An Estimable Dynamic General Equilibrium Model of Work, Schooling, and Occupational Choice

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20 min presentation for Sargent's RG

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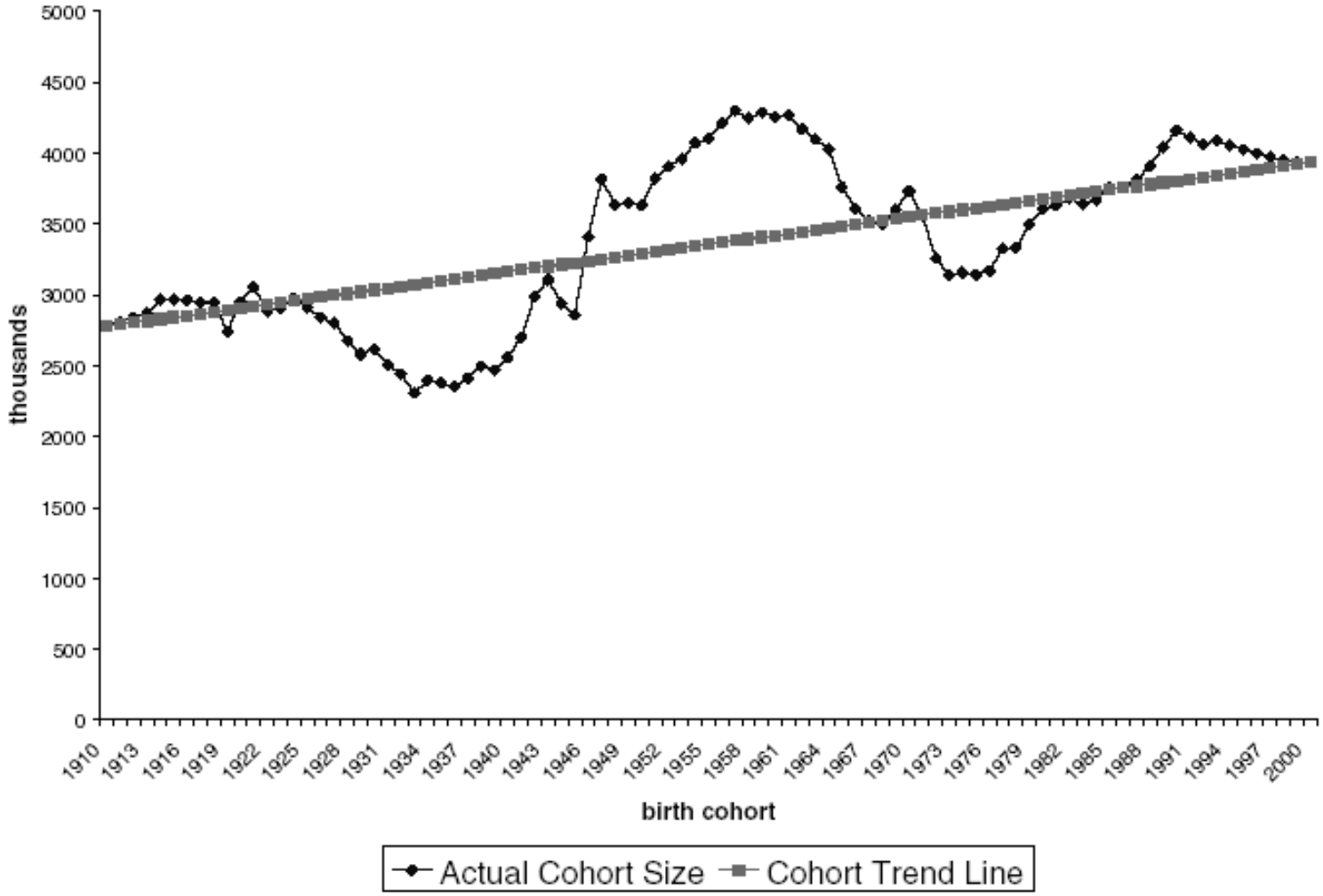
U.S. Birth Cohort



