

# Status Externalities and Low Birth Rates in Korea

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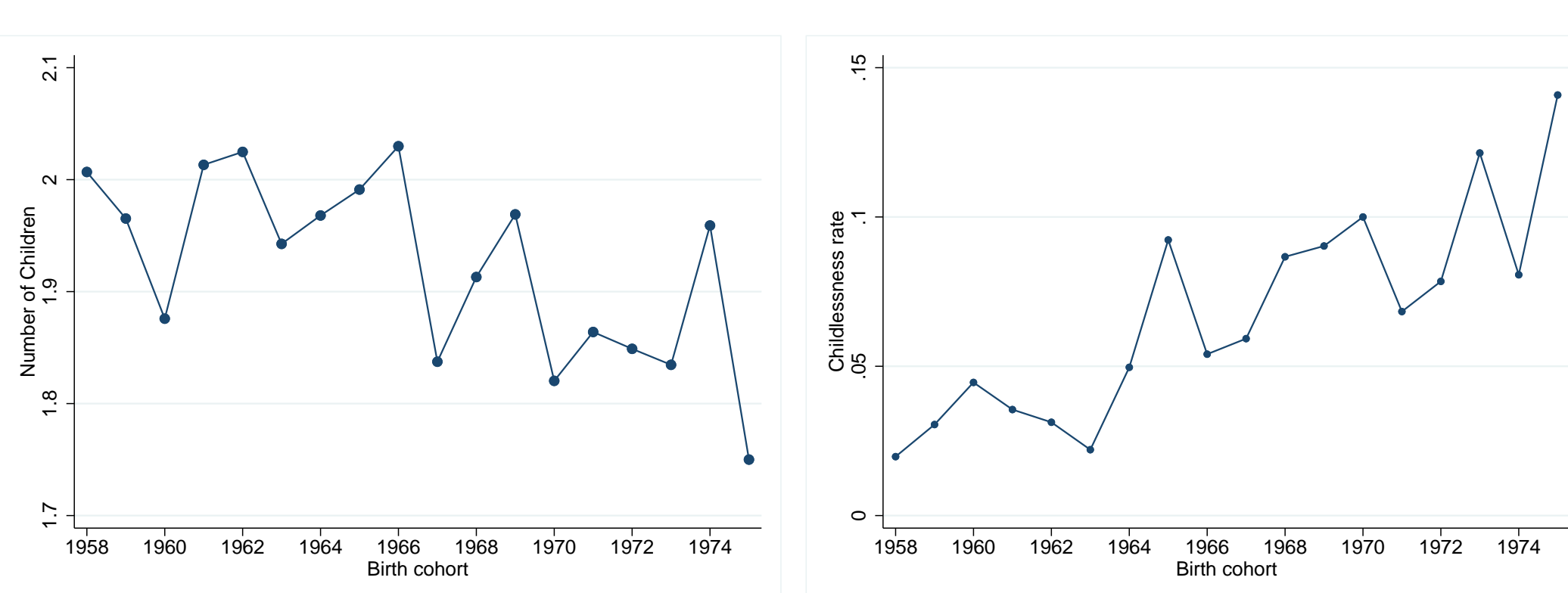
## Summary

- Fertility is very low in Korea. Why?
- Government concerned about low birth rate. What, if anything, should be done about it?
- Fertility-income relationship is positive in Korea – in contrast to other countries.
- Hypothesis: Status externality important in Korea. Responsible both for low birth rates and positive fertility-income relationship.
- Explore what this implies for policy.

## Fertility rate in Korea very low

Country	TFR, 2016
South Korea	1.17
Germany	1.50
United States	1.80
East Asia and Pacific	1.85
High income countries	1.68
World	2.44

## Declining fertility in Korea

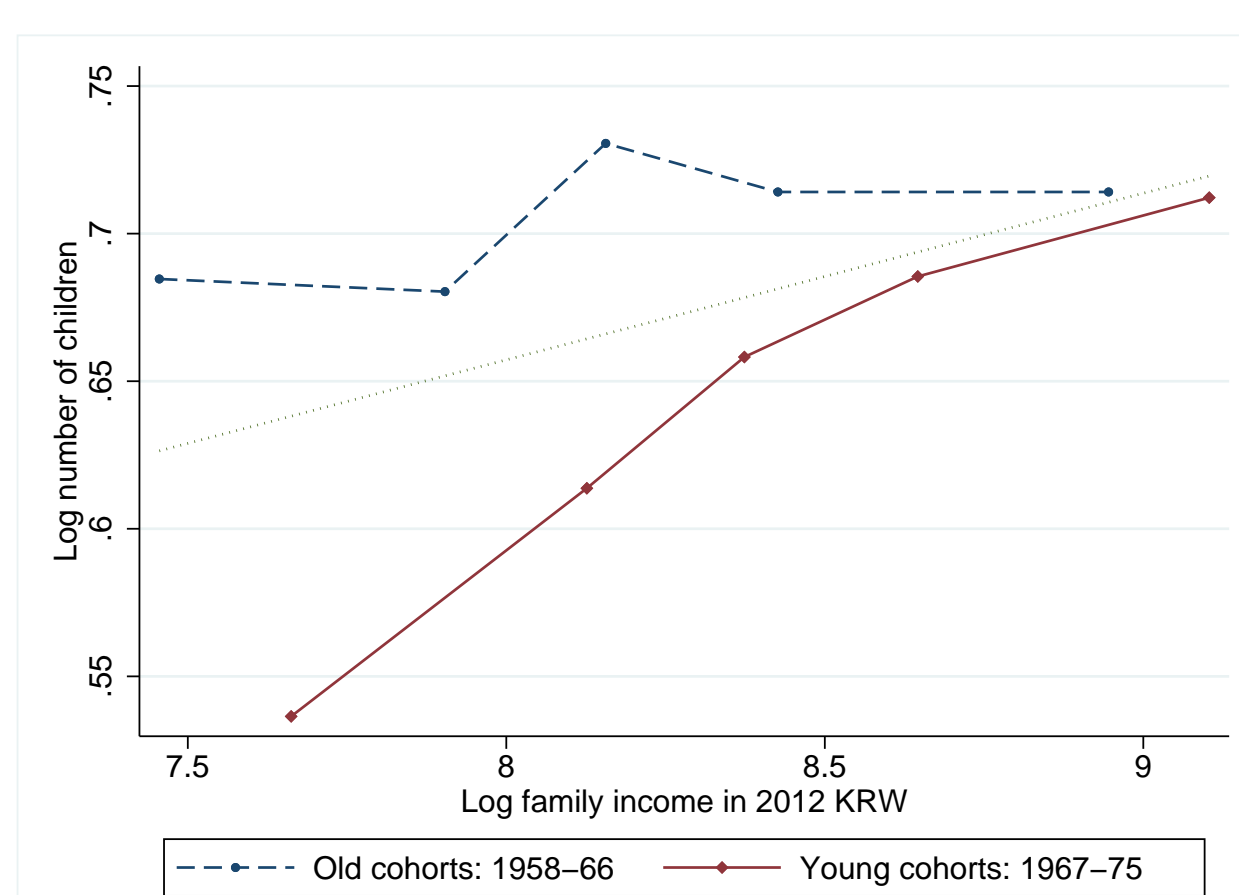


Children ever born

Childlessness

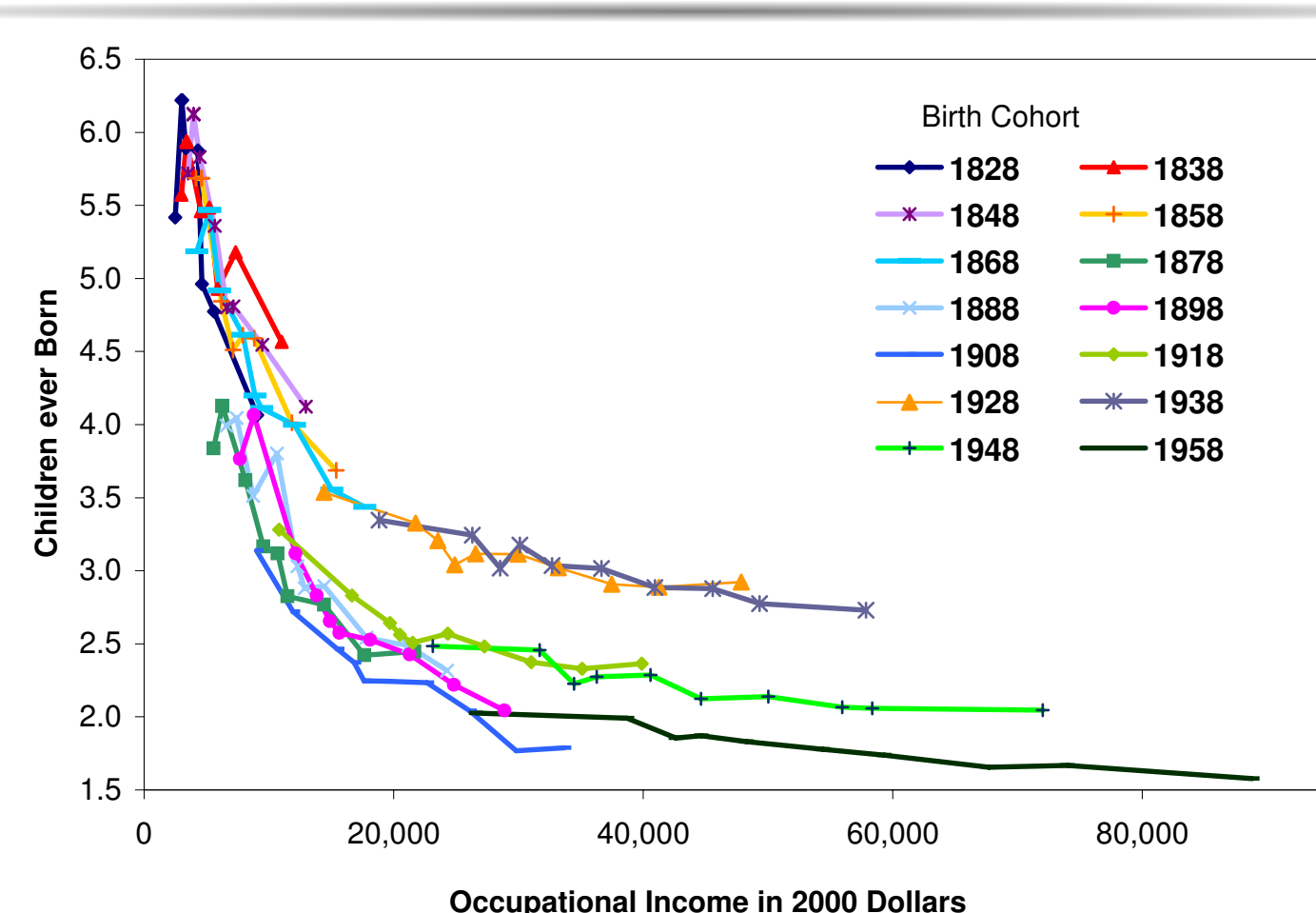
- In particular, extensive margin is relevant for the recent change.

## Cross-sectional fertility-income relationship in Korea



- Fertility is **positively** related to family income, especially in recent cohorts.
- The profile has shifted down in recent cohorts: falling fertility.
- The profile has become **steeper** in recent cohorts.

## Contrast to the US



## Huge demand for private education in Korea

Private education survey: spending on Hagwon (cram school), private/group tutoring, internet/online tutoring.

- Average monthly spending per school-aged child around 240 USD (almost 10% of net income).
- Participation rate (any after-school programs) above 70%.
- Average time spent in private education by students around 4-8 hours per week.

## The Hypothesis

- Status concerns seem particularly important in Korea.
- Parents appear obsessed about their children's future status in society.
  - ⇒ makes parents over-invest into education ⇒ makes children particularly expensive ⇒ reduces fertility.
- Especially poorer parents cannot afford (desired) education and rather have fewer kids.
- Lowers aggregate fertility rate; but also affects slope of fertility-income relationship.

