What Pension Crisis?

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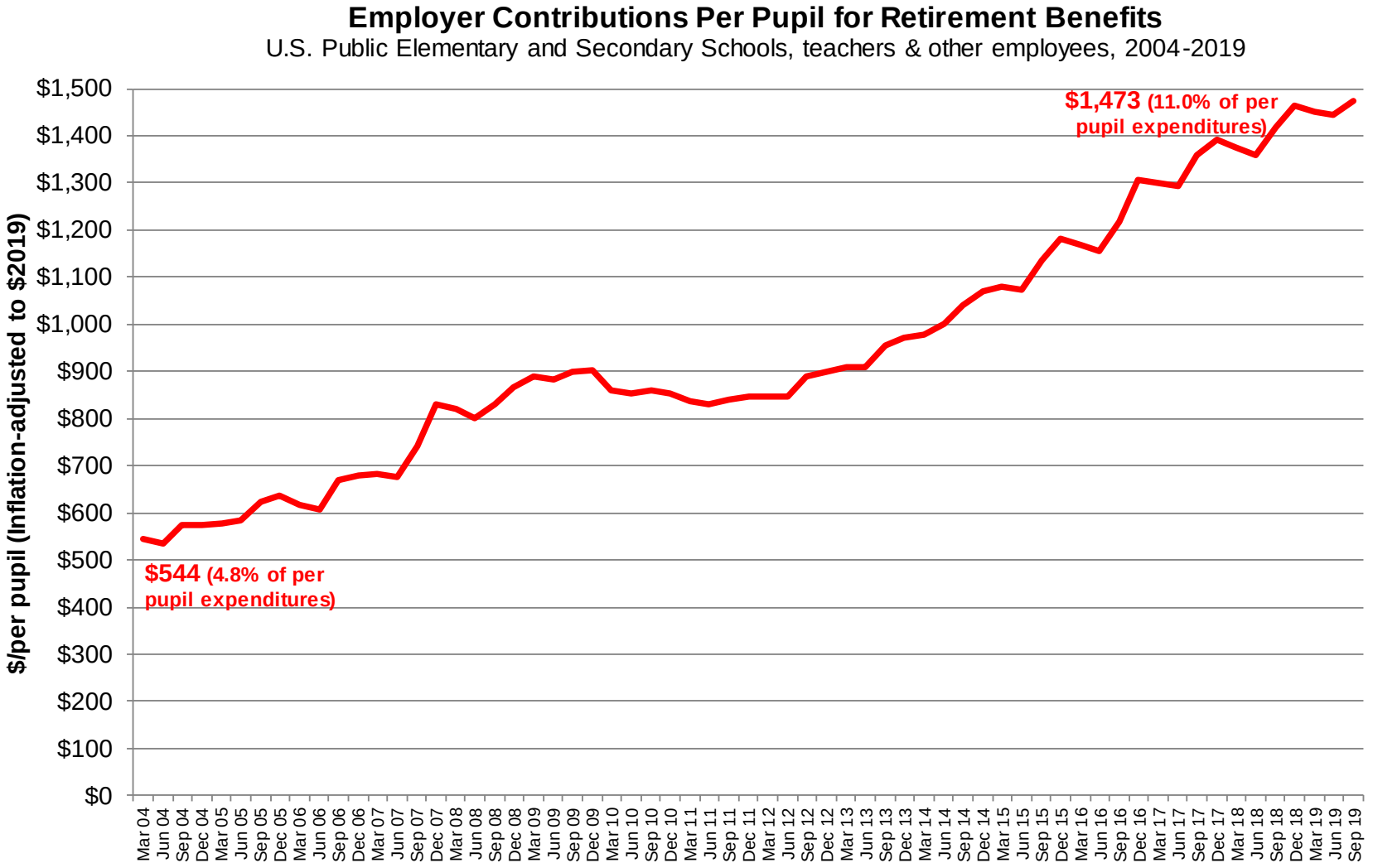
May seem like an odd question to ask this week

