

The Sustainability of State and Local Government Pensions: A Public Finance Approach

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Disclaimers

Federal Reserve Disclaimer

The opinions expressed are those of the authors and do not necessarily express the opinion of the Board of Governors of the Federal Reserve.

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Introduction

State and local gov pensions important economic institutions

- \$4 trillion in assets; 10 million retirees

Previous work focused on proper discount rate to measure liabilities

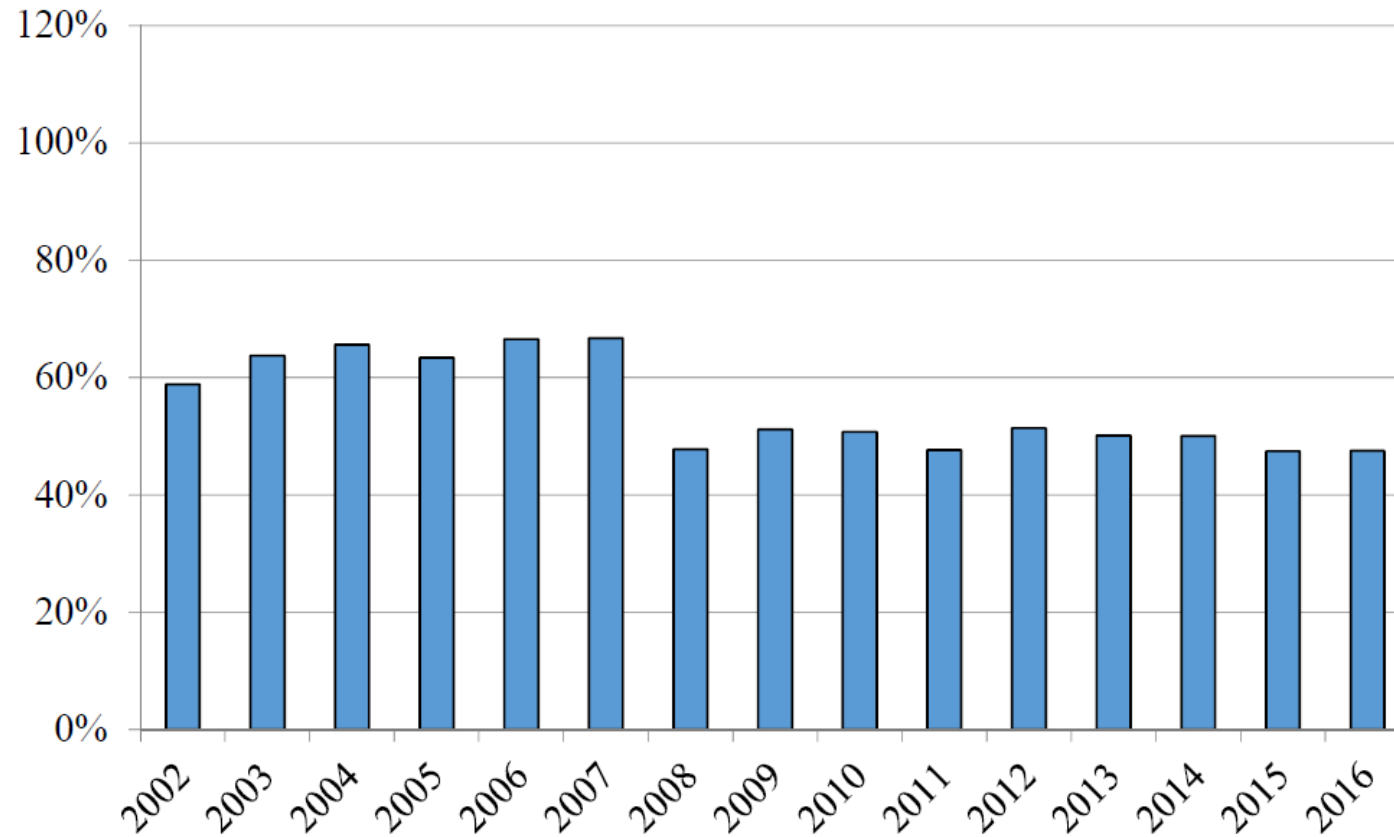
- Using risk-free rate of return, unfunded liabilities \approx \$4 trillion (Rauh 2017 & FA)
- 50% funding ratio

Existence of unfunded liabilities \rightarrow widespread sustainability concerns

- Academics, press, rating agencies, policymakers
- Plans have failed to “provide economic security in old age in a financially sustainable way” (Novy-Marx & Rauh 2014)

How Funded are State and Local Pension Plans?

Panel B: State and Local Government Pension Funding Ratios Under AAA Corporate-Bond Interest Rate



Our Approach

We adopt a methodology more rooted in public finance

- Prefunding not required for fiscal sustainability – pay-as-you-go systems can be sustainable
- Unfunded pension liabilities = implicit public debt
- Sustainability requires contributions = present value of benefits + $(r-g)$ *implicit debt
(r = interest rate, g = growth rate of tax base)
- Spreads costs of existing debt across generations.

