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

ND TFFR Board Meeting
Thursday, September 21, 2023, 1:00 p.m.
WSI Board Room (In Person), 1600 E Century Ave, Bismarck, ND
Click here to join the meeting

AGENDA

I. CALL TO ORDER AND ACCEPTANCE OF AGENDA *(Board Action)*
- A. Pledge of Allegiance
- B. Executive Summary
- C. Introduction of New Staff

II. ACCEPTANCE OF MINUTES (July 21, 2023 & August 31, 2023) *(Board Action)*

III. EDUCATION (30 Minutes) *(Information)*

- A. Cybersecurity – Jessica Newby, NDIT

IV. GOVERNANCE (60 minutes)

- A. Governance & Policy Review Committee Update – Mr. Mickelson & Mr. Roberts
  1. 2nd Reading & Final Adoption – Multiple Policies – *(Board Action)*
- B. Administrative Rules – Ms. Murtha *(Information)*
- C. Pioneer Project Update – Mr. Roberts *(Information)*
- D. Outreach Update – Ms. Mudder *(Information)*

(Break)

V. REPORTS (105 minutes) *(Board Action)*
- A. Annual Technology Report – Michele Blumhagen, NDIT
- B. Quarterly & Annual Investment Report (6/30) – Mr. Posch
- C. Annual Internal Audit Report – Ms. Seiler
- D. Quarterly TFFR Ends (6/30) – Mr. Roberts
- E. Executive Limitations/Staff Relations – Ms. Murtha

VI. CONSENT AGENDA – Disability & QDRO[1] *(Board Action)*

VII. OTHER BUSINESS

- A. Board Reading Materials – Material References Included
- B. Next Meetings:
  1. TFFR GPR Committee Meeting Tuesday, November 7, 2023, at 3:30 p.m.
  2. TFFR Board Meeting Thursday, November 16, 2023, at 1:00 p.m.

VIII. ADJOURNMENT

[1] Executive Session possible if Board discusses confidential member information under N.D.C.C. 15-39.1-30.

EXECUTIVE SUMMARY

TFFR Regular Meeting

September 21, 2023 – 1:00pm CT

I. **Agenda:** The **September Board Meeting will be held in the Board Room at the WSI Building to accommodate in person attendance, however, a link will also be provided so that Board members and other attendees may join via video conference.** The board member video link is included in the email with the Board materials.

- Attendees are invited to join the Board President in the Pledge of Allegiance.
- Introduction of new staff members

II. **Minutes (Board Action):** The July 21 and August 31, 2023, Board meeting minutes are included for review and approval.

III. **A. Board Education – Cybersecurity (Information):** Ms. Newby from NDIT will provide a presentation on cybersecurity efforts led by NDIT for the State and RIO. As a NDIT unified agency RIO receives technology service support from NDIT.

IV. **A. Governance & Policy Review Committee Report (Board Action):** The Committee Chair and Mr. Roberts will provide an overview of committee discussion. TFFR Governance Manual amendments will be presented for second reading and final adoption.

B. Administrative Rules (Information): Ms. Murtha will provide the board an update on the administrative rules promulgation process.

C. Pioneer Project Update (Information): Mr. Roberts will provide the Board with an update on the current status of the Pioneer project.

D. Outreach Update (Information): Ms. Mudder will provide the board an update on current outreach activities.

V. **Reports (Board Action):** Staff will provide reports on annual technology activities, quarterly investment performance, annual audit activities, quarterly TFFR Ends and executive limitations/staff relations.

Adjournment.

NORTH DAKOTA TEACHERS' FUND FOR RETIREMENT
MINUTES OF THE
JULY 20, 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
Jordan Willgohs, Trustee

STAFF PRESENT: Scott Anderson, CIO
Derek Dukart, Investment Officer
Missy Kopp, Exec. Assistant
Rachel Kmetz, Accounting Mgr.
George Moss, Sr. Investment Officer
Sarah Mudder, Communications/Outreach Dir.
Jan Murtha, Exec. Director
Chad Roberts, DED/CRO
Sara Seiler, Supvr. of Internal Audit
Stephanie Schilling, Retirement Programs Spec
Dottie Thorsen, Internal Auditor
Nitin Vaidya, Chief Risk Officer
Tami Volkert, Compliance Specialist
Denise Weeks, Retirement Program Mgr.
Jason Yu, Risk Officer
Lance Ziettlow, Sr. Investment Officer

OTHERS PRESENT: Dean DePountis, Atty. General's Office
Members of the Public

CALL TO ORDER:

Dr. Lech, President of the Teachers' Fund for Retirement (TFFR) Board of Trustees, called the meeting to order at 1:10 p.m. on Thursday, July 20, 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, TREASURER BEADLE, DR. LECH, MR. MICKELSON, AND MR. WILLGOHS.

ACCEPTANCE OF AGENDA:

The Board considered the agenda for the July 20, 2023, meeting.

IT WAS MOVED BY MR. MICKELSON AND SECONDED BY TREASURER BEADLE AND CARRIED BY A VOICE VOTE TO APPROVE THE AGENDA AS DISTRIBUTED.

AYES: SUPT. BAESLER, TREASURER BEADLE, MR. MICKELSON, MR. WILLGOHS, AND PRES. LECH
NAYS: NONE

ABSENT: MR. BURTON
MOTION CARRIED

ACCEPTANCE OF MINUTES:

The Board considered the minutes for the April 27, 2023, and June 20, 2023, TFFR Board meetings.

IT WAS MOVED BY MR. MICKELSON AND SECONDED BY TREASURER BEADLE AND CARRIED BY A VOICE VOTE TO ACCEPT THE APRIL 27, 2023, AND JUNE 20, 2023, MINUTES AS DISTRIBUTED.

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

GOVERNANCE:

Election of Officers:

Pursuant to TFFR policy, the Board must elect officers at the first meeting of each fiscal year.

IT WAS MOVED BY TREASURER BEADLE AND SECONDED BY MR. MICKELSON AND CARRIED BY A ROLL CALL VOTE TO CAST A UNANIMOUS BALLOT OF DR. LECH FOR BOARD PRESIDENT.

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

IT WAS MOVED BY TREASURER BEADLE AND SECONDED BY MR. MICKELSON AND CARRIED BY A ROLL CALL VOTE TO CAST A UNANIMOUS BALLOT OF MR. BURTON FOR BOARD VICE PRESIDENT.

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

IT WAS MOVED BY MR. WILLGOHS AND SECONDED BY MR. BURTON AND CARRIED BY A ROLL CALL VOTE TO CAST A UNANIMOUS BALLOT OF PRES. LECH AND MR. MICKELSON AS SIB REPRESENTATIVES.

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

IT WAS MOVED BY MR. MICKELSON AND SECONDED BY TREASURER BEADLE AND CARRIED BY A ROLL CALL VOTE TO CAST A UNANIMOUS BALLOT OF MR. BURTON FOR SIB ALTERNATE.

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

IT WAS MOVED BY TREASURER BEADLE AND SECONDED BY MR. WILLGOHS AND CARRIED BY A ROLL CALL VOTE TO REAPPOINT MR. MICKELSON TO THE SIB AUDIT COMMITTEE AND PRES. LECH, MR. BURTON, AND MR. MICKELSON TO THE TFFR GPR COMMITTEE.

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

SIB Customer Satisfaction Survey:

Ms. Seiler shared the annual SIB customer satisfaction survey that will be sent to the TFFR Board. The SIB asks for feedback from its customers on the service provided by the SIB, through the RIO agency. Ms. Seiler will send the survey on behalf of the Board President who will submit the compiled results to the SIB on behalf of the Board. Board discussion followed.

Annual TFFR Program Review:

Mr. Roberts provided the annual review of program performance including Board responsibilities, awards, customer satisfaction reports, and the code of conduct policy affirmation. Board discussion followed.

IT WAS MOVED BY MR. BURTON AND SECONDED BY TREASURER BEADLE AND CARRIED BY A VOICE VOTE TO ACCEPT THE ANNUAL TFFR PROGRAM REVIEW.

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

Annual Governance & Policy Review (GPR) Committee Report:

Mr. Mickelson provided an update on the work of the GPR Committee. The Committee has worked to review and update the TFFR Policy Manual this past year. Mr. Roberts shared the approach taken by the Committee. Ms. Murtha discussed the Employer Reporting Models policy change. When this policy change is finalized, it will require an effective date and education for the employers. Board discussion followed.

IT WAS MOVED BY MR. MICKELSON AND SECONDED BY TREASURER BEADLE AND CARRIED BY A VOICE VOTE TO APPROVE THE INTRODUCTION AND FIRST READING

OF TFFR POLICIES SECTION 1 – A, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, AND EXHIBIT 2; SECTION 2 – A, B, D, E, F, AND G.

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

Administrative Rules:

Ms. Murtha provided an update on the Administrative Rules process. Ms. Trotter provided an overview on the Administrative Rules timeline. The Board will have a special meeting in August to approve the first reading of the proposed revisions. Phase 2 will be completed at the November Board meeting when the Board approves the second reading of the proposed revisions. In Phase 3 RIO will receive the rules opinion from the Attorney General's Office then will file final documents with Legislative Council and schedule the Legislative Rules Committee meeting prior to February 1, 2024, for an effective date of April 1, 2024. Board discussion followed.

Pioneer Project Update:

Mr. Roberts provided an update on the Pioneer Project. The project is on time and under budget. Staff identified three interfaces with OMB, DPI, and PERS which will eliminate manual processes. The DPI interface has been completed and will allow the system to check and validate member licenses. Board discussion followed.

EDUCATION:

Investment Program Overview:

Mr. Anderson provided Board education on the Investment Program. The presentation included an overview of the RIO agency, the assets under management (AUM), client funds, and investment managers. The investment team is focused on providing value to clients. Mr. Anderson reviewed an illustration of the return differences for indexing, passive, and active management. Active management provides value added for TFFR. Mr. Anderson reviewed the investment program belief statements, process, target model, sources of value added, and the evolving structure. Board discussion followed.

REPORTS:

Quarterly Investment Report:

Mr. Posch provided the investment performance report for the period ended May 31, 2023. The performance report is still using the old benchmark method. The next update will use the new method which will show more positive returns. TFFR's performance relative to other public funds in the last quarter was in the bottom quartile. This is primarily because of being overweight in private equity and fixed income in relation to other plans. TFFR is in the middle or top quartile when looking over the three-, five-, and ten-year periods. Board discussion followed.

Quarterly Internal Audit (IA) Report:

Ms. Seiler reviewed the IA report for the quarter ended June 30, 2023. The Audit Committee met on May 11, 2023. The external auditor, CLA, presented the engagement scope, workplan, and timeline for the 2023 fiscal year (FY) financial statement audit. The Committee approved the 2023-24 IA workplan and received the IA Business Process review report. Board discussion followed.

Quarterly TFFR Ends Report:

Mr. Roberts reviewed the TFFR Ends for the quarter ended March 31, 2023. There was a change in the Federal tax withholding form which resulted in a surge of phone calls and walk ins early in the quarter. Staff provided testimony during the legislative session. The Board received the actuarial audit report which had no significant findings. A Request for Proposals (RFP) was issued for Actuarial Services. Ms. Mudder was hired as the Communications and Outreach Director. Board discussion followed.

Executive Limitations/Staff Relations Report:

Ms. Murtha provided the Executive Limitations/Staff Relations report. Staff are working to fill two of the new FTEs granted during the legislative session. The Sr. Investment Accountant position was filled internally, so the vacated Investment Accountant position has been posted. The Fiscal/Investment Administrative Assistant position has also been posted. The actuary transition went smoothly. Ms. Murtha reviewed current projects and initiatives, presentations done by staff, and new Board member onboarding activities. Board discussion followed.

IT WAS MOVED BY TREASURER BEADLE AND SECONDED BY MR. WILLGOHS AND CARRIED BY A VOICE VOTE TO ACCEPT THE QUARTERLY INVESTMENT, INTERNAL AUDIT, AND TFFR ENDS REPORTS AND THE EXECUTIVE LIMITATIONS/STAFF RELATIONS REPORT.

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

CONSENT AGENDA:

IT WAS MOVED BY MR MICKELSON AND SECONDED BY TREASURER BEADLE AND CARRIED BYA ROLL CALL VOTE TO APPROVE THE CONSENT AGENDA ITEM - DISABILITY APPLICATION 2023-1D.

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

ADJOURNMENT:

With no further business to come before the Board, Pres. Lech adjourned the meeting at 3:15 p.m.

Prepared by,

Missy Kopp, Assistant to the Board

NORTH DAKOTA TEACHERS' FUND FOR RETIREMENT
MINUTES OF THE
AUGUST 31, 2023, SPECIAL BOARD MEETING

BOARD MEMBERS PRESENT: Dr. Rob Lech, President
Mike Burton, Vice President
Kirsten Baesler, State Supt. DPI
Thomas Beadle, State Treasurer
Scott Evanoff, Trustee
Cody Mickelson, Trustee
Jordan Willgohs, Trustee

STAFF PRESENT: Missy Kopp, Exec. Assistant
Jan Murtha, Exec. Director
Chad Roberts, DED/CRO
Ryan Skor, CFO/COO
Dottie Thorsen, Internal Auditor
Denise Weeks, Retirement Program Mgr.

OTHERS PRESENT: Dean DePountis, Atty. General's Office
Members of the Public

CALL TO ORDER:

Dr. Lech, President of the Teachers' Fund for Retirement (TFFR) Board of Trustees, called the meeting to order at 4:01 p.m. on Thursday, August 31, 2023. The meeting was held virtually.

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

ACCEPTANCE OF AGENDA:

The Board considered the agenda for the August 31, 2023, meeting.

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

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

GOVERNANCE:

Administrative Rules:

Ms. Murtha reviewed the timeline for the administrative rule promulgation process and the reasons for changes to the rules which include legislative changes, the need for clarifying language, and updates ahead of the Pioneer project completion. Ms. Murtha reviewed each of

the proposed changes and asked for Board feedback. Ms. Murtha reviewed the required analyses for the administrative rules process.

IT WAS MOVED BY TREASURER BEADLE AND SECONDED BY MR. EVANOFF AND CARRIED BY A ROLL CALL VOTE TO APPROVE THE PROPOSED AMENDMENTS TO THE ADMINISTRATIVE RULES, SUBJECT TO LEGAL REVIEW, AND TO SET A PUBLIC HEARING DATE OF MONDAY, OCTOBER 23, 2023, AT 1:00 P.M.

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

ADJOURNMENT:

With no further business to come before the Board, Pres. Lech adjourned the meeting at 4:40 p.m.

Prepared by,

Missy Kopp, Assistant to the Board

CYBERSECURITY

Jessica Newby
Governance and Compliance Team Lead

NORTH Dakota
Be Legendary.™

Cyber Operations Center

Analysis and Response

- Incident Response
- Forensics
- Malware Analysis

Active Defense

- Penetration testing
- Threat Intelligence
- Exploitation Analysis

Security Infrastructure

- Endpoint Protect
- Network Detection
- Vulnerability Management

CYBER SECURITY TEAM

Governance, Risk and Compliance

- Cyber Risk Management
- Policy/Procedure/Standards
- Compliance with Federal and Industry Regulation
- Information Security Officer Liaisons

Education and Public Awareness

- Develops Defend.ND.gov
- Outreach to classrooms and business communities
- Works with EduTech to support PK-20W initiative
- Builds a community and culture around cybersecurity in North Dakota

THREATS AND CONCERNS: RANSOMWARE

RANSOMWARE / EXTORTION ATTACKS

- The global threat of ransomware
  - Since 2016, over 4,000 ransomware attacks have happened daily in the U.S. (Justice Dept)
  - 37% of respondents' organizations were affected by ransomware attacks in the last year (Sophos, 2021)
  - In 2021, the largest ransomware payout was made by an insurance company at $40M, setting a world record (Business Insider, 2021)

RANSOMWARE / EXTORTION ATTACKS

- SLTT/Government
  - In 2020, 33% of attacks on governmental bodies were ransomware (Security Intelligence, 2020)
  - A ransomware attack against a Southern city in 2020 cost over $7M (MSSPAlert, 2020)
  - A ransomware attack struck an East coast city in 2019 and caused a loss of over $18M (Baltimore Sun, 2019)
  - In 2019, attacks against municipalities increased 60% from the year before (Kaspersky Labs, 2019)

RANSOMWARE / EXTORTION ATTACKS

- Things will likely get worse.
  - Driven by organized crime
  - Well-developed monetary ecosystem around these attacks
  - Every successful attack gives ransomware groups bigger budgets
  - Bigger budgets means more of an ability to develop or buy better exploits and tools

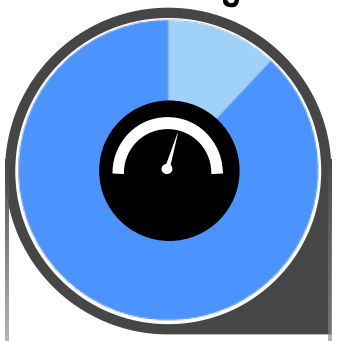
NORTH DAKOTA THREAT LANDSCAPE

North Dakota prevents/detects over 4.5 Billion threats[1] on STAGEnet per year, including external threats from:

- Nation states
- Corporate espionage
- Organized crime syndicates

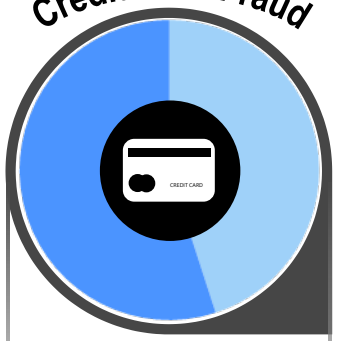
Vast majority of attacks are managed through automated defenses, however ~50k cyber events[2] were handled by the team

Phishing



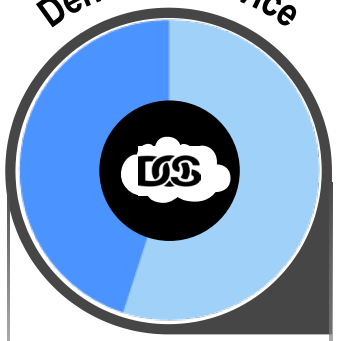
~80% of all inbound email volume is SPAM or phishing

Credit Card Fraud



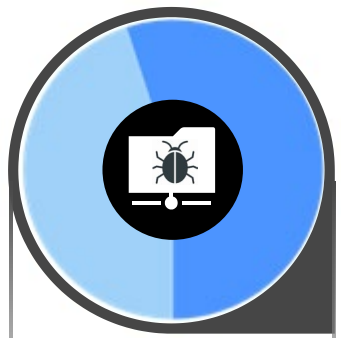
Multiple agencies have been victim of credit card stuffing attempts

Denial of Service



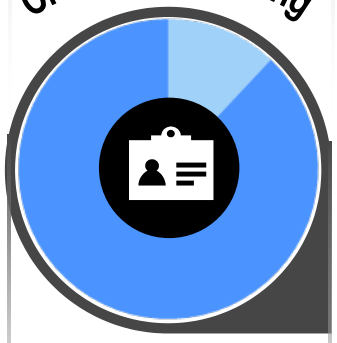
DDOS attacks are up 341% globally since start of pandemic[3]

Malware



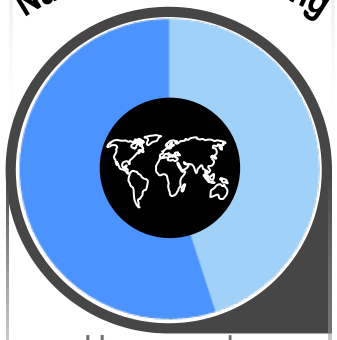
Viruses, worms, Trojans, ransomware, and cryptominers

Credential Stuffing



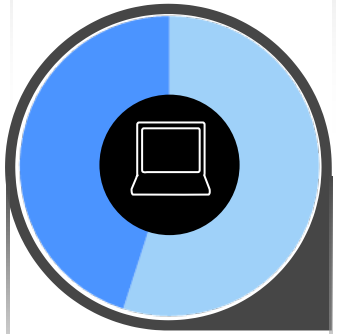
Dark web monitoring detected more than 5,000 total leaks of state employees in 2021

Nation State Hacking



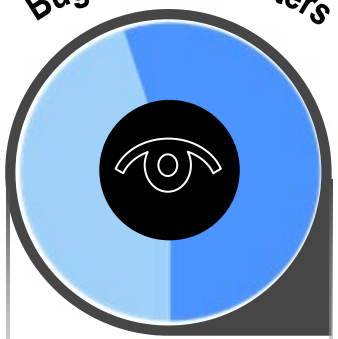
Use zero-day techniques that interrupt operations and generate massive data and revenue loss

Botnets



Allows attacker to amplify attacks and are a staple of ransomware

Bug Bounty Hunters



Look for vulnerabilities for profit, fame, or sometimes to exploit vulnerable systems

1. 4,519,962,807 threat log events from 01/01/2021 – 12/31/2021 per NDIT Panorama
2. 49,775 XSOAR Incidents created between 01/01/21 – 12/31/2021 per Cortex XSOAR
3. DDoS attacks increase 341% amid pandemic - Help Net Security

AVERAGE COST OF RANSOMWARE

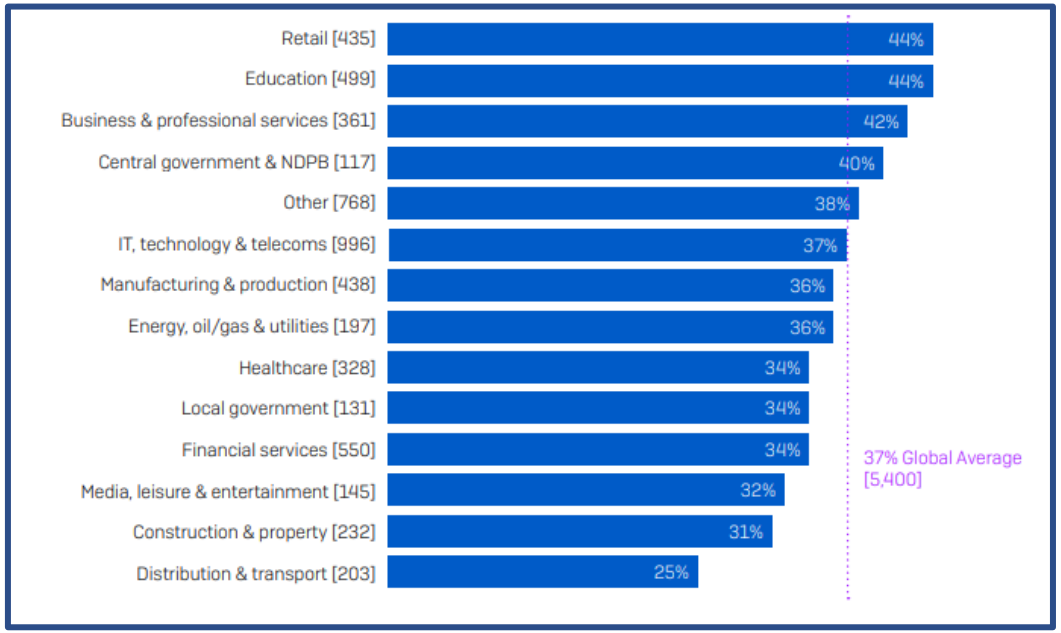
Potential massive cost to North Dakota as a whole

- The inherent risk to the state from ransomware is $877,101,000 per biennium
- Ransomware remediation has more than doubled since last year
- Extortion style attacks have more than doubled since last year
- Having tools deployed, governance, polices, and trained security teams, reduces risk

2020
$761,000

2021
$1,850,000

Ransomware Remediation Cost
Has More Than Doubled Since Last Year



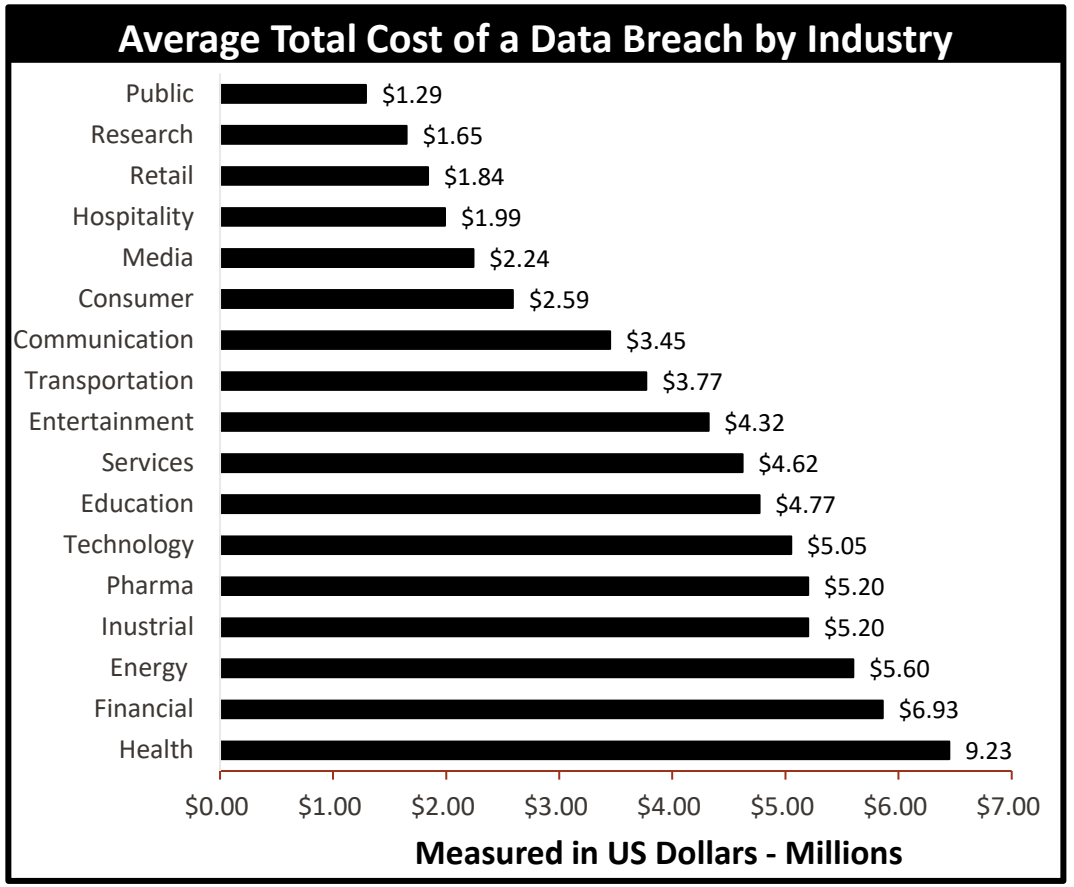
See appendix for calculations

sophos-state-of-ransomware-2021-wp.pdf

AVERAGE ANNUAL COST OF A SECURITY BREACH

Average cost of security breach

- IBM/Ponemon Institute places the average cost of $4.37 million per year
- Healthcare breaches average $9.23 million*
- Personal records tend to be the most compromised data types while databases tend to be the most frequently involved asset in breaches



* The Average Cost of a Healthcare Data Breach is Now $9.42 Million (hipaajournal.com)

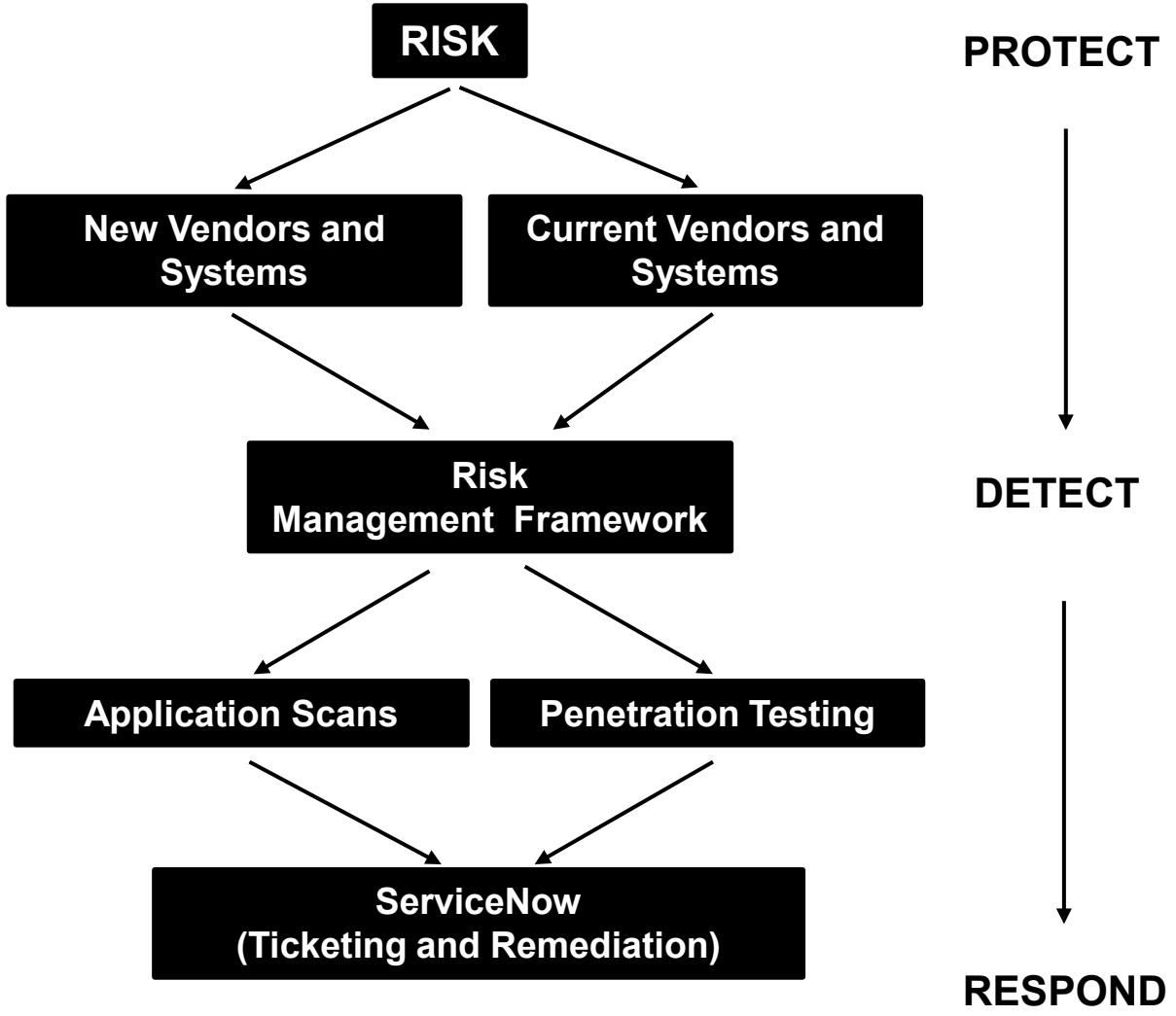
* Cost of a Data Breach Report 2021 | IBM

REDUCING RISK

Reducing Risk

- **Risk Management Framework (RMF)**
  - Preventing risk to systems by building a risk reduction lifecycle from beginning to end

- **Third Party Risk Management (TPRM)**
  - Preventing risk by evaluating and monitoring risk introduced by vendors



THIRD PARTY RISK MANAGEMENT

Primary Purpose

Third Party Risk Management (TPRM) in IT is to assess, monitor, and mitigate the potential risks associated with the use of third-party vendors, suppliers, or service providers in an organization's information technology ecosystem.

Why is it important?

- Mitigate undue risk and cost associated with third-party breaches
- Safeguard and protect ND citizen data

THIRD PARTY RISK MANAGEMENT

- TPRM / ND-RAMP is assessing security controls for potential or existing vendor(s) of an IT solution and/or host State data
- Third-party risk management (TPRM) focuses on identifying and reducing risks relating to the use of third parties' vendors
- Vendors who complete and pass their assessments will become "ND-RAMP" certified and will be reassessed every 1-2 years based on risk of vendor and/or type of data they will handle.
  - Vendors could be reassessed sooner if:
    - A security breach has occurred
    - The vendor does not comply with the State requirements of contracting for cloud services
    - Significant changes in security policies, controls, or architecture have occurred

TPRM STAGES

WORKFLOW

DATA CLASSIFICATION

Data Classifications		
Low Risk	**Moderate Risk**	**High Risk**
1. The data is intended for public disclosure. 2. Unauthorized disclosure, alteration, or destruction of the data would result in little or no risk to the state and its citizens.	1. The data is not generally available to the public. 2. Unauthorized disclosure, alteration, or destruction of the data could result in a moderate level of risk to the state or its citizens.	1. The data requires protection by law/regulation. 2. Unauthorized disclosure, alteration, or destruction of the data could cause a significant level of risk to the state or its citizens.

https://www.ndit.nd.gov/governance/data-classification-policy

DATA CLASSIFICATION

Activity / Classification	Low Risk	Moderate Risk	High Risk
Data Access and Handling Controls			
User Access – Authentication	No authentication needed	Must use NDGOV accounts only	Must use NDGOV accounts with Multi-Factor Authentication (MFA)
Access Audit	n/a	Role-based	Required
End User Training	n/a	Role-based	Required
Data Sharing	n/a	Require data steward approval	Restricted; Require data steward approval
Data Transmission and Communication Controls			
Sent in Email	n/a	Include a disclaimer	Must be encrypted, consider secure alternative
Internal Network Transmission	n/a	Consider encryption	Must be encrypted
External Network Transmission	n/a	Consider encryption	Must be encrypted
Access from External Network	n/a	Must use VPN	Must use MFA VPN
Spoken/Verbal Communication	n/a	Consider confidential use of landlines or secure communication apps	Require confidential use of landlines or secure communication apps
Fax	n/a	Consider encryption	Encrypt, consider secure alternative

HOUSE BILL 1528

Primary Purpose:

- Mitigate risk of loss or deletion of state records due to the departure of agency heads or the unexpected departure of personnel holding a supervisory position or above.

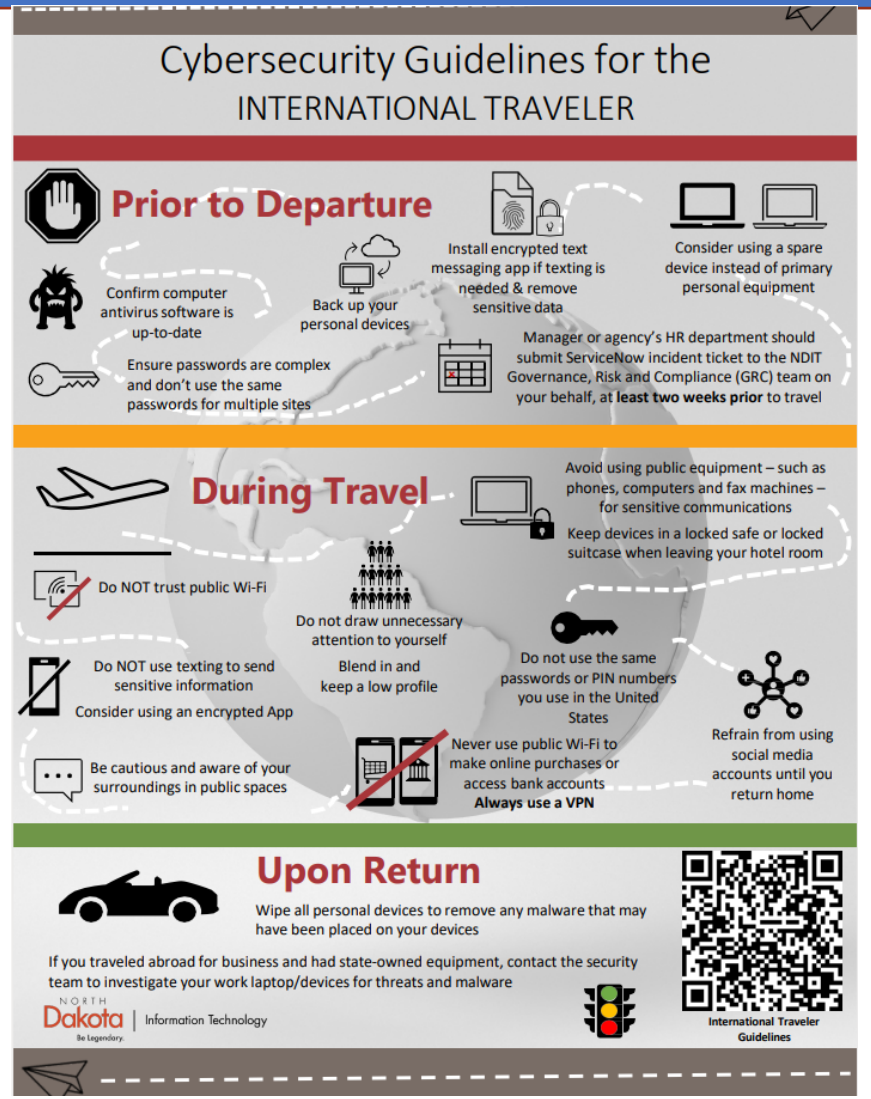
- Highlights:
  - Updates the definition of a state record to specifically include electronic mail if it provides administrative, fiscal, legal, audit, historical or business value.
  - Establishes a minimum 1-year retention on email for agency heads, elected officials, and those appointed by the Governor to fill a cabinet vacancy under NDCC 44-02.

HOUSE BILL 1528

- Highlights:
  - For an employee who holds a supervisory position or above, the employee account must be put on hold if:
    - The employee is involuntarily terminated
    - The employee is placed on administrative leave
    - The employee resigns or departs without notice
    - The employee dies
    - An event the agency deems sufficient to place a hold occurs
  - NDIT conducted training on the requirements for all designated agency record coordinators

INTERNATIONAL TRAVELER GUIDELINES

- International travel can be a risky undertaking. This is especially true for government employees. In addition to physical risks such as theft, loss, and damage of devices, foreign travelers are susceptible to social engineering techniques and a wide range of cyberattacks. Government employees are favorite targets of nation-state hackers and cyber criminals.
- State and personal devices can contain sensitive information, which may be valuable to such actors to sell or to use in intelligence operations. Thus, it is imperative as an employee of the State of North Dakota to exercise due diligence in protecting sensitive data. While travelling abroad, you are responsible for the security of data!



https://www.ndit.nd.gov/international-traveler-guidelines

INTERNATIONAL TRAVELER GUIDELINES

Before Travel

- Back up your personal devices
- Consider using a burner device and not taking your primary equipment
- Install encrypted text messaging app (e.g., Signal, etc.) for phones if texting is needed
- Remove sensitive data
- Ensure passwords are complex, and do not use the same password for multiple sites
- Confirm antivirus software is up-to-date
- Have your manager or agency's HR department submit a ServiceNow incident ticket to the NDIT Governance, Risk and Compliance (GRC) team on your behalf, at least two weeks prior to travel, indicating:
    - your destination
    - dates of departure and return
    - hotel name(s), address(s), and phone number(s), and
    - which device(s) you will be taking out of the country

NDIT GRC will notify NDIT Cyber Analysis and Response of your travel plans to ensure that you retain access to your device while travelling. Desktop Support will ensure "Always on VPN" is configured on the state-owned device and hard drive is encrypted.

INTERNATIONAL TRAVELER GUIDELINES

During Travel

- Be vigilant about your surroundings and where and how you use your devices. Make sure to keep your devices secure in public places such as airports, hotels and restaurants. Take care that nobody is trying to steal information from you by spying on your device screen while it is in use.
- You are especially vulnerable in locations with public Wi-Fi, including:
- Internet cafes, coffee shops, bookstores, travel agencies, clinics, libraries, airports and hotels.
- Do not trust public Wi-Fi
- Do not use the same passwords or PIN numbers abroad that you use in the United States
- Never use public Wi-Fi to make online purchases or access bank accounts.
  Always use a VPN
- Avoid using public equipment – such as phones, computers and fax machines – for sensitive communications
- Keep your device(s) in a locked safe or locked suitcase when leaving your hotel room
- Refrain from logging into social media accounts
- Do not draw excessive attention to yourself. Do your best to blend in and keep a low profile
- Be mindful of what you say and do in public spaces—especially while using your device

INTERNATIONAL TRAVELER GUIDELINES

Upon Return

- Upon return to the United States, wipe all personal devices to remove any malware that may have been placed on your devices.
- If you have traveled abroad for business with state-owned equipment, contact the security team to investigate your work device(s) for threats and malware.

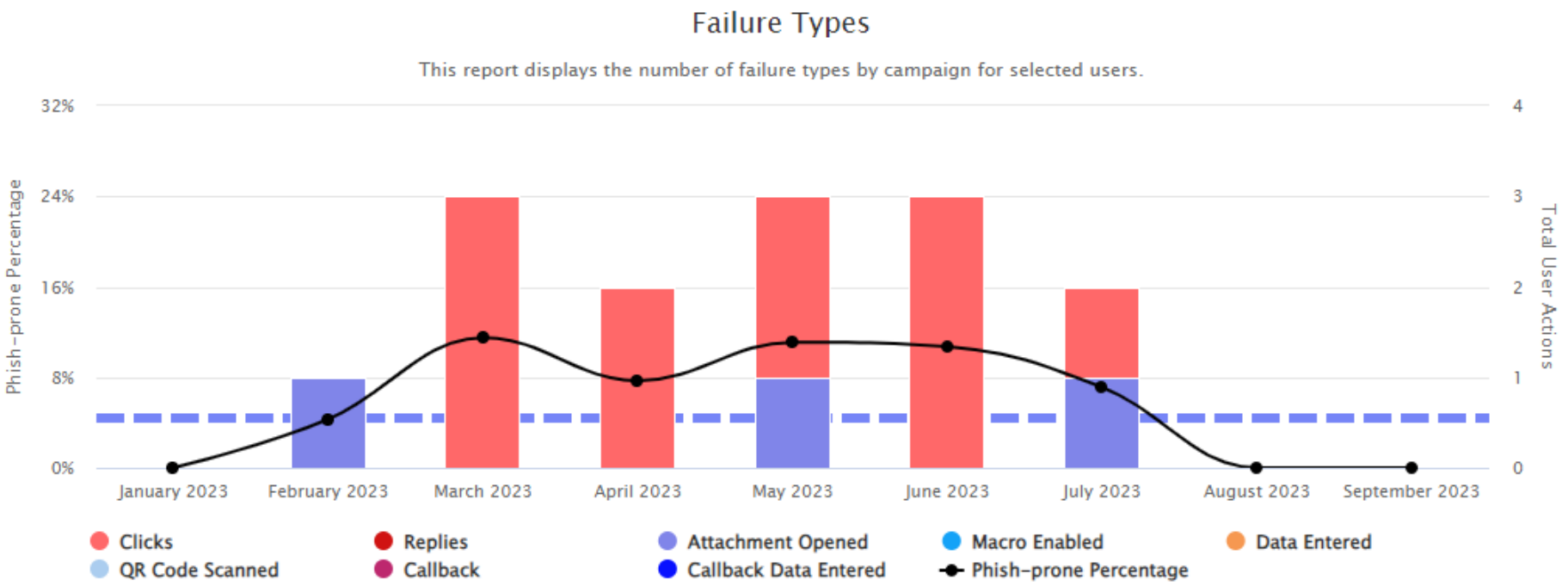
SECURITY AWARENESS TRAINING

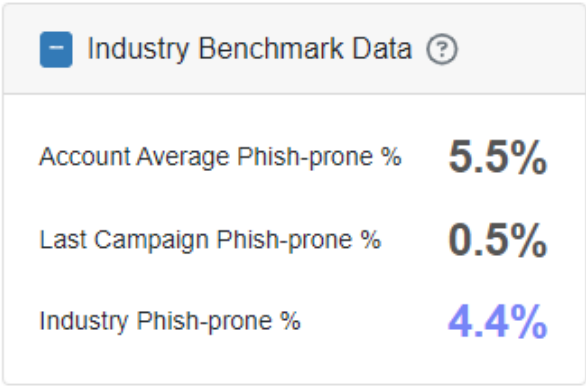
State of North Dakota Standard:

- Provide Information Security Awareness overview on the first day of employment
- Complete Security Awareness Training within three days of receiving computer access
- Complete annual refresher training
- Complete ongoing, brief training quarterly
- Monthly simulated phishing campaigns
  - Users that fail 3 or more simulated phishing campaigns in a 12-month period receive additional training

https://www.ndit.nd.gov/standards/POL0020119

SECURITY AWARENESS TRAINING



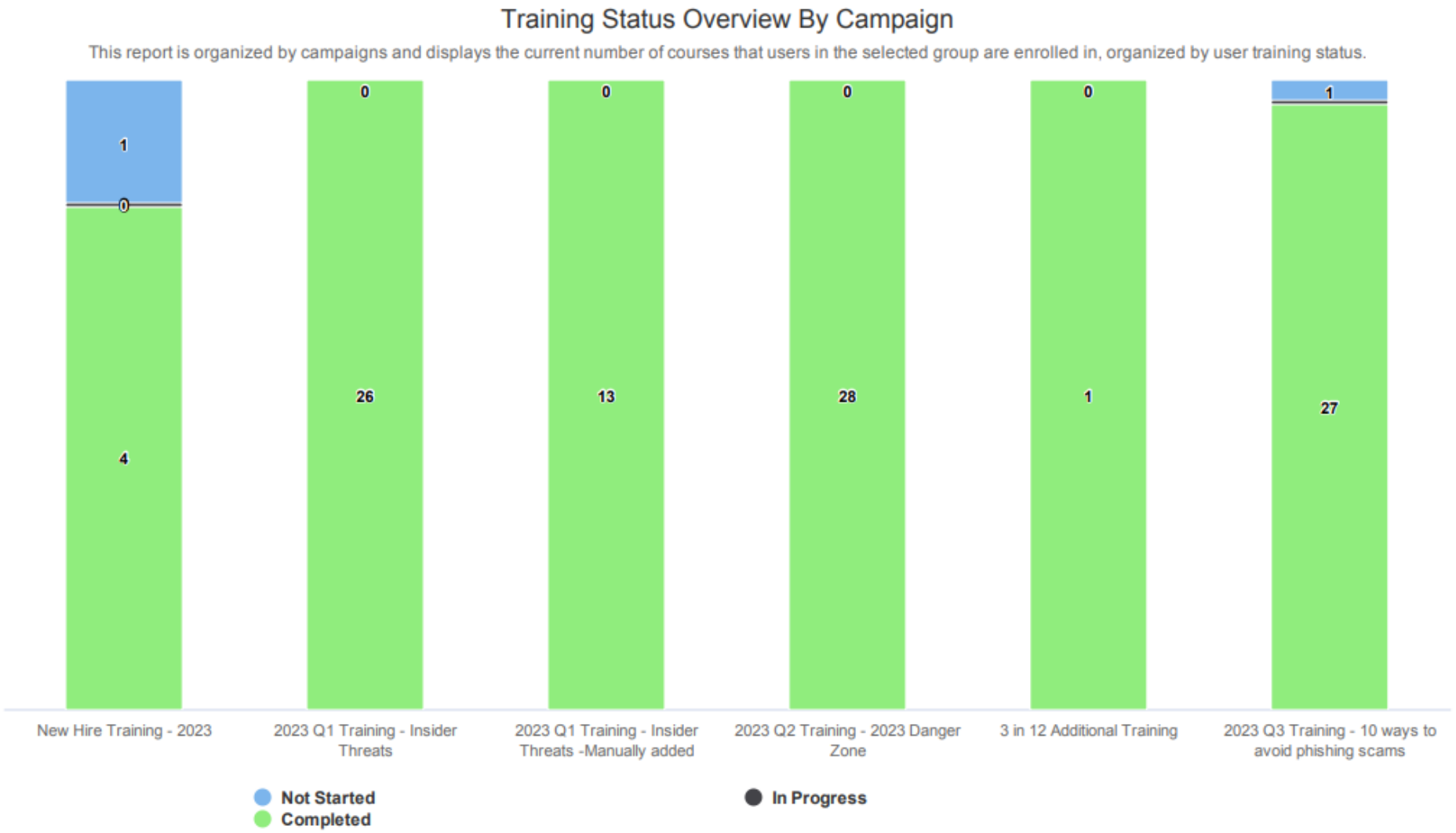


Industry All Industries

Organization Size Small (<250 use

Program Maturity 1 Year

SECURITY AWARENESS TRAINING



RIO HIGHLIGHTS

- Outside assessment completed pre-unification
  - Walking through recommendations
  - Unification addressed a number of recommendations
  - Meeting regular to discuss implementation of additional recommendations
- Agency is extremely proactive
  - Reaches out when faced with suspicious email
  - Follows compliance requirements and exercises due diligence

ON THE NDIT SECURITY ROAD MAP

- Data Loss Prevention (DLP)
  - The primary purpose of DLP is to prevent the unauthorized disclosure or leakage of sensitive and confidential data from an organization's internal network. DLP solutions are designed to monitor, detect, and protect against the improper use or transmission of sensitive information.
- Artificial Intelligence (AI) Policy Creation
  - The purpose of the Artificial Intelligence (AI) Policy is to embrace the innovative benefits AI can provide to increase productivity and citizen experience, while reducing risks and concerns in using this emerging technology. This policy protects the safety, privacy, and intellectual property rights of the State of North Dakota by ensuring all forms of artificial intelligence are handled in a transparent, consistent, and secure manner.


tenable®
network security


KnowBe4
Human error. Conquered.


HACKNOTICE


CORTEX™ XDR
BY PALO ALTO NETWORKS

DO YOUR PART.

#BECYBERSMART

YOU CAN BE MORE SECURE ONLINE

Cybercrime is on the rise, especially during COVID-19 and the global shift to telework and e-learning. Bad actors are exploiting the situation, making it especially important to secure all of your devices and online interactions. Virtual vulnerabilities can be an open door for cyber criminals to steal your information, and even your identity. Knowing what the common threats are and how to mitigate them can help make sure you aren't leaving a virtual door open to your personal information.

Security Q&A

Jessica Newby
Governance and Complaince Team Lead
Email: jnewby@nd.gov
Phone: 701-328-4395

CONTACT US

NORTH Dakota | Information Technology
Be Legendary.™

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad Roberts, DED/CRO**
DATE: **September 14, 2023**
RE: **2nd Reading of TFFR Policy Manual revision as recommended by GPR Committee**

Summary

As part of the established work plan for the TFFR GPR Committee adopted by the committee during the September 2022 meeting, the committee undertook a full review of the TFFR Policy Manual. The committee has reviewed the 2022 manual in parts at the November 2022, February 2023, and May 2023 committee meetings.

The committee finalized its review at the May 2023 meeting and recommended the following policy manual changes to the full TFFR Board for the first reading at the July 2023 meeting. The changes were reviewed, and the first reading was accepted at the July 2023 board meeting. The TFFR GPR committee again reviewed the policies at the August 2023 GPR committee meeting.

Pursuant to policy, proposed policy amendments require two readings before the full Board to pass and amendments may be proposed at any time. The proposed amendments were submitted for legal review prior to 2nd reading and final adoption. Legal recommendations and changes recommended by the board during the first reading have been incorporated into the proposed changes for the second reading.

TFFR Policy Manual sections reviewed at the November 2022 committee meeting

Program Manual Section 1 Sub-section I
Program Manual Section 1 Sub-section J
Program Manual Section 1 Sub-section K
Program Manual Section 1 Sub-section O
Program Manual Section 1 Sub-section P
Program Manual Section 1 Sub-section S
Program Manual Section 2 Sub-section A
Program Manual Section 2 Sub-section B
Program Manual Section 2 Sub-section C

TFFR Policy Manual sections reviewed at the February 2023 committee meeting

Program Manual Section 1 Sub-section A
Program Manual Section 1 Sub-section B
Program Manual Section 1 Sub-section C
Program Manual Section 1 Sub-section D
Program Manual Section 1 Sub-section E

Program Manual Section 1 Sub-section F
Program Manual Section 1 Sub-section L
Program Manual Section 1 Sub-section T
Program Manual Section 1 Sub-section U
Program Manual Section 2 Sub-section D

TFFR Policy Manual sections reviewed at the May 2023 committee meeting

Program Manual Section 1 Sub-section G
Program Manual Section 1 Sub-section H
Program Manual Section 1 Sub-section M
Program Manual Section 1 Sub-section N
Program Manual Section 1 Sub-section Q
Program Manual Section 1 Sub-section R
Program Manual Section 2 Sub-section E
Program Manual Section 2 Sub-section F
Program Manual Section 2 Sub-section G

Recommended revisions to policy reviewed at the May 2023 committee meeting by section

Section 1, subsection A adds the Executive Director to the review authorities for the annual manual review

Section 1, subsection D(4) replaces the Deputy Executive Director with the Executive Director in the board appointment process, clarifying the roles of the two positions

Section 1, subsection E(2) removes the responsibilities of evaluation and termination of the Deputy Executive Director from the Board

Section 1, subsection F(1) replaces the Deputy Executive Director with the Executive Director as a source of advice for the Board.

Section 1, subsection F(4) reflects the changes to the SIB composition as it relates to TFFR representatives as established under HB1088

Section 1, subsection G has been edited to reflect the changes in the composition of the SIB Board as delineated in HB1088

Section 1, subsection H clarifies the duties of the Executive Director and the Deputy Executive Director as it relates to the RIO agency and TFFR program

Section 1, subsection I clarifies roles between Executive Director and Deputy Executive Director.

Section 1, subsection J reflects division of ED and CIO roles. Subsections J(1)(b),(c), (d), (e), (f), (h), (i), (j), (k, (m), and (n) specifically define the roles of the two positions.

Section 1, subsection J(2)(a), (b), (c), (d), (e), (f), (g), (h), (i), and (j) further defines the responsibilities of the Executive Director and removes the role of CIO from the Executive Director position description

Section 1, subsection K(2) specifies the board may delegate the responsibility of the extension of the medical consultant contract to the Executive Director and not the Chief Retirement Officer

Section 1, subsection L(1) reflects the change in number of TFFR representatives appointed to the SIB and adds the appointment of three TFFR members to the TFFR GPR committee

Section 1, subsection L(2) adds the appointment of members to any committees to board election procedures
Section 1, subsection M(1) has been edited to reflect open meeting laws apply to business conducted on personal devices as established by the ND Attorney General

Section 1, subsection M(3) has been edited to reflect the Board may conduct retreats either on or off site

Section 1, subsection M(5) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection M(6) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection M(7) has been edited for grammatical clarity

Section 1, subsection M(10) has been edited to strike language delineating reasons for an executive session

Section 1, subsection N(2) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection O has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection P has been edited to reflect the role of the Executive Director and Deputy Executive Director in relation to the Board in line with previous edits to the manual clarifying that role. This section also incorporates the role of the Communications Director for the response to specific inquiries from the public and other stakeholders

Section 1, subsection Q(2) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection Q(3) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection Q(5) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection Q(6) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection Q(10) has been edited to reflect the role of the Executive Director in relation to the Board in line with previous edits to the manual clarifying that role.

Section 1, subsection R has been edited to include the Executive Director in the conflict-of-interest affirmation

Section 1, subsection S clarifies the Executive Director will be the primary lead to work with the TFFR Board on the development of a strategic plan.

Section 1, subsection T adds the Executive Director as a source of proposed new policies or amendment and as the overseer of internal agency processes

Section 1, subsection U designates the Executive Director and not the Deputy Executive Director as a responsible party to assist the Board with the annual self-assessment.

Exhibit 2; TFFR Board Meeting Public Participation Guidelines; has been updated to clarify the Executive Director, and not the Deputy Executive Director, as the decision-making role

Section 2, subsection A signing authorities changed to reflect Executive Director and Chief Investment Officer

Section 2, subsection B deleted wording regarding how many years of amortization is remaining as of date

Section 2, Subsection D(3) clarifies language regarding the release of program information

Section 2, Subsection D(4) strikes specific language relating to account claims and inserting reference to section 2 subsection D(5). Language is also modified to allow account notices to be produced and provided by other means than only mail

Section 2, Subsection D(7) adds the Executive Director as a role that may waive the 120-day refund waiting period

Section 2, Subsection D(11) adds language excluding professional development, non-contracted subbing and extracurricular hours from reportable compensable hours

Section 2, subsection E(1)(c)(3) limits model 2 partial percentage matches to full percentage amounts

Section 2, subsection E(3) adds the role of Executive Director to the approval authorities for waiver of employer reporting penalties

Section 2, subsection F(2) changes the authority for the release of TFFR program information to interest groups to the Executive Director

Section 2, subsection G(1) has been removed to reflect the deletion of the social security income leveling option from the program with the passage of HB1219.

Recommended revisions to policy reviewed by legal counsel subsequent to the first reading of the recommended changes.

Section 1, subsection J(1) has been revised to reflect the Deputy Executive Director reports to the Executive Director in order to clarify reporting lines.

<u>Recommended revisions to policy reviewed by TFFR Board during the first reading of the recommended changes.</u>

Section 2, subsection E(1)(c)(3) limits model 2 partial percentage matches to full percentage amounts ***becoming effective July 1, 2025***

ACTION REQUESTED: Motion to Approve Introduction and Second Reading to the following policies: TFFR Governance Manual Section 1, subsections A, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, and Ex: 2, and Section 2, subsections A, B, D, E, F and G.

BOARD ACTION REQUESTED: Board acceptance.

NORTH Dakota
Be Legendary.

Teachers' Fund For Retirement
RETIREMENT & INVESTMENT

Board Program Manual

ND TEACHERS' FUND FOR RETIREMENT (NDTFFR) BOARD

PROGRAM MANUAL

Contents

ND TEACHERS' FUND FOR RETIREMENT (NDTFFR) BOARD

PROGRAM MANUAL

SECTION I: TFFR GOVERNANCE POLICIES

A. Introduction and Purpose

The ND Teachers' Fund for Retirement (TFFR) Board of Trustees is dedicated to ethically serving the members and stakeholders of the TFFR pension plan and ensuring that the plan is effectively managed. The Board is committed to excellence in Board governance. An effective governance structure is essential to fulfilling fiduciary duties and Board responsibilities in accordance with the highest standards of professional responsibility, accountability, and transparency.

The Board developed and adopted this TFFR Board Program Manual to establish the framework within which the Board intends to set governance and oversight policy.

The purpose of the Manual is to:

1. Provide orientation material and exhibits for new TFFR trustees and executive staff as to the roles, responsibilities, policies, procedures, and activities in the governance and oversight of the TFFR plan.

2. Serve as an ongoing reference manual for current trustees and staff.

3. Describe the roles and responsibilities of the Board of Trustees as a Board, individual Trustees, Committees, Staff, and Service Providers.

4. Describe the relationship between the TFFR Board, the State Investment Board (SIB), and the Retirement and Investment Office (RIO) as it relates to the administration of the TFFR plan.

5. Establish a Board meeting protocol that outlines the manner in which the Board will conduct itself to enable the Board to carry out its responsibilities as effectively and efficiently as possible, and in accordance with state and federal law.

6. Facilitate the organized, efficient, and cohesive functioning of the Board.

7. Facilitate effective communication among the Trustees, staff, plan members, employers, and other external parties.

8. Define responsibility and accountability for hiring and monitoring outside service providers.

9. Document the method by which the Board will conduct a Board self- assessment.

10. Document Board governance and program policies, administrative rules, and state statutes governing the plan.

The TFFR Board Program Manual is an evolving set of documents that reflect the Board's current governance practices. The Manual will be reviewed by the Board on an annual basis. Board trustees, the Executive Director, Deputy Executive Director-Chief Retirement Officer, and/or legal counsel may recommend modifications for Board consideration and approval.

The contents of the TFFR Board Program Manual are intended to be consistent with state and federal laws, rules, and regulations. If there is any conflict between the provisions included in this Manual and state or federal law, the law prevails.

B. TFFR Program Overview

1. History

The ND Teachers' Fund for Retirement (NDTFFR) (formerly the ND Teachers' Insurance and Retirement Fund or NDTIRF) was created by the ND Legislature in 1913. The defined benefit plan provides lifetime retirement, disability and survivor benefits for ND public school educators.

Membership participation, benefits provided, contribution requirements, and plan provisions are described in State Law and the TFFR Member Handbook.

2. Legal Framework

ND Century Code (NDCC) Chapter 15-39.1 contains the legal authority and statutory language governing the TFFR plan, and is supplemented by ND Administrative Code Title 82. TFFR is a qualified (tax exempt) defined benefit public pension plan covered under Section 401(a) of the Internal Revenue Code (IRC).

C. TFFR Mission, Vision, and Values

1. Our Mission

To administer a comprehensive retirement program that provides North Dakota public educators with a foundation for retirement security.

2. Our Vision

To be a trusted leader in the administration of a financially sound retirement program for North Dakota educators by providing exceptional customer service, professional plan management, and organizational effectiveness by adhering to the principles of good governance, transparency, and accountability.

3. Our Core Values

a. Customer Satisfaction and Commitment to Excellence which are demonstrated by our trustworthiness, accountability, and respectfulness.
b. Strong Governance and Operational Effectiveness through our strategic leadership, fiduciary responsibility, ethical practices, and transparency.

D. TFFR Board Authority, Composition, Appointment, Terms

1. Board Authority

TFFR is governed by a 7-member TFFR Board of Trustees who are charged with oversight, policy making, and administration of the TFFR retirement program as provided under NDCC 15-39.1-05. The trustees are fiduciaries, and as such have the highest standard of law placed on them.

2. Board Composition

a. The Board is composed of seven trustees consisting of:

1) Two elected state officials:

- State Treasurer (ex officio)
- State Superintendent of Public Instruction (ex officio)

2) Five members appointed by the Governor:

- Two board members who are actively employed as elementary or secondary teachers in full-time positions not classified as school administrators. The appointment is made from a list of three nominees submitted to the Governor by ND United (NDU).
- One board member who is actively employed as a full-time school administrator. The appointment is made from a list of three nominees submitted to the Governor by the ND Council of Educational Leaders (NDCEL).
- Two board members who are retired members of the Fund. The appointment is made from a list of three nominees submitted to the Governor by the ND Retired Teachers Association (NDRTA).

3. Board Trustee Desired Attributes

Board trustees should possess or develop the following desired attributes in order to become an effective board trustee.

a. Unwaveringly ethical

b. Perpetually inquisitive

c. Knowledgeable about the membership

d. Ability to understand complex actuarial, financial, and investment concepts

e. Committed to strong board governance practices

f. Diligent and willing to spend time to learn best pension practices

g. Professional, respectful, and courteous demeanor

h. Proactive and responsive approach to member needs

i. Committed and engaged

j. Active listening and communication skills

k. Critical thinking skills

l. Ability to make fair and timely decisions

m. Open and accountable to stakeholders

4. Board Appointment Process

When a TFFR Board trustee term expires or vacancy occurs, the Executive Director~~Chief Retirement Officer~~ will notify the Governor's Office and the applicable stakeholder group (ND United, ND Council of Educational Leaders, or ND Retired Teachers Association) of the vacancy. Board trustee desired attributes and board responsibilities will be provided to the Governor's Office and applicable stakeholder group to assist them in making board nominee or trustee selection.

NDU, NDCEL, or NDRTA will submit a list of three Board nominees to the Governor's Office, as required by state law. Board nominees must complete the "Application for Boards and Commissions" from the Governor's Office in order to be considered for TFFR Board appointment. This application contains information about the nominee's background, education, experience, financial disclosures, and references.

After reviewing the Board nominee applications, the Governor will make the trustee appointment, and will notify the selected nominee and the Executive Director~~Chief Retirement Officer~~. The Governor's Office will send the newly appointed trustee a Certificate of Appointment which provides formal documentation of appointment to the TFFR Board. The Governor's office will also send an Oath of Office and Statement of Intent which must be signed by the trustee and returned to the Governor's Office. These documents confirm the trustee's appointment is official. Trustees can then carry out their official duties as a Board member and can be paid for authorized expenses.

5. Trustee Terms, Resignations and Vacancies

The State Treasurer is an ex-officio member of the Board, and serves on the Board throughout the term of the State Treasurer's elected position. A lawful Deputy of the State Treasurer (pursuant to NDCC 44-03-01) may act with the full authority of the State Treasurer, and may vote when serving as the State Treasurer's official designee on the Board.

The State Superintendent of Public Instruction is an ex-officio member of the Board, and serves on the Board throughout the term of the State Superintendent's elected position. The State Superintendent may designate an individual to attend and participate in Board meetings, however the designee may not vote since the designee does not have the lawful authority to vote on behalf of the State Superintendent.

Each of the five Governor-appointed trustees are appointed for a term of five years. The terms of office are staggered with the five appointed trustee positions beginning July 1 and expiring on June 30 of each successive year. There is no limit to the number of terms a trustee may serve on the Board. Trustees may remain on the Board until they are reappointed or until their successors are appointed.

Appointed active trustees who terminate employment may not continue to serve on the Board as active teacher representatives. Appointed active and retired trustees may resign from the Board by providing written notice to the Governor and the TFFR Board.

Appointed trustee position vacancies which occur before the expiration of a term will be filled by the Governor, and the new appointee will complete the term for which the original trustee was selected.

E. TFFR Board - Duties and Responsibilities

1. Fiduciary Duties

TFFR trustees are fiduciaries, and as such, have the highest standard of law placed upon them. Trustees are expected to discharge their duties with the utmost honesty and integrity and to act solely in the interest of the members, retirees, and beneficiaries for the exclusive purpose of providing benefits and paying reasonable expenses of administering the TFFR program.

Fiduciary duties include the following:

a. Duty of loyalty. The obligation to act for the exclusive benefit of the plan participants and beneficiaries. Regardless of how trustees are selected, trustees must put the interests of all plan participants and beneficiaries above their own interests or those of any third parties.

b. Duty of care. The responsibility to administer the plan efficiently and properly. The duty of care includes consideration and monitoring of the financial sustainability of funding practices and the effective administration of plan benefits in compliance with applicable laws.

c. Duty of prudence. The obligation to act prudently in exercising power or discretion over the interests that are subject of the fiduciary relationship. A trustee should act in a manner consistent with a reasonably prudent person exercising care, skill, and caution.

2. Board Responsibilities

The TFFR Board of Trustees is responsible for oversight, policy making, and administration of the TFFR plan as provided under NDCC 15-39.1-05.2.

Board responsibilities include:

a. Establish and monitor policies for the administration of the TFFR plan.

b. Set legislative priorities and positions, submit legislative proposals, and monitor legislation affecting the plan.

c. Develop and adopt administrative rules and board policies to administer the plan.

d. Establish and monitor TFFR plan funding policy and progress.

e. Establish and monitor TFFR investment policies and asset allocation under NDCC 21-10-02.1.

f. Select and monitor the performance of consultants, advisors, and service providers for the plan.

g. Select and monitor actuarial consultant(s) to provide actuarial and technical consulting services including: annual actuarial valuations and GASB reports, periodic actuarial experience studies, independent actuarial audits, and other special projects and studies; develop and monitor actuarial funding policy, assumptions, methods, and factors; analyze proposed legislative changes; and advise the Board on actuarial, technical, and administrative issues.

h. Select and monitor medical consultant to conduct disability reviews.

i. Select and monitor investment consultant to perform asset allocation and liability studies.

j. Monitor and pay plan benefits, consulting fees, administrative and investment expenditures.

k. Administer the plan so as to maintain the plan's qualified status under Internal Revenue Code requirements.

l. Review and approve applications for disability retirement, Qualified Domestic Relations Orders (QDROs), and other special benefit payments.

m. Review and decide board appeals.

n. Determine appropriate levels of service and monitor outreach programs provided to members and employers.

o. Monitor RIO budget, expenditures, financial reporting system, and financial audit.

p. Monitor RIO information technology systems, projects, and security.

q. Select TFFR representatives to serve on SIB and monitor investment program activities and fund performance.

r. Select TFFR representative to serve on SIB Audit Committee and monitor audit program activities.

s. Inform the State Investment Board (SIB), which is the administrative board of the Retirement and Investment Office (RIO), of the TFFR program needs, policies, and services expected to be provided through RIO.

t. Participate with the RIO Executive Director in the hiring~~, evaluation, and termination~~ of the TFFR Chief Retirement Officer – RIO Deputy Executive Director.

F. TFFR Board Trustees and Officers – Duties and Responsibilities

1. TFFR Trustee

Trustees must be willing and able to devote the necessary time to fulfill their duties on the Board. This commitment includes the responsibility to:

a. Act as a member of a seven-member Board of Trustees to provide leadership, oversee plan administration, and set the strategic direction for the TFFR program.

b. Prepare for and attend Board and Committee meetings.

c. Be an informed and active member of the Board, fully participating in the decisions and actions of the Board and its Committees by making independent assessments and reasonable judgments.

d. Acquire and maintain the knowledge and skills necessary to perform trustee duties.

e. Follow Board policies and procedures, applicable state and federal laws and rules.

f. Be accurate when communicating with other trustees, members, beneficiaries, interested parties, the public, and RIO staff.

g. Act collegially with the other trustees and staff in the conduct of TFFR business.

h. Bring to the attention of the Board matters of concern that affect the TFFR plan.

i. Seek the advice of the Executive Director~~Chief Retirement Officer~~, legal advisor, and other trustees when necessary to fulfill their fiduciary duties.

j. Comply with the Board's Code of Conduct and Ethics.

k. Adhere to state law regarding confidentiality of member records and benefits.

l. Adhere to state law regarding Open Meetings and Open Records.

m. Evaluate trustee's individual performance and the Board's performance as a whole.

2. TFFR Board President

The Board President's principal role is to lead the Board in the conduct of Board business by managing the affairs of the Board and ensuring the integrity of the Board's process. The Board President must be willing and able to devote the time necessary to fulfill these special responsibilities. This commitment includes the responsibility to:

a. Convene and preside over all Board meetings in a collegial, fair, and efficient manner following Board policies, procedures, and applicable state laws and rules.

b. Review and approve the agenda for regular and special Board meetings.

c. Ensure proper and timely flow of adequate information to the Board.

d. Solicit input from trustees regarding matters before the Board.

e. Ensure adequate time is provided for effective study and discussion of business.

f. Make Committee assignments.

g. Execute documents and other legal instruments on behalf of TFFR as required by state law, authorized by the Board, or determined in conjunction with the Chief Retirement Officer.

h. Represent the Board to outside parties and organizations.

i. Lead the Board's self-assessment and self-development processes.

j. Perform all other duties identified by the Board.

3. TFFR Board Vice President

The Vice President will perform the duties of the President in the absence of the President.

4. TFFR Representatives to SIB

The TFFR Board selects two~~three~~ trustees to represent TFFR on the SIB. The TFFR Board also selects one trustee as a alternate to serve on the SIB in the absence of either designated representative. ~~TFFR representatives to the SIB must include one active teacher, one active administrator, and one retired member.~~ TFFR representatives to the SIB must be from the following categories: active or retired members. A third trustee from either category will be appointed to serve as the alternate to the SIB.

The TFFR representatives to the SIB have the same authority and responsibilities as do other SIB trustees as provided in NDCC 21-10 and outlined in the SIB Governance Manual.

5. Alternate TFFR Representative to SIB

The TFFR Board selects one alternate TFFR representative to serve on the SIB.

The Alternate TFFR representative to the SIB will perform the duties of the regular TFFR representative on the SIB in the absence of that trustee.

6. TFFR Representative to SIB Audit Committee

The TFFR Board selects one TFFR representative on the SIB to serve on the SIB Audit Committee, subject to official appointment by SIB Chair.

The TFFR representative on the SIB Audit Committee has the same authority and responsibilities as do other trustees on the SIB Audit Committee which are outlined in the SIB Audit Committee Charter.

G. State Investment Board

The ND State Investment Board (SIB) is responsible for oversight, policy making, and administration of the SIB investment program as provided under NDCC 21-10. As such, TFFR assets, as well as other state pension, insurance, and other state funds, are invested by the SIB.

The SIB is composed of ~~twelve~~thirteen trustees consisting of:

a. Lt. Governor of the State of ND
b. State Treasurer
c. ~~State Insurance Commissioner~~Director of Office of Management and Budget
d. Director of Workforce Safety & Insurance
e. Commissioner of University and School Lands
f. ~~Three~~ Two TFFR trustees
g. ~~Three~~ Two PERS trustees
h. Two members, each of whom by experience is familiar with institutional investments, appointed by the governor. One initial appointee shall serve a term of three years, one initial appointee shall serve a term of five years, and all subsequent appointees shall serve five-year terms ~~One Legacy & Budget Stabilization Fund Advisory Board trustee (nonvoting)~~
i. Two members, one from the senate and one from the house of representatives, or the member's designee, who serve on the legacy and budget stabilization fund advisory board, as selected by that board
~~h.~~

Investment of TFFR assets is based on the asset allocation and investment policy statement approved by the TFFR Board and accepted by the SIB. Funds are invested following the "prudent investor rule" and must be invested exclusively for the benefit of TFFR members.

The SIB is also the governing body of the ND Retirement and Investment Office (RIO).

H. Retirement and Investment Office

The ND Retirement and Investment Office (RIO) coordinates the activities of the TFFR retirement program and SIB investment program as provided under NDCC 54-52.5. The governing body of RIO is the SIB, although the TFFR Board and SIB each maintain their legal identities and authority under state law.

RIO is responsible for developing the agency budget, providing the staff, and allocating necessary resources to administer both the TFFR and SIB programs, subject to budget

approval by the Legislature. The TFFR Board and SIB provide input to RIO Executive Management to ensure retirement and investment program needs, policies, and services are considered.

RIO Executive Director ~~– Chief Investment Officer~~ is the administrator of RIO and is responsible for ~~the SIB investment program~~oversight and administration of all RIO programs and operations. RIO Deputy Executive Director – Chief Retirement Officer assists in the administration of RIO and ~~is responsible for~~ the TFFR retirement program.

RIO is an administrative agency of the State of North Dakota and operates from an office located at 3442 East Century Avenue in Bismarck, North Dakota.

I. Delegation to Staff and Organizational Structure

The TFFR Board delegates administration of the TFFR program to the RIO ~~Deputy~~ Executive Director. Daily operations of the program are delegated to the RIO Deputy Executive Director ~~–~~ TFFR Chief Retirement Officer, subject to approval by the RIO Executive Director.

The RIO Deputy Executive Director – TFFR Chief Retirement Officer reports directly to the RIO Executive Director ~~– Chief Investment Officer and functionally to the TFFR Board. *See RIO Organizational Chart (Exhibit 1)*~~.

J. Staff - Duties and Responsibilities

~~3.~~ 1. Deputy Executive Director – Chief Retirement Officer ~~Update in Coordination with SIB~~

The RIO Deputy Executive Director – Chief Retirement Officer is hired by the RIO Executive Director~~ – Chief Investment Officer~~, serves in an unclassified position, and is paid such salary as the Executive Director determines. The Board delegates responsibility for administering the TFFR program to the ~~Deputy~~ RIO Executive Director~~ – Chief Retirement Officer~~, ~~subject to approval by the Executive Director~~some or all of those duties may be delegated to the RIO Deputy Executive Director – Chief Retirement Officer by the RIO Executive Director. The Board will participate with the Executive Director in the hiring~~, evaluation, and termination~~ of the Deputy Executive Director-Chief Retirement Officer.

Duties and responsibilities include:

a. Assist the Executive Director in planning, supervising, and directing overall RIO programs in accordance with the SIB ~~-~~governance policies and state laws and rules, and represent the Executive Director in his/her absence.

b. ~~Administer~~ Assist the Executive Director in administering the TFFR retirement program in accordance with governing statutes, rules, and TFFR Board policies and perform related work as assigned by the TFFR Board, including interpretation of the state and federal law which governs the retirement program.

c. Assist the Executive Director in d~~D~~eveloping annual and long-range plans for the retirement program.

~~d. Interpret state and federal law which governs the retirement program.~~

~~e.~~d. Assist the Executive Director in the d~~D~~evelopment of administrative rules, policies, and procedures necessary to administer the program.

~~f.~~e. In the absence of or at the direction of the Executive Director, r~~R~~epresent the TFFR Board on retirement program issues.

~~g.~~f. Assist the Executive Director in the d~~D~~irection of TFFR legislative agenda and process.

~~h.~~g. Maintain effective relationships with TFFR members, beneficiaries, employers, state officials, legislators and legislative committees, member and employer stakeholder groups, the media, and the public at large.

h. Work with actuarial consultant, medical consultant, legal counsel, auditor, investment consultant, and other service providers in administering the plan, and in coordination with the Executive Director to keep staff and Board members apprised of consultant services and recommendations.~~.~~

~~i.~~

~~j.~~i. Assist the Executive Director in the formulation of RIO's budget, including staffing needs, program costs, operating costs, information technology requirements, and resources to assure that retirement program obligations are met.

~~k.~~j. Assist the Executive Director in the d~~D~~evelopment and preparation of Board and Committee meeting agendas and materials, ~~attend all Board and Committee meetings, responsible for preparation of~~ meeting minutes, required notices, procedures, and applicable rules and regulations of the fund, and attend all Board and Committee meetings.

~~l. Provide the Board with relevant, appropriate, and timely information to enable it to properly carry out its oversight responsibilities~~.

~~m.~~k. In coordination with the Executive Director, ~~A~~advise the Board on significant issues, problems or developments pertaining to the plan, and provide recommended courses of action as appropriate~~.~~ regarding Board policy or action.

~~n.~~l. Maintain the data, records, and files of TFFR members, beneficiaries, and employers including membership data, salary, service, contributions, and benefit payments.

~~o.~~m. Ensure the accurate and timely collection of member and employer contributions, maintenance of member accounts, processing of account claims, and payment of pension, disability, death and refund benefits as allowed under state and federal law.

~~p.~~n. In the absence of the ~~Deputy~~ Executive Director the Deputy Executive Director-Chief Retirement Officer, ~~the Retirement Program Manager~~ will be responsible for the administration of the TFFR program. In the absence of both the Executive

Director and the Deputy Executive Director – Chief Retirement Officer, the TFFR Board may recommend to the SIB that another RIO staff member serve as Interim Deputy Executive Director- Chief Retirement Officer.

2. Executive Director ~~- Chief Investment Officer~~ Update in Coordination with ~~SIB~~

The Executive Director ~~– Chief Investment officer~~ (ED~~- CIO~~) is hired by the SIB, serves in an unclassified position at the SIB's pleasure, and is paid such salary as the SIB determines.

Duties and Responsibilities include:

a. Administer the investment and retirement programs of RIO, ~~O~~oversee planning, supervising, and directing overall RIO programs in accordance with SIB and TFFR governance policies, ~~and~~ federal and state laws, and rules, and perform related work as assigned by the SIB and TFFR Board.

b. Responsible for the developing the annual, biennual and strategic long range ~~plans~~ for RIO and both the SIB and TFFR Board.

~~b. Administer the investment and programs of RIO and perform related work as assigned by the SIB and TFFR Board.~~

c. Develop administrative rules, policies and procedures necessary to administer the retirement and investments programs and seek committee and board approval for changes when appropriate.

~~c.~~d. Direct the preparation and execution of the RIO budget and legislative agenda for the agency and both the SIB and TFFR boards ~~and evaluates and monitors financial and operational programs~~.

~~d.~~e. Represent RIO, promote RIO programs, and has the authority and responsibility to carry out the day-to-day administrative duties for RIO including developing and approving policies relating to the effective operation of the Office.

~~e.~~f. Develop and prepare or direct the preparation of agendas and materials, meeting minutes, required notices, procedures, and applicable rules and regulations for the retirement and investment programs and ~~A~~attend all meetings of the SIB and TFFR Board and corresponding committees.

~~f.~~g. Hire staff as necessary to carry out the responsibilities of RIO. Provides leadership, coaching and feedback to assigned staff, recommending measures to improve performance and increase efficiency.

h. The TFFR Board will participate with the Executive Director in the hiring~~, evaluation, and termination~~ of the Deputy Executive Director-Chief Retirement Officer, and participate in any surveys conducted by the SIB – Executive Review and Compensation Committee for executive team members.

i. Maintain effective relationships with clients, members, beneficiaries, employers, state officials, legislators and legislative committees, member and employer stakeholder groups, the media, and the public at large relevant to both the retirement and investment programs.

~~g.~~j. Advise the SIB and TFFR Board on significant issues, problems or developments pertaining to the plan, and provide recommended courses of action as appropriate regarding Board policy or action.

K. Service Providers – Duties and Responsibilities

1. Actuary

The TFFR Board is responsible for selecting and monitoring the actuarial consultant for the plan.

Duties and responsibilities include:

a. Provide actuarial and technical consulting services for the plan.
b. Prepare annual actuarial valuation and GASB reports, periodic actuarial experience studies, and other special projects and reports.
c. Develop and monitor actuarial funding policy, assumptions, methods, factors, etc.
d. Analyze proposed legislative changes.
e. Advise the Board on actuarial, technical, and administrative issues.

The Board utilizes a request for proposal (RFP) process to periodically select and approve the plan's consulting actuary. It is the Board's intent to issue RFP's every 6 to 10 years, however the timing may be adjusted at the Board's discretion.

The Board monitors actuarial costs and services and may extend the actuarial consulting service contract for 2 year terms, as approved by the TFFR Board.

The Board also hires an independent actuary to periodically perform an actuarial audit of the plan's consulting actuary. The Board utilizes an RFP process to select and approve the plan's actuarial auditor.

2. Medical Consultant

The TFFR Board is responsible for selecting and monitoring a medical consultant for the plan to conduct disability reviews, disability re-certifications, and perform other medical reviews as necessary.

The Board monitors medical consulting costs and services and may extend the medical consulting contract for 2-year terms, as approved by the TFFR Board. The Board may delegate this responsibility to the Executive Director~~Chief Retirement Officer~~.

3. Legal Counsel

The ND Attorney General's Office (AGO) provides legal services to the TFFR Board and staff. The AGO assigns an assistant attorney general to advise the Board on legal issues related to plan administration.

Duties and Responsibilities include:

a. Represent the Board and staff in all legal matters.
b. Draft proposed legislation, administrative rules, and other legal documents.
c. Review and advise on retirement program issues.
d. Research and interpret state statutes and federal regulations.
e. Review Board policies, procedural issues, contracts, and other legal documents.
f. Respond to legal questions from staff, members, employers, and other individuals.
g. Advise and educate the Board and staff on legal matters that relate to the administration of the retirement system including Board appeals, fiduciary duties, ethics, open records and meetings, potential litigation, and other legal issues.
h. Work with staff from the AGO in representing the retirement plan in administrative hearings, litigation, and other matters involving the AGO.
i. Work with outside legal counsel on application of Internal Revenue Code technical requirements and plan qualification issues.

4. Auditor (External financial)

The ND State Auditor's Office selects the external financial auditor for RIO, with input from the SIB Audit Committee.

Duties and Responsibilities include:

a. Perform annual audit of RIO's financial statements.
b. Perform annual audit of TFFR's GASB 68 schedules.
c. Provide report on internal controls and compliance.
d. Provide required written communications.

Results of the annual financial audit are reported directly to SIB Audit Committee and communicated to the TFFR Board in conjunction with annual audit services report.

5. Investment Consultant, Managers, and Advisors

The SIB is responsible for investment of TFFR trust fund assets, and selects the investment consultant, managers, custodian, and advisors for the SIB program.

The governing body of each fund invested by the SIB is required to use RIO staff and consultants in developing asset allocation and investment policies. The TFFR Board has contracted with the SIB investment consultants to perform asset allocation and liability modeling studies in the past.

L. Election of TFFR Board Officers and SIB trustee positions

1. Board Officers

The TFFR Board will elect the following Board officers each year. Any trustee may serve as a TFFR Board officer.

- Board President
- Board Vice President

The TFFR Board will select the following representatives to the SIB each year. Any trustee may serve as a TFFR representative to the SIB, except the State Treasurer is required to be an ex officio member of both the TFFR Board and SIB so may not be selected as a TFFR representative to the SIB.

- Two~~hree~~ TFFR representatives to SIB ~~(representatives must include one active teacher, one active administrator, and one retired member)~~
- One TFFR alternate representative to SIB
- One TFFR representative to SIB Audit Committee (from SIB)
- Three Board members to serve on the TFFR Governance & Policy Review Committee.

2. Election Procedure

The TFFR Board will elect the Board officers~~, and~~ TFFR representatives to the SIB, and members of any committees, at the first regular Board meeting immediately following July 1 of each year. There must be a quorum of four board members in attendance to elect officers.

Four affirmative votes are required to elect. ~~Board officers and TFFR representatives to the SIB~~.

3. Term

Board officers and TFFR representatives to SIB will hold office for one year, or until their successors are elected.

There is no limit to the number of years a trustee may hold office.

4. Vacancies

A Board officer or TFFR representative to the SIB may resign from their position by providing written notice to the Board and Chief Retirement Officer.

Board officer or TFFR representative to the SIB vacancies that occur before the expiration of a term will be filled by the Board at the next regular meeting of the Board following the vacancy.

M. Board and Committee Meetings

1. Open Meetings

All Board and Committee meetings are open to the public in accordance with ND Open Meetings laws pursuant to NDCC 44-04-17.1.

Meetings include any gathering of a quorum of the members of the Board (four members constitute a quorum for TFFR Board) regarding public business, and includes committees, subcommittees, informal gatherings or work sessions, and discussions where a quorum of members are participating by phone or any other electronic communication (either at the same time or in a series of individual contacts).

Emails or text messages between Board members regarding public business may constitute a meeting and violate open meeting laws even if done on personal devices under circumstances and within the parameters established by the ND Office of Attorney General.

Training seminars and purely social gatherings attended by a quorum of the Board or Committee are not meetings, however, as soon as the members discuss any public business, it becomes a meeting.

2. Rules of Order

All Board and Committee meeting will be conducted in accordance with Robert's Rules of Order Newly Revised, except as superseded by state law and Board governance policies.

3. Meeting Schedule

The Board will hold meetings as often as necessary for the transaction of business but will conduct a minimum of six Board meetings each year.

The Board will approve an annual Board meeting schedule identifying the time, date, and location of regular Board meetings. Board meetings will generally be scheduled for the Thursday afternoon preceding SIB meetings beginning in July of each year~~,~~ unless a different day is determined. (Note: SIB meetings are generally scheduled for the 4th Friday of each month.) The Board or Board President may modify this schedule, if needed. This schedule must be filed annually with the Secretary of State's office.

The Board President, or any two members of the Board, may call for special or emergency Board meetings.

At the July Board meeting each year, the Board will elect officers, review governance and program policies, and develop the annual board agenda and education plan.

The Board may hold an annual ~~offsite~~ Board retreat, either on-site or off-site, to focus on board development, strategic planning, legislative planning, developments in public pension administration, and other topics as determined by the Board. A Board Retreat must also be noticed as a meeting of the Board.

4. Meeting Notice

Public notice of all Board and Committee meetings is made in accordance with state law pursuant to NDCC 44-04-20.

Meeting notices are posted on the Secretary of State website, RIO public website, RIO office, and the meeting location.

5. Meeting Agendas

An annual schedule of agenda topics, reports, and education items for each regular board meeting will be developed by the ~~Chief Retirement Officer~~Executive Director and approved by the Board. The annual schedule will also include review of the Board Governance Manual over several meetings.

Board meeting agendas will be prepared by the ~~Chief Retirement Officer~~Executive Director and approved by the Board President using the annual schedule as a basis for topics to be included on each regular meeting agenda. Additional topics may be added by the Executive Director, Chief Retirement Officer, Board President, and Board trustees subject to approval by the Board President.

The meeting agenda should contain enough detail so trustees, members, interested parties, and the general public can understand the nature of each agenda item.

Any individual or organization who desires to appear on the agenda of a Board or Committee meeting must notify the ~~Chief Retirement Officer~~Executive Director in writing at least ten working days prior to the meeting date. The request must include the reason or topic to be discussed with the Board. Subject to approval by the Board President, the individual will be placed on a Board meeting agenda.

Regular Board meeting agendas may be added to or altered at the time of the meeting. For special or emergency meetings, only the specific topics included in the meeting notice may be discussed.

The meeting agenda will identify if the item requires Board action, information only, consent agenda, or executive session. The agenda will also note the estimated amount of time expected for each topic.

a. **Action** items on the agenda contain information that require Board discussion and vote (annual reports, policy changes, benefit determinations, legislative positions, etc.)

b. **Information** only items contain information that it is important for the Board to know, but do not require Board action or a Board vote (project updates, status reports, education, etc.)

c. **Consent agenda** items will primarily consist of approval of disability applications, QDROs, employer reviews, or other routine administrative matters that require

Board action as recommended by staff, but which typically do not require Board discussion. Trustees may request any item to be removed from the Consent agenda `to allow for Board discussion and action.

d. If an **Executive session** is required or anticipated, the Executive session must be listed as an agenda item (i.e., confidential member information, attorney consultation, etc.)

6. Meeting Materials

The ~~Chief Retirement Officer~~Executive Director will coordinate the preparation of Board meeting materials and develop an Executive Summary.

Meeting materials will generally be sent to trustees 5-7 days before the meeting, unless otherwise indicated.

Materials will be posted on the public RIO website, except for Executive Session or confidential items which will be sent via secure email to the trustees only.

7. Meeting Attendance and Quorum

Attendance at Board meetings is an essential element of a trustee's fiduciary responsibility. Therefore, Board members are expected to attend all Board and applicable Committee meetings.

Board members may attend meetings in person, by telephone or video conference.

A quorum of four members must be present for the Board to conduct business.

Board members should come to meetings having read the materials prepared and circulated by staff and/or consultants.

Board members should be inquisitive, and should appropriately question staff, advisors, and fellow trustees as circumstances require.

Board members should conduct themselves with integrity and dignity, always maintaining the highest ethical conduct ~~maintaining the highest ethical conduct at all times~~.

Board members should make every effort to engage in collegial deliberations and to maintain an atmosphere in which trustees can speak freely and explore ideas before becoming committed to positions.

8. Voting

Voting on matters before the Board will be by roll call vote, except for procedural matters.

Board members have a duty to vote unless there is an applicable statute that would require or permit abstention.

Each Board member is entitled to one vote. Proxy voting is not allowed.

Four members constitutes a quorum.

Four votes are required for resolution or action by the Board.

Board minutes will show the recorded vote of each Board member.

9. Public Access and Comment

All Board and Committee meetings are open to the public and all persons who wish to attend may do so in accordance with ND Open Meeting laws, NDCC 44-04-17.1.

Public participation or comments during Board meetings may be allowed and limited to reasonable time limits at the discretion of the Board Pp~~p~~resident as follows:

a. By written request to appear on a Board meeting agenda.
b. By written request to speak on a specific Board meeting agenda topic.
c. By written request to speak on any TFFR related topic which is not on a regular Board meeting agenda.
d. By submitting a letter or written document for distribution to the Board.

See TFFR Board Public Participation Guidelines (Exhibit 2).

10. Executive Sessions

The Board or Committee may conduct business in Executive Session only as permitted by state law, NDCC 44-04-19.2. Executive sessions shall be presided over by the Board President or Committee Chair.

Only the portions of a public meeting that are specifically confidential or exempt from the Open Meetings law may be closed to the public and held in Executive Session. The remainder of the meeting must be open to the public.

~~Reasons a meeting may not be open to the public includes Board discussion of:~~

~~a. Confidential member records or information under NDCC 15-39.1-30 (examples include member benefit appeals, benefit determinations, disability applications, QDROs, etc.)~~

~~b. Attorney's advice regarding a "pending or reasonably predictable" lawsuit involving TFFR.~~

~~c. Attorney's assessment of the risks, strengths or weaknesses of an action of the TFFR Board or negotiating strategy if holding the discussion in an open meeting would have an adverse effect on the bargaining or litigating position of the Board.~~

11. Closed Meeting Procedures

State law specifies the following general procedure for holding an executive session.

a. Convene meeting in an open session preceded by public notice.
b. Announce during the open portion of the meeting the topics to be considered during the Executive Session and the legal authority for holding an Executive Session on those topics.

c. Pass a motion to hold an Executive ~~session, unless~~session unless motion is unnecessary because a confidential meeting is required to discuss confidential information.
d. Record the Executive Session electronically.
e. Limit the topics considered during the Executive Session to the announced, authorized topics.
f. Take final action on the topics considered in the Executive Session during the open portion of a meeting.
g. All substantive votes must be recorded by roll call.

12. Meeting Minutes and Records

Minutes will be taken at all Board and Committee meetings and presented for approval at the next regular meeting. The Board President or Committee Chair will sign the minutes after Board approval.

At a minimum, minutes must include:

a. The names of the members attending the meeting.
b. The date and time the meeting was called to order and adjourned.
c. A list of topics discussed regarding public business.
d. A description of each motion made at the meeting and whether the motion was seconded.
e. The results of every vote taken at the meeting; and
f. The vote of each member on every recorded roll call vote.

Approved meeting minutes will be made available on the RIO-TFFR website, or upon request. Meeting minutes and records of the Board and Committee activities and actions will be maintained as required by state law.

13. Meeting Payment and Travel Expense Reimbursement

Board members, excluding ex-officio members, will receive compensation and travel expenses for attending Board and Committee meetings as provided in state law, ~~–~~NDCC 15-39.1-08.

Board members will be paid $148 for each Board or Committee meeting attended. Board members will be paid the full amount for each meeting attended that lasts for two or more hours. Meetings lasting less than two hours will be paid at one half the amount. Mileage and travel expense reimbursement will be paid as provided in state law.

Board members may not lose regular salary, vacation pay, vacation or any personal leave, or be denied attendance by the state or political subdivision while serving on official business of TFFR.

To receive meeting payment, Board members must complete a travel expense form and submit it to RIO. *See RIO Board Meeting In-State Travel Expense Voucher (Exhibit 3).*

N. Committees

1. Standing Committees

The TFFR Board may establish permanent standing committees. The TFFR Board has created a permanent standing Governance and Policy Review Committee.

a. POLICY OF THE TFFR BOARD – Governance & Policy Review Committee
   The Governance & Policy Review Committee is authorized to:
   - Review and recommend policies for the governance manual.
   - Ensure the governance manual reflects best practices and governance.
   - As directed by the board, review specific governance concerns, and make recommendations for improvement.
   - Request RIO staff for specific topic training or education

2. Special Committees

The Board may establish special ad hoc committees as needed to carry out duties specified by the Board.

The Board President will appoint the Committee Chair and Committee members for special committees.

Committee Chairs are responsible for organizing the work of the Committee. In fulfilling this function, Committee Chairs:

a. Schedule Committee meetings as often as necessary.
b. Consult with the ~~Chief Retirement Officer~~Executive Director or designee in setting the meeting agenda in accordance with the Committee's delegated responsibilities.
c. Conduct Committee meetings in a collegial, fair, and efficient manner following Board policies, procedures, and applicable state law such as the open meetings law.
d. Ensure the Committee operates to assist the Board consistent with its delegation.
e. Provide Committee updates and reports to the Board.

When the Committee's duties are completed, the Committee automatically ceases to exist.

3. Audit Committee

The SIB Audit Committee also functions as the Audit Committee for the TFFR Board since the SIB is the governing body of the RIO agency and RIO administers both the TFFR retirement program and SIB investment program.

The TFFR Board selects one TFFR representative on the SIB to serve on the SIB Audit Committee, subject to official appointment by SIB Chair. This representative will act as the TFFR Board's liaison to the SIB Audit Committee.

The TFFR Board's representative on the SIB Audit Committee and/or the Audit Supervisor, will provide Audit Committee updates and monitoring reports to the Board.

O. Board Appeals

Any member, beneficiary, employer, or affected individual may appeal a determination made by the Executive Director or designee~~Chief Retirement Officer~~ regarding TFFR eligibility, benefits, or other plan provisions with which the individual does not agree.

The affected individual must file a written request for Board review within thirty days after notice of the determination of the Executive Director or designee~~Chief Retirement Officer~~ has been mailed to the affected individual. If a request for Board review is not filed within the thirty-day period, the decision of the agency~~Chief Retirement Officer~~ is final. The request for Board review must include the decision being appealed, the reason(s) the individual believes the decision should be reversed or modified, and any relevant documentation.

To review the matter, an appeal hearing will be scheduled as part of a regularly scheduled Board meeting. A summary of the relevant facts and documentation will be presented. The affected individual and/or designee may attend and speak at the hearing. After review of the facts, documentation, and testimony, the Board will make its decision. The Board's decision will be communicated in writing to the affected individual within 30 days of the decision.

Any individual aggrieved by a decision of the Board may initiate a formal administrative action against the Board in accordance with ND Administrative Code Chapter 82-10 and ND Century Code Chap. 28-32.

P. Board Communications

The TFFR Board President and ~~Chief Retirement Officer~~Executive Director; or Deputy Executive Director – Chief Retirement Officer in the absence of or at the direction of the Executive Director; are authorized to represent the Board on retirement program issues and in announcing Board positions and decisions, unless otherwise determined by the Board.

Board members may respond to general inquiries about the TFFR retirement program, however specific questions from members, beneficiaries, employers, and the public should be referred to the Communications Director or other~~Deputy Executive Director - Chief Retirement Officer or the~~ Retirement and Investment Office staff to provide more detailed information about the retirement program.

Q. Trustee Orientation and Education Program

Trustees are responsible for making policy decisions affecting all major aspects of TFFR plan administration. Therefore, trustees should acquire and maintain an appropriate level of knowledge that provides and improves core competencies necessary to govern a large, complex pension fund.

1. Board Member Core Competencies

Board members should develop and maintain their knowledge and understanding of the issues involved in the prudent management of the retirement plan. Specific areas include:

a. Public pension plan governance
b. Asset allocation and investment management
c. Actuarial principles and funding policies
d. Financial reporting, controls, and audits
e. Benefits administration
f. Open meeting and open records laws
g. Fiduciary responsibilities
h. Ethics and conflicts of interest

2. Board Member Education

To permit Board members to develop core competencies, discharge their fiduciary duties, and ensure Board members have a full understanding of the issues facing the TFFR plan, the Board encourages trustee education including:

a. New trustee orientation
b. Mentoring program
c. Educational conferences, workshops, and other training programs
d. In-house education sessions
e. Fiduciary education and ethics training
f. Open meeting and open records training
g. Webinars, Reports, and Studies

Board members should identify areas in which they might benefit from additional education, and work with the ~~Chief Retirement Officer~~Executive Director to find or develop educational opportunities to best address those needs.

Board members must annually report trustee education received each year. *See TFFR Board Education Report Form (Exhibit 4).*

3. New Trustee Orientation

Each new Board member should attend a new trustee orientation session(s) as soon as possible after appointed to the Board or elected to office. The orientation sessions will be developed by the ~~Chief Retirement Officer~~Executive Director, and will include, at minimum, review of the following topics and materials:

a. Introduction to RIO staff
b. Tour of RIO office
c. Board Governance Manual
d. Board duties and responsibilities
e. History and overview of the plan
f. Overview of TFFR-SIB-RIO organizational structure
g. Laws, rules, and board policies governing the plan

h. Benefit structure, administration, outreach services
i. Fiduciary responsibilities, conflict of interests, and ethics
j. Open meetings and open records
k. Board meeting schedule and protocol
l. Board meeting minutes and materials
m. Actuarial valuation report, assumptions, methods, and funding policy
n. Actuarial experience report
o. Actuarial audit report
p. Annual financial report
q. Investment program, investment policy statement, asset allocation, and performance
r. RIO website – TFFR and SIB sections
s. Legislative issues
t. List of educational conferences and training sessions
u. Other relevant information or materials deemed appropriate

4. Mentoring Program

The Board President will assign each new trustee an experienced Board mentor to assist the new trustee in becoming familiar with Board responsibilities. The Board mentor should have at least two years of experience on the Board.

The Board mentor should contact the new Board member periodically outside of regularly scheduled Board meetings for consultation or discussion related to Board member duties and responsibilities. The new Board member should contact the Board mentor as often as necessary.

Appointment of a Board mentor does not constitute appointment of a c~~C~~ommittee and does not implicate open meeting notice requirements.

5. Educational Conferences, Workshops, and other Training Programs

The ~~Chief Retirement Officer~~Executive Director or designee will maintain a list of educational conferences, workshops, and other training programs appropriate for Board members to attend. The list will be provided at least annually to Board members. Board members may attend such conferences or others deemed to be appropriate by the Executive Director~~Chief Retirement Officer~~.
Subject to budget availability, Board members may attend at least one out of state educational conference each year. New trustees, or trustees with investment or other specialized Board responsibilities, may attend additional educational training sessions to help develop core competencies and become proficient in performing their duties.

The ~~Chief Retirement Officer~~Executive Director will review conference agendas and materials to ensure they are geared toward trustee education, and subject to budget availability, will approve Board travel requests. Board travel outside of the continental United States must be approved by the Board President and Executive Director~~Chief Retirement Officer~~.

Any Board member who attends a conference, workshop, or other training program will present an oral report to the Board.

The ~~Chief Retirement Officer~~Executive Director will inform the Board of educational conferences, workshops, or other training programs attended by trustees on an annual basis.

6. In-House Education Sessions

Based on the education needs identified by Board members, the ~~Chief Retirement Officer~~Executive Director will arrange for staff or outside service providers to conduct educational sessions at regularly scheduled Board meetings. Topics may include pension board governance, actuarial and funding issues, investments, retirement operations and benefits, workforce demographics and shortages, and other topics determined by the Board.

7. Fiduciary Education and Ethics Training

At least every two years, a fiduciary education and ethics training session will be conducted at a regularly scheduled Board meeting. The session will review and update trustees regarding fiduciary issues and ethical conduct affecting their service on the Board.

8. Open Meetings and Open Records Training

At least every two years, an open meetings and open records training session will be conducted at a regularly scheduled Board meeting. The session will review and update trustees regarding open meetings and open records requirements affecting their service on the Board.

9. Webinars, Reports, and Studies

Board members are encouraged to subscribe to mailing lists and review websites for information about public pension plan conferences, webinars, reports, and studies from pension and investment organizations. Examples include:

a. National Council on Teacher Retirement (NCTR)
b. National Institute on Retirement Security (NIRS)
c. National Education Association-Retired (NEA-R)
d. National Retired Teachers Association (NRTA-AARP)
e. International Foundation for Employee Benefit Plans (IFEBP)
f. Center for State and Local Government Excellence (SLGE)
g. Center for Retirement Research at Boston College (CRR)
h. Callan Investment Institute (Callan)
i. Council of Institutional Investors (CII)

The Chief Retirement Officer will also provide links to recent published reports and studies with Board meeting materials.

10. Reimbursement of Education Expenses

Trustees must request approval for travel to educational conferences or other educational programs. Trustees should notify the Chief Retirement Officer of their interest in attending an educational conference or other program. RIO will complete the travel authorization form which

must be signed by the trustee and approved by the ~~Chief Retirement Officer~~Executive Director. *See ND Authorization for Out of State Travel (Exhibit 5).*

RIO will make all travel arrangements and pay conference registration fees, unless otherwise agreed to by the Chief Retirement Officer and trustee.

Payment of travel-related expenses for trustee education will be in accordance with state of ND travel policies. Trustees will be reimbursed for travel related expenses including lodging, meals, transportation, etc. In order to receive reimbursement, a trustee must complete an expense form and attach receipts as required. *See RIO Conference Expense Voucher – Board Members (Exhibit 6).*

R. Code of Conduct, Ethics, and Conflicts of Interest

Following is the Code of Conduct, Ethics, and Conflicts of Interest policy for the TFFR Board of Trustees:

1. Board members owe a duty to conduct themselves so as to inspire the confidence, respect, and trust of the TFFR members and to strive to avoid not only professional impropriety, but also the appearance of impropriety.

2. Board members shall perform the duties of their offices impartially and diligently. Board members are expected to fulfill their responsibilities in accord with the intent of all applicable laws and to refrain from any form of dishonest or unethical conduct. Board members shall be unswayed by partisan interest, public sentiment, or fear of criticism.

3. Conflicts of interest and the appearance of impropriety shall be avoided by Board members. Board members shall not allow their family, social, professional, or other relationships to influence their judgment in discharging their responsibilities. Board members shall refrain from financial and business dealings that tend to reflect adversely on their impartiality or interfere with the proper performance of their duties. If a conflict of interest unavoidably arises, the Board member shall immediately disclose the conflict to the Board. The Board must vote on whether the member can vote. Conflicts of interest to be avoided include but are not limited to: receiving consideration for advice given to a person concerning any matter over which the Board member has any direct or indirect control, acting as an agent or attorney for a person in a transaction involving the Board, and participation in any transaction for which the Board member has acquired information unavailable to the general public, through participation on the Board. “Conflict of interest” means a situation in which a Board member has a direct and substantial personal or financial interest in a matter which also involves the member’s fiduciary responsibility.

4. The Board shall not unnecessarily retain consultants. The hiring of consultants shall be based on merit, avoiding nepotism and preference based upon considerations other than merit that may occur for any reason, including prior working relationships. The compensation of such consultants shall not exceed the fair value of services rendered.

5. Board members shall abide by NDCC 21-10-09, which reads: “No member, officer, agent, or employee of the state investment board shall profit in any manner from

transactions on behalf of the funds. Any person violating any of the provisions of this section shall be guilty of a class A misdemeanor."

6. Board members shall perform their respective duties in a manner that satisfies their fiduciary responsibilities.

7. Political contributions are regulated under NDCC 16.1-08-03 and are not restricted under this policy.

8. All activities and transactions performed on behalf of public pension funds must be for the exclusive purpose of providing benefits to plan participants and defraying reasonable expenses of administering the plan.

9. Prohibited transactions. Prohibited transactions are those involving self-dealing. Self-dealing refers to the fiduciary's use of plan assets or material, non-public information for personal gain; engaging in transactions on behalf of parties whose interests are averse to the plan; or receiving personal consideration in connection with any planned transaction.

10. Violation of these rules shall result in an official reprimand from the TFFR Board. No reprimand shall be issued until the board member has had the opportunity to be heard by the Board.

11. Board members are required to affirm their understanding of this policy annually, in writing, and must disclose any conflicts of interest that may arise. *See TFFR Code of Conduct Annual Affirmation (Exhibit 7)*

12. RIO Deputy Executive Director- Chief Retirement Officer is required to affirm his/her understanding of RIO Administrative Policy – Code of Conduct for RIO Employees – annually, in writing, and must disclose any conflicts of interest that may arise.

~~12.~~13. RIO Executive Director is required to affirm his/her understanding of RIO Administrative Policy – Code of Conduct for RIO Employees – annually, in writing, and must disclose any conflicts of interest that may arise.

S. Strategic Planning

The Board and ~~Chief Retirement Officer~~RIO Executive Director will work collaboratively to develop a long-term strategic plan which may:

1. Identify and prioritize TFFR program issues and initiatives.
2. Assess the strengths, weaknesses, opportunities, and threats for TFFR.
3. Focus resources on high value activities.
4. Develop strategies to address priorities.
5. Monitor the progress and implementation of the strategic plan.
6. Work with RIO to ensure adequate resources are in place to support the successful execution of the plan.

T. Board Policy Approval Process

Board governance and program policies may be adopted or amended from time to time based on the following process.

New policies or policy amendments may be proposed by RIO staff~~the Chief Retirement Officer~~ or a Board member. The Executive Director shall maintain an internal agency process for the development and presentation of staff recommendations. All new policies or amendments must be submitted to the Board's legal counsel at the Attorney General's office for review prior to Board approval.

Upon request of RIO staff~~the Chief Retirement Officer~~ or a Board member, a new policy or amendment shall be placed on the Board's agenda for action as follows:

1. Introduction and first reading. A brief explanation or summary of the new policy or amendment shall be presented to the Board. Upon approval of introduction and first reading, the policy shall be placed on the agenda of the next scheduled meeting of the Board for second reading and adoption. When appropriate, the policy shall be distributed to interested parties.

2. Second reading and adoption. Interested parties and the public shall be allowed an opportunity to comment on the policy or amendment before final action by the Board. The policy shall take effect immediately following second reading and adoption by the Board, unless a different effective date is stated.

3. Amendments. Amendments may be proposed at any time before final adoption of the policy. Upon determination by the Board that adoption of an amendment constitutes a substantive change that significantly changes the meaning or effect of the policy, the Board shall continue consideration of second reading and adoption to the next meeting to permit further review and comment.

4. Emergency measures. Upon determination that an emergency or other circumstances calling for expeditious action exists; the Board may waive the requirement of a second reading and immediately approve the new policy or amendment following introduction and first reading.

Board policies will be reviewed at least annually, or more often as needed.

U. Board Self-Assessment

On an annual basis, the Board will engage in a self-assessment process to evaluate the trustee's individual performance and the Board's overall performance. The Board President is responsible for overseeing implementation of this assessment, with assistance of the Executive Director ~~Chief Retirement Officer~~ and Supervisor of Audit Services.

Individual Trustee and Overall Board Assessments may contain topics including:

1. Board and staff roles
2. Board and Committee structure

3. Board meetings
4. Policy making and reviews
5. Financial management practices
6. Pension plan administration practices

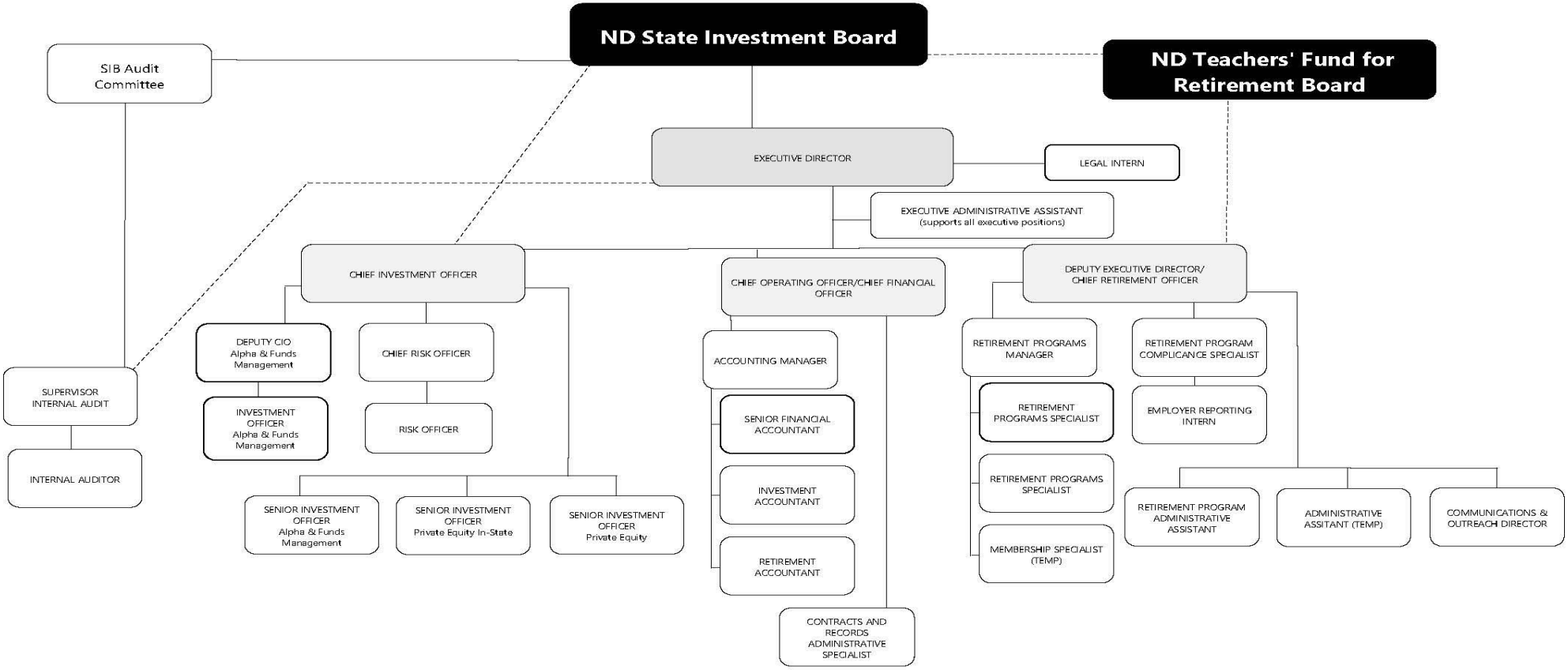
See TFFR Board Self- Assessment (Exhibit 8 Process and Survey To Be Developed).

Board Governance Policies Approved _____
Date

Board Governance Section Exhibits

1. RIO Organizational Chart

RETIREMENT AND INVESTMENT OFFICE



2. TFFR Board Public Participation Guidelines

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

TFFR Board Meeting

Public Participation Guidelines

All TFFR Board and Committee meetings are open to the public and all persons who wish to attend may do so in accordance with ND Open Meetings laws, NDCC 44-04-17.1.

The Board is responsible for oversight, policy making, and administration of the TFFR plan. The Board may seek public input to assist in making decisions, but time spent answering routine questions or criticisms must not be taken from Board business. Generally, if an individual has a question or concern about the operation of the TFFR program or a specific member or employer issue, he/she is encouraged to contact the Executive Director or Chief Retirement Officer to get the needed response directly.

Although there is no legal requirement that the public be given an opportunity to speak at TFFR Board meetings, it is the Board's policy that public participation or comments during Board meetings may be allowed and limited to reasonable time limits at the discretion of the Board President. (See TFFR Board and Committee Meetings – Public Access and Comment, Policy M-9.)

Subject to approval of the Board President, public participation or comments may be provided to the Board as follows:

1) **By written request to appear on a Board meeting agenda.** The request must include the topic to be discussed and must be provided to the Executive Director~~Chief Retirement Officer~~ at least ten working days prior to the meeting date.

2) **By written request to speak on a specific Board meeting agenda topic at the meeting.** The request must include the topic to be discussed and must be provided to the Executive Director~~Chief Retirement Officer~~ at least two hours prior to the meeting.

3) **By written request to speak on any TFFR related topic which is not on a regular Board meeting agenda under "Other Business."** The request must include the topic to be discussed and must be provided to the Executive Director~~Chief Retirement Officer~~ at least two hours prior to the meeting.

4) **By submitting a letter or written document** to the Executive Director~~Chief Retirement Officer~~ for distribution to the Board.

SPEAKER INFORMATION

- Speaker should stand (if able to do so) and be recognized by the Board President.
- Speaker should state Name and Organization Representing (if applicable).
- Speaker should state agenda number and topic which the speaker will address.
- 5-minute time limit for speaker unless additional time is allowed by Board President.
- No undue interruption, disorderly conduct or remarks made out of order.
- No charges or complaints against staff will be allowed.
- Questions and comments by the Board and Executive Director~~Chief Retirement Officer~~ will be allowed.
- Board or Staff response to the Speaker's remarks will be allowed but is not required.

TFFR BOARD

PUBLIC PARTICIPATION REQUEST FORM

Date and Time Submitted _____

Name _____

Organization Representing (if applicable) _____

Contact Information (phone number, email, or mailing address) _____

_____

_____

Topic or Agenda Item _____

_____

_____

3. RIO Board Meeting In-State Travel Expense Voucher

RETIREMENT AND INVESTMENT OFFICE
Board Meeting Travel Expense Voucher

_____
Name (please print)

MEETING ATTENDED:

		Time	Office Use
☐ TFFR			
☐ SIB	Date		
☐ Audit Committee	Date		
☐ Securities Litigation Committee	Date		
☐ Executive Review Committee	Date		
☐ TFFR Governance & Policy Review Committee	Date		
☐ SIB Governance & Policy Review Committee	Date		

TRAVEL EXPENSES

MEALS (Reimbursed at state rate effective 8/1/15:

Date _____	☐ Breakfast (1st Qtr - 6am)	$7.00	Date _____	☐ Breakfast (1st Qtr - 6am)	$7.00
	☐ Lunch (2nd Qtr - Noon)	$10.50		☐ Lunch (2nd Qtr - Noon)	$10.50
	☐ Dinner (3rd Qtr - 6pm)	$17.50		☐ Dinner (3rd Qtr - 6pm)	$17.50
Date _____	☐ Breakfast (1st Qtr - 6am)	$7.00	Date _____	☐ Breakfast (1st Qtr - 6am)	$7.00
	☐ Lunch (2nd Qtr - Noon)	$10.50		☐ Lunch (2nd Qtr - Noon)	$10.50
	☐ Dinner (3rd Qtr - 6pm)	$17.50		☐ Dinner (3rd Qtr - 6pm)	$17.50

MILEAGE (Round trip):

FROM: _____

TO: _____

Total Miles: _____ @58.5¢/mile Effective 1/1/22

LODGING (Attach Receipts - reimbursed at actual cost up to $86.40/night + tax)
Effective 10/1/19:
Number of Nights: _____

MISCELLANEOUS (Attach Receipts):

Telephone Calls _____

Taxi, car rental, etc _____

Other _____

SIGNATURE: _____

DATE: _____

Office Use
521020/521035
Total Meals $ _____
521030
Total Mileage $ _____
521015
Total Lodging $ _____
Total Misc. $ _____
TOTAL TRAVEL $ _____

1/5/2022

4. ND Authorization for Out of State Travel

AUTHORIZATION FOR OUT OF STATE TRAVEL
STATE OF NORTH DAKOTA
SFN 2564 (8-96)

Department or Institution	Dept. No.
ND RETIREMENT AND INVESTMENT OFFICE	190

Mailing Address (If not "Inside Capitol" mail)

3442 EAST CENTURY AVENUE, PO BOX 7100, BISMARCK ND 58507 7100

Person Traveling (Last Name) (First Name)

Destination(s) (City and State)

METHOD OF TRAVEL:
☐ Train (1) ☐ State Vehicle (3) ☐ Commercial Air (5) ☐ State Plane (6)
☐ Bus (2) ☐ Personal Vehicle (4) ☐ Charter Plane (5) ☐ Other (Explain)

Date to depart from home	Date to return home	Does trip include vacation days?
		☐ Yes ☒ No

REASON FOR TRIP:
☐ Conference/Meeting (C) ☐ Seminar/Workshop/Training (T) ☐ Routine Work (W) ☐ Other (X)

NAME OF MEETING (DO NOT Abbreviate)

TOTAL NUMBER OF PERSONS FROM YOUR AGENCY FOR THIS TRIP/MEETING:	NOTE: Submit a separate SFN 2564 for each person at the same time.

ESTIMATED COST OF TRIP (To Nearest Dollar)					COSTS WILL BE PAID BY
Transportation	Meals, Lodging, Etc.	Registration	Rental Car/Taxi	TOTAL	Department
$	$	$	$	Estimated $	☐ Other (Explain in Remarks)

REMARKS

Signature of Person Traveling _____ Date _____

Supervisor Signature _____ Date _____

Deputy Executive Director _____ Date _____

Executive Director _____ Date _____

5. ND Travel Expense Voucher

TRAVEL EXPENSE VOUCHER
STATE OF NORTH DAKOTA
SFN 52785 (03-2015)

Month	Year	Department Name	Official Position

Employee Name	Employee ID	Business Unit	Fiscal Month	Biennium

Day	Points Covered By Travel	Hour (Show AM or PM) Depart	Hour (Show AM or PM) Arrive	Vehicle Miles	Ref	Comm'l Air Trans.	Ref	Taxi & Other Air Trans.	Ref	Misc. Exp.	Meals In State	Meals Out of State	Ref	Lodging In State	Lodging Out of State

Purpose of Travel and Explanation of Expenses:

Lodg. in State	521015			
Lodg. out of State	521075			
Meals in State	521020			
Meals out of State	521080			
IRS Meals-Taxable	521035			
Miscellaneous Expenses				
Other Transportation in State	521025			
Other Transportation out of State	521085			
Air Transportation in State	521010			
Air Transportation out of State	521070			
Vehicle Miles in State		X		521030
Vehicle Miles out of State		X		521090
Total Expenses				
(Ref. Doc. No. of Advance):			Less Travel Advance	
NET EXPENSES				

Line	Due Date	Dept. ID	Account	Oper. Unit	Class	Fund	Project ID	Activity ID	Resource Type	Resource Category	Amount

I hereby certify that the within itemized statement representing a claim for payment or per diem, mileage or travel expenses or a combination thereof, truthfully and accurately states the days of service and the mileage traveled, and the purpose thereof.

TOTAL

Employee Signature	Date
Departmental Approval	Date

INSTRUCTIONS FOR THE TRAVEL EXPENSE VOUCHER

Be sure to "Tab" from one field to another, rather than using the mouse.

Month – Enter the month of travel.

Year – Enter the year of travel.

Department Name – Enter the name of your Agency.

Official Position – Enter your job title.

Employee Name – Enter your name.

Employee ID – This number is assigned by payroll.

Business Unit – Your agency's 5-digit number.

Fiscal Month – Enter the fiscal month.

Biennium – Enter the biennium.

Day - Enter the day of the month in which the activity occurred.

Points Covered By Travel – Enter the departure/destination points.

Hour – Enter the departures and arrival time for the actual travel day (example: 7:00 am).

Vehicle Miles – Enter the number of vehicle miles traveled. If you have in state and out of state miles, separate them and list them on separate lines.

Ref – Enter an "I" for in-state travel or an "O" for out-of-state travel. **If this is not entered, the form will not calculate correctly.**

Comm'l Air Trans. – Enter the amount of commercial air transportation.

Ref – Enter an "I" for in-state travel or an "O" for out-of-state travel. **If this is not entered, the form will not calculate correctly.**

Taxi & Other Air Trans. – Enter taxi fares and any other air transportation.

Ref – Enter an "I" for in-state travel or an "O" for out-of-state travel. **If this is not entered, the form will not calculate correctly.**

Misc. Exp – Enter your other expenses that do not belong in any other column. Explain these expenses in the "Purpose of

Travel and Explanation of Expenses" section.

Meals In State – Enter the dollar amount of the meals in state.

Meals Out of State – Enter the dollar amount of the meals out-of-state.

Ref – Enter a "T" if your meals are taxable. Meals are taxable if no overnight stay is involved.

Lodging in State – Enter the dollar amount of lodging in state.

Lodging Out of State – Enter the dollar amount of lodging out-of-state.

Purpose of Travel and Explanation of Expenses – Enter the reason for travel and any explanations for your miscellaneous expenses.

The amounts entered in the top section of the form will automatically be totaled and filled in the appropriate fields of the middle section, as long as the correct reference codes were entered and you used the tab key to navigate between fields. The only exceptions are the following two fields:

Vehicle Miles in State – Calculates the total vehicle miles traveled within the state. You will need to enter the current rate. The total will then automatically calculate.

Vehicle Miles out of State – Calculates the total vehicle miles out of state. You will need to enter the current rate. The total will automatically calculate.

Total Expenses – Calculates the total expenses automatically.

Ref. Doc. No. of Advance – Enter the document number if you received a travel advance and the dollar amount.

Net Expenses – Calculates the net expenses automatically.

Print two copies of the Travel Expense Voucher.

Sign one copy, attach all of your receipts, and submit it for approval. Once approved and forwarded to accounting, the bottom fields will be cost-coded and entered. Remember to keep copies of the receipts for yourself as well.

6. TFFR Code of Conduct Annual Affirmation

NORTH Dakota | Retirement and Investment
Be Legendary.

MEMORANDUM

To: **TFFR Board**

From:

Date:

RE: **Annual Affirmation of Code of Conduct Policy**

The *TFFR Board Members' Code of Conduct and Ethics Policy,* which is attached to this memorandum, details the Code of Ethical Responsibility for the TFFR Board. Item #11 of this policy indicates that each Board Member is required to reaffirm their understanding of this policy annually and disclose any conflicts of interest. Therefore, please read and sign the statement below to comply with this requirement.

"I have read and understand TFFR Board Members' Code of Conduct and Ethics Policy. I have disclosed any conflicts of interest as required by this policy"

Name (printed) _____

Signature_____

Date_____

Detail of any conflicts of interest (if any):

SECTION II: TFFR Program Policies

A. Investment Policy Statement

1. Plan Characteristics and Fund Constraints

The North Dakota Teachers' Fund for Retirement (TFFR) is a successor pension benefit plan to the Teachers' Insurance and Retirement Fund (TIRF). TIRF was established in 1913, 24 years after North Dakota became a state, to provide retirement income to all public school and certain state teachers and administrators in the state of North Dakota. TIRF became TFFR in 1971. The plan is administered by a seven-member Board of Trustees comprised of: two active teachers, two retired teachers and one school administrator appointed by the Governor of North Dakota and two elected officials - the State Treasurer and the State Superintendent of Public Instruction.

The plan is a multi-employer defined benefit public pension plan that provides retirement, disability, and death benefits in accordance with Chapter 15-39.1 of the North Dakota Century Code (NDCC). Monthly retirement benefits are based on the formula: Number of Years of service X 2.0% X Final Average Salary. Adjustments to the basic formula are made depending on the retirement option selected.
Funding is provided by monthly employee and employer contributions scheduled to increase as follows:

	7/1/11	7/1/12	7/1/14
Employee	7.75%	9.75%	11.75%
Employer	8.75%	10.75%	12.75%

Employee and employer contributions will be reduced to 7.75% each when TFFR reaches 100% funded level on an actuarial value basis.

The TFFR Board has an actuarial valuation performed annually and an Experience Study and Asset Liability Study performed every five years. The actuarial assumed rate of return on assets was reduced to 7.25% from 7.75% as of July 1, 2020. Key plan and financial statistics are recorded in the most recent valuation report on file at the North Dakota Retirement and Investment office (RIO).

2. Fund Goals

The Plan benefits are financed through both statutory employer and employee contributions and the investment earnings on assets held in the Fund. The TFFR Board recognizes that a sound investment program is essential to meet the pension obligations.

As a result, the Fund goals are to:

a. Improve the Plan's funding status to protect and sustain current and future benefits.
b. Minimize the employee and employer contributions needed to fund the Plan over the long term.
c. Avoid substantial volatility in required contribution rates and fluctuations in the Plan's funding status.
d. Accumulate a funding surplus to provide increases in retiree annuity payments to

preserve the purchasing power of their retirement benefit.

The Board acknowledges the material impact that funding the pension plan has on the State/School District's financial performance. These goals affect the Fund's investment strategies and often represent conflicting goals. For example, minimizing the long-term funding costs implies a less conservative investment program, whereas dampening the volatility of contributions and avoiding large swings in the funding status implies a more conservative investment program. The Board places a greater emphasis on the strategy of improving the funding status and reducing the contributions that must be made to the Fund, as it is most consistent with the long-term goal of conserving money to apply to other important state/local projects.

3. Responsibilities and Discretion of the State Investment Board (SIB)

The TFFR Board is charged by law under NDCC 21-10-02.1 with the responsibility of establishing policies on investment goals and asset allocation of the Fund. The SIB is charged with implementing these policies and investing the assets of the Fund in the manner provided in NDCC 21-10-07, the prudent investor rule. Under this rule, the fiduciaries shall exercise the judgment and care, under the circumstances then prevailing, that an institutional investor of ordinary prudence, discretion, and intelligence exercises in the management of large investments entrusted to it, not in regard to speculation but in regard to the permanent disposition of funds, considering probable safety of capital as well as probable income. The Fund must be invested exclusively for the benefit of the members and their beneficiaries in accordance with this investment policy.

Management responsibility for the investment program not assigned to the SIB in Chapter 21-10 of the North Dakota Century Code (NDCC) is hereby delegated to the SIB, who must establish written policies for the operation of the investment program, consistent with this investment policy.

The SIB may delegate investment responsibility to professional money managers. Where a money manager has been retained, the SIB's role in determining investment strategy and security selection is supervisory, not advisory.

At the discretion of the SIB, the Fund's assets may be pooled with other funds. In pooling funds, the SIB may establish whatever asset class pools it deems necessary with specific quality, diversification, restrictions, and performance objectives appropriate to the prudent investor rule and the objectives of the funds participating in the pools.

The SIB is responsible for establishing criteria, procedures, and making decisions with respect to hiring, keeping, and terminating money managers. SIB investment responsibility also includes selecting performance measurement services, consultants, report formats, and frequency of meetings with managers.

The SIB will implement changes to this policy as promptly as is prudent.

4. Risk Tolerance

The Board is unwilling to undertake investment strategies that might jeopardize the ability of the Fund to finance the pension benefits promised to plan participants.

However, funding the pension promise in an economical manner is critical to the State/School Districts ability to continue to provide pension benefits to plan participants. Thus, the Board actively seeks to lower the cost of funding the Plan's pension obligations by taking on risk for which it expects to be compensated over the long term. The Board understands that a prudent investment approach to risk taking can result in periods of under-performance for the Fund in which the funding status may decline. These periods, in turn, can lead to higher required contribution rates. Nevertheless, the Board believes that such an approach, prudently implemented, best serves the long-run interests of the State/School District and, therefore, of plan participants.

5. Investment Objective

The Board's investment objectives are expressed in terms of reward and risk expectations relative to investable, passive benchmarks. The Fund's policy benchmark is comprised of policy mix weights of appropriate asset class benchmarks as set by the SIB.

a. The fund's rate of return, net of fees and expenses, should at least match that of the policy benchmark over a minimum evaluation period of five years.

b. The fund's risk, measured by the standard deviation of net returns, should not exceed 115% of the policy benchmark over a minimum evaluation period of five years.

c. The risk-adjusted performance of the fund, net of fees and expenses, should at least match that of the policy benchmark over a minimum evaluation period of five years.

6. Policy Asset Mix

Benefit payments are projected to occur over a long period of time. This allows TFFR to adopt a long-term investment horizon and asset allocation policy for the management of fund assets. Asset allocation policy is critical because it defines the basic risk and return characteristics of the investment portfolio. Asset allocation targets are established using an asset-liability analysis designed to assist the Board in determining an acceptable volatility target for the fund and an optimal asset allocation policy mix. This asset-liability analysis considers both sides of the plan balance sheet, utilizing both quantitative and qualitative inputs, in order to estimate the potential impact of various asset class mixes on key measures of total plan risk, including the resulting estimated impact of funded status and contribution rates. After consideration of all the inputs and a discussion of its own collective risk tolerance, the Board approves the appropriate policy asset mix for the Fund.

