The Baby Boom and World War II: A Macroeconomic Analysis

Matthias Doepke, Moshe Hazan, and Yishay Maoz
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Did World War II cause the baby boom?
The Total Fertility Rate in the United States:

![Graph showing the total fertility rate in the United States from 1940 to 1970. The rate starts at approximately 2 in 1940, peaks around 3.5 in 1960, and then declines to 1.5 by 1970.](image_url)
The Completed Fertility Rate in the United States:
Hypothesis: WWII Raised Fertility through Effect on Female Labor Market

• World War II draws women into labor market. War generation gathers labor market experience.

• Many war-generation women stay at work after the war, raising female participation.

• Higher effective labor supply induces young women NOT to enter labor market and to have children instead.

• Crowding-out effect reverses when war generation retires from labor market.
Amplifying Mechanism: Taxes

- World War II was financed with large, persistent increase in taxes.

- Taxes further reduced women’s incentives for delaying childbearing.
Longing won't bring him back sooner... GET A WAR JOB!
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Labor Supply of Young and Old Women in the United States:
Wages of Young Women in the United States:
Outline:

• Existing theories of the baby boom.
• Evidence from mobilization rates.
• Model and calibration.
• Effect of the World War II shock.
• The baby boom in other countries.
Existing Theories

● Easterlin (1961):
  The “relative income hypothesis.”
  People growing up in the Great Depression had low material aspirations, and had lots of children instead.

● Greenwood, Seshadri, Vandenbroucke (2005):
  The “household technology hypothesis.”
  Household technology became more productive from the 1930s to the 1950s, which lowered the cost of having children.
Reasons Why Existing Theories Are Not Sufficient:

• Relative income hypothesis:
  • Timing problem:
    – Many mothers of the baby boom were born after the Great Depression.
    – Fertility highest in 20-24 age group; fertility peaks 1957.

• Household technology hypothesis:
  • Difficult to quantify.
  • Abrupt end of the baby boom not accounted for.
  • Fertility should rise for all age groups.
Evidence from Mobilization Rates

Regression equation:

\[ y_{ist} = \delta_s + \gamma \cdot d_{1960} + X'_{ist} \beta_t + \varphi \cdot d_{1960} \cdot m_s + \epsilon_{ist} \].

- \( y_{ist} \): Outcome variable of woman \( i \) residing in state \( s \) in year \( t \) (1940 or 1960).
- \( \delta_s \): State dummies.
- \( d_{1960} \): 1960 dummy.
- \( X_{ist} \): Other covariates, including age, education, and race dummies.
- \( m_s \): WWII mobilization rate.
- Parameter of interest: \( \varphi \).
Correlation Between Mobilization and Change in Fertility 1940–1960:
Results for Women Aged 25–35:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Children under Age 5</td>
<td>1.1</td>
<td>0.7</td>
<td>0.6</td>
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<tr>
<td>Weeks Worked</td>
<td>-27.8</td>
<td>-14.5</td>
<td>-5.4</td>
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<tr>
<td>Married</td>
<td>0.4</td>
<td>0.4</td>
<td></td>
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<tr>
<td>Education and Farm Controls</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Marital Status Controls</td>
<td>no</td>
<td>no</td>
<td>yes</td>
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Results for Women Aged 45–55:

<table>
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<th></th>
<th>14.8</th>
<th>14.8</th>
<th>14.1</th>
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<tr>
<td>Weeks Worked</td>
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<td></td>
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<tr>
<td>Education and Farm Controls</td>
<td>no</td>
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<td>yes</td>
</tr>
<tr>
<td>Marital Status Controls</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>
Robustness of Empirical Results:

- Almost identical results for Probit and Ordered Probit regressions.
- Results robust to using alternative measures of fertility and labor supply.
- Results robust to using age structure and German ancestry as instruments for mobilization.
Model

- Overlapping generations of married couples.
- Period is 2.5 years. Turn adult at age 20, retire at 60, and live until age 70.
- Men supply labor inelastically.
- Women can have one child per period until age 32.5.
- When not having children, women decide whether to enter the labor market.
Household Problem:

$$\max \left\{ \sum_{j=1}^{T} \beta^{j-1} \left[ \log(c_j) + \sigma_{xi} \log(x_j + x_{Wj}) \right] + \sigma_n \log(n) \right\}$$

subject to:

$$c_j + a_{j+1} = (1 + r_j)a_j + w_j^m e_j^m + w_j^f e_j^f l_j - T_j,$$

$$x_j = h - \kappa b_j - \phi(n_j^y)^{\psi} - l_j - z_j,$$

$$e_{j+1}^m = (1 + \eta_{m,j}) e_j^m,$$

$$e_{j+1}^f = (1 + \eta_{f,j} l_j + \nu(1 - l_j)) e_j^f.$$
The Female Labor Market:

- Discrete labor supply: \( l_j \in \{0, 1\} \).
- Women cannot work while giving birth.
- Fixed cost \( z_j \) of re-entering labor market.
Technology:

\[ Y_t = A_t K_t^\alpha \left( \theta (L_t^F)^\rho + (1 - \theta)(L_t^M)^\rho \right) \frac{1-\alpha}{\rho}. \]

- Constant productivity growth.
- Constant depreciation at rate $\delta$. 
Government:

\[ G_t + w_t^m L^D_t + (1 + r_t)B_t = B_{t+1} + T_t \]

- Government buys goods \( G_t \) and drafts soldiers \( L^D_t \).
- Financed via government debt \( B_t \) and taxes.
- Proportional taxes on labor and capital income.
- Exemption level for labor income.
What Drives Fertility?

• Typical life cycle for women:
  1. Work for a while.
  2. Exit labor market when first child is born.

• The first child is the marginal child.

• Opportunity cost depends on young female wage.

• Fertility rises when female wage falls relative to male wage.
The World War II Shock:

1. Mobilization:
   - Male labor supply drops by 30 percent.

2. Patriotism:
   - Preference shock matches increase in female labor.

3. Taxes:
   - Government spending shock.
   - Permanent increase in taxes.
Calibration Strategy:

- Match technology to U.S. long-run growth observations.
- Match fertility rate, female labor force participation, experience accumulation, and relative female wages to U.S. data in 1940.
- Match elasticity of fertility response to regression evidence.
Key Calibration Targets:

- Pre-war fertility rate is 2.4.
- Pre-war labor-force participation for women 33 and older is 13 percent.
- Elasticity of substitution between female and male labor is 2.9.
Calibration of Fiscal Impact of War:

- Match increase in government spending during war.
- Government debt matched to debt service in post-war period.
- Labor tax rises from 4 percent to 22 percent from war onwards.
Calibration of Fertility Response:

- Elasticity of fertility and labor supply depends on density of preference distribution.
- Assume uniform distribution.
- Choose density to match regression evidence of impact of mobilization on fertility . . .
- . . . by comparing baseline scenario with counterfactual “peace” scenario, keeping fiscal environment constant.
- Adjust for difference between change in total and cohort fertility rates.
Results

- Model reproduces the main patterns in fertility, labor supply, and wages throughout baby boom period.

- Model accounts for large fraction of change in cohort fertility.

- Model suggests that labor-supply channel accounts for 80 percent of change in fertility, with 20 percent accounted for by fiscal changes.
Cohort Fertility Rate in Data:

![Graph showing fertility rate from 1910 to 1955](chart.png)
Cohort Fertility Rate in Model and Data:

![Graph showing cohort fertility rate with blue and red lines representing model and data respectively. The x-axis represents years from 1910 to 1955, and the y-axis represents completed fertility rate from 1.6 to 3.2.]
Total Fertility Rate in Data:

<table>
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<th>Year</th>
<th>Rate</th>
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<tr>
<td>1940</td>
<td>1.8</td>
</tr>
<tr>
<td>1945</td>
<td>2</td>
</tr>
<tr>
<td>1950</td>
<td>2.2</td>
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<tr>
<td>1955</td>
<td>2.4</td>
</tr>
<tr>
<td>1960</td>
<td>2.6</td>
</tr>
<tr>
<td>1965</td>
<td>2.8</td>
</tr>
<tr>
<td>1970</td>
<td>3</td>
</tr>
<tr>
<td>1975</td>
<td>3.2</td>
</tr>
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![Graph showing total fertility rate from 1940 to 1975](image-url)
Total Fertility Rate in Model and Data:
Average Age at First Birth in Data:
Average Age at First Birth in Model and Data:

<table>
<thead>
<tr>
<th>Year</th>
<th>Model</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>1945</td>
<td>1950</td>
</tr>
<tr>
<td>1950</td>
<td>1960</td>
<td>1970</td>
</tr>
<tr>
<td>1960</td>
<td>1975</td>
<td></td>
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</tbody>
</table>
Labor Market for Young Women in Data:

![Graph showing the change in labor force participation (LFP) for 20-32 year-olds relative to 1940 from 1940 to 1975. The graph shows a decline in LFP from the early 1950s to the mid-1960s, followed by a recovery towards the end of the period.]
Labor Market for Young Women in Model and Data:

![Graph showing LFP 20-32 relative to 1940 from 1940 to 1975. The graph compares model and data, with a notable decline starting in the late 1940s and a recovery by the late 1960s.](image-url)
Wages for Young Women in Data:

![Graph showing change in wage ratio for 20-24 year olds from 1940 to 1975. The graph indicates a decline in the wage ratio from 1940 to 1960, reaching its lowest point in 1960. From 1960 to 1970, the wage ratio shows a significant increase, and then it stabilizes until 1975.]
Wages for Young Women in Model and Data:
 Completed Fertility Rate with Matched Wages:

Baseline result:
Completed Fertility Rate with Matched Wages:

Baseline versus result with time-varying $\theta$: 

![Graph showing completed fertility rate with baseline and matched wage gap]
Fiscal versus Labor Supply Channel:

Baseline result:
Fiscal versus Labor Supply Channel:

Baseline versus simulation without fiscal changes:
The Baby Boom in other Countries

- Most industrialized countries experienced a post-war baby boom.

- Size and duration of boom varies substantially.

- Compare two groups:
  - Countries with similar war experience to U.S.: Canada, Australia, New Zealand.
  - Neutral countries: Sweden, Switzerland, Portugal, Spain, Ireland.
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APPLY AT YOUR NEAREST NATIONAL SERVICE OFFICE
The Baby Boom in Countries Similar to U.S.:
The Baby Boom in Neutral Countries:

United States
Sweden
Switzerland
Spain
Portugal
Ireland
Summary

World War II explains a large portion of the baby boom.
Fertility by Age in the U.S.:
Birth Rate in United States, France, Germany, Ireland, Italy, Japan, and the United Kingdom: