

# The Public Pensions Crisis

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# Questions

- What are defined benefit pension plans?
- What's the problem?
- Why do we have a problem?
- How big is the problem? Where are problems biggest?
- What can state and local governments do?
- What will happen next?

What are defined benefit  
pension plans?

# What *is* a defined benefit?

The typical defined benefit pension is calculated as follows:

Step 1: # of years worked (called “years of service”)

x

Step 2: “benefit factor”

x

Step 3: a measure of pay (usually related to late-career salaries)

Example: Mary Smith retires after 20 years, 2% benefit factor, \$60,000 final salary:

Pension = 20 years x 2% x \$60,000 = 40% x \$60,000 = \$24,000 annually until death

Usually there are complexities: vesting rules, salary averaged over several years, alternative benefit calculations, survivorship benefits, COLAs, etc. But this is the essence of it. The benefit is defined, and required contributions will depend upon benefits and investment earnings. By contrast, if contributions are defined, benefits will depend upon contributions plus investment earnings. (There are hybrids, too.)

# State & local defined benefit plans

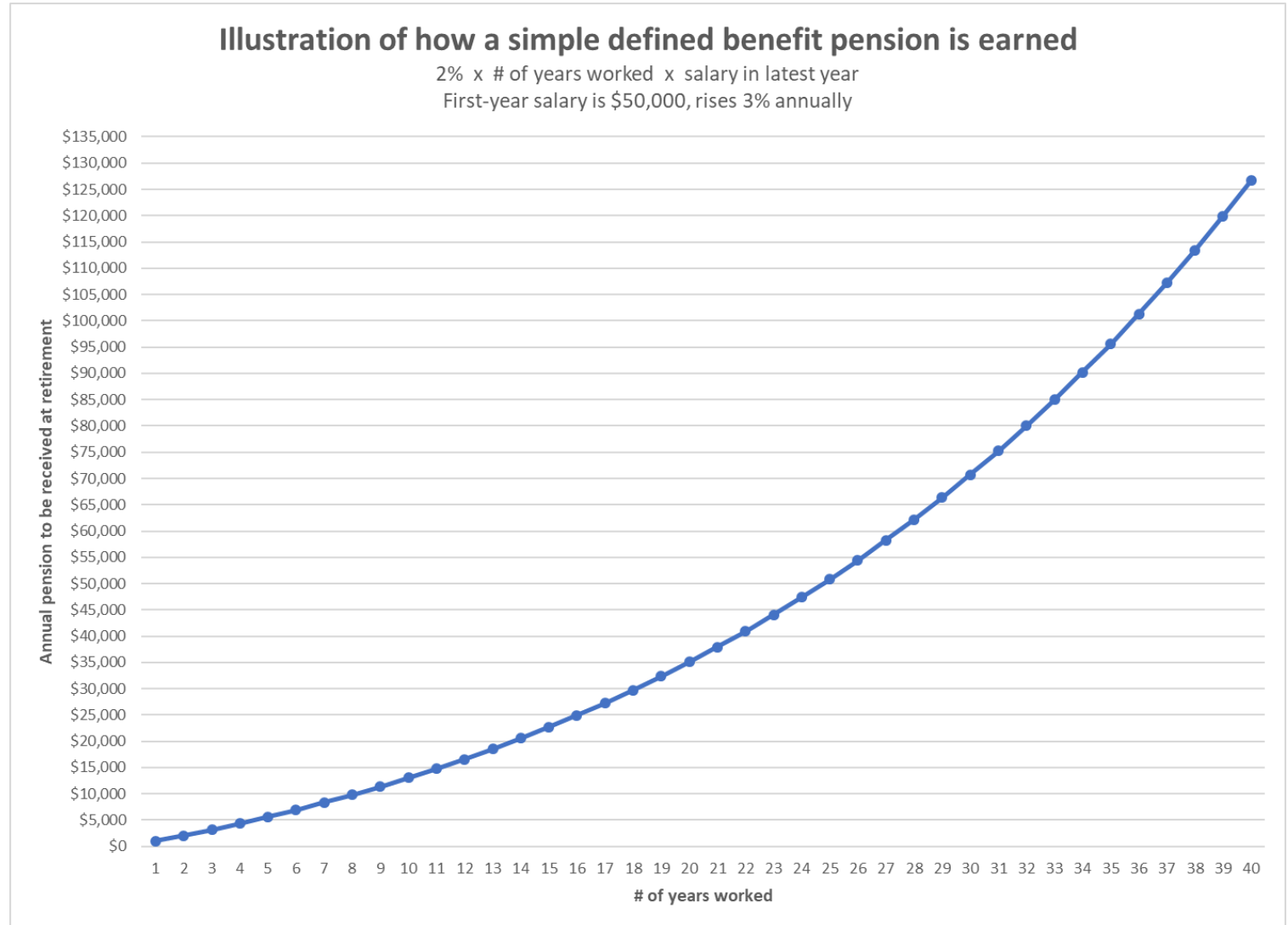
- 14+ million workers, 6+ million retirees
- > 6,000 plans; 170 large plans have 90% of assets
- \$4.6 trillion invested assets
- \$167 billion gov't contributions annually
  - About 50% greater than roads/bridges capital spending
  - About 20+% of K-12 spending
  - About 8.5% of all taxes (was 4.6% in 2000)

# Which governments do what?

- Varied administrative arrangements:
  - State-run systems, state and local workers (e.g., CalPERS, NYSLERS)
  - City and county locally-run plans, local workers (NYCERS; Chicago; etc.)
  - State-run plans, multiple municipalities (Illinois IMRF)
- Varied contribution arrangements:
  - State contributes for state workers in state-run system (common)
  - State contributes for local gov't workers in state-run system (NJ)
  - Local gov't contributes for local workers, state-run system (NYSLERS)
  - Local gov't contributes for local workers, locally-run system (common)
- Greatly varying benefit levels and legal protections for benefits

# Benefits earned in a backloaded manner

1. Pensions increase significantly as careers lengthen – incentive to stay one more year.
2. Workers who leave early don't get much.
3. If you cut the rate at which benefits will be earned for future service, it's a big cut in expected pension for the current worker. (Think **California Rule**.)
4. If pensions were funded the way they are earned, contributions would have to rise as % of pay during worker's career → Risky.



# Why prefund pensions?

- Current generation pays for services they receive.
- Money is there to pay benefits when due. *Legal* protection vs. *funding* protection.
- If strong legal protection, maybe workers and unions don't need strong funding protection? Or does drastic underfunding create pressure to weaken legal protection?

Note: Some academics argue that full funding may not be the “right” policy. Dangerous, given real-world politics.



# What's the problem?

# Usually governments, not workers, bear pension risk

- If plan investments fall short, the government must increase contributions.
- That means taxes must go up or spending on services, infrastructure, etc. must decline.
- Many incentives encourage plans and governments to assume high investment returns and take investment risk. Other bad incentives, too.
- The risks have not worked out well. Assumptions remain risky.

# What is an unfunded liability?

- The difference between:

Amount owed for benefits already earned\* by current workers and retirees, and other past workers  
and

Amount set aside for these benefits (assets)

\* Policy implications?

- Public plans measure these amounts differently than economists and the rest of the financial world.

# Technical: What is an unfunded liability?

1. Actuary forecasts future benefit payments for current workers and retirees
2. Estimates present value of future benefits, using discount rate
3. Apportions present value: (a) amount already earned (Accrued Actuarial Liability, AAL), and (b) amount to be earned with future service.
4. Accrued Actuarial Liability minus “Actuarial Assets” equals
5. Unfunded Accrued Actuarial Liability (UAAL):

