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Institutions and Fiscal Sustainability of Public Pensions

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Syracuse, NY 2026

Today's agenda

- The issue
  - Pension underfunding and fiscal burdens
  - Challenges of pension reform
- My research
  - Institutional framework
  - Simulation of pension plans
- Future directions
  - Paths to pension reform
  - Data, topics, and perspectives for future research
- Discussion and Q&A

Three pillars of retirement income in the U.S.

- Pillar 1: Federal Social Security System
- Pillar 2: Employer-sponsored pension plans
  - Public sector pension plans (mostly defined benefits)
  - Private sector 401(k) plans (defined contributions)
- Pillar 3: Personal savings and investments, such as IRA accounts

- Replacement rate = post-retirement income / pre-retirement income
- Sufficiency goal: 75% - 80%

Sufficiency of the three pillars

- Replacement rate = post-retirement income / pre-retirement income
- Sufficiency goal: 75% - 80%

- Pillar 1: Social Security provides the replacement rate of approximately 20-35%, depending on income level.
- Pillar 2: Employer-sponsored pension plans' replacement rate depends on plan provisions. Public DB plans can get to 60-65% (e.g. 30 years of service * 2% * final average salary)
- Pillar 3: The replacement rate of personal savings and investment depends on the saving levels and investment returns.

Funding sources and funding issues

- Funding sources:
  - Employee contributions
  - Employer contributions
  - Investment returns
- Funded ratio = Assets / Liabilities
  - Assets ← employee contributions + employer contributions + investment returns
  - Liabilities ← annual benefit × annuity factor

Required Contribution (as % of payroll)

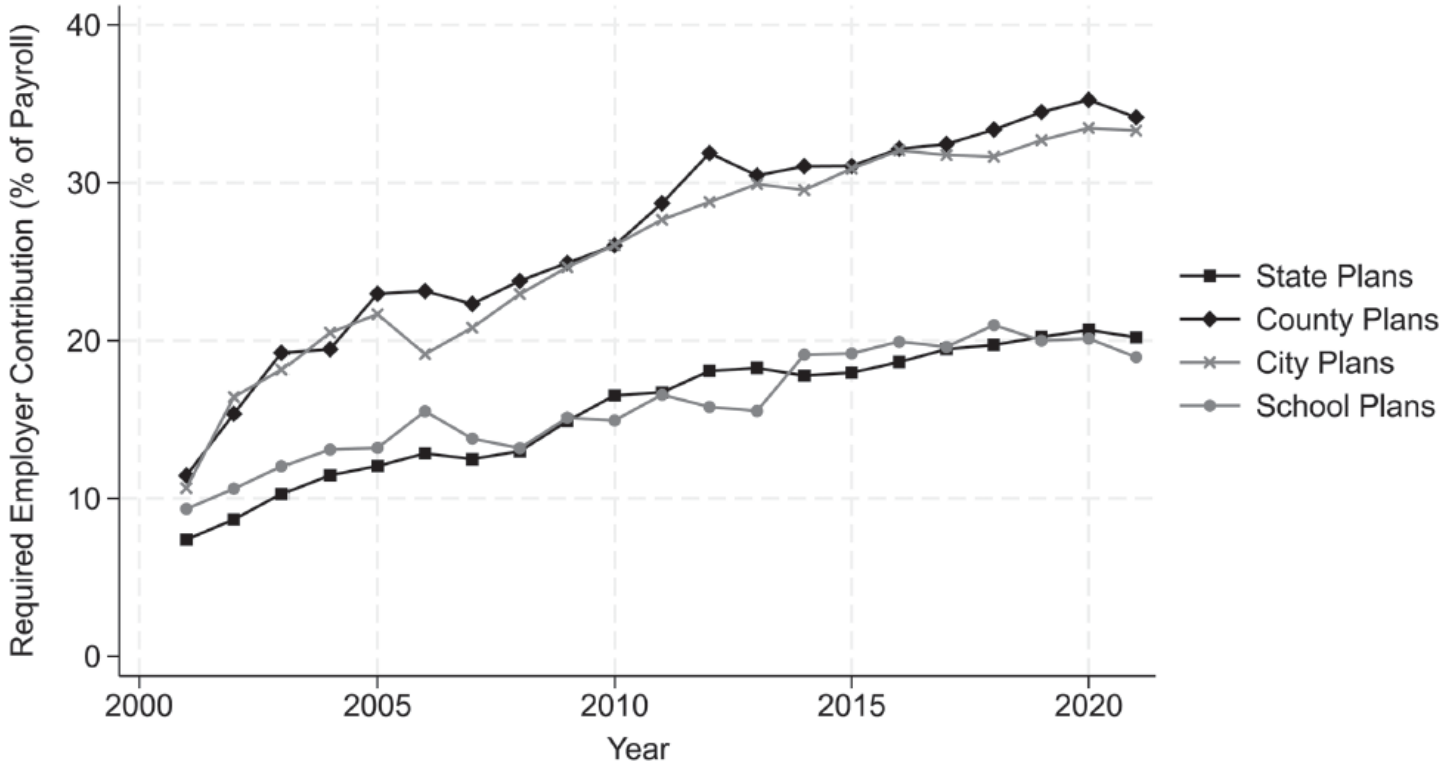


FIGURE 8.4 Required Contribution by Administering Government Type (2001–2021)

Source: Authors' calculation based on the Boston College – Public Plans Database (PPD)

Source: Chen et al (2025) Chapter 7

Three tales of one issue

- France: 2026 protests over public education and Macron's 2023 pension reform
- New York State: School districts' pension costs, Tier 6, and recent amendments
- Massachusetts: Municipal pension costs and property tax override requests

