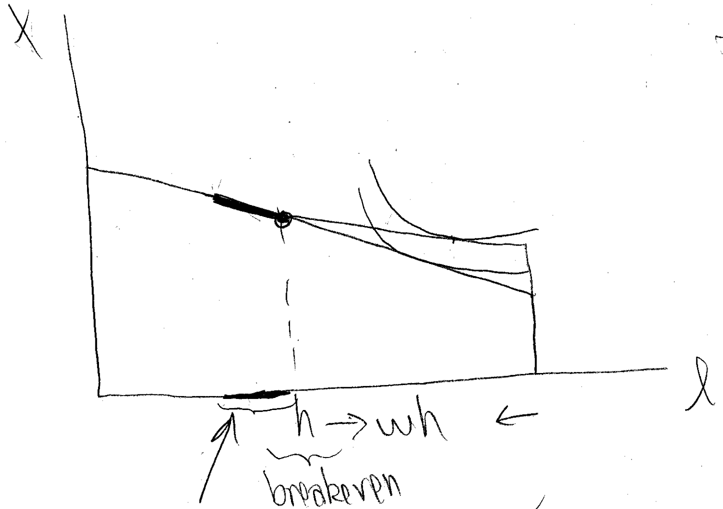
Read: ◦ Ashenfelter-Heckman 74
◦ Blundell-Macurdy 99
◦ Moffit 02
◦ Blank
◦ Abbot + Ashenfelter 76
◦ Ashenfelter 83, 78
◦ Plant
◦ Card / Hyslop 05
◦ Eissa-Leibman 96
◦ Heckman 74

Should already be done

Intertemporal substitution elasticity (ISE)
◦ Macurdy 81
◦ Altonji 86
◦ BDI 85
◦ Card 94
◦ Ashenfelter 80
◦ Angrist 91

What can we learn about labor supplies from the NITs?
◦ too many people getting payments relative to some mechanical calculation
◦ How much do people change their behavior in response to new rules?

° "control payments" and treated groups



fixed: G, t

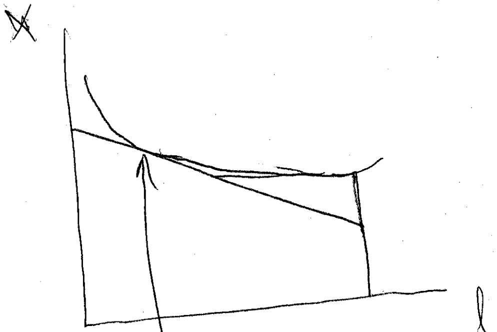
endogenous: $S = \underbrace{G - t(wh)}$

If you actually want to construct the counterfactual, you need to model the labor supply behavior

ex ante ineligible, but they "opt in"!

everyone here must get a payment in a stylized world.

° all of them reduce hours and become weakly more eligible.



the marginal guy is indifferent.

"The mechanical world works when everyone has a compensated elasticity of supply of zero."

- Welfare program $(\underbrace{G}_{\text{guarantee}}, t)$, $D = G - t(wh)$
$= \begin{cases} G - ty & \text{if } y < \frac{G}{t} = B \\ 0 & \text{else} \end{cases}$
subsidy amount

In the mechanical world:
$Pr[i \text{ gets welfare} | G,t] = Pr[y_i < \frac{G}{t}]$

$cov(\frac{G}{T}, Pr[y_i < \frac{G}{T}]) > 0$ (more generous programs have higher participation mechanically.)

- can get an exact prediction with parametric assumptions

$\ln y \sim N(\mu, \sigma^2)$

- $Pr[y_i < \frac{G}{T}] = \Phi\left(\frac{\ln \frac{G}{T} - \mu}{\sigma}\right)$

$\Rightarrow \Phi^{-1}(\hat{P}_{G,T})$ is linear in the breakeven (log)

$= \frac{1}{\sigma}\ln\left(\frac{G}{t}\right) - \frac{\mu}{\sigma}$

(*) inverse logit is the log odds

What does the world look like when labor supply is elastic?

$\max\ u(l, x)$ s.t. $\overset{=1}{p}x = wh + \overset{\text{unearned income}}{z}$

- $\Rightarrow l(w,z)$
$x(w,z)$

Expenditure function:

$\min\ x + wl \quad \text{s.t.}\ u(x,l) = \bar{u}$

In terms of how much cash you have to give:

$\min\ x + wl - wT \quad \text{s.t.}\ u(x,l) = \bar{u}$

- excess expenditure function - unearned income required to get on $\bar{u}$
- $E(w,\bar{u})$ - non-participants spend this much
- $E(w(1-t),\bar{u})$ - participants spend this much.

Participate if $G > E(w(1-t),\bar{u}) - E(w,\bar{u})$

if guarantee level compensates for lower wage.

"World with labor supply"

$$E(w(1-t),\bar{u}) \approx E(w,\bar{u}) + \underbrace{\frac{\partial E}{\partial w}}_{l^c}(-tw) + \frac{1}{2}\underbrace{\frac{\partial^2 E}{\partial w^2}}_{\frac{\partial l^c}{\partial w}}(-tw)^2$$

$$E(w(1-t),\bar{u}) - E(w,\bar{u}) = twh + \frac{1}{2}\frac{\partial l^c}{\partial w}(-tw)^2$$

$$= twh - \frac{1}{2}\frac{\partial h^c}{\partial w}t^2w^2$$

Participate if $G > twh - \frac{1}{2}\frac{\partial h^c}{\partial w} + t^2w^2$

$$\Leftrightarrow \underbrace{G - twh}_{\equiv D} + \underbrace{\frac{1}{2}\frac{\partial h^c}{\partial w} t^2 w^2}_{} > 0$$

more people participate if this is ≥ 0 than under the mechanical rule

$$\Leftrightarrow G + \frac{1}{2}\frac{\partial h^c}{\partial w} t^2 w^2 > wht$$

$$\Leftrightarrow \frac{G}{t} + \frac{1}{2}\frac{\partial h^c}{\partial w} tw > wh$$

$$\Leftrightarrow \frac{G}{t} + \frac{1}{2}\underbrace{\left(\frac{\partial h^c}{\partial w}\frac{w}{h}\right)}_{e} twh > wh$$

$$\Leftrightarrow \frac{G}{t} + \frac{1}{2} etwh > wh$$

$$\Leftrightarrow wh < \frac{G}{t}\frac{1}{1 - \frac{1}{2}et}$$

mechanical rule if $e = 0$ otherwise it is a bigger number

$$\Leftrightarrow \log wh < \log \frac{G}{t} - \underbrace{\log\left(1 - \frac{1}{2}et\right)}_{\approx -\frac{1}{2}et}$$

$$\approx \log \frac{G}{t} + \underbrace{\frac{1}{2}et}_{\text{deviation from mechanical rule}}$$

Using this to estimate e:

Likelihood of a data set is the joint distribution of a sample given your model for the distribution (μ, σ, e)

Density of ctrl observation: $\frac{1}{\sigma}\varphi\left(\frac{y_i-\mu}{\sigma}\right)$

$$\overbrace{\mathcal{L}^C}^{\text{Control likelihood}} = \prod_{i=1}^{N^C} \frac{1}{\sigma}\varphi\left(\frac{y_i-\mu}{\sigma}\right)$$

Treated likelihood is joint distribution of what we have modeled: $d_1, \ldots, d_{N^T}$ ← *treated

$d_i = 1$ if treated i gets a payment

$$\Pr[d_i=1] = \Pr\left[y_i < \ln\left(\frac{G}{t}\right) + \frac{1}{2}e_t\right]$$

$$= \Phi\left(\frac{\ln\left(\frac{G}{t}\right) + \frac{1}{2}e_t - \mu}{\sigma}\right)$$

$$\mathcal{L}^T = \prod_{i=1}^{N^T} \Phi\left(\frac{\ln\frac{G}{t} + \frac{1}{2}e_t - \mu}{\sigma}\right)^{d_i} \times \left(1 - \Phi\left(\frac{\ln\frac{G}{t} + \frac{1}{2}e_t - \mu}{\sigma}\right)\right)^{1-d_i}$$

This is probit for

d_i on $\underbrace{\ln\frac{G}{t}}_{\text{should be } \frac{1}{\sigma}}, \underbrace{\frac{t}{2}}_{\frac{e}{\sigma}}, \underbrace{\text{constant}}_{\frac{-\mu}{\sigma}}$