

The Disappearing Gender Gap:

The Impact of Divorce, Wages, and Preferences on Education Choices and Women's Work

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Motivation

1935 cohort vs 1955 cohort: Dramatic reduction in gender gap amongst whites

1935 Cohort	1955 Cohort
29% women with some college	44% women with some college
39% men with some college	45% men with some college
40% married women (30-40) worked	70% married women (30-40) worked

Largest change in work and education behavior over any 20 year period.

Many potential causes

- Changes in the economic environment
 - Increase in skill premium
 - Closing of gender wage gap
 - Evidence of higher returns to experience, lower child care costs, technological change in household and workplace
- Change in family structure
 - Lower fertility
 - Probability of divorce doubled
- Change in social preferences (culture)
 - Proportion who approved of a “wife working if her husband was capable of supporting her”: 17% in 1945 → 63% in 1970

This Paper

- Dynamic life-cycle model calibrated to 1935 cohort
- Use model to quantify contributions
 - 1955 divorce rates
 - 1955 family structure
 - 1955 wages
 - All 1955 changes: family and economic structure
 - Role of preferences
- Welfare

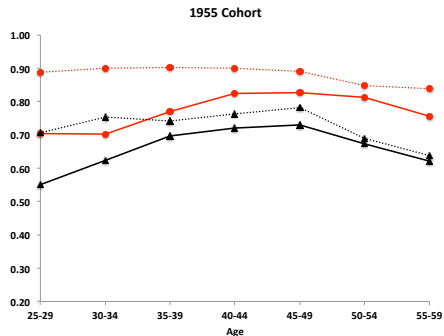
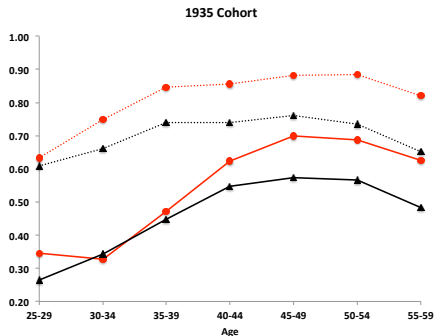
Summary of Findings

- Divorce is key for asymmetric gender effects
 - $\approx 60\%$ of increased LFP married women
 - Closes about half the education gap
- Wage Changes
 - Can also account for some 60% of married women's LFP.
 - Increases gender gap in education
- Family and Wage changes
 - Account for 3/4 of changes in LFP
 - Education gender gap remains as large as before
- Welfare:
 - Conditional on education, no preference changes:
all women worse off, all men better off
 - Ex-ante: all women and men better off in 1955

Data and Facts

- Synthetic cohorts using March CPS (1962-2010)
 - 1935 cohort: born 1934 and 1936
 - 1955 cohort: born 1954 and 1956
- White men and women (no restriction on spouses)
- Condition data on gender-education and marital status
- **Education Facts:** Proportions with some college
 - 1935 Cohort: 29.1% women vs. 39.2% men
 - 1955 Cohort: 43.7% women vs. 44.5% men

Data and Facts: LFP



—●— Married College
 —▲— Married HS
 ···●··· Div College
 ···▲··· Div HS

Data and Facts: Divorce and Remarriage

Divorce and remarriage rates after 20 years
by gender, education, and cohort

		Women		Men	
		HS	College	HS	College
1935 Cohort	Divorce	19.81	16.74	23.94	18.21
	Remarriage	87.62	86.06	87.61	91.27
1955 Cohort	Divorce	38.22	36.53	40.79	31.31
	Remarriage	86.75	85.46	85.86	92.18

Notes: SIPP 2004. Divorce rates are calculated as the proportion of first marriages which end in divorce before the 20th wedding anniversary. Remarriage rates are calculated as the proportion of people who remarry before they reach the 20th anniversary of their first divorce. Birth cohorts are defined as people born in a five year interval centered on the year of the birth cohort.

Demographics and Life-cycle

- Life-cycle model
- Agents born female or male, $g \in \{f, m\}$
- Ability endowment θ
- 3 life stages: (model period is 5 years)
 - $t = 0$: education and initial marriage market
 - $t = 1$ to 7 : working life beginning at age 25
 - $t = 8$ to 12 : retirement at age 60 ($t^R = 8$) and die at age 85 ($T = 12$)
- Endogenous choices: education, saving/consumption, female LFP
- Exogenous variables (conditioned on e, g, t, s): fertility and marital status shocks

