Household Labor Supply and Taxes

Thomas H. Jørgensen

2025

Plan for today

- Dynamic labor supply of **couples**
  Borella, De Nardi and Yang (2023): "Are Marriage-Related Taxes and Social Security Benefits Holding Back Female Labor Supply?"

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- **Reading guide:**
  1. What are the main *research questions*?
  2. What is the *(empirical) motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

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- **Reading guide:**
  1. What are the main *research questions*?
     - How does household-level taxes and transfers affect labor supply?
     - Could individual taxes/transfers increase welfare?
  2. What is the *(empirical) motivation*?
  3. What are the central *mechanisms in the model*?
  4. What is the *simplest model* in which we could capture these?

Empirical Motivation: I

- High marginal tax rates for secondary earner (often women historically)
  $\rightarrow$ labor supply discouraged
  $\rightarrow$ specialization
  $\rightarrow$ intra-household inequality

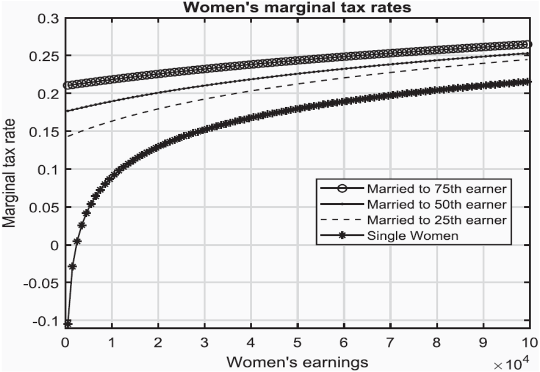
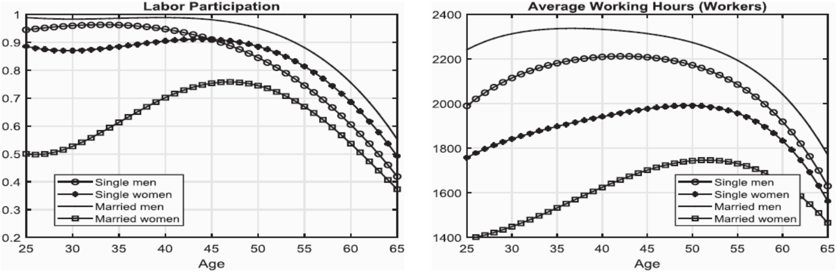


FIGURE 1

Women's marginal tax rates as a function of earnings (2016 dollars). Single (starred) and married to men at different

Empirical Motivation: II



Outline

Model Overview

- **Three stages**
  1. Working (25–61)
  2. Early retirement (62–65)
  3. Retirement (66–99)

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    Consumption/Savings, c_t, a_{t+1}

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    Labor supply of both members, n_t^i, $i \in \{1, 2\}$ (1 =man)
    Consumption/Savings, c_t, a_{t+1}
  - **States:**
    Savings, a_t
    Income shocks of both, ϵ_t^i
    Human capital of both, $\overline{y}_t^i$

Preferences

- **Individual preferences** are [my notation]

$$u(c_t, l_t, i, j) = \frac{[(c_t/\eta^{i,j})^{\omega} l_t^{1-\omega}]^{1-\gamma} - 1}{1-\gamma}$$

where
$l_t^{i,j} = L^{i,j} - n_t^i - \Phi_t^{i,j}\mathbf{1}(n_t^i > 0)$ is leisure.
(4 parameters estimated for each gender/marital status)
$\eta^{i,j}$ is equivalence scales
ω is the Cobb-Douglas input elasticity
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- **Utility of a couple** is

$$U(c_t, l_t^1, l_t^2) = u(c_t, l_t^1, 1, 2) + u(c_t, l_t^2, 2, 2)$$

Human Capital and Wages

- **Human capital** is previous avg. earnings, approximated as

$$\overline{y}^i_{t+1} = \frac{\overline{y}^i_t(t - t_0) + \min(Y^i_t, \tilde{y}_t)}{t + 1 - t_0} \tag{1}$$

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$t_0 = 25$.

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  $t_0 = 25$.

