Why do married females wage increased?

by

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Preliminary Draft

Outline

- Reconsider the married/non-married females and males dynamics in the labor market:

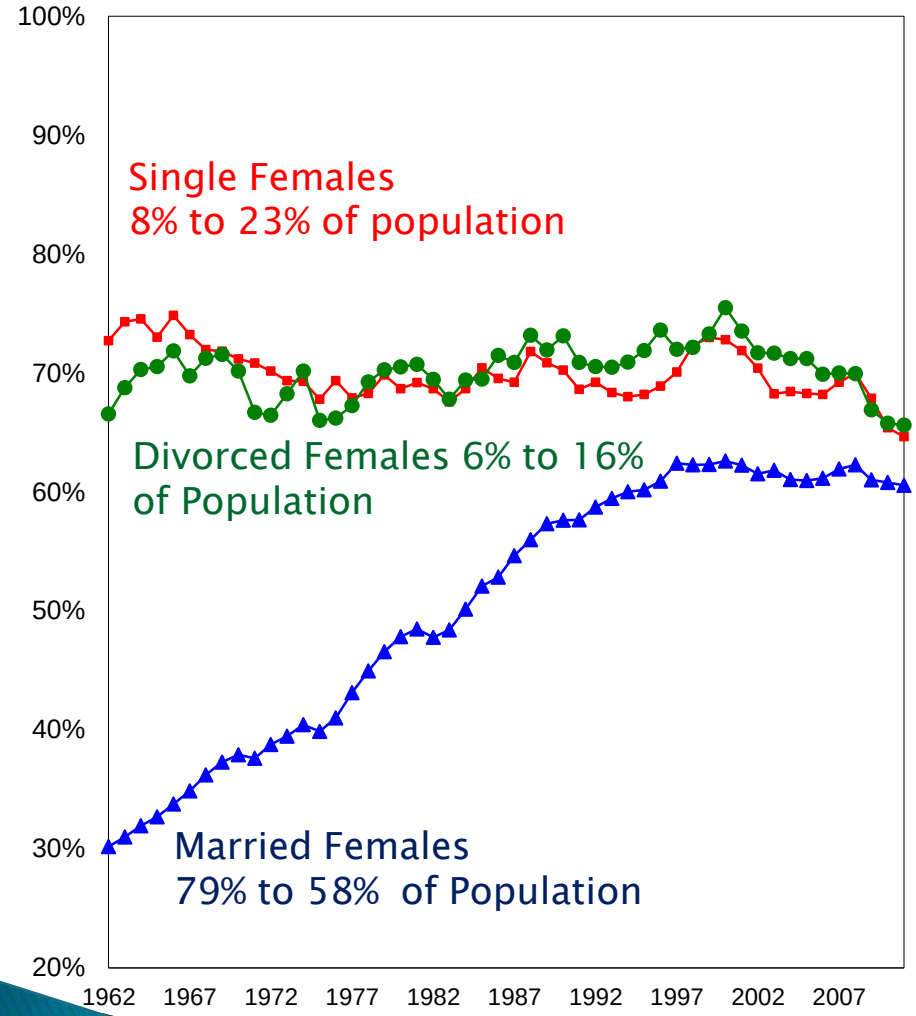
- Data
- Questions
- Model
- Preliminary results

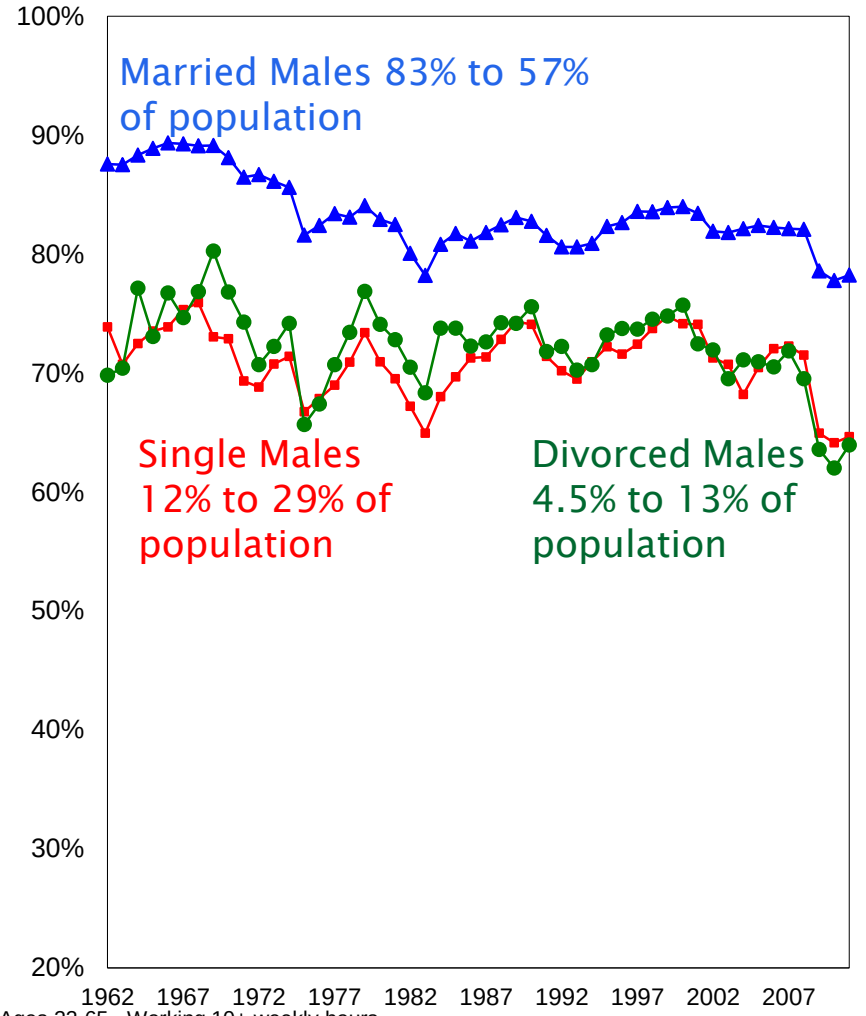
Labor Market Data for Married, Divorced and Single

CPS Data, 22-65: 1962-2011

Employment Rates

Married Female Employment Increased
Non-Married Employment Fluctuates

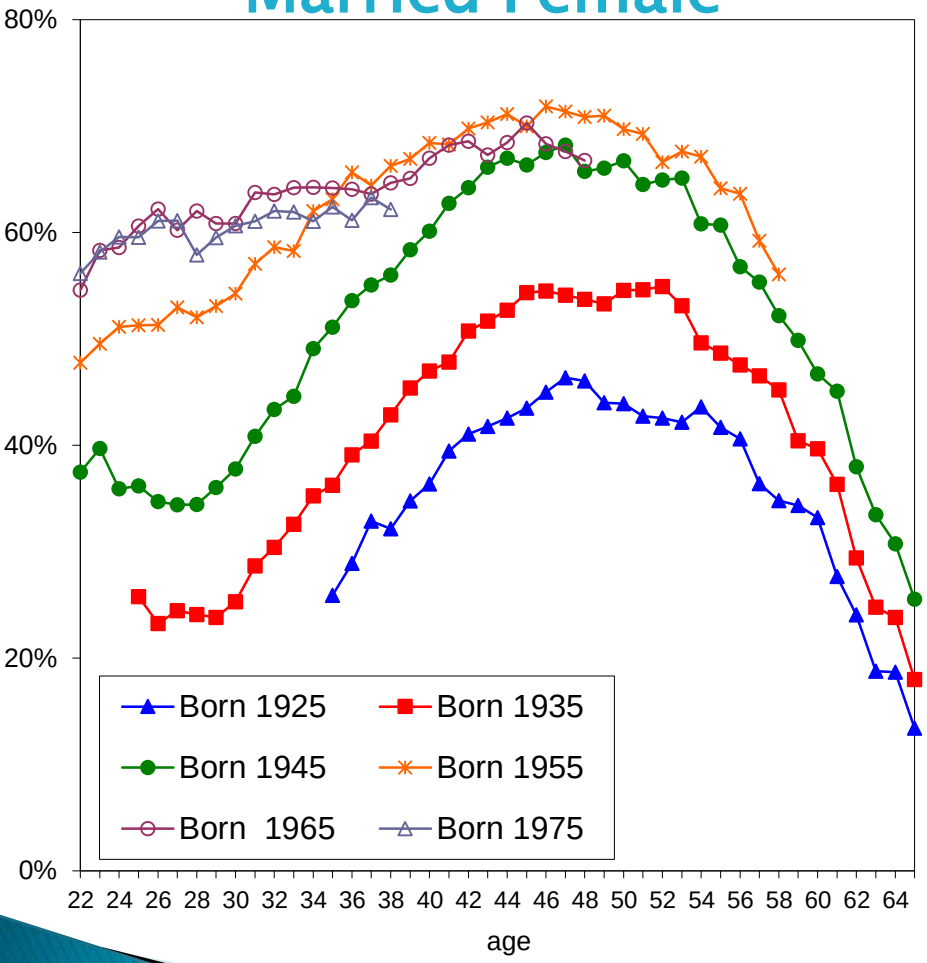




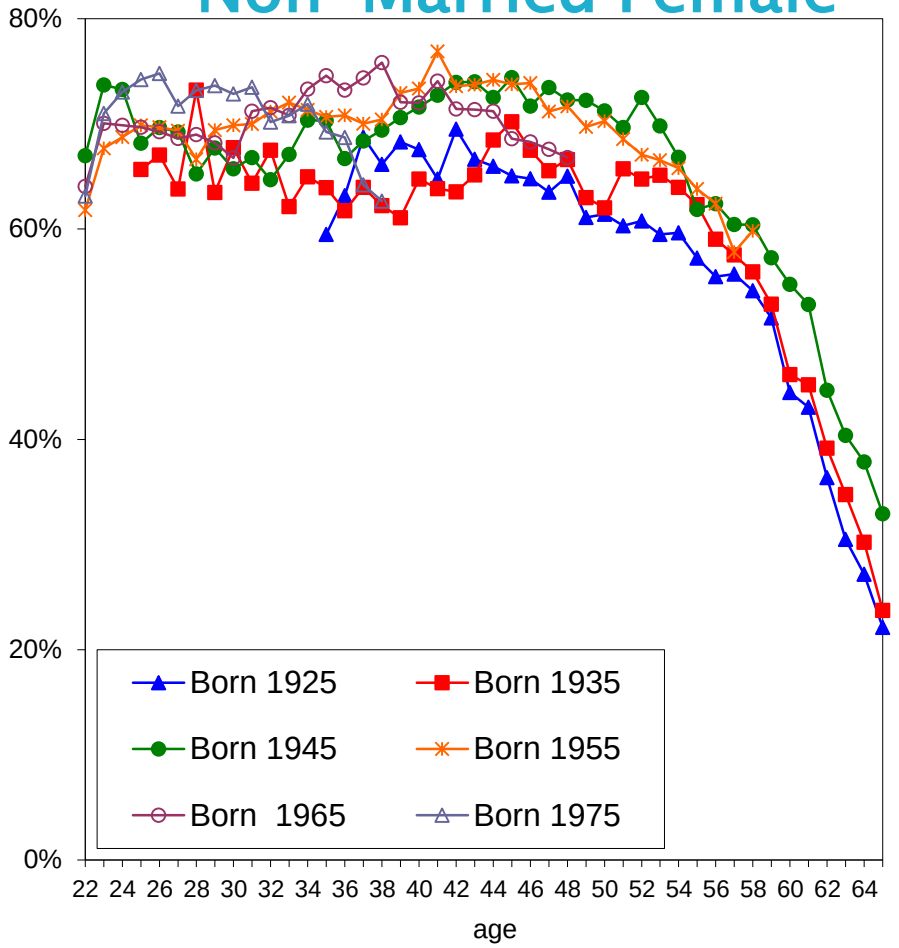
Ages 22-65. Working 10+ weekly hours.

