Accounting for the Changes in Household Composition

Juan Carlos Conesa[1] Qian Li[2] Junshan Zhou[3]

02.12.2025
University of Birmingham

[1]Stony Brook University
[2]University of Southampton
[3]Stony Brook University

Overview

Overview

Motivation

- Back in the 1960s, family structure was drastically different from what it is nowadays ▸ facts
  - Higher marriage rates, lower divorce rates, weaker assortative mating, and higher fertility
- Contributing factors
  - ✓ Technology and labor market conditions by Greenwood, Guner, Korchakov and Santos (2016)
  - ⇒ Our paper: social safety net ▸ welfare:
    - Welfare programs following Lyndon B. Johnson "Great Society" (1960s)
    - Tax credits introduced in the 1970s

How to do it

- Overlapping generation (OLG) model in a general equilibrium framework
  - Uninsurable labor shocks
  - Consumption-savings and labor supply decisions
  - Endogenous education choice
  - Endogenous marriage and divorce
  - Endogenous fertility choice
  - Detailed functions of taxes and welfare transfers

- Calibrate to 2015 economy; remove welfare to examine how well the model replicates the 1960s economy

Overview of Results

- **Removing welfare** can replicate the higher marriage rate in the 1960s
  - particularly by **young, low-skilled** individuals — marriage acts as a substitute for welfare
  - by relatively **wealthier** individuals — high-wealth individuals are less willing to marry low-wealth spouses, particularly for men

Overview of Results, cont'd

- **Removing welfare** cannot account for the weaker assortative mating (AM) and higher fertility in the 1960s

  (1) **AM along wealth** also becomes stronger — the correlation between male and female wealth in marriage decisions increases

  (2) **AM along education** becomes stronger — cross-skill marriages decline, especially those between high-skilled men and low-skilled women

  (1) + (2) $\Rightarrow$ low-skilled, asset-poor women find it harder to "marry up"

  (3) **Fertility declines**, particularly among low-skilled women
  - The proportion of low-skilled single mothers drops to nearly zero

Related Literature

Our paper is under the umbrella of family economics

- Endogenous family formation, assortative mating and fertility
  Greenwood, Guner, Kocharkov and Santos (2014), Voena (2015), Regalia, Ros-Rull and Short (2019)
- Female labor supply
  Greenwood, Guner, Kocharkov and Santos (2016), Fernández and Wong (2014),
- Optimal taxation
  Guner Kaygusuz and Ventura (2012), Kruguer, Holter and Stepanchuk (2019, 2023), Leung (2019), Wu and Krueger (2021), Frankel (2014), Gayle and Shephard (2019)
- Welfare provision
  Kaygusuz and Ventura (2023), Low, Meghir, Pistaferri, Voen (2023)

Contribution

- A significant contribution to the rapidly expanding field of family economics
- Filling the gap of welfare implication on family formation
- Among the first to jointly endogenize marriage/divorce and fertility choices within a large-scale heterogeneous-agent OLG framework — workhorse
  - e.g. optimal time limit of welfare programs

Overview

State Variables

- a: asset

  e: education

  ϵ: idiosyncratic labor shock

  superscript $\{m, f\}$: male, female

  subscript $\{s, m\}$: single, married

  b: bliss shock

  j: age

  k: case of children: combination of mom's age, children's ages and # of children

- Single male: $\{a, e, \epsilon, j\}$
- Single female: $\{a, e, \epsilon, j, k\}$
- Married couple: $\{a, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k\}$

Key Decisions

- Education
  - Age 21 before entering labor and marriage market; an instant outcome
  - A time cost of higher education: 0.2 of time endowment per period
  - College is subject to a gender-dependent cost $e^g \sim N(\mu_e^g, (\sigma_e^g)^2)$, where $g = \{m, f\}$
  - The education decision rule:

$$1_e(\cdot) = \begin{cases} 1 & \text{if } V_s^m(a, e=1, \epsilon, 1) > V_s^m(a, e=0, \epsilon, 1) \quad \text{for male} \\ & \text{if } V_s^f(a, e=1, \epsilon, 1, 0) > V_s^f(a, e=0, \epsilon, 1, 0) \quad \text{for fem.} \\ 0 & \text{if otherwise} \end{cases}$$

Key Decisions

- Marriage / divorce
  - decisions throughout working age 21 - 64
  - A marriage is based on mutual consent, namely if and only if

$$V_m(a^m + a^f, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k) > V_s^m(a^m, e^m, \epsilon^m, j) \quad \textit{And}$$
$$V_m(a^m + a^f, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k) > V_s^f(a^f, e^f, \epsilon^f, j, k) \qquad (1)$$

    Marriage indicator $\mathbf{1}(a, e^m, e^f, z^m, z^f, b, j, k) = 1$ if (1) holds

  - A divorce will occur if and only if

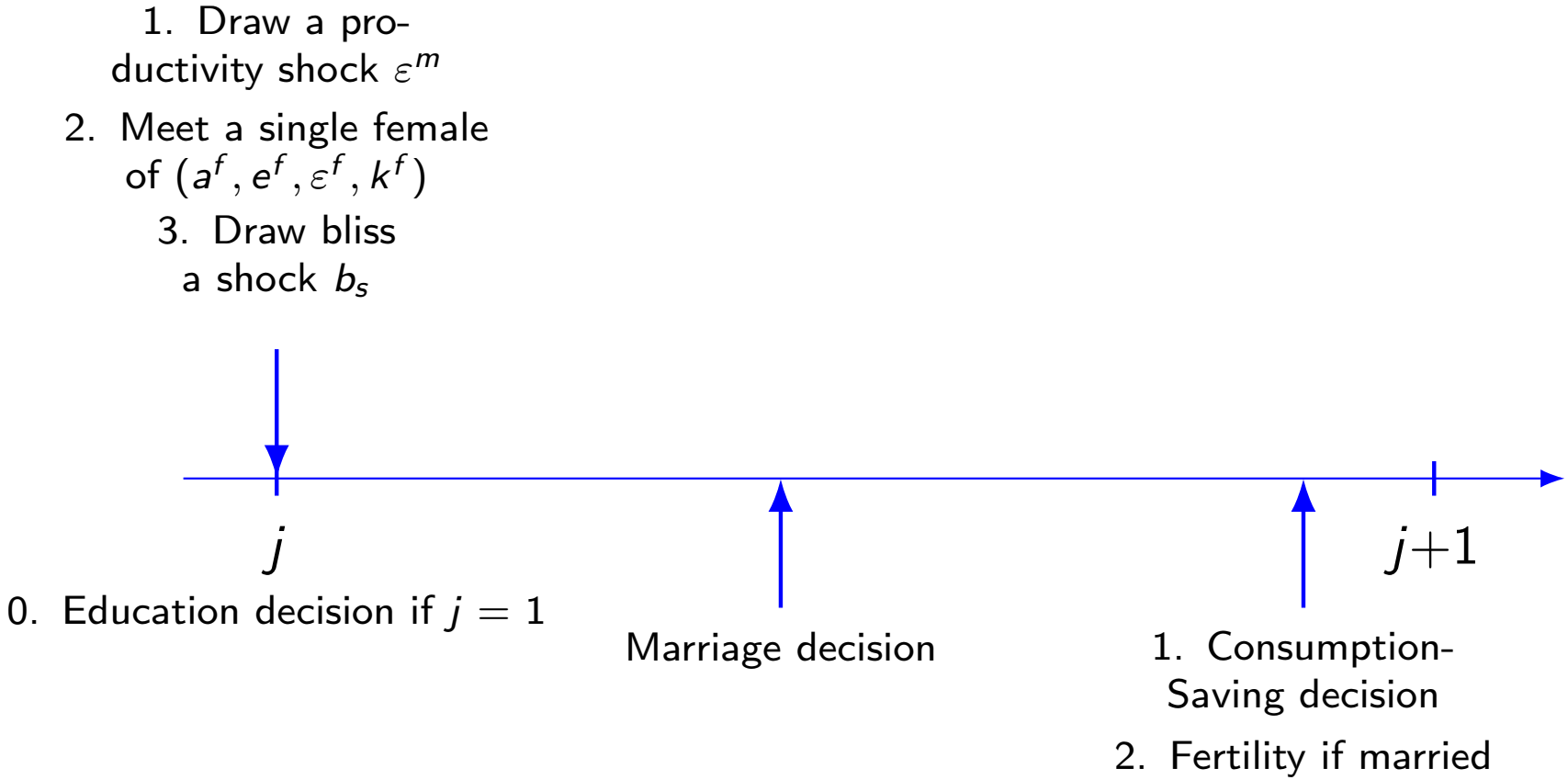
$$V_m(a^m + a^f, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k) \leq V_s^m(a^m, e^m, \epsilon^m, j) \quad \textit{Or}$$
$$V_m(a^m + a^f, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k) \leq V_s^f(a^f, e^f, \epsilon^f, j, k) \qquad (2)$$

    Marriage indicator $\mathbf{1}(a, e^m, e^f, z^m, z^f, b, j, k) = 0$ if (2) holds

Key Decisions

- Fertility
  - single & married female, age 21 - 40
  - 0 or 1 child per period (4 years), maximum 3 children
  - monetary childcare cost — participate in LF
  - childcare time — not in LF
- Female labor supply
  - NLF, part-time, full-time
- Consumption & saving

Timeline: Single Male



The Problem of Single Male

$$
\begin{aligned}
V_s^m(a,e,\epsilon,j) = \max_{\{c,d,a'\}} \; & u\big(c, n(d, 1-\bar{h})\big) \\
& + \beta\phi_{j+1} \int_{B_s} \int_{S^f} \int_{\epsilon} \Big\{ \underbrace{[1-\mathbf{1}(\cdot)] V_s^m(a', e, \epsilon', j+1)}_{\text{remain single}} \\
& + \underbrace{\mathbf{1}(\cdot) V_m(a'+a^*, e, e^*, \epsilon', \epsilon^*, b', j+1, k^*)}_{\text{getting married}} \Big\} \\
& \underbrace{dP(\epsilon'|\epsilon)}_{\text{labor shock}} \underbrace{dS^f(a^*, e^*, \epsilon^*, j+1, k^*)}_{\text{meet a female}} \underbrace{dB_s(b')}_{\text{bliss shock}}
\end{aligned}
$$

$$
\text{s.t.} \quad (1+\tau_c)c + (1+\tau_d)p_d d + a' = \begin{cases} (1+r)a + y^{earn} - Tax - ss + wel & \text{if } j \le J_R \\ (1+r)a + pen_e - Tax + wel & \text{if } j > J_R \end{cases}
$$

