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Public Pensions: Lessons From Analysis of Risk

**Joint Committee on
Pension Systems Review**

**South Carolina Legislature
Columbia, SC**

Don Boyd, Director of Fiscal Studies
donald.boyd@rockinst.suny.edu
With thanks to my colleague, Yimeng Yin.

August 29, 2017

Rockefeller Institute of Government

- Public policy research arm of State University of New York
- Focused on helping state and local governments examine and address important problems.
- Independent. Data-driven. Bringing research to bear on public problems.
- Fiscal policy program: Finances of state and local governments. Special emphasis on pensions, and pensions risk.

Lessons from our analysis of risk

- Measurement Matters. Bad measures encourage bad decisions.
- Investment risk:
 1. It's risky out there. (And riskier than it used to be.)
 2. Trade-off between risk to the fund and risk to the government.
 3. Pension funds don't bear risk. Taxpayers, people who use gov't services & infrastructure, gov't workers, and possibly even retirees bear risk.
- Implications for how you fund a pension plan.
- Mitigating risk.

Measurement Matters

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

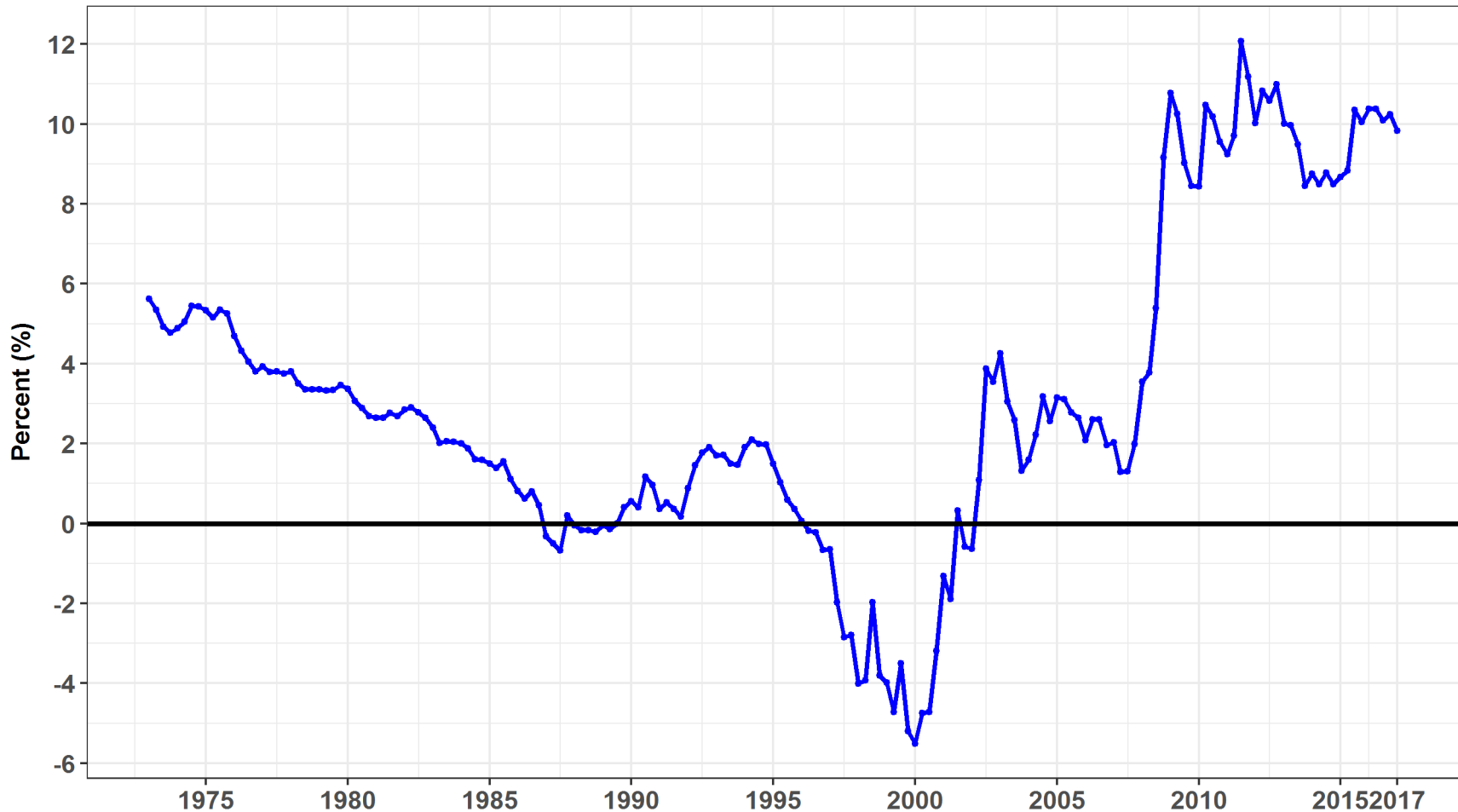
Some of the numbers that follow address these issues

1. Where practical, I use estimates produced by the Bureau of Economic Analysis and the Federal Reserve Board for liabilities and normal costs, rather than actuaries' numbers.
2. BEA/FRB generally use a **5% "discount rate"** for recent-year estimates. (Think of it as sort of like assuming a 5% investment return, although it's not quite the same thing.) There are other, smaller, differences from actuaries' numbers.
3. This produces higher estimates of liabilities and of needed contributions than actuaries produce. Differences are **big**. It is close to what many economists think and to what Moody's does. Some consider it still too generous.
4. Table and graph notes make clear when I use these estimates as opposed to actuaries' numbers.