Female Employment Rates by Cohort only Married Female Employment increases by cohort

Married Female



Non-Married Female

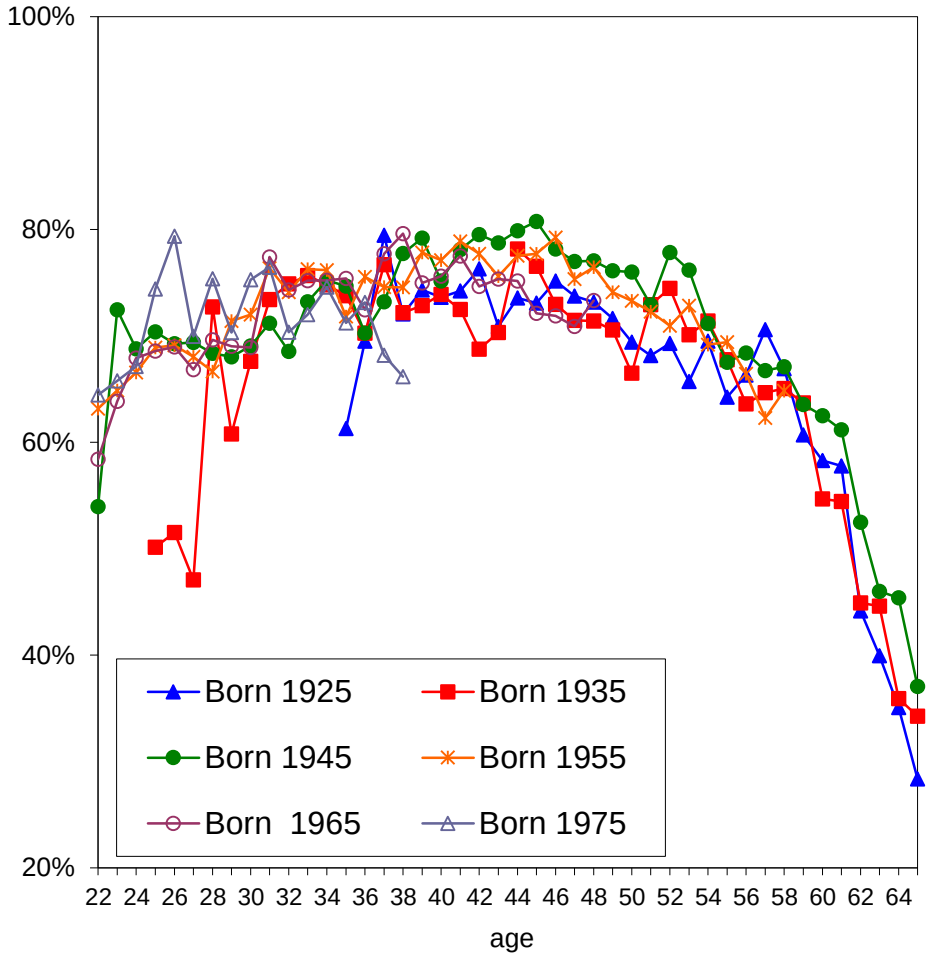


Years 1962-2011. Proportion of women working 10+ weekly hours.

Employment Rates of Divorced Females with Children by Cohort

- Why does the pattern for divorced female with children is not as for married female?
- Can the difference from married be explained by change in home production technology?

  (Greenwood at el.)

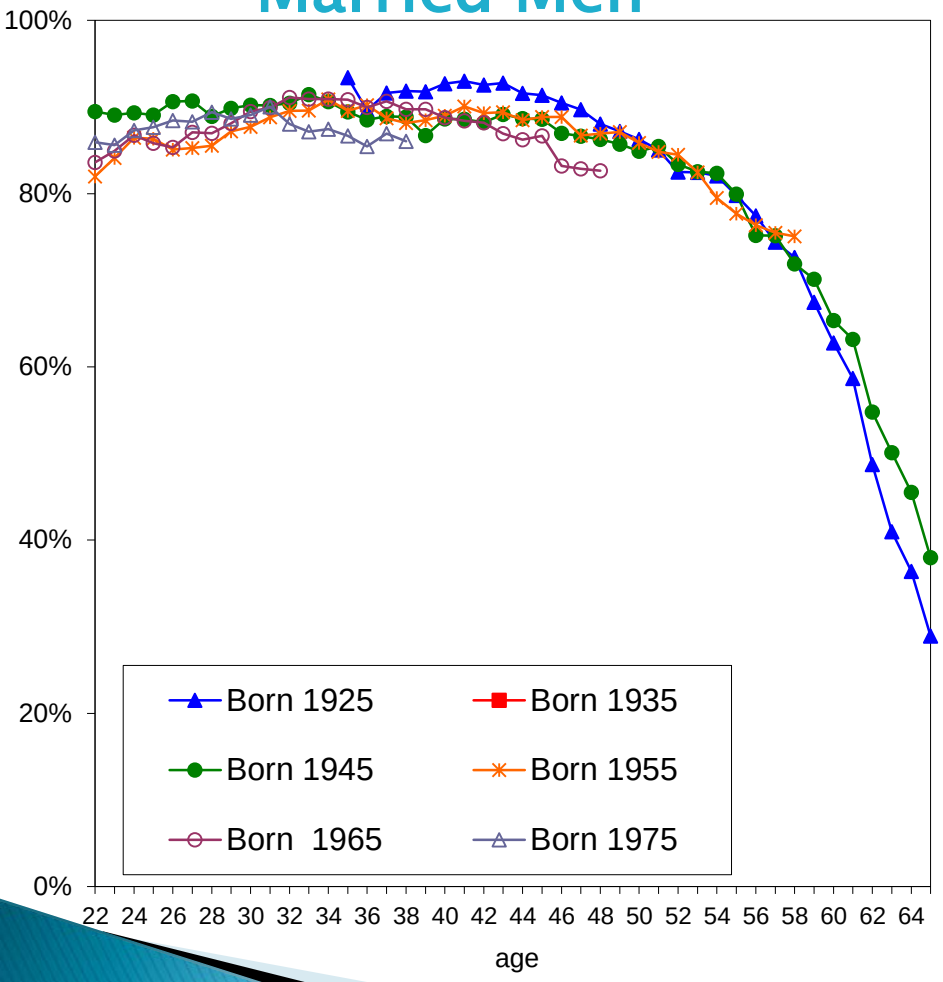


Years 1962-2011. Proportion of women working 10+ weekly hours.

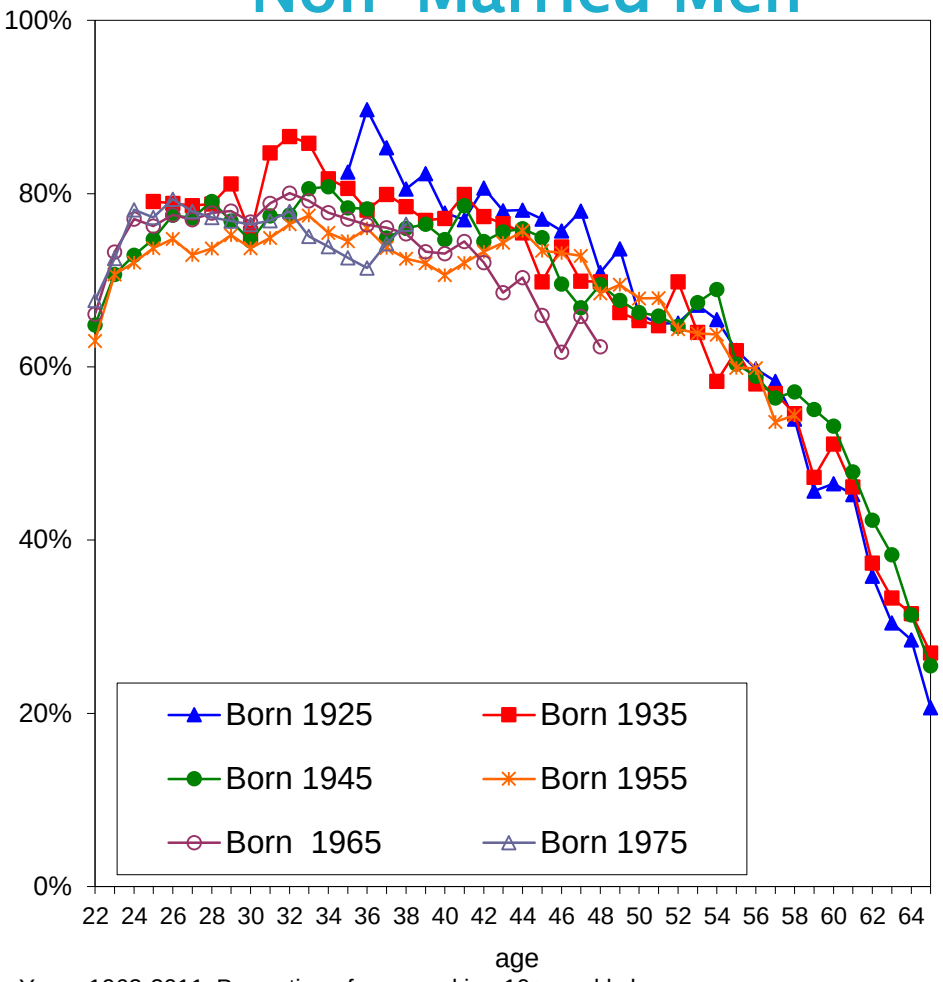
Male Employment Rates by Cohort

No Change by Cohort

Married Men



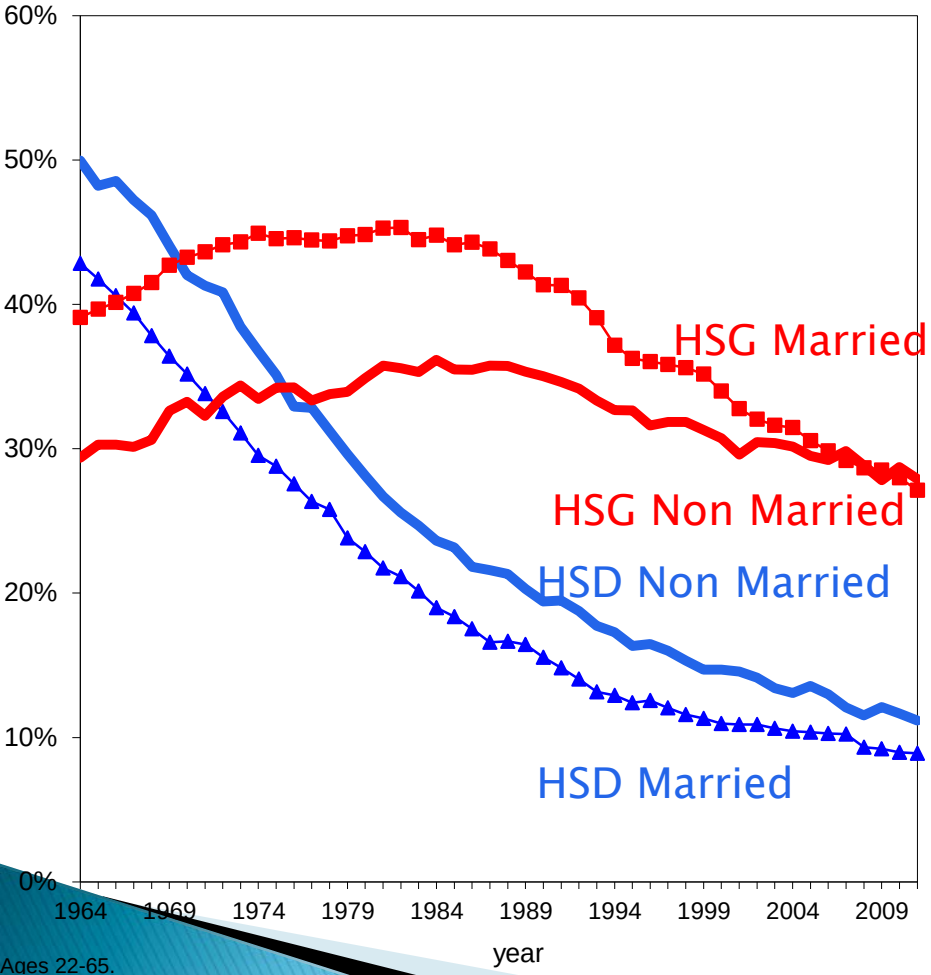
Non-Married Men



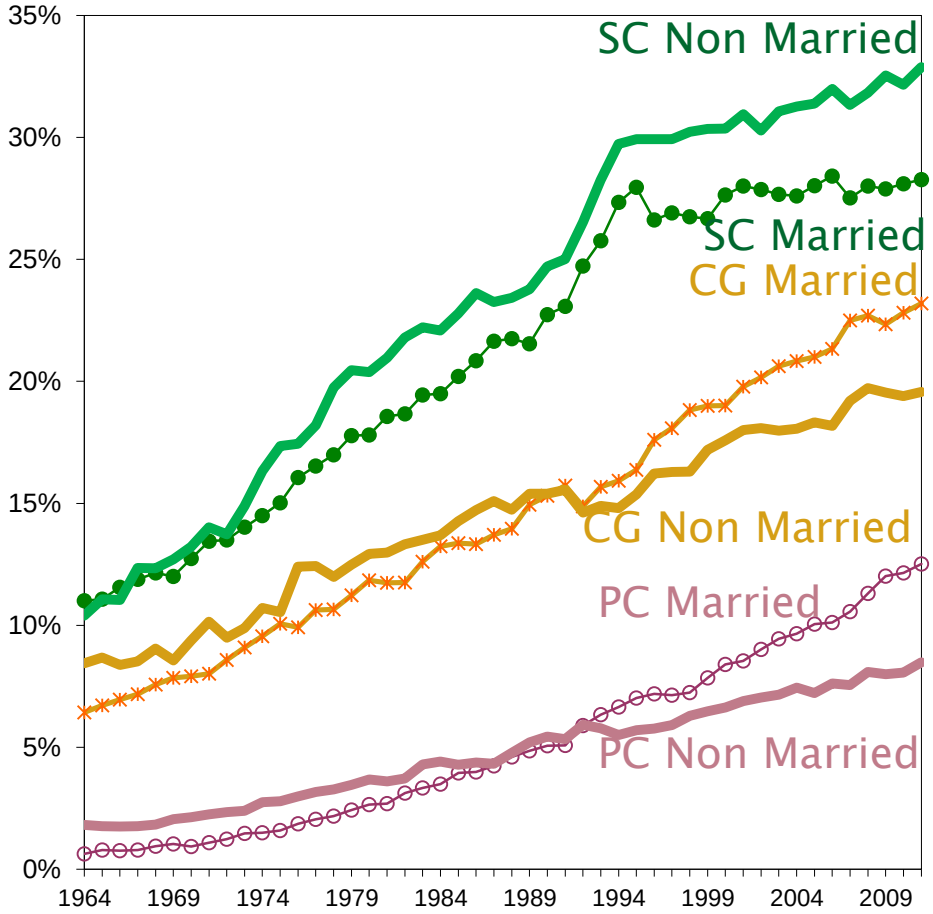
Years 1962-2011. Proportion of men working 10+ weekly hours.

Breakdown of Married/ Non-Married Female by Level of Education

Married Women Become More Educated than Non-Married



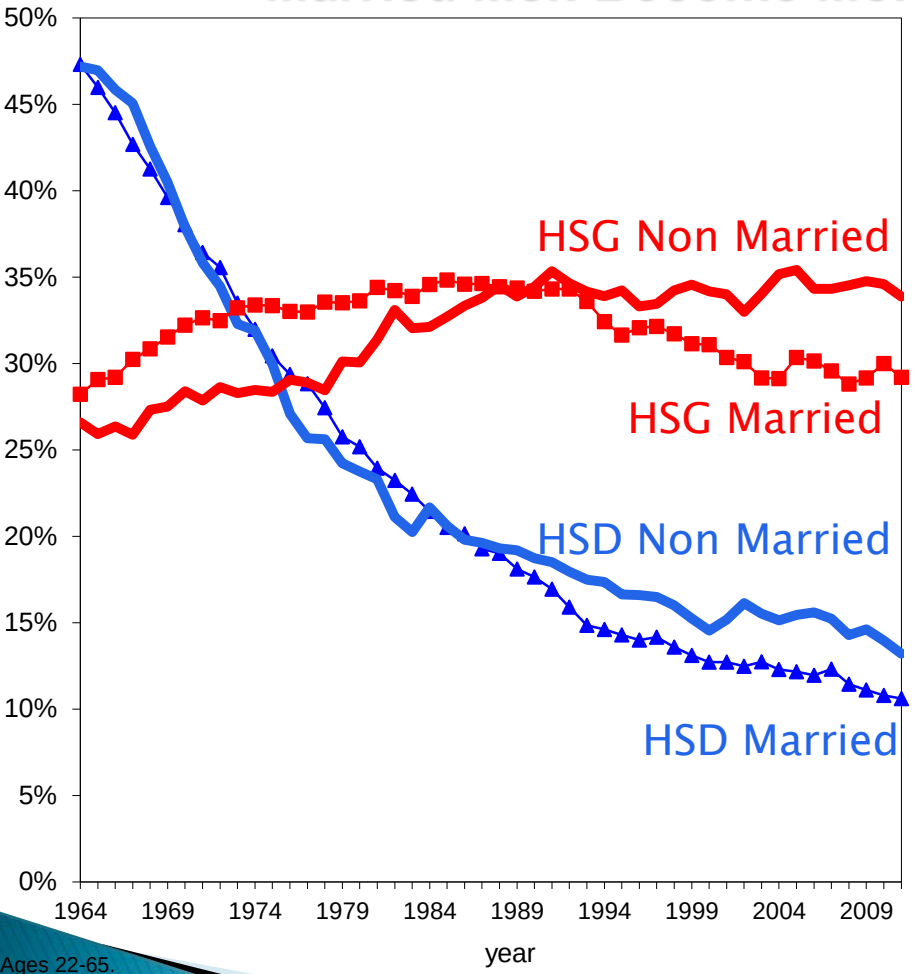
Ages 22-65.



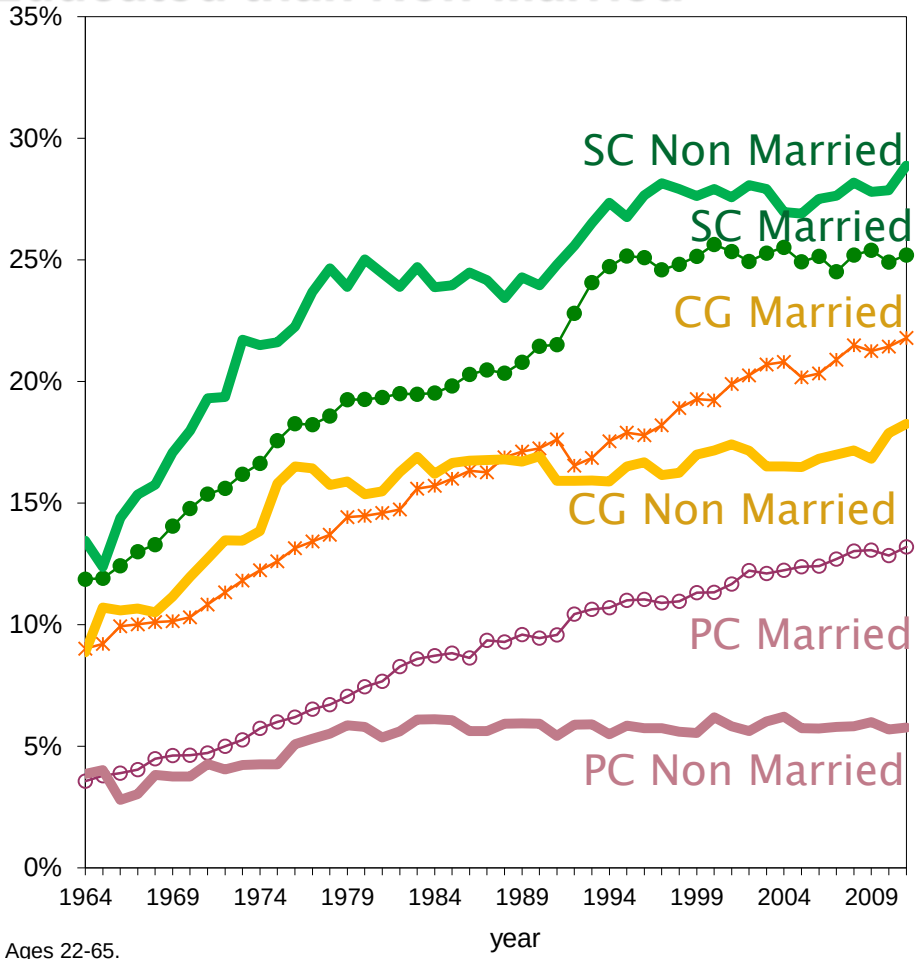
Ages 22-65.

Breakdown of Married/ Non-Married Men by Level of Education

Married Men Become More Educated than Non-Married



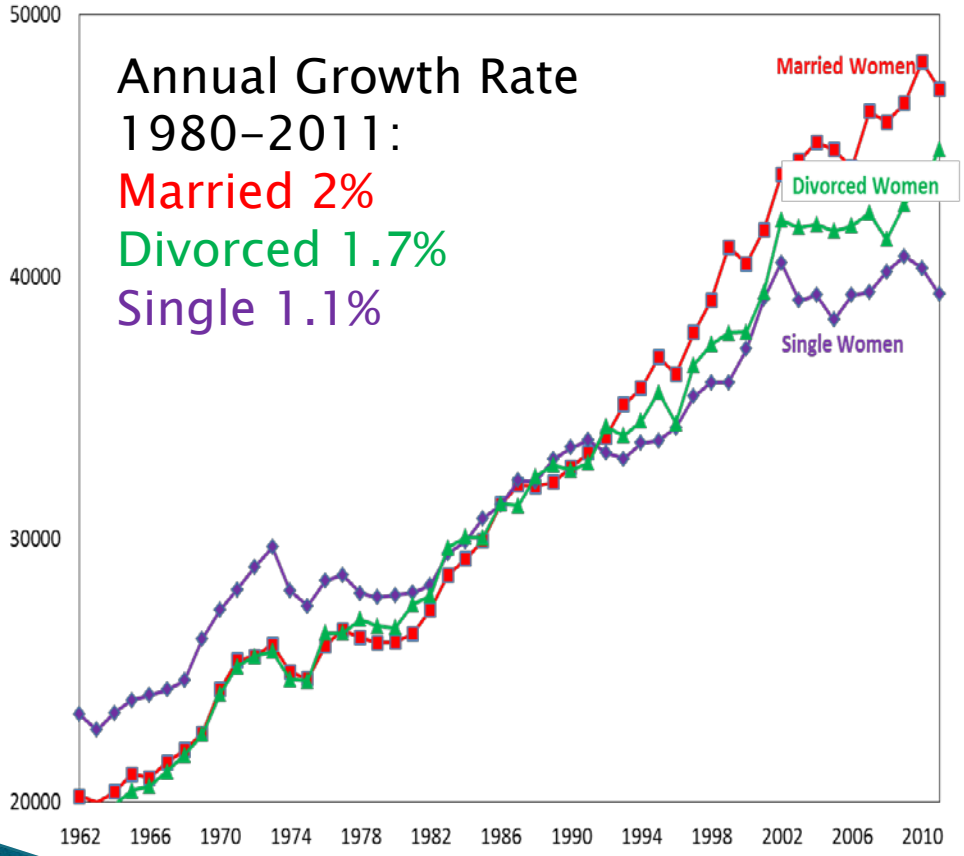
Ages 22-65.



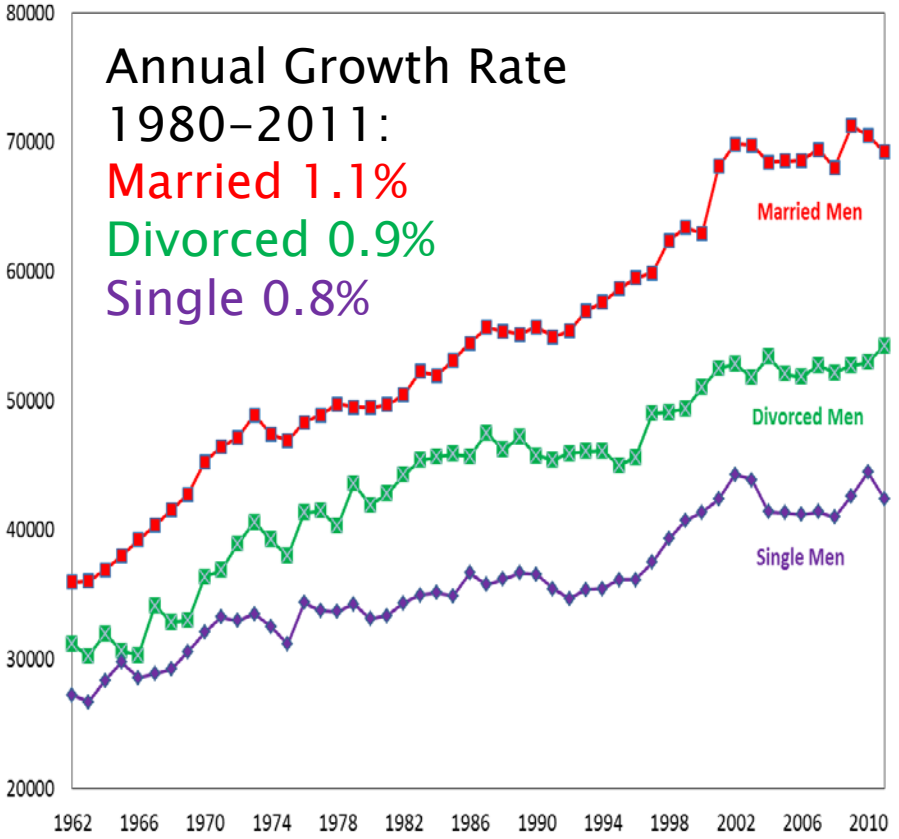
Ages 22-65.

Annual Wages of Full-Time Workers: Married women become better

Women



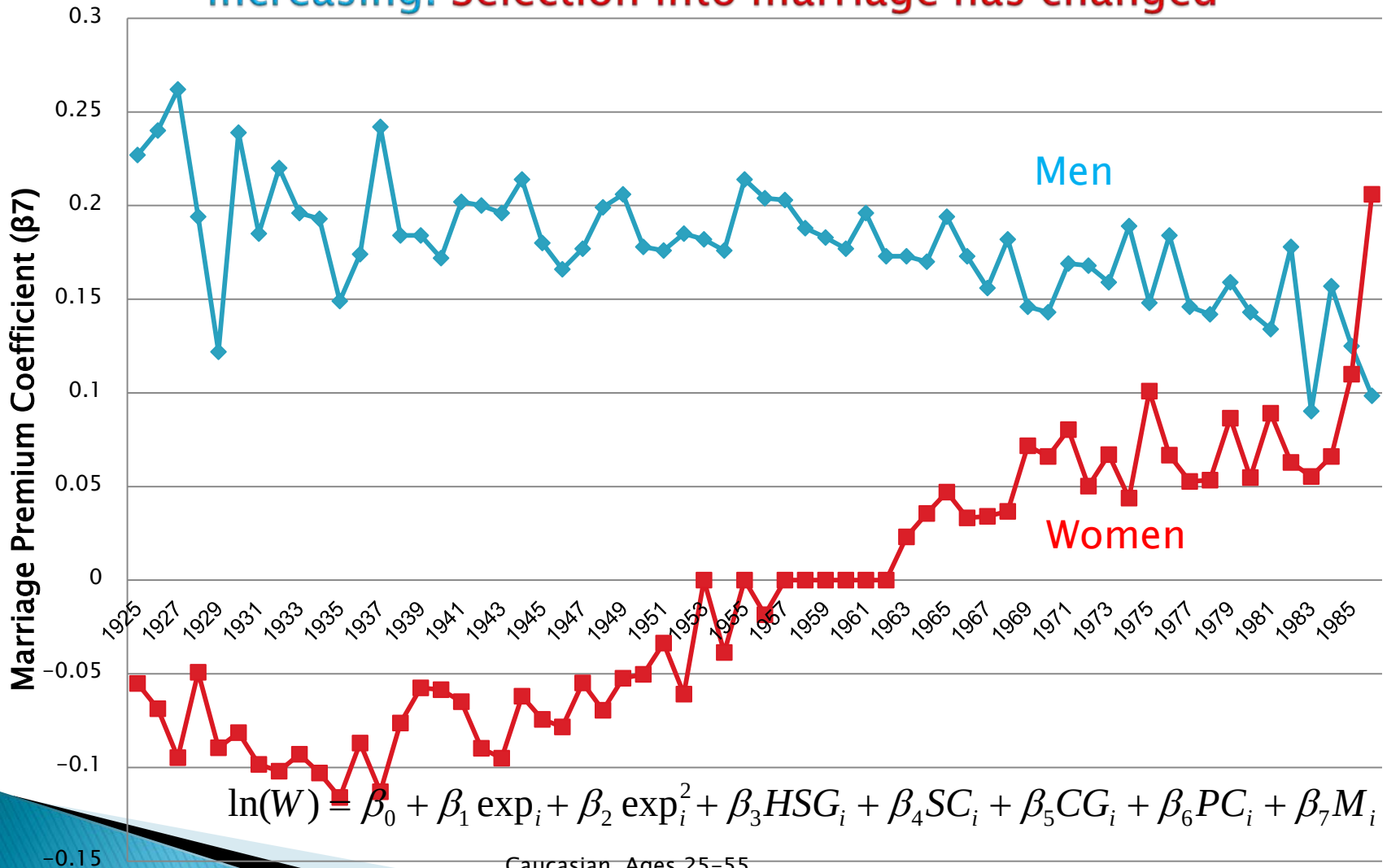
Men



Ages 22-65. Full-time full-year workers with non-zero wages.
2006 Prices.

Marriage Premium by Cohort

Marriage premium for males is decreasing and for females is increasing. Selection into marriage has changed



$$\ln(W) = \beta_0 + \beta_1 \exp_i + \beta_2 \exp_i^2 + \beta_3 HSG_i + \beta_4 SC_i + \beta_5 CG_i + \beta_6 PC_i + \beta_7 M_i + u_i$$

Caucasian, Ages 25-55

Questions

- Why does female marriage premium become positive?
- Why do married females now earn more and are more educated than non-married?
- **Answer**: Different selection into marriage over time: Why?
- Account for:
  - Change in marriage market opportunities
  - Change in composition and return to education
  - Change in cost of divorce
  - Change in household production costs

Literature

- Chiappori (1992, 1997)
- Keane and Wolpin (1997, 2008)
- Eckstein and Lifshitz (2011)
- Mulligan and Rubinstein (2005)
- Blau and Kahn (2007)
- Greenwood and Seshardi (2005)
- Fernandez and Wong (2011)

The Model

Basics

- Females (*f*) and males (*m*) make decisions from age (*t*) 16 to 65.
- Start as single ($M = 0$) in school ($sc = 1$) makes annual decisions:
  - Schooling: $sc = 1$ if **never** married and $t < 30$ and not employed ($emp = 0$)
  - Employment: $emp = 1$; hours of work, h, random draw of full ($h = 1$), or part time ($h = 0.5$);
  - Leisure: $l^j = 1 - h^j \qquad j = f, m;$
  - Married: $M = 1;$ once married s/he cannot be in school
  - Fertility: $p = 1$; female get pregnant
- Ω_{jt} = state space for $j = f, m$

Value functions for married

$$V_t^M(\Omega_{mt}, \Omega_{ft}) = \lambda V_t^{fM}(\Omega_{ft}) + (1-\lambda)V_t^{mM}(\Omega_{mt})$$

$\lambda =$ Pareto weights, fixed (0.5).

Income: $Y_t^M = w_t^m h_t^m + w_t^f h_t^f + b_m I[h_t^m = 0] + b_f I[h_t^f = 0]$

b_m, b_f = unemployment benefit.

Consumption: $C_t^M = (1 - \theta(N_t))Y_t^M - F^M$

Household consumption is a public good;

N_t – # of children under 18

F^M = fixed cost of forming and maintaining a household;

$\theta(N_t)$= fraction of income spent on children (OECD equivalence scale)

Married person utility (cont.)

$$V_t^{jM}(\Omega_{jt}) = \frac{1}{\alpha}(\psi C_t^M)^\alpha + L(l_t^j) \quad + \theta_t \quad + \pi_t^M p_t + A_j^M \quad Q(l_t^f, l_t^m, Y_t^M, N_t)$$

$$+\delta EV(\Omega_{j,t+1})$$

Where

- $L(l_t^j) = \frac{\beta_{jt}}{\gamma}(l_t^j)^\gamma + \mu_{jt} l_t^j$ – Value of Leisure
- $\ln(\mu_{jt}) = \tau_{0j}\ln(\mu_{jt-1}) + \tau_{1j} + \tau_{2j} p_{t-1} + \varepsilon_{jt}^l l_t^j$ and $\varepsilon_{jt}^l \sim iidN(0, \sigma_\varepsilon^l)$
- ψ – *couple's OECD equivalent scale (0.85)*
- β_{jt} – tastes for leisure, depends on health(H_{jt}), education (E_{jt}) and pregnancy (for females)
- μ_{jt}– marginal utility of leisure that increases with a new born and then slowly converge to the steady state value of τ_{1j} (ar(1)).

Married person utility (cont.)

$$V_t^{jM}(\Omega_{jt}) = \frac{1}{\alpha}(\psi C_t^M)^\alpha + L(l_t^j) \quad + \theta_t \quad + \pi_t^M p_t + A_j^M Q(l_t^f, l_t^m, Y_t^M, N_t)$$

$$+\delta EV(\Omega_{j,t+1})$$

- θ_t = utility from marriage
- $\pi_t^M p_t$ = utility from pregnancy (p_t=1)
- $A^M Q$ = quality and quantity of children

Married person utility (cont.)

θ_{jt}^{M} = utility from marriage;

$$\theta_{jt}^{M} = d_1(E^m - E^f = 0)$$
$$+d_2(E^m - E^f > 0) + d_3(E^m - E^f < 0) \quad +d_4(H^m - H^f)^2 + \varepsilon_t^M$$

where

Education: *E*=1 if HSD, *E*=2 if HSG, *E*=3 if SC, *E*=4 if CG, *E*=5 if PC.

Health: *H*=1 if Good, *H*=2 if Fair, *H*=3 if Poor.

$\varepsilon_t^M \sim iidN(0, \sigma_\varepsilon^M)$.

Function of education and health gap.

ε_{jt}^{M} = stochastic shock to tastes for marriage.

Married person utility (cont.)

$\pi_t^M p_t =$ utility from pregnancy

$$\pi_t = \pi_1 I(M_t = 1) + \pi_2 H_{ft} + \pi_3 N_t + \pi_4 p_{t-1} + \varepsilon_t^p$$

where $\varepsilon_t^p \sim iidN(0, \sigma_\varepsilon^p)$

$\pi_1 =$ fixed utility of pregnancy when married;

$H_{ft} =$ mother's health;

$\varepsilon_t^p =$ shock to tastes for pregnancy;

joint taste.

Married person utility (cont.)

$A_j^M Q\left(l_t^f, l_t^m, Y_t^M, N_t\right)$= utility from quality and quantity of children:

$$\mathrm{Q}\left(l_t^f, l_t^m, Y_t^M, N_t\right) = \left(a_f\left(l_t^f\right)^{\rho} + a_m(l_t^m)^{\rho} + a_g(\theta(1)Y_t^M)^{\rho} + (1\right.$$

Value functions for singles

Female: $V_t^f(\Omega_{jt}) = \frac{1}{\alpha}(C_t)^{\alpha} + L(l_t) + \vartheta_{ft} s_t + \pi_t p_t + A_f^s Q(l_t, 0, Y_t, N_t)$

$+\delta EV(\Omega_{j,t+1})$

Male: $V_t^m(\Omega_{jt}) = \frac{1}{\alpha}(C_t)^{\alpha} + L(l_t) + \vartheta_{mt} s_t + A_m^s Q(0, l_t, Y_t, N_t)$

$+ \delta EV(\Omega_{j,t+1})$

$\vartheta_{jt} s_t$ = utility from school: $\vartheta_{jt} = \vartheta_{0j} + Tu(s_t > HSG) + \vartheta_{1j} PE$

$+ \vartheta_{2j} \bar{\varepsilon_j}$

Where:

PE – Parents Education; *Tu* – college tuition; $\bar{\varepsilon_j}$ – skill endowment

Income: $Y_t = w_t^j h_t^j + (b_j + cbI(j = F, N_t > 0)) \cdot I[h_t^j = 0]$

cb – child benefit for single mothers

Labor market

Wage equation

$lnw_t^j = \omega_{0j} + \omega_{1j}E_{jt} + \omega_{2j}X_{jt} - \omega_{3j}X_{jt}^2 + \varepsilon_{jt}^W$ where $\varepsilon_{jt}^W \sim iidN(0, \sigma_\varepsilon^W)$

E_{jt} = education (5 levels);

X_{jt} = work experience (years);

ε_{jt}^W has permanent and transitory elements: $\varepsilon_{jt}^W = \bar{\varepsilon}_j\ (PE_j) + \tilde{\varepsilon}_{jt}$

$\bar{\varepsilon}_j\ (PE_j)$= the person's skill endowment; function of parents education.

Job offers: each period (year) a person receives a job offer with a probability depending on previous period employment, E_{jt} ; X_{jt} - standard logit function.

Marriage market

1. Prob. for singles to get marriage offers (age above 18, s)

2. Potential partner's education, a multinomial Logit probability function with the following values:

$$v_j^C = \eta_{0j}^C + \eta_{1j}^C \cdot I\left(\tilde{E}_{mt} - \tilde{E}_{ft} = 2\right) + \eta_{2j}^C \cdot I\left(\tilde{E}_{mt} - \tilde{E}_{ft} = 1\right) + \varepsilon_t^{\tilde{E}}$$

$$v_j^{SC} = \eta_{0j}^{SC} + \eta_{1j}^{SC} \cdot I\left(\tilde{E}_{mt} - \tilde{E}_{ft} = 1\right) + \varepsilon_t^{\tilde{E}}$$

$$v_j^{HS} = 0$$

Where:

$$\tilde{E}_{jt} = 1 \quad if \quad E_{jt} = 1,2 \quad (HSD + HSG)$$

$$\tilde{E}_{jt} = 2 \quad if \quad E_{jt} = 3 \quad (SC)$$

$$\tilde{E}_{jt} = 3 \quad if \quad E_{jt} = 4,5 \quad (CG + PC)$$

3. Marriage offer for a female consists of the vector (same age):

$$\mathrm{M_{ft}} = \left(E^m, H^m, X^m, N^m, PE^m, D_{mt-1}, \mu_m^l, \mu_m^W, \mu^M, \tilde{\varepsilon}_{mt}^M, \tilde{\varepsilon}_{mt}^W\right)$$

Offers for males are analogous

Marriage decision problem

Marriage: Given M_{ft}, the woman maximizes $V_t^f(\Omega_{ft})$ and $V_t^{fM}(\Omega_{ft})$

The potential male does the equivalent

If there is at least one set of choices at the period of the match that satisfies

$V_t^{fM}(\Omega_{ft}) > V_t^f(\Omega_{ft})$ and $V_t^{mM}(\Omega_{mt}) > V_t^m(\Omega_{mt})$, then marriage is formed.

If there is more than one, we choose the one that maximize the weighted values

Divorce occurs if:

$$V_t^{fM}(\Omega_{ft}) + \Delta < V_t^f(\Omega_{ft}) \quad or \quad V_t^{mM}(\Omega_{mt}) + \Delta < V_t^m(\Omega_{mt})$$

where Δ is the cost of divorce (estimated parameter)

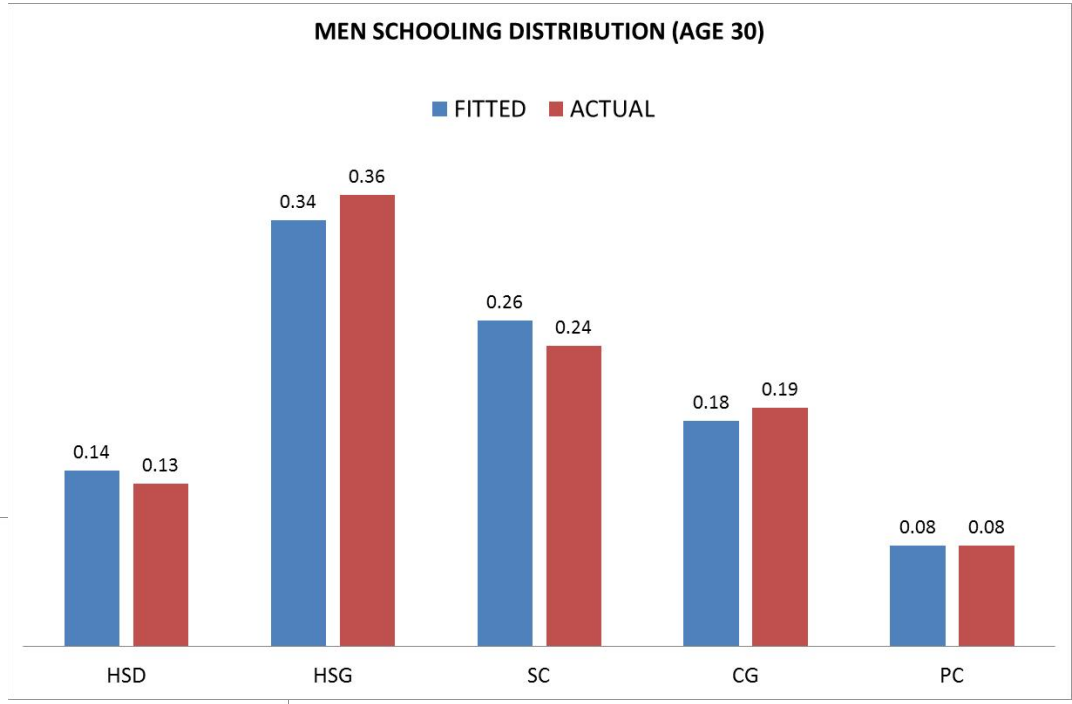
Estimation

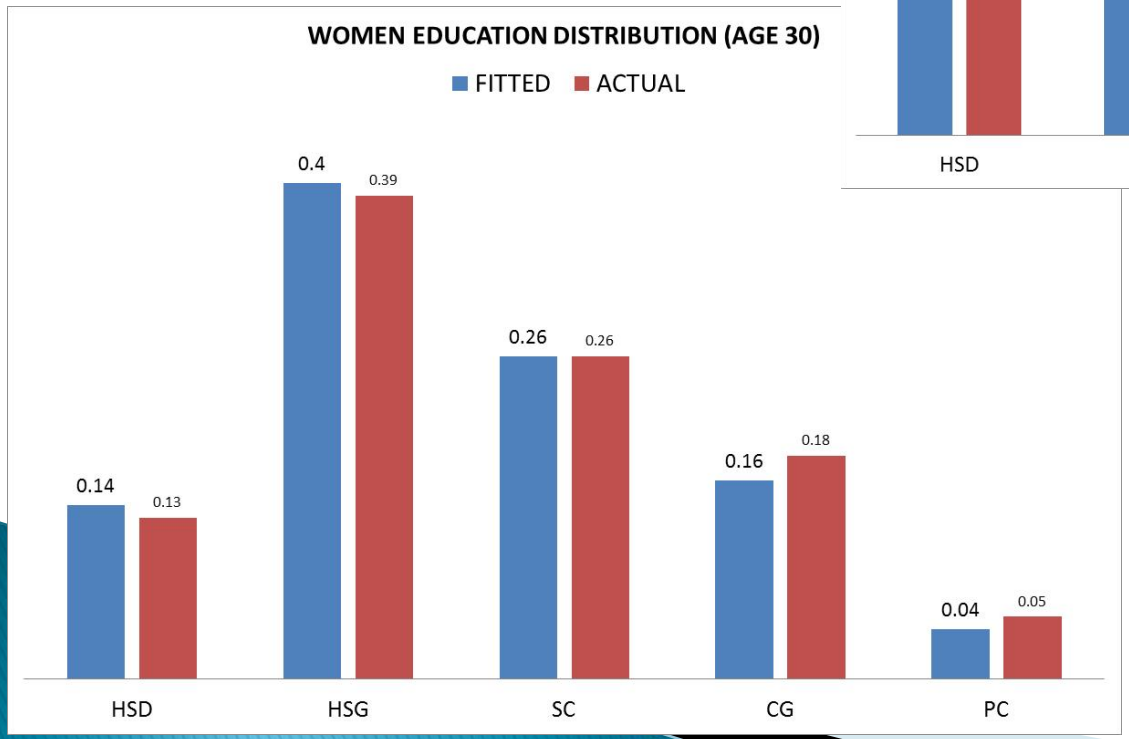
- Estimate by simulated GMM.
- CPS data (moments) of the cohort of 1955 (1953-1957).
- CPS cohort of 1975 (1973-1977) for counterfactuals.

Moments

moment	# of moments
Men Employment	43*
Women Employment	43
Married Women Employment	43
Unmarried Women Employment	43
Married with Children Women Employment	43
Married no Children Women Employment	43
Unmarried with Children Women Employment	43
Unmarried no Children Women Employment	43
Men Schooling Distribution – 5 groups	5 X 15**
Women Schooling Distribution – 5 groups	5 X 15**
Marriage Rate	43
Women # of Children by Age	25***
Married Women # of Children by Age	25***
Women Wage	43
Married Women Wage	43
Unmarried Women Wage	43
Men Wage	43
Assortative Mating	5 X 5
Wage by education level – women only	5 X 43
Employment by education level – women only	5 X 43
Women Health distribution	3 X 43
Men Health distribution	3 X 43
Total	1472****

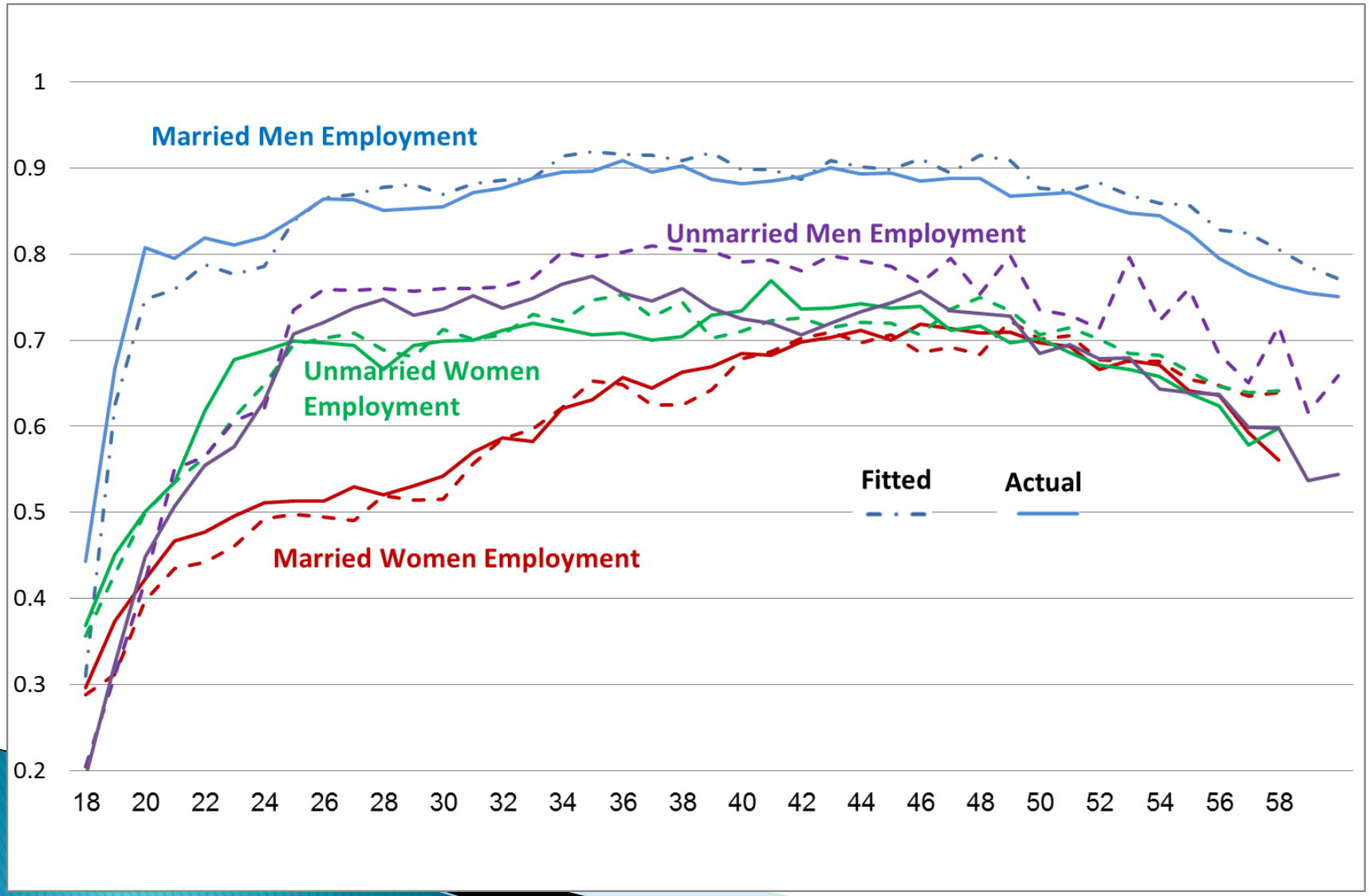
1955 Education Distribution





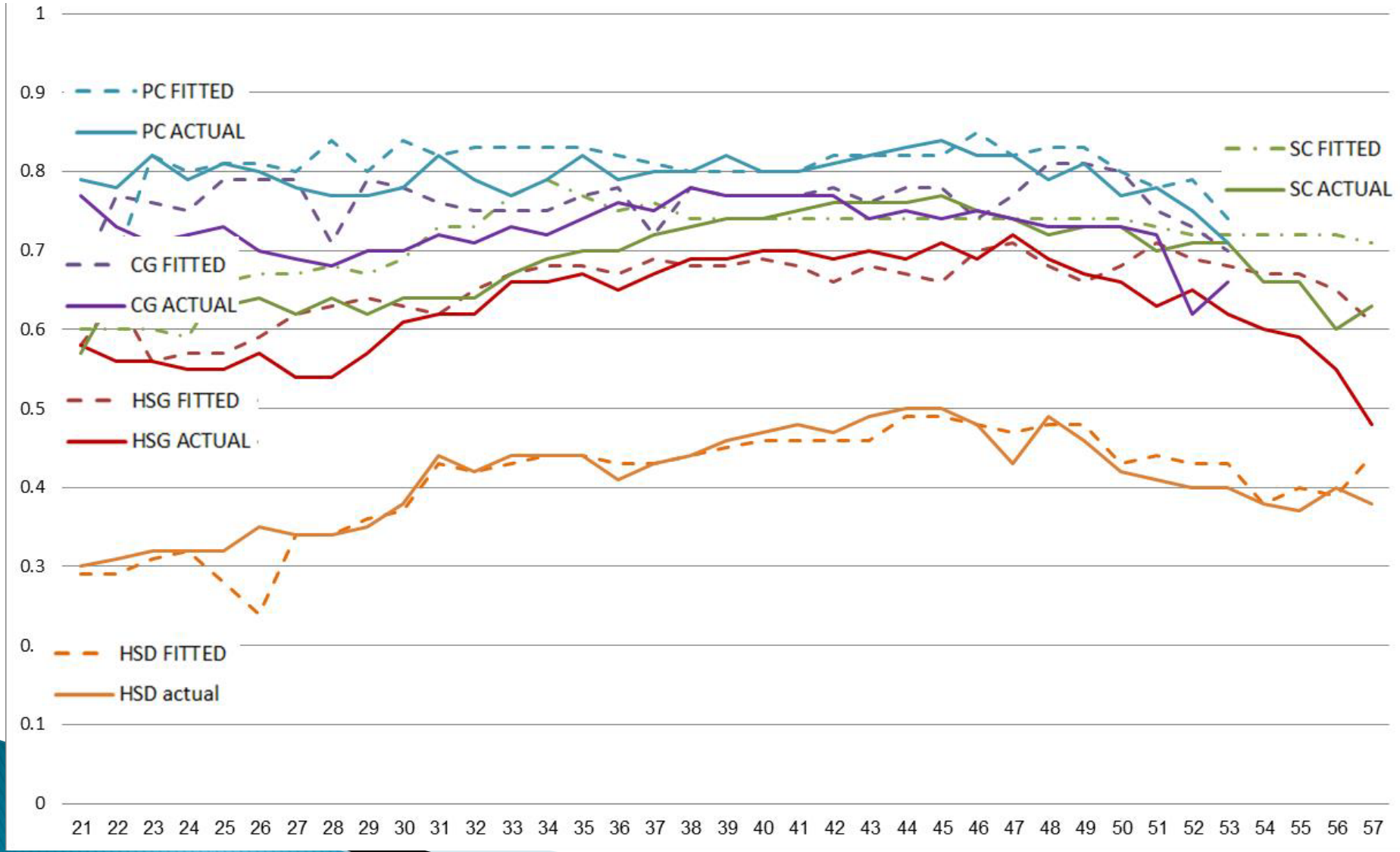
1955 Employment

Good Fit for both Men and Women, Between 25-40 Married Women work less than Unmarried



1955 Women's Employment by Education

Good Fit by 5 education groups



1955 Assortative Mating

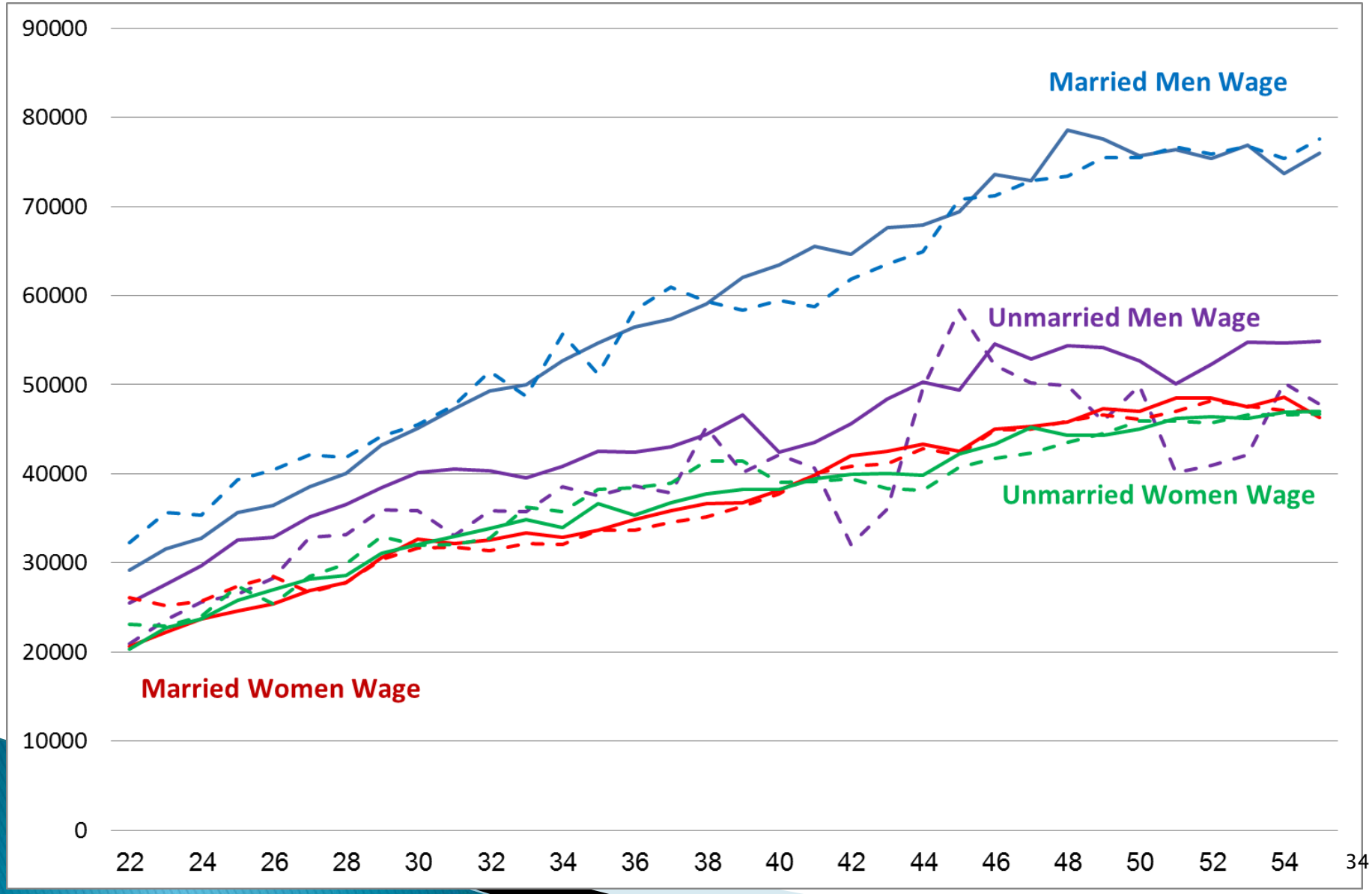
Good fit both on homogenous marriages (diagonal) and not

Women Education Group

Men Education Group		**HSD**	**HSG**	**SC**	**CG**	**PC**
High School Dropout (HSD)	Fitted	**54**	**14**	**3**	**1**	**0**
	Actual	57	12	5	2	1
High School Graduate (HSG)	Fitted	**34**	**55**	**23**	**13**	**5**
	Actual	31	52	25	12	7
Some College (SC)	Fitted	**12**	**23**	**46**	**22**	**16**
	Actual	10	24	42	21	15
College Graduate (CG)	Fitted	**0**	**7**	**21**	**42**	**34**
	Actual	2	9	21	43	28
Post College (PC)	Fitted	**0**	**2**	**7**	**22**	**45**
	Actual	1	3	8	23	48

1955 Wages

Good Fit for both men and women. Negative selection for men. No selection for women.



Marriage Taste Parameters

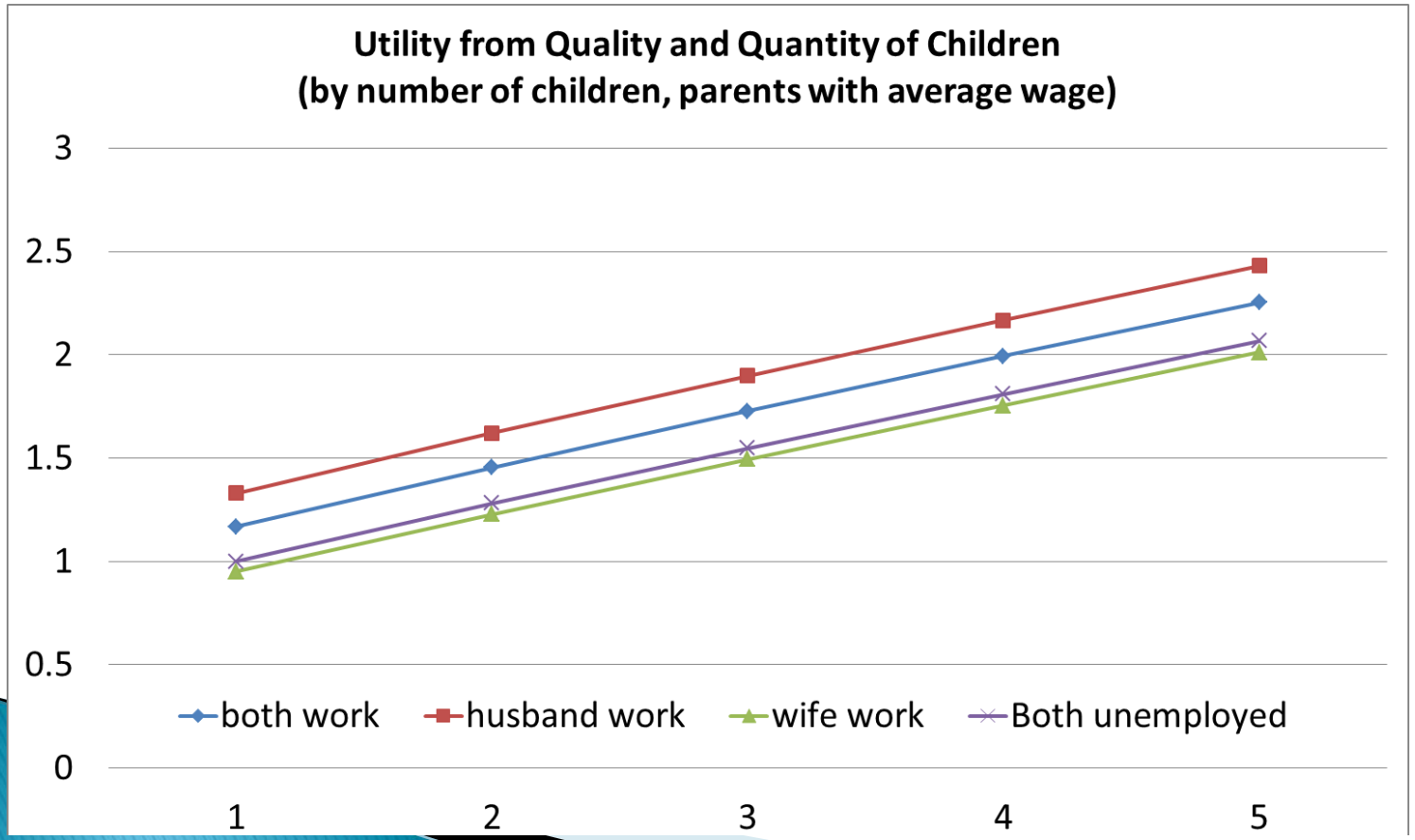
$$\theta_{jt}^{M} = 1.12(E^m - E^f = 0) \quad -1.3\left(E^m - E^f > 0\right) - 1.4\left(E^m - E^f < 0\right) \quad - 0.16(H^m - H^f)^2 + \varepsilon_t^M$$

- High utility from homogenous marriages.
- Low utility from education and health gap.

Children's utility Parameters

higher utility when both unemployed than only wife is working

$$Q(l_t^f, l_t^m, Y_t^M, N_t)$$
$$= \left(.28\left(l_t^f\right)^{-.85} + .43(l_t^m)^{-.85} + .0002(\theta(1)Y_t^M)^{-.85} + (.29)N_t^{\rho}\right)^{1/-.85}$$



Utility from School Parameters

$$\vartheta_{jt} = \vartheta_{0j} + Tu(s_t > HSG) + \vartheta_{1j} PE + \vartheta_{2j} \bar{\varepsilon}_j$$

	Utility from HS		Utility from College	
	Female	Male	Female	Male
PE = College				
low ability	0.54	0.55	-0.92	-0.91
average ability	0.89	0.93	-0.57	-0.53
high ability	1.24	1.31	-0.22	-0.15
PE = Non-College				
low ability	0.02	0.03	-1.44	-1.43
average ability	0.37	0.42	-1.09	-1.05
high ability	0.72	0.80	-0.74	-0.67

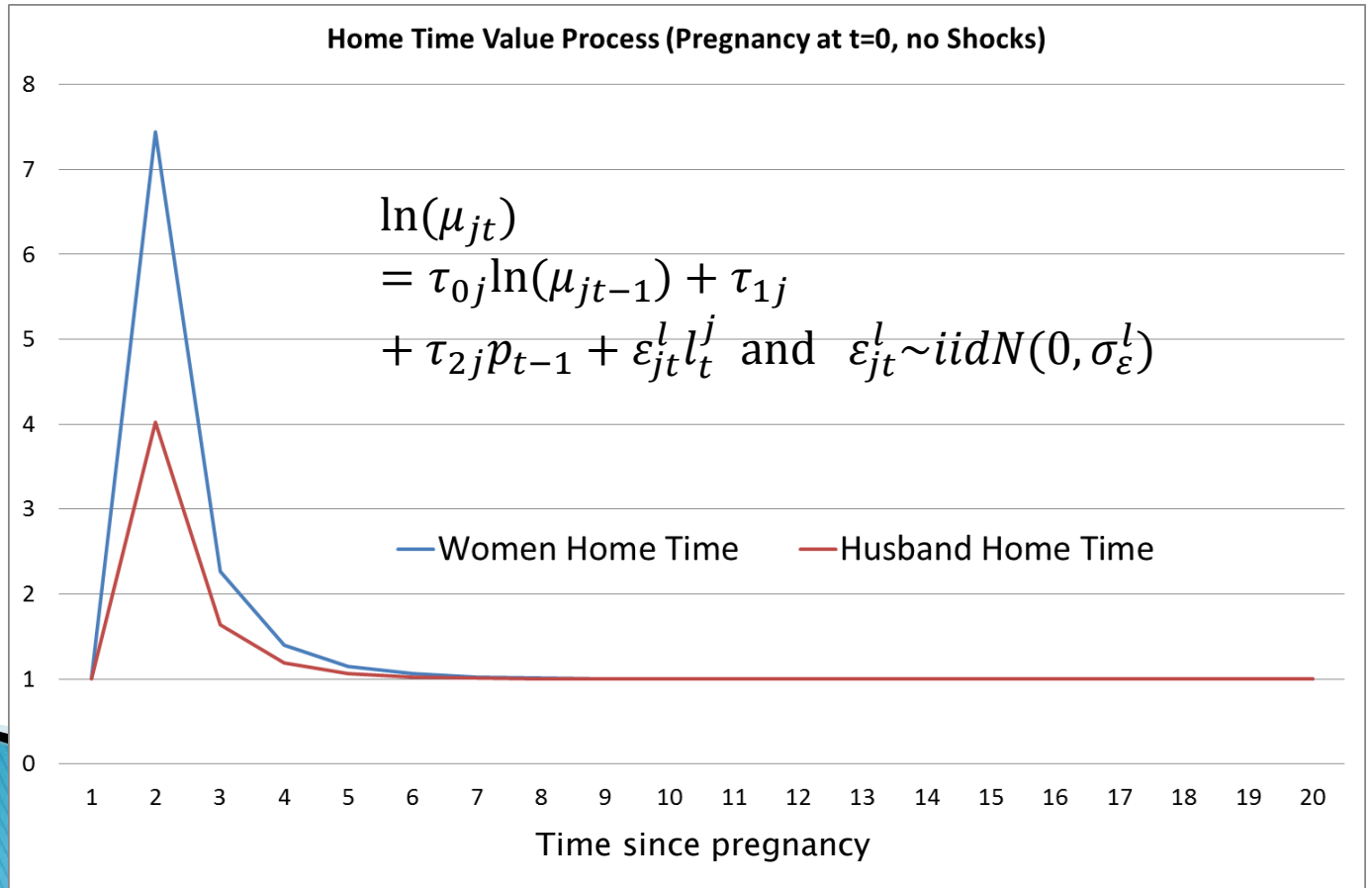
- Utility from HS always positive.
- Utility from College always negative (cost of tuition)
- Individuals go to college only for future gains.

Leisure (Home) Value Parameters

$$L(l_t^j) = \frac{\beta_{jt}}{\gamma}(l_t^j)^{\gamma} + \mu_{jt} l_t^j \qquad \beta_{jt} = \beta_{j1} E_{jt} + \beta_{j2} H_{jt} + \beta_{j3} P_t$$

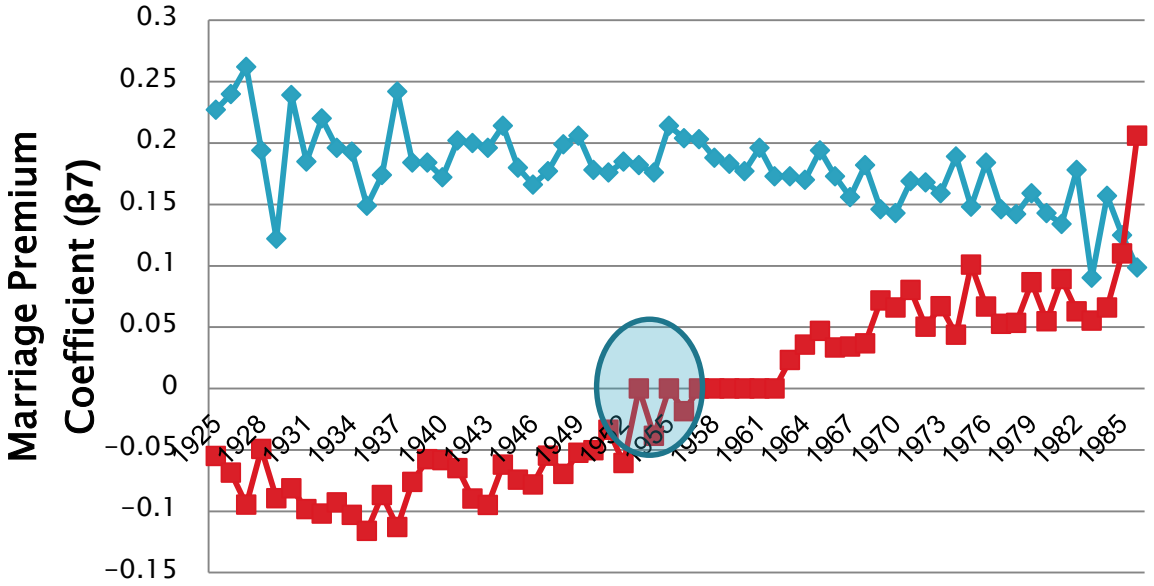
Female: $\beta_{ft} = 0.01 E_{jt} + 0.026 H_{jt} + 0.059 P_t$

Male: $\beta_{mt} = 0.00 E_{jt} + 0.033 H_{jtt}$



Marriage Premium Fit

- Can the model reproduced the marriage premium of the 1955 cohort?



- The marriage premium of the CPS data is: -1.1% (statistically insignificant).
- We simulated women's wage from the model and run the same regression and got: -1.4% and (statistically insignificant).

1975 Cohort Predictions

- 1955: Women's marriage premium is zero both in data and model.
- 1975: Women's marriage premium is 6.6% in data (positive selection).
- Can the model predict the change of selection into marriage?

1975 Cohort Predictions

- 3 changes:
  - Change **Parents Education** from **20%** in 1955 to **27%** in 1975 of college graduate parents.
  - Decrease **divorce cost by 78%** to fit the marriage rate of 1975.
  - Re-estimate male and female **wage** parameters within the model to fit 1975 (conditional on the above changes).

1975 Cohort Predictions

Negative Selection

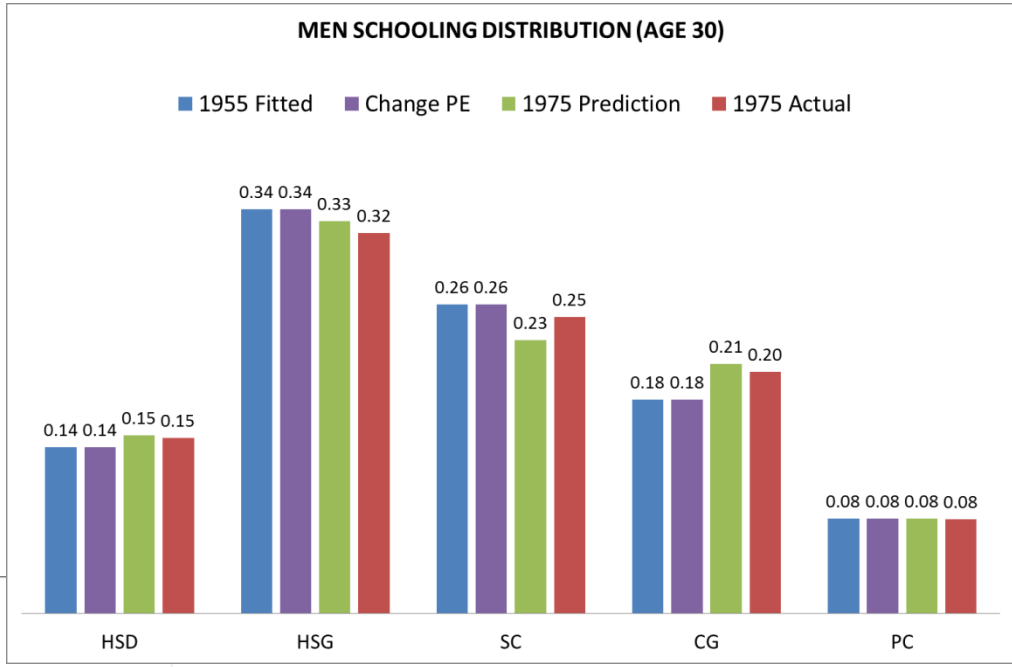
	Married males Employment*	Unmarried males Employment*	Married females Employment*	Unmarried females Employment*	Married females Wage**	Unmarried females Wage**
1955 Data	0.83	0.60	0.55	0.70	29896	30851
1955 Model Fit	0.83	0.60	0.54	0.70	29970	31300
1975 Prediction	0.82	0.67	0.62	0.74	40770	37214
1975 Data	0.83	0.66	0.61	0.73	41179	37665

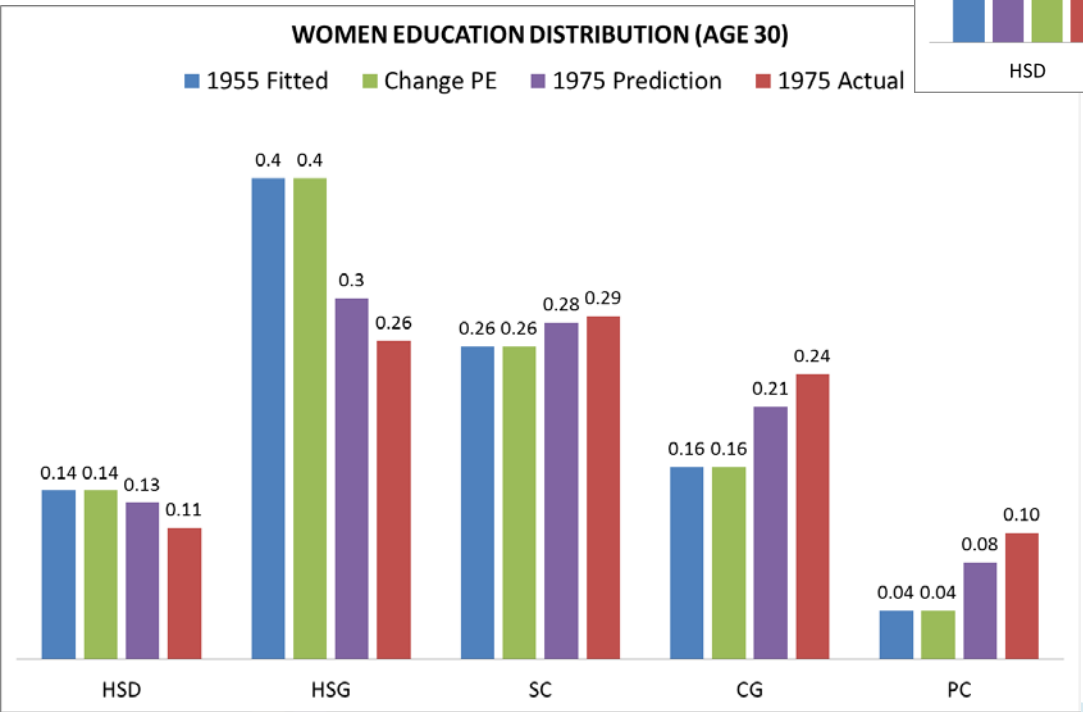
* Average employment rate, ages 25-35
**Average annual wage, ages 25-35

Positive Selection

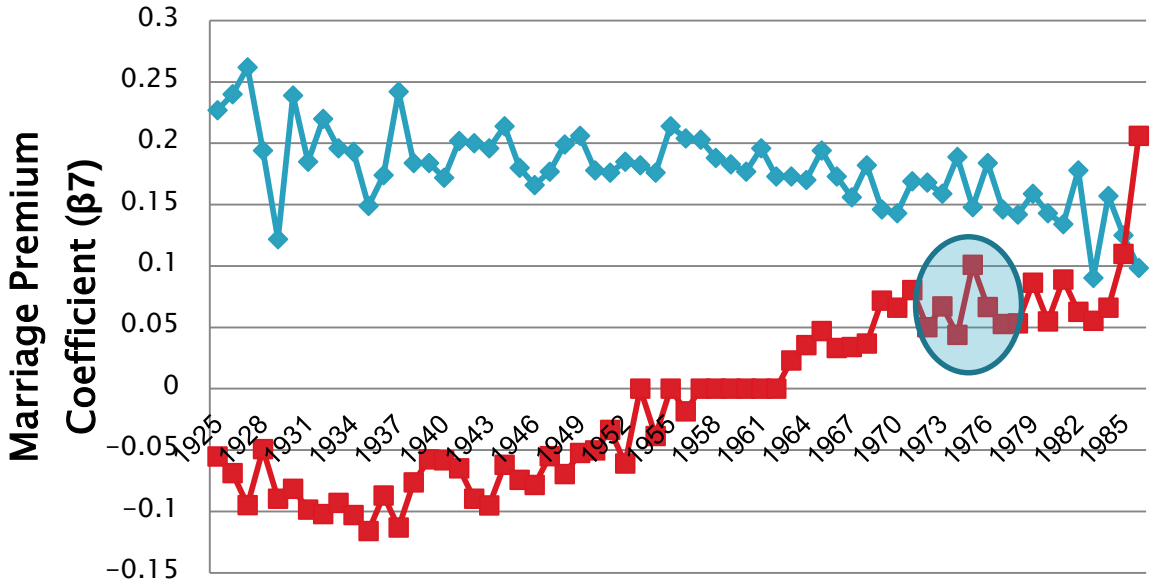
- Main source of change: Divorced Cost +Wages

1975 Cohort Predictions





1975 Cohort predictions



- The marriage premium of the CPS data is: 6.6% (statistically significant).
- We simulated women's wage from the 1975 Counterfactuals and got: 4.7% (statistically significant).

Thanks