Preferences, Market Structure and Endowments

- Preferences (by education e , gender g , marital status s):

$$U_{eg}(c_t, P_t; s) = \frac{c_t^{1-\sigma}}{1-\sigma} - \psi_{eg}^s(k_t)P_t$$

where k_t = vector with ages of kids

- Households save through risk-free bonds with exogenously set interest rate r
- Wage draws during working life:

$$\ln y_{egt}(\theta, x_t, z_t, P_{t-1}) = \tau_{eg,t} + \gamma_{eg1}x_t + \gamma_{eg2}x_t^2 + \lambda_e \ln \theta - \delta(1 - P_{t-1}) + z_{et}$$

- θ : ability draw
- x_t : experience
- z_t : AR(1) persistent stochastic component of wages
- P_{t-1} : participation last period

The Initial Stage: $t = 0$

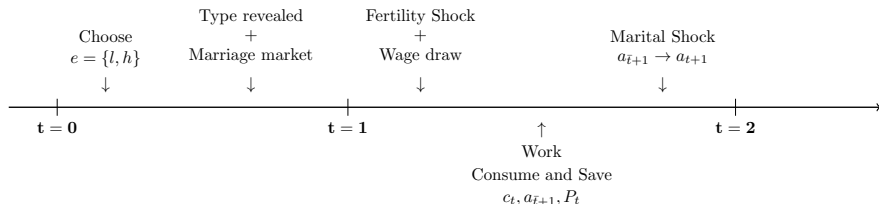
- Education choice:
 - Individuals have ability θ
 - Draw psychic cost $\omega_i \sim C^E(\omega)$
 - Choose $e \in \{h, l\}$ to solve:

$$V_{eg,t_0}(\theta, \omega) = \max_{e \in \{l, h\}} \{-\omega + \mathbb{E} V_{hg, \bar{t}_0}^s(\theta), \mathbb{E} V_{lg, \bar{t}_0}^s(\theta)\}$$

- Enter initial marriage market:
 - Emerge with marital status $s \in \{\mathbf{s}, \mathbf{m}, \mathbf{d}\}$
 - Permanent spousal type (characteristics of actual/potential spouse) revealed: ζ_{it} includes ability, education, persistent component of wages, assets...

Working Periods: $t = 1, \dots, 8$

- Make consumption, savings, and LFP decisions
- Subject to marital, fertility, and income shocks



Divorce

- Agents remain divorced at least one period
- Children reside with mother upon divorce
- Assets split: α for wife and $1 - \alpha$ for husband
- Man pays child support if ex-wife is not remarried and child < 20
- For computational simplicity, both spouses remarry at same time
- Upon retirement, ex-wife receives portion of husband's retirement income if she is not married

Budget Constraints : Married

$$\hat{c}_t(k_t) + a_{t+1}^m = Ra_t^m + [y_{eft} - \kappa(k_t)]P_t + y_{emt}$$

where

$$c_t = \frac{\hat{c}_t}{\mathbf{e}(k_t; s)}$$

law of motion for $a_{g,t+1}^s$:

$$a_{g,t+1}^s = \begin{cases} a_{t+1}^m = a_{t+1}^m & \text{if } s_{t+1} = \mathbf{m}, g = m, f \\ a_{f,t+1}^d = \alpha a_{t+1}^m & \text{if } s_{t+1} = \mathbf{d}, g = f \\ a_{m,t+1}^d = (1 - \alpha) a_{t+1}^m & \text{if } s_{t+1} = \mathbf{d}, g = m \end{cases}$$

Optimization Problems: Married Household

- State Vector: $\Omega_{it} = \{e_i, \theta_i, a_{it}, x_{i,t-1}, P_{i,t-1}, k_t, z_{it}, \zeta_{it}\}$

$$\begin{aligned}
 V_t^m(\Omega_t) = & \max_{c_t, P_t, a_{t+1}^m} \chi \left[\frac{c_t^{1-\sigma}}{1-\sigma} - \psi_e^m(k_t) P_t \right] + (1-\chi) \left[\frac{c_t^{1-\sigma}}{1-\sigma} \right] \\
 & + (1 - d_{egt}) \beta \mathbb{E} [V_{t+1}^m(\Omega_{t+1} | \Omega_t)] \\
 & + d_{egt} \beta \{ \chi \mathbb{E} [V_{f,t+1}^d(\Omega_{f,t+1} | \Omega_t)] + (1-\chi) \mathbb{E} [V_{m,t+1}^d(\Omega_{m,t+1} | \Omega_t)] \}
 \end{aligned}$$

s.t. the budget constraint for married couples

and asset law of motion

and $x_{t+1} = x_t + P_t$

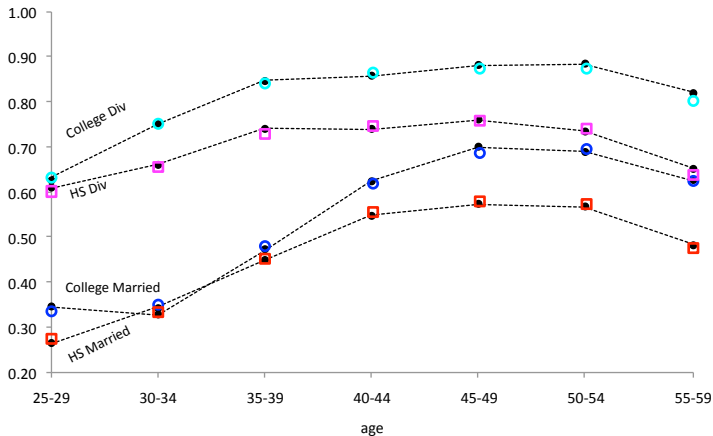
Parameters set Externally:

- CRRRA (1.5), discount factor (0.98/yr), interest rate (1.5%/yr) set to standard values
- Pareto weight for wife ($\chi = 0.3$) and asset split ($\alpha = 0.5$)
- 2% return for an additional year of experience for women between 25-40
- Probability of college spouse by own e, g match proportions in data
- Probability of marriage, divorce, and remarriage set to generate per-period probabilities in data
- Fertility shocks to generate the average number of children for women by e
- McClements scale for consumption deflation
- Child support of 10% of husband's income
- Parameters for income process estimated directly from the NLSY79 data (PSID for year intercepts)

Parameters set Internally

- Internally calibrate parameters for: (28)
 - Disutility from labor (by marital status, education, and children)
 - Childcare costs
 - Wage depreciation
 - Education costs (by gender)
- To match: (45)
 - LFP rates for married and divorced women by education in each period
 - Gender wage gaps by period
 - Skill premia by period
 - Proportions of men and women who have at least one year of college

LFP: model vs data

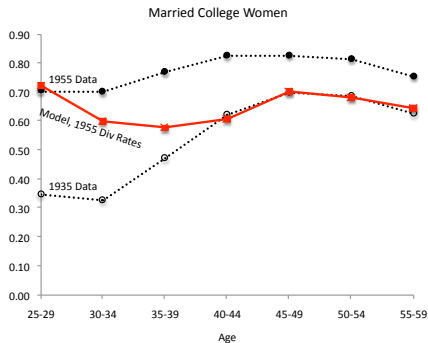
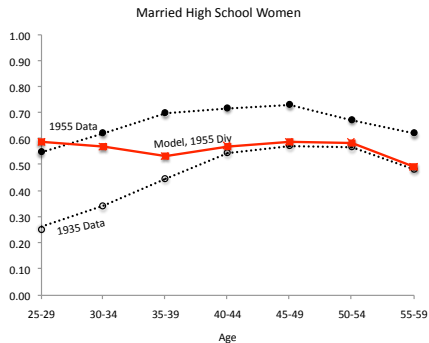


1955 Divorce Profile

- The average per period probability of divorce 5.5% → 9.1%
- **Education:** divorce alone can close almost half (49.0%) of the initial education gender gap
 - Proportion college women: 29.1% → 30.7% (43.7% in 1955)
 - Proportion college men: 39.2% → 35.9% (44.2% in 1955)
- **Work:** during the first 2 periods of life
 - Married college women: LFP ↑ 33 percentage points
 - Married HS women: LFP ↑ 28 percentage points

1955 Divorce Profile

Model predictions for married women with 1955 divorce profile

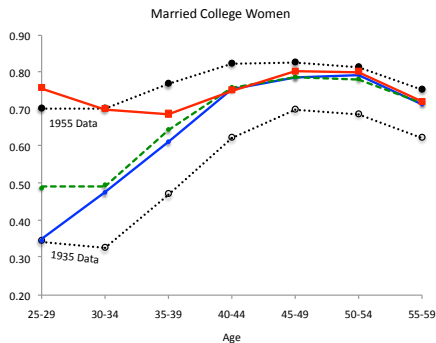
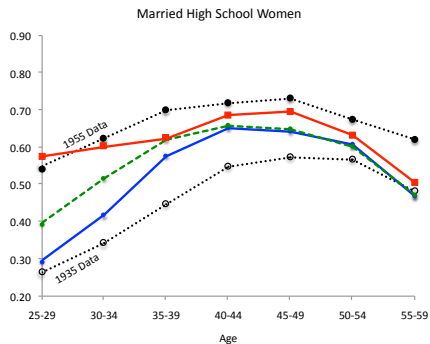