Asset Class	Policy Target (%)
Public Equity	45%
- Broad U.S. Equity	27%
- Global ex-U.S. Equity	18%
Fixed Income	27%
- Core Fixed Income	18%
- High Yield	8%
- Cash Equivalents	1%
Alternatives	28%
- Real Estate	9%
- Private Infrastructure	9%
- Timber	0%
- Private Equity	10%
Total	100%

An allocation to Global Alternatives of up to 10% is authorized but shall not increase the expected volatility of the portfolio as measured in Section 5; and if utilized, all other targets will be adjusted pro-rata. The Board does not endorse tactical asset allocation, therefore, it is anticipated the portfolio be managed as close to the policy target as is prudent and practicable while minimizing rebalancing costs. Rebalancing of the Fund to this target will be done in accordance with the SIB's rebalancing policy.

7. Restrictions

a. While the SIB is responsible for establishing specific quality, diversification, restrictions, and performance objectives for the investment vehicles in which the Fund's assets will be invested, it is understood that:

   1) Futures and options may be used to hedge or replicate underlying index exposure, but not for speculation.
   2) Derivatives use will be monitored to ensure that undue risks are not taken by the money managers
   3) No transaction shall be made which threatens the tax-exempt status of the Fund.
   4) All assets will be held in custody by the SIB's master custodian, or such other custodians as are acceptable to the SIB.
   5) No unhedged short sales or speculative margin purchases shall be made.
   6) Social investing is prohibited unless it meets the Exclusive Benefit Rule, and it can be substantiated that the investment must provide an equivalent or superior rate of return for a similar investment with a similar time horizon and similar risk.

b. For the purpose of this document, Social Investing is defined as "The investment or commitment of public pension fund money for the purpose of obtaining an effect other than a maximized return to the intended beneficiaries."

1) Economically targeted investing is prohibited unless the investment meets the Exclusive Benefit Rule.

c. For the purpose of this document economically targeted investment is defined as an investment designed to produce a competitive rate of return commensurate with risk involved, as well as to create collateral economic benefits for a targeted geographic area, group of people, or sector of the economy.

Also, for the purpose of this document, the Exclusive Benefit Rule is met if the following four conditions are satisfied:

1) The cost does not exceed the fair market value at the time of investment.

2) The investment provides the Fund with an equivalent or superior rate of return for a similar investment with a similar time horizon and similar task.

3) Sufficient liquidity is maintained in the Fund to permit distributions in accordance with the terms of the plan.

4) The safeguards and diversity that a prudent investor would adhere to are present.

Where investment characteristics, including yield, risk, and liquidity are equivalent, the Board's policy favors investments which will have a positive impact on the economy of North Dakota.

8. Internal Controls

A system of internal controls must be in place by the SIB to prevent losses of public funds arising from fraud or employee error. Such controls deemed most important are the separation of responsibilities for investment purchases from the recording of investment activity, custodial safekeeping, written confirmation of investment transactions, and established criteria for broker relationships. The annual financial audit must include a comprehensive review of the portfolio, accounting procedures for security transactions and compliance with the investment policy.

9. Evaluation and Review

Investment management of the Fund will be evaluated against the Fund's investment objectives. Emphasis will be placed on five-year results. Evaluation should include an assessment of the continued feasibility of achieving the investment objectives and the appropriateness of the Investment Policy Statement for achieving those objectives.

Performance reports will be provided to the TFFR Board periodically, but not less than annually. Such reports will include asset returns and allocation data as well as information regarding all significant and/or material matters and changes pertaining to the investment of the Fund, including but not limited to:

A list of the advisory services managing investments for the board.

A list of investments at market value, compared to previous reporting period, of each fund managed by each advisory service.

Earnings, percentage earned, and change in market value of each fund's investments.

Comparison of the performance of each fund managed by each advisory service to other funds under the board's control and to generally accepted market indicators.

All material legal or legislative proceedings affecting the SIB.

Compliance with this investment policy statement.

TFFR Board Adopted: May 25, 1995.
Amended: November 30, 1995; August 21, 1997; July 15, 1999; July 27, 2000; September 18, 2003; July 14, 2005; September 21, 2006; September 20, 2007; October 27, 2011; September 26, 2013; January 21, 2016; September 21, 2017; January 25, 2018; November 19, 2020, April 22, 2021.

Approved by SIB: November 18, 2011, February 26, 2016, September 22, 2017, February 23, 2018, November 20, 2020, May 21, 2021.

~~Change Signatures to be updated: ED & CIO or ED CRO or just ED signature with Board approval dates?~~

ND Teachers' Fund for Retirement	ND State Investment Board
_____	_____
Date	Date
_____	_____
Janilyn Murtha Executive Director ~~Deputy Executive Director/~~ ~~Chief Retirement Officer~~	Scott Anderson Chief Investment Officer~~Janilyn Murtha~~ ~~Executive Director~~

B. Plan Management Policy Overview

The North Dakota Teachers' Fund for Retirement (TFFR) Plan Management Policy is a risk assessment and management tool that monitors the ongoing health of TFFR using the most recent actuarial valuation results and stochastic projections. The objective of the Plan Management Policy is to provide a basis for balancing the Fund's obligations with current assets and expected future contributions in order to maintain its long-term health and viability. The Policy also provides a framework that the Board can follow in establishing metrics for future funding and benefit changes. The Plan Management Policy is based upon metrics and a scoring system that were established at the July 24, 2019, Board meeting. The Plan Management Policy Score will be updated subsequent to each annual actuarial valuation.

1. Background

The Plan Management Policy is different from the Funding Policy. The Funding Policy sets parameters for the determination of the actuarially determined contribution (ADC) as of each actuarial valuation date. The Plan Management Policy establishes the parameters for a forward-looking assessment of TFFR.

An ADC is used as a benchmark to compare to the statutory contribution rate. An ADC reflects an asset valuation method (i.e., smoothing method), actuarial cost method (e.g., entry age normal), and amortization method for paying down unfunded liabilities or recognizing surplus assets. A description of the ADC is contained in a separate document ("Actuarial Funding Policy Statement"). In summary, the current TFFR funding policy relies on an ADC that is equal to the sum of (a) the employer normal cost rate and (b) the level percentage of pay required to amortize the unfunded actuarial accrued liability over the 30-year closed period that began July 1, 2013 ~~(24 years remaining as of July 1, 2019)~~ .

2. Risk Assessment and Management

The Plan Management Policy is a risk assessment tool. The risks facing TFFR can be broadly classified into three categories: risks related to economic variables, risks related to demographic events, and risks related to external forces. An overview of the primary risks facing TFFR stakeholders follows.

a. Risks related to economic variables:

Investment return – the risk that actual returns will be different than expected and more volatile than desired.
Inflation (price inflation, wage inflation) – the risk that measures of inflation will be inconsistent with other economic measures.

b. Risks related to demographic events:
   1) Mortality/longevity – the risk that participants will live longer than expected
   2) Payroll and/or population growth – the risk that aggregate payroll will increase at a rate less than expected. This is relevant since contributions to TFFR are collected as a percentage of member payroll.
   3) Retirement/disability/termination experience – the risk that members leave active service in a manner than generates actuarial gains or losses relative to the assumptions.

There are even risks related to external forces (e.g., governance risk, regulatory risk, litigation risk, political risk), but these risks are difficult – or impossible – to manage.

The Plan Management Policy is a tool that measures investment return risk since investment return risk has the most significant impact on TFFR's long term financial health.

3. Scoring System Metrics

The scoring system metrics that will be monitored on a periodic basis are:

a. ***The current funded ratio***: This is equal to the ratio of the market value of assets to the actuarial accrued liability as of the latest actuarial valuation date. The purpose of this metric is to assess the current funded status of TFFR.
b. ***The downside funded ratio as of July 1, 2030***: Based on stochastic projections, determine the probability that the funded ratio will be less than 65%. The purpose of this metric is to assess the likelihood of the funded ratio not improving over the short term. The lower the likelihood that the funded ratio will not increase, the higher the score.
c. ***The target funded ratio as of July 1, 2040***: Based on stochastic projections, determine whether the funded ratio is projected to increase above certain thresholds over a longer time horizon with 51% or more probability.
d. ***Improvement in the funded ratio over a 10-year period***: Based on stochastic projections, determine the probability that the funded ratio will improve by 5% over the following 10 years.
e. ***Ability to recover/withstand from a market downturn***: Based on stochastic projections, determine the probability that the funded ratio improves by 5% over 10 years following a market downturn. A market downturn is defined as a two-year period with a compound average return of -10% or worse.

4. Policy Score

The Policy Score is the sum of the points that have been assigned to each metric and can range from 0 to 14 and correspond to a color ranging from red to green. A higher score indicates better overall health of TFFR. The Policy Score is grouped into the following categories:

Color	Policy Score	Indication
Green	11 to 14	TFFR objectives are being met or likely to be met
Yellow	7 to 10	TFFR objectives may be met over a longer period
Orange	4 to 6	Continue to monitor TFFR
Red	0 to 3	Changes to TFFR should be considered

5. Policy Scoring System

Each metric is assigned a score based upon the results of the annual actuarial valuation and resulting analysis as follows:

Metric	Criteria	Score
The current funded ratio	• Funded ratio of 90% or higher • Funded ratio between 80% and 90% • Funded ratio between 70% and 80% • Funded ratio less than 70%	• +3 • +2 • +1 • +0
The downside funded ratio as of July 1, 2030	• Under 65% funded ratio with less than 20% probability • Under 65% funded ratio with less than 30% probability • Under 65% funded ratio with less than 40% probability • Under 65% funded ratio with more than 40% probability	• +3 • +2 • +1 • +0
The target funded ratio as of July 1, 2040	• 85% or higher with 51% or more probability • Between 80% and 85% with 51% or more probability • Between 75% and 80% with 51% or more probability • Between 70% and 75% with 51% or more probability • Not more than 70% with 51% or more probability	• +4 • +3 • +2 • +1 • +0
Improvement in the funded ratio over a 10-year period	• Funded ratio improves by +5% over 10 years with 66% probability • Funded ratio improves by +5% over 10 years with 50% probability • Funded ratio does not improve by +5% over 10 years with 50% probability	• +2 • +1 • +0
Ability to recover from or withstand a market downturn	• Funded ratio after downturn improves by +5% over 10 years with 50% probability • Funded ratio after downturn improves by +5% over 10 years with 33% probability • Funded ratio after downturn does not improve by +5% over 10 years with 33% probability	• +2 • +1 • +0

For purposes of scoring, probabilities and funded ratios will be rounded to the nearest whole percentage. For example, a probability of 49.6% would be rounded up to 50%.

6. Outside Factors

Other factors outside of TFFR could have an effect on the directional trend of future Policy Scores. These factors include, but are not limited to:

a. Projected economic conditions
b. Market cycles
c. North Dakota economy

TFFR Staff and the actuary will discuss the appropriate outside factors and determine whether these factors are expected to potentially improve or worsen the Policy Score.

7. Actuarial Assumptions

The actuarial assumptions used will be the same as those used for the annual actuarial valuation. The actuarial assumptions are described in detail in the actuarial valuation report. The funded ratio used in the plan management policy is based upon the market value of assets.

In order to stochastically model investment returns, Capital Market Assumptions are used. Capital Market Assumptions are developed by investment firms and represent expectations for future risk and returns for different asset classes. The Capital Market Assumptions used for the analysis are those published in the most recently available Horizon's Annual Survey of Capital Market Assumptions. If Horizon discontinues the publication of this survey, a suitable replacement or alternative will be used.

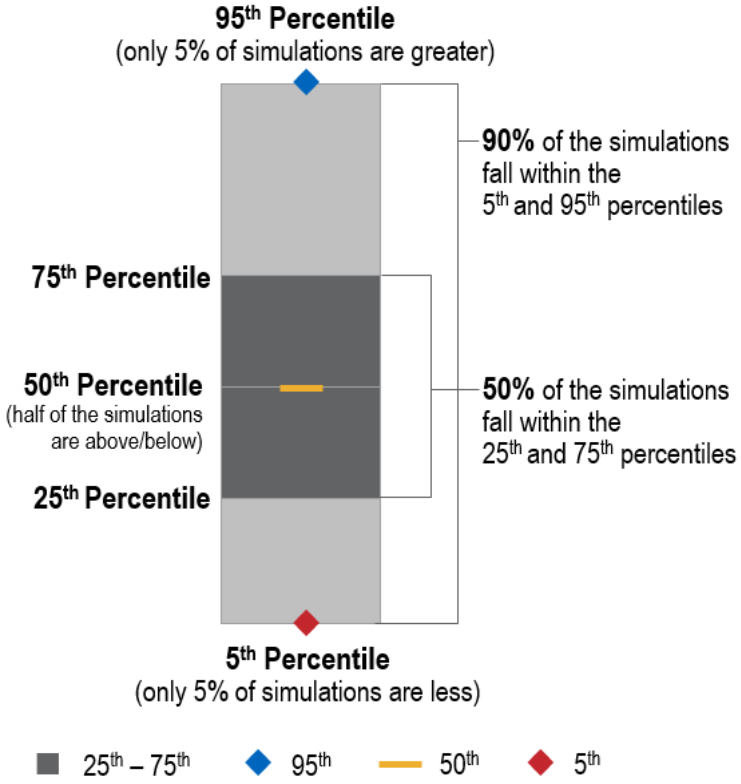
Projected liabilities are based upon an "open group" liability forecast. An open group projection generates projected populations for each future valuation date based on assumptions related to retirement, termination, salary increases, mortality, etc. New entrant records are generated to replace active members that decrement in the model in order to maintain a level active membership in the future. The profile of new entrants is based on recent demographics of new hires, subject to input from TFFR staff and Board.

8. Stochastic Modeling

The Capital Market Assumptions are used with TFFR's target asset allocation in order to simulate 5,000 investment portfolio return scenarios, each simulation representing a 20-year period. The simulated investment returns, along with open group liability forecasts, are used to model the projected funded ratio. The results are grouped into percentiles and summarized as a range:

a. **Best Case**: Better cases would occur only 5% of the time (above the 95th percentile in the example below)
b. **Most Likely**: Better or worse cases (50th percentile) are equally likely
c. **Worst Case**: Worse cases would occur only 5% of the time (below the 5th percentile in the example below)

Sample
Funded Ratio



TFFR Board Adopted: October 24, 2019

Amended: January 23, 2020

C. Actuarial Funding Policy Statement

1. Introduction

The purpose of this Actuarial Funding Policy is to record the funding objectives and policy set by the Board of Trustees (Board) for the North Dakota Teachers' Fund for Retirement (TFFR). Effective with the July 1, 2013, actuarial valuation, the Board establishes this Actuarial Funding Policy to help ensure the systematic funding of future benefit payments for members of TFFR. The contributions made to TFFR are set by statute. These statutory contributions will be compared to the contributions determined under the funding policy in order to assess the appropriateness of the statutory contributions. Based upon this comparison, the Board will decide what action to take, if any. The employer contribution determined under the funding policy is called the actuarially determined employer contribution (ADEC). In addition, this document records certain guidelines established by the Board to assist in administering TFFR in a consistent and efficient manner.

This Actuarial Funding Policy supersedes any previous Actuarial Funding Policies and may be modified as the Board deems necessary.

2. Goals of Actuarial Funding Policy

a. To achieve long-term full funding of the cost of benefits provided by TFFR;

b. To seek reasonable and equitable allocation of the cost of benefits over time;

c. To maintain a policy that is both transparent and accountable to the stakeholders of TFFR, including plan participants, employers, and residents of the State of North Dakota.

3. Actuarially Determined Employer Contribution and Funding Policy Components

TFFR's actuarially determined employer contribution is comprised of the Normal Cost and an amortization of the Unfunded Actuarial Accrued Liability (UAAL). The Normal Cost and the amortization of the UAAL are determined by the following three components of this funding policy:

a. Actuarial Cost Method: the techniques to allocate the cost/liability of retirement benefits to a given period;

b. Asset Smoothing Method: the techniques that spread the recognition of investment gains or losses over a period of time for the purposes of determining the Actuarial Value of Assets used in the actuarial valuation process; and

c. Amortization Policy: the decisions on how, in terms of duration and pattern, to reduce the difference between the Actuarial Accrued Liability and the Actuarial Value of Assets in a systematic manner.

4. Actuarial Cost Method:

The Entry Age Normal method shall be applied to the projected benefits in determining the Normal Cost and the Actuarial Accrued Liability. The Normal Cost shall be determined as a level percentage of pay on an individual basis for each active member.

5. Asset Smoothing Method:

The investment gains or losses of each valuation period, as a result of comparing the actual market return to the expected market return, shall be recognized in level amounts over 5 years in calculating the Actuarial Value of Assets. Deferred investment gains or losses cannot exceed 20% of the Market Value of Assets (i.e., the Actuarial Value of Assets cannot be more than 120%, nor less than 80%, of the Market Value of Assets as of any valuation date).

6. Amortization Policy:

a. The UAAL, (i.e., the difference between the Actuarial Accrued Liability and the Actuarial Value of Assets), as of July 1, 2013, shall be amortized over a "closed" 30-year period. In other words, the UAAL as of July 1, 2014 shall be amortized

over 29 years, the UAAL as of July 1, 2015 shall be amortized over 28 years, etc.

b. Beginning with the July 1, 2024, valuation, the Board shall have the discretion to continue the "closed" amortization period, or instead to amortize the UAAL over another period, not to exceed 20 years.

c. Any new UAAL as a result of change in actuarial assumptions or methods will be amortized over a period equal to the amortization period of the UAAL. The Board shall have the discretion to amortize the new UAAL as a result of change in actuarial assumptions or methods over a period of 20 years.

d. Unless an alternative amortization period is recommended by the Actuary and accepted by the Board based on the results of an actuarial analysis, the increase in UAAL as a result of any plan amendments will be amortized over a period not to exceed 20 years.

~~d.~~

e. In a situation where the amortization of the UAAL has more than one component, a single equivalent amortization period will be determined by the Actuary.

~~e.~~

f. UAAL shall be amortized as a level percentage of payroll so that the amortization amount in each year during the amortization period shall be expected to be a level percentage of covered payroll, taking into consideration the current assumption for general payroll increase.

g. If an overfunding exists (i.e., the UAAL becomes negative so that there is a surplus), such surplus and any subsequent surpluses will be amortized over an "open" amortization period of 30 years. Any subsequent UAAL will be amortized over 20 years as the first of a new series of closed period UAAL amortization.

~~g.~~

7. Actuarial Assumptions Guidelines

The actuarial assumptions directly affect only the timing of contributions; the ultimate contribution level is determined by the benefits and the expenses actually paid offset by actual investment returns. To the extent that actual experience deviates from the assumptions, experience gains and losses will occur. These gains (or losses) then serve to reduce (or increase) the future contribution requirements.

Actuarial assumptions are generally grouped into two major categories:

a. Demographic assumptions – including rates of termination, retirement, disability, mortality, etc.

b. Economic assumptions – including investment return, salary increase, payroll growth, inflation, etc.

The actuarial assumptions are described in detail in the actuarial valuation report. They represent the Board's best estimate of anticipated experience under TFFR and are intended to be long term in nature. Therefore, in developing the actuarial assumptions, the Board considers not only past experience but also trends, external forces and future expectations.

Actuarial experience studies are completed every five years or at the Board's direction.

8. Glossary of Funding Policy Terms

a. **Present Value of Benefits (PVB) or total cost**: the "value" at a particular point in time of all projected future benefit payments for current plan members. The "future benefit payments" and the "value" of those payments are determined using actuarial assumptions as to future events. Examples of these assumptions are estimates of retirement patterns, salary increases, investment returns, etc. Another way to think of the PVB is that if the plan has assets equal to the PVB and all actuarial assumptions are met, then no future contributions would be needed to provide all future service benefits for all current members, including future service and salary increases for current active members.

b. **Actuarial Cost Method:** allocates a portion of the total cost (PVB) to each year of service, both past service and future service.

c. **Normal Cost:** the cost allocated under the Actuarial Cost Method to each year of active member service.

d. **Entry Age Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as a level percentage of pay or level dollar amount over the working lifetime of the plan's members.

e. **Actuarial Accrued Liability (AAL)**: the value at a particular point in time of all past Normal Costs. This is the amount of assets the plan would have today if the current plan provisions, actuarial assumptions and participant data had always been in effect, contributions equal to the Normal Cost had been made and all actuarial assumptions came true.

f. **Market Value of Assets (MVA):** the fair value of assets of the plan as reported in the plan's audited financial statements.

g. **Actuarial Value of Assets (AVA):** the market value of assets less the deferred investment gains or losses not yet recognized by the asset smoothing method.

h. **Unfunded Actuarial Accrued Liability (UAAL):** the portion of the AAL that is not currently covered by the AVA. It is the positive difference between the AAL and the AVA.

i. **Surplus:** the positive difference, if any, between the AVA and the AAL.

j. **Actuarial Value Funded Ratio:** the ratio of the AVA to the AAL.

k. **Market Value Funded Ratio:** the ratio of the MVA to the AAL.

l. **Actuarial Gains and Losses:** changes in UAAL or surplus due to actual experience different from what is assumed in the actuarial valuation. For example, if during a given year the assets earn more than the investment return

assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or "actuarial gain" as of the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under the policy.

m. **Valuation Date:** July 1 of every year.

D. Operations

1. Membership Data and Contributions

A. Ensure the security and accuracy of the members' permanent records and the collection of member and employer contributions from every governmental body employing a TFFR member.

B. Accordingly, the administrative means will be to:

1. Retain member and employer documents applicable to the retirement program.
2. Safeguard TFFR database files.
3. Protect the confidential information contained in member and employer files.
4. Collect the member and employer contributions from the employers based on retirement salary earned by the member.
5. Monitor the employer reporting process including the timely filing of information, consistency of month-to-month data, and changes in the employer payment plan models.
6. Review the individual member data, salary, and service credit for accuracy.
7. Post and validate the data received from the employer to the individual member accounts.
8. Provide annual statements to every member.
9. Summarize the member data reported and notify the employers annually of the prior fiscal year information.

10. Perform reviews to monitor whether individuals employed as “teachers” in North Dakota school districts, political subdivisions, and state institutions are reported to TFFR in compliance with the North Dakota Century Code (NDCC).

11. Provide publications and reporting instructions to employers on TFFR.

12. Transfer member and employer contributions to the investment program in a timely manner.

A. **Monitoring** (Method, Responsibility, Frequency)

1. Internal Report

   a. Disclosure of compliance to the board from RIO’s internal auditors.

   b. Compliance for individual accounts is monitored through internal audits of staff compliance with state laws, rules, board policy, and procedures.

2. External Report

   a. Disclosure of compliance to the board by RIO’s external auditors as a part of the annual audit.

   b. Disclosure of compliance to members through annual statements.

2. Member Services

Provide direct services and public information to members of TFFR.

A. Accordingly, the administrative means will be to:

1. Enroll, update, maintain, and certify all member accounts.

2. Respond to member inquiries on the retirement program.

3. Provide statewide benefits counseling services to members.

4. Make group presentations and distribute information at conferences and conventions throughout the state.

5. Coordinate and conduct retirement education programs for members on a statewide basis.

6. Certify eligibility for TFFR benefits and purchase of service credit.

7. Calculate and process claims for refund, retirement, disability, survivor, and Qualified Domestic Relations Order (QDRO) benefits, as well as claims for purchasing credit.

8. Permit members to change designated beneficiaries in the event of life occurrences identified in the administrative rules.

9. Close retirement accounts of deceased teachers.

10. Develop and distribute information to the members on the retirement program and related topics through newsletters, annual reports, member handbooks, brochures, and retirement planning materials.

11. Maintain a website and provide online services to provide members with a variety of access methods for TFFR information.

B. Monitoring (Method, Responsibility, Frequency)

1. Internal Report

a. Disclosure of compliance to the board through internal audits on compliance with laws, rules, and policies.

b. Periodic presentations by staff at board meetings.

2. External Report

a. Receive annual reports from leadership of groups representing the plan's beneficiaries.

b. RIO's annual audit by independent auditor.

c. Written and oral communication with board members from teachers regarding payment and processing of benefit claims.

3. Disclosure of Confidential Information for Treatment, Operational, or Payment Purposes

The TFFR Board of Trustees has determined that confidential information for treatment, operational, or payment purposes under NDCC 15-39.1-30(12) includes:

A. Information related to enrollment, participation, benefits, ~~or~~ contributions , and otherwise necessary for the administration and operation of the program may be shared with participating employers or TFFR contractors, attorneys, and consultants. ~~for purposes of maintaining a member's participation and benefits in the TFFR program. Such sharing of information is limited to that information which is necessary to assure that a member's participation and benefits are properly handled. All such information remains confidential whether in the possession of TFFR, its participating employers, or its contractors.~~

~~1. Information necessary for the administration and operation of the program may be~~

~~shared with TFFR attorneys and consultants. To the extent such information is shared, it remains confidential.~~

~~2. Information relating to the death benefits and beneficiary designations of a deceased member or beneficiary may be shared with an ex-spouse if listed as a beneficiary on a designation of beneficiary form, subsequent to the death of the applicable member or beneficiary, but in advance of a final determination regarding the applicable beneficiary, only to the extent necessary to accurately identify the appropriate beneficiary.~~

B. Information relating to the death benefits and beneficiary designations of a member or beneficiary may be shared with any other person if the beneficiary is unknown or unable to be located, only to the extent necessary to accurately identify the appropriate beneficiary or to close an account subsequent to the death of a member or beneficiary.

~~All other requests for confidential information under this policy must first be submitted to the Deputy Executive Director/Chief Retirement Officer and then reviewed by the TFFR Board of Trustees.~~

TFFR Board adopted: September 25, 2014

4. Account Claims

A. Ensure the payment of benefit claims to members of TFFR.
Accordingly, the administrative means will be to:

1) Pay retirement benefits based on an estimated final salary for members retiring upon completion of their teaching contract and whose final salary has not been reported to TFFR.

2) Allow retired members receiving an annuity from TFFR to have payroll deductions subtracted from their monthly benefit, pursuant to section II.D.5. ~~including: , but not limited to: health, life, and other insurance premiums payable to NDPERS, North Dakota Retired Teachers Association (NDRTA) dues, North Dakota United (ND United) Retired dues, and federal and North Dakota income tax withholdings.~~

3) Distribute payments for benefit claims (annuities, PLSOs, refunds, and rollovers) once per month. ~~Benefit payments made by Electronic Funds Transfer (EFT) will be deposited and payable on the first working day of each month. Benefit payments made by check will be mailed on the last working day of the previous month payable on the first working day of each month.~~

4) Distribute special payments for benefit claims in the event of unforeseen circumstances (i.e., death, disability, Court Order, staff processing delay, etc.) if approved by the Deputy Executive Director-Chief Retirement Officer.

5) ~~Mail~~ Produce and make available new account notices and account change notices to retired members and beneficiaries receiving benefits.

B. Monitoring (Method, Responsibility, Frequency)

1) Internal Report
   i. Disclosure of compliance to the board through internal audits on compliance with laws, rules, and policies.

2) External Report
   ii. Disclosure of compliance to the board through annual audit by RIO

external auditors.

5. Deductions from Annuity Checks

A. It shall be the policy of the TFFR Board of Trustees to allow retirees and beneficiaries receiving annuity payments to have payroll deductions subtracted from their monthly payments.

B. To initiate, change, or stop a deduction, the retiree must notify the administrative office in writing at least ten working days prior to the date the monthly benefit is issued. All deductions withheld will be forwarded to the appropriate entity within three working days after the first of the month or as required by federal/North Dakota state law. Authorization forms are to be kept on file at the administrative office.

The following deductions are available to retirees and beneficiaries receiving monthly annuity benefits:

1) Health, life, and other insurance premiums payable to the NDPERS.

2) Annual dues payable to the NDRTA and the ND United Retired organization.

3) Federal and North Dakota income tax withholdings.

4) Court ordered payments including child support orders, Qualified Domestic Relations Orders (QDRO), IRS tax levies, federal garnishments, and other court ordered payments, subject to approval by the Attorney General's office.

5) Additional deductions may be added upon approval by the board.

6. Military Service Credit

It shall be the policy of the TFFR Board of Trustees that a teacher purchasing military service be credited with a full year of credit if the service was rendered for at least 175 school days or a period of nine months within any fiscal year.

7. Payment of Benefits

It shall be the policy of the TFFR Board of Trustees to distribute payments for benefit claims (annuities, refunds/rollovers) once per month. Distributions will be mailed on the last working day of the previous month payable on the first working day of each month.

In order for a teacher to assure receipt of a benefit payment on the first working day of the month, the required information and forms must be filed with the administrative office at least ten working days prior to the distribution date.

The Deputy Executive Director/Chief Retirement Officer may authorize special payments to pay benefit claims due to unforeseen circumstances that delay the processing of the claim.

Payments to a teacher approved for a refund/rollover will include all contributions and interest paid by a teacher for the purchase and repurchase of service credit. This is in addition to the entitled refund of member contributions plus interest. The Executive Director or Deputy Executive Director/Chief Retirement Officer may waive the 120-day waiting period for refunds/rollovers based on necessary documentation.

8. Retirement Benefit Payments

A. It is the policy of the TFFR Board of Trustees that new retirees will have their initial retirement benefit payment calculated using either estimated or final salary and service credit information:

1) Estimated salary and service credit information

The member's initial retirement benefit is calculated using 90% of the estimated current year salary for final average salary calculation purposes. If the final information reported by the employer is different than the estimated information, the member's monthly retirement benefit will be adjusted retroactive to the member's retirement date. Using estimated information allows a member to begin receiving retirement benefits sooner but results in correction of benefits at a later date retroactive to the member's retirement date.

2) Finalized salary and service credit information

The member's retirement benefit is calculated using finalized current year salary and service credit information. After salary, service credit, and last date of employment are reported by the employer and verified by TFFR, the member's retirement benefit is calculated, and claim is processed. Using finalized information delays a member's first retirement benefit payment, but when payment is made, it is retroactive to the member's retirement date.

B. Under all circumstances, if any change or error in the records of TFFR or a participating employer or if any calculation results in a member receiving more or less in benefits than the member is entitled to receive, TFFR will correct the error and adjust the benefit (NDCC 15-39.1-31 and 32).

9. Voiding Checks

It shall be the policy of the TFFR Board of Trustees to void any uncashed benefit checks for the payment of retirement, disability, survivor, and refund benefits after six months. Should the payee request payment after six months, the RIO will reissue a check, but without additional interest.

10. In-Staff Subbing Contract Period – ~~Per Board action on 7-22-21 the policy is suspended as it applies to rehired retirees until further Board action. Needs to be updated to reflect changes made in H.B. 1219 (2023~~[MJ1]~~)~~

It is the policy of the TFFR Board of Trustees that the following guidelines apply for the purpose of determining the contract period for in-staff subbing for active members and re-employed retirees as provided for in NDCC 15-39.1-04 (4) and (12), 15-39.1-19.1, 15-39.1-19.2, and NDAC 82-05-06-01.

A. In-staff subbing is defined as substitute teaching duties performed by a contracted teacher for the contracting TFFR participating employer.

B. If the active member or re-employed retiree has a contract or written agreement with the participating employer for full or part time work, TFFR will view the beginning and ending calendar dates indicated on the contract as the contract term to determine the contract period, unless the contract period is otherwise specifically detailed in the active member or re-employed retiree's contract.

1) If substitute teaching duties are performed during the contract term, those duties are considered in-staff subbing, and retirement contributions are required to be paid on the substitute teaching pay. The in-staff subbing hours are reported as compensated hours for active members and are counted toward the annual hour limit for re-employed retirees (700 – 1000 hours depending upon length of contract).
2) If substitute teaching duties are performed before the beginning calendar date or after the ending calendar date of the contract term, those duties are not considered in-staff subbing, and no retirement contributions are required to be paid on the substitute teaching pay. The subbing hours are not reported as compensated hours for active members and are not counted toward the annual hour limit for re-employed retirees.

C. If the active member ~~or re-employed retiree~~ does not have a contract or written agreement with the participating employer, then no retirement contributions are required to be paid on the ~~-~~substitute teaching pay. The subbing hours are not reported as compensated hours for active members. If a re-employed retiree does not have a contract or written agreement with the participating employer then professional development, extracurricular duties and non-contracted substitute teaching duties ~~and~~ are not counted toward the annual hour limit ~~for re-employed retirees~~and no contributions may be collected for these activities~~.~~

D. This policy does not prohibit the Board from making an eligible salary determination for an individual member pursuant to N.D.A.C. 82-04-02-01.

11. Plan Beneficiaries

TFFR beneficiaries are:

A. Plan Members:

1) Active – all persons who are licensed to teach in North Dakota and who are contractually employed in teaching, supervisory, administrative, or extracurricular services:

i. Classroom teachers
ii. Superintendents, assistant superintendents, county superintendents
iii. Business managers
iv. Principals and assistant principals

v. Special teachers
vi. Superintendent of Public Instruction, professional employees of Dept. of Public Instruction and Dept. of Career and Technical Education, unless transferred to North Dakota Public Employees Retirement System (NDPERS)
vii. Professional or teaching staff of Center for Distance Education, Youth Correctional Center, School for the Blind and School for the Deaf.
viii. Other persons or positions authorized in state statutes

2) Annuitants – All persons who are collecting a monthly benefit:
i. Retirees
ii. Disabilitants
iii. Survivors/Beneficiaries

3) Inactive members:
i. Vested
ii. Nonvested

B. Employers:

1) School districts, special education units, vocational centers, County superintendents, Regional Education Associations (REA)
2) State institutions and agencies defined in state statutes
3) Other TFFR participating employers

12. Head Start Program Employees

It shall be the policy of the TFFR Board of Trustees that employees of a Head Start Program who are certified to teach and contracted with a school district or other participating employer, are members of TFFR if the following conditions are met:

A. Grantee agency for the Head Start Program is the school district which is governed by the local school board.

B. Head Start Program employees are on the school district teaching or administrative faculty in positions such as coordinator, director, teacher, or home visitor.

C. Head Start Program employees are on the school district salary schedule and negotiate for salary and benefits like other school district teaching faculty.

13. PERS Retirement Plan Election (DPI and CTE)

A. NDCC 15-39.1-09(3) allows new employees of the Department of Public Instruction (DPI), who are eligible for TFFR coverage and hired after January 6, 2001, excluding the State Superintendent of Public Instruction, to elect to become participating members of ND Public Employees Retirement System (PERS).

B. NDCC 15-39.1-09(4) allows new employees of the Department of Career and Technical Education (CTE) who are eligible for TFFR coverage and hired after July 1, 2007, to elect to become participating members of PERS.

C. It is the policy of the TFFR Board of Trustees to allow the PERS retirement plan election by eligible new DPI and CTE employees under the following guidelines:

1) Any new employee who is required to participate in TFFR under NDCC 15-39.1-04(11)(b) and who is entered onto the payroll of DPI after January 6, 2001 (except the Superintendent of Public Instruction), or CTE after July 1, 2007, is eligible to make the election to become a participating member of NDPERS.

2) If eligible, the new employee must complete the "NDPERS/TFFR Membership Election" form within ninety days of hire. Until this election is made, the employee will be enrolled in the NDPERS retirement plan. If no election is made, the employee will be transferred to TFFR.

3) If the new employee is a former DPI employee or is retired from DPI and receiving TFFR benefits, the employee must have a one- year break in service to be eligible to elect participation in PERS. If the new employee is a former CTE employee or is retired from CTE and receiving TFFR benefits, the employee must have a one-year break in service to elect participation in PERS.

4) If the new employee is a TFFR retiree (but not a former DPI or CTE employee), the retiree may elect participation in PERS upon date of hire. The retiree is not subject to the one-year waiting period and is not subject to the TFFR retiree annual hours limit.

E. Employer Policies

1. Employer Payment Plan Models

A. The TFFR Board has developed models relating to employer payment of member contributions as provided for in NDCC 15-39.1-09 and NDAC 82-04-01. The models are outlined in employer instructions prepared by the fund. Special provisions apply to state agencies and institutions, and employers that have not adopted a model.

B. Employers must select the employer payment plan model under which they will pay member contributions on a form provided by the administrative office. The model selected by the employer can only be changed once each year at the beginning of the fiscal year.

C. The following employer payment plan models are available to participating employers:

1) Model 1: Member contributions are paid by the member through a salary reduction and remitted to TFFR by the employer as tax deferred contributions.

2) Model 2 All: Member contributions are paid by the employer as a salary supplement and remitted to TFFR as tax deferred contributions.

3) Model 2 Partial (%): A fixed percentage (1% minimum and increasing increments of full percentages only) of the member contributions are paid by the employer as a salary supplement and remitted to TFFR as tax deferred contributions. The remaining member contributions are paid by the member and remitted by the employer as tax deferred contributions.

4) Model 3 Partial ($): A fixed dollar amount of the member contributions are paid by the employer as a salary supplement and remitted to TFFR as tax deferred contributions. The remaining member contributions are paid by the member and remitted by the employer as tax deferred contributions. Effective July 1, 2003, employers may no longer select Model 3. Any employers currently paying member contributions under this model may continue as a closed group, but Model 3 will no longer be available to other employers. Effective July 1, 2019, Model 3 will be eliminated, and no employers will be allowed to utilize this model.

5) Model 4 State Agencies: Four Percent (4%) of the member contributions (or the % of member contributions the State agrees to pay) are paid by the State as a salary supplement and remitted to TFFR as tax deferred contributions. The remaining member contributions are paid by the member and remitted by the employer as tax deferred contributions.

D. Employers who do not select one of the above models must report member contributions paid by the member and remitted by the employer as taxed contributions. Payment of member contributions cannot be made on a tax deferred basis unless one of the above approved models is selected in writing.

2. Employer Reporting Errors

It is the policy of the TFFR Board of Trustees that when an unintentional error in the reporting of retirement contributions by a TFFR participating employer is discovered during an employer audit, the following guidelines will apply:

a. The employer will be billed for all material shortages due plus interest or refunded for all material overpayments.
b. Materiality limit to be used in determining if a member's account will be corrected is an aggregate total of $500 in a fiscal year per individual member per year, unless otherwise approved by the Deputy Executive Director-Chief Retirement Officer.
c. The interest charged to the employer will be the actuarial investment return assumption.
d. Failure of the employer to pay the required shortages or provide required information will constitute "failure to make required reports and payments"

and require application of section 15-39.1-23, NDCC.

e. The TFFR board reserves the right to negotiate with an employer.
f. The employer must respond in writing to the finding(s) and/or recommendation(s) within 30 days of being notified.

3. Employer Reports

A. It shall be the policy of the TFFR Board of Trustees to require all participating employers to file reports and make payment of member and employer contributions on a monthly basis to the RIO. Both payment and report are due by the 15th day of the month following the end of the reporting period.

B. The administrative office will monitor late TFFR employer reports and payments and establish procedures for minor processing delays. Except for unintentional reporting errors, employers that do not meet the established deadlines for filing required reports shall be assessed a civil penalty as required in NDCC 15-39.1-23 unless the Executive Director or Deputy Executive Director/Chief Retirement Officer approves a request for a waiver of the penalty under special circumstances such as:

1) Death, surgery, or illness of the individual responsible for TFFR reports or their family.

2) "Acts of God" that require an employer to close school such as blizzards, storms, or floods.

3) Unforeseen events such as resignation of the individual responsible for TFFR reports, computer malfunction, etc.

C. The request for a waiver must be in writing and signed by the administrator.

4. Ineligible TFFR Salary

The TFFR Board desires to provide guidance to TFFR employers regarding how eligible salary shall be determined for payments made to licensed teachers for performing certain duties.

NDCC 15-39.1-04(10)(h) provides that eligible salary does not include "*other benefits or payments not defined in this section which the board determines to be ineligible teachers' fund for retirement salary.*"

It is the policy of the TFFR Board of Trustees that effective July 1, 2016, additional payments made by a TFFR participating employer to a licensed TFFR member for equipment maintenance and repair, jobsite prep and finish work, and similar types of nonteaching duties are not eligible salary for TFFR purposes if the duties are not included on the member's regular teaching contract(s).

This policy does not prohibit the Board from making an eligible salary determination for an individual member pursuant to N.D.A.C. § 82-04-02-01.

F. Member Communication

1. Disclosure to Membership

It shall be the policy of the TFFR Board of Trustees that member handbooks, member statements, member newsletters, and financial reports be prepared and made available for TFFR members. RIO staff will prepare, and the TFFR Board of Trustees will review for approval at least once a biennium a communications plan that summarizes the content and method for providing member and employer education and publications.

2. Information Dissemination

It is the policy of the TFFR Board of Trustees to allow member and employer interest groups and other approved third parties to send specific information to the TFFR membership using a "blind mailing" method. The information to be mailed and ~~third party~~third-party organization must be approved by the Executive Director ~~RIO Deputy Executive Director/Chief Retirement Officer~~ in advance. Member and employer interest groups include, but are not limited to, North Dakota Council of Educational Leaders (NDCEL), ND United, NDRTA, and North Dakota School Boards Association (NDSBA).

Under the "blind mailing" method, the third party must submit information or materials they wish to send to TFFR members. The third party must sign an agreement that they will not use the mailing to engage in partisan political activities.

If approved, the third party will forward the materials to an independent mailing company approved by TFFR. The mailing company must sign a "no disclosure" agreement with TFFR.

TFFR will then supply membership mailing information to the mailing company. The mailing company will combine the material from the third party with the mailing list and send to TFFR members. The cost of the mailing will be paid by the third party.

TFFR Board Adopted: July 15, 1999.

Amended: November 15, 2001.

3. Outreach Program Facilities

It shall be the policy of the TFFR Board of Trustees that school district facilities used for TFFR outreach programs must meet ADA requirements. In addition, authorized school district employees must be present to direct guests to the proper meeting room and lock the building at the close of the program. RIO employees who are conducting outreach programs for TFFR

members are not allowed to be in school district buildings without the presence of an administrator, teacher, or other authorized school district employee.

RIO staff will not be able to conduct outreach programs at that site if the above conditions are not met.

~~G. Other Policies – Recommended for Removal~~

~~1. Level Income Option~~

~~**(May be Removed Pending Legislation)**~~
~~It shall be the policy of the TFFR Board of Trustees to allow members who select the level income retirement option:~~

~~1. To level to age 62 or normal retirement age (including any fractional age from age 65 to 67.~~

~~2. To combine the level income option with the service retirement options offered (single life annuity, 100% and 50% joint and survivor, 10 and 20 year term certain and life annuity).~~

~~3. To reduce a member's retirement benefit the second month following the month the member reaches age 62 or normal retirement age.~~

~~4. To apply postretirement legislative benefit increases to the teacher's non- level income monthly retirement benefit.~~

Section II Program Policies Section Exhibits

Asset Allocation Definitions

Overview of Asset Class Definitions

There are three major asset classes:

1. **Equity**
2. **Debt**
3. **Real Assets** (or Other)

Alternative Investments are often cited as the fourth major asset class, but can frequently be re-classified into one of the other three categories with some exceptions (i.e. total return strategies using debt and equity).

Equity investments represent an ownership claim on the residual assets of a company after paying off debt.

Equities should be segregated into two major sectors, Public and Private, given major differences in liquidity:

1. Public equities are generally highly liquid and *valued on a daily basis* in the financial markets. Examples include common stock (Apple, Coca-Cola or McDonalds), options and futures.
2. Private equities are generally less liquid and often *valued on a less frequent basis* (quarterly).

Public equity markets are often sub-classified by geographic region (U.S., International or Global), market capitalization (Large, Medium or Small), investment style (core, growth or value) and level of economic development (developed or emerging markets). The top U.S. and global equity benchmarks are discussed below.

Five major U.S. equity benchmarks include the **S&P 500, Russell 1000, 2000 and 3000,** and **Dow Jones Industrial Average ("Dow")**. The **S&P 500** is based on the market capitalizations of 500 large companies having common stock listed on the NYSE or NASDAQ. The **Russell 1000** represents the highest-ranking 1,000 stocks in the Russell 3000 Index, and represents about 90% of the total market capitalization of that index. The Russell 1000 has a weighted average market capitalization of over $100 billion with a median of approximately $8 billion. The **Russell 2000 Index** is a small-cap index and represents the bottom 2,000 stocks in the Russell 3000 Index. The Russell 2000 has a weighted average market capitalization of less than $2 billion with a median of less than $1 billion. The Russell 2000 is the most common benchmark for funds that identify themselves as "small-cap", while the **S&P 500** index is used primarily for large capitalization stocks. The **Dow** is a price-weighted measure of 30 U.S. blue-chip companies. **The Dow** covers all industries with the exception of transportation and utilities, which are covered by the Dow Jones Transportation Average and Dow Jones Utility Average. While stock selection is not governed by quantitative rules, a stock typically is added to The Dow only if the company has an excellent reputation, demonstrates sustained growth and is of interest to a large number of investors. Maintaining adequate sector representation within the indices is also a consideration in the selection process.

The MSCI All Country World Index (or "ACWI") measures the equity market performance of developed and emerging markets and consists of 47 country indexes comprising 23 developed and 24 emerging market country indexes. The ACWI includes approximately 2,500 large and mid-cap equity securities and covers 85% of the global investable market. The **MSCI ACWI Investible Market Index** (or "ACWI IMI") captures large, mid and small cap securities across 23 developed and 24 emerging market countries with over 8,700 constituents and covering approximately 99% of the global investment opportunity set. The **MSCI EAFE Index (Europe, Australasia, Far East)** measures the equity market performance of the developed market countries, excluding the US & Canada. The **MSCI Emerging Markets Index** measures equity market performance of emerging markets and consists of 24 countries.

Public equity has historically provided **high investment returns with high volatility and high liquidity when compared to Bonds or Real Assets**. Most investment consultants believe that Private Equity can provide an even higher investment return than Public Equity, albeit with significant less liquidity and potentially higher volatility.

Debt represents a legal obligation between a borrower and a lender for a stated period of time and rate.

Debt or "Bonds" are classified as fixed or floating depending upon whether the interest rate is derived using a fixed rate (i.e. 5%) or a floating rate (i.e. Prime + 1.00%). Duration risk within fixed income is a major driver of investment risk and return particularly for longer term securities, including U.S. Treasury bonds.

Debt is often sub-classified into investment grade (rated BBB- or better) or non-investment grade (rated less than BBB- or non-rated) or by geographic region (U.S., International, Developed Markets or Emerging Markets). Debt can be issued by governments, agencies or companies and represent general obligations of the issuer or be backed by a specified pool of assets (i.e. mortgage backed securities). Bonds serve to diversify a portfolio by offering **lower volatility** than equities along with a **lower expected return and generally high liquidity**. **Real Assets represent an ownership interest in physical assets** such as real estate, infrastructure (airports, electrical grids, energy pipelines, information technology data centers and systems, shipping ports, toll roads, and water supply and treatment facilities), timberland and certain commodities (gold, oil, wheat). Real assets are expected to provide inflation hedging characteristics in periods of unanticipated inflation and diversify a portfolio consisting of debt and equity.

Alternative Investments can include precious metals, art, antiques, and financial assets such as derivatives, commodities, private equity, distressed debt and hedge funds. Real estate, infrastructure and forestry/timber are also often termed alternative. Alternatives are sometimes used as a tool to reduce overall investment risk through diversification and may offer lower correlation with traditional financial investments such as stocks and bonds, although it may be difficult to determine the current market value of the asset, may be illiquid, purchase and sales costs may be high, and there may be limited historical risk and return data, all of which makes analysis complex.

Asset Class Definitions

Global Equity

Definition
Investment represents an ownership claim on the residual assets of a company after the discharge of all senior claims such as secured and unsecured debt.

Public Equity

Public equity is traded on a national exchange. Includes common stock, preferred stock, convertible to stock, options, warrants, futures and other derivatives on equities or composites of equities, exchange-traded funds and equity-linked notes, units and partnership shares representing ownership interests in an underlying equity investment.

Private Equity

Private equity represents equity or equity linked securities in operating companies that are not publicly traded on a stock exchange.

Types of investment strategies

- *Leveraged buyout (LBO*) – Acquisition of a company with the use of financial leverage
- *Growth capital* – Investment in mature companies looking for capital to expand, restructure, enter new markets

- *Venture capital* – Investment in typically less mature companies, for launch, early development, or expansion
- *Mezzanine* – Subordinated debt/preferred equity used to reduce amount of equity capital required to finance LBOs
- *Distressed* – Equity securities of financially stressed companies
- *Secondary* – Investment in existing private equity assets

Types of structures

- *Direct investment* – Direct purchase of equity securities of a private company
- *Co-investments* – Investments in equity securities of a private company alongside
- the manager of a direct fund
- *Direct fund* – Pool of capital formed to make direct investments
- *Fund-of-funds* – Pool of capital formed to make investments in direct funds

Strategic Role

- High long-term real returns
- Hedge against active (pre-retirement) liabilities
- Private equity enhances total portfolio return as a tradeoff for illiquidity

Characteristics

Public Developed Markets

- Relatively high returns (long-term) as compared to fixed income and real assets
- Relatively high volatility (standard deviation of returns) as compared to fixed income and real assets
- Relatively high liquidity
- Diversification
- Historically, public developed equities exhibit high correlation with private equity and high yield bonds, moderate correlation with investment grade corporate bonds and real assets, and negative correlation with sovereign debt.
- Currency adds to volatility but can be hedged, which mutes the diversification benefits

Public Emerging Markets

- Higher expected returns due to economic growth potential
- Liquidity risk is significant, particularly in frontier markets
- High volatility, particularly in frontier markets
- Historically, public emerging equities exhibit high correlation with high yield bonds, moderate correlation with investment grade corporate bonds and real assets, and negative correlation with sovereign debt.
- FX markets not sufficiently developed to hedge currency risk
- Limited access to markets
- Market information less abundant than for developed markets
- Counterparty risk and settlement delays pronounced in frontier markets

Private Equity

- Illiquid, long-term time horizon (7-12 year closed-end partnerships)
- Quality of the managers selected is the key determinant of success
- High volatility of returns compensated by higher expected returns
- Historically, public emerging equities exhibit high correlation with high yield bonds,

moderate correlation with investment grade corporate bonds and real assets, and negative correlation with sovereign debt.
- Encompasses three stages: fundraising, portfolio construction and investment, exit and return realization

Risks

Public Equity

- *Absolute risk* – Possible magnitude of price decline
- *Liability hedging risk* – Risk that assets will not increase when liabilities increase
- *Regulatory risk* – Changes may adversely affect markets
- *Tax risk* – Changes may adversely affect markets
- *Liquidity risk* – Difficulty trading securities under adverse market conditions
- *Firm specific risk* – Unique risks associated with a specific firm
- *Tracking risk* – Magnitude of performance deterioration from a benchmark
- *Time horizon* – Horizon too short to weather cycles
- *Benchmark risk* – Benchmark not appropriate proxy
- *Market risks* – Price decline
- *Currency risk* – Unanticipated changes in exchange rate between two currencies
- *Counterparty risk* – Counterparty does not live up to its contractual obligations

Private Equity

- *Liquidity risk* – Absence of liquidity and appropriate exits could significantly increase time horizon
- *Firm specific risk* – Unique risks associated with a specific firm
- *Leverage risk* – Historical excess use of leverage and current inability to secure financing may adversely affect LBOs
- *Manager selection risk* – Selecting managers that fail to deliver top performance results
- *Diversification risk* – Inability to properly diversify the portfolio by vintage year, industry groups, geography
- *Tax risk* – Changes may adversely affect markets
- *Regulatory risk* – Changes may adversely affect markets
- *Strategy risk* – Continuing applicability of investment strategy in context of capital flows
- *Market risks* – Price decline

Global Fixed Income

Definition

Investment represents a legal obligation between a borrower and the lender with a maturity in excess of one year. Evidence of indebtedness and securities that evidence an ownership interest in debt obligations that are issued, insured, guaranteed by, or based on the credit of the following: companies, governmental entities or agencies, banks and insurance companies. Includes agency and non-agency mortgage-backed securities, collateralized mortgage obligations, commercial mortgage- backed securities, asset-backed securities, private placements, and options, futures or other derivatives on fixed income securities or components of fixed income.

Strategic Role

- Diversification within a multi-asset class, total return portfolio
- Hedge against a long duration accrued liability

- Current income
- Non-U.S. provides hedge against unanticipated domestic inflation and diversification to U.S. assets

Characteristics
- Medium volatility asset class
- Relatively high liquidity
- Broadly diversified by market sector, quality, and maturity
- Historically, developed sovereign debt exhibits low to negative correlation with real assets and negative correlation with equities; investment grade corporate bonds exhibit moderate correlation with equities and low correlation with real assets; high yield exhibits high correlation with equities and moderate correlation with real assets.
- A large currency component exists within international fixed income returns
- Developed markets are extremely liquid. Many issues of less developed markets are also relatively liquid.

Risks
- *Duration risk* – Price volatility from a change in overall interest rates
- *Convexity risk* – Negative convexity is the risk of price declines being greater than the price increase due to interest rates moving equally up versus down
- *Default or credit risk* – The uncertainty surrounding the borrower's ability to repay its obligations
- *Structure risk* – Risk that arises from the options implicit in bonds (like call ability and sinking funds) or the rules that govern cash flow differ from expectations
- *Sector risk* – Risk of holding sectors that are in different proportions than the benchmark
- *Liquidity risk* – Cost of trading in a security which is reflected in the bid-ask spread or the cost of selling due to cash flow needs
- *Reinvestment risk* – The uncertainty surrounding future yield opportunities to invest funds which come available due to call, maturities, or coupon payments
- *Benchmark risk* – Risk of the benchmark being inappropriate
- *Yield curve risk* – Price changes induced by changes in the slope of the yield curve
- *Currency risk* – The risk of currency movements vs. the dollar for each market. Currency may contribute greatly to return and lower correlation.

Global Real Assets

Definition
Investment represents an ownership interest in real return assets that provide inflation hedging characteristics in periods of unanticipated inflation. Includes inflation-linked securities, private or public real estate equity or equity-linked investments, private or public real estate debt, infrastructure, timber, real asset mezzanine debt or equity, non-fixed assets and other opportunistic investments in real assets.

Strategic Role
- Reduces risk of composite multi-asset portfolios through diversification
- Relatively low correlations to traditional asset classes
- Can serve as a possible inflation hedge during periods of high inflation
- Provides an attractive return relative to fixed income asset class in periods of low to moderate inflation

- Infrastructure provides inflation protection as he revenues of the underlying assets are typically linked to CPI
- Potential for high returns in niche opportunities

Characteristics

Real Estate

- *Risk* – Volatility of private real estate falls between publicly-traded debt and publicly-traded equities
- *Returns* – Nominal returns are expected to fall between equities and fixed income
- *Correlation* – Expected to exhibit low to no correlation with government and investment grade corporate bonds, and moderate correlation with high yield and equities.
- *Illiquidity* – Transactions require a significantly longer period to execute than other asset classes
- *Inefficient Market* – Information affecting real estate asset valuation and market trading is not rapidly, accurately, or efficiently reflected or interpreted in its pricing

Infrastructure

- *Long life assets* – Capital intensive assets with 25 to 99 year concessions, match for liability duration
- *Inflation protection* – Revenues typically linked to CPI
- *Monopoly or quasi monopoly* – High barriers to entry due to scale and capital cost
- *Steady and predictable cash flow* – Produce strong and predictable yields
- *Low correlation* – Provides portfolio diversification, low beta; expected to exhibit low to no correlation with fixed income and equities
- *Inelastic demand* – Predictable demand with little volatility, less susceptibility to economic downturns
- *Limited commodity risk* – Not subject to commodity pricing
- *Insensitive to changes in technology* – Low risk of redundancy or technology obsolescence
- Investments are usually illiquid and involve a long (10 to 20 year) holding period

Timberland

- *Return* – Low correlation with other asset classes, returns stem from four distinct sources: biological growth, timber prices, land values and management strategy
- *Income* – Driven almost entirely by the sale of harvested mature trees
- *Correlation* – Expected to exhibit low to no correlation with government and investment grade corporate bonds, and moderate correlation with high yield and equities.
- *Appreciation* – Driven by increased volume and value on timber and appreciation of underlying land
- Categorized by type of land (e.g. plantation, natural forest), type of tree (e.g., hardwood, softwood), country and region

Commodities

- *Real assets* – Raw materials that are the physical inputs of production, relatively homogenous in nature, lending itself to be traded via contracts with standardized terms
- *Inflation protection* – Storable commodities (such as energy) directly related to the intensity of economic activity exhibit positive correlation with unexpected inflation
- *Insurance risk premium* – Commodity futures prices tend to be priced at a discount to

spot prices in order to induce speculators to bear volatile commodity price risk that inventory holders and producers wish to lay off
- *Positive event risk* – Surprises that occur in the commodities markets tend to be those that unexpectedly reduce the supply of the commodity to the market, resulting in price spikes
- *Negatively correlated with financial assets* – Unlike stocks and bonds, commodities are not as directly impacted by changes in discount rates as they are by the current supply and demand of the underlying commodity, thus they should be expected to have little or even negative correlation with capital assets.

Risks

Real Estate

- *Property type risks* – Negative changes in demand/supply conditions by property type (e.g., office, industrial, retail, lodging, mixed-use, multi-family)
- *Location risks* – Local market condition relative to the adverse changes surrounding a property, or in discovery of hazardous underlying conditions, such as toxic waste
- *Tenant credit risks* – Failure by a tenant to pay what is contractually owed
- *Physical/functional obsolescence* – Negative influences on buildings due to technological changes, outdated layout and design features, and physical depreciation
- *Interest rate risk* – Higher rates can negatively impact both sales strategies and leveraged properties at refinancing
- *Reinvestment risk* – In a declining rental rate market, cash flow received may not be reinvested at the same level
- *Business cycle risk* – As economies slow down, there may be less demand for space
- *Inflationary risk* – Rent levels may not always keep up with rising operating expense levels
- *Illiquidity* – Inability to effectively liquidate a property into cash
- *Natural disaster risk* – Weather, floods, earthquake
- Regulatory concerns are critical, especially in emerging markets
- Capital and managerial intensive

Infrastructure

- *Leverage* – Deals with leverage between 40% and 80% can transform low risk assets into risky investments. Changes in the credit environment alter refinancing risk.
- *Market inefficiencies* – Competitive auctions lead to overpaying. There is a limited history and track record in the U.S. infrastructure space.
- *Political and headline risk* – Public acceptance and understanding of infrastructure needs to expand. In addition, the political landscape in every state and municipality differs.
- *Regulatory risk* – Regulated assets are subject to government changes
- *Construction and development* – Project overruns and delays should be shared with construction partners. Volume/demand risk for new developments can vary.
- *Labor issues* – Greenfield projects could generate new jobs while the privatization of brownfield assets could eliminate skilled labor members
- *Asset control* – Stipulations via concession agreements limit some management control (pricing, growth, decision approvals, etc.). Asset control needs to be appropriately priced.
- *Firm specific risk* – Unique risks are associated with specific firm

Timberland

- *Liquidity risk* – Liquidity is thin, marketplace characterized by few buyers and sellers, transactions are complicated and can take many months to execute
- *Valuation risk* – Annual appraisal process can lead to disparities between carrying value and realized sales prices during downturns
- *Physical risk* – Subject to losses from natural and human-caused events such as fire, insect and vermin infestations, disease, inclement weather, and theft
- *Political and regulatory risk* – Environmental regulations can restrain or prohibit timberland management activities
- *Leverage* – Can amplify volatility and potentially lead to an inability to refinance properties or lead to a distressed sale, requires a minimum level of generated income
- *Location risks* – Real estate dispositions may also be impacted by weakness in local residential real estate markets

Commodities

- *Price risk* – *C*ommodities with difficult or non-existent storage situations (heating oil, live cattle, live hogs, copper) coupled with a long-lead time between the production decision and the actual production of the commodity can lead to very volatile spot prices
- *Negative futures roll* – When the future contract's price is at a premium to the spot price, the cost to roll contracts forward is negative: an investor continuously locks in losses from the futures contracts converging to a lower spot price
- *Regulatory risk* – Concerns about the role played by investors in commodity markets could lead to new regulations impacting available investment opportunities, ultimately affecting investors' "license to invest".
- *Leverage* – A commodity futures program that is not fully collateralized (for every desired $1 in commodity futures exposure, an investor sets aside $1 in cash) can amplify volatility and potentially lead to greater losses
- *Implementation* – Because futures contracts are levered, cash management for the collateral is an important consideration due to the value

Global Alternatives

Definition
Investment has a distinct return/risk factor profile as compared to other specified broad asset class groupings. Examples: Low market exposure/absolute return strategies such as market neutral, and other niche strategies with low asset class beta such as insurance-linked investments, volatility, intellectual property, healthcare royalty, shipping, litigation finance and fine art.

Strategic Role

- More robust diversification achieved through the introduction of non-traditional return driver/risk factors
- Low or negative correlations to other asset classes
- Return profile less dependent on economic growth and interest rates
- Potential for attractive risk-adjusted returns

Characteristics

- *Returns* – Exhibits lower correlations to broader equity and credit markets in periods of

market distress
- *Illiquidity* – Transactions may require a longer period to execute than other asset classes
- *Inefficient Market* – Information affecting asset valuation and market trading may not be accurately or efficiently reflected or interpreted in its pricing

Risks
- *Market risk* – Cost of carry on being long volatility
- *Natural disaster risk* – Weather, floods, earthquake affect natural catastrophe-based insurance-linked products
- *Due diligence* – Complicated to evaluate and monitor
- *Illiquidity* – Transactions may require a longer period to execute than other asset classes
- *Implementation* – Complexity of implementation may be an impediment

A verbal update will be provided for agenda item IV. B

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad Roberts, DED/CRO**
DATE: **September 14, 2023**
RE: **September 2023 Pioneer Project Update**

Project Status

The development sessions for Pilot 3 concluded the week of July 17th. The fourth of final pilot, Pilot 4, began the first week of August 2023. This final pilot focuses on the design and appearance and usability of both the employer portal and the member facing portal. These are the portals the actual users will use to access the system. This pilot will be completed the third week of October. With the conclusion of this pilot the design phase concludes. While some positions such as the DED/CRO and Retirement Programs Manager will continue to be required to put in additional hours on the project on a routine basis, other positions will begin to see a greatly reduced demand on their time for the project for the next few months.

The file scanning and integration sessions focusing on the transfer of indexing of all historical records and documents in the State FileNet system are continuing. This project will be sporadic through the next 12 months as time allows. The completion of this piece of the overall project does not need to be complete until we “go live”, so it is being worked on as vendor and TFFR staff time allows. There is heavy NDIT involvement in this function as well.

An ongoing part of the project which will continue until the “go live” is the data mapping. This is converting the data from the format the legacy system we presently have uses to the format the new system needs the data to be in to process it. This is a large undertaking also requiring significant assistance from NDIT.

Underway is the development of an interface with NDPERS to track dual members as well as health, vision, and dental insurance deductions. Presently the tracking of dual membership, calculation of benefits for dual members, and the withholding of insurance deductible payments is a very manual process taking significant TFFR staff time. This interface will allow the new system to automatically calculate and process these items and drastically reduce any staff time involved in these processes. An initial assessment of how the process should work has been developed by the vendor and reviewed by TFFR staff. After some revisions are made by Sagitec addressing questions raised during the review by TFFR staff, a meeting with PERS staff will be conducted to attempt to develop concurrence and proceed with the development of the interface.

Budget Status

The project remains slightly under budget by approximately $60,000 due to the savings found through the elimination of the SharePoint licensing listed in the contract by using the existing State SharePoint licensing.

A need for additional storage for the processing of tax documents has been identified during the design phase. The vendor is developing the proposal for cost for the additional storage. This will be an ongoing annual maintenance cost. Rough estimates received from the vendor put the cost in the range of $5,000 per biennium.

Unanticipated Issues

The vendor lost an asset on the data migration area of the project. The vendor has developed a plan for replacing the asset and provided that plan to TFFR staff and project management staff for review. The plan has been agreed to and the replacement is expected to cause little, if any, delay in the data migration portion of the project and should not affect the timeline overall.

BOARD ACTION REQUESTED: Information only.

NORTH Dakota | Retirement and Investment
Be Legendary.™

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Sarah Mudder, communications and outreach director**
DATE: **Sept. 21, 2023**
RE: **TFFR outreach Q3 conducted/Q4 planned**

The Retirement and Investment Office (RIO) staff who administer the Teachers' Fund for Retirement (TFFR) program engaged with members and partners in the third quarter of the calendar year as follows:

AGENCY EVENTS/COMMUNICATIONS

Retirement Education Workshops	**Attendance**
July 19 – Face-to-face (any member), hosted by Fargo Public Schools	54
July 25 – Virtual (any member), hosted by RIO using Microsoft Teams	62

The virtual event was recorded with the videos shared with event registrants and posted to RIO's website. The five topics have a combined 93 views to date; most popular are Legal/Estate and Health Insurance.