*Forced to decide between giving her daughter siblings or an expensive education, Hong Sung-ok saw little choice. "I can't afford not to send my child to privation tuition, because everyone else does," says the 47-year-old insurance saleswoman. "I spend more than half my income on tutors and childcare expenses - it's really expensive. . . That's why I decided to have only one child."* (Financial Times, Jan 2, 2013)

- Goal of this project: investigate this idea in a quantitative model.

## Model Economy

- We build on the quality-quantity model of De la Croix and Doepke (2003).
- Endogenous fertility (discrete) & Intergenerational human capital investment

- Status externalities: utility function defined as

$$U(c_y, c_o, l, n, h' | \bar{h})$$

where  $\bar{h}$ : average human capital to which parents compare their children.

- Family heterogeneity

- $h$ : human capital of parents (endogenous)
- $\kappa$ : human capital formation productivity (exogenous)

$$\log \kappa \sim N(\mu_\kappa, \sigma_\kappa^2)$$

- Household's problem:

$$V(h, \kappa) = \max_{c_y, c_o, n, x, l} \left\{ \log \left( \frac{c_y}{\Lambda(n)} \right) + \beta \log \left( \frac{c_o}{\Lambda(0)} \right) + B \log(1 - l - \lambda n) + \phi(n)(h' - \chi \bar{h})^\varepsilon \right\}$$

where  $c_y + s + p_x x n \leq w h_p l$ ,  $c_o = (1 + r)s$ ,  $h' = \kappa(\theta + x^{\gamma_x} h^{\gamma_h})$ ,  $l \in [0, 1 - \lambda n]$

- $\chi \in [0, 1)$ : strength of externality;  $\Lambda(n)$ : household equivalence scale

- Production: Cobb-Douglas

$$Y = AK^\alpha L^{1-\alpha}$$

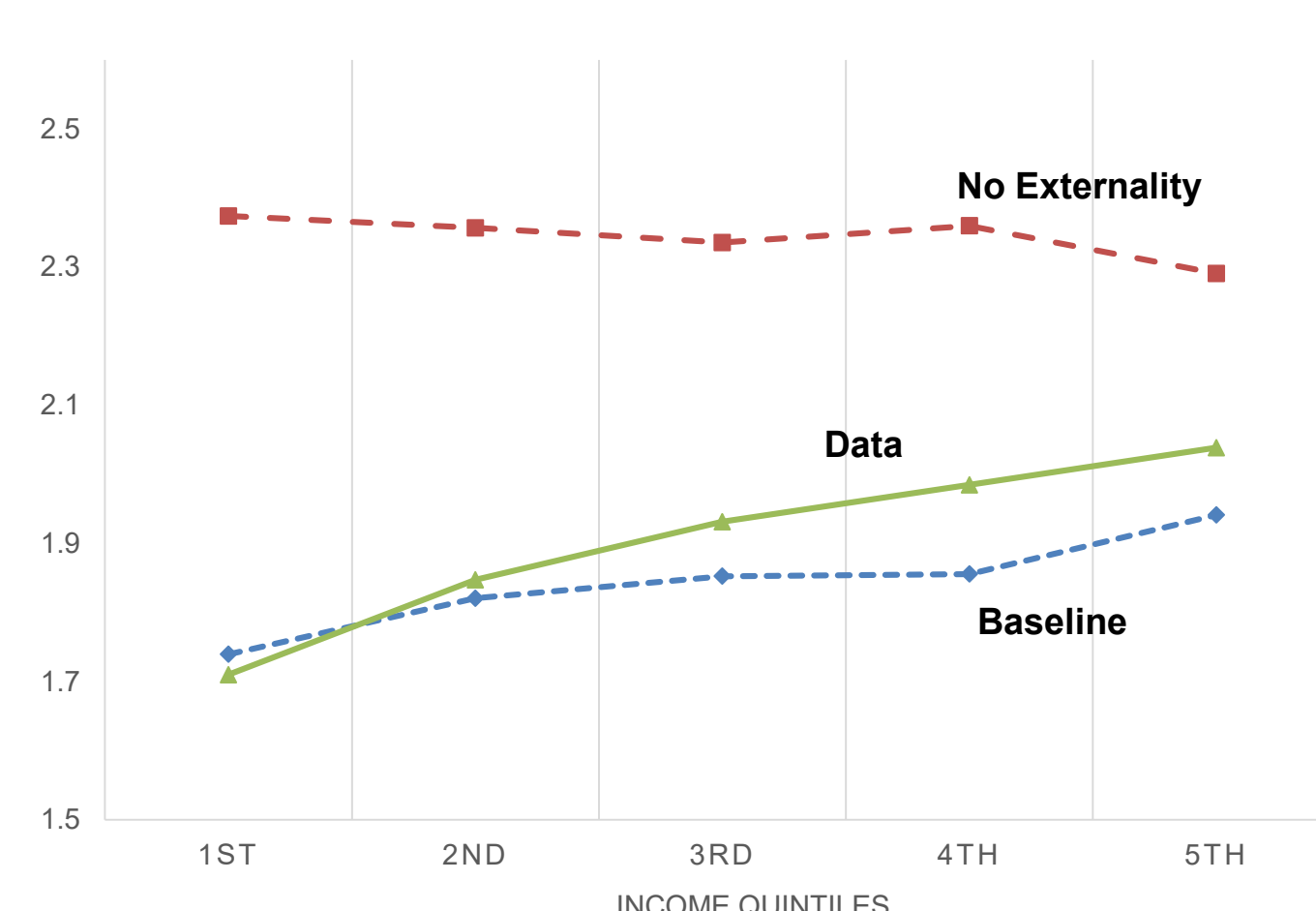
- General equilibrium:

$$L = \mu_y \int \int (h \times l(h, \kappa)) dF(h) dF(\kappa)$$

$$K = \mu_y \int \int s(h, \kappa) dF(h) dF(\kappa)$$

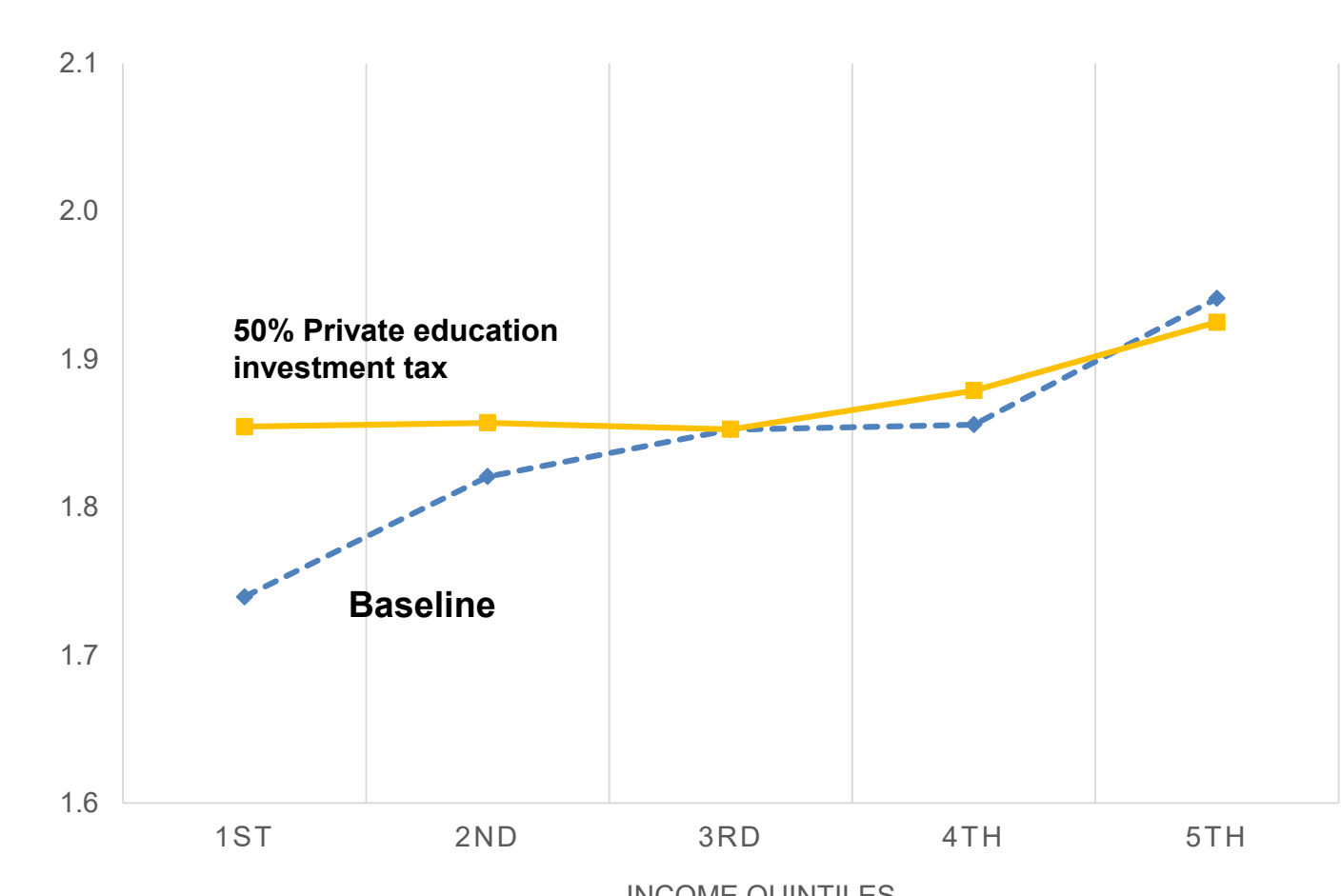
- Stationary equilibrium: stationary distribution of human capital  $F(h)$ .

## Calibration, Results & Policy Experiments



- Model matches positive fertility-income relationship.
- Without externality:
  - fertility rate higher (2.34 vs 1.84), especially among lower income parents.
  - Income elasticity of fertility falls (from 0.09 to -0.02).
  - Average investment per child as share of income falls from 8.7% to 5.7%.

Policy Experiment	Baseline	$\tau_x = 50\%$
Fertility rate	1.842	<b>1.873</b>
Avg educ inv per kid/income	8.7%	<b>6.5%</b>
Income elasticity of fertility	0.089	<b>0.025</b>



Fertility for low income parents increases a lot.

## Inefficiency

- The presence of externality leads to "too low" fertility and "too high" education simultaneously.
- room for government intervention to correct inefficiency
  - e.g., tax on private education investment:  $(1 + \tau_x)xn$