Purpose

- Develop and estimate a dynamic general equilibrium overlapping generations model of career decisions
- Use the the model to
  - determine the impact of cohort size on human capital investment behavior and labor market outcomes
  - contrast the estimates of a college tuition subsidy on career decisions in partial equilibrium and general equilibrium settings

Household Problem

$$\max_{d_m(a)} E\Big[\sum_{\tau=a}^{A} \delta^{\tau-a} \sum u_m(a) d_m(a) | S(a)\Big]$$

where

- for $m = 1$ (white-collar) and $m = 2$ (blue-collar)

$$\begin{aligned} u_{mt}(a) &= r_{mt} s_m(a) + \alpha_{m7} \\ &= r_{mt} \exp(\alpha_{m1} + \alpha_{m2} E(a) + \alpha_{m3} x_1(a) + \alpha_{m4} x_2(a) \\ &\quad + \alpha_{m5} x_1^2(a) + \alpha_{m6} x_2^2(a) + \epsilon_m) + \alpha_{m7} \end{aligned}$$

- for $m = 3$ (attend school)

$$\begin{aligned} u_{3t}(a) &= \alpha_{31} - \alpha_{32} I(d_3(a-1) = 0) - tc_1 I(E(a) \geq 12) \\ &\quad - tc_2 I(E(a) \geq 16) + \epsilon_3 \end{aligned}$$

- for $m = 4$ (stay in home)

$$u_{4t}(a) = \alpha_{41} + \alpha_{42} NC(a) + \epsilon_4$$

Skill Market Equilibrium

- aggregate production

$$Y_t = S_{1t}^{\alpha_{1t}} S_{2t}^{\alpha_{2t}} K_t^{1-\alpha_{1t}-\alpha_{25}}$$

- aggregate skill supply

$$S_m^s(t) = \sum_a \sum_i s_{mi}(a) d_{mi}(a) \quad (m = 1, 2)$$

- aggregate skill demand

$$S_m^d(t) = \frac{\alpha_{mt} Y_t}{r_{mt}} \quad (m = 1, 2)$$

- skill market equilibrium

$$S_m^s(t) = S_m^d(t) \quad \text{for all t and } m = 1, 2$$

Exogenous variables

- skill share

$$\text{white-collar skill share} = (1 - \text{capital share}) \times \frac{\text{total compensation of w.c. employees}}{\text{total compensation of employees}}$$

- initial schooling and work experience at age 16
- cohort size
- capital stock
- number of preschool children

Variable	Source	Coverage Years
Education level at age 16	CPS & Census	1865–1991
Cohort size	Census Bureau	1800–2050
Capital stock	Bureau of Economic Analysis	1925–1997
Preschool children	CPS & Census	1871–1995

