future contributions and investment returns
- Most public pension benefits are prefunded
- Pay-as-you-go is opposite of prefunded

ACTUARIAL FUNDING LEVELS

Investment returns have a substantial effect on a pension plan's funding level.

Other factors which affect a plan's funding level include:

- adequacy of employer and employee contributions
- demographic composition
- benefit levels
- actuarial methods and assumptions

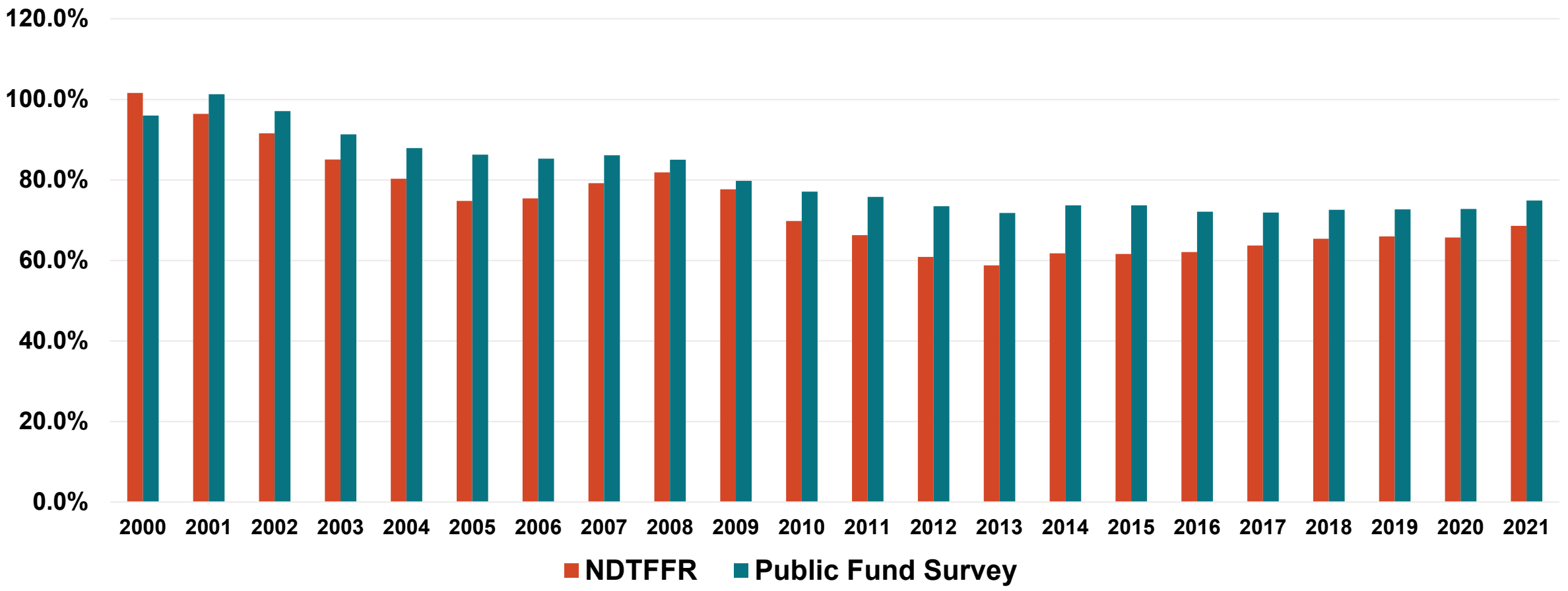
ACTUARIAL FUNDING LEVELS

According to the 2022 Public Fund Survey, public pension funding levels increased from 74.9% in FY21 to 72.2% in FY20

NDTFFR funding levels decreased slightly from 68.6% in FY21 to 65.7% in FY20

NDTFFR ranking, in terms of highest funding level, is 88 of 128 plans for FY2021

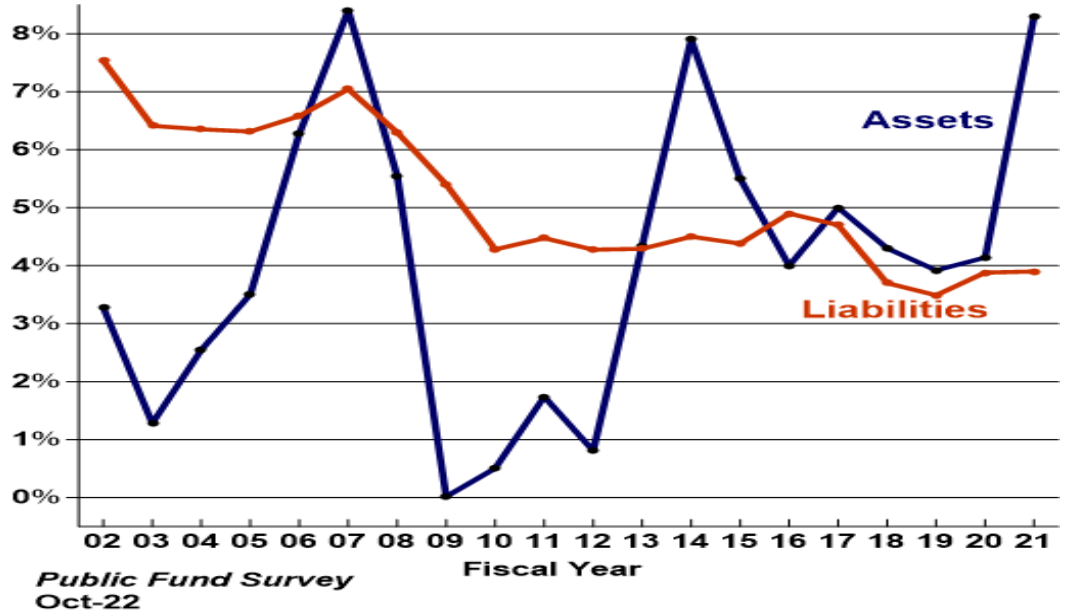
CHANGE IN ACTUARIAL FUNDING LEVELS

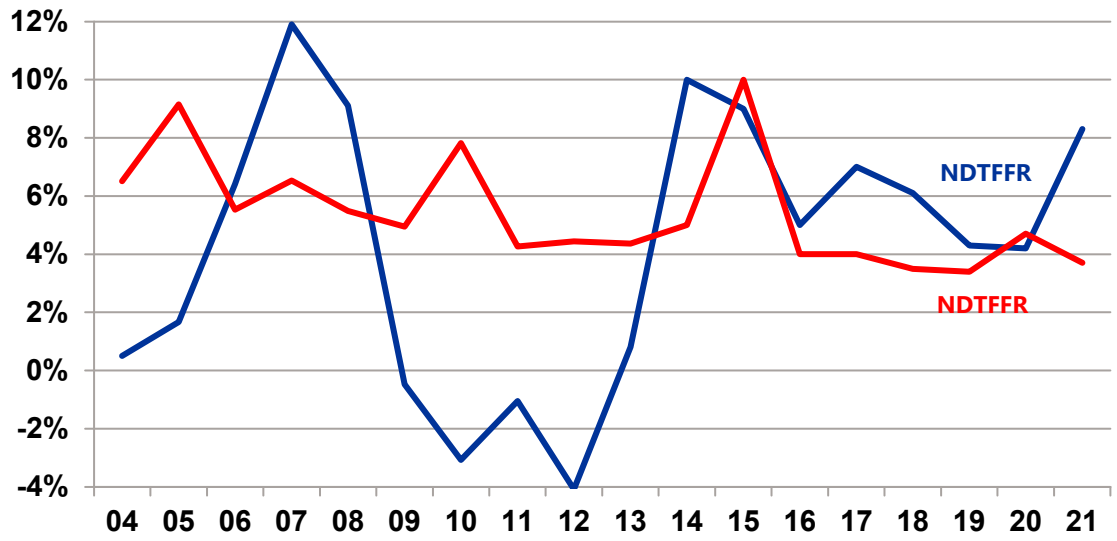


ACTUARIAL ASSETS & LIABILITIES

- For a pension plan's funding to improve, its AVA must grow faster than its AVL.
- For most plans in the PFS, **liability growth** remains lower than historical rates, at a median rate of 3.7% in 2021
- In the PFS, the **aggregate actuarial value of assets** grew by 7.1% in FY21
- **NDTFFR** liability growth has generally declined over the past decade, but changes in actuarial assumptions following experience studies in 2010, 2015, and 2020 increased liabilities as expected. Liability growth was 3.7% in FY21
- Volatility in aggregate changes in **asset values** is muted compared to actual changes in market values of assets because plans phase in investment gains and losses over several years which smooths out market volatility
- **NDTFFR** asset growth followed similar trends as the PFS

CHANGE IN ACTUARIAL ASSETS & LIABILITIES





MEMBERSHIP CHANGES

PFS shows the median rate of increase in **annuitants** decreased in FY21, this continues a downward trend of the increase of annuitants for the 3rd straight year

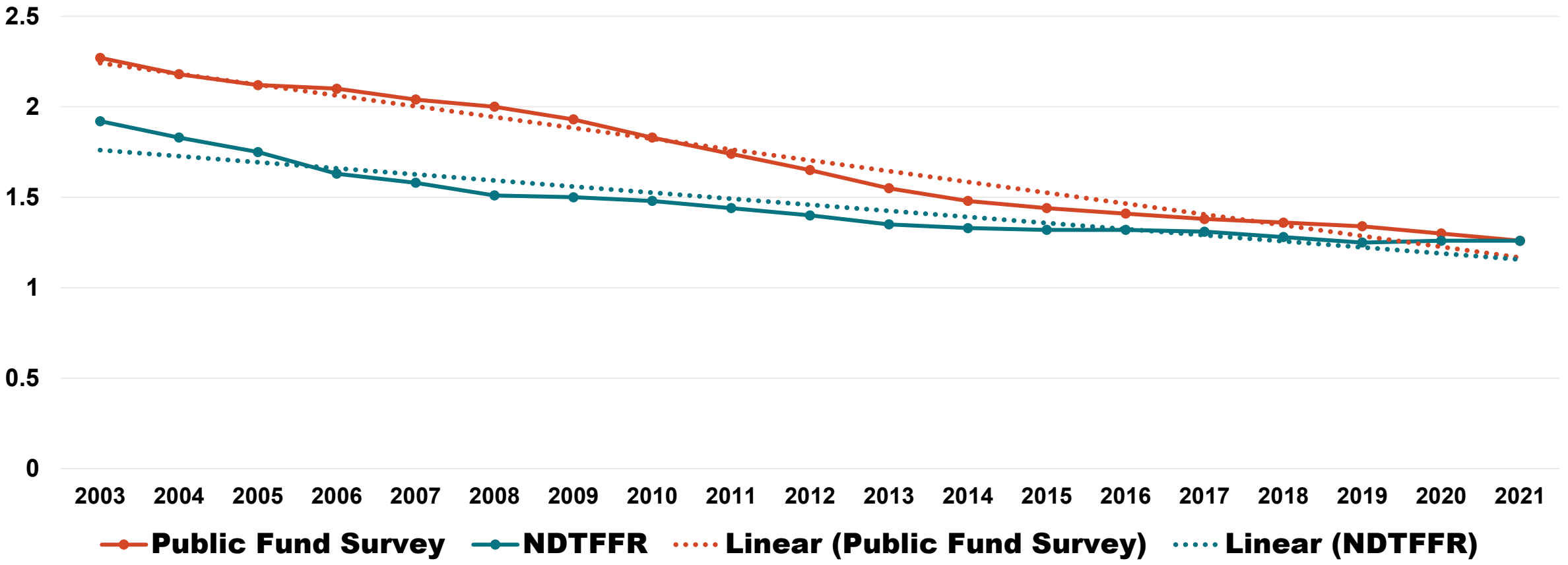
The number of **active members**, according to the PFS, declined in FY2021, following 6 years of moderate growth.

The ratio of active members to annuitants is continuing to decline. This ratio dropped from 1.30 in FY20 to 1.26 in FY21

For **NDTFFR** the ratio remains unchanged at 1.26 in both FY20 and FY21

Although a declining active-annuitant ratio does not, by itself, pose an actuarial or financial problem, when combined with a poorly funded plan with a high UAAL, a low or declining ratio of actives to annuitants can result in higher required pension costs (like NDTFFR)

RATIO OF ACTIVE MEMBERS TO ANNUITANTS



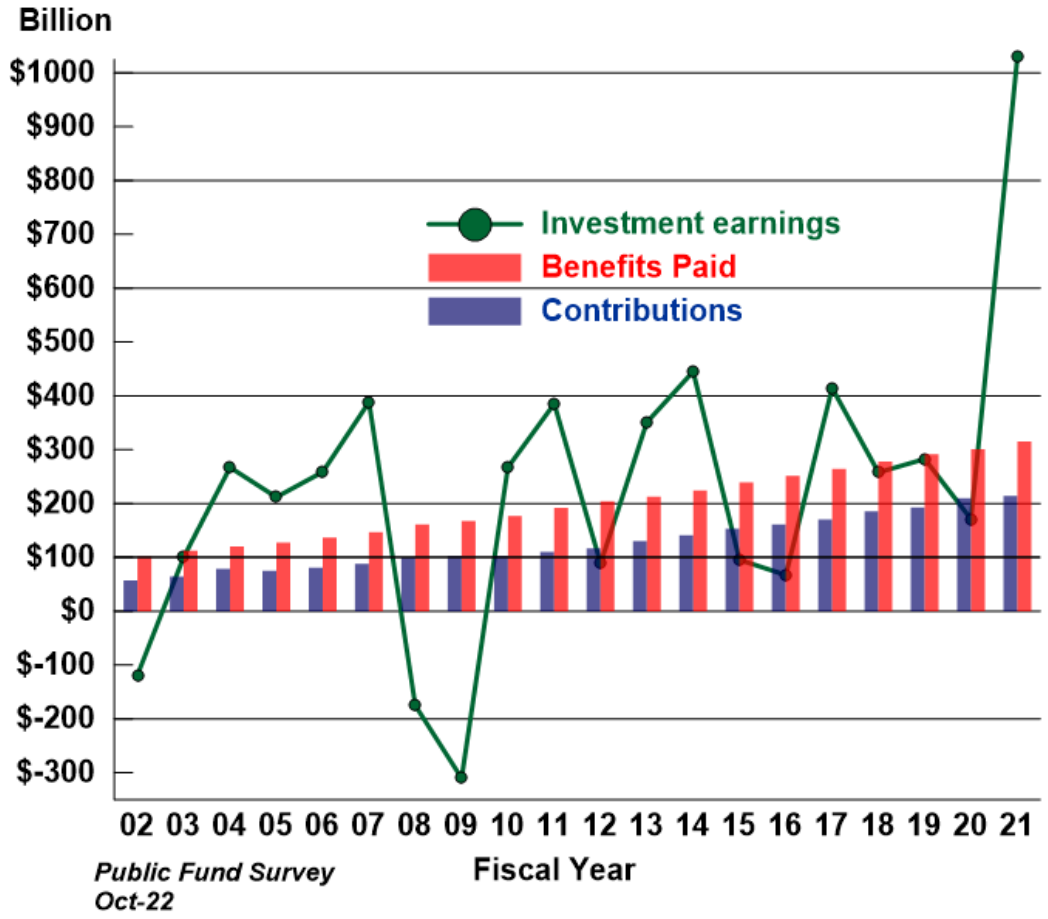
REVENUES, EXPENDITURES, & INVESTMENTS

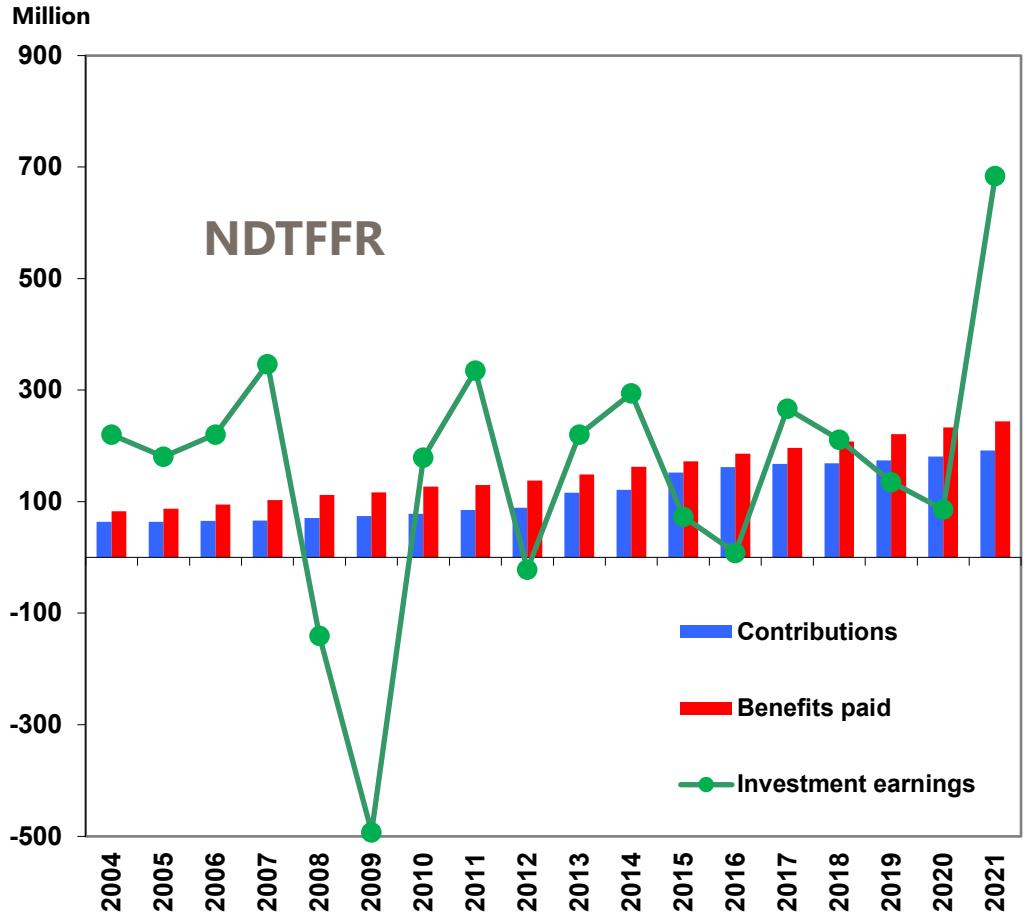
Most Plans pay out more each year than they receive in contributions

Benefits are paid from the pension's trust fund; pension payments are not paid from SLG operating budgets or general funds

Growth levels of contributions and Benefits are mostly stable and predictable; whereas investment earnings can fluctuate between extremes

REVENUES AND DISTRIBUTIONS





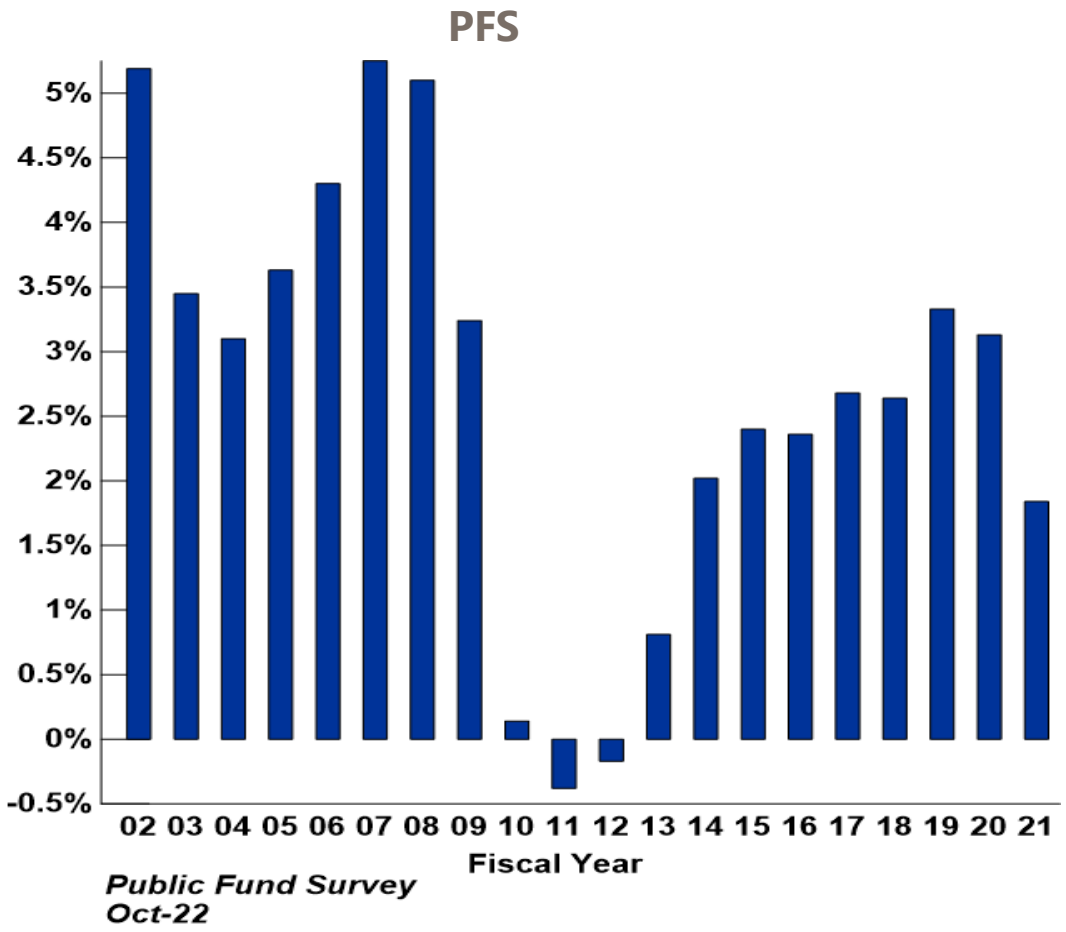
ANNUAL CHANGE IN PAYROLL

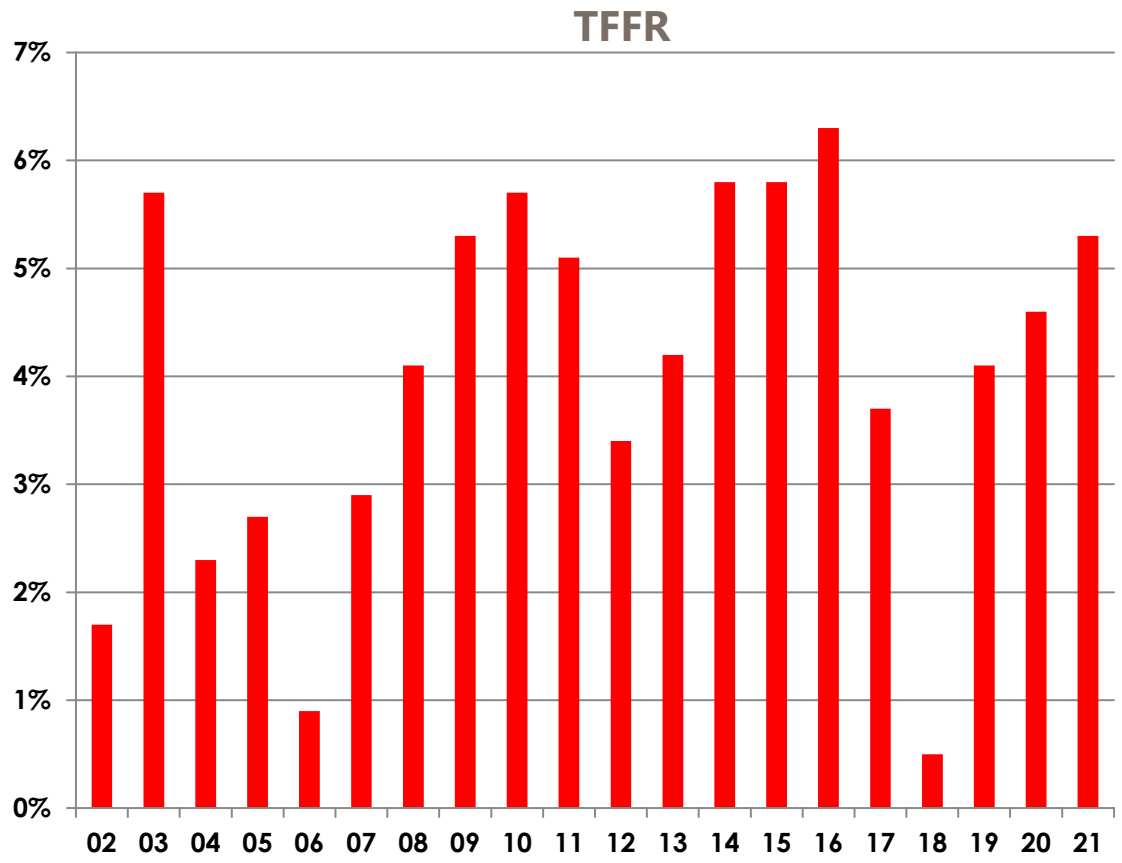
Median change in active member payroll was either negative or in decline from FY08 to FY12, and has increased slowly but steadily through FY2021

The median increase in payroll declined in FY21 and declined to less than 2%, well below the average of just above 3% for the previous several years

NDTFFR active payroll growth has not followed the experience of PFS and has generally been higher with the exception of FY18. NDTFFR payroll growth was 4.6% in FY20, and 5.3% in FY21

ANNUAL CHANGE IN PAYROLL





EXTERNAL CASH FLOW

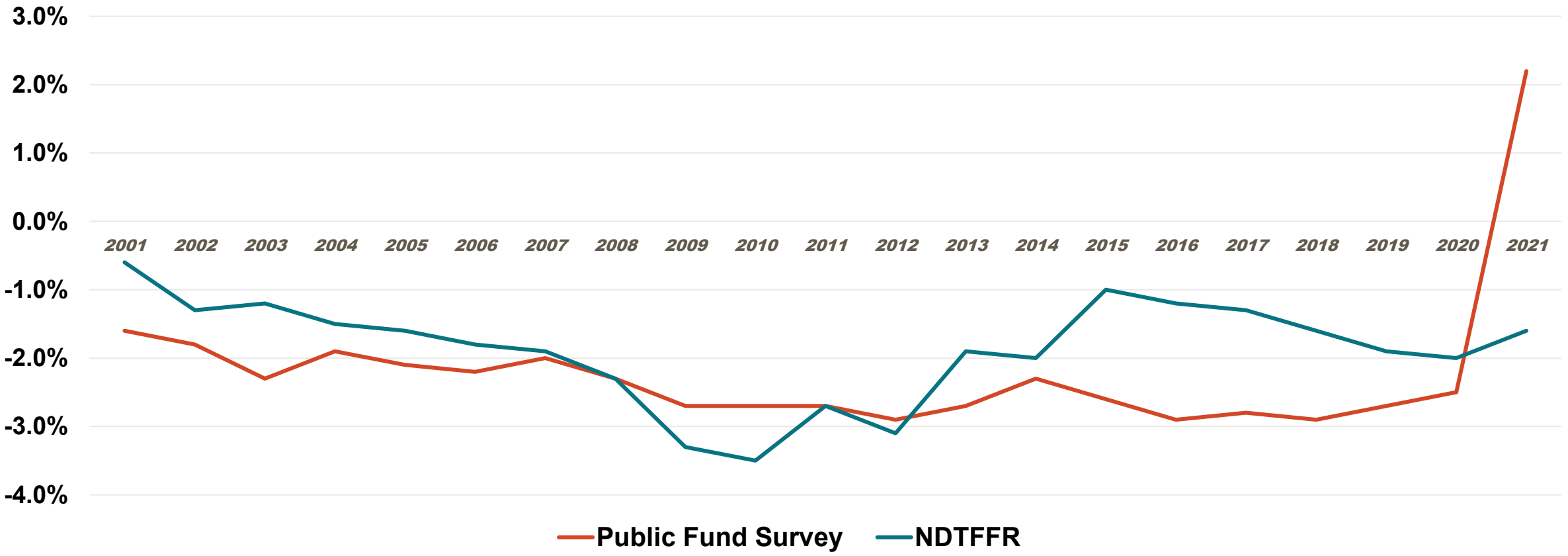
External cash flow is the difference between a system's revenue from contributions and payouts for benefits and administrative expenses, divided into the value of the system's assets. It excludes investment gains and losses

Nearly all systems in PFS have external cash flow that is negative, meaning they pay out more each year than they collect in contributions.

