The Baby Boom and World War II: A Macroeconomic Analysis

Matthias Doepke, Moshe Hazan, and Yishay Maoz

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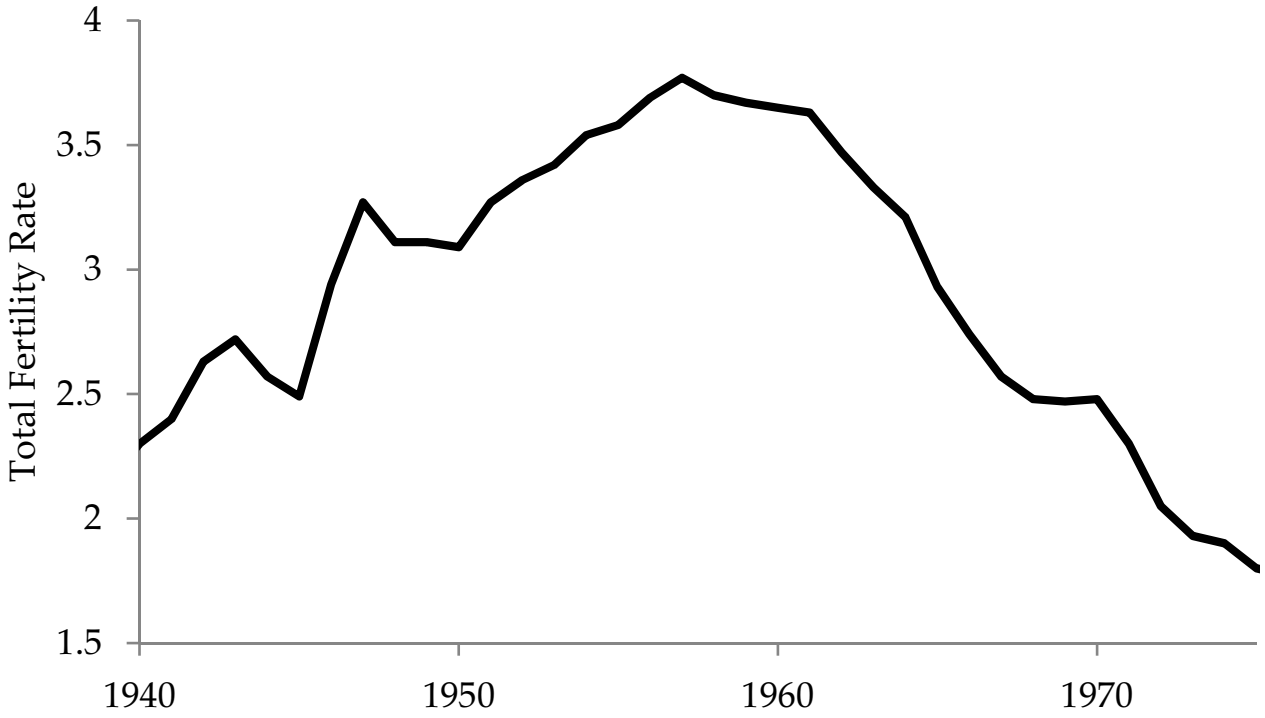
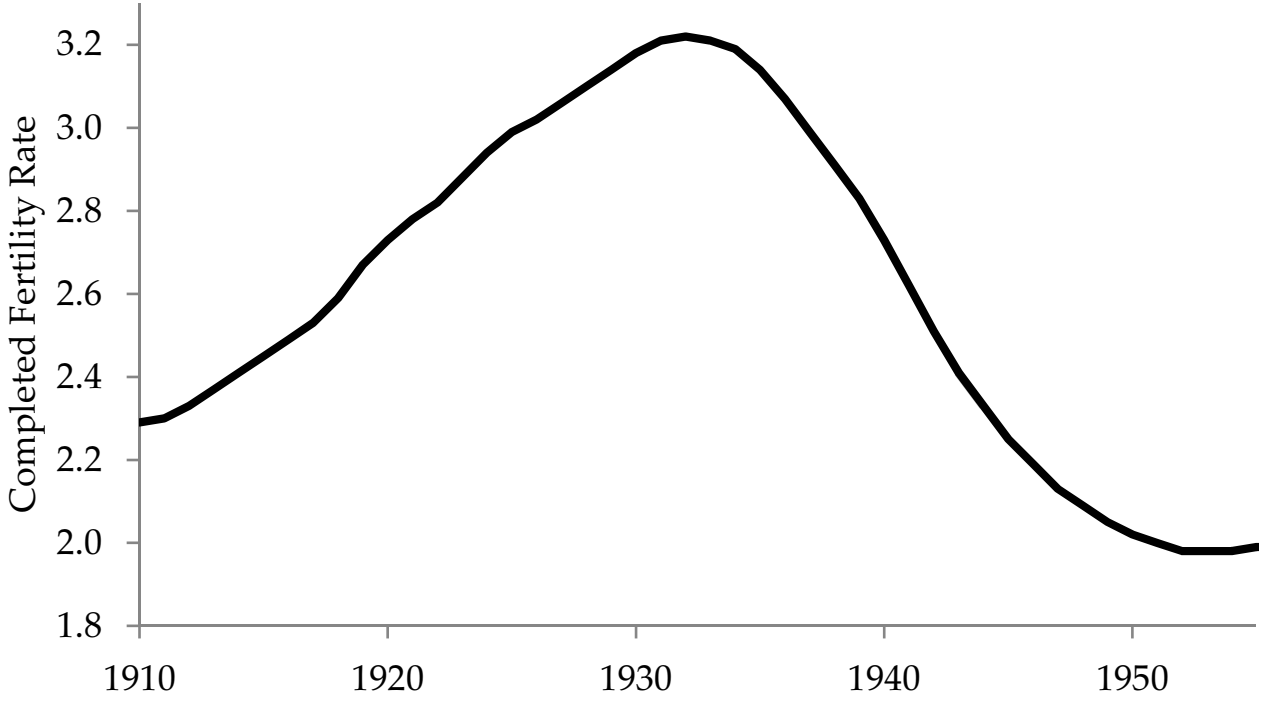
Did World War II cause the baby boom?

The Total Fertility Rate in the United States:



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.

