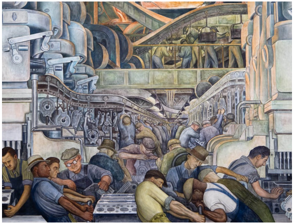

Macroeconomic Theory I

Section 7 - Labor market

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Spring 2021

Labor market models

- Key stylized facts:
  - o persistent involuntary unemployment;
  - o limited pro-cyclicality of wages;
  - o strong pro-cyclicality of employment
- *Efficiency-wages* [Bowles-Stiglitz-Shapiro]
- *Search-and-matching* [Diamond-Mortensen-Pissarides]
- *Monopsony* [Manning 2003, Dube et al., 2018, Azar et al. 2019, ...]

Search-and-matching

- No Walrasian centralized market-clearing with auctioneer.
- Workers & firms meet in decentralized one-on-one matches.
- Search frictions give raise to ‘frictional’ unemployment in equilibrium.

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Assumptions (1)

- Continuum of identical workers of mass 1.
- Firms freely create vacancies and then search for workers.
- Maintaining a job (filled or unfilled) costs c to the firm.
- Firm's payoff per period from a job:
  - $y - w(t) - c$ if filled.
  - $-c$ if unfilled.
- Worker's payoff per period:
  - w if employed.
  - b if unemployed.
- $y > b + c$, so there is always positive surplus from filling a job.

Assumptions (2)

- Matching function:

$$M(t) = M[U(t), V(t)], \qquad M_U > 0; \quad M_V > 0$$

- Employment change:

$$\dot{E}(t) = M(U(t), V(t)) - \lambda E(t)$$

    - $\lambda =$ exogenous separation rate;

- Share ϕ of surplus from filling a vacancy goes to the worker (bargaining power).

Assumptions (3)

- CRS matching function

$$M(U(t),V(t)) = U(t)m(\theta(t)), \quad \text{with } \theta = V/U \quad \text{and} \quad m = M/U$$

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- Job-finding rate:

$$a(t) = \frac{M}{U} = m[\theta(t)]$$

- Vacancy-filling rate:

$$\alpha(t) = \frac{M}{V} = \frac{m[\theta(t)]}{\theta(t)}$$

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- Specifically, Cobb-Douglass matching function:

$$M(U, V) = kU^{1-\gamma}V^{\gamma}; \qquad m(\theta) = k\theta^{\gamma}$$

Solving the model

- We are after the *inter-temporal equilibrium* (steady state); we'll ignore disequilibrium dynamics & stability issues;
- Strategy:

1. Figure out V_E, V_U, V_F, V_V.
2. Impose intertemporal equilibrium conditions (constant V's, E, a, α).
3. Find V_V as a function of E and exogenous parameters;
4. Impose $V_V = 0$ (free-entry condition) to determine the equilibrium values of E, a and α.

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1 - Value of each possible state

- Value of being employed:

$$rV_E(t) = w(t) - \lambda[V_E(t) - V_U(t)] + \dot{V}_E(t)$$

- Value of being unemployed:

$$rV_U(t) = b + a(t)[V_E(t) - V_U(t)] + \dot{V}_U(t)$$

- Value of a filled job:

$$rV_F(t) = [y - w(t) - c] - \lambda[V_F(t) - V_V(t)] + \dot{V}_F(t)$$

- Value of a vacancy:

$$rV_V(t) = -c + \alpha(t)[V_F(t) - V_V(t)] + \dot{V}_V(t)$$

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2 - Steady-state conditions

- $\dot{E} = \dot{\alpha} = \dot{a} = \dot{V}_E = \dot{V}_U = \dot{V}_F = \dot{V}_V = 0$;

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Step 3 - Find V_V as a function of E

- Model equations + steady-state conditions imply (after some algebra)

$$rV_V = -c + \frac{[(1-\phi)\alpha(E)](y-b)}{\phi a(E) + (1-\phi)\alpha(E) + \lambda + r}, \quad a_E > 0, \alpha_E < 0 \quad \Rightarrow \quad \frac{\partial V_V}{\partial E} < 0$$

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Step 4 - Free-entry condition pins down equilibrium E

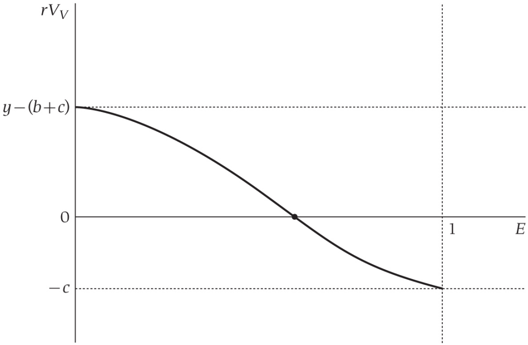
- Free-entry implies $V_V = 0$

$$rV_V = -c + \frac{[(1-\phi)\alpha(E)](y-b)}{\phi a(E) + (1-\phi)\alpha(E) + \lambda + r} = 0$$

- This implicitly defines the equilibrium values of E, a and α.

The equilibrium employment rate

$$\frac{\partial V_V}{\partial E} < 0 \quad \& \; V_V = 0$$



Takeaways

- Equilibrium unemployment could be just ‘frictional’...
  - (...**but** evidence on long-term unemployment suggests otherwise; moreover, unemployment could seem frictional for the individual worker, while not being so on aggregate).
- cyclical increase in profitability of a filled job (y up, no change in c and b) brings to large wage increase and modest increase in employment and vacancies
  - no wage rigidity!
  - (increase in job-finding rate pushes wages up, reducing incentive to create new vacancies);
- decentralized equilibrium is generally not efficient
  - see stylized example in the book.