Public pension risk-sharing mechanisms and their potential impacts

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Introduction

Trend in adopting risk-sharing policies

- Traditional DB plan: employer bears all/most risks - investment returns, longevity, inflation - during members' working and retirement years
- Some public pension plans incorporate risk sharing, under which the employer and plan members each bear some risks
- More governments may seek risk sharing in the future as a way to reduce plan costs and risks.

Risk-sharing mechanisms

- Conversion of risks: employers ➜ workers and retirees
  - COLA adjustments ➜ benefit risk in retirement years
  - Employee contribution adjustments ➜ contribution risk in working years
- Common triggers of risk-sharing
  - Funded ratio
  - Investment return

Introduction

- Designing appropriate risk-sharing policies requires understanding how these policies affect costs and benefits and the volatility of each. Other issues important, too, including intergenerational shifts and behavioral incentives.

- The impacts of risk-sharing policies depend upon uncertain future events, particularly investment returns. These impacts are best understood with models that take investment-return volatility into account. Very little existing research has examined risk-sharing policies in this way.

- We examine several impacts of selected risk-sharing policies on employers and plan members, using a stochastic simulation model.

Method:
Steady-state pension simulation model

Key model elements:

- Stylized typical US public pension plan in **steady state**: overall demographic and salary structures do not change from year to year. Greatly simplifies the calculation while still allowing for valuable insights.

- **Benefit policy:**
  - Service retirement benefit only
  - Single retirement age of 60

- **Funding policy:**
  - 15-year level dollar closed amortization
  - 5-year asset smoothing
  - Fixed employee contribution rate: 6%
  - No negative employer contribution (i.e., no withdrawal from the fund)

Stylized risk-sharing policies examined

- **Inflation assumption :** Constant 2%
- **Baseline policy**: 1.5% constant COLA (does not quite keep up with inflation)
- **Three contingent COLA policies:**

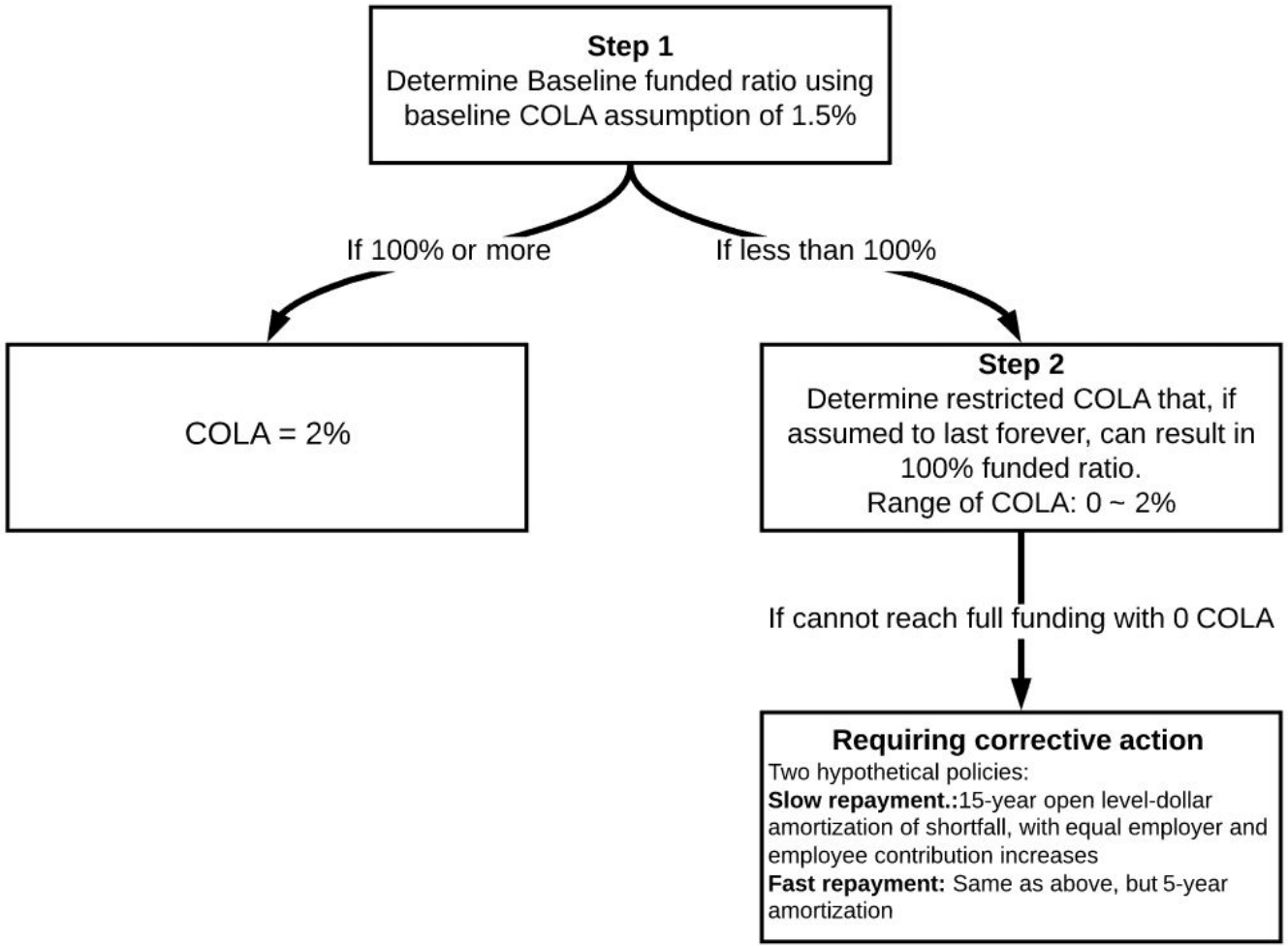
COLA policy	How COLA is determined	Single COLA rate used in valuation	Example Plans
Contingent on investment return	2% if return >= 7.5% 0% if return < 7.5%	1.50%	Maryland MSRPS
Contingent on funded ratio: threshold	2% if funded ratio >= 90% 0% if funded ratio < 90%	1.50%	Arizona SRS
Contingent on funded ratio: ramp	2% if funded ratio >= 90% 0% if funded ratio < 70% Reduced by 0.1% for every 1 percentage point funded ratio lower than 90%	1.50%	Montana PERS