Despite contribution increases unfunded liability remains near record relative to economy

Unfunded liability of state and local government defined benefit pension plans

As percentage of Gross Domestic Product



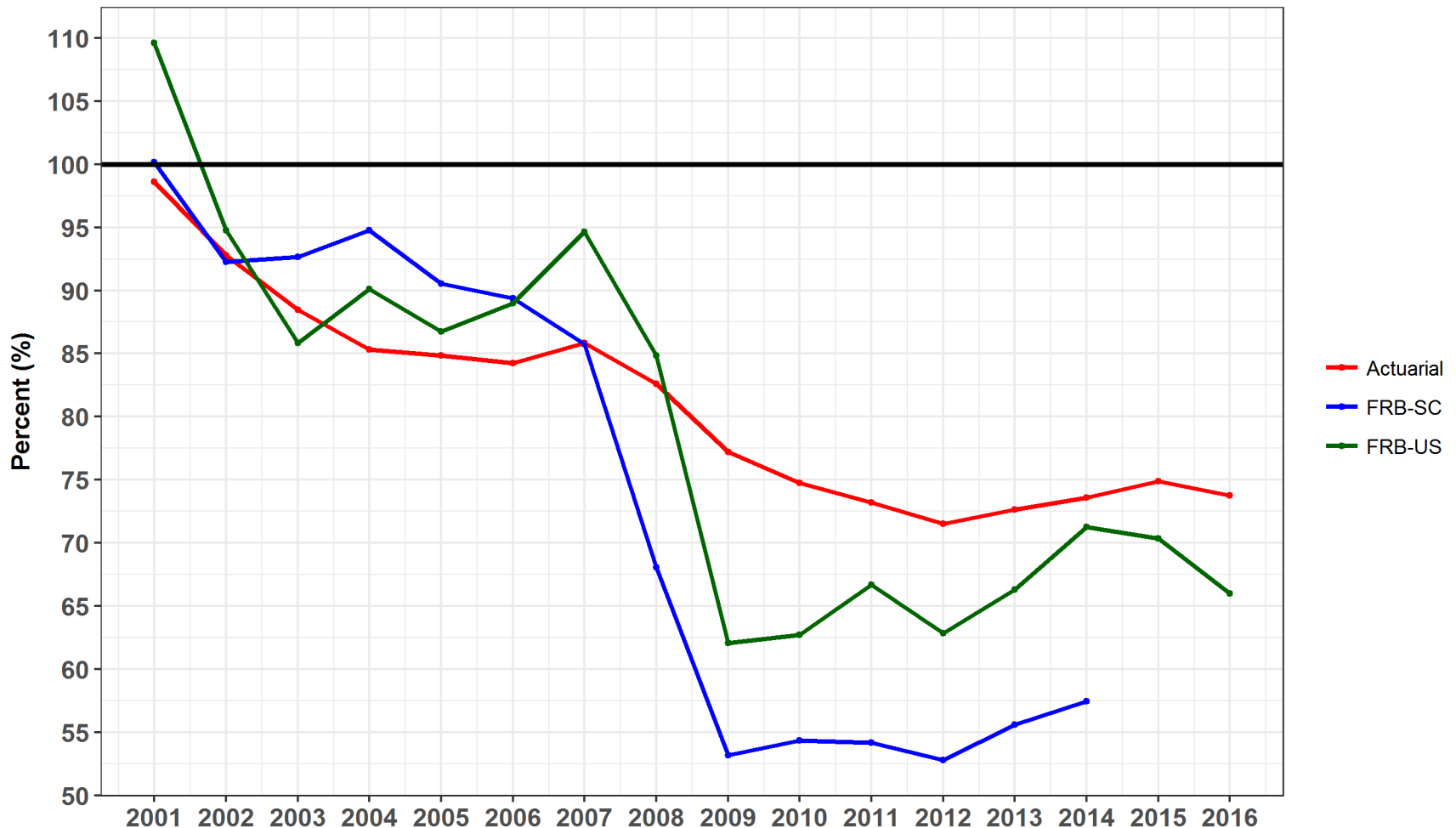
Source: Federal Reserve Board, Financial Accounts of the United States, Tables L.120.b and F.2

Note: Liabilities are as valued by the Bureau of Economic Analysis, not actuaries.

Federal Reserve / BEA estimates show a more difficult situation than do actuarial estimates

Funded ratio of state and local government defined benefit pension plans

Federal Reserve Board measure for U.S. and S.C. compared to median actuarial estimate for large U.S. plans

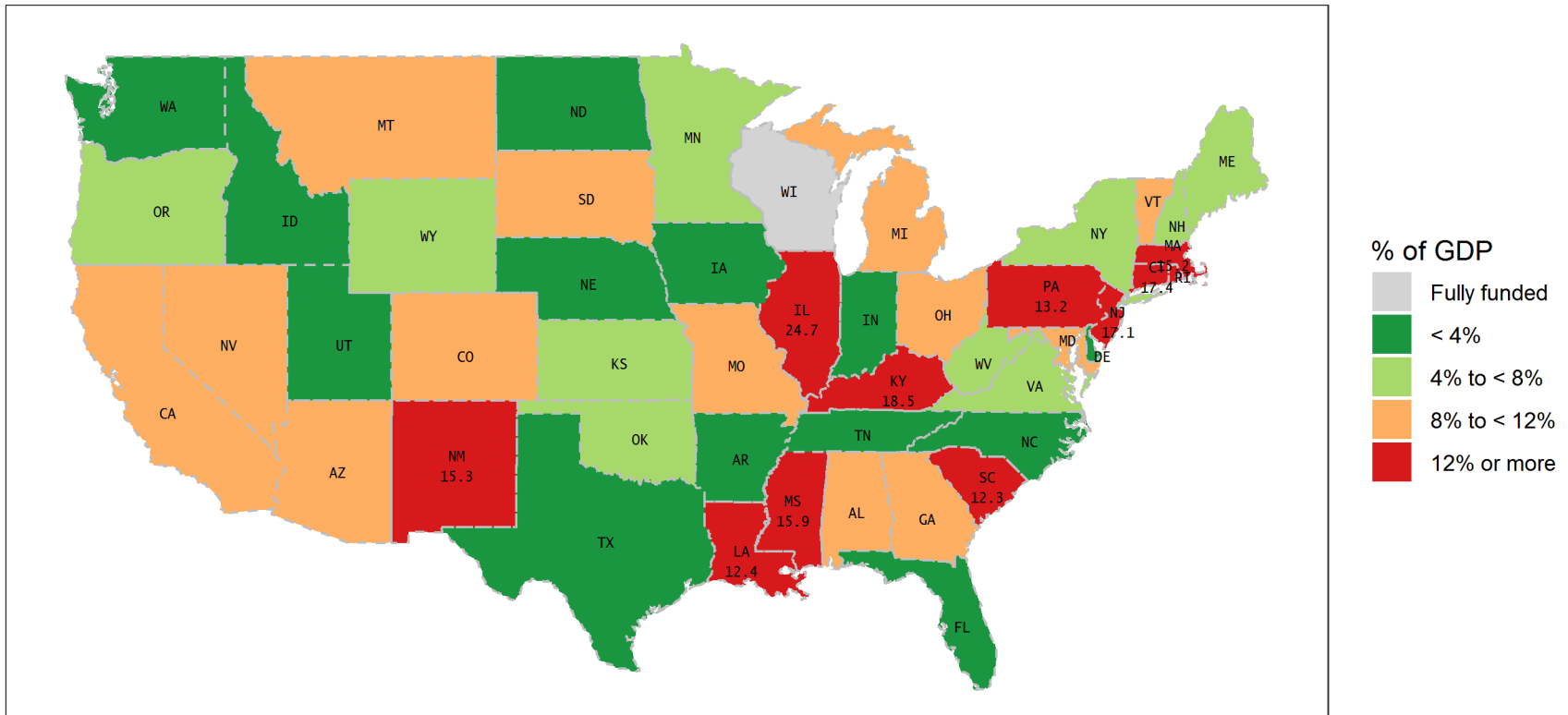


Source: Federal Reserve Board, Financial Accounts of the United States, Table L.120.b and Public Plans Database (publicplansdata.org)

Unfunded liabilities relative to economy vary greatly. SC near top of list

Unfunded liability as % of state gross domestic product, 2014

State & locally administered plans combined



Source: Federal Reserve Board Enhanced Financial Accounts
<https://www.federalreserve.gov/apps/fof/efa/efa-project-state-local-government-defined-benefit-pension-plans.htm>
These numbers differ from actuaries' estimates, and reflect discounting at 5%.

Unfunded liabilities, SC & other southern states

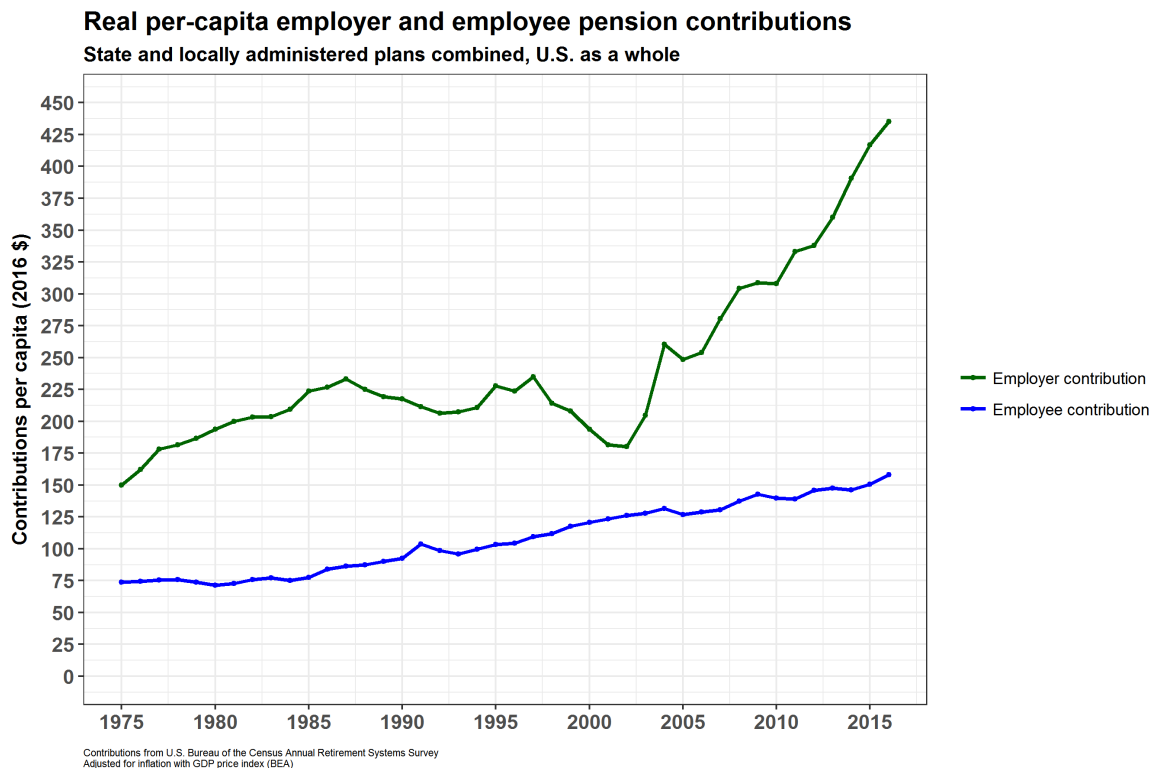
Unfunded liabilities in 2014 as measured by BEA and the FRB

	\$ billions	As % of GDP		Per capita	
		Percent	State % of US	\$ per person	State % of US
United States	\$ 1,443.1	8.4%	100.0%	\$ 4,530	100.0%
Kentucky	35.0	18.5%	221.5%	7,924	174.9%
Mississippi	16.6	15.9%	189.4%	5,563	122.8%
Louisiana	30.4	12.4%	147.6%	6,539	144.3%
South Carolina	23.4	12.3%	147.4%	4,847	107.0%
Missouri	27.6	9.8%	116.5%	4,560	100.7%
Georgia	44.0	9.3%	111.4%	4,365	96.4%
Alabama	17.9	9.1%	108.4%	3,702	81.7%
West Virginia	4.1	5.5%	66.1%	2,229	49.2%
Virginia	25.3	5.5%	65.4%	3,044	67.2%
Oklahoma	10.4	5.4%	65.0%	2,671	59.0%
Arkansas	4.7	3.9%	46.7%	1,597	35.3%
Florida	30.1	3.6%	43.0%	1,515	33.4%
North Carolina	12.2	2.6%	30.6%	1,224	27.0%
Texas	32.4	2.0%	24.1%	1,201	26.5%
Tennessee	4.4	1.5%	17.7%	679	15.0%

Source: Federal Reserve Board, Enhanced Financial Accounts, and U.S. Bureau of the Census (population).
Includes all state and local plans in a state.