1955 Wages and Family

- Family in 1955
 - Increased probability of college spouse
 - The marriage and remarriage probabilities
 - The initial distribution of marital states (e.g. later marriage)
 - Fertility patterns
 - Childcare costs decrease by 20%
- Wages in 1955
 - Skill premium: 1.42 \rightarrow 1.54 (**men**), 1.38 \rightarrow 1.50 (**women**)
 - Ratio of female to male wages: 0.61 \rightarrow 0.72
 - Returns to experience: 2% \rightarrow 3% (Olivetti (2006) finds 90% \uparrow)

1955 Wages and Family

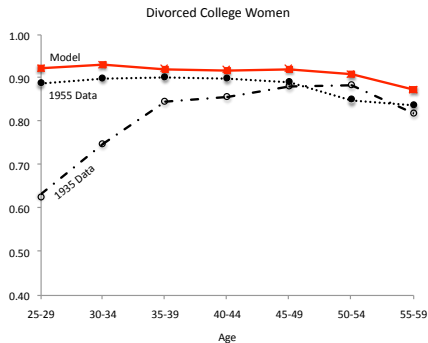
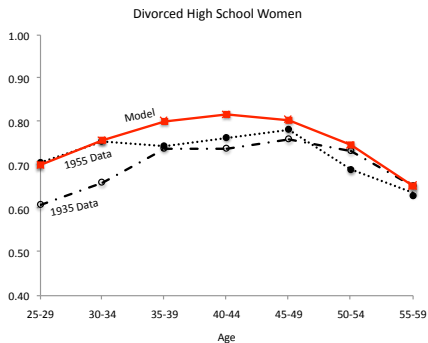
Model predictions for married women with various 1955 wage and family structure changes



—●— Skill Premium + Gender Gap
 - -●- - All Wages
 —■— Wages + Family

1955 Wages and Family

Model predictions for divorced women with all 1955 wage and family structure changes



1955 Wages and Family

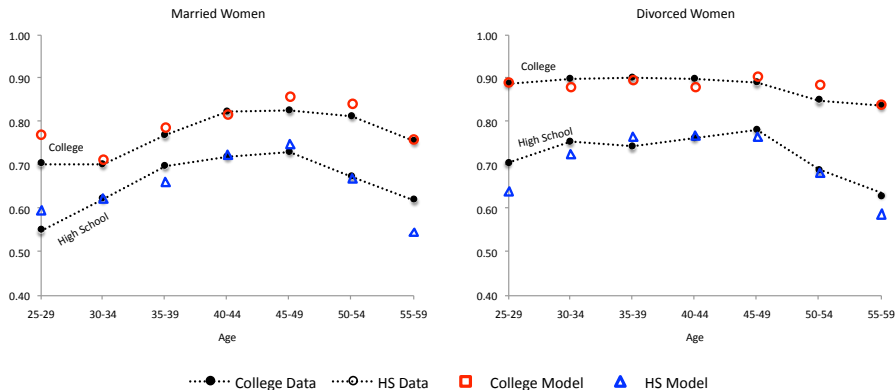
- Education: proportion going to college
 - Women: 29.1% \rightarrow 38.7%
 - Men: 39.2% \rightarrow 49.5%
- \Rightarrow same 10 percentage point gap in education as in 1935
- Need to change costs of education
 - Female average education costs \downarrow 28.1% \implies 43.7% college
 - Male average education costs \uparrow 30.6% \implies 44.2% college
- Negligible effects on LFP, conditional on education and marital status

1955 Wages, Family and Preferences

- Social attitudes towards women changed dramatically across the two cohorts
 - Proportion who approved of a “wife working if her husband was capable of supporting her”: 17% in 1945 → 63% in 1970
- Can simple change in work preferences account for the remaining LFP?
- Little quantitative evidence to discipline preference changes
 - Proportional **decrease of 10%** in all married women’s work disutilities
 - Divorced women’s work disutilities same as married women’s

1955 Wages, Family and Preferences

Model predictions with all 1955 wage and family structure and preference changes



Welfare: Ex-Ante

Conditional only on gender:

$$\sum_{t=t_0}^T \sum_{\theta} \sum_e \pi_{1955}^{eg}(\theta) \beta^{t-t_0} \mathbb{E} V_{egt}^{1955}(z, \theta) = \sum_{t=t_0}^T \sum_{\theta} \sum_e \pi_{1935}^{eg}(\theta) \beta^{t-t_0} \mathbb{E} V_{egt}^{1935}(\theta)$$

Women and men are **both better off in 1955**:

- Women in 1955 would require a 5.4% decrease in consumption
- Men in 1955 would require a 14.7% decrease in consumption

Concluding remarks and future work

- Divorce alone accounts for $\approx 60\%$ of increased LFP married women (ages 25-40). Some closing of education gap.
- All family and wage changes account for 3/4 of changes in LFP married women. Education gap remains
- Shown quantitative importance of divorce.
- Next step: endogenous marriage and divorce decisions?