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ROSIE
Norman Rockwell
MEIN
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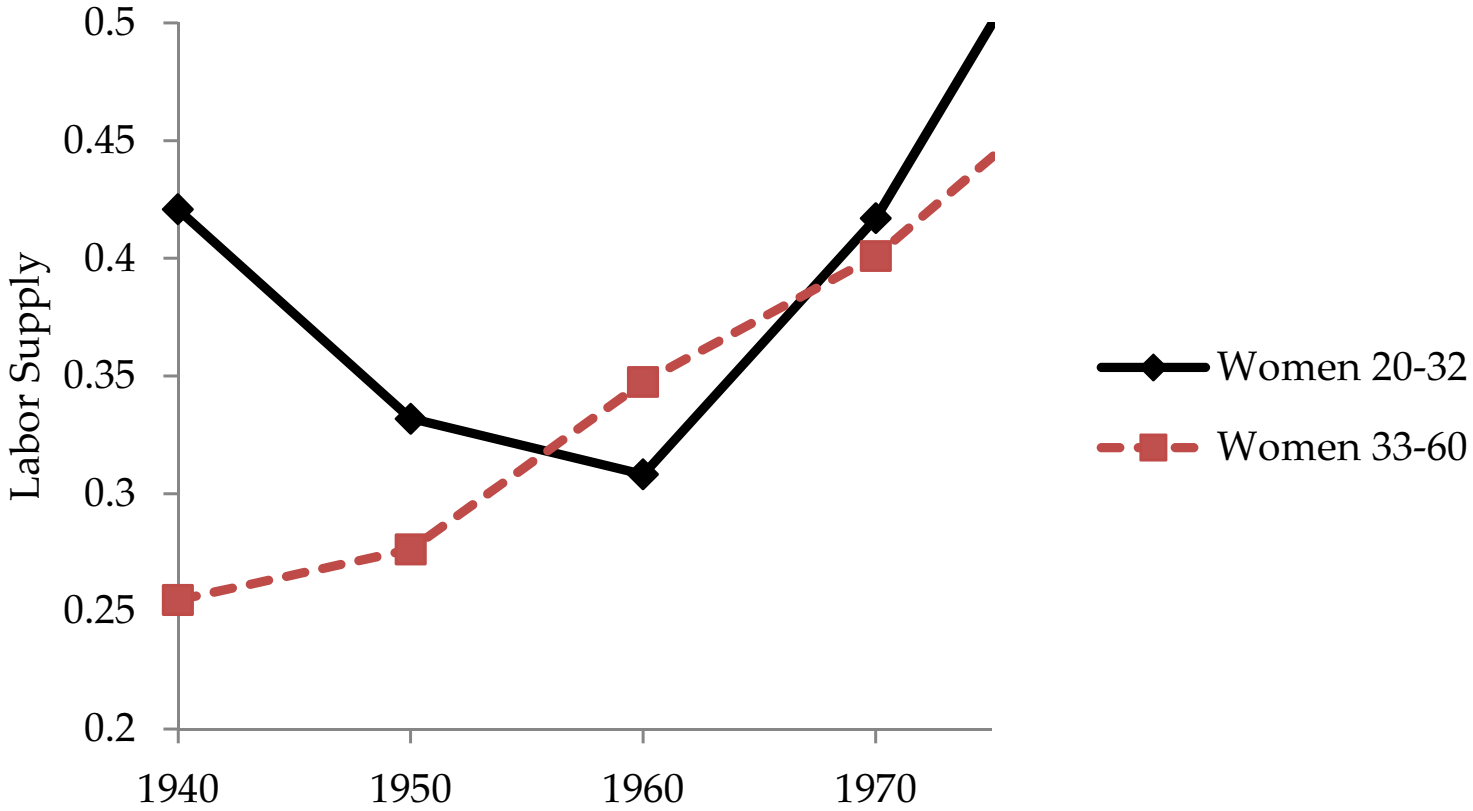
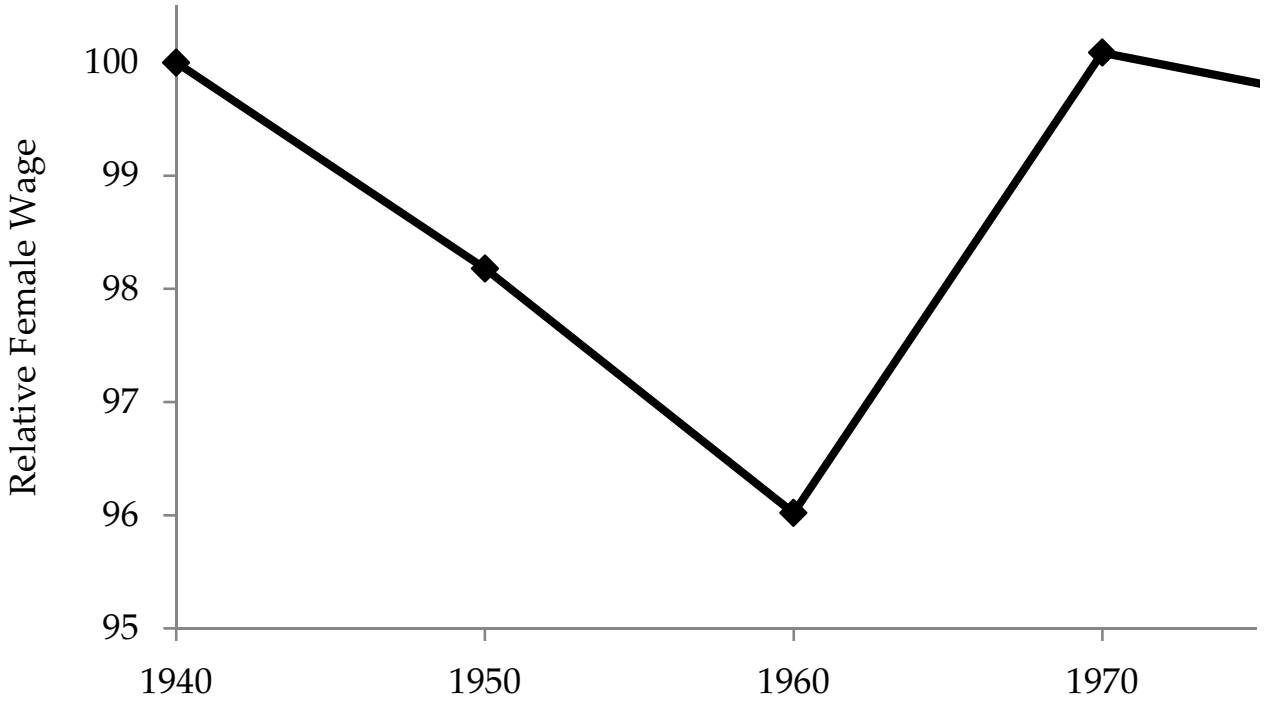
Labor Supply of Young and Old Women in the United States:



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.

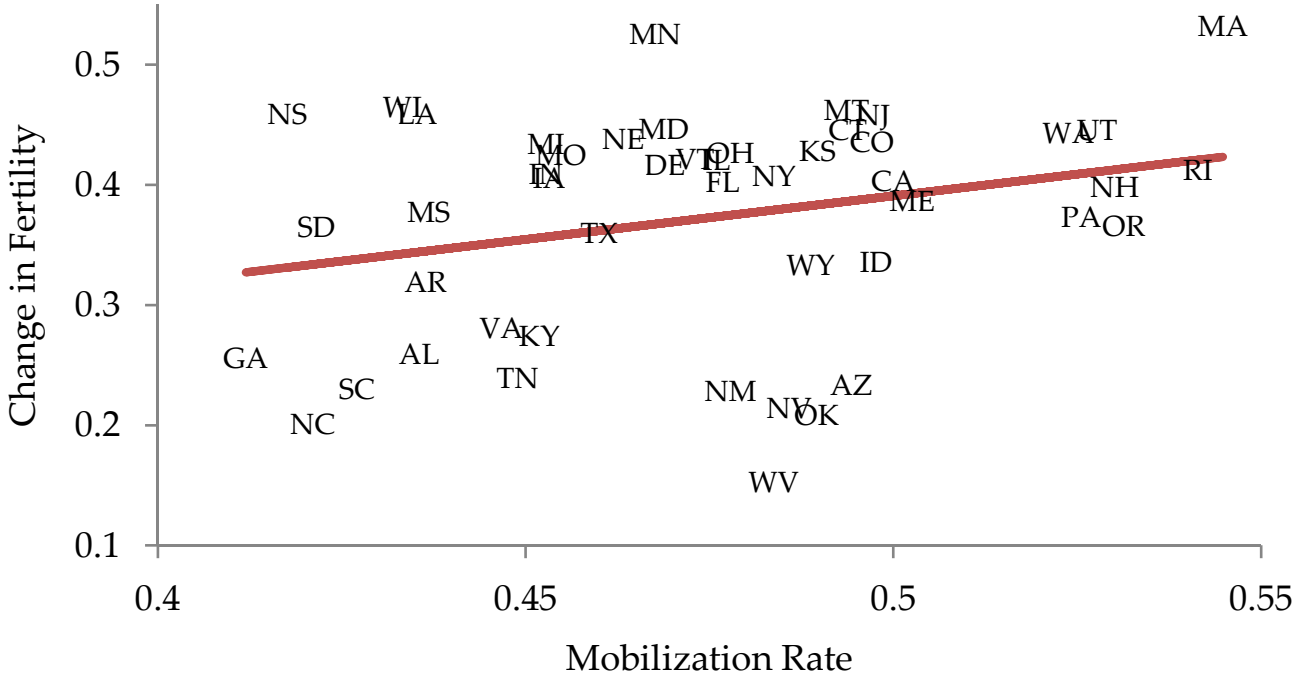
Evidence from Mobilization Rates

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).
- δ_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: φ.