Stylized risk-sharing policies examined

- One contingent employee contribution policy
  - Shared-risk employee contribution. COLA is 1.5% every year. Employee contribution is adjusted every 3 years by plus or minus 0.5% of pay based on prior 10-year returns. Maximum total adjustment is plus or minus 2% of pay.

- Two complex COLA policies loosely styled after South Dakota Retirement System (SDRS) policies:
  - Adjust COLA annually to achieve full funding, limited by 0% floor and 2% ceiling.
  - If 0% COLA cannot achieve full funding, require corrective action by policymakers. We designed two hypothetical corrective actions:
    - SDRS slow repayment. 15-year open level-dollar amortization of shortfall, with equal employer and employee contribution increases
    - SDRS fast repayment. Same as above, but 5-year amortization

Stylized SDRS-inspired policies examined



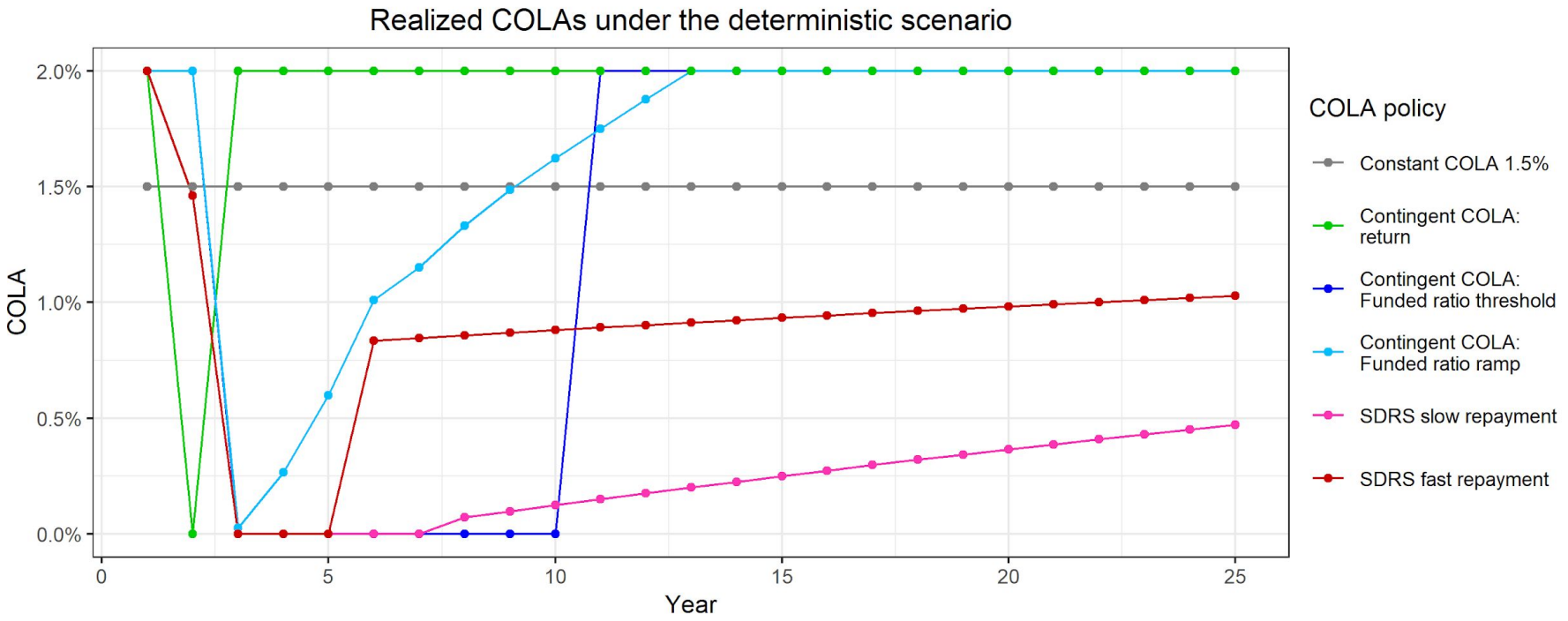
Measuring the impact of risk-sharing policies

Impact on		Measure
Employer contributions	Cost to the employer	Present value of employer contributions
	Short-term volatility of employer contributions	Maximum increase in contributions as a percentage of payroll that the employer faced in any 5-year period in our simulations
Member benefits for a single cohort	Lifetime value of benefits	Present value of benefits over a single cohort's lifetime
	Short-term volatility of member benefits	Maximum decrease in inflation-adjusted benefits that the cohort faced in any 5-year period of our simulations

A deterministic asset-shock scenario

- **Dodd-Frank-style asset-shock scenario:**
  - 24% investment loss in year 2;
  - 3-year recovery period with annual returns around 12 percent;
  - 7.5% constant annual return for the remaining years.

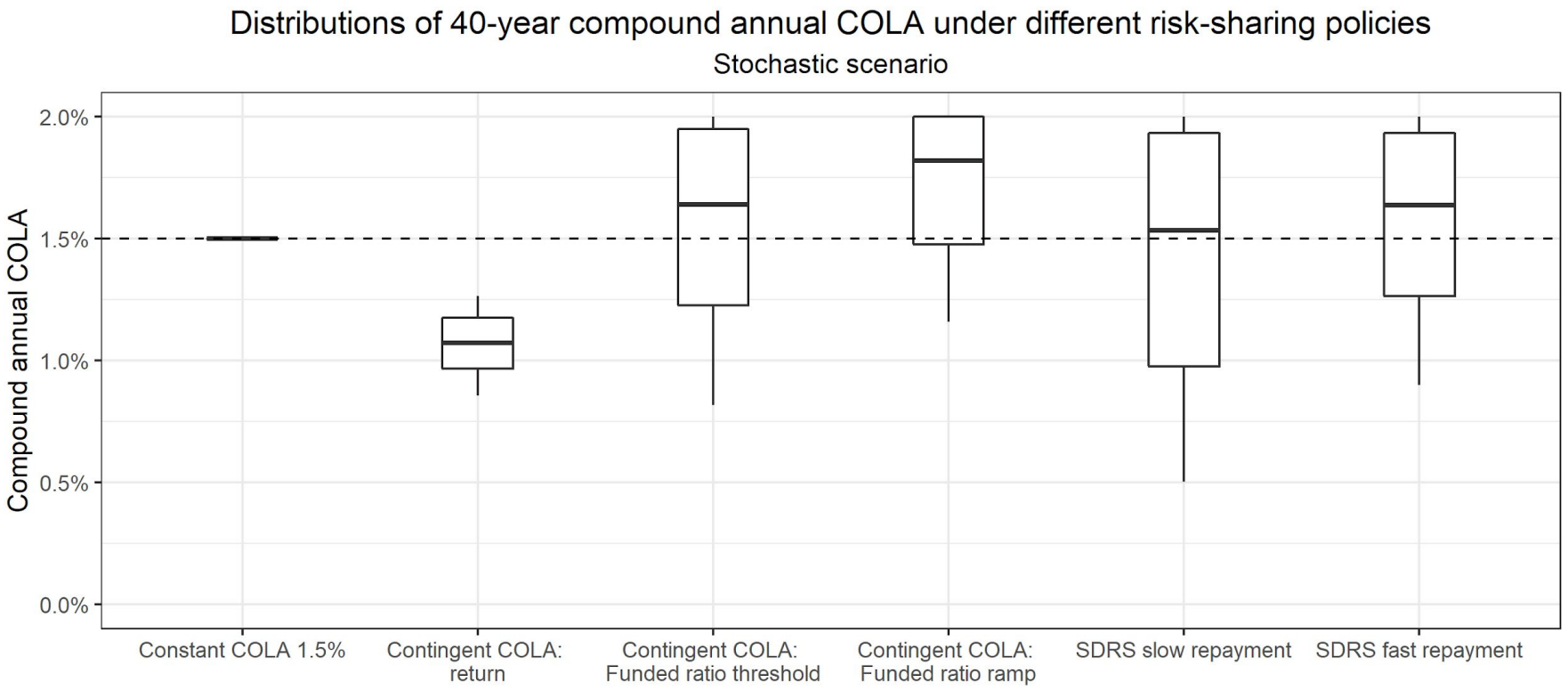
- **Realized annual COLAs under different policies**



Stochastic scenario:
Distribution of 40-year compound annual COLA

Assumptions on investment returns:

- Long-term expected compound return: 7.5%
- Standard deviation: 12%



Contribution cost to the employer

Contingent COLA policies

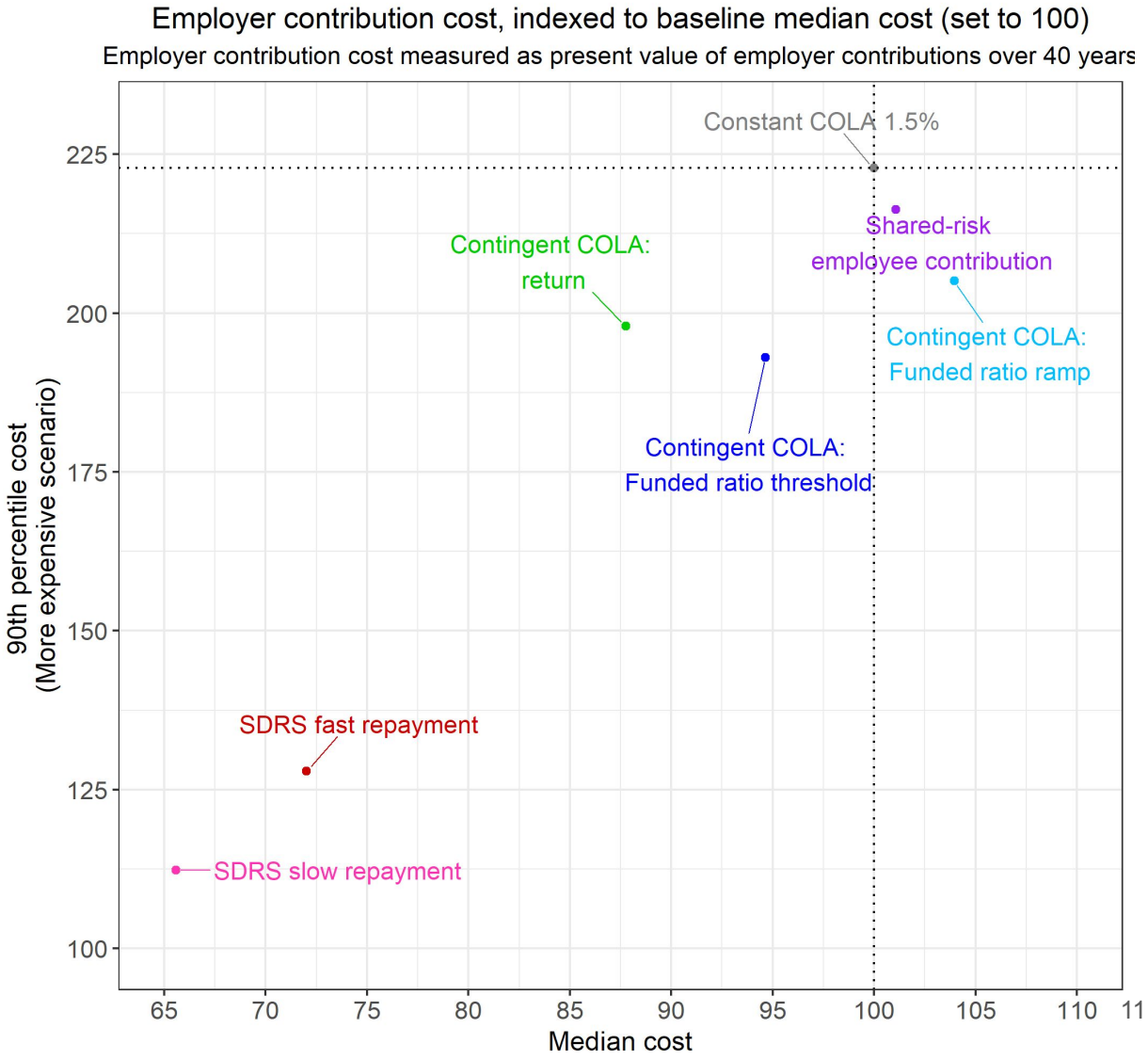
- Moderate protection against high employer cost in bad return scenarios.

SDRS-like policies

- Lower employer contribution costs than other policies

Contingent employee contribution:

- Very little impact



Short-term volatility of employer contributions

Contingent COLA policies

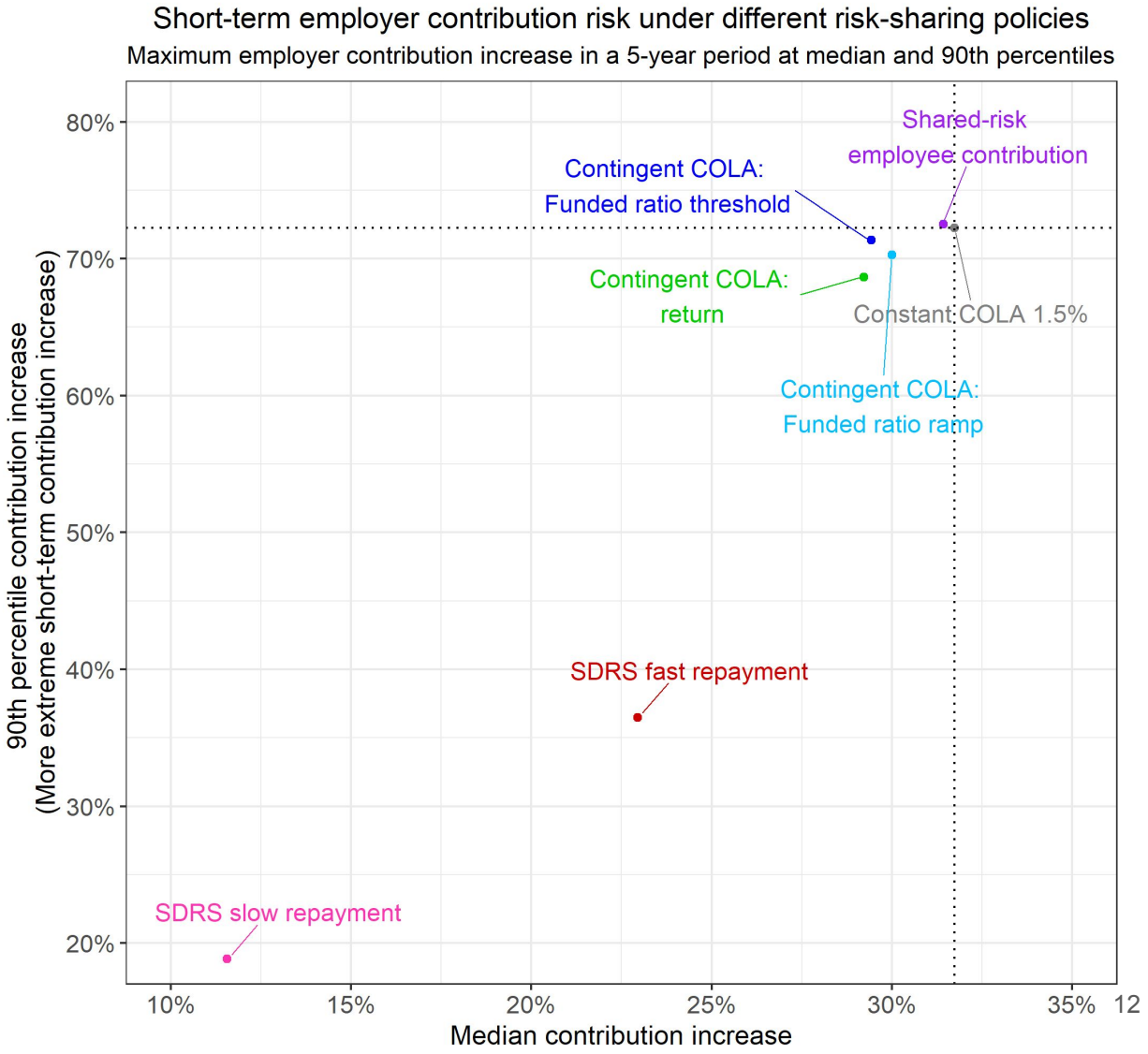
- Little protection against short-term employer contribution volatility (as measured by max 5-year increases)

