Gender Roles and Medical Progress

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Motivation

- Early 20th century in the USA: poor outcomes in maternal health; low LFP by married women
  - 1920: 1 mother died per 125 live births
  - + 20x as many suffered long-lasting disablements post-pregnancy
  - + infants depended on breast milk
  - = mothers tended not to work

- Married women LFP $\uparrow$ over the course of 20th century

- 1930-1960: not only did married women work more, they also had more children! (TFR $\uparrow$)
  - $<$ 1930: Trends were (understandably) negatively correlated
  - $>$ 1930: What changed?
  - This paper: Medical progress + wide adoption of infant formula milk

1930-1960: Dramatic increase in LFP & TFR

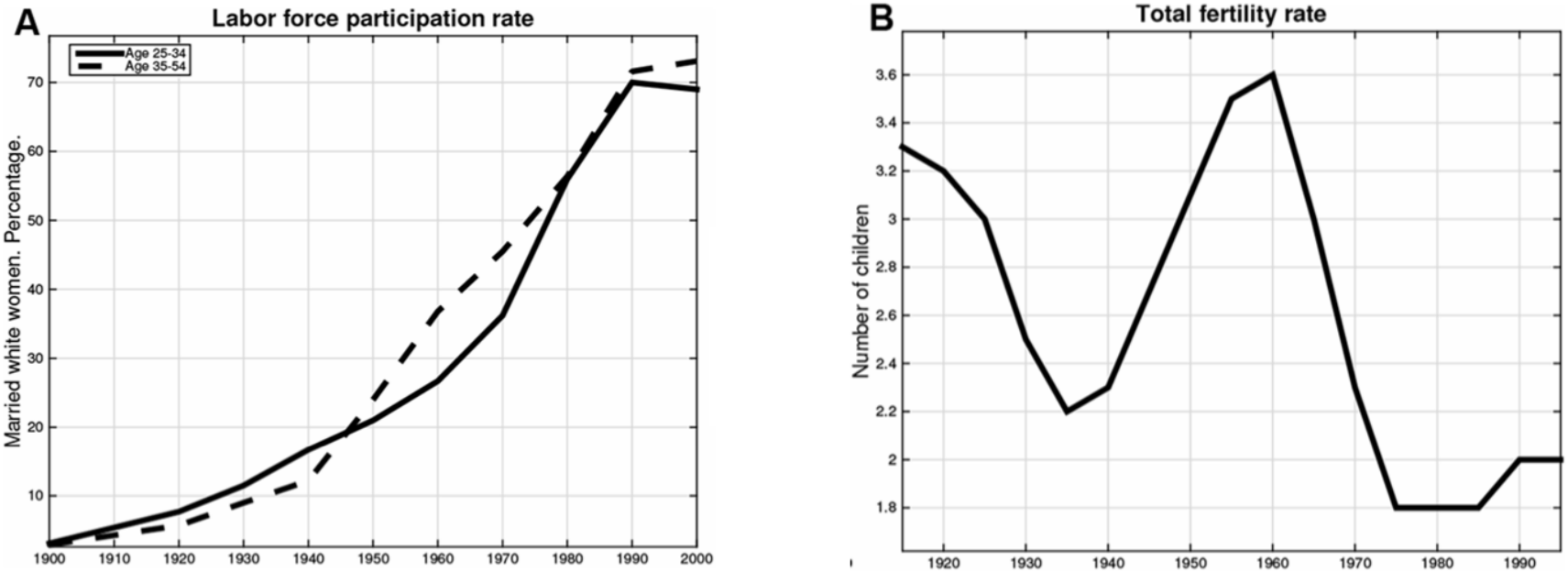

Figure 1: LFP & TFR of married women over the 20th century

- Maternal mortality (deaths per 100,000 live births): ↓ from 1930 (673) to 1960 (37.1)
- Burden of pregnancy-related health conditions also ↓

1930-1960: Large drop in maternal causes of death

INCIDENCE OF MATERNAL MORTALITY

	DEATH RATES (100,000 Population)			PERCENTAGE CHANGE	
	1900	1930	1960	1930–1900	1960–1930
All causes:					
Men	1,791.1	1,225.3	1,104.5	−31.60%	−9.90%
Women	1,646.9	1,036.7	809.2	−37.10%	−21.90%
Tuberculosis:					
Men	201	76.2	8.9	−62.10%	−88.30%
Women	187.8	65.9	3.3	−64.90%	−95%
Maternal causes:					
Women	55	52	3.4	−5.40%	−93.60%

Figure 2: Death rates and causes of death

- Intro of antibiotics (1937-43); improved obstetrics (early 1930s); births in hospitals (>1935); blood banking (1936)

Objectives

Research Question: What explains the joint rise in married women's LFP and TFR between 1930 and 1960?

Approach

- OLG model of labor choice, fertility and child-raising to understand endogenous choices by households/women
- Calibrate model with historical data + simulation

Why is this interesting?

- Practical use of a macro model to explain the factors that drive women's labor supply and motherhood choices
- Welfare: Higher LFP & TFR makes everyone better off
- Policy: reducing maternal mortality could potentially accrue large economic gains for developing economies

Quantifying improvements in health and technology

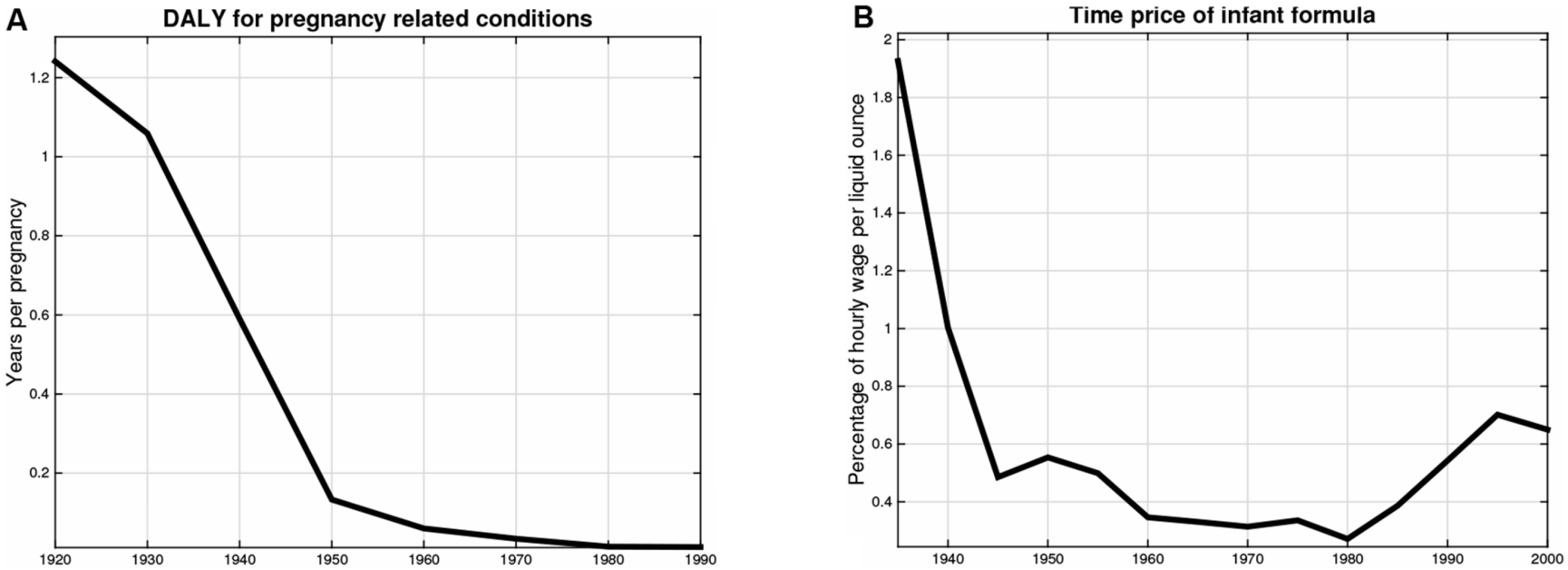

Figure 3: Advances in maternal health & infant feeding

- Maternal health outcomes: Δ Disability-Adjusted Life Years (time lost because of poor health) DALY Example
- Collect time prices (opp. cost measure) of infant formula milk from old newspaper advertisements

Overlapping generations model for TFR & LFP

- Household utility depends directly on women's time cost of labor supply and childbearing
- At $t = 0$, women choose amount of education: e
- At $t = 1$ choose no of births: $b \geq 0$
  - Children $\uparrow$ utility and survive birth with probability s
  - At $t = 1$ live children incur (time) cost of infant feeding ν
  - HHs choose how much infant formula milk $I_f \in [0,1]$ to use
  - Formula milk saves ζ units of time but reduces mother's utility by $\xi(I_f)$ and directly impacts household budget constraint
- At $t = \{1,2\}$:
  - Women choose LFP: $p_t \in [0,1]$
  - Men receive exogenous labor earnings Y_t
  - ϕ_t: burden of pregnancy-related conditions
  - ψ_t: time cost of general child care

Equations

Key mechanisms captured by the model

- Endogenize women's labor supply and childbearing choices in response to improvements in maternal-related conditions
- As price of infant formula milk $\downarrow$'s, households endogenously choose bottle-feeding, which frees up time for market work
- $\uparrow$ labor supply $\implies$ $\uparrow$ incentives for education $\implies$ $\uparrow$ potential market wages, further strengthening the incentives to work

Comment: One key strength of this paper is the thoughtful choices made in the model to parse out the various important mechanisms at work, and how they interact.