$$\text{UAAL} = \text{Actuarial liability} - \text{Actuarial assets}$$

*What's in this UAAL? What isn't? Policy implications?*

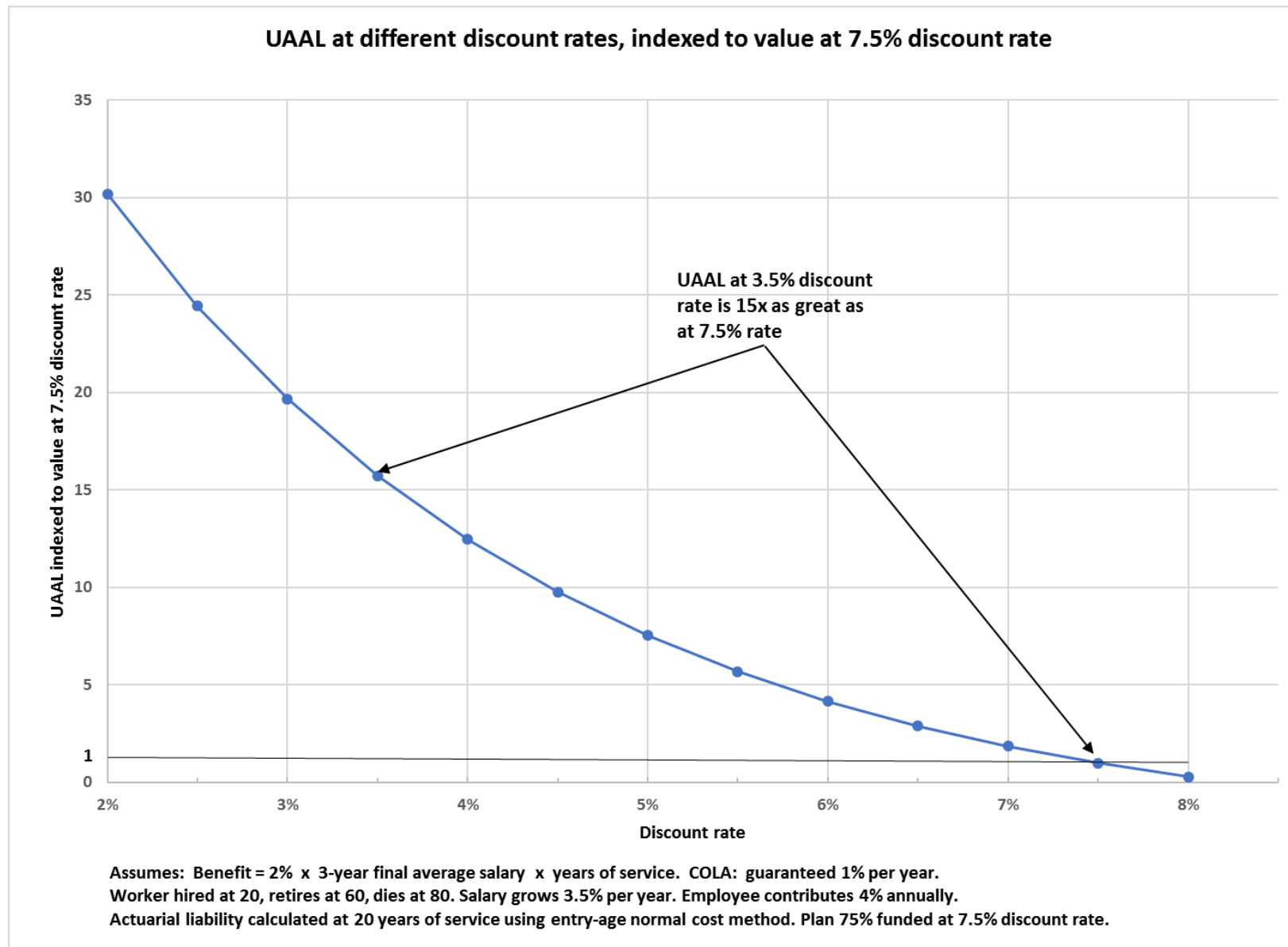
Notes: (1) more detail in appendix; (2) accounting terminology is different from actuarial terminology.

Why do we have a problem?

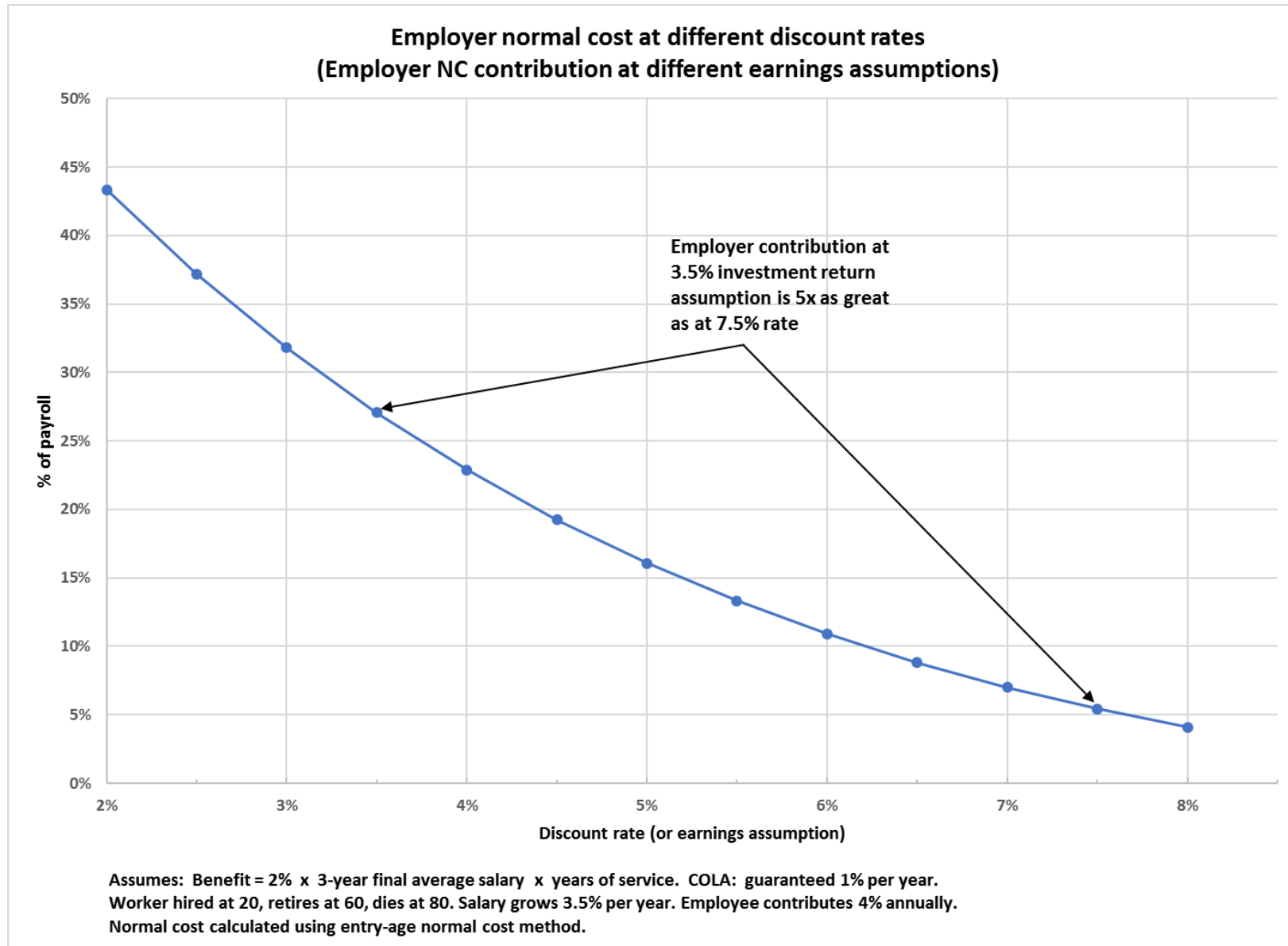
# Bad incentives and no police

- Attractive for 2- & 4-year elected officials to push costs to future. Institutional environment allows and encourages this.
- Laws often are one-way streets: Governments can increase but rarely can reduce benefits. (Some exceptions.)
- Unlike private plans, public plans not subject to ERISA and related federal laws; no federal funding requirements or minimum-contribution rules
- Weak accounting standards compared to private. Unlike FASB:
  - GASB requires discount rate assumption based on plan's own portfolio (incentive!)
  - No SEC oversight of accounting.
  - Governments effectively can veto appointments to the GASB board that oversees them.
- Actuarial Standards Board guidance allows latitude and plans use it!
- Congress has no role (so far) and is chary; Tower Amendment.
- States can impose rules on local plans; hard to impose rules on themselves.

