Teacher Pension Workshop: Connecting Evidence-Based Research to Pension Reform

Cross-Subsidization of Teacher Pension Costs: The Impact of the Discount Rate

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Cross-Subsidization of Teacher Pension Costs: The Impact of the Discount Rate

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• Uneven Distribution of Benefits:
  ➢ **Individual Normal Costs**
  ➢ Uniform Normal Cost (NC) rate masks wide Cross-Subsidies
    o within cohorts, by age of entry & exit [Costrell and McGee, 2017]
    o (x-sub across cohorts via UAL, *not* today’s paper)

• Cross-Subsidies @ current CalSTRS assumed return
• Cross-Subsidies @ lower assumed return
  ➢ **High assumed return understates redistribution w/in cohorts**
• Distribution of Benefits @ risk-free rate
  ➢ **Value of pension guarantee is highly concentrated**

• Distribution of Benefits under 1st CB plan for teachers: KS
  ➢ **KPERS assumed rate vs. risk-free rate: Much less impact**
Cost of K-12 Pensions

Employer Contributions Per Pupil for Retirement Benefits

Most of the rise is from UAL, due to assumed r > actual
4.8% of ppx  Belatedly, assumed r is being cut, raising NC too.
… how are the newly valued benefits distributed?


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](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
Individual NC Rates & Cross-Subsidies

- Individuals of entry age $e$, separation age $s$.
- **Individual** NC rate (employer+employee): $n_{es} = B_{es}/W_{es}$
  - $B_{es} = \text{PV} \ @ \ \text{entry of type } es \ \text{Benefits}$
  - $W_{es} = \text{PV} \ @ \ \text{entry of type } es \ \text{Wages}$
  - $n_{es}$ applied to each year’s pay would cover $B_{es}$
    - $n_{es}$ is the annual cost (or value) of individual benefits, as % of pay

- **Uniform** cost rate, $n$ applied to all.
  - $n$ is set to cover cohort’s benefits (ave $n$)
  - Cross-subsidies ($n_{es} - n$) > or < 0
  - *In the funding plan*, wtd sum of x-sub’s = 0
    - Redistribution of benefits within cohort
The curves depict $n_{es}$, the annual contribution rate required to fund benefits of an individual entering at age $e$ and exiting at age $s$. Variation in cost by age of exit is shown along each curve; variation by age of entry is shown across curves.

Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified.

Implies wide variation in x-subsidies
Reduce assumed return to $r = 6.0\%$

Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified

The curves depict $n_e$, the annual contribution rate required to fund benefits of an individual entering at age $e$ and exiting at age $s$. Variation in cost by age of exit is shown along each curve; variation by age of entry is shown across curves.

**Cross-Sub’s rise in absolute value:** more redistribution

**High assumed return understates redistribution w/in cohorts**

Costrell, Pension Cross-Subsidies & Discount Rate
Uneven Rise in NC rates, $r = 6.0\%$ vs. $7.0\%$

Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified

- All NC’s rise, but NC’s rise less on LHS, and more on RHS
- $n$’s rise is in between
- so x-sub $(n_{es} - n)$ widen, both on LHS and RHS

Avg rise in pos x-sub = +0.7\% of pay

Avg drop in neg x-sub = -2.1\% of pay

The curves depict $\Delta n_{es}$, the rise in annual cost to fund benefits of an individual entering at age $e$ and exiting at age $s$, as $r$ falls from 7.0\% to 6.0\%. Variation in $\Delta n_{es}$ by age of exit is shown along each curve; variation by age of entry is shown across curves.

Costrell, Pension Cross-Subsidies & Discount Rate
Why is this so? “Simple” Answer

• As \( r \) drops, why does \( \Delta n_{es} \) rise with \( s \) (up to point of max \( n_{es} \))?
  (over-) simplified answer: it’s because of the back-loading.

• to a 1st approx., \( n_{es} \) rises proportionately w/drop in \( r \)

• So drop in \( r \) magnifies \( n_{es} \) more, as % of pay, where \( n_{es} \) is high

• \( \Delta n_{es} = n_{es}[\Delta n_{es}/n_{es}] = n_{es}[(\Delta B_{es}/B_{es}) - (\Delta W_{es}/W_{es})] \)

• \( [(\Delta B_{es}/B_{es}) - (\Delta W_{es}/W_{es})] > 0 \) because benefits follow earnings
  but impact of \( s \) on wtd gap in time patterns is ambiguous

• The direct impact of \( s \) on \( n_{es} \) is decisive

  (it’s a different story on the refund part of the curve)
Value of Risk-Free Benefit

• Finance economics: risk-free benefit valued at risk-free $r$
  o Wilcox & Brown, Novy-Marx & Rauh, Biggs

• Value of individual benefits much higher than contribution rate
  o Not only critics of traditional DB plans (Richwine & Biggs)
  o Defenders, too (Rhee & Fornia)

• How is the value of the guarantee distributed?
The curves depict $n_{es}$, the annualized value, as a percent of earnings, for risk-free benefits of an individual entering at age $e$ and exiting at age $s$. Variation by age of exit is shown along each curve; variation by age of entry is shown across curves.

Costrell, Pension Cross-Subsidies & Discount Rate
Nation’s 1st Teacher Cash Balance Plan: KS

- New hires since 2015
- Employee cont’n = 6%
- Employer cont’n credit:
  - < 5 YOS: 3%
  - 5 – 11 YOS: 4%
  - 12 – 23 YOS: 5%
  - > 23 YOS: 6%
- Interest credit, \( i = 4\% + 0.75 \times [\text{actual } r \ (5-yr \ ave) – 6\%] \)
- 5-year vesting to get employer cont’n credit
- annuitize’n @ 55 w/10 YOS; @ 65 w/5-10 YOS

- KPERs assms: \( r = 7.75\%, \ i = 6.25\% \)
NC, KPERS CB assms, $r = 7.75\%, \ i = 6.25\%$
(note: preliminary estimates by author)

Much less variation in individual NC rates
(and much lower)
NC, KPERS CB risk-free, $r = 4.0\%, \ i = 4.0\%$

(note: preliminary estimates by author)

Much less impact of lower discount rate

Costrell, Pension Cross-Subsidies & Discount Rate
Takeaways: Distributional impact of discount rate

- High assumed return understates redistribution within cohorts
- Value of pension guarantee is highly concentrated

Policy Implications?

- CB benefits much more evenly distributed
  - and less sensitive to discount rate