PFS median external cash flow increased from -2.5% in FY20 to -2.2% in FY21

NDTFFR external cash flow was -2.0% in FY20, increasing to -1.6% in FY21

EXTERNAL CASH FLOW



CONTRIBUTION RATES

Contribution rates differ on basis of Social Security participation

- **About 25% of employees of SLGs do not participate in Social Security**
- **About 40% of all public school teachers do not participate in Social Security**

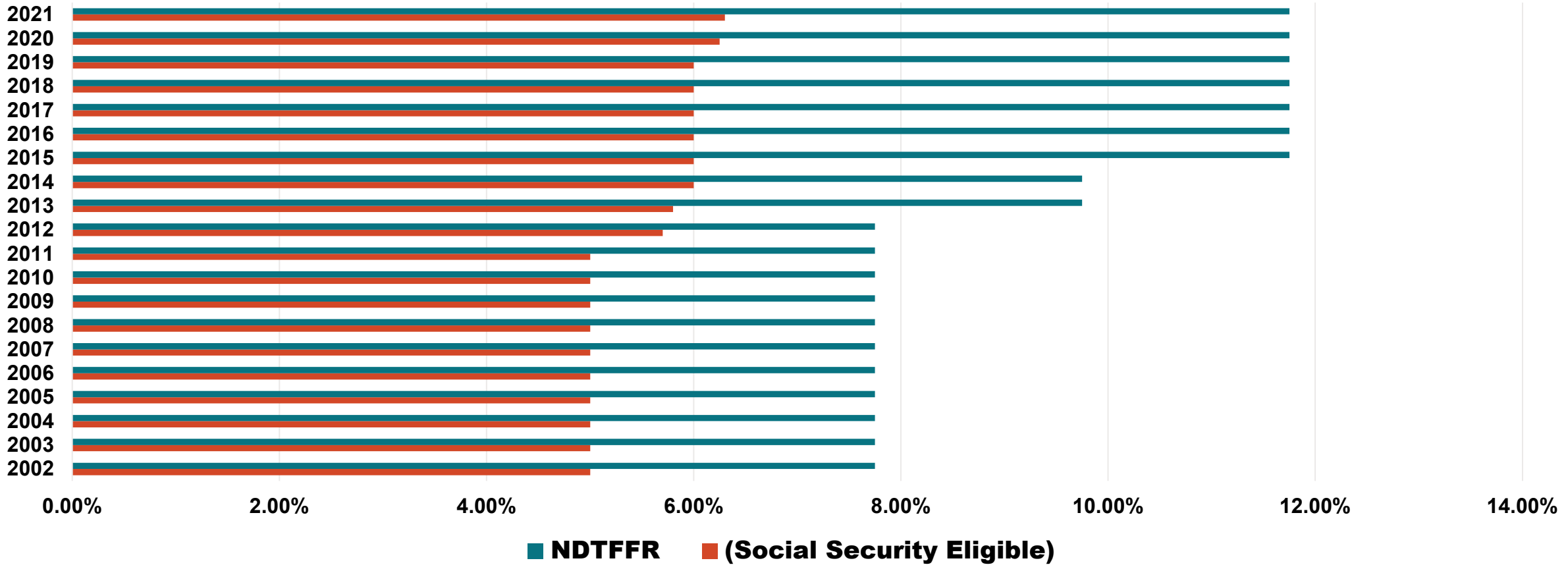
Median **employee** contribution rate increased to 6.30% in FY2021 from 6.25% in FY2020 for Social Security eligible workers. This increase follows several years at 6.0%

- **NDTFFR employee rate is 11.75% (effective 7/1/14). Rate will be in effect until plan is 100% funded, then reduced to 7.75%**

Median **employer** contribution rate decreased to 14.9% in FY2021, down from 15.0% in FY2020, for Social Security eligible workers

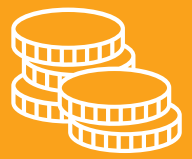
- **NDTFFR employer rate is 12.75% (effective 7/1/14). Rate will be in effect until plan is 100% funded, then reduced to 7.75%**

EMPLOYEE CONTRIBUTION RATES



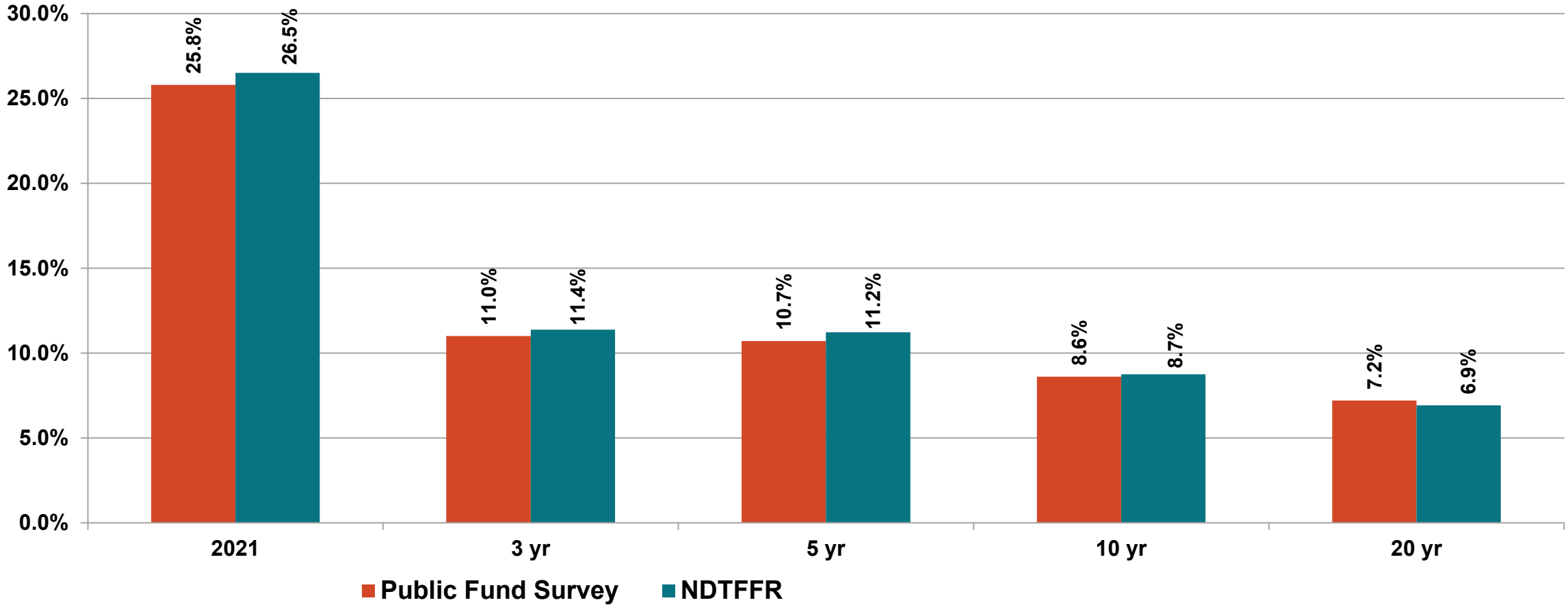
INVESTMENT RETURNS

Median investment return for plans with FY end date of 6/30/21 (about ¾ of PFS participants), was 25.8%



NDTFFR return was 26.5% for FY21

ANNUAL INVESTMENT RETURNS (net)



ACTUARIAL ASSUMPTIONS

Actuarial valuations contain many assumptions:

Demographic

- Retirement rate
- Mortality rate
- Turnover rate
- Disability rate

Economic

- Investment return rate
- Inflation rate
- Salary increase rate

INVESTMENT RETURN ASSUMPTION

Of all assumptions, a public pension plan's investment return assumption has the greatest effect on the long-term cost of the plan

- Because most revenues of a typical public pension fund come from investment earnings, even a small change in a plan's investment return assumption can impose a disproportionate impact on a plan's funding level and cost

Investment assumption is made up of 2 components

- Inflation assumption
- Real return assumption which is investment return net of inflation

INVESTMENT RETURN ASSUMPTION

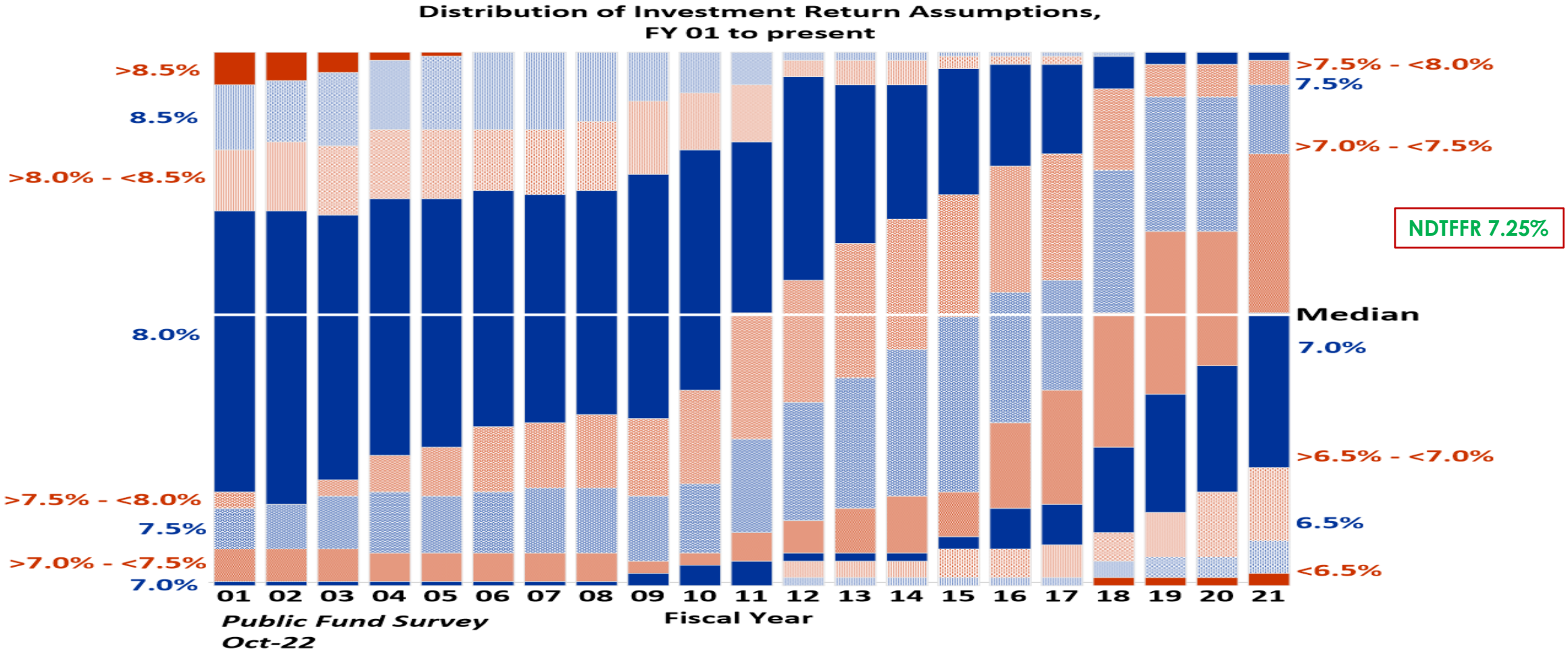
Until FY11, the most common investment return assumption used by public pension plans was **8.0%**

Since that time, nearly every plan in the survey has reduced their investment return assumption

Median investment return assumption is **7.00%**

NDTFFR investment return assumption was **7.25%**

INVESTMENT RETURN ASSUMPTION



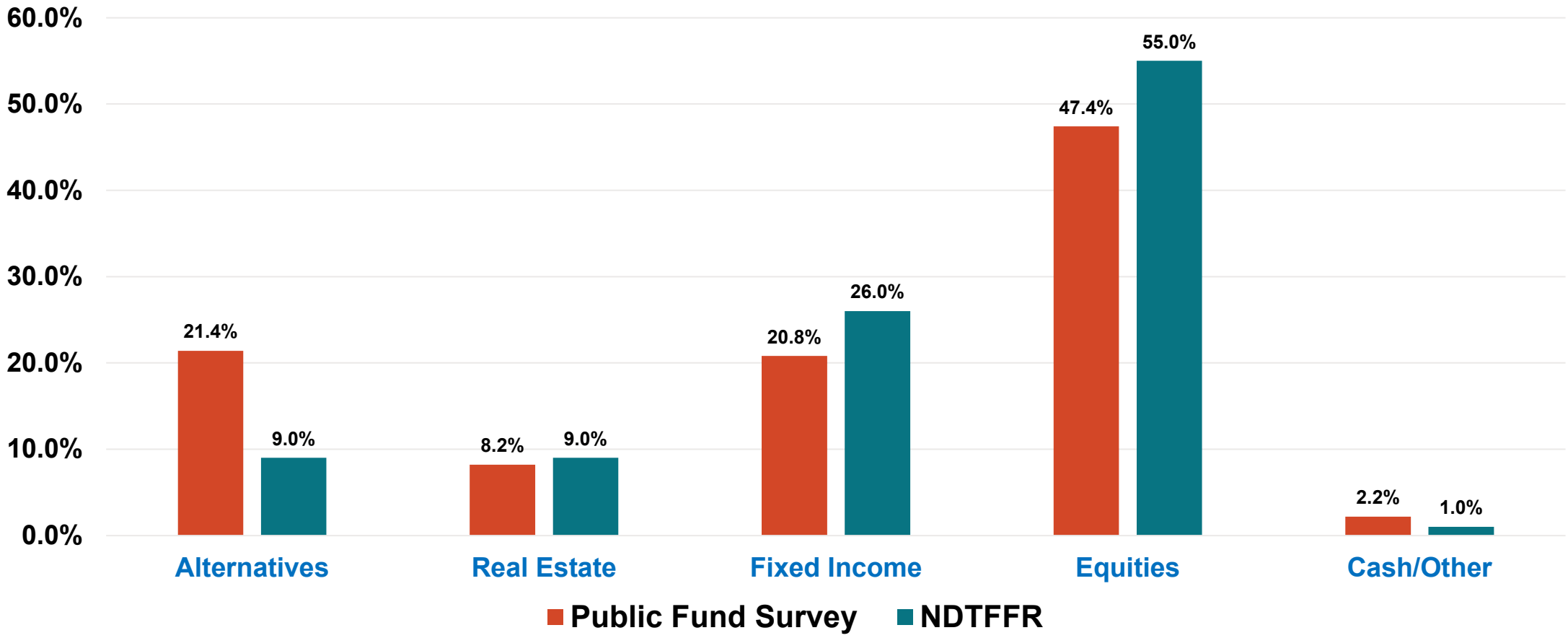
ASSET ALLOCATION

There were minor changes to PFS plan's asset allocations

- Public Equities increased to 47.0% in FY21 from 45.6% in FY20
- Fixed Income declined to 21.2% in FY21 from 23% in FY20
- Real Estate holdings declined to 6.8% from a median which was historically just above 7%
- Alternatives (composed of primarily private equity and hedge funds) continues to grow steadily and is increased to 22.6%, the highest percentage ever
- Cash/Other median for FY21 was 2.5%, increasing from 2.0% in FY20

Compared to the 2021 PFS, **NDTFFR** has less in Cash and Alternatives, and more in Fixed Income, Real Estate and Equities

ASSET ALLOCATION FY2021



QUESTIONS

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MEMORANDUM

TO: **TFFR Board**
FROM: **Jan Murtha, Executive Director**
DATE: **April 20, 2023**
RE: **Executive Limitations/Staff Relations**

Ms. Murtha will provide a verbal update at the meeting on staff relations and strategic planning. Including updates on the following topics:

1. **Retirements/Resignations/FTE's/Temporary Assistance**:

Employee Title	Status
Investment Accountant	Offer accepted. Anticipated start date May 2023.
Legal Intern - Summer	Offer accepted. Anticipated start date May 2023.
Accounting Intern – 23/24 school year	Interviews Scheduled.

2. **Current Project Activities/Initiatives:**

- **TFFR Pioneer Project** – The TFFR Pioneer Project continues with implementation consistent with the project plan. Currently the project is in an elaboration phase involving review of system components. The amount of time spent on the project by various staff members currently varies from 5 to 25 hours or more per week.
- **TFFR Actuary RFP** – An RFP for actuarial consulting services for the TFFR program has been issued. Finalists will present to the TFFR Board in April.
- **Legacy Fund Asset Allocation Study –** RVK continues its work on the Legacy Fund Asset Allocation Study. It is anticipated that RVK will present to the Advisory Board in Q2 2023 to review recommendations for updates to the Legacy Fund asset allocation and discuss a pacing schedule. Legislation relating to the asset allocation of the Legacy Fund is being monitored by staff. RVK has offered neutral testimony for SB 2330 and has provided an impact analysis relating to subsequent amendments of the bill. They provided additional assistance to staff at the request of the legislature relating to an impact analysis relating to HCR 3033.
- **Northern Trust Initiative** – In an effort to enhance the infrastructure for the investment program the Investment and Fiscal teams are leading an initiative to coordinate with Northern Trust for additional functionality/capabilities.
- **Audit Consultant Report:** Weaver Consulting will present its final report and recommendations to the SIB Audit Committee in May. The report includes identification of Internal Audit's current business state, desired future business state, and intermediate steps to achieve the desired future state. RIO staff recognized that development of additional internal audit business practices to support program evolution consistent with the agencies strategic plan is needed.

3. **Board & Committee Presentations March 24, 2023 through April 28, 2023**

   Staff provided or is scheduled to provide the following presentations to Boards and Committees during the above referenced time period:

   - **Information or testimony for continued committee work as discussed in the Legislative Update agenda item.**
   - **SIB Securities Litigation Committee – 4/10//23**
   - **SIB Executive Review and Compensation Committee – 4/19/23**
   - **SIB Investment Committee – 4/21/23**
   - **SIB GPR Committee – 4/26/23**
   - **TFFR Board – 4/27/23**
   - **SIB meeting – 4/28/23**

BOARD ACTION REQUESTED: Board Acceptance.

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MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad R. Roberts, DED/CRO**
DATE: **April 17, 2023**
RE: **April 2023 TFFR Board Reading Materials**

Summary

Attached to this memo are three cited materials related to teacher retirement and pensions. The first report cited is from December 2022 and addresses retirement readiness of public sector employees. The second work cited is a March 2023 peer-reviewed article providing an overview of the general state of teacher pensions. The last citation is a November 2021 survey conducted by St. Louis University and RAND regarding teacher readiness and knowledge of retirement.

Journals, Reports, and Articles

1. The Real Deal for The Public Sector: Retirement Income Adequacy Among U.S. Public Sector Employees
2. Teacher Pensions: An Overview
3. Teachers' Knowledge and Preparedness for Retirement: Results from a Nationally Representative Teacher Survey

Bibliography

Dillon Fuchsman, J. B. (2021). *Teacher's Knowledge and Preparedness for Retirement: Results from a Nationally Representative Teacher Survey.* St Louis: SLU Research Sinquefield Center for Applied Economic Research.

Eric Atwater, T. B. (2022). *The Real Deal for The Public Sector: Retirement Income adequacy Among U.S. Public Sector Employees.* Washington, D.C.: National Institute on Retirement Security.

Kata Mihaly, M. P. (2023). Teacher Pensions: An Overview. *Educational Researcher*, 57-62.

THE REAL DEAL FOR THE PUBLIC SECTOR

RETIREMENT INCOME ADEQUACY AMONG U.S. PUBLIC SECTOR EMPLOYEES

AON

NATIONAL INSTITUTE ON
Retirement Security

Reliable Research. Sensible Solutions.

By Eric Atwater, Tyler Bond, Dan Doonan, and Emily Swickard

December 2022

ABOUT THE AUTHORS

Eric Atwater, FSA, EA is the practice leader for Aon's Public Sector Retirement Practice and also serves as lead consulting actuary and relationship manager to public entities. He has nearly twenty-five years of consulting experience in pension and employee benefits in both the public and private sector. Eric graduated with honors from Georgia State University, where he received a BBA with a concentration in Actuarial Science. He is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, a Member of the American Academy of Actuaries, and an Enrolled Actuary. He has served on the Board of Directors for the International Association of Black Actuaries and is also in the process of completing the requirements for the CFA.

Tyler Bond is the research manager for the National Institute on Retirement Security. He works with the executive director to plan all NIRS research products. Since joining NIRS, Bond has authored and co-authored numerous research reports, issue briefs, and fact sheets on a wide range of topics relating to retirement security. He regularly speaks at conferences about NIRS research and testifies before policymakers. Previously, Bond spent four years at the National Public Pension Coalition, where he directed the research program and authored six original research reports. He also has held positions on Capitol Hill and at the Center on Budget and Policy Priorities. Bond holds a B.A. in political science and philosophy from Indiana University and an M.A. in public policy from The George Washington University. He is a member of the National Academy of Social Insurance.

Dan Doonan is the executive director of the National Institute on Retirement Security. With the Board of Directors, Doonan leads the organization's strategic planning, retirement research and education initiatives. Doonan has more than 20 years of experience working on retirement issues from different vantage points including an analyst, consultant, trainer, and a plan trustee. He comes to NIRS after serving as a senior pension specialist with the National Education Association. Doonan began his career at the Department of Labor as a mathematical statistician. He then spent seven years performing actuarial analysis with Buck Consultants in the retirement practice. His experience also includes positions as a research director and labor economist. Doonan holds a B.S. in Mathematics from Elizabethtown College and is a member of the National Academy of Social Insurance.

Emily Swickard, FSA, EA is an actuarial consultant in Aon's Wealth Solutions practice. In her role, she assists both private and public sector clients with a variety of projects related to pension liability management and retirement strategy. Emily is an expert in actuarial valuations and technical accounting standards for pension and retiree welfare plans. Her expertise also includes employee retirement readiness and plan design in her role as a member of Aon's The Real Deal (retirement income adequacy study) team. Emily graduated summa cum laude from the University of Nebraska with a BSBA in actuarial science. She is a Fellow of the Society of Actuaries and an Enrolled Actuary.

ACKNOWLEDGEMENTS

The authors are grateful for the comments, advice, and assistance provided by the following teams at AON: Real Deal team- Karthik Balaji & Grace Lattyak; Public Sector team- Al-Karim Alidina, Michaela Perez, Erin Sabo, Andy Witte; Leadership team- Jennifer Brasher, Melissa Elbert, Rick Jones, Eric Keener, Rob Reiskytl; as well as Kelly Kenneally and Celia Ringland at NIRS. All errors and omissions are solely those of the authors.

I. INTRODUCTION

Saving and preparing for retirement is one of the biggest financial challenges most American workers will undertake during their careers. Retirement benefits rank right at the top alongside salary and health insurance as priorities for working people.[1] Defined benefit (DB) pension plans remain prevalent in the public sector. Eighty-six percent of state and local government employees have access to a pension plan, as do federal employees. The prevalence of DB plans in the public sector has led to a perception that most public employees are set for retirement. But in reality, even those workers with strong pension benefits may fall short of achieving retirement income adequacy according to their individual retirement needs. This is particularly true for workers in less generous tiers of benefits.

The Real Deal for the Public Sector explores different metrics for evaluating retirement income adequacy for public sector employees. The analytical model for this research is based upon previous work done by Aon in analyzing retirement adequacy for the private sector through their series of *The Real Deal* reports.[2] This research takes that model and adapts it to the unique features and characteristics of a typical public sector pension plan. It also considers differences in public sector retirement plan provisions, such as whether a worker is in a DB or defined contribution (DC) plan, and whether or not they participate in Social Security.

The results not only suggest actions that individual savers might take to improve their retirement income adequacy, but also what elements legislators and other policymakers could consider when evaluating the design of retirement plans for public workers. Most of the public sector retirement reform in recent years appears to have focused on cost and not factored in retirement income adequacy, nor the impact of employees not being able to retire in an orderly fashion.

This paper seeks to answer the following questions:

- How much do employees need for an adequate retirement?
- How adequate of a retirement does the average public sector plan provide? What is the shortfall or surplus of the average plan?
- What is the impact on retirement readiness of having:
  - Retiree medical, often referred to as other post-employment benefits (OPEB) plans
  - Social Security
  - Cost-of-living-adjustment (COLA)
- Do "cost-neutral" DB and DC plans provide the same retirement income for participants?
- What is the impact on retirement shortfall or surplus of a high or low investment return environment?

Answering these questions should provide more clarity to public sector employees and plan sponsors about the adequacy of common retirement plans offered in the public sector.

II. DESIGNING THE ANALYSIS

Retirement Income Adequacy Defined

This report defines retirement income adequacy simply: retirement income is adequate when retirement resources meet or exceed retirement needs.

Retirement resources include DB or DC plan income, Social Security, and retiree medical plan benefits. Retirement needs are the assets required to maintain a preretirement standard of living during retirement years. The definition of retirement needs keeps in mind three facts. First, saving for retirement is no longer necessary during retirement. Second, taxes generally decrease for retired workers. Third, costs can increase over time, including healthcare costs. All of the resources and needs for each worker in the analysis are summed up and then the total resources and total needs are compared to determine if there is an expected shortfall or surplus.

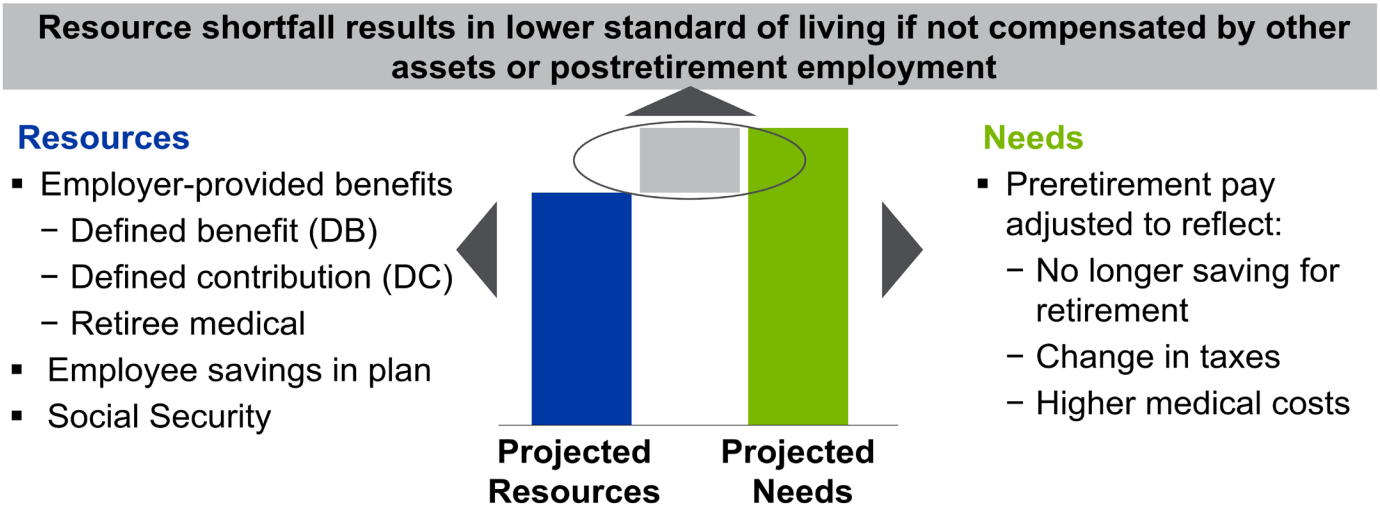
Retirement Needs

Simply put, retirement needs are the sum of money an employee must have at retirement to last through all their retirement years. Individuals need an income that will allow them to maintain their preretirement standard of living over a postretirement lifetime. This premise follows from an existing body of research on retirement readiness that focuses on maintaining a preretirement standard of living.[3] As noted above, this research considers changes in needs that are expected to occur at retirement. Also, it recognizes that some individuals personally may choose to reduce their standard of living during retirement, which requires fewer resources.

This research begins by determining the amount of income a person needs in the first year of retirement to maintain their standard of living. This is done by calculating the annual income that the employee expects to have right before retirement by projecting each employee's current pay to retirement age using an assumed pay growth rate. This amount is then adjusted to account for the following changes that occur at retirement.

Saving for retirement is no longer necessary once an individual begins retirement, so projected pay is reduced by the amount of the individual's contributions to their retirement plans.

Taxes payable after retirement generally decrease from preretirement levels, so each employee's projected pay is reduced for the anticipated difference. Taxes are reduced primarily because a portion of Social Security benefits is not subject to taxation and retirees are no longer paying Federal Insurance Contributions Act (FICA) taxes on wages. Gross



income also may be lower after retirement, and a lower tax bracket may be applicable.[4]

Healthcare expenses generally increase during retirement. As individuals retire and move from active employee healthcare to retiree healthcare, they can see dramatic increases in healthcare premiums and out-of-pocket costs, especially if they do not have access to an employer plan. Moreover, the rate of healthcare inflation is markedly higher than general price inflation. The typical active employee pays 25 to 30 percent of their healthcare costs, while the typical future retiree likely will pay a higher percentage of those costs, depending on the subsidy offered by their employer. The study projects the dollar cost of retiree medical insurance, focusing on the incremental increase in moving from active employee to retiree. This incremental cost has been added to the retirement income needs.

Healthcare costs, relative to pay, vary across generations because medical inflation is expected to be higher than both regular inflation and salary increases. As a result, retiree medical costs are likely a smaller percentage of income today than they are expected to be in the future. Medical inflation and capped or declining employer subsidies for retiree health benefits are eroding retirement resources.

Healthcare costs also vary somewhat by income level based on government subsidies. While Medicare premiums are lower at lower income levels and Affordable Care Act subsidies provide some assistance to low-income participants, these participants still have much higher medical needs as a percentage of their income than high-income participants.

After accounting for these changes that occur at retirement, the income needed to maintain the standard of living in the first year of retirement generally is less than the preretirement income.

The research then projects annual income needed in retirement. The costs of goods and services will continue to increase with inflation, but the retiree will no longer have annual salary increases that typically allow workers to keep up with rising costs. Some retirement resources such as Social Security, a DB plan that provides a COLA, and a subsidized retiree medical plan without a cap may mitigate the impact of inflation. Since healthcare costs are expected to rise above the rate of inflation, *The Real Deal* analysis factors in larger medical expenses in retirement.

The analysis then takes the annual income needed throughout retirement for an average life expectancy and calculates a single-sum amount that represents the amount of assets needed at retirement to maintain a preretirement standard of living throughout retirement. The model presents this single-sum value as a multiple of projected pay at retirement.

Retirement Resources

This study recognizes retirement resources from three sources in the baseline scenario—Social Security, a DB pension plan, and retiree medical. The potential of employer contributions and employee savings in a defined contribution plan are assessed in alternative scenarios. To determine whether an employee will have adequate retirement income, total needs are offset by the resources provided by these sources. Employee savings outside of employer plans are not included in the study since they are not straightforward to capture across a population and are often fairly small for a typical employee.

Like needs, resources in *The Real Deal* are expressed as a multiple of projected pay at retirement ("multiple of pay"). Some retirement resources, such as Social Security and certain DB plan benefits, are payable only as fixed monthly installments over the employee's lifetime. *The Real Deal* expresses these fixed installments as the single-sum amount at retirement that, when invested, would provide an equivalent stream of payments designed to last through the employee's expected age at death.

Replacement Ratios and Multiples of Pay

The model used for this paper expresses retirement needs and resources as a multiple of projected pay at retirement. Through this approach, *The Real Deal* can compare the retirement resources and needs of people retiring at different times in the future.

Traditionally, retirement adequacy has been expressed in terms of replacement ratios—the income needed in the first year of retirement as a percentage of income earned right before retirement. The replacement ratio approach typically focuses solely on income adequacy at the point of retirement and does not consider subsequent adequacy. In contrast, a multiple-of-pay approach provides a target that enables employees to maintain their preretirement standard of living throughout all their retirement years, rather than merely in the first year of retirement. This

measure also allows the study to reflect future inflation and medical trends, which cannot be easily captured in a year-of-retirement replacement ratio.

The Real Deal can analyze retirement income adequacy based on the surplus or shortfall of retirement resources versus retirement needs.

- **If retirement resources exceed retirement needs,** then the individual can anticipate a retirement income surplus through an average postretirement lifetime or can consider retiring at an earlier age.

- **If resources are not sufficient to cover needs,** then the individual can anticipate a shortfall, and may need to consider some combination of actions to have enough resources in retirement, including increasing retirement resources prior to retiring, reducing their standard of living in retirement, or retiring at a later age.

This analysis does not include all assets individuals may have set aside for retirement, and it does not reflect every possible retirement need. Even so, this study provides a reasonable way to evaluate how effectively current employer-sponsored benefits and Social Security might financially prepare public employees to have adequate retirement income throughout retirement.

General Employee Data and Assumptions

Retirement needs and resources are calculated individually for each representative person in the study. The analysis examines a wide, representative array of general employees at a large U.S. public plan sponsor. **Table 1** captures the average key inputs for the general employee data used in the analysis.

Table 1: Average General Employee Data

Average:	
Age	39
Service	13
Limited 2019 Pay	$50,000
Average Account Balance	$110,000

Below are the assumptions used in the development of the results that follow (**Table 2**).[5] The assumption descriptions denoted by an asterisk (*) are used for sensitivity analysis in some results, such as +/-1% on returns and 80th percentile mortality experience.

Table 2: Baseline Scenario Assumptions

	Baseline Assumption
Retirement age	62
Preretirement investment rate of return	6.00%
Postretirement investment rate of return	5.00%
General inflation	2.25% pre- and postretirement
Medical inflation	5.50%
Pay growth	3.75%
National wage base increase rate	2.75%
Postretirement mortality	50th percentile life expectancy (approximately age 90 for females and age 88 for males)
Defined Benefit plan discount rate (used to develop cost equivalent DC plan)	6.50%

Table 3: Baseline Plan Designs

	Baseline DB	Cost Equivalent DC	Baseline DB without Social Security
DB Design	2.00% of 5-yr FAE	None	2.50% of 5-yr FAE
DB Employee Contributions	6.00%	None	7.50%
COLA	**None**	**None**	**None**
Social Security	**Yes**	**Yes**	**No**
Retiree Medical	50% ER Subsidy	50% ER Subsidy	50% ER Subsidy
DC Employer Contributions	None	6.00%	None
DC Employee Contributions	None	6.00%	None
Unreduced Retirement Age	62	N/A	62

Baseline Plan Designs

Two baseline plan designs were constructed to model in the analysis: one DB plan and one cost-equivalent DC plan. The specific features of the baseline design are displayed in **Table 3**.

The baseline design represents a typical DB plan for a general employee. The DB plan features a 2 percent multiplier based on five year Final Average Earnings (FAE). Other categories of public employees, such as teachers, firefighters, and police officers, may have features of their DB plan that differ from this one and some of these features are considered in alternative plan designs. Three aspects of this baseline model should be noted. First, there is no COLA in the DB plan. Second, the covered employees participate in Social Security. Third, there is retiree medical coverage.

Alternative Plan Designs

Alternative plan designs also were modeled and will be discussed later in the paper. The purpose of these alternative designs was to capture the impact of growing trends in the public sector retirement space on participants' retirement income adequacy.

The first alternative scenario modeled was a DC plan designed to be considered a "cost-equivalent" replacement for the baseline DB plan using the 6.5 percent conversion assumption detailed in the Assumptions section. To determine the cost-equivalent benefit, a series of normal cost (the annual cost attributable to a year of service within a pension plan) calculations were completed for an average participant and then converted to a percent of payroll. The employer contribution level was selected assuming the employee would continue to contribute the same amount as under the baseline DB model. It should be noted that this calculation is highly sensitive to the underlying conversion assumption. An alternative design assuming a seven percent conversion assumption is analyzed later in the paper.

An additional alternative design modeled was one in which the plan participants do not participate in Social Security like many public safety employees. In this scenario, the multiplier for the DB plan was increased from 2.0 percent to 2.5 percent and the employee contribution increased from 6 percent to 7.5 percent.

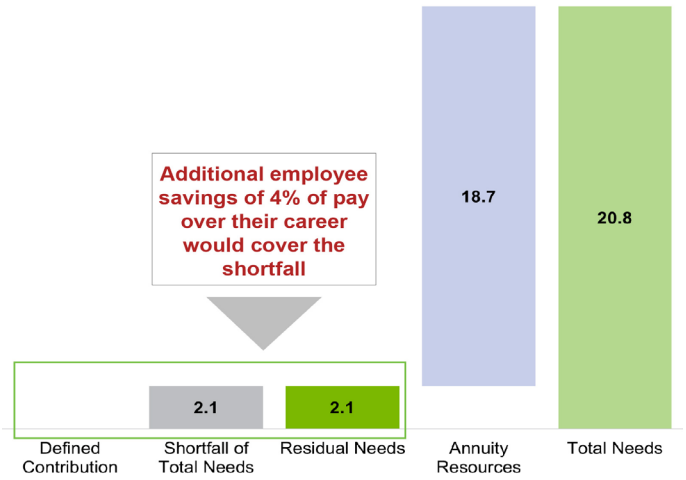
Finally, additional scenarios were analyzed regarding more ancillary benefits related to the baseline DB design. One scenario examines the impact if the covered employees did have a COLA, set at 1.5 percent, as part of the baseline DB plan design. Furthermore, the impact of not having a retiree medical plan was calculated.

III. FINDINGS

Retirement Readiness - Typical Public Sector Plan for General Employees

The model used in this analysis calculates target needs at retirement as 20.8 times final pay as the average for general employees at an age 62 retirement (**Figure 1**). Under the baseline scenario, the DB plan, along with Social Security and the retiree medical plan, would provide annuity resources of 18.7 times final pay, on average, at age 62. The annuity resources break down as follows: the DB plan covers 10.3 times final pay; Social Security covers 5.1 times final pay; and retiree medical covers 3.3 times final pay.

Figure 1: Baseline DB Plan Results



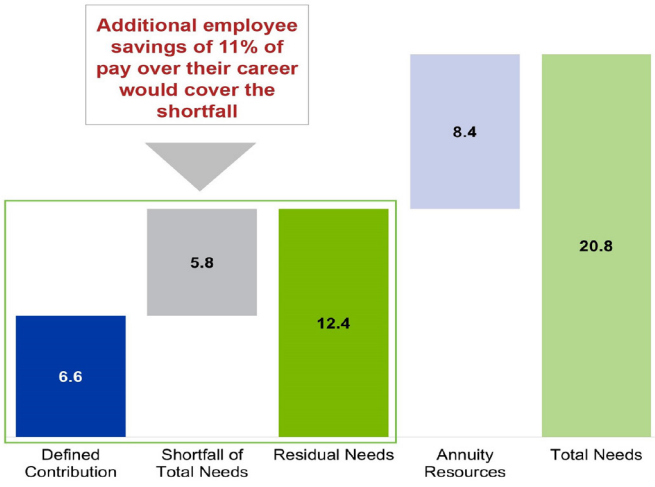
This results in a shortfall of needs of 2.1 times final pay that the average employee would need to cover through other resources. If the average employee saved an additional four percent of pay over their career, perhaps in a supplemental DC plan, that would be sufficient to cover the shortfall of total needs.

There are other ways to make up the shortfall. Changing the multiplier in the DB plan from 2 percent to 2.5 percent would cover the residual needs. Adding a 2 percent COLA to the baseline DB plan also would make up the difference. The plan sponsor could pursue both of these approaches by increasing the multiplier to 2.25 percent and adding a one percent COLA. Any of these adjustments would be enough for the covered employee to meet their total needs in retirement.

Retirement Readiness - Cost Equivalent DC Design for General Employees

A general employee working his or her full career participating in the cost-equivalent baseline DC plan design faces a much greater shortfall of needs in retirement when the employee and the employer are each assumed to be contributing six percent of pay. The baseline DC plan provides only 6.6 times final pay in resources (**Figure 2**). This amount, combined with the resources from Social Security and retiree medical, leaves a shortfall of needs of 5.8 times final pay. If the employee saved an additional 11 percent of pay over their career, in addition to the six percent already being contributed, that would be sufficient to cover the shortfall. Total contributions to the DC plan would need to total 23 percent - 17 percent from the employee and 6 percent from the employer- to provide sufficient retirement resources at age 62.

Figure 2: Cost-Equivalent DC Plan Results

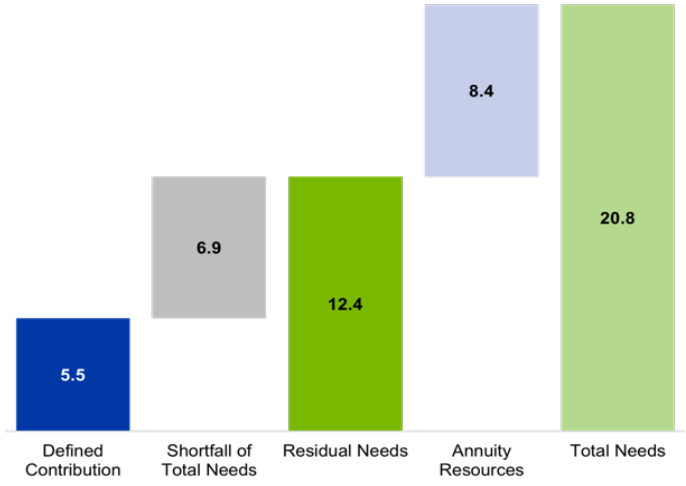


Raising the employer contribution to 13 percent of pay would make the adequacy of the DC plan comparable to the baseline DB plan, but as discussed above, this would still leave a small shortfall of needs that the employee would need to meet through additional savings, delayed

retirement, or a lower standard of living.

The cost equivalence between DB and DC plans often is discussed by plan sponsors when considering what type of plan to offer or whether to make changes to an existing plan. The DB plan in the baseline scenario uses a 6.5 percent discount rate and this discount rate was used to create the cost-equivalent baseline DC plan. If the DB plan discount rate was set at seven percent, the current median discount rate among public plans in the U.S., the employer contribution rate for the DC plan drops to four percent (rather than six percent) while remaining "cost-equivalent" to the DB plan. In this scenario, the shortfall of needs in the DC plan increases by 1.1 times final pay since less is being contributed to the DC plan (**Figure 3**). This cautions against focusing solely on employer cost without considering the impact on employee retirement preparedness when making plan design decisions.

Figure 3: Cost-Equivalent DC Plan with a 7% Discount Rate Results



There are two primary reasons the cost equivalent DC plan in these examples falls short of providing the retirement income that the DB plan provides. The first reason is that the study assumes that the employer can earn a 6.5 percent or 7.0 percent expected return and thus uses that as the discount rate or conversion rate. In contrast, the study assumes a participant can only earn a 6.0 percent expected return. Secondly, the accrual of benefits in a final average DB plan increases at the end of a participant's career, unlike the DC plan which accrues evenly across a career. Comparing the DB and DC plans mid-career would result in a more similar benefit being provided. Comparing the DB and DC plans early-career would result in the DC plan providing a higher benefit to the participant. These benefit comparisons become even more complex if we consider employees who move between jobs with different types of benefits throughout their career. However, in this analysis we are focused on income at retirement age, another factor which plan sponsors can consider when analyzing the impact of plan changes.

Gender

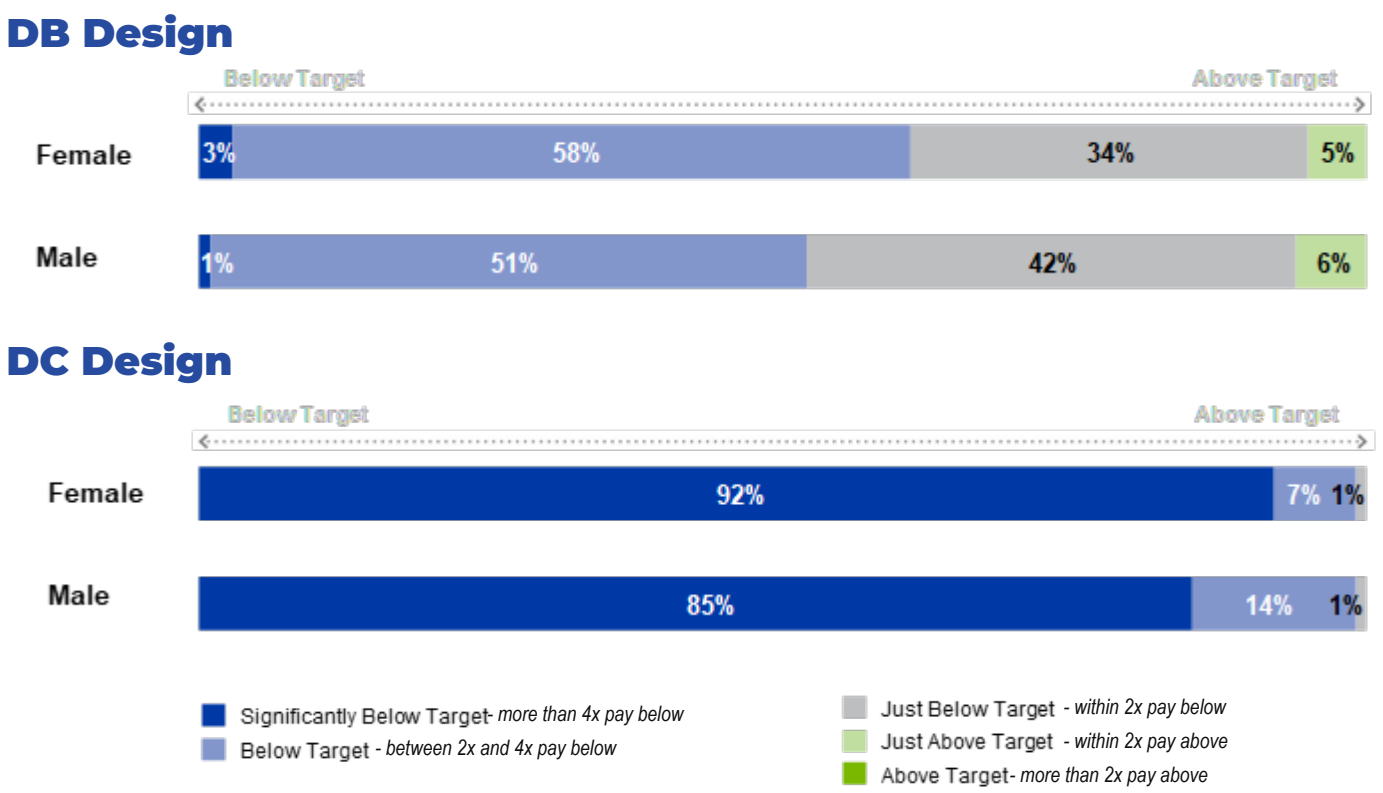
The Real Deal research describes five levels of retirement readiness based on surplus or shortfall as a multiple of pay: significantly below target (more than four times pay shortfall), below target (between two times pay and four times pay shortfall), just below target (within two times pay shortfall), just above target (within two times pay surplus), and above target (more than two times pay surplus). Both men and women participating in the baseline DB plan find themselves falling below target. More than half of women and men are "below target," 58 percent and 51 percent respectively, with an additional three percent of women and one percent of men "significantly below target" (**Figure 4**).

Among women in the baseline DB plan, 34 percent are "just below target" and only five percent are "just above target"; none are "above target." For men, the same percentages are 42 percent and six percent respectively, with no men "above target" either. While these numbers are more encouraging than the numbers for DC plan participants discussed below, it still suggests that pension plan participants should not expect their DB plan to meet their full needs in retirement. Some amount of personal savings will be necessary for most retirees, in addition to Social Security, the pension, and retiree medical benefits.

The situation is more dire for those in the baseline DC plan. An overwhelming 92 percent of women and 85 percent of men are "significantly below target". An additional seven percent of women and 14 percent of men are "below target" and a mere one percent each of women and men are "just below target." While these employees will receive annuity resources from Social Security and retiree medical, their DC plan, at this level of contributions, is anticipated to be insufficient to meet their needs in retirement. As discussed above, a significantly higher contribution on behalf of either the employee or the employer could close much, if not all, of the shortfall of needs for DC plan participants.

Women fall below target more than men for a few reasons. Since women live longer than men, on average, they have more years of retirement to finance, which requires more

Figure 4: Comparing DB and DC Designs Retirement Readiness - Results by Gender



resources at retirement to achieve the same standard of living. Those additional years of retirement also mean that the value of their retirement resources is eroded by inflation more than men's resources. Relatedly, women often face greater healthcare costs, again because they live longer and have more years to potentially manage late-life health conditions or to cover long-term care costs at advanced ages. Women experience a steep decline in income past age 80, a decline not experienced by men of the same age.[7]

The results from this model assume women have similar work experiences as men in terms of career trajectory. However, the data used in the study reflects women have slightly lower earnings than men. Furthermore, as prior National Institute on Retirement Security (NIRS) research has noted, external factors also impact the retirement security of women.[6] For instance, taking time out of the workforce for caregiving work can affect one's retirement preparedness and it is more often women who take on these additional responsibilities. Divorce can also disproportionately impact women's financial situations, and the timing of divorce seems to matter. These external impacts are not modeled here, but on a case-by-case basis can play a significant role in impacting retirement outcomes.

Results by Income and Age

This analysis also considered retirement preparedness as a function of both age and income. Figure 5 shows the results for the baseline DB plan. Generally, older and lower-income employees are more likely to be close to target, while younger and higher-income workers are more likely to be below target, often significantly so. Social Security's progressive formula provides a higher replacement rate to lower-income workers, so they are more likely to have the annuity resources necessary to meet their needs in retirement. Also, those closer to retirement today will avoid the years of continually rising healthcare costs that will be faced by younger workers in The Real Deal model. Furthermore, lower-income workers, almost by definition, will require fewer resources at retirement because they have smaller preretirement incomes to replace. The combination of Social Security and a DB pension does much to replace these low incomes.

Somewhat surprisingly, then, it is the oldest, lowest income workers who have the highest surplus, at 1.1 times pay, whereas it is the highest income workers in their early 30s who have the greatest deficit, at 6.3 times pay. These young, but already high-income workers are expected to receive a lower replacement rate, and, therefore, fewer annuity resources from Social Security, while they will have to replace more of their high incomes via their pension plan and personal savings. Also, they are projected to face years of rising healthcare costs that have been outpacing increases in wages, whereas the workers in their 60s will face fewer years of that. Finally, those workers in their 30s today are expected to live longer than workers in their 60s today, and those additional years mean more time for inflation to erode the value of retirement resources. These factors make it more difficult for younger workers to reach their retirement income target. In reality, many of those high-income workers likely will have private resources to meet their needs in retirement, but it is incumbent upon them to save over the course of their career.

Figure 5: Baseline DB Plan - Results by Age and Income

2019 Limited Pay	Age: Under 25	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59	60+	Total
$0 to $29,999	-0.8	-1.1	-1.0	-0.1	0.3	0.4	0.6	0.8	1.1	-0.6
$30,000 to $39,999	-1.7	-2.1	-2.4	-1.6	-0.8	-0.1	0.3	0.3	0.5	-1.6
$40,000 to $49,999	-2.6	-2.7	-2.9	-2.4	-2.0	-1.3	-0.3	-0.2	0.0	-2.4
$50,000 to $59,999	-2.3	-2.6	-2.9	-2.5	-2.3	-2.1	-1.3	-0.8	-0.3	-2.3
$60,000 to $69,999	-2.2	-2.6	-2.8	-2.4	-2.3	-2.1	-1.8	-1.3	-0.7	-2.1
$70,000 to $79,999	-3.1	-3.2	-3.1	-2.6	-2.4	-2.0	-1.8	-1.8	-1.1	-2.1
$80,000 to $89,999	-3.5	-3.7	-3.6	-3.1	-2.7	-2.3	-1.9	-2.0	-1.9	-2.4
$90,000 to $99,999	-4.0	-4.1	-3.9	-3.3	-3.0	-2.6	-2.1	-2.3	-2.1	-2.6
$100,000 to $149,999		-4.8	-4.6	-4.0	-3.6	-3.1	-2.7	-2.8	-2.8	-3.1
$150,000+			-6.3	-5.7	-5.3	-4.5	-4.1	-4.1	-4.0	-4.5
Total	-1.8	-2.3	-2.6	-2.3	-2.1	-1.8	-1.3	-1.2	-0.8	-2.1

In the baseline DC plan, nearly everyone is significantly below target (**Figure 6**). Save for a relatively small number of mostly low-income, somewhat older workers who are merely "below target", all other age and income cohorts are falling significantly behind. The young, already high-income workers have a shortfall of 9.9 times pay in the DC plan.

Figure 6: Cost-Equivalent DC Plan - Results by Age and Income

2019 Limited Pay	Age: Under 25	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59	60+	Total
$0 to $29,999	-4.8	-5.0	-4.8	-3.8	-3.4	-3.2	-2.9	-2.7	-2.2	-4.4
$30,000 to $39,999	-5.7	-6.0	-6.2	-5.3	-4.4	-3.7	-3.2	-3.1	-2.8	-5.4
$40,000 to $49,999	-6.7	-6.7	-6.7	-6.1	-5.7	-4.8	-3.7	-3.5	-3.2	-6.2
$50,000 to $59,999	-6.4	-6.6	-6.7	-6.2	-6.0	-5.6	-4.7	-4.2	-3.5	-6.0
$60,000 to $69,999	-6.1	-6.5	-6.6	-6.1	-5.9	-5.7	-5.3	-4.7	-3.9	-5.7
$70,000 to $79,999	-7.1	-7.0	-6.9	-6.3	-6.0	-5.6	-5.2	-5.2	-4.3	-5.7
$80,000 to $89,999	-7.5	-7.5	-7.2	-6.7	-6.3	-5.8	-5.4	-5.4	-5.1	-5.9
$90,000 to $99,999	-8.0	-8.0	-7.6	-6.9	-6.6	-6.2	-5.5	-5.6	-5.3	-6.1
$100,000 to $149,999		-8.6	-8.3	-7.6	-7.1	-6.6	-6.0	-6.1	-6.0	-6.5
$150,000+			-9.9	-9.3	-8.6	-7.8	-7.5	-7.3	-7.0	-7.8
Total	-5.8	-6.3	-6.4	-6.0	-5.7	-5.4	-4.8	-4.6	-4.1	-5.8

Examining the results by generation reveals the same trends as noted above. The majority of younger workers are "below target" while the majority of older workers are "just below target" in the baseline DB scenario (**Figure 7**). Very small numbers of workers in their 50s and 60s are above target, while six percent of workers in their 30s are "significantly below target." The DC plan results show nearly all employees in their 20s, 30s, and 40s are significantly below target, while nearly three-fourths of workers in their 50s and half of workers in their 60s fall significantly below target (**Figure 8**).

The model presented here assumes that the same benefits will be offered to all workers, regardless of age. In practice, nearly all state and local government plan sponsors have adjusted benefit levels and plan provisions in the years since the Great Recession. Most of these changes protected current retirees and only affected future workers (though some did impact current employees). Regardless of the impact to current active workers and retirees, almost all of the policies aimed at reducing benefits and costs will affect future workers, who are expected to be most impacted by the key retirement trends of longer lives and higher health costs.

These benefit changes came in many forms, including requiring workers to contribute more to their pension plan, which reduces take-home pay during one's career. Other

changes will diminish expected retirement income by lowering benefit levels, reducing postretirement COLAs, or changing retirement eligibility, e.g., by raising the retirement age.[8] While many of these changes were implemented to reach plan cost targets, it is notable that the workers most impacted by benefit reductions are more likely to be from younger generations that are expected to face higher retirement needs relative to their pay levels.

Figure 7: Baseline DB Plan - Results by Generation

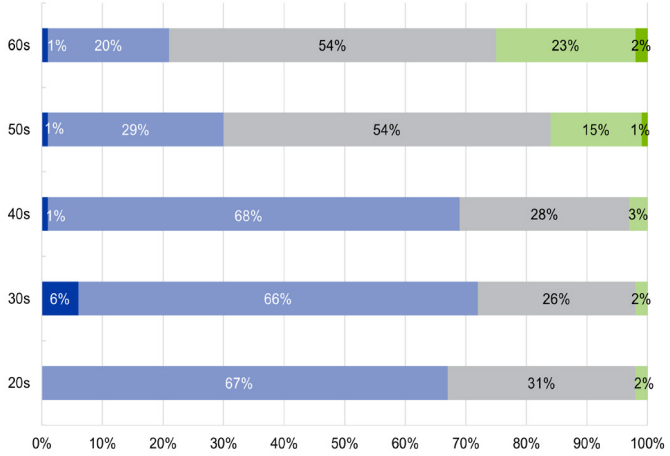
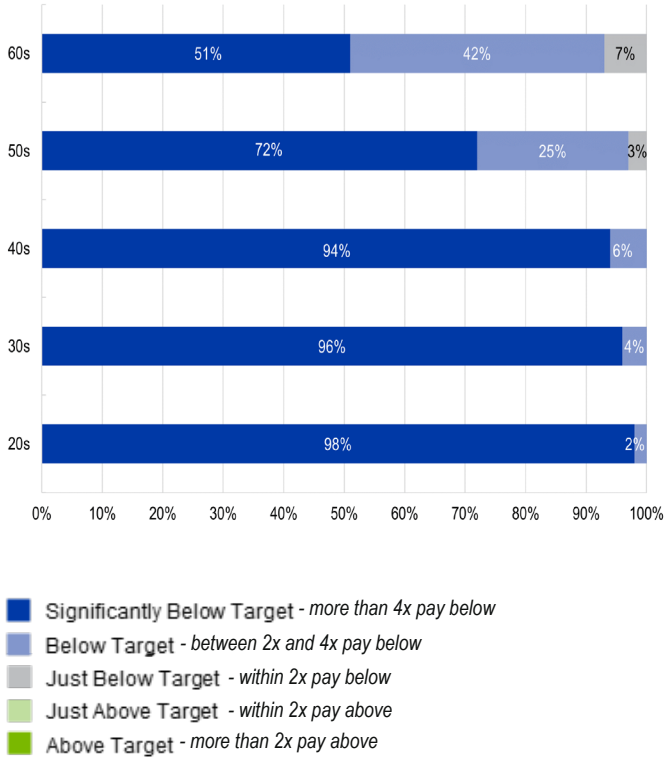


Figure 8: Cost-Equivalent DC Plan - Results by Generation



Additional Scenarios

High Return and Low Return Scenarios

Investment return is an important input in the valuation and management of both DB and DC plans. The investment risk is borne by plan sponsors in the DB plan and by employees in a DC plan. From an employee's retirement income adequacy perspective, sensitivity around returns is more important in a DC plan. Regardless of the return achieved by a DB plan, an employee can expect underlying annual income from the pension to remain unchanged. This is also true of the retiree medical and Social Security benefits modeled.

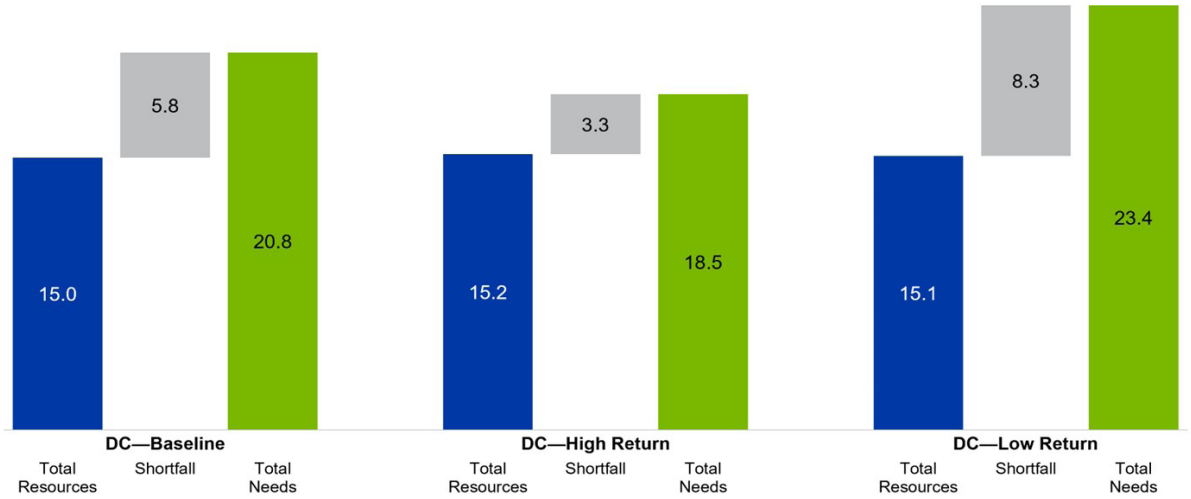
The Real Deal for the Public Sector analysis considered two alternative scenarios related to investment returns. The baseline model assumes a preretirement investment rate of return of six percent and a postretirement investment rate of return of five percent. Alternative scenarios were modeled in which pre- and postretirement returns were seven and six percent (high return) and five and four percent (low return), respectively.

The shortfall of needs in the DC plan is lower in the high return scenario and greater in the low return scenario. This is intuitive since the only input more impactful to DC resources at retirement than investment return is the savings rate itself. The shortfall of needs under the DC plan in the high return scenario decreases from 5.8 times final pay to 3.3 times (**Figure 9**). On the other hand, the shortfall increases to 8.3 times pay in the low return scenario.

Within the DC plan, the individual is taking on the risk of investment returns. The exposure to this level of volatility poses a risk to the retirement security of individuals saving in a DC plan. Employers choosing to pass along this risk to employees may consider increasing the benefit level to account for the transfer of the risk. Timing also matters when it comes to retirement for a worker in a DC plan. A worker could dutifully save over the course of their career, but if the economy enters a low return period as that worker approaches retirement, they could fall behind if they are in a DC plan.

It is worth pointing out another intricacy revealed in the analysis. Total needs, not just the shortfall of needs, actually decrease in the high return scenario while they increase in the low return scenario. This is because the analysis is based upon the assumptions detailed in **Table 2**. Higher returns reduce total needs at retirement since more retirement income is generated through investment earnings. Additionally, the impact of both regular and

Figure 9: Cost-Equivalent DC Plan - Alternative Return Scenarios



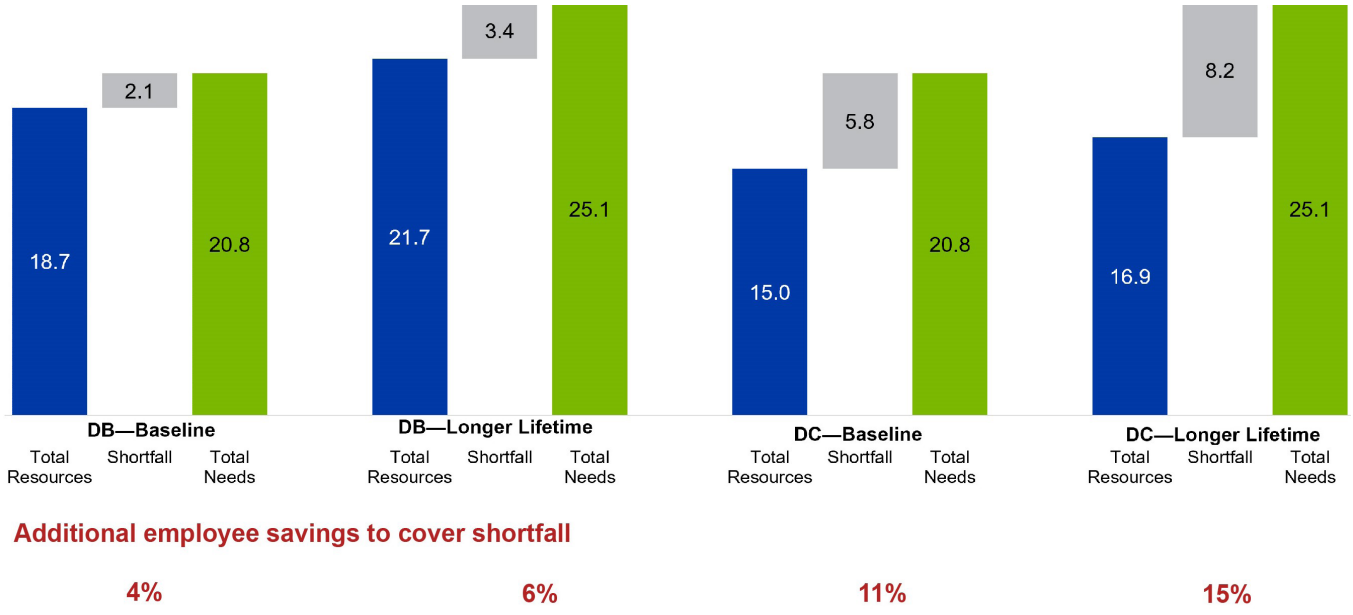
medical inflation is lessened because higher returns do more to counteract inflation.

Put another way, the value of the needs does fluctuate depending on the investment return used because the multiple of pay is calculated using the present value of the stream of necessary income. A higher rate of return will lead to a lower present value, and vice versa for the low return scenario. The same is true for any annuity resources modeled, such as retiree medical and Social Security benefits. The annual resource does not change between return scenarios, but the present value of the resource does.

Longer Lifetime

This analysis also considered the impact of people living longer. The baseline scenario for both plans assumes the 50th percentile of life expectancy, which is approximately age 90 for females and age 88 for males. This research also examined the impact of assuming the 80th percentile of life expectancy, which is age 98 for females and age 96 for males. As one would expect, total needs and the shortfall of needs increase under both plans in the longer lifetime scenario. Total needs grow to 25.1 times final pay (**Figure 10**). This is the highest level of total needs examined under any of the

Figure 10: Comparing DB and DC Plans Shortfall - Longer Lifetime Scenario



scenarios in this analysis, indicating the very real impact longevity can have on retirement income adequacy.

Under the DB plan, the shortfall of needs increases from 2.1 times final pay to 3.4 times, while in the DC plan, the shortfall rises from 5.8 times to 8.2 times. Retirement resources in the DB plan increase as more years of benefits are paid, however the DB plan benefit does not increase with a COLA to cover inflationary increases in the later years. Retirement resources generated by the DC plan are the same in both the baseline scenario and the longer lifetime scenario because greater longevity in retirement has no effect on the savings generated through a DC plan during one's working years. In practice, this means a long-lived retiree will either need to reduce their standard of living to make their DC savings last throughout retirement or run the risk of outliving their savings.

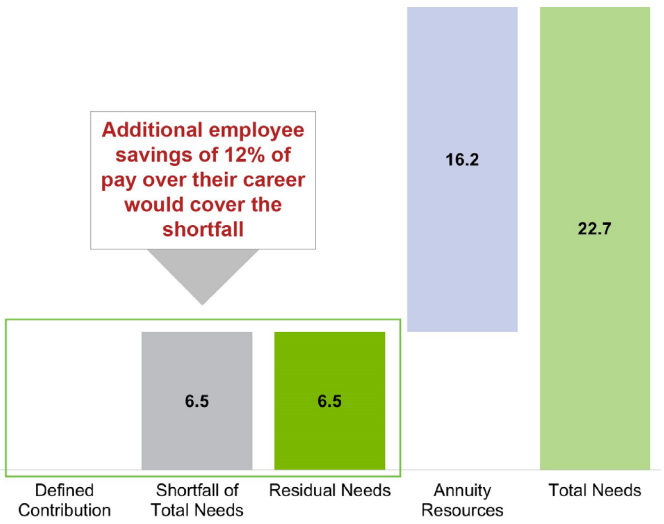
Public DB plans are able to pool longevity experience among all plan participants to provide annuity payments for a lifetime. This is much more difficult to address in individual-based savings programs. Individual savers are not able to plan for exactly how long they will live. Experience pooling allows the DB plan sponsor to bear the longevity risk for the plan members, a risk that is completely carried by individual DC plan participants.

No Social Security

Slightly more than a quarter (28 percent) of all public pension participants nationwide do not participate in Social Security.[8] The Real Deal for the Public Sector examined the effect of non-participation for both DB and DC plan members. The design modeled for DB plan members shifts from a multiplier of 2.0 percent to 2.5 percent and the employee contribution increases from 6 percent to 7.5 percent. This is not intended to be a cost equivalent design to the DB plan with Social Security, but rather to represent a typical DB plan without Social Security. Under this design, DB plan members see their shortfall of needs triple from 2.1 times final pay to 6.5 times without Social Security (**Figure 11**). And 97 percent of non-Social Security DB plan members are significantly below target in terms of retirement preparedness.

The analysis also considered what would happen if the money saved by not paying the 6.2 percent FICA payroll tax was contributed by the employer to the DB plan. In essence, this maintains the same cost to the sponsor as the baseline DB plan, just without Social Security participation. The resulting design has a multiplier of 3.2 percent. The shortfall of needs still rises, but from the baseline DB plan's results of 2.1 to 2.9 times final pay, with more than a quarter of plan participants just below or just above target.

Figure 11: Baseline DB Plan - Impact of Not Having Social Security



If participants saved their FICA tax savings, shortfall would drop by another 3.5x pay (or 6.2% of pay over an employee's career).

2.0% Baseline DB Design without Social Security can meet shortfall with following changes:

- Multipler changed from 2.0% to 3.75%
- Employee contribution changed from 6.0% to 7.5%

A similarly cost equivalent DC plan without Social Security would mean the employer puts the 6.2 percent savings from not paying the FICA tax into the DC plan, for an employer contribution rate of 12.2 percent. Under this design, the shortfall increases dramatically from the baseline DC plan's results of 5.8 to 8.5 times final pay. Also, 100 percent of those plan members are significantly below target.

If an employee not participating in Social Security also chose to save the additional income from not contributing to FICA in a defined contribution plan, their shortfall (either of 2.9 times pay under the DB plan or 8.5 times pay under the DC plan) would decrease by 3.5 times pay. These employees will have additional accumulated savings to help offset retirement expenses.

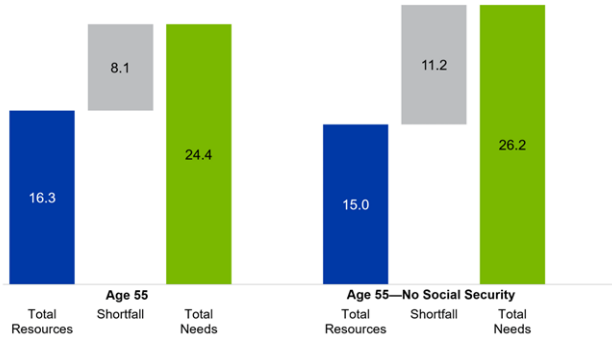
The DB plan expected surplus of 0.6 times pay when the employer and employee cost are the same as in the baseline DB plan may seem counterintuitive. The results highlight

the impact of the progressive nature of the Social Security benefit and differences in the underlying assumptions of what Social Security benefit can be provided through FICA tax funding. Employees making above a certain threshold will have more replaced by an employer sponsored plan as compared to Social Security.

Age 55 Retirement

It is common to see retirement ages even earlier than 62 in the public sector, particularly for public safety employees. It is also more common in public safety plans for participants to not be covered by Social Security. A common retirement age considered for these public safety employees is age 55. However, retiring earlier means less time to accumulate resources and more time in retirement spending those more limited resources. This effect leads to an even greater shortfall for participants at age 55 (**Figure 12**) under both the baseline and no Social Security designs in this analysis. The results in Figure 12 are modeled from a strawman of an average male under the baseline and no Social Security plan designs and assuming age 55 retirement.

Figure 12: Baseline DB Plan - Impact of Retiring at Age 55



The retiree medical benefit modeled in this analysis makes up a particularly large portion of the total resources at age 55 (4.0 times pay under both scenarios), since medical costs are particularly expensive before Medicare eligibility at age 65. The impact of removing Social Security coverage at age 55 is less significant as a multiple of pay as compared to age 62 retirement because the earliest age employees are able to access Social Security is 62. Still, the design without Social Security is not rich enough to compensate for the lack of Social Security for the average participant. If sponsors deem it important for participants to retire at age 55, their plan's benefits will need to be designed with that consideration in mind.

The Benefit of a Cost of Living Adjustment (COLA)

This research also examined the impact of providing a COLA with the baseline DB plan. Total needs as a percentage of final pay increase over the course of retirement. As these needs rise, the shortfall of annuity resources grows. However, including a 1.5 percent COLA dramatically reduces the shortfall of needs.

Total needs as a percentage of pay at retirement increase to 148 percent at age 86. Under the baseline DB plan, annuity resources at age 86 are 98 percent of pay at retirement, leaving a significant shortfall. However, when a COLA is added to the baseline DB plan, the annuity resources at age 86 are 122 percent, cutting in half the shortfall of needs (**Figure 13**). As a multiple of pay at retirement, the total shortfall of needs declines from 2.1 times pay (baseline) to 0.4 times pay (1.5 percent COLA).

Inflation levels have been much lower than historical norms in the period following the Great Recession. The expectations of plan sponsors, investment managers, and others changed throughout this period, with the Federal Reserve lowering its inflation target to two percent (and with actual inflation often falling short of that lowered target). Pension funds followed by lowering their long-term expectations, as well.

It is reasonable for public plans to respond to new data by updating their expectations, but there is no guarantee that inflation will remain low in the future simply because it has been low in recent years. Inflation reached five percent in May of 2021 and then continued to climb to levels unseen since the 1980s.

While inflation is not expected to persist at current levels, e.g., 8.2 percent in September 2022, it highlights the challenge of predicting the level of inflation during retirement. Many plan changes to reduce COLA benefits during the past 15 years were premised on the expectation that inflation would remain low for the foreseeable future. Some of these COLA reductions recognized that some plans had fixed COLAs that were providing increases that exceeded actual inflation during the recovery from the Great Recession. Today, the tables have turned for many retirees, with inflation surpassing COLAs, if COLAs are even still offered. A number of plans eliminated COLAs completely.

The value of a COLA is that it prevents the erosion of the purchasing power of a pension benefit. Even at the historically low levels of inflation experienced in the years following the Great Recession, the purchasing power of a

Figure 13: Baseline DB Plan - Impact of a Cost of Living Adjustment (COLA)

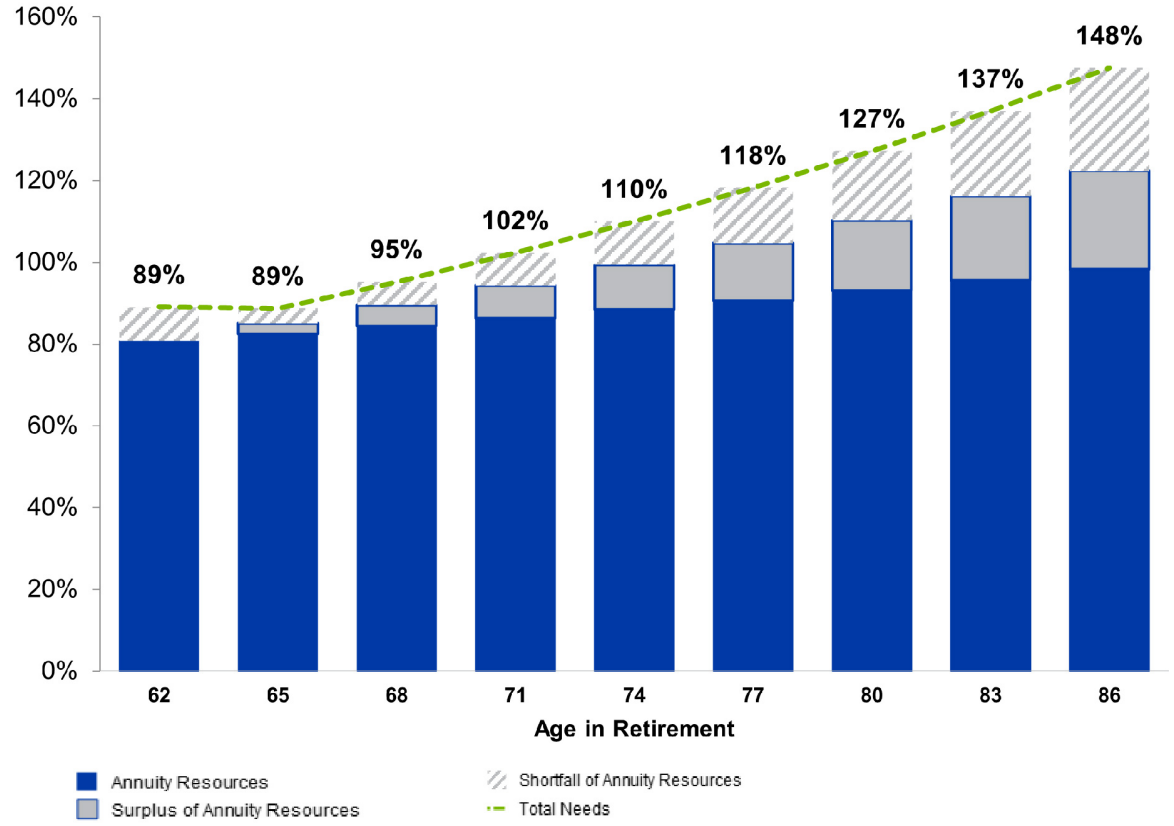
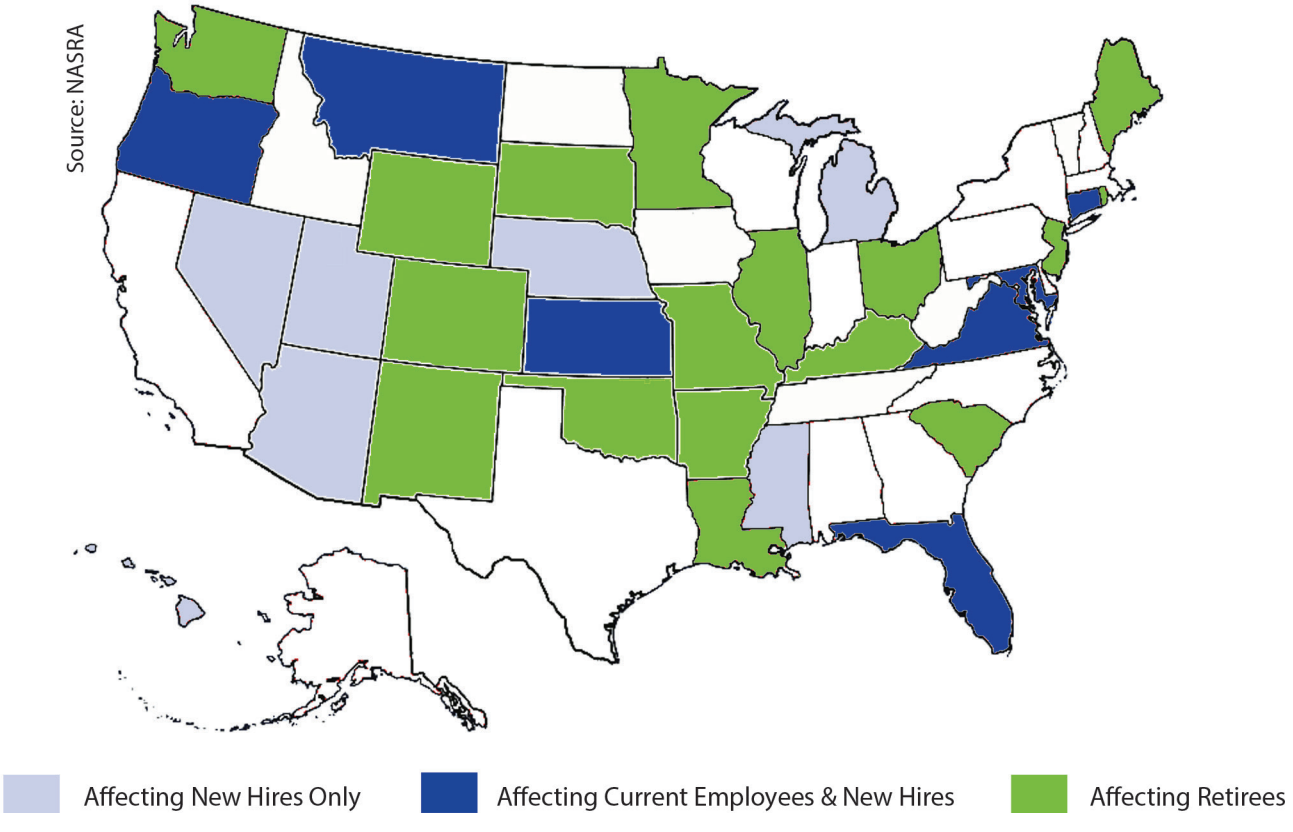


Figure 14: State COLA Reductions, 2009-2018



pension benefit still will decline over time, as illustrated in Figure 13 above. The higher levels of inflation seen since the Covid-19 pandemic recession have only exacerbated this challenge.

Given legal protections regarding public pension benefits in many states, it is common for younger generations to be offered a COLA benefit that is lower than what was provided to preceding generations because it is easier to reduce COLA benefits for new hires. In some sense, the COLA reductions reflected changing expectations of future inflation after living through a decade with very low inflation. But the current COLA provisions will not be relevant for a young, recently hired worker for many decades. And there is no guarantee that the low inflation of the past decade will persist during the next 30-50 years, as recent experience has shown. This suggests that plan sponsors may need to reconsider COLA provisions if they are to provide adequate retirement income to future generations of workers.

Lack of a Retiree Medical Plan

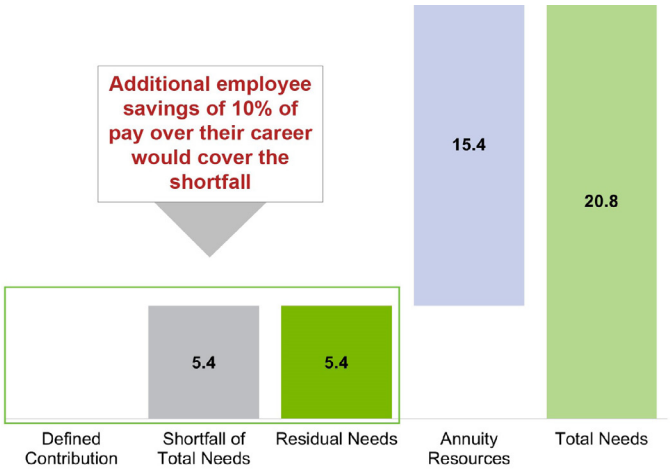
The baseline scenario in this analysis assumes that a worker will have access to a retiree medical plan providing benefits equal to 3.3 times pay at retirement. Without access to one of these plans, the shortfall of needs grows to 5.4 times pay (**Figure 15**). An individual worker can cover this gap by increasing their personal savings by an additional ten percent of pay over the course of their career.

Another way to address this shortfall of resources is to simply increase other annuity resources. For instance, the DB plan could be adjusted to make up for the lack of a retiree medical plan. Changing the DB plan multiplier from two percent to three percent; adding a three percent COLA; or raising the multiplier to 2.5 percent and including a two percent COLA could eliminate the shortfall created by the lack of a retiree medical plan.

The value of a retiree medical plan attests to the impact of health costs during retirement. Older people typically experience a greater number of health conditions that cost more to treat than younger people, which drives costs. Also, medical inflation has long outpaced regular inflation, which disproportionately impacts older people. Thus, any benefit that helps to alleviate health costs increases retirement income adequacy.

Retiree medical coverage and other post-employment benefits offered in the public sector typically enjoy fewer legal protections than pensions, which means it is easier for legislators to cut or reduce retiree medical benefits. This not only weakens retirement income adequacy for retirees in the near-term, but exacerbates the trend discussed throughout this paper of younger workers bearing more of the brunt of plan changes focused on reducing costs. It is worth noting that there is already a great variety of retiree medical offerings from state to state and the majority of public retiree medical costs are concentrated in just ten states.[10]

Figure 15: Baseline DB Plan - Impact of Not Having a Retiree Medical Plan



Not having access to a retiree medical plan increases an employee's shortfall from 4.0% to 10.0% of pay over their career.

Changing DB design to the following also makes up for the shortfall:

- Change multiplier to 3%
- Adding 3% to COLA
- Change multipler to 2.5% and 2% COLA, respectively

IV. UNDERSTANDING THE GAP BETWEEN RETIREMENT RESOURCES & TOTAL NEEDS

Employees in the average public sector DB plan still need to save approximately four to six percent of pay annually on their own for an adequate retirement. While the combination of Social Security, a pension, and retiree medical benefits covers much of an employee's needs at retirement, that combination alone is not sufficient to meet total needs. If offered a supplemental DC savings plan through their employer, such as a 457 plan, the average public sector employee should strongly consider setting aside additional savings for retirement.

Under all the scenarios studied in this analysis, DC plans provide less retirement income than DB plans for the same cost for career employees. DB plans benefit from professional investment advice, investment risk pooling, and longevity pooling. Final average pay DB plans focus on final retirement income compared to DC plans which allocate retirement income evenly across a career. This leaves many career employees falling behind sharply at retirement age when participating in "cost-equivalent" DC plans.

This research also examined alternative scenarios. One of these scenarios modeled public employees not participating in Social Security, which represents the experience of just more than a quarter of public sector employees. Not participating in Social Security requires a higher multiplier as part of the DB plan and higher employee savings for an adequate retirement. Even with a higher multiplier and additional contributions, the general employee considered still experienced a greater shortfall of needs without Social Security.

The addition of a COLA does much to counteract the effects of inflation on eroding the value of retirement resources. The 1.5 percent COLA modeled and discussed above still leaves a small shortfall of needs under the baseline scenario. Offering a DB plan with a two percent COLA provides employees with adequate retirement income without any additional employee savings. Many public plan sponsors reduced or eliminated COLAs during the past fifteen years, but those decisions were made at a time of low inflation. Now that inflation is rising rapidly, many retirees are seeing the value of their pension benefit decline.

Another alternative scenario considered the impact of not having a retiree medical plan. This increases an employee's shortfall, requiring an additional 10 percent of pay over an employee's career to cover the gap. While retiree medical plans often feel ancillary, they are particularly important for sponsors encouraging retirement before Medicare eligibility.

Retirement is growing more challenging for younger generations. Several factors are working against younger employees today. As general longevity is projected to increase, current cohorts of young people are expected to live longer lives than current cohorts of older people. This fact alone requires more savings for retirement. Additionally, rising medical costs mean younger employees are less ready for retirement than prior generations. Younger workers today are expected to face higher medical costs when they reach retirement age as compared to older workers nearing retirement in the next few years. Furthermore, the impact of changes to plan designs and benefit offerings in recent years will be borne disproportionately by younger cohorts of workers, who will participate in tiers of pension plans with less generous benefits.

While this analysis modeled a general employee in the public sector, it is worthwhile to consider some of the implications for employees in plans with compressed working years. Public safety employees, particularly police officers and firefighters, typically have fewer working years and more retirement years than a general government employee, which means more resources are necessary per year worked. A firefighter may only have a twenty year career and then retire from the profession in their late 40s or early 50s. While they are likely to pursue a second career after leaving firefighting, plan sponsors should consider how the baseline DB plan modeled here could be adjusted to provide retirement income adequacy to these categories of workers with fewer working years in a public DB plan.

Key Findings

The following are the key findings from the research relative to retirement income adequacy:

- **'Your Retirement Number' is elusive** because key factors are individual-based
- **Retirement is growing more challenging** for younger generations
- **Employees** in the average public sector DB plan **still need to save ~4.0%-6.0% on their own** for an adequate retirement
- Rising medical costs have **younger employees less ready for retirement than prior generations**
- **Females are less prepared for adequate retirement than males** due to longer life expectancies

The following are the key findings from the research relative to plan design:

- **DC plans provide less retirement income than DB plans** in a typical "cost-equivalent" conversion for career employees
- The average **DB plan with a 2.0% COLA provides employees with adequate retirement income** without any additional employee savings in the baseline scenario
- **Not participating in Social Security requires a higher multiplier and higher employee savings** for an adequate retirement
- **Not having a retiree medical plan increases** an employee's shortfall, requiring **an expected additional 6% of pay** over an employee's career to replace the gap

V. CONCLUSION

Achieving retirement income adequacy should be a key goal for plan sponsors and employees alike. Many public sector employees still have access to a DB pension plan, which provides high levels of retirement income adequacy. But public employees should be aware that their DB plan, in combination with Social Security and a retiree medical plan, may not be enough to meet all of their needs in retirement. Becoming educated about their needs and what retirement resources they can expect from Social Security and employer-sponsored plans is critical for retirement preparedness. Plan sponsors also should understand their plan's level of retirement readiness for most employees and should encourage employee savings for retirement. Together, plan sponsors and employees can work toward a secure retirement for all.

VI. DISCLOSURES

This analysis is intended to assist with review of typical retirement adequacy for public sector employees, and its use may not be appropriate for other purposes. Experience different than anticipated could have a material impact on the ultimate costs of the benefits or the ultimate benefit provided.

Models are used to calculate the expected retirement income adequacy under deterministic scenarios of an employer's retirement benefit plans as applied to their current active population.

The model outputs various assumption sensitivities. In practice, certain other assumptions, such as inflation and retirement age, would also be expected to vary when the expected return assumption changes.

The model does not include or address the following items:

- Participant resources outside of the employer's plan(s)
- Demographic changes to the population modeled
- Changes to expenses after retirement other than savings in the employer's plan, average taxation changes, and average medical costs. It does not consider that discretionary expenditures may decrease over a participant's lifetime or increase with long-term care costs.

The retirement actuaries relied on experts at Aon for the development of the capital market assumptions underlying the economic assumptions and also relied on experts for the development of health care assumptions in the projection model.

ENDNOTES

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Teachers' Knowledge and Preparedness for Retirement: Results from a Nationally Representative Teacher Survey

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Abstract

Adequately saving for retirement requires both planning and knowledge about available retirement savings options. Teachers participate in a complex set of different plan designs and benefit tiers, and many do not participate in Social Security. While teachers represent a large part of the public workforce, relatively little is known regarding their knowledge about and preparation for retirement. We administered a survey to a nationally representative sample of teachers through RAND's American Teacher Panel and asked teachers about their retirement planning and their employer-sponsored retirement plans. We find that while most teachers are taking steps to prepare for retirement, many teachers lack the basic retirement knowledge necessary to plan effectively. Teachers struggled to identify their plan type, how much they are contributing to their plans, retirement eligibility ages, and who contributes to Social Security. These results suggest that teacher retirement reform may not be disruptive for teachers and that better, simpler, and clearer information about teacher retirement plans would be beneficial.

JEL Codes: I20, J33
Keywords: teacher pensions; retirement knowledge; retirement planning

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I. INTRODUCTION

Retirement planning is important for retirees' financial wellbeing (Ameriks et al., 2003; Lusardi & Mitchell, 2011a; van Rooij et al., 2012), physical and mental health (Elder & Rudolph, 1999), and general satisfaction (Topa et al., 2009). Good retirement planning requires knowledge about and coordination between the various savings vehicles available to workers. The metaphor of a "three-legged stool" commonly describes good retirement planning, illustrating the interdependence of the elements of retirement savings. In this metaphor, three elements support retirement security: personal savings, employer-sponsored plans, and Social Security (DeWitt, 1996). How much an individual must save to reach a secure retirement depends on the value of their employer provided plan and Social Security benefits (Mitchell & Moore, 1998). A lack of knowledge about the value of the various retirement savings components makes planning difficult and can leave workers in a retirement insecure position.

Some aspects of teachers' retirement systems simplify retirement planning and create the perception that these plans protect teachers. Teachers are generally automatically enrolled in a state or school district sponsored retirement plan. For most teachers, that means they participate in a traditional pension that offers lifetime benefits to eligible members. In these plans, the pension system or sponsoring government manages most decisions, including setting contribution rates and investment allocation. Benefits for experienced teachers are rarely changed. Teachers must make very few decisions to enroll, are invested reasonably well, and earn lifetime income.

However, other aspects of teachers' pensions complicate retirement planning. Teachers' pensions are often backloaded, meaning that teachers earn relatively meager benefits in the early and middle portions of their careers and much more valuable benefits towards the end. In the median state, only 45 percent of teachers will work long enough to qualify for retirement benefits

and 80 percent will not qualify for full retirement benefits (Aldeman & Rotherham, 2014). Teachers who work less than a full career or split a career across two states earn much less valuable benefits and may face retirement insecurity without supplemental savings (Aldeman & Johnson, 2015; Costrell & Podgursky, 2009, 2010). For new teachers who are likely uncertain about how long they will work in the classroom or in their current state, it is challenging to predict how much they should be saving privately to offset this uncertainty (Marchitello et al., 2021; McGee & Winters, 2019). In addition, approximately 40 percent of teachers are not covered by Social Security (Kan & Aldeman, 2014); they lack one leg of the stool entirely, and therefore are more reliant on their employer provided plan.

Understanding how much teachers know about their employer-sponsored retirement plans and levels of financial literacy is vital to ensuring all teachers are equipped to make sound decisions about their retirement in this complex environment. This paper investigates teachers' retirement knowledge and preparation using a five-question retirement quiz. The quiz was administered to a nationally representative sample of teachers from RAND's American Teacher Panel as part of a larger survey about teacher retirement. This work is a contribution not only because teachers represent a large and important part of the public workforce, but also because the literature on teachers' retirement plan knowledge is sparse: we only found one study on the topic (DeArmond & Goldhaber, 2010).

Our results indicate that most teachers are taking steps to plan for retirement but that many lack the knowledge to plan effectively. Over half of teachers have tried to develop a plan for retirement and 70 percent are saving separately from their employer-sponsored plan. Of teachers that are or have been married, 70 percent report that their spouse has a separate retirement plan

offered through their employer. But there is room for improvement in teachers' financial literacy, especially for early-career teachers.

Approximately 45 percent of teachers could not identify their retirement plans and 30 percent are unaware about how long their benefits will last. Teachers also struggled to identify how much they contribute to their retirement plans, when they will be able to retire, and who contributes to Social Security. Late-career teachers were the most likely to correctly answer these questions.

These results suggest that teachers are not fully equipped to make decisions about their retirement. Previous research has provided evidence that education interventions help improve how well individuals plan for retirement (Collins & Urban, 2016; Kaiser et al., 2020; Lusardi et al., 2020). States and districts should do more to improve teachers' understanding of their retirement plans. Lacking knowledge could result in poor retirement planning among teachers, especially for short- and medium-tenure teachers.

The lack of basic knowledge is also a potential reason that early- and mid-career teachers exhibited a limited willingness to pay for traditional pensions in prior work (Fuchsman et al., 2020). The combination of these results may mean that, when combined with education around retirement plans, states may be able to make positive changes to retirement plan design with minimal pushback from teachers.

II. BACKGROUND

Retirement Plan Overview

Teachers participate in three basic retirement plan designs. The two most common designs are final average salary (FAS) defined benefit (DB) and defined contribution (DC). FAS DB plans, also called traditional pensions, base benefits on a formula that includes the employee's tenure,

age, and average salary over the last few years of the employee's career. DC plans, such as 401(k) and 403(b) plans, base benefits on how much money has accrued in an individual's retirement account from employee and employer contributions and investment returns. The third plan design, Cash Balance (CB), is a less common type of DB plan in which benefits accrue similarly to DC plans, but CB plans include a minimum guaranteed benefit. Some teachers also participate in hybrid systems that include both a FAS DB plan and a DC plan. Nationally, 80 percent of teachers participate in DB plans and only 14 percent participate in DC plans (U.S. Bureau of Labor Statistics, 2020).[1] Nearly all teachers in DB plans participate in FAS plans.[2]

While there are many differences between designs that can affect teachers' retirement planning, one of the most important is how benefits accrue. FAS DB plan plans are typically backloaded, meaning that teachers do not earn substantial benefits until they near eligibility age (Aldeman & Johnson, 2015; Costrell & Podgursky, 2009). DC and CB benefits, on the other hand, accrue more evenly across teachers' careers, allowing early- and mid-career teachers to earn more valuable benefits (Costrell, 2019).

Pension backloading can impact retirement planning due to uncertainty teachers have in terms of how long they work under the same system. New teachers are unlikely to know if they will teach for a full-career, much less whether that service will occur in a single state or district (Aldeman & Rotherham, 2014; Costrell & McGee, 2019; Costrell & Podgursky, 2010; Lueken, 2017; Marchitello et al., 2021; McGee & Winters, 2019). To this end, only 45 percent of teachers in the median state last long enough to qualify for retirement benefits, and 80 percent will not qualify for full retirement benefits; less than 60 percent of teachers qualify for benefits in 46 states

[1] Full-time private industry workers have a DB participation rate of 14 percent and a DC participation rate of 57 percent (U.S. Bureau of Labor Statistics, 2020).
[2] DB participation rates include FAS plans and CB plans. Only Kansas teachers hired on or after January 1, 2015, participate in CB plans (Costrell, 2019).

and fewer than 30 percent of teachers will reach full retirement eligibility in 40 states (Aldeman & Rotherham, 2014). Seemingly harmless decisions, such as moving to a different state, can decimate teachers' expected retirement benefits, reducing net pension wealth by over 50 percent (Costrell & Podgursky, 2010). These features of traditional pension plans underscore the importance of private retirement savings.

While all private-sector employees participate in Social Security, the same cannot be said for teachers. Teachers in the District of Columbia and 15 states either do not participate in Social Security or left the decision up to localities. Nationally, approximately 40 percent of teachers are outside of Social Security, reliant on their personal retirement savings and their employer-sponsored pension during their retirement years (Kan & Aldeman, 2014).

Despite the shortcomings of traditional pension plans for early- and mid-career teachers, pension proponents believe these plans operate as an important recruitment and retention tools for schools (Boivie, 2011, 2017). Advocates argue that most teachers would be worse off under alternative plan designs and that pensions facilitate turnover at known retirement eligibility ages (Rhee & Joyner, 2019; Weller, 2017). However, the quality of pensions as workforce management tools depends on teachers' understanding of how pensions work.

Retirement Knowledge

Retirement systems provide new teachers with information about retirement plans, aiming to help teachers plan for retirement and improve retention. The information from states usually concentrates on how long teachers must work to become eligible for a pension and how to calculate benefits for teachers who work a full career in the profession. However, this information may not give teachers adequate knowledge about other important retirement aspects and may not be relevant to early- and mid-career teachers; while teachers might have an idea of how much their

benefits will be worth when they reach their retirement ages, they are less likely to know how much they have accrued at an earlier age. Benefit handbooks are oftentimes bogged down in the minutiae of so-called service credit, designating beneficiaries, and divorce. Teachers may simply have faith that state plan-designers will have teachers' best interests in mind regardless of how long teachers remain in the profession.

Understanding teachers' levels of retirement knowledge, preparation, and financial literacy are vital to ensuring all teachers are equipped to make sound decisions about their retirement. While there is literature demonstrating the importance of retirement education for retirement outcomes (Collins & Urban, 2016; Kaiser et al., 2020; Lusardi et al., 2020), the literature on teachers' retirement knowledge is sparse. DeArmond and Goldhaber (2010) find that approximately 80 percent of Washington teachers can identify their retirement plan types based on a common label and plan description, but that early-career teachers were four percentage points less likely to be correct. In the general population, Gustman and Steinmeier (1999) find that half of surveyed adults can identify their retirement plan type based on a DB/DC label and less than half of respondents can identify their retirement eligibility age within one year.

Additional literature links behavior to pension incentives and plan parameters, suggesting that teachers understand their retirement plans well enough to exit when they maximize or nearly maximize the present value of their retirement benefits (Costrell & McGee, 2010; Costrell & Podgursky, 2009; Kim, 2020; Ni et al., 2020; Ni & Podgursky, 2016). While teachers appear knowledgeable enough to know when to retire, they may not learn this optimal date until late in their careers. Teachers may not develop a satisfactory understanding of their employer-sponsored retirement plans until they near the retirement eligibility age, calling into question the quality of their previous retirement savings and if pensions are an effective workforce management tool.

III. DATA

We combine three data sources to learn about teachers' retirement knowledge and preparation. The primary data source is a survey administered through RAND's American Teacher Panel, which we merged with retirement plan information from the Urban Institute's State and Local Employee Pension Plan Database and retirement system information from the Boston College's Center for Retirement Research's Public Plans Database. We elaborate on the RAND survey and retirement plan/system data below.

RAND American Teacher Panel

We administered an approximately 15-minute survey using RAND's American Teacher Panel (ATP) between February 10 and March 16, 2020. The ATP is a nationally representative online survey research panel of American teachers in public K-12 schools with approximately 29,000 active respondents. RAND purchased teacher rosters from a vendor for randomly sampled schools and randomly invited teachers from those schools to join the panel (Robbins et al., 2018; Robbins & Grant, 2020). RAND compensates teachers $1 for each minute of expected survey time; teachers earned $15 for completing our survey.

The survey included questions about teachers' knowledge, preparation, and preferences around retirement as well as previously validated scales for financial literacy, personality, numeracy, and risk tolerance (Frederick, 2005; John et al., 1991; Kimball et al., 2008; Lipkus et al., 2001; Lusardi & Mitchell, 2011b; Toplak et al., 2014). RAND invited 9,904 teachers to take the survey and 5,464 completed the survey, yielding a 55 percent response rate.[3] We oversampled teachers from seven areas in the country.[4]

[3] This response rate did not vary substantially from other ATP surveys administered in 2019 (e.g., Johnston et al., 2019; Prado Tuma et al., 2020).
[4] Oversampled areas were Arkansas, California, Florida, Georgia, New York, New York City, and Texas.

Panel A of Table 1 includes descriptive statistics for our sample. Descriptive statistics for the ATP sample match the general population well.[5] Female teachers make up 78 percent of the sample. Teachers identifying as Hispanic comprise 8 percent of the sample. White teachers are 83 percent of the sample and black and Asian teachers are 8 and 3 percent of the sample, respectively. Nearly three-quarters of the sample are married or in a domestic partnership while 1 percent are widowed, 9 percent are divorced, 1 percent are separated, and 15 percent are single, never married. Elementary school teachers are 44 percent of respondents and 56 percent teach in secondary schools. Respondents report an average experience in their current states of 14.73 years with a standard deviation of 8.2 years. The sample includes beginning teachers and teachers that report up to 52 years of experience. The average age is 44.15 with a standard deviation of 10.65 years.

State and Local Employee Pension Plan Database and Public Plans Database

We obtain data on retirement plans from the Urban Institute's State and Local Employee Pension Plan Database (SLEPP). These data include nearly all state teacher retirement plans. We utilize data on teachers' eligibility for different plans, plan types, employee contribution rates, normal retirement eligibility ages, and Social Security participation.[6] These data were originally collected in 2012 and updated in 2018. To ensure accuracy of the SLEPP database, we combed through member handbooks and annual financial reports from the states and plans. We made the according changes when our interpretation of plan parameters differed from the SLEPP database.

[5] The sample's statistics are somewhat comparable to general teacher population statistics compiled by the National Center for Education Statistics (Hussar et al., 2020). The ATP sample includes more teachers that self-identify as white than the general teacher population. The general teacher population is also more evenly split between elementary and secondary school teachers than the ATP sample. Analyses include probability weights to ensure representativeness.

[6] Georgia, Rhode Island, and Texas leave the decision to enroll their teachers in Social Security up to the local districts. We obtain additional information on which districts participate in these states from the National Center for Education Statistics. See: https://nces.ed.gov/programs/maped/storymaps/TeacherSocialSecurity/index.html

The most common changes were to employee contribution rates to substitute in more recent data and to recode several FAS plans as hybrid plans when appropriate.[7]

We combine these data with Boston College's Center for Retirement Research's Public Plans Database (PPD). The PPD collects data from retirement systems aggregated over the individual plans. These data cover actuarial costs and methods the plans use longitudinally beginning in 2001 and are updated quarterly. We obtain normal cost rates and employer normal cost rates for 2020 from the Second Quarter 2021 PPD update.[8]

IV. RETIREMENT KNOWLEDGE

Grading the Retirement Quiz

Evaluating teachers' knowledge about their retirement plans is complicated because teachers participate in many different retirement plans. Each state, the District of Columbia, and five municipalities (Chicago, Kansas City, New York City, Saint Louis, and Saint Paul) operate their own teachers' retirement systems. Governments often have multiple (typically two to four) retirement plans, sometimes called "benefit tiers", within the same system.

For the purposes of this paper, we consider a benefit tier to be each potential combination of plan parameters that could be a correct set of answers to the quiz.[9] For example, California operates two FAS plans that generate different benefits, have different retirement eligibility requirements, and different contribution rates. We consider these separate benefit tiers that California teachers could be enrolled even though both are FAS plans. Across the 56 states and municipalities that have their own teachers' retirement system, there are 210 total benefit tiers.[10]

[7] Our retirement plan data are available upon request.
[8] Normal cost rates refer to the share of salary required to prefund currently accruing pension expenditures. Payments on unfunded liabilities are not included in the normal cost.
[9] This definition of benefit tiers differs slightly from how the states define separate tiers. For example, one tier in Washington allows respondents to choose one of six contribution rate paths. We consider these contribution rate paths to be separate benefit tiers even though they function as one tier in the state.
[10] Appendix Table A.1 shows the number of benefit tiers for each state and municipality.

All but 5 states and municipalities have more than one tier, and 43 states and municipalities have 4 or fewer tiers. Michigan has the most benefit tiers at 15.[11]

Determining which benefit tier a teacher belongs to can be challenging when there are multiple tiers per state/municipality. Most benefit tiers determine eligibility based on when a teacher was originally hired, but some states and tiers have additional or alternative requirements to determine plan eligibility such as the dates teachers vest (qualify for a benefit), retire, or are eligible to retire. We can estimate teachers' year of hire using reported experience in the state and if we assume teachers have worked continuously as a teacher since their year of hire.[12] We compare the approximate hire year to eligibility dates for benefit tiers to infer which tier a respondent is enrolled in.

While using reported experience to estimate a teacher's start date can give us a well-educated guess about benefit tier membership, there are still two remaining challenges. First, some states allow teachers to choose among a set of plans within the same tier, such as Florida and Ohio. If teachers in choice states meet eligibility criteria for multiple plans, then we cannot know if the teacher is correct when answering some plan knowledge questions. Second, teachers hired in a transition year, the start year for a new benefit tier, could be enrolled in the previous tier or the new tier depending on the date they were hired. Since the actual hire date is unknown to us, we cannot be certain about which tier that transition year hires would be enrolled in.

Considering these two challenges, we use two primary grading schemes for the retirement knowledge quiz. The first strategy compares responses against the universe of potential answers

[11] Michigan operates two FAS plans, two hybrid plans, and a DC plan. At multiple times, the FAS plans allowed teachers to change their FAS benefit by paying a higher contribution rate. After many years, FAS teachers could revert to a different contribution rate if they had elected to pay an increased contribution rate. Given the options afforded to teachers, Michigan teachers enrolled in one of the two FAS plans could have one of twelve contribution rate histories, as well as the opportunity to switch into a DC plan. We consider each contribution rate path to be a separate plan..