# Higher discount rates → much better (reported) funded status

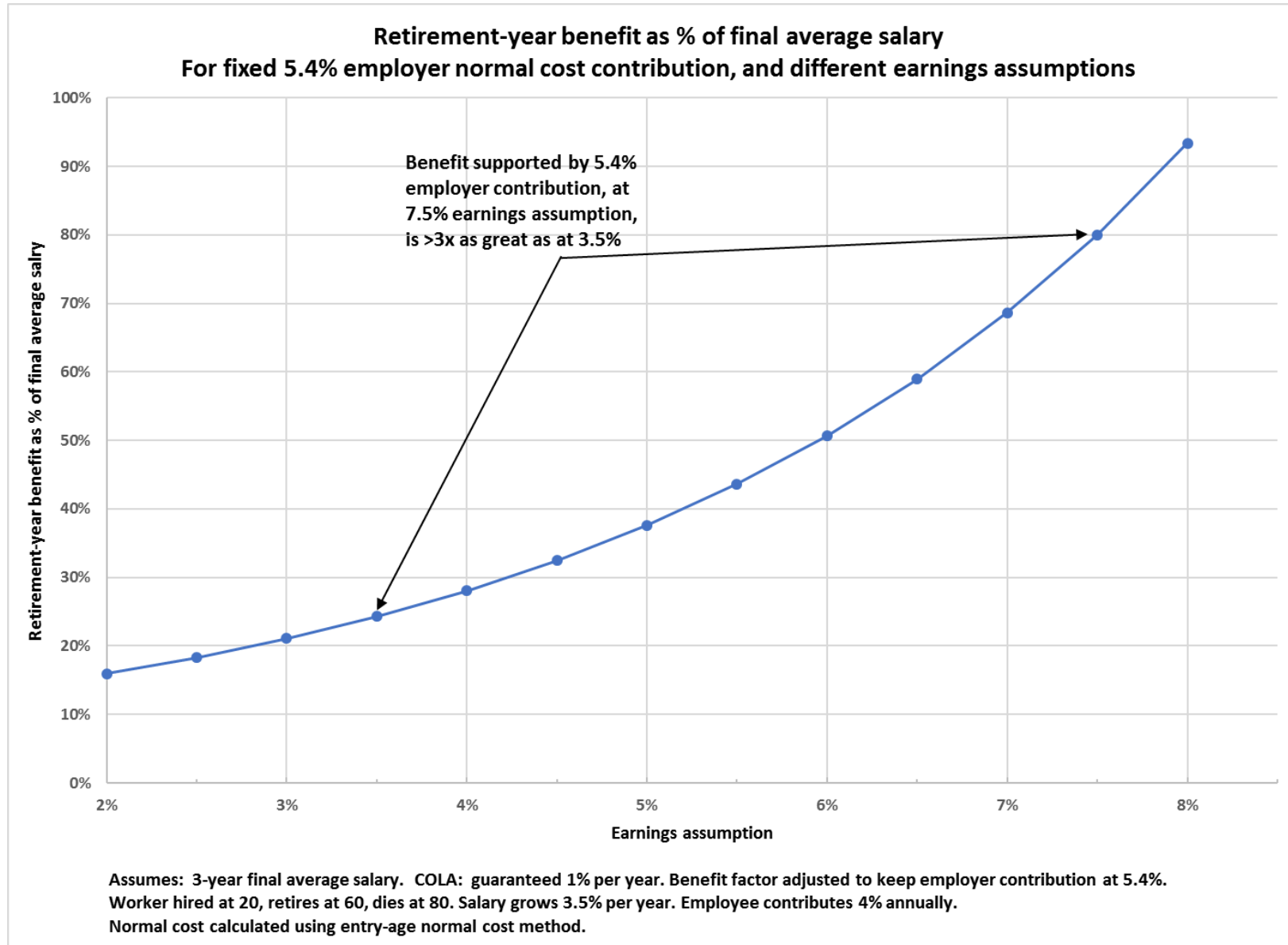


# Higher assumed investment returns → much lower contributions



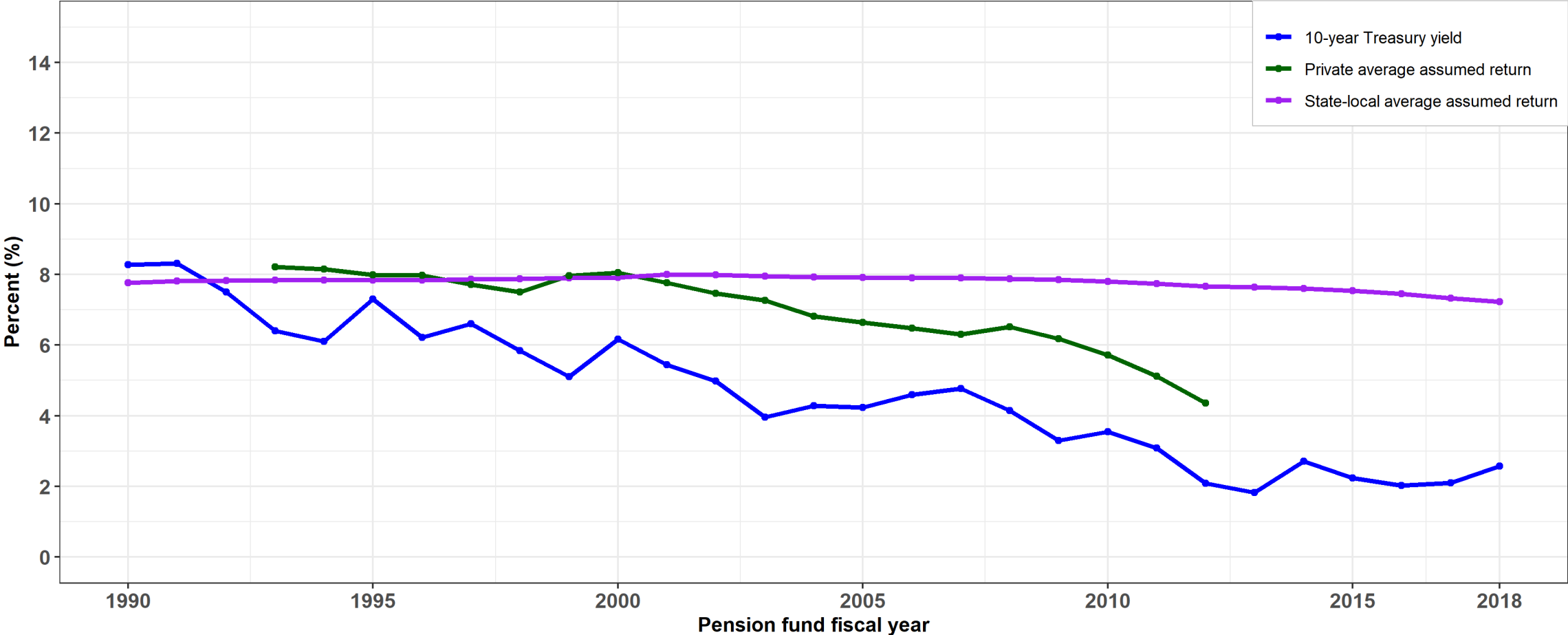


# Also → Can offer higher benefits for a given contribution level



# Public plans have lowered return assumptions only slightly in response to declining risk-free rates

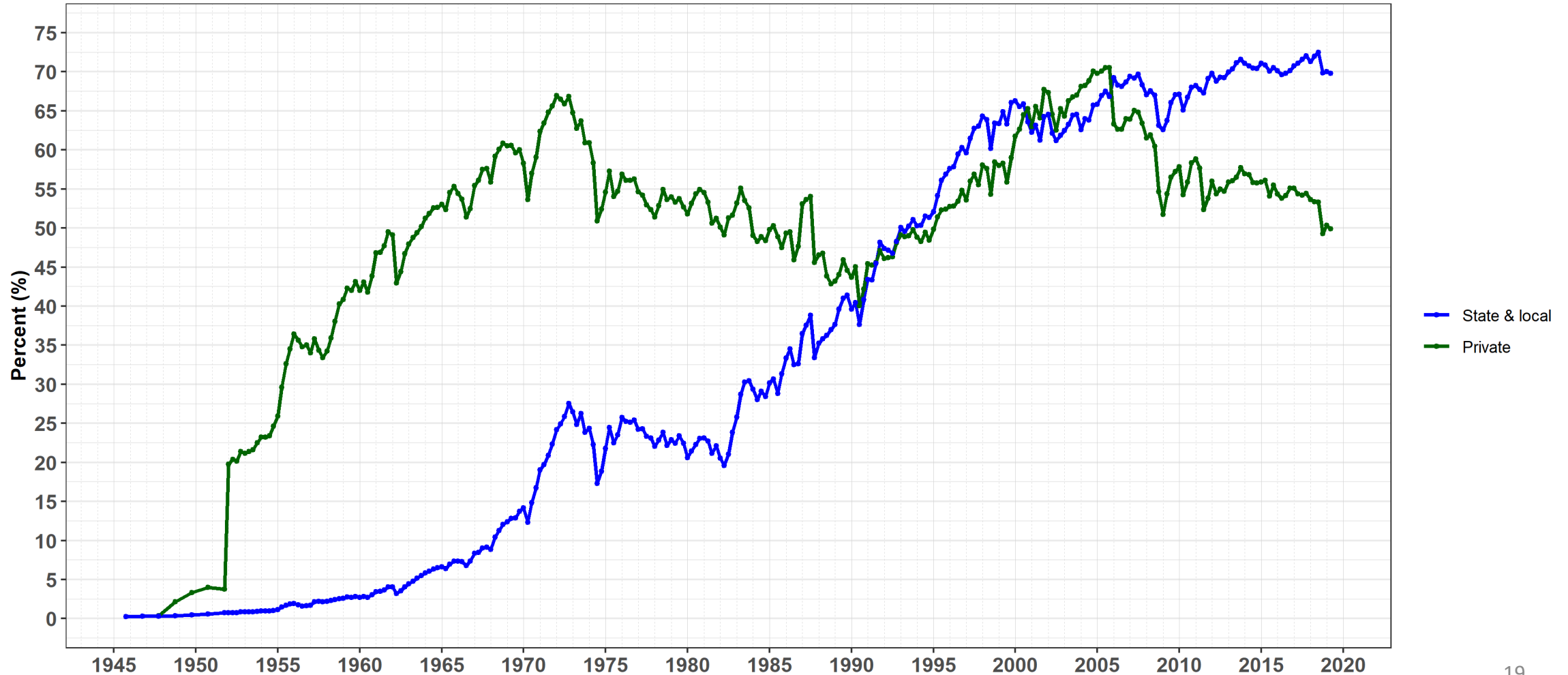
Assumed investment returns and risk-free returns  
Public and private retirement systems



Notes:  
- Public plan assumptions for 2001+ from Public Plans Database, Center for Retirement Research. Earlier years from multiple sources.  
- Private plan assumptions provided via correspondence with authors of:  
Andonov, Aleksandar and Bauer, Rob and Cremers, Martijn, Pension Fund Asset Allocation and Liability Discount Rates (March 3, 2016). <http://ssrn.com/abstract=2070054>  
- 10-Year Treasury yield from Federal Reserve Bank of St. Louis (FRED)

# Public plans are increasingly invested in equity-like assets

Equity-like investments as percentage of invested assets  
State and local government and private sector defined benefit pension plans



# Risk has increased relative to government budgets

## Investment risk and state and local government taxes

Fiscal year	Assets, all pension funds in SC (\$ millions)	Estimated standard deviation of portfolio with 7.5% expected return	1 standard deviation investment-return shortfall (or overage) (\$ millions)	State & local taxes in SC, all governments (\$ millions)	1 standard deviation shortfall as % of taxes	30-year level-dollar amortization (\$ millions)	As % of taxes
1995	\$ 12,526	4.3%	\$ 539	\$ 7,059	7.6%	\$ 45	0.6%
2016	29,514	12.0%	3,542	17,272 *	20.5%	293	1.7%

Source: Author's calculations, based upon Census Bureau data, and upon Donald J. Boyd, and Yimeng Yin. "Appropriateness of Risk-Taking by Public Pension Plans." Nelson A. Rockefeller Institute of Government, February 2017.

\* Estimated

# U.S. public plans, with unique regulatory environment, have increased risk. Other plans have not.

- Important paper: Andonov, Bauer, Cremers (2017). Examines, among other things, how U.S. public plans, private plans, and Canadian/European plans responded to Treasury rate declines.
- Their statistical analysis shows that other plans reduced discount rates as market rates declined, but not U.S. public plans.

“U.S. public pension funds have become the biggest risk-takers among pension funds internationally”

# Even IF assumptions are correct, a roller coaster path

Three individual simulations, all with 7.5% discount rate & 30-year 7.5% compound annual returns.

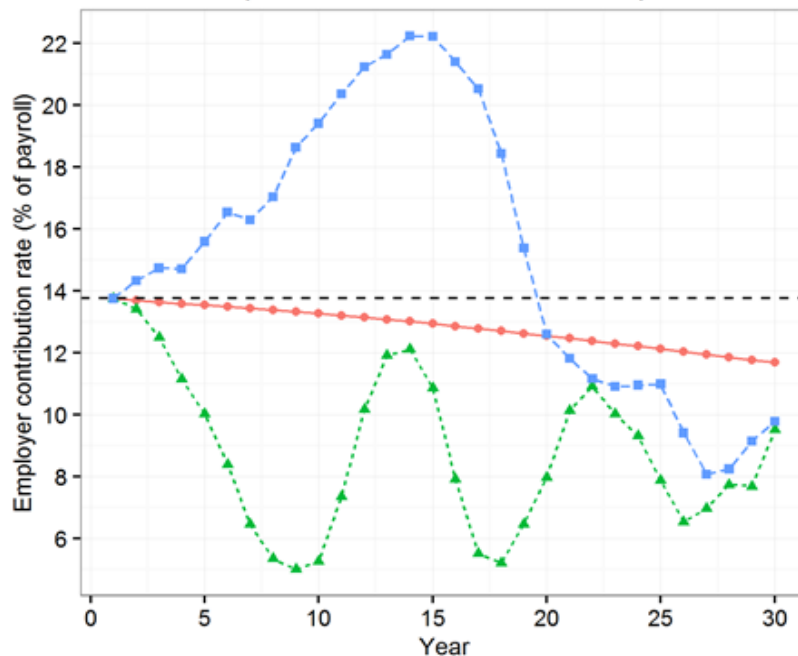
- **Deterministic run: constant returns**
- **Stochastic run: high returns in early years**
- **Stochastic run: low returns in early years**

*People* (politicians) interact with this system:

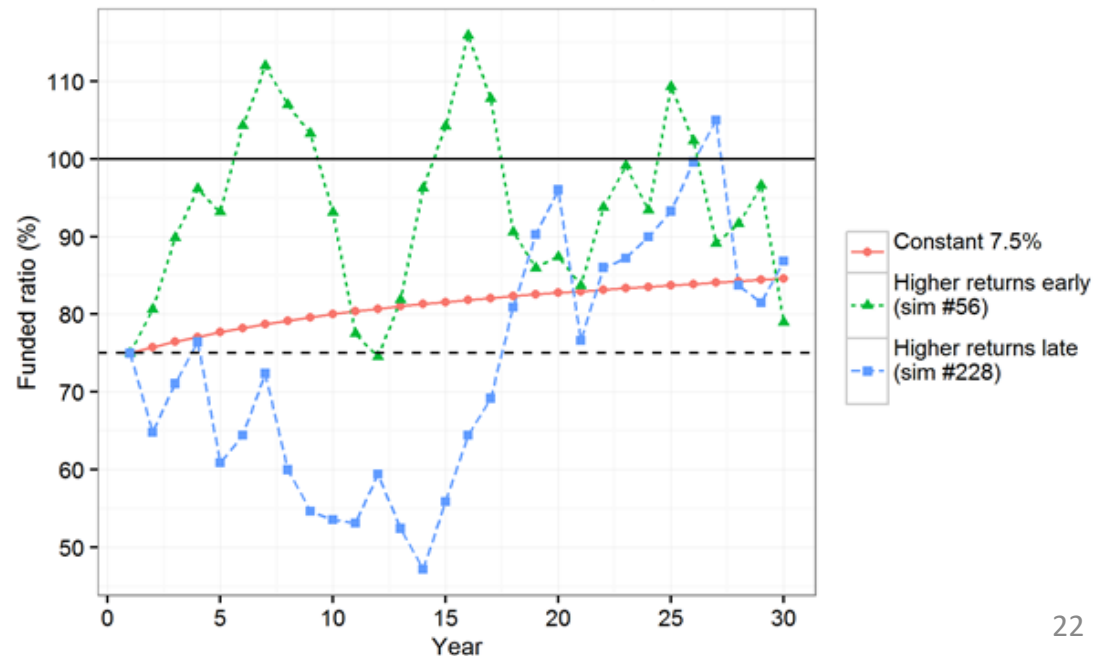
- Will they support 50+% contribution increases?
- Will they refrain from benefit increases and gimmicks if plan funding shoots above 100%?

And this is when return assumptions are met at 30 years. Most times, things will be better or worse than assumed.

Employer contribution rate



Funded ratio



How big is the problem?

# Basic facts – underfunding

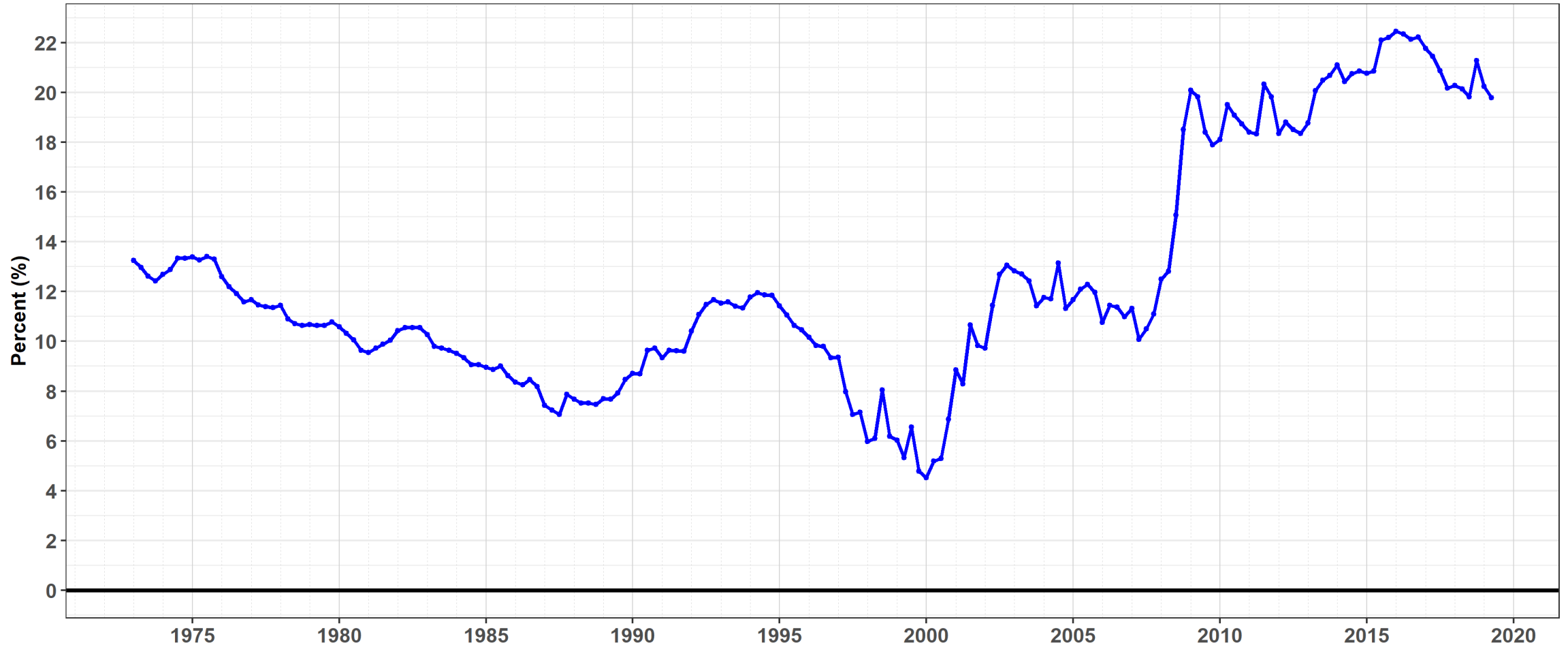
- Controversy about how to measure liabilities
- Per Federal Reserve Board 2019q3 unfunded liabilities were \$4.3 trillion. By contrast public plan estimates are ~\$1.5-2 trillion.
- Great variation around country in extent of underfunding



