Household Labor Supply and Taxes

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Plan for today

- Dynamic labor supply of **couples**
  Borella, De Nardi and Yang (forthcoming): "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)
  → labor supply discouraged
  → specialization
  → intra-household inequality

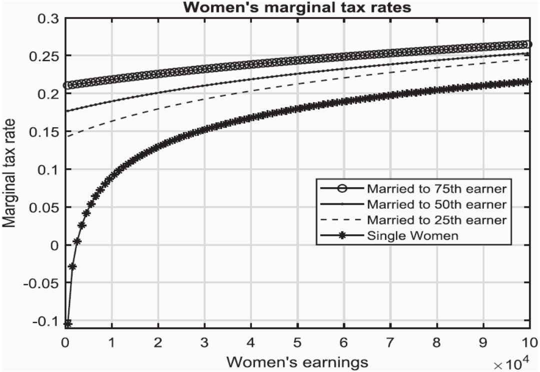

FIGURE 1

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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  - **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]

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

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)
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- **Utility of a single** man and woman is $v(c_t, l_t, 1, 1)$ and $v(c_t, l_t, 2, 1)$.
- **Utility of a couple** is

$$w(c_t, l_t^1, l_t^2) = v(c_t, l_t^1, 1, 2) + v(c_t, l_t^2, 2, 2)$$

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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- **Wages** are

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

  where

$$e^i_t(\overline{y}^i_t) : \text{age, gender and HC. Table 1 i Appendix}$$

$$\log \epsilon^i_{t+1} = \rho^i_\epsilon \log \epsilon^i_t + v^i_{i+1},\ v^i_{i+1} \sim \mathcal{N}(0, (\sigma^i_v)^2) \tag{2}$$

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)

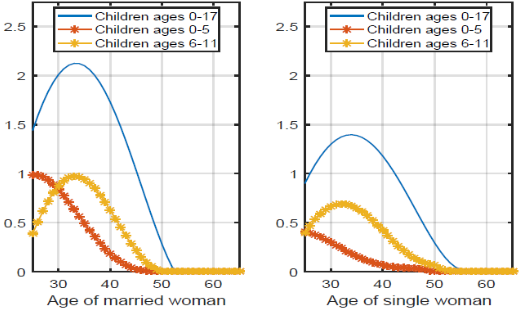

Figure: Figure 5 in Online Appendix. 1945 cohort.

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))

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

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

$\mathbb{E}_t[W_{t+1}^c(a_{t+1}, \epsilon_{t+1}^1, \epsilon_{t+1}^2, \overline{y}_{t+1}^1, \overline{y}_{t+1}^2)] =$

$\int \int W_{t+1}^c(\bullet, \underbrace{\exp(\rho_\epsilon^1 \log \epsilon_t^1 + v_{t+1}^1)}_{\epsilon_{t+1}^1}, \underbrace{\exp(\rho_\epsilon^2 \log \epsilon_t^2 + v_{t+1}^2)}_{\epsilon_{t+1}^2}, \bullet)\phi(dv_{i+1}^1)\phi(dv_{i+1}^2)$

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

$$a_{t+1} = (1+r)a_t + Y_t^1 + Y_t^2(1 - \tau_c(2, 2, t)) - c_t - \tau_t^{SS} \sum_{i=1}^{2} \min(Y_t^i, \tilde{y}_t)$$
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- **Welfare effects:** Level of wealth at age 25 (t_0) in the baseline model that makes individuals indifferent between the baseline and the new
- **Also: Remove spousal dependence** on social and survivor benefits
  Only affects in later life stages (ignore a bit here)

Simulation Results

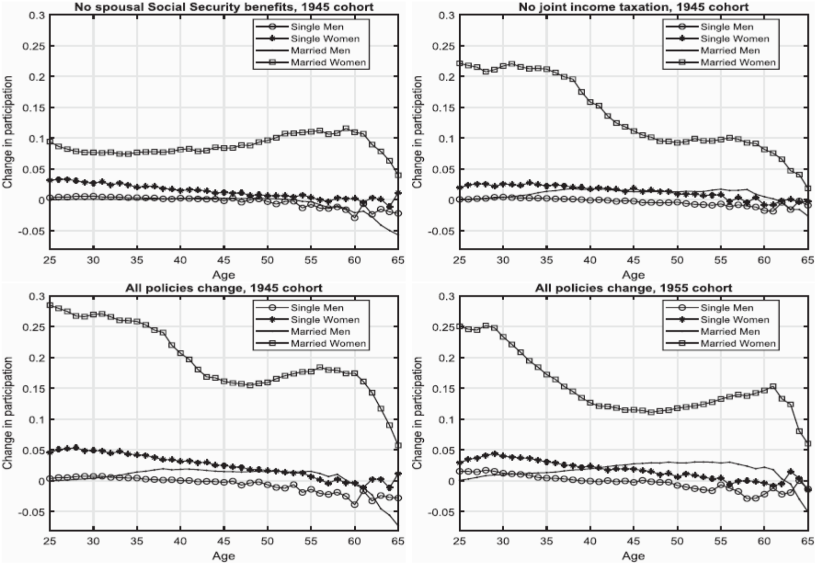

FIGURE 9

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**

$$V_t(K_{1,t}, K_{2,t}) = \max_{h_{1,t}, h_{2,t}} U(c_t, h_{1,t}, h_{2,t}) + \beta V_{t+1}(K_{1,t+1}, K_{2,t+1})$$

$$c_t = \sum_{j=1}^{2} w_{j,t} h_{j,t} - T(w_{1,t} h_{1,t}, w_{2,t} h_{2,t})$$

$$\log w_{j,t} = \alpha_{j,0} + \alpha_{j,1} K_{j,t},\ j \in \{1,2\}$$

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

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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 [UPDATE]

- **Next time:**
  Labor supply and children.

- **Literature:**
  Keane (2011, sections 1–5): "The Career Costs of Children"
  - **Read** before lecture
  - **Reading guide:**
    Section 1: Introduction. Key
    Section 2: Data. Skim fast.
    Section 3: Model. *Key*, but complex. Get the idea.
    Section 4: Results. *Simulations in sections E, F and G are key*!

References I

Borella, M., M. De Nardi and F. Yang (forthcoming): "Are Marriage-Related Taxes and Social Security Benefits Holding Back Female Labor Supply?," *Review of Economic Studies*.

Keane, M. P. (2011): "Labor Supply and Taxes: A Survey," *Journal of Economic Literature*, 49(4), 961–1075.