Rethinking the Welfare State

Nezih Guner, Remzi Kaygusuz and Gustavo Ventura

CEMFI (Spain)
Sabanci Universitesi (Turkey)
Arizona State University (USA)

April 2021

- Redistribution via 'welfare' programs and tax credit provisions in the U.S. (about 2.3% of GDP).
  - OECD – Income support to the working age population
  - US (1.9%), Germany (3.5%), France (5.4%), Belgium (7.5%)
- Transfers depend on income (means-tested), marital status/gender differences and presence of children.
- Multiple non-medical transfer programs for working-age poor and middle-income households.
  - Means-tested tax credits – Earned Income Tax Credit, Child Tax Credit, Childcare Tax Credit
  - Means-tested transfers – AFDC/TANF, Food Stamps, WIC (Food Stamps for children), SSI, Housing, Childcare subsidies
- Can simple alternatives do better?

- Aiyagari-Bewley-Huggett economies
  - Models with heterogeneity
  - Agents (typically households with one earner) face idiosyncratic productivity shocks.
  - Given these shocks, agents decide how much to consume, how much to save, how much to work to smooth consumption.
  - Agents face borrowing constraints
  - Labor supply and savings allow agents to smooth their consumption.
  - Public policies also help agents to smooth consumption
- How well agents are able to smooth their consumption?
- What are the role of policy and household decisions?
- Judge the extent of insurance looking at the inequality in earnings versus inequality of consumption over the life-cycle
  - individual earnings data vs. household level consumption data

- We depart from standard one-earner framework with incomplete markets.
- We present a framework with uninsurable shocks, a realistic demographic structure and labor supply decisions in two-earner households.
- We use this framework for policy analysis.

Questions:

- Do households value current social insurance/redistributive programs in the U.S.?
- What are the effects of policy reforms?

What we do

- Document facts on inequality over the life-cycle for different types of households –married, single, skilled, unskilled.
- Develop a life-cycle economy that accounts for these facts
- Use this framework to evaluate/understand quantitatively:

  (i) how households value current transfer system

  (ii) a system that replaces current transfers with a Universal Basic Income.

  (iii) a system that replaces current taxes and transfers with a Negative Income Tax (universal transfers plus a linear income tax).

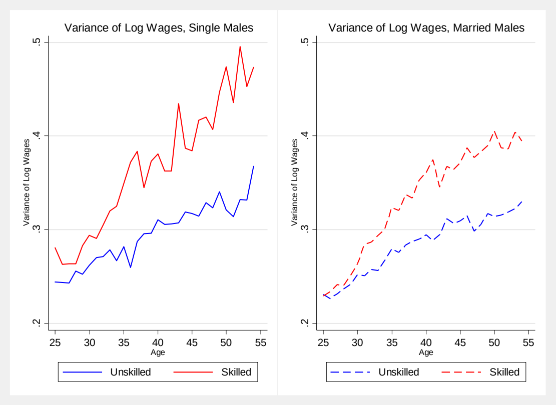
- Current Population Survey (CPS), 1980-2006
  - Household heads and their spouses, 25 to 60
  - Fit a Pareto-tail for top-coded observations
  - Drop observations with hourly wages less than federal minimum wage
  - Drop if yearly hours is less than 520 hours per year
  - Gender (female vs. male), marital status (married vs. single), skill (college vs. non-college)
- Estimate

$$m_{a,t} = \beta_a' \mathbf{D}_a + \beta_t' \mathbf{D}_t + \varepsilon_{a,t}$$

- Consumption Expenditure Survey (CEX), 1980-2006
  - Compute total non-durable consumption expenditure
- Huggett, Ventura and Yarom (2010), Heathcote, Perri and Violante (2010)

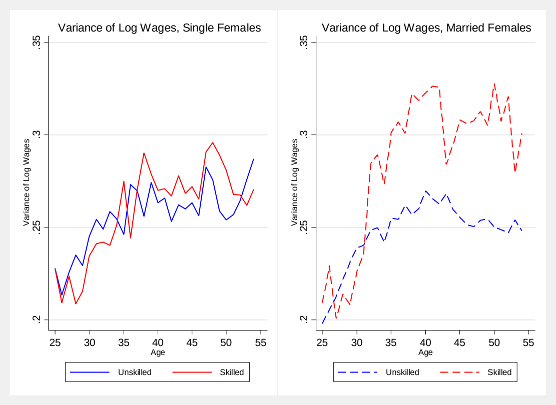
- Differences by level and slope
- Gender gap, skill premium

- Linear, significant increase between 25 and 54



Inequality over the life-cycle, females

- Picture is very different for females
- Not much increase after 35

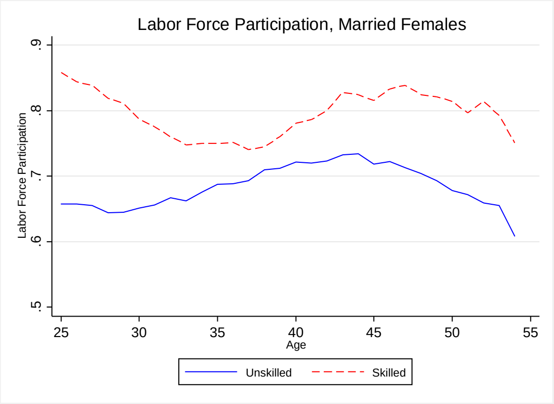


Inequality over the life-cycle, females vs. males

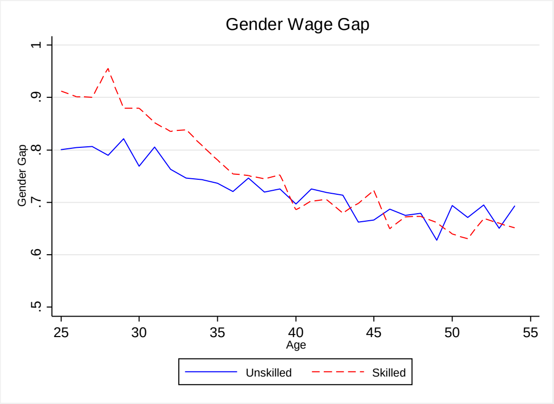
- Var of Log Hours $\Rrightarrow$

Labor Force Participation, Married Females

- U-shape associated with childbearing years

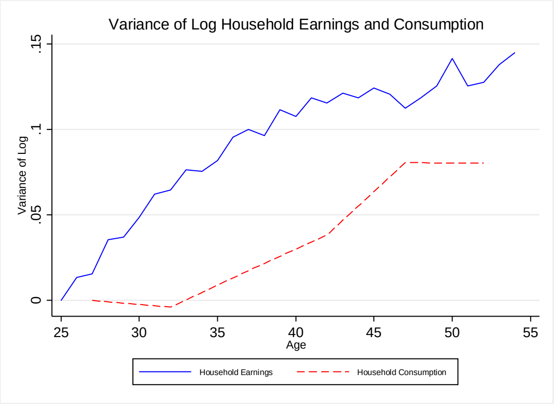


- Increases with age, larger increase for skilled women



Inequality in household consumption over the life-cycle

- Much milder increase in consumption inequality



Recap

- Hourly wages grow faster for skilled than for unskilled workers.
- Variance of log earnings for males increases non-trivially over the life-cycle.
- BUT for females, married or not, we do not observe such increase.
- Wage-gender gap increases over life cycle, more rapidly for the skilled
- LFP rate of married females first declines and then rises, and then declines again.
- The variance of log consumption increases over the life-cycle.
  - But much less than the increase in the variance of household earnings.

- Life-cycle economy
- Populated by married and single households.
- Agents are born as married or single, and marital status does not change along the life-cycle.
- Who is married and who is single, and who is married with whom is consistent with the data.
- Heterogeneity
    - Education/types (skilled, unskilled)
    - Permanent
    - Persistent shocks
- Shocks are correlated between husbands and wives

Model II

- Married households and single females differ in terms of the number of children attached to them.
  - Three possibilities: *without*, *early*, *late*
- If a female with children works, married or single, then the household has to pay for child care costs.
- Children do not provide any utility.
- Joint market work for married couples also implies a utility cost
  - Residual heterogeneity in labor force participation
  - Depends on the age of youngest child

Model III

- Household decide how much to consume and how to save.
- Married households also decide whether the female member should work.
    - Cost: have to pay for childcare, utility cost of joint work.
    - Benefit: human capital accumulation.
- Policies
    - Tax credits and transfers conditional on income and number of children
    - Progressive taxation
- General Equilibrium

Model – Demographics and Heterogeneity

- Life-cycle economy, $j = 1, ..., J_R, ...J$. [25,26,.......,65,.....,80]
- Males (m) and females (f), differ in their types/education, $z/x \in \{s, u\}$,
  - Male types map into productivity profiles, $\varpi_m(z, j)$.
  - Female types map into initial productivity levels, $h_0 = \eta(x)$, and after age 1, h evolves endogenously.
- Agents can be single or married.Marital status is exogenous, and does not change over the life-cycle.

Model – Demographics and Heterogeneity

- Married households and single females differ in the number of children attached to them.
  - Three possibilities: *without*, *early*, *late* $(b = 0, 1, 2)$
- If $b \neq 0$, married households have $k(x, z)$, single females have $k(x)$
  - Half of the children appear at parents age $\bar{j}(x, z, b)$ and $\bar{j}(x, b)$, the other half 2 years later
  - Each child stays with their parents for N model periods.
- If a female with children works, married or single, then the household has to pay for child care costs.
  - $d(x, z, t)$, $d(x, t)$ - depends on the age of children (t)
- Joint market work for married couples implies a utility cost, q
  - Depends on the age of youngest child – $q(1 + \vartheta_x(t_{min}))$

Model – Human Capital Accumulation for Females

- Female types map into initial productivity levels, $h_0 = \eta(x)$
- After age 1, labor market productivity of females evolves endogenously

$$h' = \mathcal{H}(x, h, l, e) = \exp\left[\ln h + \alpha_x^e \chi(l) - \delta_x (1 - \chi(l))\right],$$

  - where $\chi(l)$ is an indicator function for $l > 0$ (hours worked by females).
  - e is labor market experience
- Given costs (children and utility cost of joint work) and benefits (earnings plus human capital accumulation), females decides whether to work or not.

- Singles

$$U^S(c,l) = \log(c) - B_i(l)^{1+\frac{1}{\gamma}}, \quad i = m, f$$

- Married couple

$$U^M(c, l_f, l_m, \theta, q, j) = 2\log(c) - B_m l_m^{1+\frac{1}{\gamma}} - \theta B_f l_f^{1+\frac{1}{\gamma}}$$

$$-\underbrace{\chi\{l_f\}q(1+\vartheta_x(t_{min}))}_{\text{utility cost}}$$

  - θ - heterogenity to match the variance of log hours

- Consumption and investment goods are produced according to

$$Y = F(K, S, U) = K^{\alpha} L_g^{1-\alpha}$$

with

$$L_g \equiv \left(\nu S^{\rho} + (1-\nu) U^{\rho}\right)^{\frac{1}{\rho}}, \quad \rho \in (-\infty, 1)$$

Model – Idiosyncratic Productivity Shocks

- For an age-j single male of type $z \in \{s, u\}$, earnings are

$$\underbrace{w^z}_{\text{wage}} * \underbrace{\varpi(z,j) * \exp(\upsilon^S_{m,z} + \eta^S_{m,z,j})}_{\text{labor endowment}} * \underbrace{l_m}_{\text{labor supply}},$$

- υ is a *permanent* shock and η is a *persistent* shock.
- Permanent shock is normally distributed:

$$\upsilon^S_{m,z} \sim N(0, \sigma^2_{\upsilon^S_{m,z}}), \ \ z = u, s$$

- Persistent shock is governed by a random walk

$$\eta^S_{m,z,j+1} = \eta^S_{m,z,j} + \varepsilon^S_{m,z,j+1} \text{ with } \varepsilon^S_{m,z,j+1} \sim N(0, \sigma^2_{\varepsilon^S_{m,z}}), \ \ z = u, s$$

- For an age-j single female of type-x, $x \in \{s, u\}$, who has human capital h,

$$\underbrace{w^x}_{\text{wage}} * \underbrace{h \times \exp(\nu^S_{f,x} + \eta^S_{f,x,j})}_{\text{labor endowment}} * \underbrace{l_f}_{\text{labor supply}}$$

- Permanent shock is normally distributed:

$$\upsilon^S_{f,x} \sim N(0, \sigma^2_{\upsilon^S_{f,x}}), \ x = u, s$$

- Persistent shock is governed by a random walk

$$\eta^S_{f,x,j+1} = \eta^S_{f,x,j} + \varepsilon^S_{f,x,j+1} \text{ with } \varepsilon^S_{f,z,j+1} \sim N(0, \sigma^2_{\varepsilon^S_{f,x}}), \ x = u, s$$

- Married couples

$$w * \underbrace{h \times \exp(\upsilon^M_{f,x} + \eta^M_{f,x,j})}_{\text{labor endowment}} * w * l_f + w * \underbrace{\varpi(z,j) \times \exp(\upsilon^M_{m,z} + \eta^M_{m,z,j})}_{\text{labor endowment}} *$$

- $\eta^M_{m,z,j}$ and $\eta^M_{f,x,j}$ follow a bivariate process, given by

$$\eta^M_{m,z,j+1} = \eta^M_{m,z,j} + \varepsilon^M_{m,z,j+1} \text{ and } \eta^M_{f,x,j+1} = \eta^M_{f,x,j} + \varepsilon^M_{f,x,j+1}$$

$$(\varepsilon^M_{m,z,j+1}, \varepsilon^M_{f,x,j+1}) \sim N\left(\begin{matrix} 0 \\ 0 \end{matrix}, \begin{matrix} \sigma^2_{\varepsilon^M_{m,z}} & \sigma_{\varepsilon_f \varepsilon_m} \\ \sigma_{\varepsilon_f \varepsilon_m} & \sigma^2_{\varepsilon^M_{f,x}} \end{matrix} \right), \quad z, x \in Z \times X.$$

- The values of permanent shocks

$$(\upsilon^M_{m,z}, \upsilon^M_{f,x}) \sim N\left(\begin{matrix} 0 \\ 0 \end{matrix}, \begin{matrix} \sigma^2_{\upsilon^M_{m,z}} & \sigma_{\upsilon_f \upsilon_m} \\ \sigma_{\upsilon_f \upsilon_m} & \sigma^2_{\upsilon^M_{f,x}} \end{matrix} \right), \quad z, x \in Z \times X.$$

Model – Idiosyncratic Productivity Shocks

- Many parameters.
  - Variances depend on gender, skill and marital status.
- We infer variances and covariances from the data
  - Inequality in wages and correlations in wages between spouses at different stages in life cycle.
- Specification of shocks is a mixture of
  - Representative Income Processes (RIP)
  - Heterogeneous Income Processes (HIP)

- Use the Survey of Income and Program Participation (SIPP) to calibrate childcare costs - $d(x, z, t)$, $d(x, t)$
- Estimate how per-child childcare cost depends on the average age of children at home

$$\widehat{d}(x, t; mar) = a_x^{mar} + b_x^{mar} \ln(t),$$

  - where $mar \in \{M, S\}$ stands for marital status, and t is the average age of children at home.

- The childcare spending per children in the data, $\widehat{d}(x, t; mar)$, reflects effective spending $\Rrightarrow$
  - differences among household in access to informal care or quality of childcare chosen.

Model – Government

- Income tax functions $T^M(I,k)$ and $T^S(I,k)$
- The average tax rate

$$\tau(I) = 1 - \lambda I^{-\tau}$$

- We estimate these functions from Internal Revenue Service (IRS) micro data – Guner, Kaygusuz and Ventura (2014) $\Rrightarrow$
- Besides the income and payroll taxes, each household pays an additional flat capital income tax for the returns from his/her asset holdings, τ_k.
- There is a social security system financed by a flat payroll tax, τ_p
  - Social Security payments are indexed by agents' initial types (education)

Model – Government

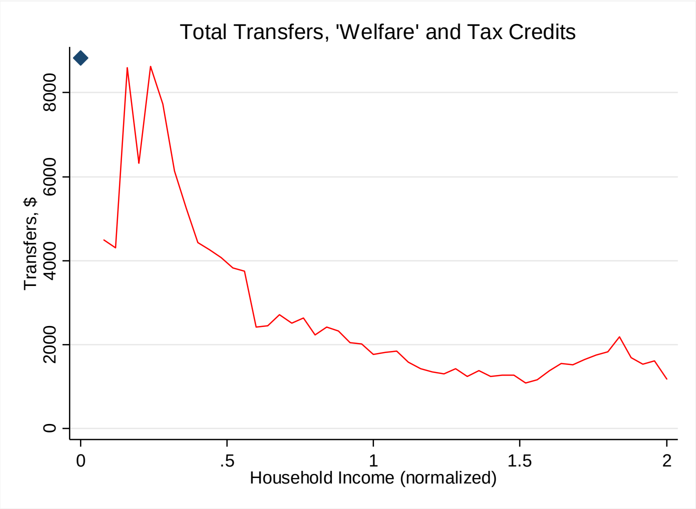
- Earned Income Tax Credit (EITC), Child Tax Credit (CTC), Child and Dependent Care Tax Credit (CDCTC)
  - Model them exactly as they are in the tax code
  - We estimate these functions from Internal Model them exactly as they are in the tax code $\Rrightarrow$
- Childcare subsidies, 75% subsidy for the poorest 5% of children

Model – Government

- Means-tested Transfers
  - Survey of Income and Program Participation (SIPP), 1995-2013
  - Include AFDC/TANF, SSI, Food Stamps/SNAP, WIC, Housing
- Total transfer functions $TR^M(I,k)$ and $TR^S(I,k)$ $\Rrightarrow$

$$TR(I) = \begin{cases} \omega_0 \text{ if } I = 0 \\ \max\{0, \alpha_0 - \alpha_1 I\} \text{ if } I > 0 \end{cases},$$

- *Total transfers* in the model (2019$)



- Households have access to one-period, risk-free asset.
- They decide how much to consume, save and the work of their members. $\Rrightarrow$
- Given their state, married households decide whether the female member should work.
  - Costs of work: child care expenses, additional taxes.
  - Benefits: higher household income, future human capital.
- Taxation plus presence and generosity of transfers affect the cost and benefits of work