Newsletters	**Open Rate**
July 25 – Employer	30%
Sept. 7 – Employer, sent July issue to new hires	41%

PARTNER/ASSOCIATION EVENTS

Aug. 8-9 – Career and Technical Education, Bismarck	exhibit
Aug. 15 – Governor's Summit on Innovative Education, West Fargo	exhibit
Sept. 12-13 – North Dakota Retired Teachers' Association, Fargo	exhibit and present

RIO staff have scheduled and/or are planning the following in the fourth quarter:

AGENCY EVENTS/COMMUNICATIONS

Group Benefit Presentations
Sept. 19 – Face-to-face (district specific and any member), hosted by Grand Forks Public Schools
Sept. 20 – Face-to-face (district specific and any member), hosted by Fargo Public Schools
Sept. 26 – Face-to-face (any member), hosted by Dickinson Public Schools

Oct. 3 – Face-to-face (any member), hosted by Bismarck Public Schools
Oct. 4 – Face-to-face (any member), hosted by Minot Public Schools
Oct. 10 – Face-to-face (any member), hosted by Jamestown Public Schools
Oct. 11 – Face-to-face (any member), hosted by Williston Public Schools

TBA – Virtual (any member), hosted by RIO using Microsoft Teams

Newsletters
Sept. 27 – Active Member News
Oct. 5 – Employer News

Webinars
Sept. 26 – Employer Update (Info Mixer)
Nov. 2 – New Business Manager Workshop
Nov. 9 – North Dakota Council on Educational Leaders, PAS preview for employers
Nov. 15 – North Dakota School Board Association, PAS preview for employers

PARTNER/ASSOCIATION EVENTS

Oct. 7-10 – National Council on Teacher Retirement, La Jolla, CA
Oct. 8-11 – Public Pension Financial Forum, Denver, CO
Oct. 14-18 – National Pension Education Association, Savanah, GA
Oct. 19-20 – North Dakota Council on Educational Leaders, Bismarck
Oct. 27 – North Dakota School Board Association, Bismarck

BOARD ACTION REQUESTED: Information Only

PORTFOLIO REVIEW WITH TBP

NORTH Dakota | Information Technology

Be Legendary.

Agenda

- Agency Collaboration
- Delivery Update
- What's Coming
- Q&A

NDIT – RIO Collaboration

NDIT Dedicated Staff

- Technology Business Partner (TBP)
- Information Security Officer (ISO)
- Business Application Support

- End User Compute & Collaboration Team (EUCC)

Delivery Update

Positive Trends and Areas of Improvement

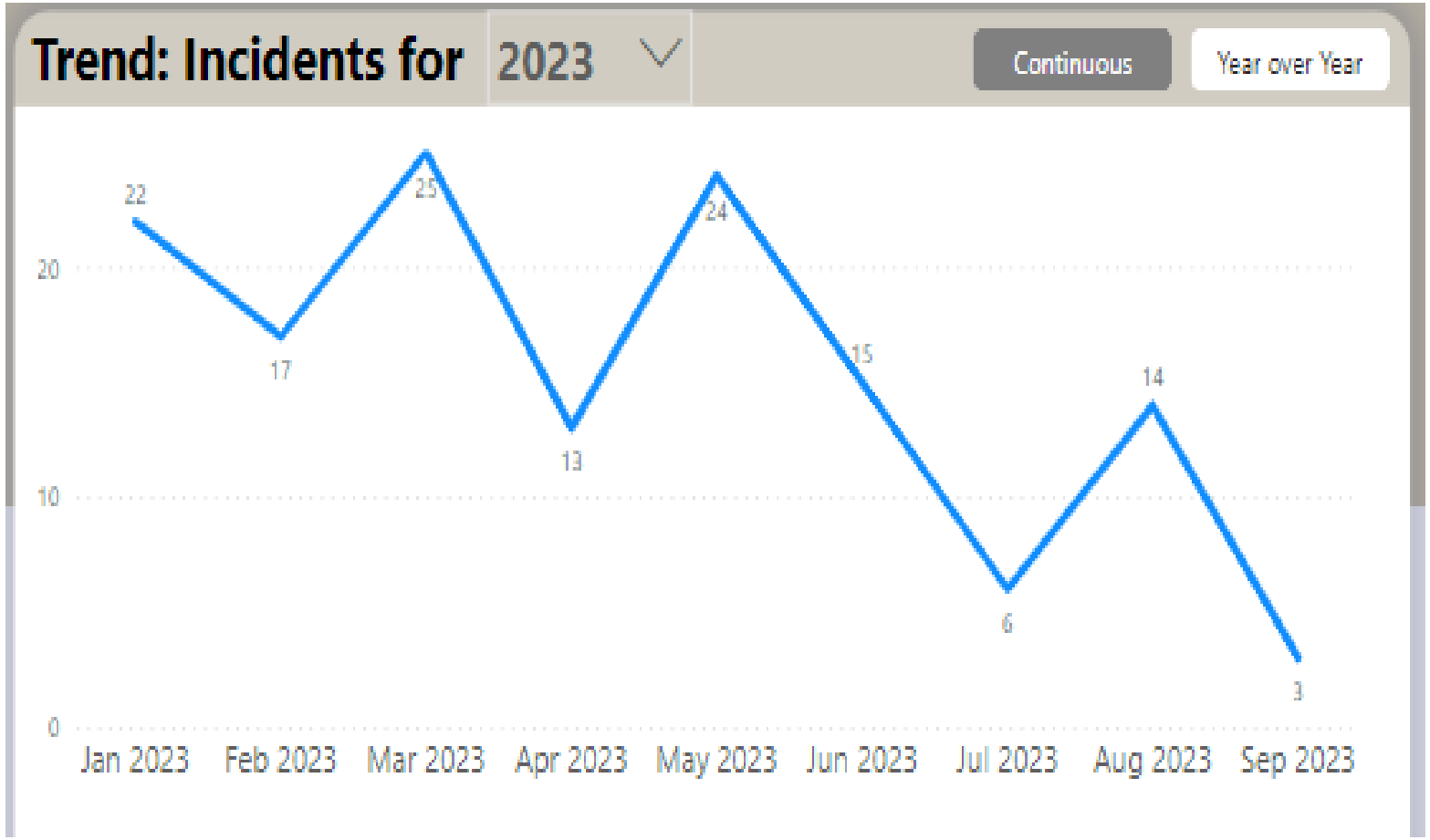
- Service Desk now closing ~50% of all incoming tickets.
- More notes in the tickets & better customer communication overall
- Implementation of Categories and Subcategories on tickets
- Better interaction within various Tiers (Tier 2 & Tier 3 and Security)
- Creation of Agency Dashboards
- Implementation of Managed Print Services

RIO Specific Dashboards

Desktop Incidents:

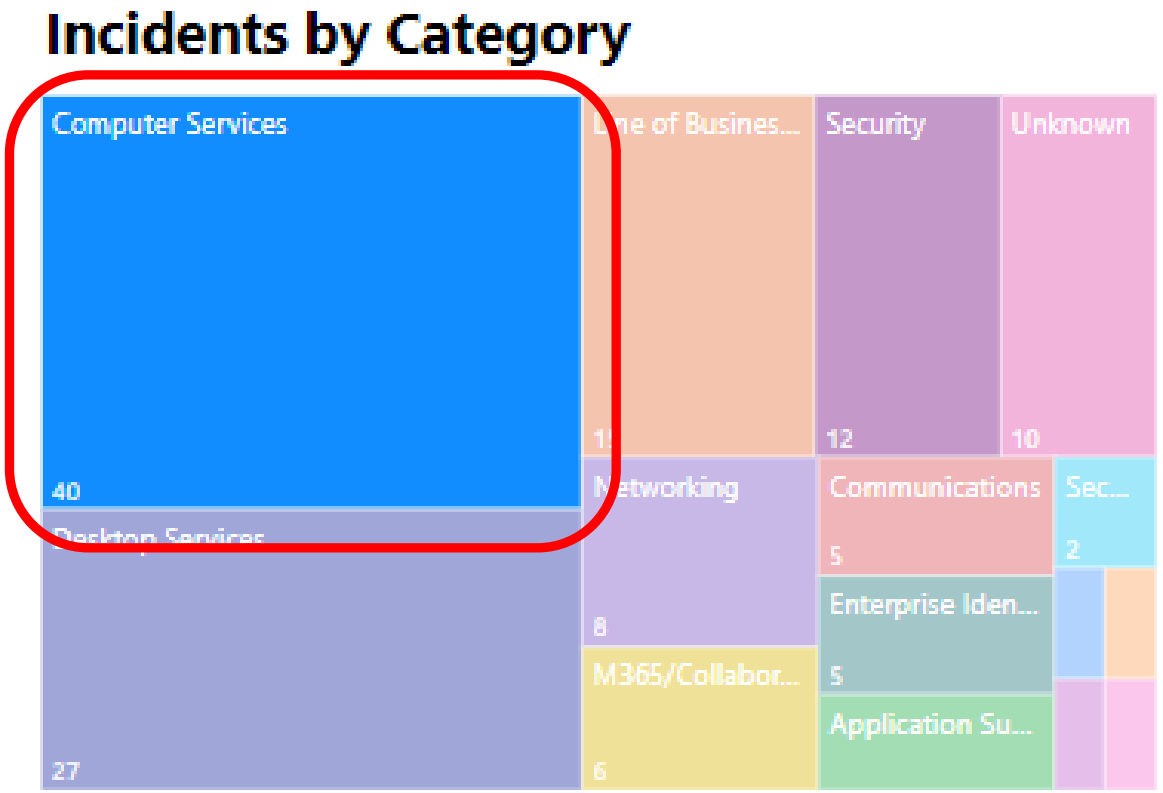
Summary Metrics for 1/1/2023 - 9/15/2023

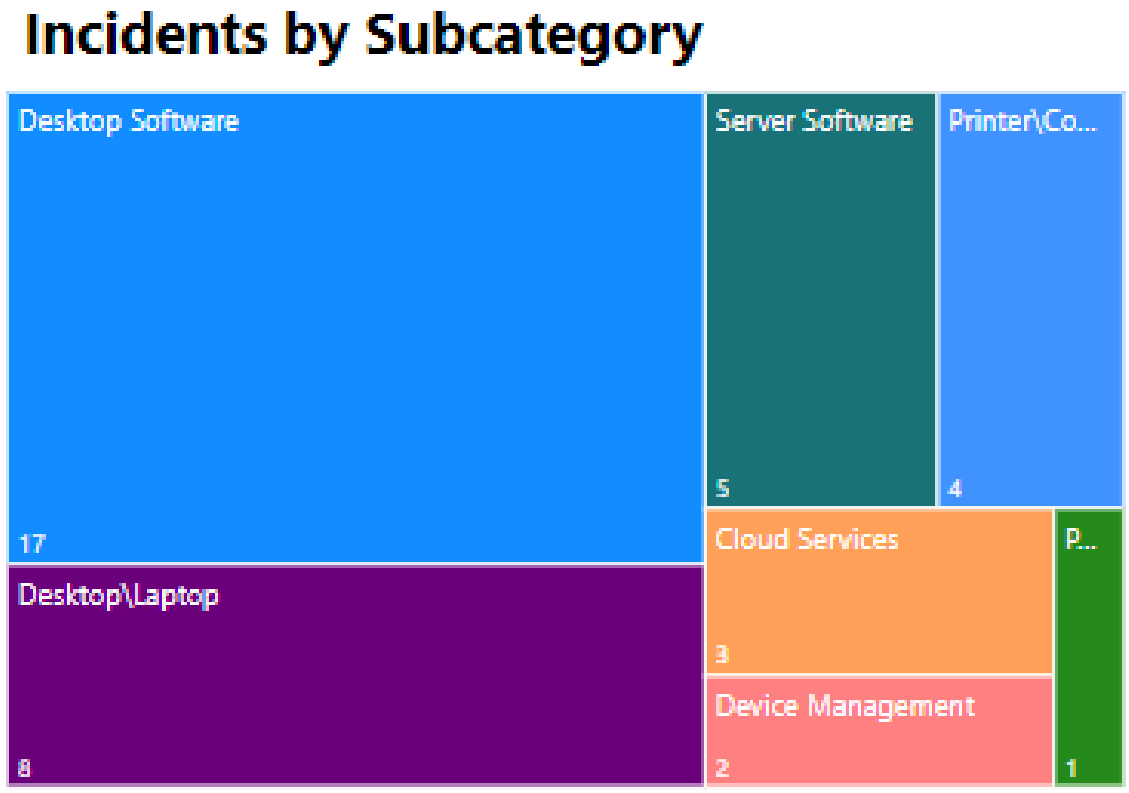
- Incidents Created – 141
- Incidents Resolved – 139
- Incidents Outstanding – 2



RIO Specific Dashboards

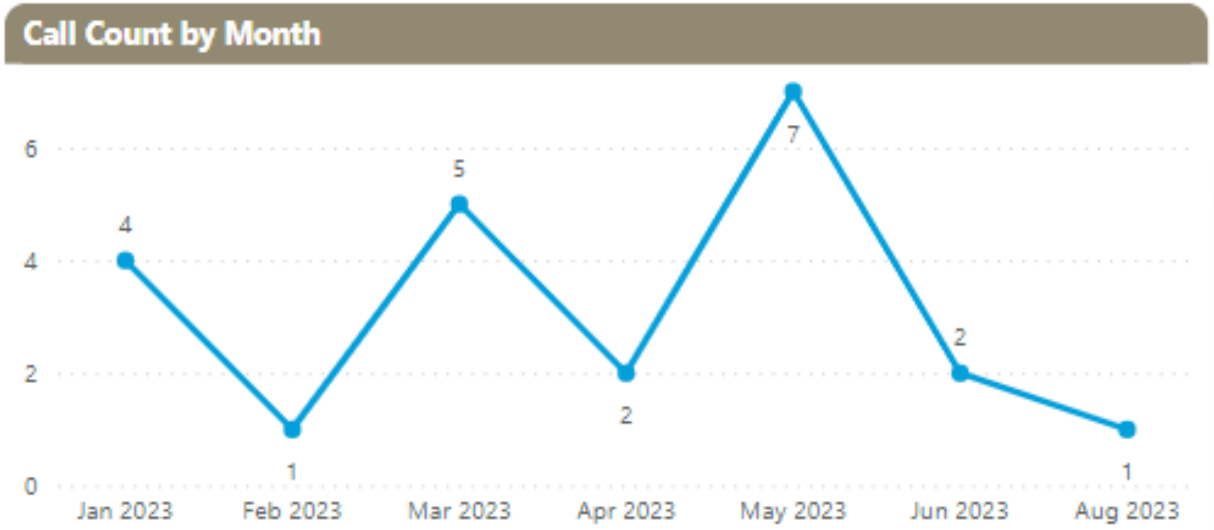
Desktop Incidents by Category:





RIO First Call Resolution

Summary Metrics for 1/1/2023 - 9/15/2023



- Call Count – 22
- Average Minutes Open – 3.5 min
- Resolved by Service Desk – 45%

Service Performance SLA Matrix

	Major Incidents **Life-threatening events,** **All P1 Incidents,** **Incidents where Business Applications are down, and** **Major Security Incidents.**	**IMPACT**		
		High-System Wide/Citizen Impact Business Unit, Department, Location	**Medium-Multiple Users** More than 1 User	**Low-Single User** Single User
URGENCY	**High** Major business process are stopped No workaround	1 Response time: **15 minutes** Resolution Plan: **4 Hours**	2 Response time: **30 minutes** Resolution Plan: **6 Hours**	3 Resolution Plan: **1 Business Day**
	Medium Restricts ability to conduct business Reasonable workaround exists	2 Response time: **30 minutes** Resolution Plan: **6 Hours**	3 Resolution Plan: **1 Business Day**	4 Resolution Plan: **3 Business Days**
	Low Does not significantly impede business	3 Resolution Plan: **1 Business Day**	4 Resolution Plan: **3 Business Days**	5 Resolution Plan: **5 Business Days**

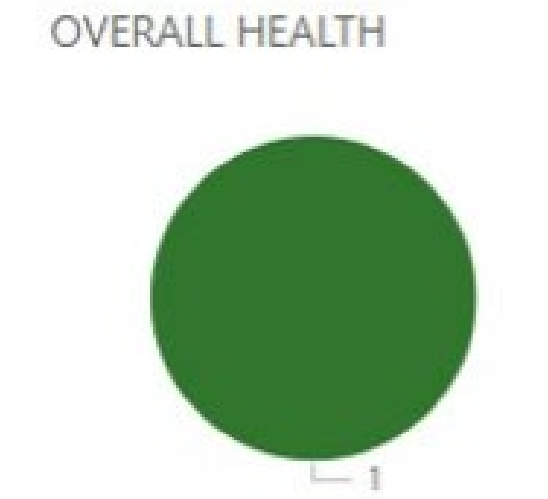
- All incidents reported to the Service Desk will be assessed a priority based upon the following matrix. NDIT will work with customers to identify the impact that an incident has on their core business and the urgency desired for its resolution.
- Impact reflects the likely effect incidents will have upon core business services.
- Urgency is an assessment of the speed with which an incident requires resolution.
- **Together, impact and urgency are blended to determine the priority of an incident.**

Initiative Intake Submissions

Data Warehouse for Fiscal and Investment Data

- **Request:** We are looking for a solution to unify our data, internally if possible, or through an external IT solution, so that both our Fiscal and Investment teams can better utilize the data for current reporting needs and improved analysis..
- **Current Status:** In Customer Review
- **NDIT Estimate:**
  - NDIT presented an estimate of $210,000 to $241,000
  - NDIT working with RIO to determine path forward

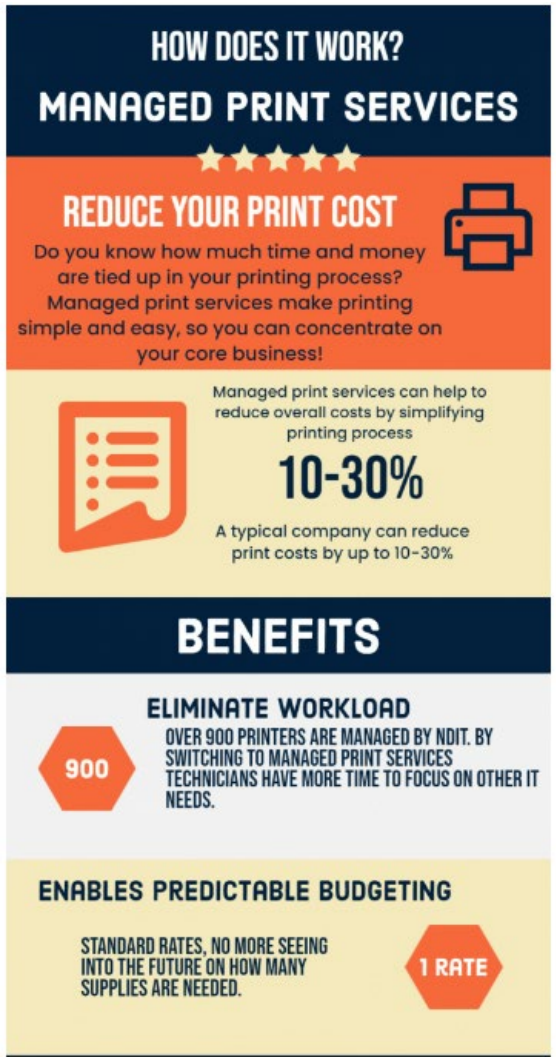
RIO Active Projects Status



Large Project – Teachers Fund for Retirements Pension System Replacement

- **Key Update:** Focusing on remaining Pilot 3 Elaboration and Design sessions. Pilot 4 Elaboration and Design sessions will be underway in September. Development and System Testing continued for Pilot 2.
- **Current Estimated Go-Live:** September 13, 2024
- **Costs:**
  - Project Budget: $8,908,001
  - Actual Cost: $3,487,019

Managed Print Services



Project to enroll supported agencies into printer services directly from Hewlett-Packard (HP)

- Service includes:
  - toner & ink (cartridges & disposal)
  - Phone and online support
  - Maintenance & repairs,
  - remote monitoring software

What’s Coming?

Upcoming Demand- Projects & Programs

- Artificial Intelligence
- Data Classification Policy
- Printer Logic

Q&A

NORTH Dakota | Information Technology

Be Legendary.

PERFORMANCE REVIEW

INVESTMENT STAFF
SEPTEMBER 21, 2023

NORTH Dakota | Retirement & Investment
Be Legendary.

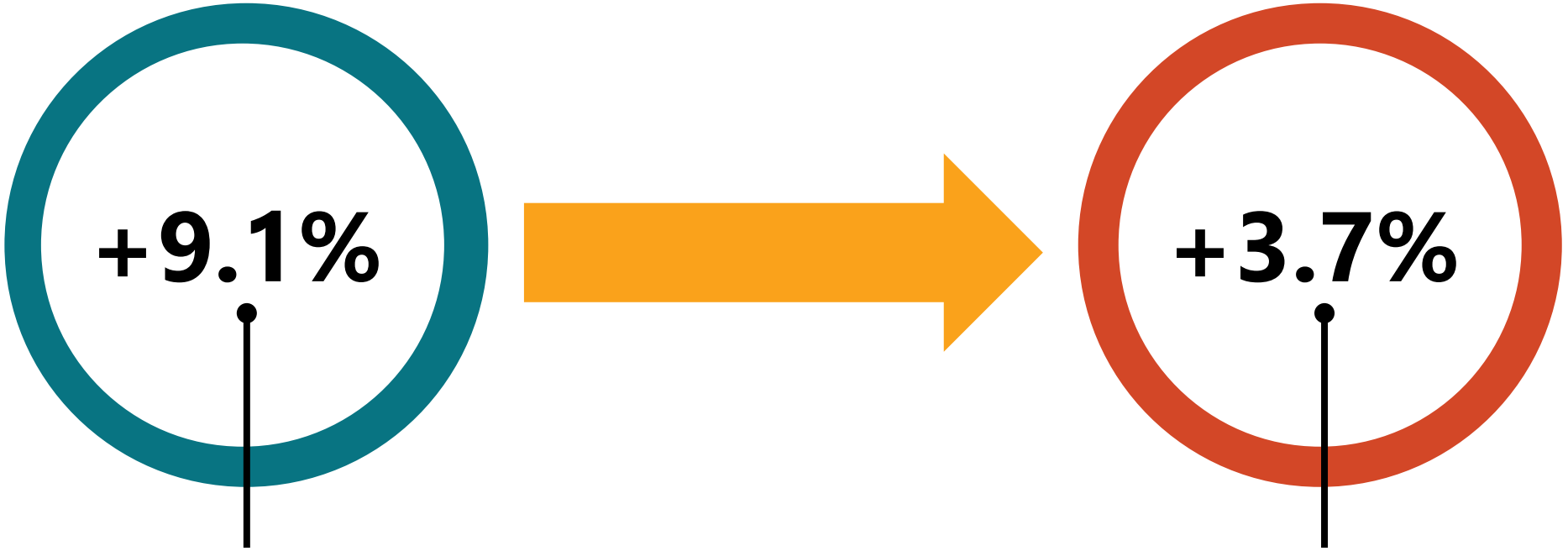
PERFORMANCE – BENCHMARK INDICES

NORTH Dakota
Be Legendary.™

Summary of Returns June 30, 2023					
Benchmark Indices (% change, annualized)	**YTD**	**1 Yr**	**5 Yr**	**10 Yr**	**10 Yr Volatility**
Russell 1000	16.7%	19.4%	11.9%	12.6%	17.8%
Russell 2000	8.1%	12.3%	4.2%	8.3%	22.3%
S&P 500	16.9%	19.6%	12.3%	12.9%	17.7%
MSCI ACWI IMI Net	13.2%	16.1%	7.6%	8.6%	14.2%
MSCI World ex US	11.3%	17.4%	4.6%	5.4%	14.2%
MSCI Emerging Markets	4.9%	1.7%	0.9%	2.9%	15.7%
Bloomberg Aggregate	2.1%	-0.9%	0.8%	1.5%	4.3%
Bloomberg Gov/Credit	2.2%	-0.7%	1.0%	1.7%	4.7%
Bloomberg US High Yield	5.4%	9.1%	3.4%	4.4%	5.1%
NCREIF Property Index (06/30/2023)	-3.8%	-6.6%	5.9%	7.82%	3.6%

Source: Bloomberg

INFLATION



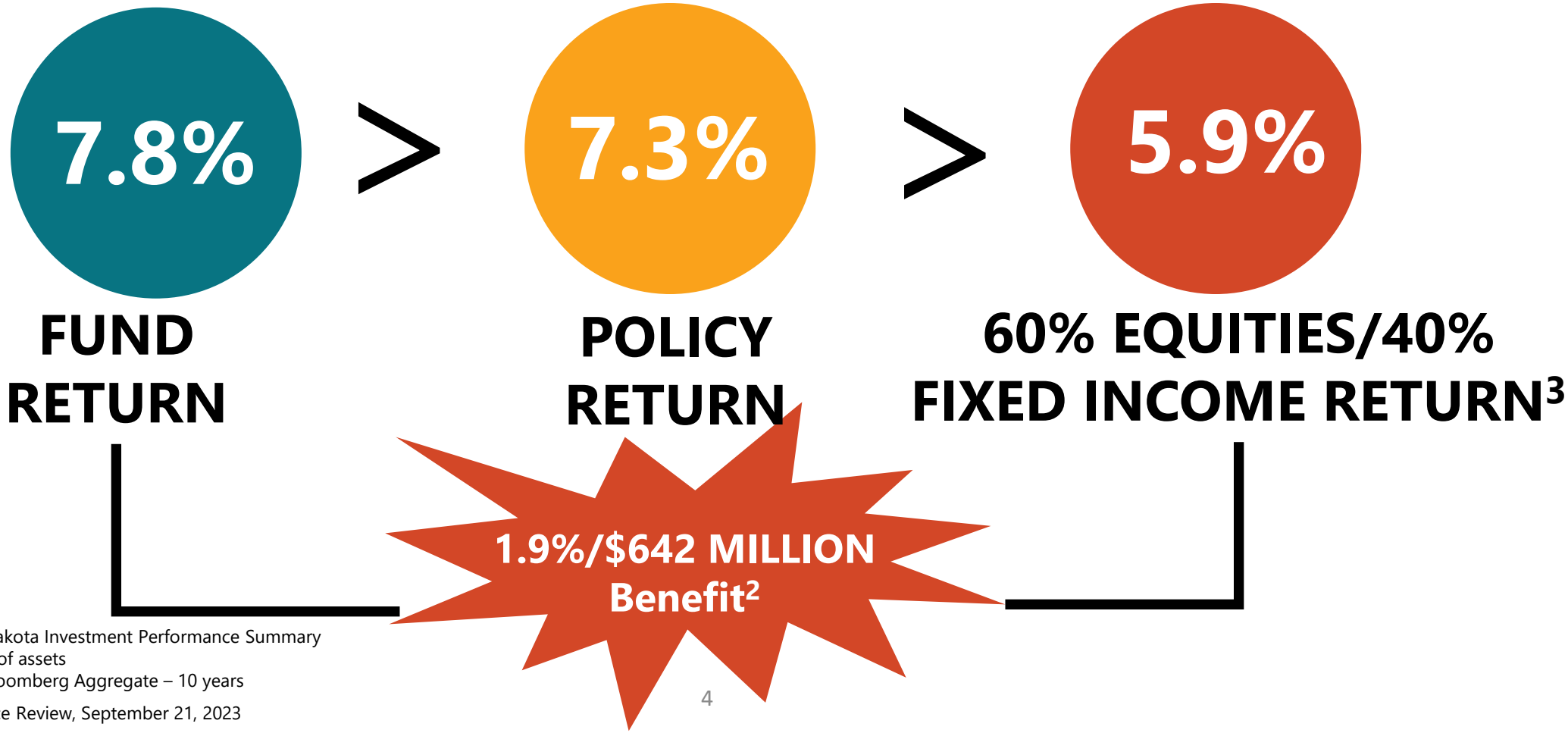
ANNUAL INFLATION RATE
(June 2021 thru June 2022)

ANNUAL INFLATION RATE
(August 2022 thru August 2023)
4.3% Ex Food & Energy

1. Bureau of Labor Statistics

INVESTMENT MANAGEMENT BENEFITS

TFFR TEN YEAR AVERAGE RETURN[1]



1. Thru June 2023; North Dakota Investment Performance Summary
2. Starting with $3.1 Billion of assets
3. 60% MSCI World/40% Bloomberg Aggregate – 10 years

Investment Team, Performance Review, September 21, 2023

PERFORMANCE – TFFR[1]

NORTH Dakota Be Legendary.™

AS OF JUNE 30, 2023

TFFR ($3.1 BILLION)	YEAR TO DATE	1 YEAR	3 YEAR	5 YEAR	RISK (5 YEAR)
Total Fund Return	6.7%	7.5%	8.4%	6.8%	9.9%
Policy Benchmark	6.7%	8.2%	8.6%	7.1%	10.2%
Total Relative Return	0.0	-0.7%	-0.2%	-0.2%	
Total Relative Return (Corridor)		0.0%	0.5%	0.3%	

1. After fees performance

PERFORMANCE – TFFR[1]

NORTH Dakota
Be Legendary.™

One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equities	24%	22%	19.62%	18.51%	0.25%	(0.09%)	0.15%
World Equities	3%	2%	(33.08%)	(32.51%)	(0.09%)	0.11%	0.02%
International Equities	15%	17%	13.84%	12.40%	0.18%	(0.09%)	0.09%
Private Equities	13%	13%	9.24%	9.24%	0.00%	0.00%	0.00%
Domestic Fixed Income	25%	26%	1.43%	2.08%	(0.16%)	(0.05%)	(0.22%)
Real Estate	12%	12%	(10.87%)	(6.60%)	(0.54%)	0.00%	(0.54%)
Timber	1%	1%	(5.29%)	11.13%	(0.24%)	0.00%	(0.24%)
Infrastructure	6%	6%	8.61%	(3.04%)	0.71%	(0.00%)	0.71%
Cash & Equivalents	1%	1%	3.93%	3.59%	0.00%	(0.04%)	(0.03%)
Residual Holdings	0%	0%	-	-	0.00%	0.00%	0.00%
Total			**7.48%**	**= 7.55%**	**+ 0.10%**	**+ (0.17%)**	**(0.07%)**

Five Year Annualized Relative Attribution Effects

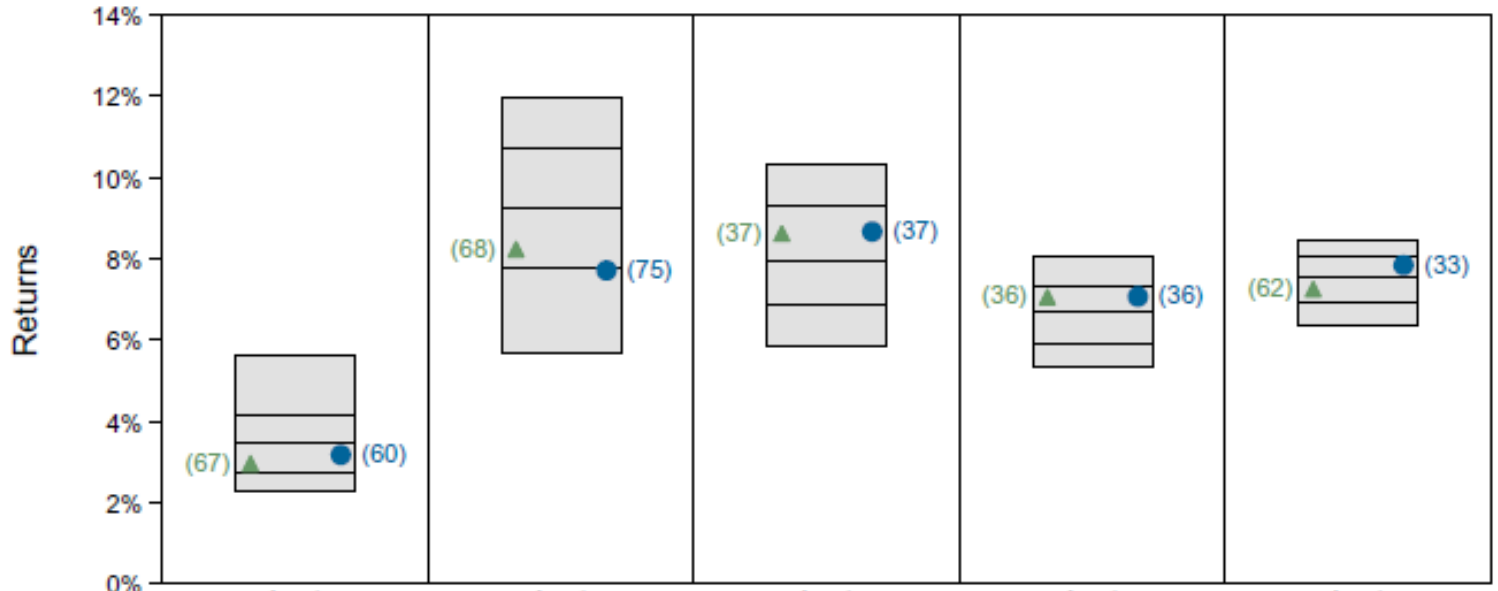
Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equities	23%	23%	11.69%	10.41%	0.27%	(0.09%)	0.18%
World Equities	12%	11%	(4.44%)	(2.55%)	(0.34%)	0.00%	(0.33%)
International Equities	15%	15%	4.20%	3.47%	0.12%	(0.01%)	0.12%
Private Equities	7%	7%	15.25%	15.25%	0.00%	0.00%	0.00%
Domestic Fixed Income	25%	25%	2.31%	1.62%	0.20%	(0.01%)	0.19%
Real Estate	10%	10%	5.62%	5.90%	(0.03%)	0.00%	(0.03%)
Timber	2%	2%	3.36%	5.80%	(0.02%)	0.00%	(0.02%)
Infrastructure	5%	5%	8.13%	4.98%	0.19%	(0.00%)	0.19%
Cash & Equivalents	1%	1%	1.60%	1.55%	0.00%	(0.00%)	(0.00%)
Residual Holdings	0%	0%	-	-	0.00%	0.00%	0.00%
Total			**6.83%**	**= 6.54%**	**+ 0.39%**	**+ (0.11%)**	**0.29%**

1. After fees performance corridor benchmark, Callan Investment Team, Performance Review, September 21, 2023

PERFORMANCE – TFFR[1]

NORTH Dakota
Be Legendary.™

Callan Public Fund Sponsor Database

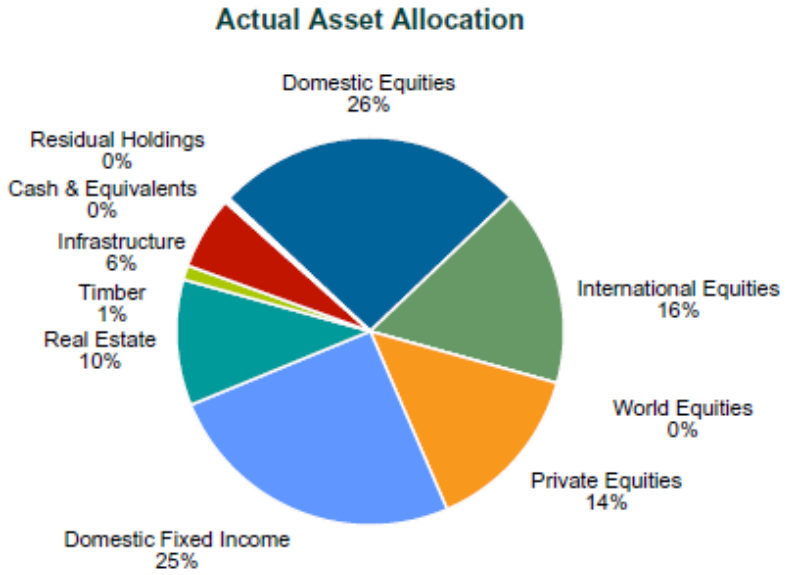


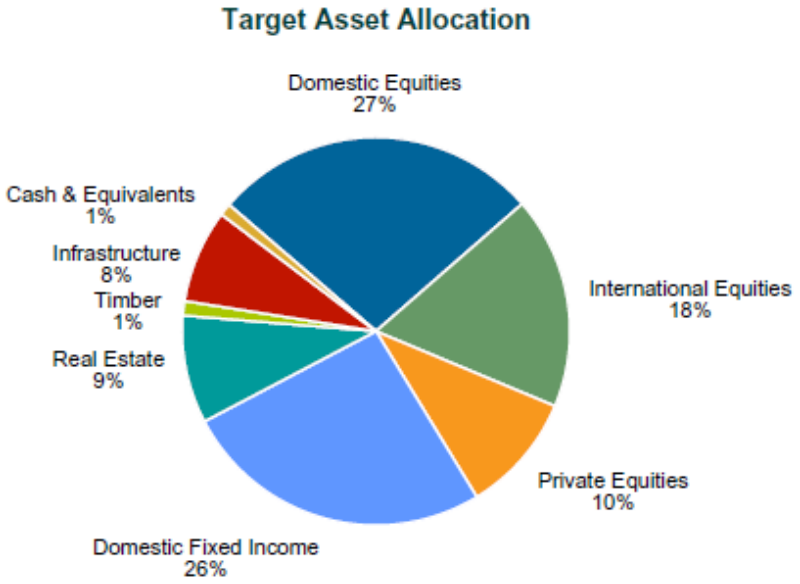
	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
10th Percentile	5.62	11.98	10.35	8.04	8.47
25th Percentile	4.16	10.71	9.31	7.35	8.05
Median	3.46	9.27	7.96	6.71	7.54
75th Percentile	2.73	7.76	6.85	5.88	6.93
90th Percentile	2.28	5.70	5.84	5.35	6.34
Total Fund ●	3.18	7.72	8.67	7.07	7.84
Policy Target ▲	2.97	8.23	8.62	7.06	7.26

1. Callan

TFFR ASSET ALLOCATION

NORTH Dakota Be Legendary.™





Asset Class	$000s Actual	Weight Actual	Target	Percent Difference	$000s Difference
Domestic Equities	808,928	25.9%	27.3%	(1.4%)	(43,857)
International Equities	512,966	16.4%	17.7%	(1.3%)	(39,823)
World Equities	246	0.0%	0.0%	0.0%	246
Private Equities	444,163	14.2%	10.0%	4.2%	131,814
Domestic Fixed Income	790,640	25.3%	26.0%	(0.7%)	(21,469)
Real Estate	326,766	10.5%	9.0%	1.5%	45,651
Timber	37,549	1.2%	1.2%	(0.0%)	(0)
Infrastructure	189,439	6.1%	7.8%	(1.7%)	(54,127)
Cash & Equivalents	9,288	0.3%	1.0%	(0.7%)	(21,947)
Residual Holdings	3,513	0.1%	0.0%	0.1%	3,513
Total	3,123,498	100.0%	100.0%		

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Sara Seiler, Supervisor of Internal Audit**
DATE: **September 6, 2023**
RE: **Fiscal Year End Audit Committee Activities July 1, 2022 - June 30, 2023**

The Audit Committee is a standing committee of the State Investment Board (SIB) authorized under the SIB Governance Policy B-6, Standing Committees. Its primary function is to assist the SIB in fulfilling its oversight responsibilities of the Retirement and Investment Office (RIO) internal and external audit programs, including the financial reporting process, internal controls, and compliance with laws, regulations, policies, and procedures.

The Audit Committee consists of five members selected by the SIB. Three members of the Audit Committee represent the three groups on the SIB (Teachers' Fund for Retirement (TFFR) Board, Public Employees Retirement System (PERS) Board, and elected and appointed officials). The other two members are selected from outside the SIB, that are both independent and financially literate. Members of the Audit Committee for the 2022 - 2023 fiscal year were:

Treasurer Thomas Beadle, Elected and Appointed Officials, Chair
Yvonne Smith, PERS Board, Vice Chair
Cody Mickelson, TFFR Board
Julie Dahle, External Member
Jon Griffin, External Member

The Audit Committee held four regular meetings for the fiscal year ended June 30, 2023. The meetings occurred: August 9, 2022, November 15, 2022, February 15, 2023, and May 11, 2023.

Activities of the Audit Committee during the past year included:

- The Committee approved a July 1, 2022, through June 30, 2023, Internal Audit work plan. Progress was monitored on a quarterly basis. Audit activities included:
    - Executive Limitations Audit was completed. The audit determined the Executive Director's level of compliance with SIB Governance Manual Executive Limitation policies (A-1 through A-11) for the calendar year ending December 31, 2022.
    - State Investment Board Self-Evaluation was administered by Internal Audit. The SIB requested Internal Audit's assistance in administering the self-evaluation and presenting the results. The SIB self-evaluation was presented on February 17, 2023, SIB meeting.
    - Internal Audit Business Review - The Supervisor of Internal Audit and the Executive Team developed an RFP to review and evaluate the needs of the Internal Audit division. The RFP was issued in September 2022, with Weaver & Tidwell, LLP being selected. The project kicked off in November 2022 with Internal Audit staff providing information and having weekly

meetings. The final report was issued and presented to the Audit Committee by Weaver & Tidwell, LLP in May 2023.

- Payroll Audit –RIO management requested Internal Audit to perform a payroll audit for the period of January through August 2022. The payroll audit compared the payroll records, documentation, and the ND transparency website. The payroll audit encompassed new hires, temporary increases, promotions, legislative increases, any bonuses, and any other pay changes. The audit was issued on November 14, 2022.
- Employee Exit Review – The Internal Audit Division will do a post review of an employee's accounts if there is an abrupt resignation of an employee or if there is a separation of employment. A RIO staff member had separation of employment in January 2023. Internal Audit did a review of emails and various accounts. Internal Audit reviewed for open record requests, media inquiries, and any other open tasks that would need to be completed. The report was issued on February 7, 2023.
- RIO Onboarding and Offboarding Procedures – The Supervisor of IA is a committee member of the Onboarding and Offboarding Group. The group has been reviewing and enhancing RIO's current onboarding and offboarding procedures. Members of the working group are the Deputy Executive Director/Chief Retirement Officer, Chief Financial Officer/Chief Operating Officer, Executive Assistant, and Contracts/Records Administrative Assistant.
- TFFR File Maintenance Audit – Internal Audit reviewed system generated (CPAS) audit tables to ensure transactions initiated by staff are expected and appropriate given an individual's role with the organization. Member account information from Member Action Forms, Address Change Forms, Direct Deposit Authorization Forms, and Point of Contact Forms are reviewed to verify that contact and demographic information has been updated correctly. A sample of purchases, refunds, and deaths were reviewed as part of the of audit. The audit was issued on October 27, 2022.
- TFFR Model 2 Partial Review - This salary review only includes Model 2 Partial employers. IA selected one participant from forty-one employers to ensure model compliance. The review will also determine if the retirement salaries and contributions reported to TFFR by the participating employers are following the definition of salary as it appears in the North Dakota Century Code (N.D.C.C. § 15-39.1-04 (10)). Reported service hours and eligibility for TFFR membership are also verified. This review is currently in process.
- TFFR Pioneer Project – Stage 3 of the Pioneer project started in the previous fiscal year. Pilots 1 & 2 were completed during the fiscal year. Pilot 3 was completed in July 2023. Internal Audit staff participated in elaboration meetings.
- TFFR Actuarial Audit – TFFR Governance Manual requires the TFFR Board to hire an independent actuary to perform an actuarial audit. The Executive Director, Deputy Executive Director/Chief Retirement Officer and Supervisor of Internal Audit reviewed and scored the RFPs in August 2022. The TFFR Board selected from the finalists at their September 2022 meeting. The actuarial audit was completed and presented to the TFFR Board at their January 2023 meeting.
- TFFR Actuarial Services RFP – Staff has prepared a request for proposal (RFP) for actuarial and consulting services for the period starting July 1, 2023, ending June 30, 2025. The RFP includes in the scope of work an experience study expected to be performed in FY2024 as well as actuarial valuation, GASB 67 and 68 reporting, proposed legislation analysis and consulting services. The Executive Director, Deputy Executive Director/Chief Retirement Officer and Supervisor of Internal Audit reviewed and scored the RFPs in March 2023. The TFFR Board made a selection from the finalists at their April 2023 meeting.
- Internal Audit worked with staff on updating the Administrative Policy Manual. Policies were written and updated to ensure compliance with state and federal policies. RIO also adopted other federal and state policies as found on the ND State OMB website. This is a continual project.

- RIO's Internal Audit division provided assistance to our external audit partners, CliftonLarsonAllen, LLP (CLA), during the 2022-2023 and the 2023-2024 financial audits of the RIO as well as the GASB 68 Census Data Audits.
- Internal Audit staff continued to pursue networking and professional development opportunities via the IIA's local chapter and the APPFA (Association of Public Pension Fund for Auditors). Staff attended a conference which covered a variety of topics (System Implementations, IIA Standards, External Managers, Data Analytics, Asset Allocations, and Information Security). Internal Audit staff also attended free webinars throughout the year as available.

- The Committee received the results of the RIO financial audit for the fiscal year ended June 30, 2022, from independent auditors, CliftonLarsonAllen, LLP. They issued an unmodified "clean" opinion.

- The Committee reviewed the RIO financial audit plan for fiscal year ended June 30, 2023, with independent auditors, CliftonLarsonAllen, LLP. Discussion included scope and approach for the audit to ensure complete coverage of financial information and GASB 68 Audit.

- The Committee adopted a detailed audit work plan and budgeted hours for fiscal year July 1, 2023, to June 30, 2024.

The above activities support the Committee's fulfillment of its oversight responsibilities. Please inform the Committee if there are special audits or activities the Board would like to have reviewed.

BOARD ACTION REQUESTED: Board acceptance.

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Sara Seiler, Supervisor of Internal Audit**
DATE: **September 6, 2023**
RE: **Audit Activities Quarterly Update**

The SIB Audit Committee met on August 2, 2023. The SIB Audit Committee reviewed and approved the 2022 – 2023 annual audit activities and an update on current audit activities.

The following were presented and approved:

1. 2022 – 2023 Audit Committee Report to the SIB
    a. Review and report of completed audits and audit activities in previous fiscal year
2. 2022 – 2023 Review of Audit Charter
    a. Required by charter
    b. Ensure Committee is meeting their responsibilities.
3. Internal Audit Business Process Review
    a. Next steps for Internal Audit maturity

The following link has the committee materials that were presented for your reference:

https://www.rio.nd.gov/sites/www/files/documents/PDFs/SIB%20Audit/Board/Materials/sibauditmat20230802.pdf

BOARD ACTION REQUESTED: Board acceptance.

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad Roberts, DED/CRO**
DATE: **September 14, 2023**
RE: **TFFR Ends Report – 3rd Qtr. ending June 30, 2023**

This report highlights exceptions to the normal operating conditions of the TFFR program for the period spanning April 1, 2023, through June 30, 2023.

- RIO welcomed a summer business and accounting intern in May. The intern, Madelynn Nelson, will work through August 18, 2023. Madelynn is entering her senior year at Grand Canyon University in Phoenix, AZ, studying finance. She is from Bismarck.
- The DED/CRO and the Retirement Programs Manager attended the Public Retirement Information Systems Management (PRISM) conference in St. Petersburg, FL. The conference focused on the implementation of pension administration systems and fraud and risk related to those systems.
- A contract for actuarial services was awarded to GRS. The contract begins on July 1, 2023. Initial meetings were conducted with the new vendor to plan for the transition and replication.
- The TFFR GPR Committee completed a full review of the TFFR Program Policy Manual. The recommended changes will be presented to the TFFR Board at the July 2023 meeting.
- RIO used the GovDelivery platform for the first time in May to deliver messages to all TFFR active members and employers. This system automates a more manual e-mail and messaging process employed up until it was implemented. The system also allows for metrics related to communications such as number of messages opened, number of users unsubscribing, etc.
- TFFR conducted a member survey of TFFR active members in May. The survey focused on the understanding of retirement and specifically the TFFR plan. The results were analyzed and presented to the board at the June board retreat.
- Pilot 3 of the pension administration project began in April of 2023. The pilot will be completed in July of 2023. Additionally, a cost savings of approximately $60,000 was achieved through avoiding the duplication of services provided for in the vendor contract which are already available as an agency under the unified NDIT plan.
- HB 1150 providing for an exemption from participation in TFFR for qualified military retirees and HB 1219 containing provisions for changes to the plan as recommended by the TFFR board both passed the legislature and were signed in to law.

BOARD ACTION REQUESTED: Board acceptance.

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **SIB**
FROM: **Jan Murtha, Executive Director**
DATE: **September 15, 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:

I. New Board & Committee Member Update

Board and committee members have been provided access to current onboarding materials. Sarah Mudder, Communications and Outreach Director, will be present following both the TFFR and SIB meetings in September to answer any questions regarding access to materials. The next in person onboarding meeting has been scheduled for Monday, October 30, 2023, at 1pm.

II. Retirements/Resignations/FTE's/Temporary Assistance:

Position Title*	Status
Sr. Investment Accountant	Position filled by internal candidate.
Investment Accountant (see above for vacancy)	Offer accepted. Anticipated start date Sept. '23
Fiscal/Investment Administrative Assistant	Position filled.
Retirement Accountant	Offer accepted. Anticipated start date Sept. '23
Retirement Program Specialist	Anticipated posting Sept. '23

*New FTEs granted by the 2023 Legislative Assembly. Remaining new FTEs related to the Internal Investment program are expected to be posted in 2nd Quarter 2024.

III. 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 continues to vary from 5 to 25 hours or more per week.
- **Northern Trust Initiative** – In an effort to enhance the infrastructure for the investment program the Investment and Fiscal teams continues to coordinate with Northern Trust for additional functionality/capabilities.
- **Annual Audit Activities** – Staff has been coordinating activities with CLA to complete external audit activities for this past fiscal year.
- **Audit Consultant Report:** Staff has created an Executive Steering committee comprised of the ED, CFO/COO, and IA Supervisor to oversee a project to implement recommendations from Weaver Consulting. Co-sourcing activities will be identified to pursue through a RFP process. A special

meeting of the Audit committee will be convened to approve any related RFP and subsequent vendor selection.

- **Compensation Study RFP:** An RFP for a Compensation Study was issued for consultant services necessary to prepare and present an incentive compensation plan for approval to the Board and develop compensation goals for agency positions. The ERCC issued an award in August and staff is currently finalizing contract negotiations with the successful bidder.
- **Benchmark Consultant RFP:** An RFP was issued for an independent third-party consultant to provide benchmarking services. These services are necessary for the creation of an internal investment program. No responses were received by the initial or extended RFP deadline. Staff proceeded under an agency procurement exception allowed in century code to reach out to potential vendors to procure these services. The Investment Committee interviewed potential vendors in August. The full SIB approved moving forward with consultant services at the August meeting. Staff and the vendor have started kick-off activities.
- **Investment Program Software Solutions:** Staff has identified the procurement activities necessary to facilitate the technology infrastructure necessary to move forward with internal investment management. The Investment Committee has reviewed and approved the corresponding procurement plan.

IV. Board & Committee Presentations August 26, 2023 through September 22, 2023

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

- **BND Interim Study Discussion – 8/28/23**
- **TFFR Board Special Meeting – 8/31/23**
- **Public Funds Forum – 9/7/23**
- **SIB Investment Committee – 9/8/23**
- **Cash Management Interim Study Discussion – 9/11/23**
- **SIB Securities Litigation Committee – 9/11/23**
- **SIB GPR Committee – 9/11/23**
- **NDPERS – 9/12/23**
- **NDRTA (Retired Teachers' Association) Conference – 9/13/23**
- **Sovereign Wealth Fund forum – 9/13/23**
- **Red Tape Reduction meeting – 9/15/23**
- **FargoDome Board meeting – 9/20/23**
- **Government Finance Committee (Legislature) – 9/20/23**
- **TFFR Board meeting – 9/21/23**
- **SIB meeting – 9/22/23**

V. Executive Director Education/Travel Activities

September 5-7, 2023, I attended a Public Funds Forum and spoke on a panel with other Executive Directors regarding fund governance. This organization collects and provides information and education on public pension plan administration and public sector institutional investor topics.

BOARD ACTION REQUESTED: Board acceptance.

Confidential materials will be send separately to Board member via secure link.

NORTH Dakota | Retirement & Investment
Be Legendary.

MEMORANDUM

TO: **TFFR Board of Trustees**
FROM: **Chad Roberts, DED/CRO**
DATE: **September 14, 2023**
RE: **September 2023 Board Reading Materials**

Summary

Enclosed are seven journal articles related to teacher pensions specifically. The articles are from a special issue of *Educational Researcher* in March of 2023 addressing the issue.

BOARD ACTION REQUESTED: Information only.

FEATURE ARTICLES

The Long-Term Solvency of Teacher Pension Plans: How We Got to Now and Prospects for Recovery

Andrew G. Biggs[1]

The COVID-related financial market decline and economic recession have raised new concerns regarding the financial sustainability of retirement plans for state and local government employees, the largest group of whom is public school teachers. Using data from the Public Plans Database and the National Income and Product Accounts, I analyze teacher pension plans over the 2001–2019 period, seeking to answer questions regarding teacher pensions' funded status, investment decisions and returns, adequacy of contributions, and generosity of benefits. These data show that teacher pension funding peaked at the beginning of the 2001–2019 period due to the tech bubble's inflation of asset values, but then it declined thereafter due to investment returns that significantly underperformed assumptions, failures by sponsoring governments to consistently make full contributions, and increases in the generosity of pension benefits. School districts will face substantial funding challenges in the post-COVID period, as investment losses are factored into contribution rates, government revenues available to make contributions shrink, and education funding from state governments comes under pressure. I outline several policy alternatives that policymakers may consider, but none would make restoring teacher pensions to full funding a painless process.

Keywords: administration; aging; career development; case studies; demography; descriptive analysis; economics of education; educational policy; educational reform; longitudinal studies; policy analysis

Introduction

The COVID-related economic and financial market downturn has raised questions regarding the financial sustainability of defined benefit (DB) pensions for state and local government employees, the largest group of whom is public school teachers. The onset of the COVID-19 pandemic led to rapid declines in financial markets, reducing assets available to pay teacher pension benefits. Even following the mid-2020 stock market recovery, most public pensions were likely to receive investment returns well below the 7%–8% rate they assume and upon which their financial health relies.

A longer-term effect of the COVID pandemic is a decline in state and local government tax revenues, which undermines these governments' ability to make their full actuarially determined pension contributions. Clemens and Veuger (2020) project that state government income and sales tax revenues will decline by 11.5% in 2020 relative to previously projected levels. This revenue loss, in conjunction with greater demands on state and local governments to fight COVID-19, puts in question these governments' ability to fully fund their employee retirement plans.

In this context, the larger policy questions surrounding retirement income provision for public school teachers have become more salient for elected officials. Using two unique data sets, I examine a range of questions regarding the funding, investment practices, and generosity of teacher retirement systems in the United States.

Most public school teachers, administrators, and staff participate in a traditional DB pension. In a DB pension, the participant is promised a guaranteed monthly benefit at retirement, generally based on a formula that factors in years of service and final salary. At retirement, most teachers receive benefits paid as

[1]American Enterprise Institute, Washington, DC

Educational Researcher, Vol. 52 No. 2, pp. 98–115
DOI: 10.3102/0013189X221093352

an annuity that lasts for life. The employer—in this case, the government—generally bears all risks related to investment returns, life expectancies, and other uncertain variables.

DB pensions stand in contrast to defined contribution (DC) retirement accounts, such as 401(k)s. DC plans are predominant in the private sector. Employers may provide a contribution to an employee's account, but the employee generally chooses the investments and bears the risk and reward of those choices.

Some public school teachers do not participate in Social Security; these teachers generally contribute more to their plans and receive higher benefits than teachers who also receive Social Security benefits. Similarly, although most teacher pensions provide cost-of-living adjustments to benefits after retirement, provisions differ from plan to plan.

Private-sector DB pensions are generally funded only by employers, but in the public sector, teacher pensions ordinarily are funded via a combination of employer and teacher contributions. Contributions are based on the assumed investment return for the pension's investments, such that if that investment return is realized every year and other actuarial assumptions also hold true, the contributions made in a given year will be sufficient to pay out all future benefits accrued by teachers in that year.

Importantly, however, the employer in general bears any direct financial risk for paying benefits. If the plan's assumed investment return or other assumptions prove inaccurate, the government is responsible for filling the unfunded liabilities that arise as a result. Generally, any unfunded liability is amortized (or paid off) over a period of 20 to 30 years. Currently, for a number of teacher plans, annual amortization payments exceed the contributions made by the plan to prefund benefits accruing to teachers in that year.

I begin by discussing the data used in this study. I then use those data to analyze a number of policy-relevant questions regarding teacher pensions. These include how the generosity of pension benefits has changed over time, how well teacher pension sponsors have fulfilled their obligation to make full annual contributions, how accurately teacher pensions have projected their investment returns, and how investment risk taking by teacher pensions has changed over time. I close with a discussion of policy options available to help teacher pension funding recover in coming years.

Data

In this study, I rely upon two main sources of data on teacher pension plans. The first source is the Public Plans Database (PPD), which is maintained by the Center for Retirement Research and has been used in dozens of studies authored by the center's researchers as well as outside scholars. For instance, Aubry and Crawford (2019) use the PPD data to analyze public-sector pensions' investment portfolios; Biggs (2015) uses the PPD to analyze public plans' financial recovery from the Great Recession; and Munnell et al. (2012) use PPD data to analyze how pension plan benefit formulas affect state and local governments' ability to retain employees.

Earlier work on teacher pension funding includes that of Barro and Buck (2010). However, that work relies upon a different data set that contains fewer years of data than the PPD and fewer variables of interest on teacher pension financing. I use PPD data on 31 teacher pension plans from 2001 through 2019.[1] The 31 plans are chosen based on the PPD's indicating that the plan is exclusive to teachers or is a larger plan in which teachers participate along with other public employees. Although the 31 plans chosen do not cover every teacher plan, the sample includes states with large numbers of teachers, including California, Texas, New York, Illinois, and New Jersey.[2]

One shortcoming of the PPD is that it does not contain data for every plan in every year from 2001 to 2019. For several plans, a number of years of data are missing. For that reason, my measures of trends tend to be medians rather than means. Moreover, no data set contains comprehensive public pensions data prior to 2001. Public-sector pensions are not covered by the federal Employee Retirement Income Security Act of 1973, meaning that there is no centralized collection of public pension financial disclosures in the way in which Form 5500 data for private-sector pensions may be analyzed.

A second shortcoming of the PPD is that its figures are as reported by teacher pensions in actuarial valuations, comprehensive annual financial reports, and other filings. These figures are calculated using standards promulgated by the Governmental Accounting Standards Board (GASB). Most notably, the GASB allows the present value of future pension benefit liabilities to be calculated by using a discount rate equal to the expected return on the pension's investments. Generally, this discount rate has been in the range of 7%–8%, based on the high proportion of risky assets held in teacher pension plans. Other figures, such as annual required contributions (ARCs) and funded ratios, are based on these present values.

Most economists and most of the rest of the pension world discount pension liabilities by using a lower bond yield to reflect the guaranteed nature of pension benefits. All other things equal, lower discount rates result in higher present values of plan liabilities and lower funded ratios. These in turn may trigger higher contributions, depending upon the funding policy of the plan. Most public-sector pensions, including teacher pension plans, strongly resist the use of these risk-adjusted discount rates and do not publish figures based on them. However, the Society of Actuaries (SOA) Blue Ribbon Panel on Public Pension Underfunding (2014) recommends that public pensions publish liability figures based upon risk-adjusted discount rates. More recently, a draft revision to the Actuarial Standards of Practices established by the Actuarial Standards Board (2020) would require public pension actuaries to publish liability figures calculated by using a lower, more risk-appropriate discount rate. However, for the moment, the most detailed data on teacher retirement system liabilities are calculated by using higher discount rates than most independent analysts believe are appropriate.

Other data measure pension liabilities by using interest rates more consistent with the risk of the benefits offered by teacher pension plans. The Bureau of Economic Analysis's National Income and Product Accounts (NIPA; 2020) and the Federal Reserve's Financial Accounts of the United States publish pension liability figures that are calculated by using a corporate bond yield as the discount rate. These figures are more consistent with economic theory and with how U.S. private-sector pensions and pensions in other countries measure their liabilities.

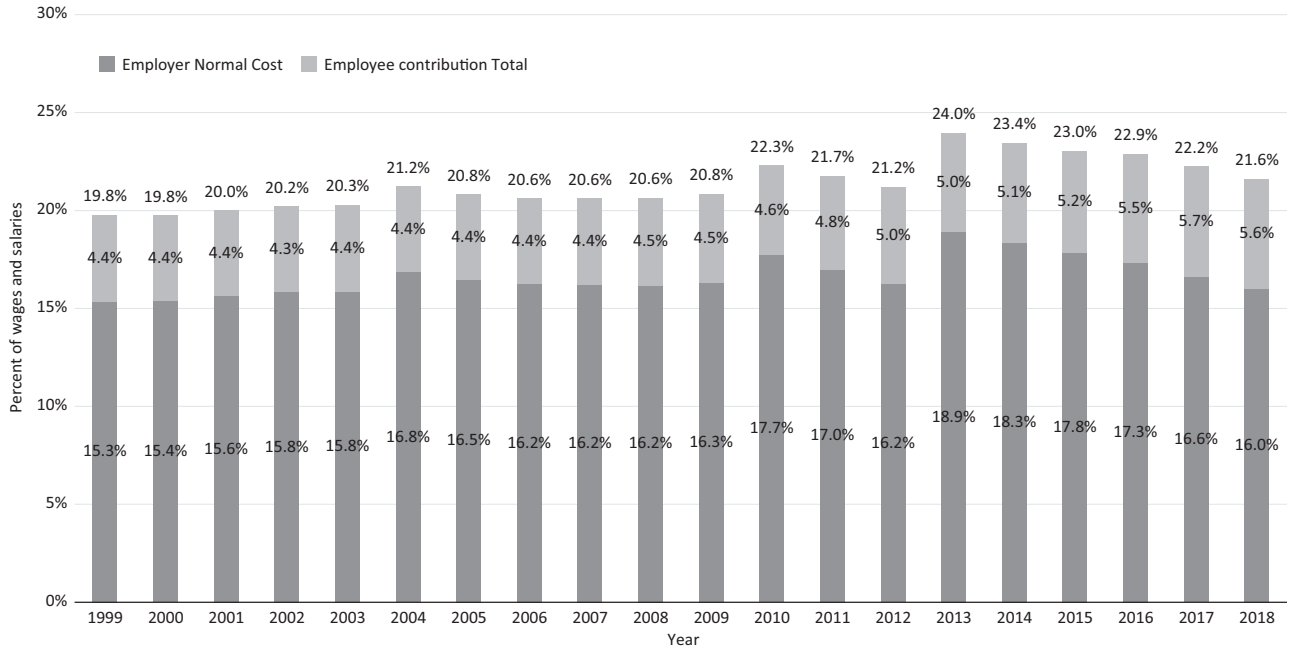


FIGURE 1. *Total normal cost of state and local government-defined benefit pensions, as percent of total state and local government wages and salaries.*

However, the NIPA and the Federal Reserve data are not available at the same level of detail as the PPD. Thus, although the NIPA and the Federal Reserve figures can be helpful in making broader points, much of the detailed analysis of teacher pension finances continues to rely upon the data found in the PPD.

Generosity of Benefits

A key cost component of any fringe benefit is its generosity. For DB pensions, the generosity of benefits is generally measured as the present value of the future benefits accrued by employees in a given year. This figure, called the "normal cost" of the pension, is often expressed as a percentage of employee wages.

Figure 1 presents data from the NIPA for the state and local government sectors, which include public education along with other functions of government. Unfortunately, it is not possible to break out teacher plans from other state and local DB systems, but the ability to illustrate trends over time should be helpful. Figure 1 shows the normal cost of new benefits accruing to employees in each year, represented as a percentage of employee wages in that year. In the NIPA, pension liabilities, including the normal cost of pensions, are calculated by using a corporate bond yield to discount future benefit amounts. Thus, changes in normal costs in the NIPA reflect not only changes to pension plan benefit formula parameters but also changes to the safe interest rate that pensions could receive via their investments.

Part of the normal cost of newly accruing benefits is funded via employee contributions, which the NIPA data show increased from an average of 4.4% to 5.6% of employee wages. The remainder of the normal cost is the responsibility of the employer. However, the employer's normal cost is distinct from the employer's total cash contribution, which should include the normal costs of new benefits earned and the cost of paying off unfunded liabilities from prior years. However, at times of fiscal distress, certain governments have failed to contribute enough even to fund the normal cost of new benefits. Thus, in any given year, actual cash contributions may be more or less than the employer's share of the cost of accruing benefits net of the employee contribution. The NIPA figures are based on the value of accruing benefits in a given year, not of government employers' actual cash contributions. The NIPA figures show the average employer's normal cost of state and local pension benefits rising from 15.3% to 16.0% of employee wages from 1999 through 2018. The total normal cost of newly accruing state and local pension benefits increases from 19.8% to 21.6% of employee wages from 1999 through 2018, a 9.4% relative increase in the generosity of state and local government pensions.

This increase in DB pension generosity is understated to the degree that a portion of state and local government employees shifted from DB pensions to DC retirement plans. For instance, certain teachers in Michigan and Alaska participate in DC retirement plans in addition to or instead of traditional DB pensions. The reason is that those employees' wages are still counted in the denominator of the calculation in Figure 1, but they receive employer contributions via their DC accounts rather than the normal cost of a DB pension. However, the available data do not allow for the easy quantification of state and local government employee wages not subject to DB pensions or state and local government contributions to DC plans, either of which would allow for a more accurate measurement of pension generosity over time.

The increase in the value of newly accruing state and local government pensions may be puzzling, given reports that many states have enacted pension reforms since the Great Recession that tend to reduce the value of public-sector pensions going forward. One reconciliation of these results is that 65% of the increase in the normal cost of state and local government pensions from 1999

Table 1
Statistics on New CalSTRS Retirees, by Fiscal Year

Fiscal year beginning	Average final salary	Average benefit	Average age at retirement	Replacement rate	Replacement per year of work	Average years of job tenure
1995	$74,274	$39,233	61.3	52.8%	1.99%	26.6
1996	$74,417	$39,102	60.9	52.5%	1.98%	26.6
1997	$75,561	$40,172	60.8	53.2%	1.98%	26.8
1998	$78,347	$46,687	61.2	59.6%	2.19%	27.2
1999	$79,694	$48,823	61.3	61.3%	2.29%	26.8
2000	$88,112	$58,454	61.2	66.3%	2.36%	28.1
2001	$92,539	$62,967	61.1	68.0%	2.40%	28.3
2002	$93,278	$62,309	61.2	66.8%	2.39%	27.9
2003	$92,825	$60,145	61.2	64.8%	2.39%	27.1
2004	$91,382	$57,559	61.7	63.0%	2.39%	26.3
2005	$90,872	$56,954	61.2	62.7%	2.41%	26.0
2006	$92,715	$59,069	61.5	63.7%	2.44%	26.1
2007	$93,840	$60,162	61.6	64.1%	2.44%	26.3
2008	$93,643	$60,573	61.9	64.7%	2.46%	26.3
2009	$93,784	$58,698	62.2	62.6%	2.45%	25.5
2010	$91,704	$55,432	62.3	60.4%	2.47%	24.5
2011	$88,207	$52,051	62.5	59.0%	2.49%	23.7
2012	$87,843	$51,649	62.6	58.8%	2.44%	24.1
2013	$86,740	$50,438	62.7	58.1%	2.44%	23.8
2014	$88,505	$52,272	63.0	59.1%	2.44%	24.2
2015	$92,299	$55,022	63.2	59.6%	2.43%	24.5
2016	$93,841	$55,791	63.3	59.5%	2.42%	24.6
2017	$94,687	$55,276	63.3	58.4%	2.40%	24.3
2018	$94,560	$54,564	63.3	57.7%	2.39%	24.1
Change number	$20,286	$15,331	2.00	4.9%	0.4%	–2.5
Change percent	27.3%	39.1%	3.3%	9.2%	20.6%	–9.4%

Source. CalSTRS Comprehensive Annual Financial Reports, various years.

through 2018 is offset via increases in employee contributions, with only one-third borne by government employers.

A second explanation for the broader increase in pension normal costs is the decline in the interest rates used by the Bureau of Economic Analysis in calculating pension figures for the NIPA. Pension present values in the NIPA, for state and local governments and for the private sector, are calculated by using a corporate bond yield, and such yields have fallen over the 1999–2018 period. A lower discount rate produces a higher present value of pension liabilities, including a higher normal cost of newly accruing benefits. This reflects the economic reality that it is more expensive to provide a guaranteed future cash payment when interest rates are low than when interest rates are high, and it is similarly more valuable to employees to receive a given guaranteed future cash payment in a low-interest rate environment.

A second approach to measuring the generosity of pension benefits is to calculate "replacement rates" for new retirees, where the replacement rate represents the value of initial pension benefits as a percentage of average earnings in the years immediately prior to retirement. No data set provides such figures on a comprehensive basis, but by gathering Comprehensive Annual Financial Reports for a single system over time—the California Teachers Retirement System, or CalSTRS—I am able to illustrate such changes over the period 1995–2018. The figures in Table 1 are for all new retiree benefit claimants in each year. The second column shows the average final salary of new retirees by year, in 2018 dollars adjusted for inflation by using the Personal Consumption Expenditure (PCE) deflator. Between 1995 and 2018, the average final salary of a CalSTRS participant increased by 27.3% above inflation, from $74,274 to $94,560. Column 3 shows initial CalSTRS retirement benefits by year, which rose 39.1% above inflation, from $39,233 to $54,564. The average age at retirement, in column 4, rose by 2.0 years, from 61.3 to 63.3. Column 5 shows the replacement rate, which divides the initial pension benefit in column 3 by average final earnings in column 2. Because CalSTRS benefits rose more quickly than the final salaries of newly retiring teachers, the replacement rate increased, from 52.8% of final salary in 1995 to 57.7% of final salary in 2018. Average replacement rates rose as high as 68.0% of salary in 2001, but new retirees in that year had on average 4.2 more years of service than retirees in 2018. To account for the changing number of years of service at retirement between 1995 and 2018, column 6 shows calculations of replacement of final earnings per year of employment, which is simply equal to the replacement rate in column 5 divided by the average number of years of service in column 7. Final salary

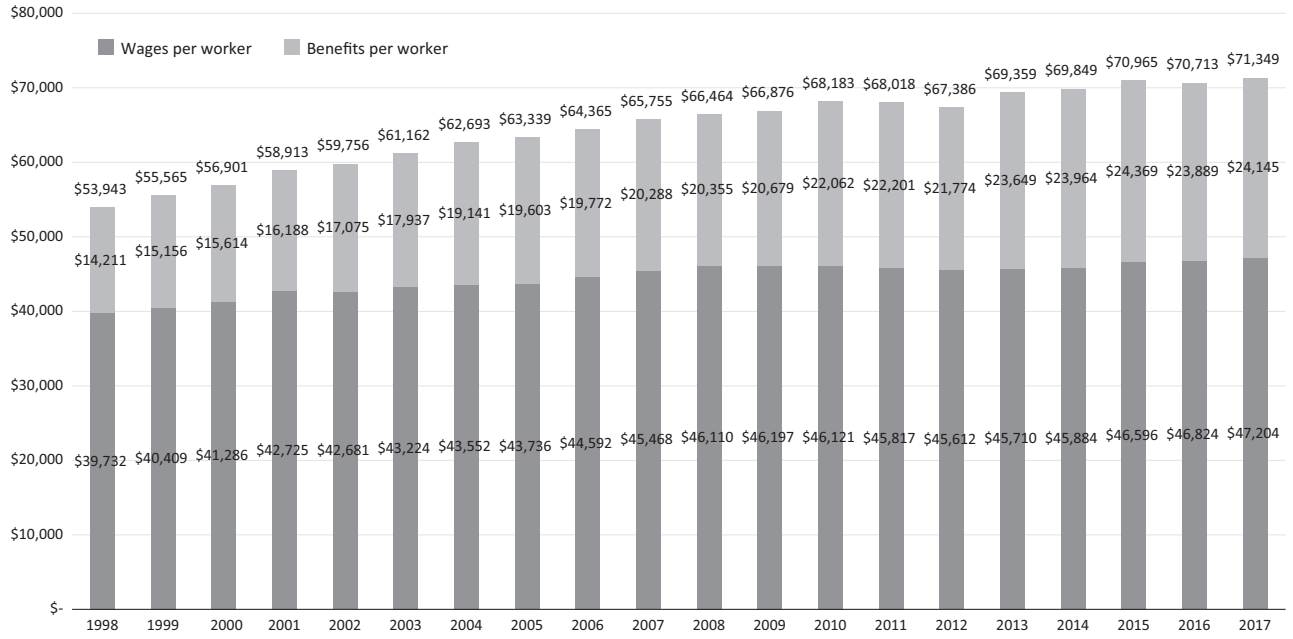


FIGURE 2. *Wages and benefits per worker, public education.*

replacement per year of service rose from 1.99% in 1999 to 2.39% in 2018, a 20.6% increase in the relative generosity of CalSTRS benefits. Over that same period, the CalSTRS employee contribution rate increased from 8.0% to 8.25% of salary, a 3.1% increase. Thus, over the 1999–2018 period, CalSTRS offered substantially greater benefits net of employee contributions.[3]

The growing generosity of teacher pensions has played a role in increasing the role that fringe benefits play in total teacher compensation. Figure 2 is based upon NIPA data for the state and local public-education sectors. Public school teachers are the largest occupational group in public education, although these figures include public school support staff and supervisors as well as state-run colleges and universities. In 1998, the per-employee value of all fringe benefits, including accruing pension benefits, was $14,211, making up 26% of total per-employee compensation of $53,945. (Figures are inflation-adjusted to 2017 using the PCE deflator.) By 2017, average annual benefits in public education had increased to $24,145, making up 32% of total compensation. Although concerns have been raised regarding the seemingly slow growth rate of teacher wages, increased benefits have boosted the increase of total compensation in public education. From 1998 through 2017, average annual wages in public education increased by 19% above inflation. However, combined with the 70% real growth of per-employee benefits, total compensation per public education employee rose by 32%. (These data are explored in greater detail in Biggs [2019a].)

Pension Finances

In this section, I analyze the finances of major teacher pension plans by using figures from the PPD for the years 2001–2019, although for certain plans, the annual data are incomplete. I examine plan funding on a present value and on a cash flow basis.

Table 2 shows plan funded ratios from 2001 through 2019, where available. Unlike the NIPA data cited above, these figures are calculated by using GASB accounting rules, where benefit liabilities are discounted by using the assumed rate of return on a risky portfolio of investments. For 2019, the median funded ratio was 70%. Due to the recent market downturn related to the COVID-19 virus, current funded ratios are likely several percentage points lower. By contrast, in 2001, the median funded ratio was 96%, and in 2007, it was 80%.

As pensions become more poorly funded, present-value figures, such as long-term liabilities, matter less, and cash flow–based figures matter more. Table 3 shows one common cash flow–based figure, which is the ratio of assets to annual benefit payments. This ratio is helpful in providing an approximate guide to the number of years the plan could pay benefits absent any employer contributions. A larger ratio of assets to benefit payments provides a greater cushion against investment downturns or a sponsor's temporary inability to make contributions.

Table 3 shows that although most teacher retirement systems are not in any imminent danger of exhausting their funds, the ratios of plan investments to annual benefit payments have declined significantly for most plans since 2001. In 2001, the median teacher pension plan had assets equal to 20.4 years of benefit payments. Immature plans with few retirees, such as DC Teachers and Washington Teachers Plan 2/3, had assets equal to 247 and 205 years of annual benefit payments, respectively. Underfunded plans, such as West Virginia Teachers, had only 4 years of benefits payable solely via assets on hand.

By 2019, the median teacher pension plan had assets equal to 11.4 years of benefit payments. While this is a near-halving of the assets-to-benefits ratio since 2001, the median teacher retirement plan could nevertheless make full payments for approximately a decade without any contributions from either employers or employees. Moreover, despite the decline in median assets-to-benefits ratios, the poorest

Table 2
Assets as a Percentage of Liabilities, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alabama Teachers	101%	97%	94%	90%	84%	83%	80%	78%	75%	71%	68%	67%	66%	68%	68%	68%	69%	70%	
Alaska Teachers	95%	68%	64%	63%	61%	68%	68%	70%	57%	54%	54%	50%	48%	55%	77%	76%	76%	76%	76%
Arkansas Teachers	95%	92%	86%	84%	80%	80%	85%	85%	76%	74%	72%	71%	73%	77%	80%	81%	79%	80%	80%
California Teachers	98%	90%	82%	83%	86%	87%	89%	87%	78%	71%	69%	67%	67%	69%	69%	64%	63%	64%	64%
Chicago Teachers	100%	96%	92%	86%	79%	78%	80%	79%	73%	67%	60%	54%	49%	52%	52%	52%	50%	48%	47%
Connecticut Teachers		76%	70%	65%	62%	60%	65%	70%	66%	61%	58%	55%	57%	59%	57%	56%	57%	58%	58%
DC Teachers						111%	112%	108%	111%	118%	102%	94%	90%	89%	89%	91%	93%	93%	91%
Georgia Teachers	104%	102%	101%	101%	98%	97%	95%	92%	90%	86%	84%	82%	81%	82%	79%	74%	74%	77%	77%
Illinois Teachers	60%	52%	49%	62%	61%	62%	64%	56%	52%	48%	47%	42%	41%	41%	42%	40%	40%	41%	41%
Indiana Teachers	43%	42%	44%	45%	43%	44%	45%	48%	42%	44%	44%	43%	46%	48%	46%	47%	48%	46%	48%
Kentucky Teachers	91%	87%	84%	81%	76%	73%	72%	68%	64%	61%	57%	55%	52%	54%	55%	55%	56%	58%	58%
Louisiana Teachers	78%	74%	69%	63%	65%	68%	71%	70%	59%	54%	55%	55%	56%	57%	61%	62%	65%	66%	67%
Maryland Teachers	95%	92%	93%	93%	89%	84%	81%	80%	66%	65%	66%	66%	67%	71%	72%	73%	74%	75%	76%
Massachusetts Teachers	79%	76%	65%	70%	68%	67%	71%	74%	58%	63%	66%	61%	56%	56%	54%	53%	52%	52%	52%
Minnesota Teachers	106%	105%	103%	100%	99%	92%	88%	82%	77%	78%	77%	73%	72%	74%	77%	76%	77%	77%	77%
Missouri Teachers	99%	95%	81%	82%	83%	83%	84%	83%	80%	78%	86%	82%	80%	83%	84%	85%	84%	84%	84%
Montana Teachers		87%	82%	77%	73%	76%	80%	80%	66%	65%	62%	59%	67%	65%	67%	69%	70%	68%	69%
New Jersey Teachers	108%	100%	93%	86%	79%	76%	75%	71%	64%	67%	63%	59%	57%	54%	51%	47%	42%	43%	
New York City Teachers	98%	94%	88%	81%	77%	72%	70%	65%	64%	59%	58%	58%	58%	58%	56%	59%	64%	64%	64%
New York State Teachers	125%	100%	99%	99%	99%	103%	104%	107%	103%	100%	97%	90%	88%	93%	94%	98%	98%	99%	99%
North Carolina Teachers and State Employees		112%	108%	108%	108%	107%	106%	105%	99%	96%	95%	94%	94%	95%	96%	93%	90%	88%	86%
North Dakota Teachers	96%	92%	85%	80%	75%	75%	79%	82%	78%	70%	66%	61%	59%	62%	62%	62%	64%	65%	66%
Ohio Teachers	91%	77%	74%	75%	73%	75%	82%	79%	60%	59%	59%	56%	66%	69%	69%	70%	75%	76%	76%
Oklahoma Teachers	51%	51%	54%	47%	50%	49%	53%	51%	50%	48%	57%	55%	57%	63%	67%	66%	70%	73%	72%
St. Paul Teachers	82%	79%	76%	72%	70%	69%	73%	75%	72%	68%	70%	62%	60%	62%	63%	63%	64%	64%	64%
Texas Teachers	103%	96%	95%	92%	87%	87%	89%	91%	83%	83%	83%	82%	81%	80%	80%	80%	81%	77%	76%
TN State and Teachers	100%	100%	100%	100%	100%	98%	96%	93%	91%	91%	92%	93%	93%	94%	95%	95%	93%	93%	
Vermont Teachers	89%	90%	90%	90%	91%	85%	85%	81%	65%	67%	64%	62%	61%	60%	59%	58%	53%	54%	54%
Washington Teachers Plan 2/3	197%	182%	164%	153%	134%	133%	130%	125%	118%	116%	113%	114%	105%	94%	92%	89%	91%	90%	90%
West Virginia Teachers	21%	19%	19%	22%	25%	32%	51%	50%	41%	47%	54%	53%	58%	66%	66%	65%	67%	70%	70%
Median	96%	92%	85%	82%	79%	77%	80%	80%	69%	67%	66%	61%	63%	66%	68%	67%	70%	70%	70%

Source. Public Plans Database.

Table 3
Ratio of Plan Investments to Annual Benefit Payments, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alabama Teachers	20.5	19.8	18.6	18.1	16.9	15.7	14.3	13.5	13.1	12.4	11.2	10.1	10.0	10.0	10.1	10.1	10.9	10.9	
Alaska Teachers	16.1	11.9	10.8	10.2	9.6	11.5	11.6	11.7	9.6	9.6	9.6	8.7	8.2	9.4	12.9	12.3	12.1	12.0	11.6
Arkansas Teachers	24.4	22.8	20.6	19.8	19.0	18.0	18.9	18.9	16.4	15.1	14.9	14.2	14.2	14.3	14.6	14.5	14.5	14.2	
California Teachers	26.3	23.3	21.3	19.9	19.3	19.2	20.1	19.3	16.5	14.6	13.9	13.2	12.8	13.0	13.0	12.7	12.7	12.8	12.2
Chicago Teachers	20.3	18.4	18.4	16.8	15.3	14.4	13.9	12.9	11.8	10.7	9.3	8.0	7.4	7.6	7.7	7.6	7.6	7.5	
Connecticut Teachers	-	13.6	12.3	11.2	10.3	9.6	10.9	11.9	10.6	10.1	9.5	8.9	8.9	8.9	8.8	8.8	8.8	9.0	8.7
DC Teachers	247.4	179.8	151.0	104.7	47.9	49.6	49.9	43.1	35.1	36.3	31.8	28.0	18.8	23.6	23.3	23.1	23.9	24.0	
Georgia Teachers	31.6	30.2	28.4	26.9	25.1	23.9	22.1	19.2	20.5	19.0	17.7	16.7	16.0	16.1	16.0	15.8	15.6	15.7	14.9
Illinois Teachers	14.4	12.3	11.2	13.6	13.1	12.4	13.2	11.0	10.2	9.3	8.7	8.1	7.6	7.9	8.0	7.9	7.7	7.9	7.8
Indiana Teachers	9.7	10.1	10.4	10.1	9.5	9.6	9.2	9.3	8.4	8.5	7.1	6.9	7.3	7.6	7.2	7.6	8.0	6.5	7.4
Kentucky Teachers	19.3	18.0	16.6	15.8	14.9	14.1	13.5	12.8	11.7	11.0	10.4	9.7	9.3	9.6	9.7	9.4	9.5	9.5	9.4
Louisiana Teachers	13.5	12.6	11.4	10.2	10.2	10.4	10.9	10.8	8.9	8.1	7.9	7.8	7.8	8.3	8.6	8.8	9.0	9.2	9.5
Maryland Teachers	23.5	22.1	21.1	20.5	19.7	19.1	18.9	18.3	14.2	14.0	14.0	13.5	13.4	13.9	14.2	14.0	14.3	14.4	14.3
Massachusetts Teachers	18.4	16.9	13.9	13.9	12.9	11.7	12.2	12.2	9.3	9.3	9.9	9.1	8.5	8.5	8.4	8.3	8.3	8.5	8.4
Minnesota Teachers	18.9	18.0	17.4	17.0	16.6	15.2	14.5	13.5	12.6	12.0	11.5	11.1	10.9	11.3	11.9	11.6	11.8	11.9	11.9
Missouri Teachers	26.8	24.8	20.8	20.2	19.3	19.0	18.9	18.5	16.9	16.2	15.4	14.4	13.9	14.2	14.6	14.5	14.8	15.0	14.9
Montana Teachers	-	18.8	17.5	16.4	15.7	16.1	16.6	16.3	13.5	13.1	11.9	11.0	11.1	11.6	11.6	11.6	11.6	11.3	11.2
New Jersey Teachers	26.0	22.4	19.7	18.0	16.5	15.6	14.7	13.4	11.9	10.8	9.5	8.7	8.2	7.5	7.0	6.5	6.1	5.9	
New York City Teachers	18.1	15.4	13.4	12.5	10.4	9.6	9.4	8.4	8.0	7.8	7.7	7.5	7.5	9.7	9.6	7.4	7.7	7.4	7.1
New York State Teachers	29.6	21.9	19.6	18.1	17.7	17.5	17.5	17.7	17.0	16.4	15.1	13.9	13.4	14.1	15.1	15.8	16.2	16.4	16.0
North Carolina Teachers and State Employees	-	22.1	20.5	19.8	19.3	18.9	18.6	18.5	17.4	17.0	16.6	16.0	15.7	15.6	15.4	15.2	14.8	14.9	14.6
North Dakota Teachers	22.8	20.2	19.2	17.1	16.5	16.3	16.7	16.8	16.1	14.3	13.8	12.5	11.7	11.8	12.2	11.9	12.0	12.0	11.8
Ohio Teachers	20.5	17.5	16.3	16.0	15.1	15.0	15.9	15.3	11.5	11.0	10.6	10.0	9.8	9.9	9.9	9.5	10.0	10.0	10.2
Oklahoma Teachers	9.8	10.1	9.4	9.5	9.3	9.5	10.2	10.6	9.9	10.1	9.8	9.5	9.6	10.2	10.9	11.1	11.3	11.6	11.6
St. Paul Teachers	15.9	15.0	13.9	13.0	12.2	11.7	12.0	11.9	11.2	10.3	9.8	8.8	8.4	8.8	9.0	9.0	9.1	9.1	9.2
Texas Teachers	22.1	18.8	17.9	15.5	15.8	16.0	16.9	16.3	16.0	16.0	15.1	14.4	14.2	14.1	14.1	14.0	14.2	14.3	13.5
TN State and Teachers	30.6	29.5	28.3	27.1	26.0	25.1	24.2	22.4	20.7	21.1	20.9	20.1	19.1	18.6	18.1	17.7	17.6	17.5	
Vermont Teachers	22.8	21.8	20.4	19.6	18.5	17.6	17.1	16.1	12.5	12.1	11.5	10.7	10.0	9.6	10.8	10.4	10.2	10.1	10.0
Washington Teachers Plan 2/3	204.9	211.2	214.1	204.7	179.8	169.7	151.8	27.0	115.2	104.9	90.3	79.0	68.2	58.7	51.9	47.0	45.0	43.0	33.7
West Virginia Teachers	4.2	3.9	4.0	4.4	4.6	5.7	8.9	9.4	7.5	8.2	9.3	8.7	9.1	9.8	9.4	9.1	9.1	9.1	8.9
Median	20.4	18.8	18.2	16.9	16.1	15.7	15.3	14.4	12.6	12.1	11.3	10.4	10.0	10.1	11.3	11.3	11.4	11.5	11.4

Source. Public Plans Database.

Table 4
Annual Employer Pension Contributions as Percentage of ARC

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
Alabama Teachers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		100%
Alaska Teachers	114%	155%	133%	83%	45%	54%	62%	106%	139%	79%	85%	85%	90%	103%	528%	34%	115%	105%	107%	117%
Arkansas Teachers	102%	102%	103%	102%	117%	109%	103%	102%	104%	107%	96%	90%	89%	83%	86%	94%	98%	101%		99%
California Teachers	123%	90%	91%	62%	74%	69%	71%	80%	67%	60%	52%	51%	49%	51%	53%	69%	84%	80%	102%	72%
Chicago Teachers	41%	43%	49%	38%	29%	36%	33%	57%	68%	82%	33%	27%	24%	81%	88%	85%	99%	92%		56%
Connecticut Teachers	85%	97%	81%	69%	66%	100%	97%	486%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	115%
DC Teachers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		100%
Georgia Teachers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Illinois Teachers	71%	74%	68%	64%	59%	36%	40%	60%	76%	91%	85%	75%	80%	88%	85%	85%	66%	59%		70%
Indiana Teachers	126%	105%	105%	69%	78%	104%	101%	101%	104%	93%	87%	91%	115%	97%	103%	103%	103%	102%	114%	100%
Kentucky Teachers	100%	100%	100%	100%	93%	87%	88%	83%	74%	76%	153%	74%	71%	68%	61%	57%	99%	97%	100%	88%
Louisiana Teachers	110%	105%	98%	94%	106%	103%	107%	116%	106%	84%	90%	100%	99%	103%	108%	105%	101%	105%	105%	102%
Maryland Teachers	100%	100%	100%	95%	96%	91%	85%	94%	89%	92%	75%	71%	78%	74%	89%	97%	100%	100%	100%	91%
Massachusetts Teachers	113%	100%	64%	59%	97%	93%	98%	108%	68%	62%	111%	90%	81%	81%	100%	100%	100%	100%	100%	91%
Minnesota Teachers	180%	194%	220%	160%	153%	150%	91%	83%	68%	57%	63%	66%	63%	61%	69%	77%	71%	73%	85%	104%
Missouri Teachers	100%	100%	95%	76%	66%	71%	73%	79%	84%	81%	87%	93%	125%	106%	99%	104%	107%	131%	113%	94%
Montana Teachers	100%	100%	100%	100%	100%	223%	117%	100%	100%	98%	98%	82%	70%	100%	100%	100%	100%	100%	100%	105%
New Jersey Teachers	100%	100%	0%	0%	0%	8%	49%	45%	6%	2%	1%	14%	28%	18%	23%	30%	40%	50%		29%
New York City Teachers	78%	84%	79%	91%	94%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	96%
New York State Teachers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	100%	100%	100%	100%	100%
North Carolina Teachers and State Employees			100%	100%	100%	100%	100%	100%	99%	100%	100%	73%	104%	100%	100%	105%	100%	102%	100%	99%
North Dakota Teachers	100%	100%	100%	87%	68%	64%	63%	76%	89%	77%	68%	67%	113%	105%	110%	98%	96%	98%	99%	88%
Ohio Teachers	100%	100%	100%	95%	96%	88%	83%	100%	89%	52%	51%	41%	47%	91%	106%	125%	144%	148%	148%	95%
Oklahoma Teachers	73%	66%	62%	70%	56%	86%	93%	101%	87%	84%	78%	116%	113%	117%	132%	100%	101%	107%	108%	92%
St. Paul Teachers	115%	139%	98%	77%	69%	59%	56%	58%	86%	83%	74%	84%	64%	86%	91%	95%	98%	103%	126%	87%
Texas Teachers	100%	105%	84%	81%	82%	83%	85%	102%	108%	86%	86%	74%	74%	79%	94%	98%	98%	99%	82%	89%
TN State and Teachers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Vermont Teachers	91%	92%	72%	59%	51%	43%	99%	99%	94%	101%	104%	110%	108%	106%	100%	101%	100%	130%	113%	93%
Washington Teachers Plan 2/3	172%	70%	23%	31%	29%	45%	61%	52%	86%	75%	72%	92%	99%	98%	99%	83%	88%	92%	94%	77%
West Virginia Teachers	107%	103%	99%	99%	106%	190%	454%	108%	94%	91%	106%	105%	101%	113%	108%	110%	109%	106%	111%	127%
Median	100%	100%	99%	89%	94%	92%	95%	100%	94%	88%	89%	90%	99%	100%	100%	100%	100%	100%	100%	

Source. Public Plans Database.

funded plans improved their standing: West Virginia Teachers went from having only 4 years of assets on hand to nearly 9 years. The poorest funded plans by this measure were New Jersey Teachers, which as of 2018 had only 5.9 years of benefits payable by assets alone, and New York City Teachers, which in 2019 has an assets-to-benefits ratio of 7.1.

The COVID-19 market downturn put an immediate dent into public pensions' funding, and the following decline in state income and sales tax revenues may make it impossible for sponsors to make their full pension contributions in 2020 or even beyond. These outcomes are worrying. However, most teacher pensions appear to have sufficient assets on hand to weather the immediate storm, even if significant make-up contributions or other reforms may be necessary to stabilize these plans' finances once the COVID-19 pandemic has been addressed.

Contributions, Investments, and Investment Returns

The ARC is an actuarially determined amount that, when combined with employee contributions, will fund the normal cost of newly accruing benefits in that year plus an amortization payment to pay down unfunded liabilities over a stated period, provided that the plan receives its assumed investment return in an future years. Although each plan has discretion over its ARC based on its chosen investment return assumption and the period and path of amortization payments, it is often considered fiscally irresponsible for a pension plan to set an ARC and not have that payment met by its sponsor. In more recent years, the actuarial terminology has shifted to the "ADC," which represents the actuarially *determined* contribution. For clarity, I use the acronym *ARC* throughout, but readers should be aware that they may encounter the acronym *ADC* in other contexts and that it is, in most respects, identical to the ARC.

A plan sponsor's commitment to funding its teacher retirement plan is an extremely important component of the plan's ongoing financial health. Teacher pensions differ substantially in the degree to which annual ARCs have been paid by the plan's sponsor. Biggs (2014) shows that the chance of a public pension becoming insolvent is extremely low, so long as the plan's sponsor contributes the full ARC each year, regardless of how high the ARC may rise. However, when a pension sponsor fails to contribute the full ARC, insolvency becomes a more significant risk. Table 4 shows the percentage of plan ARCs that was actually paid in each year. Roughly half of teacher plans received precisely 100% of their ARCs in each year from 2001 through 2018 or 2019, depending on data availability. Other plans received an average annual payment equal to approximately 100% of the ARC, but payments varied from year to year. For instance, Oklahoma Teachers never received its full ARC from 2001 through 2007, but it generally received amounts significantly greater than the ARC in subsequent years. Kentucky Teachers showed an opposite pattern, with full payment of the ARC early in the measurement period but lagging payments in following years. Finally, certain teacher plans have had highly problematic funding patterns. New Jersey Teachers, for instance, received no ARC payment in a number of years, and over the 2001–2018 period, it received an average of just 17% of its ARC. Chicago Teachers received an average of just 56% of its ARC. CalSTRS received 72% of its ARC from 2001 to 2019.

That said, plans faced different levels of required contributions. Table 5 shows ARCs as a percentage of employee payroll by plan and year. Average ARCs over the 2001–2019 period ranged from a low of 4% of wages for DC Teachers, an immature plan, to 33% of wages for Illinois Teachers, a plan that is mature and chronically underfunded. The median plan had an average ARC over the period of 14% of employee pay.

For all but one plan, Ohio Teachers, ARCs grew since 2001, with substantial increases being the norm. In 2001, the median teacher plan had an ARC of 10% of payroll, rising to 17% of employee wages in 2019. The largest increase was for Illinois Teachers, where the ARC grew by 53% of wages, from 17% of pay in 2001 to 70% of pay in 2018. While nearly all teacher plans faced meaningful increases in ARCs, half of the plans kept cost increases to less than 10% of payroll, while seven of the 31 plans experienced cost increases of 21% of payroll or more. Once again, this illustrates that teacher retirement systems are not a homogenous group.

Investment Returns

ARCs to teacher pension plans are calculated based upon an assumed investment return on those contributions. Even payment of the full ARC will result in an underfunded plan if investment returns fall short of the assumed rate. In 2001, the median teacher plan assumed a future nominal investment return of 8.0%, with individual plan assumptions ranging from a low of 7.3% to a high of 8.8%. (See Table 6.) Public pensions in general were often criticized in the years that followed for assuming unrealistically optimistic investment returns. By 2019, the range of nominal assumed investment returns among teacher pensions had declined to 6.5%–8.0%, with a median assumed return of 7.5%, a move that seemingly vindicated and addressed the criticisms. However, the median rate of inflation assumed by teacher pensions declined by a full percentage point from 2001 through 2019, implying that assumed real rates of investment return increased over this period, despite declining interest rates on safe investments. For the majority of teacher plans that offer inflation adjustments to benefits after retirement, the real rate of return on plan investments may be more material to plan-funding health than the nominal investment assumption.

It also is worth comparing the rates of investment return assumed by teacher pensions in 2001 to the returns that teacher plans received in the period since then. For each plan, the right-hand columns in Table 7 list the geometric mean return received, drawn from the previous Table 6, and the difference between that realized return and the return assumed by the plan in 2001. This comparison is meaningful because the duration of public-pension liabilities is approximately equal to the 18 years between 2001 and 2019.[4] The median teacher plan received an average investment return from 2001 through 2019 that was 1.4 percentage points below the future return it had assumed in 2001. The smallest gap between assumed and actual returns was –0.2% (Oklahoma Teachers), while the largest gap was for New Jersey Teachers, which assumed 8.8% future returns in 2001 but received only 5.8% from 2001 through 2018. As a shorthand,

Table 5
ARC as Percentage of Employee Payroll

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alabama Teachers	7%	6%	5%	6%	7%	8%	9%	12%	12%	13%	13%	10%	10%	11%	12%	12%	12%	12%	
Alaska Teachers	9%	6%	7%	13%	27%	30%	31%	25%	17%	30%	29%	41%	47%	47%	66%	76%	30%	34%	39%
Arkansas Teachers	11%	11%	12%	13%	12%	14%	15%	15%	15%	15%	15%	16%	17%	17%	17%	16%	15%	15%	
California Teachers	9%	12%	11%	18%	19%	19%	18%	18%	19%	21%	25%	26%	27%	26%	28%	26%	26%	30%	30%
Chicago Teachers	11%	10%	9%	11%	13%	17%	17%	15%	15%	17%	21%	23%	26%	32%	32%	33%	35%	40%	
Connecticut Teachers		8%	8%	9%	9%	13%	13%	15%	15%	15%	16%	21%	21%	25%	25%	25%	25%	31%	31%
DC Teachers	2%	0%	0%	1%	3%	5%	4%	2%	0%	0%	0%	0%	2%	8%	9%	10%	13%	13%	
Georgia Teachers	11%	9%	9%	10%	10%	10%	10%	10%	10%	10%	11%	11%	12%	13%	14%	15%	15%	17%	21%
Illinois Teachers	17%	17%	20%	24%	22%	22%	25%	23%	24%	27%	30%	37%	38%	43%	42%	47%	63%	70%	
Indiana Teachers	16%	15%	16%	17%	17%	18%	17%	18%	19%	22%	25%	25%	25%	25%	26%	27%	27%	29%	29%
Kentucky Teachers	12%	12%	13%	14%	14%	14%	17%	18%	18%	19%	20%	22%	23%	24%	26%	28%	30%	30%	31%
Louisiana Teachers	16%	15%	16%	17%	18%	19%	18%	17%	18%	23%	28%	30%	31%	32%	32%	30%	30%	31%	31%
Maryland Teachers	10%	9%	10%	10%	9%	9%	10%	11%	12%	14%	20%	21%	20%	22%	18%	17%	17%	16%	16%
Massachusetts Teachers	12%	10%	15%	13%	15%	16%	15%	15%	14%	20%	14%	17%	19%	19%	16%	18%	19%	19%	20%
Minnesota Teachers	3%	3%	2%	3%	3%	4%	7%	8%	9%	11%	10%	10%	12%	12%	11%	10%	11%	11%	9%
Missouri Teachers	11%	11%	11%	14%	17%	16%	16%	16%	15%	16%	16%	15%	11%	14%	15%	14%	14%	11%	13%
Montana Teachers		8%	8%	8%	8%	10%	14%	12%	12%	12%	12%	15%	18%	20%	17%	17%	17%	17%	17%
New Jersey Teachers	0%	0%	2%	8%	10%	13%	15%	15%	15%	17%	20%	22%	22%	21%	22%	24%	25%	28%	
New York City Teachers	11%	11%	14%	16%	21%	19%	22%	24%	28%	31%	31%	33%	35%	36%	37%	40%	39%	42%	42%
New York State Teachers	1%	0%	2%	3%	6%	8%	8%	9%	8%	6%	9%	11%	12%	16%	18%	13%	12%	10%	10%
North Carolina Teachers and State Employees		0%	2%	0%	0%	2%	2%	3%	3%	4%	4%	7%	8%	9%	10%	9%	11%	11%	13%
North Dakota Teachers	8%	8%	8%	9%	12%	12%	13%	11%	10%	11%	13%	14%	10%	11%	12%	14%	14%	14%	13%
Ohio Teachers	9%	9%	13%	13%	13%	14%	15%	13%	14%	24%	24%	30%	27%	14%	13%	11%	9%	9%	9%
Oklahoma Teachers	15%	18%	19%	18%	23%	16%	16%	16%	19%	19%	22%	15%	16%	15%	13%	17%	17%	17%	17%
St. Paul Teachers	10%	9%	12%	14%	16%	18%	19%	18%	12%	13%	14%	12%	17%	16%	15%	15%	15%	15%	14%
Texas Teachers	5%	5%	7%	7%	7%	7%	7%	6%	6%	7%	7%	8%	8%	8%	8%	8%	8%	8%	9%
TN State and Teachers	5%	5%	6%	5%	9%	9%	10%	10%	10%	10%	12%	12%	12%	12%	12%	12%	12%	13%	
Vermont Teachers	5%	5%	6%	9%	10%	11%	8%	8%	7%	7%	9%	9%	11%	12%	13%	13%	14%	14%	17%
Washington Teachers Plan 2/3	2%	3%	3%	3%	4%	5%	5%	6%	5%	6%	6%	6%	5%	6%	6%	8%	8%	8%	8%
West Virginia Teachers	27%	30%	35%	42%	45%	46%	39%	25%	27%	33%	31%	30%	32%	31%	28%	24%	26%	29%	31%
Median	10%	9%	9%	11%	12%	13%	15%	15%	14%	15%	16%	16%	17%	17%	17%	16%	16%	16%	17%

Source. Public Plans Database.

Table 6
Assumed Investment Returns, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alabama Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.8%	7.7%	
Alaska Teachers	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.4%	7.4%
Arkansas Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.5%	7.5%	7.5%
California Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.0%	7.0%
Chicago Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.8%	7.8%	7.8%	7.8%	7.0%	7.0%
Connecticut Teachers		8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.3%	8.0%	8.0%
DC Teachers	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.5%	7.0%	7.0%	7.0%	7.0%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
Georgia Teachers	7.3%	7.3%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.3%	7.3%
Illinois Teachers	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.0%	8.0%	7.5%	7.5%	7.0%	7.0%	7.0%	7.0%
Indiana Teachers	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.0%	7.0%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Kentucky Teachers	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Louisiana Teachers	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.0%	7.8%	7.8%	7.8%	7.7%	7.7%	7.6%
Maryland Teachers	8.0%	8.0%	8.0%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.7%	7.7%	7.6%	7.6%	7.5%	7.5%	7.4%
Massachusetts Teachers	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.0%	8.0%	7.8%	7.5%	7.5%	7.4%	7.3%
Minnesota Teachers				7.0%	7.0%	6.9%	6.9%	7.1%	7.1%	7.2%	6.7%	6.7%	6.7%	8.4%	8.4%	8.4%	8.5%	7.5%	7.5%
Missouri Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.6%	7.5%	7.5%
Montana Teachers	8.0%	8.0%	8.0%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.5%	7.5%
New Jersey Teachers	8.8%	8.8%	8.8%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.0%	7.9%	7.9%	7.9%	7.9%	7.7%	7.5%	7.5%	
New York City Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
New York State Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.5%	7.5%	7.5%	7.3%	7.3%
North Carolina Teachers and State Employees		7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.2%	7.0%	7.0%
North Dakota Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.8%	7.8%	7.8%	7.8%
Ohio Teachers	7.8%	7.8%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.8%	7.8%	7.8%	7.8%	7.5%	7.5%	7.5%
Oklahoma Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.5%	7.5%	7.5%	7.5%
St. Paul Teachers	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.5%	7.5%
Texas Teachers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.3%	7.3%
TN State and Teachers	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.3%	
Vermont Teachers	8.5%	8.5%	8.0%	8.0%	8.0%	8.3%	8.3%	8.3%	8.5%	8.3%	8.5%	8.5%	8.5%	8.5%	8.0%	8.0%	7.5%	7.5%	7.5%
Washington Teachers Plan 2/3	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.9%	7.8%	7.8%	7.7%	7.7%	7.5%	7.5%	7.5%
West Virginia Teachers	8.0%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Median	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.8%	7.8%	7.7%	7.5%	7.5%	7.5%

Source. Public Plans Database.

Table 7
Actual Annual Investment Returns, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Geometric mean return	Assumed return, 2001	Delta
Alabama Teachers	–6%	–8%	16%	11%	11%	9%	17%	–15%	–8%	8%	2%	18%	15%	12%	1%	10%	12%	9%		6.4%	8.0%	–1.6%
Alaska Teachers	–5%	–5%	4%	15%	9%	12%	19%	–3%	–21%	12%	21%	1%	13%	18%	3%	0%	13%	10%	6%	6.4%	8.3%	–1.9%
Arkansas Teachers	–3%	–6%	2%	18%	9%	12%	19%	–4%	–18%	14%	22%	–1%	14%	19%	5%	–1%	16%	12%		7.2%	8.0%	–0.8%
California Teachers	–9%	–6%	3%	17%	11%	13%	21%	–4%	–25%	12%	23%	2%	14%	19%	5%	1%	13%	9%	7%	6.7%	8.0%	–1.3%
Chicago Teachers	–1%	–3%	4%	15%	11%	11%	18%	–5%	–22%	13%	25%	1%	13%	18%	4%	1%	14%	9%		6.8%	8.0%	–1.2%
Connecticut Teachers	–4%	–6%	2%	15%	10%	11%	17%	–5%	–17%	13%	21%	–1%	12%	16%	3%	0%	14%	7%	6%	6.0%		
DC Teachers	–12%	–8%	16%	12%	14%	10%	17%	–17%	–2%	10%	3%	15%	11%	8%	–4%	9%	13%	5%		5.7%	7.3%	–1.6%
Georgia Teachers	–5%	–4%	5%	10%	8%	6%	15%	–3%	–13%	11%	21%	2%	13%	17%	4%	1%	13%	9%	7%	6.1%	7.3%	–1.2%
Illinois Teachers	–4%	–3%	5%	17%	11%	12%	19%	–5%	–23%	13%	24%	1%	13%	17%	4%	0%	13%	9%	5%	6.6%	8.5%	–1.9%
Indiana Teachers	1%	–4%	5%	15%	9%	11%	18%	–6%	–18%	14%	18%	1%	6%	14%	0%	1%	8%	9%	7%	5.8%	7.5%	–1.7%
Kentucky Teachers	–1%	–4%	5%	10%	8%	5%	15%	–6%	–14%	13%	22%	2%	14%	18%	5%	–1%	15%	11%	6%	6.5%	7.5%	–1.0%
Louisiana Teachers	–4%	–8%	3%	18%	11%	14%	20%	–5%	–22%	13%	27%	0%	14%	20%	3%	2%	17%	12%	7%	7.4%	8.3%	–0.9%
Maryland Teachers	–9%	–8%	3%	16%	10%	10%	18%	–5%	–20%	14%	20%	0%	11%	14%	3%	1%	10%	8%	6%	5.4%	8.0%	–2.6%
Massachusetts Teachers	–7%	–6%	4%	19%	13%	15%	20%	–2%	–24%	13%	22%	0%	13%	18%	4%	2%	13%	10%	6%	7.1%	8.3%	–1.2%
Minnesota Teachers	–7%	–8%	2%	17%	11%	12%	18%	–5%	–19%	15%	23%	2%	14%	19%	4%	0%	15%	10%	7%	6.9%		
Missouri Teachers	–2%	–3%	5%	12%	9%	10%	17%	–5%	–19%	13%	22%	2%	13%	17%	5%	2%	13%	9%	7%	6.6%	8.0%	–1.4%
Montana Teachers	–5%	–7%	6%	14%	8%	9%	18%	–5%	–21%	13%	22%	2%	13%	17%	5%	2%	12%	9%	6%	6.2%	8.0%	–1.8%
New Jersey Teachers	–10%	–9%	3%	14%	9%	10%	17%	–3%	–14%	13%	18%	3%	12%	17%	4%	–1%	13%	9%		5.8%	8.8%	–2.9%
New York City Teachers	–8%	–8%	4%	16%	11%	10%	17%	–6%	–18%	14%	23%	2%	12%	18%	3%	2%	13%	8%	8%	6.3%	8.0%	–1.7%
New York State Teachers	–6%	–7%	4%	16%	11%	12%	19%	–6%	–21%	12%	23%	3%	14%	18%	5%	2%	13%	9%	7%	6.8%	8.0%	–1.2%
North Carolina Teachers and State Employees	–2%	–4%	8%	12%	10%	7%	15%	–2%	–14%	12%	18%	2%	10%	16%	2%	1%	11%	7%	7%	6.1%		
North Dakota Teachers	–7%	–9%	2%	19%	13%	15%	20%	–8%	–27%	14%	24%	–1%	14%	17%	4%	0%	13%	9%	6%	6.2%	8.0%	–1.8%
Ohio Teachers	–2%	–8%	2%	18%	12%	14%	21%	–5%	–22%	14%	23%	2%	14%	17%	5%	1%	14%	10%	7%	7.1%	7.8%	–0.6%
Oklahoma Teachers	–2%	–5%	5%	21%	10%	10%	19%	–7%	–16%	17%	24%	2%	18%	22%	4%	–2%	15%	10%	5%	7.8%	8.0%	–0.2%
St. Paul Teachers	–2%	–4%	3%	20%	12%	13%	20%	–7%	–19%	13%	25%	0%	14%	19%	3%	0%	14%	10%	6%	7.3%	8.5%	–1.2%
Texas Teachers	–5%	–6%	5%	16%	10%	10%	18%	–2%	–22%	16%	22%	3%	10%	16%	4%	1%	13%	9%	6%	6.5%	8.0%	–1.5%
TN State and Teachers	–2%	–2%	5%	9%	7%	7%	13%	–1%	–15%	10%	20%	6%	10%	17%	3%	3%	11%	8%	8%	6.2%	7.5%	–1.3%
Vermont Teachers	–2%	–5%	6%	16%	10%	10%	17%	–7%	–20%	18%	21%	2%	9%	14%	2%	1%	10%	7%	6%	6.1%	8.5%	–2.4%
Washington Teachers Plan 2/3	–6%	–6%	4%	16%	13%	17%	21%	–1%	–23%	13%	21%	1%	12%	17%	5%	3%	13%	10%	8%	7.4%	8.0%	–0.6%
West Virginia Teachers	0%	–3%	5%	15%	11%	10%	17%	–8%	–16%	15%	21%	1%	13%	18%	4%	0%	16%	10%	6%	7.0%	8.0%	–1.0%
Median	–5%	–6%	4%	16%	11%	11%	18%	–5%	–19%	13%	22%	2%	13%	17%	4%	1%	13%	9%	6%	6.5%	8.0%	–1.5%

Source. Public Plans Database.

pension liabilities tend to increase by about one-fifth for each percentage-point change in the discount rate applied to those liabilities. This implies that for many teacher pensions, overoptimism regarding future investment returns in 2001 played a meaningful role in the unfunded liabilities faced by those plans today. Costrell (2015) explores the impact of investment returns on plan funding in greater detail.

Teacher Pension Demographics and Investment Allocations

Most teacher retirement plans are maturing, meaning that the average age of workers and beneficiaries participating in the systems has increased. In general, pension actuaries recommend that as a DB pension's participants age, the pension should adopt a more conservative allocation of its investment portfolio. The reason is that pension actuaries generally believe that a plan can accept more risk with longer-term liabilities that must be paid in the distant future than with near-term liabilities that come due more quickly. Moreover, for a heavily underfunded pension, where cash flows matter as much as present-value measures of future liabilities, a steady stream of employee contributions can help buttress the program's finances, at least in the short and medium terms. A shrinking number of employees relative to beneficiaries lowers that stream of new contributions.

The PPD does not contain information on the average age of pension participants. However, trends can be established by calculating the ratio of employees to beneficiaries for each teacher plan by year, using figures contained in the PPD. Table 8 shows such employee-to-beneficiary ratios for the major teacher retirement systems analyzed in this paper. In nearly all cases, the ratio of active employees to beneficiaries declined significantly. Declines were largest for teacher pensions that were relatively immature in 2001, such as DC Teachers and Washington Teachers Plan 2/3. But even long-established teacher plans matured as the baby-boom generation of teachers retired and life expectancies for retirees increased. In 2001, the median teacher plan had 2.3 active employees per beneficiary, falling to only 1.3 employees per beneficiary in 2019. As a result, the average age of teacher retirement plan participants has almost surely increased. Under common actuarial practices, teacher retirement systems should have scaled back investment risk taking over the 2001–2019 period.

However, as Table 9 shows, teacher pensions' investment risk taking has generally increased. Table 9 quantifies the share of teacher pension investments that are allocated to "risky" asset classes, which I define as the sum of stocks, private equity, hedge funds, other alternative investments, commodities, and real estate. This is a simplification, as even within the "risky assets" category, risks may differ from one asset class to another, but these figures provide a view of the direction of teacher pension risk taking over time, if not the specific amount of risk being taken. The median teacher pension plan in 2001 held 65% of its investments in risky assets, as defined above. By 2019, the median teacher plan held 76% of its investments in risky assets. The vast majority of teacher pensions increased the risky share of their investment portfolios, although a small number of plans reduced risk taking.

The increased level of investment risk taking adopted by state and local pensions despite aging participants prompted a 2014 letter from the SOA to the Actuarial Standards Board. The SOA wrote:

> We are concerned that we see many public sector plans using practices that have not been used by private sector plans or that have been abandoned by private sector plans around the world. We see public sector plans making choices about risk taking that go against basic risk management principles. For example, public sector plans in the U.S. are unique in that they have taken additional risk as the plans have become more mature, compared to private sector plans in the U.S. and private and public sector plans in Canada, UK and the Netherlands, which have taken less risk as plans have matured.[5]

But, as Table 9 shows, investment risk taking by teacher plans has not abated since the 2014 SOA letter, despite the continued aging of pension participants.

Prospects of Recovery Amid the COVID-19 Investment and Economic Downturn

Since the onset of the COVID-19 virus in early 2020, teacher pension plans that already faced financial challenges must seek to recover amid a decline in investment markets that has hurt pension assets and has reduced state and local tax revenues, which will make it more difficult to meet present and future pension contributions.

The more optimistic view is that most teacher pensions have sufficient investment reserves that the worst-case scenario—insolvency of the plans—is highly unlikely in the near term and, for most pensions, unlikely even beyond that. Thus, for most teacher pension plans, fears of imminent insolvency are very likely overblown.

In the longer term, however, the status quo in which states attempt to fully prefund defined benefits for teachers may no longer be sustainable. Current pension practice is that contributions should cover the normal cost of newly accruing pension benefits along with an amortization payment to eliminate the plan's unfunded liabilities over a given period of time, often 20–30 years. In theory, over that period, the plan would return to 100% funding. And yet the exhibited difficulty that teacher pensions have had making full annual contributions over the past 2 decades coupled with current declines in state and local government tax revenues due to the COVID-19 downturn may cause governments to abandon the goal of returning to full pension funding. It isn't clear how school districts can meet the burdens of full pension funding while maintaining their current slate of other education-related activities.

Some analysts have recently argued that prefunding public employee pensions is not necessary and perhaps not even desirable (Sgouros, 2017). Whatever the merits of those arguments, so-called pay-as-you-go financing of teacher pensions would not improve their long-term affordability. For one thing, pay-as-you-go funding provides little protection to sponsoring governments against declines in the tax revenues needed to pay pension benefits as they are due. Although a pension sponsor may shortchange its ARC in times of financial stress without immediately harming

Table 8
Ratio of Employee Participants to Beneficiaries, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Difference	Percent reduction
Alabama Teachers	2.7	2.5	2.3	2.2	2.1	2.1	2.0	2.0	1.8	1.8	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4		1.2	–46.5%
Alaska Teachers	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	1.0	–75.1%
Arkansas Teachers	3.5	3.2	3.1	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.1	1.9	1.8	1.5	1.5	1.4	1.4	1.3	2.1	–62.2%
California Teachers	2.5	2.5	2.5	2.3	2.2	2.2	2.1	2.1	2.0	1.8	1.7	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	–40.6%
Chicago Teachers	2.2	2.1	2.0	1.9	1.8	1.6	1.4	1.3	1.3	1.4	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.1	–52.5%
Connecticut Teachers		2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	0.8	–38.4%
DC Teachers	8.1	6.2	4.2	3.2	2.8	2.3	2.1	2.0	1.7	1.6	1.5	1.4	1.3	1.2	1.3	1.3	1.3	1.3	1.3	6.8	–84.1%
Georgia Teachers	3.8	3.7	3.6	3.2	3.0	2.9	2.9	2.9	2.8	2.6	2.3	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.8	2.0	–53.2%
Illinois Teachers	2.3	2.2	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.0	–42.2%
Indiana Teachers	2.2	2.2	2.0	2.0	1.9	1.8	1.8	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	–49.2%
Kentucky Teachers	1.7	1.6	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3	0.4	–22.6%
Louisiana Teachers	1.7	1.6	1.6	1.5	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	0.6	–37.9%
Maryland Teachers	2.3	2.3	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.0	–41.4%
Massachusetts Teachers	2.7	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3	–47.3%
Minnesota Teachers	2.1	2.0	2.0	1.9	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.2	0.9	–41.5%
Missouri Teachers	2.5	2.4	2.3	2.2	2.0	2.0	1.9	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.2	1.3	1.3	1.2	–49.7%
Montana Teachers	1.9	1.8	1.8	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	0.8	–39.9%
New Jersey Teachers	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	1.8	1.7	1.6	1.6	1.6	1.5	1.5	1.5		2.5	–41.1%
New York City Teachers	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	0.4	–22.3%
New York State Teachers	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.7	1.7	1.7	1.6	1.6	1.6	0.7	–29.5%
North Carolina Teachers and State Employees		2.6	2.5	2.5	2.4	2.4	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.4	1.3	–48.1%
North Dakota Teachers	2.1	2.0	1.9	1.8	1.8	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.3	0.9	–41.5%
Ohio Teachers	1.7	1.7	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.1	1.1	1.0	1.1	1.1	1.1	1.1	0.7	–37.7%
Oklahoma Teachers	2.4	2.3	2.2	2.1	2.1	2.1	2.0	2.0	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.0	–42.1%
St. Paul Teachers	2.3	2.0	1.9	1.9	1.7	1.6	1.4	1.4	1.3	1.2	1.1	1.2	1.2	1.1	0.9	0.9	0.9	0.9	0.8	1.5	–64.4%
Texas Teachers	4.2	3.7	3.5	3.0	2.9	3.0	2.9	2.9	2.9	2.8	2.7	2.5	2.4	2.4	2.2	2.2	2.1	2.1	2.0	2.2	–51.8%
TN State and Teachers	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.2	1.2	1.1		1.1	–49.5%
Vermont Teachers	2.7	2.6	2.5	2.4	2.3	2.2	2.1	1.9	1.8	1.7	1.4	1.4	1.3	1.2	1.1	1.1	1.1	1.1	1.0	1.7	–61.5%
Washington Teachers Plan 2/3	57.3	48.5	40.9	34.0	28.5	24.1	21.7	18.5	16.0	13.6	11.2	9.1	7.6	6.6	5.7	5.2	4.7	4.3	4.3	53.0	–92.5%
West Virginia Teachers	1.0	0.9	0.8	0.7	0.7	0.7	0.7	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.1	–7.1%
Median	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3		

Source. Public Plans Database.

Table 9
Risky Share of Total Pension Portfolios, by Plan and Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Change 2001–2019
Alabama Teachers	43%	42%	53%	58%	60%	64%	65%	60%	59%	60%	57%	60%	65%	67%	63%	65%	71%	70%		27%
Alabama Teachers	43%	42%	53%	58%	60%	64%	65%	60%	59%	60%	57%	60%	65%	67%	63%	65%	71%	70%		27%
Alaska Teachers	68%	64%	67%	69%	72%	75%	78%	80%	84%	80%	83%	82%	85%	85%	86%	87%	85%	90%	88%	19%
Arkansas Teachers	53%	65%	65%	71%	73%	75%	75%	73%	73%	74%	76%	79%	81%					84%		31%
California Teachers	71%	71%	71%	76%	75%	78%	79%	81%	77%	77%	82%	80%	82%	82%	83%	80%	84%	86%	86%	15%
Chicago Teachers	67%	65%	65%	70%	72%	73%	76%	74%	70%	73%	78%	74%	77%	73%	77%	70%	77%	73%		6%
Connecticut Teachers	66%	62%	60%	69%	69%	71%	70%	66%	68%	67%	74%	75%	76%	75%	75%	74%	74%	72%		7%
DC Teachers	54%	57%	67%	70%	75%	77%	80%	76%	73%	73%	72%	72%	71%	70%	68%	70%	69%	69%		15%
Georgia Teachers	57%	54%	52%	59%	60%	61%	63%	59%	57%	64%	72%	71%	74%	73%	71%	69%	71%	69%	70%	13%
Illinois Teachers	65%	62%	73%	76%	76%	76%	81%	83%	80%	82%	82%	83%	82%	81%	82%	79%	79%	77%	74%	9%
Indiana Teachers	43%	45%	45%	53%	59%	60%	64%	77%	70%	57%	64%	64%	68%	68%	68%	70%	71%	72%	70%	28%
Kentucky Teachers	56%	53%	52%	59%	59%	64%	68%	68%	66%	65%	69%	70%	71%	71%	72%	73%	74%	76%	74%	18%
Louisiana Teachers	76%	73%	75%	73%	78%	80%	77%	76%	75%	78%	80%	76%	75%	75%	76%	74%	76%	78%	79%	2%
Maryland Teachers	71%	69%	64%	70%	69%	69%	70%	76%	75%	78%	77%	77%	80%	82%	85%	77%	78%	78%	81%	10%
Massachusetts Teachers	71%	71%	73%	71%	76%	79%	80%	78%	79%	79%	80%	78%	78%	77%	77%	77%	79%	79%	78%	7%
Minnesota Teachers	72%	72%	73%	73%	74%	73%	75%	74%	76%	73%	75%	76%	75%	74%	75%	73%	78%	74%	77%	4%
Missouri Teachers	52%	54%	57%	65%	66%	69%	74%	77%	70%	66%	74%	76%	78%	77%	75%	76%	76%	76%	77%	25%
Montana Teachers	58%	57%	63%	68%	68%	70%	73%	73%	70%	69%	74%	74%	77%	76%	76%	74%	74%	75%	71%	13%
New Jersey Teachers						70%	69%	64%	57%	58%	63%	68%	72%	72%	74%	73%	73%	75%		5%
New York City Teachers	72%	70%	71%	74%	75%	79%	78%	77%	71%	71%	73%	69%	72%	73%	69%	69%	72%	68%	69%	–4%
New York State Teachers	71%	68%	73%	78%	81%	80%	81%	77%	72%	74%	77%	77%	78%	78%	75%	74%	74%	74%	74%	2%
North Carolina Teachers and State Employees	58%	55%	55%	62%	62%	62%	65%	61%	58%	60%	62%	63%	66%	69%	70%	71%	66%			8%
North Dakota Teachers	79%	78%	80%	78%	79%	75%	78%	73%	68%	71%	75%	76%	76%	76%	76%	76%	76%	75%	76%	–3%
Ohio Teachers	80%	80%	80%	79%	74%	75%	74%	72%	74%	71%	74%	76%	76%	77%	78%	82%	80%	79%	77%	–3%
Oklahoma Teachers	59%	58%	67%	70%	68%	66%	68%	64%	55%	61%	66%	71%	73%	79%	79%	77%	76%	77%	76%	17%
Texas Teachers	66%	67%	69%	71%	71%	69%	70%	74%	73%	75%	79%	81%	80%	85%	86%	86%	85%	86%	85%	19%
TN State and Teachers	42%	42%	37%	42%	44%	47%	52%	56%	44%	51%	59%	60%	62%	66%	66%	68%	70%	71%	71%	29%
Vermont Teachers			70%	70%	70%	76%	75%	74%	81%	58%	63%	64%	68%	68%	64%	68%	67%	71%	65%	–5%
Washington Teachers Plan 2/3	73%	71%	72%	71%	73%	75%	76%	77%	77%	77%	79%	78%	77%	75%	76%	78%	81%	76%	78%	5%
West Virginia Teachers	58%	57%	59%	58%	59%	53%	43%	70%	70%	74%	69%	76%	78%	83%	84%	85%	85%	85%	87%	29%
Median	65%	63%	67%	70%	71%	72%	74%	74%	71%	71%	74%	75%	76%	75%	75%	74%	76%	75%	76%	11%

Source. Public Plans Database.

benefits paid to retired employees, it could not do so under pay-as-you-go funding. Thus, a pay-as-you-go pension may come under severe financial stress during economic conditions such as those prevailing in 2020, when income and sales tax revenues to governments dropped precipitously. Pension sponsors may be faced with the alternatives of reducing benefits to retired employees or dramatically cutting expenditures in other areas.

Moreover, beyond the short term, pay-as-you-go financing would not make teacher pensions more affordable. In the near term, a pay-as-you-go funding strategy would allow teacher pensions to draw down their remaining assets rather than attempt to return to full funding, a strategy that would permit current contributions to be reduced or even eliminated. But in the longer term, the costs of funding benefits on a pay-as-you-go basis generally substantially exceed the current required contributions that teacher pension sponsors may find to be financially onerous. In 2018, the median teacher pension plan had an ARC of 16.2% of employee wages (see Table 10). However, the median pay-as-you-go cost in 2018—that is, annual benefit payments as a percentage of employee wages—was 41.1% of employee wages. Thus, although the insolvency of a pension plan may force the sponsor to revert to pay-as-you-go funding, doing so would make the pension less affordable rather than more.

A second approach that could potentially reduce teacher pension costs would be for governmental sponsors to aim only for partial funding of plan liabilities. For instance, the sponsor might conclude that rather than setting an ARC to fund the normal cost of accruing benefits plus amortization payments to restore the plan to 100% funding over a period of time, the plan might aim only for 50% funding. The result would reduce the annual amortization payment by roughly half. This approach would acknowledge an intergenerational inequity, meaning that past and present participants in the pension received benefits that they did not pay for in full because paying in full would require the plan be fully funded. But this approach would argue that so long as funding were sufficient to prevent insolvency in the case of an economic downturn, simply servicing the interest costs on the pension's unfunded liability would spread them over all future generations of taxpayers.

A third approach would be to fully fund benefit accruals at the margin in a way that would reduce or eliminate investment risk. As discussed above, teacher pensions fund newly accrued benefits with a contribution amount that, should it receive the plan's assumed rate of investment return in future years, would be sufficient to pay those newly accruing benefits when they come due. However, there is significant risk that the pension's assumed rate of return will not be achieved in some years, and future taxpayers will be required to make up the difference. This contingent liability means that, under current pension funding practices, even newly accruing benefits are not truly fully funded (see Biggs, 2011). Teacher pensions could reduce the risk of future underfunding if they lowered the discount rate applied to at least the normal cost of new benefit accruals. This would cause teacher pension benefits to be funded on a more equal basis with benefits in other retirement plans. For instance, the Ontario Teachers Plan in Canada functions very similarly to a U.S. teacher pension plan but applies a discount rate of just 3.2% to plan liabilities. This implies that, at any given measured funded percentage—for instance, Ontario Teachers was 104% funded in 2018—the Canadian plan would have set aside significantly more assets than a U.S. teacher pension because the Canadian plan's lower discount rate produced a higher measured value of plan liabilities.[6]

Another alternative would be to fund newly accruing benefits in DC retirement accounts rather than via traditional DB pension plans. These contributions would by definition be fully funded because the employer's obligation would be limited to making the contribution rather than guaranteeing a given benefit level in retirement. There are many facets to such a discussion that go beyond the scope of this study. The effects of existing DB pensions and alternative pension designs on teacher labor supply have been broadly discussed (see Koedel & Podgursky, 2016). Another strand of research concludes that DB pensions are a money-loser for most teachers who fail to work a full career (see Aldeman & Robson, 2017), implying that a similarly funded DC or cash-balance plan might be superior, although Biggs (2018) shows that this conclusion depends strongly upon the discount rate applied to pension contributions. Still other research (Fitzpatrick, 2015) concludes that teachers place a low value on marginal changes to their benefits, which would imply that a less generous pension coupled with salary increases may make teaching more attractive as an occupation. Johnston (2020) reaches similar conclusions. The adequacy of a DC plan as a retirement income vehicle for teachers would depend upon whether they participated in Social Security and the employer and employee contributions to the plan. Biggs (2019b) finds that, when combined with Social Security benefits, relatively modest retirement plan contributions can, within a range of interest-rate assumptions, enable employees to achieve common retirement income "replacement rate" targets.

Perhaps the most likely near-term outcome is that teachers will be required to pay increased contributions to their pensions. When benefits cannot be changed and government resources are constrained, increasing the pension contribution paid by teachers is one of the few policy levers available to school districts to improve pension funding in a rapid manner. Teacher pension contribution rates have increased modestly over time, although not as rapidly as the required contributions for employers. Contribution rates vary significantly by retirement system, which in theory leaves room for certain plans to raise teacher contributions without a significantly adverse impact to districts' ability to attract and retain employees. However, the worst-funded plans generally already have the highest employee contribution rates, potentially limiting the effectiveness of that policy lever.

Pensions are an important component of total compensation for most employees, but particularly so for public school teachers. The value of pensions affects the attractiveness of employment as a teacher relative to other occupations and influences incentives for teachers to remain on the job and eventually to retire. Moreover, the rising costs of teacher pension plans place a call on resources that could be used for other educational purposes, including higher teacher salaries.