Employer contributions are up substantially

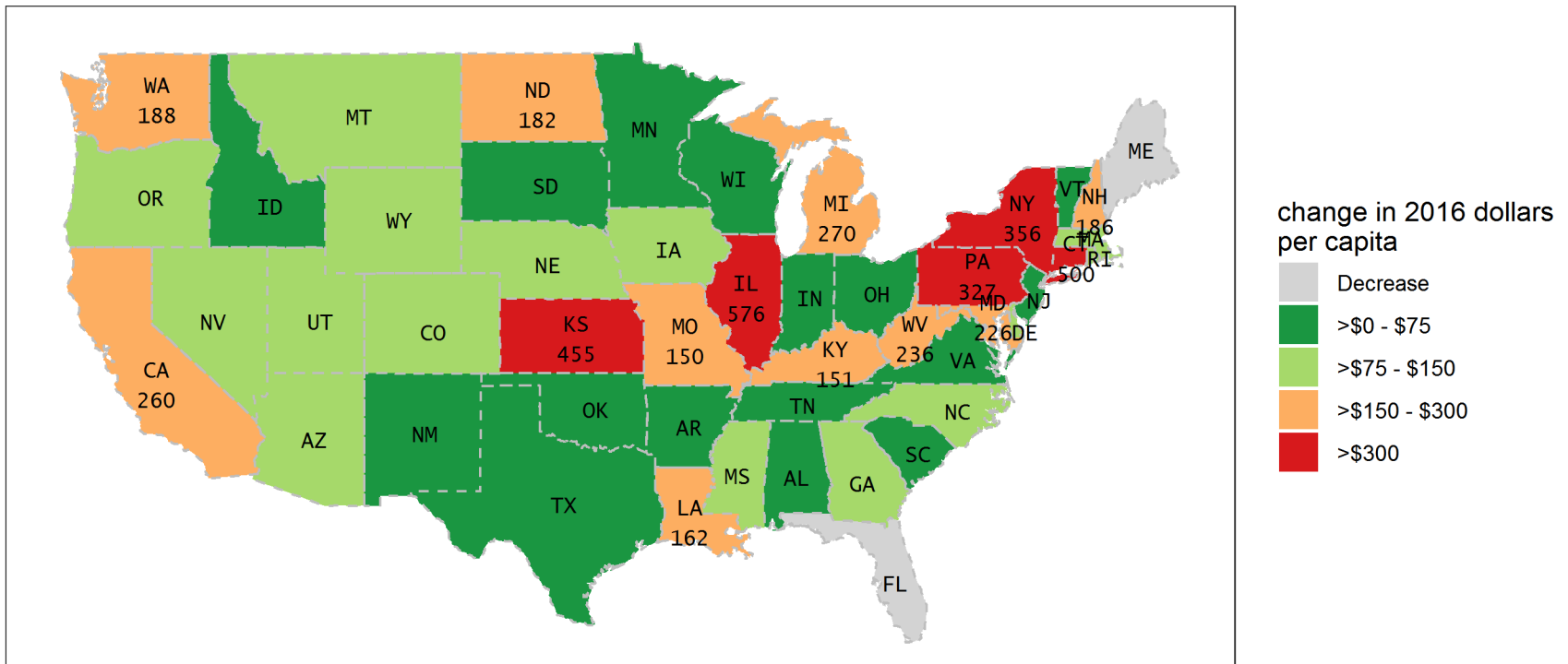
- Up \$155 per capita 2007 to 2016, adjusted for inflation
- Up \$55 billion, inflation-adjusted
- SLG taxes grew \$219b same period, inflation-adjusted
- Great variation around the country



Employer contribution increases generally have been smaller in southern states

Change in state & local government pension contributions

Inflation-adjusted dollars per capita, 2007 to 2016



Source: Rockefeller Institute analysis of Annual Survey of Public Pensions, U.S. Bureau of the Census

Note: Due to extraordinary contributions in West Virginia in 2007, contributions for 2008 were used as the base year

Employer contributions in southern states

Employer contributions per capita, in 2016 dollars

	2007*	2016	\$ change	% change	2016 contribution as % of US
United States	\$ 281	\$ 435	\$ 155	55%	100%
West Virginia	326	562	236	72%	129%
Louisiana	413	575	162	39%	132%
Kentucky	204	355	151	74%	82%
Missouri	257	408	150	58%	94%
Mississippi	248	353	105	42%	81%
Georgia	182	283	102	56%	65%
North Carolina	81	174	94	116%	40%
Virginia	308	376	68	22%	87%
Texas	173	234	61	35%	54%
South Carolina	199	258	60	30%	59%
Arkansas	238	283	45	19%	65%
Alabama	214	257	43	20%	59%
Oklahoma	302	345	43	14%	79%
Tennessee	186	213	27	14%	49%
Florida	222	199	(22)	-10%	46%

Source: Rockefeller Institute analysis of Census Bureau Annual Surveys of Public Retirement Systems. Includes all state and local plans in a state.

Note: *2008 used for West Virginia because 2007 was boosted by pension obligation bonds

Economic measures imply much higher contributions if risk is to be reduced

“Tread water” contributions: sufficient to keep unfunded liability from growing, but not sufficient to reduce it.

“Economic measures”: Liability and normal costs as estimated by federal government – reflects a 5% discount rate.

