Working Paper

# 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
    - within cohorts, by age of entry & exit (Costrell and McGee, 2017)
    - (x-sub *across* cohorts via UAL, *not* today's paper)

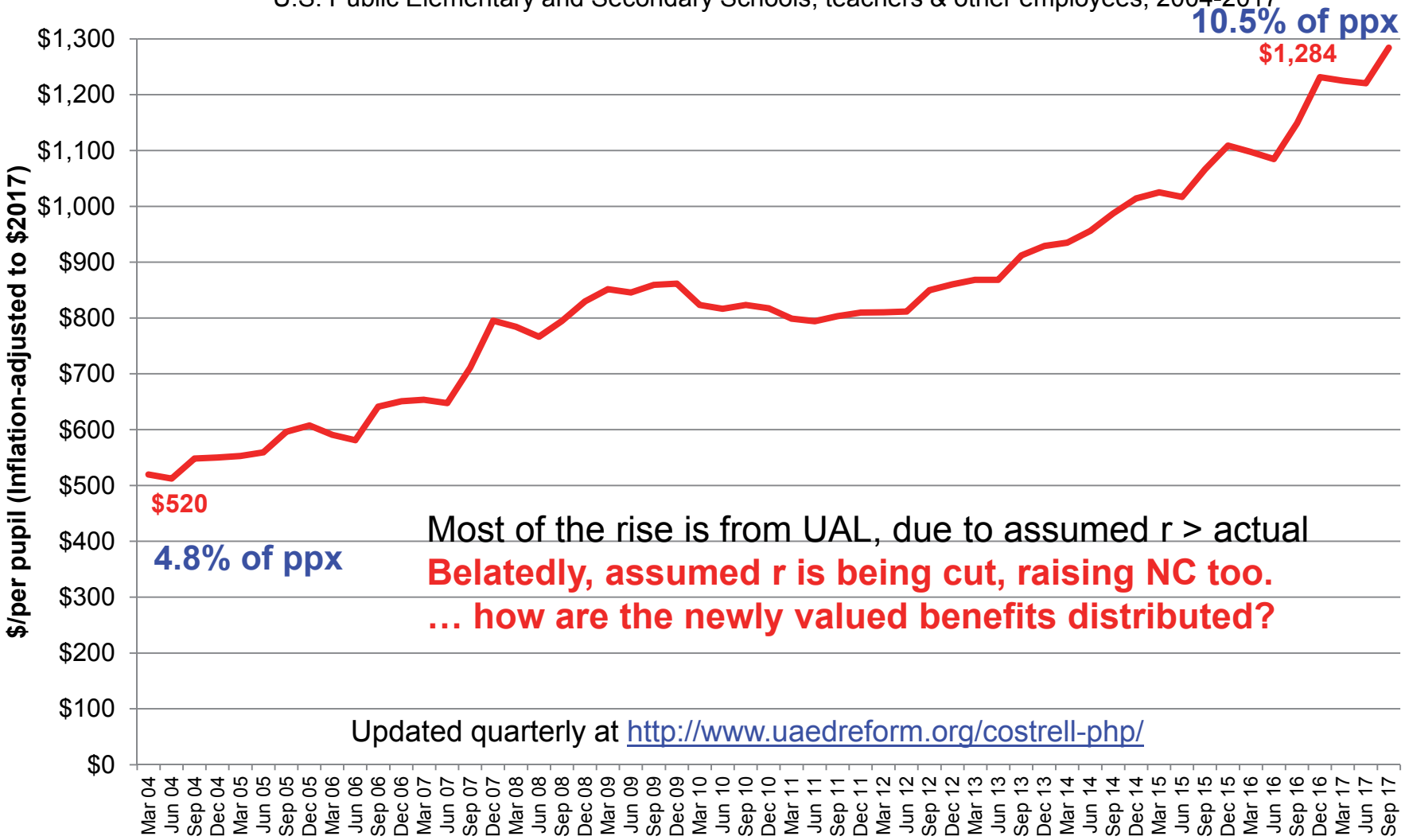
- Cross-Subsidies @ current CalSTRS assumed return
- Cross-Subsidies @ lower assumed return
  - **High assumed return understates redistribution w/in cohorts**
- Distribution of Benefits @ risk-free rate
  - **Value of pension guarantee is highly concentrated**