Calibration

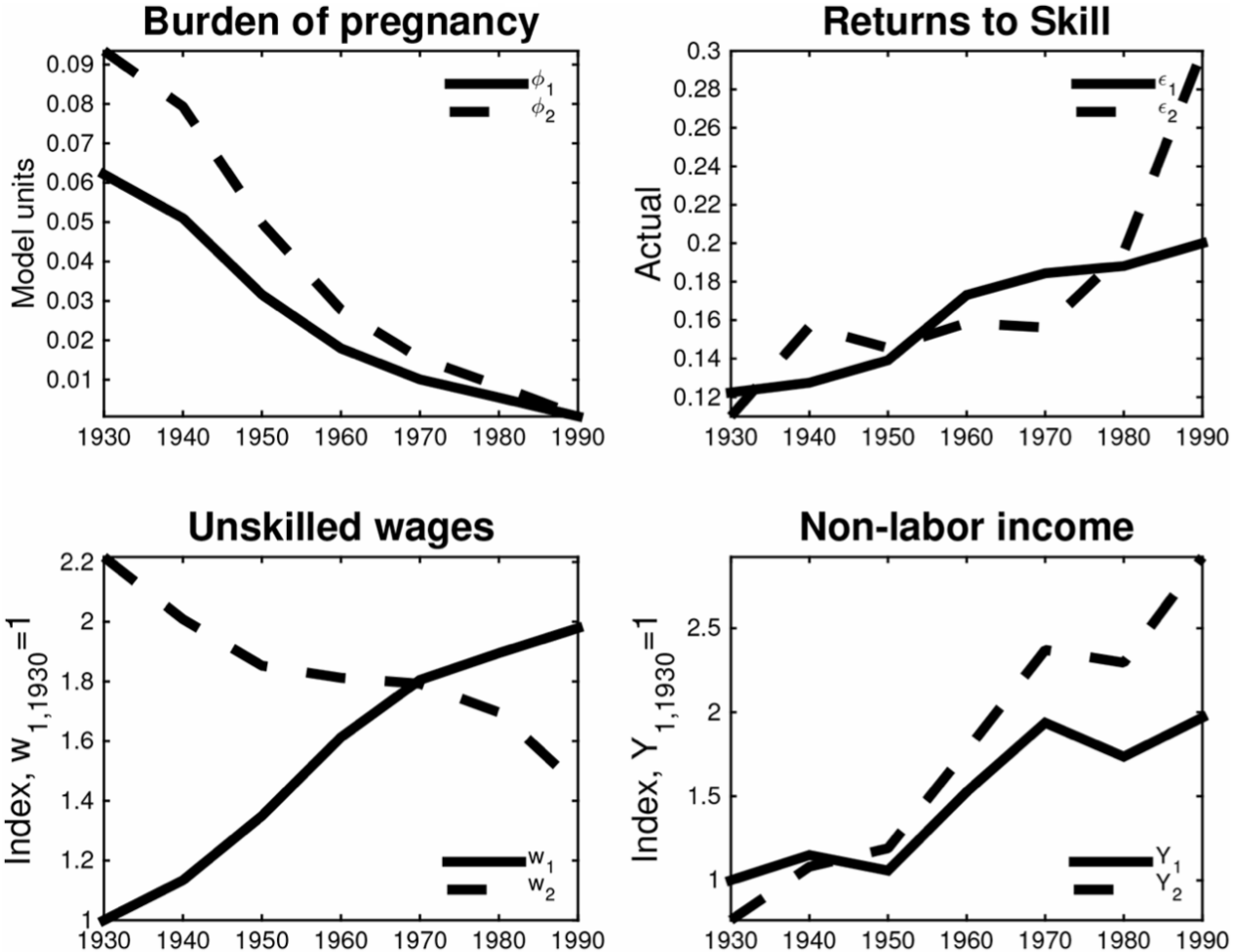

Figure 4: Exogenous forces in the model

Results

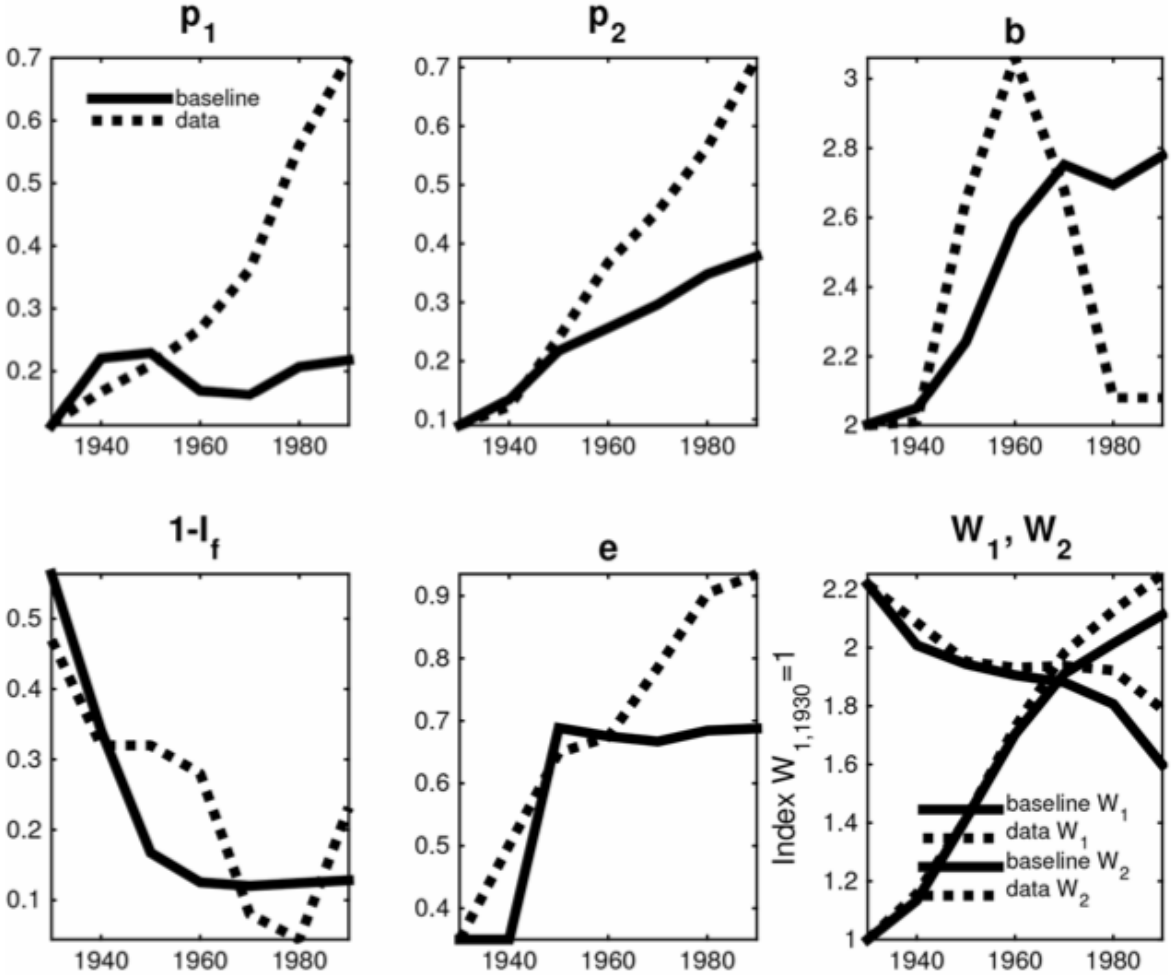

Figure 5: Results from baseline simulation

Discussion

Remarks

Findings

1. $\downarrow$ burden of maternal conditions $\Longrightarrow$ 50% $\uparrow$ in married women's LFP and TFR between 1930 and 1960
2. Infant formula milk played an important auxiliary role

