Peer Effects in Retirement

John Chalmers
Woodrow Johnson
Jonathan Reuter

A First Look…

Motivation

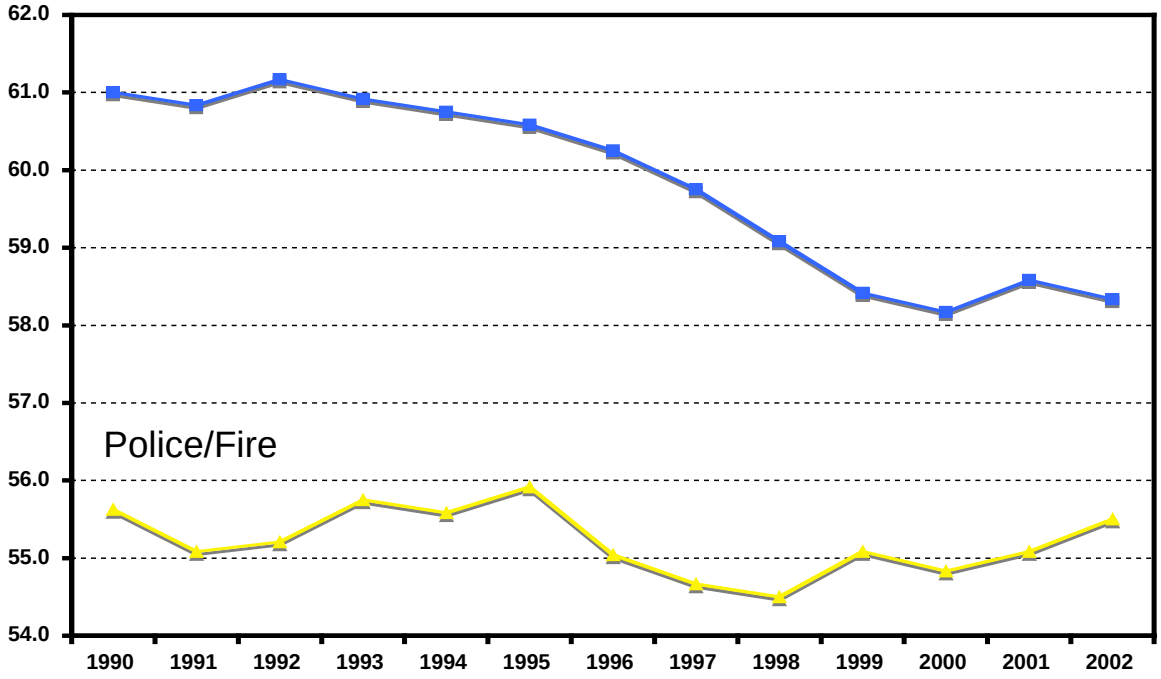
- Deciding when to retire is an important financial decision that is not easily reversed
  - Retirement date determines when labor income ends and retirement benefits begin **&** level of benefits
- Retirement calculations are complicated
- How do people choose when to retire?
  - How important are individual characteristics and financial considerations?
  - How important are the choices of your peers?

Big Picture Questions

- Why do retirements occur in waves?
  - Rational response to retirement plan incentives?
  - Link between stock market returns and retirement?
  - Peer effects ⇒ herding?
- What is the impact of retirements waves on employers and the economy?
  - Falling median retirement age ⇒ more rapid loss of firm-specific human capital?
- How should pension plans be designed?

Retirement Waves

Median Retirement Age



Our Research Objective

- Use data on state and local employees covered by Public Employee Retirement System (PERS) to study four retirement choices
  - Choices range from basic portfolio allocation to the choice of a retirement date
- For each choice, we ask whether choice of individual **i** can be predicted by choices of his/her co-workers ⇒ test for "peer effects"
  - Next step: Are peers source of information about choices or non-economic factor influencing choices?

Existing Literature

- In context of financial decision making, there is evidence of peer effects in:
  - Whether one participates in 401(k) plan and which vendor one chooses
    - (Duflo and Saez, 2002 & 2004)
  - Whether one invests in the stock market
    - (Hong, Kubik and Stein, 2004)
- These are important decisions that individuals might reasonably consult peers about but do peer effects extend to timing of retirement?

How Does PERS Work?

- Combines aspects of defined contribution (DC) and defined benefit (DB) retirement plans
- Employee and employer both contribute to PERS retirement account
- Two investment vehicles: regular and variable
  - Regular has guaranteed minimum return of 8%
  - Variable returns higher in bull markets but lower (or negative) in bear markets
  - Allocation to variable $\in$ {0%, 25%, 50%, 75%}
- Account balance is one determinant of benefits

Determining PERS Benefits

Retirement benefit maximum of two calculations

- "Full Formula"
  - *Years of service × final average monthly salary based on 3 highest years × 0.0167*
  - Standard DB-style benefit
  - Early retirement lowers benefit by 8 percent per year
- "Money Match"
  - *Age factor × PERS retirement account balance × 2*
  - Annuitization of DC-style benefit
  - Early retirement lowers benefit via age factor

Early vs. Normal Retirement

- Normal PERS retirement
  - Tier 1 — 58 or 30+ years service
  - Tier 2 (1/1/96) — 60 or 30+ years service
  - Police/Fire — 55 or 25+ years service
- Early PERS retirement
  - Tier 1 & Tier 2 — 55 and < 30 years service
  - Police/Fire — 50 and < 25 years service
- *For Social Security, early retirement age is 62 and normal retirement age is 65*

Data

- PERS employees, 1990-2002
  - 126,695 unique employees, 35,505 eligible to retire
  - PERS withheld data on Judges and Politicians
  - We exclude state's university system because it has a single employer code and its employees can opt out of PERS and into traditional DC plan
- Individual characteristics
  - Gender, age, salary, retirement account balance, years of service, police/fire, Tier 1 vs. Tier 2, and employer code

Data (2)

- Statistics for employees eligible to retirement

	Mean	Std. Dev.	Fraction of Variation Within Employers	Fraction of Variation Between Employers
Annual salary (t)	$34,219	$19,773	84.23%	15.77%
Account balance (t)	$62,131	$72,671	88.72%	11.28%
Age (t)	58.8	4.2	82.17%	17.83%
Female?	54.4%	49.8%	84.18%	15.82%
Tier 2?	9.2%	28.9%	93.31%	6.69%
Police/Fire?	9.7%	29.6%	0.00%	100.00%

Note: Sample restricted to PERS employees eligible to retire in year t for. years 1990-2002. Nominal dollars reported.

Four Retirement Choices

- **All employees:** initial allocation to variable retirement account and annual changes
- **All retirees:** retirement date and whether the retirement is early or normal
- **All retirees:** receive retirement benefits as a (partial) lump sum or an annuity?
- **Police/Fire retirees:** purchase supplemental annuities ("units")?
- What factors influence these choices? How important are peer effects?

Empirical Strategy

- General specification:
  - $\mathbf{y_{ijt} = a + bx_{it} + c\ddot{y}_{-ijt} + e_{ijt}}$
  - $\mathbf{y_{ijt}}$ is choice of individual i at employer j in year t
  - $\mathbf{x_{it}}$ are characteristics like retirement account balance in year t, age FEs, and year FEs
  - $\ddot{\mathbf{y}}_{-ijt}$ is average choice of individual i's colleagues at employer j in year t
- Peer effects $\Rightarrow$ **c > 0**
- Beware the reflection problem (Manski 1993)

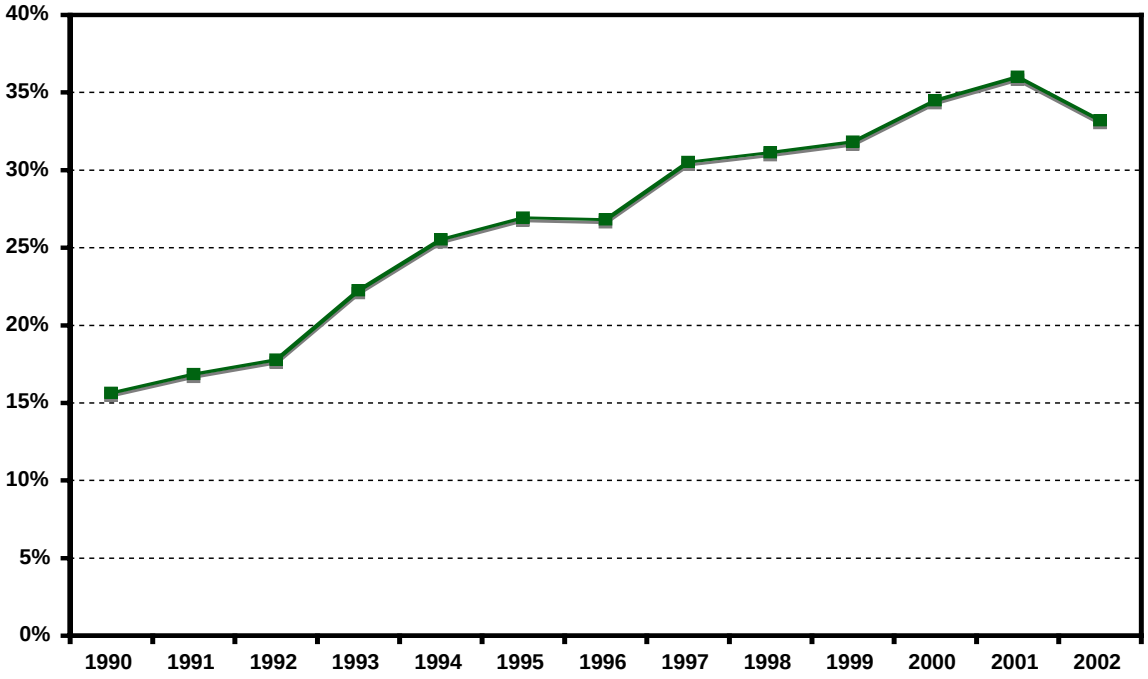
Outline of Empirical Analysis

- Asset allocation
  - Peer effects in allocation to variable account?
- Retirement decision
  - Peer effects in decision to retire?
  - If so, are peer effects stronger in years with more retirements?
- Conditional on retiring…
  - Peer effects in choice of lump sum vs. annuity?
  - Peer effects in purchase of “units” by police/fire?

Asset Allocation to Variable Account

- Participation
- Changes in participation

Fraction PERS Employees with Allocation to Variable Account



Peer Effects in Allocation to Variable Account?

Estimation: **Linear Probability Model**
Dependent: **1 if employee *i* has allocation to variable account in year *t***

Fraction of peers with allocation to variable (t)	0.728 ***
Eligible for PERS early retirement (t)	-0.036 ***
Eligible for PERS normal retirement (t)	-0.097 ***
Eligible for SS early retirement? (t)	-0.041 **
Eligible for SS normal retirement? (t)	-0.020 **
Female?	-0.002
Police/fire?	-0.042 ***
PERS Tier 2?	-0.023 ***
LN years service (t-1)	-0.022 ***
LN salary (t-1)	-0.006 **
LN PERS account balance (t-1)	0.067 ***
N	708232
R-Squared	0.1505

Note: Sample is all PERS employees between 1990 and 2002. Includes FEs for Salary quartile x Benefit quartile x Year and for ages between 21 and 90.

Peer Effects in Changes in Allocation to Variable Account?

Estimation: **OLS**
Dependent: **Employee *i* variable dummy in year *t* minus dummy in year *t-1***

Fraction of peers increasing allocation to variable (t-1 to t)	0.484 ***
Fraction of peers decreasing allocation to variable (t-1 to t)	-0.173 ***
Eligible for PERS early retirement (t)	-0.007 ***
Eligible for PERS normal retirement (t)	-0.019 ***
Eligible for SS early retirement? (t)	-0.010
Eligible for SS normal retirement? (t)	-0.012 ***
Female?	0.003 ***
Police/fire?	-0.002 **
PERS Tier 2?	0.001
LN years service (t-1)	-0.012 ***
LN salary (t-1)	0.019 ***
LN PERS account balance (t-1)	-0.014 ***
N	661479
R-Squared	0.0357

Note: Sample is all PERS employees working in both t-1 and t. Includes FEs for Salary quartile x Benefit quartile x Year and for ages between 21 and 90.

Do Peer Effects Matter?

- Results are economically significant and similar to those in Duflo and Saez (2002, 2004)

	Std. Dev.	Coef.	Effect
Predicting Allocation to Variable Account			
Fraction of peers with allocation to variable (t)	0.128	0.728	**0.093**
Predicting Changes in Allocation to Variable Account			
Fraction of peers increasing allocation to variable (t-1 to t)	0.214	0.484	**0.104**
Fraction of peers decreasing allocation to variable (t-1 to t)	0.082	-0.173	**-0.014**

- But do peer effects matter for retirements?

Retirement Decisions

- Retirement date
- Lump sum vs. annuity
- “Units”

Predicting Retirements

Estimation: **Linear Probability Model**
Dependent: **1 if employee *i* retires in year *t***

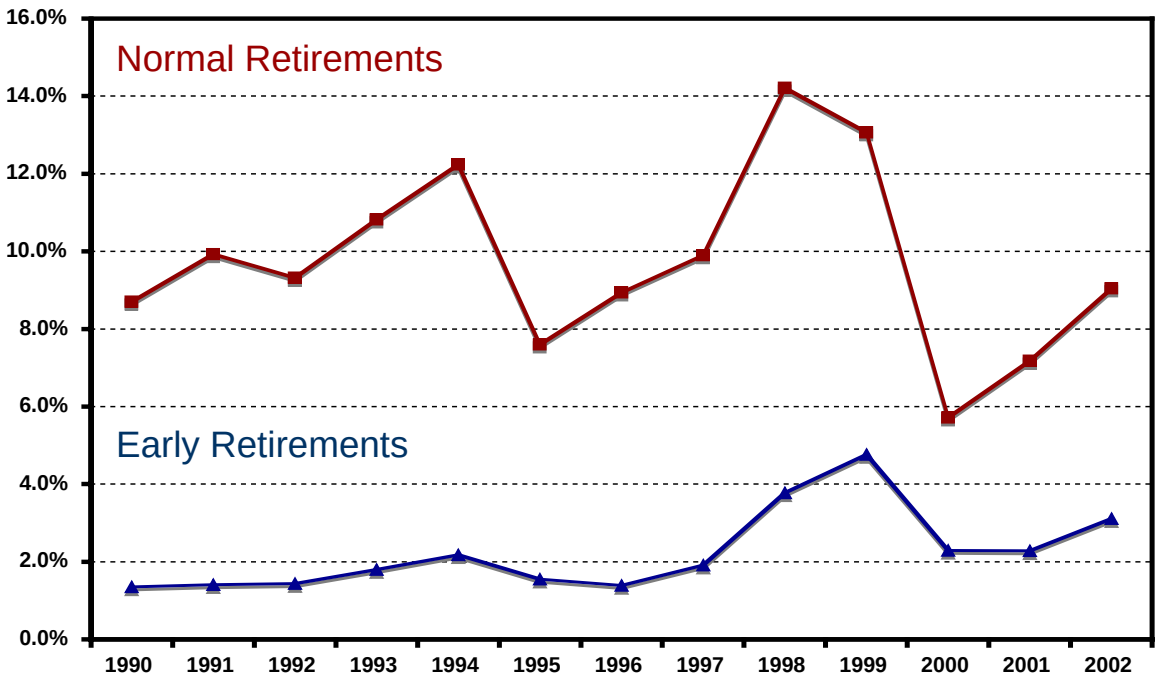
	All Employees	Police / Fire
Fraction of peers retiring (t)	0.158 ***	0.069 ***
Eligible for SS early retirement? (t)	0.101 ***	0.144 ***
Eligible for SS normal retirement? (t)	0.214 ***	0.418 ***
Female?	0.005 **	0.000
Police/fire?	0.026 ***	---
PERS Tier 2?	0.053 ***	0.057 ***
LN years service (t-1)	0.017 ***	0.026 **
LN salary (t-1)	-0.041 ***	-0.038 **
LN PERS account balance (t-1)	0.040 ***	0.077 ***
N	130658	12332
R-Squared	0.1147	0.1265

Note: Estimation restricted to employers with two or more employees eligible to retire in year t. Includes FEs for Salary quartile x Benefit quartile x Year and FEs for each age.

Economic Significance?

- All Employees
  - One std. dev. increase in fraction of peers retiring increases probability of individual retiring by 1.45%
  - In contrast, the probability that eligible employee retires in average year is 12.05%
- Police/Fire
  - One std. dev. increase in fraction of peers retiring increases probability of individual retiring by 0.79%
  - In contrast, the probability that eligible employee retires in average year is 9.27%

Normal vs. Early Retirements



Normal vs. Early Retirements

Estimation: **Linear Probability Model**
Dependent: **1 if employee *i* retires normal (or early) in year *t***

	Normal	Early
Fraction of peers retiring normal (t)	0.179 ***	0.051 ***
Fraction of peers retiring early (t)	0.325 ***	0.290 ***
Eligible for SS early retirement? (t)	0.214 ***	---
Eligible for SS normal retirement? (t)	0.102 ***	---
Female?	0.003	0.007 ***
Police/fire?	0.009	0.007
PERS Tier 2?	0.048 ***	0.026 ***
LN years service (t-1)	0.026 ***	-0.022 ***
LN salary (t-1)	-0.048 ***	-0.039 ***
LN PERS account balance (t-1)	0.044 ***	0.044 ***
N	74181	56477
R-Squared	0.1059	0.0743

Note: Estimation restricted to employers with two or more employees eligible to retire normal (or early) in year t. Includes FEs for Salary quartile x Benefit quartile x Year and FEs for each age.

Are Peer Effects Stronger in Years with More Retirements?

Estimation: **Linear Probability Model**
Dependent: **1 if employee *i* retires in year *t***

	Annual Retirement Rate > 12%	Annual Retirement Rate < 12%
Fraction of peers retiring (t)	0.180 ***	0.133 ***
Eligible for SS early retirement? (t)	0.190 ***	0.230 ***
Eligible for SS normal retirement? (t)	0.088 ***	0.109 ***
Female?	0.006 *	0.004
Police/fire?	0.031 ***	0.022 ***
PERS Tier 2?	0.074 ***	0.041 ***
LN years service (t-1)	0.029 ***	0.011 ***
LN salary (t-1)	-0.046 ***	-0.038 ***
LN PERS account balance (t-1)	0.049 ***	0.034 ***
N	53640	77018
R-Squared	0.1436	0.0778

Note: Estimation restricted to employers with two or more employees eligible to retire in year t. Includes FEs for Salary quartile x Benefit quartile x Year and FEs for each age. Years with retirement rate greater than 12% are 93, 94, 98, 99, 02.

Peer Effects in Retirement Options?

- Retirees have 13 benefit payment options
  - 7 options involve full annuitization
    - Differ primarily with respect to survivor benefits
  - 5 options involve lump-sum payment of employer account and annuitization of employee account
  - 1 option involves lump-sum payment of all benefits
    - Surprisingly, no one ever chooses this option!
- 17.78% of retirees elect to receive a (partial) lump-sum benefit payment

Predicting Who Elects to Receive Lump-Sum Benefit Payment

Estimation: **Linear Probability Model**
Dependent: **1 if retiree *i* receives benefits as lump-sum payment in year *t***

Fraction of peers receiving lump-sum payment (t)	0.074 ***
Individual taking early retirement? (t)	0.049 ***
Eligible for SS early retirement? (t)	0.009
Eligible for SS normal retirement? (t)	0.014
Female?	-0.041 ***
LN years service (t-1)	-0.063 ***
LN salary (t-1)	0.040 **
LN PERS account balance (t-1)	0.030 **
N	15049
R-Squared	0.0816

Note: Estimation restricted to employers with two or more retirees in year t. Includes FEs for Salary quartile x Benefit quartile x Year, FEs for each age, PERS Tier 2 dummy, and Police/Fire dummy.

Peer Effects in Units?

- Police/Fire have option to purchase "units"
  - Each unit pays $20 per month for 60 months
  - Up to 8 units can be purchased any time before retiring, prior to age 65
  - Each unit costs employee (and employer) $500
  - Buying 8 units at retirement $\Rightarrow$ $4000 today buys 60 monthly payments of $160 $\Rightarrow$ IRR of 50.91%
- In other words, every police/fire retiree should purchase units… but only 64% actually do

Predicting Which Police/Fire Retire With Unit Benefits

Estimation: **Linear Probability Model**
Dependent: **1 if individual *i* retires with unit benefits in year *t***

Fraction of peers receiving unit benefits (t)	0.214 ***
Individual taking early retirement? (t)	-0.085 *
Eligible for SS early retirement? (t)	-0.055
Eligible for SS normal retirement? (t)	0.050
Female?	-0.038
LN years service (t-1)	-0.070
LN salary (t-1)	-0.039
LN PERS account balance (t-1)	0.009
N	962
R-Squared	0.2674

Note: Estimation restricted to police/fire employers with two or more retirees in year t. Includes FEs for Salary quartile x Benefit quartile x Year, FEs for each age, and PERS Tier 2 dummy.

Peers Matter for Unit Benefits

- Results are economically significant
  - Early retirement reduces probability by 8.5% (which is consistent with credit constraints)
  - One std. dev. decrease in fraction of peers receiving unit benefits reduces probability by 6.5%
- Probably our best evidence of peer effects
  - Potential heterogeneity in understanding of unit benefits $\Rightarrow$ role for peers…
  - … and optimal decision is clear

Summary

- Studying the behavior of state and local employees, we find evidence consistent with peer effects in four retirement choices:
  - Allocation to variable retirement account
    - Similar to results in existing literature
  - Retirement date
    - True for both early and normal retirements
  - Lump sum vs. annuity
  - Whether police/fire buy annuities (with IRR > 50%!)

What's Next?

- We see this analysis as first part of a larger research project on determinants of retirement choices and pension design
- Peer effects help to explain annual fluctuations in retirement rates…
- … but question remains whether peer effects reflect diffusion of information about retirement incentives or non-economic factors
- Focusing on time-series variation in incentives and retirements may help sort this out

Random Thoughts

- Peer effects reflect similar people making similar choices or different people making similar choices?
  - Need measure of sameness
  - Can we construct measure of peer effects based on similarity of one set of choices and then use to predict peer effects for another set?