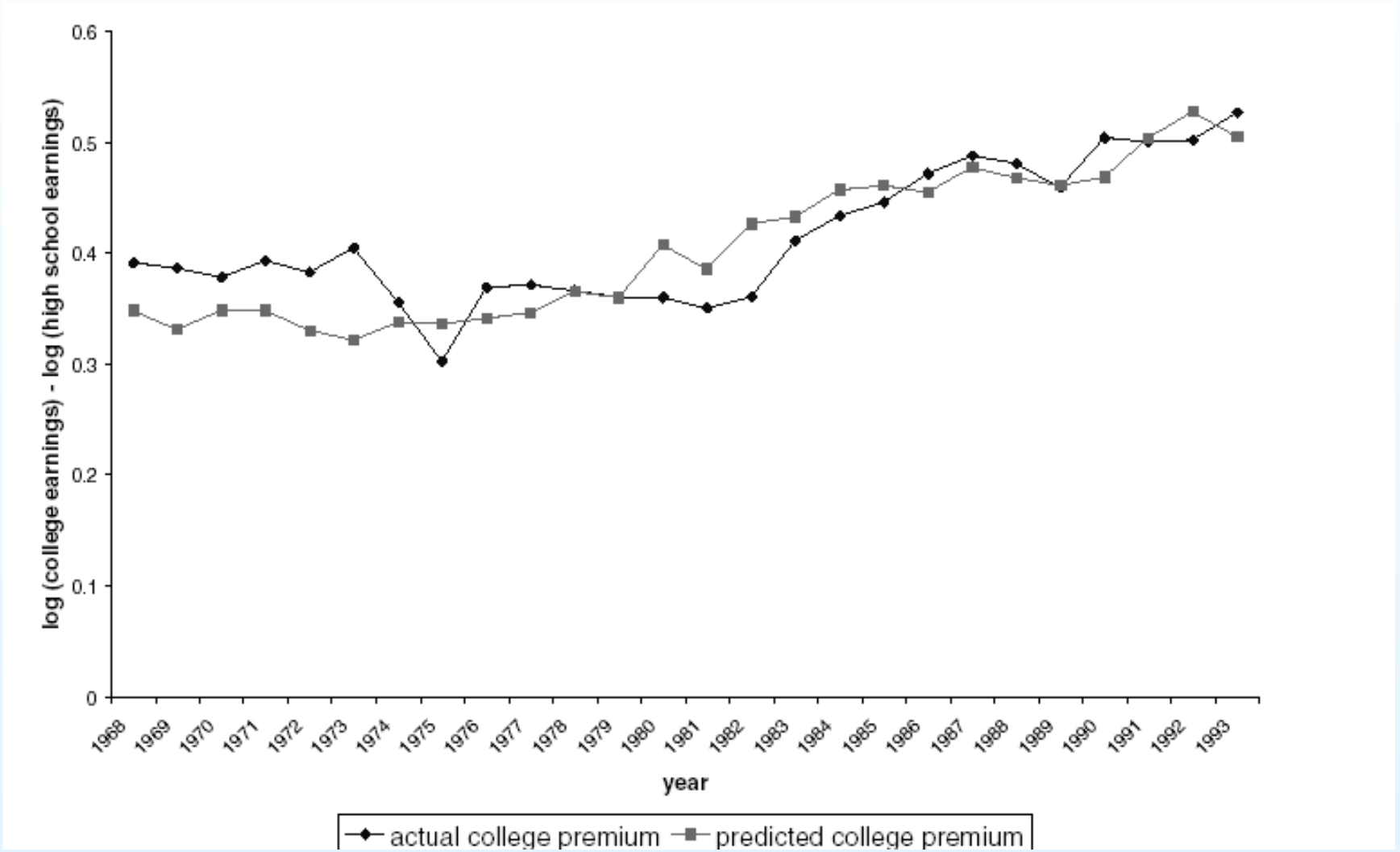
Aggregate moments to match

AGGREGATE MOMENTS

Aggregate Moment	Number of Conditional Moments
White-collar employment rate	$26 \times 50 \times 2 \times 4 \times 2$
Blue-collar employment rate	$26 \times 50 \times 2 \times 4 \times 2$
Attending school rate	$26 \times 50 \times 2 \times 4 \times 2$
Staying home rate	$26 \times 50 \times 2 \times 4 \times 2$
Mean white-collar labor earnings	$26 \times 50 \times 2 \times 4$
Mean blue-collar labor earnings	$26 \times 50 \times 2 \times 4$
SD white-collar labor earnings	$26 \times 50 \times 2 \times 4$
SD blue-collar labor earnings	$26 \times 50 \times 2 \times 4$
One-period career decision transition rate	$3 \times 3 \times 26 \times 50 \times 2$
Schooling distribution	$26 \times 50 \times 2 \times 4$

NOTE: 1. The first four choice moments are conditioned on year (26), age (50), sex (2), education level (4), and whether one has a preschool child or not (2). 2. One-period career decision transition rate (from white-collar, blue-collar, outside labor force at period $t-1$ to white-collar, blue-collar, outside labor force at period t) is conditioned on year (26), age (50), and sex (2). 3. The rest are conditioned on year (26), age (50), sex (2), and education level (4).