- **Wages** are

$$w^i_t = e^i_t(\overline{y}^i_t)\epsilon^i_t$$

  where

$$e^i_t(\overline{y}^i_t) : \text{age, gender and HC. Table 1 in Appendix}$$
$$\log \epsilon^i_{t+1} = \rho^i_\epsilon \log \epsilon^i_t + v^i_{t+1},\ v^i_{t+1} \sim \mathcal{N}(0, (\sigma^i_v)^2) \tag{2}$$

Government: Taxes and Transfers

- Labor income taxes are approximated as

$$T(Y, i, j, t) = (1 - \lambda_t^{i,j} Y^{-\tau_t^{i,j}}) \cdot Y$$

  where
  $Y = ra_t + Y_t^1 + Y_t^2$ is total *household* income
  $\lambda_t^{i,j}$ and $\tau_t^{i,j}$ are gender/marital specific tax-parameters (not reported).
- Payroll tax: $\min(Y, \tilde{y}_t)\tau_t^{SS}$
- Consumption floor, $c(j)$. See table 10 in Appendix.

Children

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- $f^{0,5}(i,j,t)$: number of children in age-group 0-5
  $\tau_c^{0,5}$: child care cost, pct of income (estimated)
- $f^{6,11}(i,j,t)$: number of children in age-group 6-11
  $\tau_c^{6,11}$: child care cost, pct of income (estimated)
- $f(1,1,t) = 0$ (single men)

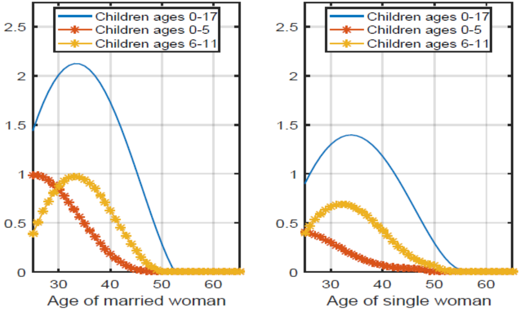

Figure: Figure 5 in Online Appendix. 1945 cohort.

Marriage and Divorce

- **Marriage** probability depends on wage-shock

$$v_{t+1}(i, \epsilon_t^i) = \Pr(j_{t+1} = 2 | j_t = 1, t, i, \epsilon_t^i)$$

- Probability of *matching* a partner with states $(a_{t+1}^p, \overline{y}_{t+1}^p, \epsilon_{t+1}^p)$:

$$\Pr(a_{t+1}^p, \overline{y}_{t+1}^p, \epsilon_{t+1}^p | \epsilon_t^i, i) = \theta_{t+1}(a_{t+1}^p, \overline{y}_{t+1}^p | \epsilon_{t+1}^p) \cdot \xi_{t+1}(\epsilon_{t+1}^p | \epsilon_t^i, i)$$

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- **Divorce** probability depends on both members wage shocks

$$\zeta_{t+1}(\epsilon_t^1, \epsilon_t^2) = \Pr(j_{t+1} = 1 | j_t = 2, t, \epsilon_t^1, \epsilon_t^2)$$

- Wealth *equally split* + no alimony.

Recursive Formulation: Working-Stage Couple

- **Bellman Equation** for couple is (subject to (1) and (2))

$$W_t^c(a_t,\epsilon_t^1,\epsilon_t^2,\overline{y}_t^1,\overline{y}_t^2) = \max_{c_t,n_t^1,n_t^2} U(c_t,l_t^1,l_t^2) + (1-\zeta_{t+1})\beta\mathbb{E}_t[W_{t+1}^c(a_{t+1},\epsilon_{t+1}^1,\epsilon_{t+1}^2,\overline{y}_{t+1}^1,\overline{y}_{t+1}^2)] + \zeta_{t+1}\beta\sum_{i=1}^{2}\mathbb{E}_t[W_{t+1}^s(i,a_{t+1}/2,\epsilon_{t+1}^i,\overline{y}_{t+1}^i)]$$

s.t.

$$a_{t+1} = (1+r)a_t + Y_t^1 + Y_t^2(1-\tau_c(2,2,t)) - c_t - \tau_t^{SS}\sum_{i=1}^{2}\min(Y_t^i,\tilde{y}_t) - T(ra_t + Y_t^1 + Y_t^2, 2, t)$$

where

$W_{t+1}^s(\bullet)$ is value of being single

$$\mathbb{E}_t[W_{t+1}^c(a_{t+1},\epsilon_{t+1}^1,\epsilon_{t+1}^2,\overline{y}_{t+1}^1,\overline{y}_{t+1}^2)] = \int\int W_{t+1}^c(\bullet,\underbrace{\exp(\rho_\epsilon^1\log\epsilon_t^1+\eta_{t+1}^1)}_{\epsilon_{t+1}^1},\underbrace{\exp(\rho_\epsilon^2\log\epsilon_t^2+\eta_{t+1}^2)}_{\epsilon_{t+1}^2},\bullet)\phi(d\eta_{t+1}^1)\phi(d\eta_{t+1}^2)$$