Statistic	Data	Model
Capital Output Ratio	2.93	2.93
LFP of Married Females (%), 25-54		
Unskilled	68.2	68.6
Skilled	77.4	76.6
Total	72.2	71.8
Total Transfers (% of GDP)	2.28	2.34

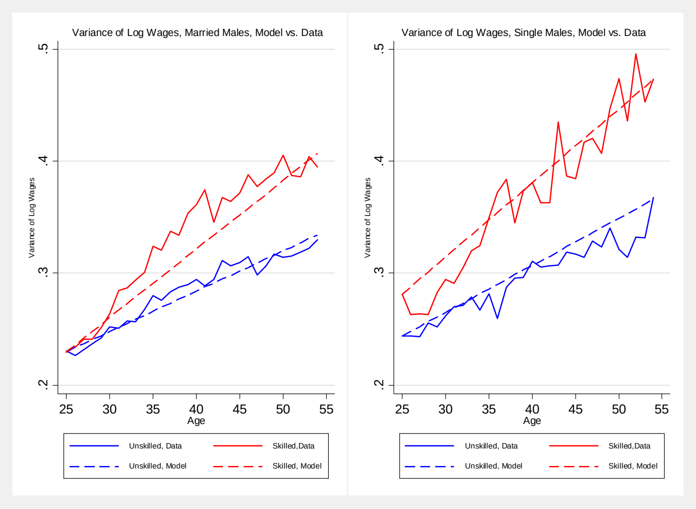
- Parameters $\Rrightarrow$

Model and Data

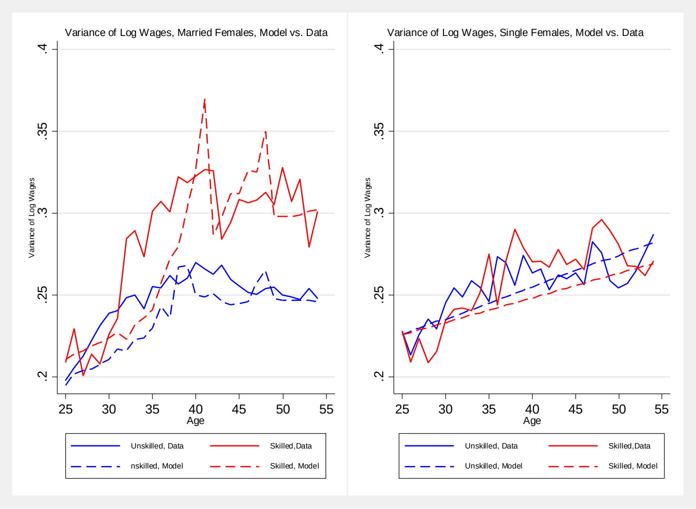
Statistic	Data	Model
Variance log-wages (Married Males, age 54, S)	0.40	0.41
Variance log-wages (Married Males, age 54, U)	0.33	0.33
Variance log-wages (Married Females, age 54, S)	0.25	0.25
Variance log-wages (Married Females, age 54, U)	0.30	0.30
Variance log-hours (Married Females, age 40)	0.13	0.13
Correlation Between Wages of Spouses (age 25)	0.27	0.27
Correlation Between Wages of Spouses (age 40)	0.31	0.31
Skill Premium	1.8	1.8
Variance log-consumption (Age 50-54 vs 25-29)	0.08	0.07

- Parameters $\Rrightarrow$

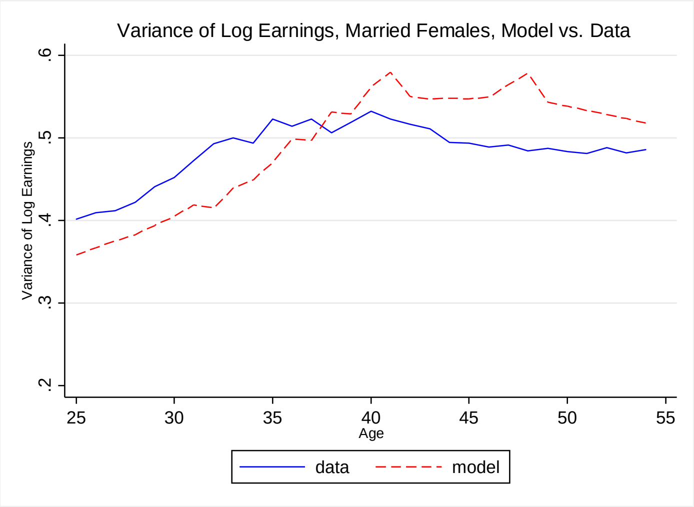
Variance of Log Wages, Males



Variance of Log Wages, Females

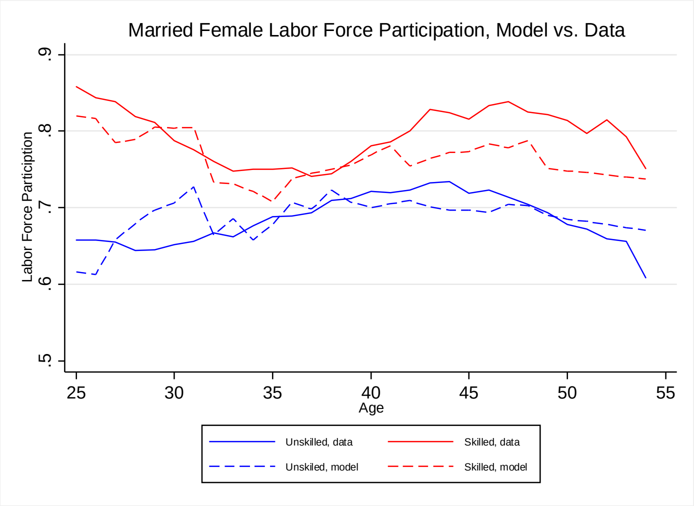


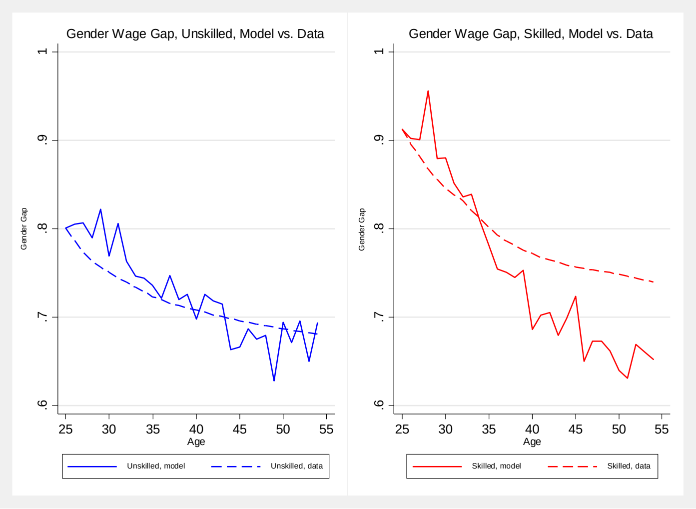
Variance of Log Earnings, Married Females



- Var of Log Hours $\Rrightarrow$

Labor Force Participation, Married Females

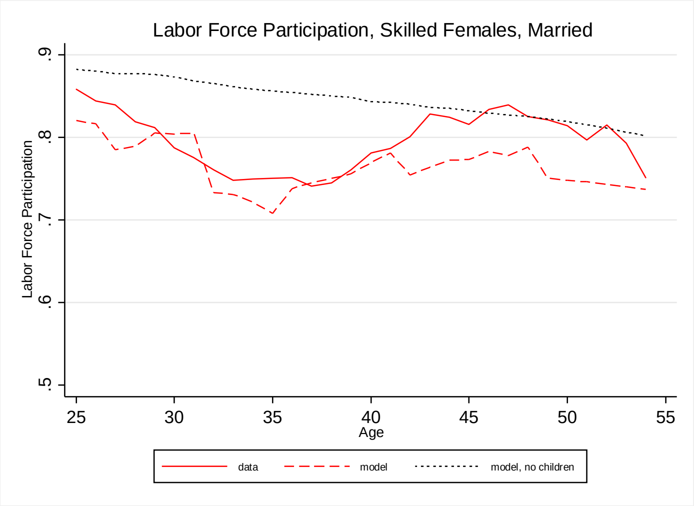



Gender Wage Gap, Unskilled, Model vs. Data
Gender Gap
1
.9
.8
.7
.6
25 30 35 40 45 50 55
Age
Unskilled, model
Unskilled, data
Gender Wage Gap, Skilled, Model vs. Data
Gender Gap
1
.9
.8
.7
.6
25 30 35 40 45 50 55
Age
Skilled, model
Skilled, data

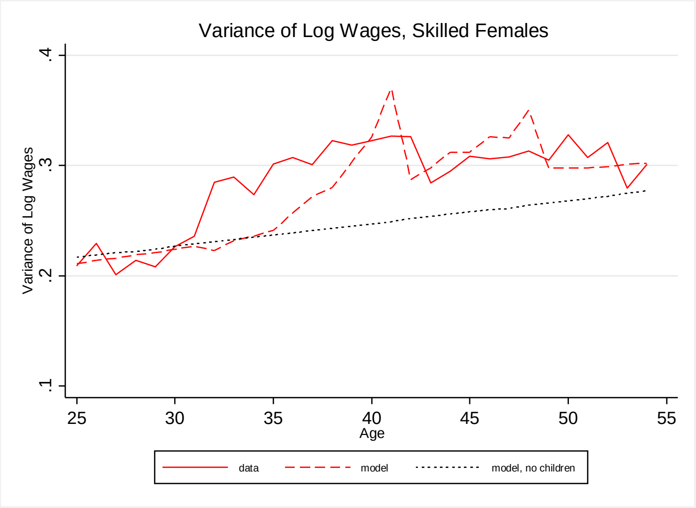
Key Model Features

- Children and childcare costs
    - LFP of married women
    - Variance of log wages for married women.
- Human capital depreciation
    - The gender wage gap

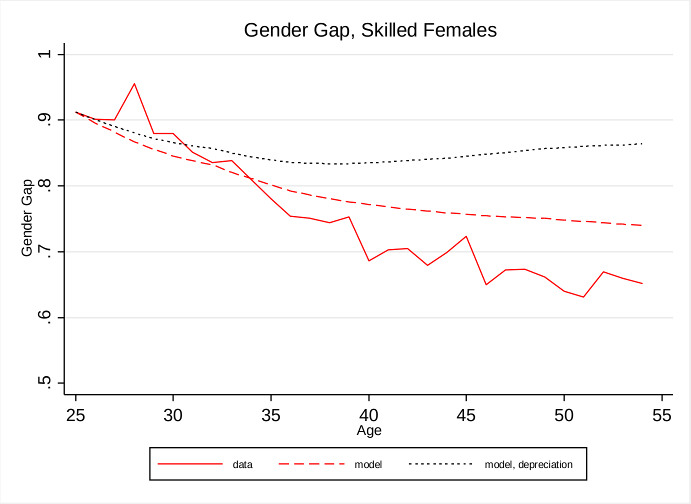
Model, w/o Children



Model, w/o Children



Model, w/o Human Capital Depreciation



Eliminating the Welfare State

- Eliminate the welfare system
- Balance the budget by lowering taxes for everyone
  - A married couple with 2 children with mean household income, from 9.2% to 4.8%

Output (%)	1.8
Mrrd. Females LFP (unskilled, %)	6.3
Mrrd. Females LFP (skilled, %)	2.4
Mrrd. Females LFP (%)	4.6
Aggregate Hours (%)	3.0
Welfare (CV, %)	-2.8
Winning Households (%)	62.1

- Large welfare losses – but majority support
- Proportional Income Tax $\Rrightarrow$

- Eliminate the welfare system, replace with UBI for each person
  - Add UBI on top of everything $\Rrightarrow$
- Taxes are still progressive, but higher to finance the UBI

	UBI (optimal)	No Transfers
Output (%)	-0.4	1.8
Mrrd. Females LFP (unskilled, %)	-2.6	6.3
Mrrd. Females LFP (skilled, %)	-1.4	2.4
Aggregate Hours (%)	-0.4	3.0
Welfare (CV, %)	-1.4	-2.8
Winning Households (%)	58.9	62.1
Transfer per person (normalized)	2.7	0
Aggregate Transfers (% of GDP)	4.9	0

- UBI does NOT lead to welfare gains. But majority support!
- Optimal UBI transfer: $ 2,600 per person in current dollars.

