Government Policies

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Active labor market policies: Policies to reduce un-employment (when u is too high)

① Wage policies: minimum wage, wage tax

② Public employment

Passive labor market policies: Policies to improve situation of unemployed workers

③ Unemployment insurance

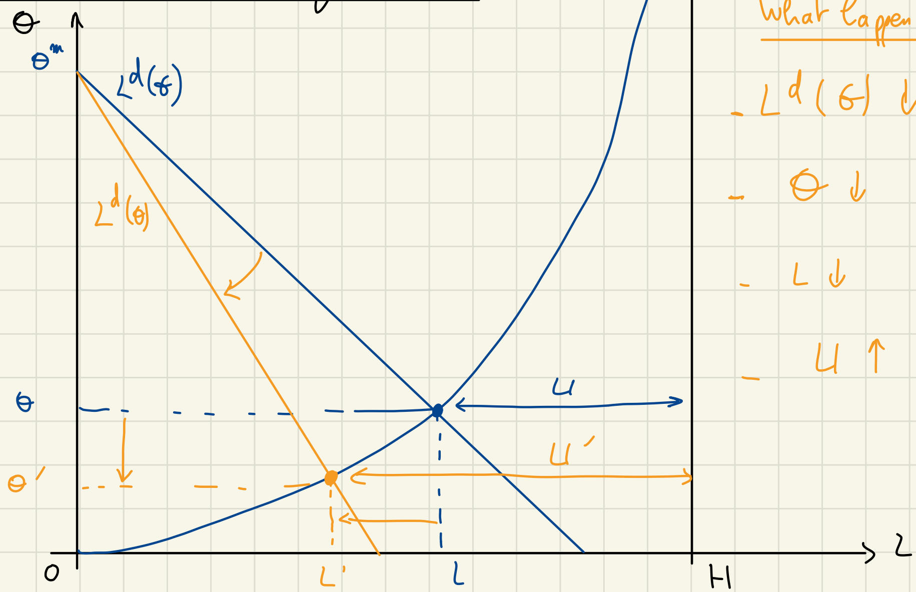
Minimum wage: Assume all workers are paid at minimum wage W. What happens when minimum wage goes up?

Use matching model w/ job rationing.

- Wage function W
- Production function: $Y = a N^{\alpha}$, $0 < \alpha < 1$

- Labor supply $L^s(\theta)$ unaffected by minimum wage
- Labor demand $L^d(\theta) = \left[\frac{\alpha \, a}{W \cdot [1 + \tau(\theta)]^{\alpha}} \right]^{1/1-\alpha}$

Increase in minimum wage W



What happens if $W\uparrow$?

- $L^d(\theta)\downarrow$
- $\theta\downarrow$
- $L\downarrow$
- $U\uparrow$

Optimal minimum wage

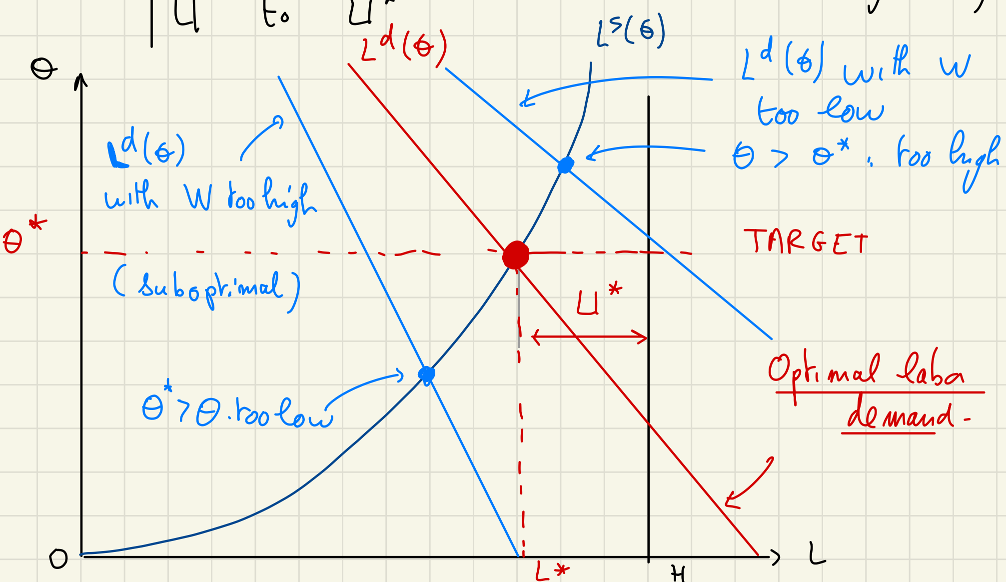
Minimum wage that maximizes social welfare

minimum wage that brings | θ to θ^* (efficient labor market tightness)

| U to U^*

Formula.

$$\theta^* = \frac{1-z}{\varepsilon\, r}$$



W^* optimal minimum wage $\to$ maximize welfare

- θ^* efficient tightness $\to$ θ^* given by formula

- $L^* = L^s(\theta^*) = \dfrac{f(\theta^*)}{s + f(\theta^*)} \cdot H$

- $U^* = H - L^*$

- w^* is such that $L^d(\theta^*) = L^*$

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

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

$$\frac{W^* \quad (1 + \tau(\theta^*))^\alpha}{a \quad \alpha} = (L^*)^{\alpha-1}$$

$$\boxed{W^* = \frac{a \quad \alpha \quad (L^*)^{\alpha-1}}{[1 + \tau(\theta^*)]^\alpha}}$$

- If currently $\begin{cases} \theta < \theta^* \\ U > U^* \end{cases}$ then need reduce W to W^*

- If currently $\begin{cases} \theta > \theta^* \\ U < U^* \end{cases}$, then need increase W to W^*

Empirical evidence on minimum wage

Empirical literature is divided in 2 camps

Minimum wage reduces employment   Consistent with our model

Minimum wage has no effect on employment / unemployment.

Not consistent with our matching model → modify / improve the model to explain this fact. Need to introduce new elements such that minimum wage does not depress labor demand

① Efficiency-wage element: labor productivity increases w/ wage: $a = a(w)$ w/ $a'(w) > 0$

In labor demand $\frac{a}{w} = \frac{a(w)}{w}$

If $a(w)/w \sim$ constant → w does not affect $L^d(\theta)$ → minimum wage does not reduce employment.

⚠ can we still explain business cycles?

② Aggregate-demand element: $w \uparrow \Rightarrow$ disposable income $\uparrow \Rightarrow$ spending $\uparrow \Rightarrow$ sales $\uparrow \Rightarrow$ "effective productivity" $\uparrow \Rightarrow a \uparrow$

Could introduce $a(w)$ w/ $a'(w) > 0$

Tax / subsidy on wage ($\sim$ change in payroll tax)

- W wage received by workers (wage net of tax)
- t payroll tax US: $t \approx 7\%$ to fund UI system

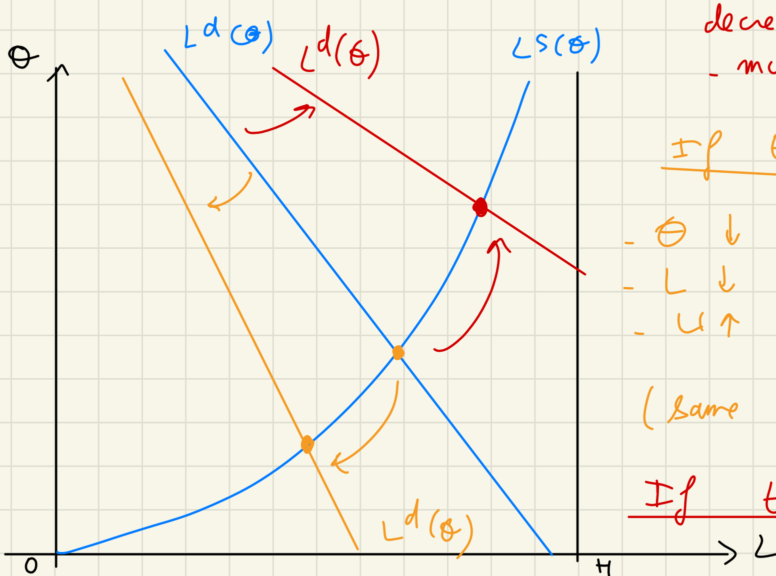
Assume that firms pay payroll tax

- wage paid by firms: $(1+t) \cdot W > W$

- labor demand is modified by payroll tax

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

- When $t \uparrow$: $L^d(\theta) \downarrow$ → same as increase in minimum wage
- When $t \downarrow$: $L^d(\theta) \uparrow$ → same as decrease in minimum wage



If $t \uparrow$

- $\theta \downarrow$
- $L \downarrow$
- $u \uparrow$

(same as $w \uparrow$)

If $t \downarrow$

Optimal payroll tax t^* (to maximize welfare → reach θ^*)

efficiency θ^*, $L^* = L^S(\theta^*)$, $U^* = H - L^*$

Optimal payroll tax such that $L^d(\theta^*) = L^S(\theta^*) = L^*$

Solve $L^d(\theta^*) = L^*$

$$\Rightarrow \left[\frac{a \quad \alpha}{(1+t^*)\, w\, (1+\tau(\theta^*))^\alpha}\right]^{1/1-\alpha} = L^*$$

$$\Rightarrow \frac{(1+t^*)\, w\, [1+\tau(\theta^*)]^\alpha}{a \quad \alpha} = (L^*)^{\alpha-1}$$

$$\Rightarrow \boxed{1 + t^* = \frac{a\,\alpha\,(L^*)^{\alpha-1}}{[1+\tau(\theta^*)]^\alpha\, w}}$$

t^* could be > 0 or < 0.

⚠ If payroll tax paid by firms (incidence of tax is on firms): payroll is effective tool

But if payroll tax paid by workers (incidence of tax is on workers): firms & labor demand are unaffected by tax → tax is completely ineffective.

Public employment

US
- # workers in public sector = 17% of # workers in economy
- spending on public workers = 63% of government spending
- stimulus packages often raise public employment. Example US New Deal

Introducing public employment in matching model

- Matching process: public & private workers are part of same labor market
  - V : # vacancies from firms + # vacancies from government
  - $\theta = V/U$
  - s : job-separation rate applies both to private firms & government
  - $m(U, V)$ gives # matches on aggregate labor market (firms + government)

workers apply indiscriminately to public & private jobs

government & private firms recruit workers indiscriminately

- Laba supply not affected by public employment.

$$\boxed{L^S(\theta) = \frac{f(\theta)}{s + f(\theta)} \quad H}$$

private employment
+ public employment | aggregate employment

Laba demand is modified by public employment.

Aggregate laba demand

= Private laba demand (by firms) + public laba demand (by government)

$$= L^d(\theta) + G$$

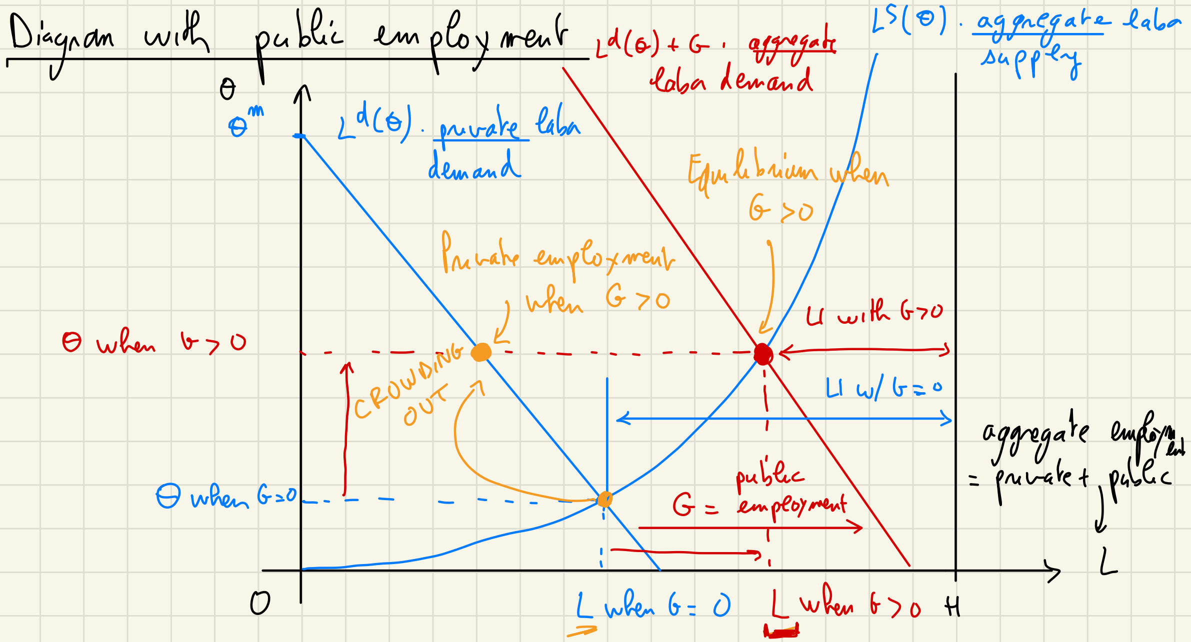
$$= \left[\frac{\alpha \cdot a^{1-\gamma}}{\omega \quad [1+\tau(\theta)]^{\alpha}} \right]^{1/1-\alpha} + G$$

- Production function is concave,
  $Y = a \cdot N^{\alpha} \quad 0 < \alpha < 1$

- Wage is rigid
  $W = \omega \quad a^{\gamma} \quad 0 \leq \gamma < 1$

Laba market equilibrium $\underbrace{L^d(\theta) + G}_{\text{aggregate laba demand}} = \underbrace{L^S(\theta)}_{\text{aggregate laba supply}}$

Diagram with public employment



Introduction of public employment $G>0$ leads to

- Aggregate employment L ↑
- Tightness θ ↑
- Unemployment U ↓
- Private employment $L^d(\theta)$ ↓

→ there is crowding out of private employment by public employment

Public-employment multiplier λ

Definition: additional # of workers employed when 1 worker is hired in public sector

$$\boxed{\lambda = \frac{dL}{dG}}$$

<u>Computation of λ</u> $\underline{G=0}$ $L^d(\theta) = L^s(\theta)$

$\underline{G>0}$ $L^d(\theta) + G = L^s(\theta)$

Implicitely, θ is a function of G through equilibrium condition.

<u>Increase public employment by $dG > 0$</u>

- Employment changes by dL
- Tightness change by $d\theta$

① Compute $d\theta$

② Infer $dL \rightarrow \lambda = dL/dG$

$$\underbrace{L^d(\theta) + G}_{\text{LHS}} = \underbrace{L^s(\theta)}_{\text{RHS}}$$

$dG \rightarrow dLHS$ & $dRHS$

Since equilibrium condition is valid before & after change dG, then $\underline{dLHS = dRHS}$

- $dRHS = \frac{dL^s}{d\theta} \cdot d\theta$

- $dLHS = \frac{dL^d}{d\theta} \cdot d\theta + dG$

Hence $\frac{dL^d}{d\theta} d\theta + dG = \frac{dL^s}{d\theta} d\theta$

$$\left[\frac{dL^s}{d\theta} - \frac{dL^d}{d\theta}\right] d\theta = dG$$

$$\left[\frac{dL^s}{d\theta} - \frac{dL^d}{d\theta}\right] \frac{d\theta}{dG} = 1$$

$$\frac{d\theta}{dG} = \frac{1}{\frac{dL^s}{d\theta} - \frac{dL^d}{d\theta}}$$

Recall from "Unemployment fluctuations"

- $\varepsilon_\theta^{LS} = (1-\eta) \cdot u(\theta)$

Assumption Cobb-Douglas matching function

$$\varepsilon_\theta^{LS} = \frac{d\ln L^s}{d\ln\theta} = \frac{\theta}{L^s} \frac{dL^s}{d\theta}$$

$$\Rightarrow \frac{dL^s}{d\theta} = \frac{\overbrace{L^s}^{=L}}{\theta} \cdot \varepsilon_\theta^{LS} = \frac{L}{\theta} \cdot \varepsilon_\theta^{LS}$$

$$\boxed{\frac{dL^s}{d\theta} = \frac{L}{\theta} (1-\eta)\, u}$$

$$\cdot\ \varepsilon_{\theta}^{L^d} = -\frac{\alpha}{1-\alpha}\ \eta\ \tau$$

$$\varepsilon_{\theta}^{L^d} = \frac{d\ln L^d}{d\ln\theta} = \frac{\theta}{L^d}\ \frac{dL^d}{d\theta}$$

$$\Rightarrow \frac{dL^d}{d\theta} = \frac{L^{d}}{\theta}\cdot\varepsilon_{\theta}^{L^d} = \frac{L-G}{\theta}\cdot\varepsilon_{\theta}^{L^d}$$

L-G

$$\Rightarrow \boxed{\frac{dL^d}{d\theta} = -\frac{\alpha}{1-\alpha}\cdot\eta\ \tau\ \frac{(L-G)}{\theta}}$$

Thus $$\boxed{\frac{d\theta}{dG} = \frac{1}{\frac{L}{\theta}(1-\eta)u + \frac{\alpha}{1-\alpha}\eta\ \tau\ \frac{(L-G)}{\theta}} > 0}$$

Multiplier. $\lambda = \frac{dL}{dG}$ and $L = L^s(\theta)$

$$\lambda = \frac{dL}{dG} = \frac{dL^s}{d\theta}\cdot\frac{d\theta}{dG}$$

$$\lambda = \frac{(L/\theta)(1-\eta)\ u}{(L/\theta)(1-\eta)\ u + \alpha/_{1-\alpha}\cdot\eta\cdot\tau\left(\frac{L-G}{\theta}\right)}$$

$$\lambda = \frac{1}{1 + \frac{\alpha}{1-\alpha}\ \frac{\eta}{1-\eta}\ \frac{\tau}{u}\left(1-\frac{G}{L}\right)}$$

share of workers in private sector σ

shape of production function

shape of matching function

$$\boxed{\lambda = \frac{dL}{dG} = \frac{1}{1 + \frac{\alpha}{1-\alpha} \frac{\eta}{1-\eta} \frac{\tau(\theta)}{u(\theta)} G}}$$

Properties of the public-employment multiplier

① $\lambda > 0$.

When public employment ↑, then $\begin{cases} \text{total employment } \uparrow \\ \text{unemployment } \downarrow \end{cases}$

② $\lambda < 1$.

Total employment increases less than public employment - Unemployment decreases by less than public employment increases.

This is b/c private employment is crowded out.

When public employment ↑, private employment ↓, so total employment ↑ by less than public employment.

→ crowding out b/c θ ↑ when G ↑.

③ λ is <u>countercyclical</u>. λ is large when θ (L) is low but λ is low when θ (L) is high.

Good times, low λ / Bad time high λ.

Proof

$$\lambda(\theta) = \frac{1}{1 + \frac{\alpha}{1-\alpha}\frac{\eta}{1-\eta} - \sigma\frac{\tau(\theta)}{u(\theta)}}$$

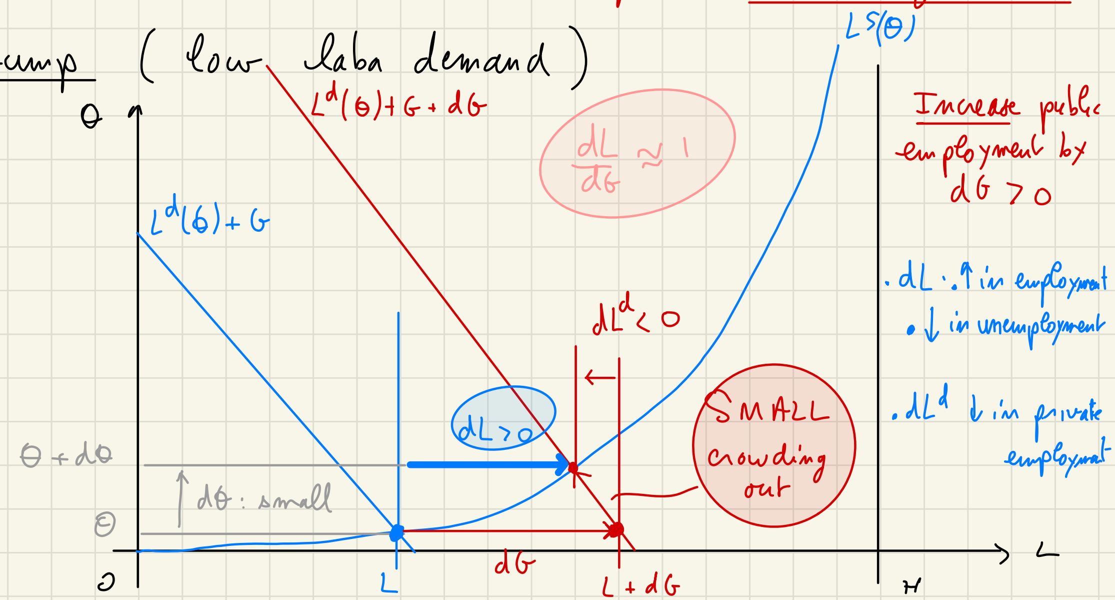
α, η, σ : same over the business cycle

good times (θ is high): $u(\theta)$: low, $\tau(\theta)$ high $\Big\}$ $\frac{\tau(\theta)}{u(\theta)}$ is high $\Rightarrow$ $\boxed{\lambda(\theta) \text{ is low}}$

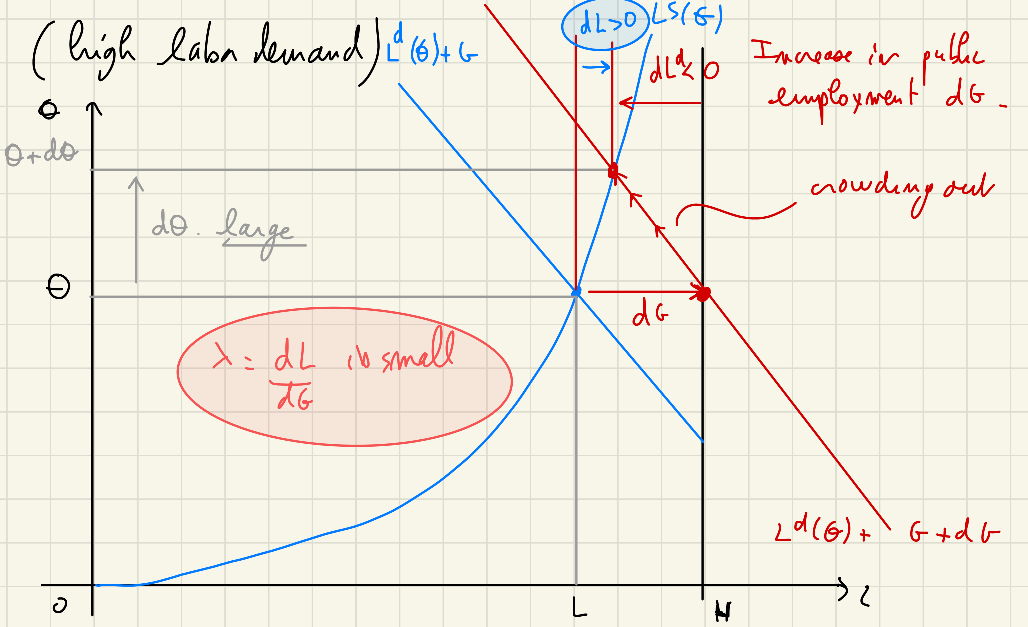
bad times (θ is low): $u(\theta)$ high, $\tau(\theta)$ low $\Big\}$ $\frac{\tau(\theta)}{u(\theta)}$ is low $\Rightarrow$ $\boxed{\lambda(\theta) \text{ is high}}$

$\lambda'(\theta) < 0$ so multiplier is countercyclical

Slump (low laba demand)



Boom: (high labor demand)



Unemployment insurance (UI)

UI in the US

- Eligibility rules
- Replacement rate ≈ 50%

→ benefits = 50% of past wage (+ cap on benefits)

- Benefits have finite duration

→ usual duration = 26 weeks

- Duration of benefits is countercyclical

→ 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 $E > 0$
  - $\rightarrow$ Aggregate search effort = # unemployed workers × (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 $E \times f(\theta)$

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

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

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

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

<u>Profit</u> $\pi = y - w \times L$

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

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

↳ 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 $\rightarrow$ 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

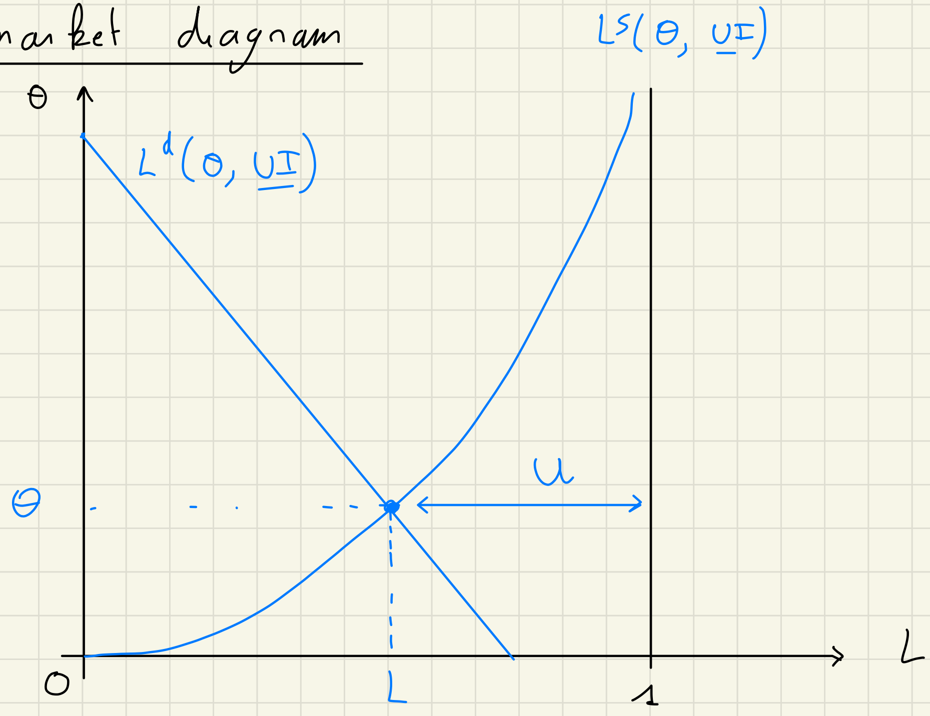
- $\partial L^s / \partial \theta > 0$

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

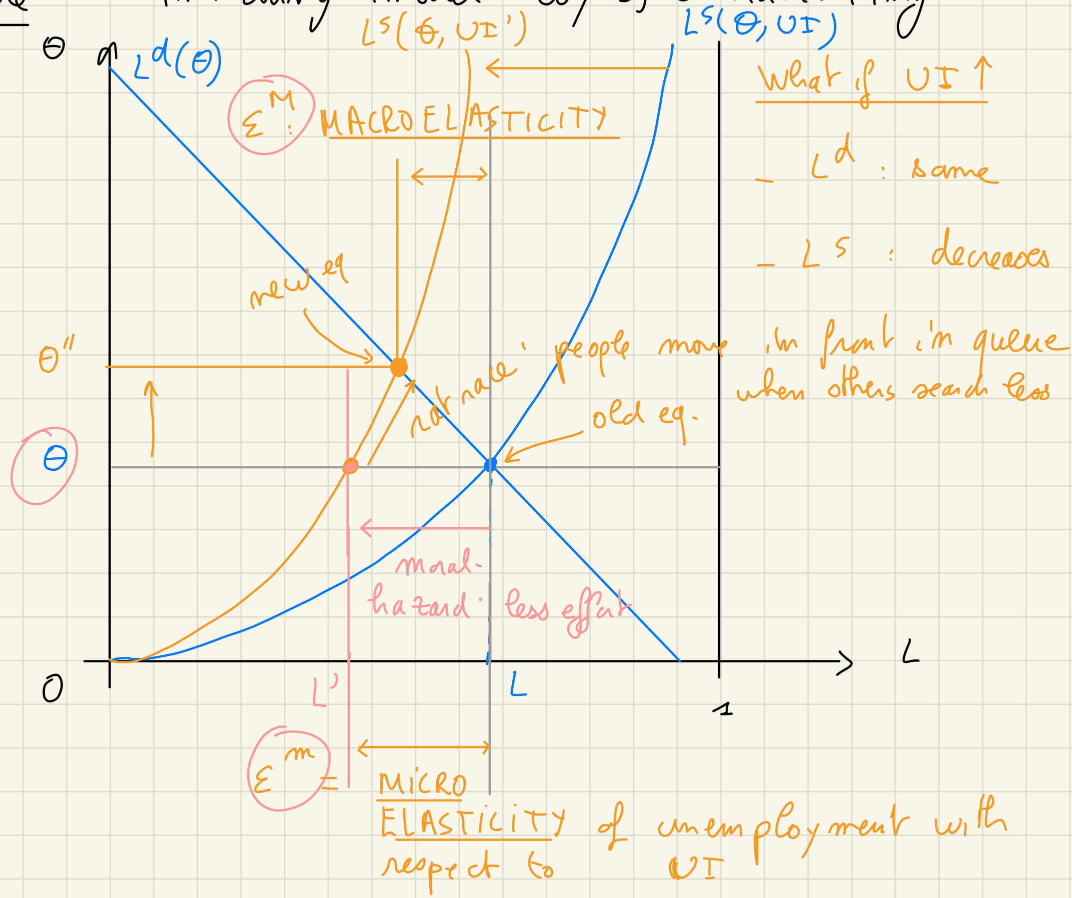


Effects of UI on labor market

1) <u>Wages do not respond to UI</u> (most realistic case)

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

Example   matching model w/ job rationing



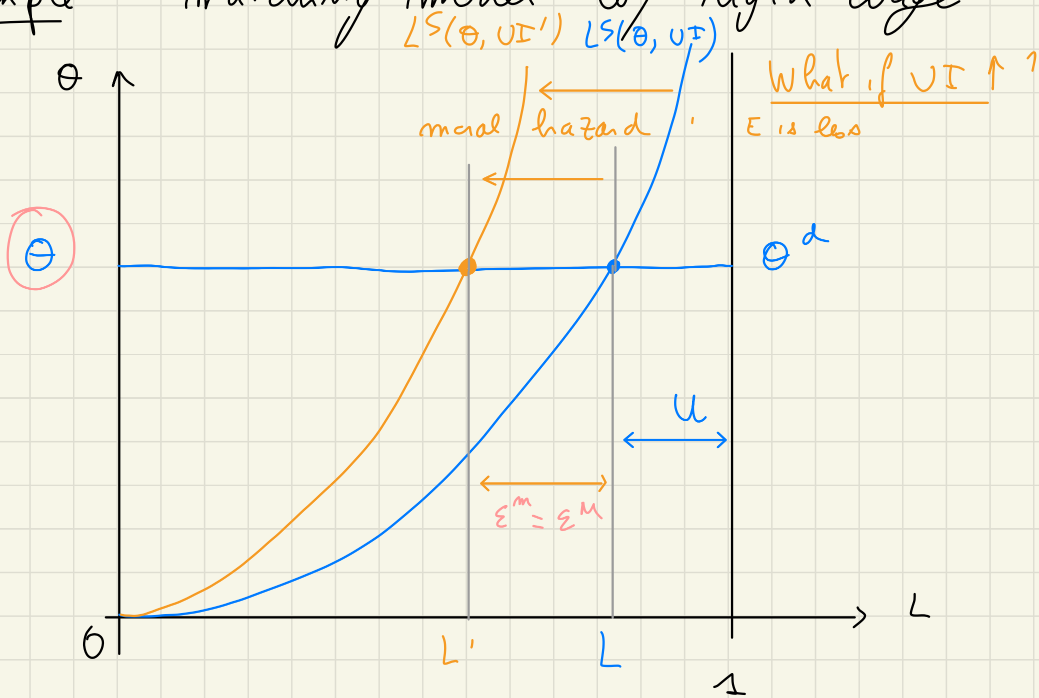
Effects of an increase in UI.

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

MACRO   MICRO

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

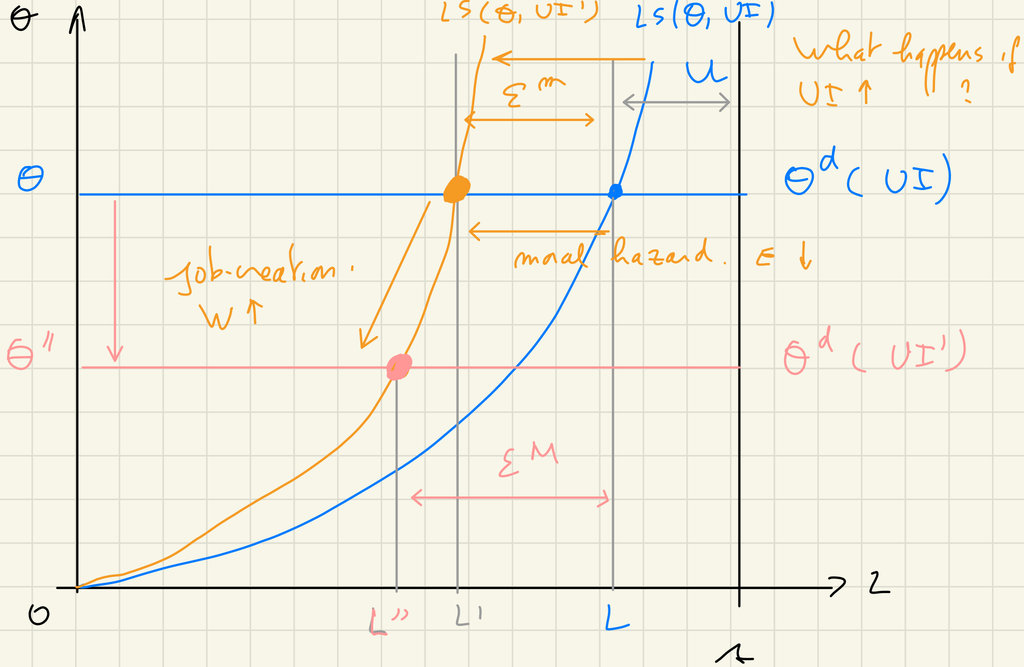
Example matching model w/ rigid wage



Effects of an increase in UI.

- $L \downarrow$ & $u \uparrow$
- $\theta \rightarrow$
- $E \downarrow$
- $O < \varepsilon^M = \varepsilon^m$

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



Effects of higher UI.

- $L \downarrow$ & $U \uparrow$
- $\theta \downarrow$
- $E \downarrow$
- $W \uparrow$
- $0 < \varepsilon^m < \varepsilon^M$

Optimal UI.

Social welfare is :

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

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

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

    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

$\in[0,1]$ $\underbrace{u'(c^e)/u'(c^u)}$ ↑ $\Rightarrow$ 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 <u>model</u> 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 <u>model</u> w/ job rationing
- $0 < \varepsilon^M < \varepsilon^m$

→ Baily - chetty formula has to corrected

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

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

⇒ optimal UI is countercyclical

$\Rightarrow$ optimal UI is more generous in slumps than in booms (as in US)

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

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

$\rightarrow$ Baily - Chetty formula has to be corrected

$\Rightarrow$ Optimal UI is procyclical

$\Rightarrow$ Optimal UI is more generous in booms than in slumps (opposite of US policy)