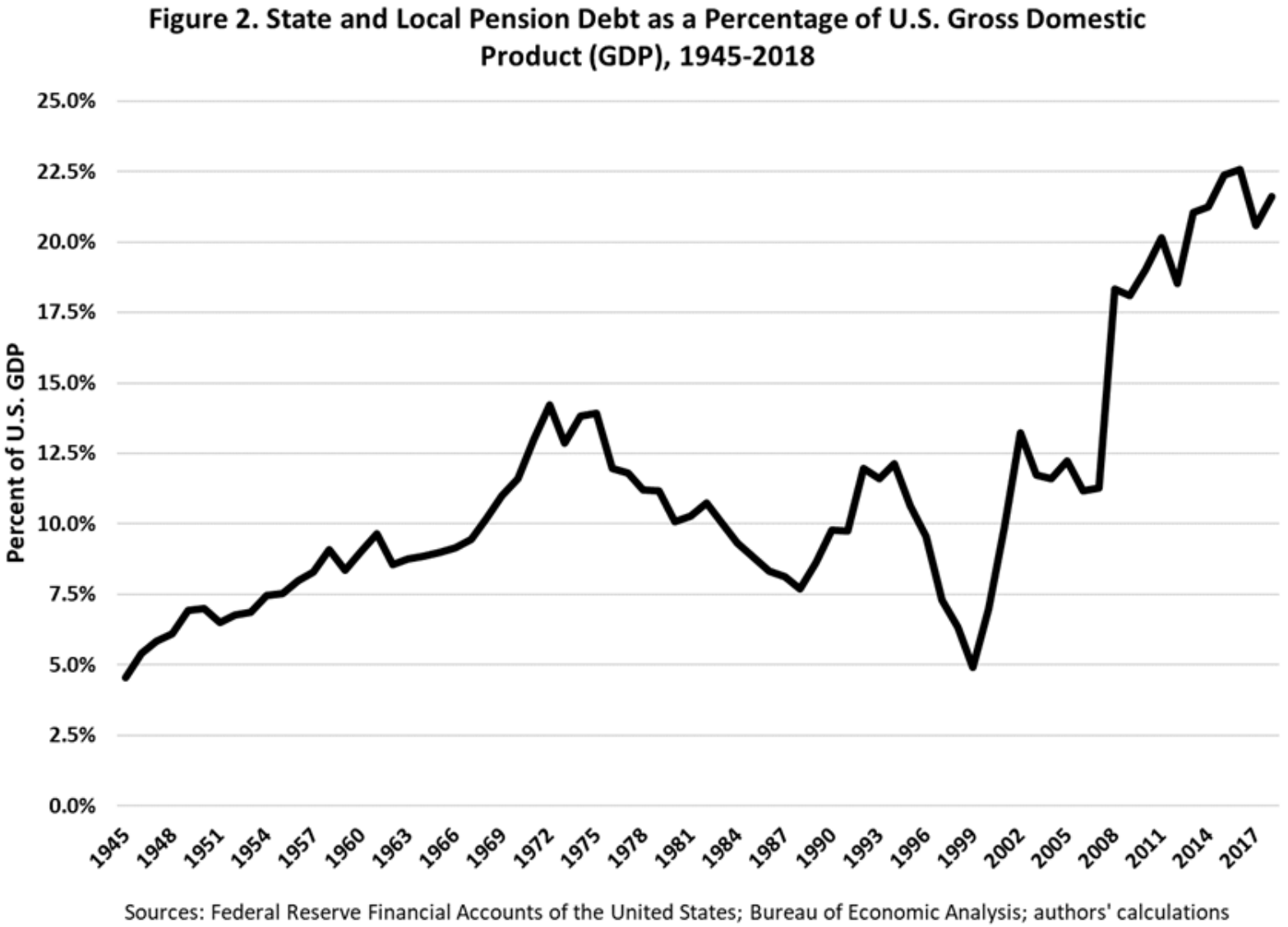
- But it was a question posed by a series of papers last year
- Most notably, the “Brookings paper,” which received a lot of play
  - **Claim: pension funding can be stabilized with modest rise in contributions**
  - This seemed puzzling
- Our paper was formed to examine the puzzle of the Brookings model
  - And to apply our insights to the broader pension funding debate
- The conversation now will change dramatically
  - We can discuss
- But let’s back up & look at the pre-Corona context & debate

Pension costs are growing faster than budgets.



Sources: BLS, National Compensation Survey, Employer Costs for Employee Compensation;
NCES Digest of Education Statistics; BLS, CPI; author's calculations explained in Robert M. Costrell:
http://www.teacherpensions.org/blog/school-pension-costs-have-doubled-over-last-decade-now-top-1000-pupil-nationally
Note: Does not include retiree health benefits or Social Security

Costs are rising because of increasing debt.



Do governments really need to pay down debt?

- Recent papers: no need to pay down pension debt.
  - UC Berkley Haas Institute – Funding Public Pensions
  - NCPERS - The Case for New Pension Accounting Standards
  - **"Brookings Paper"- The Sustainability of State and Local Government Pensions: A Public Finance Approach (Lenney, Lutz, Sheiner)**
    - July Version
    - November Version (cited below)

➢ Funding policy: **roll over pension debt, rather than paying it down**
  - **Claim: pension funding can be stabilized with modest rise in contributions**

➢ **But**, oddly, the model used **conservative** discount rate for liabilities
  - Puzzle: wouldn't risk-free discount imply very high contribution rate?
  - Answer: **not if one is still banking on high returns from risky assets**

How does pension funding work?

- Pension funding comes from two sources:
  1. investment income
  2. contributions.
- Investment income is risky.
- Taxpayers are on the hook to ensure benefits are paid.
- Low contributions now raise risk of pay-go later.
- Pay-go would result in a big contribution jump.
  - Current taxpayer contributions are ~18% of payroll
  - Pay-go rate is ~38% of payroll.

Pension Notation: Assets & Contributions

A = assets on hand

W = payroll

c = contributions as % of payroll

c^p = benefit payments as % of payroll ("pay-go rate")

r = rate of return on assets

g = growth rate of payroll

Funding Dynamics: Assets & Contributions

- $A_{t+1} = A_t(1+r) + \mathbf{c_t} W_t - c^p{}_t W_t$

  Assets grow by investment earnings + contributions − benefit payments

- The funding policy determines the:
  - trajectory of contributions, $\mathbf{c_t}$ and
  - Asset accumulation.

Pension Notation: Liabilities

L = liabilities, the present value of future benefits earned to date

c^n = newly accrued liabilities as % of payroll (“normal cost rate”)

c^p = benefit payments, which extinguish liabilities

d = discount rate used to calculate present value of liabilities

Funding Dynamics: Liabilities

- $L_{t+1} = L_t(1+d) + c^n_t W_t - c^p_t W_t$

  Liabilities grow by interest on prior liabilities + new liabilities − benefit payments

  Actuarial practice has set d = r.

    Choice of high d has been criticized

  Brookings sets d < r

- UAL = unfunded (accrued) liability = L – A, “pension debt”