- 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**

U.S. Public Elementary and Secondary Schools, teachers & other employees, 2004-2017




Most of the rise is from UAL, due to assumed r > actual

**Belatedly, assumed r is being cut, raising NC too.**

**… how are the newly valued benefits distributed?**

Updated quarterly at http://www.uaedreform.org/costrell-php/

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

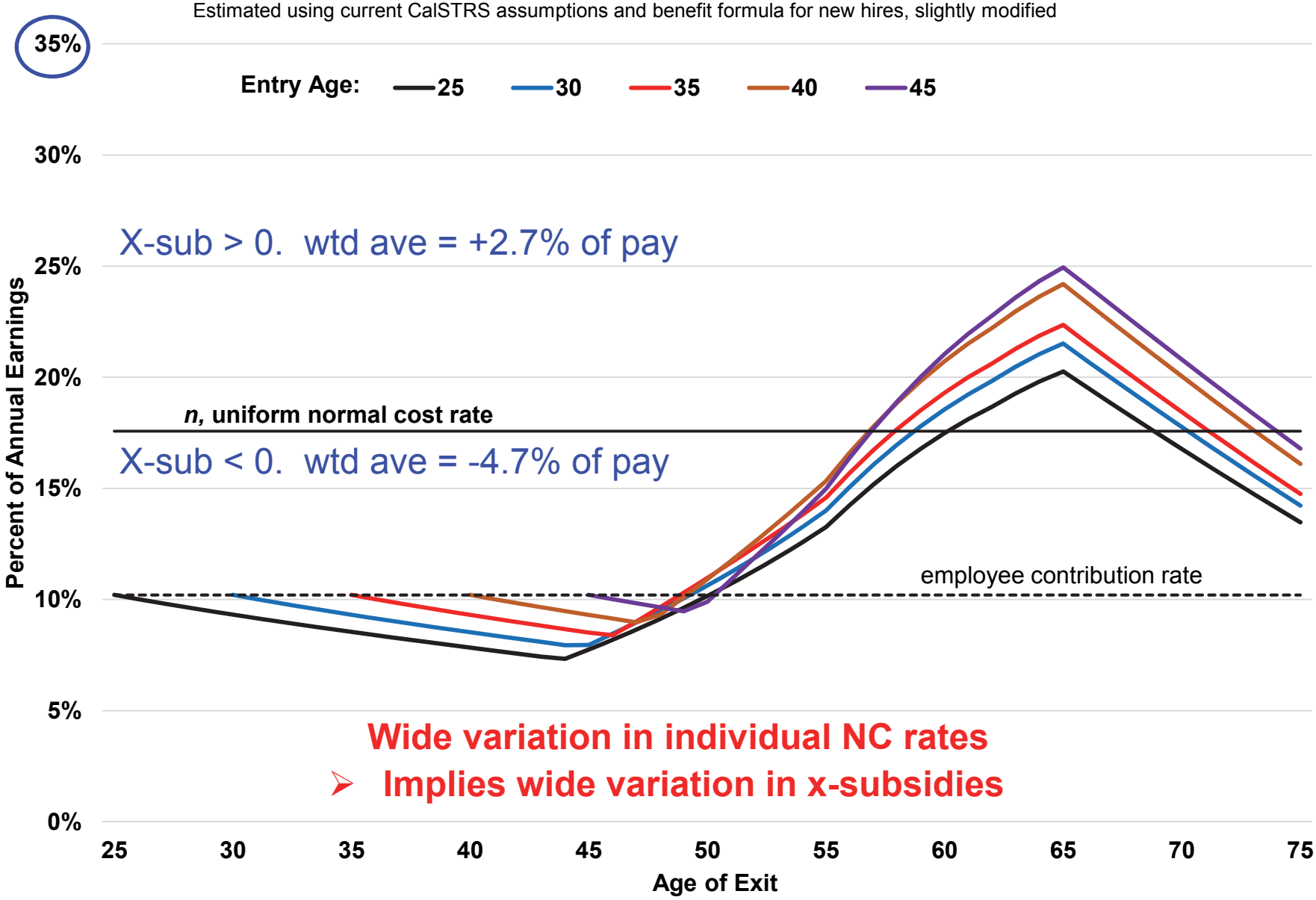
# Individual NC Rates & Cross-Subsidies

- Individuals of entry age *e*, separation age *s*.
- *Individual* NC rate (employer+employee): $n_{es} = B_{es}/W_{es}$
  - $B_{es}$ = PV @ entry of type *es* Benefits
  - $W_{es}$ = PV @ entry of type *es* 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**

# NC, by Age of Entry & Exit, $n_{es}$, $r = 7.0\%$

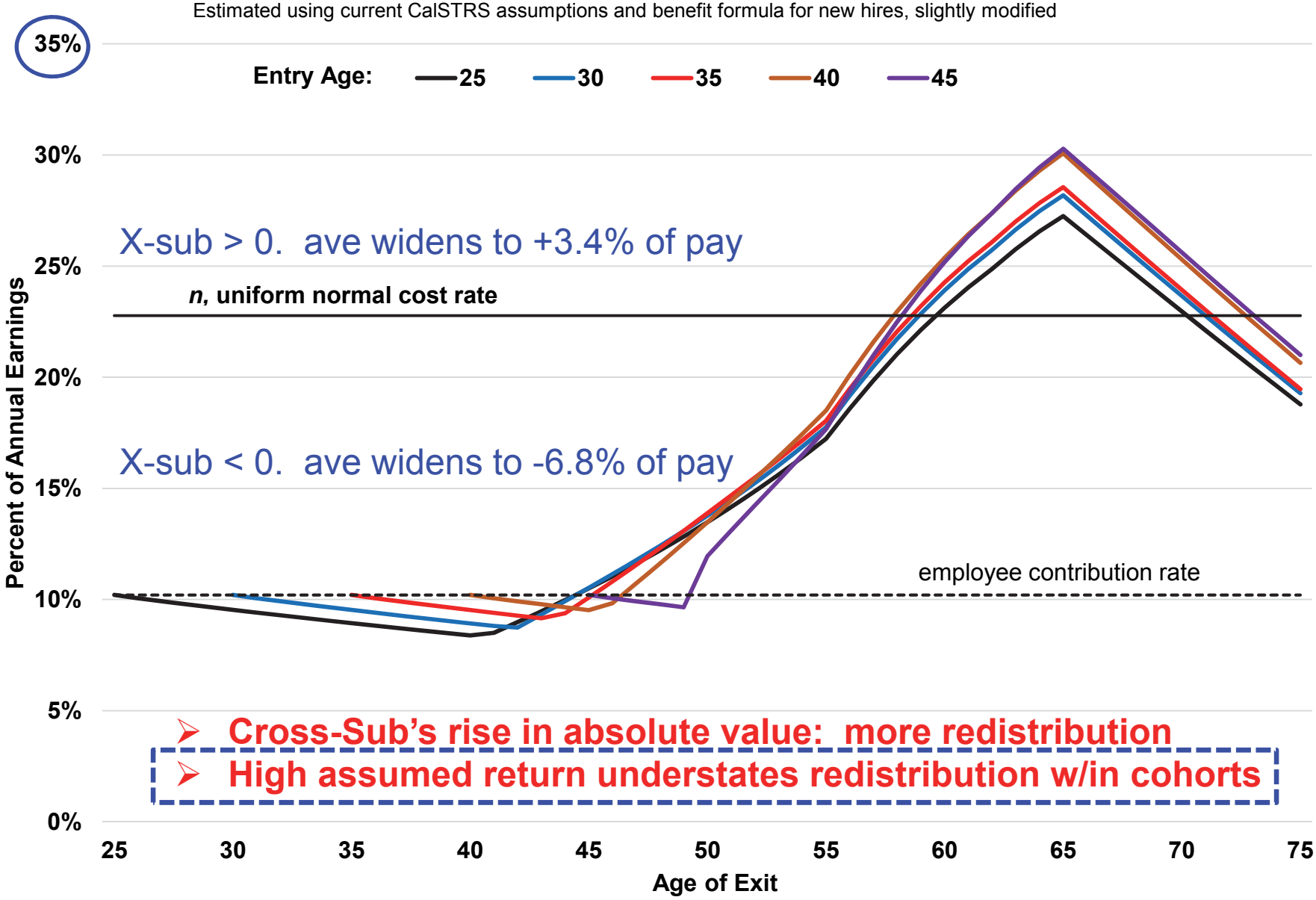
Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified




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.

# Reduce assumed return to *r = 6.0%*

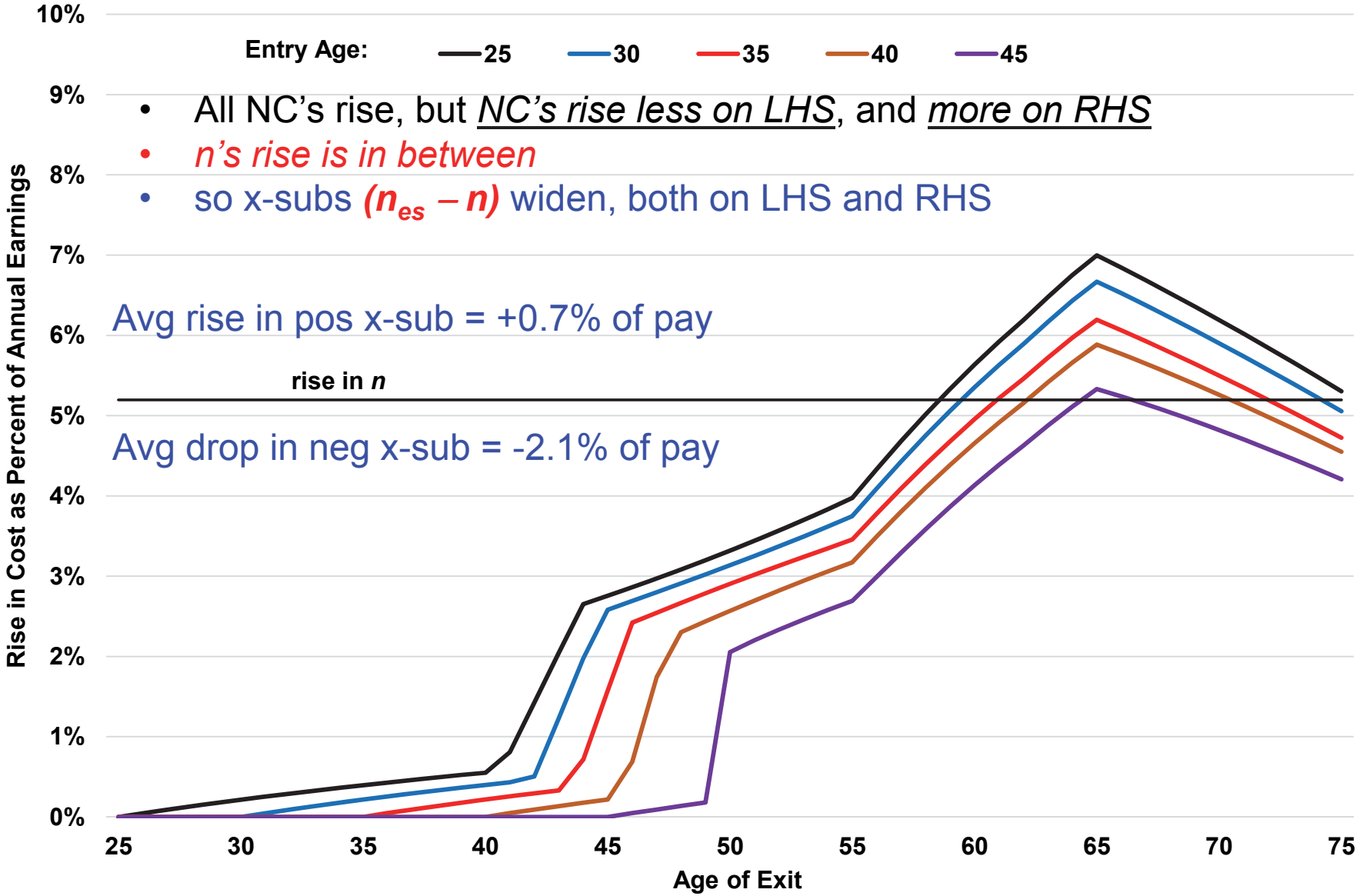
Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified




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.

# Uneven *Rise* in NC rates, *r = 6.0% vs. 7.0%*

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




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.

# 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

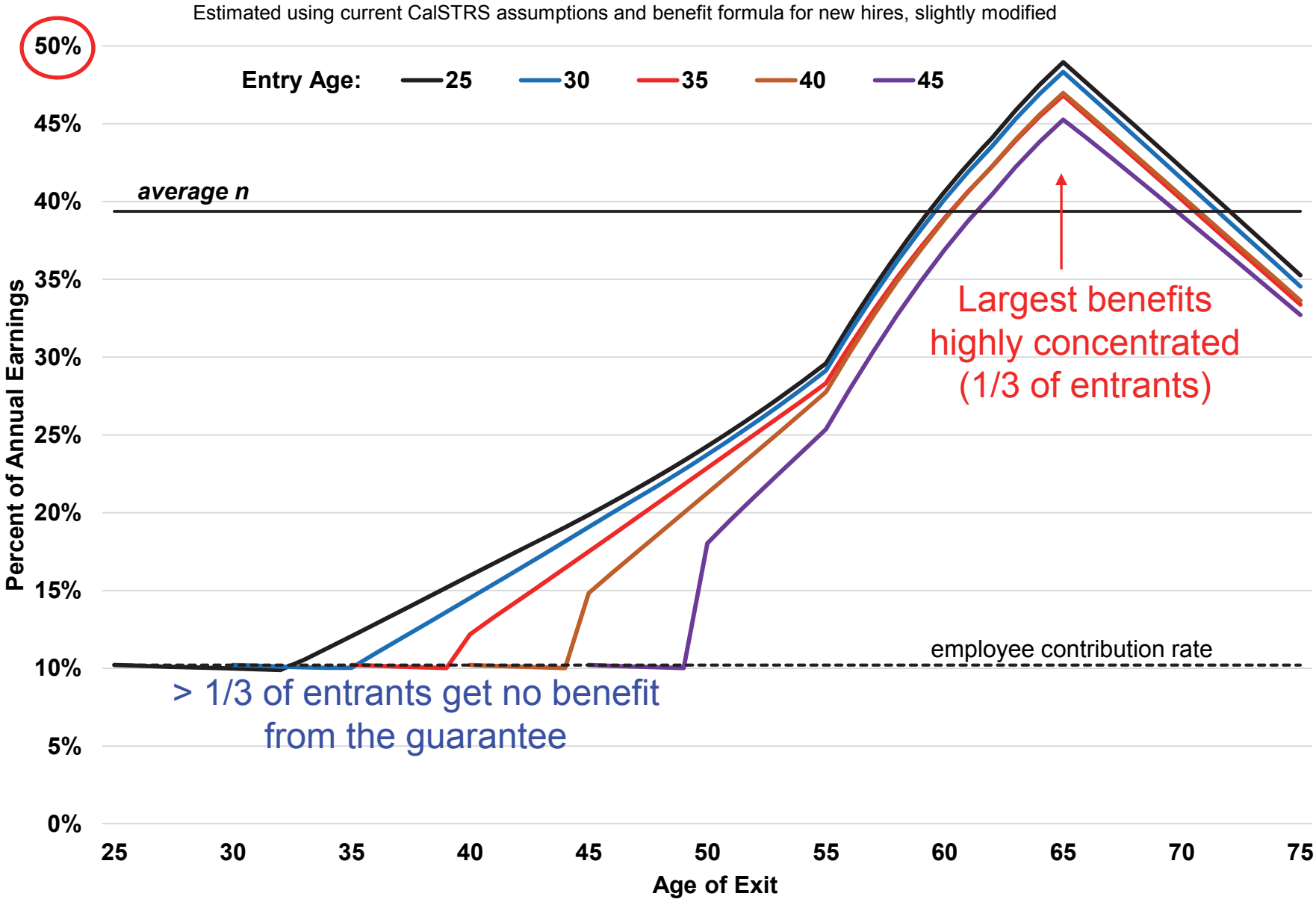
- The direct impact of $s$ on $n_{es}$ is decisive

(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*
  - Wilcox & Brown, Novy-Marx & Rauh, Biggs
- Value of individual benefits much higher than contribution rate
  - Not only critics of traditional DB plans (Richwine & Biggs)
  - Defenders, too (Rhee & Fornia)
- **How is the value of the guarantee distributed?**

# Annual Value of Risk-Free Benefits, *r = 4.0%*




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.

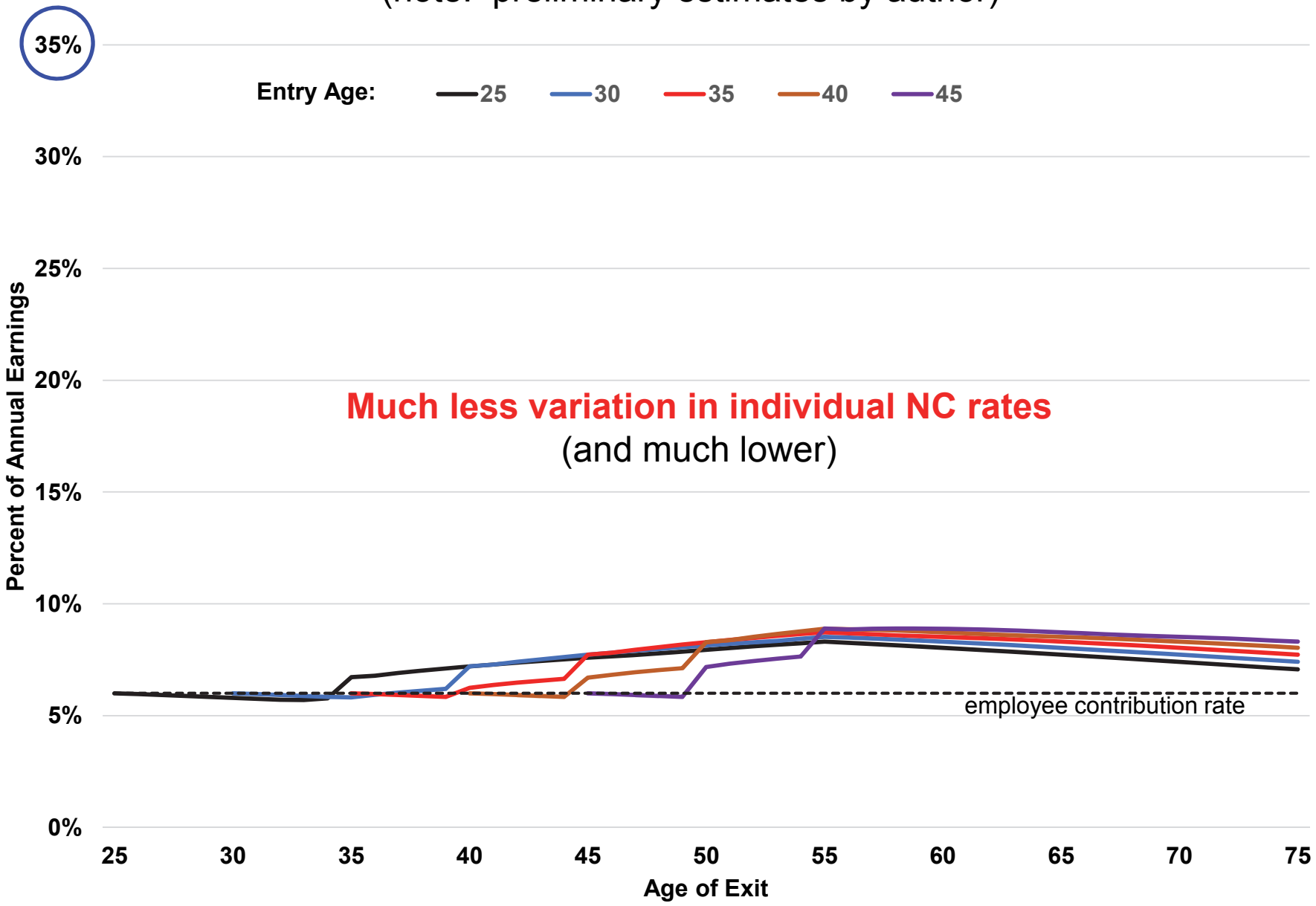
# Nation's 1st Teacher Cash Balance Plan: KS

- 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 × [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%*

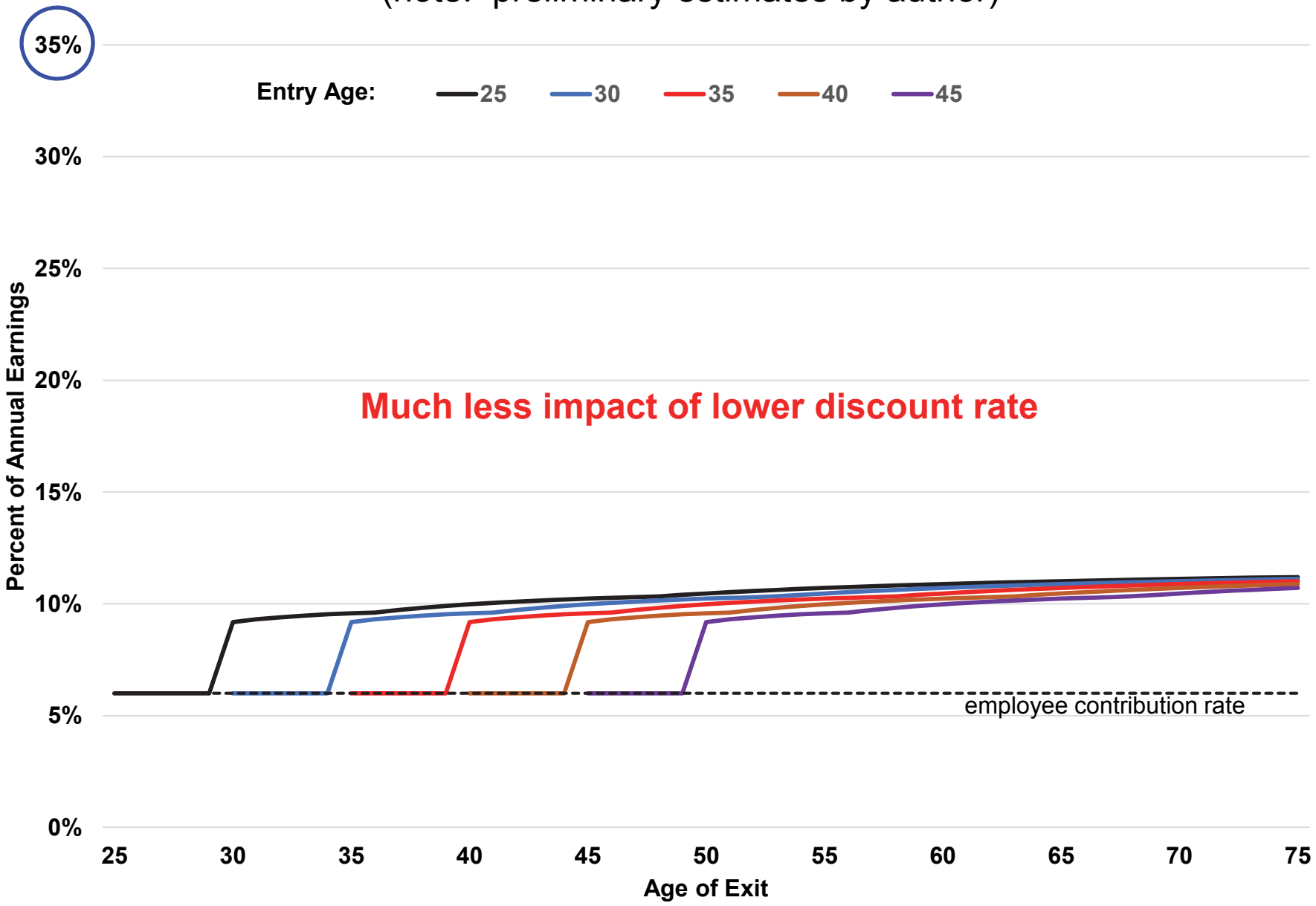
# NC, KPERS CB assms, *r = 7.75%, i = 6.25%*

(note: preliminary estimates by author)



# NC, KPERS CB risk-free, *r = 4.0%, i = 4.0%*

(note: preliminary estimates by author)



# Takeaways: Distributional impact of discount rate

- High assumed return understates redistribution w/in cohorts
- Value of pension guarantee is highly concentrated

Policy Implications?

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