[12] DeArmond and Goldhaber (2010) make a similar assumption using administrative data on experience to infer hire years.

for teachers in their state/municipality. The response is correct if it matches any correct answer for the state/municipality. For example, Florida teachers answering that are enrolled in the state's FAS plan would be correct because Florida offers a FAS plan even if the teacher is truly enrolled in the state's DC plan.[13] This is our "lenient" grading scheme.

Our second – and preferred – grading scheme is the "strict" scheme. Here, we use reported experience in the state to approximate which benefit tier a teacher is likely enrolled in, but we limit the sample to respondents that could only be enrolled in one tier. These restrictions remove respondents that have a choice among plan parameters and respondents hired in transition years.[14] We retain 78 percent of the sample with these restrictions in place. Each of the five questions on our quiz has only one correct answer under this strict grading scheme.

Retirement Knowledge Quiz Results

We included five survey questions designed to measure how much teachers know about how their retirement plans work. Panel B of Table 1 summarizes the responses to these questions.[15] Figure 2 contains graded responses to the five-item retirement plan knowledge quiz using the lenient and strict grading schemes. Our discussion will focus on the strict grading scheme. [16]

We expect that teachers with more experience in their states are likely to be more knowledgeable about their retirement plans since they have been around those plans longer and since they are likely closer to collecting retirement benefits. We show the share of correct

[13] Appendix Table A.2 shows which states/municipalities offer each plan type. Appendix Table A.1 shows 210 potential plans for our survey respondents, but there are 74 combinations of states/municipalities and plan types in Appendix Table A.2. This difference is due to some plans of the same type having different parameters. For example, one Washington hybrid plan allows members to choose one of six contribution rates. We consider the six contribution rates to correspond with different hybrid plans even though they function as one tier within the state.
[14] We exclude some teachers in Florida, New York City, Pennsylvania, South Carolina, Utah, and Washington and all teachers in Michigan and Ohio because they have options regarding either plan type or contribution rates. Nevada teachers are excluded because plans have different employee contribution rates depending on locality.
[15] See Appendix B.1 for question and answer text.
[16] The full sample and sample remaining after imposing strict restrictions are comparable, see Appendix Table C.1, but the strict grading scheme sample teachers report one more year of experience and are one year older on average.

responses by experience quartile in Table 2. Teachers in the first quartile of experience have 8 or fewer years of experience (early-career) while quartile four teachers have 20 or more years (late-career).

Figure 3 displays heterogeneity based on which plan type teachers believe they are enrolled in for the share correctly identifying plan type and benefit duration. Panel A deconstructs responses to the plan type question, and Panel B provides the share correctly identifying benefit duration based on the retirement plan type selected.

Retirement Plan Type. Our first quiz question provided four descriptions of common retirement plan types and asked respondents to identify the description that most closely matched their actual primary retirement plan.[17] The options corresponded with FAS plans, DC plans, CB plans, and hybrid plans.

This question design differs from DeArmond and Goldhaber's (2010) design which provided both plan labels and plan descriptions; Gustman and Steinmeier (2002) provided plan labels but not a plan description. Retirement handbooks and benefit guides use both plan labels and describe plans; thus, teachers have access to both pieces of information. We used plan descriptions because we are interested in assessing teachers' retirement preparation which depends on their understanding of how benefits accrue not the label commonly used to describe the plan. Teachers may be able to identify plan labels, but they may not know how those plans determine benefits nor how these plans could affect them.

Panel B of Table 1 shows that 52 percent of teachers believe they are enrolled in FAS plans and another 28 percent believe they are enrolled in hybrid plans. Only 13 percent believe they are

[17] We always asked teacher about their primary employer-offered retirement plans. Many local districts and some states offer optional supplemental plans.

enrolled in DC plans and 6 percent think they are enrolled in plans matching the description of a CB plan.

Less than 3 out of 5 respondents could correctly identify their retirement plans based on a description of how benefits are determined. Based on Figure 1, the share correctly identifying plan type is 55.7 percent using the strict grading scheme. Teachers indicating FAS enrollment were almost always correct, but those who answered anything else were generally wrong (Figure 2, Panel A). Respondents answering with the DC plan description were incorrect 98.9 percent of the time, 99.3 percent of the time for CB responses, and 87.2 percent of the time for respondents answering hybrid plans.

Comparatively more experienced teachers were more likely to identify their retirement plan type correctly than newer teachers (Table 2). Just under half (49.7 percent) of first experience quartile teachers could identify their retirement plans based on plan descriptions. Mid-career teachers were correct 55.1 percent of the time and 62.6 percent of late-career teachers could identify their retirement plan.

Retirement Eligibility Age. We asked teachers at what age they would be eligible for full retirement benefits, asking them to ignore early retirement eligibility. Panel B of Table 1 shows that the mean reported retirement eligibility age is 59.97, the median is 60, and the standard deviation is 7.23 years. The fifth percentile was 52 and the 95th percentile was 68.[18]

Most systems have multiple retirement eligibility thresholds. These thresholds usually involve age, years of service, and/or the sum of age and years of service. For example, teachers in one Minnesota plan can retire at age 65 with 3 years of service, at age 62 with 30 years of service,

[18] Kernel density plot available in Appendix Figure D.1. Two responses were over 2000; we interpreted these responses as if they were the year teachers will retire and subtract respondents' reported birthyears to impute retirement ages.

or any age once age and years of service sum up to 90. We project the earliest possible retirement eligibility age for teachers among all possible retirement eligibility ages for their plans using reported age, experience, and assuming teachers serve continuously until their earliest retirement eligibility age. This projection serves as teachers' actual retirement eligibility age for grading.

Teachers had difficulty identifying their retirement eligibility ages; results are available in Figure 1. Less than 20 percent of teachers knew their retirement ages, 33.7 percent knew the age within one year, 59.6 percent answered within 3 years, and 74.3 percent could identify a retirement eligibility age within 5 years. Teachers graded using the lenient scheme were at least 10 percentage points more likely to be correct about their retirement eligibility ages than when graded using the strict grading scheme's parameters, suggesting that teachers are more likely to know a potential retirement eligibility age in their system rather than their own retirement eligibility age or that they may not know their earliest retirement eligibility age.

Teachers with more experience in their states are much more likely to know their retirement eligibility ages, as shown in Table 2. Top experience quartile teachers knew their initial retirement eligibility age 21.3 percent of the time compared to 18 percent for early-career teachers and 19.5 percent for mid-career teachers. Late-career teachers could identify a retirement eligibility age within one year of their actual retirement eligibility ages 40.6 percent of the time; 67.2 percent could identify an eligibility age within three years. Early- and mid-career teachers were significantly less likely to know their retirement eligibility ages within one or three years (27 percent and 54.5 percent within one or three years, respectively, for early-career teachers and 33.7 percent and 58.4 percent for mid-career teachers).

Social Security. Another question concerned Social Security. Both employees and employers contribute to Social Security when Social Security covers the position. We asked, "Do

you currently contribute part of your teaching salary to Social Security or does your school district contribute on your behalf?" The possible answers were "I do", "My school district does", "Both my school district and I do", and "No". Table 1 shows that the most common response was that teachers believe they contribute to Social Security but that their school district does not with 41 percent of respondents answering this way. The second most common answer was that neither employees nor employers contribute to Social Security with 29 percent of teachers believing this to be their case. 15 percent of teachers believe that only their employer contributes on their behalf, and 16 percent of teachers answered that both they and their districts contribute on their behalf.

Technically, answering that only either respondents or school districts pay into Social Security on teachers' behalf is incorrect for respondents participating in Social Security. The 56 percent of respondents who believe that only they or their school districts pay into Social Security are technically incorrect regardless of whether the respondent truly participates in Social Security. Given this misconception about who pays into Social Security, we grade this question in two ways. First, we consider that only answering that both employees and employers pay into Social Security is the correct response for Social Security participants (termed "Who Contributes"). Second, we consider responses indicating that at least one party contributes as correct since these teachers likely know that they will receive Social Security benefits (termed "Participation").

Figure 1 shows substantial differences when grading responses to the Social Security question with respect to what answers are considered correct. Only 40 percent of respondents were correct in identifying whether they and their employers contribute to Social Security on their behalf (corresponds with "Who Contributes" bars). 86.4 percent were correct, however, in determining whether someone was contributing on their behalf (corresponds with "Participation" bars).

Heterogeneity in the share correctly identifying their Social Security participation by experience is available in Table 2. More experienced teachers were the most likely to answer about who contributes to Social Security correctly with 45.8 percent of late-career teachers correctly identifying if both employees and employers contribute to Social Security. The difference between the top and bottom experience quartiles was 12.6 percentage points and 4.1 percentage points between the top and middle two quartiles.

Most teachers could identify if they participate in Social Security with some differences in the likelihood based on experience. Respondents in the top quartile of experience were correct 91.2 percent of the time and teachers in the second and third quartile were correct 88.2 percent of the time; 78.5 percent of the least experienced teachers were correct.

Benefit Duration. We also asked teachers how long they will receive monthly payments as part of the retirement plan. Potential answers included "As long as I live", "For a fixed time", "Until the money runs out", and "Other, please specify". Summary statistics in Table 1, Panel B, show that 70 of teachers believe their benefits will last for the remainder of their lives, 22 percent believe they will receive benefits until the money runs out, and 7 percent think the payments will only last for a fixed time.

We consider benefit duration to be directly tied to plan types. While many plans give retirees flexibility in choosing how their benefits will be paid out, FAS plans, CB plans, and the FAS component of hybrid plans generally pay out benefits until the retiree dies and DC benefits until the money in the retiree's plan runs out.[19]

[19] FAS plan members are often afforded the flexibility to take a partial lump-sum of projected FAS benefits when they retire or can guarantee benefits until their spouse dies by taking a benefit cut. Similarly, DC plans can be converted through a private vendor to pay a guaranteed benefit like a pension for life.

Respondents were most accurate at identifying how long they will be able to collect benefits (Figure 1), suggesting that benefit duration is something that teachers value. The share correctly identifying their benefit duration was 68 percent.

Teachers with more experience were more likely to identify their benefit duration (Table 2). 80.7 percent of top experience quartile teachers could identify their benefit duration while less, 54.4 percent, could in the bottom experience quartile and 68.6 percent of mid-career teachers.

We also test if teachers selected benefit durations that are consistent with the plan types they believe they are enrolled in (Figure 2, Panel B). Overall, 65.4 percent of teachers chose benefit durations that matched with their reported plan types, thus they were more likely to know how long benefits will last in their actual retirement plans. Teachers reporting FAS enrollment were correct about benefit duration 74.9 percent of the time while 63.9 percent of hybrid respondents were correct. In contrast, less than half of the teachers indicating enrollment in DC or CB plans were correct in identifying how long those benefits will last, suggesting one potential educational hurdle when implementing these alternative plans.

Employee Contributions. Another question asked teachers how much they contribute to their retirement plans and how much their employers contribute as a percent of their salary. As shown in Table 1, Panel B, the distribution of responses to the employee contribution question was highly skewed: the average response was 13.08 percent while the median response was 7 percent. The standard deviation was 22.67 percentage points. The fifth percentile was 0 percent and the 95th percentile was 50 percent.[20]

[20] Kernel density plot available in Appendix Figure D.2.

Many benefit tiers have more than one employee contribution rate. We use reported age and experience for tiers where contribution rates vary with age and experience, respectively.[21] New Mexico operates a tier where teachers' earnings place them into a contribution rate bracket. We use teachers' reported salaries to determine contribution rates in this case. Some tiers have progressive contribution rates where contribution rates vary for different salary brackets; we create a blended contribution rate for each respondent based on their reported salary.[22]

Teachers had difficulty identifying their contribution rates based on results in Figure 1. Only 2 percent of teachers knew their exact contribution rates. Less than 25 percent of respondents answered within one percentage point of the correct response. 54.5 percent of respondents identified a contribution rate to be within 5 percentage points of the actual rate and 74.8 percent estimated their contributions within 10 percentage points.

Experience does have large impacts on how well teachers guess their contribution rates (Table 2). While no first experience quartile teachers could identify their exact contribution rates, these inexperienced teachers were nearly as likely to pick a rate within 1 and 2.5 percentage points as their more experienced counterparts. In fact, bottom experience quartile teachers were the most likely to identify a contribution rate within 5 and 10 percentage points of the actual rate. Perhaps most interesting, over 20 percent of top experience quartile teachers did not pick a contribution rate within 10 percentage points of the actual rate.

Employer Contributions. The distribution of responses to the employer contribution question (Table 1, Panel B) was also highly skewed: the average response was 13.84 percent while

[21] Massachusetts, Michigan, New York, and New York City operate benefit tiers where employee contribution rates vary by years of service and Washington operates a tier where contributions vary by age.
[22] Delaware, Massachusetts, Michigan, New York, and New York City operate benefit tiers with progressive contribution rates.

the median response was 6 percent. The standard deviation was 26.32 percentage points. The fifth percentile was 0 percent and the 95th percentile was 75 percent.[23]

Many plans do not report employer contribution rates in membership handbooks, opting to explain that it is plan actuaries who determine a required contribution rate; employers pick up what is left over after employees contribute. When it is reported, the total employer contribution rate includes the employer's share of the normal cost and a payment on unfunded liabilities. The relevant component of employer contributions for our purposes is the employer's share of the normal cost since it represents the contribution required to pre-fund the benefits teachers earn in that year. We use data from the PPD on the employer's share of the normal cost rate as the correct employer contribution rate for this quiz question.[24] Because this measure is imperfect, we use a bandwidth around the value from the PPD to determine if respondents answered correctly.

Teachers had more difficulty identifying the employer contribution rates than their employee contribution rates based on results in Figure 1. No teachers knew their employer's exact contribution rate. Less than 15 percent of respondents answered within one percentage point of the correct response. Approximately 52 percent identified a contribution rate to be within 5 percentage points of the actual rate.

Results in Table 2 show that experience had a small impact on how well teachers guess their employee contribution rates, but early-career teachers were the most likely to be correct. Early-career teachers were 1.6 percentage points more likely to correctly identify their employer's contribution rate within one percentage point than mid-career teachers and were 3.3

[23] Kernel density plot available in Appendix Figure D.3.

[24] The employer's share of the normal cost rate and the total normal cost rate for New York and Saint Louis are not available in PPD. Since New York was nearly fully funded in 2020 (the funded ratio was 0.996), we substitute the difference between the total required contribution rate and the employee's share of the normal cost rate. We obtain the total normal cost rate for Saint Louis from its 2020 Comprehensive Annual Financial Report and use the difference between the total normal cost rate and the employee's share of the normal cost rate.

percentage points more likely than late-career teachers. Early-career teachers were 4.2 percentage points more likely to be correct within 2.5 percentage points than late-career teachers.

Sensitivity Checks for Retirement Knowledge

The previous results are the product of multiple assumptions and the two grading schemes (lenient and strict) operate on different samples. We perform several sensitivity checks to investigate how the different samples and assumptions impact estimates of teachers' retirement plan knowledge. The first two sensitivity checks investigate to what extent differences across grading schemes can be attributed to sample composition. Full results of these sensitivity checks are available in Appendix E.

First, the estimates from the lenient grading scheme generally correspond with a larger share of teachers answering the questions correctly than under the strict grading scheme. This divergence could be either the result of lenient grading or the sample composition since the strict grading scheme's sample omits teachers in states that can choose their retirement plan and teachers hired during transition years. We re-estimate the lenient grading scheme results for only the strict grading scheme's sample to shed light on if sample construction accounts for the differences between grading schemes.[25] Results when using the lenient grading scheme on the strict grading scheme's sample closely resemble the results of the lenient grading scheme on the full sample. These estimates suggest that it is, indeed, the different grading schemes that explain differences between grading schemes rather than sample composition.

The second check relaxes the two sample restrictions that form the strict scheme to see how these assumptions impact the strict estimates separately. The first restriction limits the sample to teachers that could only plausibly be enrolled in one plan. The second restriction limits the sample

[25] See Appendix Table E.1 for results.

to teachers who were not hired in transition years. Results from relaxing the two restrictions independently and together do not differ substantially from the strict results: the maximum difference between results is 1.6 percentage points and the median difference is 0.4 percentage points.

The final sensitivity check alters the hire year for teachers. Hire year had been determined using the difference between the year of survey administration and years of experience in the state, relying on the assumption that teachers have no breaks in service. This check relaxes the continuous service assumption by adding and subtracting 1, 3, and 5 years from the assumed hire year, which has the potential to place teachers into different plans.[26] The results do not differ substantially from the initial strict estimates: the maximum difference in estimates is 4.1 percentage points and the median difference is 0.4 percentage points.

V. RETIREMENT PREPARATION

We also evaluate teachers' retirement preparation using responses to seven survey questions including three financial literacy questions.[27] The responses to each question are available in Figure 3. Responses are reported for the full sample and by teachers' experience quartiles in their current state.[28]

In the general population, adults that have attempted to figure out how much to save for retirement are more likely to develop retirement saving plans, stick to those plans, and attend retirement seminars or consult with financial planners (Lusardi & Mitchell, 2011a). Over half of teachers in our sample have tried to develop a plan for their retirement (compared to 60 percent of

[26] See Appendix Table E.2 for results.
[27] See Appendix B.2 for question and answer text.
[28] When available, we use data from the Understanding America Study (UAS), an ongoing internet panel of American households run by the University of Southern California comprising a nationally representative sample of the entire U.S, to compare responses of other college graduates with teachers in the ATP sample.

college educated adults have tried to develop a plan for retirement).[29] While only 47 percent of early-career teachers have tried to develop such a plan, 52 percent of mid-career teachers have tried to develop a plan. The most senior teachers were the most likely to indicate they have tried to develop a plan, but 36 percent of teachers with top experience quartile teachers have not tried to develop a retirement plan.

The second question asked if teachers have any money saved for retirement separately from employer-sponsored plans. Since pensions only tend to benefit career teachers (e.g., Costrell & Podgursky, 2009), it is important to understand what steps teachers are taking aside from their employer-sponsored retirement plans. 71 percent of teachers indicate that they have some other money set aside, 27 percent have no other money set aside, and the remaining 2 percent do not know. Experience is associated with an increased likelihood of having additional money saved for retirement. Among first experience quartile teachers, 62 percent had money additional money set aside for retirement. The share rises to 83 percent among fourth experience quartile teachers.

Pensions can shortchange teachers who move across state lines (Costrell & Podgursky, 2010), but teachers may decide to move to a different state for a variety of reasons. 21 percent of our sample reported total years of experience as a teacher exceeding experience in their current state, and 11 percent have worked at least five years in a different state and 7 percent have worked at least 10 years.

One potential reason, though maybe not the most common reason for moving across state lines, would be to follow a spouse to a new job, but it seems likely that the spouse's job would also provide a retirement plan. The next two questions were only presented to the 85 percent of respondents who are or have ever been married or in a domestic partnership. We first asked

[29] This general population statistic uses data from UAS wave 113.

respondents if their partner participates in a separate retirement plan offered through their employer. Overall, 71 percent of respondents with partners report that their partner has a retirement plan offered through their employer. This rate did not meaningfully vary with experience. Another 23 percent of teachers indicated that their partners do not have a separate employer-offered retirement plan and 6 percent of teachers did not know.

Following the spouse's retirement plan question, we asked teachers whose retirement benefits they will primarily rely on in their retirement years: respondents' benefits or respondents' partners' benefits. Overall, 69 percent of teachers said they will rely equally on both their partners' and their benefits, 14 percent said they will rely on their benefits primarily, 8 percent of respondents said they will rely on their partner's benefits primarily, and 9 percent did not know. The share of respondents who will rely equally on both partners' benefits and the share who did not know is relatively constant with experience, but more experienced teachers indicated they would be more likely to rely on teaching-associated retirement benefits rather than their partners' benefits.

The final element of our retirement preparation module included three additional questions designed to measure financial literacy from Lusardi and Mitchell (2011b) and are correlated with retirement planning (Lusardi & Mitchell, 2007, 2011a).[30] 52 percent of respondents answered all three questions correctly (compared to 68 percent of college educated adults answered all three questions correctly).[31] Teachers with more experience were more likely to answer more questions correctly: 62 percent of top experience quartile teachers answered all three questions correctly

[30] The questions are related to compounding interest rates, inflation, and "risk diversification"; responses are multiple choice with an option for "don't know", which we consider to be an incorrect response.
[31] General population statistic uses data from UAS wave 121.

compared to 44 percent of bottom quartile teachers and 52 percent of teachers in the middle two experience quartiles.

VI. CONCLUSION

Retirement planning is important for all. For teachers, knowing how much to save personally for retirement depends on both employer-sponsored retirement plans and Social Security benefits. Understanding how retirement benefits work combined with strong retirement planning and financial literacy are key to financial wellbeing during retirement. We assess how much teachers know about their retirement and what basic steps they have taken to progress towards a comfortable and secure retirement using a nationally representative sample of public K-12 schoolteachers.

Our results show that teachers could know more about their retirement plans. While most teachers knew how their benefits are determined and how long benefits will last, respondents do not appear to be aware of how much they contribute, their retirement eligibility ages, nor who contributes to Social Security. Teachers with more experience demonstrated more knowledge of their retirement plans.

Our results also show that most teachers are taking steps toward preparing for retirement and that more experienced teachers are more likely to take these steps. Many teachers have tried to develop a plan for their retirement and have personal retirement savings. Most teachers that are or have been married report that their spouses have retirement plans and that they will rely equally on both sets of benefits.

These results have important implications for policy. First, given that teachers report they will be heavily reliant on only their retirement benefits or both their own and their spouses' benefits, it is important to consider the likelihood that these teachers will receive these retirement

benefits. Teacher retirement systems nationally lack the necessary assets to pay for all retirement benefits and have unfunded liabilities exceeding $600 billion (McGee, 2019; Novy-Marx & Rauh, 2011). States will have to respond to these financial pressures to ensure that teachers receive their benefits in retirement; the long-term viability of guaranteed FAS benefits is becoming questionable (McGee, 2019). Recent theoretical evidence suggests that teachers might actually prefer alternative retirement plans to FAS plans and that teachers may not value FAS plans highly (Fuchsman et al., 2020; McGee & Winters, 2019). Reforming retirement plans to plan types that are fiscally safer for taxpayers might be the best way to ensure that teachers are taken care of in their retirement years.

Second, teachers were more likely to know how long their benefits will actually last than how long benefits will last in the plan they thought they were enrolled in. This might suggest that knowledge of how the different retirement plans operate is lacking, but this knowledge gap might be the result of what teachers value. Teachers place a larger value on elements of retirement plans such as how large benefits are and when they will be eligible to retire than they place on how those benefits are determined (Fuchsman et al., 2020). Teachers likely value how long they will receive benefits more than how those benefits are set. Further research should consider which retirement plan features are important to teachers.

Third, the lack of knowledge of how Social Security works is noteworthy. While 9 out of 10 respondents knew that someone contributes to Social Security on their behalf, only 4 out of 10 knew that both employees and employers contribute. Over half of respondents thought that only they or their employer contribute to Social Security, with most of these respondents believing they are the only ones who contribute to Social Security. Social Security is a benefit that teachers place

a large value on (Fuchsman et al., 2020), but teachers appear unaware that employers provide this benefit.

Finally, these results suggest that employers and teacher preparation programs should do more to educate teachers about their retirement benefits, especially for less experienced teachers. If teachers are unaware how their benefits are set and do not know if they will receive Social Security benefits, then they may not be saving enough on their own. Policymakers should design information interventions that give teachers the information they need to set themselves up for a long, comfortable, and secure retirement.