Contributions

1. Meticulous and thoughtful use of data to measure women's health
2. First study to consider impact of $\uparrow$ maternal health and infant feeding on married women's LFP & TFR
3. From broader perspective, also add to macro literature: effects of health + technology (infant formula milk) on the economy

Disability-Adjusted Life Years[1]

$$\text{DALY} = \text{Years of Life Lost (YLL)} + \text{Years Lost to Disability (YLD)}$$

$$\text{YLL} = \frac{\text{no. deaths} \times \text{average life expectancy at age of death}}{\text{group population}}$$

$$\text{YLD} = \text{incidence} \times \text{duration} \times \text{WHO age-specific disability weight}$$

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[1] For full exposition please see Section II.B of paper

How to calculate Years of Life Lost

CALCULATIONS OF YEARS OF LIFE LOST DUE TO CHILDBIRTH, 1920–90

	Life Expectancy at Age 20 (Additional Years) (1)	Maternal Mortality Rate (1,000 Live Births) (2)	Live Births (1,000s) (3)	Female Population (Ages 20–40) (4)	YLL (Years) (5)
1920	46.5	7.80	2,950	15,077,142	.0710
1930	48.5	6.73	2,618	17,397,683	.0491
1940	51.4	3.76	2,559	19,134,218	.0258
1950	54.6	.833	3,632	21,129,755	.0078
1960	56.2	.371	4,258	20,723,409	.0043
1970	57.4	.215	3,731	23,281,991	.0020
1980	59.4	.092	3,612	29,860,157	.0007
1990	60.3	.082	4,158	32,068,706	.0006

SOURCE.—Column 1: Haines (2006, ser. Ab656–703). Column 2: 1900–1920: Loudon (1992, app. table 5); 1921–98: Haines (2006, ser. Ab924). Column 3: Haines (2006, ser. Ab11–30). Column 4: Haines and Sutch (2006, ser. Aa287–364).

NOTE.—Column 5 is obtained as (col. 1 × col. 2 × col. 3)/col. 4.

Figure 6: YLL due to childbirth (1920-90), authors' calculations

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Household problem

Each household maximizes their utility

$$U(e,b,p_1,p_2,l_f) = -\kappa(e) + \sum_{t=1,2} \beta_t[u(c_t) - v(n_t)] + g(sb)$$

$$n_1 = hp_1 + [\phi_1 + s(\psi_1 + \nu)]b - (\nu + \zeta)sbl_f + \xi(l_f)sb$$

$$n_2 = hp_2 + (\phi_2 + s\psi_2)b$$

subject to

$$\frac{c_1}{1+r_1} + \frac{c_2}{1+r_2} \leq \frac{\bar{w}_1 hp_1 + Y_1}{1+r_1} + \frac{\bar{w}_2 hp_2 + Y_2}{1+r_2} - \frac{(q+\nu)w_1 l_f sb}{1+r_1}$$

$$\bar{w}_t = (1 + \varepsilon_t e)w_t$$

Assume $\frac{1}{1+r_t} = \beta_t \implies c_1 = c_2$. FOCs solve (e,b,p_1,p_2,l_f).

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Evaluation

- Model overpredicts the LFP growth rate of married women in 1940 and 1950 and underpredicts its rise after 1960
- The authors acknowledge there were other factors during the period that the model did not capture:
  - Factors depressing married women's participation in the early years: marriage bars, cultural aversion to working women
  - Factors encouraging participation in later period: oral contraception, changes in the labor market structure, reduced cultural biases against working women
- Baseline model also assumes a representative household in each cohort to focus on the aggregate implications; but labor supply and fertility responses would have been heterogeneous

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