

# 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

Robert M. Costrell, University of Arkansas

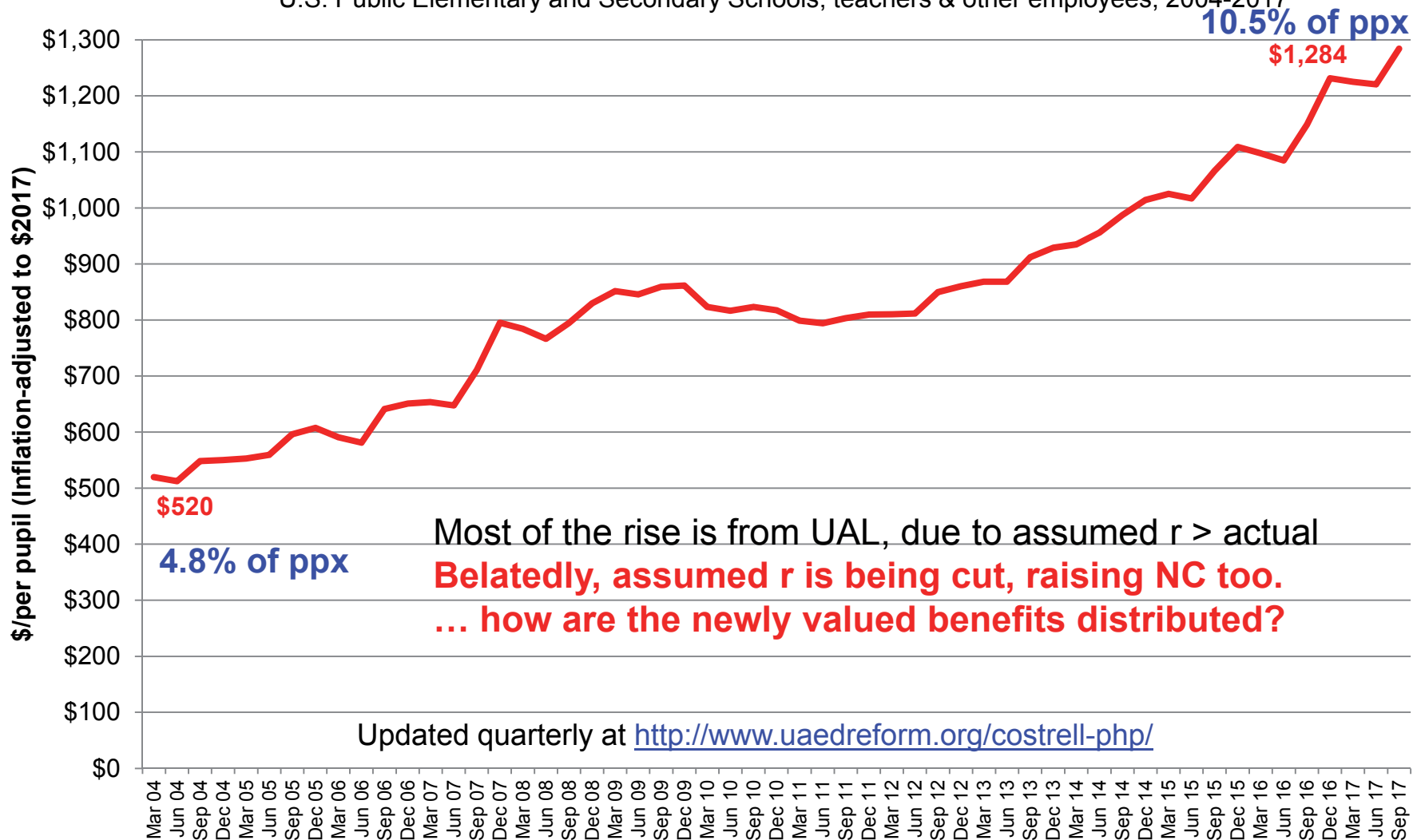
Teacher Pension Workshop; March 9, 2018; RAND, Santa Monica, CA

- 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 1<sup>st</sup> 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



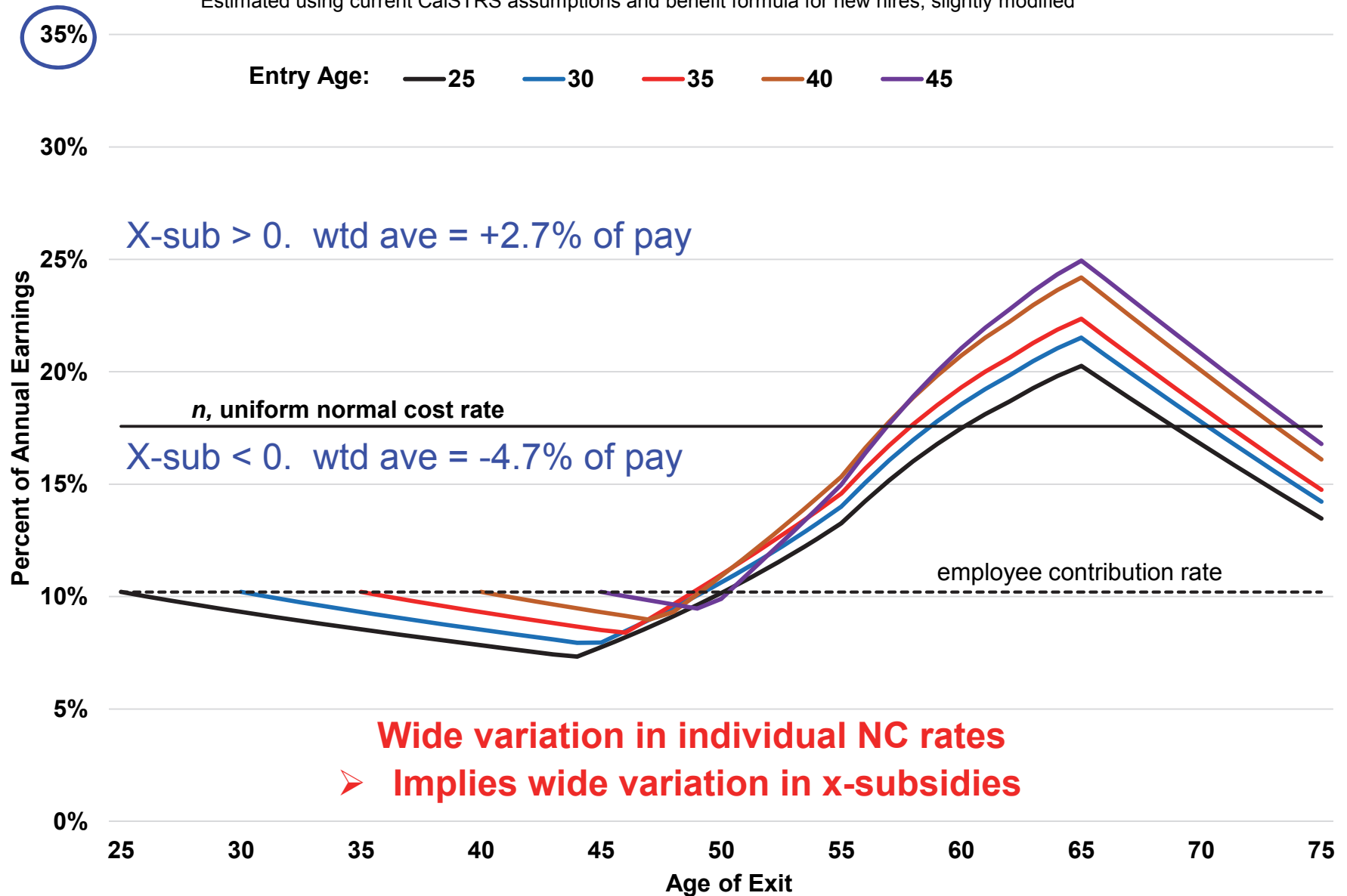
Sources: BLS, National Compensation Survey, Employer Costs for Employee Compensation;  
 NCES Digest of Education Statistics; BLS, CPI; author's calculations explained in Robert M. Costrell:  
<http://www.teacherpensions.org/blog/school-pension-costs-have-doubled-over-last-decade-now-top-1000-pupil-nationally/>  
 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  $(n_{es} - n) > \text{or} < 0$**
  - In the funding plan, wtd sum of x-sub's = 0
    - **Redistribution of benefits within cohort**

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

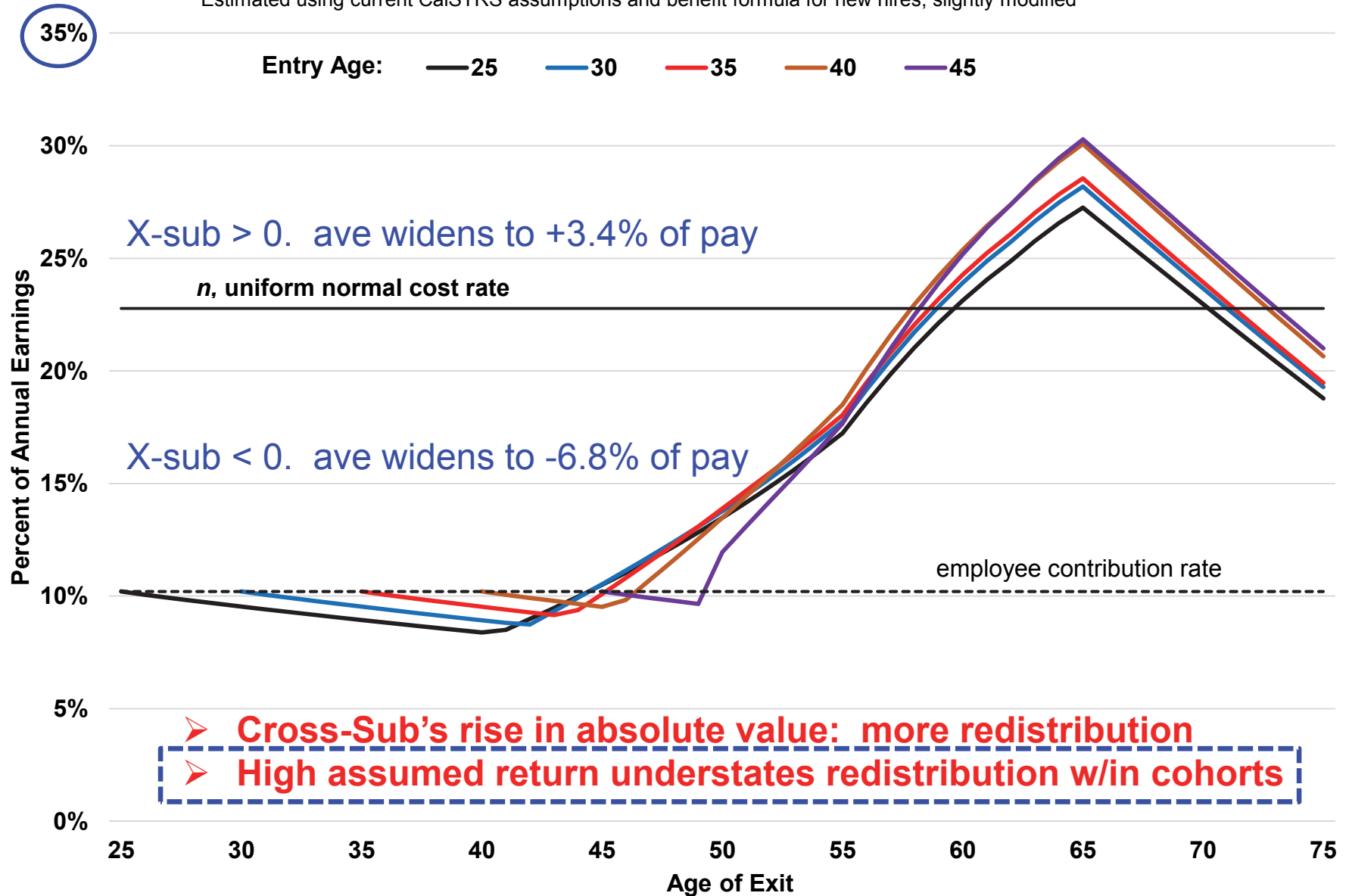
Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified



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 $r = 6.0\%$

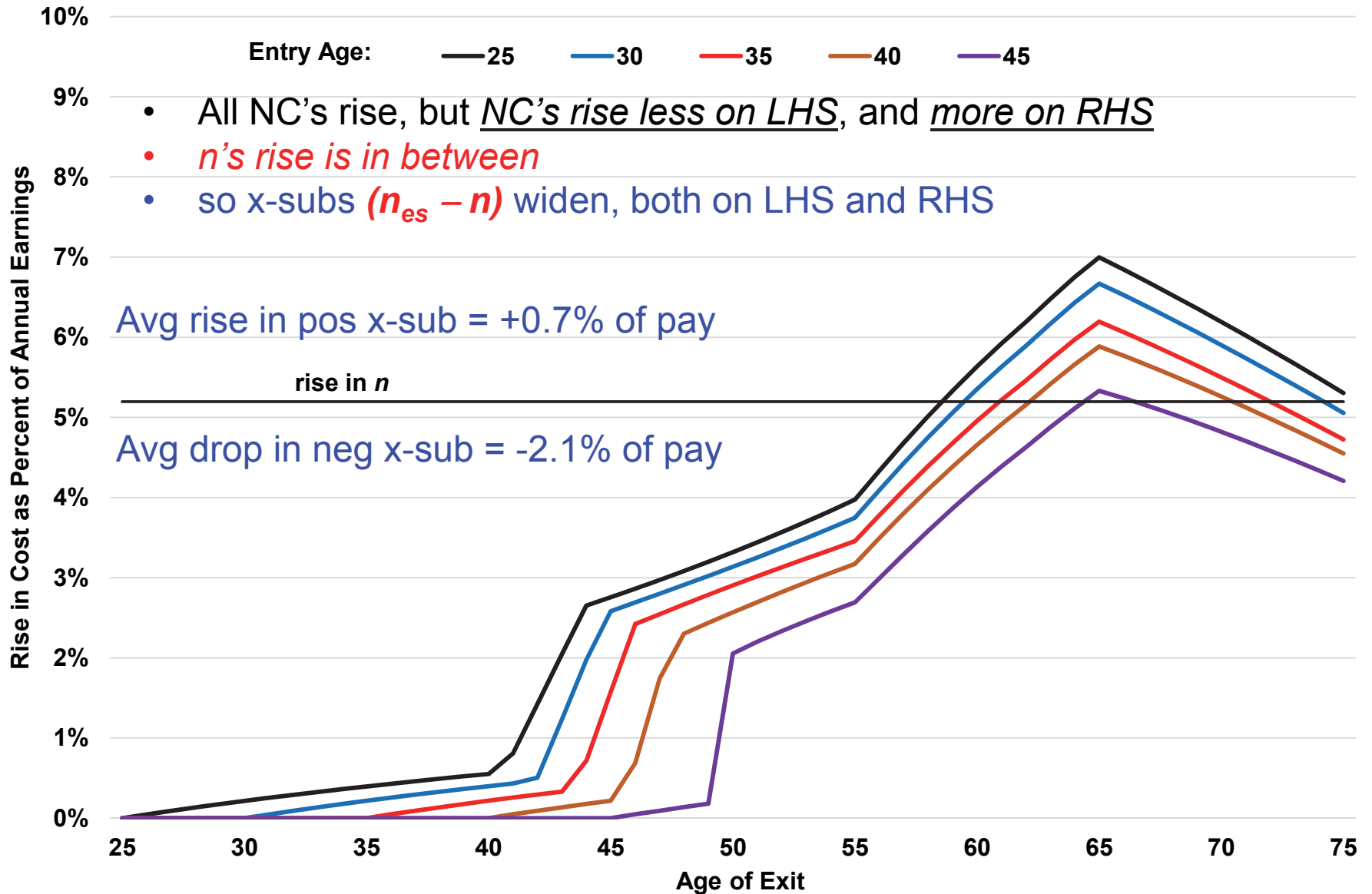
Estimated using current CalSTRS assumptions and benefit formula for new hires, slightly modified



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 1<sup>st</sup> 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

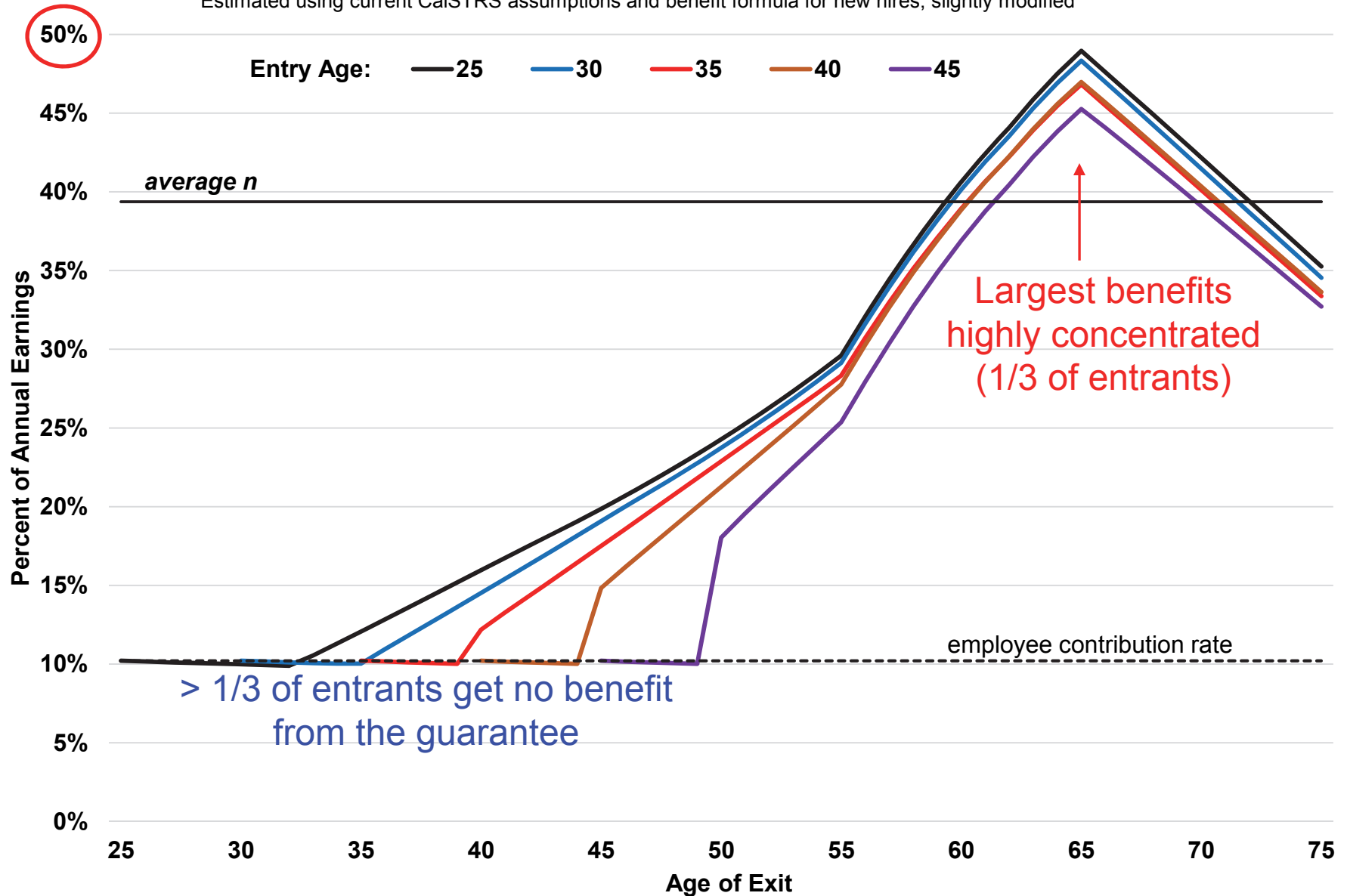
(it's a different story on the refund part of the curve)

# 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, $r = 4.0\%$

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



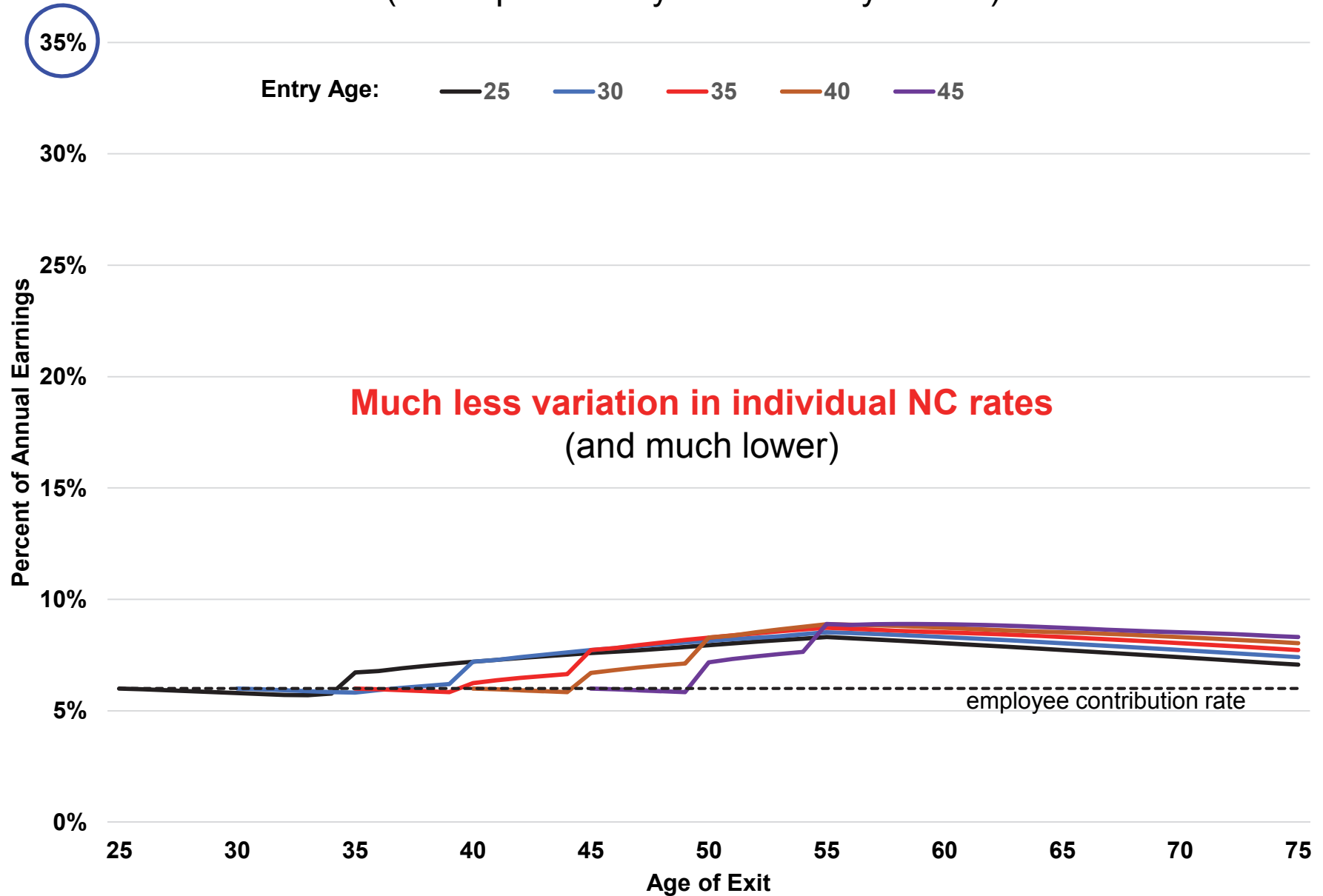
The curves depict  $n_{es}$ , the annualized value, as a percent of earnings, for risk-free benefits of an individual entering at age  $e$  and exiting at age  $s$ . Variation by age of exit is shown along each curve; variation by age of entry is shown across curves.

# Nation's 1<sup>st</sup> 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,  $i = 4\% + 0.75 \times [\text{actual } r \text{ (5-yr ave)} - 6\%]$
- 5-year vesting to get employer cont'n credit
- annuitize'n @ 55 w/10 YOS; @ 65 w/5-10 YOS
- **KPERS assms:  $r = 7.75\%$ ,  $i = 6.25\%$**

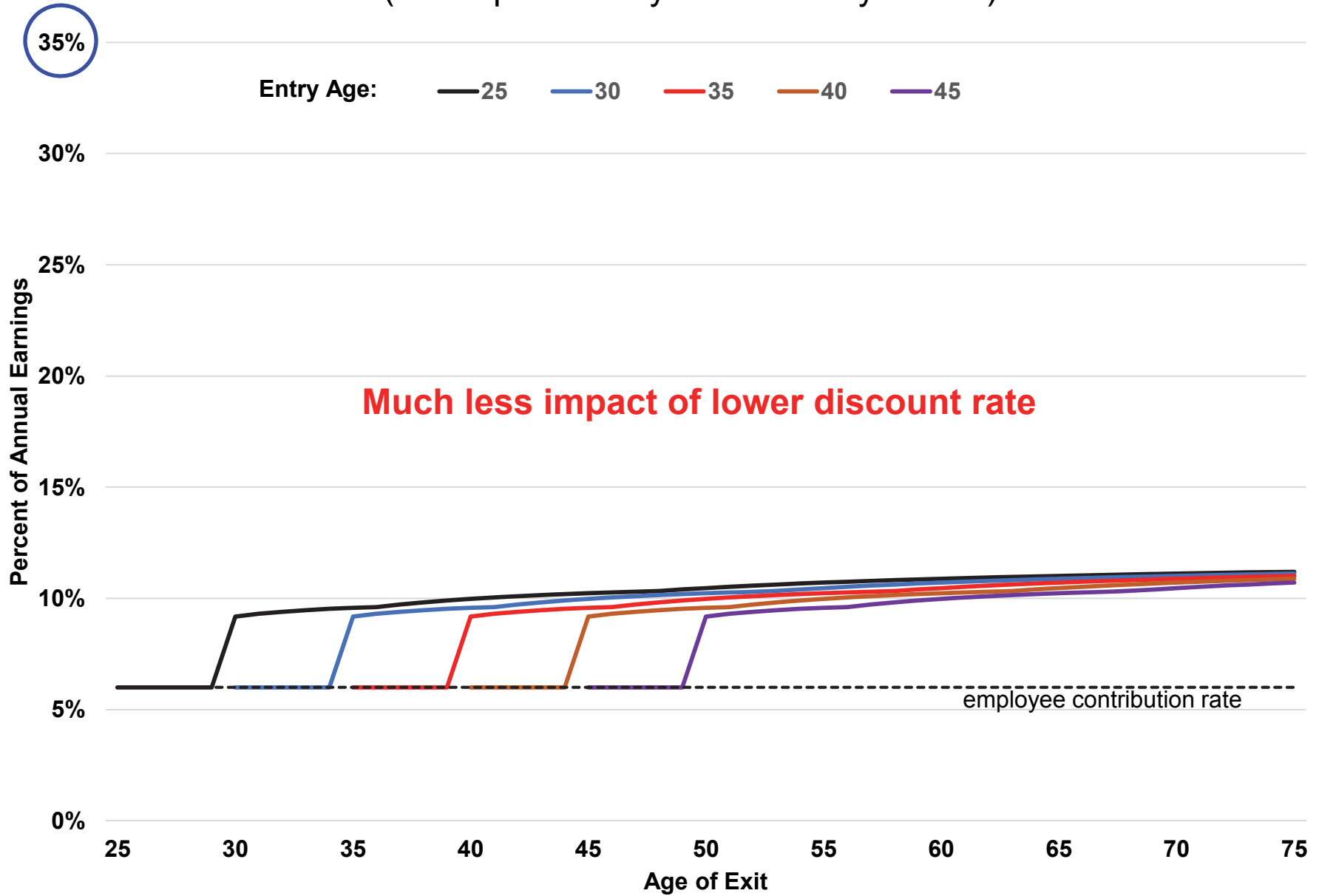
# NC, KPERS CB assms, $r = 7.75\%$ , $i = 6.25\%$

(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