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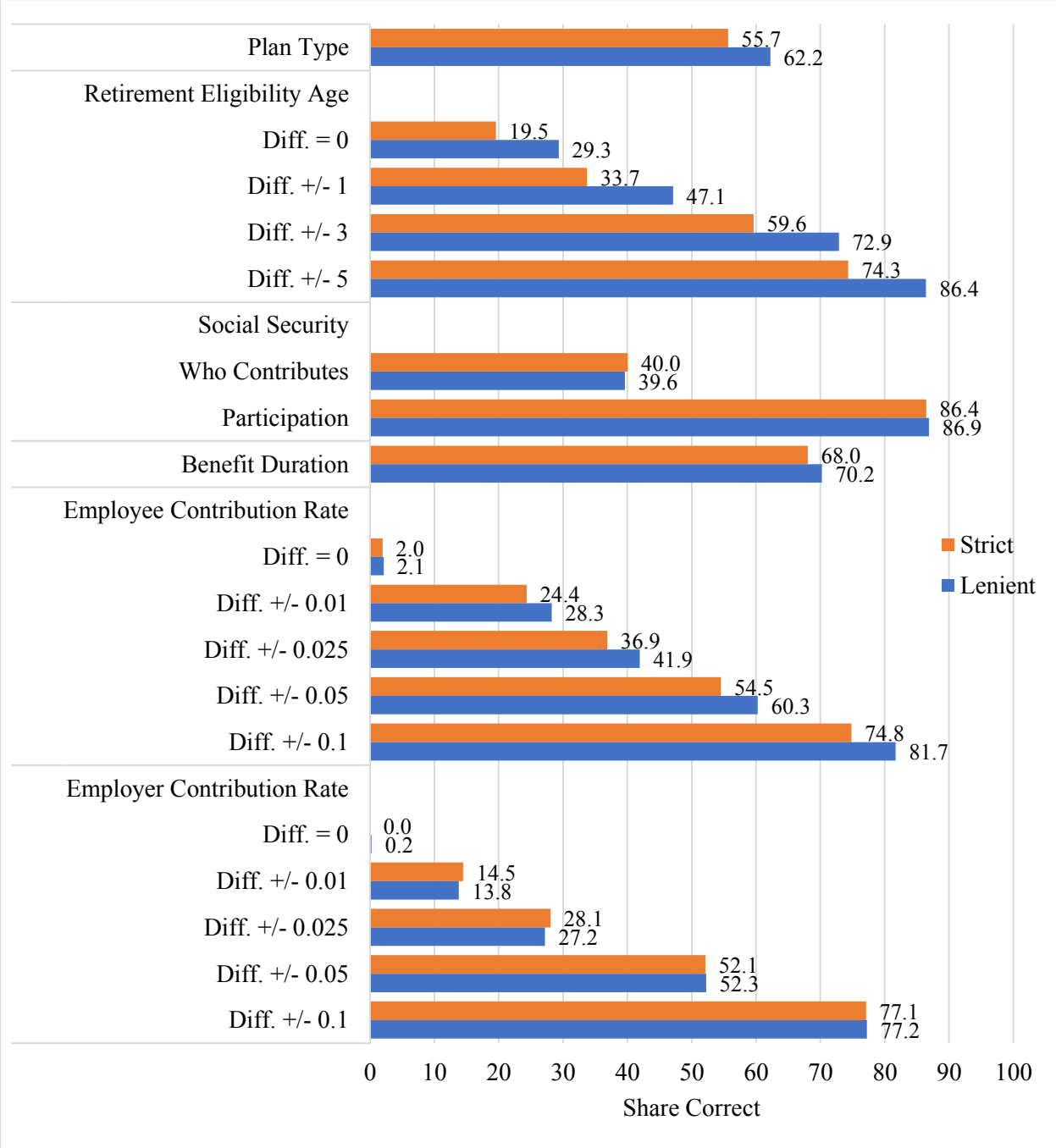
FIGURES

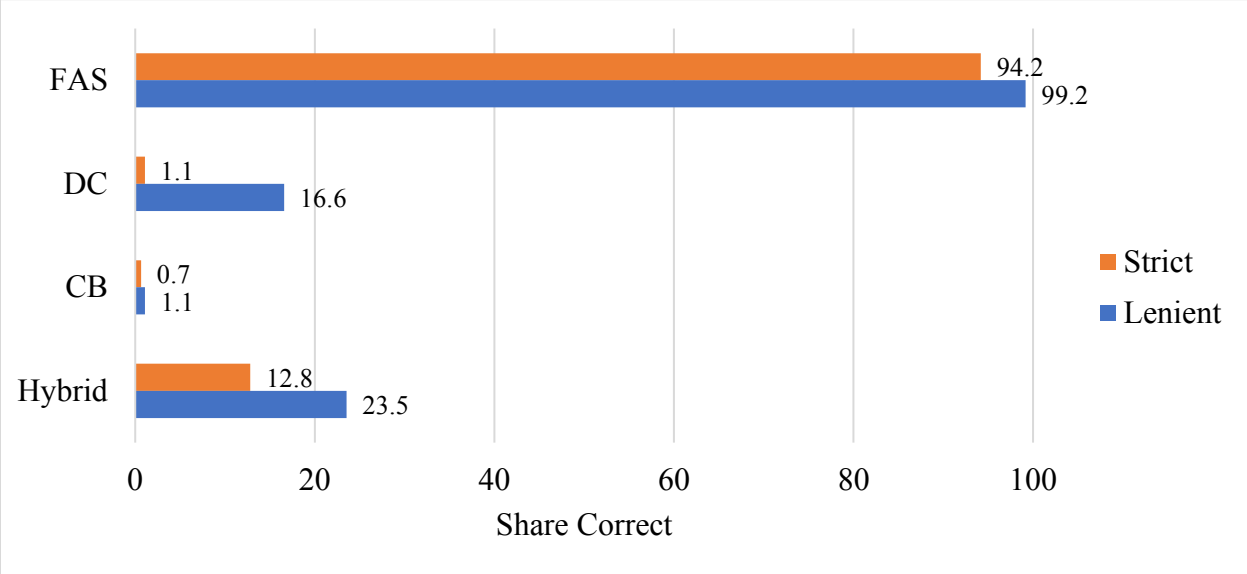
Figure 1: Share Correctly Answering Retirement Plan Knowledge Questions



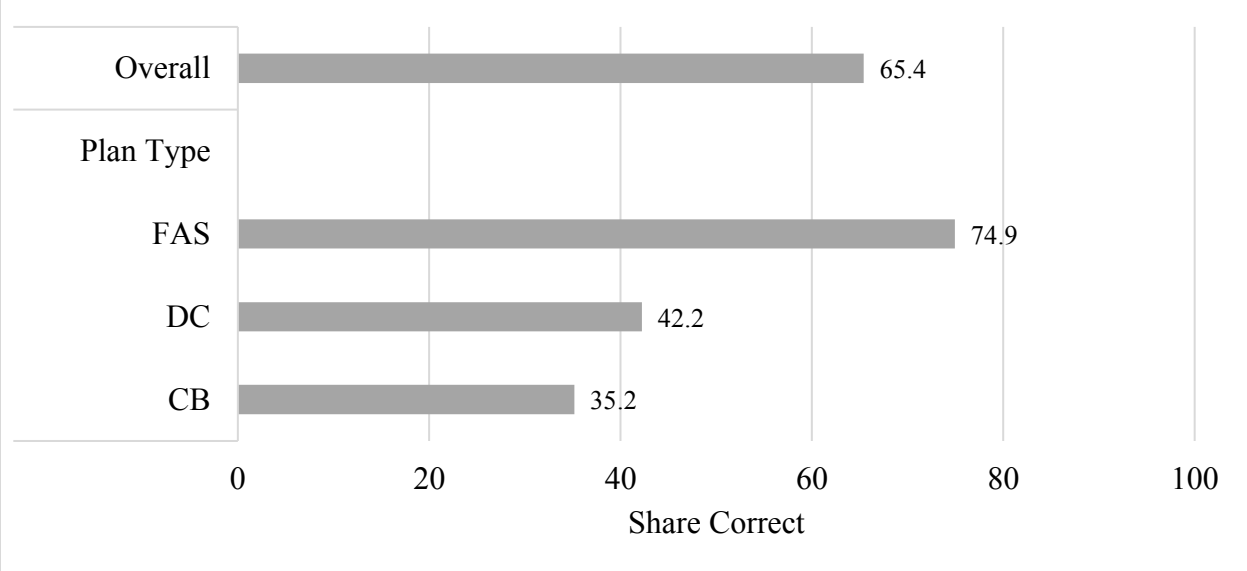
Notes: Lenient grading scheme compares teachers' answers to all potential responses in teachers' states and grades responses as correct if they could have been correct given each state's plan parameters. Strict grading scheme limits correct responses to only those that are most likely correct given teachers' reported years of experience in the state. Strict grading omits teachers that could choose which plan to enroll in or were hired in plan transition years. Differences refer to the difference between reported and actual employee contribution rates and retirement eligibility ages. Question and answer text available in Appendix B. Probability weights included.

Figure 2: Heterogeneity by Retirement Plan Type Response

Panel A: Share Correctly Identifying Plan Type by Reported Plan Type

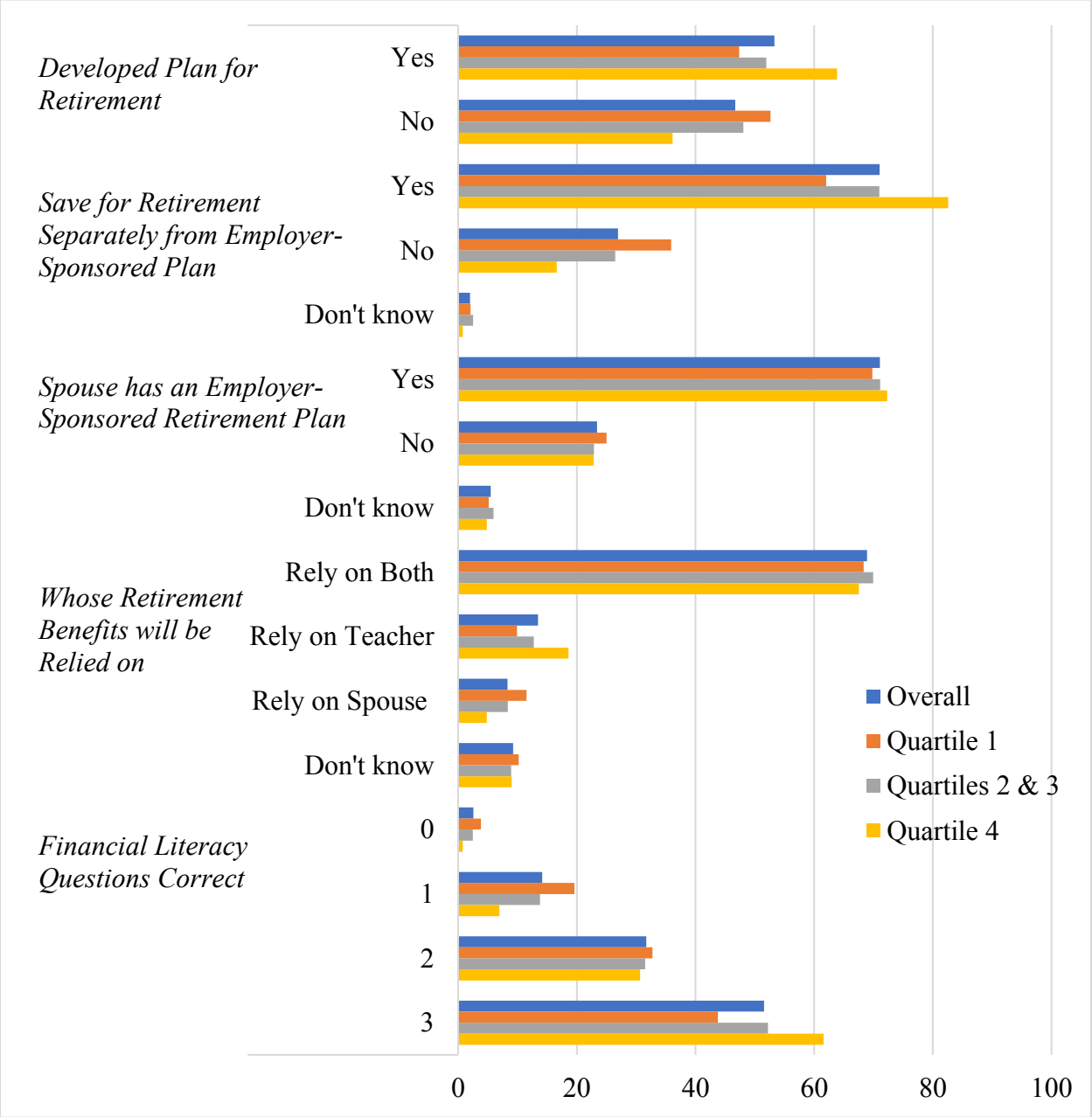


Panel B: Share Correctly Identifying Benefit Duration by Reported Plan Type



Notes: Panel A shows share correctly identifying retirement plan type by which plan respondents selected. Panel B shows share correctly identifying the benefit duration corresponding to the retirement plan selected in plan type question. Lenient grading scheme compares teachers' answers to all potential responses in teachers' states and grades responses as correct if they could have been correct given each state's plan parameters. Strict grading scheme limits correct responses to only those that are most likely correct given teachers' reported years of experience in the state. Strict grading omits teachers that could choose which plan to enroll in or were hired in plan transition years. Question and answer text available in Appendix B. Probability weights included.

Figure 3: Retirement Preparation Responses



Notes: Question and answer text available in Appendix B. Quartiles refer to experience in the state. Respondents in first experience quartile have less than or equal to 8 years of experience in the state; respondents in the second and third experience quartile have between 9 and 19 years of experience in the state; respondents in the fourth experience quartile have greater than or equal to 20 years of experience in the state. Probability weights included.

TABLES

Table 1: Sample Summary Statistics

Panel A: Teacher Characteristics

	N	Mean	SD	Min	Max
Female	5430	0.78		0	1
Hispanic	5394	0.08		0	1
White	5394	0.83		0	1
Black	5394	0.08		0	1
Asian	5394	0.03		0	1
Married or Domestic Partnership	5210	0.74		0	1
Widowed	5210	0.01		0	1
Divorced	5210	0.09		0	1
Separated	5210	0.01		0	1
Singe, Never Married	5210	0.15		0	1
Elementary Teacher	5210	0.44		0	1
Secondary Teacher	5210	0.56		0	1
Experience in State	5211	14.73	8.2	0	52
Age	5174	44.15	10.65	20	98

Notes: Unweighted responses.

Panel B: Summary of Retirement Knowledge Question Responses

	N	Mean	SD	5th Percentile	Median	95th Percentile
Plan Type						
FAS	5257	0.52				
DC	5257	0.13				
CB	5257	0.06				
Hybrid	5257	0.28				
Employee Contribution Rate	5209	13.08	22.67	0	7	50
Employer Contribution Rate	5204	13.84	26.32	0	6	75
Retirement Eligibility Age	5228	59.97	7.23	52	60	68
Benefit Duration						
As long as I live	5229	0.70				
For a fixed time	5229	0.07				
Until the money runs out	5229	0.22				
Other	5229	0.01				
Social Security						
Employee Contributes	5227	0.41				
Employer Contributes	5227	0.15				
Both Contribute	5227	0.16				
Neither Contribute	5227	0.29				

Notes: Question and answer text available in Appendix B. Unweighted responses.

Table 2: Share Correctly Answering Knowledge Questions by Experience Quartile

	Grading Scheme	Early-Career	Mid-Career	Late-Career
Plan Type	Strict	49.7	55.1	62.6
	Lenient	55.0	62.4	71.1
Retirement Eligibility Age				
Diff. = 0	Strict	18.0	19.5	21.3
	Lenient	27.1	29.2	32.5
Diff. +/- 1	Strict	27.0	33.7	40.6
	Lenient	39.9	47.2	56.3
Diff. +/- 3	Strict	54.5	58.4	67.2
	Lenient	66.5	72.7	81.4
Diff. +/- 5	Strict	71.5	73.1	79.6
	Lenient	82.7	86.5	91.1
Social Security				
Who Contributes	Strict	33.2	40.7	45.8
	Lenient	33.1	40.7	45.7
Participation	Strict	78.5	88.2	91.2
	Lenient	80.2	88.7	91.3
Benefit Duration	Strict	54.4	68.6	80.7
	Lenient	58.8	71.4	82.3
Employee Contribution Rate				
Diff. = 0	Strict	0.0	2.5	2.8
	Lenient	0.3	2.6	3.5
Diff. +/- 0.01	Strict	23.1	23.8	26.7
	Lenient	27.3	28.1	29.6
Diff. +/- 0.025	Strict	36.4	35.2	40.6
	Lenient	41.7	41.1	43.9
Diff. +/- 0.05	Strict	57.3	52.9	54.8
	Lenient	61.9	59.8	58.9
Diff. +/- 0.1	Strict	79.2	74.4	71.3
	Lenient	83.4	81.7	79.4
Employer Contribution Rate				
Diff. = 0	Strict	0.0	0.0	0.0
	Lenient	0.1	0.3	0.2
Diff. +/- 0.01	Strict	16.1	14.5	12.8
	Lenient	15.1	13.5	12.5
Diff. +/- 0.025	Strict	28.2	28.9	26.3
	Lenient	27.8	27.1	26.4
Diff. +/- 0.05	Strict	54.9	51.3	50.8

Diff. +/- 0.1	Lenient	54.7	51.3	50.8
	Strict	79.7	77.2	74.2
	Lenient	80.1	77.1	73.5

Experience Range	Less than 9	Between 9 & 19	More than 19

Notes: Experience range determined using experience in state quartiles: early-career respondents are in the first experience quartile, mid-career respondents are in the second or third experience quartiles, late-career respondents are in the fourth experience quartile. Question and answer text available in Appendix B. Probability weights included.

APPENDIX A: NUMBER AND TYPES OF RETIREMENT PLANS

Appendix Table A.1: Number of Benefit Tiers per State/Municipality

Benefit Tiers	States/Municipalities				
1	AR	CT	GA	ID	SL
2	AL	CA	CH	DE	DC
	IL	IN	IA	KC	MD
	MN	MO	MT	NC	SD
	TN	WV	WI	WY	
3	AK	AZ	KS	KY	MS
	ND	OR	SC	VT	VA
4	FL	HI	LA	ME	NE
	NH	NM	NY	NYC	OK
5	MA	NJ	SP	UT	
6	CO	NV	TX		
9	OH	PA			
12	RI				
14	WA				
15	MI				

Notes: Benefit tiers are the number of unique plan parameter combinations that a teacher could be enrolled in. There are 210 benefit tiers spread across the 56 states and municipalities. CH is Chicago, IL; KC is Kansas City, MO; NYC is New York City, NY; SL is Saint Louis, MO; SP is Saint Paul, MN.

Appendix Table A.2: Plan Types by State/Municipality

Plan Type	States/Municipalities				
FAS	AL	AK	AZ	AR	CA
	CH	CO	CT	DE	DC
	FL	GA	HI	ID	IL
	IA	KS	KC	KY	LA
	ME	MD	MA	MI	MN
	MS	MO	MT	NE	NV
	NH	NJ	NM	NY	NYC
	NC	ND	OH	OK	PA
	RI	SL	SP	SC	SD
	TN	TX	UT	VT	VA
	WA	WV	WI	WY	
DC	AK	FL	IN	MI	OH
	PA	SC	UT		
CB	KS				
Hybrid	HI	IN	MI	OH	OR
	PA	RI	TN	UT	VA
	WA				

Notes: Plan types refer to general structure of benefit accrual; see text for explanation of different plan types. FAS plans and final average salary plans; DC plans are defined contribution plans; CB plans are cash balance plans; hybrid plans combine elements of FAS and DC plans. There are 74 state/municipality-plan type combinations. CH is Chicago, IL; KC is Kansas City, MO; NYC is New York City, NY; SL is Saint Louis, MO; SP is Saint Paul, MN.

APPENDIX B: SURVEY QUESTION AND ANSWER TEXT

Appendix B.1: Retirement Knowledge

Retirement Plan Type:

Most retirement plans require employee and employer contributions. However, plans differ on how benefits are earned. Below are 3 descriptions of common plans.
Please click on the plan description that most closely resembles the primary retirement plan offered through your current teaching job.
If you do not know, please make your best guess.

1. Some retirement plans base benefits on a formula involving a person's age, years of service, and salary.
2. Some retirement plans base benefits on how much money has accumulated in a person's individual account from employee contributions, employer contributions, and investment returns.
3. Some retirement plans base benefits on how much money has accumulated in a person's individual account from employee contributions, employer contributions, and investment returns with a minimum guarantee.
4. My primary employer-provided retirement plan combines plans that match options 1 and 2.

Retirement Eligibility Age:

At what age would you be eligible for full retirement benefits from teaching under your current employer-provided retirement plan?
Please do not include early retirement eligibility. If you do not know, please make your best guess.

____ years old

Social Security:

Do you currently contribute part of your teaching salary to Social Security or does your school district contribute on your behalf?
If you do not know, please make your best guess.

1. I do
2. My school district does

3. Both my school district and I do
4. No

Benefit Duration:

Once you retire from teaching, how long will you be able to receive monthly payments from your primary employer-provided retirement plan?

If you do not know, please make your best guess.

1. As long as I live
2. For a fixed time
3. Until the money runs out
4. Other, please specify _____

Employee and Employer Contributions:

As a percent of your teaching pay each month, how much is currently contributed to your current employer-offered retirement plan:

If you do not know, please make your best guess.

1. By me: ___ percent (please choose an answer between 0 and 100)
2. By my employer: ___ percent (please choose an answer between 0 and 100)

Appendix B.2: Retirement Preparation

Retirement Planning:

Have you ever tried to develop a plan for your retirement?

1. Yes
2. No

Separate Retirement Savings:

Do you have any money set aside for retirement separately from your employer-offered retirement plan?

1. Yes
2. No
3. Don't know

Partner has Separate Retirement Plan

Does/did your partner participate in a separate retirement plan offered through their employer?

1. Yes
2. No
3. Don't Know

Whose Benefits Teachers will Rely On:

Will you rely equally on both your and your partner's retirement benefits during your retirement years?

1. Yes, we will rely equally on both mine and my partner's retirement benefits
2. No, we will primarily rely on my retirement benefits
3. No, we will primarily rely on my partner's retirement benefits
4. Don't know

APPENDIX C: SUMMARY STATISTICS FOR STRICT SAMPLE

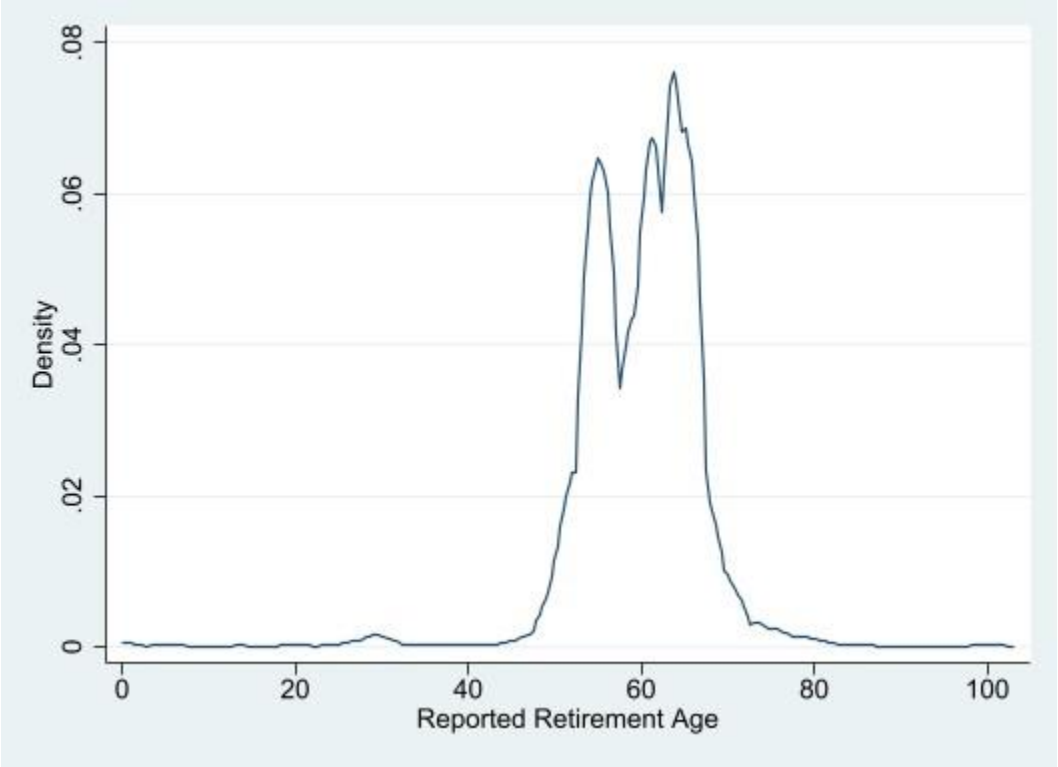
Appendix Table C.1: Summary Statistics for Strict Sample

	N	Mean	SD	Min	Max
Female	4076	0.78		0	1
Hispanic	4085	0.07		0	1
White	4085	0.84		0	1
Black	4085	0.08		0	1
Asian	4085	0.03		0	1
Married or Domestic Partnership	4092	0.74		0	1
Widowed	4092	0.01		0	1
Divorced	4092	0.1		0	1
Separated	4092	0.01		0	1
Singe, Never Married	4092	0.14		0	1
Elementary Teacher	4091	0.44		0	1
Secondary Teacher	4091	0.56		0	1
Experience in State	4094	15.67	8.42	0	52
Age	4064	44.91	10.64	20	98

Notes: Sample excludes teachers that could choose which plan to enroll in or were hired in plan transition years. Unweighted responses.

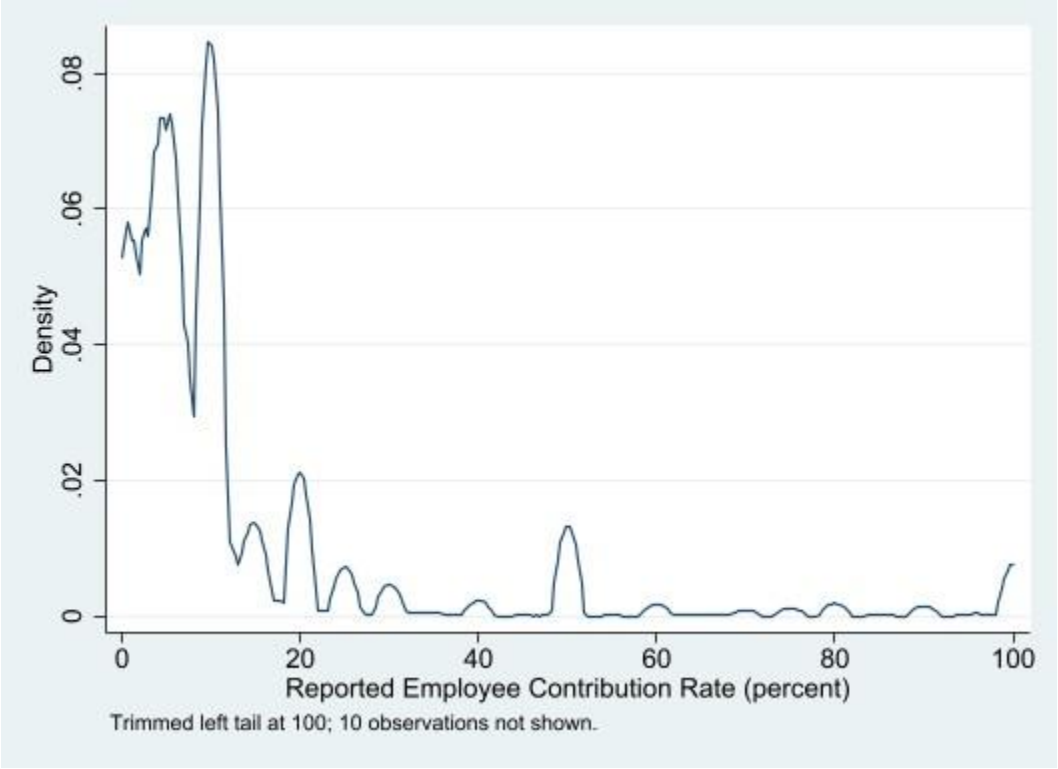
APPENDIX D: DISTRIBUTION OF RETIREMENT KNOWLEDGE QUESTION RESPONSES

Appendix Figure D.1: Distribution of Reported Retirement Eligibility Ages



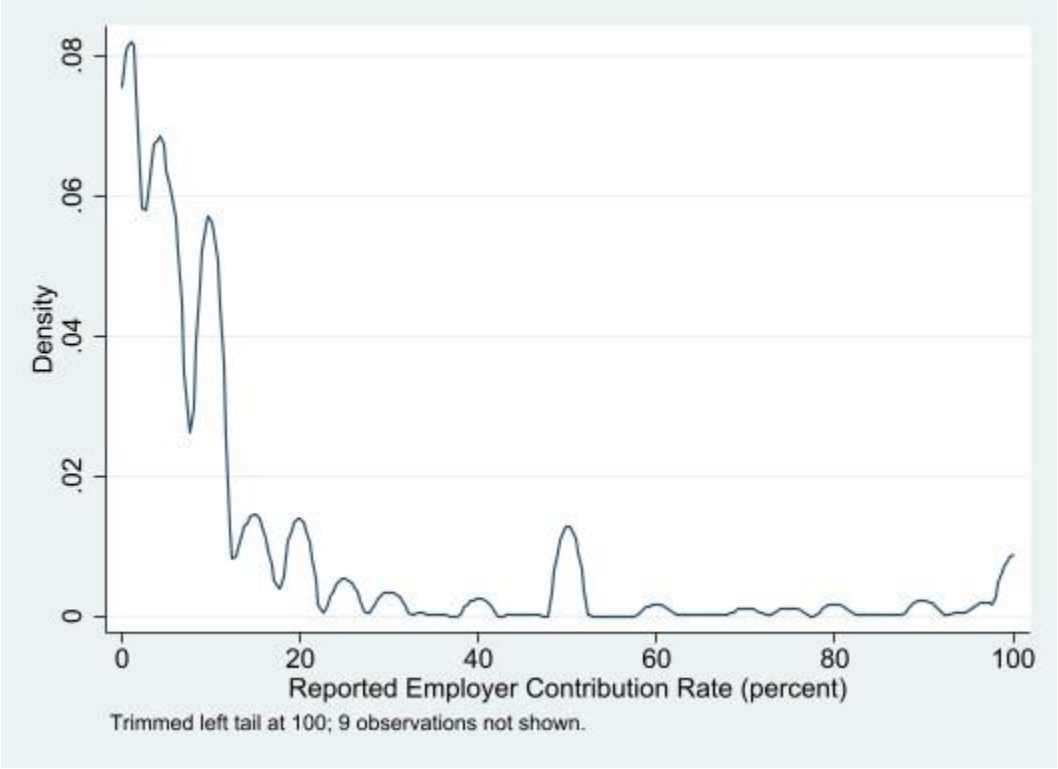
Note: Unweighted responses.

