Unemployment Insurance

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Unemployment insurance (UI)

UI in the US:

- Eligibility rules
- Replacement rate $\approx$ 50%

$\to$ benefits = 50% of past wage (+ cap on benefits)

- Benefits have finite duration

$\to$ usual duration = 26 weeks

- Duration of benefits is countercyclical

$\to$ duration of benefits is extended when unemployment $\uparrow$

- state $u > 6.5\%$ duration of UI benefits $\uparrow$ to 39 weeks
- state $u > 8\%$ duration $\uparrow$ to 46 weeks
- additional federal extensions

Introducing UI into matching model

- One-period model

- All workers are initially unemployed
- Size of labor force $H = 1$
- Unemployed workers search with effort $E > 0$

$\to$ Aggregate search effort $=$ # unemployed workers $\times$ (effort / worker)

$$= E \times 1$$

$$= E$$

- Firms post V vacancies to recruit workers
- Matching function gives # of worker-firm matches : $m(E, V)$

- Labor market tightness is $\theta = V/E$.
- Probability to fill a vacancy : $q(\theta)$
- Probability to find a job / unit of effort $f(\theta)$

↳ Probability to find a job $\underline{E \times f(\theta)}$

Labor demand

One representative firm. - L workers
- N producers
- R recruiters

- production function. $Y = a N^{\alpha}$
- wage function $W = W(a, UI)$
- recruiter-producer ratio $\tau(\theta) = R/N$

L hires $\rightarrow V = L/q(\theta)$

$\rightarrow R = r \times V = r \times \frac{L}{q(\theta)}$

So $\frac{R}{N} = r \times \frac{L}{q(\theta)} = \frac{r}{q(\theta)} \times \left(\frac{R}{N} + 1 \cancel{N}\right)$

$$\tau = \frac{r}{q(\theta)}(1 + \tau)$$

$$\tau = \frac{r/q(\theta)}{1 - r/q(\theta)}$$

$$\boxed{\tau(\theta) = \frac{r}{q(\theta) - r}}$$

<u>Profit</u>

$\tau(\theta)\alpha N = R$

$$\pi = y - w \times L$$

$$\pi = a \cdot N^{\alpha} - w \times [1 + \tau(\theta)] \times N$$

↳ same as in usual model

<u>same labor demand.</u>

$$L^d(\theta, UI) = \left[\frac{a \quad \alpha}{W(a, UI) \quad [1 + \tau(\theta)]^{\alpha}}\right]^{1/1-\alpha}$$

- downward-sloping labor demand if $\alpha < 1$
- but horizontal labor demand if $\alpha = 1$
- L^d responds to UI if W does

<u>Representative worker</u>

- employed worker: consume C^e
- unemployed worker: consume $0 < C^u < C^e$

→ gap between C^e & C^u is determined by UI

- generous UI system: C^u close to C^e

- nongenerous UI system: C^u much lower than C^e

- <u>utility function of workers</u>
  - consumption utility $U(C_i)$: increasing, concave (risk-averse workers: value insurance)
  - disutility from job search $\psi(E)$ increasing, convex - Quadratic disutility $\psi(E) = E^2/2$.
  - generosity of UI is well-measured by the utility gain from work: $\Delta U = U(C^e) - U(C^u)$
    - $\Delta U > 0$
    - UI generous $\Leftrightarrow$ ΔU is low
    - UI nongenerous $\Leftrightarrow$ ΔU is high
    - increase generosity of UI <u>reduce ΔU</u>.

