Prices, Market Wages, and Labor Supply

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Econ 350

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Outline

1. About the paper
2. Model
3. Estimation

About the paper

- Pretty cool paper
- Why?
  - Models wage rates, hours worked and the decision to work all together!
  - First time someone did this in the field!
  - Specially important for women's labor supply
- How?
  - Focus on women's labor supply
  - Derives a common set of parameters which underlie the functions determining
    1. the probability that a woman works
    2. her hours of work
    3. her observed wage rate
    4. her asking wage rate or shadow price of time

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Wages

- Shadow wage (value of marginal units of wife's time in household production and consumption) function depends on
  - hours of work (time in no-market activities, h
  - wage of husband, W_m
  - vector of goods prices, P
  - asset income of the household, A
  - constraints from previous economic decision, Z (e.g., number of children)

$$W^* = g\left(h, W_m, P, A, Z\right) \tag{1}$$

- Market wage depends on
  - Education, E
  - Experience, S

$$W = B(E, S) \tag{2}$$

Decision

- Assume that the woman is free to adjust her working hours
  - If she works
$$W = W^* \tag{3}$$
  - If she does not work
$$W^* \geq W \tag{4}$$
  - Interpret hours of work as a slack variable
$$h\left(W^* - W\right) = 0 \tag{5}$$

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Estimation

- Let $l(\cdot)$ be some strictly increasing transformation so that

$$
\begin{aligned}
l(W_i^*) &= \beta_0 + \beta_1 h_i + \beta_2 W_{mi} + \beta_3 P_i + \beta_4 A_i + \beta_5 Z_i + \varepsilon_i \\
l(W_i) &= b_0 + b_1 S_i + b_2 E_i + u_i \qquad (6)
\end{aligned}
$$

- If $W^* > W$ at zero hours of work, the reduced form equations for observed wages and hours is

$$
\begin{aligned}
h_i &= \frac{1}{\beta_1}(b_0 - \beta_0 + b_1 S_i + b_2 E_i - \beta_2 W_{mi} \\
&- \beta_3 P_i - \beta_4 A_i - \beta_3 Z_i) + \frac{u_i - \varepsilon_i}{\beta_1} \\
l(W_i) &= b_0 + b_1 S_i + b_2 E_i + u_i \qquad (7)
\end{aligned}
$$

Estimation, contd 1

- If there are T women and K work, it is possible to estimate the parameters of interest maximizing

$$
\begin{aligned}
L(\cdot) &= \prod_{i=1}^{K} j\left(h_i, l(W_i) | (W_i > W_i^*)_{h=0}\right) \cdot \Pr\left[(W_i > W_i^*)_{h=0}\right] \\
&\times \prod_{i=K+1}^{T} \Pr\left[(W_i < W_i^*)_{h=0}\right] \qquad (8)
\end{aligned}
$$

where $j(\cdot)$ is the conditional joint distribution of $h_i, l(W_i)$

- How?
  1. Assume that ε, u_i are i.i.d. joint normal
  2. Use Yike's results on normality to simplify expressions (this is joint censored distribution)