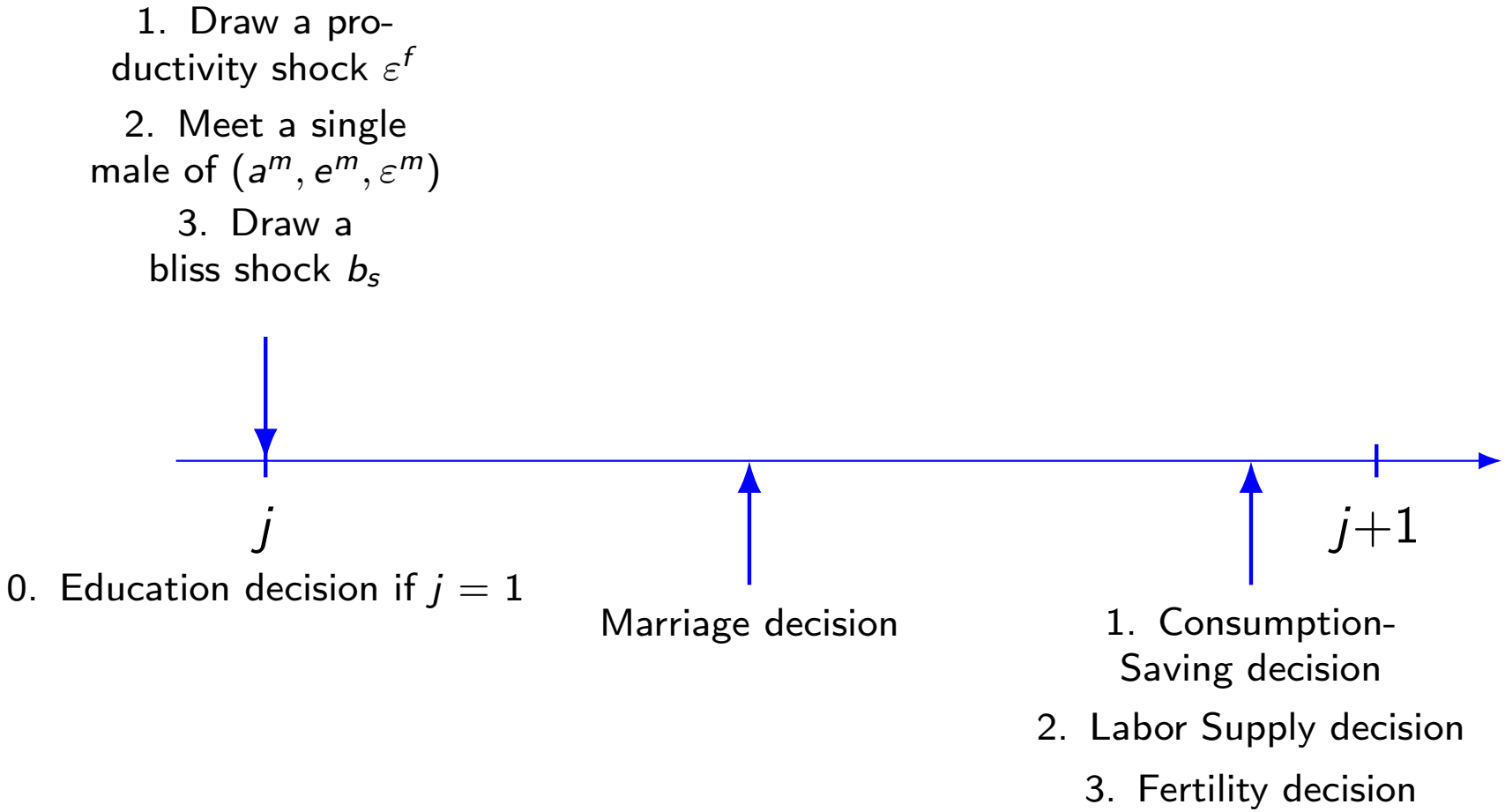
$$
y^{earn} = we_j^m \epsilon_{e,j}^m \bar{h}
$$

$$
Tax = \begin{cases} \tau^a ra + T(ra + y^{earn} - 0.5ss) & \text{if } j \le J_R \\ \tau^a ra + T(ra + pen_e) & \text{if } j > J_R \end{cases}
$$

$$
ss = \tau^{ss} \min\{\bar{y}, y^{earn}\}
$$

$$
c \ge 0, a' \ge 0, d \ge 0 \tag{3}
$$

Timeline: Single Female



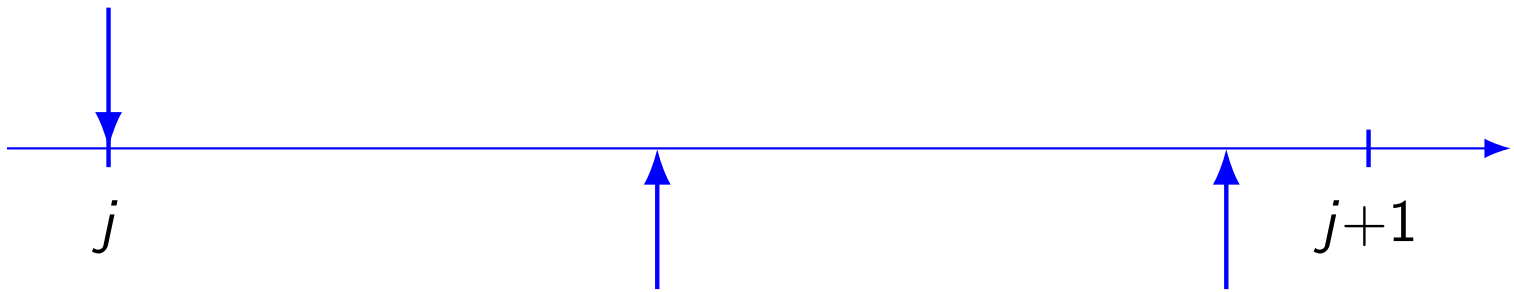
The Problem of Single Female

$$
\begin{aligned}
V_s^f(a,e,\epsilon,j,b,k) = \max_{\{c,d,a',h,k'\}} & \; u\big(c, n(d, 1-h-(1-\mathbf{1}_f)h_{childcare}), k\big) \\
& + \beta\phi_{j'} \int_{B_s}\int_{S^m}\int_{\epsilon} \Big\{ \underbrace{[1-\mathbf{1}_m(\cdot)]V_s^f(a',e,\epsilon',j+1,k')}_{\text{remain single}} \\
& + \underbrace{\mathbf{1}_m(\cdot)V_m(a^*+a', e^*, e, \epsilon^*, \epsilon', b', j+1, k')}_{\text{getting married}} \Big\} \\
& \underbrace{dP(\epsilon'|\epsilon)}_{\text{labor shock}} \underbrace{dS^m(a^*,e^*,\epsilon^*,j+1)}_{\text{meeting a male}} \underbrace{dB_s(b')}_{\text{bliss shock}}
\end{aligned}
$$

$$
\begin{aligned}
\text{s.t.} \quad & (1+\tau_c)c + (1+\tau_d)p_d d + a' + 1_f childcare \\
& = \begin{cases} (1+r)a + y^{earn} - Tax - ss + wel & \text{if } j \le J_R \\ (1+r)a + pen_e - Tax + wel & \text{if } j > J_R \end{cases} \\
& y^{earn} = we_j^f \epsilon_{e,j}^f \bar{h} \\
& Tax = \begin{cases} \tau^a ra + T(ra + y^{earn} - 0.5ss) & \text{if } j \le J_R \\ \tau^a ra + T(ra + pen_e) & \text{if } j > J_R \end{cases} \\
& ss = \tau^{ss} \min\{\bar{y}, y^{earn}\} \\
& c \ge 0, a' \ge 0, d \ge 0
\end{aligned} \tag{4}
$$

Timeline: Married Couple

1. Draw productivity shocks $\varepsilon^f, \varepsilon^m$
2. Update bliss shock b



Marriage/divorce decision

1. Consumption-saving decision
2. Wife's labor supply decision
3. Fertility decision

The Problem of Married Couples

$$V_m(a, e^m, e^f, \epsilon^m, \epsilon^f, b, j, k) = \max_{\{c,d,a',h^f,k'\}} u\big(c, n(d, 2 - \bar{h} - \mathbf{1}_f h^f - (1 - \mathbf{1}_f) h_{childcare}), k\big)$$

$$+ b_m + \underbrace{M(e^m, e^f)}_{\text{match. qual}}$$

$$+ \beta\phi_{j+1} \int_{B_m} \int_{\epsilon^m} \int_{\epsilon^f} \Big\{ \underbrace{\mathbf{1}_m(\cdot) V_m(a', e^m, e^f, \epsilon^{m'}, \epsilon^{f'}, b', j+1, k')}_{\text{remain married}}$$

$$+ \underbrace{[1 - \mathbf{1}_m(\cdot)]\big(\frac{1}{2} V_s^m(\frac{1}{2}a', e^m, \epsilon^{m'}, j+1) + \frac{1}{2} V_s^f(\frac{1}{2}a', e^f, \epsilon^{f'}, j+1, k')\big)}_{\text{getting divorced}} \Big\}$$

$$\underbrace{dP(\epsilon^{m'}|\epsilon^m) dP(\epsilon^{f'}|\epsilon^f)}_{\text{labor shocks}} \underbrace{dB_m(b'|b)}_{\text{bliss shock}}$$

$$\text{s.t.} (1 + \tau_c)c + (1 + \tau_d) p_d d + a' + 1_f childcare$$

$$= \begin{cases} (1 + r)a + y^{earn} - Tax - ss + wel & \text{if } j \le J_R \\ (1 + r)a + pen_e - Tax + wel & \text{if } j > J_R \end{cases}$$

$$y^{earn} = y_f^{earn} + y_m^{earn} = we_j^m \epsilon_{e,j}^m \bar{h} + we_j^f \epsilon_{e,j}^f h^f$$

$$Tax = \begin{cases} \tau^a ra + T(ra + y^{earn} - 0.5ss) & \text{if } j \le J_0 \\ \tau^a ra + T(ra + pen_e) & \text{if } j > J_0 \end{cases}$$

$$ss = \tau^{ss} \min\{\bar{y}, y_T^{earn}\}$$

$$a \ge 0, a' \ge 0, h^f \ge 0, k' \ge 0, j \text{ if } \in \{0, \bar{J}\} \quad \in \{f\}$$

Firm & Government

- A neoclassical firm: $F(K, L) = AK^{\alpha}L^{1-\alpha}$
- Government taxes consumption, capital, and labor to finance welfare programs and its own consumption
- Social security is self-financed

Overview

Calibration

- Benchmark economy: 2015
- 1 period = 4 years
- External parameters: literature + estimation from the data (marked in blue)
  - Demographics
  - Life-cycle wage profile, idiosyncratic labor shock
  - Age structure of children
  - Child care cost, time use
  - Tax, credits, welfare

Calibration

- Internal parameters (52, marked in red): match the major aggregate moments and life-cycle profiles. Using simulated method of moment (SMM) approach:

$$\hat{\omega} = \arg\min G(\omega)' \mathrm{W} G(\omega)$$

where ω is the vector of parameters, $G(\omega)$ is the vector of the associated moments

  - Discount factor
  - Female LFP
  - Matching quality
  - Marriage rate, divorce rate profile
  - Birth rate profile

Parameters of Benchmark Economy, cont'd

Parameters	Name	Source / Target	Value
Demographics			
g	pop growth rate	the World Bank	0.9%
ϕ	cond. surv. prob	Bell & Miller (2002)	Figure 8
Labor income			
e	life-cycle profile	PSID	Figure 9
ϵ	idiosyncratic shock	PSID	Figure 10

Parameters of Benchmark Economy, cont'd

Parameters	Name	Source / Target	Value
Preference			
β	discount factor	$K/Y = 3.3$	1.12
ζ_1	inv. elasticity of consump.	Greenwood et al. (2016)	1.78
ζ_2	inv. elasticity of home prod.	Greenwood et al. (2016)	3.11
ξ	weight of home prod.	Greenwood et al. (2016)	1.2
Home production			
θ	share of dur. in home prod.	Greenwood et al. (2016)	0.21
λ	substitution in home prod.	Greenwood et al. (2016)	0.19
χ	adult equivalent of adults	United Nation	0.7
χ_k	adult equivalent of kids	United Nation	0.5

