Sins of the Past, Present & Future: Alternative Pension Funding Policies

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Our Paper’s Major Objectives

1. Better understand **pension funding dynamics**
2. Better **incorporate risk** into the analysis of **funding policy for intergenerational equity**
Context: Crowd Out from Rising Pension Costs

Costs are rising because of increasing debt

LLS: do we need to pay down debt?
Pension Funding Dynamics and Policy

• Understanding key features of LLS’ deterministic model
  ➢ Debt rollover untethers asset accumulation from liabilities
  ➢ Low-risk discount rate for liabilities but risky return on assets
    o “Conservative discounting” (LLS, November: abstract, p. 1, 3, 15, 23)
    o But little effect on contribution for debt rollover, with $d < r$. (Costrell & McGee, 2019, 2020a,b)
      ❖ Puzzle: why doesn’t drop in $d$ raise contributions under debt rollover?
      ❖ Math isolates role of (i) assumed arbitrage profits & (2) delinking $c$ from liabilities

• Stochastic Simulation
  ➢ deterministic vs. stochastic model
    ❖ What are the future risks of debt rollover policy?

• General Policy Analysis framework for intergenerational tradeoffs with risk
  ➢ a first stab: current contribution vs. expected value of future contributions
  ➢ Extensions in future work
Basic Pension Math: Assets & Contributions

• \( A_{t+1} = A_t(1+r) + c_t W_t - c^p_t W_t \)

Assets grow by investment earnings + contributions – benefit payments

\[ \begin{align*}
A &= \text{assets on hand} \\
W &= \text{payroll} \\
c &= \text{contributions as % of payroll} \\
c^p &= \text{benefit payments as % of payroll ("pay-go rate")} \\
r &= \text{rate of return on assets}
\end{align*} \]

• The funding policy simultaneously determines:
  - Trajectory of contributions, \( c_t \)
  - Asset accumulation.

• We will look at both sides of that coin
Basic Pension Math: Liabilities

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

Liabilities grow by interest on old liabilities + normal costs – benefit payout

\( L \) = 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

LLS sets \( d < r \)

To see implications, we simulate debt rollover policy for CalSTRS
Compare \( d = r = 6\% \) vs. \( d = 4\%, r = 6\% \) in deterministic model.
Maintain Pension Debt/Payroll Ratio at \( r = d = 6\% \)

Figure 4a. CalSTRS Assets & Liabilities: Debt Rollover Policy, \( d = r \)

- Maintain rediscouned debt ratio.
- \( \text{discount rate} = \text{expected return} = 6.00\% \)

- **Assets** (funded ratio < 60%)
- **Liabilities**

Full-Funding Asset Accumulation
Maintain Pension Debt Ratio at \( r = 6\% \), \( d = 4\% \)

Figure 5a. CalSTRS Assets & Liabilities: Debt Rollover Policy, \( d < r \)

Maintain rediscounted debt ratio. \( \text{discount rate} = 4.00\% \), \( \text{expected return} = 6.00\% \)

Assets

Liabilities

(funded ratio drops to 40 - 45%)

Much larger liabilities, but virtually no change in asset accumulation

Asset accumulation essentially untethered from liabilities
Contributions to Maintain Debt at $r = d = 6\%$

Figure 4b. CalSTRS Contribution Rates: Debt Rollover Policy, $d = r$
Maintain rediscounted debt ratio. discount rate = assumed return = 6.00\%

Benefits ("Pay-go Rate")

Contribution Rate to Maintain (rediscounted) Debt Ratio

Normal Cost @ $d = 6\%$

Debt service much reduced from full-funding, but still $c >$ normal cost
Contributions to Maintain Debt at $r = 6\%$, $d = 4\%$

Figure 5b. CalSTRS Contribution Rates: Debt Rollover Policy, $d < r$

Discount rate $= 4.00\%$, assumed return $= 6.00\%$

**Benefits ("Pay-go Rate")**

**Normal Cost @ $d = 4\%$**

**Normal Cost @ $d = 6\%$**

**Contribution Rate @ $d = 4\%, r = 6\%$**

Much higher normal cost rate, but virtually no change in SS contribution rate

For given steady-state $(A/W)$, $c^* = c^p - (r - g)(A/W)$

So long as $(A/W)$ untethered from $(L/W)$, $c^*$ is unaffected by drop in $d$

Debt rollover policy sets: $c_t = c^n_t + (UAL/W)_t(d-g) - (A/W)_t(r - d)$

Assumed arbitrage profits – risky – used to keep contributions low
Pension Funding Risks

• **Sustainability** → Government can’t afford contributions
  • Somewhat subjective concept
  • Dependent on taxpayers’ willingness to pay
  • Can be self-correcting if earned benefits and contributions are linked

• **Pay-go** → Plan runs out of assets
  • Benefit payments would be made from annual budget
  • Would require a big increase in contributions for the average plan from ~25% to ~40% of payroll
  • Workers’ benefits less secure

• **Intergenerational Equity** → taxpayers pay more/less than cost of services
  • Pass cost of current services on to future generations
  • Can result in workers receiving vastly different compensation for the same work
Debt Rollover Policy Would Increase Chances of Pay-go

Figure 6. CalSTRS Probability of Reaching Pay-Go using Fixed Contribution Rate with Stochastic Returns
(Monte Carlo simulation results, contribution = 33%, return distribution = lognormal)

Geometric Mean Investment Return = 5% 6% 7%
Investment Risk Results in Wide Distribution of Outcomes

Figure 7. CalSTRS Funded Ratio with Stochastic Returns
(Monte Carlo simulation results, contribution = 33%, geometric mean return = 6%, return distribution = lognormal)
Figure 8. CalSTRS Expected Contribution Rate with Stochastic Returns
(Monte Carlo simulation results, contribution = 33%, return distribution = lognormal)

Geometric Mean Investment Return = 5%, 6%, 7%
Lower Contributions Now Increases the Likelihood of Higher Contributions Later

Figure 9. CalSTRS Expected Contribution Rate with Stochastic Returns
(Monte Carlo simulation results, return distribution = lognormal, 6% geometric mean return)

- c=33%
- c=36%
- c=40%
Conclusions

• Debt rollover funding policy would do little to solve the generational equity challenges created by pension funding.
• In fact doing so would exacerbate those challenges by:
  • Increasing the chances of reaching pay-go; and
  • Further decoupling liabilities and contributions.
• We need to re-conceptualize how we achieve the goal of intergenerational equity in a risky world.
• Our proposed expected contribution metric is a start to better incorporate risk and its impact on future cost into funding policy deliberations.
Future Work

• We plan to expand on our expected contribution metric by:
  • Modeling continuous funding policies across a wider array of public plans;
  • Incorporating risk-aversion in our implicit social welfare function; and
  • Aggregating over time with (i) a discount rate and (ii) an intertemporal rate of substitution to characterize policy-makers’ social welfare function and highlight tradeoffs.