“Tread-water” cost in 2014 based upon economic concepts, per capita
Additional contributions needed to “tread water” if based on economic measures

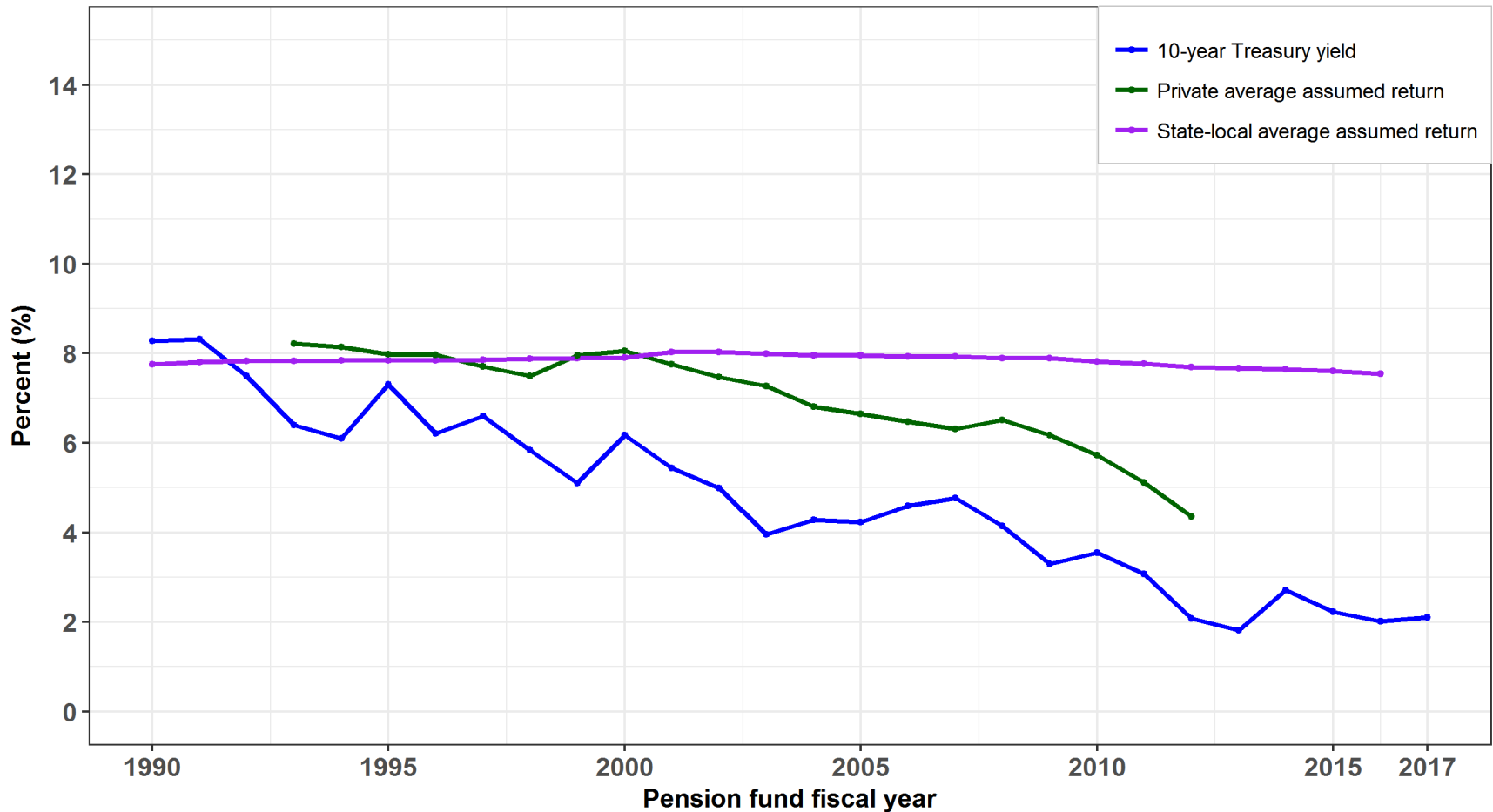
	<i>Per-capita “tread-water” cost</i>			Actual contributions	Additional contributions needed to “tread water”
	Normal cost	Interest on unfunded liability	Normal cost plus interest		
United States	\$ 562	\$ 227	\$ 788	\$ 382	\$ 407
Missouri	588	228	816	320	495
Kentucky	408	396	804	314	490
Virginia	477	152	629	281	348
Georgia	345	218	563	224	339
North Carolina	418	61	479	167	312
Mississippi	368	278	646	336	310
South Carolina	269	242	512	235	277
Alabama	308	185	493	247	247
Texas	420	60	480	235	245
Tennessee	375	34	408	197	211
Oklahoma	378	134	512	313	198
Florida	311	76	387	200	187
Arkansas	361	80	441	288	153
Louisiana	408	327	735	738	(2)
West Virginia	294	111	406	438	(32)

Source: Rockefeller Institute analysis and calculations, based on data from the Bureau of Economic Analysis and the Bureau of the Census. Includes all state and local plans in a state.