SDRS-like policies

- Lower employer contribution volatility than other policies

Contingent employee contribution:

- Very little impact



Lifetime value of benefits for a single cohort

Contingent COLA policies

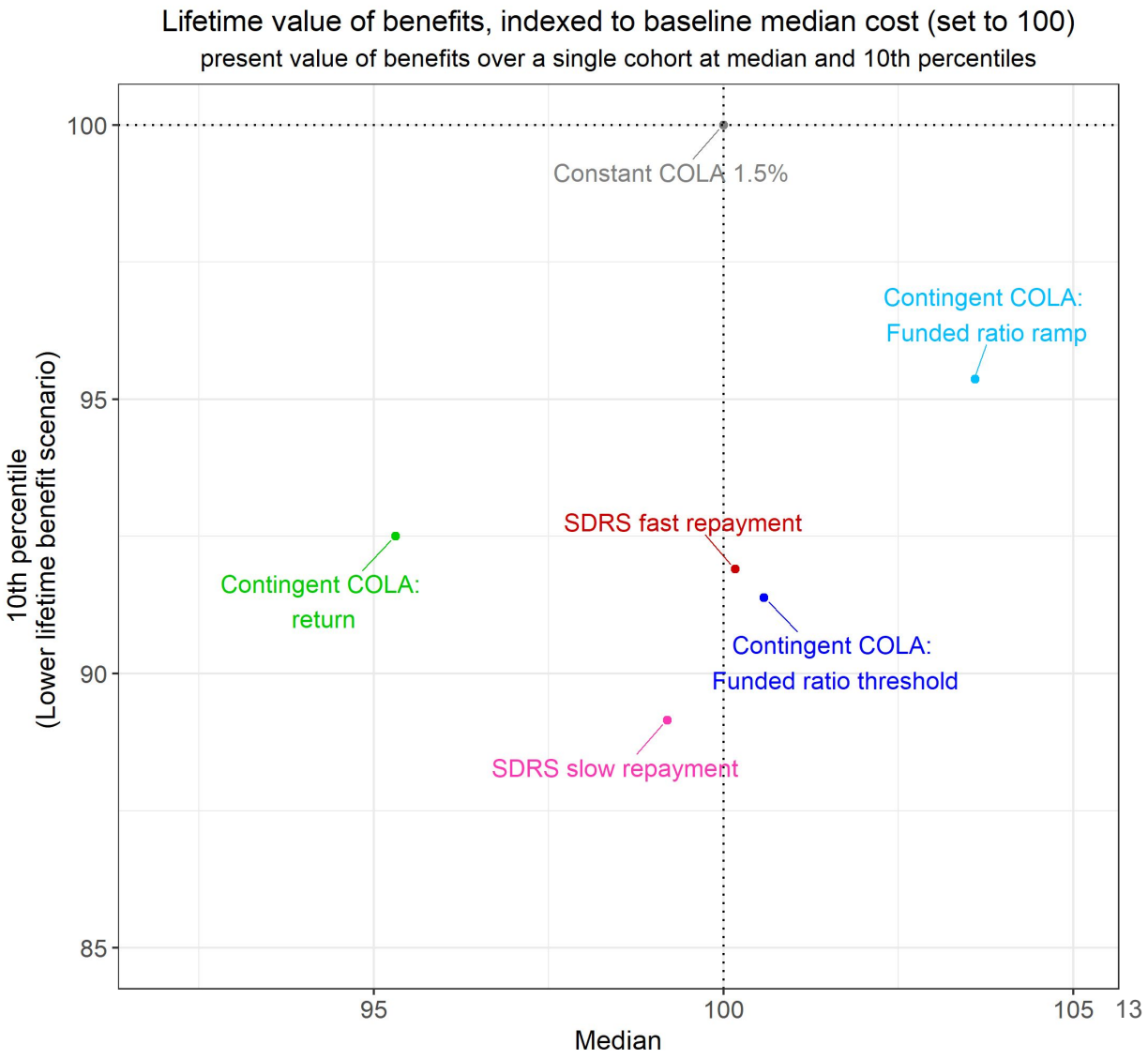
- Substantial risk of lower lifetime benefit

SDRS-like policies

- Similar to contingent COLA policies

Contingent employee contribution:

- No impact (not shown)



Short-term volatility of member benefits

Contingent COLA policies

- Substantial risk of decrease in real benefit over short time periods.