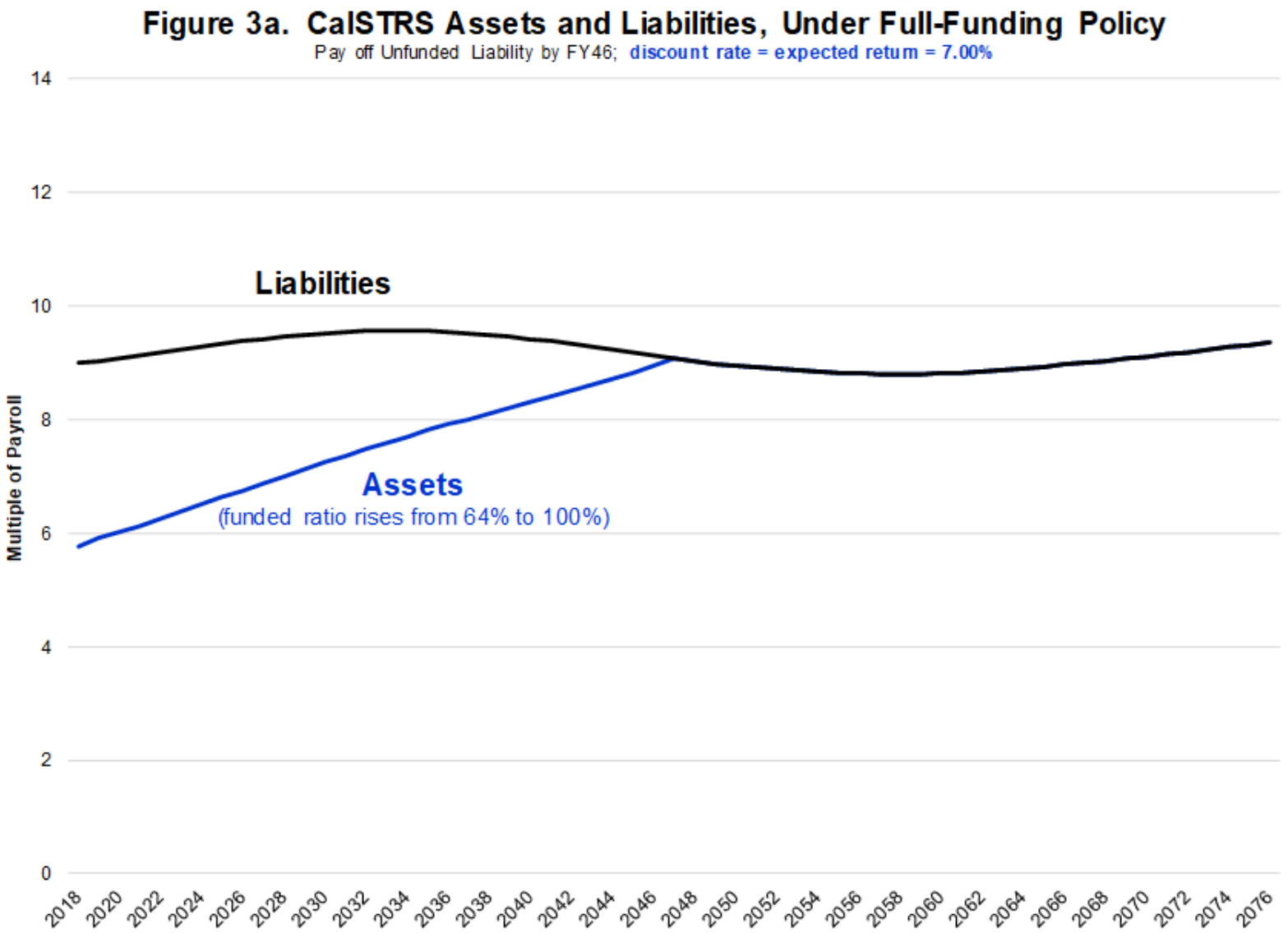
Illustration of Different Funding Policies

- We use CalSTRS data to illustrate Brookings approach.

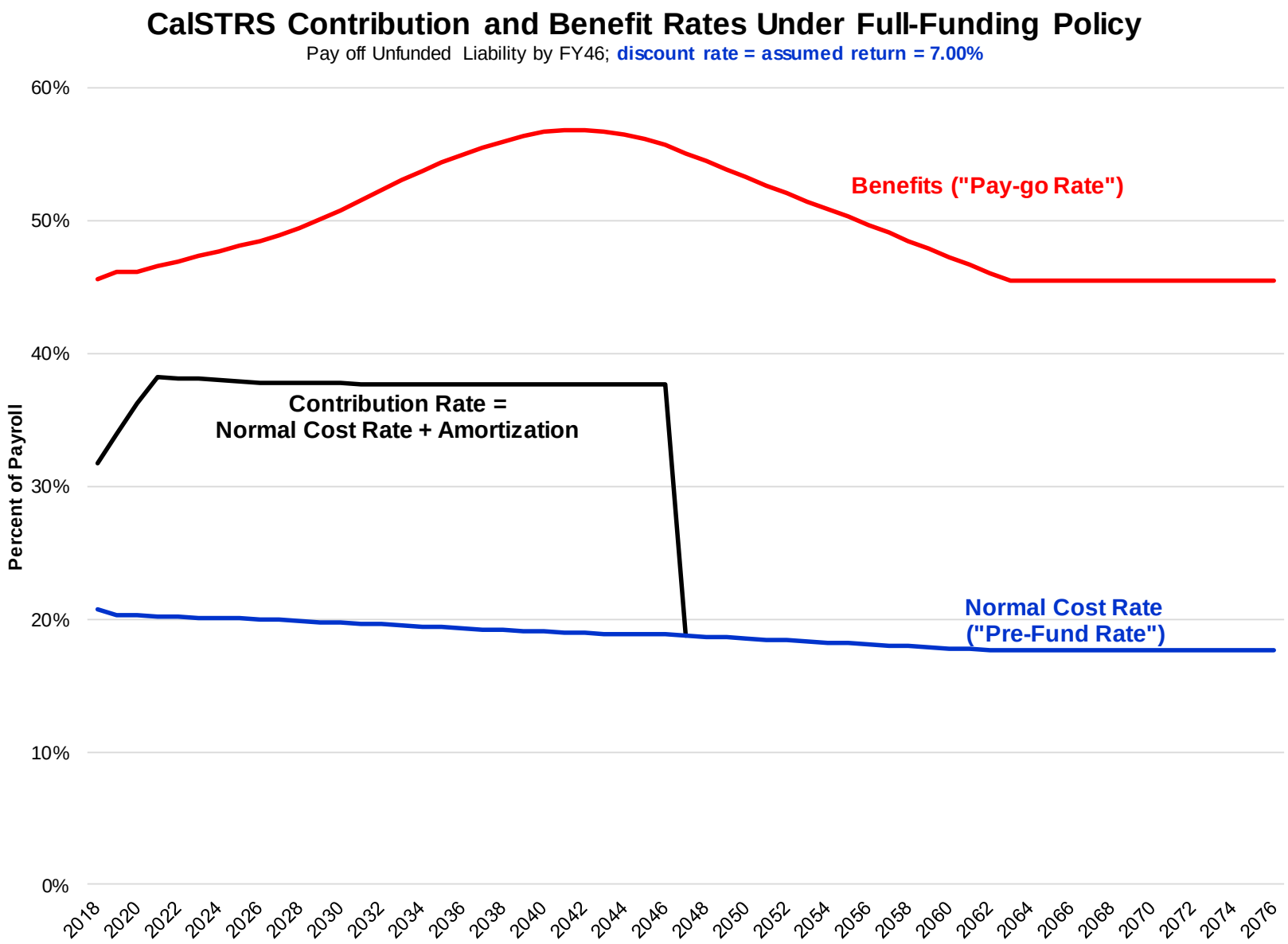
Traditional Pre-funding Approach

- **Pay for retirement benefits as workers earn them ("normal cost").**
- To reach full-funding, **pay off pension debt with amortization payments.**
- So, contribution rate = normal cost + amortization.
  - $\mathbf{c_t} = c^n_t$ + amortization rate.
- Once assets reach liabilities, contributions revert to the normal cost rate.

CalSTRS Seeks to Eliminate Pension Debt by 2046



CalSTRS Scheduled Contribution Rate



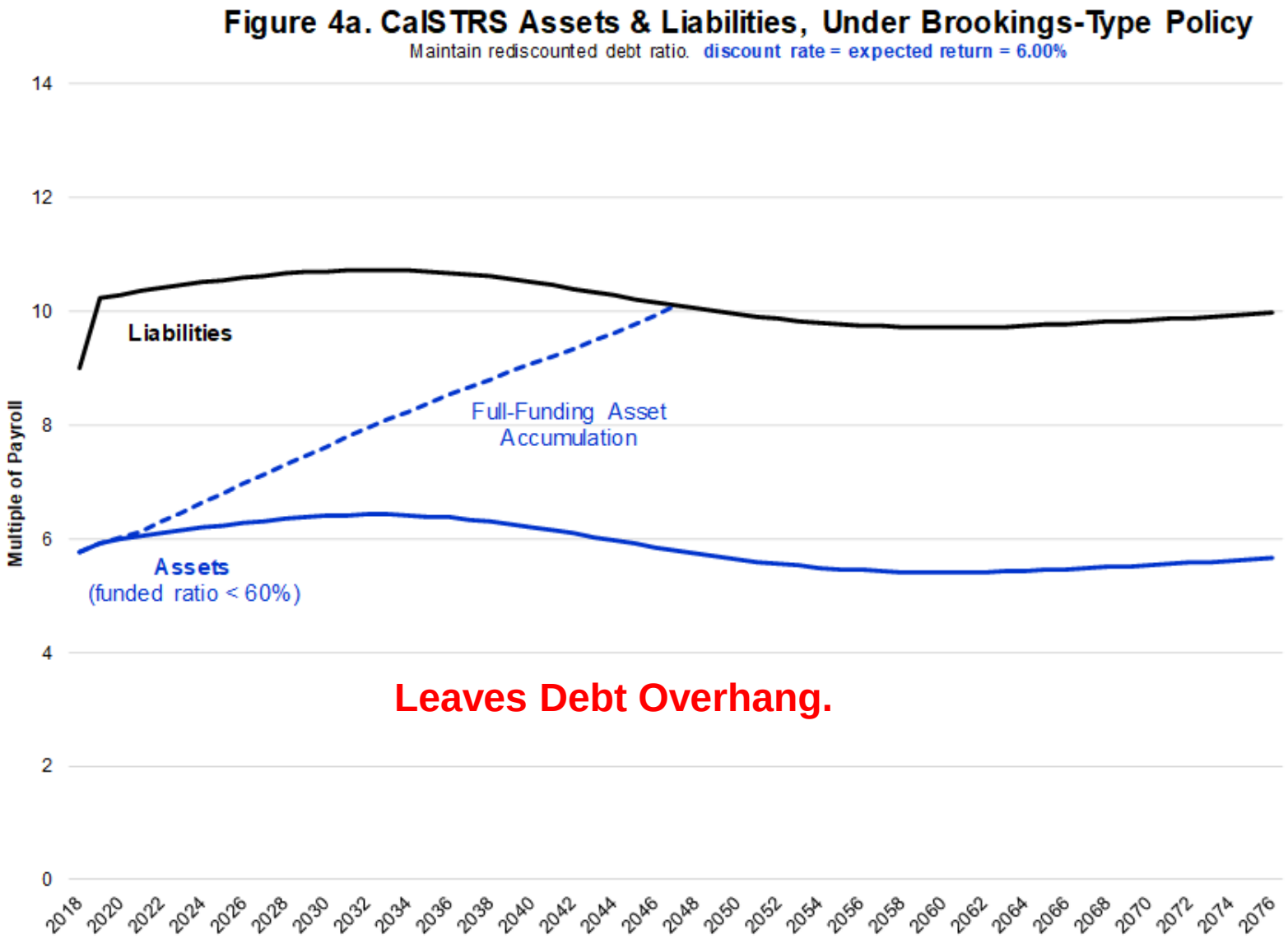
Critiques of Traditional Full-Funding Method

- Pursuing full funding by a specific date creates a contribution cliff.
  - is it generationally equitable to load all past sins on the current generation?
  - The politics will never actually let the contribution cliff happen anyway
  - Nor will the politics let contributions really cover amortization:
    - assumed return will be set high to keep contributions manageable

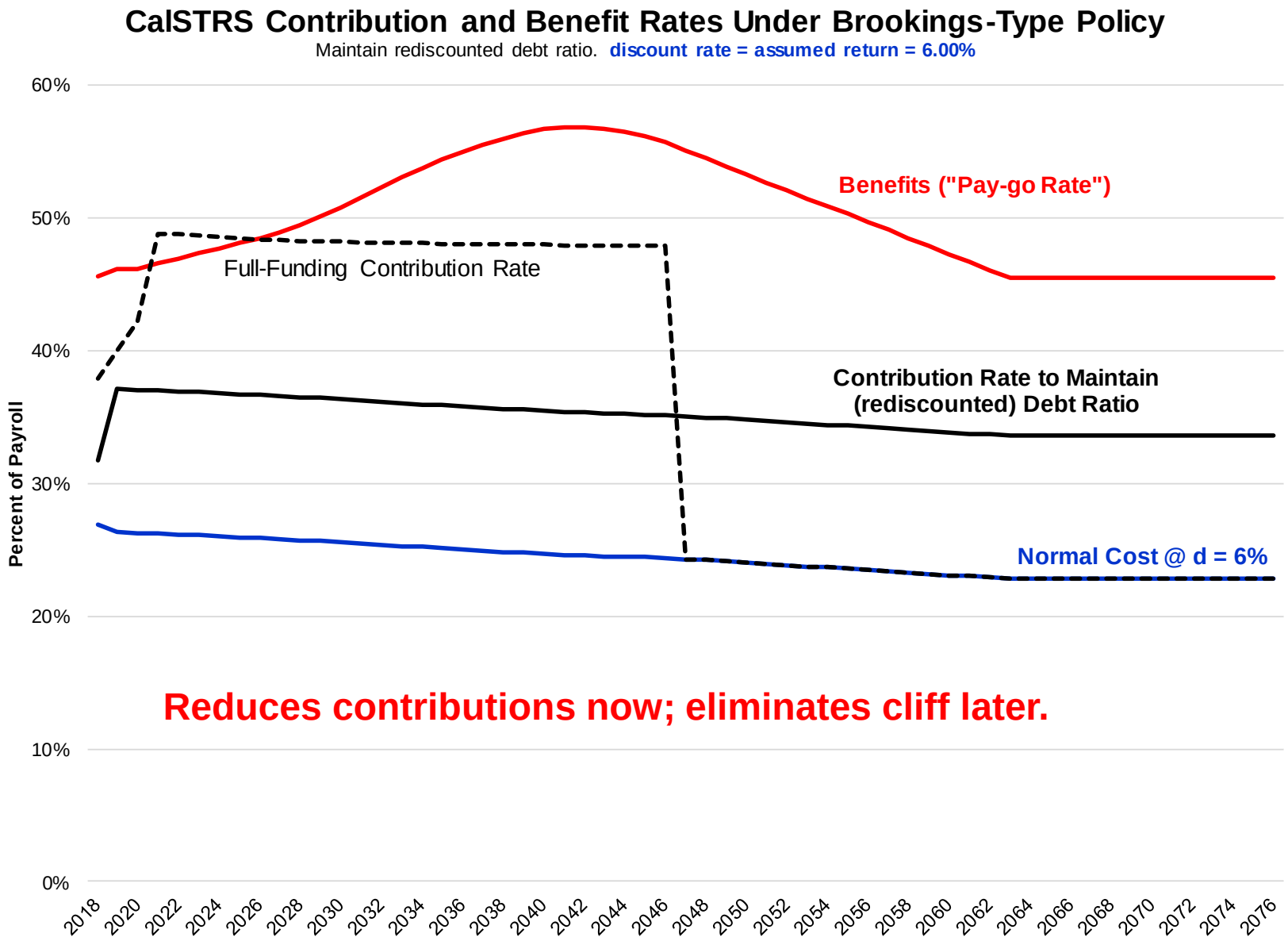
Brookings Paper

- paying down the pension debt is not necessary
  - Nor generationally equitable
- Brookings proposed funding policy:
  - set contribution rate (c) to stabilize debt as % of payroll, at given level
- Brookings assumptions:
  - Return on assets **r** = 3.5% real, ~ **6% nominal**
  - Discount rate on liabilities **d** = 1.5% real, ~ **4% nominal**
    - Low-risk rate, corresponding to pension guarantee
    - **Conservative**, as finance economics has long recommended
- We illustrate this in 2 steps:
  - d = r = 6%
  - d = 4%; r = 6%

Maintain Pension Debt/Payroll Ratio at r = d = 6%



Contributions to Maintain Debt at r = d = 6%

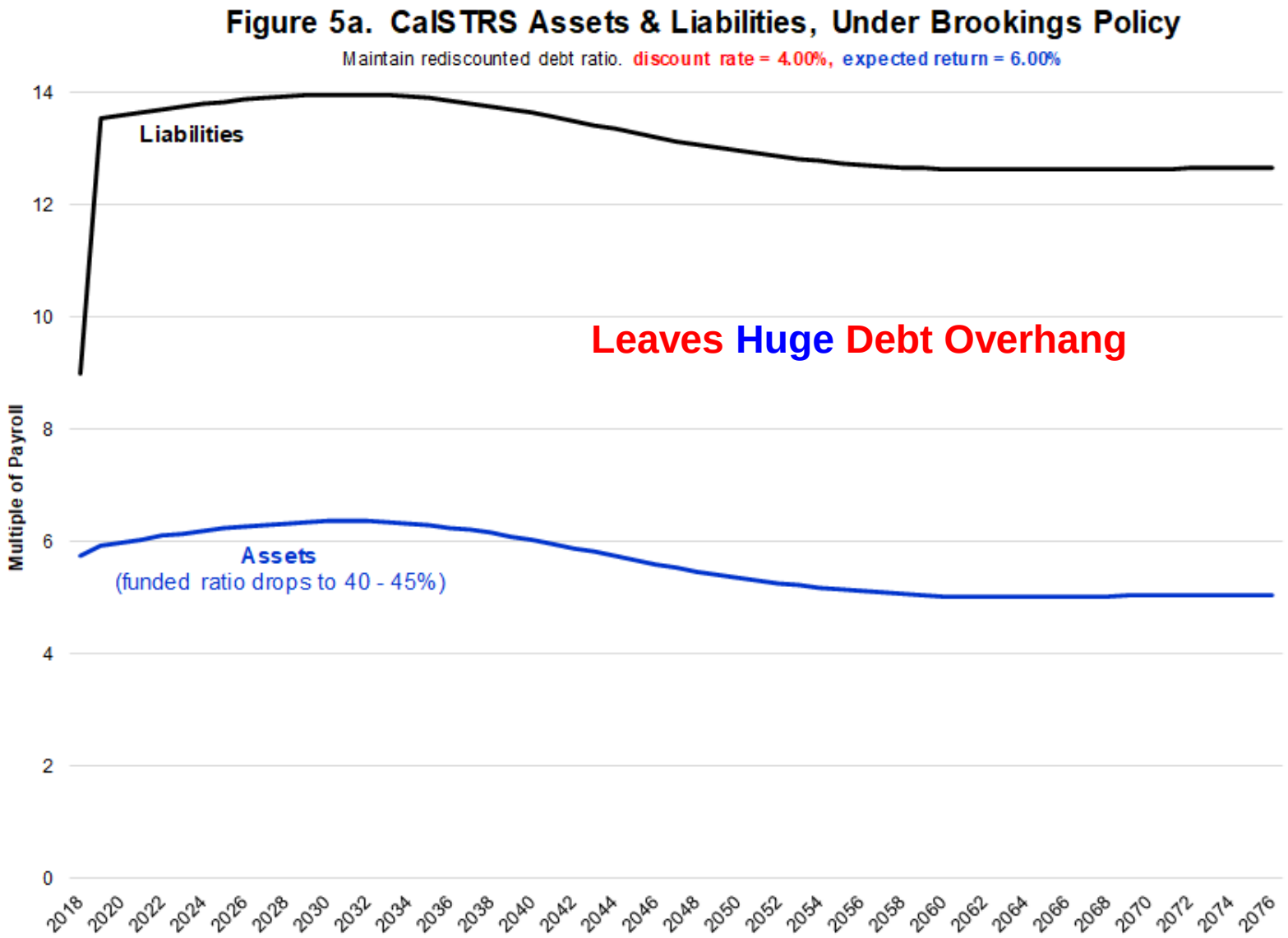


Reduces contributions now; eliminates cliff later.

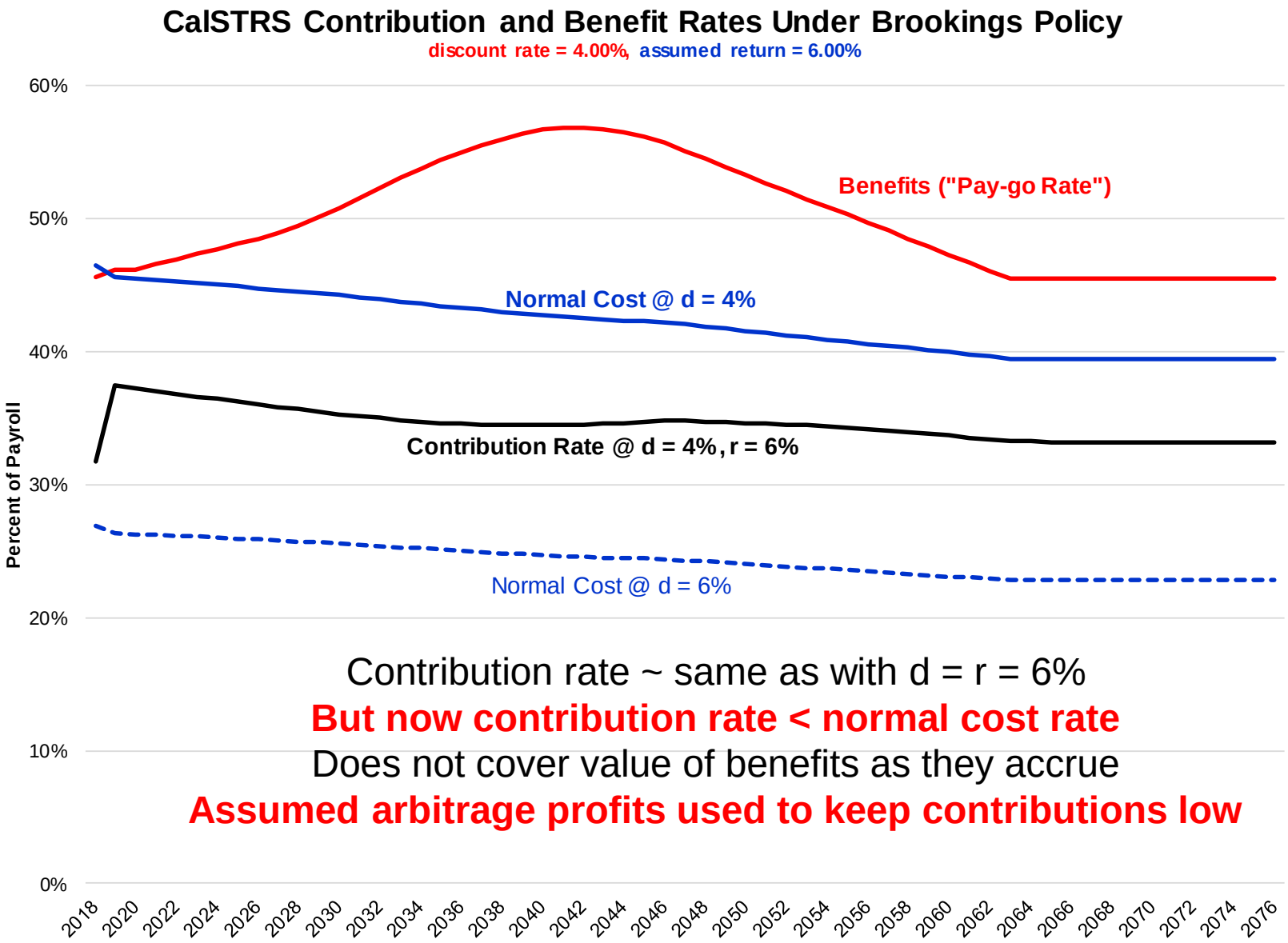
Critique of Traditional Discounting

- Liabilities should be discounted at risk-free rate
- Governments may, however, still invest in risky assets.
- Brookings Approach:
  - set d = risk-free rate < r; and
  - after rediscounting, set contributions to hold expected debt ratio constant.
- We show that Brookings proposed approach:
  - **leaves an even more massive debt overhang;**
  - **the contribution rate does not increase as d decreases;**
  - **the contribution rate is less than the normal cost rate; and**
  - **Assumed arbitrage profits, from d < r, keep contribution rate below normal cost**

Maintain Pension Debt Ratio at r = 6%, d = 4%



Contributions to Maintain Debt at r = 6%, d = 4%



Contribution rate ~ same as with d = r = 6%

But now contribution rate < normal cost rate

Does not cover value of benefits as they accrue

Assumed arbitrage profits used to keep contributions low

The Math of Brookings Contribution Policy

$L_{t+1} = L_t(1+d) + c^n_t W_t - c^p_t W_t$ (Brookings equation (7))

$A_{t+1} = A_t(1+r) + \mathbf{c_t} W_t - c^p_t W_t$ (Brookings equation (8))

Brookings' policy is to maintain constant (UAL/W), so UAL grows at rate g.

It can be shown that this implies:

$$\mathbf{c_t} W_t = \mathbf{c^n_t W_t} + \mathbf{UAL_t(d-g)} - \mathbf{A_t(r-d)}$$

Contributions cover: **normal cost** + **interest (net of growth) on UAL** – **arbitrage profits**

Steady state contribution rate **33.2%** = **39.5%** + **3.8%** **- 10.1%**

Note: The Brookings paper's description (p. 21) of the debt-stabilizing contribution rate incorrectly omits the 3rd term in equation (5) above (i.e., the arbitrage profits). Without the arbitrage profits, the contribution rate would equal or exceed the normal cost rate, but Brookings' assumed arbitrage profits drives the debt-stabilizing contribution well below normal cost.

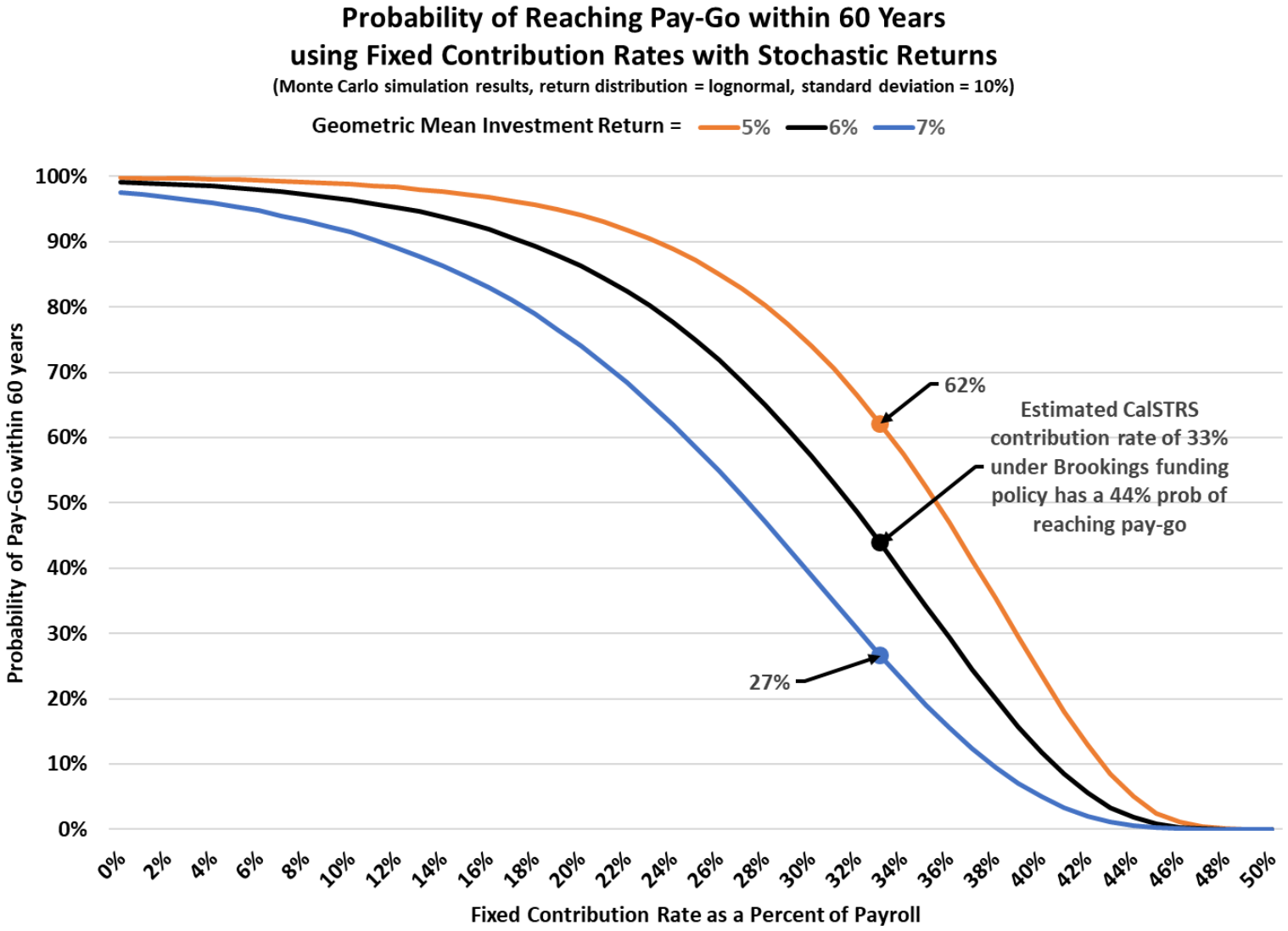
Some Steady State Math

- It can be shown formally, that in a true steady state:

$\mathbf{c^*} = c^p - (r - g)(A/W)$

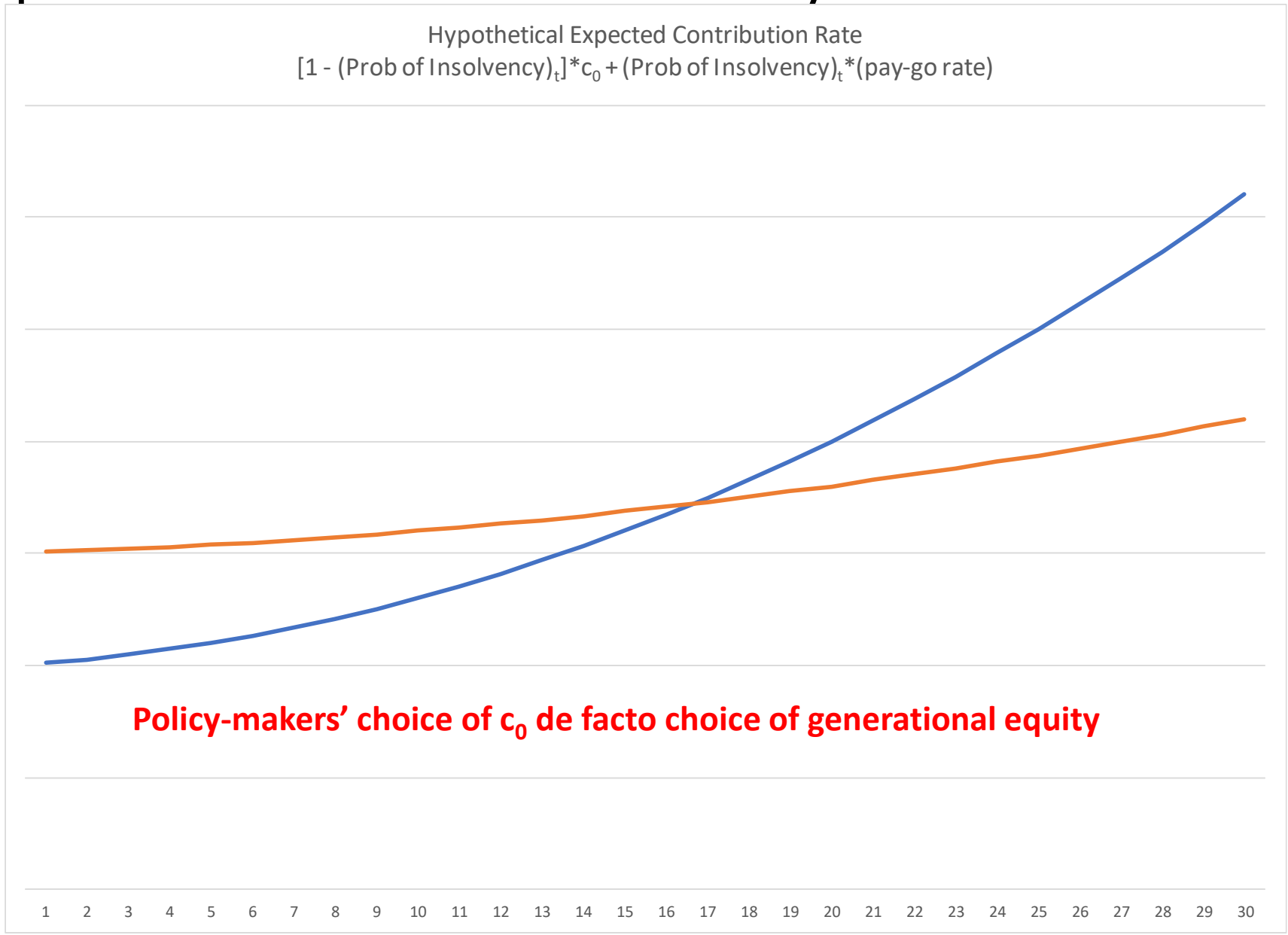
- **For any given SS value of (A/W), c* is *independent* of d.**
- Brookings approach uses conservative discounting
- ***But*** it relies on similar risky bets as current practice
- This keeps contributions low, but still incurs future risks

Probability of insolvency & paygo



Further modeling to be done: E(c) over time

Simple Illustration of Policy Tradeoffs



Takeaways from Brookings Funding Approach

- Brookings' approach would:
  - More accurately measure pension debt, but perpetually roll it over;
  - Set contributions below normal cost, using assumed arbitrage profits instead
  - Dramatically increase the probability of insolvency & pay-go.

Big Questions

- What should the funding goals be when setting contributions?
  - What does generational equity mean given current underfunded state?
    - Is the traditional actuarial definition still pertinent?
  - More generally, how does generational equity vary with contribution policy?
  - How to factor both risk & expected contributions into generational equity?
  - How does the level of investment risk affect generational equity?
- These questions were already quite pressing ***last*** year …
- How will the conversation change ***now***?
  - debt will be much higher
  - may be greater pressure to not pay it down
  - but probability of insolvency will rise
  - pay-go contributions loom larger in the not-so-distant future