Most S&L pensions have effectively long been partially-funded hybrid systems

- We test to see if plans are sustainable, and, if not,
- When plans likely to run out of money
- What changes are required to make them sustainable

Preview of Conclusions

In aggregate, pensions can be stabilized with moderate fiscal adjustments under low and moderate asset return assumptions

Only moderate returns to stabilizing immediately versus in the future (e.g. 10 years in future), particularly when interest rates are low

Lots of heterogeneity and some plans are far from stable

Methodology

Analyzing sustainability requires benefit cash flows

Actuarial reports provide the pension liability and actuarial assumptions

Reverse engineer cash flows

- Method pioneered by Novy-Marx and Rauh (2011, 2014)
- Used in Lutz and Sheiner (2014))

Data

Public Plans Database (PPD) from BC Retirement Center

2017 Actuarial Valuations (AVs) and Comprehensive Annual Financial Reports (CAFRs)

Sample of 40 plans

- Small sample reflects extremely labor intensive nature of methodology
- Sample observationally similar to universe of S&L pensions

Estimation Sample of State and Local Pension Plans

	Estimation Sample	Public Plans Database National Sample
Assets / Liabilities	0.71 (0.16)	0.71 (0.17)
Unfunded Liabilities / Payroll	2.04 (1.60)	2.07 (1.63)
Total Pension Contributions / Payroll	0.24 (0.11)	0.24 (0.11)
Active Members / Retired Members	1.37 (0.36)	1.34 (0.37)
Projected Percent Active Member Growth	0.41 (0.57)	0.44 (0.60)
Observations	40	180

Reverse Engineering Cash Flows

Collect:

- For current employees: age, years of service, withdrawal and retirement probabilities, pension benefit calculations, wage growth
- For current retirees: ages, average benefit
- For all: mortality probability, COLAs, discount rate

Construct statistical machinery to “age” workers and retirees and calculate benefits

- Each year: apply quit, disability, death, and retirement probabilities
- Surviving workers gain a year of age & service, receive wage increases
- Each year calculate benefits for retirees

Reverse Engineering Cash Flows (cont.)

Simple conceptually, but very challenging in practice

Calculate PDV of liabilities and compare to reports

- Errors are about zero on average but larger for some plans and for current workers