Appendix Figure D.2: Distribution of Reported Employee Contribution Rates



Note: Unweighted responses.

Appendix Figure D.3: Distribution of Reported Employer Contribution Rates



Note: Unweighted responses.

APPENDIX E: SENSITIVITY CHECKS OF KNOWLEDGE RESULTS

Appendix Table E.1: Alternative Grading Schemes

	Strict	Lenient	Lenient, Strict Sample	Any Plan	Any Year	Any Plan, Year
Plan Type	55.7	62.2	61.2	56.1	55.8	56.2
Retirement Eligibility Age						
Diff. = 0	19.5	29.3	28.9	20.0	19.2	19.6
Diff. +/- 1	33.7	47.1	47.4	34.0	32.8	33.1
Diff. +/- 3	59.6	72.9	73.5	59.4	59.2	59.1
Diff. +/- 5	74.3	86.4	86.6	74.7	73.9	74.3
Social Security						
Who Contributes	40.0	39.6	40.0	39.4	40.3	39.6
Participation	86.4	86.9	86.4	87.0	86.3	86.8
Benefit Duration	68.0	70.2	69.4	69.6	67.1	68.7
Employee Contribution Rate						
Diff. = 0	2.0	2.1	2.1	1.9	1.8	1.8
Diff. +/- 0.01	24.4	28.3	26.8	25.4	24.5	25.4
Diff. +/- 0.025	36.9	41.9	40.4	38.0	37.4	38.4
Diff. +/- 0.05	54.5	60.3	59.3	55.3	54.8	55.4
Diff. +/- 0.1	74.8	81.7	81.3	75.0	75.5	75.5
Employer Contribution Rate						
Diff. = 0	0.0	0.2	0.2	0.0	0.0	0.0
Diff. +/- 0.01	14.5	13.8	14.5	13.6	14.7	13.8
Diff. +/- 0.025	28.1	27.2	28.1	26.8	28.4	27.2
Diff. +/- 0.05	52.1	52.3	52.1	51.7	52.7	52.2
Diff. +/- 0.1	77.1	77.2	77.1	76.8	77.5	77.1

Notes: Lenient grading scheme compares teachers' answers to all potential responses in teachers' states and grades responses as correct if they could have been correct given each state's plan parameters. Strict grading scheme limits correct responses to only those that are most likely correct given teachers' reported years of experience in the state. Strict grading omits teachers that could choose which plan to enroll in or were hired in plan transition years. Lenient and Strict columns report same estimates as Figure 2. Lenient, Strict Sample uses Lenient grading scheme with

Strict sample restrictions. Any Plan grading scheme is Strict scheme but allows for teachers to choose plans. Any Year grading scheme is Strict grading scheme but allows for teachers hired in plan transition years. Any Plan, Year grading scheme is Strict grading scheme but allows for teachers to choose plans and for teachers hired in plan. Differences refer to the difference between reported and actual employee contribution rates and retirement eligibility ages. Question and answer text available in Appendix B. Probability weights included.

Appendix Table E.2: Alternative Hire Year for Strict Grading Scheme

	Minus 5 Years	Minus 3 Years	Minus 1 Year	Strict	Plus 1 Year	Plus 3 Years	Plus 5 Years
Plan Type	55.2	55.8	56.0	55.7	55.7	55.9	55.7
Retirement Eligibility Age							
Diff. = 0	17.7	18.5	19.1	19.5	19.7	19.0	18.8
Diff. +/- 1	31.5	32.5	33.2	33.7	33.1	32.4	31.7
Diff. +/- 3	55.5	57.3	58.7	59.6	59.8	59.3	58.4
Diff. +/- 5	71.2	72.7	73.9	74.3	74.6	74.7	74.7
Social Security							
Who Contributes	39.4	40.1	40.6	40.0	40.7	40.3	39.9
Participation	86.5	86.4	86.8	86.4	86.2	86.0	85.6
Benefit Duration	67.0	67.2	67.9	68.0	67.6	67.6	67.2
Employee Contribution Rate							
Diff. = 0	1.8	1.9	1.9	2.0	1.9	1.7	1.5
Diff. +/- 0.01	24.7	24.6	24.4	24.4	24.6	24.3	23.9
Diff. +/- 0.025	38.0	37.8	37.2	36.9	37.4	37.1	37.1
Diff. +/- 0.05	54.9	54.9	54.8	54.5	55.0	55.0	55.1
Diff. +/- 0.1	75.7	75.7	75.5	74.8	75.6	75.6	75.8
Employer Contribution Rate							
Diff. = 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diff. +/- 0.01	14.3	14.5	14.7	14.5	14.9	15.1	14.8
Diff. +/- 0.025	28.0	28.3	28.4	28.1	28.4	28.9	28.3
Diff. +/- 0.05	52.3	52.6	52.5	52.1	52.9	52.7	52.7
Diff. +/- 0.1	77.3	77.5	77.4	77.1	77.5	77.5	77.3

Notes: Only uses Strict grading scheme. Strict column reports same estimates as Figure 2. Each column changes the approximate year of hire by plus or minus 1, 3, or 5 years. Differences refer to the difference between reported and actual employee contribution rates and retirement eligibility ages. Question and answer text available in Appendix B. Probability weights included.

SPECIAL ISSUE

Teacher Pensions: An Overview

Kata Mihaly[1] and Michael Podgursky[2,3]

This article provides an overview for the special issue and a framework for thinking about the included papers. We begin by explaining why teacher pensions is a topic that should be of interest to the broader education research community and not just specialists in school finance or teacher compensation. Pension costs now account for 11% of K–12 operating expenditures—a share that has been steadily rising. The question for the education research community is whether these expenditures represent the best way to recruit, retain, and motivate high-quality teachers. We briefly review the current pension landscape with an explanation of how these plans work, trends in costs and expenditures, and changes that have been discussed or implemented. We then provide a brief literature review. Finally, we discuss how the articles in this special issue contribute to the literature on such topics as the influence of teacher pension policies on school staffing and workforce quality, teacher preferences for retirement plans, and the sustainability of plans.

Keywords economics of education, educational policy, finance, retention, teacher research, econometric analysis, policy analysis

Introduction

Teacher pensions are a large and costly expenditure for state education systems. Employer costs for public teacher pensions have risen sharply over the last 15 years—from 10.5% of salaries in 2004 to 24.7% by June 2021. By contrast, employer retirement benefit costs for private-sector professionals over the same time period have been nearly flat, at about 10% of salaries.[1] In current dollars, employer teacher pension costs (excluding Social Security and teacher contributions) amounted to $577 per student, or 4.8% of per-student expenditures, in March 2004. By June 2021, these costs had risen to $1,606 per student, or 11.5% of per-student expenditures.[2] These rising pension costs have been a source of fiscal stress and have forced districts to cut spending in other areas, including teacher salary increases and programs for students (Moody & Randazzo, 2020).

Despite these rising pension costs, issues of pension finance, workforce effects, and funding reform are poorly understood by many education policy makers and researchers. At the individual teacher level, retirement benefits are a significant portion of compensation, but realized benefits from teacher and employer contributions are very unequally distributed. More broadly, increases in district and state pension costs can crowd out spending on teacher salaries, school building improvements, and programs to support students. Most of these increases in costs arise from inadequate funding for prior promised benefits.

In this special issue of *Educational Researcher*, we present research on a variety of policy issues surrounding teacher pensions. How do these plans work? What incentives do they create? What does research tell us about how teachers respond to these incentives? Are these plans an efficient way to recruit and reward public school teachers? Would teachers prefer alternatives? And, finally, are these current plans sustainable? The articles in this special issue use a variety of quantitative methods to address these questions, including descriptive analysis, regression analysis, modeling, and simulations.

Unlike most private-sector professionals and many college professors, public K–12 educators are nearly universally enrolled in defined-benefit (DB) pension plans. Under a DB system, the plan (typically a statewide retirement plan) provides teachers with an annuity at retirement, the value of which is based on years of service and the teacher's salary in the final years of their career. In principle, these plans are supposed to be prefunded, meaning that at any point in time, the assets on hand are adequate to pay for the liabilities (current and future promised pension payments) that have been accrued. Maintaining adequate funding for these plans has become a large and growing expense for school districts and state governments. Various reasons have

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contributed to these rising public-sector costs, including pension enhancements during the 1990s, failure of states to make adequate contributions to fund the plans, and shortfalls in assumed versus actual returns on plan assets, all of which are explored in more detail in Biggs (2023).

Most plans covering public school teachers are contributory, in that teachers and districts make contributions (the relative shares are typically set by statute). The rising public school employer costs noted above do not include these teacher contributions, which average about 6% or more of salary—and are increasing (Biggs, 2023). Nor do they include retiree health insurance costs, which can be substantial for many school districts, given that most teachers retire prior to becoming eligible for Medicare at age 65. Prior to the Covid-19 recession, there was a considerable range of experience across states, with some state plans in serious fiscal trouble, while others were in relatively stable financial shape. The current recession is likely to cause further fiscal deterioration and greater pressures for plan restructuring (Biggs, 2023).

One type of restructuring under consideration is shifting teachers from DB to defined-contribution (DC) plans, where payments after retirement are based on the amounts contributed by the teacher and the employer to an individual retirement account owned by the teacher.[3] The only employer obligation in a DC plan is to make a contribution to an employee's retirement account each year. Once that contribution is made, the employer has no further obligation. Thus, DC plans are never "underfunded," and the costs of these plans are known upfront and quite transparent. As Costrell (2023) notes, DC plans incur no "hidden costs" for state governments. Of course, a cost for teachers in a DC plan is that they, not the state government, bear the risks associated with investing to ensure an adequate retirement income. Ohio and Florida allow newly hired teachers to choose between a DB or a fiscally equivalent DC plan. A few states have placed new teachers in "hybrid plans" that combine DB and DC plans—typically a scaled-down DB plan, with teacher contributions going into a DC plan. Although DB plans were once commonplace for larger private employers, they have now largely disappeared in the private sector, having been replaced by various types of DC plans. In the United States, most employees covered by DB plans are public school teachers and other state and local employees (Butricia et al., 2009; Munnell, 2012).

In this introductory essay, we provide an explanation of how teacher pension plans work and a summary of the contributions made by the articles in this special issue. Earlier drafts of these articles were presented at a research conference hosted by the RAND Corporation, *Connecting Evidence-Based Research to Pension Reform*, on April 19, 2018.

How Teacher Pension Plans Work

Most public educator retirement plans are administered at the state level (Doherty et al., 2015; Hansen, 2010), although a few municipal plans remain (e.g., New York City, Chicago, and Saint Louis). Nearly all of these plans, whether state or municipal, use a formula such as the following to determine the annual benefit that a vested teacher receives at retirement:

$$B = F * YOS * FAS$$

In this equation, B represents the annual benefit, F is a formula factor (also called benefit factor) and is the percentage of pay the retiree is entitled to after retirement for each year of service, usually 1.5%–2.5% per year. *YOS* indicates years of service in the system, and *FAS* is the teacher's final average salary, commonly calculated as the average of the final (highest) few years of earnings. In many plans, annuity payments are increased over time according to cost of living adjustments (COLAs), which are meant to maintain the spending power of the annuity in the face of inflation.

Each plan has its own rules that determine retirement eligibility. Once teachers become eligible for retirement, they can begin collecting their pension. Eligibility is based on some combination of age and/or years of service in the system. In Missouri, for example, teachers are eligible for a full pension if they have 30 years of service, if they have reached age 60 with at least 5 years of service, or if their age added to number of service years totals at least 80 ("rule of 80"). Many states also have rules that permit a teacher to retire with reduced benefits at a younger age or with fewer service years. In Missouri, the early-retirement provision is called "25 and out." It allows teachers to retire and begin collecting benefits immediately, at any age, once they have worked for 25 years in the system. In nearly all of these plans, once teachers retire and begin collecting their annuity, they generally cannot return to full-time work in a school district covered by the plan. (The retired teacher can work without penalty in a private school or a public school in another state. Part-time work in the same plan—up to a maximum number of hours—is also typically permitted.)

Teachers are not automatically entitled to a pension (i.e., "vested") when they start working. Vesting typically takes 3–5 years, although Doherty et al. (2015) report that 13 states now require 10 years of service for new teachers to be vested. Roughly 40% of public school teachers are employed in states or districts in which they are not covered by Social Security, which means that if these teachers quit prior to being vested, they have no retirement benefits (until some type of covered employment occurs).[4]

The complicated rules regarding the calculation of the annuity, eligibility, vesting, and so forth vary from state to state and seemingly make cross-state comparisons of plan generosity difficult. However, tools from the larger finance economics literature allow us to compute comparable measures of the value of retirement benefits as they accrue over a teacher's work life in different plans. *Pension wealth* (PW) is a simple measure of the cash value of a pension at any point in a worker's career, in *present discounted value*.

Figure 1 shows PW accrual over time for a representative mid-career teacher in Missouri who begins their career at the age of 25—the modal age for beginning teachers in the state (for PW graphs for other states, see Backes et al., 2016; Costrell & Podgursky, 2009). The figure shows the value of retirement benefits as a function of when the teacher leaves their position.

Notice that the teacher accumulates no PW until they are 29 (due to the vesting rules in the state), and PW accrues very slowly in their early years. There are two main reasons for this.

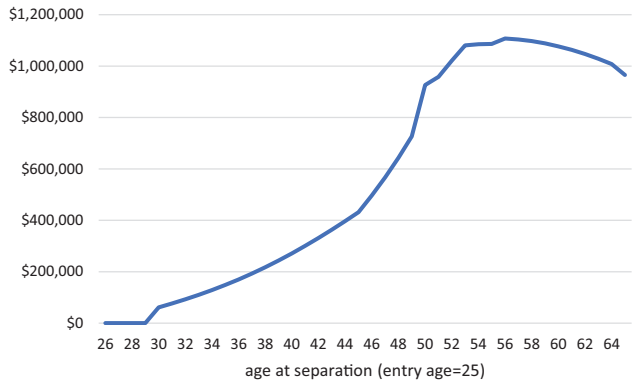

FIGURE 1. *Pension Wealth Accrual for a Typical Missouri Public School Teacher.*

Continuing with our example, if a teacher exits after year 5, one reason for low PW is that the final-average-salary calculation is held fixed until retirement. So, for the teacher who quits after their fifth year, the annuity they collect at age 60 is based on their salary in their late 20s, unadjusted for inflation or lifecycle pay increases (COLAs, if any, are not made until after retirement). A second reason is that teachers who exit the system before the peak in Figure 1 collect fewer annuity payments. To understand this, note that the teacher who quits after 5 years must wait until age 60 to collect a pension, but an otherwise similar teacher who works continuously is eligible to retire with full benefits under the "rule of 80" when they are 52 years old and have 28 years of service in the system. That is, the full-career teacher is eligible to collect pension payments for 8 additional years relative to the early exiter.

Economists describe the payoff structure shown in Figure 1 as *backloaded*. It reflects the very powerful *pull* and *push* incentives that are built into these plans. At the front end of a teaching career, the plan exerts a strong retention effect, encouraging teachers to stay in the profession until they are eligible to collect a pension. Past this retirement date, however, PW actually decreases. This decrease is due to the fact that if the teacher does not retire and collect a pension, the benefits are lost—pension benefits cannot be collected while the teacher is working—and aside from a spouse, the benefits cannot be passed to children or relatives after the teacher dies. In other words, the pension has a "use it or lose it" character. The highly backloaded pattern of PW accrual shown in Figure 1—in particular, the "peak value" after which PW declines—is typical of plans in other states and municipalities and is a direct mathematical consequence of the types of rules built into these systems. Although contributions on behalf of teachers are identical as a percentage of salaries regardless of their age or experience, Figure 1 illustrates that not all teachers benefit equally. Teachers who retire at or near the peak value earn much higher benefits relative to contributions than do teachers who leave employment with, say, 10 or 15 service years. The reason is that the former never reaches the steeply sloped portion of the curve, where each additional service year adds very large gains in PW. Costrell (2023) highlights the redistribution from short- to long-career teachers implied by these types of plans (also see Costrell & Podgursky, 2010).

In addition to encouraging retirement within a narrow age or experience window, another consequence of this backloading is that it creates severe penalties for educator mobility between states. This issue is because the benefit formula and retirement rules depend on *system* service, not on overall teaching service. Educators who move from one state to another during their careers have much less PW than otherwise identical educators who spend an entire career in a single state (Costrell & Podgursky, 2010).

As noted earlier, private-sector employers, as well as many public-research universities, have largely converted to DC retirement plans. These tax-advantaged plans travel under many titles—for instance, 401(k), 403(b), individual retirement accounts (IRAs)—depending on the relevant employment situation, but their common feature is that the employer and the employee contribute to a retirement account owned by the employee. This account travels with the worker from job to job without penalty. Unlike the example shown in Figure 1, PW accrues smoothly over a career, without "pull" or "push" incentives. Nor is there a "use it or lose it" feature—unspent funds in a retirement account can be passed to heirs. Thus, as long the employee continues to work, PW rises. At this time, only one state (Alaska) has all of its public school teachers in a DC plan. However, several states have *hybrid* or mixed plans in which employer contributions go to a DB plan and employee contributions funnel to individual DC retirement accounts. Nonetheless, currently the vast majority of employed public school teachers are in traditional DB plans. (Charter schools in some states can opt out of the state teacher plans, and many have. See Pendergrass et al., 2018.)

Overview of Articles in This Special Issue

Below, we discuss three topics related to teacher pensions that are covered in this special issue: work force effects, teacher preferences, and plan sustainability.

Workforce Effects

Studies of senior teachers consistently show a high degree of responsiveness in retirement timing to pension system incentives (e.g., Brown, 2013; Costrell & McGee, 2010; Furgeson et al., 2006; Hosek et al., 2023; Knapp et al., 2016; Kong & Ni, 2023; Ni & Podgursky, 2016). For teachers and educational administrators, this timing means retiring at relatively young ages—typically in the mid- to late 50s.

This issue includes two new articles (Hosek et al., 2023; Kong & Ni, 2023) that contribute to the literature analyzing teacher responses to pension system incentives. Both of these articles estimate what are called "econometric structural models" that describe teacher decisions regarding work versus retirement.[5] In contrast to conventional reduced-form regression models, these authors use variation in pension-plan incentives over time and in a cross section to estimate the underlying preference structure of teachers regarding work versus retirement. An important benefit of this approach is that it is independent of any particular set of pension rules that is in place when teachers make their decisions. This independence makes it possible to

simulate the impact of alternative pension rules. Simulations using econometric structural modeling are especially beneficial for understanding teacher pensions because the full effects of a policy change may not be understood for decades, and there are no opportunities to conduct randomized studies to evaluate changes to pension plans.

Kong and Ni (2023) use their model to study the effects of Missouri teacher pension enhancements during the 1990s. After demonstrating the good in- and out-of-sample fit of their estimated model (overall and in comparison to a reduced-form probit), they examine the effects of various pension enhancements enacted during the 1990s. All of these enhancements reduced the number of expected remaining years of work for senior teachers in the short and long term. Because it is not legally possible to eliminate retirement benefit enhancements once they are given (except for new hires), the authors consider an interesting voluntary option: conversion to a DC plan. They analyze several alternative DC scenarios, most of which yield savings relative to the current DB plan. They show that a substantial share of senior teachers, depending on age and experience, would be willing to take the voluntary conversion. In the absence of a policy in place, it is not possible to compare these simulations to actual experience, but they do provide a useful economic foundation for thinking about changes in pension plan design.

Hosek et al. (2023) use their structural model to predict the take-up rate and costs of a $1,500 voluntary retirement incentive (VRI) that was proposed by Chicago Public Schools (CPS). VRIs are a way that many employers have attempted to lower payroll costs by encouraging earlier retirement among more expensive senior employees, who may then be replaced by less expensive new hires (or not replaced at all). Payroll cost reduction was the explicit goal of the CPS VRI, but the plan never hit the required take-up rate for implementation—the VRI was far too low to hit the threshold of 1,500 retirees. Moreover, even if a more generous VRI program had been put in place, it would have been unlikely to reduce district payroll costs. This article provides an excellent example of the value of structural models for simulating the labor supply and the fiscal effects of pension policies.

Teacher Preferences

The structural equation approaches in Kong & Ni (2023) and Hosek et al. (2023) highlight an important issue that is relatively understudied—namely, what do we know about teacher preferences regarding retirement benefits? In particular, would teachers prefer to trade higher upfront salaries for lower retirement benefits? A widely cited study by Fitzpatrick (2015) finds that a substantial share of Illinois teachers passed up an opportunity to purchase and upgrade their retirement annuity at a very low price. Based on her estimates, on average, teachers valued an additional dollar of retirement benefits at only roughly 20 cents. This valuation suggests very large inefficiencies in the compensation mix for teachers (i.e., teachers would be better off if some retirement benefits were reduced to finance higher upfront salaries). Other more recent studies analyze observed retirement behavior by Wisconsin teachers (Biasi, 2019) and a national sample of teachers in the RAND American Educator Panel (Fuchsman et al., 2020) and find that teachers seem to value a dollar of pension benefits at less than a dollar of current salary, although with not nearly as steep a discount as Fitzpatrick finds.

Goldhaber and Holden (2023) take up this question in an examination of Washington teachers. Washington State has a hybrid DC/DB plan that currently enrolls more than half the public school teachers. Washington is one of only two states with a hybrid plan that allows teachers a range of choices regarding their contribution to a DC plan (above a minimum of 5% of salary). Goldhaber and Holden show that the salary replacement rate under the DB plan (including Social Security) for a teacher near retirement in Washington is slightly higher than for a similar Illinois teacher (who is not covered by Social Security). Nonetheless, the vast majority of teachers (particularly senior teachers) choose to contribute more than the 5% minimum. On the face of it, this finding seems inconsistent with the low value of additional retirement benefits reported by Fitzpatrick. The issues of how much teachers value a dollar of retirement benefits versus a dollar of upfront salary and how much this value differs for junior and senior teachers are important considerations for efficient compensation design and school staffing. Goldhaber and Holden make a valuable contribution to this research literature.

Sustainability of Current Plans

Looming over all discussions of the workforce effects of these teacher pension plans is whether current plans are fiscally sustainable (i.e., whether current and future teacher contributions combined with expected returns on plan assets can cover promised benefits). If they are not, how much will it cost to make them sustainable, and what alternative reforms are feasible? Two articles in this issue take different, but complementary, approaches to this question.

Costrell (2023) takes a more theoretical approach and provides an informative framework for understanding the "Three R's" of pension plans—risk, return, and redistribution—for thinking about this complicated issue. He illustrates this framework by analyzing detailed data from the California teacher retirement plan (CalSTRS)—the largest teacher plan in the country, and one that is under considerable fiscal stress. Unlike Biggs (2023), Costrell focuses entirely on the issue of "normal cost" (i.e., the currently accrued future pension costs for active teachers) as opposed to legacy debt. He shows that the way that these costs are carried on the books by pension plans and districts, and thus paid for, dramatically understates their true costs, thus laying the foundation for future unfunded liabilities and fiscal stress. Therefore, even if teacher plans pull themselves out of their present fiscal holes, the way that plans and states are pricing liabilities currently being accrued (and thus paying for them) virtually guarantees fiscal trouble down the road. In the case of California teachers, the "on the books" normal cost rate of 18 cents per dollar of salary, intended to pay for pension promises currently being accrued, understates the true cost of these promises—roughly 44 cents per dollar of pay. It bears repeating that DC plans, which are the norm in the private sector and much of higher education, have no such hidden costs. What you see is what you get.

Biggs (2023) mines a variety of databases to shed light on how we got to the current situation. He shows that the fiscal

health of these plans has deteriorated since 2000. Current pension costs rise primarily because many plans have large unfunded liabilities, meaning that their liabilities are larger than their assets. As a practical matter, this gap is a debt that pension plans must pay down over time. Analyzing a variety of data sets over the last 2 decades, Biggs sheds light on how this debt arose and various strategies that pension plan administrators have adapted to pay it down. Of course, K–12 revenues used to pay down this debt are not available for current school operations. One important contribution of the Biggs article is that it shows the range of data sets that can be used to analyze this very important school finance issue, many of which may not be familiar to students of education finance.

Conclusion

The weak financial condition of many state teacher pension plans ensures that pension reform will continue to be at the forefront of policy discussions. Although teacher pensions have received much less attention than other areas of personnel policy that affect teachers, such as pay, licensing, and training, the ongoing fiscal stresses associated with teacher retirement plans will continue to confront education policy makers. Although the seemingly technical complexity of these pension plans may have deterred their study by many education policy analysts, the challenges associated with these plans have become too important to be ignored. In the following articles, the authors employ a variety of analytic methods—including descriptive analysis, regression analysis, modeling, and simulations—to examine the effects of these pension plans. An important theme throughout is that pension plans create important incentives that shape teachers' behavior and the teaching workforce. As education policy makers seek ways to staff classrooms with high-quality teachers, particularly in high-need schools, it is important to consider the ways in which teacher pension plans, and changes in these plans, can help or hinder these efforts. In addition, the major fiscal costs associated with maintaining these plans need to be balanced against other competing school needs, including more competitive early-career salaries for young teachers. We hope that the articles in this special issue can shed some light on this complicated but important topic.

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NOTES

[1]https://edre.uark.edu/_resources/pdf/costrellemployercontrates.pdf

[2]https://edre.uark.edu/_resources/pdf/costrellemployercontperpupil.pdf

[3]Perhaps the most familiar DC plan for readers is TIAA-CREF, which is widespread in higher education and research institutions. Similar 401(k) or 403(b) plans are commonplace for private employers.

[4]The Social Security Act of 1935 did not cover state and local workers. Amendments to the act starting in 1951 permitted coverage for state and local workers, and many states opted in. Currently, whether a public school teacher is enrolled in Social Security generally depends on the state in which they are employed. For details, see https://www.teacherpensions.org/blog/why-aren%E2%80%99t-all-teachers-covered-social-security

[5]Structural econometric models estimate components of a theoretical economic model wherein agents make decisions to maximize their utility (or happiness), given the information that they have and the economic environment. These models are based on economic theory that makes assumptions about relationships and are closely linked to the data that are used to estimate them. Structural econometric models are different from structural equation models (SEM) that are estimated in education research, which model relationships among networks of constructs and are used to assess unobserved "latent" constructs.

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