<u>Worker's problem</u> maximize expected utility by choosing search effort E

$$\max_E \quad U(C^u) + E\, f(\theta)\, \Delta U - E^2/2$$

Concave function $\to$ first-order condition gives global maximum -

take derivative of objective function

$$f(\theta)\,\Delta U - E = 0$$

Effort chosen by workers

$$\boxed{E^S(\theta, UI) = f(\theta)\,\Delta U}$$

- $UI \downarrow \Rightarrow$ gain from working $\uparrow \Rightarrow$ incentive to search $\uparrow \Rightarrow E \uparrow$

$$\boxed{\partial E^S / \partial UI < 0}$$

- $\theta \uparrow \Rightarrow$ return on effort $\uparrow \Rightarrow$ incentive to search $\uparrow \Rightarrow E \uparrow$

$$\boxed{\partial E^S / \partial \theta > 0}$$

Labor supply

$$\boxed{L^S(\theta, UI) = E^S(\theta, UI) \times f(\theta)}$$

- $\theta = 0 \Rightarrow f(\theta) = 0 \Rightarrow L^S = 0$
- $\partial L^S / \partial UI < 0$. UI depresses labor supply

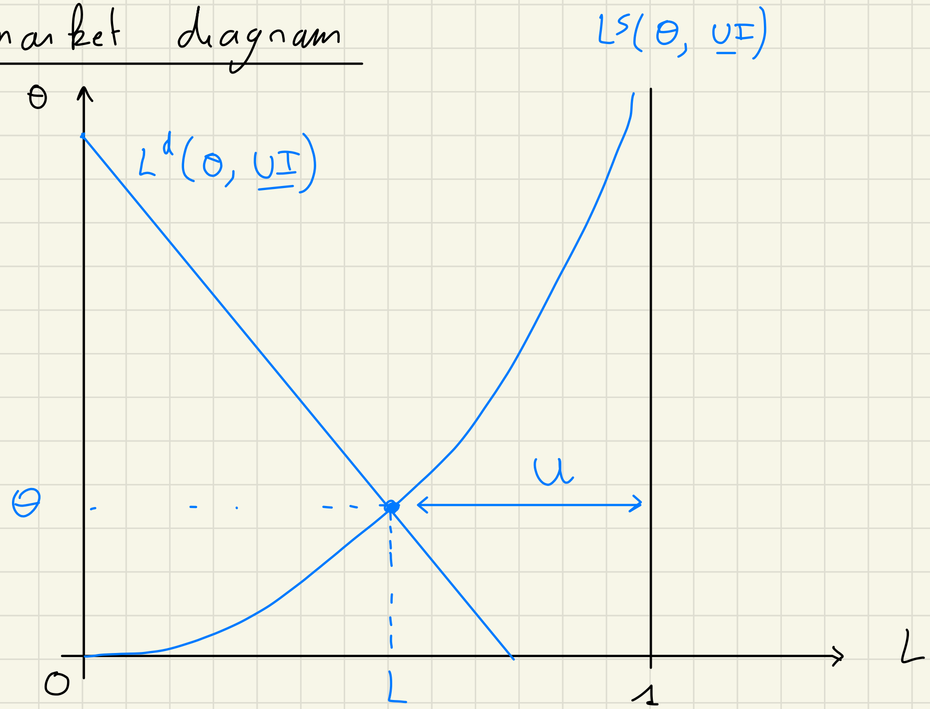
- $\partial L^s / \partial \theta > 0$

Labor market equilibrium with UI

$$\boxed{L^s(\theta, UI) = L^d(\theta, UI)}$$

Implicitly, θ is function of UI $\quad \theta(UI)$

Labor market diagram

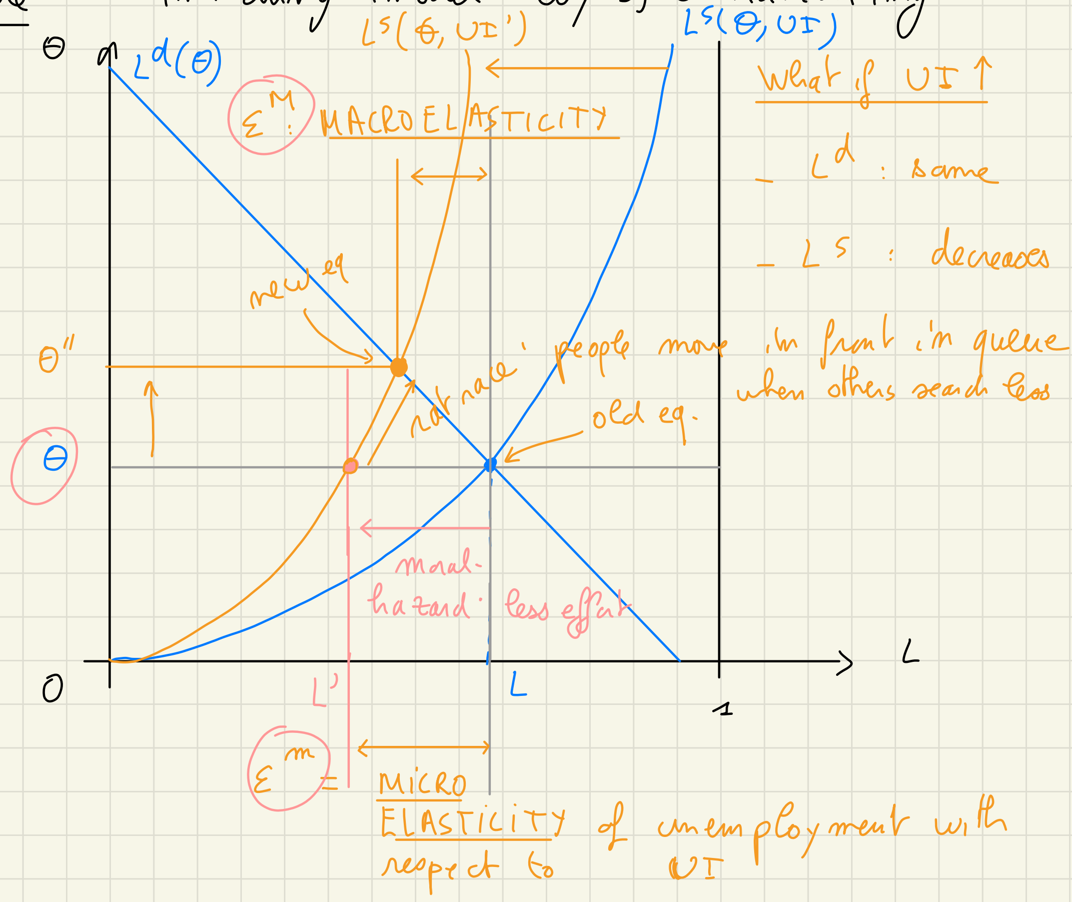


Effects of UI on labor market

1) Wages do not respond to UI (most realistic case)

+ concave production function (ie a downward sloping labor demand)

Example   matching model w/ job rationing



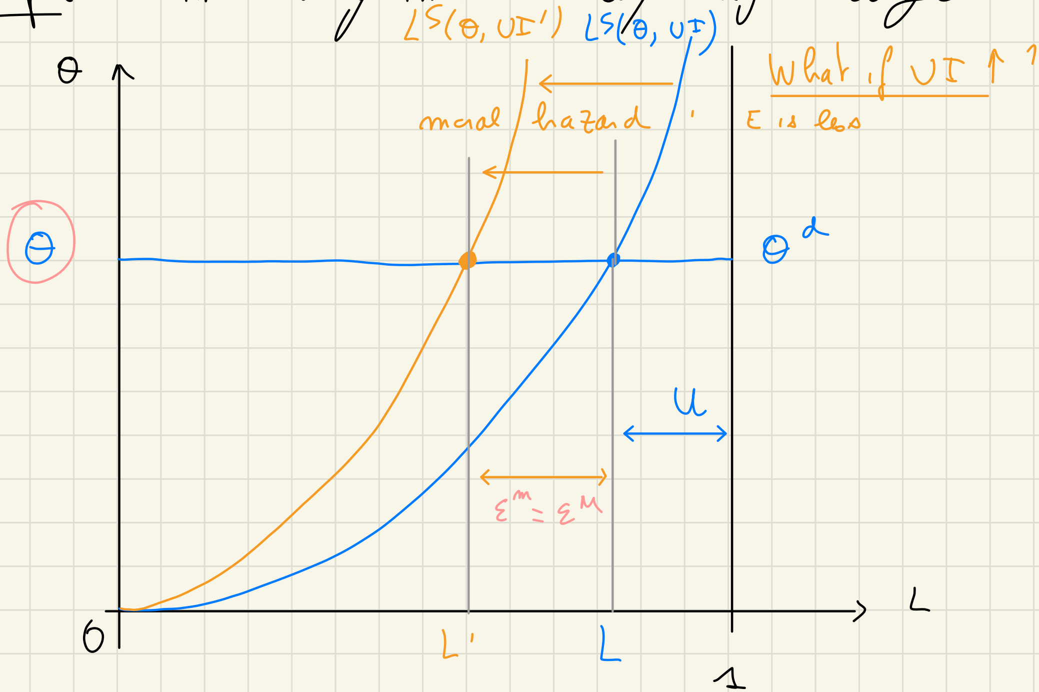
Effects of an increase in UI.