Parameters of Benchmark Economy, cont'd

Parameters	Name	Source / Target	Value
Fixed cost of female LFP			
$q_{s,nc}$	single, non-college	LFP = 0.56	-1.8
$q_{s,col}$	single, college	LFP = 0.85	-3.2
$q_{m,nc-nc}$	married, nc & nc	LFP = 0.67	-0.22
$q_{m,nc-col}$	married, nc & col	LFP = 0.83	-0.31
$q_{m,col-nc}$	married, col & nc	LFP = 0.62	-0.25
$q_{m,col-col}$	married, col & col	LFP = 0.73	-0.32
Value of children			
$\iota_{j,nc}$	weight of kids for nc mom	fertility rate profile	▸ Figure 13
$\iota_{j,col}$	weight of kids for col mom	fertility rate profile	see above
υ_{nc}	elasticity of children		1.5
υ_{col}	elasticity of children		1.5
Structure of k ▸			

Parameters of Benchmark Economy, cont'd

Parameters	Name	Source / Target	Value
Matching Quality			
m_{nc-nc}	m. noncol + f. noncol	share = 0.51	-0.6
m_{nc-col}	m. noncol + f. col	share = 0.11	1.0
m_{col-nc}	m. col + f. noncol	share = 0.12	1.1
$m_{col-col}$	m. col + f. col	share = 0.26	3.3
Bliss Shock			
$\bar{b}_{m,j}$	mean of married	jointly match	
$\rho_{b_m,j}$	persistence of married	the life-cycle	
σ_{b_m}	std. of married	marriage rate	▸ Figure 15
$\bar{b}_{j,s,j}$	mean of single	&	
σ_{b_s}	std. of married	divorce rate	

Parameters of Benchmark Economy, cont'd

Parameters	Name	Source / Target	Value
Tax			
τ_a	capital tax		0.1
τ_c	consumption tax	gov. budget	0.05
$\tau_s s$	social security tax		0.13
$T(\cdot)$	income tax function	CBO	▸ tax
Welfare			
$wel(\cdot)$	welfare received	PSID + SIPP	▸ Figure 11

Overview

Life-cycle Profile of Welfare

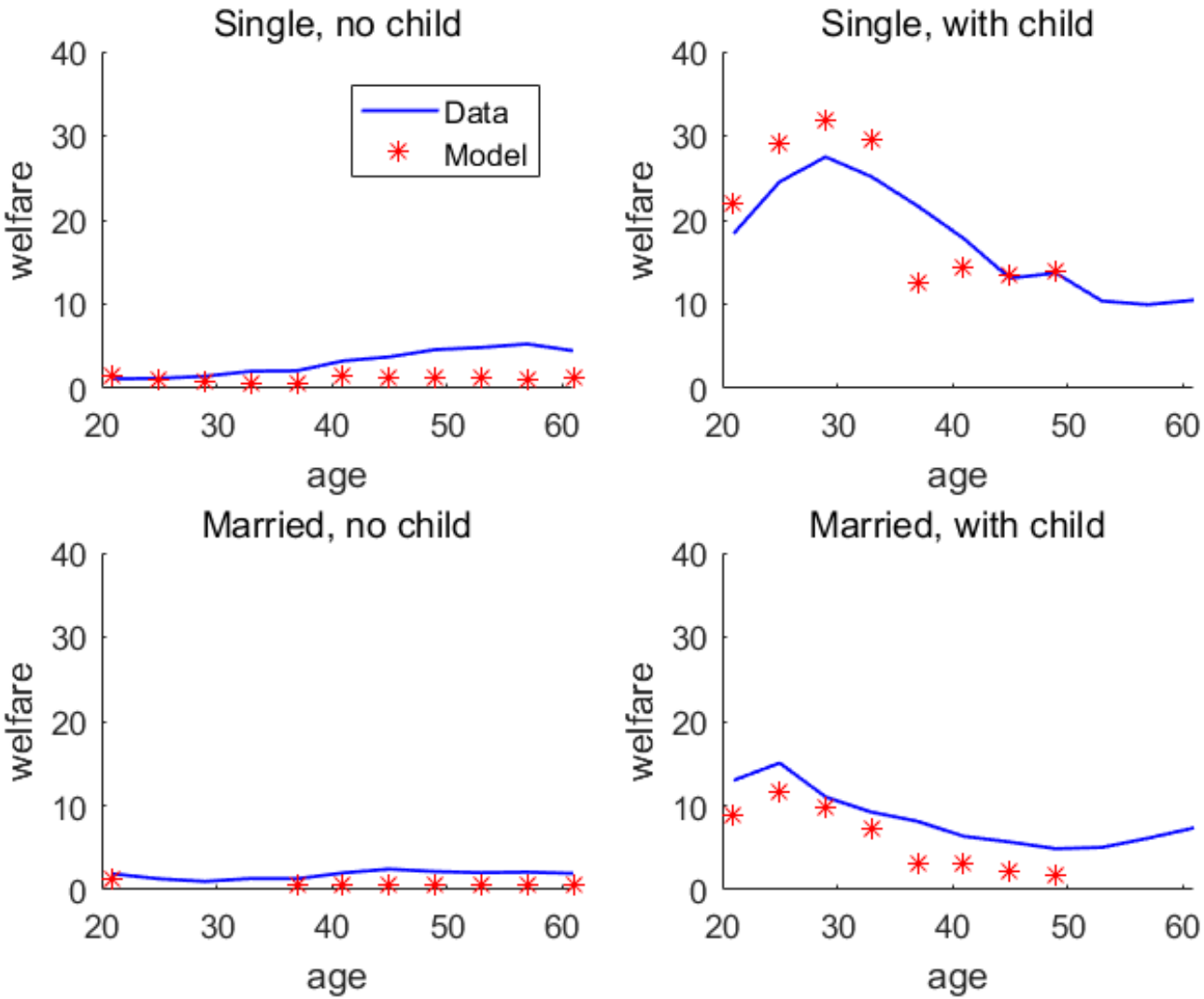


Figure 1: Welfare relative to GDP in %, over the life-cycle

Marriage Rate by Productivity

- Marriage rate increases with productivity

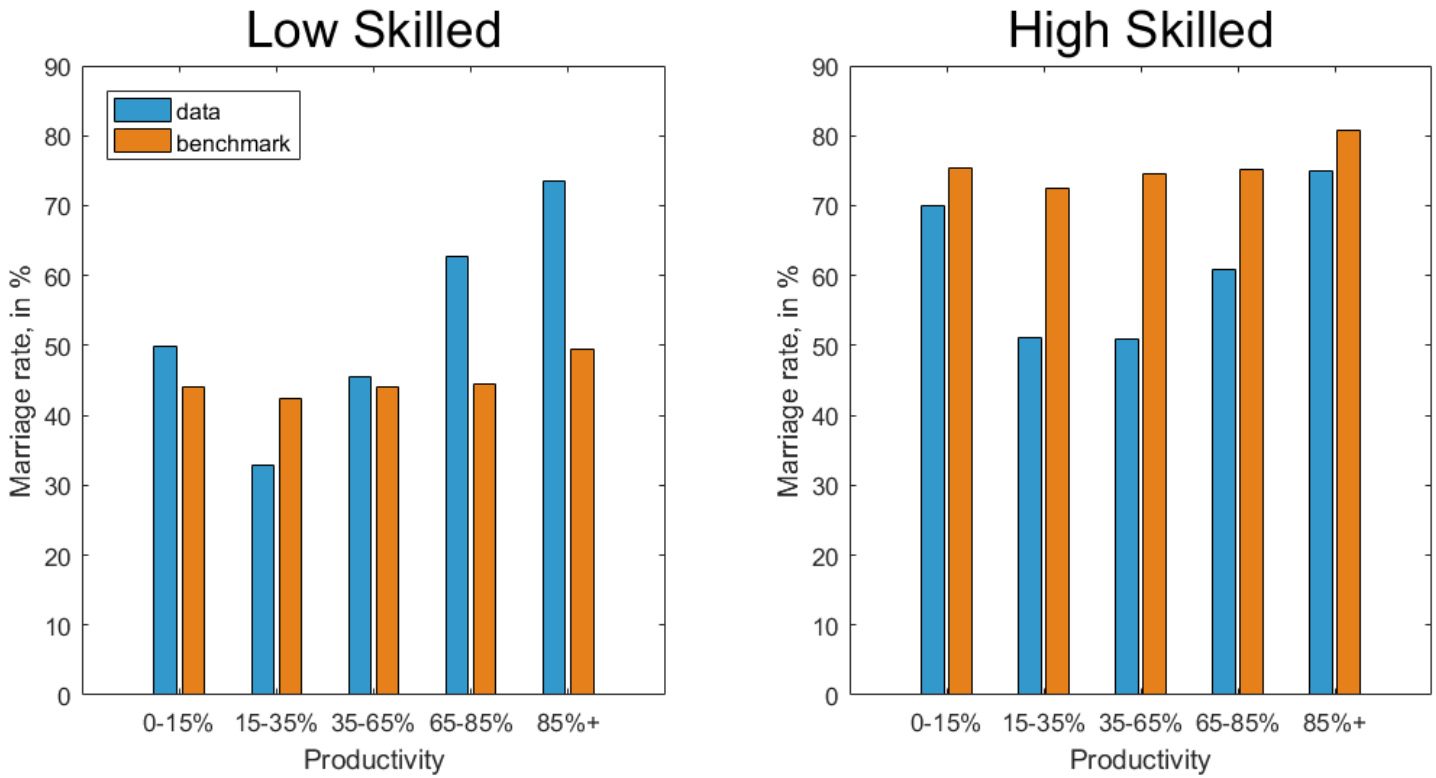


Figure 2: Marriage rate by productivity

- Replicate the **U-shaped** marriage rate by productivity

Marriage Rate by Productivity and Wealth

Figure 3: Marriage rate by wealth

- Replicate the **increasing** marriage rate with wealth

Low skilled, Single, Female with children

Table 1: Low skilled, single mom families

	HH as % in total	LFP	Income to ave. GDP	Welfare to ave. GDP	Welfare as % in total
Data	5.6%	75.7%	0.51 ($30k)	0.22 ($13k)	20.3%
Model	15.9%	43.2%	0.15 ($9k)	0.27 ($16k)	69.6%

Table 2: Low skilled, single mom families with LFP = 0

	HH as % in total	Income to ave. GDP	Welfare to ave. GDP	Welfare as % in total
Data	1.4%	0.03 ($1.6k)	0.36 ($21k)	8.2%
Model	8.9%	0.03 ($1.8k)	0.32 ($19k)	45.5%

- Each low-skilled single-mother family receives **nearly four** portions of welfare
- Each low-skilled, non-working single-mother family receives **over five** portions of welfare

Overview

Aggregate Results

Table 3: Counterfactual Result - No Welfare

	college %		single fem. LFP		married fem. LFP			
	male	fem.	L	H	L+L	L+H	H+L	H+H
Bench	39.4	24.6	68.0	100	77.0	95.2	77.7	65.7
No wel	37.2	30.7	100	100	99.8	100	100	99.6

- W/o welfare, female collage rate ↑
- Female LFP ↑

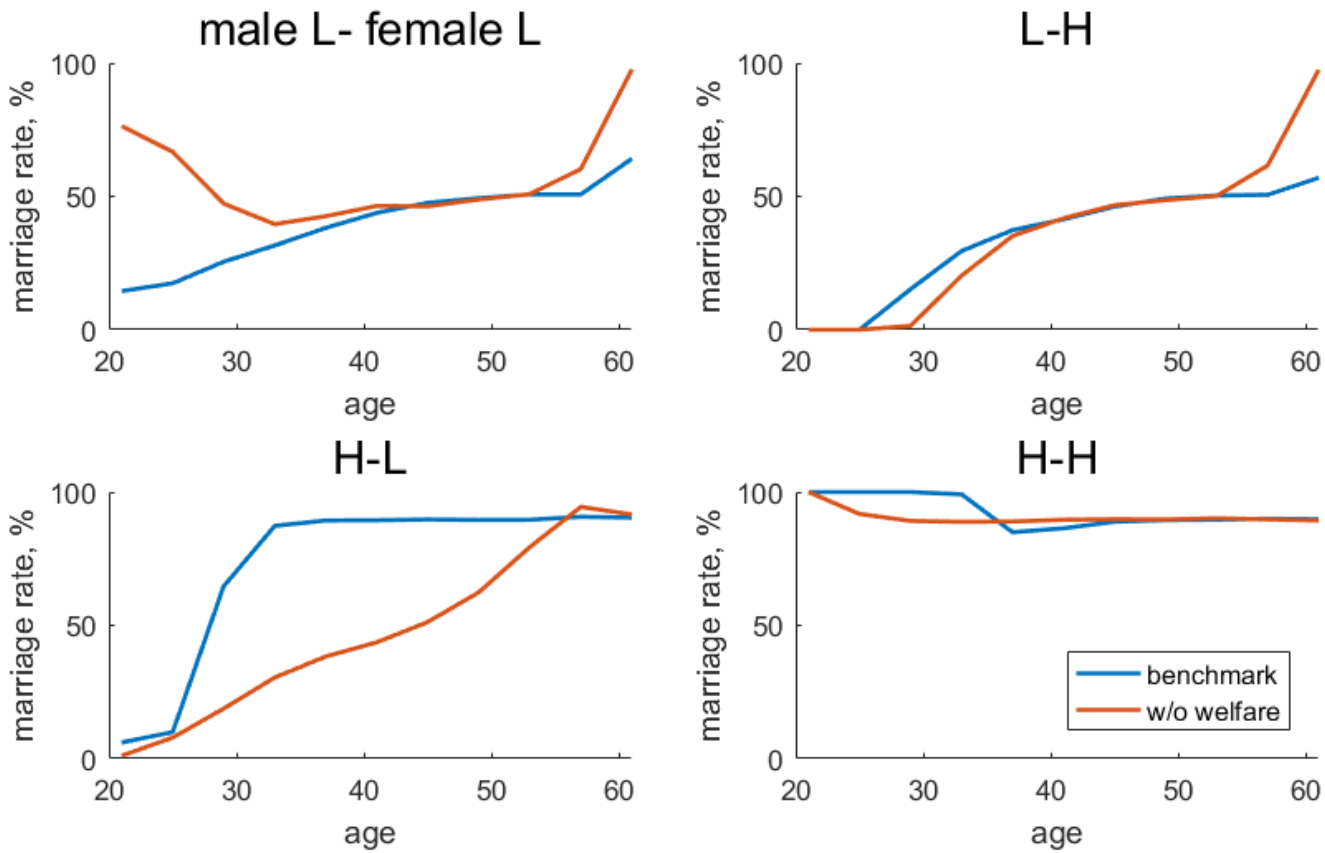
Aggregate Results, cont'd

Table 4: Counterfactual Results - 1960 Welfare

	assortative mating				marriage %		divorce %		fertility %	
	L+L	L+H	H+L	H+H	L	H	L	H	L	H
Bench	36.8	6.0	31.9	25.3	46.21	76.4	32.4	12.2	1.9	1.7
No wel	49.3	6.4	13.3	30.9	54.1	72.3	35.3	14.1	0.2	0.2

- W/o welfare, average **marriage rate** $\uparrow$, contributed by low skilled
- **AM becomes stronger**, cross-skilled marriage $\downarrow$, particularly H-male + L-female
- **Fertility rate** $\downarrow$

Marriage Rate over Life-Cycle and Skill Type



- W/o welfare, **young and L-L skilled** individuals are more willing to marry to substitute for the lost welfare

Marriage Rate over Life-Cycle and Skill Type

- **AM along education becomes stronger**; cross-skilled marriages declines
  - especially H-male + L-female
  - with welfare, by marrying a L-female, a H-male can receive up to 5 times welfare than otherwise being single
  - w/o welfare, H-males are less willing to married L-females

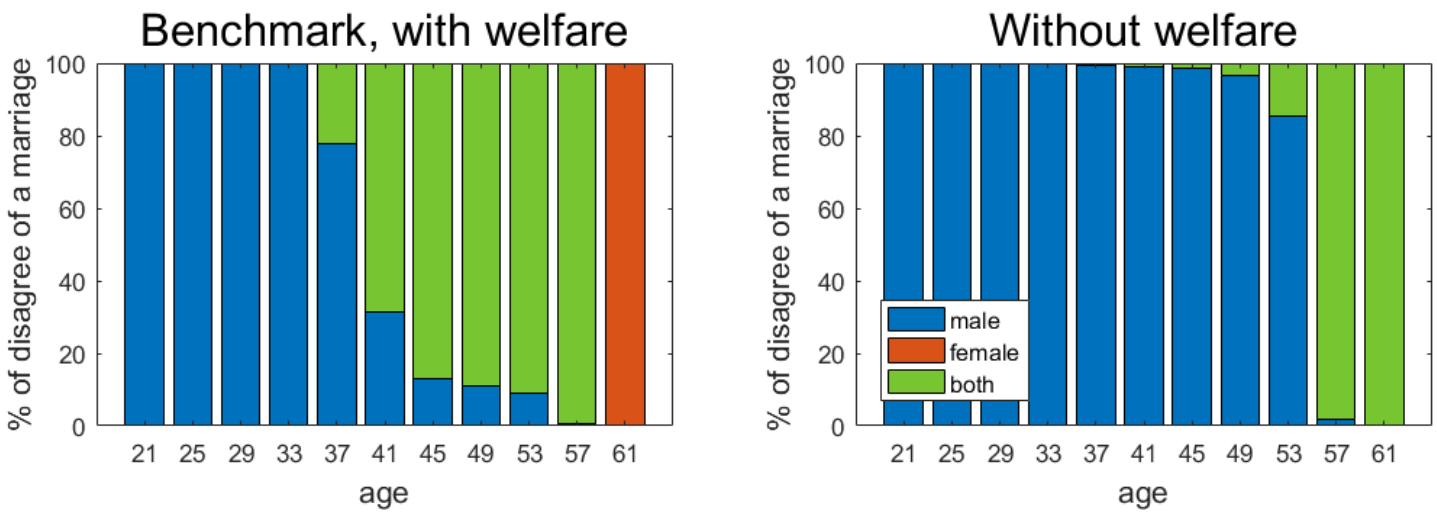
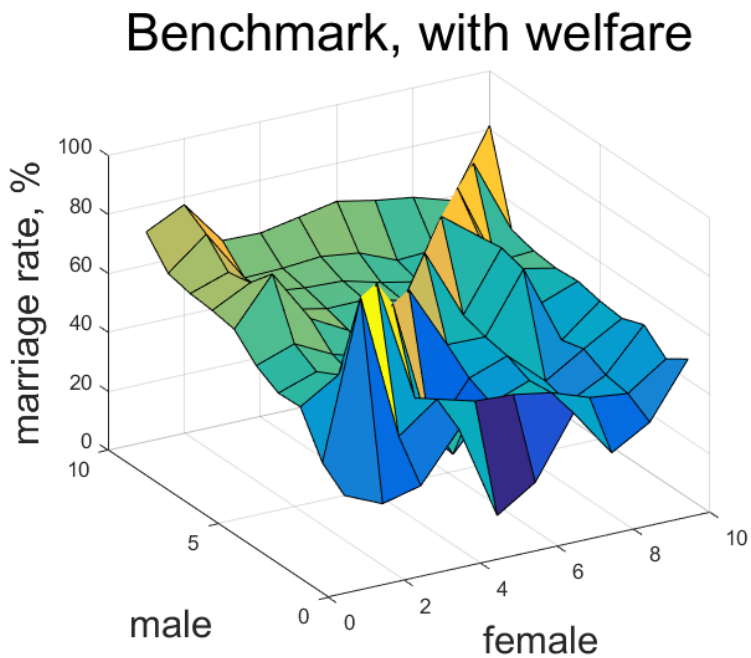
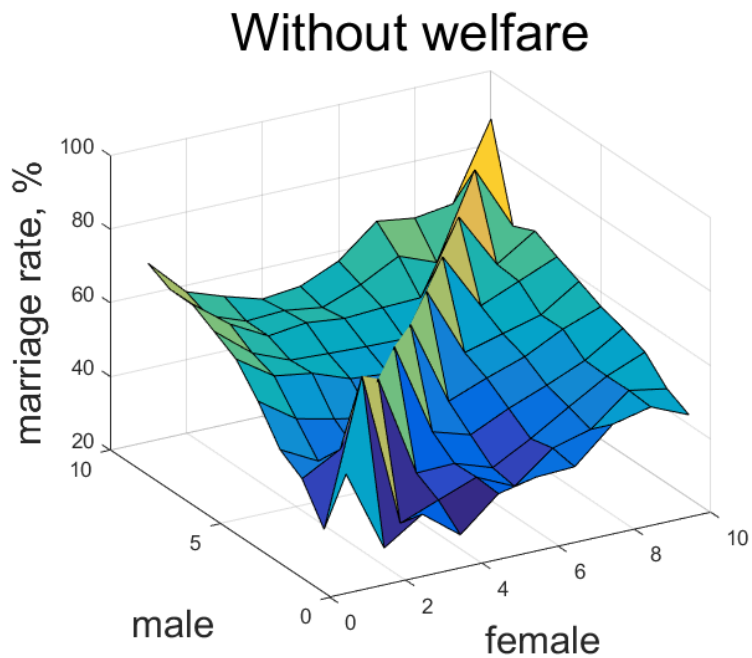


Figure 4: Unmatched reason, H-male + L-female

Marriage Rate over Wealth





- X-Y plane: female & male wealth quintile
- Along the ridge — the existing marriages
- Off the ridge — new marriages

Marriage Rate over Wealth

- A male's wealth is the key to form / stay in a marriage
- W/o welfare, a female's wealth also becomes important
- W/o welfare, disproportionately more males are unwilling to marry females with low wealth