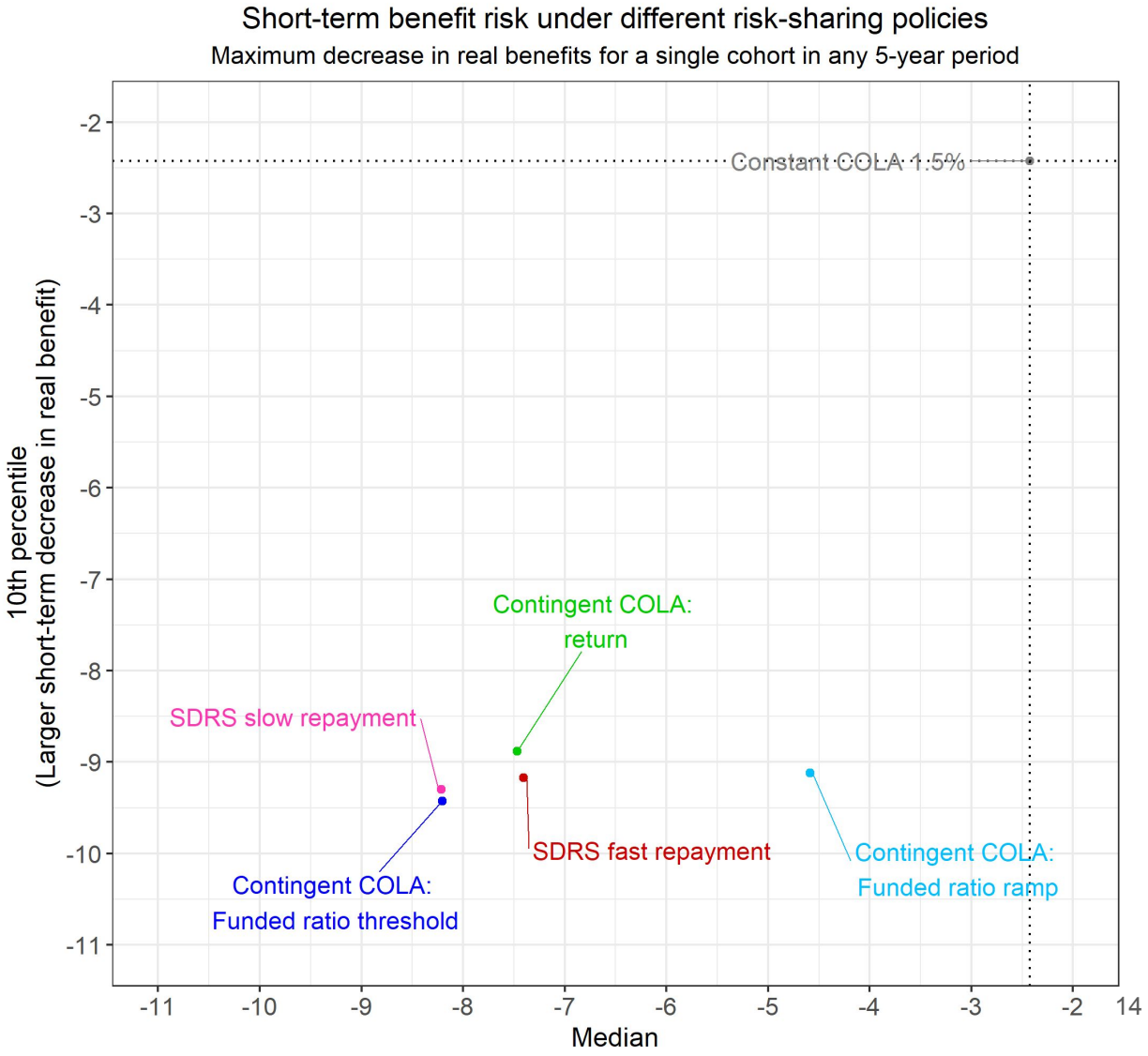
SDRS-like policies

- Similar to contingent COLA policies

Contingent employee contribution:

- No impact (not shown)

Note: ALL COLA policies examined, including baseline, show a decrease in real benefits because baseline 1.5% COLA is lower than the 2% inflation rate.



Conclusions

- The contingent COLA policies we examined, other than the stylized SDRS-like policies, reduce the volatility of employer contributions only marginally. The impact of these policies is more significant during dramatic market downturns than during more-normal market conditions.

- The contingent COLAs we examined create a significant benefit risk for retirees. During downturns, retirees could experience low benefits during retirement. Acceptance of contingent COLA policies depends on the risk tolerance and risk preference of plan members and policymakers.

- The contingent employee contribution policy styled after policies in Pennsylvania state retirement systems also has relatively little impact on employer contribution volatility and total employer cost.

- The complex policies styled loosely after the South Dakota Retirement System risk-sharing arrangement, which seek to achieve full funding by adjusting the COLA within a ceiling and a floor, have much bigger impacts on costs and risks for employers and for members.

- Put simply, the specific design of a risk-sharing policy will have large effects on its impact.

- Finally, in some instances, introduction of a risk-sharing policy when a plan is deeply underfunded may be less about reducing risk and more about reducing cost

Thanks!