Correlation Between Mobilization and Change in Fertility 1940–1960:



Results for Women Aged 25–35:

Children under Age 5	1.1	0.7	0.6
Weeks Worked	-27.8	-14.5	-5.4
Married	0.4	0.4	
Education and Farm Controls	no	yes	yes
Marital Status Controls	no	no	yes

Results for Women Aged 45–55:

Weeks Worked	14.8	14.8	14.1
Education and Farm Controls	no	yes	yes
Marital Status Controls	no	no	yes

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:

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

subject to:

$$\begin{aligned} c_j + a_{j+1} &= (1 + r_j) a_j + w_j^m e_j^m + w_j^f e_j^f l_j - T_j, \\ x_j &= h - \kappa b_j - \phi (n_j^y)^{\psi} - l_j - z_j, \\ e_{j+1}^m &= (1 + \eta_{m,j}) e_j^m, \\ e_{j+1}^f &= (1 + \eta_{f,j} l_j + \nu(1 - l_j)) e_j^f. \end{aligned}$$

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 δ.

Government:

$$G_t + w_t^m L_t^D + (1 + r_t)B_t = B_{t+1} + T_t$$

- Government buys goods G_t and drafts soldiers L_t^D.
- 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.
  3. Stay home afterwards.
- 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.

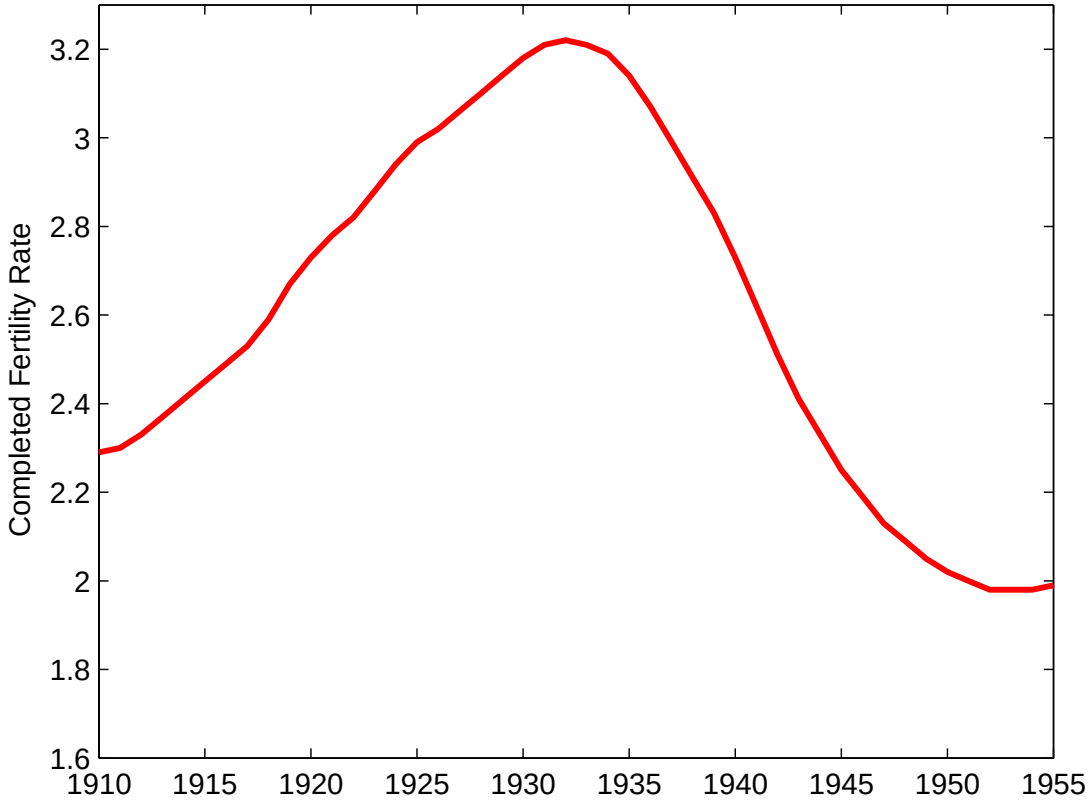
Calibration of Fertility Response:

- 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.

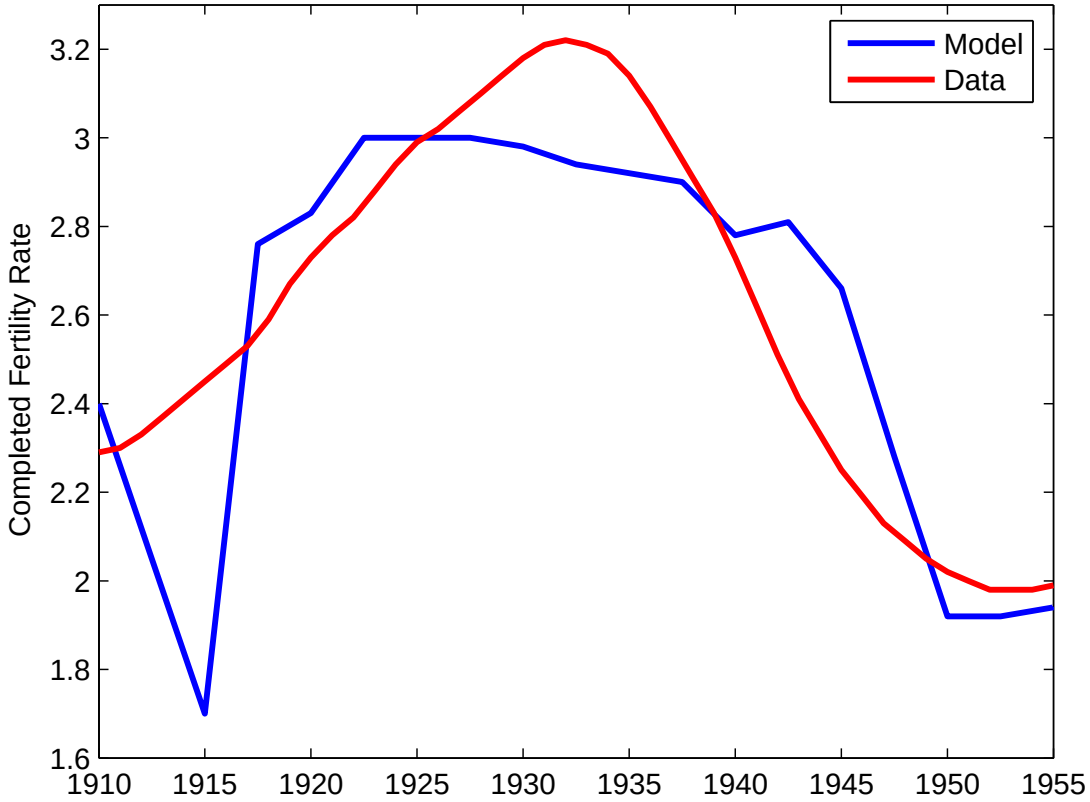
Results

- 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.