Calibrate benefits to perfectly match PDVs in reports using PDV assumptions

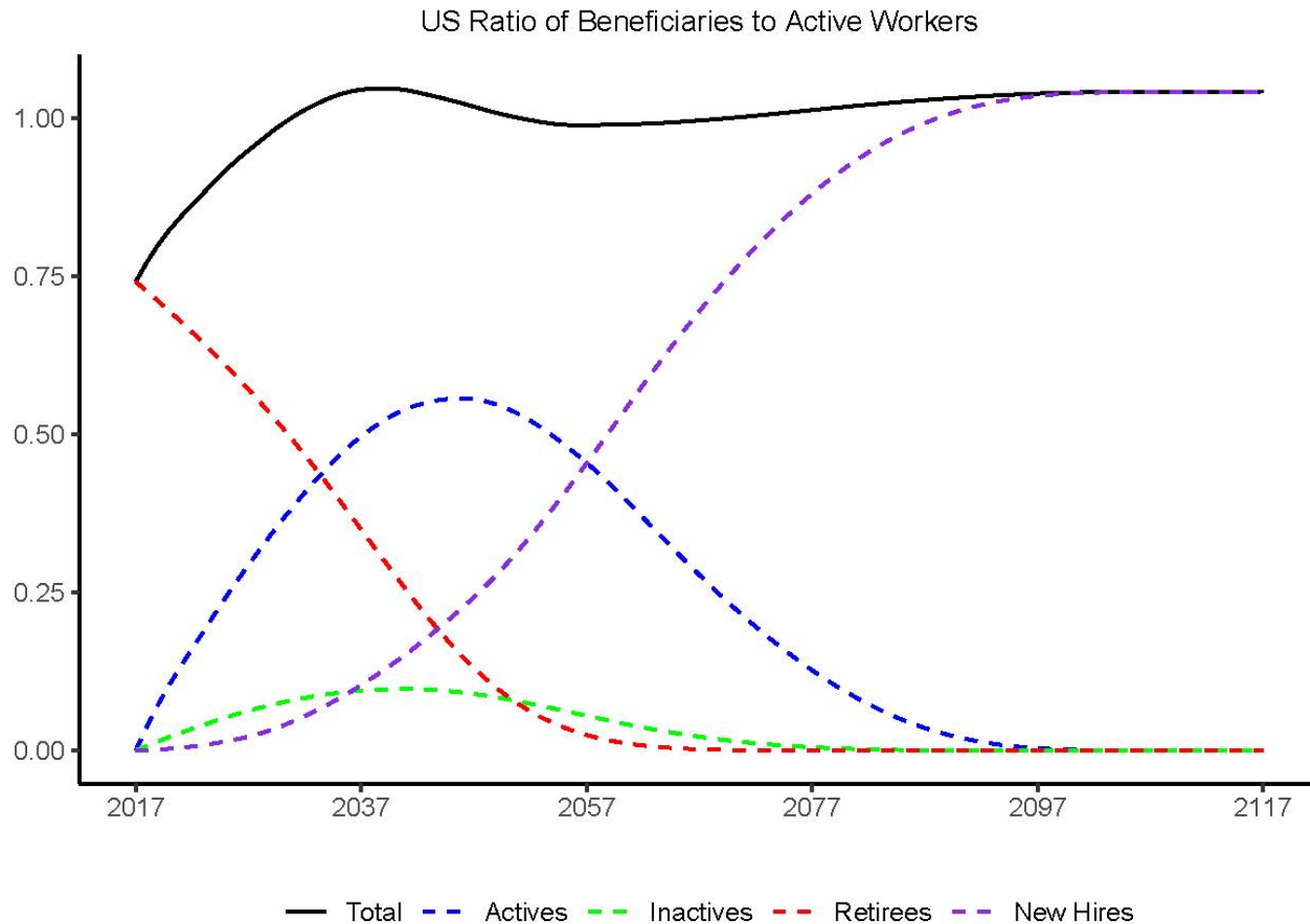
Final Steps

Harmonize assumptions: use same discount rate, inflation rate, wage growth, asset returns for all plans

Project population and GDP on state or locality specific basis

Add new hires each year based on state population

US Ratio of Beneficiaries to Workforce

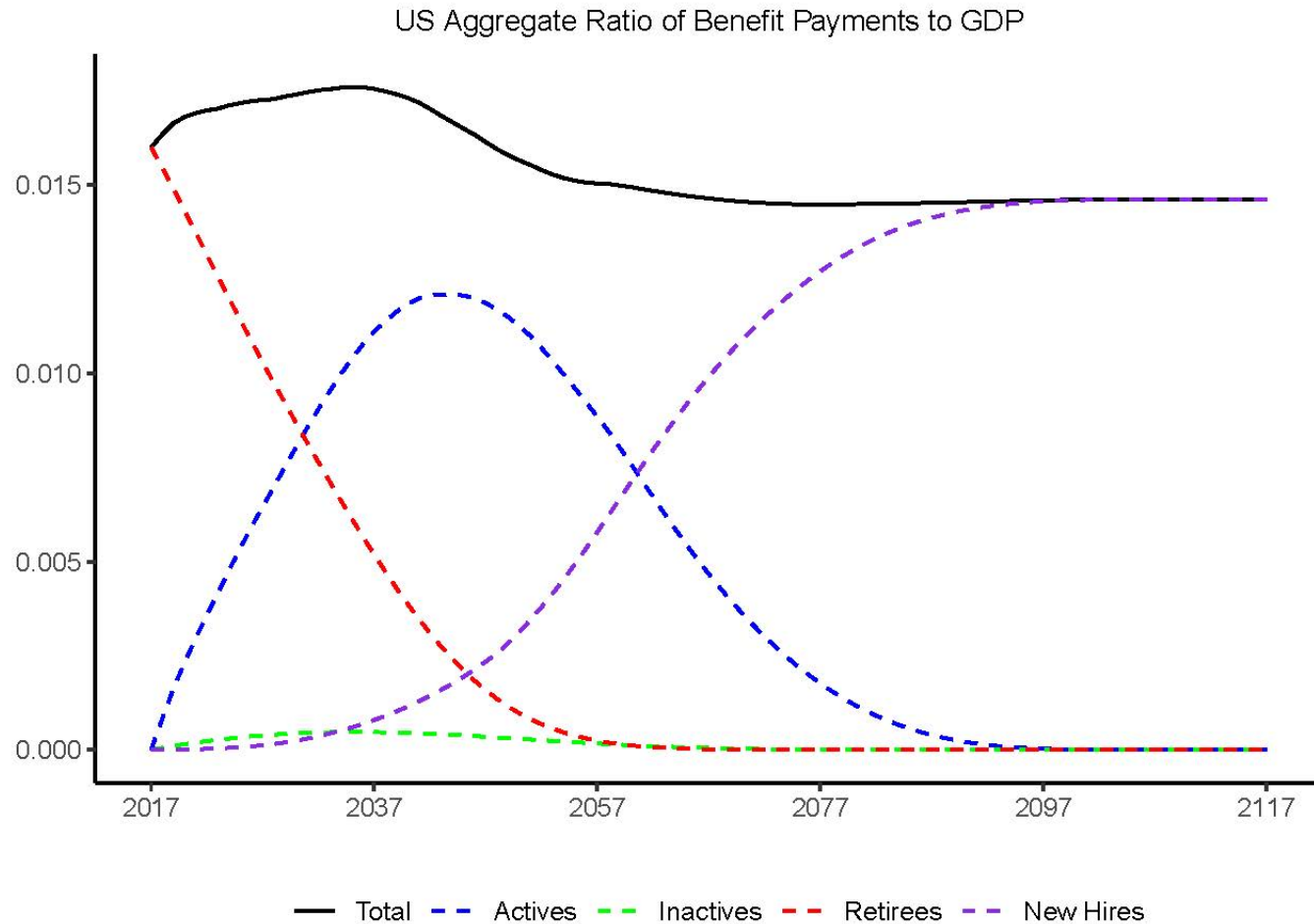


Demographic transition
increasing ratio of retirees
to workforce

Ratio increases about 40
percent over next two
decades

Rise is a bit larger than
that projected for Social
Security

US Ratio of Benefit Payments to GDP



Benefits rise much less than #
retirees – about 10% over next two
decades

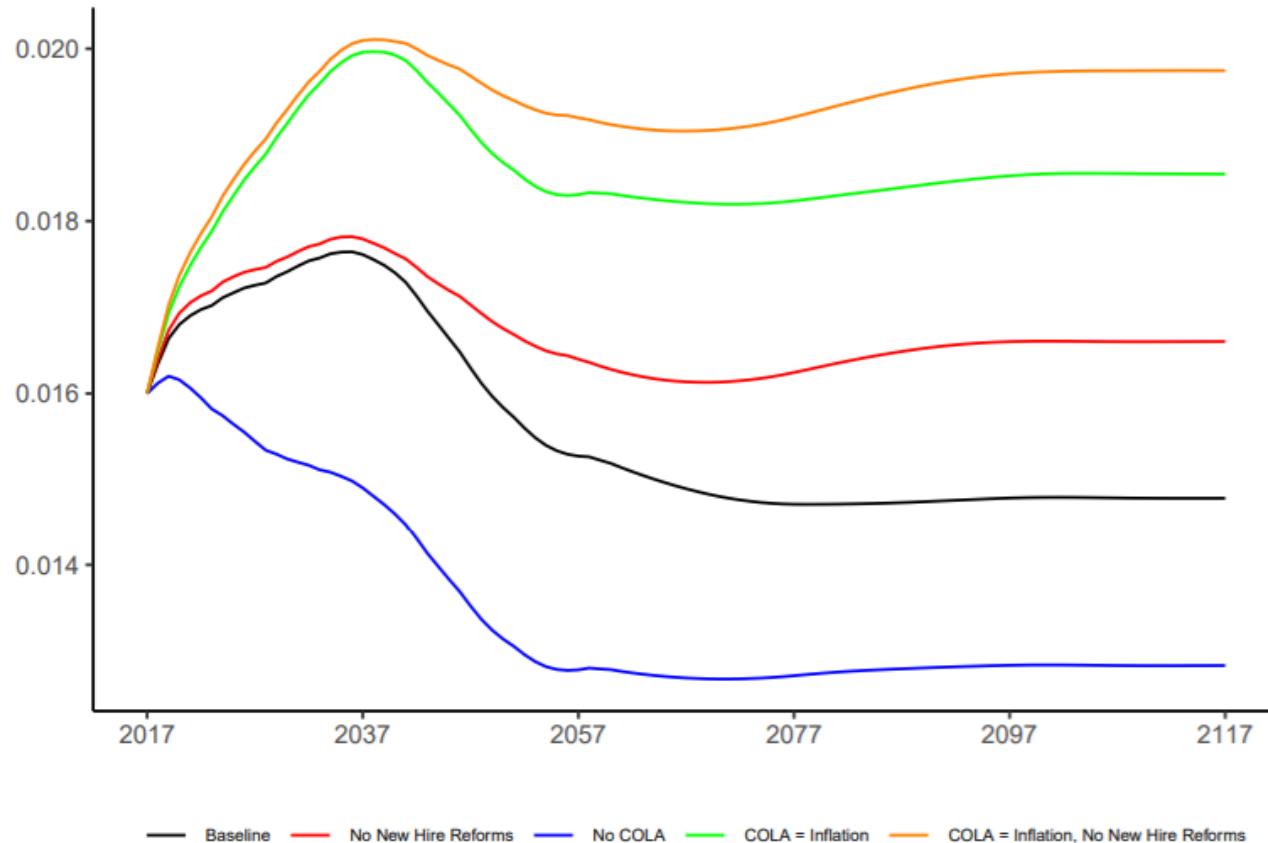
Then benefits decline as a share of
GDP – not at all like Social Security

Plans get eventual fiscal relief

Governments may wish to smooth
through period of peak benefits

Why Don't Benefits Rise More?

US Aggregate Ratio of Benefit Payments to GDP



17 out of 40 plans have lowered COLAs since 2007

- If COLAs equaled inflation, benefits would rise about 25% over next two decades.
- If plans eliminated COLAs (many could do so legally), benefits would eventually fall an additional 9%.

Plans have made plans less generous for new hires (adjusting retirement ages, benefit factors, vesting, etc.)

- If reforms for new hires eliminated, benefits would be about 12% higher in long run

Sustainability Analysis

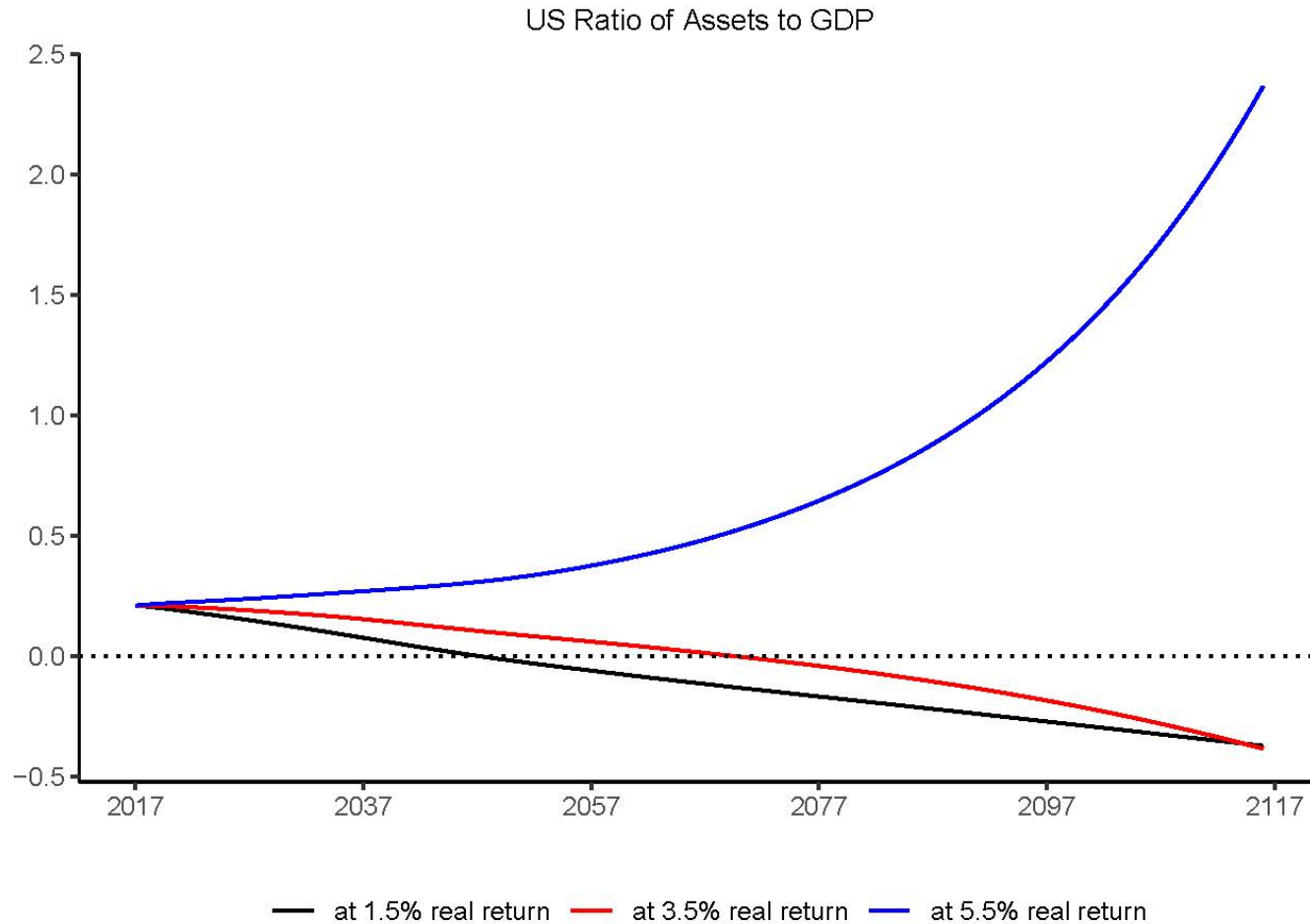
Assume plan sponsors maintain current contribution as share of payroll to pensions in the baseline.

Discount the value of the liabilities at a risk-free rate.

Consider 3 deterministic rates of return on pension assets

- 1.5% real return = risk-free rate
- 5.5% real return = expected rate
 - About what plans have realized since 2000
- 3.5% real return = middle ground.

Exhaustion Dates: One way of assessing sustainability



In aggregate, plans don't exhaust (hit zero assets) for 30 years under a 1.5% rate of return, and not until after 50 years under 3.5%

At 5.5% real return, plans are overfunded on average

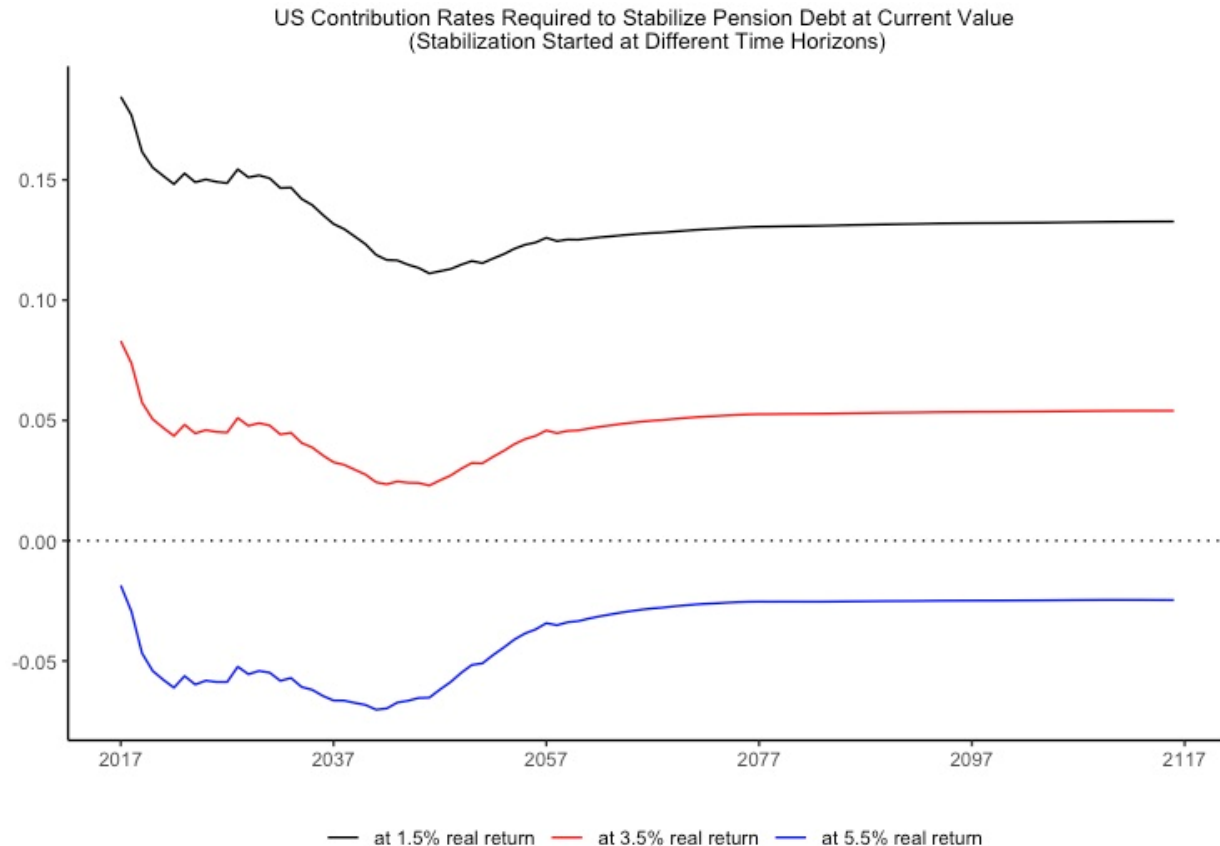
Making Pensions Sustainable

3 Stabilization Exercises

Choose time-varying contribution to

1. **Immediately:** Keep implicit debt-to-GDP ratio constant at today's level every year

Annual Contribution to Maintain Constant Implicit-Debt to GDP Ratio



Time varying contribution: more now, less later when benefits are lower

At 3.5% real return, increase funding about 8% of payroll.

At 5.5% real return, lower contributions now.

At 1.5% real return, need much larger increases in contribution—18% of payroll, or about 75%.

Downward slope → governments may wish to smooth through the period of peak contributions

Making Pensions Sustainable

3 Stabilization Exercises

Choose time-varying contribution to

1. **Immediately:** Keep implicit debt-to-GDP ratio constant at today's level every year

Choose one-time permanent change in contributions to:

2. **Long-run:** Debt as share of GDP is constant in long run (without regard to the level)

3. **30-year Medium-run:** Return to today's debt-to-GDP ratio by the end of 30 years

Contribution to Stabilize Implicit Debt in Long-Run

Real rate of return	Increase in contribution rate required if changes are made (percent of payroll):			
	Start Today	Start In 10 years	Start In 20 years	Start In 30 years
1.5%	12.7%	12.89%	13.06%	13.2%
3.5%	4.28%	5.46%	6.82%	8.41%
5.5%	-5.2%	-7.55%	-10.97%	-15.87%

At 3.5% return, contribution increase about 4% of payroll today. Rises to 8% if delay 30 years.

Contribution to Stabilize Implicit Debt in Long-Run

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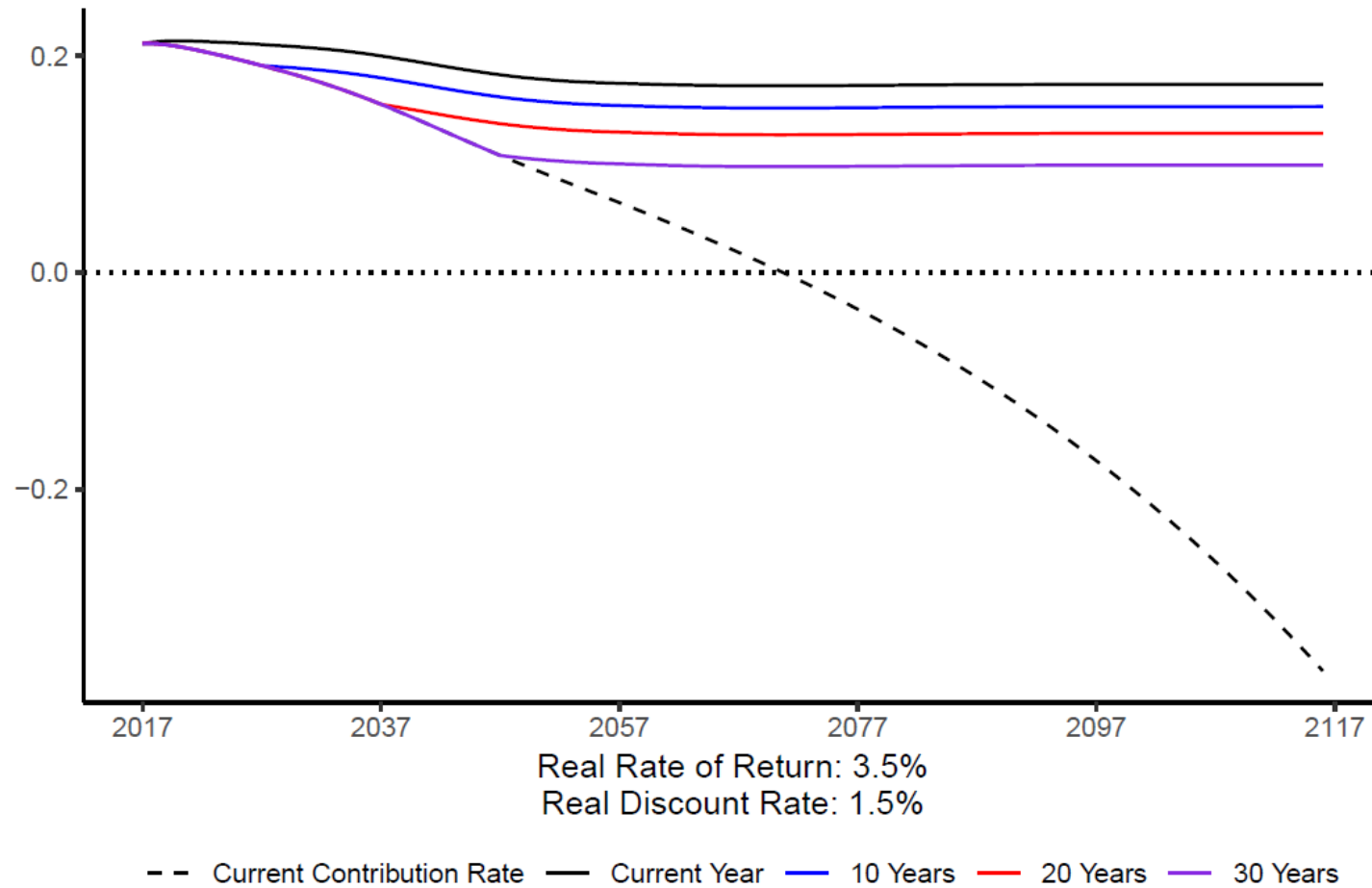
At 3.5% return, contribution increase about 4% of payroll today. Rises to 8% if delay 30 years.

At 1.5% return, contribution increase about 13% of payroll, regardless of when you start.
Why? 1.5% return is only sufficient to hold assets-to-GDP ratio fixed.

The lower the rate of return, the larger the required increase, but the less urgency to act.

Assets Under Long-Run Stabilization

US Pension Assets Under Pension Debt Stabilization
(Stabilization Started at Different Time Horizons)



Implicit Debt to GDP Returns to Today's Level in Year 30

Implicit debt gets back to today's level in 30 years

Real rate of return	Start Today	Start In 10 years	Start In 20 years
1.5%	13.97%	18.32%	22.81%
3.5%	4.19%	6.25%	9.05%
5.5%	-5.74%	-9.61%	-14.84%

- At 3.5% return, contribution increase about 4% of payroll today. Rises to 9% if delay 20 years.
- Delay causes contribution to increase, because have to not just stabilize but pay down debt
- At 5.5% return, can decrease contributions.

Implicit Debt to GDP Returns to Today's Level in Year 30

Implicit debt gets back to today's level in 30 years

Real rate of return	Start Today	Start In 10 years	Start In 20 years
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3.5%	4.19%	6.25%	9.05%
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- At 3.5% return, contribution increase about 4% of payroll today. Rises to 9% if delay 20 years.
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Full Funding Requires Much Larger Adjustments

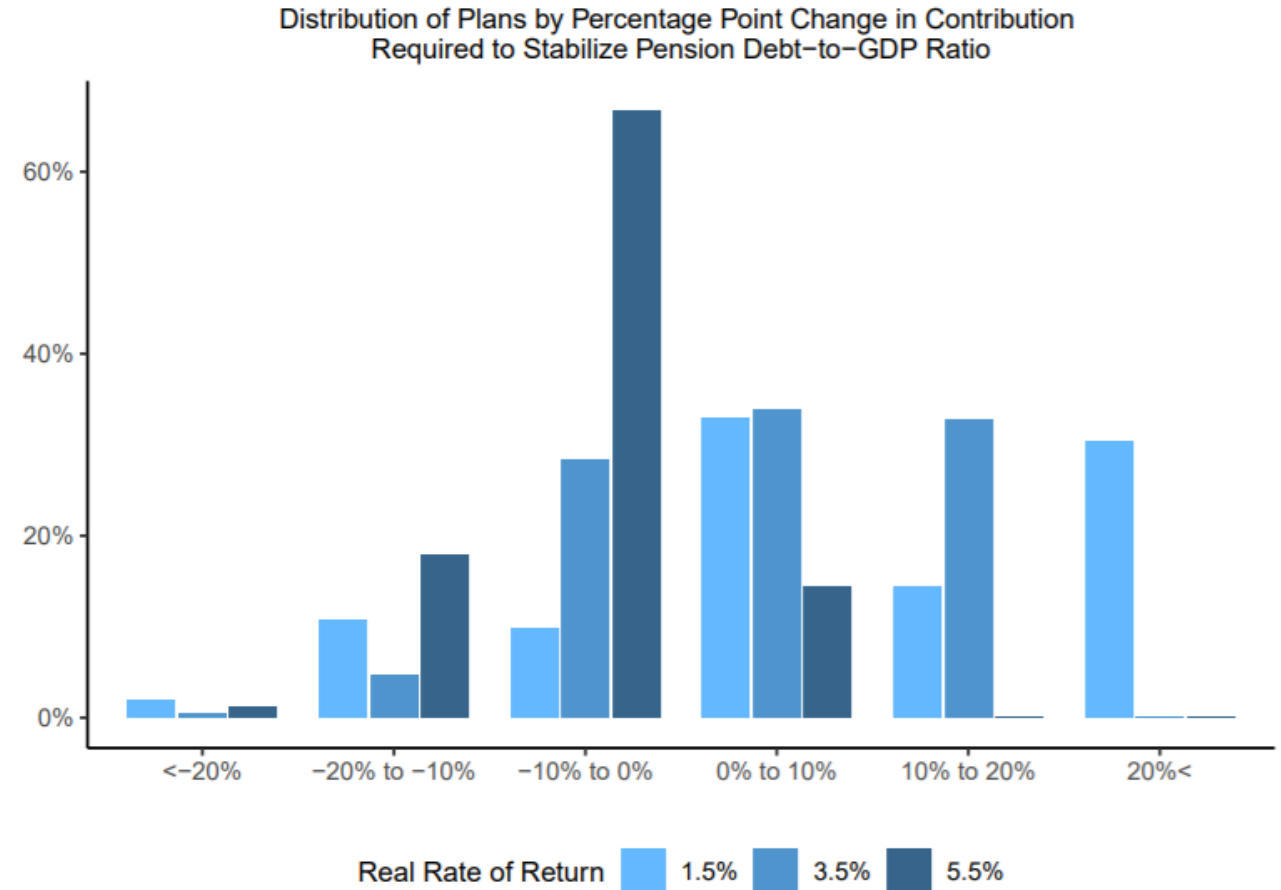
Fully Funded in 30 Years			Implicit Debt Gets Back to Today's Level in 30 Years		
Start Today	Start In 10 years	Start In 20 years	Start Today	Start In 10 years	Start In 20 years
35.52%	55.76%	120.01%	13.95%	18.30%	22.72%
20.34%	35.62%	84.90%	4.16%	6.20%	8.89%
6.15%	12.29%	32.72%	-5.76%	-9.67%	-15.07%

Heterogeneity Across Plans

All of this for the aggregate state and local pension sector

Some plans in much better shape, some in much worse

One key question we hope to address in future work: What's optimal response for plans in poor shape?



Conclusions

In aggregate, plans can become sustainable with modest changes in funding assuming moderate asset returns.

At higher returns, plans mostly stable, though not all.

At very low returns, changes are larger, but less urgency in acting sooner rather than later.

Implication of low interest rates: Forgoing worthwhile public investments to prefund pension plans may not be welfare increasing.

Significant heterogeneity across plans.

Thank you!

Comments welcome:

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