# Despite contribution increases, unfunded liabilities are near record relative to economy

Unfunded liability of state and local government defined benefit pension plans

As percentage of Gross Domestic Product

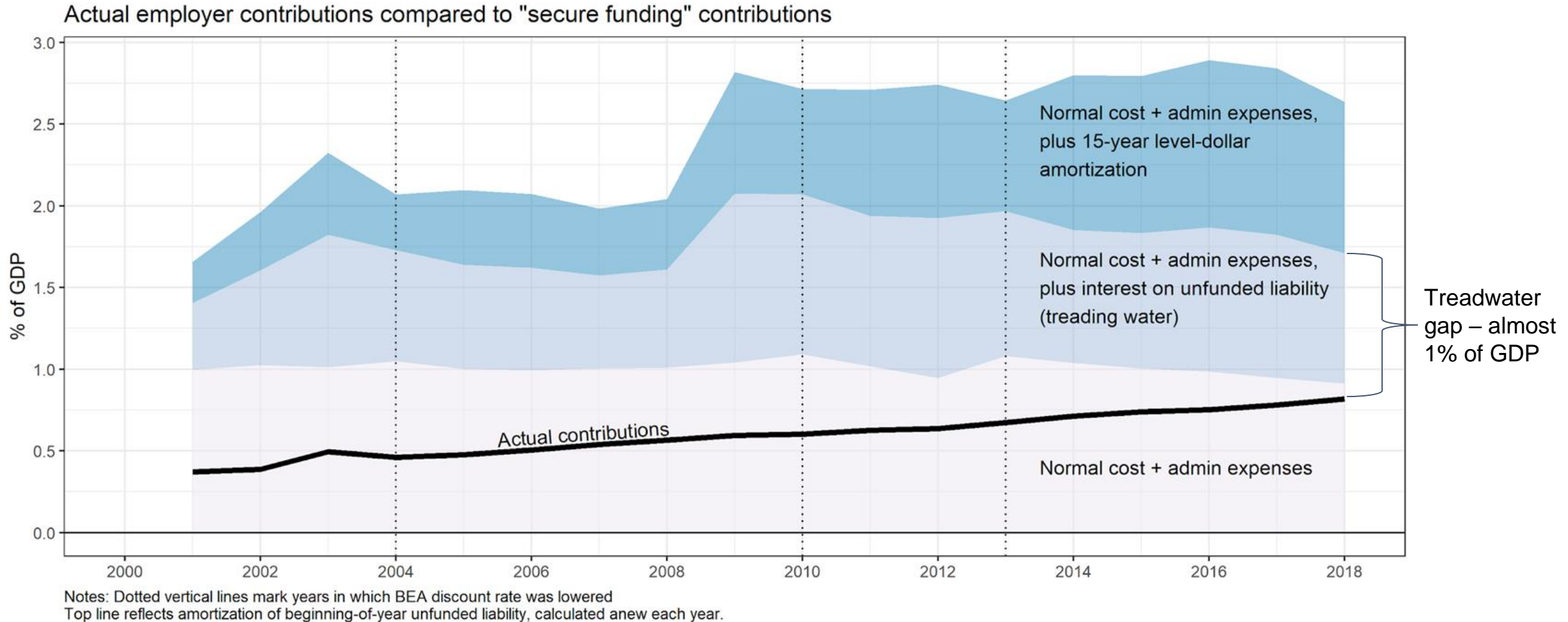


Source: Federal Reserve Board, Financial Accounts of the United States, Tables L.120.b and F.2  
Note: Liabilities are as valued by the Bureau of Economic Analysis, not actuaries.

# What does it take to tread water?

- Tread water: Keep things from getting worse, i.e., keep unfunded liabilities from growing.
- Requires contributions to cover costs of:
  - New benefits earned with a new year of service (the “normal cost”), plus
  - Interest on unfunded liability.

# Huge gap between employer contributions and “secure funding”



Where are problems the  
biggest?

# Multiple overlapping underfunded plans must be funded by the same economic and tax base

For example, Illinois taxpayers (largely) must pay for multiple underfunded plans:

- Illinois Teachers' Retirement System
- State Employees' Retirement System
- State Universities Retirement System
- Chicago-area funds: Municipal Employees, Laborers', Police, Firemen's; Chicago Public Schools; Cook County Employees'; Chicago Transit Authority
- Many lesser funds in the Chicago area and throughout the state, most of which are deeply underfunded

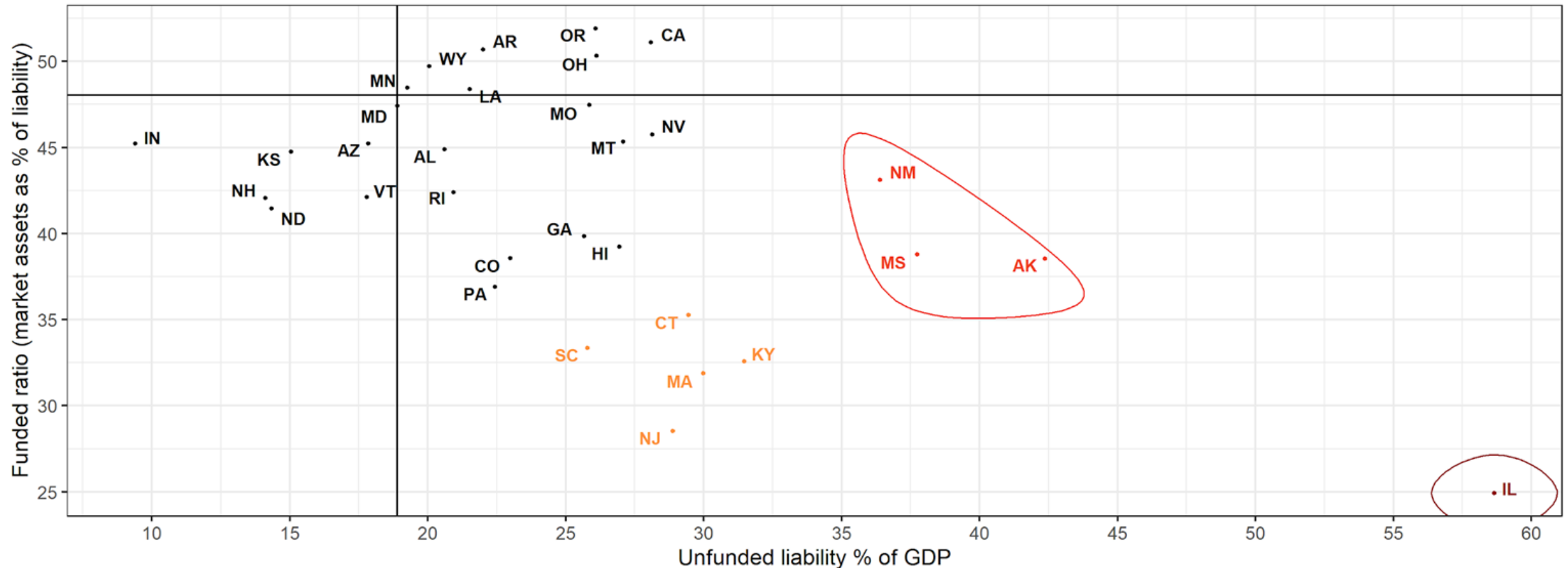
**BEA data allow this.** It is a valuable way to compare across states.

(It would be nice - but much harder still - to do this for smaller geographic areas.)

# Comparing to the economy can be more revealing than simply looking at the funded ratio

Funded ratio vs. Unfunded liabilities as % of GDP, 2018

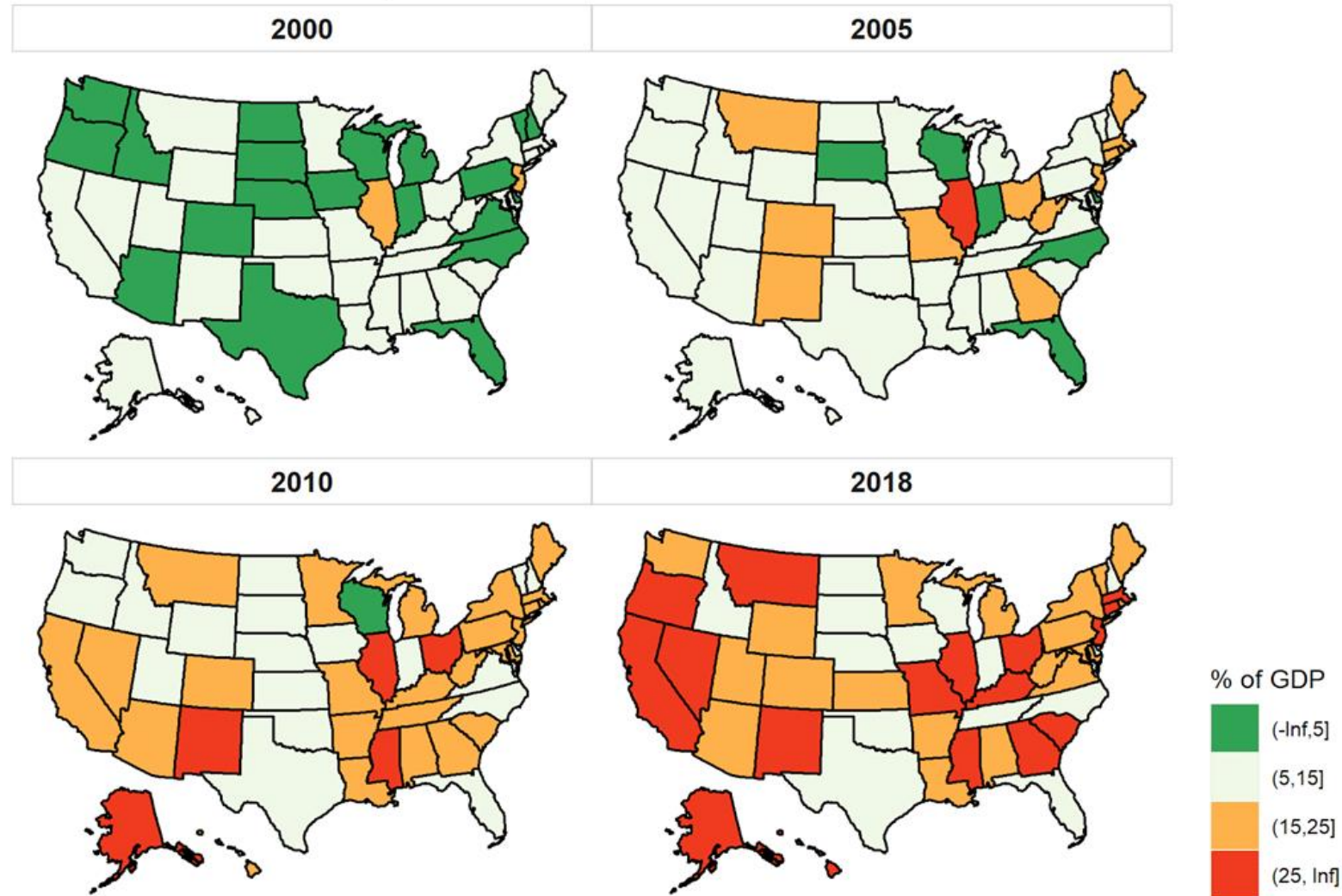
States with funded ratio, or unfunded liability as % of GDP, that is worse than median



Note: Crosslines mark 50-state medians

# Unfunded liabilities have grown in most states

Unfunded liabilities as percent of GDP

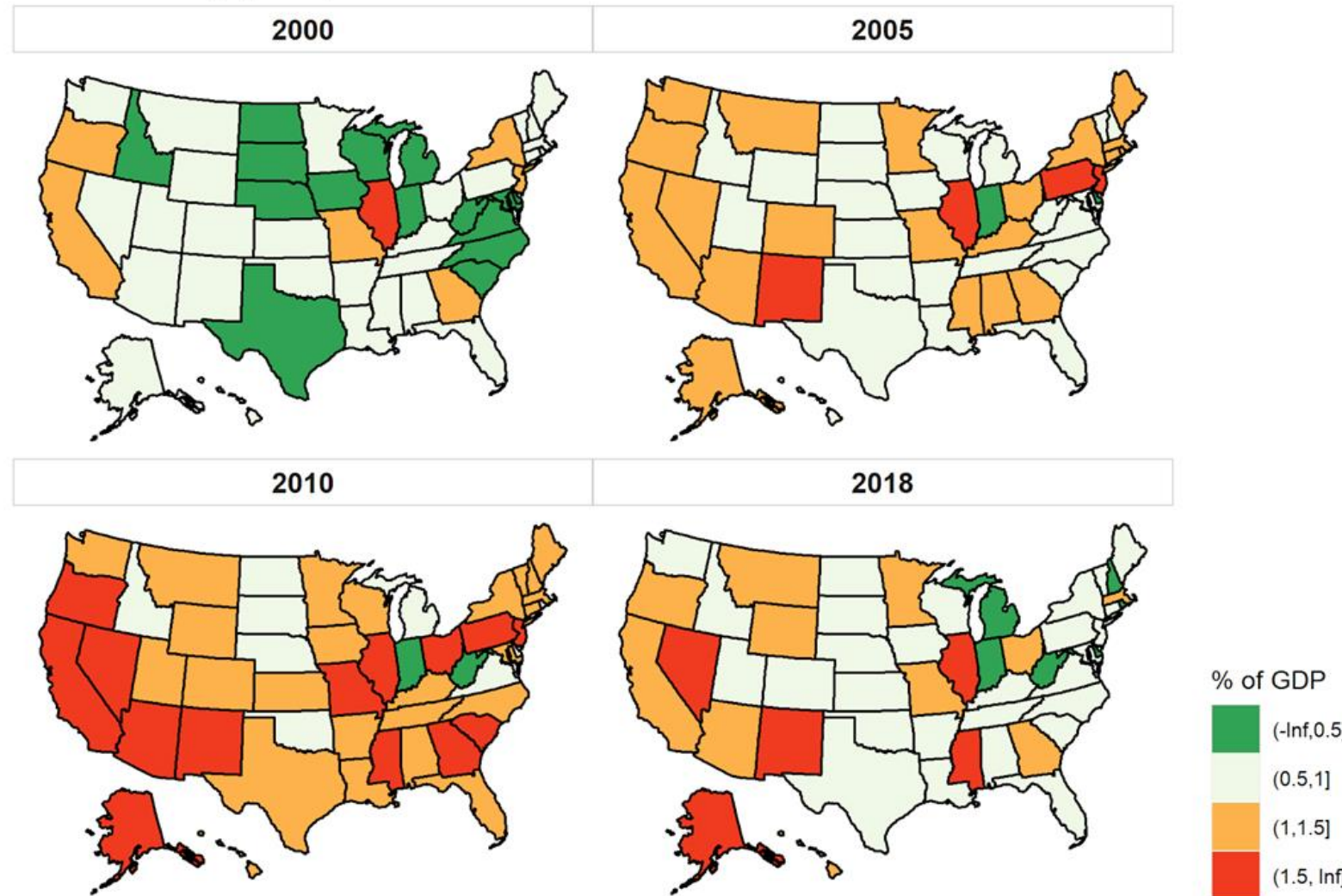


Source: Author's analysis of BEA state pension estimates



# Contribution increase needed to “tread water” has fallen recently (due to contribution increases and benefit cuts)

Treadwater gap as percent of GDP

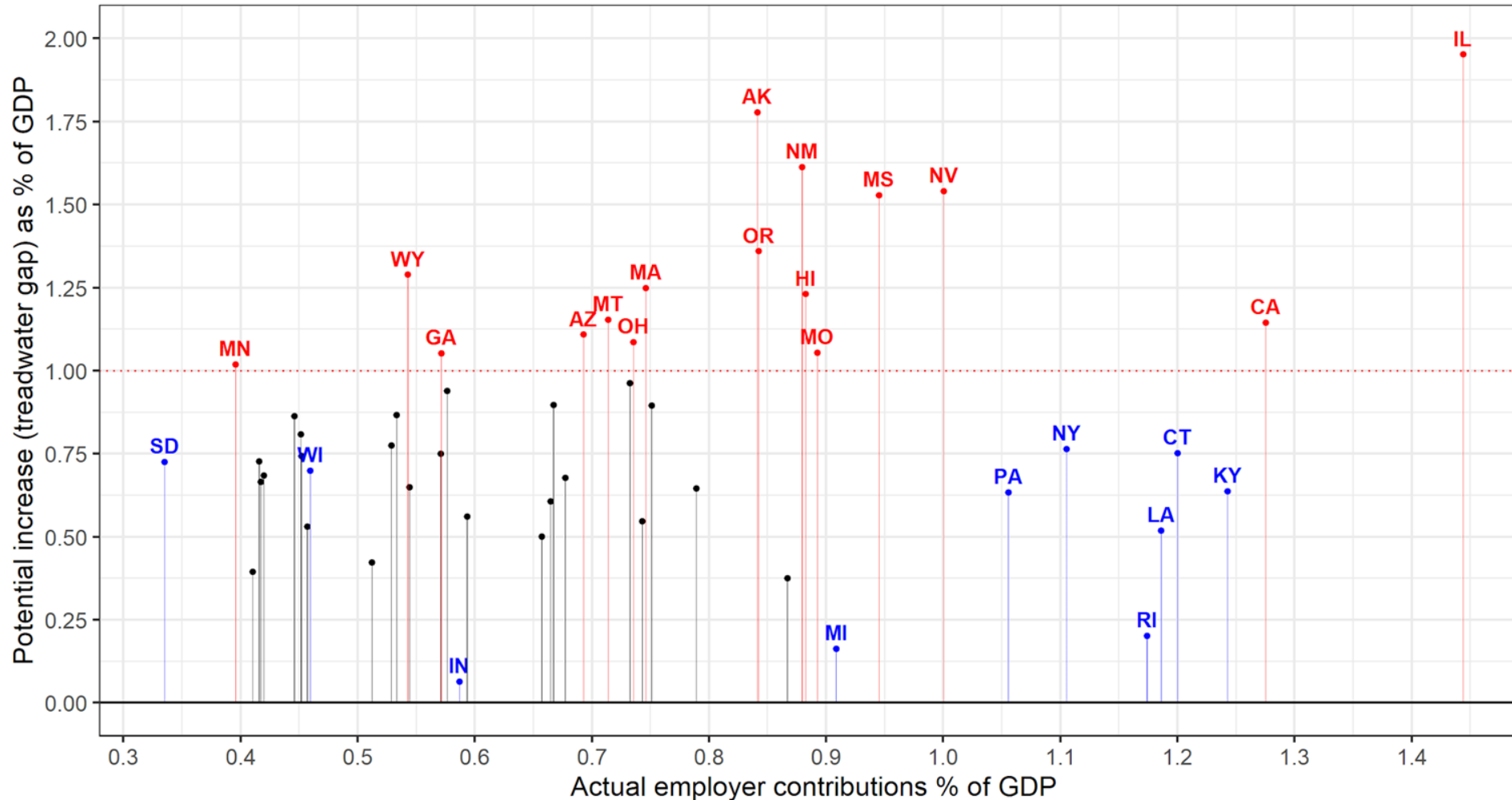


Source: Author's analysis of BEA state pension estimates



# How hard would it be to tread water?

Contribution increase needed to cover normal cost plus interest on unfunded liability, compared with actual employer contributions, as % of GDP in 2018



Note: Labeled states have gap > 1% of GDP or are otherwise noteworthy

1% of GDP for US is roughly equivalent to:

- 49% of all state-local income or sales taxes, or
- 29% of all K12 spending, or
- 190% of all highway capital spending

What can state and local  
governments do?

# Policy options highly constrained

- Politicians understandably concerned about going back on commitments, especially to people who no longer work or are near retirement
- Laws in some states are particularly constraining
  - Employee contribution increases often easier to do, legally than benefit cuts. Different impacts on plan members.
  - COLAs sometimes legally easier to do than other benefit changes.
  - “California rule” – an evolving issue – is especially constraining
- Benefit cuts also can reduce a government’s attractiveness as an employer. Changes should be considered in this context.
- Risk-sharing an option in some places: SD, WI; PA. Under consideration in some places.

# Reducing unfunded liabilities – stylized view

People affected	What a government may be able to do*	Examples	Comments
<b>1. People who don't work for you yet</b>	Anything	<ul style="list-style-type: none"> <li>• New tiers</li> <li>• Hybrid DB-DC plans</li> <li>• Risk-sharing</li> </ul>	<b>NONE OF THE UAAL IS HERE.</b> A “stop digging” solution – can ease future costs, <i>slowly</i> . Competitiveness-as-employer issues. <b>Most reforms have been here.</b>
<b>2. People who work for you now:</b>			
(a) Service they have yet to render	Depends. “ <b>California rule</b> ” may prevent cuts. In IL, state Supreme Court said cannot change. (Can lay off workers, but not change benefits)	<ul style="list-style-type: none"> <li>• Reduce benefit factor for future service</li> <li>• Increase retirement age</li> <li>• Change COLA</li> </ul>	<b>#3) SOME UAAL CAN BE IN HERE UNDER EAN COST METHOD BUT PROBABLY NOT MUCH.</b> In some circumstances, can be substantial. Potentially important in distressed situations (e.g., Detroit). ERISA allows for private plans.
(b) Service they've already rendered	Hard to cut benefits, legally, politically, morally.	<ul style="list-style-type: none"> <li>• Haircuts, future benefits</li> <li>• COLA cuts</li> <li>• Contingent COLAs</li> </ul>	<b>#2) MOST REMAINING UAAL IS HERE. BIG IMPACT ON PROBLEM.</b> Vested/non-vested distinctions matter, too.
<b>3. People who used to work for you (e.g., retirees)</b>	Hard to cut benefits, legally, politically, morally. Great variation. COLAs more susceptible to cuts than other benefits.	<ul style="list-style-type: none"> <li>• Haircuts, current benefits</li> <li>• COLA cuts or suspension for retirees</li> <li>• Contingent COLAs for retirees</li> </ul>	<b>#1) MOST OF THE UAAL IS HERE (Often 50-60%). BIG IMPACT ON PROBLEM.</b>

\* Varies greatly across states. See Monahan.

What will happen next?

# Very difficult to predict

- Investment risk is a wild card. Plans could get lucky, or even do much worse.
- Benefits for new workers already reduced widely; some reductions in benefits for current members.
- Laws in some states are particularly constraining
  - Employee contribution increases often easier to do, legally than benefit cuts. Different impacts on plan members.
  - COLAs often legally easier to do than other benefit changes.
  - “California rule” – an evolving issue – is especially constraining
- Benefit cuts also can reduce a government’s attractiveness as an employer. Changes should be considered in this context.

# What if a government has made promises it cannot keep?

- Local governments
  - Bankruptcy is an option, if allowed by state.
  - All bets are off – bankruptcy is about breaking deals (and contracts).
  - Pain can be spread – to bondholders and to other creditors of the gov't, not just to workers and retirees.
  - In fact, in general, pensions have been relatively protected. Will they be if bankruptcy becomes more widespread?
- State governments
  - No bankruptcy option – see David Skeel...
  - No explicit mechanism to spread pain beyond workers and retirees.
  - Taxpayers, service beneficiaries, infrastructure-users still hit through political process – crowd-out. Probably not bondholders.

# Conclusions



# My conclusions

- Liabilities and annual costs severely underestimated by plans.
- ON AVERAGE, plans deeply underfunded.
- Unless plans get lucky, investment returns won't bail us out.
- Benefit cuts for workers/retirees unlikely to be big part of solution.
- Further tax increases and service cuts likely – “crowd out”.
- Loss of political support for public defined benefits will encourage gradual movement to defined contribution plans and to risk-sharing DB plans.
- And the system that allowed this will remain largely in place. The issue will be with us for many years.

# Appendix

# Selected compilations of public DB pension data

	BEA	<a href="#">Public Plans Database (PPD)</a> (Boston College...)*	<a href="#">Moody's adjusted net pension liabilities</a> *
Reported at:	State geography	Primarily plan-level	Primarily state-level totals for state plans, local plans
Universe	Complete -- estimated	~190 plans ~90% of assets	227 large SG plans; 50 large locals
Availability	Annual (CY), 2000-2018	Annual (FY), 2001-2018	Annual (FY), ~2011-2018
Discounting	Based on Moody's AAA corporate; 4% for 2018	Plan-chosen rates; 7.3% median for 2018	High-quality long-term taxable (FTSE PLI); ~4.1% 2018
MV assets Liability Unfunded; FR Employer NC Payroll; NC %	\$4.1 trillion \$8.6 trillion \$4.5 trillion; 47.3% \$167 billion \$928 b; ~17% (Boyd ests.)	\$3.7 trillion \$5.2 trillion \$1.5 trillion; 71.8% \$52 billion (noisy) \$733 billion; 7.1% (noisy)	~\$1.6 tr <a href="#">states</a> , \$0.5 tr <a href="#">local</a>
Other	Lumpy DR changes	Limited resources for QC	Paywall + inconvenient

\* These are the most prominent producers/providers/publishers of these data. There are some alternatives.

# Elements of actuarial funding - stylized

- **Project future benefits** for the current workforce (do nothing about people not yet hired). Imagine, for a specific worker, estimating years already worked, likely future years of service based on probability of leaving or dying, salary in each year, etc. Estimate pension at retirement and in each subsequent year until death. Scale it up.
- **Calculate the present value** of that projected stream of future benefits (PVFB, or PVB) of all current workers, using a discount rate.
- **Split that present value into 3 pieces: already earned, being earned this year, still to be earned**, using one of several possible “cost methods”
  1. Benefits that we can *attribute* to years already worked – the accrued actuarial liability (AAL, or just AL)
  2. Benefits that we can *attribute* to service in the year ahead – called normal cost (NC)
  3. The remainder: benefits that we can *attribute* to future years of service after that – present value of future service→ A common cost method is entry age normal (EAN), which calculates the normal cost as a constant percentage of pay.
- **Estimate under- or over-funding (UAAL)** as “actuarial” assets minus the actuarial liability
  - Actuarial assets (AA) aren’t equal to the money you actually have! Usually they are smoothed over several years.
  - Actuarial liability (AL) minus actuarial assets (AA) equals unfunded accrued actuarial liability (UAAL) (or surplus).→ Note that UAAL only includes liability attributed to years already worked (i.e., for current retirees, and for years already worked by existing workers). In theory, it includes nothing for years not yet worked by current workers and nothing for workers not yet hired. In theory, to reduce the UAAL, you need to reduce benefits already earned by retirees, or benefits already earned by current workers. Gulp. (There are some technical exceptions.)
- **Amortize (i.e., spread) any unfunded liability (UAAL)**, or overfunding, over future years.
  - Sometimes the amortization amount is called supplemental cost (SC)
  - Amortization can be quick, or slow, depending on many technical choices plans can make. Many studies have shown that amortization payments often are not great enough to reduce unfunded liabilities. A BIG problem.
- **Sum normal cost and amortization cost to get actuarially determined contribution (ADC)**, (formerly annual “required” contribution or ARC)
- **Employer’s actuarially determined contribution** is total ADC minus the employee contribution (if any).

\*NOTE: Governments often do not pay the full actuarially determined employer contribution. This is a BIG problem. It has been the *proximate* cause of virtually all MAJOR pension problems.

# The discount rate controversy

- Two separate but related concepts, often muddled:
  - Discount rate: used to value a future cash flow now (e.g., to determine the liability to report on financial statements).
  - Earnings assumption: what you think a specific investment portfolio will earn
- Financial theory is unambiguous: What you owe has nothing to do with how you invest. Liabilities should be discounted using rates that reflect their characteristics, not a plan's investment portfolio. Bond-like liabilities that must be paid should be discounted at approximately risk-free rates, *for purposes of reporting liabilities*.
- But public pension plans use an earnings assumption to value liabilities. This practice assumes they will take investment risk successfully, before they have been successful (or not).
- More investment risk → higher assumed return → lower contributions (now) → more money for everyone (except for future selves, kids, and grandkids). This is a BIG problem. **\$ trillions in play.**
- The choice of discount rate really matters. For example:
  - \$100 benefit to be paid in 20 years is liability of:
    - \$24 if discounted at 7.5% (typical plan assumption)
    - \$61 if discounted at 2.5% (similar to risk-free rate)
  - Liability at 2.5% is nearly 3x as great as at 7.5%! Even bigger impacts on UAAL.
- This is **NOT** a statement about how plans should invest. How much to invest in stocks and other risky assets is a separate decision.

# Financial reporting vs. funding

- **Financial reporting** – numbers that appear in the financial statements of governments and pension plans. Prepared by accountants, with input from actuaries. These statements report results for a year just ended. These numbers need not affect political behavior – e.g., the contributions a government makes. They are disclosure. Two main elements:
  - Liability – the amount owed for future benefits, to be reported on the balance sheet.
  - The cost of new benefits earned
- **Funding** – by contrast, refers to how we determine how much money to set aside to pay for future pensions, taking into account how we will invest, and our tolerance for investment risk. Estimates prepared by actuaries, sometimes overridden by politicians.
- Always, always, always must distinguish between financial reporting and funding. They are two separate activities.

# Discount rate example

**Liability today for \$100 paid in the future, different discount rates**

\$100 benefit to be paid in:	Discount rate			
	2.5%	5.0%	7.5%	10.0%
<i>1 year</i>	\$ 98	\$ 95	\$ 93	\$ 91
calculation -->	$\$100 / (1.025)^1$	$\$100 / (1.050)^1$	$\$100 / (1.075)^1$	$\$100 / (1.10)^1$
<i>10 years</i>	\$ 78	\$ 61	\$ 49	\$ 39
calculation -->	$\$100 / (1.025)^{10}$	$\$100 / (1.050)^{10}$	$\$100 / (1.075)^{10}$	$\$100 / (1.10)^{10}$
<i>20 years</i>	\$ 61	\$ 38	\$ 24	\$ 15
calculation -->	$\$100 / (1.025)^{20}$	$\$100 / (1.050)^{20}$	$\$100 / (1.075)^{20}$	$\$100 / (1.10)^{20}$

# Additional risk: actuarial-valuation return assumptions seemingly inconsistent with capital market assumptions

- Recent study: 28 large plans all used higher return assumptions for valuation and contributions than typical CMA justified; average discrepancy of 1.26% points.\*
- Some plans appear to justify this by stating that investment returns will fall short in the near term, but will be *above* the return assumption in later years:
  - CalPERS 6.2% over next decade, then 7.8%
  - Ohio PERS 6.76% next 5-7 years, then 7.85%
  - South Carolina plans are assuming returns of 4% over the next 4-6 years.
- Our simulations of low-returns-early scenarios show that the risks of severe underfunding and large contribution increases in the early years rise substantially.\*\*

\* Christopher Mier, "Public Pensions: Complex Systems Still in Flux," *Municipal Finance Journal* 38, no. 1 (Spring 2017).

\*\* For example, see Yimeng Yin, and Donald J. Boyd. "Investment Return Volatility and the Pennsylvania Public School Employees' Retirement System," Nelson A. Rockefeller Institute of Government, August 2017.



# Why it's so hard to assess and compare pension fiscal stress

1. Plans report liabilities on **assumption that they will be successful investors**
  - a) Maybe yes, maybe no. With this kind of measurement, you tell us how the stock market will do, we'll tell you magnitude of pension fiscal stress.
  - b) Another way: Report liabilities without assuming successful risk-taking. Disclose investment risk and potential consequences.
2. Actuarial contributions are **far lower** than they would be if plans did not assume successful investing
3. Actuarial contributions often **stretch out repayments** of unfunded liabilities over LONG periods
4. Some governments **underpay** actuarial contributions
5. Size of liabilities and payments **relative to economy and budget** are important – not just funded ratio.
6. Wide variation on these key characteristics

Legacy item	Is it a debt?	Important characteristics	Implications for solutions
<b>Unfunded pension liabilities</b>	Yes. It was promised, and creditors (workers) understand the promise.	A debt for services delivered in the past – thus, payment requires taxes but yields little political benefit. True payment needs generally not included in budgets, so proper repayment creates pressure. Strong legal protections, usually. Can be abrogated in bankruptcy.	Relatively weak public support for payment. The true legacy debt (as opposed to costs for new workers) usually will require bankruptcy-like arrangements to reduce debt.
<b>Unfunded retiree health care obligations</b>	Probably not, in general. Govts and workers/retirees often understand that plans, copays, benefits, and premiums may be changed.	An obligation for services delivered in the past; taxes with little political benefit. True payment needs rarely are included in budgets, so proper funding will be painful. Weak legal protections. May not need bankruptcy to abrogate.	Weak public support for payment, union opposition to changes. Can be changed in contract negotiations.
<b>Bonded debt</b>	Yes. Almost always well understood.	Yes. Payment needs usually are well-reflected in budgets, so repayment can be habitual. (Exceptions for some governments.) A debt for services still being delivered (kids use schools, and drivers drive on roads, built in the past but still “delivering” services). Strong legal protections; can be abrogated in bankruptcy.	Generally, requires bankruptcy-like arrangements to reduce debt.
<b>Infrastructure deferred maintenance</b>	No.	Maintenance can be easy to defer, especially in hard times. Failure to maintain has direct negative effects on the public. Relatively strong public support for infrastructure improvement. Don’t think bankruptcy should be relevant, generally.	One of the few issues for which voters tend to support tax increases.