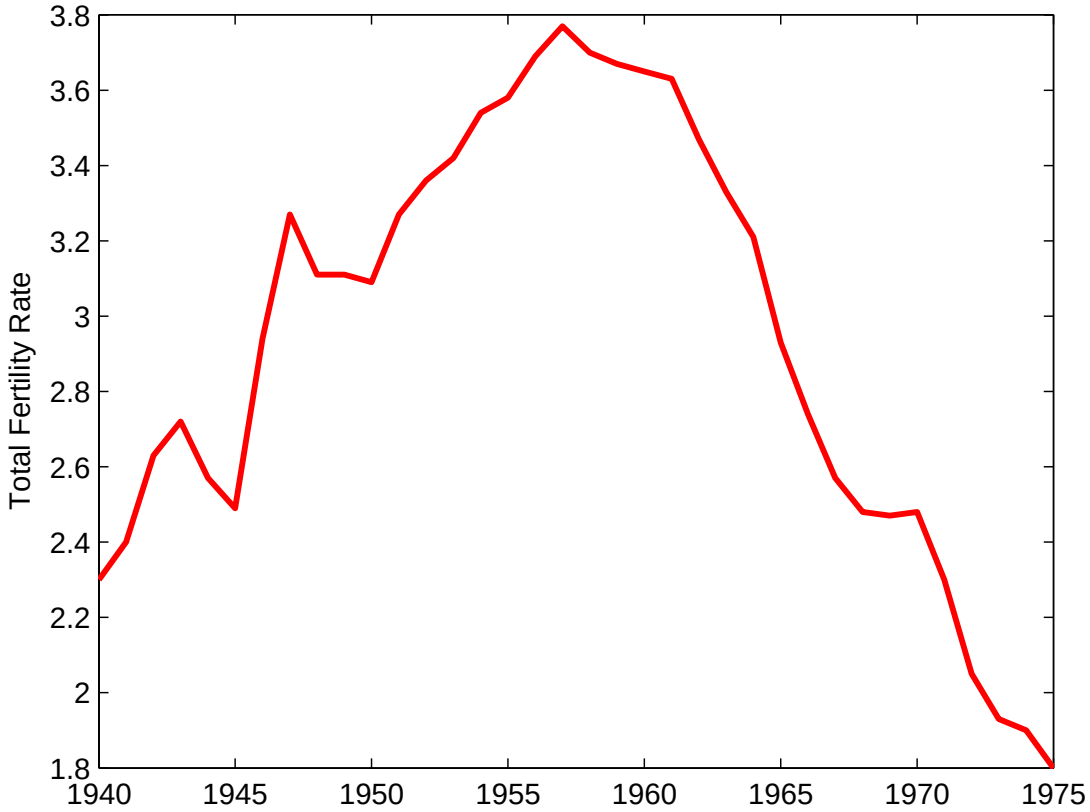
Cohort Fertility Rate in Data:



Cohort Fertility Rate in Model and Data:



Total Fertility Rate in Data:



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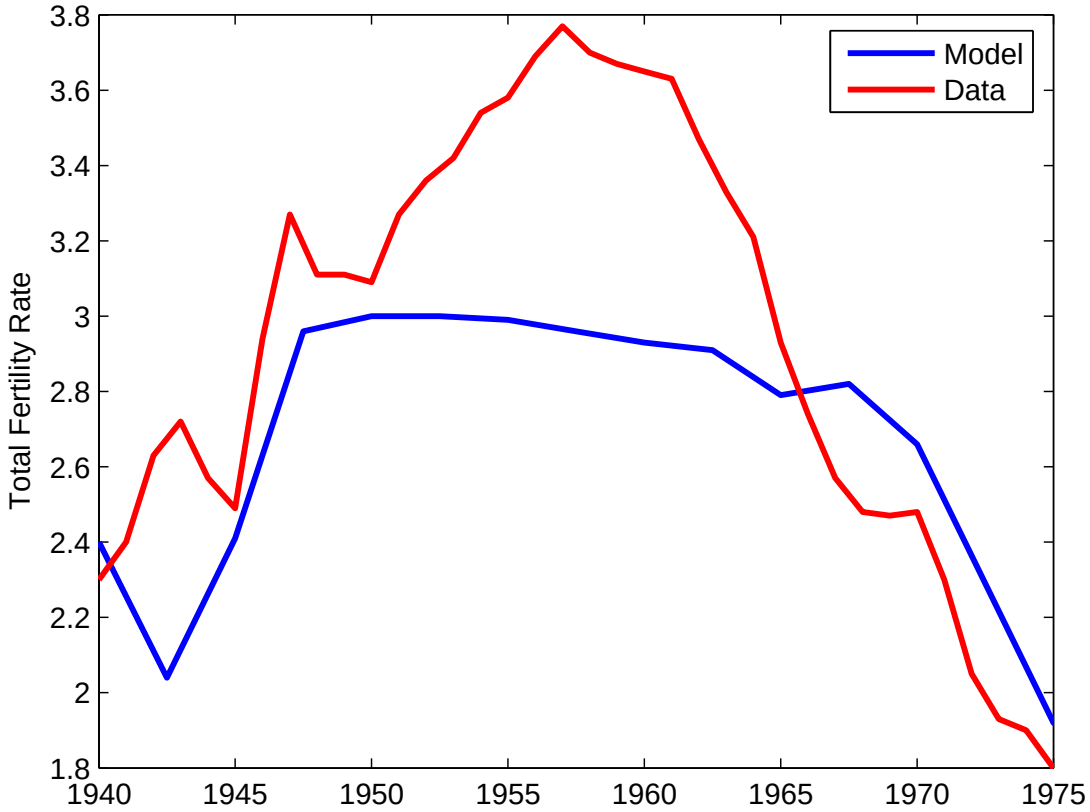
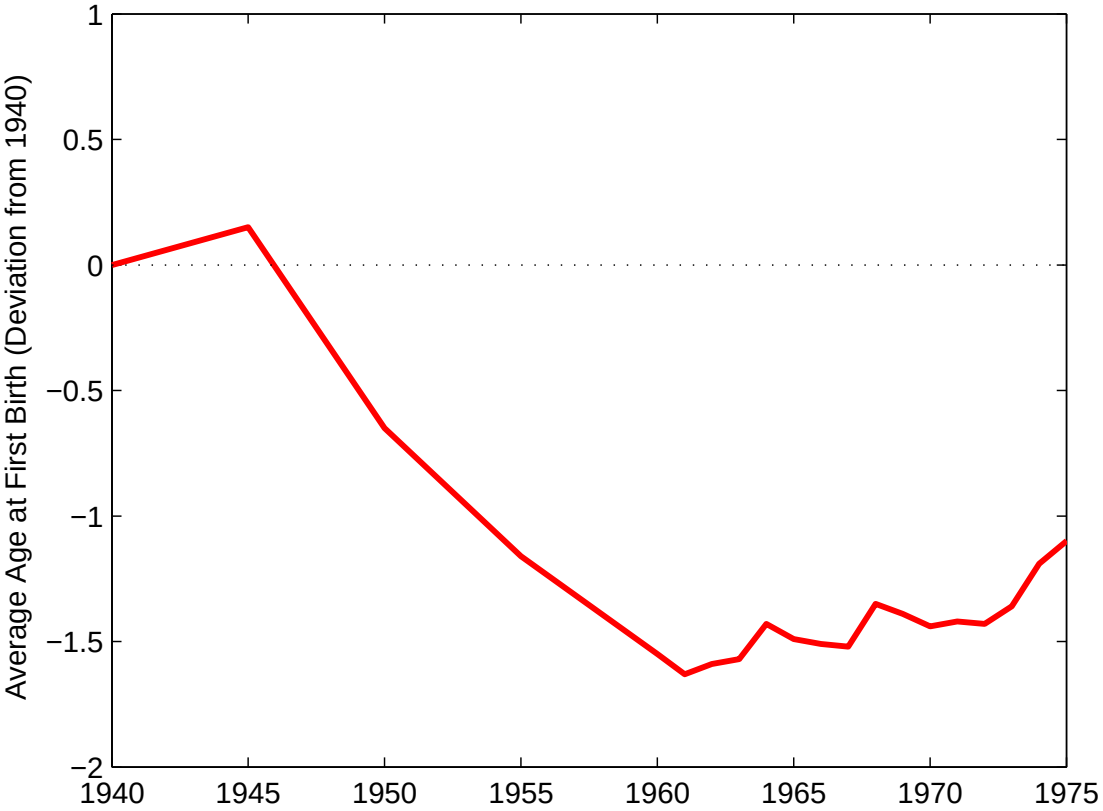


Average Age at First Birth in Data:



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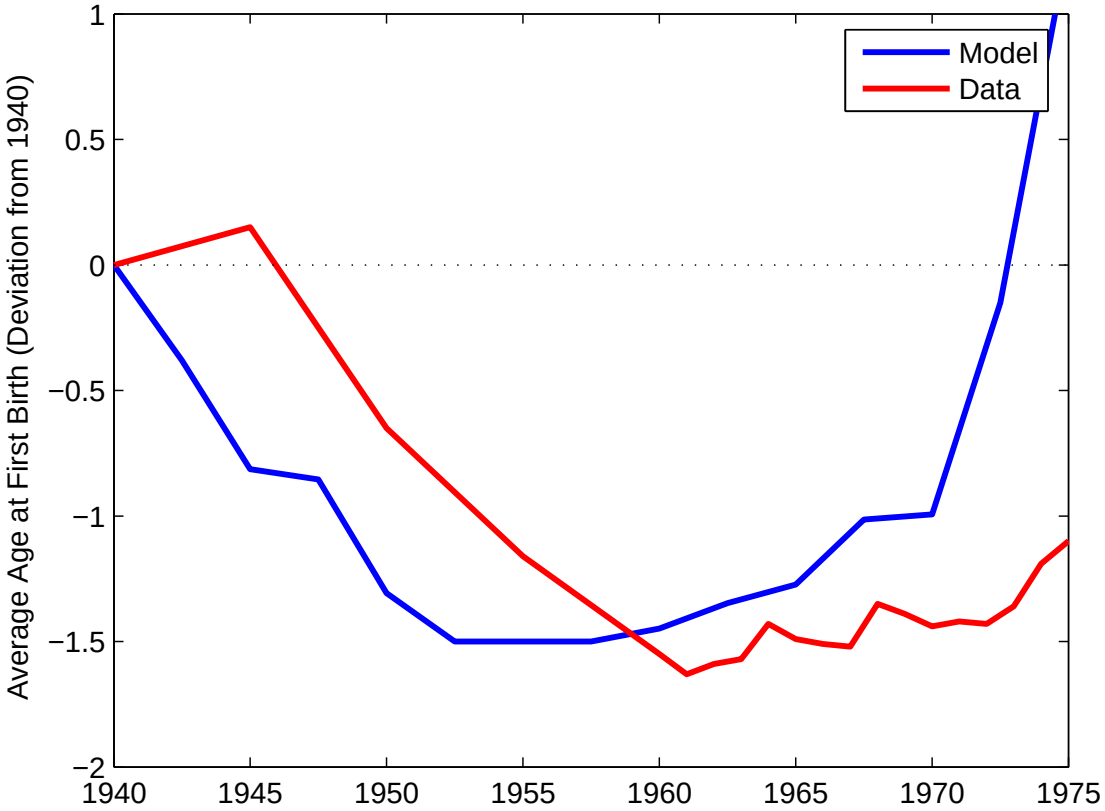
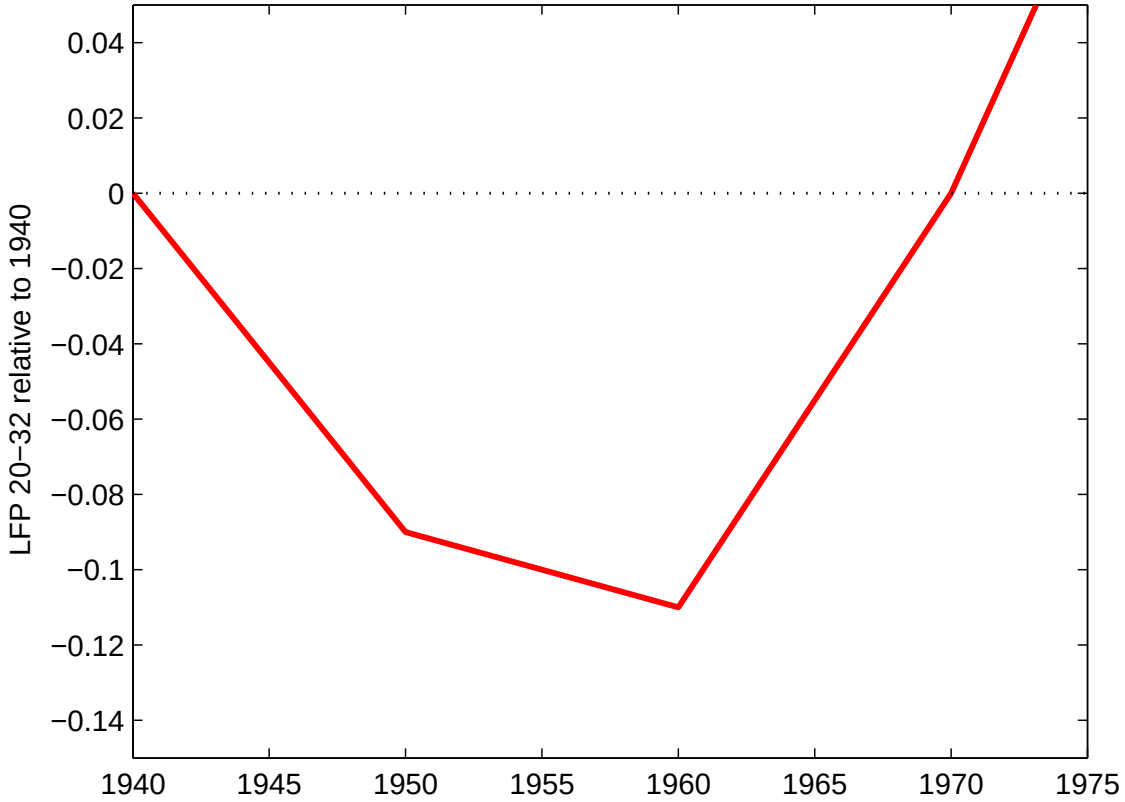


Labor Market for Young Women in Data:



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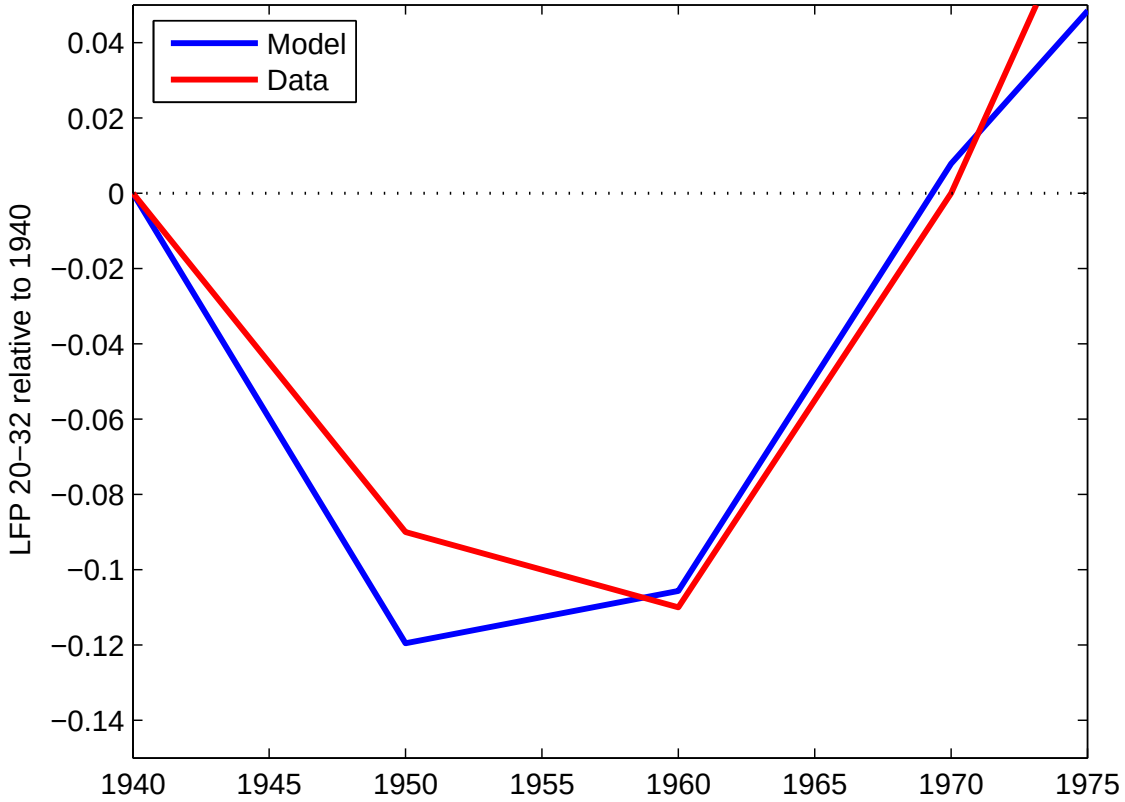
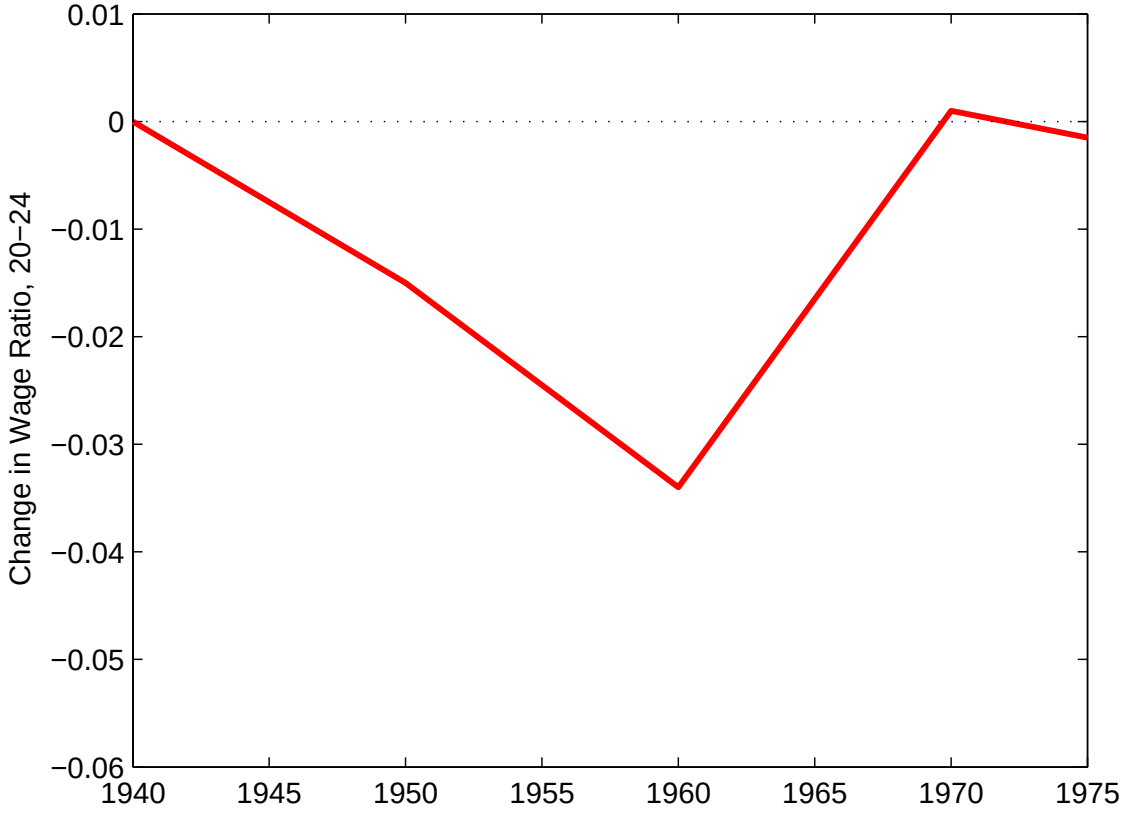


Wages for Young Women in Data:



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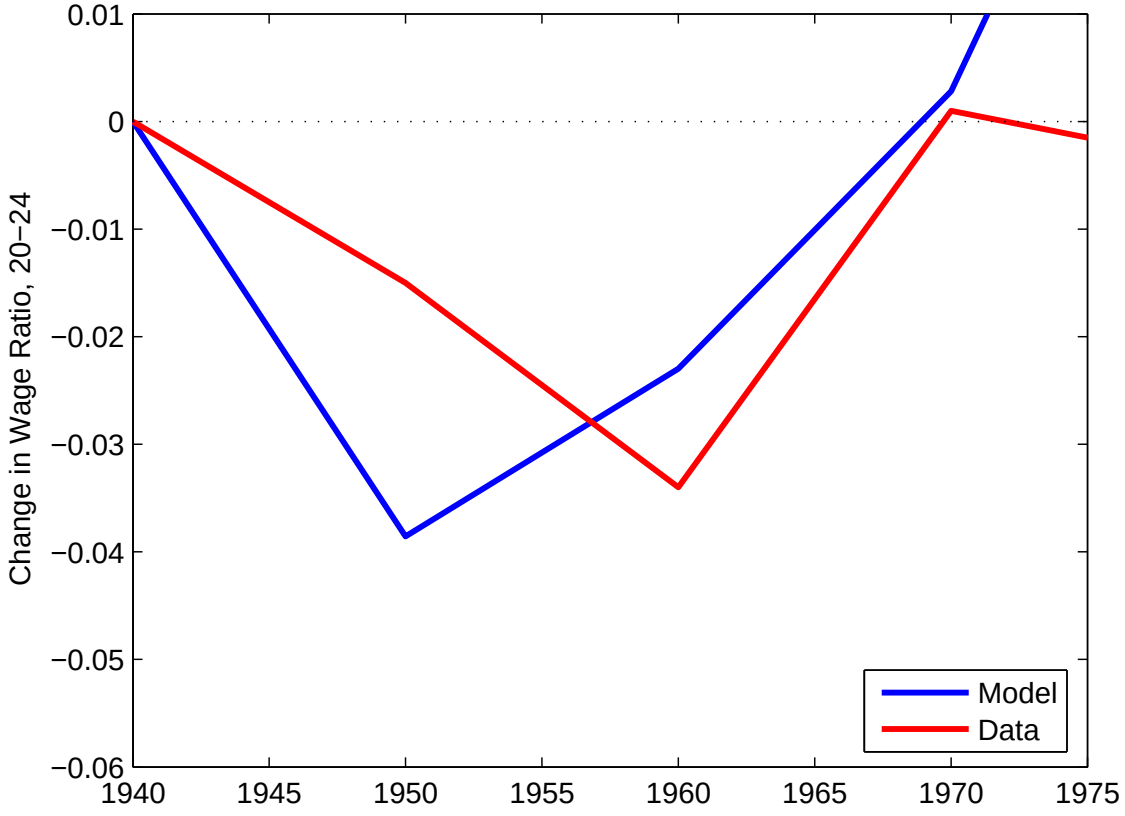
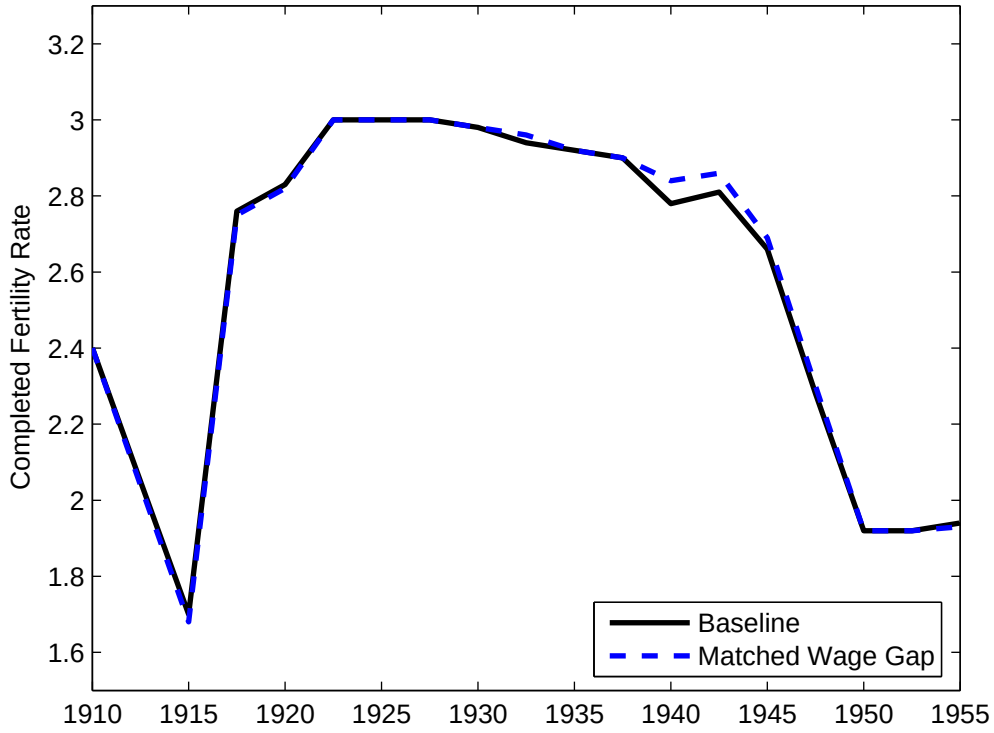