Negative Income Tax

- Eliminate the welfare system, replace with a transfer for each person
- Replace existing progressive taxes with a linear one

	NIT (opt.)	UBI (opt.)	No Trans.
Output (%)	0.1	-0.4	1.8
Mrrd. Fem. LFP (unskilled, %)	-2.8	-2.6	6.3
Mrrd. Fem. LFP (skilled, %)	-1.0	-1.4	2.4
Aggregate Hours (%)	-0.1	-0.4	3.0
Welfare (CV, %)	0.03	-1.4	-2.8
Winning Households (%)	73.5	58.9	62.1
Trans. per pers. (% of HH Inc.)	4.0	2.7	0
Aggregate Trans. (% of GDP)	7.3	4.9	0

	NIT (opt.)	UBI (opt.)	No Trans.
Output (%)	0.1	-0.4	1.8
Mrrd. Fem. LFP (unskilled, %)	-2.8	-2.6	6.3
Mrrd. Fem. LFP (skilled, %)	-1.0	-1.4	2.4
Aggregate Hours (%)	-0.1	-0.4	3.0
Welfare (CV, %)	0.03	-1.4	-2.8
Winning Households (%)	73.5	58.9	62.1
Trans. per pers. (% of HH Inc.)	4.0	2.7	0
Aggregate Trans. (% of GDP)	7.3	4.9	0

- UBI dominated by NIT in terms of welfare and support.
- NIT can lead to welfare gains and strong majority support.
- UPSHOT: more redistribution feasible with lower distortions.
- Optimal NIT transfer: $ 3,900 per person in current dollars, plus 17.4% linear tax.⇒

How Different Household Affected?

Welfare (%)	Married			Single		
		female				
No Transfers	Male	u	s		male	female
	u	0.0	0.7	u	-0.2	-5.1
	s	0.4	1.8	s	0.2	-1.2
UBI (optimal)	u	1.8	0.3	u	-0.5	-2.8
	s	0.2	0.3	s	-0.2	-0.8
NIT (optimal)	u	2.3	0.5	u	-0.6	-2.5
	s	0.4	1.1	s	-0.2	-0.8

- Current system is very targeted
- All alternatives generates winners and loosers

Conclusions

- It is not easy to improve over the existing welfare system.
- Revenue-neutral elimination of all transfers leads to large welfare losses BUT is supported by a majority of newborn households.
- A Universal Basic Income is NOT a good idea.
- NIT arrangements can improve upon the status quo and be supported by a large majority.
  - However, ex-ante gains are not large.
- Why a NIT? KEY: larger redistribution is possible via lower distortions.

- State - $a, h, e, \mathcal{S}^M, \boldsymbol{\eta}, j$
- $\mathcal{S}^M \equiv (x, z, \theta, \boldsymbol{\upsilon}, q, b)$, $\boldsymbol{\eta} \equiv (\eta^M_{f,x}, \eta^M_{m,z})$, $\boldsymbol{\upsilon} = (\upsilon^M_{f,x}, \upsilon^M_{m,z})$
- $b = \{1, 2\}$, $j \in \{\bar{j}(x, b), ..., N + 2\}$

$$
\begin{aligned}
V^M(a, h, e, \mathcal{S}^M, \boldsymbol{\eta}, j) &= \max_{a',\ l_f,\ l_m} \{U^M(c, l_f, l_m, q, x, z, b, j) \\
&\quad + \beta \mathbf{E}_{\boldsymbol{\eta}'|\boldsymbol{\eta}} V^M(a', h', e', \mathcal{S}^M, \boldsymbol{\eta}', j + 1)\},
\end{aligned}
$$

subject to

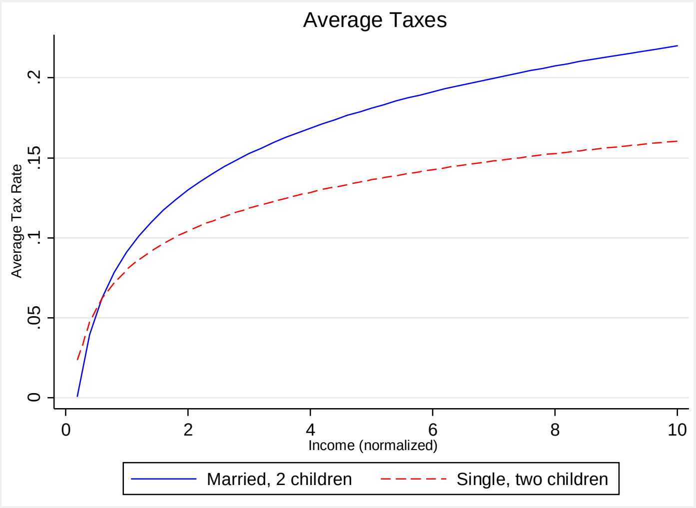
$$
c + a' = \left\{ \begin{array}{l} a(1 + r(1 - \tau_k)) + \mathcal{E}^M(x, z, h, \boldsymbol{\eta}, \boldsymbol{\upsilon}, l_m, l_f, j)(1 - \tau_p) \\ -T^M(I, \mathcal{K}) + TR^M(I, \mathcal{K}, \mathcal{D}) - w^u D\chi(l), \end{array} \right\}
$$

where $I = \mathcal{E}^M(x, z, h, \boldsymbol{\eta}, \boldsymbol{\upsilon}, l_m, l_f, j) + ra$, $\mathcal{K}$ is the number of children at home, D is childcare expenses

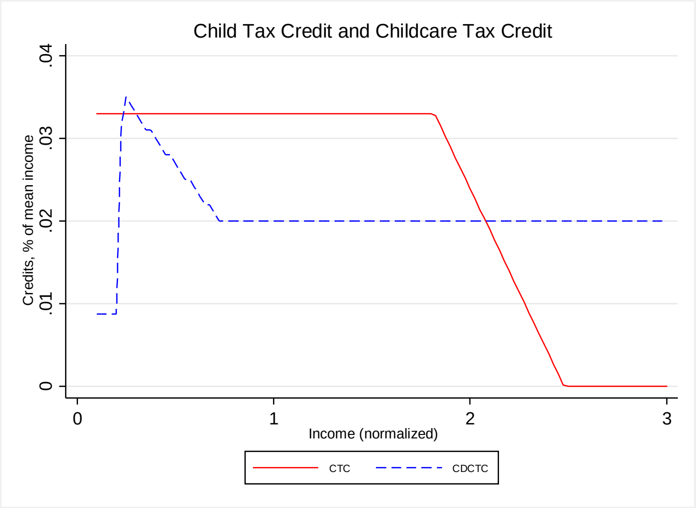
$\Rrightarrow$

Parameter	Value	Comments
Population Growth (n)	0.01	U.S. Data
Discount Factor (β)	0.982	Calibrated
Labor Supply Elasticity (γ)	0.2	Literature
Skill depreciation, females (δ_x)	0.025, 0.056	Calibrated
Growth of skills (α_x^e)	-	Calibrated
Distribution of utility costs $\zeta(.\|z)$	-	Calibrated
Loading Factor $\vartheta(t)$	-	Calibrated
Preference Shock $\theta = 1 \pm \triangle$	1 ± 0.88	Calibrated
Capital Share (α)	0.343	Calibrated
Skilled Labor Share (ν)	0.513	Calibrated
Substitution Elasticity (ρ)	1/3	Literature
Depreciation Rate (δ_k)	0.055	Calibrated
Childcare costs $d^S(x,t)$, $d^M(x,t)$	-	Calibrated

$\Rrightarrow$

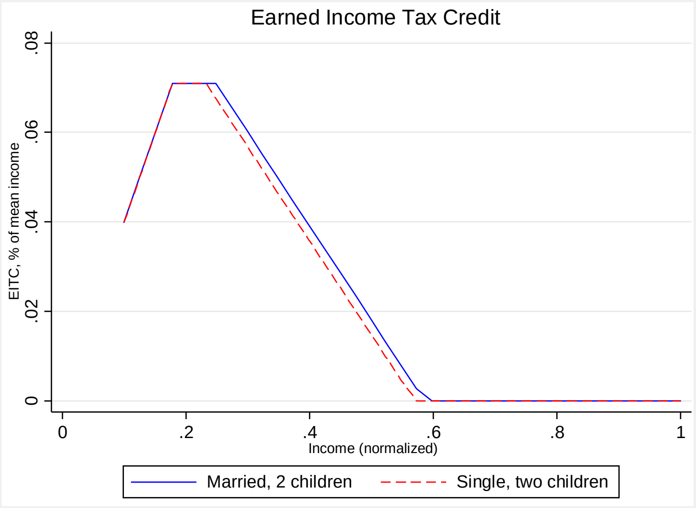


$\Rrightarrow$

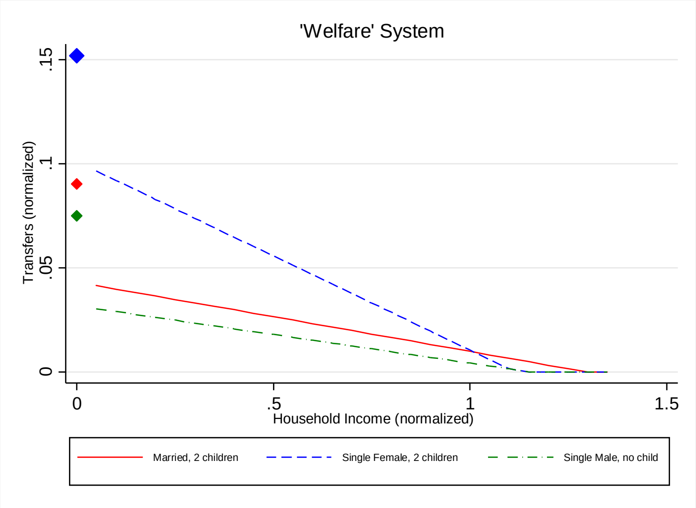


Child Tax Credit and Childcare Tax Credit
Credits, % of mean income
0
.01
.02
.03
.04
0
1
2
3
Income (normalized)
CTC
CDCTC

⇛


Earned Income Tax Credit
EITC, % of mean income
0
.02
.04
.06
.08
0
.2
.4
.6
.8
1
Income (normalized)
Married, 2 children
Single, two children

⇛



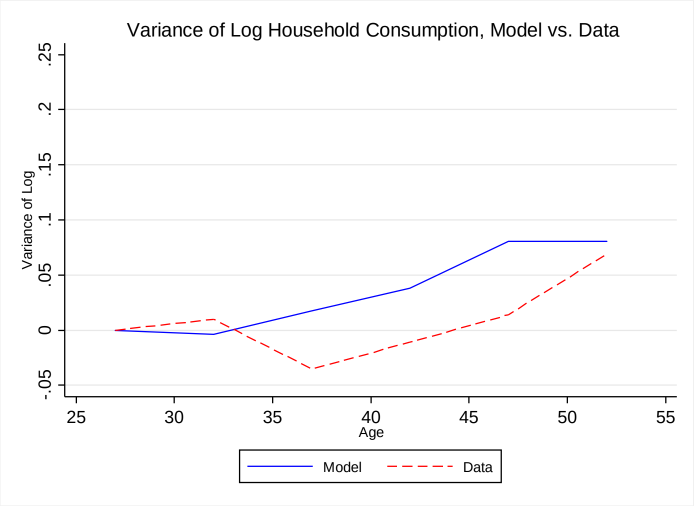
$\Rrightarrow$

Idiosyncratic Shocks

Statistic	Permanent	Persistent
Variance Single Skilled Males	0.281	0.0042
Variance Single Unskilled Males	0.244	0.0066
Variance Single Skilled Females	0.226	0.0020
Variance Single Unskilled Females	0.226	0.0015
Variance Married Skilled Males	0.230	0.0036
Variance Married Unskilled Males	0.230	0.0061
Variance Married Skilled Females	0.220	0.0008
Variance Married Unskilled Females	0.228	0.0021
Covariance (male, female)	0.047	0.0010

$\Rrightarrow$

Variance of Log Consumption



- Replace progressive taxes with a linear one
- Keep the current welfare system

Output (%)	1.5
Mrrd. Females LFP (unskilled, %)	3.3
Mrrd. Females LFP (skilled, %)	2.0
Mrrd. Females LFP (%)	2.7
Aggregate Hours (%)	1.6
Tax Rate (%)	10.67
Welfare (CV, %)	0.26
Winning Households (%)	37.7

- Welfare gains but no majority support

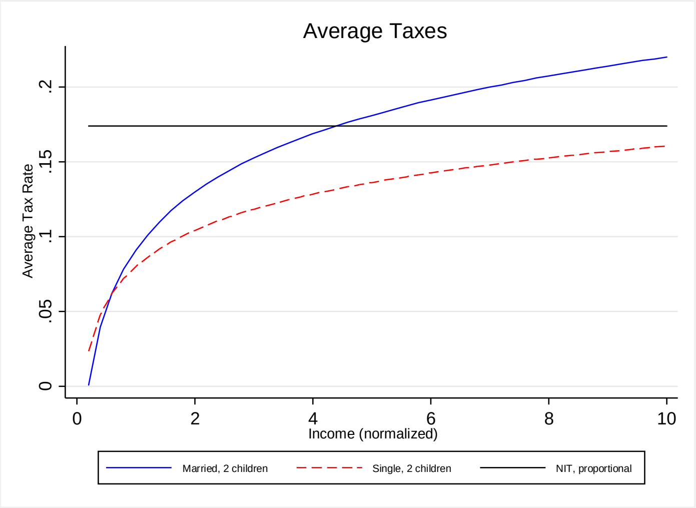
$\Rrightarrow$

- UBI on top of the current welfare system
- Optimal UBI per person is small (about 60$ per person)

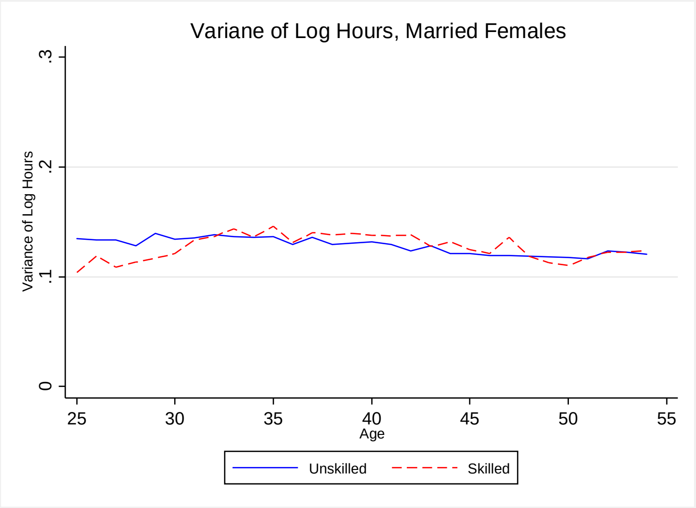
Output (%)	0
Mrrd. Females LFP (unskilled, %)	-0.1
Mrrd. Females LFP (skilled, %)	-0.1
Mrrd. Females LFP (%)	-0.1
Aggregate Hours (%)	-0.1
Welfare (CV, %)	0.0122
Winning Households (%)	50.5

- Marginal gains

$\Rrightarrow$

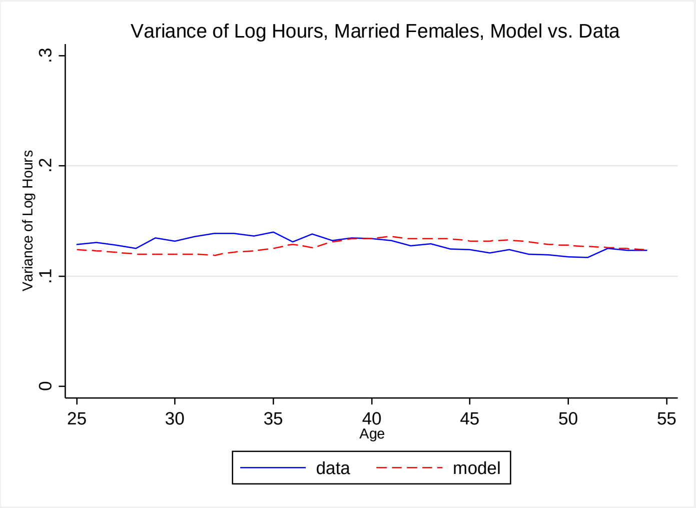


$\Rrightarrow$

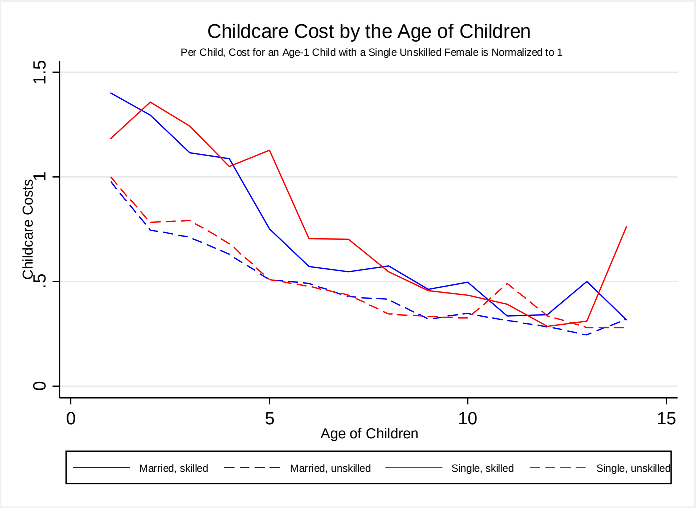


Variane of Log Hours, Married Females
Variance of Log Hours
0
.1
.2
.3
25
30
35
40
45
50
55
Age
Unskilled
Skilled

⇛


Variance of Log Hours, Married Females, Model vs. Data
Variance of Log Hours
0
.1
.2
.3
25
30
35
40
45
50
55
Age
data
model

⇛


Childcare Cost by the Age of Children
Per Child, Cost for an Age-1 Child with a Single Unskilled Female is Normalized to 1
Childcare Costs
0
.5
1
1.5
0
5
10
15
Age of Children
Married, skilled
Married, unskilled
Single, skilled
Single, unskilled

⇛