Table 10
ARCs and Pay-as-You-Go Costs, 2018

	Alabama Teachers	Alabama Teachers	Alaska Teachers	Arkansas Teachers	California Teachers	Chicago Teachers	Connecticut Teachers	DC Teachers	Georgia Teachers	Illinois Teachers	Indiana Teachers	Kentucky Teachers	Louisiana Teachers	Maryland Teachers	Massachusetts Teachers	Minnesota Teachers
ARC	11.9%	11.9%	33.9%	14.7%	30.0%	40.4%	31.2%	12.5%	17.2%	69.7%	28.6%	30.1%	30.7%	16.2%	19.3%	10.7%
Pay-as-you-go cost	33.9%	33.9%	108.4%	41.1%	46.6%	69.2%	49.0%	18.9%	40.9%	64.7%	35.8%	56.8%	55.0%	32.0%	46.7%	38.3%
Ratio of pay-as-you-go to ARC	2.9	2.9	3.2	2.8	1.6	1.7	1.6	1.5	2.4	0.9	1.3	1.9	1.8	2.0	2.4	3.6

	Missouri Teachers	Montana Teachers	New Jersey Teachers	New York City Teachers	New York State Teachers	North Carolina Teachers	North Dakota Teachers	Ohio Teachers	Oklahoma Teachers	St. Paul Teachers	Texas Teachers	TN State and Teachers	Vermont Teachers	Washington Teachers Plan 2/3	West Virginia Teachers	Median
ARC	11.2%	16.8%	28.0%	42.3%	9.8%	11.3%	13.5%	8.9%	16.7%	14.5%	7.6%	13.3%	14.4%	8.3%	28.9%	16.2%
Pay-as-you-go cost	55.0%	43.5%	40.9%	65.0%	44.0%	33.6%	32.2%	61.5%	33.8%	44.4%	23.9%	37.9%	30.1%	5.2%	53.6%	41.1%
Ratio of pay-as-you-go to ARC	4.9	2.6	1.5	1.5	4.5	3.0	2.4	6.9	2.0	3.1	3.1	2.9	2.1	0.6	1.9	2.5

Source. Public Plans Database.

The poor funding status of teacher pension plans posed a challenge to educational finance even prior to the COVID-19 pandemic and the ensuing financial market declines and drop in state and local tax revenues. The rigid structure of teacher pension plans allows school districts with relatively few options to restore plan funding in ways other than increasing contributions from teachers themselves, a policy that would eventually reach its limits. Thus, in a time of significant financial challenges, teacher retirement systems in the United States are left with precious few options to restore funding.

ORCID ID

Andrew G. Biggs https://orcid.org/0000-0001-7339-1688

NOTES

The author thanks Michael Podgursky for helpful comments.

[1]The retirement systems included from the PPD are Alabama Teachers, Alaska Teachers, Arkansas Teachers, California Teachers, Chicago Teachers, Connecticut Teachers, DC Teachers, Georgia Teachers, Illinois Teachers, Indiana Teachers, Kentucky Teachers, Louisiana Teachers, Maryland Teachers, Massachusetts Teachers, Minnesota Teachers, Missouri Teachers, Montana Teachers, New Jersey Teachers, New York City Teachers, New York State Teachers, North Carolina Teachers and State Employees, North Dakota Teachers, Ohio Teachers, Oklahoma Teachers, St. Paul Teachers, Texas Teachers, TN State and Teachers, Vermont Teachers, Washington Teachers Plan 2/3, and West Virginia Teachers.

[2]Some teacher retirement plans include non-teacher school employees, making it difficult to determine the percentage of teachers nationally who are included in the 31 plans analyzed here.

[3]The broader adequacy of CalSTRS retirement benefits demands contextual analysis. Financial planners generally recommend a replacement rate of 70% of final salary as sufficient to maintain a retiree's pre-retirement standard of living. Because California teachers do not participate in Social Security, a retiring teacher may not be eligible for such benefits. On the other hand, as shown in columns 7 and 8, the average new CalSTRS retiree in 2018 retired after only 24.1 years of service, whereas an individual who entered the workforce at age 21 and was continuously employed through the Social Security Normal Retirement Age of 66 would have accrued 45 years of work experience. Put another way, assuming continuous teaching employment, the average new CalSTRS beneficiary in 2018 would have begun teaching at age 39. Between employment prior to that age and potential summer employment while teaching, it is possible that many California teachers would have gained eligibility for Social Security benefits by other means prior to retirement.

[4]It is generally assumed as a shorthand that public pensions have a mean duration of existing liabilities of around 15 years, while the mean duration of newly accruing benefit liabilities is about 22 years.

[5]Letter from Errol Cramer, president, Society of Actuaries, to Actuarial Standards Board, October 30, 2014.

[6]Ontario Teachers' Pension Plan (2019).

REFERENCES

Actuarial Standards Board. (2020). *Proposed revision of ASOP no. 4—Measuring pension obligations and determining pension plan costs or contributions* (second exposure draft).

Aldeman, C., & Robson, K. (2017, May 16). Why most teachers get a bad deal on pensions. *Education Next*. https://www.educationnext.org/why-most-teachers-get-bad-deal-pensions-state-plans-winners-losers/

Aubry, J.-P., & Crawford, C. V. (2019). *Impact of public sector assumed returns on investment choices*. Boston College Center for Retirement Research Working Paper.

Barro, J., & Buck, S. (2010). *Underfunded teacher pension plans: It's worse than you think. Civic report no. 61*. Manhattan Institute for Policy Research.

Biggs, A. G. (2011). An options pricing method for calculating the market price of public sector pension liabilities. *Public Budgeting & Finance*, *31*(3), 94–118.

Biggs, A. G. (2014). The public pension quadrilemma: the intersection of investment risk and contribution risk. *Journal of Retirement*, *2*(1), 115–127.

Biggs, A. G. (2015). *The state of public pension funding: Are government employee plans back on track?* American Enterprise Institute, Economic Perspectives.

Biggs, A. G. (2018). *Connecting evidence-based research to pension reform: Costs and cross-subsidies: Reconciling two strands of teacher pension analysis*. RAND Corporation, WR-1253.

Biggs, A. G. (2019a). *The growth of salaries and benefits in the federal government, state and local governments and public education, 1998–2017*. AEI Economic Policy Working Paper Series.

Biggs, A. G. (2019b). *How much should the poor save for retirement? Data and simulations on retirement income adequacy among low-earning households*. Pension Research Council WP2019-15.

Bureau of Economic Analysis. (2020). National Income and Product Accounts.

Center for Retirement Research at Boston College. Public Plans Database.

Clemens, J., & Veuger, S. (2020). *Implications of the COVID-19 pandemic for state government tax revenues*. Working paper no. w27426. National Bureau of Economic Research.

Costrell, R. (2015). Assessing the impact of investment shortfalls on unfunded pension liabilities: The allure of neat, but faulty counterfactuals. *Journal of Pension Economics and Finance*, Forthcoming.

Fitzpatrick, M. D. (2015). How much are public school teachers willing to pay for their retirement benefits? *American Economic Journal: Economic Policy*, *7*(4), 165–188.

Johnston, A. C. (2020). *Teacher preferences, working conditions, and compensation structure*. Working paper, Economics Department, University of California at Merced. http://dx.doi.org/10.2139/ssrn.3532779

Koedel, C., & Podgursky, M. (2016). Teacher pensions. In *Handbook of the economics of education* (Vol. 5, pp. 281–303). Elsevier.

Munnell, A. H., Aubry, J.-P., Hurwitz, J., & Quinby, L. (2012). *How retirement provisions affect tenure of state and local workers*. Center for Retirement Research, State and Local Pensions 27.

Ontario Teachers' Pension Plan. (2019). *2018 annual report*.

Sgouros, T. (2017). *Funding public pensions*. Haas Institute. http://haasinstitute.berkeley.edu/sites/default/files/funding_public_pensions_-_publish.pdf

Society of Actuaries. (2014, February 24). *Report of the Blue Ribbon Panel on Public Pension Plan Funding*.

AUTHOR

ANDREW G. BIGGS, PhD, is a senior fellow at the American Enterprise Institute, 1789 Massachusetts Ave. NW, Washington, DC 20036; *andrew.biggs@aei.org*. His research focuses on pensions, retirement, and public-sector pay.

Manuscript received June 17, 2020
Revision October 1, 2020, and December 4, 2020
Accepted January 25, 2021

The Three R's of Teacher Pension Funding: Redistribution, Return, and Risk

Robert M. Costrell[1]

How are teacher pension benefits funded? Under traditional plans, the full cost of career teachers' benefits far exceeds the contributions designated for them. The gap between the two has three pieces, which may (with some license) be mnemonically tagged the three R's of pension funding: *redistribution, return*, and *risk*. First, some contributions made for the benefits of short-term teachers are *redistributed* to fund the benefits of career teachers. Second, pension plans assume rosy *returns* on their investments, which push costs onto future teachers and taxpayers. Finally, the *risk* inherent in providing guaranteed pensions carries other costs, tangible and intangible, notably including the nontrivial risk of insolvency, which would dramatically raise mandated contributions and endanger future teacher benefits. I quantify these three components of the gap between benefits and contributions using the same metric as annual contributions. Illustrating with the California plan, I find the full cost of a career teacher's annual accumulation of benefits can be as high as 46.6% of earnings, nearly triple the corresponding contributions of 17.5%. To understand this gap, which fiscally affects all areas of education policy, researchers and practitioners may find it helpful to think of the three R's of pension funding: *redistribution, return*, and *risk*.

Keywords: descriptive analysis; economics of education; educational policy; finance

Introduction

How are teacher pension benefits funded? In 401(k)-style plans, the answer is simple: A member's benefits are funded by the contributions of the member and her employer over the course of her career. But this is not the system we have for teachers. Under traditional plans, where members are promised a specific (defined) benefit, the full cost of that benefit for a career teacher far exceeds the contributions made on her behalf. The gap between the two has three pieces, which may (with some license) be mnemonically tagged the three R's of pension funding: *redistribution, return*, and *risk*—which can be explained more specifically as follows:

1. *Redistribution from early leavers to stayers:* Most teachers earn little or no employer-funded benefit if they leave before about age 50. The employer contributions made on their behalf help fund the benefits of those who stay longer. This is intragenerational redistribution.
2. *Costs of unfulfilled returns:* Much of the contributions for future teachers will go to cover unfunded benefits for today's teachers, just as much of today's contributions go to cover unfunded benefits from the past. The main source of underfunding has been overoptimistic assumptions of the expected *return* on investments. This keeps contributions low in the short run but ultimately generates higher contributions and/or lower benefits for future entrants. This is intergenerational redistribution.
3. *The cost of risk:* Teachers are promised fixed benefits, largely funded by investment in risky assets. Returns fluctuate dramatically, and contributions do not readily adjust in the short run. In addition, the plan's assumptions about mortality, early retirement, and wage growth are also risky. This tension between fixed benefits and risky funding imposes costs that are off-the-books under public pension accounting. These costs—both tangible and intangible—derive from uncertainty regarding the level and fluctuations of required public contributions, the political risk of cutting benefits for new teachers when assumptions do not pan out, and, in extremis (albeit less "extremis" of late), the risk of fund insolvency, incurring a host of additional costs. These costs

[1]University of Arkansas, Fayetteville

Educational Researcher, Vol. 52 No. 2, pp. 91–97
DOI: 10.3102/0013189X211027534

of uncertainty are ultimately borne by the public and future teachers.

In this article, I quantify these three components of the gap between benefits and contributions in a simple integrated framework, using the same metric as annual contributions. Illustrating with the California plan, I find the full cost of a career teacher's annual accumulation of benefits can be as high as 46.6% of earnings, nearly triple the corresponding contributions of 17.5%. The impact of such a gap on school budgets and all areas of educational policy cannot be overstated.

K–12 pension costs have risen dramatically over the past two decades. Employer contributions now account nationally for about $1,600 per pupil, up from $500 (inflation adjusted) since 2001 (Costrell, 2015).[1] The fiscal stress occasioned by this rise has squeezed salaries and likely constrains other classroom expenditures in an era of tightening revenues. This growth in pension costs represents the payments due on the rise in unfunded benefits earned in the past. Going forward, newly earned benefits continue to cost more than the contributions designated to fund them. To understand this huge gap, educational researchers and practitioners may find it helpful to think of the three R's of pension funding: *redistribution, return*, and *risk*.

The Annual Cost of Funding Retirement Benefits: Background and Basic Concept

Consider a standard retirement plan in the private sector—a 401(k)-style plan. This is referred to as a "defined contribution" (DC) plan. The annual cost of funding such a plan is straightforward: The employee contributes, say, 10% of salary, and the employer matches with, say, 5% to an individual retirement account. The cost of the plan is 15% of the salary, split, as specified, between employer and employee. There are various details, but the general idea is simple: The cost of the plan is fully captured by the contribution rate, as advertised. There are no hidden costs to be paid later. There are no hidden subsidies from some employees to help cover the retirement costs of other employees: Each employee has his or her own retirement account. The ultimate retirement benefit is uncertain, depending on the choice of investments and the return, but the cost is not. The contribution is well "defined" in a DC plan.

Teacher retirement plans are different. They are "defined benefit" (DB) plans. The benefit is well-defined, by a formula traditionally based on years of service, final average salary, and age of retirement. The annual cost, however, is harder to discern. There are the out-of-pocket contribution rates for employee and employer, but these are only the beginning of the story. Since these contributions go into a pooled pension fund, rather than individual retirement accounts, part of the contributions for some employees (typically short-termers) go to fund the benefits of others (career teachers). Even taken all together, the contributions designated to cover the benefits of current teachers typically fail to do so. Ultimately, current contributions will be supplemented by future taxpayers and teachers, just as current contributions cover past unfunded benefits. Cuts to future teacher benefits also loom. Finally, there are the hidden costs of funding guaranteed pensions ("defined benefits") from risky investments, often intangible but also including the prospect of very tangible costs in the event of future insolvency.

All of these costs can be estimated on a common basis, as a percentage of salary, comparable with the contribution rates in DC plans. The technical term for the cost of newly earned benefits is the plan's "normal cost." The standard measure of the normal cost is the annual contribution rate (from employee plus employer—the joint rate), collected over employees' careers, which would fund the benefits for any given cohort of entering teachers. These contributions are designed to accumulate over time and earn interest—or a return on investment—that will be sufficient to fund retirement benefits when the time comes (or refunds for the cohort's early leavers). In this article, I extend this measure to convey the explicit and hidden elements of a teacher pension plan's costs, including both present contributions, likely hikes in future contributions or cuts in benefits for future teachers, and other intangible costs of risk. In short, my analysis will build on the basic standard measure of the annual contribution rate for newly earned benefits, adapting it in three ways to capture the full costs of teacher pension benefits, reflecting our three R's: *redistribution, return*, and *risk*.

Redistribution: Individual Versus Average Cost of Funding Retirement

Employer and employee contributions go into a pooled pension fund rather than individual accounts. The cost rate designed to fund the benefits of the whole cohort is a weighted average of the cost for each individual. These individual cost rates vary widely; it costs much more on an annual basis to fund the benefits of a career teacher who retires at or beyond the "normal retirement age" than a teacher who leaves early. And yet the annual contributions made by or for each teacher are the same. Thus, a career teacher will earn benefits that cost much more than the contributions made on her behalf, and conversely, a short-term teacher earns benefits that cost much less—often little more (and possibly less) than her own individual contribution. Some portion of the employer contributions for the short-termer help fund the benefits of the career teacher. In this sense, there is a *redistribution* of those contributions.

To illustrate, consider the California State Teachers' Retirement System (CalSTRS).[2] Based on the plan's benefit formula for recent hires and its actuarial assumptions, I calculate the individual cost rate by age of entry and of exit. It is the annual contribution rate, collected over such an individual's career, that would fund her benefits. Figure 1 depicts these cost rates for an individual exiting at any given age, averaged over all entry ages. The highest cost rate is for a career teacher, exiting at age 65.[3] It would require contributions of 21.3% per year throughout her career to fund her expected retirement benefits.

For those who exit early, however, the cost is very different. Those who exit before vesting (at 5 years of service) are only entitled to a refund of their own contributions, which are 10.2% of the salary. The cost of providing these refunds is even lower, since the plan assumes it will earn 7% return on those funds and pays only 3% interest to the member on withdrawal. Even after vesting, it takes some years of service for the cost of the pension to surpass the cost of the refund because the pension must be deferred

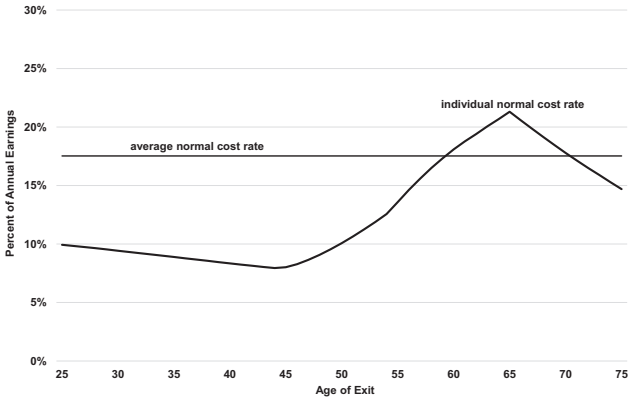


FIGURE 1. *Normal cost rates, 7% return assumed by plan (estimated using 2019 CalSTRS assumptions and benefit formula for new hires, slightly modified). From "Recent Research on Teacher Pension Funding, Benefits, and Policy Debates," by R. M. Costrell and J. B. McGee, in T. Downes and K. M. Killeen (Eds.),* Recent Advancements in Education Finance and Policy *(p. 404), 2022, IAP. Reprinted with permission.*
Note. The curve depicts the annual contribution rate required to fund the benefits of an individual exiting at any given age, averaged over all entry ages. The benefit may be a refund (up to age 45) or a pension (deferred to age 62). The horizontal line is the cost averaged over all entry and exit ages. CalSTRS = California State Teachers' Retirement System.

until age 62. The average entrant would be better off taking the refund than the pension all the way up to an exit age of 45 (the point at which the individual normal cost curve bottoms out and turns up in Figure 1). Throughout this period, the contribution rate needed to cover the refund falls as the difference accumulates between the plan's assumed investment return and the interest paid to the member. For exit age 45, the individual's refund could be funded with contributions of only 8.0% per year. The difference between the low annual cost of funding short-termers and the high cost of funding career teachers is a manifestation of the well-known backloading of benefits that favors long-termers under traditional pension formulas (Costrell & Podgursky, 2009).

This wide variation among individual cost rates contrasts with the uniform contribution rate designated to cover newly earned benefits for the cohort taken as a whole—the overall normal cost rate. This is a weighted average of the individual cost rates, depicted in Figure 1 by the horizontal line at 17.5%. This is the number typically reported as the cost of teachers' benefits. The gap between Figure 1's curve for individual cost rates and the horizontal contribution line represents the *redistributions*. Those above the line receive benefits that are partly funded from the contributions made on behalf of those below the line. So, for example, an individual who leaves at age 45, with benefits that cost only 8.0% of earnings, is effectively seeing almost 10 percentage points worth of contributions redistributed to fund the benefits of others. Conversely, the benefits for an individual exiting at age 65, which cost 21.3% of earnings, are effectively being funded by contributions for others of almost 4% of earnings, on top of the contributions made by or for herself.

These *redistributions* are built into the funding plan. The plan counts on using some or all of the employer contributions made on behalf of those below the horizontal line—plus, the plan's profits on refunded employee contributions—to help fund the benefits of career teachers. This is the first departure from the DC funding model, where an individual's benefits are funded entirely by the person's own contributions and the employer match. In a traditional DB plan, career teachers' benefits are funded additionally by contributions *redistributed* from short-termers.

Return: Future Payments due to Today's Overly Rosy Expectations

The analysis above would be the end of the story if everything went according to plan. Contributions at the overall normal cost rate would cover benefits for the cohort as a whole (if not each individual), and there would be no need for extra future contributions to fund benefits earned today. In actuarial language, there would be no unfunded liabilities—no pension debt to be paid off at some point in the future. As we all know from the headlines, however, that has not been the case for some time. Pension funds are carrying large debts and are paying far more than the cost of benefits earned today. These extra contributions, over and above the normal cost, are payments on the pension debt—analogous to mortgage payments on a house. In the case of CalSTRS, these payments are currently running at about 18% of payroll—doubling the contribution rate for normal costs alone.

There are several historical reasons for this, but the main reason has been overoptimistic assumptions for the return on investments (Costrell, 2018a). Rosy scenarios are appealing to pension plans (as to all of us) because they allow the plans to keep contributions lower than would otherwise be required. Long after the bull market of the 1990s had passed, most plans continued to assume their investments would earn 8% or more annually, year after year. Clearly this became untenable following the crash of 2008. Starting in 2010, for example, CalSTRS gradually reduced its assumed return from 8.0%, finally reaching its current rate of 7.0% in 2017. In the meantime, however, the actual market return for CalSTRS over the period 2001–2019 has been 5.8%. The failure to meet expectations and to pay down its growing debt led to the current situation. It is now paying 18% of payroll, on top of normal costs, in an attempt to pay off its pension debt by 2046. Thus, CalSTRS—like almost all teacher pension plans—is paying extra now for benefits earned by prior cohorts, on top of its payments estimated to fund benefits earned by current teachers.

These debt payments today are indicative of how costs can be shifted forward again, from current cohorts to future ones. However, these extra costs from past shortfalls do not directly represent the underfunding of currently earned benefits to be paid in the future. That is, today's debt payments do not necessarily predict future debt payments, arising from the failure to fully fund today's earned benefits. Indeed, current assumptions are more conservative than past ones (7.0% assumed return instead of 8.0%), so the contributions calculated to cover new benefits today are higher than they would be if calculated under the old assumed return. Moreover, *if* all current assumptions were to hold, debt payments would go away by 2046, and

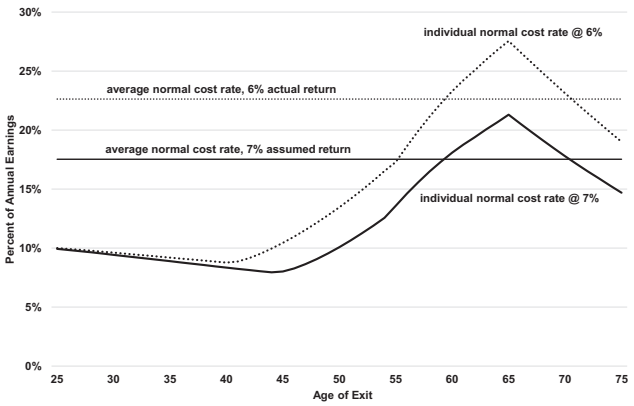


FIGURE 2. *Normal cost rates, 6% actual return versus 7% assumed (estimated using 2019 CalSTRS assumptions and benefit formula for new hires, slightly modified).*
Note. The curves depict the annual contribution rate required to fund the benefits of an average individual exiting at any given age. The lower curve is based on the plan's assumed investment return of 7%; the upper curve, based on 6%, is close to the 2001–2019 rate of 5.8%. CalSTRS = California State Teachers' Retirement System.

contributions would fall in half to the normal cost alone. That is, indeed, CalSTRS's published projection.

That said, there is good reason to suspect that current assumptions may still be too optimistic, in which case the contributions made to cover currently earned benefits (17.5%) would not suffice. New pension debt would accrue, raising future contributions once more, even after past pension debts are paid down. Suppose for example, that future investment returns average 6.0% (slightly better than CalSTRS's actual record from 2001 to 2019) instead of 7.0%. Figure 2 depicts what normal costs would be under this assumption.

Overall, the normal cost rate would be 5.1 percentage points higher at 6.0% return than at the currently assumed 7.0% (compare the dotted horizontal line with the solid one). This 5.1% figure represents the extra contributions that would be required to cover the cohort's benefits earned today but not funded by current contributions. They would have to be made good in the future. These extra future contributions would retroactively fund benefits that are concentrated among today's career teachers. As the previous section showed, the benefits for those teachers are already being funded, in part, by contributions made on behalf of short-termers, so the extra future contributions for them are on top of that. For example, the benefits of those retiring at age 65 would cost 27.5% of earnings over their careers, of which 17.5% is covered by current contributions, 3.8% by contributions made on behalf of others, and 6.2% by future contributions. These are represented in Figure 2 by comparing the dotted curve, the solid curve, and the solid horizontal line.

It may be noted that the overall rate of unfunded normal costs, 5.1 percentage points, is much lower than the current rate of debt payments, 18 percentage points. However, this does not mean that contributions will go down after the current debt is paid off. The fact that currently earned benefits are not being fully funded in this scenario means that new debt is accruing. Thus if in the future normal costs are more fully funded, at a higher rate (adding 5.1 points to the current 17.5), there will also be contributions required to pay down the additional debt that is likely accumulating now.

Finally, the scenario considered thus far assumes the returns on investment are certain at 6.0%, year after year. There is, of course, uncertainty on that return, as well as its annual fluctuation, and other variables as well. These risks carry additional costs, to which we now turn, as the third R, the additional costs of *risk*.

Risk: The Hidden Costs, Tangible and Intangible[4]

There are a host of costs, thus far not considered, embedded in the very nature of DB pension plans that fund risk-free benefits from investments in risky assets. As illustrated in Figure 2, the first obvious risk is simply that the assumed return on investments may be overly optimistic: 6.0% is arguably more realistic than 7.0%. But even 6.0% is an estimate of the expected return, which is an average of possible outcomes. The long-run return may well be lower than 6.0%, in which case the contributions that would be required to fund benefits as they are earned would exceed those depicted in Figure 2.

In addition, even if the long-run return clocks in at 6.0%, pension plans incur costs from year-to-year volatility. These include the tangible and intangible costs of fluctuating contributions to offset this volatility. They also include the risk of insolvency if bad years precede good ones (Boyd & Yin, 2018). Costrell and McGee (2020) estimate for CalSTRS that, even with long-run returns at 6.0% and contributions at the 2018 rate, market fluctuations would generate a 15% chance of insolvency within 30 years. Insolvency means guaranteed benefits must be funded at the pay-as-you-go rate, which would mean a jump in contributions of more than 20 percentage points.

Over and above risky investment returns, there are risks in a variety of other actuarial assumptions (mortality, retirement rates, salary growth, etc.) on which the contributions are based. If any of these assumptions turn out to be overly optimistic, benefits will again turn out to be underfunded, and hidden costs will emerge.

One approach to totaling up the costs of risk would be to itemize and price the separate costs identified above, along with other intangibles. Alternatively, I will use a direct and comprehensive approach, based on a fundamental tenet of finance economics: The full cost of risk-free benefits is evaluated using the return on risk-free assets rather than risky ones (Biggs, 2011; Brown & Wilcox, 2009; Novy-Marx & Rauh, 2009). The return on risk-free (or low risk) assets is lower than the expected return on risky assets. The difference, known as the "risk premium," is the market measure of what investors are willing to pay to avoid the costs of risk. Thus, the full cost of risk-free benefits is much higher than that calculated by public pension plans.

To understand this principle, consider an alternative pension portfolio. To avoid all costs of investment risk, the pension plan would have to fully hedge with fixed-income assets that match the plan's income stream to its payment obligations. That is, instead of the current portfolio, typically about 75% risky assets and 25% fixed income, plans would have to shift entirely to

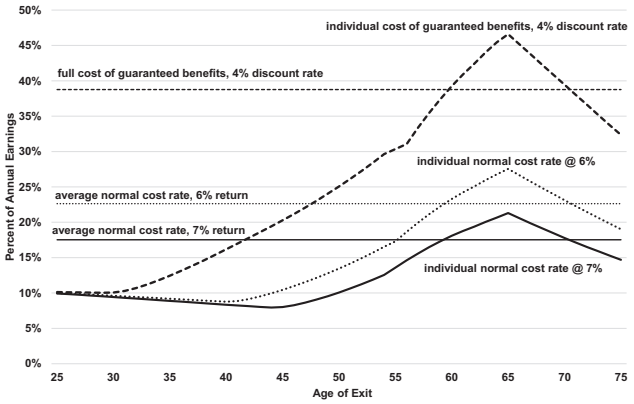


FIGURE 3. *Full cost of guaranteed benefits, 4% discount rate (estimated using 2019 CalSTRS assumptions and benefit formula for new hires, slightly modified. From "Recent Research on Teacher Pension Funding, Benefits, and Policy Debates," by R. M. Costrell and J. B. McGee, in T. Downes and K. M. Killeen (Eds.),* Recent Advancements in Education Finance and Policy *(p. 408), 2022, IAP. Reprinted with permission.*

Note. The top curve depicts the full annual cost of guaranteed benefits for an average individual exiting at any given age. It is equal to the market cost of acquiring an equivalent annuity, at a low-risk discount rate (4%), as used to value private sector defined benefit (DB) pensions. CalSTRS = California State Teachers' Retirement System.

fixed-income assets. This would call for higher contributions to acquire these assets, since their returns are lower and more assets would be required to fund a given stream of benefits. The difference between the two contribution rates is the extra cost of providing the pension guarantee. Plans may well decline this alternative, choosing to continue funding promised benefits with risky investments, acquired with lower contributions, but the costs of risk (tangible and intangible) do not go away—they are still borne by the plan. Recognizing this principle, the financial reporting rules for private sector DB plans require them to calculate the full cost of their obligations using a "discount rate"[5] equal to the low-risk return on high-grade corporate bonds, regardless of the plan's actual portfolio.

An alternative way of understanding this principle is to consider the market value of the guaranteed benefits. For an individual to obtain such an income stream, he or she would have to buy an annuity, priced in the market using a low-risk interest rate. Again, such an annuity would cost far more than what public pension plans calculate for the cost of the equivalent pension, using the expected return on a risky portfolio. The point here is this: The guarantee on a teacher's pension has a high market value. This is not a controversial statement; both defenders and critics of DB pension plans make the same point—that a guaranteed pension has greater value than a DC plan, where the risk is borne by the individual instead of the plan. However, there is no free lunch: The full cost of providing this guarantee is borne by the DB plan, even if it is off-the-books.[6]

To summarize, the full cost of guaranteed pension benefits, as they are earned, is the normal cost calculated with a low-risk rate of return rather than the expected return on risky assets.

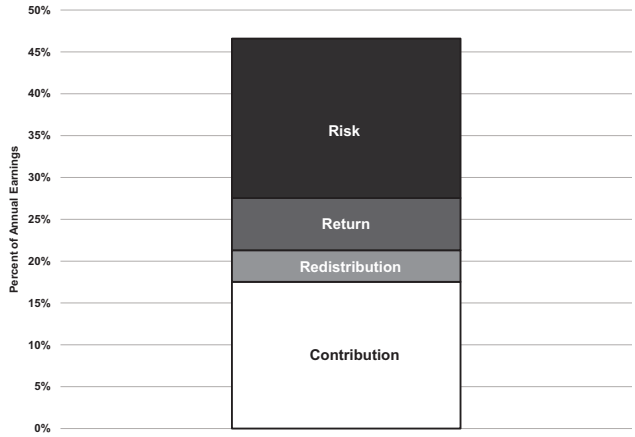


FIGURE 4. *Full cost of pension for career teachers in California.*

Figure 3 provides my estimates using a 4.0% discount rate, which is about the return on high-grade corporate bonds used to evaluate the cost of private sector DB plans. I find that the full cost of CalSTRS benefits is 38.8%. This is more than double the normal cost contributions of 17.5%, calculated at the plan's assumed return of 7.0%. The extra 21.3% includes the cost of overestimating the long-run return on risky assets (illustrated here by the extra 5.1% contributions if the long-run return is 6.0%) and the other tangible and intangible costs of risk (illustrated by the extra 16.2% between the top two horizontal lines). Of course, we do not know what the true dividing line is between these two costs of risk (i.e., what the true overestimate is for long-run expected return), but we do know that the market value of the guaranteed benefits exceeds the reported cost of newly earned benefits by more than 20% of earnings, as depicted.

The extra cost of the pension guarantee covers benefits that are concentrated on career teachers. The full cost for 65-year-old retirees is 46.6% of their career earnings. The breakdown of this full cost is depicted in Figure 4. Again, 17.5% is funded by uniform contributions, another 3.8% is *redistributed* from contributions for others, 6.2% is the deferred cost if long-run *returns* come in at 1.0% below assumed (but are otherwise certain and constant), and the extra cost of the *risk* borne to guarantee their pension is 19.1% of their earnings. The benefits for career teachers incur the highest annual cost before accounting for risk (Figure 1), and that cost is magnified the most when the risk premium—the higher expected return on risky assets—is stripped out of the discount rate.

Comparison With Other State Plans[7]

One may ask if the case of California, important in its own right by virtue of its size, is also representative of other states more generally. Table 1 presents cost estimates from other states previously studied, for comparison: Arkansas, Massachusetts, and Kansas. This table presents the maximum full-cost rate for 25-year-old entrants.[8] Among these states, California's full-cost rate of 47.0% is on the high end but not an outlier; Arkansas matches it at 46.7% and, moreover, reaches that rate for retirement at age 53 (instead of 65 in California).[9] At the other end, Kansas's final average salary plan reaches a full cost of only 26.1%. That is because Kansas had trimmed the plan repeatedly

Table 1
Maximum Cost Rates, Selected State Plans: 25-Year-Old Entrants; Cost Rates as a Percentage of Annual Earnings

	California	Arkansas	Massachusetts	Kansas[a]
Age of exit (years)	65	53	60	60
Full cost at 4.0%	47.0%	46.7%	36.9%	26.1%
Contribution[b]	17.5%	12.2%	12.3%	7.7%
Redistribution[b]	2.2%	6.0%	2.9%	1.6%
Return at 6.0%	6.7%	8.9%	6.2%	5.7%
Risk at 4.0%	20.6%	19.6%	15.5%	11.1%

[a]Final average salary plan (KPERS, Tier 2), for hires prior to the adoption of the cash balance plan in 2015. [b]Estimated at assumed returns of 7.00% (California), 7.50% (Arkansas), 7.25% (Massachusetts), and 7.75% (Kansas).

under fiscal duress before replacing it entirely for new hires (Costrell, in press). Among these states, the breakdown of full cost between contributions, *redistribution, return*, and *risk* is of comparable proportions. In each state, the hidden cost of *risk*, including optimistic assumed *returns*, is well over half the full cost for career teachers.

Conclusion: The Cost of Unfunded Benefits, Past and Future

K–12 pension costs have tripled since 2001, due to rising payments for benefits previously earned but not funded. The ensuing fiscal strains have, in many cases, led to lower pension benefits for new hires, higher employee contributions, and reduced cost-of-living adjustments for retirees. They have also likely curbed nonpension expenditures, slowing salary growth and reducing other classroom expenditures.

Conceptually, the past rise in pension costs differs from the object of this article's analysis, which is the unfunded cost of currently earned benefits. The past rise has been driven by escalating payments to make good on the failure to fund benefits previously earned. There are those who contend that such payments will not or should not remain at these elevated levels indefinitely. The official funding plans project that these payments will extinguish outstanding pension debt at a specified date (2046 for CalSTRS) and that contributions will then drop dramatically to cover only the cost of newly earned benefits. There are also those who contend that we should not even aim at paying off that debt (Lenney et al., 2019[10]). Moreover, the cost of newly earned benefits will gradually decline as the workforce increasingly comprises those who were hired under newer, less generous benefit formulas. None of these points, valid or not, pertain to my analysis here.[11]

This article's subject is the gap between the full cost of newly earned benefits and the contributions designated to fund them. Even though the object of analysis is conceptually distinct from the high level of current contributions, including payments on pension debt, it is worth comparing the two to discern what the future may portend. The point here is that even if the future is no longer burdened by debt payments, the full cost of newly earned benefits, as illustrated in Figure 3 for CalSTRS, will not be lower than current contributions.

This is not to say that current contributions for newly earned benefits should necessarily be raised to the level required to guarantee these benefits, on top of current debt payments. It is a policy decision beyond the scope of this article to decide how much to contribute now, in the face of budgetary pressures, versus how much risk to bear regarding future outcomes. This is a matter of intergenerational equity, requiring a value judgment reserved for the political process. The point of this article is to help guide the community of education researchers and practitioners regarding the nature and extent of the trade-offs. The failure to cover today the full cost of the risk borne to guarantee future benefits likely means new debt payments in the future, the additional political and educational cost of potential benefit cuts, and even the distinct possibility of insolvency for some pension plans. Our imperfect polity may well choose to defer costs to the future, but we should at least be informed—and in a transparent way—about their magnitude. The cost of the pension guarantee is off-the-books in public pension accounting. We should also be clear that the benefits of that guarantee are concentrated on career teachers, and it will likely be future career teachers who will bear the burden of potential benefit cuts if current bets do not pan out. Pension funding is a technical subject, but since the gap between the full cost of benefits and the contributions to fund them fiscally affects all areas of educational policy, we all need to understand it. To that end, educational researchers and practitioners may find it helpful to bear in mind the three Rs of pension funding: *redistribution, return*, and *risk*.

NOTES

Previous, related papers were presented at the RAND Corporation's "Teacher Pension Workshop," March 9, 2018, Santa Monica, CA; Association for Public Policy Analysis and Management Fall Research Conference, November 4, 2017, Chicago, IL; and Association for Education Finance and Policy, March 18, 2017, Washington DC. The author gratefully acknowledges previous research support from the Laura and John Arnold Foundation. The views expressed here are those of the author and should not be attributed to his institution or funder. Any and all errors are attributable to the author.

[1]Regularly updated figures can be found at edre.uark.edu/_resources/pdf/costrellemployercontperpupil.pdf

[2]CalSTRS (2020). See Costrell and McGee (2019) for a full discussion of the analysis reported here. CalSTRS is one of the largest public pension plans in the United States. For comparison with selected other states, see the section "Comparison With Other State Plans."

[3]"Normal retirement" is at age 62 in CalSTRS's plan. However, the formula continues to reward extra service until age 65.

[4]This section is based on Costrell (2020).

[5]The "discount rate" is the interest rate used to calculate the present value of benefits—the liability calculation.

[6]It is sometimes claimed that there is a free lunch for public plans to invest in risky assets, since they can diversify the risk away over time, as immortal entities. However, this claim has been long discredited as the "fallacy" of time diversification (Samuelson, 1963). The dispersion of average annual returns may diminish with the length of the horizon but not the risk on the total amount to be accumulated to pay future benefits.

[7]This section draws on estimates from Costrell (2018b), Costrell and Fuchsman (2018), and Costrell (in press).

[8]The estimates for California in this table differ slightly from those above, as those are averages over all entry ages for any given exit age. More limited data for the states added here render the weights for such averages less reliable.

[9]In Arkansas, 28 years of service qualifies one for a full pension, independent of age.

[10]But see also the critique in Costrell and McGee (2020).

[11]The illustrations from CalSTRS and other states are already based on the lower benefit structure for recent hires.

REFERENCES

Biggs, A. (2011). An options pricing method for calculating the market price of public sector pension liabilities. *Public Budgeting & Finance*, *31*(3), 94–118. https://doi.org/10.1111/j.1540-5850.2011.00988.x

Boyd, D., & Yin, Y. (2018). *Investment risk and its potential consequences for teacher retirement systems and school districts* (RAND Education Working Paper 1250). RAND Corporation.

Brown, J., & Wilcox, D. (2009). Discounting state and local pension liabilities. *American Economic Review*, *99*(2), 538–542. https://doi.org/10.1257/aer.99.2.538

California State Teachers' Retirement System. (2020). *Defined benefit program of the California State Teachers' Retirement System: June 30, 2019 actuarial valuation*. Milliman. https://bondlink-cdn.com/29/2019.s1c9bGAl.pdf

Costrell, R. M. (2015, July 20). School pension costs have doubled over the last decade, now top $1,000 per pupil nationally. *Teacher Pensions Blog*. https://www.teacherpensions.org/blog/school-pension-costs-have-doubled-over-last-decade-now-top-1000-pupil-nationally

Costrell, R. M. (2018a). Accounting for the rise in unfunded public pension liabilities: Faulty counterfactuals and the allure of simple gain/loss summations. *Journal of Pension Economics and Finance*, *17*(1), 23–45. https://doi.org/10.1017/S1474747216000159

Costrell, R. M. (2018b, September 11). *Arkansas Teacher Retirement Plan: Risks, redistribution and remedies*. Arkansas Legislature, Joint Committee on Public Retirement.

Costrell, R. M. (2020). Cross-subsidization of teacher pension benefits: The impact of the discount rate. *Journal of Pension Economics and Finance*, *19*(2), 147–162. https://doi.org/10.1017/S1474747218000239

Costrell, R. M. (in press). Reforming teacher pension plans: The case of Kansas, the 1st teacher cash balance plan *Education Finance and Policy*.

Costrell, R. M., & Fuchsman, D. (2018, February). *Distribution of teacher pension benefits in Massachusetts: An idiosyncratic system of cross-subsidies* (Policy brief). University of Arkansas.

Costrell, R. M., & McGee, J. (2019). Cross-subsidization of teacher pension costs: The case of California. *Education Finance and Policy*, *14*(2), 327–354. https://doi.org/10.1162/edfp_a_00253

Costrell, R. M., & McGee, J. (2020, July 13–14). *Sins of the past, present, and future: Alternative pension funding policies*. 9th annual Municipal Finance Conference, Brookings Institution, Washington, DC, United States. https://www.brookings.edu/wp-content/uploads/2020/07/Sins-of-the-Past-Present-and-Future_Costrell-and-McGee_July-10-2020.pdf

Costrell, R. M., & Podgursky, M. (2009). Peaks, cliffs and valleys: The peculiar incentives in teacher retirement systems and their consequences for school staffing. *Education Finance and Policy*, *4*(2), 175–211. https://doi.org/10.1162/edfp.2009.4.2.175

Lenney, J., Lutz, B., & Sheiner, L. (2019, July 15–16). *The sustainability of state and local government pensions: A public finance approach*. 8th annual Municipal Finance Conference, Brookings Institution, Washington, DC, United States. https://www.brookings.edu/wp-content/uploads/2019/07/lenney_lutz_sheiner_MFC_Final.pdf

Novy-Marx, R., & Rauh, J. D. (2009). The liabilities and risks of state-sponsored pension plans. *Journal of Economic Perspectives*, *23*(4), 191–210. https://doi.org/10.1257/jep.23.4.191

Samuelson, P. A. (1963). Risk and uncertainty: A fallacy of large numbers. *Scientia*, *98*, 108–113.

AUTHOR

ROBERT M. COSTRELL, PhD, is a professor of education reform and economics (by courtesy) and holds the Endowed Chair in Education Accountability at the University of Arkansas, 200 Graduate Education Building, Fayetteville, AR 72701; *costrell@uark.edu*. His research focuses on teacher pension policy.

Manuscript received July 2, 2020
Revision received November 6, 2020
Accepted January 25, 2021

FEATURE ARTICLES

How Much Do Teachers Value Compensation Deferred for Retirement? Evidence From Defined Contribution Rate Choices

Dan Goldhaber[1,2] and Kristian L. Holden[1]

How much do teachers value compensation deferred for retirement (CDR)? This question is important because the vast majority of public school teachers are covered by defined benefit pension plans that "backload" a large share of compensation to retirement relative to the compensation structure in the private sector, and there is scant evidence about whether pension structures are consistent with teacher preferences for current compensation versus CDR. This study examines a unique setting in Washington State, where teachers are enrolled in a hybrid pension system that has both defined benefit and defined contribution components. We exploit the fact that teachers have choices over their defined contribution rate to infer their revealed preferences for current versus CDR. We find that teachers on average contribute 7.23% of salary income toward retirement; 62% in fact elect to contribute more than the minimally required contribution of 5%. This suggests that teachers value CDR far more than suggested by prior evidence.

Keywords: descriptive analysis; educational policy; policy; statistics; teacher research

How much do teachers value dollars that are set aside for retirement (which we refer to as compensation deferred for retirement or CDR)? The answer to this question is of fundamental import to designing a teacher compensation structure that makes teaching a desirable profession. Understanding teacher preferences for different compensation structures is important but also challenging since, in most states, the amount that teachers defer for retirement is determined through a political process where policymakers, as opposed to individual teachers, make decisions.

The vast majority of public school teachers are served by defined benefit (DB) pension plans (National Education Association, 2010) that "backload" a disproportionate share of compensation to retirement (relative to the compensation structure in the private sector).[1] There are good theoretical arguments for why a backloaded teacher compensation structure might be optimal for student achievement. Ippolito (2002), for instance, suggests that backloaded compensation may be desirable to higher quality employees, who tend to prefer higher rates of saving for retirement. It is also possible that a backloaded compensation lowers attrition and shirking behavior of employees (Costrell & Podgursky, 2009; Gustman et al., 1995; Lazear, 1979; Lazear & Moore, 1984).[2,3]

An alternative, however, is that compensation backloading reflects rent capture and not efficiency. One theory, proposed by Glaeser and Ponzetto (2014), suggests that DB pensions could shroud benefits from public notice so that policymakers can increase total teacher compensation by more than would be possible if benefits were transparent. It is also possible that compensation is backloaded due to the greater influence of experienced teachers relative to novices. For example, Monk and Jacobson (1985) suggest that the increased backloading of salary schedules during the 1970s could be due to effective bargaining by teachers' unions on behalf of more experienced teachers. Similarly, Lankford and Wyckoff (1997) find that the majority of districts have allocated disproportionally large shares of salary increases to veteran teachers that appear to have little impact on retention.

Much of the literature on teacher pensions is focused on the fiscal sustainability of state systems (e.g., Biggs, 2015; Novy-Marx

[1]American Institutes for Research/CALDER, Washington, DC
[2]University of Washington, Seattle, WA

Educational Researcher, Vol. 52 No. 2, pp. 80–90
DOI: 10.3102/0013189X21999665

& Rauh, 2011). This is certainly warranted given that a number of states' pension systems are judged to be inadequately funded in the sense that the current liabilities in the system far exceed the current assets (e.g., Pew Charitable Trusts, 2019). There is also concern about the degree to which the funding of pension promises is eating into current schooling expenditures; the share of per-pupil expenditures going to pensions has, for instance, risen from about $500 in 2004 to over $1,500 in 2020 and accounts for 11.1% of total per-pupil expenditures (Costrell, 2020).

Far less research has focused on the extent to which teacher pension structures are consistent with *teacher preferences* for CDR.[4] Some precision with language is necessary for this discussion: When we say "compensation deferred for retirement (CDR)" we are referring specifically to funds set aside for retirement that cannot be accessed prior to reaching retirement and drawing a pension.[5] By "current compensation" we are referring to money that individuals receive in the form of salary or wages, which may be used for consumption or savings (though not savings that receive special tax deferred benefits).

Two recent studies attempt to shed some light on teacher preferences for CDR relative to current compensation; both find that teachers under a DB pension system tend not to value dollars set aside for pension upgrades anywhere close to the cost of providing them (Fitzpatrick, 2015; Johnston 2020).[6] But there may be reason to question these results because the studies are based on complex methods that require a number of assumptions (Fitzpatrick, 2015) or rely on stated preferences (in surveys) rather than revealed preferences (Johnston, 2020).

In this article, we contribute to the body of evidence on this topic by considering an alternative to estimating demand or asking teachers to consider alternatives. Instead, we exploit the fact that a significant share of teachers in Washington state are enrolled in a hybrid pension plan that has both DB and defined contribution (DC) components, and teachers have to choose a contribution rate under the DC component. This allows us to infer how much teachers value current compensation versus CDR by using a simple approach that does not require any complex estimation (as in Fitzpatrick) and is motivated by revealed preferences (as opposed to stated preferences as studied by Johnston, 2020).

As a specific example of our assumption about teacher preferences, we infer that those teachers who choose to set aside 7% of their current consumption for retirement, rather than the default 5%, reveal that they prefer setting aside these dollars toward additional retirement income more than the forgone current consumption.[7] Thus, the key to our analysis is the fact that the teachers enrolled in Washington's hybrid DB–DC pension system can choose to contribute between 5% and 15% of their current compensation into the DC portion of the system and earn market rates of return (more on the limits of their choices in the Contribution Rate Choices and Teacher Preferences in Washington State section). Washington is one of a small number of states where a teacher's primary pension plan provides a DC component, and it is one of only two states that grant teachers discretion over contribution rates.

We find that about 62% of teachers in Washington actively choose to set aside more than the minimum required compensation toward their retirement; on average they set aside 7.2% from each paycheck. This average contribution rate figure is roughly consistent with research on average contribution rates in private sector DC plans, where research finds that employee contribution rates average between 5% and 7% (Holden & VanDerhei,2001; Huberman et al., 2007; Munnell et al., 2002).[8]

Importantly, the average contribution rate masks the considerable heterogeneity across teachers. About 10% and 13% of teachers actively choose high contribution rates of 10% or 15%, which greatly exceed the average, and about 38% of teachers choose to contribute the minimum amount of 5%. This heterogeneity in preferences for CDR suggests one virtue of DC pension plans: Teachers can choose contribution rates that are more tailored to their own preferences. This contrasts with DB plans, where members contribute the same amount to retirement, and conditional on age, years of service, and salary receive the same expected retirement compensation.

But just because Washington teachers contribute an average of 7.2% does not mean that they *value* these dollars at the same rate because of minimum required contributions. Yet even under very conservative assumptions about how much teachers value those contributions, such as assuming that those in the minimally required 5% contribution plan would rather not contribute salary toward retirement, we find teachers are willing to trade current compensation for CDR. This finding stands in sharp contrast to Fitzpatrick (2015) who suggests that teachers only value money set aside for their retirement at a faction of the cost of the providing retirement benefits. We conclude by discussing possible explanations for this difference and policy implications.

Contribution Rate Choices and Teacher Preferences in Washington State

We argue that contribution rate choices allow us to directly observe teacher preferences for current compensation versus CDR. Teachers with strong preferences for current compensation will choose to contribute little of their salary to their DC account, and teachers with strong preferences for CDR will contribute more of their current salary. We illustrate this idea in Figure 1 by presenting a simple theoretical model of teacher preferences for current versus deferred compensation.[9] As mentioned above, "CDR" refers specifically to funds set aside for retirement that cannot be accessed for consumption spending prior to retirement, and "current compensation" refers to money that individuals receive in the form of salary or wages, which may be used for consumption or savings (that does not receive special tax benefits).

In Figure 1, individuals choose contribution rates that are best suited to their preferences. Increasing a contribution rate, for example, from the state required minimum of 5% (represented by the vertical line) to 8%, represents a tradeoff between current compensation and CDR.[10] Individuals will choose the rate that maximizes their utility by choosing a contribution rate that balances increases in retirement compensation with decreases in current compensation. This balance is depicted by

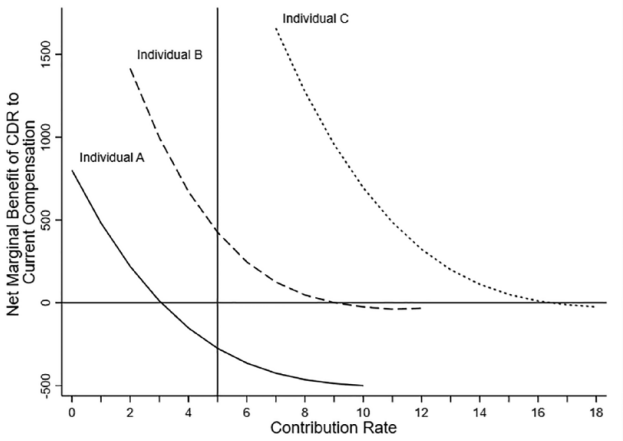


FIGURE 1. *The net marginal benefit of CDR relative to the marginal benefit of current compensation.*
Note. CDR = compensation deferred for retirement.

the net marginal benefit (MB) curves, which represent individuals' preferences for current compensation versus CDR. The values on the vertical axis show the utility measured in dollars associated with different retirement contribution rates. The curves for Individuals A, B, and C show the net marginal benefit—that is, the MB of current compensation, MB_C, less the MB of CDR, MB_R.

Now consider the three Individuals A, B, and C, who are deciding whether or not to contribute more or less than 5% of their current compensation toward retirement. At a 5% contribution rate, the net MB is negative for Individual A, that is, $MB_C > MB_R$. Individual A can improve her utility by decreasing savings and increasing current compensation, so would opt to contribute less than 5%. But Individuals B and C have positive net MBs, that is, $MB_C < MB_R$ at a 5% contribution rate; they will opt to save more. Each individual optimizes savings where $MB_C = MB_R$, which is a contribution rate of 3% for Individual A, a contribution rate of 9% for Individual B, and a contribution rate of 16.5% for Individual C.

This model illustrates how contribution rates are directly related to an individual's preferences for current compensation and CDR. If teachers place a low value on retirement compensation, they will have net MB curves similar to Individual A and will choose to contribute low levels of current compensation. Alternatively, teachers could resemble Individual B or C and would wish to contribute higher levels of current compensation. The bottom line is that contribution rate choices reveal teacher preferences for CDR.

The simple model is also useful for illustrating three censoring issues due to the discrete nature of contribution rate plans in Washington State.[11] Teachers choose one of six contribution rate plans, where four plans have fixed contribution rates: 5%, 7%, 10%, and 15%. The other two plans allow for increasing contribution rates according to age: 5% to 7.5% and 6% to 8.5% with increasing age. Teachers may have preferences to save less than 5% (which we call left censoring), preferences to save more than 15% (right censoring), or preferences to save in between the percentage values offered by Washington State (interval censoring). Individual A in Figure 1 would prefer to contribute less than 5%, but must contribute at least 5%—their contribution rate choice is left censored, and a naïve examination of their contribution rate decision will overstate their true preferences for CDR as they would have chosen a contribution rate of 3%. Individual B is interval censored, because they must choose between contributing 7% or 10%, while they would in fact prefer to contribute 9%. Finally, Individual C is right censored as they would prefer to contribute 16.5% but must choose the maximum rate of 15%.

We address the censoring issues described above, providing lower bound estimates of what contribution rates imply for teacher preferences for CDR. We deal with the three types of censoring issues as follows. In the case of teachers selecting the 5% contribution plan, we make the very cautious assumption that teachers, such as Individual A, who contribute the minimally required 5% would prefer to contribute zero. This clearly provides a lower bound on the valuation for retirement contributions for those in the 5% plan since there would be some individuals who prefer to contribute some value between zero and 5%. For teachers such as Individual B, whose contribution rate preferences fall between 7% and 10%, we assume that they would prefer to contribute at one rate plan below what they actually chose. For instance, suppose that Individual B chooses to contribute 10%, which we know exceeds their preferred choice of 9%. We can infer that choosing 10% indicates they would prefer to contribute at least at a rate of 7%. Finally, for teachers, such as Individual C, who would prefer to contribute more than 15% and are right censored, we simply note that these choices will understate their preference for CDR as they would choose to set aside a higher amount given the option (e.g., 16.5%, as mentioned above).

Evidence From Washington State Contribution Rate Decisions

In 1995 the Washington legislature passed legislation that created Teacher Retirement System 3 (TRS3), a hybrid retirement plan with a DB component funded by employers and a DC component funded by employee contributions. We examine teacher preferences for CDR by using data on each teacher's pension plan, membership dates, and contribution rate choices, recorded by the Washington Department of Retirement Services (DRS). These administrative data contain 157,515 teacher-level records between 1997 and 2010.

We focus on the contribution decisions of TRS3 teachers who may choose one of six different contribution rate plans described in Table 1. A teacher who does not indicate a preference within 90 days is defaulted into the lowest contribution rate plan, Plan A, at 5% of earnings.[12] Prior research suggests that default options can greatly influence the pension choices of individuals (Goda & Manchester, 2013).[13] This suggests that, in our setting, some of the 38% of individuals enrolled in Plan A would likely have chosen a different option if they had more information about their retirement options. This will tend to understate the value that teachers place on retirement benefits relative to a fully informed population of teachers.

One important consideration when examining contribution rates is whether teachers actively chose to enroll in TRS3. Enrollment into TRS3 consists of three types of members—(1)

Table 1
Contribution Rate Choices, Average Rates, and Lower Bound Estimates for Teacher's Preferred Choices

	All TRS3 Teachers	TRS3 Transferred	TRS3 Mandated	TRS3 Choice
Panel A: Percent of teachers choosing contribution rate plan choices				
Plan A, 5%	37.8	28.3	43.7	39.1
Plan B, age adjusted 5%–7.5%	12.6	8.4	14.8	18.8
Plan C, age adjusted 6%–8.5%	14.3	15.7	13.5	14.3
Plan D, 7%	12.8	20.5	8.2	8.2
Plan E, 10%	12.8	15.2	11.4	11.9
Plan F, 15%	9.7	11.9	8.6	7.7
Choosing				
To defer more compensation than the minimum requirement	62.2	71.7	56.4	60.9
Panel B: Average age, average contribution rate, predicted contribution rate, and lower bound				
Average age	39.5	45.0	36.4	33.1
Average contribution rate	7.2	7.9	6.9	6.8
Predicted contribution rate at age 40 years	7.2	7.4	7.2	7.2
Lower bound estimate on desire to contribute at age 40 years	4.3	5.0	3.8	4.1
Observations	76,643	28,203	45,500	2,929

Note. Calculations are based on the most recent observation of teachers in each category to capture changes in contribution rates in the flexibility period or due to changes in employer. Average contribution rates are calculated using the fixed values of 5%, 7%, 10%, and 15% for teachers who choose plans A, D, E, and F, respectively. We use data on teacher age for contribution rate plans that vary by age to determine the level of contribution. Lower bound contribution rates set Plan A 5% contribution rates to zero, and adjust all other contribution plans down one level—see discussion in the Contribution Rate Choices and Teacher Preferences in Washington State section. Proportion choosing to defer more compensation than the minimum requirement is calculated as the proportion of teachers choosing plans other than Plan A. Predicted contribution rates control for age and group interactions and are evaluated for teachers at age 40 years. All predictions are statistically significantly different from zero, and jointly different from each other, at the 0.001 level. TRS3 = Teacher Retirement System 3.

employees already employed in the state as of July 1996, who had been enrolled in a traditional DB system (known as TRS2) and transferred to TRS3 when the plan was created; (2) employees who were hired between July 1996 and July 2007 and were mandated into TRS3; and (3) employees who were hired after July 2007 who opted into TRS3 rather than TRS2 when given the choice as a new employee—we refer to these groups as Transferred, Mandated, and Choice, respectively.[14]

We present results for all teachers in TRS3, but also for each group individually. Exploring differences between the Transferred and Choice groups relative to the Mandated group provides evidence on how self-selection into TRS3 may be related to preferences for CDR.[15]

The first column of Table 1 shows the percentage of TRS3 teachers choosing each contribution rate plan for all teachers in TRS3, and as described above, the next three columns present results for Transferred, Mandated, and Choice teachers. The first column indicates that, overall, about 38% of teachers contribute at the lowest rate of 5%,[16] and about 62% of teachers choose to contribute more than 5%. About 27% of teachers choose contribution rates that increase with employee's age (e.g., 5%–7% and 6%–8.5% plans), and about 23% of teachers are willing to contribute very high levels of compensation, at 10% or 15%.

Not surprisingly, and consistent with prior research (Goldhaber & Grout, 2016b), the older and more experienced Transferred teachers have the lowest enrollment in Plans A and B (5% contribution and 5%–7.5% contribution by age) relative to the Mandated and Choice groups. Put another way, Panel B shows that the teachers who self-selected into the hybrid plan mid-career tend to save significantly more for retirement *on average*, 7.9%, than either those teacher mandated into the hybrid pension system at 6.9%, or those who select in at the beginning of their careers at 6.8%.

The above evidence suggests that selection into TRS3 is related to preferences for CDR. But these different groups of TRS3 teachers also vary along other important dimensions. In particular, because enrollment in TRS3 by group depends on date-of-hire, the average age of the teachers across the three groups differ. To account for this, we explore contribution rates by age graphically and then estimate a simple model at the individual teacher level in which contribution rate is a function of age.

Consistent with the evidence mentioned above, we show in Figure 2 that average contribution rates tend to rise for teachers with age, where the vertical line represents the mean age of teachers (about 40 years). There is also evidence that there are somewhat different retirement savings patterns by teacher group (Transferred, Mandated, and Choice). In particular, between ages 30 and 45 years, contribution rates are fairly comparable. For instance, Transferred teachers who are age 40 years tend to contribute an average of 7.4%, which is quite similar to 40-year-old Mandated and Choice teachers who contribute about 7.3% and 7.2%, respectively. There are some small differences—for example, older Transferred teachers and Mandated teachers have less than a 1 percentage point difference in average contribution

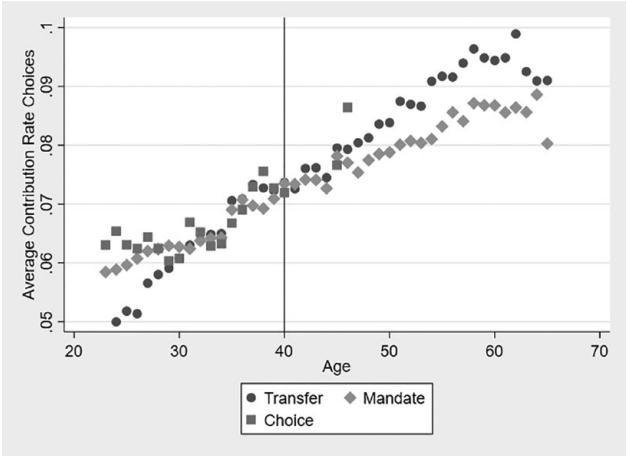


FIGURE 2. *Variation in contribution rate decisions by age and TRS3 group.*
Note. TRS3 = Teacher Retirement System 3.

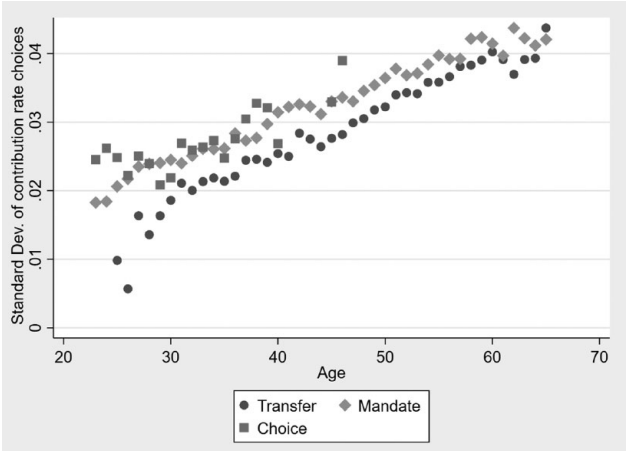


FIGURE 3. *Standard deviation of contribution rates by age and group.*

rates. This could reflect the fact that Transferred teachers tend to have more experience than Mandated teachers. Interestingly, there is a somewhat larger difference in contribution rates for young teachers—Mandated teachers have contribution rates that are about 1 percentage point higher than Transferred teachers.

Given the apparent differences shown in Figure 2, we report predicted contribution rates in Table 1 Panel B that control for a quadratic in age interacted with group indicators (Transferred, Mandated, Choice) to account for nonlinearities in contribution rates by age and group.[17] These predictions are estimated for teachers who are aged 40 years (corresponding to the vertical line in Figure 2, which is the mean age for all teachers). These results suggest that controlling for age leads to very similar rates across groups—7.4%, 7.2%, and 7.2% for Transferred, Mandated, and Choice groups, respectively. This is consistent with the notion that, conditional on age, teachers are willing to contribute a large share of their current compensation toward retirement, and the consistency across groups suggests that self-selection into TRS3 does not greatly affect our estimates of contribution rates.[18]

As described above, contribution rate plans in Washington State do not allow for contributions less than 5%, or for individuals to freely choose any rate; they must choose one of the six rate plans specified in Table 1. Thus, we report lower bound estimates of the valuation of CDR (according to the assumptions described at the end of the Introduction section). These calculations are shown in Table 1 Panel B. The lower bound valuation of CDR is 4.3%. Finally, we do see small, but statistically significant differences in valuation across the different teacher groups; consistent with the findings reported in Panel A of the table, the Transfer Group values CDR more than the Mandated or Choice groups (whose valuation is similar).[19]

Last, we present results on the heterogeneity of preferences for TRS3 teachers. As previously shown in Table 1, Panel A, there is a great deal of variation in the rate plans chosen in Washington State. For instance, while nearly 40% of teachers choose to contribute as little as possible, over 20% choose very high contribution rate plans of 10% or 15%. Why do teachers differ so much in their choices? One source of heterogeneity is clearly teacher age, because as previously shown in Figure 2, contribution rate choices are positively correlated with age; but our models suggest that age explains only about 10% of the variation in contribution rates. So, to what degree is there heterogeneity among similarly aged teachers? Figure 3 explores this issue by presenting the standard deviation of contribution rate choices by age and group (Transferred, Mandated, Choice). Variation in contribution rates shows a clear correlation with age; young teachers appear to choose very similar contribution rates while older teachers have a greater spread.[20] That said, the larger point is that there is considerable heterogeneity in contribution rate choices even controlling for age. This means a retirement plan that forces teachers into a single rate of CDR will poorly reflect the heterogeneity of preferences.

Comparing Washington With Prior Research

We are aware of only three papers that estimate teacher preferences for current salary versus CDR. In a well-cited and influential paper, Fitzpatrick (2015) considers a unique setting in Illinois where teachers were offered the option to purchase an upgrade to their DB pensions, providing the opportunity to evaluate the extent to which teachers tradeoff current salary against greater retirement benefits. Based on her analysis, Fitzpatrick (2015) reaches the provocative conclusion that "employees are willing to trade just 20 cents of current compensation for each expected dollar of future compensation" (p. 179) and that "teachers' valuation of the increased pension benefits was much less than their cost" (p. 185).

Two new working papers explore preferences for current compensation versus CDR using discrete choice experiments that ask people to choose between hypothetical jobs with randomly selected attributes (e.g., salary, retirement plan generosity, DB vs. DC). Johnston (2020), analyzes survey responses from teachers in a large school district in Texas and finds that "teachers value an additional ten-point replacement rate in pension equivalent to a $1,730 salary increase, somewhat less than its cost of $2,870 per

year" (p. 16).[21] Johnson notes that his findings are consistent with Fitzpatrick, but we believe while consistent in the sense that teachers value increased CDR at less than the cost of providing them, the magnitude of the difference with Fitzpatrick is quite large. In particular, the ratio between valuation of benefits and cost of provision is much larger than what Fitzpatrick estimates. Johnston's results imply a ratio of about 0.60 ($1,730 divided by $2,870)—which is much higher than Fitzpatrick's estimates of 0.20.

Fuchsman et al. (2020), another new working paper, like Johnston, uses a discrete choice stated preferences experiment as part of a nationally representative survey of teachers to estimate willingness to pay for many different retirement plan characteristics. They find that "a one percentage point replacement rate increase in retirement is equivalent to a 1.6 percent salary increase." (p. 22). With an average salary of about $63,000, this implies a willingness to pay of about $1,015 for an increase in the replacement rate that is one tenth as large as the one specified in Johnston (2020). That said, it is challenging to compare these estimates to the above studies because Fuchsman et al. do not provide an estimate of the cost of providing the 1 percentage point increase in replacement rates.[22]

As we describe in more detail below, our findings in Washington appear most at odds with Fitzpatrick's Illinois-based analysis, given the low valuation she finds teachers place on monies set aside for retirement compensation. So how does the magnitude of the findings in Washington State compare to those in Illinois? Putting the findings on the same metric is challenging because both the cost (to the state) and the benefits are known (given assumptions about retirement ages and life expectancy) in the Illinois context, whereas in Washington the benefits of setting aside funds for retirement compensation depend on rates of return on those set aside funds. Recall, however, that the advantage of examining teacher choices in Washington is that no sophisticated estimation is required to assess the value teachers place on CDR. A teacher clearly values the tradeoff of current compensation today for contributions toward future retirement compensation if they choose to make a contribution that is above the mandated 5%.

In Washington we can put a lower bound on the value teachers place on getting a dollar toward deferred compensation by examining the tax implications of setting aside a dollar toward retirement. The cost of deferring a dollar of compensation for retirement is less than a dollar given that teachers would have paid tax if they had received the compensation in the form of salary, but do not if they set it aside toward retirement. For the sample period of our data, the highest federal marginal tax rate faced by most teachers is 28%, so that each dollar set aside only reduces current compensation by 72 cents.[23] Given that we observe 62% of Washington teachers setting aside at least some compensation above what is minimally required, it suggests that these teachers value the dollars set aside for retirement compensation at a rate of at least 72 cents on the dollar.[24] We know that at least 62% of Washington teachers opt for this current compensation versus CDR tradeoff (see Table 1 and accompanying discussion). Even if the remaining 38% of teachers do not place any value on their required contribution, we can infer an average value of at least 45 cents on the dollar that is set aside for retirement (i.e., 0.62 * $0.72 + 0.38 * $0 = $0.45), or more than twice the 20 cents on the dollar suggested by Fitzpatrick (2015).

From one perspective, our findings do not appear to be that different from what Fitzpatrick reports about teachers purchasing the upgrade in Illinois. Specifically, the pension upgrade Fitzpatrick examines is quite generous: an income stream that is likely worth about $97,000 in current compensation has a price of about $15,000 (Fitzpatrick, 2015), and as such, it may not be surprising that 70% to 78% of teachers purchase the upgrade.[25] Nevertheless, her analysis leads her to the conclusion that teachers only value these additional dollars set aside for retirement at about 20 cents, which is less than half of what we report above.

What might explain the contrast between the findings in Washington and Fitzpatrick's in Illinois? We discuss a number of possible explanations. First, even if one knows the exact benefits and prices that teachers face, there are reasons to think that Fitzpatrick's estimates may be biased. In particular, demand is challenging to estimate in the Illinois context Fitzpatrick examines given that both the benefits and the cost of purchasing those benefits (the pension upgrade offered to teachers) are functions of a teacher's salary. As such, income effects are likely to influence the estimates of demand, and call into question the validity of these estimates. In Supplemental Appendix A (available on the journal website), we illustrate the econometric challenges of estimating teacher demand for the pension upgrade (and hence valuation of the upgrade) using a simple model and discuss their implications in more detail.[26] Moreover, recent work by Ni et al. (2020) suggests that Fitzpatrick's approach of using historical retirement patterns to calculate these benefits and prices are problematic because of unobserved heterogeneity in teacher preferences for work versus retirement (many teachers who did not purchase the upgrade worked long enough to reach the Illinois pension cap anyway), and because the policy itself changed retirement patterns. The bottom line is there are good reasons to be skeptical that the 20 cents on the dollar is an accurate estimate of the value teachers place on the investment in their pensions.

But let us assume that Fitzpatrick's 20 cents on the dollar estimate is correct. A second explanation for the divergent findings is that teachers across the two contexts could have very different perspectives about the returns they will see from those set aside dollars. If, for instance, teachers in Washington have very high expectations for the investment returns on their DC contributions, we would expect them to value dollars set aside more than teachers in the Illinois context, where the benefit stream of the set aside is known because it is based on a DB formula. But how high would these expectations need to be to make the DC account more appealing than the DB benefit upgrade in Illinois? As mentioned above, the Illinois upgrade is quite generous with a ratio of price to present value of benefits at 6.37 or 637% (Fitzpatrick, 2015). Washington teachers would need to expect an *even greater* rate of investment returns to explain the behavior we see in Washington State. While individuals might have unreasonably optimistic assumptions about the returns they might see, it is hard to believe that Washington teachers hold such widely optimistic assumptions about the rates of return for this to explain the dichotomy between the Washington and Illinois findings.

Third, differences in valuations could be due to differences in overall retirement wealth between Illinois and Washington teachers. Economic theory suggests that the marginal utility of retirement wealth is decreasing—said simply, if teachers in Illinois start with higher retirement wealth, they will be less willing to pay for increases relative to Washington teachers. Evaluating and comparing total retirement wealth is quite challenging because Washington teachers are contributing toward one of their primary investment vehicles whereas Illinois teachers are choosing whether to purchase a supplement. While the pension upgrade in Illinois is clearly a marginal contribution, to some extent, DC contributions to TRS3 are also marginal in the sense that it funds only half of the plan—DB benefits are not affected by these contribution rate decisions. Moreover, deciding to contribute 5% or 7% has relatively little impact on the total annual allocation toward the Washington teacher's pension, changing the total annual contribution by about 10%.[27] By comparison, Illinois teachers who decide to purchase the upgrade tend to pay slightly less, about 6 to 7%.[28] The bottom line is that these figures are somewhat different so it is possible that teachers are making decisions on different margins—but it seems unlikely that it is large enough to explain the difference in valuation that we see in Washington relative to Illinois.[29]

Related to the above point, a fourth potential difference could be the influence of retirement wealth from other sources which would also affect relative marginal willingness to set aside funds for retirement. In fact, one important contextual feature is that teachers in Illinois do not participate in social security but Washington do; if plan generosity is comparable between these states, theory would suggest that Illinois teachers should be willing to contribute more, not less (as is suggested by Fitzpatrick's results).[30] Thus, it also appears that the differences across the two states in terms of pension plan setting are unlikely to explain the differences in findings.[31]

Finally, teachers may simply have different preferences for DB versus DC retirement plans. J. R. Brown and Weisbenner (2014) find that individual's preferences for risk, financial literacy, and expectations of returns are important factors when individuals choose between DB and DC pension structures. DC pension plans can provide teachers with greater control over their investments, both in terms of the quantity of compensation to set aside and how those funds are invested, and individuals may derive utility from managing and following their investments (Keller & Siegrist, 2006; Wärneryd, 1996). It is also possible that there are different views about the extent to which pension assets can be bequeathed; it tends to be easier to provide for inheritance of pension assets under a DC plan (Poterba et al., 2007), though this is more complicated in the case of public pensions.[32]

Teachers in Washington were surveyed prior to the design of the hybrid pension plan (TRS3), and the survey responses suggested that teachers viewed the previous pension plan, which was a pure DB, as somewhat inflexible, and believed that they would not have a good return on their contributions if they left before the age of 65 years (HB 1206, Laws of 1995). DC pensions are also more portable across employers and state lines (Goldhaber et al., 2015) and provide higher benefits for teachers who separate midcareer (Costrell & Podgursky, 2009). All this may suggest that Washington State teachers could choose to contribute larger proportions of their current compensation for their hybrid-DC plan because they value these features of DC plan structure more than DB plans.

Conclusion

Our findings suggest that Washington teachers willingly set aside more of their current compensation than is required for CDR—and in some cases—quite a lot. This willingness to participate appears to contrast with prior research suggesting that teachers do not value these benefits anywhere near the cost of providing them. This is important since having compensation structures that reflect the preferences of teachers is crucial to the desirability of the teacher workforce. Our revealed preference findings in Washington are quite different from the prior published work in this area in that a large share of teachers in a hybrid pension system that includes a DC component elect to save more than is required by the system. As we discussed above, there are a number of potential explanations for the divergent findings, but the fact that they diverge, suggests the need to be cautious about interpretations of teachers' valuation of CDR. We believe more research is needed on this important topic, especially in light of the fact that the underfunding of pensions will likely put pressure on making structural changes to pension systems in the not too distant future.

We also find that Washington teachers vary greatly in how much compensation they choose to set aside. The heterogeneity in contribution rate choices reveals a potentially important advantage that DC pension systems have over DB systems: DB pension systems are not well suited to addressing such differences in retirement preferences as they provide the same retirement benefits to all individuals with a given level of experience, age, and final average salary. Consequently, they may lead to inefficiencies in terms of compensation packages that make teaching less desirable to individual teachers than would be possible if the same level of compensation were allocated differently.[33] Providing teachers choice about how much compensation to defer to retirement is a means of better aligning teacher compensation structures with teacher preferences. But while it is natural to think of DC plans as providing more flexibility, not all do. For example, Ohio teachers who participate in a DC plan are required to contribute 14%, regardless of their preferences (Aldeman, 2020). And, as with the case of the Illinois pension upgrade, DB systems could potentially offer teachers with choices about CDR.

That many teachers are enrolled in the default rate plan of 5% raises questions about what is the appropriate default in a system that offers contribution rate choices. A growing body of work suggests that default choices could explain a great deal of behavior, from participation in 401(k) plans (Madrian & Shea, 2001) to decisions between DB and DC pension plans (Goda & Manchester, 2013). While we cannot determine how many Washington teachers are in the 5% rate plan due to default rules or because they prefer it, there is no obvious reason to favor the lowest contribution rate as the default. Given concerns about retirement security (Aldeman & Robson, 2017) and findings

that individuals tend to save less than they would prefer (e.g., Laibson, 1998), there seems little downside to setting a higher default contribution rate but allowing teachers to select into plans with lower contributions.

Last, our findings clearly demonstrate a positive relationship between savings for retirement and age. While teachers in Washington could once adjust their contributions as they age, a 2013 change in IRS (Internal Revenue Service) rules limited the ability to do this (except when teachers change jobs). While there may be good reasons to do this from a tax revenue perspective, the inability to adjust contributions is clearly out-of-step with the way DC systems in the private sector function and limits the extent to which public sector teachers can align their preferences for retirement compensation with actual contributions.

ORCID ID

Dan Goldhaber https://orcid.org/0000-0003-4260-4040

NOTES

This research was supported by the National Center for Analysis of Longitudinal Data in Education Research (CALDER), which is funded by a consortium of foundations. For more information about CALDER funders, see www.caldercenter.org/about-calder. We wish to thank Cyrus Grout, James Cowan, and Michael Podgursky for thoughtful comments. All opinions expressed in this paper are those of the authors and do not necessarily reflect the views of our funders or the institutions to which the author(s) are affiliated.

[1]Public school teachers typically earn over 10% of their total compensation through retirement benefits (not including employee retirement contributions), which is nearly twice the rate of the average private sector employee (Aldeman, 2016).

[2]There is evidence that the churn of teachers is itself harmful for student achievement (e.g., see Ronfeldt et al., 2013), which means that a backloaded compensation structure could be a net positive for student achievement even if the structure of compensation is not optimized to make teaching as desirable as possible for new entrants. For this to be the case, the benefits of reduced churn associated with backloading would need to offset any reduction in the quality of new teacher entrants associated with backloading.

[3]Apart from workforce quality/student achievement effects, there are other arguments favoring backloaded compensation and DB pensions in particular. One is that teachers, left to their own devices, would save too little for retirement as they may not fully understand the features of their retirement plans and/or are not generally sophisticated about retirement planning (J. R. Brown & Weisbenner, 2014; Chan & Stevens, 2008; Laibson, 1998; Laibson et al., 1998). In addition to potentially correcting undersaving, one frequently referenced benefit of DB pensions is that they protect teachers from investment risk and that DB pension plans may have better investment returns relative to DC plans (National Education Association, 2016). That said, these issues are contentiously debated; many researchers find that many teachers exit the profession prior to the accumulation of meaningful retirement benefits (e.g., see Costrell & McGee, 2010; Johnson et al., 2014 Koedel et al., 2013).

[4]Related issues are the degree to which DB pensions affect attrition (Goldhaber et al., 2017; Koedel & Xiang, 2017), retirement timing (K. M. Brown, 2013; Costrell & McGee, 2010; Costrell & Podgursky, 2010; Ni & Podgursky, 2016) or teacher quality (Koedel et al., 2013).

[5]Or more generally, the funds cannot be accessed without incurring significant financial penalties, such as those associated with withdrawing funds from a 403B account prior to reaching retirement age.

[6]Johnston (2020) considers a large set of employment characteristics in addition to the value teachers place on CDR, though the inclusion of costs of pension upgrades allow us to compare these estimates to other studies. Closely related work by Fuchsman et al. (2020) uses a similar stated preferences experiment and focuses primarily on the tradeoffs of different types of pension systems, finding that teachers slightly prefer DB pension plans and these preferences differ depending on age which informs our estimation as described below.

[7]In particular, we do not need to model pension wealth or identify exogenous variation in prices in order to obtain estimates of teacher preferences for current compensation versus CDR.

[8]In the private sector employees individuals have more flexibility to choose rates that fall below federally mandated maximums that are age dependent (in the Washington hybrid system, describe in more detail below, teachers must choose among specific plans with defined rates and there is more limited flexibility to adjust between plans over time).

[9]This figure can be derived from the traditional two product constrained utility maximization problem where the products depict the tradeoff between current compensation and CDR and the budget constraint is determined by the rate of return on investments and marginal tax rates.

[10]Not illustrated explicitly, this model is built on the fact that the interest rate received for retirement contributions determines the amount of retirement income. Moreover, in practice, the decision to set aside current compensation for retirement is moderated by national and state tax laws that provide incentives to save by reducing taxable income and deferring tax payments on retirement contributions until retirement. Last, individuals could decide to set aside current compensation into other forms of savings for future consumption.

[11]Another type of censoring is related to when we observe individuals in the sample. For example, we do not observe the final contribution rate decisions of teachers hired in 2010—only their initial election. That said, we are not particularly concerned about this because most teachers do not change their rate choice (Goldhaber & Grout, 2016b) and in fact, a 2013 IRS rule change described below greatly limited teacher's ability to change rate plans (apart from changing jobs).

[12]Initially, TRS3 members could change contribution rate plans only if changing employers. However, in 2000 the DRS submitted TRS3 to the IRS for qualification and added a provision allowing members to change rate plans during an adjustment period occurring in January of each year. TRS3 was qualified by the IRS in 2002, and in 2003 state statutes were amended to include rate flexibility (Chapter 156, Laws of 2003). The first January adjustment period occurred in 2004. TRS3 members were informed of the opportunity to change contribution rates in a memo prepared by the DRS in December 2003. In 2013, rate flexibility was removed as part of an IRS requirement for the requalification of TRS3.

[13]See Aldeman (2020) for a discussion of default rules in pension plan choice (e.g., choosing between DB and DC plans) for Ohio teachers.

[14]For more detail about the choice by teachers between TRS2 and TRS3 (see Goldhaber and Grout, 2016a).

[15]They do, of course, self-select into and out of the Washington public school teacher workforce so it is possible that they could differ from teachers who would have entered or exited the workforce under an alternative pension structure.

[16]Note that this is the default rate plan so, for this rate choice, we cannot determine that employees are actively choosing 5% as the most optimal plan. Our data includes a default flag, but we cannot rule out that individuals are aware of the default rule and prefer the minimum 5% contribution rate, and choose not to actively select the default plan.

[17]Formally, we estimate the following regression models: $rate_i = \alpha_0 + \alpha_1 age_i + \alpha_1 age_i^2 + \sum_{j=0}^{2} \beta_j age_i^j * 1(Mandated = 1) + \sum_{j=0}^{2} \delta_j age_i^j * 1(Choice = 1) + \varepsilon_i$, where $rate_i$ is the observed rate chosen by teacher i, and the omitted group is Transferred teachers. We have also estimated linear models with age and group interactions and find very similar results.

[18]We note that all predictions are statistically significant from zero and that the predicted contribution rate for Transferred teachers is statistically significantly different from that for Mandated teachers (F test of equality, $p < .001$). Though, this appears to have little practical difference in the magnitude (e.g., 0.2 percentage points), and the difference between Mandated and Choice teachers is not statistically significant (F test of equality, $p = .534$).

[19]Left censoring is much more of a concern for Mandated and Choice teachers because, as reported above, they are far more likely to be enrolled in Plan A and therefore have their 5% contribution (conservatively) adjusted to a valuation of zero.

[20]This could be because circumstances change as individuals age in ways that are likely to affect retirement savings—for example, marriage, children (Knoll et al., 2012; Munnell et al., 2017). While outside the scope of this article, we believe this issue merits more investigation.

[21]A replacement rate is the percent of salary that a teacher will receive in retirement (e.g., a DB plan with a 50% replacement rate will provide half of a teacher's final average salary in retirement each year).

[22]Fuchsman et al. and Johnston could have estimates that are consistent with each other if there is strong diminishing marginal utility; in other words, each additional percentage point increase sharply decreases a teacher's willingness to pay. In this case, Fuchsman et al. measure the increases with the highest valuation while Johnston measures the value for the total increase.

[23]There is no state income tax for Washington, so we only need to be concerned about the implications of federal taxes. We use reported federal tax brackets in 2010, and pick a conservative bracket that represents the highest marginal tax rate faced by most teachers at 28%: single filers making between $82,401 and $171,850. Using data from the DRS, we calculate that more than 98% of teachers make less than $171,850 in 2010. Of course, different filing status or family income levels could push teachers to higher marginal tax rates, such as 28%, 33%, or 35%. Moreover, CDR is taxed when it is withdrawn in retirement; rather than model this, we use a more conservative figure by ignoring taxable income in retirement.

[24]Note that we would not expect a rational teacher to value a dollar set aside for employer-sponsored retirement plans at a dollar (or more) given that the dollar set aside is constrained in the sense that they cannot easily use it without incurring financial penalties. Put another way, if setting aside a dollar of current income did not cost less than a dollar, we would expect individuals to simply take the dollar in current compensation and make their own unconstrained savings decisions—in fact, tax deferral is one method to encourage retirement savings by providing a more favorable vehicle (Bernheim, 2002; Yoo & De Serres, 2004).

[25]Recent work by Ni et al. (2020) reexamines the upgrade decisions of the same cohort of Illinois teachers using recent data and finds that, by 2019, almost all them have purchased the upgrade (87%).

[26]There are other potential challenges in estimating demand in this context. As noted by Fitzpatrick, the Illinois setting requires out-of-sample estimates for high-valuation individuals and thus, strong assumptions about the slope of the demand curve. And DB pensions require assumptions about expected benefits via retirement dates, survival probabilities, and end-of-career salary, and these may differ systematically across teachers who choose to purchase or not purchase the upgrade.

[27]For instance, based on the average salary of about $70,000 for teachers in 2010, a change in the contribution rate from the 5% plan to the 7% plan represents only about a 10% increase percent of the total annual allocation toward a Washington teacher's pension ($1,400 additional contribution/$10,000 employer contributions + $3,500 employee contributions under the 5% plan).

[28]In Illinois teachers purchasing the upgrade contribute a one-time payment of 20% of their salary for the upgrade (about $15,000 of $75,000 salary), and spread over the 8 to 10 years between the purchase and retirement for Fitzpatrick's sample of teachers, this works out to about $1,500 to $1,875 per year. This value should be compared to total contributions in Illinois—state actuaries calculate that employer and state contributions should be about 25% of payroll (much of this is intended to offset the massive amount of unfunded liabilities from years of underfunding) and about a 9% employee contribution rate (see https://www.trsil.org/sites/default/files/documents/2010ValuationRept.pdf). Thus, purchasing the upgrade is about a 6 to 7% increase in total annual allocations toward the Illinois DB pension ($1,500 for upgrade over 10 years/$18,750 in employer/state contributions + $6,750 employee contributions without the upgrade).

[29]It also seems plausible that teachers are at different margins in terms of their retirement investments, due to age. Fitzpatrick focuses on an older sample of teachers (e.g., age 61 years) while we consider a younger sample of teachers in Washington (e.g., age 40 years). Given that age is likely to be closely related to retirement savings choices, one might expect this to explain some of the differences in contribution rate decisions. To explore this possibility, we consider teachers who are on a similar margin of retirement savings—those who are near the end of their career and choosing how much more to contribute to their retirement. Specifically, we use models discussed above that control for age and group interactions (Transferred, Mandated, and Choice), to predict the contribution rate of teachers at age 61 years (the average from Fitzpatrick's sample)—consistent with Figure 2, we actually find that average contribution rates are higher for this age, at about 9%, relative to the average Washington teacher. Thus, age does not appear to explain the differences in findings across contexts.

[30]Of course the relative generosity of the pension plans also matters. It may be that Illinois pension plans are designed around the fact that teachers do not participate, and tend to provide larger benefits to compensate. At best, one can roughly calculate that the TRS3 DB annuity plus social security benefits, which suggests that the Washington setting is slightly more generous than the Illinois DB plan and would tend to cause Washington teachers to contribute less. For a teacher who does not purchase the upgrade in Illinois, the replacement rate at 30 years of service is 54%. The DB portion of TRS3 provides a replacement ratio of 30%, while social security contributes an additional 27.1% (see Clingman et al., 2016, for high earnings group who attain age 62 years in 2013).

[31]Note that we cannot account for other unobserved factors could also play a role. For instance, if Washington teachers place virtually no value on the DB portion of their retirement wealth, or on their social security benefits, then total wealth looks much lower in Washington relative to Illinois. And it could also be the case that DC accounts and social security could affect private savings, either crowding out private savings or by encouraging it (Attanasio & Rohwedder, 2003; Lehmann-Hasemeyer & Streb, 2018). The bottom line is that we cannot know definitively that total wealth (or perceived total wealth) in both settings is comparable.

[32]Many states like Washington give annuity options for DB plans to provide for survivors.

[33]But, on the other hand, some argue that DB pension plans have lower administrative costs, and that participants in DC plans may earn lower investment returns and pay higher fees relative to individuals in DB plans (Boivie & Weller, 2012; Fornia & Rhee, 2014; Munnell et al., 2011). Thus, it does not immediately follow that DC plans would increase overall teacher welfare.

REFERENCES

Aldeman, C. (2016, May 13). The Pension Pac-Man: How pension debt eats away at teacher salaries. *Bellwether Education Partners*. https://bellwethereducation.org/publication/pension-pac-man-how-pension-debt-eats-away-teacher-salaries#:~:text=In%20our%20new%20report%2C%20%E2%80%9CThe,could%20be%20spent%20on%20salaries

Aldeman, C. (2020, November 12). Default settings: How Ohio can nudge teachers toward a more secure retirement. *Bellwether Education Partners*. https://bellwethereducation.org/publication/default-settings-how-ohio-can-nudge-teachers-toward-secure-retirement

Aldeman, C., & Robson, K. (2017, May 16). Why most teachers get a bad deal on pensions. *Education Next*. https://www.educationnext.org/why-most-teachers-get-bad-deal-pensions-state-plans-winners-losers/#:~:text=Teachers%20generally%20accept%20lower%20base,goes%20toward%20teacher%20retirement%20benefits

Attanasio, O. P., & Rohwedder, S. (2003). Pension wealth and household saving: Evidence from pension reforms in the United Kingdom. *American Economic Review*, *93*(5), 1499–1521. https://doi.org/10.1257/000282803322655419

Bernheim, B. D. (2002). Taxation and saving. In A. J Auerbach & M. Feldstein (Eds.), *Handbook of public economics* (Vol. 3, pp. 1173–1249). Elsevier.

Biggs, A. G. (2015). *The State of Public Pension Funding: Are government employee plans back on track?* AEI Economic Perspectives. American Enterprise Institute.

Boivie, I., & Weller, C. E. (2012). The fiscal crisis, public pensions, and labor and employment relations. In D. Mitchell (Ed.), *Public jobs and political agendas: the public sector in an era of economic stress* (pp. 167–194). Labor and Employment Relations Association.

Brown, J. R., & Weisbenner, S. J. (2014). Why do individuals choose defined contribution plans? Evidence from participants in a large public plan. *Journal of Public Economics*, *116*, 35–46. https://doi.org/10.1016/j.jpubeco.2013.05.004

Brown, K. M. (2013). The link between pensions and retirement behavior: Lessons from California teachers. *Journal of Public Economics*, *98*, 1–14. https://doi.org/10.1016/j.jpubeco.2012.10.007

Chan, S., & Stevens, A. H. (2008). What you don't know can't help you: Pension knowledge and retirement decision-making. *Review of Economics and Statistics*, *90*(2), 253–266. https://doi.org/10.1162/rest.90.2.253

Clingman, M., Burkhalter, K., & Chaplain, C. (2016). *Replacement rates for hypothetical retired workers* (Actuarial Note No. 2016.9). Office of the Chief Actuary. Social Security Administration.

Costrell, R. M. (2020, July 20). School pension costs have doubled over the last decade, now top $1,000 per pupil nationally. *Teacherpensions.org*.

Costrell, R. M., & McGee, J. B. (2010). Teacher pension incentives, retirement behavior, and potential for reform in Arkansas. *Education*, *5*(4), 492–518. https://doi.org/10.1162/EDFP_a_00013

Costrell, R. M., & Podgursky, M. (2009). Peaks, cliffs, and valleys: The peculiar incentives in teacher retirement systems and their consequences for school staffing. *Education*, *4*(2), 175–211. https://doi.org/10.1162/edfp.2009.4.2.175

Fitzpatrick, M. D. (2015). How much are public school teachers willing to pay for their retirement benefits? *American Economic Journal: Economic Policy*, *7*(4), 165–188. https://doi.org/10.1257/pol.20140087

Fornia, W., & Rhee, N. (2014). *Still a better bang for the buck: An update on the economic efficiencies of defined benefit pensions*. https://doi.org/10.2139/ssrn.2785732

Fuchsman, D., McGee, J. B., & Zamarro, G. (2020). *Teachers' willingness to pay for retirement benefits: A national stated preferences experiment* (Working Paper No. 20–313). https://doi.org/10.26300/m3b7-nn67

Glaeser, E. L., & Ponzetto, G. A. (2014). Shrouded costs of government: The political economy of state and local public pensions. *Journal of Public Economics*, *116*, 89–105. https://doi.org/10.1016/j.jpubeco.2014.03.005

Goda, G. S., & Manchester, C. F. (2013). Incorporating employee heterogeneity into default rules for retirement plan selection. *Journal of Human Resources*, *48*(1), 198–235. https://doi.org/10.1353/jhr.2013.0000

Goldhaber, D., & Grout, C. (2016a). Pension choices and the savings patterns of public school teachers. *Education Finance and Policy*, *11*(4), 449–481. https://doi.org/10.1162/EDFP_a_00208

Goldhaber, D., & Grout, C. (2016b). Which plan to choose? The determinants of pension system choice for public school teachers. *Journal of Pension Economics & Finance*, *15*(1), 30–54.

Goldhaber, D., Grout, C., Holden, K. L., & Brown, N. (2015). Crossing the border? Exploring the cross-state mobility of the teacher workforce. *Educational Researcher*, *44*(8), 421–431. https://doi.org/10.3102/0013189X15613981

Goldhaber, D., Grout, C., & Holden, K. L. (2017). Pension structure and employee turnover: Evidence from a large public pension system. *ILR Review*, *70*(4), 976–1007. https://doi.org/10.1177/0019793916678424

Gustman, A. L., Mitchell, O. S., & Steinmeier, T. L. (1995). Retirement measures in the health and retirement study. *Journal of Human Resources*, *30*, S57–S83. https://doi.org/10.2307/146278

Holden, S., & VanDerhei, J. L. (2001). *Contribution behavior of 401(k) plan participants*. Employee Benefit Research Institute.

Huberman, G., Iyengar, S. S., & Jiang, W. (2007). Defined contribution pension plans: determinants of participation and contributions rates. *Journal of Financial Services Research*, *31*(1), 1–32. https://doi.org/10.1007/s10693-007-0003-6

Ippolito, R. A. (2002). Stayers as" workers" and" savers": toward reconciling the pension-quit literature. *Journal of Human Resources*, *37*(2), 275–308. https://doi.org/10.2307/3069648

Johnson, R. W., Butrica, B. A., Haaga, O., & Southgate, B. G. (2014). *How long must state and local employees work to accumulate pension benefits?* Urban Institute. http://www.urban.org/sites/default/files/publication/22571/413107-How-Long-Must-State-and-Local-Employees-Work-to-Accumulate-Pension-Benefits-.PDF

Johnston, A. C. (2020). *Teacher preferences, working conditions, and compensation structure*. https://doi.org/10.2139/ssrn.3532779

Keller, C., & Siegrist, M. (2006). Investing in stocks: The influence of financial risk attitude and values-related money and stock market attitudes. *Journal of Economic Psychology*, *27*(2), 285–303. https://doi.org/10.1016/j.joep.2005.07.002

Knoll, M. A., Tamborini, C. R., & Whitman, K. (2012). I do . . . want to save: Marriage and retirement savings in young households. *Journal of Marriage and Family*, *74*(1), 86–100. https://doi.org/10.1111/j.1741-3737.2011.00877.x

Koedel, C., Podgursky, M., & Shi, S. (2013). Teacher pension systems, the composition of the teaching workforce, and teacher quality.

Journal of Policy Analysis and Management, *32*(3), 574–596. https://doi.org/10.1002/pam.21699

Koedel, C., & Xiang, B. P. (2017). Pension enhancements and the retention of public employees. *ILR Review*, *70*(2), 519–551. https://doi.org/10.1177/0019793916650452

Laibson, D. (1998). Life-cycle consumption and hyperbolic discount functions. *European Economic Review*, *42*(3), 861–871. https://doi.org/10.1016/S0014-2921(97)00132-3

Laibson, D. I., Repetto, A., Tobacman, J., Hall, R. E., Gale, W. G., & Akerlof, G. A. (1998). Self-control and saving for retirement. *Brookings Papers on Economic Activity*, *1998*(1), 91–196. https://doi.org/10.2307/2534671

Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher sorting and the plight of urban schools: A descriptive analysis. *Educational Evaluation and Policy Analysis*, *24*(1), 37–62. https://doi.org/10.3102/01623737024001037

Lankford, H., & Wyckoff, J. (1997). The changing structure of teacher compensation, 1970–1994. *Economics of Education Review*, *16*(4), 371–384. https://doi.org/10.1016/S0272-7757(96)00066-0

Lazear, E. P. (1979). Why is there mandatory retirement? *Journal of Political Economy*, *87*(6), 1261–1284. https://doi.org/10.1086/260835

Lazear, E. P., & Moore, R. L. (1984). Incentives, productivity, and labor contracts. *Quarterly Journal of Economics*, *99*(2), 275–296. https://doi.org/10.2307/1885526

Lehmann-Hasemeyer, S., & Streb, J. (2018). Does social security crowd out private savings? The Case of Bismarck's system of social insurance. *European Review of Economic History*, *22*(3), 298–321. https://doi.org/10.1093/ereh/hex022

Madrian, B. C., & Shea, D. F. (2001). The power of suggestion: Inertia in 401 (k) participation and savings behavior. *Quarterly Journal of Economics*, *116*(4), 1149–1187. https://doi.org/10.1162/003355301753265543

Monk, D. H., & Jacobson, S. L. (1985). The distribution of salary increments between veteran and novice teachers: Evidence from New York State. *Journal of Education Finance*, *11*(2), 157–175.

Munnell, A. H., Aubry, J. P., Hurwitz, J., & Quinby, L. (2011). *A role for defined contribution plans in the public sector* (Issue Brief No. 11). Center for Retirement Research. https://crr.bc.edu/wp-content/uploads/2011/04/slp_16.pdf

Munnell, A. H., Hou, W., & Sanzenbacher, G. T. (2017). *The impact of raising children on retirement security* (Issue Brief No. 17–16). Center for Retirement Research. https://crr.bc.edu/wp-content/uploads/2017/09/IB_17-16.pdf

Munnell, A. H., Sundén, A., Soto, M., & Taylor, C. (2002). *How will the rise in 401 (K) plans affect bequests* (Issue Brief No. 10). Center for Retirement Research. https://crr.bc.edu/wp-content/uploads/2002/11/ib_10-508.pdf

National Education Association. (2010). *Characteristics of large public education pension plans* (p. 182).

Ni, S., & Podgursky, M. (2016). How teachers respond to pension system incentives: New estimates and policy applications. *Journal of Labor Economics*, *34*(4), 1075–1104. https://doi.org/10.1086/686263

Ni, S., Podgursky, M., & Wang, F. (2020). *How teachers value pension wealth: A reexamination of the Illinois experience* (Working Paper No. 20–07). https://economics.missouri.edu/sites/default/files/wp-files/ni-podgursky-wang-a.pdf

Novy-Marx, R., & Rauh, J. (2011). Public pension promises: How big are they and what are they worth? *Journal of Finance*, *66*(4), 1211–1249.

Pew Charitable Trusts. (2019). *The state pension funding gap: 2018*. https://www.pewtrusts.org/-/media/assets/2020/06/statepensionfundinggap2018.pdf

Poterba, J., Rauh, J., Venti, S., & Wise, D. (2007). Defined contribution plans, defined benefit plans, and the accumulation of retirement wealth. *Journal of Public Economics*, *91*(10), 2062–2086. https://doi.org/10.1016/j.jpubeco.2007.08.004

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal*, *50*(1), 4–36. https://doi.org/10.3102/0002831212463813

Wärneryd, K. E. (1996). Risk attitudes and risky behavior. *Journal of Economic Psychology*, *17*(6), 749–770. https://doi.org/10.1016/S0167-4870(96)00034-7

Yoo, K. Y., & De Serres, A. (2004). Tax treatment of private pension savings in OECD countries and the net tax cost per unit of contribution to tax-favoured schemes. https://doi.org/10.2139/ssrn.607185. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=607185

AUTHORS

DAN GOLDHABER, PhD, is the Director of the Center for Analysis of Longitudinal Data in Education Research (CALDER, www.caldercenter.org) at the American Institutes for Research and the Director of the Center for Education Data and Research (CEDR, www.cedr.us) at the University of Washington, 3876 Bridge Way North, #201, Seattle, WA 98103; *dgoldhaber@air.org*. His research focuses on issues of educational productivity and reform at the K-12 level, including the broad array of human capital policies that influence the composition, distribution, and quality of teachers in the workforce, and connections between students' K–12 experiences and postsecondary outcomes.

KRISTIAN L. HOLDEN, PhD, is a CALDER researcher (www.caldercenter.org) at the American Institutes for Research; Center for Education Data and Research, 3876 Bridge Way North, #201, Seattle, WA 98103; *kholden@air.org*. His research interests include the influence of teacher pensions on the workforce, including early-career attrition, earnings, and retirement timing, as well as career and technical education for students with disabilities.

Manuscript received March 9, 2020
Revision received December 1, 2020
Accepted January 26, 2021

Incentivizing Retirement: An Analysis of Cash Retirement Incentives for Chicago Teachers

James Hosek[1], David Knapp[2], Michael G. Mattock[1], and Beth J. Asch[1]

Retirement incentives are frequently used by school districts facing financial difficulties. They provide a means of either decreasing staff size or replacing retiring senior teachers with less expensive junior teachers. We analyze a one-time retirement incentive in a large school district paid to teachers willing to retire at the end of the 2016–2017 school year that required 1,500 teachers to accept the offer for it to be paid. The analysis uses an estimated structural model of teacher retention—enabling predictions through simulation of what teacher behavior would be in lieu of the incentive. As predicted by the model, too few teachers accepted the incentive and it was not paid. Simulations enable the decomposition of the would-be retirement incentive takers into those that retired because of the retirement incentive (i.e., marginal teachers) and those who would have retired without the incentive. We find that (1) most teachers who receive the retirement incentive would have retired regardless leading to substantial payments to teachers whose decisions are unchanged, (2) marginal teachers are likely to have retired within a couple years without the incentive limiting the period in which a salary gap can recoup the incentive's costs, and (3) sharp increases in salary over the first years of teaching narrow the salary gap from which potential savings might derive. These mechanisms are common to most school districts so it is unlikely districts using retirement incentives will realize any cost savings if they replace retiring teachers with junior teachers.

Keywords: econometric analysis; economics of education; methodology; restructuring; retention; secondary data analysis; teacher research

Financially strapped school districts frequently use teacher retirement incentives to change workforce size or demographics in an effort to save money. Since 2010, more than 60 districts in at least 28 states have used or considered using retirement incentives, but the number is likely much greater as most retirement incentives are offered by school districts and school districts' compensation policies are rarely reported in the news.[1] Those incentives take a number of forms, including cash bonuses at separation, coverage of health benefits, options to buy age and/or service credits toward pension eligibility, and reduction or eliminations of benefit penalties for starting pension benefits before the pension plan's age or service requirements. These incentives go by a number of names, including early retirement incentives, early retirement options, and teacher buyouts. We refer to them as voluntary retirement incentives (VRI). Not all VRIs require "early retirement," but the common thread is that all are voluntary and are open to all teachers eligible to immediately begin collecting benefits from the teacher retirement system either as regular retirees or early retirees.

Justifications for offering VRIs are typically based on a school board's goal of reducing costs either through decreasing staff size or replacing retiring senior teachers with less expensive junior teachers. While the former argument can reduce costs, the latter argument is frequently used and offered as prima facie evidence by proponents to school boards and the public that VRI offerings are financially sound decisions. In this article, we challenge that assertion and argue that using VRIs to replace senior teachers with junior ones is unlikely to yield cost savings relative to an alternative where they are not offered because (1) most teachers who receive them would have retired without the incentive, (2) marginal retirees are likely to have retired within a couple years without the incentive, and (3) sharp increases in salary over the

[1]RAND Corporation, Santa Monica, CA
[2]University of Southern California, Los Angeles, CA

Educational Researcher, Vol. 52 No. 2, pp. 71–79
DOI: 10.3102/0013189X211062850

first years of teaching narrow the salary gap between junior and retiring teachers from which potential savings are supposed to derive.

Our findings are supported by an analysis of a one-time VRI that would be paid in a lump sum at retirement. The analysis uses an estimated structural model of teacher retention—enabling predictions through simulation of what teacher behavior would be in lieu of the incentive—and a natural policy experiment of a conditional VRI offering in a large school district that required 1,500 teachers to accept the offer for it to be paid. The simulations enable the decomposition of the would-be VRI takers into those who were incentivized to retire (i.e., the marginal teachers) and those who would have retired without the VRI. Furthermore, many VRIs are developed with a target number of retirees to achieve their predicted cost savings. We predict the district's expected budget cost savings over a range of VRI generosity and find that more generous VRIs, while increasing the number of marginal teachers, are unlikely to yield cost savings. This finding is due to the potential savings from additional teachers taking the incentive being insufficient to cover additional costs incurred from paying higher benefits to those who would have retired under less generous VRIs and the cost of replacement junior teachers.

While our analysis is based on a specific VRI offered by Chicago Public Schools in 2016, the mechanisms revealed in our analysis are common to most school systems (e.g., selective retention of teachers with a preference for teaching; pensions with strong incentives; pay schedules that exhibit sharp early career increases with late career plateaus). Overall, we expect our findings to generalize to other school districts. Consequently, most school systems offering VRIs are unlikely to realize any cost savings from replacing retiring teachers with junior teachers.

Related Literature

The broad theme in our article and many studies of retirement is that incentives in retirement plan design affect the timing of retirement. Much of this literature has focused on social security, pensions for federal workers or military retention payments (e.g., Burtless, 1986; Gotz & McCall, 1984; Gustman & Steinmeier, 1986; Stock & Wise, 1990). Only in the past 15 years has research begun to highlight the strong relationships between teacher pension incentives and retirement timing (Brown, 2013; Costrell & McGee, 2010; Costrell & Podgursky, 2009; Fitzpatrick, 2015; Friedberg & Turner, 2010; Furgeson et al., 2006; Goldhaber et al., 2017; Kim et al., 2021; Knapp et al., 2016; Koedel et al., 2013; Ni et al., 2020; Ni & Podgursky, 2016). For example, Costrell and McGee (2010) focused on how the structure of the Arkansas teacher retirement plan induces teachers to separate shortly after they become eligible for regular or early retirement, resulting in teachers retiring in a narrow range of ages and job tenures, and hypothesized that this is due to sharp changes in accumulated retirement wealth with years of service.

In the past 5 years, researchers have begun to explicitly model teachers' preferences to continue teaching and incorporate the key elements of the pension design in the model. The parameters of these models, known as structural models, are estimated using personnel data covering a long period. Estimated structural models can be used to simulate behavioral responses, namely, retention, under alternative compensation policies. Ni and Podgursky (2016) use such a model to understand late-career Missouri teacher decision making to predict retention if the retirement plan were converted from defined benefit (DB) to defined contribution (DC). Knapp et al. (2016), the basis for the analysis here, estimate a structural model of Chicago public school teacher retention decisions and simulate the consequences of alternative DB pension designs on teacher retention over an entire career and highlight parts of pension design that are more influential for teacher retention. Ni et al. (2020) apply a structural model similar to that found in Ni and Podgursky (2016) to longitudinal data on Tennessee teachers and allow work-retirement preferences to differ by teacher quality. Higher quality teachers were found to have higher retention conditional on age and experience, and targeted retention bonuses would delay their retirement at relatively low cost. Kim et al. (2021) use Missouri microdata to estimate a dynamic retention model to simulate the effect of retention bonuses versus deferred retirement plans (DROPs) on promoting the retention of late-career STEM (science, technology, engineering, and medicine) teachers. While some of these papers focus on the influence of retirement system structure on teacher retention, none focus on VRI or their potential for cost savings.

Private sector firms used VRIs to shape their workforces in the 1980s and 1990s when DB plans were more common because these payments could be combined with the strong incentives to continue or leave work built into the worker's retirement plans (Hogarth, 1988; Lumsdaine et al., 1990). The stated motivations were often similar to those voiced by current public sector proponents of VRIs—namely, that they can reduce wage costs through replacing senior workers with more junior workers or as a way of promoting separations in place of layoffs. As DB plans have declined in the private sector, more recent studies have focused on the public sector use, including higher education (Pencavel, 2001), federal civil service workers (Asch et al., 2005; Asch et al., 2016) and, most relevant for this study, teachers (Fitzpatrick & Lovenheim, 2014). Fitzpatrick and Lovenheim (2014) explore a particular type of VRI that allows purchase of age and service credits that can provide earlier access to pension benefits or enhance existing benefits. Known as the "5+5" early retirement incentive program in Illinois, the program allowed individuals to purchase an additional 5 years of age and 5 years of service credit to be used to compute their retirement benefit. Fitzpatrick and Lovenheim (2014) did not find that 5+5 program resulted in a decrease in student test scores, and instead it likely increased them. They showed that the 5+5 program was valuable to experienced teachers and offered a substantial increase in lifetime consumption relative to normal retirement for representative teachers, which helps explain the high take-rate among the population of teachers—as a result of this program, the Illinois public school system lost 10% of its teachers over a 2-year span. While the focus of Fitzpatrick and Lovenheim (2014) is on teacher quality, they do estimate potential costs and find that school districts saved

money from replacing experienced teachers with novice teachers, but also find that comparatively greater costs to the pension system due to earlier retirements resulted in a net cost to the state taxpayers of $92.3 million. To reach these cost estimates, Fitzpatrick and Lovenheim (2014) project changes in teacher retention based on historical differences. They do not have a model of teacher retention which limits their ability to estimate which teachers were incentivized to retire versus those that would have retired regardless. The 5+5 program is a particular VRI example in three ways: (1) it required teachers to pay an upfront premium to receive age and/or service credits and school districts were effectively required to pay an employer premium for the enhanced benefits if a teacher wanted to participate; (2) it allowed for earlier retirement than was currently available under the DB plan (i.e., teachers could retire as early as age 50 with 15 years of service rather than age 55 with 20 years of service); and (3) it was passed by the state legislature, thus requiring the pension fund to participate and to absorb any cost not covered by the premium paid by the district and employee. In the context of teacher pensions, this type of VRI is most often created by a state government.[2] Most VRIs originate at the district level and cannot shift costs to the pension fund or state government, though there can be changes in contributions to the pension fund and outlays from it depending on how many workers participate in the VRI.

Our following analysis adds to this literature by investigating retirement incentives available to those presently eligible for retirement and uses a model of retention that considers current pay, pension benefits and design, and preference for teaching to understand the personnel and financial consequences of offering a VRI for school districts. In doing so, it permits the analysis of economic rents which have not been a feature of the VRI literature to date—economic rents are payments to teachers that would have retired without the incentive. Understanding economic rents is critical to determining the true costs of VRIs and accurately projecting if differences in salary costs between junior and senior teachers following the VRI are sufficient to offset upfront incentive payments.

The Voluntary Retirement Incentive in Chicago Public Schools

In 2016, Chicago Public Schools (CPS) negotiated a new labor contract. To decrease operating costs and have more funds for pension contributions and for classrooms, CPS and the Chicago Teachers Union (CTU) agreed to a VRI. The VRI was expected to generate budget savings by encouraging the retirement of teachers eligible to retire and replacing them to some extent with less costly junior teachers. The salaries of these senior teachers are 70% higher than those of new teachers. More broadly, VRIs are a tool for shaping the workforce and VRIs are arguably less disruptive than layoffs or furloughs (Asch et al., 2016). Key features of the CPS VRI were (CTU, 2016):

- Eligibility: teachers had to be eligible for retirement
- Amount: $1,500 per year of CPS service
- Participation threshold: at least 1,500 out of approximately 2,700 retirement eligible teachers had to indicate their willingness to accept the VRI, otherwise the VRI would not be implemented.

Teachers in our data were eligible to retire for a pension without a reduction at age 62 with 5 years of service; age 60 with at least 20 years of service; or age 55 with at least 33.95 years of service. A teacher could retire with a reduced pension at age 55 with 20 years of service. CPS had approximately 21,500 teachers in 2016. The participation threshold of 1,500 teachers is 7% of the teacher workforce. The VRI for a 60-year-old teacher with at least 20 years of service would be $30,000, for instance. The VRI amount was not capped.

The contract was approved in early December 2016. Retirement eligible teachers had to submit their retirement notice on or before March 31, 2017, with an effective retirement date of June 30, 2017. The VRI offer was promoted through the CTU. In a separate analysis, we identified that 748 teachers signed up for the program, fewer than the threshold (Knapp et al., 2019). Consistent with the union contract, teachers electing to retire were allowed to rescind their retirement notice and the VRI was not paid. The retirement incentive would have been paid on December 31, 2017, had the participation threshold been met.

In this article, we consider the retention and cost impact of the VRI had it been implemented for the purpose of providing insights into the design and cost-effectiveness of VRIs. We predict retention and costs using an econometric structural model that captures teacher preferences to continue teaching based on historical data. To do this, we extend the teacher retention structural model in Knapp et al. (2016). The model is a dynamic stochastic model of teacher retention for entry cohorts of CPS teachers. A dynamic stochastic model is a multiperiod model where the individual makes decisions in the face of future uncertainty. We estimated it using longitudinal personnel data of teachers present in 1992 plus teachers entering through 2000, all tracked through 2012. Data on CPS teachers come from the Teacher Service Record database of the Illinois State Board of Education. This database contains annual school-year censuses of public school teachers.[3] The estimation procedure accounts for selective retention among incumbent teachers in 1992. An advantage of our modeling approach is that it permits assessments of the retention and cost effects of policies that have yet to be implemented in practice, such as the VRI.

Below, we first provide a narrative description of the model and describe the underlying intuition, method of estimation, and fit to the data. We then consider the retention effects and cost of a range of VRIs. The results show the number of teachers willing to accept the VRI, demonstrate the sensitivity of willingness-to-accept to alternative VRI levels, and quantify the extent of cost savings to the school district, if any, over a period of six years relative to cost in the baseline year. We discuss model limitations and offer closing thoughts on our VRI results and on the usefulness of models such as ours for the formulation and evaluation of teacher compensation and retirement policies.

Model

In each year, a teacher decides whether to stay in CPS or to leave based on available information to the teacher.[4] An individual's probability of staying in CPS at a point in time is based on whether her lifetime value from continuing to teach (i.e., staying) this school year exceeds her lifetime value from leaving teaching and pursuing her next best opportunity. A teacher's value of staying is comprised of known factors (e.g., pay) and estimated factors that reflect her preferences and expectations. Her value of staying is the sum of

- her annual pay in CPS,
- a teacher-specific factor that reflects her preference for teaching relative to the next best alternative,
- a common factor related to early career attrition that is the same for all teachers,
- the value of having the option to stay or leave in future periods (all future values are *present discounted* to reflect the notion that teachers value a dollar of compensation received today higher than a dollar of compensation received in the future), and
- a random teacher-year-specific factor, which we refer to as a *random shock*, capturing independent events that can encourage or discourage staying. The random shock is an additive term that randomly increases or decreases the value of staying in each period. Teachers do not know the value of the random shock in advance, but they are assumed to know the distribution of the random shock (that is, the probability that the random shock may take on a given positive or negative value) and that the mean of the random shock is zero.

The value of leaving CPS is the sum of

- the present discounted average annual pay in a non-CPS position from now until retirement from the labor force,
- the present discounted value (PDV) of accrued CPS retirement benefits,[5] and
- a random shock, capturing independent events that can encourage or discourage leaving.

The dynamic retention model assumes fully informed, far-sighted rational decision making given uncertainty about future events as captured by the random shocks. It allows teachers to differ in ways affecting retention, that is, teachers are heterogeneous. This is allowed through the teacher-specific factor. By implication, teachers of the same education, seniority, current compensation, expected retirement benefits, and having the same shock may nevertheless differ in their retention, with some choosing to stay and others choosing to leave. The specific attributes and conditions underlying the teacher-specific factor are unobserved in the data but assumed to be constant in magnitude and persistent over time for each teacher. The teacher-specific factor may include preference for teaching, teacher quality, teacher effort, and the persistent difference, if any, between the average external wage and the wage the teacher would expect to obtain given the teacher's private knowledge of their ability, interests, and transferability of teaching experience to nonteaching jobs.

Teacher attrition is high in the first years of teaching. Possible reasons are that new teachers overestimate the satisfaction they will derive from teaching and underestimate the hours of work and effort required; childbearing and child care may be relatively frequent for new teachers (relative to higher seniority teachers) and, for some, take priority over and displace teaching; new teachers may be tied-movers and their spouses or partners, also young, may be more likely to change jobs and locations compared with older spouses or partners; and the personal discount rate may tend to be higher at younger ages. Our model includes a factor common to all teachers that captures the net effect of such factors on retention in the early years of teaching.

Intuition on How the Model Works

The model is recursive and works backward from the final allowable period of teaching before mandatory retirement.[6] From the viewpoint of the current period, the teacher does not know whether she (or he) will be teaching in that period, but if she is, she will want to make the optimal choice between teaching and not teaching based on the value of staying and the value of leaving, defined earlier. As noted earlier, the teacher faces shocks with an expected value of zero, by assumption. If she knew the shocks, she would simply choose the alternative with the higher value. But the shocks in future periods are not known in the current period, and the best she can do from the viewpoint of the current period is to devise a rule for optimal behavior. The rule is based on expected values, but the rule also recognizes that when future shocks are realized, the optimal choice from the viewpoint of today may differ from the best choice once those shocks are known. That is, because the shocks in the next period are not known in the current period, there is some chance teaching will have a higher value than not teaching, and some chance the reverse will be true, and the teacher will want to make the optimal choice when the shock are realized. The best that can be done in the current period is to compute the expected value of the maximum.[7] This is called the option value of staying. All these terms together—teacher pay, teacher-specific factor, shock, and the discounted value of the expected value of the maximum in the next period—sum together to form the value of staying. The value of leaving has similar logic. Few teachers return to CPS once they leave, so the simplifying assumption of never returning is justifiable.[8] Under the assumption of no return, the value of leaving is the PDV of nonteaching wages until retirement from the labor force plus the PDV of retirement benefits given the teacher's pay and seniority as of the current period. With the values of staying and leaving in hand, the teacher stays if the value of staying exceeds the value of leaving.

Estimation

The dynamic retention model described earlier provides mathematical expressions for the values of staying and leaving. With the assumption that the shocks are drawn from an extreme value distribution, the probability of choosing to stay can be expressed in a closed form (i.e., a relatively simple mathematical expression) which facilitates estimation. The teacher-specific factor is assumed to be normally distributed. We use longitudinal personnel data from the Illinois State Board of Education to track teacher retention, identify

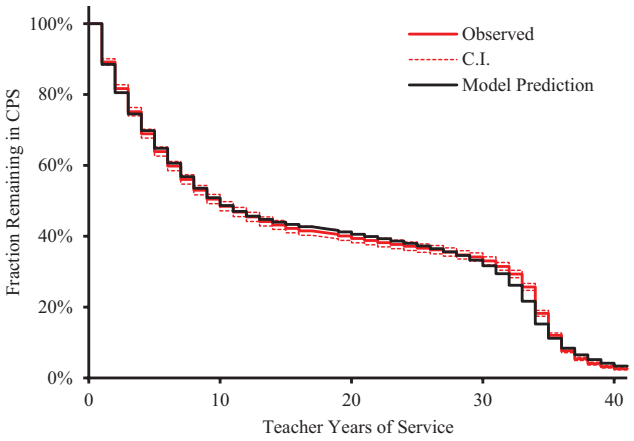


FIGURE 1. *Observed and predicted teacher retention.*
Note. CPS = Chicago Public Schools.

teacher characteristics (e.g., entry year, age) and earnings while teaching in CPS (additional information on the data used in this analysis is available in the online Supplemental Material, available on the journal website). Combined with CPS rules on retirement benefit vesting, eligibility, and amount, we estimate teacher pay and benefits. The expected nonteaching wage is predicted from wage regressions using March Current Population Survey data from 1962 to 2014 for individuals working in the Chicago metropolitan area with a bachelor's degree. Together, the decision-making framework and data enable the estimation of the model. Estimation is done by maximum likelihood. The estimates include

- Mean and variance of the teacher-specific factor
- Parameter describing early attrition
- Personal discount rate
- Variance of the shock distribution of shocks (the mean shock is zero)

All parameter estimates are statistically significant at levels of 0.0001 or better, and, when we simulate retention behavior of teachers using the estimated parameters and aggregating their predicted retention decisions, the estimated model fits the data well in terms of the cumulative probability of remaining in CPS, as seen in Figure 1.

Our results connect to other articles in this special issue. Goldhaber and Holden (2023) find that more than 76% of teachers choose to set aside more than Washington State's minimum requirements for pension contributions, implying that they value the expected future compensation more than the cost of forgone current compensation. The implied rate of return is at least 7.5%, which, though different, is not far from the personal discount rate we estimate of 5.7%. Consistent with our model and estimates, Kong and Ni (2023) show that the timing of teacher retirement is affected by the terms of the retirement benefit system. The opportunity to retire earlier causes earlier retirement—a year earlier under the system change they analyze.

Retention and Cost Under VRIs

Although our CPS data ended in 2012, we used the estimated model to project forward and predict which teachers would be retirement eligible at the end of the 2016–2017 school year, which was when teachers were asked if they would be willing to accept the VRI. We predicted 2,696 such teachers. Given this set of teachers, we introduced a VRI into their decision-making calculus by including a term in the value of leaving, that is, not continuing to the 2017–2018 school year. This term was the amount of the VRI based on the teacher's years of service in CPS. Consistent with the policy context, it was assumed to be a one-time, unanticipated offer. These assumptions—one-time, unanticipated—reflect the fact that CPS and CTU had just agreed on a new contract and offering the VRI, and the offer would be made once.

The 2016–2017 VRI offer was $1,500 per year of service. To understand how changing the VRI influences its effectiveness, we considered a range of VRIs relative to a baseline with no VRI, including: $1,000, $1,500, $2,000, $3,000, and $5,000.

A total of 588 teachers (22% of those eligible) were predicted to be willing to accept the $1,500 VRI, hence be willing to retire (Table 1). This number is far short of the 1,500 teachers needed to implement the VRI. Equally important, 73% of the 588 teachers would have retired anyway. At baseline, 430 teachers were predicted to retire, and the $1,500 VRI increased this by 158. Introducing the VRI would therefore result in economic rent (a payment in excess of that required to induce a teacher to retire) for most teachers because all retiring teachers would receive a VRI but only 158 were predicted to change their behavior because of the VRI, a 27% rescind rate. A much larger VRI, $5,000 per year of CPS service, achieved 1,088 retirements (40% of those eligible), yet that number was still below the required 1,500. The higher VRI would involve substantially more economic rent (i.e., even higher payments to teachers who would have retired anyway, or would have retired given a lower payment).

In the end, 29% of eligible teachers elected to retire, the benefit was not paid and 31% of those that elected to retire rescinded their retirement election (Knapp et al., 2019). This ex post percentage, 29%, is higher than our ex ante predicted percentage of 22% although the percentages are not far apart. A possible reason the ex post percentage is higher comes from factors outside our model and data; some teachers might have feared being laid off in the future and felt that accepting the VRI offer would be preferable to layoff without VRI.

We predicted not only retirements in the year the VRI was offered but also teacher retention for 5 more years. This allowed us to determine how many more teachers would need to be hired each year to keep the teacher workforce constant in size, relative to hiring under no VRI, that is, at baseline. Table 2 shows an example calculation for a VRI of $1,000. Teachers retiring because of the VRI would have retired within a couple years without the incentive: 58% within 2 years and 90% within 5 years. The VRI causes teachers to "move up" their retirement. This increases retirements in 2018 and reduces retirements in future years. As a result, hiring is increased in 2018 and decreased in future years, relative to baseline.

Consistent with most VRI proponents, CPS stakeholders saw the VRI as a promising policy because of its potential to decrease salary costs. The VRI is predicted to reduce salary cost in 2018, but this reduction is more than offset by the salary cost of new

Table 1
Retention of Retirement-Eligible Teachers Under the Baseline and Alternative Voluntary Retirement Incentive Amounts

Fiscal year	Baseline	$1,000 per Year	$1,500 per Year	$2,000 per Year	$3,000 per Year	$5,000 per Year
2017	2,696	2,696	2,696	2,696	2,696	2,696
2018	2,266	2,166	2,108	2,046	1,909	1,608
Retirements	430	530	588	650	787	1,088
Change in retirements from baseline		100	158	220	357	658

Table 2
Retention of Retirement-Eligible Teachers and New Hires Under the Baseline and Voluntary Retirement Incentives (VRI) of $1,000

Fiscal Year	Retention at Baseline	Implied New Hires at Baseline	Retention Under VRI	Implied New Hires Under VRI	Difference in New Hires
2017	2,696		2,696		
2018	2,266	430	2,166	530	100
2019	1,865	401	1,799	367	–34
2020	1,506	359	1,464	335	–24
2021	1,196	310	1,169	295	–15
2022	920	276	904	265	–11
2023	684	236	674	230	–6

Table 3
Salary Cost at Baseline and With Voluntary Retirement Incentives (VRI) of $1,000 per Year in 2017, Including New Hires (Millions of Dollars)

Fiscal Year	Decrease in Salary Cost (retirements)	Increase in Salary Cost (new hires)	Cost of VRI	Budget Savings
2018	8.6	4.9	15.2	–10.9
2019	5.7	3.7		2.3
2020	3.7	2.7		1.2
2021	2.4	2.1		0.5
2022	1.5	1.6		–0.06
2023	0.9	1.2		–0.3
Total	24.1	16.3	15.2	–7.3

hires and the cost of the VRI (Table 3). In subsequent years, sharp increases in salary over the first years of teaching narrow the salary gap from which potential savings are supposed to be derived. Viewed over the 6-year period from 2018 to 2023, the salary cost of teachers eligible to retire in 2017 decreases (because more teachers retire than at baseline), but the new hires generate a salary cost. On net, budget costs over this period do not decrease but instead increase by $7.3 million.

The increase in budget cost grows larger as VRI generosity increases (Table 4). This is driven by the cost of the VRI program, with the decrease in salary cost for retirees and increase in salary cost for additional hires having a minor role as they tend to offset. (The salary cost changes are not shown.) Much of the VRI cost is higher rent paid to get the marginal teacher to retire.

Still cost savings are possible if the additional teachers who retire under a VRI are not replaced (Table 5). District officials would need to consider whether the loss of senior teachers would affect class size and the quality of education adversely.

Limitations of Our Analysis

There are four principal limitations to our model: (1) we assume a constant personal discount rate, rather than one that might be higher at a younger age and decline as a person gets older; (2) we assume that teachers have full information in terms of being fully cognizant of all compensation and retirement benefits they are entitled to, as well as their opportunity wage outside of teaching—we do not allow for teachers to be "rationally inattentive" to details of their retirement plan; (3) we assume

Table 4
Budget Savings by Voluntary Retirement Incentives (VRI) Generosity, With Replacement Hiring (Millions of Dollars)

Fiscal Year	Baseline	$1,000 per Year	$1,500 per Year	$2,000 per Year	$3,000 per Year	$5,000 per Year
2018	—	–10.9	–18.6	–28.1	–53.0	–128.9
2019	—	2.3	3.7	5.2	8.6	16.5
2020	—	1.2	1.9	2.8	4.6	9.3
2021	—	0.5	0.7	1.1	1.9	4.1
2022	—	–0.06	–0.1	–0.1	–0.05	0.32
2023	—	–0.3	–0.5	–0.7	–1.1	–1.8
Total savings		–7.3	–12.8	–19.8	–39.0	–100.6

Table 5
Budget Savings by Voluntary Retirement Incentives (VRI) Generosity, Without Replacement Hiring (Millions of Dollars)

Fiscal Year	Baseline	$1,000 per Year	$1,500 per Year	$2,000 per Year	$3,000 per Year	$5,000 per Year
2018	—	–6.0	–10.8	–17.2	–35.3	–96.3
2019	—	6.0	9.6	13.5	22.2	42.4
2020	—	3.9	6.3	8.8	14.7	28.9
2021	—	2.5	4.0	5.7	9.6	19.3
2022	—	1.6	2.5	3.6	6.1	12.5
2023	—	0.9	1.5	2.1	3.6	7.5
Total savings		8.9	13.0	16.5	20.9	14.2

that the distribution of the random shock is constant over time, rather than increasing or decreasing over time or with income; and (4) the outside wage may be overstated for older teachers as we use the average wage of workers with the same approximate labor force experience, whereas the wage of teachers transitioning to nonteaching jobs would be more appropriate.

In contrast to the model's assumptions, a small decrease in variance of the random shock for older teachers and an expected external wage somewhat less than the average wage for older teachers would help explain why teacher retention is slightly higher than predicted by the model for older teachers.

We analyzed the VRI from the perspective of the school district, so we did not consider changes in costs arising from the VRI to other parties that are potentially affected by it, such as the teacher pension fund. The district bears the direct cost of this VRI and decides whether or not to implement it. However, if teachers retire earlier, the pension fund incurs higher immediate costs as more teachers draw their benefits. Whether the pension fund incurs higher long-term costs from earlier retirement depends on if permanently lower benefit payments from earlier claiming are sufficient to compensate for the additional year of pension payments. This, in turn, depends on a number of factors including the pension fund's rate of return, the longevity of marginal teachers, and cost-of-living adjustments. Our calculations indicate that the long-term costs of earlier retirement in the Chicago teacher pension system are higher for teachers who are eligible for early retirement at reduced benefits but not yet eligible for regular retirement at full benefits, but typically lower for those eligible for full benefits.[9] Given the observed characteristics of those who rescinded the VRI, we find that the VRI would have increased long-term pension system costs by less than $1 million if the teachers observed rescinding their retirement election would have retired one year earlier under the VRI.[10]

Closing Thoughts

Retirement incentives are frequently used by local school boards for districts facing financial difficulties. They provide a means of either decreasing staff size or replacing retiring senior teachers with less expensive junior teachers. We investigate these claims by using an estimated model of teacher retention in Chicago Public Schools to simulate retention responses to a one-time VRI offered to Chicago teachers in the 2016–2017 school year and compare it with a counterfactual simulation of retention without the VRI. We find that (1) most teachers who receive the VRI would have retired without the incentive leading to substantial economic rents, (2) marginal teachers—those that retired because of the VRI—are likely to have retired within a couple years without the incentive, and (3) sharp increases in salary over the first years of teaching narrow the salary gap from which potential savings might derive (see Tables 1, 2, and 3, respectively).

Regardless of what district they are offered in, VRI eligible populations consist of teachers that will not retire, marginal teachers, and teachers that will retire without a VRI. Cost savings from a VRI require long-term differences between the salaries of marginal teachers and their replacements, if any, to be sufficient

to compensate for the costs of VRI payments to marginal teachers and teachers that would retire without a VRI. Nonretiring teachers may become marginal teachers with more generous VRIs. Our analysis finds that marginal teachers are likely to leave within a couple years of the incentive offer. Consequently, if teachers are replaced, the VRI will have a net cost rather than producing savings for the district (Table 4). If teachers are not replaced, then it can be an effective solution for reducing workforce size and labor costs (Table 5). We conclude that VRIs do not save money if they only involve replacing senior teachers with junior teachers.

Our findings are generalizable because the mechanisms in our structural model that identify them rely on elements that are common to most school systems. While the attributes of the pay schedule and pension systems incorporated into the model are specific to Chicago, the nature of teacher compensation is typical of most school districts in the United States. Furthermore, even though the model is estimated on Chicago Public School teachers the retention behavior our model matches in Figure 1 is not unique to Chicago.[11]

We have identified more than a dozen school districts with proposed or implemented VRIs in 2021, suggesting they remain a popular policy instrument. Additionally, state bills in New York and Massachusetts propose to implement VRIs with an option to purchase age or service credit. We did not explicitly analyze retirement incentives that permit an option to purchase age or service credit. In these cases, the cost savings are likely sensitive to the option's cost which is typically set by the legislature (e.g., see Fitzpatrick & Lovenheim, 2014), but we expect that our theoretical responses would be similarly reflected in these cases as well, namely, selective take-up by those likely to retire in the near future.

Empirically based models of retention behavior, such as ours or Kong and Ni's (2021), can provide counterfactual simulations on alternative, untried policies. Such models combine theory with empirical inference based on past behavior with respect to teacher retention and retirement, and therefore give insight into whether a contemplated policy would be effective and how it should be designed. The policy could be like one implemented in the past, but need not be. The model is versatile enough to analyze a variety of other changes to teacher pensions that have been under consideration by policy makers, including longer tenure to qualify for benefits, shift from a DB to a DC system, increased contribution rates, and altering the shape of the teacher pay schedule, for example, increasing junior pay relative to senior pay or vice versa.

ORCID ID

David Knapp https://orcid.org/0000-0002-9469-0692

NOTES

Funding for this study was provided by philanthropic contributions from RAND supporters and income from operations. We thank Darleen Opfer for her support and encouragement during the many stages of this work. This research benefitted significantly from input provided by Michael Podgursky, Kata Mihaly, two anonymous reviewers and the editor. Authors James Hosek, Michael Mattock, and Beth Asch authored the article within the scope of employment for their employer, RAND Corporation. All errors are the authors' own.

[1]We identified retirement incentives based on a structured internet search of news articles from 2010 or later pertaining to "teacher early retirement incentive" that returned about 15,000 results. We reviewed the first 150 and identified 43 examples where retirement incentives were offered or considered, of which 32 occurred since 2016. Further searching by state revealed a dozen more cases. Most retirement incentives appear to be offered at the school district level, either due to contract negotiations between a district and its teacher's union or unilaterally by the school board. Consequently, they are not always covered by local news providers thus preventing a complete picture of how common they are.

[2]Current examples include the VRIs considered by New York and Massachusetts state legislatures in 2021.

[3]Our data stop in 2012 because the Board switched information systems between 2012 and 2013, preventing us from being able to link personnel across systems.

[4]Here we provide a nonmathematical overview of the model. A more technical description of the model and the data used is provided in the online Supplemental Material (available on the journal website). The complete model and discussion of the data is included in Knapp et al. (2016).

[5]CPS teachers do not participate in Old-Age and Survivor Insurance, that is, Social Security. As in Knapp et al. (2016), we considered including these benefits as part of the value of leaving but found that including them produced poorer fit and was sensitive to the choice of maximum working age.

[6]A mandatory retirement age is included in the model to make it tractable to estimate. The mandatory retirement age is set at age 66—an age at which the vast majority of Chicago teachers have retired. Teacher pensions no longer have mandatory retirement ages.

[7]It equals the probability that the value of teaching is greater than that of not teaching times the expected value of teaching conditional on its being greater, plus the probability that the value of not teaching is greater times the expected value of not teaching conditional on its being greater.

[8]Retired CPS teachers will have their pension benefits cancelled if they return to work and earn more than $30,000 or work more than 120 days (Chicago Teachers' Pension Fund, 2019). Teachers whose benefits are canceled have to apply to re-retire in order to collect a pension again.

[9]This statement is robust to reasonable assumptions about the fund's rate of return, inflation, and longevity based on the author's calculations using CPS benefit rules, required cost-of-living adjustments and salary trajectories. Prior to eligibility for full-benefits, claiming a year earlier leads to a permanent penalty of 6% lower benefits and one less year of service, which is sufficient to compensate the pension fund over the long term for the additional year of pension payments. After full-benefit eligibility, claiming a year earlier only leads to one less year of service which is typically insufficient to compensate the pension fund over the long term for the additional year of pension payments.

[10]Estimates based on a 7.5% nominal rate of return for the pension fund, required cost-of-living adjustments, estimated salary trajectories, and assume teachers survive to age 85.

[11]We have identified similar patterns across the career in South Carolina (Knapp et al., 2021) and Pennsylvania and, although depicted differently, authors find a similar pattern for late career teachers in Missouri schools (Ni & Podgursky, 2016) and late career teachers in Tennessee schools (Ni et al., 2020).

REFERENCES

Asch, B., Haider, S. J., & Zissimopoulos, J. (2005). Financial incentives and retirement: Evidence from federal civil service workers. *Journal of Public Economics*, *89*(2–3), 427–440. https://doi.org/10.1016/j.jpubeco.2003.12.006

Asch, B. J., Hosek, J., Mattock, M. G., Knapp, D., & Kavanagh, J. (2016). *Workforce downsizing and restructuring in the Department of Defense: The voluntary separation incentive payment program versus involuntary separation*. RAND Corporation. https://doi.org/10.7249/RR1540

Brown, K. (2013). The link between pensions and retirement timing: Lessons from California teachers. *Journal of Public Economics*, *98*(February), 1–14. https://doi.org/10.1016/j.jpubeco.2012.10.007

Burtless, G. (1986). Social security, unanticipated benefit increases, and the timing of retirement. *Review of Economic Studies*, *53*(5), 781–805. https://doi.org/10.2307/2297719

Chicago Teachers' Pension Fund. (2019). *CTPF administrative rules—Return to work*. https://www.ctpf.org/sites/files/2020-10/return_to_work_policy_2019.11.11.pdf

Chicago Teachers Union. (2016). *Agreement between The Board of Education of the City of Chicago and Chicago Teachers Union Local 1, American Federation of Teachers, AFL-CIO*. https://contract.ctunet.com/

Costrell, R. M., & McGee, J. B. (2010). Teacher pension incentives, retirement behavior, and potential for reform in Arkansas. *Education Finance and Policy*, *5*(4), 492–518. https://doi.org/10.1162/EDFP_a_00013

Costrell, R. M., & Podgursky, M. (2009). Peaks, cliffs, and valleys: The peculiar incentives in teacher retirement systems and their consequences for school staffing. *Education Finance and Policy*, *4*(2), 175–211. https://doi.org/10.1162/edfp.2009.4.2.175

Fitzpatrick, M. D. (2015). How much are public school teachers willing to pay for their retirement benefits? *American Economic Journal: Economic Policy*, *7*(4), 165–188. https://doi.org/10.1257/pol.20140087

Fitzpatrick, M. D., & Lovenheim, M. F. (2014). Early retirement incentives and student achievement. *American Economic Journal: Economic Policy*, *6*(3), 120–154. https://doi.org/10.1257/pol.6.3.120

Friedberg, L., & Turner, S. (2010). Labor market effects of pensions and implications for teachers. *Education Finance and Policy*, *5*(4), 463–491. https://doi.org/10.1162/EDFP_a_00011

Furgeson, J., Strauss, R. P., & Vogt, W. B. (2006). The effects of defined benefit pension incentives and working conditions on teacher retirement decisions. *Education Nance and Policy*, *1*(3), 316–348. https://doi.org/10.1162/edfp.2006.1.3.316

Goldhaber, D., Grout, C., & Holden, K. L. (2017). Pension structure and employee turnover: Evidence from a large public pension system. *ILR Review*, *70*(4), 976–1007. https://doi.org/10.1177/0019793916678424

Goldhaber, D., & Holden, K. L. (2023). How much do teachers value compensation deferred for retirement? Evidence from defined contribution rate choices. *Educational Researcher*, *52*(2), 80–90.

Gotz, G. A., & McCall, J. J. (1984). *A dynamic retention model of Air Force officers: Theory and estimates*. RAND Corporation. https://www.rand.org/pubs/reports/R3028.html

Gustman, A. L., & Steinmeier, T. L. (1986). A structural retirement model. *Econometrica*, *54*(3), 555–584. https://doi.org/10.2307/1911308

Hogarth, J. M. (1988). Accepting an early retirement bonus. *Journal of Human Resources*, *23*(1), 21–33. https://doi.org/10.2307/145842

Kim, D., Koedel, C., Kong, W., Ni, S., Podgursky, M., & Wu, W. (2021). Pensions and late-career teacher retention. *Education Finance and Policy*, *16*(1), 42–65. https://doi.org/10.1162/edfp_a_00293

Knapp, D., Asch, B. J., & Mattock, M. G. (2021). *Public employee retention responses to alternative retirement plan design: South Carolina teachers and state public employees*. RAND Corporation. https://doi.org/10.7249/WRA816-1

Knapp, D., Brown, K., Hosek, J., Mattock, M. G., & Asch, B. J. (2016). *Retirement benefits and teacher retention: A structural modeling approach*. RAND Corporation. https://www.rand.org/pubs/research_reports/RR1448.html

Knapp, D., Hosek, J., Mattock, M. G., & Asch, B. J. (2019). Predicting retention behavior: Ex ante prediction and ex post realization of a voluntary retirement incentive offer. RAND Corporation. https://www.rand.org/pubs/working_papers/WR1289.html

Koedel, C., Podgursky, M., & Shi, S. (2013). Teacher pension systems, the composition of the teaching workforce, and teacher quality. *Journal of Policy Analysis and Management*, *32*(3), 574–596. https://doi.org/10.1002/pam.21699

Kong, W., & Ni, S. (2023). A structural econometric approach to analyzing the impact of teacher pension reform. *Educational Researcher*, *52*(2), 63–70.

Lumsdaine, R. L., Stock, J. H., & Wise, D. A. (1990). Efficient windows and labor force reduction. *Journal of Public Economics*, *43*(2), 131–159. https://doi.org/10.1016/0047-2727(90)90027-F

Ni, S., & Podgursky, M. (2016). How teachers respond to pension system incentives: New estimates and policy applications. *Journal of Labor Economics*, *34*(4), 1075–1104. https://doi.org/10.1086/686263

Ni, S., Podgursky, M., & Wang, X. (2020). Teacher pension plan incentives, retirement decisions, and workforce quality. *Journal of Human Resources*. Advance online publication. https://doi.org/10.3368/jhr.57.1.1218-9912R2

Pencavel, J. (2001). The response of employees to severance incentives: The University of California's faculty, 1991–94. *Journal of Human Resources*, *36*(1), 58–84. https://doi.org/10.2307/3069670

Stock, J. H., & Wise, D. A. (1990). Pensions, the option value of work, and retirement. *Econometrica*, *58*(5), 1151–1180. https://doi.org/10.2307/2938304

AUTHORS

JAMES HOSEK, PhD, is an adjunct economist at the RAND Corporation, 1776 Main Street, Santa Monica, CA, 90401; *jrh@rand.org*. His research focuses on compensation and personnel economics.

DAVID KNAPP, PhD, is a research scientist at the University of Southern California, Center for Economic and Social Research, 1090 Vermont Avenue NW, Suite 1250, Washington, DC 20005; *dmknapp@usc.edu*. His research focuses on pensions, retirement decision making, and workforce issues.

MICHAEL G. MATTOCK, MS, is a senior economist at the RAND Corporation, 1776 Main Street, Santa Monica, CA, 90401; *mattock@rand.org*. His research focuses on personnel economics, applied microeconomics, and computational economics.

BETH J. ASCH, PhD, is a senior economist at the RAND Corporation, 1776 Main Street, Santa Monica, CA, 90401; *asch@rand.org*. Her research focuses on compensation and incentives, personnel economics, and government workforce issues.

Manuscript received September 11, 2020
Revisions received February 5, 2021,
and October 11, 2021
Accepted November 3, 2021

A Structural Econometric Approach to Analyzing the Impact of Teacher Pension Reform

Wei Kong[1] and Shawn Ni[2]

The growing fiscal cost of K–12 teacher pension plans and pension-induced labor market distortions have led to calls for teacher pension reforms. Dynamic structural econometric models are a useful way to analyze the fiscal and staffing consequences of current and alternative retirement plans. This article lays out the benefits of the structural econometric modeling approach for analyzing changes to teacher pension plans and estimates such a model for Missouri public school teachers. The results are then used to simulate effects of a pension reform on teacher retirement and employer pension costs.

Keywords: decision-making; econometric analysis; economics of education; educational policy; policy; structural equation modeling

The Need to Reform DB Pensions

U.S. K–12 public school teachers are typically covered by state defined-benefit (DB) pension plans. During the 1990s, the DB pension rules were modified in more than half of the states in the United States to make the retirement benefits more generous (Koedel, Ni, & Podgursky, 2014). Teacher pension costs have been rising in the past decades. Nationally, employer costs for public teacher pensions doubled from 2004 to 2019 (from 11.9% of salaries to 23.6%; see Costrell, 2020). The rising pension costs are forcing cuts in other areas of school budgets, such as increases in teacher salaries, with little prospect for relief in the near term (Burnette & Will, 2018; Costrell & Maloney, 2013; Krausen & Willis, 2018; McGee, 2016.).

Aside from the fiscal pressure on the states, the DB plans also distort teachers' labor supply incentives throughout their careers. For young teachers with uncertain career plans, the DB system imposes a large penalty on mobility and early exit from a pension system before reaching the "pension cliff" because retirement benefits are not portable across state pension systems (see Hansen, 2010; McGee & Winters, 2019). Because of rising pension costs, young teachers are contributing an increasing share of their salaries to the pension plans while expecting lower salary increases. The burdens of the DB plans on young teachers hamper the recruitment of new talent and may reduce the quality of the teaching workforce in the long term. For mid- and late-career teachers, DB plans create strong incentives to "pull" teachers to remain in the classroom until reaching a certain age or experience and then "pushes" them into retirement (see Brown, 2013; Costrell & McGee, 2010; Costrell & Podgursky, 2009; Fitzpatrick & Lovenheim, 2014; Friedberg & Turner, 2010; Furgeson et al., 2006; Knapp et al., 2016; Ni & Podgursky, 2016). The push incentives of current plans encourage retirement at relatively early ages, resulting in teachers retiring earlier than other comparable professionals (Harris & Adams, 2007), which potentially exacerbates staffing challenges for schools. The pull and push incentives also reduce the quality of the mid- to late-career teaching workforce.[1] The loss in experienced high-quality teachers can adversely affect long-term student outcomes such as college attendance and labor market earnings (Chetty et al., 2014).[2]

Unfunded pension liabilities and the labor market distortions have generated calls for reforms of DB plans (Backes et al., 2016; Doherty et al., 2012; Kim et al., 2021; Malanga & McGee, 2018; McGee & Winters, 2016; Novy-Marx & Rauh, 2011, among others). One type of reform proposal aims to replace DB plans with defined contribution (DC) or hybrids of DC/DB plans (e.g., Chingos & West, 2015, and Goldhaber & Holden, 2020, on experiment of DC options in Florida and Washington states). Another type of reform focuses on giving teachers additional options within the DB plans (e.g., Costrell & McGee, 2010, on Arkansas's DROP plan for teaching postseparation and Kim et al.,

[1]Shanghai University of International Business and Economics, Shanghai
[2]University of Missouri-Columbia, Columbia, MO

Educational Researcher, Vol. 52 No. 2, pp. 63–70
DOI: 10.3102/0013189X221080913

2021, and Ni et al., 2020, on design of bonus enticing high-quality teachers in high-poverty schools to postpone retirement).

Assessing the labor supply and fiscal effect of pension reforms requires predicting outcomes of policies that generally have not been implemented in the past, thus precluding the use of conventional policy evaluation tools. In addition, pilot studies or policy experiments produce limited information because the full effects of pension reforms may take decades to materialize. Furthermore, the lessons from a specific plan change may not generalize to similar plan changes in a different setting given factors such as Social Security coverage, which is absent in many states. Instead of focusing on empirical evidence from experiments with specific pension reforms, we present a general framework for analyzing the incentive effects of plan rules using structural econometric modeling.

First, we examine methodological difficulties in evaluating pension reform proposals and lay out the structural econometric modeling approach for policy analysis. Then, we estimate the model using Missouri administrative data on teacher retirements in the presence of pension rule changes. Finally, we show how the estimated structural model can be used to simulate the effects on teacher retirement and employer pension costs of an option of permitting late-career teachers to voluntarily switch to a DC plan.

Methodological Challenges to Analysis of Pension Reform

There are a number of difficulties with predicting outcomes of reforms using traditional policy evaluation methods, especially in the presence of changing pension rules.

First, existing pension rules are complex, as are proposed changes to pension rules. A typical DB pension plan has multiple age and/or service requirements for regular or early retirement benefits. Benefits at retirement are determined by a formula such as this: annual benefit = replacement rate × service years × final average salary, where final average salary is typically the highest 3 to 5 years of annual earnings. Changes in rules may concern age and/or experience eligibility for retirement, the replacement factor, cost of living allowances, and sometimes a combination of multiple factors. The impact of these factors can be nonlinear on benefits, which makes it difficult to extrapolate the estimated effect from one experiment to other settings (see Kong et al., 2018).

Second, the effects of pension rules (or any other economic policy) depend on the targeted population. In practice, researchers interpret the estimated effects of different policies and predict effects of unimplemented policies implicitly conditional on the same population. The problem in the context of retirement research is that the population of senior teachers is policy dependent. Each year, late-career teachers observed working in any sample depend on pension rules implemented in the past and pension rules expected to be in place in the future. Thus, we need a framework that accounts for sample dependence in model estimation and enables the use of the estimated model for analyzing policy effects in different environments.

Third, the full impact of a policy's effect on retirement may take a long time to materialize. The effects of pension plan rule changes, if permanently implemented, play out over many years because forward-looking employees are likely to change their employment plans many years in advance of retirement. This means that short-term effects may differ from long-term effects.

Because of these difficulties, conventional econometric analysis through regressing teacher-level data on proxies for pension rules likely yields biased estimates of the true policy effects, and estimates of "treatment effects" based on variation in aggregate retirement rates or cross-pension plan variation in retirement rates are also unreliable for evaluating the effects of plan differences.

Given these limitations in using traditional econometric evaluation methods, we use a structural econometric model to estimate the effect of changes to teacher pension plans. The term "structural econometric model" here means economic agents (teachers) make decisions (on retirement) by maximizing an objective function (the utility function that captures teachers' preferences) given the economic environment (pension rules) and information set (how current variables are used to form predictions of future variables). Finally, we see how predictions from the model fit observed behavior.[3]

In a structural model, teacher decisions are based on utility functions that are described by a set of "structural parameters." These structural parameters quantify the nature of teachers' preferences (e.g., teachers' willingness in delaying receiving income and preference toward risk). The desire for maximizing utility and the value of the structural parameters are both independent of pension rules and salaries the teachers receive. Once we estimate the structural parameters from observations on teachers' decisions in one environment, we can use the parameters to predict teachers' decisions when facing a different set of choices. All relevant elements in the hypothesized decision-making process are explicitly specified, but, as in any model, some elements of reality are omitted. The empirical performance of a structural econometric model depends on whether it captures the key elements of the decision-making in practice. Our research shows that the structural approach is suitable for modeling teachers' retirement decisions because the pension rules are a key factor in retirement decisions and retirement decisions are typically based on careful calculations of teachers. For a more comprehensive discussion on the methodology of structural models in other contexts, see Low and Meghir (2017).

Consider an "option value" model for teacher retirement, where a utility-maximizing teacher chooses to retire in the current year (t) if retiring in t generates higher expected utility than retiring in any future year (m) and chooses to continue teaching otherwise, all conditional on information available in year t. (The term "option value" is used to describe this model because in a DB plan, the retirement decision, once made, is irreversible.) This retirement decision is made in a dynamic setting in each year by teachers who have chosen to continue working up to that time. The expected (future) utility from continuing to work depends on pension rules and expected future salary. However, pension incentives are not the only driver of retirement decisions. In particular, teachers with the same observed characteristics (e.g., age, gender, etc.) retire at different times. Unobserved factors such as the preferences for teaching, family concerns, and health conditions can also play important roles in retirement decisions. We model these unobserved factors through the introduction of preference errors. Although we do

not have data on each of these factors (because they are, by definition, unobserved), we account for them with these preference error terms in the model so that the estimates of the parameters we are interested in are not biased. Empirical evidence suggests the preference errors are correlated over time (e.g., poor health or adverse family circumstances may persist from one year to the next). The fundamental assumption is that a vector of structural parameters and the distribution of the preference errors are independent of the pension rules.

To be more specific, suppose we use a binary choice variable to denote the retirement decision: $d_t = 1$ if a teacher retires in period t, and $d_t = 0$ otherwise. How do we connect the option value model to the observed sequence of decisions? In Appendix 1, available on the journal website, we show that in the option value model, the teacher with preference error (for teaching) ν_t retires in t if $f_t \leq -\nu_t$ for a threshold f_t and continues to teach otherwise. The threshold of the preference error in period t, f_t, depends on the set up of the decision model, the model parameter vector $\mathbf{b}$ (that determines the teacher's preferences), teacher's observables related to retirement decision $\mathbf{s}_t$ (e.g., age and experience) in period t, and the pension rules R. To make the dependence explicit, we denote f_t as $f_t(\mathbf{b}, \mathbf{s}_t, \mathrm{R})$. The threshold condition can be written as a model of a latent variable,

$$z_t = f_t(\mathbf{b}, \mathbf{s}_t, \mathrm{R}) + v_t, \tag{1}$$

where $d_t = 1$ if $z_t \leq 0$ and $d_t = 0$ if $z_t > 0$. We assume the preference error follows $v_t = \rho v_{t-1} + \varepsilon_t, \varepsilon_t$ is independent and identically distributed (iid) normal $N(0, \sigma^2)$ and parameters (ρ, σ) is part of the parameter vector $\mathbf{b}$. The structural model depends on the assumptions regarding teacher preference and the environment in which teachers make retirement decisions. These assumptions restrict the function $f_t(\mathbf{b}, \mathbf{s}_t, \mathrm{R})$ in Equation 1. We keep the subscript t in the function $f_t(.,.,.)$ to signify potential updates in teachers' expectation of future rules and time-varying distribution of preference errors of remaining teachers. The population of teachers is affected by pension rules. Although the unconditional distribution of the preference errors is assumed to be a simple normal distribution, the distribution of preference errors conditional on the population of senior teachers with observed decisions on retirement is complex. Estimation of the structural parameters is based on the conditional distribution. The preference errors are serially correlated, and as the pension rules change over time, the distribution of preference errors for a given initial cohort of teachers changes as well. In estimating the structural model, we take into account this change in the distribution of preference errors over time. The technical details can be found in Kong et al. (2018).

In contrast to the structural model Equation 1, in a typical reduced-form probit regression model for retirement, we assume a latent variable,

$$z_t^{\#} = \boldsymbol{x}_t' \boldsymbol{\delta} + v_t^{\#}, \tag{2}$$

where $d_t = 1$ if $z_t^{\#} \leq 0$ and $d_t = 0$ if $z_t^{\#} > 0$. The regressor $\boldsymbol{x}$ is a vector of observable variables related to the retirement decision such as teachers' characteristics and proxies of pension rules. The error $v_t^{\#}$ is assumed to be standard normal. The reduced-form parameters to be estimated in Equation 2 is vector $\boldsymbol{\delta}$.

Despite the apparent similarity, the structural model Equation 1 and the reduced-form model Equation 2 differ fundamentally. In the structural model Equation 1, the threshold of preference errors, f_t, captures financial incentives of the pension rules for the utility-maximizing teacher. Given structural parameter vector $\boldsymbol{b}$, the functional form of f_t depends on the pension rules, but parameter $\boldsymbol{b}$ is independent of the historical pension rules. With estimated parameter vector $\boldsymbol{b}$, model Equation 1 can be used for prediction of the effect of new pension rules, R', which corresponds to a new function, $f_t(\mathbf{b}, \mathbf{s}_t, \mathrm{R}')$ in Equation 1. The new rules may be hypothetical rules that differ from the current rules (or any rules that have ever been observed) or rules implemented in a different time. This flexibility enables easy comparison of predicted outcomes from a large number of pension policies. By contrast, in the reduced-form model Equation 2, the vector parameter $\boldsymbol{\delta}$ is generally affected by the pension rules actually in place. If those rules change, then so does $\boldsymbol{\delta}$.

Before we rely on the model and the structural parameters for simulation of alternative policies, we first examine the "in-sample fit," specifically, how well the parameters fit the sample we use for estimation, and the "out-of-sample fit" (how well they fit samples not used for estimation, e.g., data from a different time or state that has different pension rules). The external validity of the structural model Equation 1 can be verified by its out-of-sample predictive performance in the presence of changes in pension rules. In contrast, although the reduced-form model Equation 2 may fit one sample reasonably well, it is unreliable for out-of-sample prediction because the estimates of $\boldsymbol{\delta}$ are not generally applicable under new pension rules.

Analysis of Missouri Pension Enhancements

The structural econometric model used for the policy simulations must be able to fit the observed teachers' retirement choices under the historical and current pension rules, and it must be useful for predicting teacher retirement behavior under pension rules that differ from those implemented in the past.

We model teacher retirements based on Ni and Podgursky (2016), who, in turn, used the general "option value" framework developed by Stock and Wise (1990) to estimate a structural model that explains the recurring decision to work or retire at later stages of the career cycle. Thus, each year, a teacher compares the value of exercising the option (retiring) versus continuing to work and exercising the retirement option at a future date.

During the 1990s, pension benefits were enhanced for public K–12 teachers in many states. These enhancements caused a significant increase in pension liabilities (Koedel et al., 2014), yet their effects are rarely investigated. We now use our structural econometric model to examine the effects of pension rule enhancements using a large administrative panel data set for public school teachers in Missouri. The pension enhancements occurred each year from 1995 to 2002. Missouri public school teachers, like nearly all public school employees, are covered by a DB pension system in a statewide educator plan—the Public School Retirement System (PSRS). Before the enhancement in 1994, the replacement factor was 2.3%, and vested PSRS

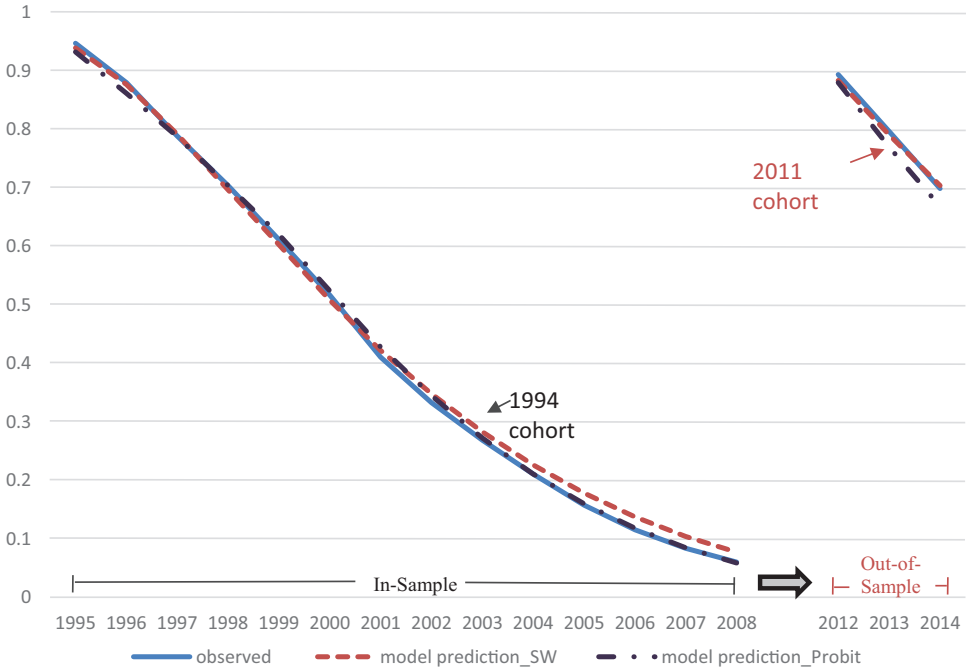


FIGURE 1. *Predicted versus observed employment survival rate.*

Note. Employment survival rate is the fraction of teachers in the initial year who remain. For the in-sample fit, we use Missouri Public School Retirement System (PSRS) female and male teachers who are age 47 to 64 and have at least 5 years of experience in the initial year of 1994. For the out-of-sample fit, we use PSRS data during 2011–2014 for teachers who are age 47 to 64 and have at least 5 years of experience in the initial year of 2011. Simulated survival rates both in and out sample are based on the estimates of Table A1 in Appendix 1, available on the journal website. The probit model is specified in Note 4.

teachers became eligible for a full pension if they met one of three conditions: (a) 60 years of age, (b) 30 years of experience, or (c) at least 55 years of age and 25 years of experience. The pension rules experienced several major enhancements: "25 and out" introduced in 1996 permitted retirement without the age restriction at a reduced rate if teachers have 25 or more years of experience. The "rule of 80" introduced in 2000 permitted regular retirement if the sum of age and years of service equals or exceeds 80. The replacement factor was raised to 2.5% in 1999 from 2.3% and to 2.55% in 2002 for teachers with experience of 31 years or more.

The option value model described in Appendix 1, available on the journal website, is estimated on a cohort of 12,871 Missouri PSRS teachers aged 47 to 64 and with 5 or more years of experience in the 1993–1994 academic year. We track how well the estimated option value model fit the cohort forward to the 2008 academic year. We also estimate a reduced-form probit model by regressing teachers' retirement decision on a number of teacher-specific variables and policy dummies.[4]

Roughly 94% of the teachers in our 1994 sample retired by 2008. One measure of in-sample fit is the observed and predicted employment survival rates (the portion of the initial sample who remain teaching during 1995–2008).[5] Figure 1 shows the employment survival rates simulated from the option value model and the probit model both track the observed ones each year, with the latter fitting more closely. We also examine the out-of-sample predictive performance of the estimated models. We simulate retirement decisions using structural parameters estimated based on the 1994–2008 sample in Table A1 (in Appendix 1, available on the journal website) to predict the retirement behavior for a new 2010–2011 cohort aged 47 to 64 with at least 5 years of experience. We track this cohort forward to 2013–2014 to examine out-of-sample performance by the option value model. It is not always feasible to make out-of-sample prediction with rule changes by using reduced-form regressions, but the presence of rules observed in the 1994–2008 sample in 2012 and absence of new rules afterward made it possible to conduct out-of-sample prediction for the 2012–2014 cohort using the probit model estimated from the 1994 cohort. The post–2011 portion of Figure 1 compares the observed and simulated employment survival rates. The option value model fits well. The probit model does not fit the 2011–2014 data as well as the option value model, and its prediction errors grow over time.

As noted earlier, some major enhancements include the introduction of 25 and out and the rule of 80. What is the impact of each of these enhancements, and what is the combined effect of all of the enhancements? Using the estimated option value model, we conduct the following thought experiments. Starting from the postenhancements policy baseline, we first remove one enhancement at a time (e.g., 25 and out) and keep the rest of the enhancements the same as in the baseline and stimulate the change in average retirement age (which equals to the change in average retirement experience). We then simulate the effects of removing all enhancements from the option value model and the reduced-form probit. The first and second columns of Table 1 show that for the 1994 cohort, the estimated effect of removing 25 and out (rule of 80) by the option value model is larger (smaller) than that by the reduced-form probit. The estimated

Table 1
Simulated Effect in Average Retirement Age by Removing Enhancements

	Probit estimate of effect on the 1994 cohort	Structural estimate of effect on the 1994 cohort	Structural estimate of long-term effect in steady state
Removing "25 and out"	+0.06	+0.16	+0.45
Removing "rule of 80"	+0.12	+0.09	+0.18
Removing all 1990s' enhancements	+0.44	+0.39	+1.10

Note. The structural model simulation is based on the estimates of Table A1 in Appendix 1, available on the journal website. The probit model is specified in Note 4. Effect on the 1994 cohort is the average simulated age under counterfactual scenarios subtracting that under the enhancements experienced by the 1994 cohort. Long-term effect in steady state is the average simulated age under counterfactual scenarios subtracting that with all enhancements in place.

effect of all enhancements on average retirement age is similar for the probit and the option value models. Because we track the vast majority of teachers in the 1994 cohort to retirement, the reduced-form regression picks up the observed responses to each enhancement without modeling the shifts in financial incentives. The option value model, on the other hand, models the shift in financial incentives with a few structural parameters. The two approaches yield similar estimated policy effect for the observed sample. The second column of Table 1 shows that for the cohort of teachers in the 1994 sample, removing the pension enhancements would *raise* the average career by 0.4 years (which means more than 5,000 additional years total taught by the cohort of 12,871 teachers).

However, the estimated policy effect for the 1994 cohort is misleading and understates the long-term effects because the enhancements occurred sequentially and did not affect teachers who retired earlier in the sample period or already qualified to retire without the enhancements. The effects of enhancements may take a long time to fully materialize on all future teachers.

We also considered the long run in a steady state, where the retired teachers are replaced by senior teachers who are approaching retirement eligibility. Using the option value model, we simulate the effect of changing pension rules through reshaping teacher distribution in the long run. The third column of Table 1 shows that in the steady state, removing the enhancements would extend a typical career by more than 1 year (or about 14,000 teacher-years for the size of the 1994 cohort.)

It is possible that probit models with more saturated right-hand variables may produce better in- and out-of-sample fit for the Missouri data and effectively predict long-term effect of a new policy that can be parameterized as an extension of past policy. In general, however, a reduced-form probit model cannot shed light on entirely new policies (e.g., a DC conversion). A structural model approach, on the other hand, is suitable for predicting effects of new policies. As is true for reduced-form models, performance of structural models depends on model specification.

Simulation of Voluntary DC Conversion for Senior Teachers

Next, we use the structural model estimates to consider a different policy change—conversion to a DC plan. In the initial period, a teacher with a given age and experience has a given DB pension wealth. In the benchmark scenario, we consider an experiment in which a senior teacher is offered a one-time option to convert from the PSRS DB plan to a DC plan with an initial balance of 80% of the DB pension wealth. Going forward, the teacher and district each add 10% of teacher current salary annually to this account, and the fund balance grows by the nominal rate of 4%, with a 2% inflation rate. As the teacher retires, he or she draws a constant flow of actuarially fair benefits from the balances. The teacher has three choices in the initial period: retire under the current DB plan, remain in the DB plan and continue teaching, or convert from the DB to DC plan and continue teaching. After the initial period, the remaining teachers choose either to retire or continue teaching, but there is no further option to switch pension plans. Pension cost under the DC plan for the employer includes the 80% of DB pension wealth conversion in the initial period plus the 10% annual salary matching prior to retirement. We then change one policy parameter (e.g., raising the initial balance from the benchmark 80% to 90% of the DB pension wealth) while keeping the rest of policy parameters constant. Appendix 2, available on the journal website, shows how a teacher's decision on the one-time offer depends on the preference parameters, among other factors.

Table 2 reports the simulation results on teachers of different age and experience. Column 1 of Table 2 reports the probability of retirement in the initial year in the absence of the option to convert to the DC plan. Column 2 shows the percentage of teachers who would take the one-time offer to convert from the current DB plan to the DC plan described previously. Column 3 shows the retirement probability in the initial year is reduced by the DC option (compared with Column 1). Column 4 shows the DC plan extends the average teaching career by removing the push incentives embodied in the DB plan. Column 5 shows that despite more years of teaching under the DC plan for the converters, the average DC pension costs for the districts are substantially lower than the DB cost for some groups of teachers.

Compared with the benchmark, changes in policy parameters yield highly nonlinear changes in outcomes. The effect of the option of converting to DC differs by age and experience of the teacher. Teachers with 54 years of age and 22 years of experience are far from the pension wealth peak and are very sensitive to policy parameters. For this group, increasing the initial cash balance from 80% to 90% raises the probability of conversion from 0 to 0.984, extends the teaching career, and saves pension cost for the employer. With the push effect of the DB plan removed, the majority of teachers in this age group prefer to receive additional years of salary and enjoy the flexibility of possibly teaching

Table 2
Simulated Voluntary Conversion From Public School Retirement System Defined-Benefit Plan to a Defined-Contribution plan

	Age in the initial year	Experience in the initial year	(1) Retirement probability in the initial year without the DC option	(2) Acceptance rate of converting to DC	(3) Retirement probability in the initial year with the DC option	(4) Additional years of teaching per teacher	(5) Pension cost saving per teacher
(a) Benchmark	54	22	0.017	0.000	0.017	0.000	0
	58	26	0.339	0.703	0.297	1.467	$40,847
	62	30	0.439	0.336	0.439	0.409	$18,112
(b) Initial cash = 90% PW	54	22	0.017	0.984	0.016	3.569	$126,235
	58	26	0.339	0.759	0.241	1.342	–$4,149
	62	30	0.439	0.616	0.384	0.670	–$6,515
(c) Contribution rate =13%	54	22	0.017	0.000	0.017	0.000	0
	58	26	0.339	0.711	0.289	1.488	$35,807
	62	30	0.439	0.449	0.439	0.546	$21,336
(d) Nominal return = 6.5%, inflation = 3%	54	22	0.012	0.990	0.010	5.235	$115,649
	58	26	0.317	0.795	0.205	2.351	$18,177
	62	30	0.431	0.632	0.368	1.209	$17,145

Note. In (a) the benchmark case: inflation rate = 2%, real discount rate = 2%, and nominal return = 4%. The initial cash balance is 80% of current pension wealth, and contribution rate is 10% for the benchmark case. In (b), (c), and (d), we only change one set of assumptions from the benchmark case. In (b), the initial cash balance is raised from 80% to 90% of the current pension wealth. In (c), the contribution rate increases to 13%. In the defined-benefit plan, we still keep contribution rate = 10%. In (d), we let nominal return be 6.5% with inflation rate of 3%; the real discount rate is now 3.5%.

beyond the year of DB peak pension in exchange for a slightly reduced initial cash balance and lower overall pension wealth. For older and more experienced teachers, the increase in the initial cash balance leads to little change in teaching career and slightly higher (or negative savings in) pension cost. Raising the contribution rate to 13% from 10% has minor impacts. The retirement decisions are highly sensitive to policy parameters. Raising the nominal return to 6.5% (with a 3% inflation) results in a large jump in the conversion to DC and larger pension cost savings, especially for the teachers with low age and experience. In sum, the response to the option of one-time conversion from DB to DC can be quite sensitive to the teacher's age/experience, terms of conversion, rate of returns, and other parameters.

Concluding Remarks

Our research on pension rules of different states shows that structural econometric models equipped with just a few parameters successfully fit data on retirement decisions made by tens of thousands of teachers and in different environments. The dynamic structural econometric model captures the effect of changes in retirement incentives and can predict outcomes decades before data from any policy experiments become available. A key advantage of structural econometric models is their ability to simulate pension design alternatives. Structural econometric models like the one estimated in this study identify underlying behavioral preferences that are independent of any particular set of pension rules. This provides the researchers with a foundation for simulating the short- and long-run fiscal and workforce effects of changes in current DB plan rules as well as alternate types of retirement plans.

NOTES

The authors thank the editor Andrew McEachin, two referees, and Kata Mihaly for constructive comments. We especially thank Michael Podgursky for many stimulating discussions and detailed suggestions throughout the project. We thank the Laura and John Arnold Foundation for research support. Shawn Ni's research was supported by the Charles Koch foundation, and Wei Kong's research was supported by the Shanghai Pujiang Program (No. 2020PJC064).

[1]Empirical evidence suggests high-quality senior teachers have stronger preference for teaching over retirement, which makes them more susceptible to the push effect (whereas the lower-quality teachers are relatively more susceptible to the pull effect). Hence, the defined-benefit (DB) pension incentives "pull in" disproportionally more lower-quality teachers and "push out" more high quality teachers (Ni et al., 2020).

[2]The relatively early retirement of teachers has a number of negative effects on teacher quality. For example, as senior teachers retire prematurely, they are replaced by novice teachers (not necessarily for the same classroom but necessarily in the population). The increase in the percentage of novice teachers in the teacher population may reduce teacher effectiveness overall because prior empirical research finds more experienced teachers are, on average, more effective than novice teachers (e.g., Clotfelter et al., 2006; Clotfelter et al., 2007; Glazerman et al., 2012; Hanushek, 1997). In addition, school administrators are mostly former senior teachers and are in the same pension plans. The current DB systems cause unnecessary loss of administrative experience in school leadership and difficulty

in recruiting leaders in high-need schools (e.g., see Koedel et al., 2012). In sum, because, on average, senior teachers are more effective than novice teachers, pension incentives lower overall teacher quality by reducing the share of senior teachers. But there may be exceptions to this general assessment. As noted in Note 1, high- and lower-quality senior teachers respond differently to pension incentives. Fitzpatrick and Lovenheim (2014) found that a marginal increase in earlier retirement does not affect overall teacher quality. It is possible that in their study, lower-quality senior teachers are more responsive to the early retirement incentive.

[3]In some fields (e.g., education) a "structural model" may refer to a general connection of variables (e.g., by a relational chart.) Structural models used in these contexts do not explicitly relate data to optimizing behavior of economic agents.

[4]The probit model regresses teachers' retirement decisions on teacher-specific variables, including age, experience, gender, salary, and rule dummy variables (D_reg, D_rule25, D_rule80, D_rep; D_reg = 1 if the teacher qualified for regular retirement; D_rule25 = 1 if the teacher qualified for 25 & out; D_rule80 = 1 if the teacher qualified for rule of 80; D_rep = 1 if it is after year 1999 when the replacement factor increased from 2.3% to 2.5%). Note that the dummy variables may pick up the effects of aggregate factors unrelated to pension rules.

[5]Figure A1 in Appendix 1, available on the journal website, shows that the observed and simulated cumulative distributions of age and experience for teachers who retired during the sample period matched closely.

REFERENCES

Backes, B., Goldhaber, D., Grout, C., Koedel, C., Ni, S., Podgursky, M., Xiang, P., & Xu, Z. (2016). Benefit or burden? On the intergenerational inequity of teacher pension plans. *Educational Researcher*, *45*(6), 367–377.

Brown, K. M. (2013). The link between pensions and retirement timing: Lessons from California teachers. *Journal of Public Economics*, *98*, 1–14.

Burnette, D., & Will, M. (2018). Costly pension plans are fanning the flames of teacher unrest. *Education Week 37*(28), 1.

Chetty, R, Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood. *American Economic Review*, *104*(9), 2633–2679.

Chingos, M. M., & West, M. R. (2015). Which teachers choose a defined contribution pension plan? Evidence from the Florida retirement system. *Education Finance and Policy*, *10*(2), 193–222.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2006). Teacher-student matching and the assessment of teacher effectiveness. *Journal of Human Resources*, *41*(4), 778–820.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2007). Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. *Economics of Education Review*, *26*, 673–682.

Costrell, R. (2020). *Employer pension costs: Private sector professionals versus public school teachers*. https://edre.uark.edu/_resources/pdf/costrellemployercontrates.pdf

Costrell, R., & McGee, J. (2010). Teacher pension incentives, retirement behavior, and potential for reform in Arkansas. *Education Finance and Policy*, *5*(4), 492–518.

Costrell, R., & Maloney, L. (2013). *The big squeeze: Retirement costs and school district budgets paying the pension price and Philadelphia*. Fordham Foundation.

Costrell, R., & Podgursky, M. (2009). Peaks, cliffs, and valleys: The peculiar incentives of teacher retirement systems and their consequences for school staffing. *Education Finance and Policy*, *4*(2), 175–211.

Doherty, K. M., Jacobs, S., & Madden, T. M. (2012). *No one benefits: How teacher pension systems are failing both teachers and taxpayers*. National Council on Teacher Quality.

Fitzpatrick, M., & Lovenheim, M. (2014). Early retirement incentives and student achievement. *American Economic Journal: Economic Policy*, *6*, 120–154.

Friedberg, L., & Turner, S. (2010). Labor market effects of pensions and implications for teachers. *Education Finance and Policy*, *5*(4), 463–491.

Furgeson, J., Strauss, R., & Vogt, W. (2006). The effects of defined benefit pension incentives and working conditions on teacher retirement decisions. *Education Finance and Policy*, *1*(3), 316–348.

Glazerman, S., Protik, A., Teh, B., Bruch, J., & Seftor, N. (2012). *Moving high-performing teachers: Implementation of transfer incentives in seven districts (NCEE 2012-4051)*. National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Goldhaber, D., & Holden, K. (2020). *How much do teachers value deferred compensation? Evidence from defined contribution rate choices*. CALDER Working paper No. 242-0920.

Hansen, J. S. (2010). An introduction to teacher retirement benefits. *Education Finance and Policy*, *5*(2), 402–437.

Hanushek, E. A. (1997). Assessing the effects of school resources on student performance: An update. *Educational Evaluation and Policy Analysis*, *19*(2), 141–164.

Harris, D. N., & Adams, S. J. (2007). Understanding the level and causes of teacher turnover: A comparison with other professions. *Economics of Education Review*, *26*(3), 325–337.

Kim, D., Kong, W., Koedel, C., Ni, S., Podgursky, M., & Wu, W. (2021). Pensions and late career teacher retention. *Education Finance and Policy*, *16*(1), 42–65.

Knapp, D., Brown, K. M., Hosek, J., Mattock, M. G., & Asch, B. J. (2016). *Retirement benefits and teacher retention: A structural modeling approach*. RAND.

Koedel, C., Grissom, J., Ni, S., & Podgursky, M. (2012). *Pension-induced rigidities in the labor market for school leaders*. CALDER Working Paper No. 67.

Koedel, C., Ni, S., & Podgursky, M. (2014). Who benefits from pension enhancement? *Education Finance and Policy*, *9*(2), 165–92.

Kong, W., Ni, S., Podgursky, M., & Wu, W. (2018). *Pension enhancements and teacher retirement*. CALDER Working Paper No. 195–0618–1.

Krausen, K., & Willis, J. (2018). *Silent recession: Why California school districts are underwater despite increases in funding*. WestEd.

Low, H., & Meghir, C. (2017). The use of structural models in econometrics. *Journal of Economic Perspectives*, *31*(2), 33–58.

Malanga, S., & McGee, J. (2018). *Garden State crowd out: How New Jersey's pension crisis threatens the state budget*. Manhattan Institute.

McGee, J. (2016). *Feeling the squeeze: Pension costs are crowding out education spending*. Manhattan Institute.

McGee, J., & Winters, M. (2016). *Better pay, fairer pensions III*. Manhattan Institute.

McGee, J., & Winters, M. (2019). Rethinking the structure of teacher retirement benefits: Analyzing the preferences of entering teachers. *Educational Evaluation and Policy Analysis*, *41*(1), 63–78.

Ni, S., & Podgursky, M. (2016). How teachers respond to pension system incentives: New estimates and policy applications. *Journal of Labor Economics*, *34*(4), 1075–1104.

Ni, S., Podgursky, M., & Wang, X. (2020). Teacher pension plan incentives, retirement decisions, and workforce quality. *Journal of Human Resources*. Advance online publication. https://doi.org/10.3368/jhr.57.1.1218-9912R2

Novy-Marx, R., & Rauh, J. (2011). Public pension promises: How big are they and what are they worth? *Journal of Finance*, *66*(4), 1211–1249.

Stock, J., & Wise, D. (1990). Pensions, the option value of work, and retirement. *Econometrica*, *58*(5), 1151–1180.

AUTHORS

WEI KONG, PhD, is an assistant professor in the School of Business at Shanghai University of International Business and Economics, 1900 Wenxiang Road, Shanghai, 201620, China; *kongwei@suibe.edu.cn*. Her research area is applied econometrics, with a focus on teachers' pension and retirement behavior.

SHAWN NI, PhD, is a professor of economics at the University of Missouri-Columbia, 118 Professional Building, Columbia, MO 65211; *nix@missouri.edu*. His research applies life cycle models to study household consumption and teachers' career choices.

Manuscript received May 27, 2020
Revisions received November 2, 2020, and March 22, 2021
Accepted August 9, 2021

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

[1]RAND Corporation, Arlington, VA
[2]University of Missouri, Columbia, MO
[3]Saint Louis University, Saint Louis, MO

Educational Researcher, Vol. 52 No. 2, pp. 57–62
DOI: 10.3102/0013189X221108197

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.

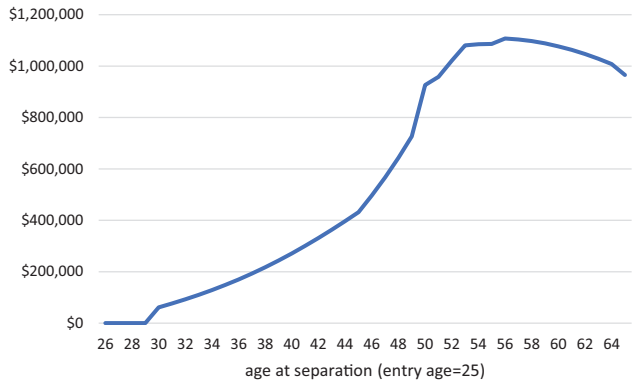


FIGURE 1. *Pension Wealth Accrual for a Typical Missouri Public School Teacher.*

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.

Kata Mihaly gratefully acknowledges financial support from Arnold Ventures.

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.

REFERENCES

Backes, B., Goldhaber, D., Grout, C., Koedel, C., Ni, S., Podgursky, M., . . . Xu, Z. (2016). Benefit or burden? On the intergenerational inequity of teacher pension plans. *Educational Researcher*, *45*(6), 367–377.

Biasi, B. (2019). *Higher salaries or higher pensions? Inferring preferences from teachers' retirement behavior*. Yale School of Management.

Biggs, A. G. (2023). The long-term solvency of teacher pension plans: How we got to now and prospects for recovery. *Educational Researcher*, *52*(2), 98–115.

Brown, K. M. (2013). The link between pensions and retirement timing: Lessons from California teachers. *Journal of Public Economics*, *98*, 1–14.

Butrica, B., Iams, H., Smith, K., & Toder, E. (2009). The disappearing defined benefit pension and its potential impact on the retirement incomes of baby boomers. *Social Security Bulletin*, *69*(3), 1–28.

Costrell, R. M. (2023). The three R's of teacher pension financing: Redistribution, return, and risk. *Educational Researcher*, *52*(2), 91–97.

Costrell, R., & McGee, J. (2010). Teacher pension incentives, retirement behavior, and potential for reform in Arkansas. *Education Finance and Policy*, *5*, 492–518.

Costrell, R., & Podgursky, M. (2009). Peaks, cliffs and valleys: The peculiar incentives in teacher retirement systems and their consequences for school staffing. *Education Finance and Policy*, *4*, 175–211.

Costrell, R., & Podgursky, M. (2010). Distribution of benefits in teacher retirement systems and their implications for mobility. *Education Finance and Policy*, *5*, 519–557.

Doherty, K. M., Jacobs, S., & Lueken, M. F. (2015). *Doing the math on teacher pensions: How to protect teachers and taxpayers*. National Council on Teacher Quality.

Fitzpatrick, M. D. (2015). How much are public school teachers willing to pay for their retirement benefits? *American Economic Journal: Economic Policy*, *7*(4), 165–188.

Fuchsman, D., McGee, J., & Zamarro, G. (2020). *Teachers' willingness to pay for retirement benefits: A national stated preferences experiment*. University of Arkansas, Department of Education Reform.

Furgeson, J., Strauss, R. P., & Vogt, W. B. (2006). The effects of defined benefit pension incentives and working conditions on teacher retirement decisions. *Education Finance and Policy*, *1*(3), 316–348.

Goldhaber, D., & Holden, K. L. (2023). How much do teachers value compensation deferred for retirement? Evidence from defined contribution rate choices. *Educational Researcher*, *52*(2), 80–90.

Hansen, J. (2010). An introduction to teacher retirement benefits. *Education Finance and Policy*, *5*, 402–437.

Hosek, J., Knapp, D., Mattock, M. G., & Asch, B. J. (2023). Incentivizing retirement: An analysis of cash retirement incentives for Chicago teachers. *Educational Researcher*, *52*(2), 71–79.

Knapp, D., Brown, K., Hosek, J., Mattock, M. G., & Asch, B. J. (2016). *Retirement benefits and teacher retention*. Rand Corporation.

Kong, W., & Ni, S. (2023). A structural econometric approach to analyzing the impact of teacher pension reform. *Educational Researcher*, *52*(2), 63–70.
Moody, J., & Randazzo, A. (2020). Hidden education funding cuts: How growing teacher pension debt is eating into K–12 education budgets. Technical report, Equable Institute.
Munnell, A. (2012). *State and local pensions: What now?* Brookings Institution.
Ni, S., & Podgursky, M. (2016). How teachers respond to pension system incentives: New estimates and policy applications. *Journal of Labor Economics*, *34*(4), 1075–1104.
Pendergrass, S., Podgursky, M., & Hesla, K. (2018) Pensions under pressure. *Education Next*, *18*(2), 8–15.

AUTHORS

KATA MIHALY, PhD, is a senior economist at the RAND Corporation, 1200 South Hayes Street, Arlington, VA 22202, and an affiliate faculty member at the Pardee RAND Graduate School; *kmihaly@rand.org*. She has more than 13 years of experience conducting evaluations of education programs using rigorous methods, including randomized control trials, regression discontinuity, propensity score-matching methods, and other quasi-experimental evaluation designs. Her work is primarily focused on evaluating the impact of teacher professional development and training programs on student and teacher outcomes. She was certified in WWC 4.1 standards in December 2020.

MICHAEL PODGURSKY, PhD, is chancellor's professor of economics at the University of Missouri – Columbia, Columbia, MO 65211, and director, Sinquefield Center for Applied Economic Research at Saint Louis University; *PodgurskyM@missouri.edu*. His research focuses on labor economics and the economics of education. He serves on the board of editors of several academic journals, including *Education Finance and Policy* and *Education Next*, and is an affiliated scholar with the Center for Analysis of Longitudinal Data in Education Research (CALDER) at the American Institutes for Research and CESifo in Germany.

Manuscript received October 14, 2020
Revisions received November 3, 2021, and May 4, 2022
Accepted May 5, 2022

COMMENTARY

Teacher Pension Reform Must Be About Cost *and Design*

Andrew J. Rotherham[1]

This commentary discusses how the teacher pension debate is often predicated on the idea of generous benefits for teachers and whether those are deserved, when in practice most teachers are disadvantaged by a retirement system with long vesting periods and limited portability.

Keywords: finance; policy; politics; policy analysis

Two broad misconceptions about teacher pensions are not an explicit focus of the articles in this volume yet exert a great deal of leverage on the debate and politics surrounding the issue. The first is the idea that teacher pensions are "gold-plated." As Aldeman and I have noted (Rotherham & Aldeman, 2018), this belief is a myth put forward by, for different political reasons and as part of different political narratives, teachers unions and critics of teacher pensions.

For teachers unions, the gold-plated narrative is a political rallying cry to bolster support for teacher pensions as a generous benefit at risk from reformers. For critics, it fuels a storyline of greedy public employee unions and teachers taking advantage of an overly indulgent public-sector benefit. Neither account tells the complicated story of how teacher pensions do—and, perhaps more importantly, *don't*—work for actual teachers.

The gold-plated mythology has staying power because so little attention is paid to the pension issue—especially relative to its fiscal impact. That's why this volume is such an important contribution, by showing the general landscape and by presenting analyses that go deep on particular dimensions of the behavioral and public-finance aspects of teacher pensions. I'm grateful for the opportunity to offer some thoughts on what this topic means for policy leaders.

As Mihaly and Podurgsky discuss, the cost of teacher pensions has increased substantially over the past 2 decades, and Biggs makes clear the depth of the problem policy makers face. Yet for the most part, this cost structure has not translated into a retirement system matched to today's labor market or one that works well for a lot of teachers. We're spending a lot but not getting adequate results. The articles here, from several perspectives, highlight the various inefficiencies and perverse incentives built into the system.

Those inefficiency and cost issues, and the appropriate attention paid to them, can lead to the second misconception: the idea that the teacher pension problem is largely or solely one of cost. This view leads to a reform emphasis on cost savings that often ignores what is arguably the key problem today: *Teacher pension systems are poorly designed as a retirement system for today's teachers*. In this volume, Goldhaber and Holden as well as Hosek look at two dimensions of the design question and challenge the conventional wisdom.

If America's teachers had an effective retirement system that was also expensive, then the debate should turn on how to better finance it and find cost savings. Instead, America's teachers are locked into retirement systems that are expensive *and* not serving many teachers well. *The problem is one of cost* and *design.*

Given standard vesting rules, more than half of those teaching don't qualify for any kind of pension or retirement benefit, and only about one in five teachers receives a full pension. The teacher pension system is largely designed for teachers who teach in one state for a long period of time. "Short-term" teachers are frequently dismissed as an afterthought because a retirement system shouldn't be oriented toward 1- or 2-year teachers. In practice, a whole host of things contribute to even tenured teachers being disadvantaged by today's prevailing retirement system structure. For instance, if a teacher teaches in three states with vesting periods of 6-plus years—not an outlier example, given that the median vesting period is 7 years (and 10 years in four

[1]Bellwether Education Partners, Washington, DC

Educational Researcher, Vol. 52 No. 2, pp. 116–118
DOI: 10.3102/0013189X221111388

states)—they can teach for 2 decades and still not be vested in any state.

This problem is compounded by a reform thrust where, again, fiscal issues are seen as the sole or primary issue. To shore up the financial issues that several of the articles in this volume highlight, policy makers are electing to make it harder for new teachers to qualify for pensions. Fewer qualifying participants means lower costs and increased savings. Many states now employ multiple benefit tiers to curb rising costs, with each subsequent tier being less generous than its predecessor.

Rufus Miles, a federal official and author who served Presidents Eisenhower, Kennedy, and Johnson on domestic policy, coined the useful rule of thumb that when considering policy problems, "where you stand depends on where you sit." If we consider the teacher pension problem as purely one of cost, then the belt-tightening focus has an obvious political logic.

Instead, if we think of teacher pensions as a broader problem of retirement security for the millions of Americans who teach for some period of time or for a career and are expected in the U.S. economy to bootstrap their own retirement, then the problem and solutions look different. This perception is where the issues of design and portability and the contributions of Goldhaber and Holden around teacher preference are important. Kong and Ni likewise look at design questions and highlight an underappreciated aspect of pension policy—financial incentives for long-term teachers to stop teaching, even when they would like to continue.

What are the design issues, broadly speaking? First, as Costrell in particular highlights, teacher pensions are heavily backloaded. Most of the benefits are earned in the final few years of a teacher's career. Policy makers must consider ways to smooth this curve, given that most teachers teach for a shorter period of time overall or in any particular state (note: non-state-based teacher pension systems exist, but for simplicity, I'm lumping them into that broad bucket and referring to them as "teacher pensions," even though some states offer other retirement vehicles as well). Smoothing this curve is one way to increase cash compensation for teachers by giving them more take-home pay earlier in their careers rather than backloading it for the last few years via retirement accrual.

In an education system where few teachers spend their full career in one place, an effective approach to retirement must allow people to carry benefits with them to new jobs or careers. This level of portability is not the norm today; backloading and long vesting periods work at cross-purposes with portability. The debate about portability tends to fall into a rut of 401(k)-style defined contribution plans versus traditionally defined benefit pensions. In practice, policy makers can consider a range of options. Portability matters to teachers who, for whatever reason, move and continue teaching elsewhere. It also matters as a retirement security issue more generally if the goal of teacher retirement systems is to help all participants with retirement planning at a level proportionate to their teaching tenure. Here, again, Kong and Ni highlight important issues.

These problems are made more acute because of how teacher pensions interact with Social Security. Several of the articles here discuss Social Security, in particular Biggs, but the intersection of Social Security and teacher retirements could fill an entire volume. For historical reasons, about four in 10 public school teachers nationally don't participate in Social Security, including every teacher in such populous states as Illinois and Ohio. In theory, an adequate teacher pension should offset this loss over the course of a career, but this isn't consistently the case (Aldeman, 2019), further disadvantaging teachers.

Again, it's worth noting that the 30-year teacher is far from the median educator today. And for younger teachers who teach in a state—or, depending on where life takes them, in more than one state—that does not participate in Social Security and has long vesting periods for its pension system, this historical anachronism can substantially set back their retirement savings. Teaching for 6, 7, or even 9 years in a state that doesn't participate in Social Security and has a 7- or 10-year vesting period is a substantial roadblock to building retirement savings for an individual.

As a result, today's approach to teacher pensions creates millions of small losers and a much smaller number of "winners," although not every retiree is enjoying the mythical gold-plated benefits. All told, it's a daunting political math problem that reformers must contend with—a disengaged population of beneficiaries and organized special-interest groups resisting reform. As we see with other issues with broad benefits but also specific costs—for instance, climate reform or tax reform—these politics are challenging in a legislative system like ours.

In the case of teacher pensions, this dynamic is especially challenging because of specific features of a key stakeholder: teachers unions. In most organizations of all kinds, a vocal minority drives policy and decision making. In the case of teachers unions, the vocal in-group is more likely to be longer-tenured teachers who are more active in union governance. Although as a legal and practical political matter, any broad reform package would respect and protect benefits for current retirees and existing teachers, longer-tenured teachers perceive themselves as having the largest stake in upholding the status quo.

In addition, the wealth held by pension funds is an enormous source of capital for public and private investment, and unions are loath to lose the leverage that comes with the ability to influence the deployment investment capital. The American Federation of Teachers has, for instance, used shareholder leverage to try to influence global education publisher Pearson around education policy debates. Other unions have also tried to influence investment in parts of the sector, such as privatized education or prisons.

Another significant barrier to broad reform is the political timeline. Pension reform is an issue that offers politicians the opportunity to defer politically difficult decisions. Some states have chronically underfunded teacher pensions for decades because politicians know the reckoning will come on someone else's watch. It's also why the most popular reforms today just make pensions worse for new teachers, who are the least likely to be paying attention to long-term retirement issues.

Teacher pension reform is, politically, a tall order. However, guideposts exist that suggest what to do and what not to do. In 2021, Bellwether Education Partners ranked state teacher retirement systems across the country (Marchitello, Rotherham, & Squire, 2021). Higher-performing states were a heterogenous

group in the ways they approached teacher pensions, illustrating that effective policy is more about plan quality than specific plan type or a uniform approach.

The articles in this volume, likewise, highlight important dimensions and simulations of the impact of several reform ideas. As with any policy issue, the loop of reform, feedback, and further reform will help pilot new ideas and help states learn from one another.

The fiscal fault lines around teacher pensions will continue putting pressure on policy makers to act because the financing of teacher retirement is not trivial for states, and the overall financial picture is daunting—especially when health care costs are factored in. Yet reforms must address the design shortcomings of today's systems, or we will have less expensive but not more effective teacher retirement. In some cases, effective reform may require additional public spending in the near term. Reformers cannot lose sight of the fact that, at its core, sound teacher pension policy should be broadly about retirement security for individuals and is one lever to make teaching an attractive option for professionals.

REFERENCES

Aldeman, C. (2019). *Social security, teacher pensions, and the "qualified" retirement plan*. Bellwether Education Partners. https://www.teacherpensions.org/resource/social-security-teacher-pensions-and-%E2%80%9Cqualified%E2%80%9D-retirement-plan-test

Marchitello, M., Rotherham, A. J., & Squire, J. (2021). *Teacher retirement systems: A ranking of the states*. Bellwether Education Partners. https://bellwethereducation.org/publication/retirement-systems-ranking

Rotherham, A., & Aldeman, C. (2018). If this is "gold-plated" . . . *Democracy*, 48. https://democracyjournal.org/magazine/48/if-this-is-gold-plated/

ORCID ID

Andrew J. Rotherham https://orcid.org/0000-0002-9518-7407

AUTHOR

ANDREW J. ROTHERHAM, MEd, is co-founder and partner at Bellwether Education Partners, 650 Massachusetts Ave. NW, Sixth Floor, Washington, DC 20001; *andy@bellwethereducation.org*. His work focuses on policy analysis on a range of education issues, including teacher retirement.

Manuscript received January 18, 2022
Revision received January 25, 2022
Accepted January 27, 2022