Completed Fertility Rate with Matched Wages:

Baseline result:

Completed Fertility Rate with Matched Wages:

Baseline versus result with time-varying θ:

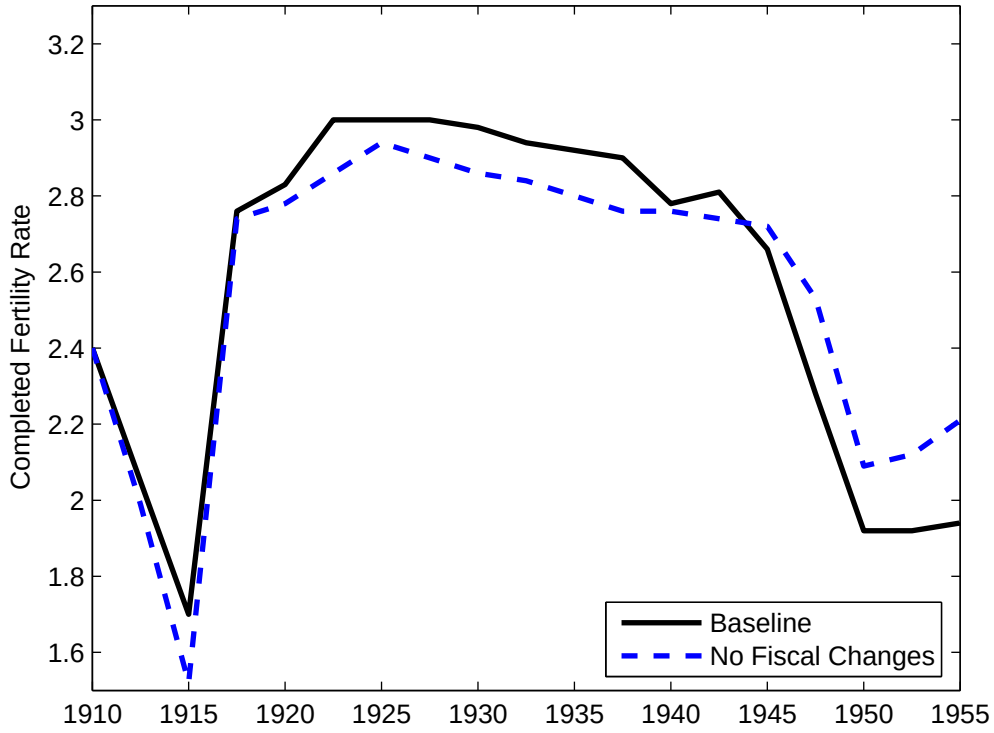


Fiscal versus Labor Supply Channel:

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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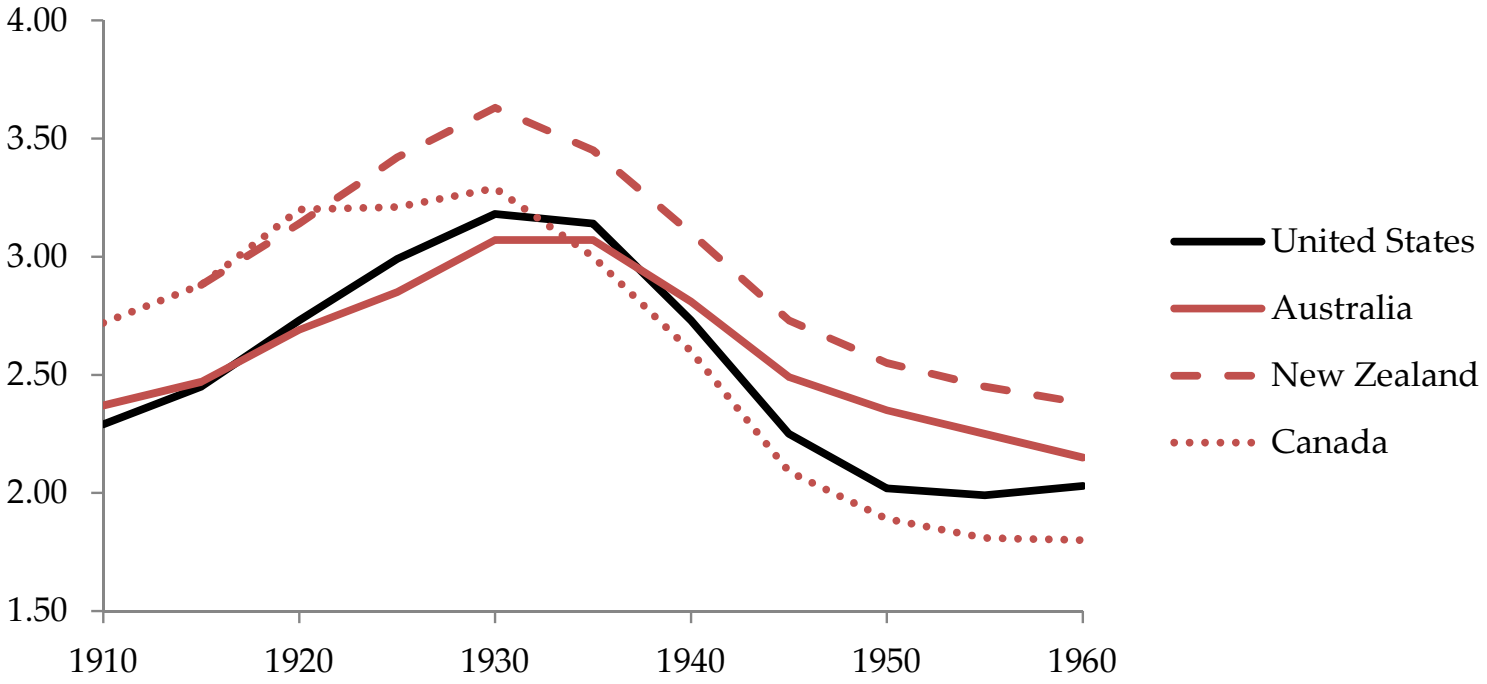
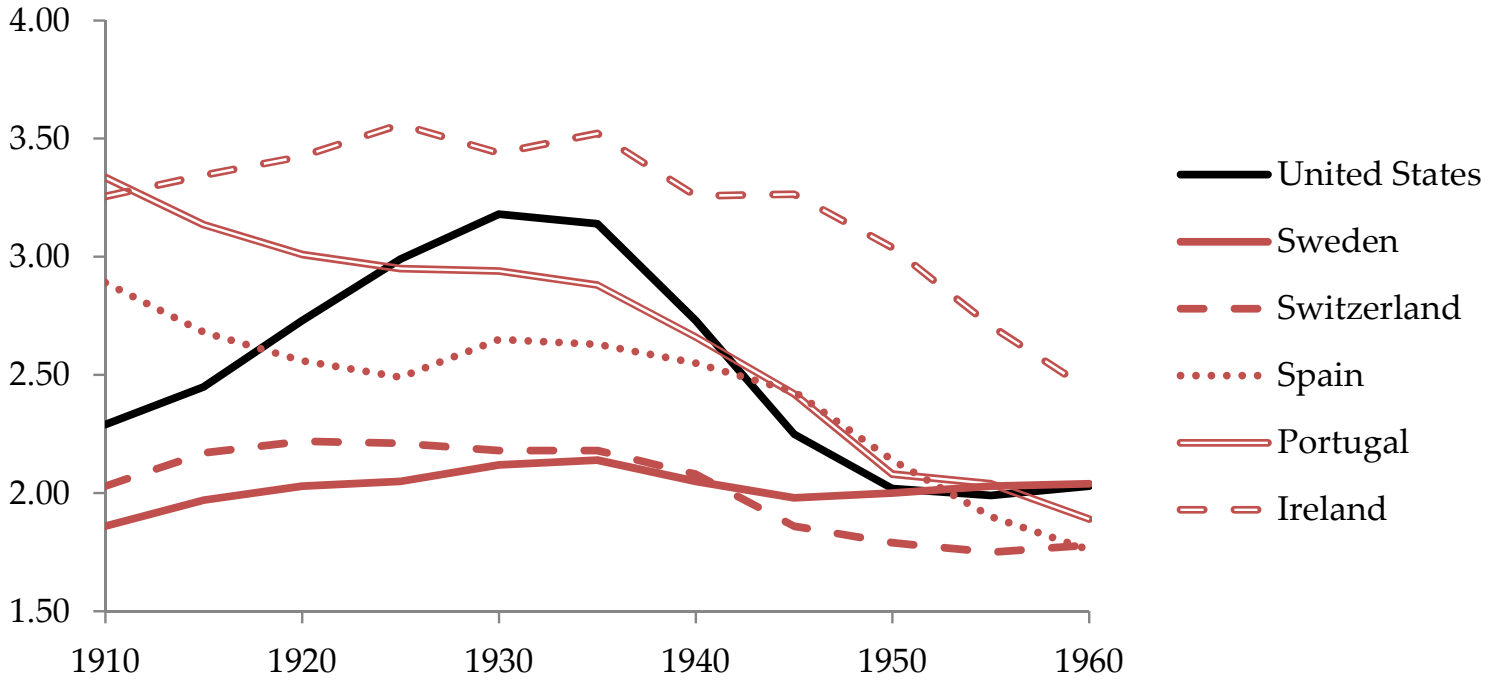
The Baby Boom in Countries Similar to U.S.:



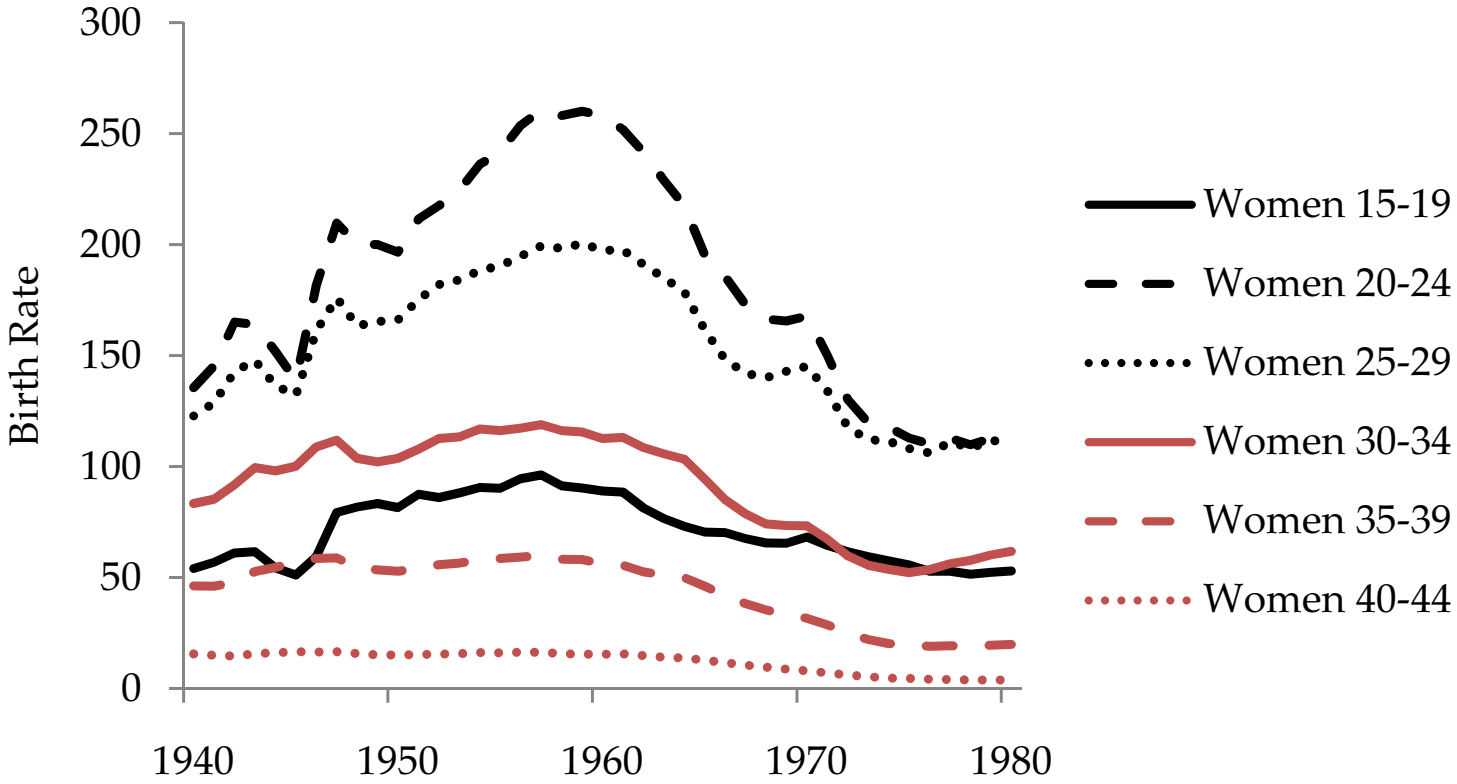
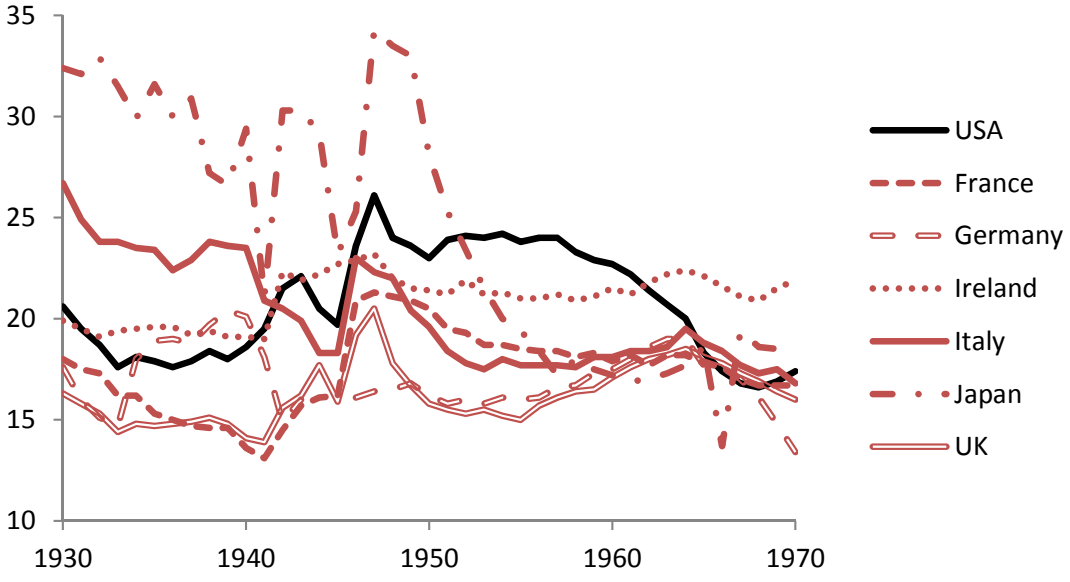
The Baby Boom in Neutral Countries:



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: