Lecture 22
More on Unemployment

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- We just presented an accounting exercise. No theory. Now develop model to explain variations in unemployment.
- Unlike Keynesian models, unemployment here will be in a market clearing setting.
- Basic premise: Search and matching are costly. Both for workers looking for job, firms looking to hire.
- Contribution of McCall (1970). Much activity since then. Pissarides (2000) *Equilibrium Unemployment Theory*.

Formal Model of Job Search

- An infinitely-lived worker would like to maximize

$$\sum_{t=0}^{\infty} \beta^t U(C_t) = U(C_0) + \beta U(C_1) + \beta^2 U(C_2) + \cdots$$

- She has two uses for her time: Work or search for a job. For simplicity, she does not enjoy leisure.
- If she is unemployed, she must search to find a job.
  - Probability p of finding a job in any period.
  - The job pays some wage $w_1 < w_2 < \cdots < w_N$.
  - The probability it pays w_i is π_i.
  - She may reject the job if the wage is too low.

- There is no borrowing or lending:
  - When unemployed, she consumes an unemployment benefit b.
  - When employed she consumes her wage w.
- An employed worker loses her job with probability s.
- The key to solving this problem is expressing it recursively.
  - $V_e(w)$ is the expected lifetime utility of an employed worker.
  - V_u is the expected lifetime utility of an unemployed worker.

An Employed Worker

- An employed worker earns and consumes w.
- Next period, she is unemployed with probability s, otherwise she is still employed.
- This can be expressed recursively as

$$V_e(w) = U(w) + \beta \left[s V_u + (1-s) V_e(w) \right]$$

- Solving this for $V_e(w)$ gives

$$V_e(w) = \frac{U(w) + \beta s V_u}{1 - \beta(1-s)}$$

So $V_e(w)$ is increasing, assuming U is.

An Unemployed Worker

- An unemployed worker earns and consumes b.
- Next period she finds a job with probability p.
    - The job pays a wage w_i with probability π_i.
    - She may accept the wage (continuation value $V_e(w)$), or she may reject the wage (continuation value V_u).
- She fails to find a job with probability $1 - p$.
- This can be expressed recursively as

$$V_u = U(b) + \beta \left[p \left(\sum_{i=1}^{N} \pi_i \max\{ V_e(w_i), V_u \} \right) + (1-p) V_u \right]$$

Reservation Wages

- The worker accepts any wage above her reservation wage w^*:

$$V_e(w^*) = V_u$$

Let n^* satisfy $w_1 < \cdots < w_{n^*-1} < w^* \leq w_{n^*} < \cdots < w_N$.

- Key question is what determines the reservation wage.
- We can rewrite the unemployed worker value as

$$V_u = U(b) + \beta \left(p \left(\sum_{i=n^*}^{N} \pi_i \big(V_e(w_i) - V_u \big) \right) + V_u \right)$$

- Solving this for $(1-\beta) V_u$ gives

$$(1-\beta) V_u = U(b) + \beta p \sum_{i=n^*}^{N} \pi_i \big(V_e(w_i) - V_u \big)$$

- The recursive equation for employed workers implies

$$V_e(w_i) = \frac{U(w_i) + \beta s V_u}{1 - \beta(1-s)} \Rightarrow V_e(w_i) - V_u = \frac{U(w_i) - (1-\beta) V_u}{1 - \beta(1-s)}$$

  A worker accepts a job if $U(w_i) \geq (1-\beta) V_u$.

- The reservation wage satisfies

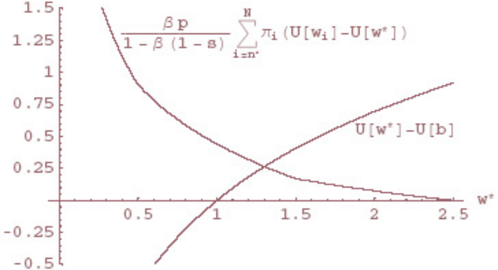
$$V_e(w^*) = V_u \text{ or equivalently } U(w^*) = (1-\beta) V_u$$

- Combine the earlier equations to get the reservation wage:

$$(1-\beta) V_u = U(b) + \beta p \sum_{i=n^*}^{N} \pi_i \left(V_e(w_i) - V_u \right)$$

$$V_e(w_i) - V_u = \frac{U(w_i) - (1-\beta) V_u}{1 - \beta(1-s)}$$

$$U(w^*) - U(b) = \frac{\beta p}{1-\beta(1-s)} \sum_{i=n^*}^{N} \pi_i (U(w_i) - U(w^*))$$



What raises the reservation wage?

- Higher unemployment benefits b.
- The best jobs pay very high wages.
- Workers are more patient β.
- Jobs are easier to find p.
- Separations are less frequent s.