Outline

Labor Supply Elasticities

- **Frisch:** Anticipated transitory income changes

TABLE 4
Model-implied elasticities of labour supply

	Participation				Hours among workers			
	Married		Single		Married		Single	
	W	M	W	M	W	M	W	M
30	1.0	0.0	0.5	0.2	0.2	0.3	0.4	0.4
40	0.7	0.1	0.4	0.2	0.4	0.5	0.4	0.5
50	0.6	0.2	0.4	0.5	0.4	0.5	0.8	0.5
60	1.1	0.8	1.8	1.4	0.3	0.3	0.5	0.4

- Highest for women
- Extensive margin important

Labor Supply Elasticities

- **Marshall:** permanent increase in *wages of women* from age 25 (t_0), I think, i.e. "regime shift".

- Large for married women
- U-shaped
- Small negative cross-elasticity for men.

Counterfactual Policy Simulations

- **Remove the Joint taxation**.
  Unclear exactly how, but I think it is like

$$a_{t+1} = (1+r)a_t + Y_t^1 + Y_t^2(1 - \tau_c(2,2,t)) - c_t - \tau_t^{SS}\sum_{i=1}^{2}\min(Y_t^i, \tilde{y}_t)$$
$$- T(ra_t/2 + Y_t^1, 1, 1, t) - T(ra_t/2 + Y_t^2, 2, 1, t)$$

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- **Balance government budget** by changing $\lambda_t^{i,j}$ in

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- **Also: Remove spousal dependence** on social and survivor benefits
  Only affects in later life stages (ignore a bit here)

Simulation Results: Participation

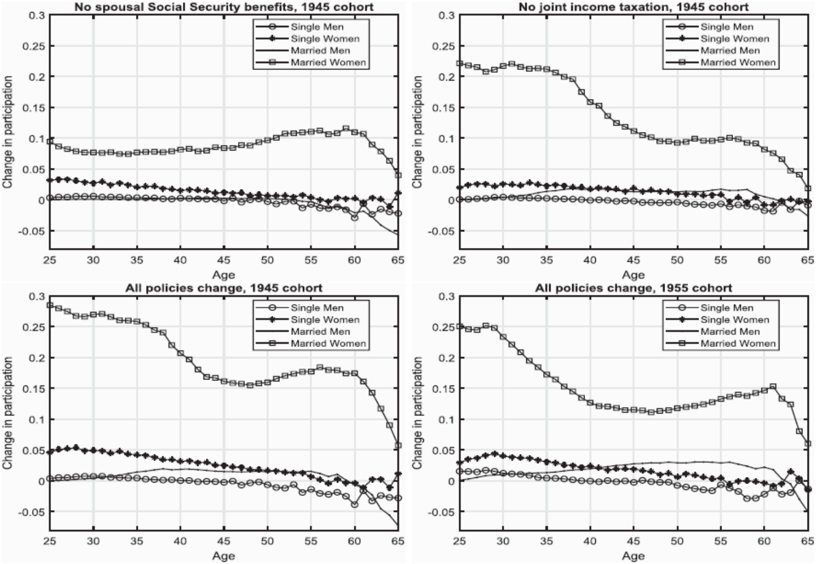

FIGURE 9

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$$V^{reform} = \frac{1}{s}\sum_{s=1}^{S} V_{t_0}(a_{s,t_0}, \epsilon^1_{s,t_0}, \epsilon^2_{s,t_0}, \overline{y}^1_{s,t_0}, \overline{y}^2_{s,t_0}; reform)$$

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- Let baseline value be

$$V^{base}(a) = \frac{1}{s}\sum_{s=1}^{S} V_{t_0}(a_{s,t_0} + a, \epsilon^1_{s,t_0}, \epsilon^2_{s,t_0}, \overline{y}^1_{s,t_0}, \overline{y}^2_{s,t_0})$$

as a function of additional initial wealth, a.

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  as a function of additional initial wealth, a.
- Asset compensation required

$$a^\star = \{a : V^{reform} - V^{base}(a) = 0\}$$

  (normalized by avg income: $\frac{1}{2}a^\star/(\overline{y}^1_{s,t_0} + \overline{y}^2_{s,t_0})$ (?))

Simulation Results: Welfare

TABLE 7

Asset compensation required for staying in the benchmark economy, normalized as a fraction of average income

	All			Winners			Losers		
	Couples	SW	SM	Couples	SW	SM	Couples	SW	SM
1945 cohort									
(1) Remove Social Security spousal benefits, unbalanced budget									
Average	−0.24	−0.20	0.25	0.00	0.00	0.25	−0.24	−0.20	−0.02
Percentage				0.0	0.0	100.0	100.0	100.0	0.0
(2) Remove Social Security spousal benefits, balanced budget									
Average	0.66	0.19	1.15	0.66	0.20	1.15	0.00	−0.03	0.00
Percentage				100.0	92.5	100.0	0.0	7.5	0.0
(3) Remove joint income taxation, unbalanced budget									
Average	0.06	−0.18	0.81	0.29	0.06	0.81	−0.19	−0.19	0.00
Percentage				52.8	4.9	100.0	47.2	95.1	0.0
(4) Remove joint income taxation, balanced budget									
Average	0.31	−0.08	1.06	0.42	0.12	1.06	−0.09	−0.13	0.00
Percentage				78.8	20.6	100.0	21.2	79.4	0.0
(5) Remove all marital-related policies, balanced budget									
Average	0.80	0.05	1.97	0.80	0.33	1.97	−0.03	−0.12	0.00
Percentage				98.8	37.4	100.0	1.2	62.6	0.0
1955 cohort									
(6) Remove all marital-related policies, balanced budget									
Average	0.73	0.21	1.14	0.74	0.30	1.14	−0.04	−0.04	−0.03
Percentage				98.2	74.1	100.0	1.8	25.9	0.0

Notes: Top line for each experiment: average welfare gain or loss. Bottom line for each experiment: fraction in that group gaining or losing welfare. SM, single men; SW, single women.

Outline

1. Model and Mechanisms

2. Simulation Results

3. Simple Model

Our simple model

- **Dual-earner model**
- **Simplifications:**
  No savings
  Couple cannot divorce (no singlehood)
  Deterministic (no shocks)
- **Taxes:**
  On household level
- **Reform** of interest:
  Individual taxation

Our simple model

- **Recursive formulation**

$$
\begin{aligned}
V_t(K_{1,t}, K_{2,t}) &= \max_{h_{1,t}, h_{2,t}} U(c_t, h_{1,t}, h_{2,t}) + \beta V_{t+1}(K_{1,t+1}, K_{2,t+1}) \\
c_t &= \sum_{j=1}^{2} w_{j,t} h_{j,t} - T(w_{1,t} h_{1,t}, w_{2,t} h_{2,t}) \\
\log w_{j,t} &= \alpha_{j,0} + \alpha_{j,1} K_{j,t},\ j \in \{1,2\} \\
K_{j,t+1} &= (1-\delta) K_{j,t} + h_{j,t},\ j \in \{1,2\}
\end{aligned}
$$

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- **Preferences** are sum of individual

$$U(c_t, h_{1,t}, h_{2,t}) = 2 \frac{(c_t/2)^{1+\eta}}{1+\eta} - \rho_1 \frac{h_{1,t}^{1+\gamma}}{1+\gamma} - \rho_2 \frac{h_{2,t}^{1+\gamma}}{1+\gamma}$$

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- **Taxes** are

$$T(Y_1, Y_2) = (1 - \lambda (Y_1 + Y_2)^{-\tau}) \cdot (Y_1 + Y_2)$$

Next Time

- **Next time:**
  Labor supply and child-related transfers.

- **Literature:**
  Guner, Kaygusuz and Ventura (2020): "Child-Related Transfers, Household Labor Supply and Welfare"
  - **Read** before lecture
  - **Reading guide:**
    (focus on types child-related transfers + policy experiments)
    Section 1: Introduction + topic. Super important - Read.
    Section 2: Background, US. Read.
    Section 3: Model. Complex. Get the idea. Focus on married couples and childcare costs.
    Section 4: Calibrations. Skim.
    Section 5: Understanding childcare subsidies. Key - read.
    Section 6: Counterfactual policies. Key - read.

References I

BORELLA, M., M. DE NARDI AND F. YANG (2023): "Are Marriage-Related Taxes and Social Security Benefits Holding Back Female Labor Supply?," *Review of Economic Studies*, 90(1), 102–131.

GUNER, N., R. KAYGUSUZ AND G. VENTURA (2020): "Child-Related Transfers, Household Labor Supply and Welfare," *Review of Economic Studies*, 87(5), 2290–2321.