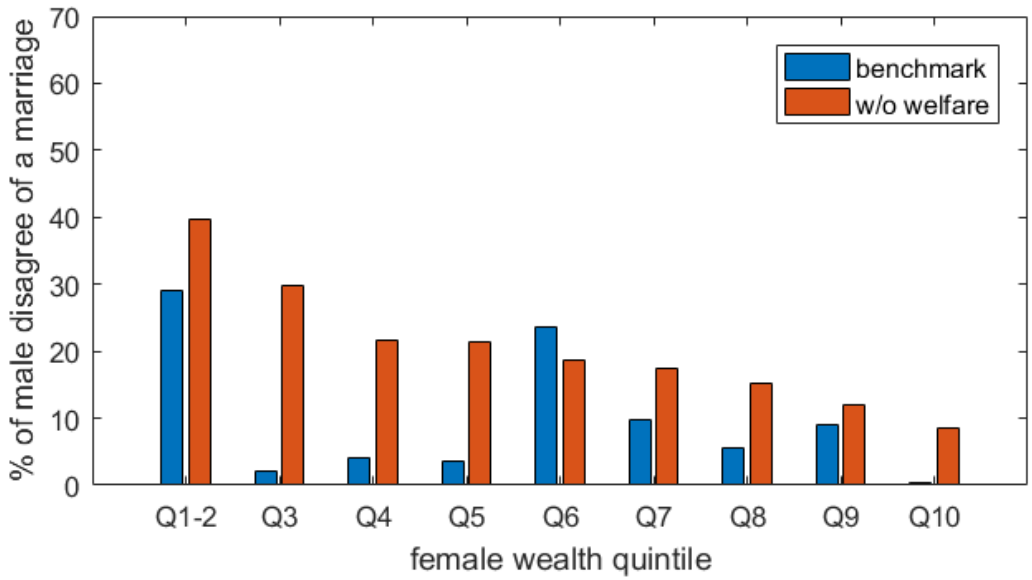


Figure 5: % of male disagree to a marriage

- **Stronger AM along wealth** — corelation between male and female wealth: 0.73 with welfare v.s. 0.84 w/o welfare; for newlyweds: 0.01 with welfare v.s. 0.32 w/o welfare

Marriage Rate over Wealth, Low-Skilled Female

- A male's unwillingness to marry a low-wealth female is even stronger when she is also low-skilled

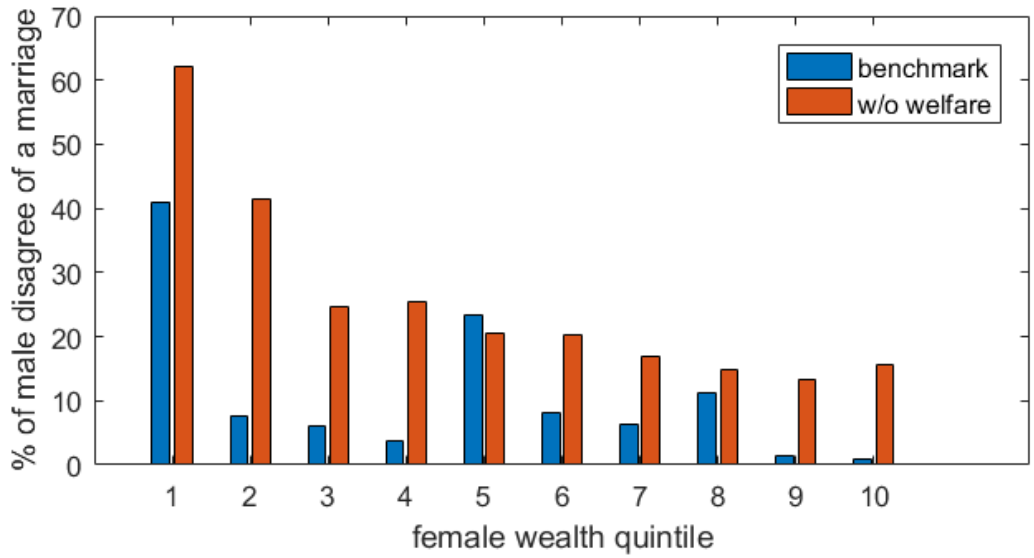


Figure 6: % of male disagree to marry a low-skilled female

- W/o welfare, low-wealth, low-skilled females have a lower chance of "marrying up"; their advantage in the marriage market is wiped out

Overview

Comparison to Greenwood et al. (2016)

- Endogenous fertility — a key modeling departure from Greenwood et al. (2016)
- Re-run the Greenwood et al. (2016) experiments with and without fertility decision
  - In the no-fertility case, the 2015 benchmark economy is recalibrated in the same way as above, except for the fertility rate

Comparison to Greenwood et al. (2016)

Table 5: Re-run Greenwood et al.(2016), with & without fertility

	single fem. LFP		married fem. LFP				fertility	
	nc	col	nc+nc	nc+col	col+nc	col+col		
without fertility								
2015 ben	90.9	99.8	72.9	77.6	67.1	69.7	-	-
1960 p^d	78.9	100	42.8	48.0	23.7	38.2	-	-
with fertility								
2015 ben	68.0	100	77.0	95.2	77.7	65.7	1.9	1.7
1960 p^d	100	100	73.7	98.3	80.6	98.6	0.2	0.2

The Role of Endogenous Fertility

- Without fertility, a higher price of durables reduces married female LFP
- With endogenous fertility, the opposite holds — a higher price of durables increases married female LFP
- Intuitively, when home appliances become more expensive, families cut back on the number of children
- With a relaxed constraint on time and resources, females participate more in market production

Overview

Conclusion

- An OLG model that **endogenizes marriage and divorce, fertility, education, and labor supply decision** to assess the role of welfare state on family composition
- Without welfare provision, the **marriage rate increases**
  - Particularly among young and low-skilled individuals
- **Assortative mating strengthens** along both educational and wealth dimensions
  - Low-skilled and financially constrained women find it more difficult to "marry up"
- **Fertility reduces** significantly
  - The proportion of single-mother families drops to nearly zero

Coming soon...

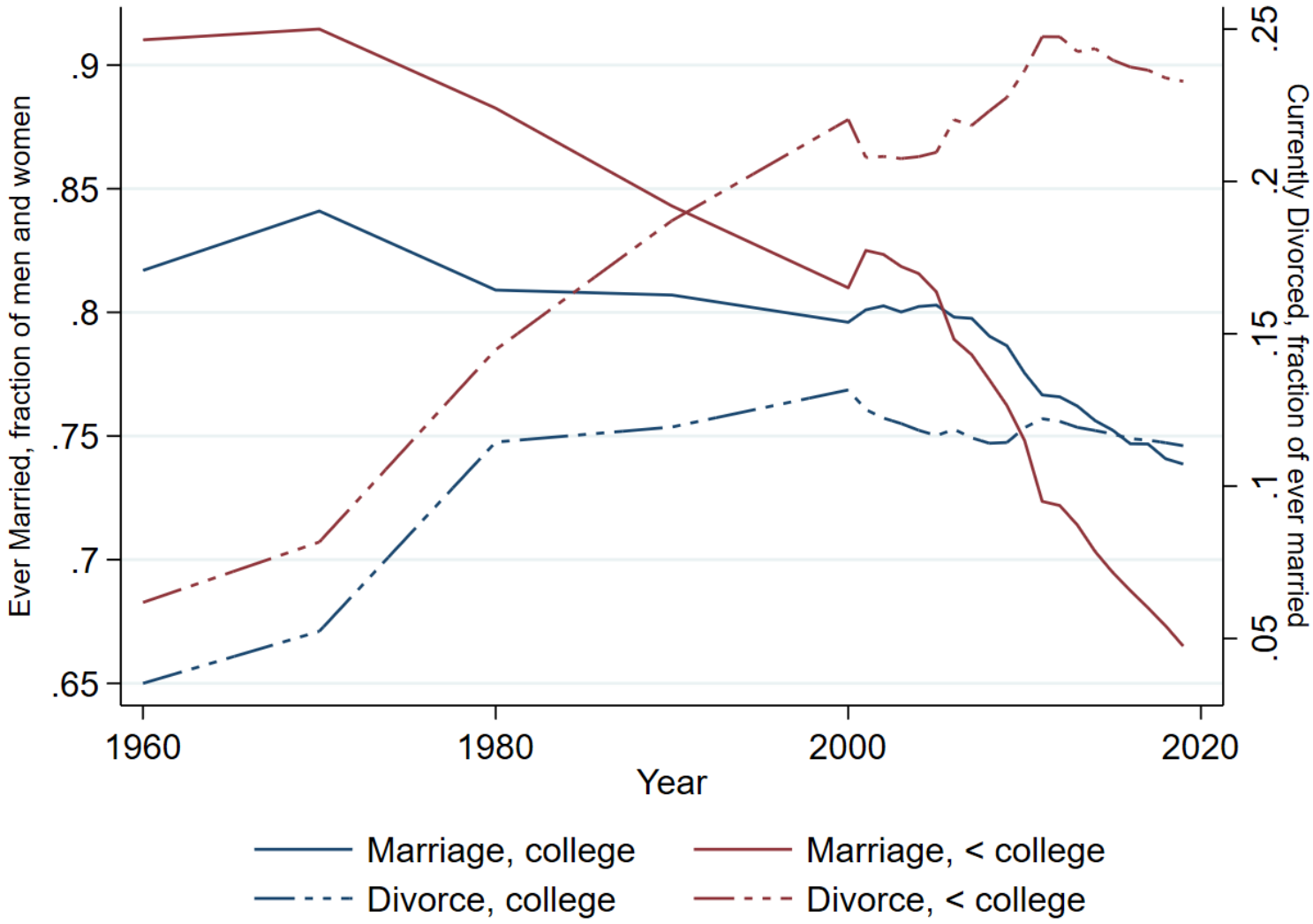
- In the current version, fertility is determined at the stage of whether getting married. Once determined, then (no) fertility will follow with certainty — 0-1 outcome
- In reality, there is probability of having children when decid not to, and vice versa
- Introduce **fertility uncertainty**:
  - $\pi 0(age, edu, marital, \#children)$: probability of not having children when decid not to
  - $\pi 1(age, edu, marital, \#children)$: probability of having children when intend to

Thank you!

Overview

Marriage and Divorce Rate

Back



Assortative Mating

Back

$$EDU_t^{wife} = \alpha + \beta \times EDU_{1960}^{husb} + \sum_{t>1970} \gamma_t \times EDU_t^{husb} \times DUMMY_{y,t} + \sum_{y \in Y} \theta_t \times DUMMY_{y,t} + \epsilon$$

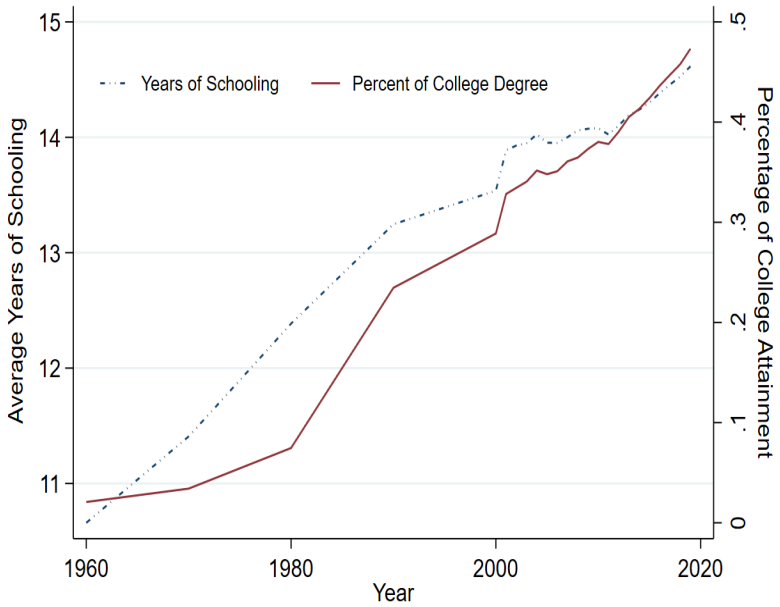
Table 6: The Rise in Assortative Mating

	(1) EDU^{wife}
EDU^{husb}	0.165***
	(0.002)
γ_{1970}	0.038***
	(0.004)
γ_{1980}	0.090***
	(0.003)
γ_{1990}	0.286***
	(0.003)
γ_{2000}	0.323***
	(0.003)
γ_{2010}	0.361***
	(0.003)
r2	0.343
N	1467028

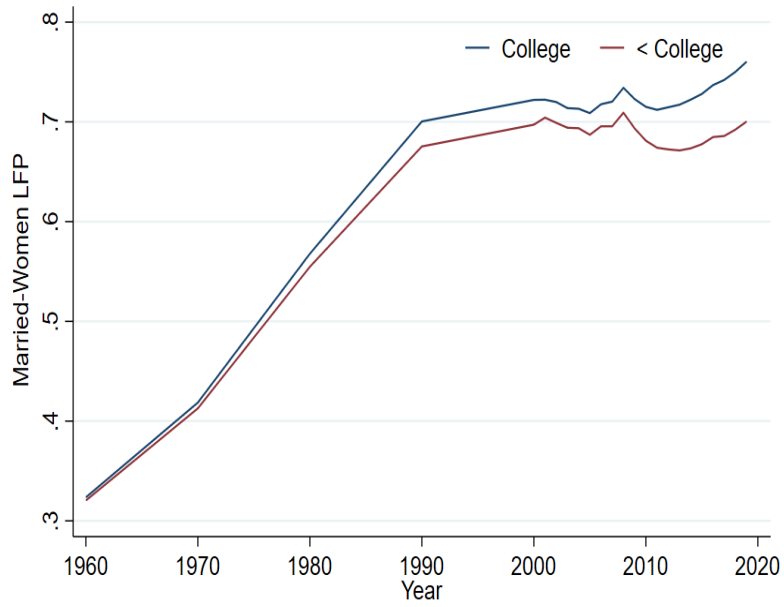
$***p < 0.01, **p < 0.05, *p < 0.1$

Female Education and Labor Market Changes

Back



(a) Female Education Attainment



(b) Married female LFP

The Development of the Welfare State 2015s

Back

- SIPP welfare programs: TANF, SNAP, SSI, WIC, housing assistance, Medicaid
- Tax credits by Taxsim

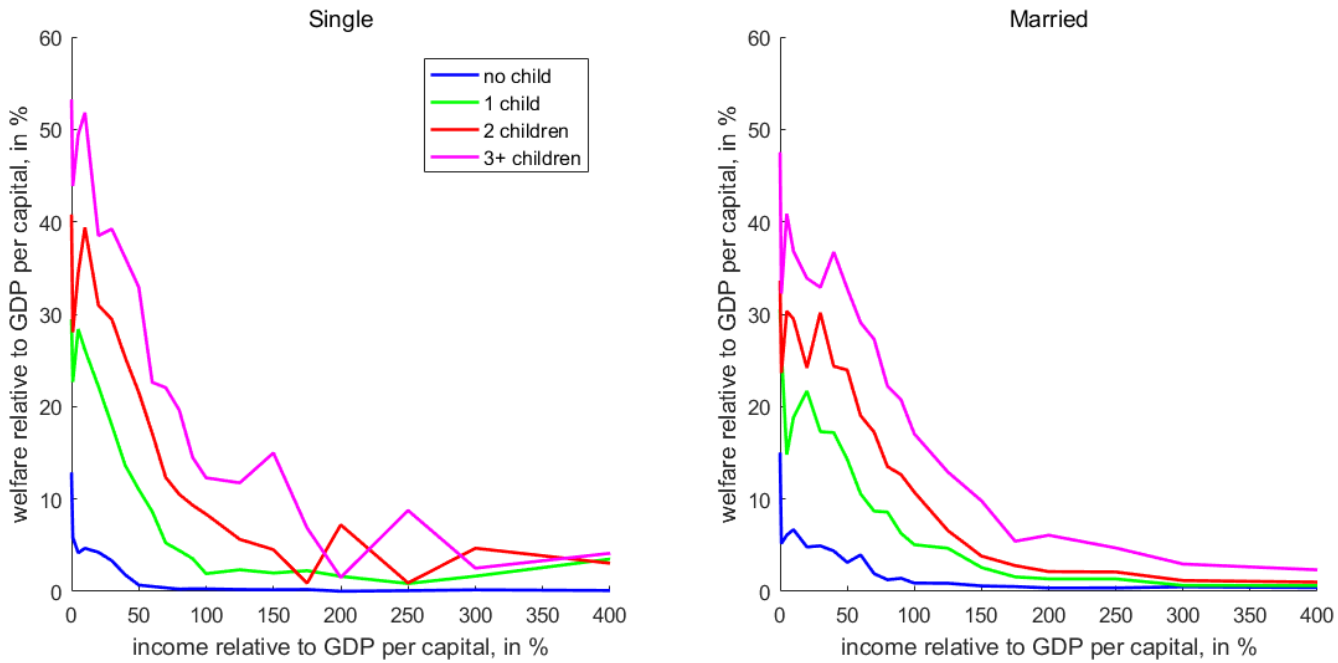


Figure 7: Welfare by marital status, # of children at home, & income

- Welfare is biased toward low-income, single and hh with more children

Dataset Back

- IPUMS-USA dataset for the facts on the household composition
  - only singles and married couples between age 21 and 65
  - wage variable is restricted to be nonnegative for singles and married men
  - skilled individuals refer to college degree or above.

Dataset Back

- PSID + SIPP dataset for earnings, income, tax credits and welfare
  - Gross household income includes labor earnings, self-employment income, private transfers (alimony, child support, help from relatives, miscellaneous transfers, private retirement income, annuities, and other retirement income), plus income from interest, dividends, and rents, following the definition of HSV(2017)
  - PSID + TAXSIM to output tax credits, categorizing by income, marital status and number of children
  - SIPP data is used for construct a non-parametric welfare transfer function of income, marital status and number of children