Investment Risk

Public plans have lowered earnings assumptions, but not by much

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



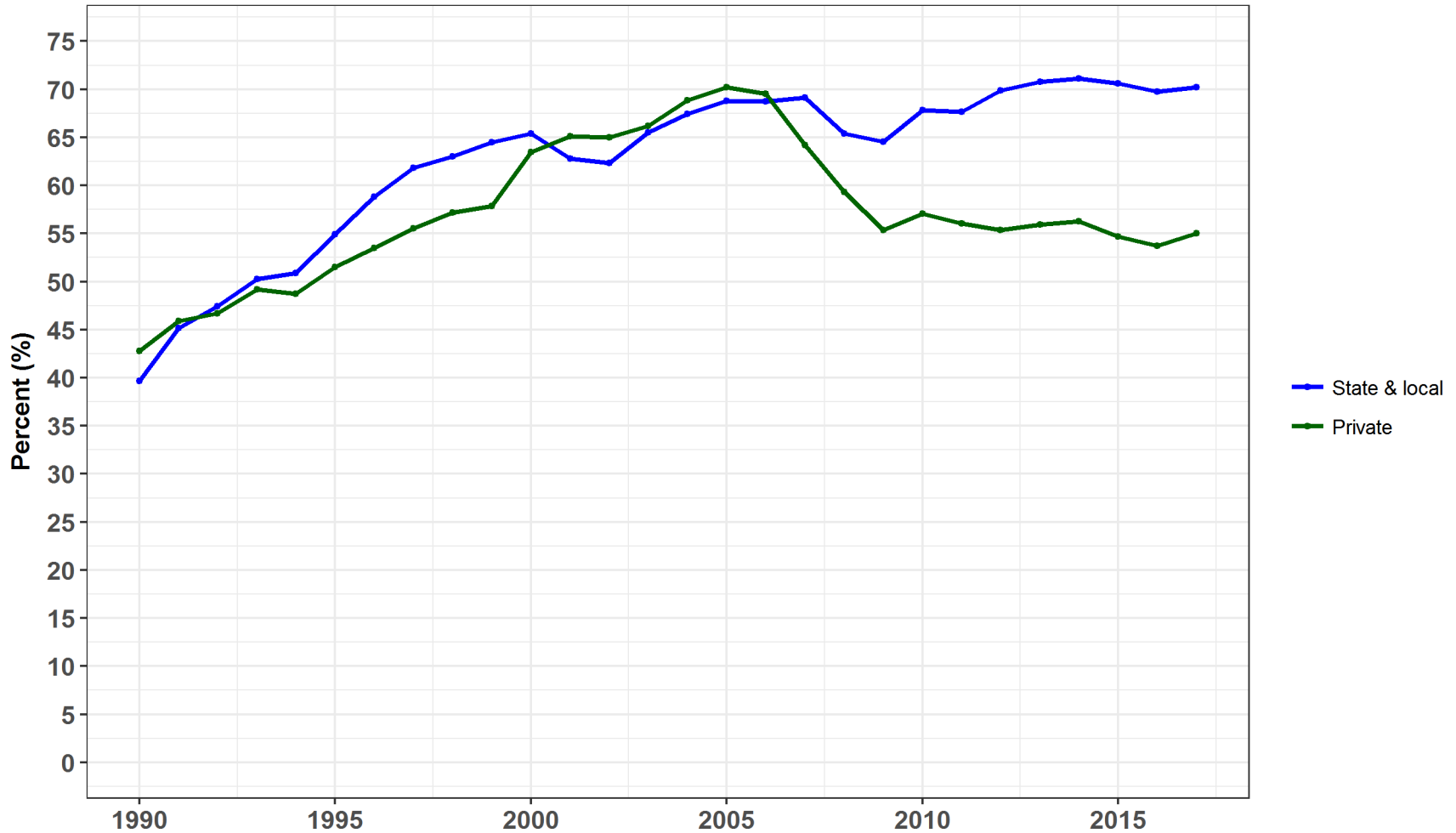
Notes:

- 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 have moved into equity-like higher-risk investments

Equity-like investments as percentage of invested assets

State and local government and private sector defined benefit pension plans



Source: Authors' analysis of Z.1 Financial Accounts of the United States, Federal Reserve Board, Tables L.118.b, L.120.b, and L.122

Risks are much higher than before

- Plans much more heavily invested in equity-like assets
- Volatility of a portfolio designed to average, say, 7.5%, is much greater than when interest rates were high
- Plans are much larger relative to the economy and state/local budgets than 20 years ago
- A “one standard deviation shortfall” now is 3 to 4 times as large relative to budgets (taxes) as in 1995.*

This reflects an accounting, actuarial, legal, political, and institutional environment that largely ignores risk:

1. Makes it unattractive for plans to request and receive contributions large enough to fund liabilities securely, and
2. Insulates plans and governments from near-term consequences of unsuccessful risk-taking.

*See Donald J. Boyd, and Yimeng Yin. “Appropriateness of Risk-Taking by Public Pension Plans.” Nelson A. Rockefeller Institute of Government, February 2017.

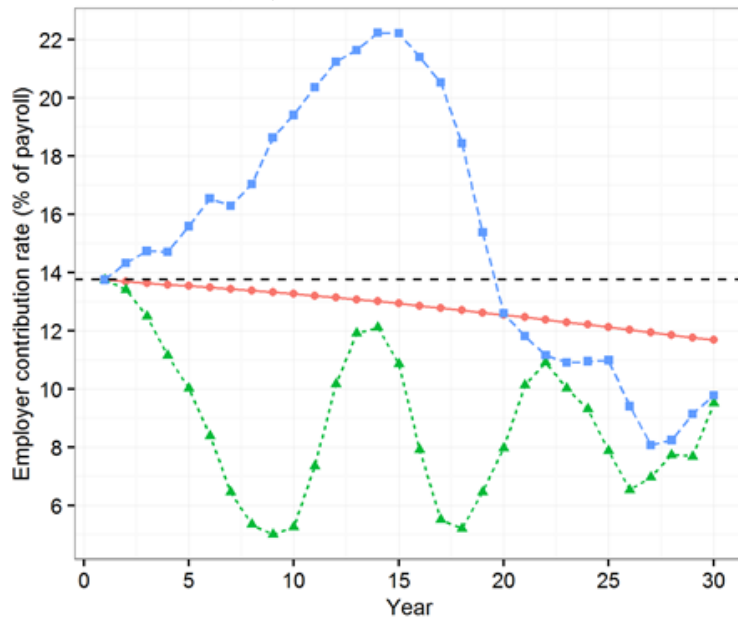
Even *IF* assumptions are correct, the path can be a roller coaster

Employer contributions and funded ratio can be highly variable, even if expected returns are correct on average.

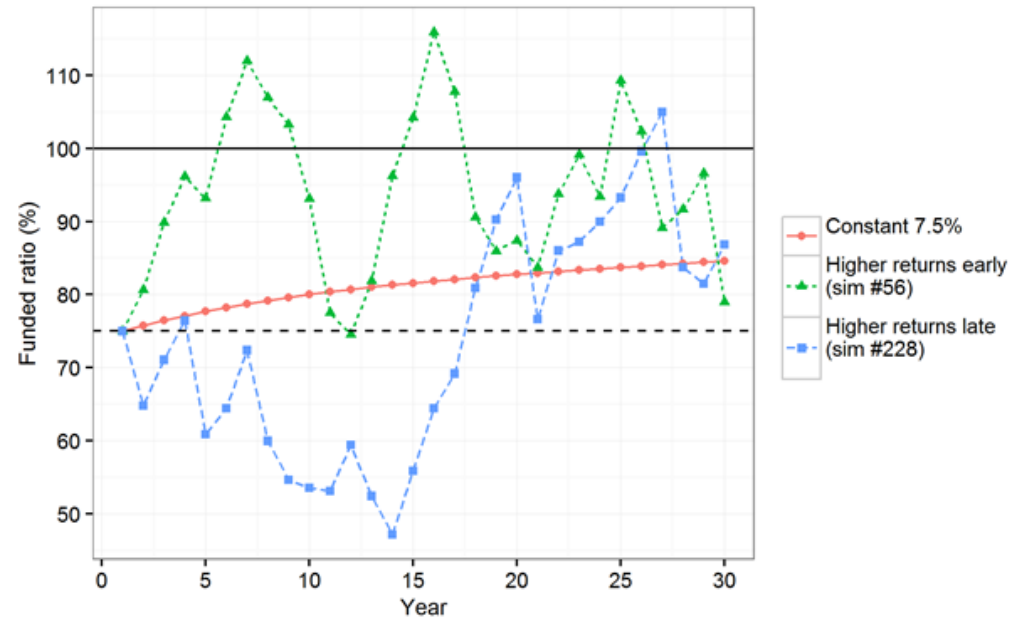
Three individual simulations, all with 7.5% discount rate and 7.5% compound annual returns.