- $L \downarrow$, $u \uparrow$
- $\theta \uparrow$
- $E \downarrow$
- $0 < \varepsilon^M < \varepsilon^m$

MACRO MICRO

2) Wages do not respond to UI + production function is linear (ie the labor demand is horizontal)

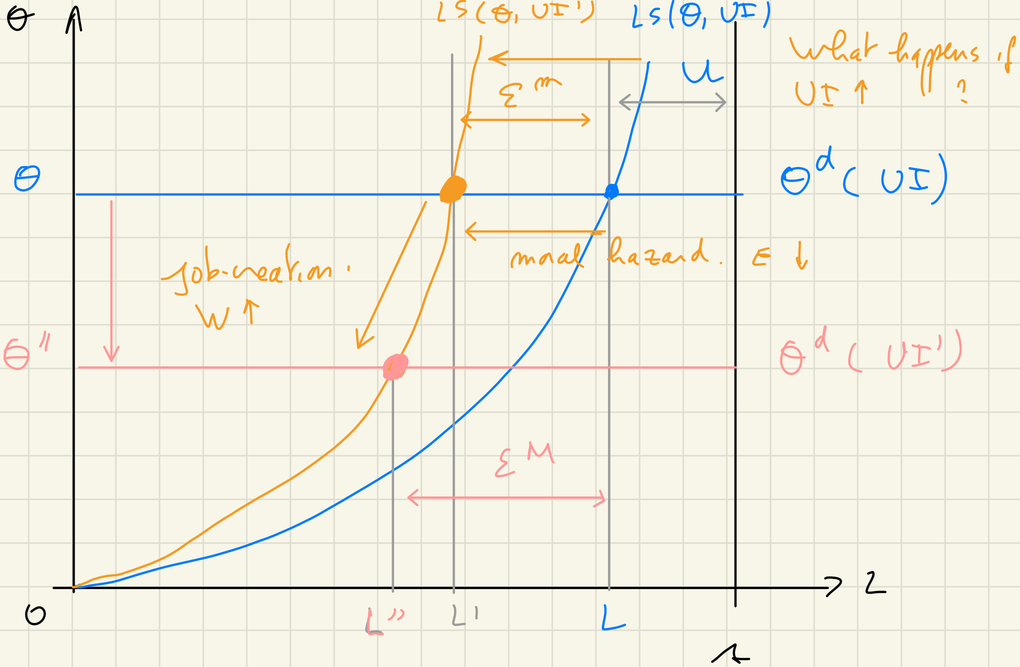
Example matching model w/ rigid wage



Effects of an increase in UI.

- L ↓ & U ↑
- $\theta \rightarrow$
- E ↓
- $O < \varepsilon^M = \varepsilon^m$

3) Wages increase with UI (bargaining) & linear production function (ie horizontal L^d)



Effects of higher UI.

- L ↓ & u ↑
- θ ↓
- E ↓
- w ↑
- $0 < \varepsilon^m < \varepsilon^M$

Optimal UI.

Social welfare is :

$$SW = \overset{\overset{LI}{\shortparallel}}{L} \cdot U(C^e) + (1-L) \cdot U(C^u) - \underbrace{E^2/2}_{\psi(E)}$$

Social planner chooses UI to maximize SW subjects to the following constraints:

- budget constraint for government $\Leftrightarrow$ resource constraint in economy.

$$\underbrace{L\, C^e + (1-L)\, C^u}_{\text{total consumption}} = Y = a \cdot N^\alpha$$

- workers response: $\cdot\ E = E^s(\theta, UI)$
  $\cdot\ L = L^s(\theta, UI)$

- equilibrium response $\quad - \quad \theta = \theta(UI)$

  given by $L^d(\theta, UI) = L^s(\theta, UI)$

- Solving social planner's problem

  * All variables in social planner's problem can be expressed as function of (θ, UI)

* Social welfare can be expressed as function $f(\theta, UI)$

* Social planner's problem becomes

$$\max_{UI} \; SW(\theta(UI), UI)$$

Optimal UI is given by first-order condition

$$\frac{dSW}{dUI} = 0 \Rightarrow \boxed{0 = \underbrace{\left.\frac{\partial SW}{\partial UI}\right|_{\theta}}_{\text{BAILY-CHETTY FORMULA}} + \underbrace{\left.\frac{\partial SW}{\partial \theta}\right|_{UI} \cdot \frac{d\theta}{dUI}}_{\text{CORRECTION TERM}}}$$

① $\left.\frac{\partial SW}{\partial UI}\right|_{\theta} = 0$ UI that maximizes welfare, keeping θ constant

→ optimal UI in a "partial equilibrium" setup or "micro" setup

→ UI solving optimally tradeoff b/w incentives & insurance

→ UI given by a

public-finance formula called "Baily-Chetty formula".

Formula gives optimal UI as a function of 2 statistics.

- ε^m microelasticity of unemployment w.r.t. UI

incentive cost of UI ↑

$\varepsilon^m \uparrow \Rightarrow$ optimal UI ↓

- $U'(c^e)/U'(c^u)$, ratio of marginal utilities, measuring need for insurance

$\underbrace{U'(c^e)/U'(c^u)}_{\in[0,1]} \uparrow \Rightarrow$ optimal UI ↓

insurance value of UI ↓

② $\left.\dfrac{\partial SW}{\partial \theta}\right|_{UI}$ efficiency term captures whether the labor market operates efficiently or not.

Three possible cases

a) $\frac{\partial SW}{\partial \theta} = 0$: labor market tightness is efficient

-> Baily-Chetty remains valid

b) $\frac{\partial SW}{\partial \theta} > 0$: labor market tightness is inefficiently low -> labor market is inefficiently slack

-> Baily Chetty formula is not valid anymore

c) $\frac{\partial SW}{\partial \theta} < 0$ tightness is inefficiently high -> labor market is inefficiently tight.

-> Baily-Chetty formula is not valid anymore

③ $d\theta/dUI$ Effect of UI on equilibrium tightness

a) $d\theta/dUI = 0$: UI has no effect on tightness

- happens in matching model w/ rigid wage
- $\varepsilon^m = \varepsilon^M$

→ Baily-Chetty formula remains valid

b) $d\theta / dUI > 0$. • $\theta \uparrow$ when $UI \uparrow$

- happens in matching model w/ job rationing
- $0 < \varepsilon^M < \varepsilon^m$

→ Baily-Chetty formula has to corrected

(A) if labor market is inefficiently tight (boom): correction term < 0 so optimal UI is less than in Baily-Chetty formula.

(B) if labor market is inefficiently slack (slump): correction term > 0 so optimal UI is more than in Baily Chetty formula.

⇒ optimal UI is countercyclical

⇒ optimal UI is more generous in slumps than in booms (as in US)

c) $d\theta/dUI < 0$ $\theta \downarrow$ when UI $\uparrow$

- happens in standard matching model (bargaining + linear production function)
- $0 < \varepsilon^m < \varepsilon^M$

→ Baily - Chetty formula has to be corrected

⇒ Optimal UI is procyclical

⇒ Optimal UI is more generous in booms than in slumps (opposite of US policy)