France, October 2026

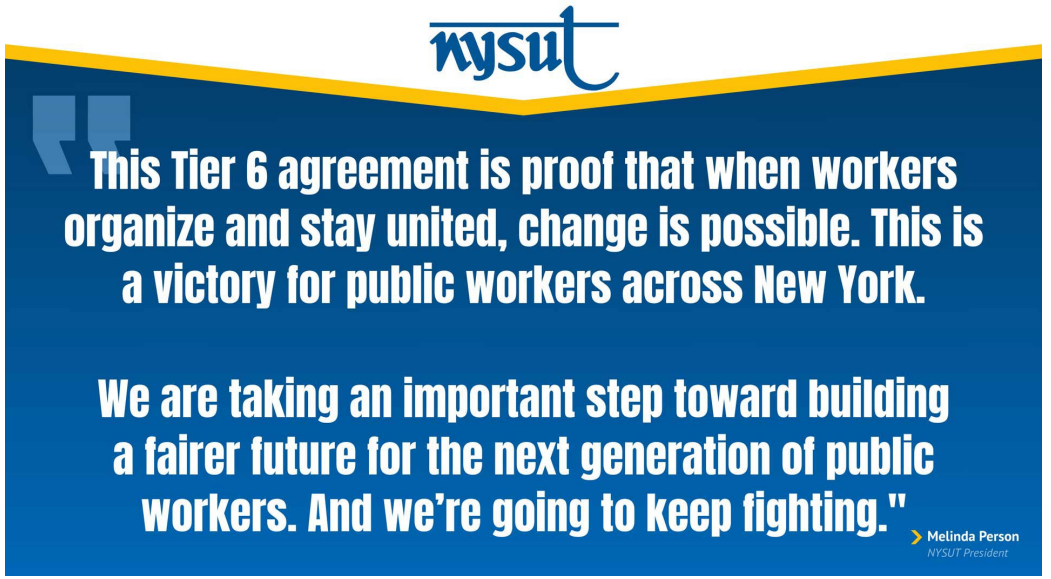
- Student-led protests over schools and the cost of living drew about 550,000 people on October 17 (Reuters 2026).
- About 32% of the education ministry's budget will go to pensions of retired civil servants. Pension spending has risen by 2.5 percentage points of GDP between 2000 and 2023. (Reuters 2026)
- Macron's reform in 2023 to raise the retirement age from 62 to 64 was suspended, which would cost €400mn in 2026 and €1.8bn in 2027. (FT 2025)
- "France is effectively handing over large subsidies to older French at the expense of everyone else" (Paul Krugman, 2026)



Source: Reuters 2026

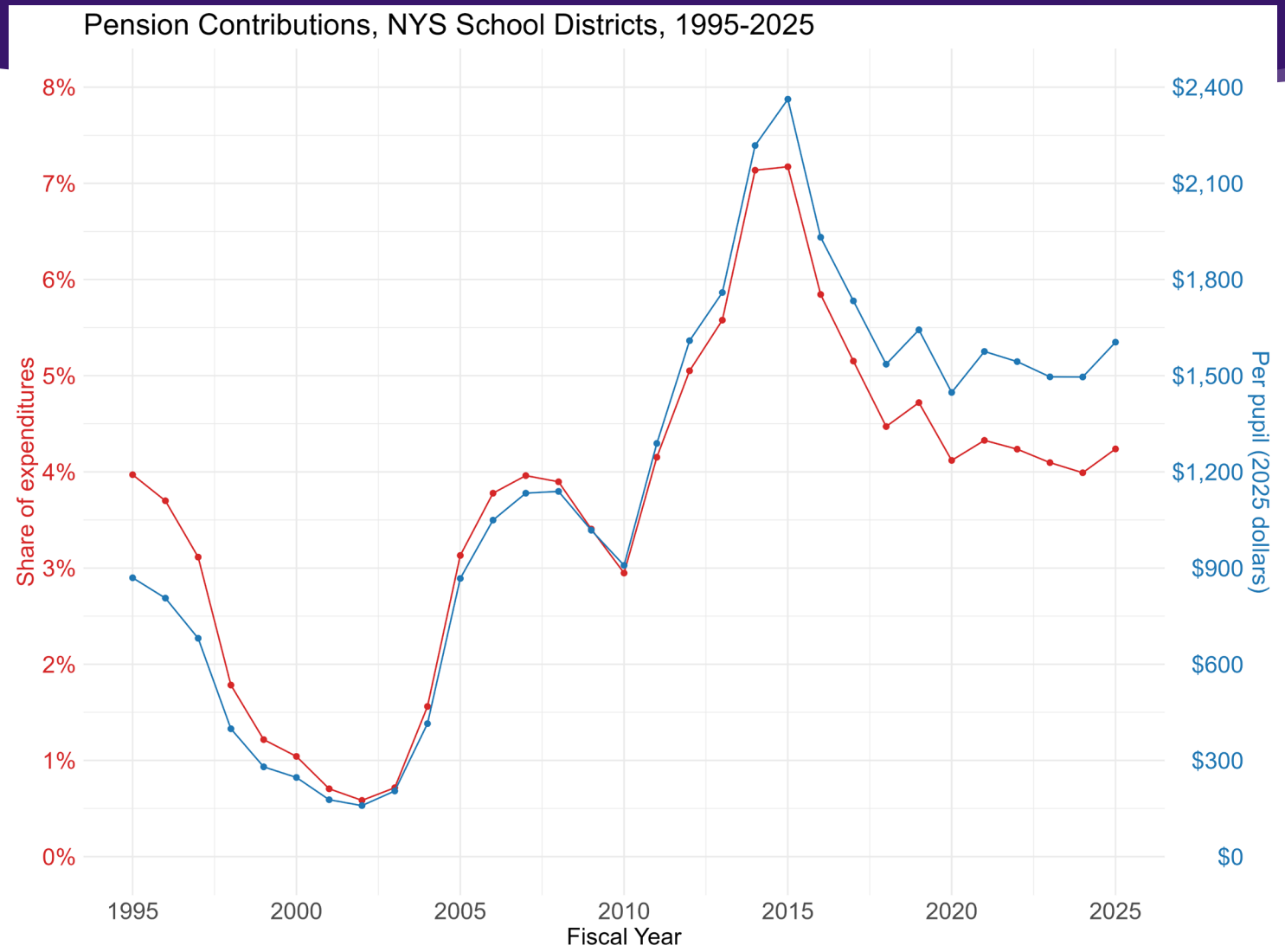
NYSTRS reform and compromise

- Tier 6 was established in 2012 for new employees entering the workforce on or after April 1, 2012, with a longer vesting period, a higher retirement age (63), lower benefits, and higher contributions. (New York State, Chapter 18, Laws of 2012)
- Tier 6 has been amended several times since 2022 to shorten the vesting period, lower the retirement age, increase benefits, and reduce employee contributions.
- New York's 2026 Tier 6 changes allow NYSTRS members to retire without an age reduction at 58 with 30 years of service. It is estimated the annual cost to participating employers at $94.9 million, or 0.46% of payroll, in fiscal year 2027-2028. (NYSTRS 2026)



Source: NYSUT President Melinda Person, 2026

Pension Costs in NYS School Districts: Growth and Volatility

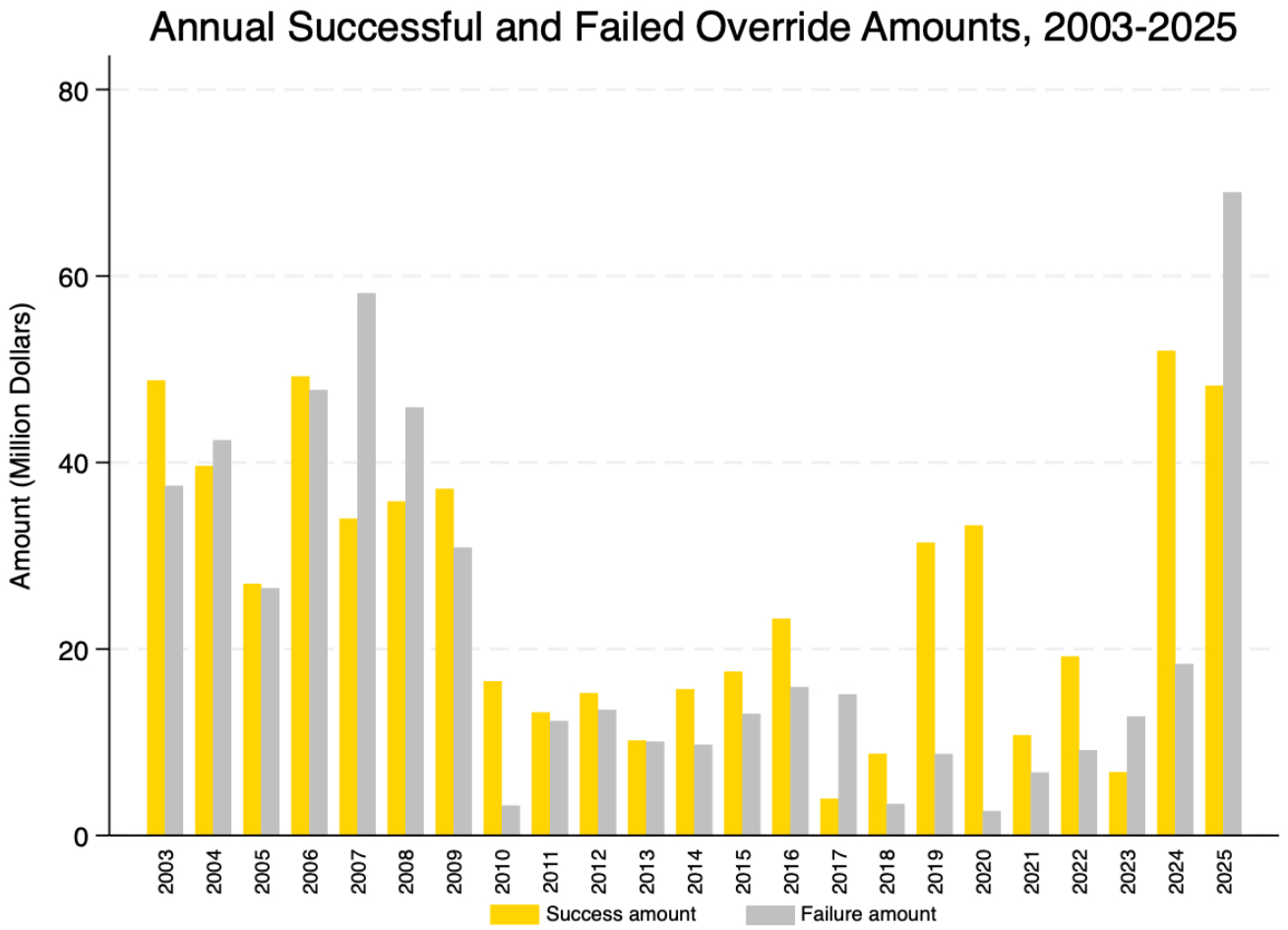


Source: Chen, 2026, based on OSC and NYSED data

MA pension contributions as % of local budgets

- In Massachusetts, Proposition 2½ generally limits annual growth in the property tax levy limit to 2.5%, plus new growth, unless voters approve an override. (DLS, 2026)
- Across 99 municipal retirement systems, employer pension contributions grew approximately 6.1% annually from FY2022 to FY2025. (DLS, 2024)
- The number of municipalities seeking property tax overrides rose from 21 in FY2021 to 46 in FY2025, while the success rate declined to 43.5% (Li, Qu, and Chen, 2026).
- Major contributors to municipal spending growth beyond available revenues include health insurance costs, pension costs, and debt service costs (based on town budget documents).

MA local governments override amounts



Override elections involve substantial fiscal stakes. In several years the failed amounts are as large as or more than the successful ones (Li, Qu, Chen, 2026)

Middlesex County (MA) Retirement System

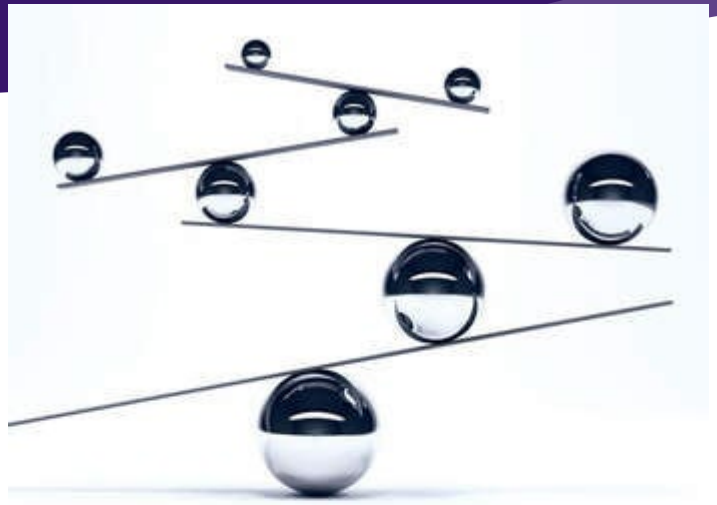
- Defined benefit pension plan with 71 participating employers (municipal governments in MA).
- The MCRS is administered by a five-person Board of Retirement consisting of
  - Two members are directly elected by the employees and retirees.
  - One member is elected by representatives of the towns.
  - Two members are appointed by the other four board members.
- ~9,000 active members, ~7,000 retirees, ~5,000 inactive participants
- Funded ratio in FY 2025: 62.56%
- Investments in private equity, hedge funds: 26%
- Contribution as % of payroll: 29.74%
- Annual increase in required contributions: 6.5%
- Source: MCRS 2025

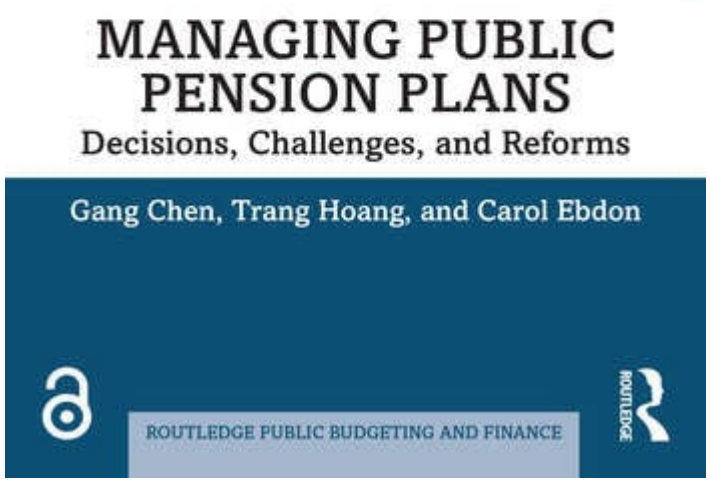
That was the issue. So, what is the problem?

- Different governments at different times, but…
  - Why do public pension plans always seem to be underfunded and have high costs?
  - Why are pension reforms so difficult?
- Public pension plans are:
  - Long-term commitments: The future is uncertain, spending responsibilities are deferred, but the commitments have already been made.
  - Funded by public money: Decisions are collectively made by multiple stakeholders and are affected by political and economic cycles.
- My research focuses on two topics: analyzing *institutions* and providing *information*

Research goals

- The importance of public pensions and their funding issues are widely recognized. However, the systems within which key decisions are made are not well understood by policymakers and stakeholders.
- Gaps in the literature:
  - The performance of pension plan management has been narrowly defined to only focus on the **funding levels**.
  - The connections among constraints, resources, and decisions are treated as a "**black box**".
  - **Decisions**, **institutions**, and **environments** are examined separately as they are related to pension funding.
- In this book project, we develop a logic model framework to explain how public pension management <u>decisions and institutions jointly shape the outcomes of public pension plans.</u>





A logic model to explain public pension management

	Inputs			Outputs	Outcomes
	Environment	Stakeholders	Constraints	Decisions	Performance
Pension systems	Capital Markets Fiscal Health Politics	Board of Trustees Administrators Advisors/Actuaries	Regulations and laws on investments and actuarial practices	Investments Actuarial Practices	Sufficiency Affordability Sustainability Efficiency Good Governance
Administering Governments (Executive & Legislative)	Fiscal Health Political Ideology Electoral Politics	Participating Employers Elected Officials Employees, Retirees, Unions Taxpayers	State laws on benefits Court rules on benefits Union contracts	Benefits Contributions	

Goals of public pension management

- **Sufficiency of pension benefits:** Public pension plans should provide benefits at a competitive level to effectively attract and retain high-quality public employees committed to government service.
- **Affordability of pension costs:** Maintaining pension expenses at a reasonable level in comparison to the financial resources of the sponsoring governments for funding these plans.
- **Sustainability of pension funding:** Keeping sufficient assets to cover the pension plan's liabilities.
- **Efficiency of asset management:** Getting the most net investment returns from the pension assets invested in the capital markets.
- **Good governance of pension plans:** Good governance of pension plans can be broadly defined as designing appropriate processes and organizational structures for the operations of pension plans.