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

Employer contribution rate



Funded ratio



Will plans de-risk? I think so, but in small increments and very slowly

- Public plans have lowered assumptions over last few years, albeit VERY slightly
- Current assumptions still require substantial investment risk, leading to return volatility and budgetary and plan funding risk.
- Many plans (I think) wish to lower assumptions further. Good for benefit security, but drives contributions up.
- I expect a “show them no good news” approach – lower assumptions whenever returns are better than expected.
- Suggests repeated increases in contributions over the longer term

If investment environment changes – e.g., higher inflation, higher interest rates – then maybe not.

Implications for How You Fund a Pension Plan

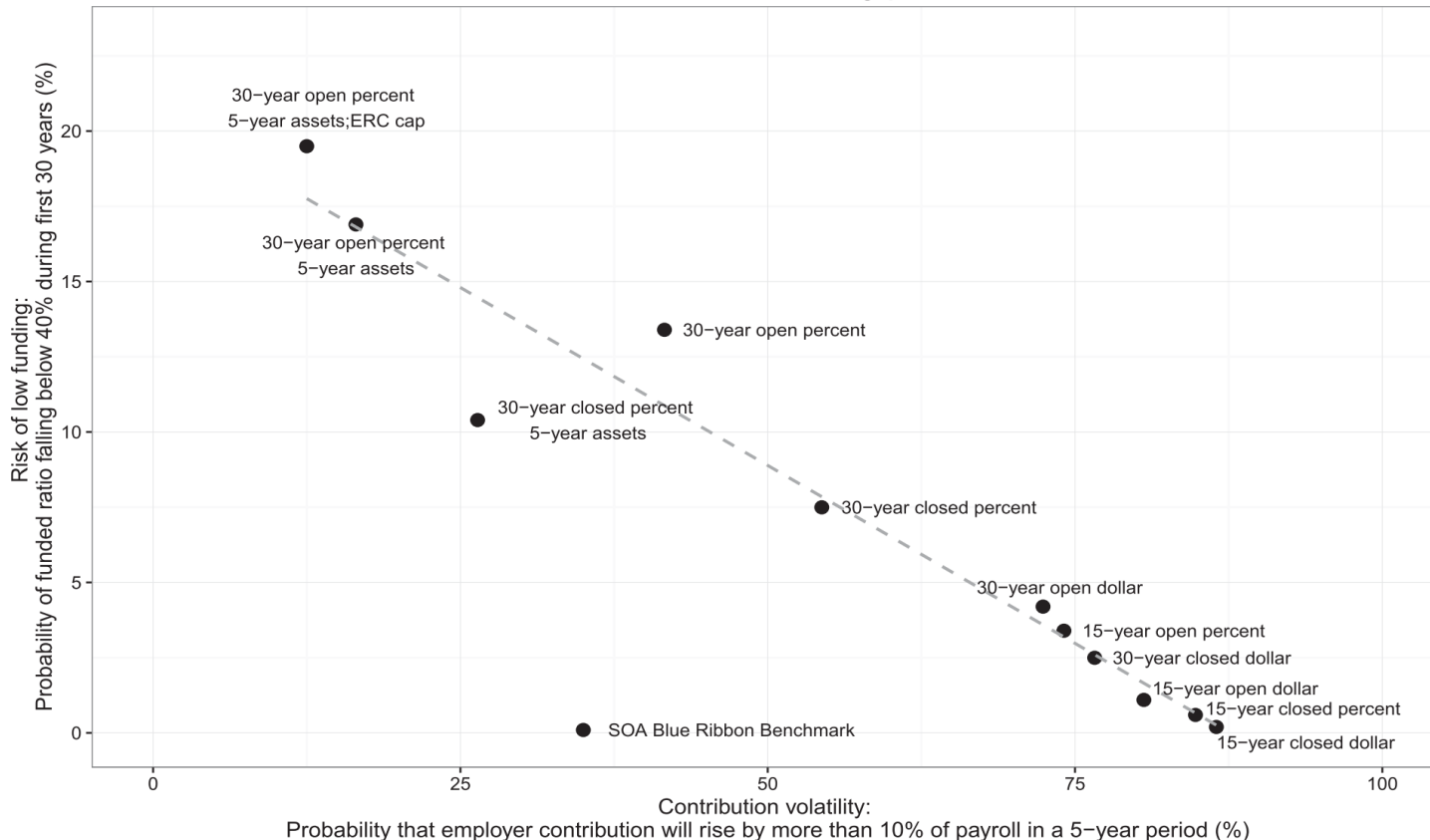
Observations regarding funding

- When you ignore risk (assuming successful risk-taking before it happens), contributions are lower than if you don't ignore risk.
- If it works out poorly, risks will be recouped in the future: from future taxpayers, people who benefit from government services, people who want good roads and bridges, future elected officials, possibly workers and retirees, ...
- These issues are compounded by funding methods that make it easy to avoid consequences in the near term – long amortization, open amortization, asset smoothing, and other methods
- They protect current taxpayers and elected officials, shifting risk to plan funding and to future taxpayers

Contribution volatility -- funding risk trade-off

- Contribution volatility: Probability of sharp increase in any 5-year period of employer contribution rate
- Risk of underfunding: Probability of funded ratio falling below 40% during a 30-year period

Risk of severe underfunding and contribution volatility under selected funding policies



See: Donald Boyd, and Yimeng Yin. "How Public Pension Plan Investment Risk Affects Funding and Contribution Risk - Report." Rockefeller Institute of Government, January 2017.

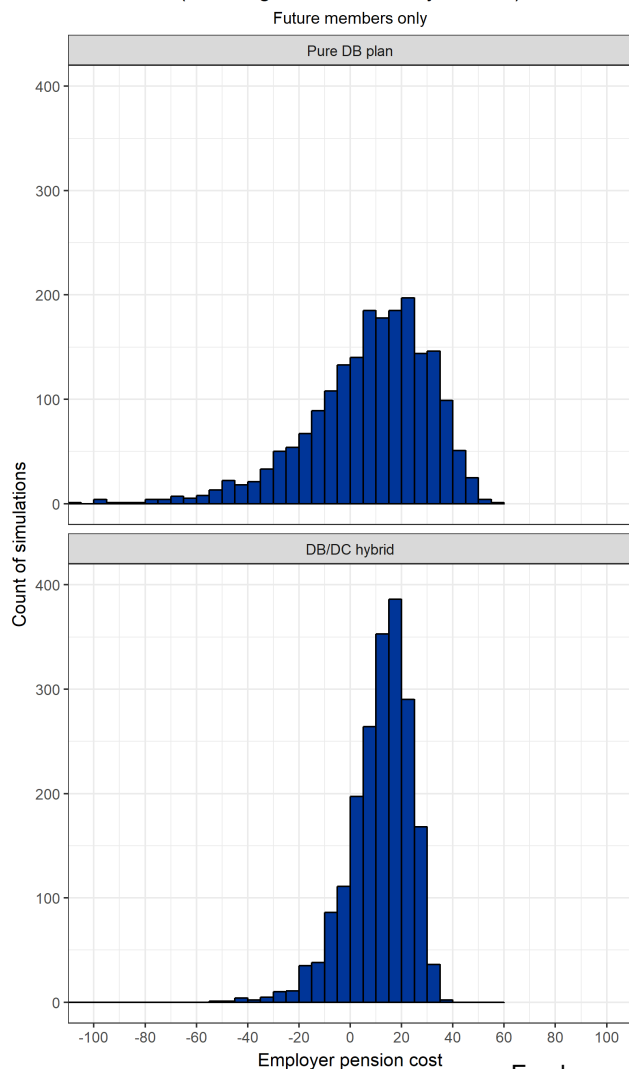
Mitigating Risk – Our Recent Report on PA-SERS*

* 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.

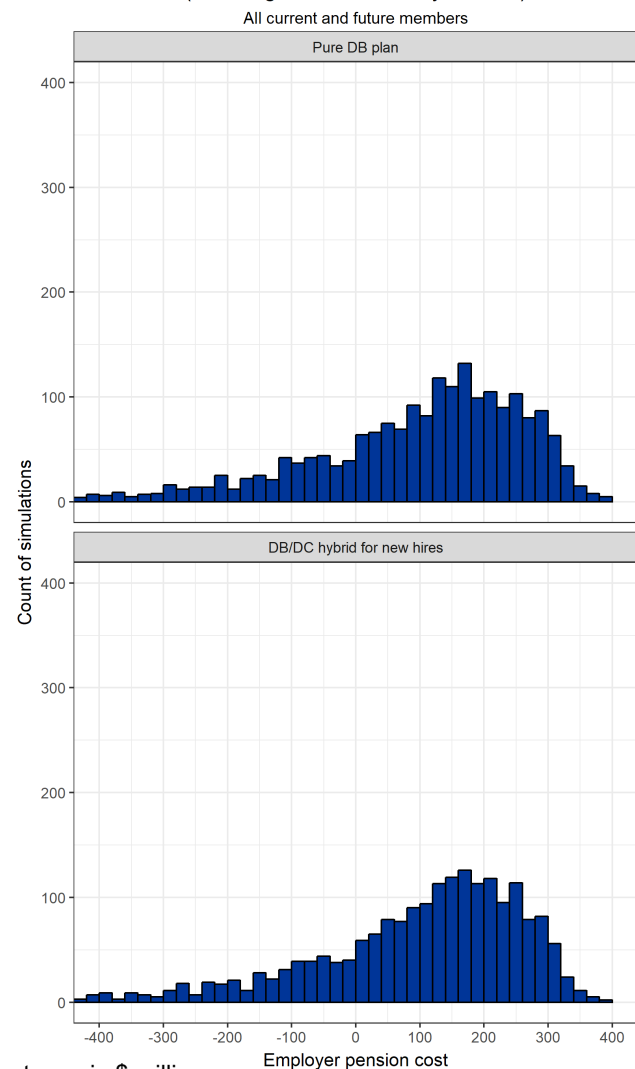
We compared a hypothetical DB/DC hybrid plan applicable only to new hires

- DB component was $\frac{1}{2}$ current DB plan. DC component had 2% employer funding, 3% employee.
- We examined impact on “riskiness” of employer cost over 30-year period.
- → 50% reduction in employer risk for new hires
- → relatively little impact on total employer risk in early years because it takes a long time for plan composition to change, but long term impact would be 50%
- → increased benefit uncertainty for employees (some risk shifted to employees)

Distributions of total employer pension costs in 2017-2048 (including unfunded liability in 2048)



Distributions of total employer pension costs in 2017-2048 (including unfunded liability in 2048)



Employer costs are in \$ millions

Conclusions: Ensuring secure funding

- Pay the actuarially determined contribution. Rain or shine. This is crucial for avoiding deep trouble.
- Calculate the actuarially determined contribution conservatively.
 - Short amortization period.
 - Closed period.
 - Don't smooth assets. Creates tempting opportunity to take risk that others must bear (classic moral hazard).
- Accept lower discount rates and lower risks. But this requires higher contributions.
- Consider risk sharing.

All of this is difficult: Hard on taxpayers, potentially hard on beneficiaries if public willingness to support pensions wanes. Good for plan funding security.

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