

**Why did rich families increase their fertility?
Inequality and marketization of child care**

Michael Bar, Moshe Hazan, Oksana Leukhina,
David Weiss, Hosny Zoabi

Ji Hwan Kim

February 7, 2022

ECON 712-006. Labor, Health & Family

Standard Theory

A **negative** relationship between income and fertility

- ▶ The tradeoff between the quantity and quality of children
- ▶ The opportunity cost of parental time

Fertility by Income Decile 1980 and 2010

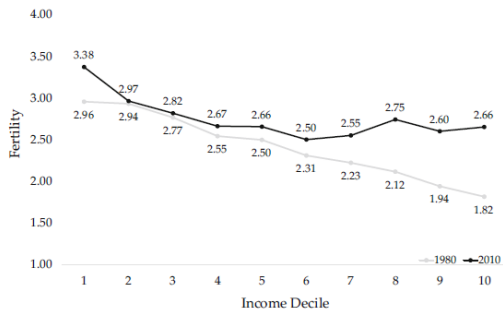


Fig. 2 Fertility by Income Decile 1980 and 2010. *Notes:* authors calculations using Census and American Community Survey Data. The sample is restricted to white, non-Hispanic married women. Fertility rates are hybrid fertility rates, constructed by age-specific deciles. Deciles are constructed using total household income

- ▶ High income families increased their fertility.
- ▶ The relationship between income and fertility has **flattened** between 1980 and 2010.

Why did rich families increase their fertility?

Inequality ↑



Costs of **marketization** of parental time for the rich relative to their income ↓



Fertility rate for the rich ↑

This Paper

1. Quantitative theory of change in the relationship between income and fertility
2. Estimate model with data
3. Use estimated model to assess the implications of inequality and marketization of market care

Model

Households

- ▶ A unit measure of households composed of married females (f) and males (m)
- ▶ Heterogeneous wage offers, w_f and w_m
- ▶ Traditional gender roles: Men do not spend time raising children

Model

Utility

The utility function is assumed to be

$$u = \ln(c) + \alpha \ln(n) + \tilde{\beta} \ln(w_k)$$

- ▶ Number of children: n
- ▶ Quality of children (income per child):

$$w_k = \begin{cases} \omega \cdot w_{nc} & \text{w.p. } \pi(e) \\ w_{nc} & \text{w.p. } 1 - \pi(e) \end{cases}$$

- ▶ Income for non-college graduates: w_{nc}
- ▶ College premium: $\omega > 1$
- ▶ Education good: e
All siblings have the same realization of education uncertainty.
- ▶ Probability of receiving a college degree: $\pi(e) = \ln(b(e + \eta)^\theta)$

Parents maximize the following expected utility

$$\mathbb{E}[u] = \ln(c) + \alpha \ln(n) + \beta \ln(b(e + \eta)^\theta)$$

Model

Budget Constraint

The budget constraint is given by

$$c + p_n n + p_e e n = w_f + w_m$$

- ▶ Both the time and market goods costs associated with raising a child: p_n
- ▶ Exogenously given price of a unit of education: p_e

Model

Technology for Child Rearing

$$n = A \left(\phi t_f^\rho + (1 - \phi) \left(\phi_m t_{hps}^{\rho m} + (1 - \phi_m) d^{\rho m} \right)^{\frac{\rho}{\rho m}} \right)^{\frac{1}{\rho}}$$

- ▶ Mother's time: t_f
- ▶ Market substitutes
 - ▶ Time of Home Production Substitute (HPS) workers: t_{hps}
 - ▶ Durables: d
- ▶ Aggregate of market substitutes:

$$m \equiv \left(\phi_m t_{hps}^{\rho m} + (1 - \phi_m) d^{\rho m} \right)^{\frac{1}{\rho m}}$$

- ▶ The utility maximization problem gives the following optimal solutions for e and n :

$$e^* = \max \left\{ \frac{\frac{p_n}{p_e} \frac{\beta\theta}{\alpha} - \eta}{1 - \frac{\beta\theta}{\alpha}}, 0 \right\}$$

$$n^* = \begin{cases} \left(1 - \frac{\beta\theta}{\alpha}\right) \left(\frac{\alpha}{1+\alpha}\right) \left(\frac{w_f + w_m}{p_n - \eta p_e}\right) & \text{if } e^* > 0 \\ \frac{1+\alpha}{\alpha} \left(\frac{w_f + w_m}{p_n}\right) & \text{if } e^* = 0 \end{cases}$$

n^* is either decreasing or U-shaped in w_f , in the interior solution region.

- ▶ The rise in income inequality motivate mothers to spend less time at home and families to marketize the time costs of children more.

$$\frac{w_f}{p_m} \uparrow \rightarrow \frac{t_f}{n} \downarrow \frac{m}{n} \uparrow$$

Data

1980 Census, 2010 American Community Survey (ACS)

- ▶ incomes, fertility, work hours of each spouse.

National Longitudinal Study of Youth 1997 (NLSY 97)

- ▶ educational attainment of children born around 1980, by family income

Survey of Program Participation and Income (SIPP)

- ▶ childcare expenditure by family income

Survey of Consumer Expenditures (CEX)

- ▶ expenditures on durables relative to expenditures on HPS workers

Estimation

10 parameters: $\Omega \equiv \{\alpha, \beta, \eta, \theta, b, \phi, \rho, p_e, A, p_{m,1980}\}$

40 moments: For each decile,

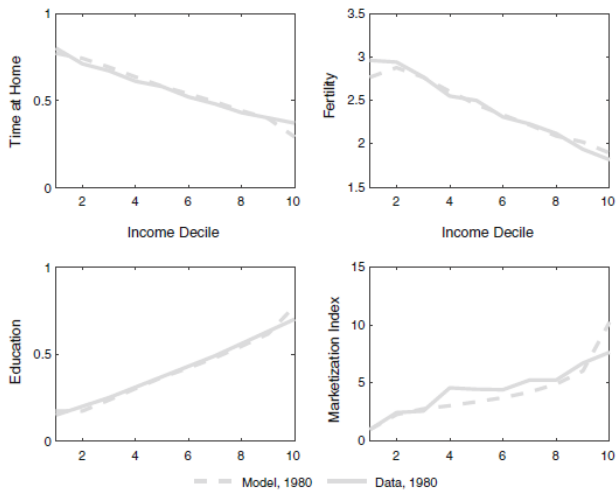
- ▶ profile of fertility in 1980
- ▶ profile of mother's time at home in 1980
- ▶ profile of college attainment rates of children in 1980
- ▶ index of relative expenditures on home good substitutes in 1980

Minimize the distance between the model moments and the data moments in order to obtain the best fit.

Estimation Result

Parameter	Interpretation	Value	Identification
α	Weight on quantity of children	0.45	Fertility
β	Weight on quality of children	0.67	Fertility
η	Basic education	2.06	Fertility
θ	Exponent π	0.43	College attainment
b	Scaling	0.87	College attainment
ρ	Elasticity mother's time/ m	0.59	Labor supply
ϕ	Share of mother's time	0.90	Labor supply
A	TFP child production	3.77	Index of marketization
$p_{m,1980}$	Price of market substitutes 1980	1	Normalization
p_e	Cost of education	1	Normalization

Model Fit



Estimation

How to get $p_d, w_{hps}, p_m, \rho_m, \phi_m, \epsilon?$

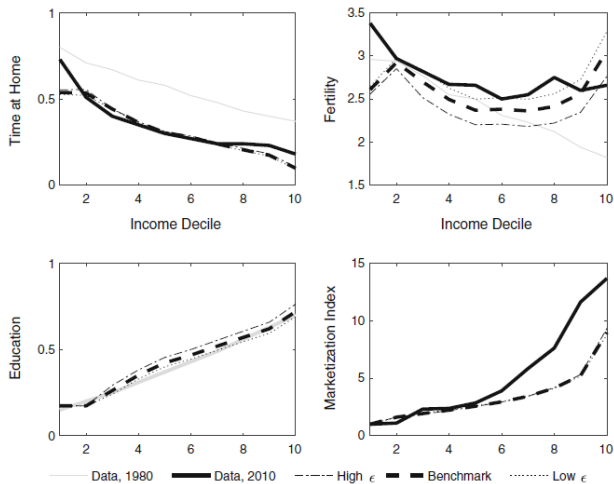
- ▶ Expenditures on durables relative to expenditures on HPS workers
- ▶ Elasticity of substitution between t_f and d
- ▶ Previous literature

Estimation Result

- ▶ 4% annual decline in p_d
- ▶ 0% annual decline in w_{hps}
- ▶ 2% annual decline in p_m
- ▶ $\rho_m = -2.88$
- ▶ $\phi_m = 0.163$
- ▶ Elasticity between mother's time and purchased durable goods:
Benchmark $\epsilon = 1.61$, High $\epsilon = 1.78$, Low $\epsilon = 1.45$

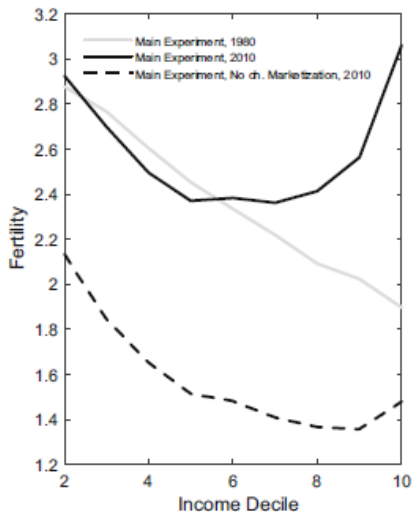
Main Experiment

Introduce 2010 values of wages and p_m into the benchmark model.



Main Experiment: No Change in Marketization

Shut down the movement in the relevant measure of marketization cost ($\frac{w_f}{p_m}$)



Main Experiment: No Change in w_m

Hold the decline-specific male incomes (w_m) at their 1980 levels.