Benchmarking Public Pension Management

Goals	Current consensus on the targets	Notes	Sources
Sufficiency of pension benefits	Replacement ratio ≥ 75%-80%	If employees are not covered by social security, the expected replacement ratio would be higher.	Urban Institute 2014.; Peng 2008; Young 2023
Affordability of pension costs	The sum of debt service, pension and OPEB expenses < 20% of governmental expenditures for "aa" rating	Other cost measures include pension costs as a percent of total payroll	Fitch (2021)
Sustainability of pension funding	Funding ratio >= 80%	The 80% rule is not a consensus. Some argue that 100% should be the goal.	GAO (2007); Standard & Poor's (2016)
Efficiency of asset management	Meeting the long-term expected rate of return (ERR)	ERR varies by plan. For most plans, this rate is around 7.5%	
Good governance of pension plans	Following best practices in plan governance, accounting and financial reporting standards, and processes	Best practices are recommended by professional associations.	GFOA 2022; Miller and Funston 2014; AFSCME 2020

Source: Chen et al (2025) Chapter 3

Politics

- Ideological politics
  - Liberals tend to protect and expand pension benefits, while conservatives tend to resist funding increases.
- Electoral politics
  - Pension reforms are politically unpopular in many elections.
  - Politicians favor promises that offer visible political gains with minimal short-term fiscal costs.
- Institutional politics
  - Pension decisions are made by legislatures or pension boards, where collective decision-making can make agreement and difficult choices challenging.
  - Decision-makers may also be members of the pension plans they oversee.

Economic and fiscal environments

- Economic and fiscal cycles
  - Economic expansions make pension benefit increases easier to approve.
  - Fiscal stress or crisis increases pressure to reduce or defer pension contributions.
  - Recessions can compound fiscal pressure: investment returns fall, required contributions may rise, and government revenues weaken.
- Delayed fiscal consequences
  - Because pension plans are prefunded, deferred contributions do not immediately disrupt benefit payments.
  - Some argue that a lower funded ratio is manageable if future contributions and long-term investment returns are sufficient.
- Investment risk
  - Taking more investment risk may raise expected long-term returns, but can pension plans and sponsoring governments take such high risks? Or are they aware of the high risks?

Legal constraints

- Strong benefit protections
  - State constitutions or statutes protect accrued pension benefits (or even benefits to be accrued), limiting reductions for current employees and retirees. Protections vary by state.
- Collective bargaining
  - For unionized employees, some benefit terms and employee contribution rates may be set through collective bargaining agreements, subject to state law. Benefit reductions can be reversed.
- Unequal enforceability
  - Employer contribution requirements may be more flexible or less enforceable than legally protected benefit promises.

Fragmented accountability

- Divided authority
  - State legislatures set many benefit and contribution rules, while pension boards oversee investment policy and actuarial decisions.
  - Trustees may include administrators, political appointees, plan members, retirees, and union representatives.
- Advisor incentives
  - Actuaries, investment consultants, and fund managers hired by the board may also have institutional or commercial interests.
- Unequal representation
  - Unions, employees, and retirees may have organized representation, while taxpayers often have less direct influence in pension decisions.

Uncertainty, complexity, and fiscal illusion

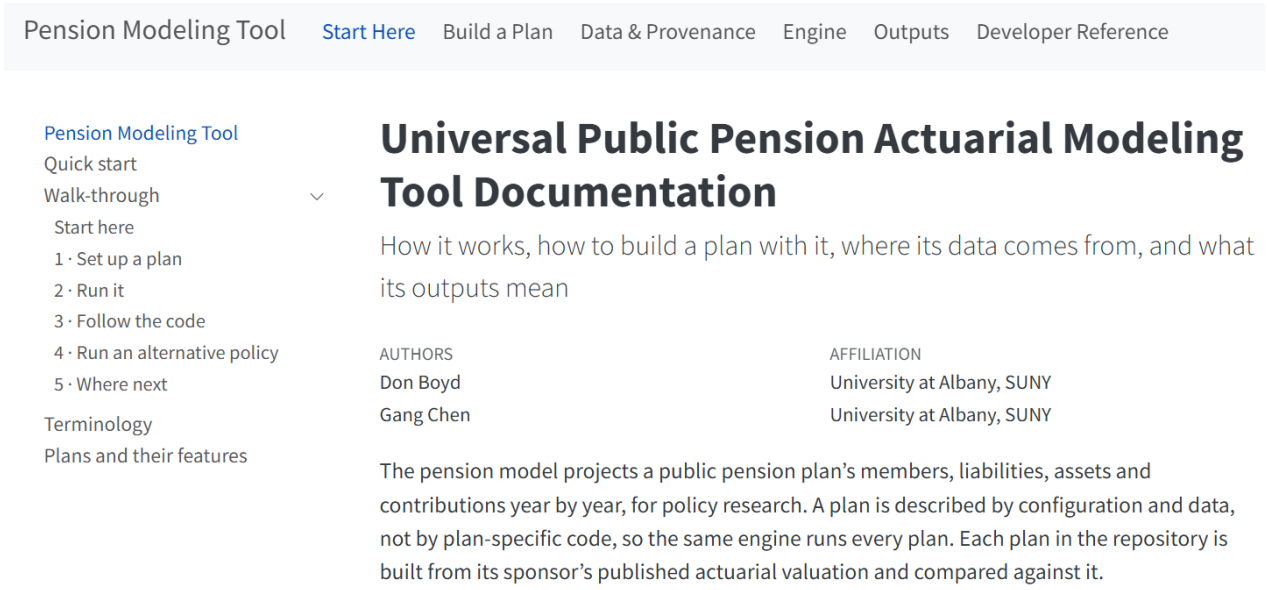
- Plan design features
  - Benefit amounts depend on retirement age, eligibility rules, tier, benefit formula, final average salary, vesting, and early-retirement reductions.
- Demographic and workforce uncertainty
  - Future benefit costs depend on workforce size and composition, salary growth, retirement patterns, turnover, disability, and longevity.
- Economic and investment uncertainty
  - Investment returns depend on inflation and capital-market performance.
  - Actuarial valuations also rely on assumptions about inflation, discount rates, and salary growth.
- Actuarial assumptions
  - Annuity factors depend on demographic assumptions, including mortality, turnover, and disability rates.

Simulations of pension plans – Why simulation?

- Pension policy outcomes depend on the interplay among policy decisions, demographic assumptions, economic conditions, and capital-market returns.
- Policy design must account for uncertainty in these assumptions and conditions.
- Regression-based methods may have difficulty isolating the effects of a specific policy when outcomes also depend on interacting conditions.
- Stochastic simulation can project fiscal risks and costs under alternative policies. Risk-based measures can summarize the range of possible outcomes.
- Example: “Probability that the Employer Contribution Rate Rises by More Than 10% Within Five Years” (Chen et al., 2022).

The Public Pension Actuarial Modeling Tool

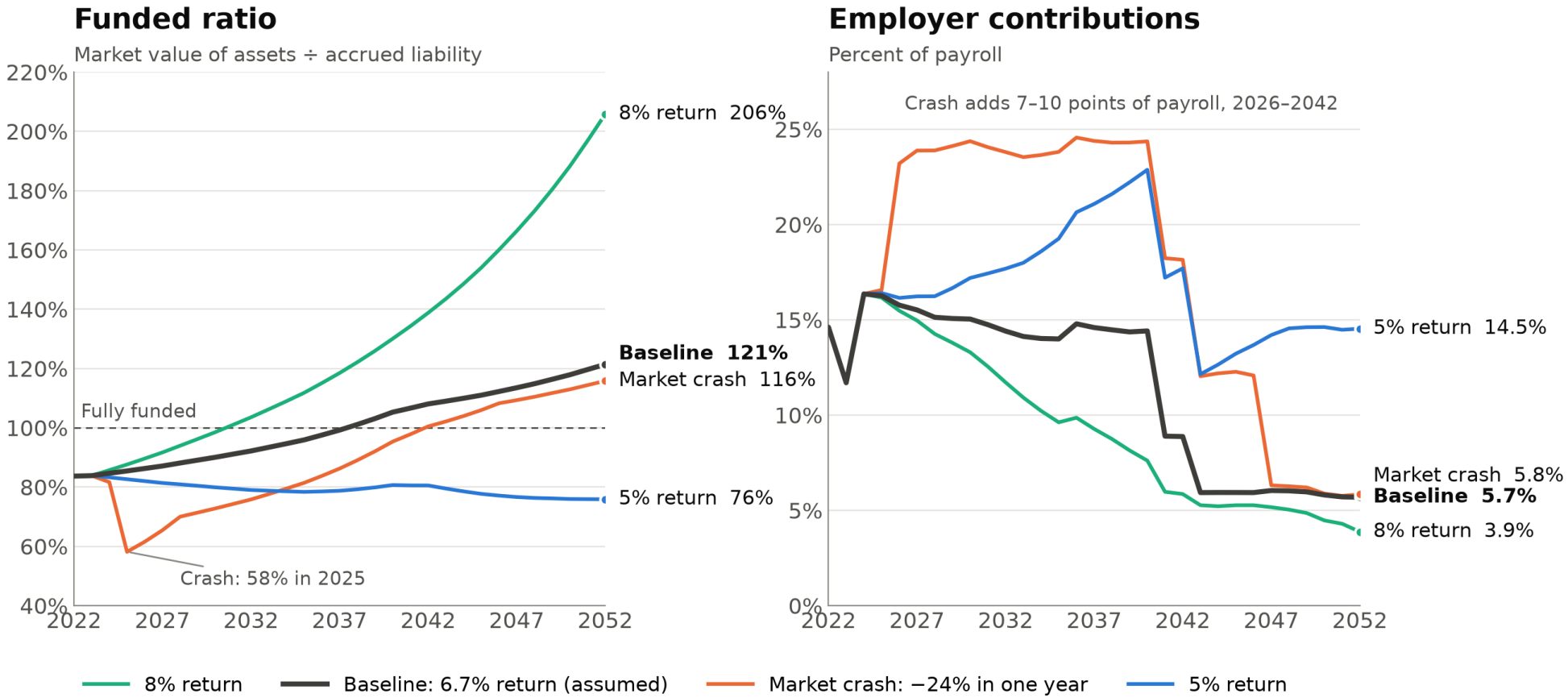
- Chen & Matkin (2017); Chen, Matkin & Kang (2021); Chen, Yin & Boyd (2022); Boyd, Chen, and Yin (2020a, 2020b, 2021); Boyd & Chen (2025)
- Universal Public Pension Actuarial Modeling Tool, funded by Reason Foundation (Boyd & Chen 2026) https://gchen3.github.io/pension_model/



Simulation of scenarios

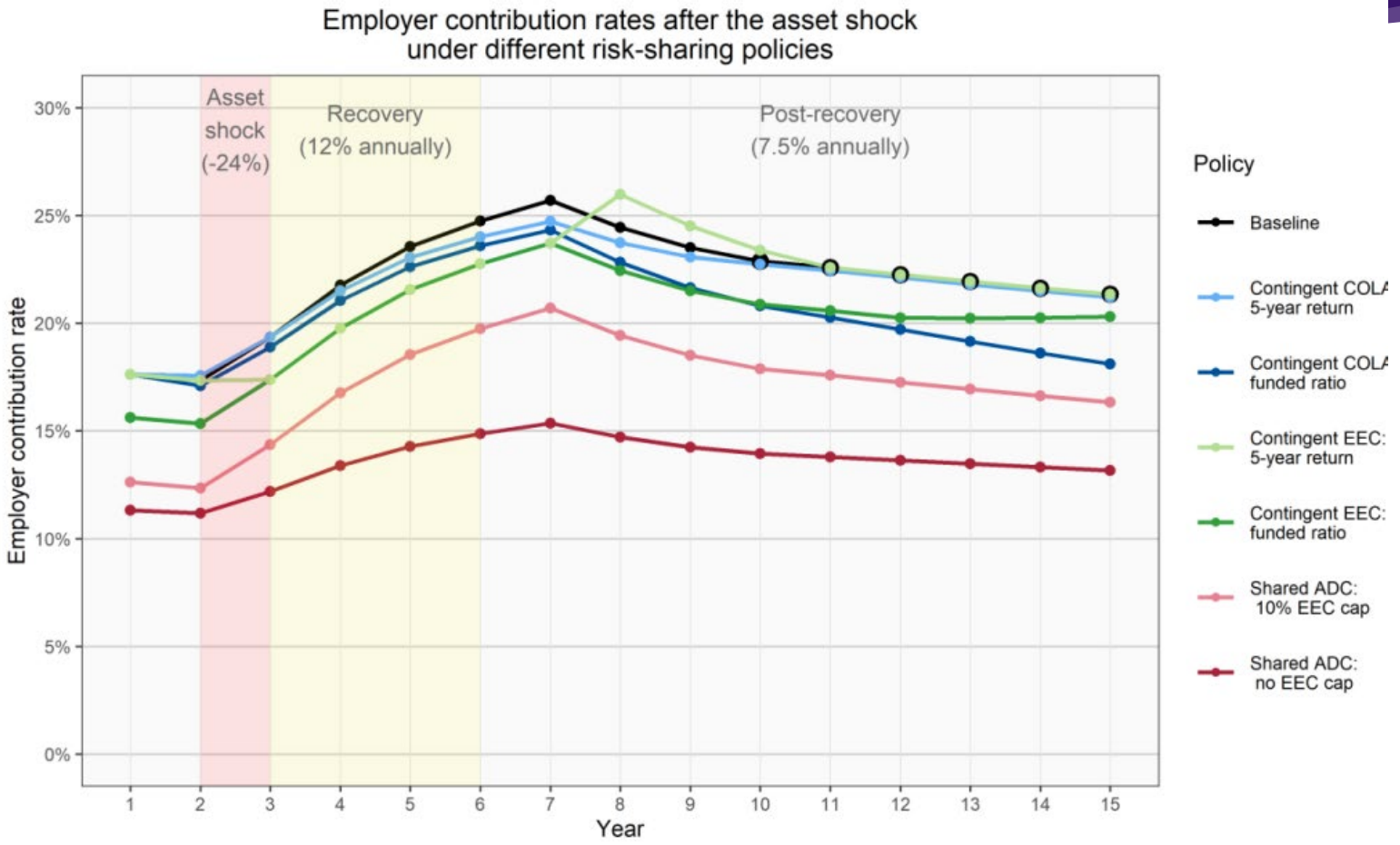
Florida Retirement System: funding under four return scenarios

A 5% return keeps the plan near 80% funded for 30 years; a one-year crash raises employer costs for nearly two decades



Projection by the Universal Public Pension Actuarial Modeling Tool (Don Boyd and Gang Chen, University at Albany, SUNY), starting from FRS's 2022 actuarial valuation. Only asset returns differ; the discount rate is 6.7% in every scenario. Market crash: 3% in 2024, −24% in 2025, 12% in 2026–2028, then 6.7%. Employer contributions follow the plan's actuarial funding policy: normal cost plus amortization of the unfunded liability. Fiscal years.

Simulation of policies



Boyd, Chen, Yin (2021) Funded by Arnold Foundation

Public Pension Risk-Sharing Policies: A Policymaker's Guidebook

Policy	Mechanism
Baseline non–risk-sharing policy	• 1.5% COLA every year • 5% of payroll employee contribution rate every year
Contingent COLA	
COLA with investment-return trigger	• 0.5% COLA if 5-year average return is less than 7.5% • 2.5% COLA if 5-year average return is at least 7.5%
COLA with funded-ratio trigger	• 0.5% COLA if funded ratio is less than 100% • 2.5% COLA if funded ratio is at least 100%
Contingent employee contributions	
Employee contribution with investment-return trigger	• 3% of payroll if 5-year average return is 11% or higher *phasing up to* • 7% of payroll if average return is 4% or lower
Employee contribution with funded-ratio trigger	• 3% of payroll if funded ratio is 115% or higher *phasing up to* • 7% of payroll if funded ratio is 85% or lower

Boyd, Chen, Yin (2021) Funded by Arnold Foundation

Reform options

- Benefit changes: Reduce cost-of-living adjustments or benefit multipliers; create new employee tiers.
- Retirement eligibility changes: Increase the retirement age, required years of service, final average salary period, or vesting period.
- Contribution changes: Increase employee or employer contributions; state assistance.
- Plan design changes: Adopt or transition to defined-contribution, cash-balance, or hybrid plans.
- Investment changes: Revise investment policies and practices.
- Governance changes: Change pension board composition or governance arrangements.
- Pension obligation bonds (POBs): Issue bonds to finance pension liabilities.

Source: Chen et al (2025) Chapter 8

DB, DC, and everything in between

Defined-benefit (DB) plans promise a retirement benefit, so the employer bears the investment risk and the risk that contributions will be insufficient to fund promised benefits.

Defined-contribution (DC) plans promise specified contributions, not a specific retirement benefit, so employees bear the investment risk and the risk that their savings will be insufficient for retirement.

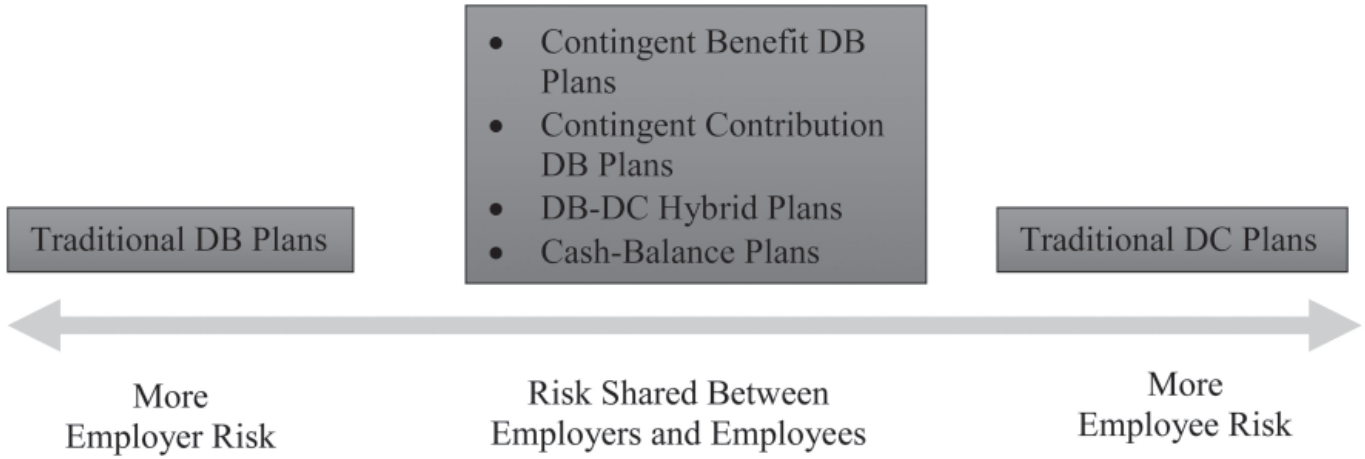


FIGURE 9.1 A Continuum of Risk-Sharing Arrangements in Public Pension Plans

Source: Adapted from Boyd et al. (2021)

Hybrid and Risk-sharing plans

- Contingent-benefit DB plans: Some benefits can vary with the plan's investment or funding performance.
- Contingent-contribution DB plans: Employee contributions can vary with the plan's investment or funding performance.
- Cash-balance (CB) plans: These are defined-benefit plans with features that resemble DC plans. The employer credits a specified percentage of pay to each participant's notional account and guarantees interest credits under a plan formula, such as 5%.
- DB–DC hybrid plans: These combine defined-benefit and defined-contribution components. Employers may use them to offer employees a choice of plan types or to gradually shift the retirement package toward a greater DC component.

Source: Chen et al (2025) Chapter 9

Challenges of moving from DB to other plans

- Legacy liabilities: Governments remain responsible for funding unfunded liabilities in closed plans, raising intergenerational equity concerns.
- Investment outcomes and potentially lower benefits: In DC plans, individual participants may invest too conservatively or hold poorly diversified portfolios; CB plans potentially have lower benefits than DB plans.
- Workforce retention: Defined-benefit plans can help retain mid-career teachers, police officers, and firefighters.
- Competing goals: Reforms that improve sustainability and affordability may reduce retirement benefit adequacy.
- The longer governments delay addressing unfunded liabilities, the more difficult reform may become. Successful reforms must balance the goals of pension management, engage diverse stakeholders, and work within legal and institutional constraints.

Source: Chen et al (2025) Chapter 9

Data

- CRR's Public Plans Data (PPD): https://publicplansdata.org/.
  - > 200 large state and local pension plans, covering >90% of members and liabilities.
  - 2001-2025 plan-year panel data.
- Equable plan database: https://equable.org/data-research
  - 230 state defined benefit retirement plans – including pension plans, guaranteed return plans, and hybrid plans.
  - 706 active retirement plans and classes of benefits, including pension plans, defined contribution plans, guaranteed return plans, and hybrid plans.
- Pension systems ACFRs
- State and local government ACFRs
- Fiscal monitoring system data (e.g. NYS OSC, MA DLS)

Questions for future research

- What institutional arrangements can promote sustainable management of public pension plans?
- How can governments navigate political and regulatory constraints to implement pension reforms?
- Which pension benefit provisions help public employers recruit and retain employees?
- How do high inflation and uncertain investment returns affect pension investments and actuarial assumptions?
- How do plans measure, disclose, and manage fiscal risks?
- How can governments maintain discipline in making pension contributions?