Model performance on matching college premium



Policy experiment 1: cohort size effect

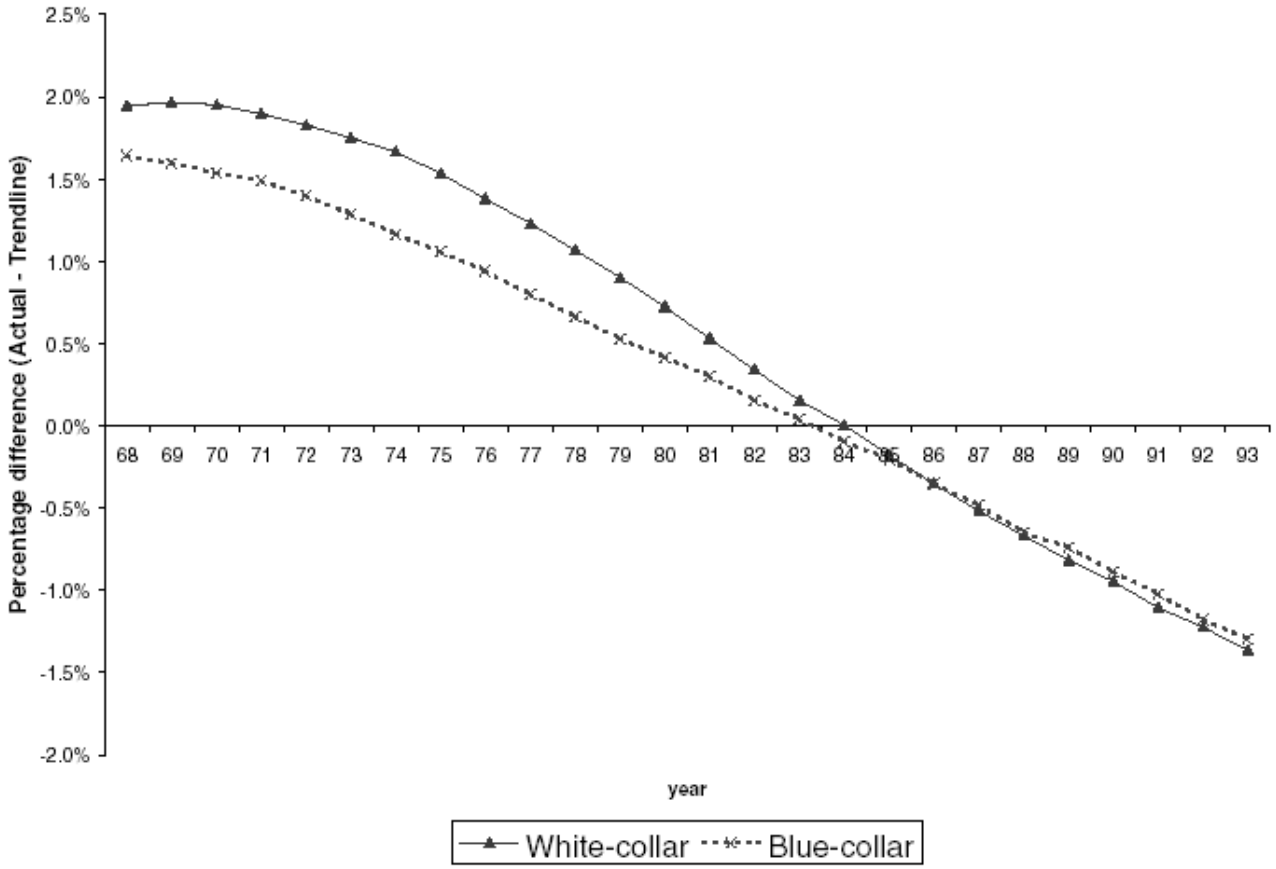


FIGURE 10

SKILL PRICE DIFFERENTIAL

Cohort size effect (continued)

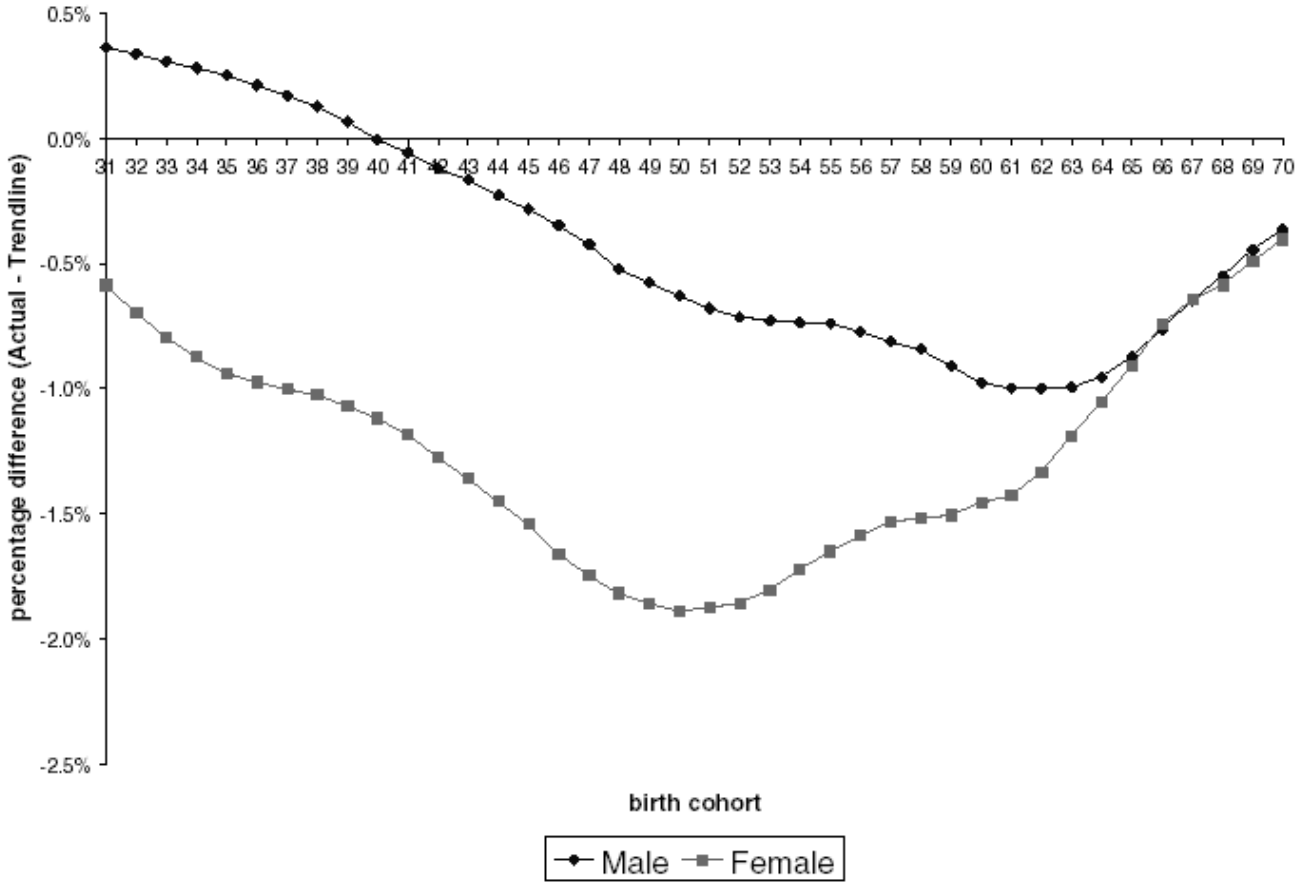


FIGURE 11

COLLEGE COMPLETION RATE DIFFERENCE BY COHORT

Cohort size effect (continued)