Conditional Survival Probability

Back

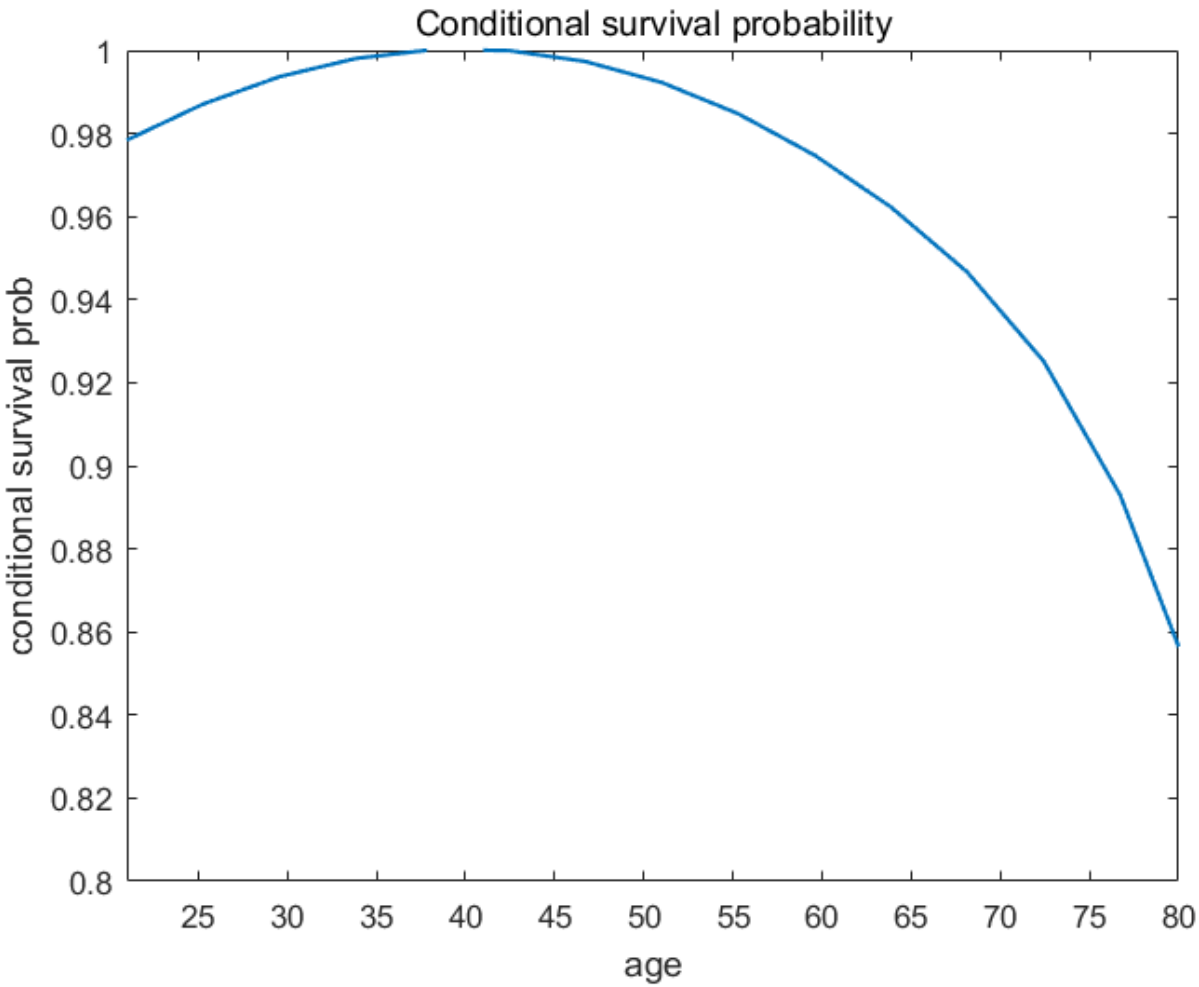


Figure 8: Conditional survival probability

Life-cycle Wage Profile

Back

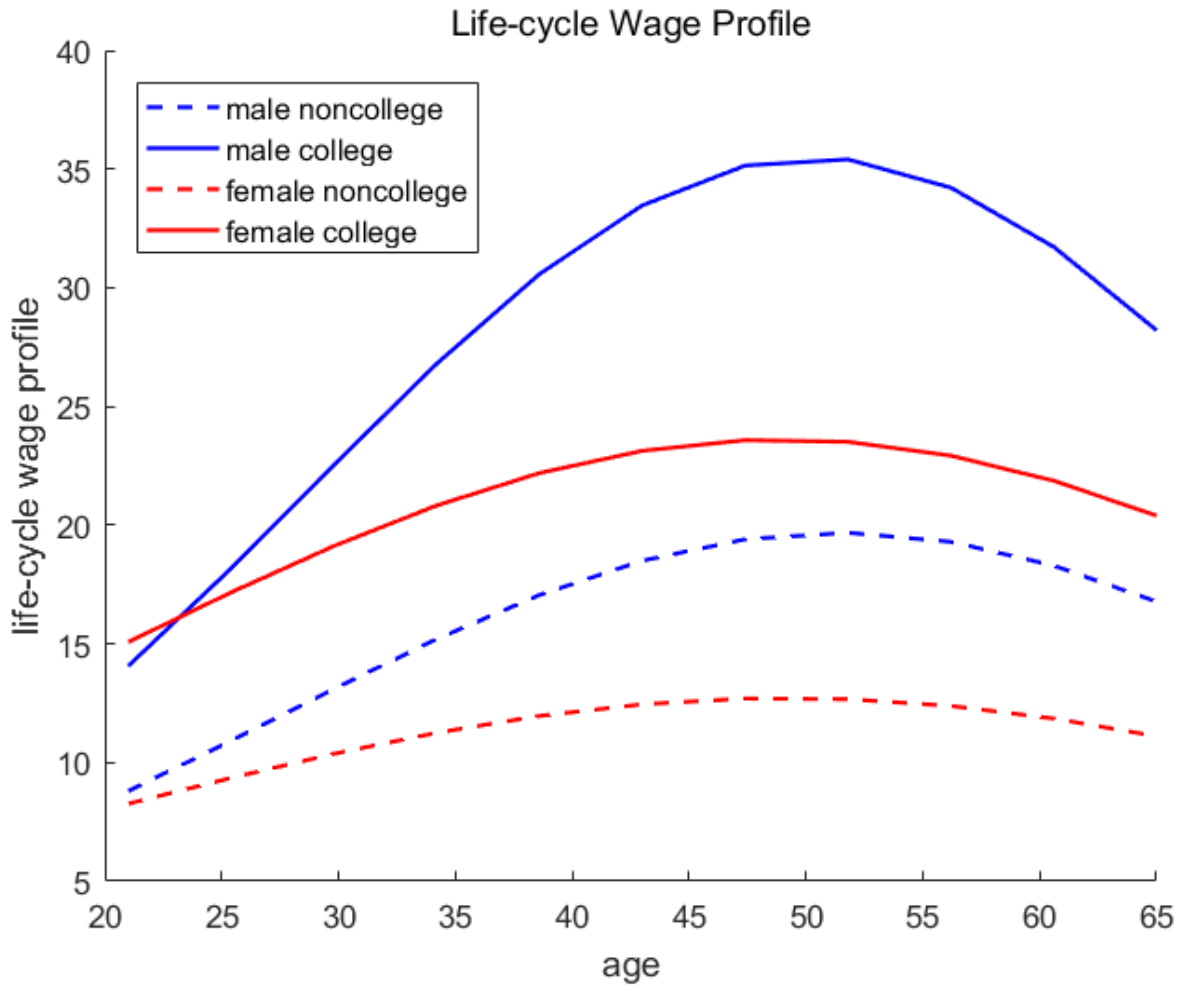


Figure 9: Life-cycle wage profile

Shock Transition Matrix

Back

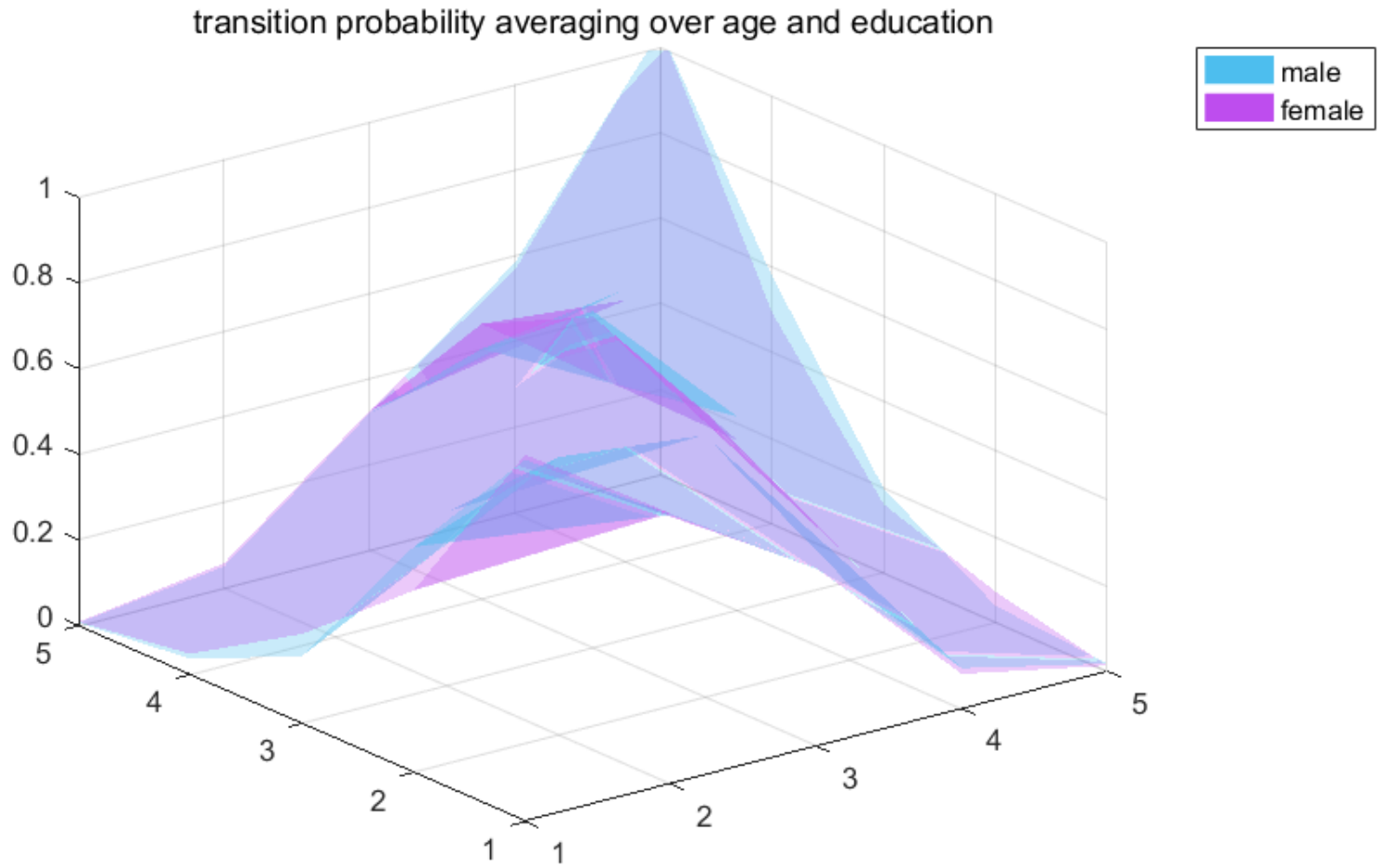


Figure 10: Transition probabilities averaging across age and education

Utility

Back

- The utility function:

$$u(c, n(d)) = \underbrace{\frac{1}{1-\zeta_1}\left(\frac{c}{\chi}\right)^{1-\zeta_1} + \frac{\xi}{1-\zeta_2}\left(\frac{n(d)}{\chi}\right)^{1-\zeta_2}}_{\text{adult equiv. consumption \& home production}} - \underbrace{1_{h^f} q_s(e^f) - 1_{h^f} q_m(e^m, e^f)}_{\text{fixed cost of working, single / married female}} + \underbrace{\iota \frac{1}{1+\upsilon}(1+\#k)^{1+\upsilon}}_{\text{children is valuable}}$$

- χ is adult equivalence = total number of adults and children *at home*
- Fixed cost of working for single female $q_s(e^f)$; fixed cost for married female $q_m(e^m, e^f)$
- Children is valuable, $\#k$ is the *total* number of children a female/couple have, no matter if they are at home or not
- ι depends on female education and age — life-cycle birth rate

Home Production

Back

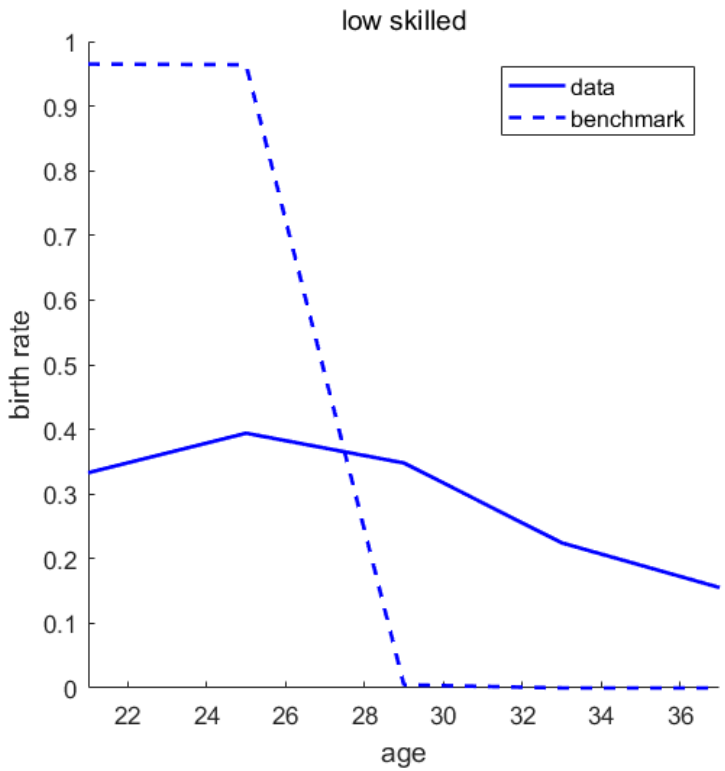
- Home production function is

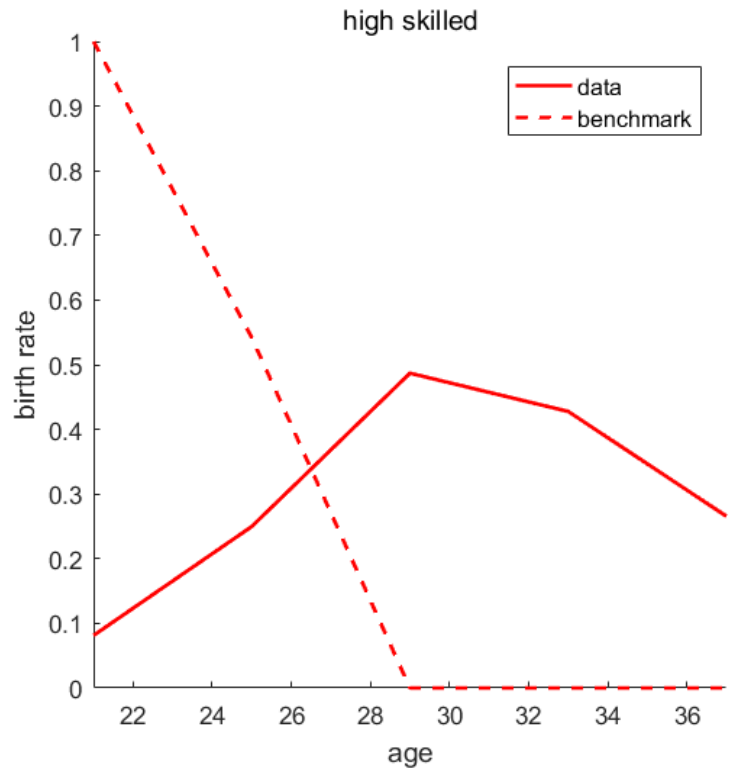
$$n(d) = \begin{cases} (\theta d^{\lambda} + (1-\theta)1^{\lambda})^{1/\lambda} & \text{R,S} \\ (\theta d^{\lambda} + (1-\theta)2^{\lambda})^{1/\lambda} & \text{R,M} \\ (\theta d^{\lambda} + (1-\theta)(1-\bar{h})^{\lambda})^{1/\lambda} & \text{W,S male} \\ (\theta d^{\lambda} + (1-\theta)(1-h^{f})^{\lambda})^{1/\lambda} & \text{W,S fem, no c} \\ (\theta d^{\lambda} + (1-\theta)(1-\mathbf{1}_f h^{f} - (1-\mathbf{1}_f)h_c)^{\lambda})^{1/\lambda} & \text{W,S fem, chil} \\ (\theta d^{\lambda} + (1-\theta)(2-\bar{h}-h^{f})^{\lambda})^{1/\lambda} & \text{W,M, no child} \\ (\theta d^{\lambda} + (1-\theta)(2-\bar{h}-\mathbf{1}_f h^{f} - (1-\mathbf{1}_f)h_c)^{\lambda})^{1/\lambda} & \text{W,M, child} \end{cases}$$