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Appendix

Key plan characteristics in the steady state model (based on 1.5 percent constant COLA)

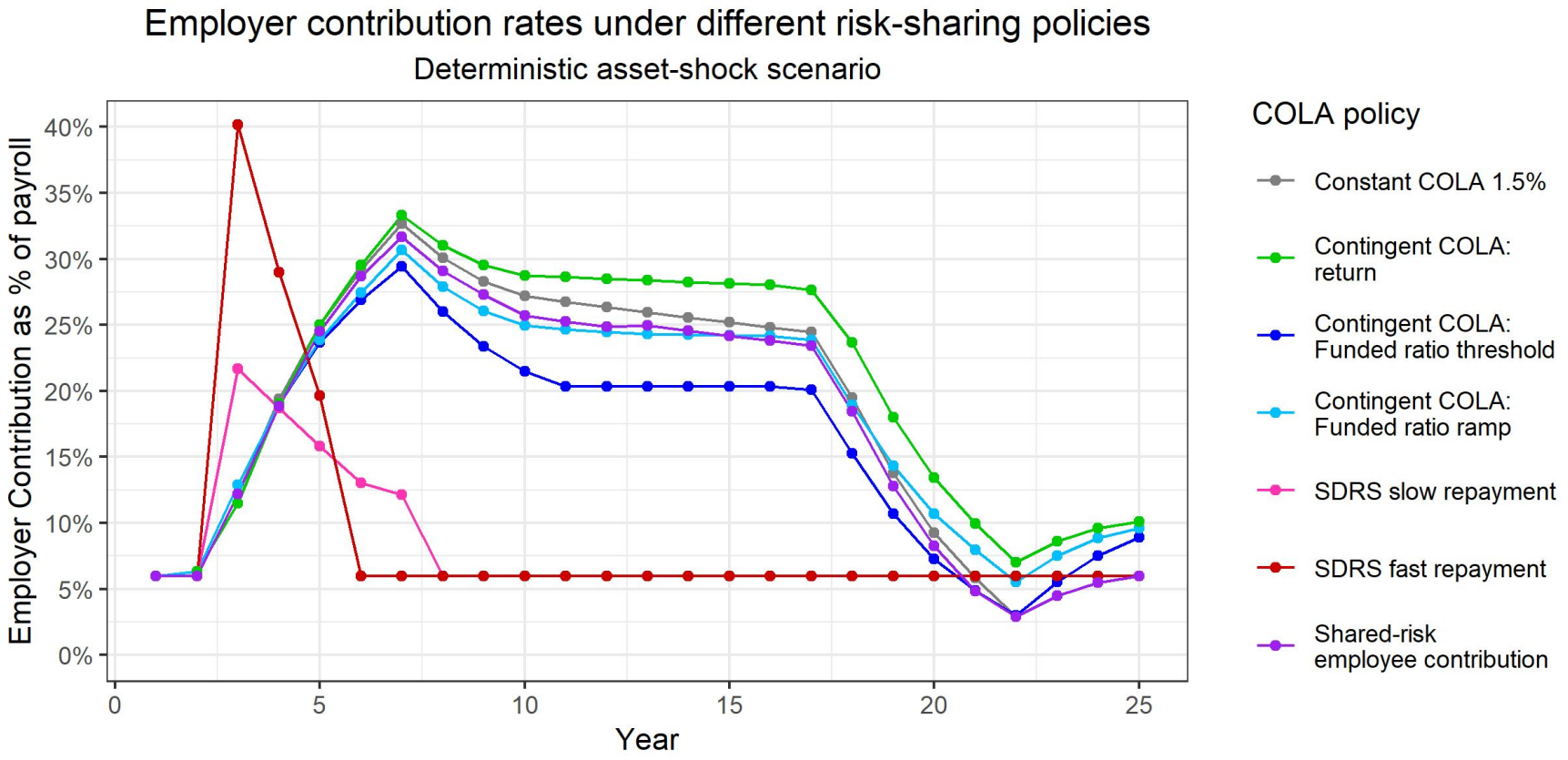
Average age of active members	42.7
Average year of service of active members	9.2
Average age of retires	76.0
Ratio of active members to retirees	1.14
Ratio of total liability to payroll	11.2
Total normal cost as percentage of payroll	12%

