Fertility, Education and Public Policy: What entices the Stork?

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Can policy reverse long run fertility decline?

Baby Bounce-Back, since 2002
Baby Bonus explains less than half of observed fertility rise

Apps & Rees (2004): child care subsidies can be more effective than cash grants

McDonald (2006): need also to support ability to combine work and child rearing
Approach of this paper

- positivist: contrast effectiveness of policy tools in boosting fertility (Apps & Rees (2004))

- 3 instruments:
  - baby bonus
  - child care subsidies
  - maternity pay

- model household decision making within endogenously growing OLG economy

- technological progress induces household to substitute quality for quantity of children (Galor & Weil (2000))
Key questions

1. Baby Bonus - How does it affect fertility in the SR (LR)?

2. Maternity Pay and Child Care subsidy - Which is more effective?

3. How do these policies affect education?
Small open economy with perfect capital mobility

In per worker terms

\[ y_t = h_t^\alpha x_t^{1-\alpha} \] (4)

\[ h_t = H_t / L_t \] is human capital per worker at time \( t \).

\[ x_t = J_t X / L_t \] is the amount of effective resources per worker:

\[ J_t = J(r, Z_t) : Z_t \text{ is technology; } X \text{ is natural resources} \]
Human capital of children of members of generation $t$

$$h_{t+1} = h(e_{t+1}, g_{t+1})$$

$h_{t+1}$, is

- an increasing function of their education, $e_{t+1}$ ($h_e > 0$)

- is depreciated by the rate of technological progress from period $t$ to period $t+1$ ($h_g < 0$)

Education lessens the adverse effect of technological change ($h_{eg} > 0$)
Household Preferences

Direct utility from potential aggregate income of children (altruism or transfers from children in old age)

Members of generation $t$ have utility

$$u^t = \gamma \ln (w_{t+1}h_{t+1}n_t) + (1 - \gamma) \ln c_t$$  \(7\)

where $n_t$ is the number of children

Cobb-Douglas: household allocates constant proportion of income to potential aggregate income of children
The total cost of rearing children is

\[ C_t = w_t h_t [(1 - m)\hat{z}^q + (1 - \sigma)\hat{x}^q + (\hat{x}^e + (1 - m)\hat{z}^e) e_{t+1}] n_t \]  (33)

- \( \hat{z}^q \) (\( \hat{z}^e \)) is fraction of time required to raise a child regardless of quality (for each unit of education per child)

- \( \hat{x}^q \) (\( \hat{x}^e \)) are bought in services required to raise a child regardless of quality (for each unit of education per child)

- \( m \) is rate of maternity benefit

- \( \sigma \) is rate of child care subsidy
Input prices

Prices of bought in services and parental time differ to heterogeneity incorporated in the CES production functions for child rearing and education:

\[ n_t = \left[ (Bz^q)^\rho + (Ax^q)^\rho \right]^{1/\rho}; \rho \neq 0 \]  
\[ e_{t+1} = \left[ (Dz^e)^a + (Ex^e)^a \right]^{1/a}; a \neq 0 \]

\( z \) and \( x \) denote total parental time and total bought in education (schooling), respectively.

Positive coefficients \( B & D \) (\( A & E \)) represent the levels of efficiency of parental time (bought in child care & education).
Household Optimisation

Production functions homogeneous of degree one

Household

1. chooses cost minimising input mix
2. chooses $n_t$ and $e_{t+1}$, given input mix, to maximise utility (7) subject to the budget constraint:

$$w_t h_t [p^n (m, \sigma, B, A) + p^e (m, D, E) e_{t+1}] n_t - bn_t + (1 + \tau) c_t \leq w_t h_t$$

(37)
Each household chooses

\[ n_t = \frac{\gamma}{p^n (m, \sigma, B, A) + p^e (m, D, E) e_{t+1} - b / y_t} \]  

\[ e_{t+1} = \frac{h_{t+1}}{h_e} - \left[ \frac{p^n (m, \sigma, B, A) - b / y_t}{p^e (m, D, E)} \right] \] (38b)

\[ p^n(.) \] is cost of raising a child with no education as a share of income
We assume initially $b = 0$
(Proposition 2) The economy converges to an equilibrium with

- constant $\bar{g}$, $\bar{e}$, $\bar{n}$ and $\bar{h}$

- $y_t$ growing at rate $\bar{g}$
Lump Sum Baby Bonus

\[
\frac{d \bar{n}}{db} \geq 0 \iff \frac{db}{b} \geq \frac{dy_t}{y_t} \tag{32a}
\]

an increase in \( b \) has an ambiguous effect on \( \bar{n} \) when \( y_t \) is growing over time

Intuition?

Household allocates constant proportion of \( y \) to potential aggregate income of children

When \( b = 0 \), opportunity cost of raising children as a proportion of \( y \) is also constant

For a given \( b > 0 \), net opportunity cost of raising children as a proportion of \( y \) rises as \( y \) rises
(Proposition 4)

1. Introduction of $b$ is predicted to increase fertility
2. Any further increase in fertility would require $b$ to be rising faster than $y$
3. If $b$ remains fixed, fertility ultimately declines as $y$ rises over time
(Proposition 3, Corollary 3)

4. Because parental time is used to rear and educate children, an increase in $m$ may boost $\bar{n}$ more than an equivalent increase in $\sigma$

Intuition?

If time cost of raising a child with education level, $e_{t+1}$, exceeds the amount of bought in child care per child, then increase $m$ yields a larger reduction in per unit cost
5. An increase in child support \((m, \sigma \text{ or } b)\) also raises the level of education, \(\bar{e}\)

Intuition: education is a normal good

Proviso regarding increase in \(m\):

if parental education and bought in education are complementary, then \(p^n(.)\) will decrease relative to \(p^e(.)\) when we subsidise parental time
Further Research

Analyse:

- overall impact on economic growth
- extend comparative static analysis to include effects of switching between forms of child support
- dynamic system with $b > 0$