- $\bar{h} = 1/3$ is the full working hour
- θ share of durables in home production
- λ is the substitution between durables and home production time

Birthrate Profile

Back





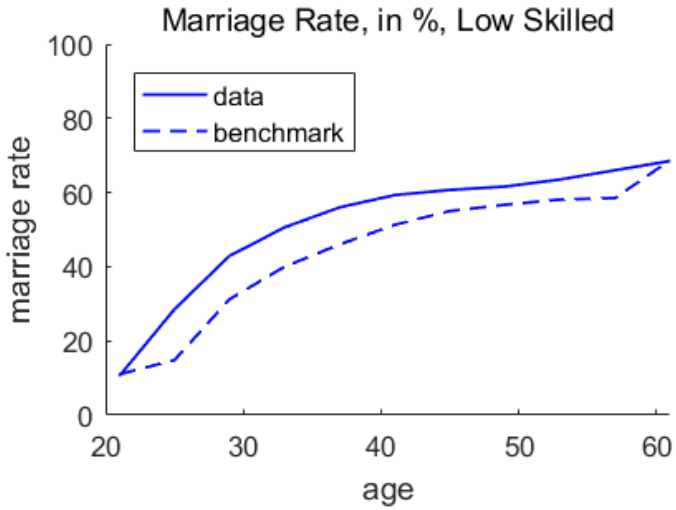
Structure of k Back

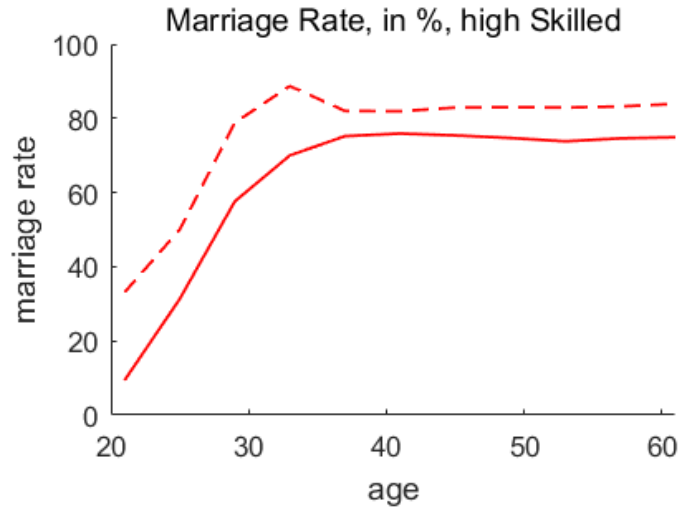
- Case id k is the index of the case, a combination of the number and the ages of children

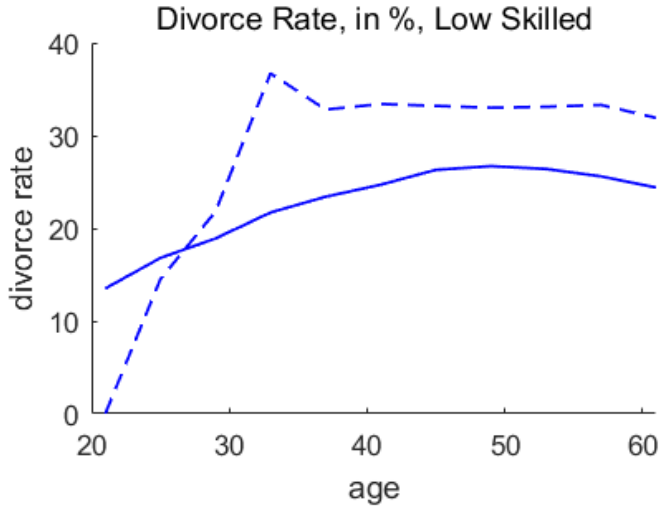
mom age	21	25	29	33	37	41	45	49	53	57	case id k
0 kid age											0
1 kid age	1	5	9	13							1
1 kid age		1	5	9	13						2
1 kid age			1	5	9	13					3
1 kid age				1	5	9	13				4
1 kid age					1	5	9	13			5
cond.1st kid	1	5	9	13							
2nd kid age		1	5	9	13						6
2nd kid age			1	5	9	13					7
2nd kid age				1	5	9	13				8
2nd kid age					1	5	9	13			9
...											
cond.1st kid			1	5	9	13					
cond.2nd kid				1	5	9	13				
3rd kid age					1	5	9	13			25

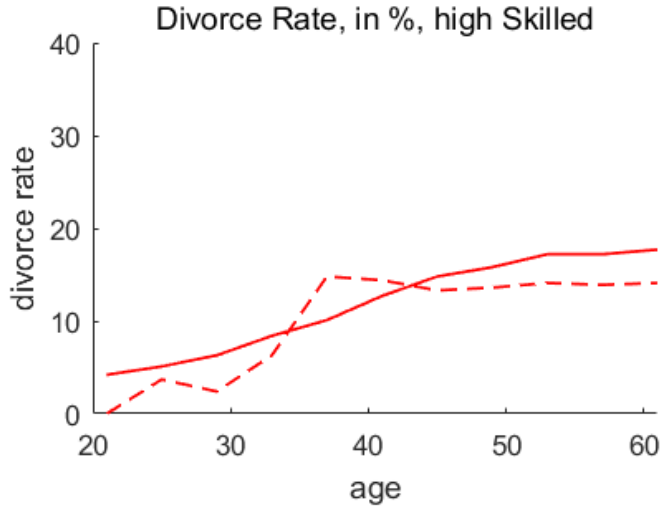
Life-cycle Marriage / Divorce Profile

Back









2015 Marginal Tax Rates

Back

Single Filing			Joint Filing		
Income Bracket		Rate, in %	Income Bracket		Rate, in %
0	$9,225	10	$0	$18,450	10
$9,226	$37,450	15	$18,451	$74,900	15
$37,451	$90,750	25	$74,901	$151,200	25
$90,751	$189,300	28	$151,201	$230,450	28
$189,301	$411,500	33	$230,451	$411,500	33
$411,501	$413,200	35	$411,501	$464,850	35
$413,201	+	39.6	$464,851	+	39.6

Cross-sectional Distribution of Welfare

Back

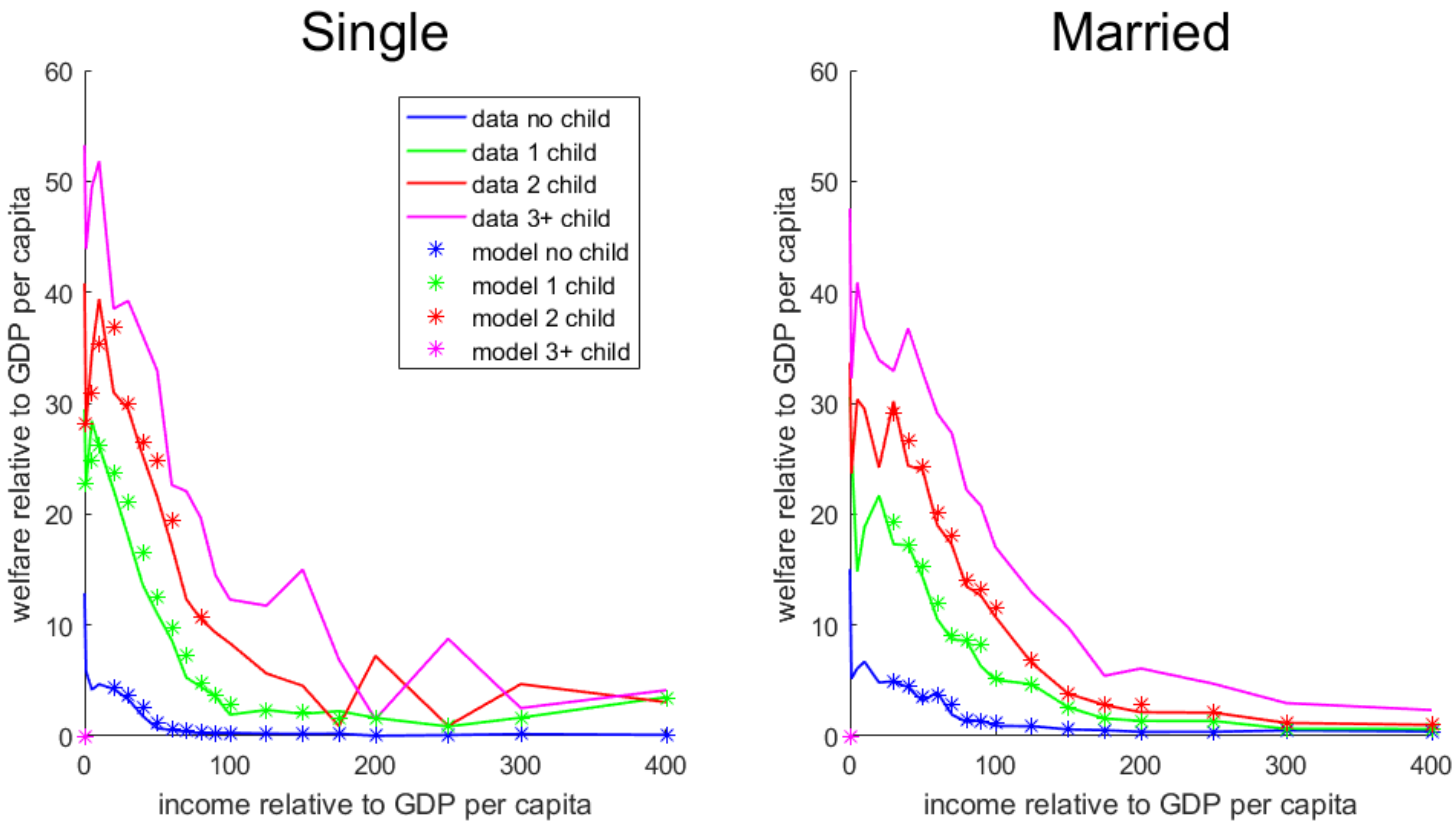


Figure 11: Welfare relative to GDP in %, by income