Back

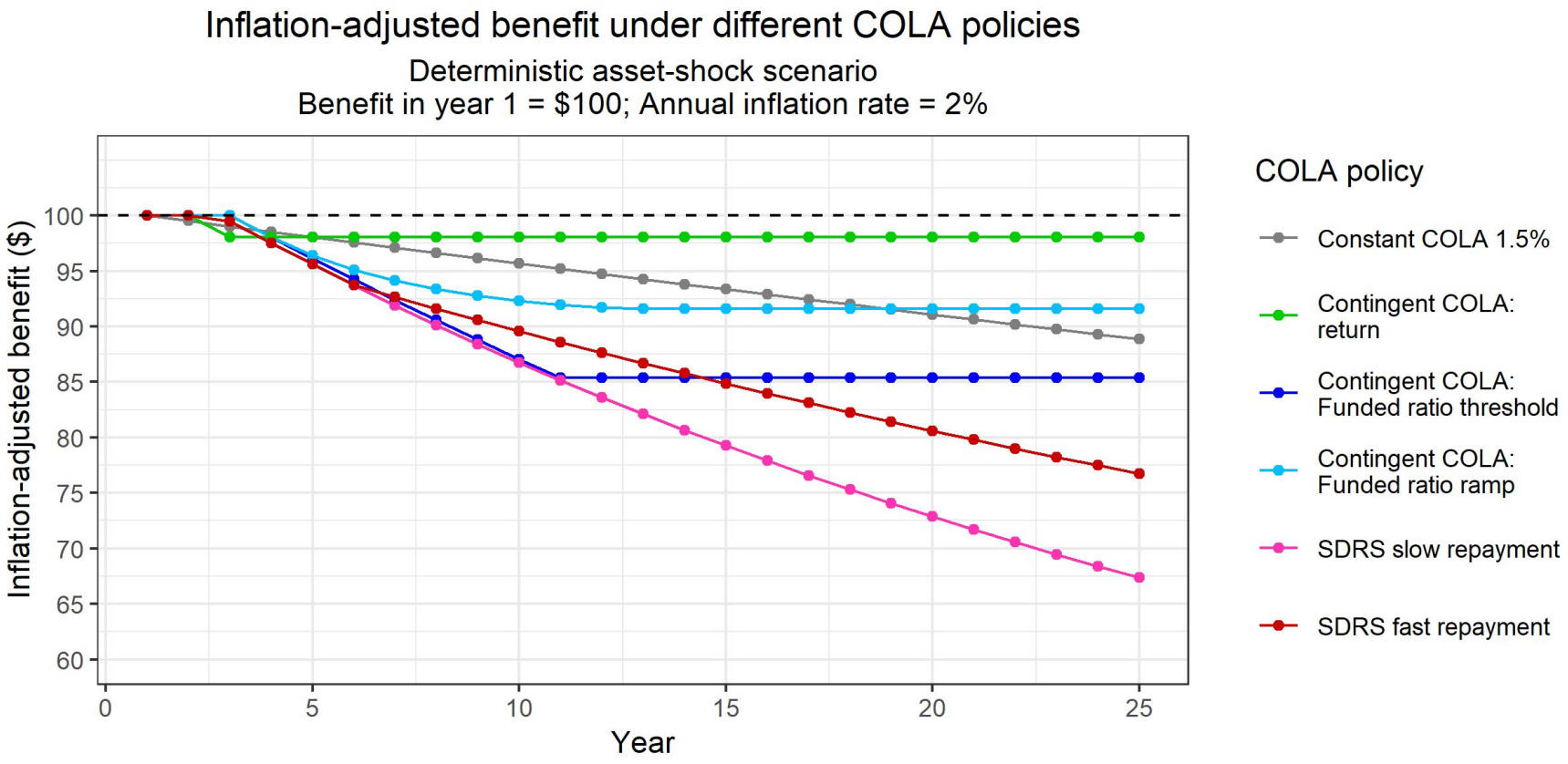
Frequency of corrective actions under SDRS-like policies

	Number of years in corrective action in the 40-year simulation period (1,000 simulations)				
	10th	25th	Median	75th	90th
SDRS-like slow repayment	0	0	5	14	24
SDRS-like fast repayment	0	0	4	9	15

Employer contribution rates under the deterministic scenario



Inflation-adjusted benefits for a single cohort under the deterministic scenario



Comparison of risk-sharing policies analyzed in this paper

	Impact on employer contributions				Impact on benefits for a single cohort			
	Present value of employer contributions		Maximum increase as % of payroll, any 5-year period		Present value of lifetime benefit		Maximum % decrease in inflation-adjusted benefit, any 5-year period	
Policy	Median	90th percentile	Median	90th percentile	Median	10th percentile	Median	10th percentile
(a) Constant COLA 1.5% (baseline)	100	223	32%	72%	100	100	(2.4)	(2.4)
Contingent COLA policies								
(b) Contingent COLA: return	88	198	29%	69%	95	93	(7.5)	(8.9)
(c) Contingent COLA: funded ratio threshold	95	193	29%	71%	101	91	(8.2)	(9.4)
(d) Contingent COLA: funded ratio ramp	104	205	30%	70%	104	95	(4.6)	(9.1)
Policies styled after South Dakota Retirement System (SDRS)								
(e) SDRS slow repayment	66	112	12%	19%	99	89	(8.2)	(9.3)
(f) SDRS fast repayment	72	128	23%	36%	100	93	(7.4)	(9.2)
Contingent employee contribution								
(g) Shared-risk employee contribution	101	216	31%	73%	*	*	*	*

Policy descriptions

(a) Constant COLA 1.5% -- fixed 1.5% annual COLA; the baseline against which we compare other policies

(b) Contingent COLA: return -- 0% COLA when prior-year investment return < 7.5%, 2% when prior return >= 7.5%

(c) Contingent COLA: funded ratio threshold -- 0% COLA when prior-year funded ratio < 90%, 2% when prior ratio >= 90%

(d) Contingent COLA: funded ratio ramp -- 0% when prior-year funded ratio < 70%, 0 to 2% as ratio rises to 90%, 2% when ratio >= 90%

The 2 policies styled on the South Dakota Retirement System have 1.5% baseline COLA, 0% floor & 2% ceiling. The assumed corrective actions differ:

(e) SDRS slow repayment. 15-year open level-dollar amortization of shortfall, with equal employer and employee contribution increases

(f) SDRS fast repayment. 5-year open level-dollar amortization of shortfall, with equal employer and employee contribution increases

(g) Shared-risk employee contribution -- COLA is 1.5% every year. Employee contribution is adjusted every 3 years +/- 0.5% of pay based on 10-year returns. Maximum total adjustment +/- 2% of pay.

* Benefits are same as in baseline policy, but employee contribution costs are different.

Stochastic scenario:
Distribution of inflation-adjusted benefit at age 80