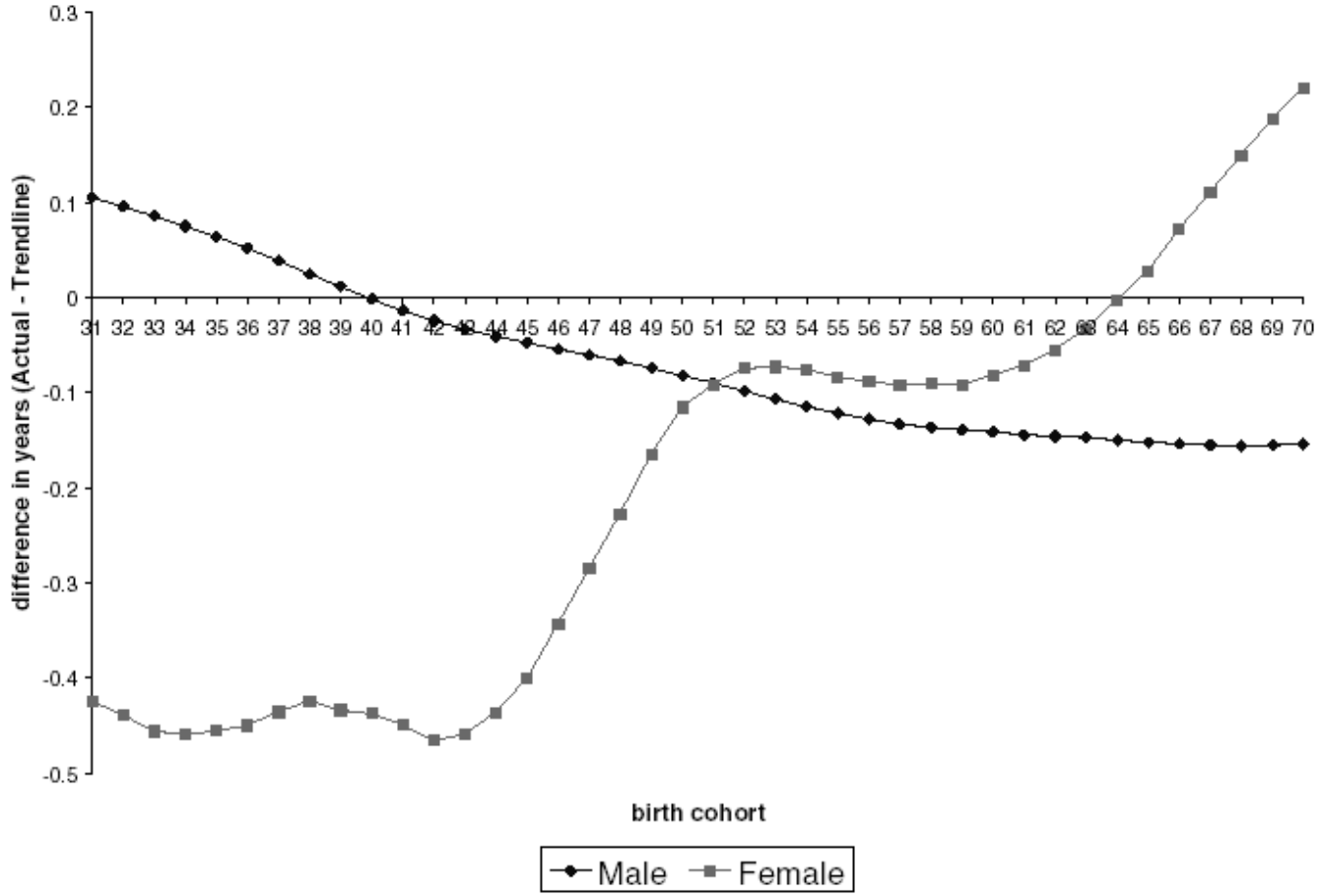


FIGURE 12

YEARS OF WORK DIFFERENCE BY COHORT

Policy Experiment 2: tuition subsidy (increase) effect

TUITION SUBSIDY (INCREASE) EFFECT

Experiment	Sex	Predicted Value	PE Value	GE Value	PE Effect	GE Effect
1	Male	27.17%	26.86%	26.88%	−1.12%	−1.05%
	Female	27.46%	27.01%	27.05%	−1.66%	−1.52%
2	Male	17.78%	17.54%	17.55%	−1.34%	−1.27%
	Female	17.35%	17.01%	17.02%	−1.95%	−1.86%
3	Male	11.98	12.20	12.17	0.57	0.50
	Female	12.22	12.56	12.53	0.88	0.82

NOTE: PE effect = partial equilibrium effect. GE effect = general equilibrium effect. PE effect and GE effect in experiments 1 and 2 are in terms of percentage increase. Experiment 1: A $100 tuition increase (in 1995 dollars) on the college enrollment rate (ages 18 and 19). Experiment 2: A $100 tuition increase (in 1995 dollars) on the college enrollment rate (ages 18 through 24). Experiment 3: A 50% tuition reduction on completed years of education by age 30.