Labor Economics and Employment Policies

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October 2008

Lecture 3: Matching, growth, unemployment and wages

- Importance of the magnitude of job creation, job destruction, and worker flows
- Unemployment
- Analyze the functioning of the labor market as a matching process between employers and employees
- Analyze the relation between growth and unemployment
- Think about the efficiency of a labor market with frictions
- Analyze the consequences of the minimum wage

- Christopher Pissarides *Equilibrium unemployment theory*, MIT Press, 2000

1. The matching model

- Simple model of the labor market in which transaction costs explain the simultaneous existence of vacant jobs and unemployed persons.
- The model is structured around the concept of "*matching function*," which sums up, at the aggregate level, the outcomes of encounters between persons in search of a job and firms with positions vacant.
- The matching function, V vacant jobs, U unemployed workers

$$\text{number of matches per unit of time } M(V, U)$$

- M is increasing with V and U.
- $M(V, 0) = M(0, D) = 0.$
- Constant returns to scale

- The probability of filling a vacant job per unit of time:

$$\frac{M(V,U)}{V} = M(1, U/V) \equiv m(\theta); \;\; \theta \equiv V/U \tag{1}$$

Parameter θ, which equals the ratio of the number of vacant jobs to the number of unemployed persons, is an indicator of the "tightness" prevailing in the labor market.

- The probability of filling a vacant job decreases with θ

- For an unemployed person, the probability to find a job is

$$\frac{M(V,U)}{U} = \frac{V}{U}\frac{M(V,U)}{V} = \theta m(\theta) \tag{2}$$

increases with θ.

Equilibrium of flows and the Beveridge curve

- Job destruction rate q
- Let N_t denote the size of the labor force at date t, $N_t \geq N_{t-1}$
- Unemployment rate at date t

$$U_t = U_{t-1} + N_t - N_{t-1} + qL_{t-1} - \theta_{t-1}m(\theta_{t-1})U_{t-1} \qquad (3)$$

- Let denote $u_t = U_t/N_t$ the unemployment rate, and $n = (N_t - N_{t-1})/N_{t-1}$,

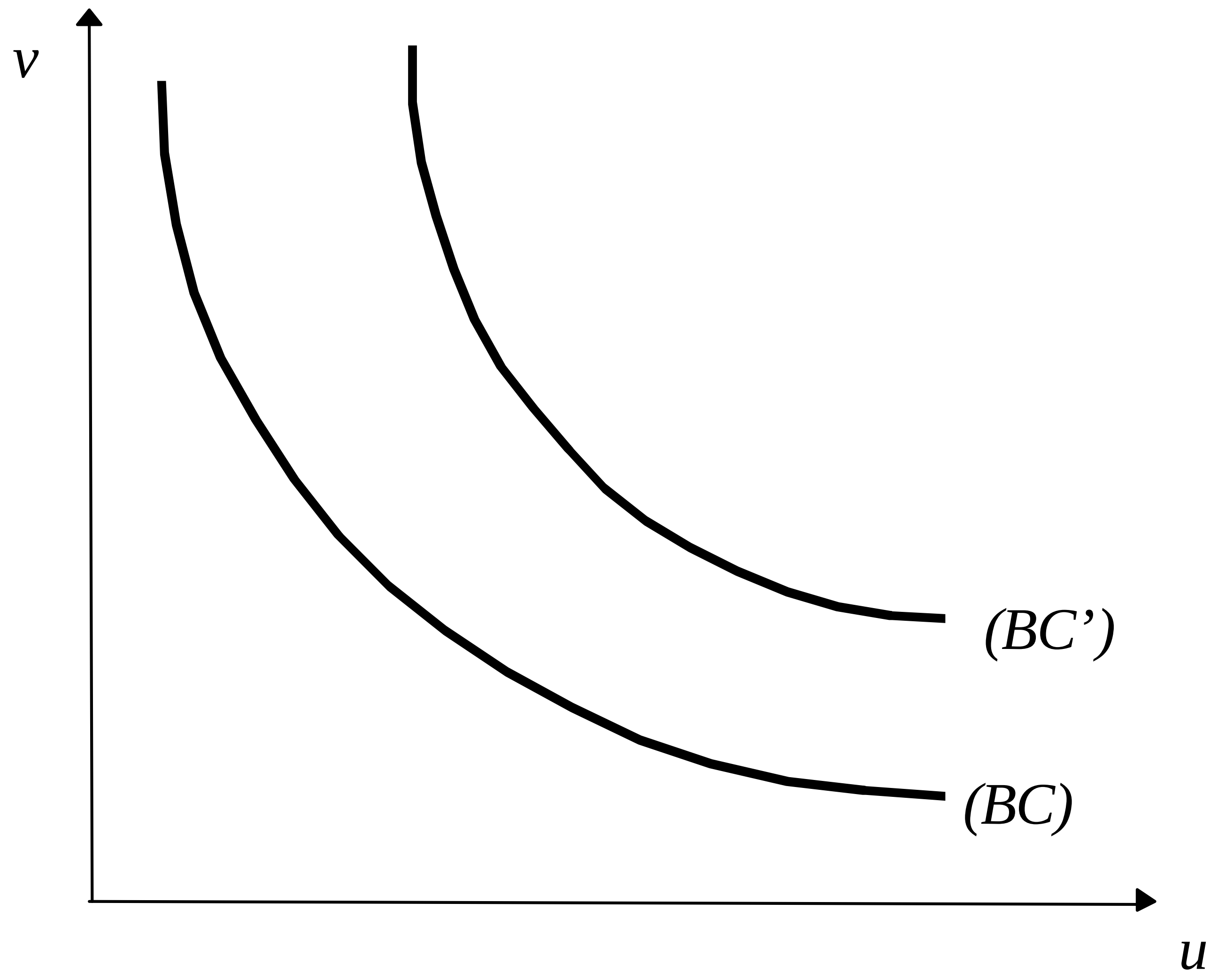
$$u_t(1+n) = u_{t-1} + q + n - [q + \theta_{t-1}m(\theta_{t-1})]\, u_{t-1} \qquad (4)$$

- The stationary value of the unemployment rate corresponds to $u_t = u_{t-1}$

$$u = \frac{q+n}{q+n+\theta m(\theta)} \qquad (5)$$

- If we define the vacancy rate by $v = V/N$, the labor market tightness θ is also equal to the ratio v/u.
- In the plane (v, u), this relationship yields the Beveridge curve.

- The Beveridge curve



The behavior of firms

- There are only two goods in the economy: a good produced by the firms and consumed by all individuals; and labor, assumed to be homogeneous, which is the sole factor of production.
- The good produced by the firms is the numeraire.
- Each firm has one job that can be either vacant or filled;
- when this job is filled, It makes possible the production of an exogeneous quantity y of the good per unit of time
- w denotes the wage.
- When it is filled, a job yields an expected profit Π_e which is different from the profit expected Π_v when the job falls vacant.

The profit expected from a filled job

$$\Pi_e = \frac{1}{1+r}\left[(y-w) + q\Pi_v + (1-q)\Pi_e\right] \tag{6}$$

- Can be rewritten in simpler form:

$$r\Pi_e = y - w + q(\Pi_v - \Pi_e) \tag{7}$$

The profit expected from a vacant job

- The costs of a vacant job per unit of time are denoted by h.
- These costs represent the expenses incurred in holding the position open and looking for an employee with the right skills to fill it (advertising, agency fees, the services of a consultant, etc.).
- Since vacant jobs are filled at rate $m(\theta)$, the profit expected from a vacant job is written:

$$\Pi_v = \frac{1}{1+r}\left\{-h + m(\theta)\Pi_e + [1 - m(\theta)]\,\Pi_v\right\}$$

- Or again, rearranging the terms of this relation:

$$r\Pi_v = -h + m(\theta)(\Pi_e - \Pi_v) \tag{8}$$

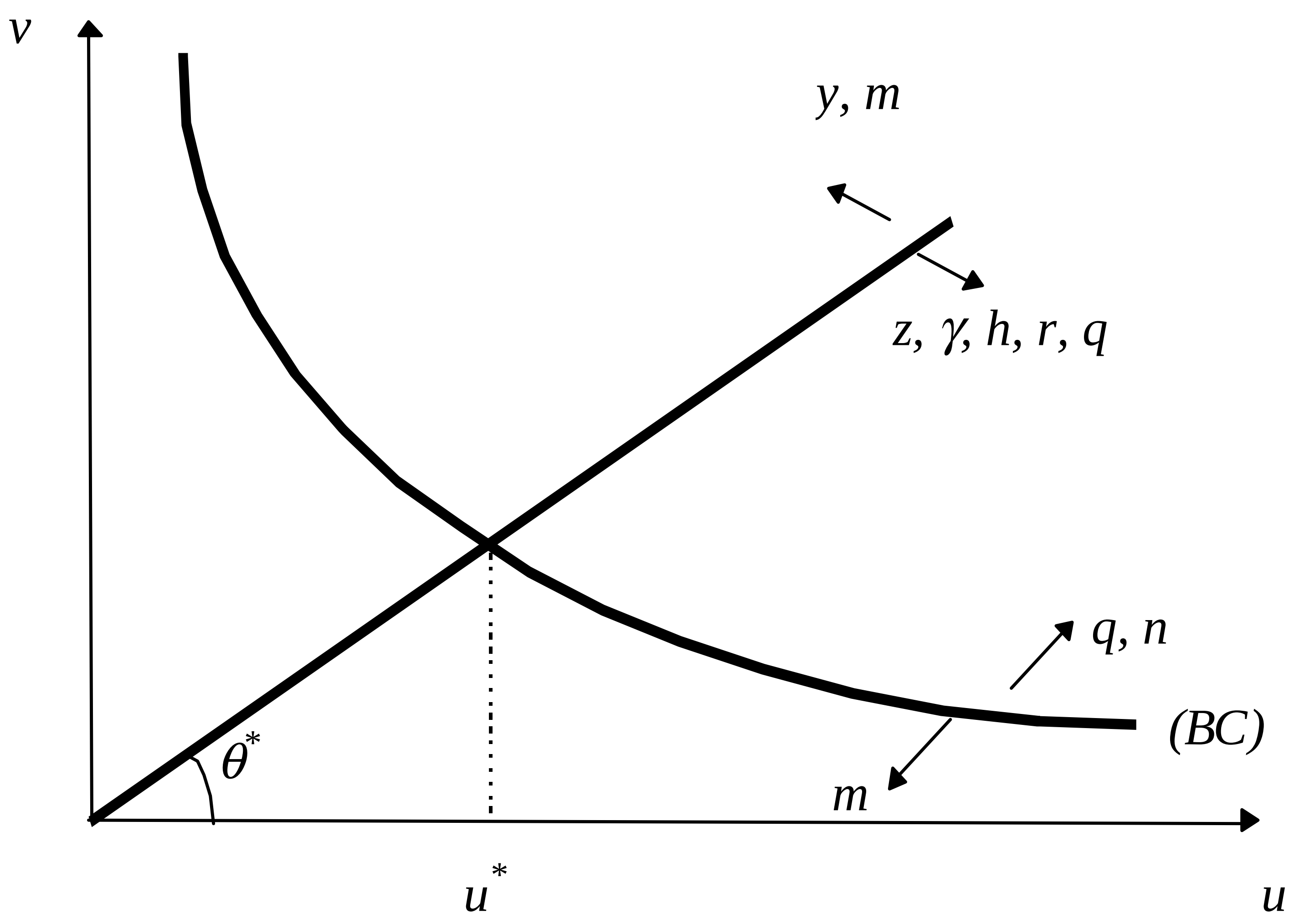
Labor demand

- *free entry* condition; it is written simply $\Pi_v = 0$.
- Yields:

$$\frac{h}{m(\theta)} = \frac{y-w}{r+q} \tag{9}$$

- The left hand side of this equation represents the average cost of a vacant job.
- At free entry equilibrium, the average cost of a vacant job must be equal to the profit expected from a filled job.
- Since the rate $m(\theta)$ at which vacant jobs are filled decreases with the labor market tightness θ, equation (9) defines a decreasing relation between the wage and the labor market tightness.

- Labor market equilibrium



Properties of the model

- The growth of the labor force: a rise in the *growth rate* n of the labor force shifts the Beveridge curve upward
- A rise in productivity y shifts the labor demand upward.
- A rise in wage w shifts the labor demand downward
- The efficiency of the matching process
- The job destruction rate
- The interest rate

Wage determination

- The wage depends on

  - productivity

  - the reservation wage

  - income of unemployed workers z

- The wage reads

$$z \leq w(\theta, y) < y$$

increases with θ and with y.

Equilibrium value of the labor market tightness

$$\frac{h}{m(\theta)} = \frac{y - w(\theta, y)}{r + q} \tag{10}$$

Labor market efficiency

- Efficient value of vacancies: maximize output per worker net of vacancy costs

$$\Omega = y(1-u) + uz - vh$$

- Trade off

  - increase in v: marginal cost of vacancy: h

  - marginal gain of vacancy: decrease in u

- There exists an optimal level of unemployment which is strictly positive
- Unemployment is useful !