Labor Mobility: Third Lecture

LABOR ECONOMICS (ECON 385)

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Introduction: search and unemployment

- On the subject of unemployment, the search model makes clear predictions about the duration of unemployment. The probabilities of accepting and rejecting an offer each period are, respectively:

$$1 - F(\overline{w}) \text{ and } F(\overline{w}).$$

  - The probability of receiving an unacceptable offer today *and* an acceptable offer tomorrow is:

$$\left(1 - F(\overline{w})\right) * F(\overline{w}) = \Pr(unemployment\ lasts\ 1\ period)$$

  This can be generalized to state the probability of unemployment lasting "n" periods.

$$\Pr(unemployment\ lasts\ n\ periods) = [F(\overline{w})]^n\left(1 - F(\overline{w})\right)$$

Duration of unemployment

- The expected duration of unemployment is the probability weighted average of all values of n.

$$E(n) = \sum_{n=0}^{\infty} n\,[F(\overline{w})]^n\big(1 - F(\overline{w})\big)$$

  - This is a series that converges to the finite value,

$$E(n) = \frac{1}{1 - F(\overline{w})}$$

    but the derivation is omitted because as far as I can tell it relies on showing the convergence of a power series using Taylor expansion. This is beyond the purview of this class.
  - Anything that increases the asking wage also increases the expected duration of unemployment.

Types of unemployment

- The unemployment experienced during periods of search is frictional unemployment. It is not very distressing to searchers or economists because the frictionally unemployed will eventually find jobs—probably good matches—and they are just patiently looking for jobs that fit their talents.
- Structural unemployment is more distressing to the unemployed, the firms with vacancies, and economists because it implies that the skills possessed by the unemployed workers are not adequate to fill the vacant positions.
- This results in prolonged periods of unemployment in which workers retrain to acquire the skills demanded by firms that are hiring.

The structural shifts hypothesis: structural unemployment

- States that shocks, e.g., demand or technology, hit industries unevenly and affect their demands for labor. Some sectors expand and others contract.
  - If there was perfect mobility across sectors, this would present no problems, however, this is a strong assumption—particularly in the short run.
  - It is more realistic to expect workers displaced from a contracting sector to move to the expanding sector only after retraining to prepare for the new job. E.g., a factory worker retrains to work in a hospital or a teacher retrains to work as a graphical designer.
  - The phenomenon of demand shocks for different segments of a labor market is also a popular explanation for changes in earnings inequality over time. This is a topic that deserves its own chapter.

Unemployment dynamics

- A holistic way of looking at labor mobility, search, matching, and wage bargaining. A slightly more advanced version is in a recent paper by Herz and Van Rens*, but the original model comes from the contributions of Diamond, Mortensen, and Pissarides.
- The assumptions are as follow:
  - The labor force (L) at a given time (t) is divided between employed (E_t) workers and unemployed (U_t) workers.
  - Workers flow into and out of unemployment:
    - A fraction (d) of employed workers are displaced each period.
    - A fraction (j) of unemployed workers receive offers each period.
    - A fraction (a) of those that receive offers accept the offers each period.

*Herz, Benedikt, and Van Rens, Thijs. "Structural Unemployment." Presented at the 2012 AEA meetings session on Mismatch and Structural Unemployment: 8 January, 2012.

Unemployment dynamics, continued

- From these assumptions, we can specify the dynamics of the unemployment rate over time:

$$U_{t+1} - U_t \equiv \dot{U} = U_t(1 - a * j) + E_t * d - U_t = E_t * d - U_t * a * j$$

If $\dot{U}$ is nonzero, it means that the unemployment rate is changing, and if it equals zero, it is unchanging and in a steady state. Imposing the steady state condition implies:

$$\dot{U} = 0 \rightarrow E_t * d - U_t * a * j = 0 \text{ and } \overline{U} = \frac{E_t d}{aj}$$

Unemployment in a steady state

- Using the definition of the labor force you can write the steady state unemployment level ($\overline{U}$):

$$\overline{U} = \frac{d}{aj}(L - \overline{U}) \rightarrow \overline{U}(1 + \frac{d}{aj}) = \frac{d}{aj}L \Leftrightarrow \overline{U} = \frac{d}{(aj + d)}L$$

and the steady state unemployment rate ($\widetilde{U}$),

$$\widetilde{U} \equiv \frac{\overline{U}}{L} \rightarrow \widetilde{U} = \frac{d}{(aj + d)}$$

- The remaining fraction of the labor force is employed in the steady state:

$$\widetilde{E} \equiv \frac{\overline{E}}{L} \rightarrow \widetilde{E} = \frac{aj}{(aj + d)} = 1 - \widetilde{U}.$$

Comparative statics

- Changes in *a*, *j*, or *d*, then, are the only things that will change the steady state unemployment rate:

$$\frac{\partial \widetilde{U}}{\partial a} = \frac{-jd}{(aj+d)^2} < 0$$

$$\frac{\partial \widetilde{U}}{\partial j} = \frac{-ad}{(aj+d)^2} < 0$$

$$\frac{\partial \widetilde{U}}{\partial d} = \frac{1}{aj+d} - \frac{d}{(aj+d)^2} > 0 \Leftrightarrow aj + d > d$$

  - Increases in the offer rate and the job acceptance rate decrease the steady state unemployment rate, ceteris paribus.
  - And an increase in the job destruction rate increases the steady state unemployment rate.

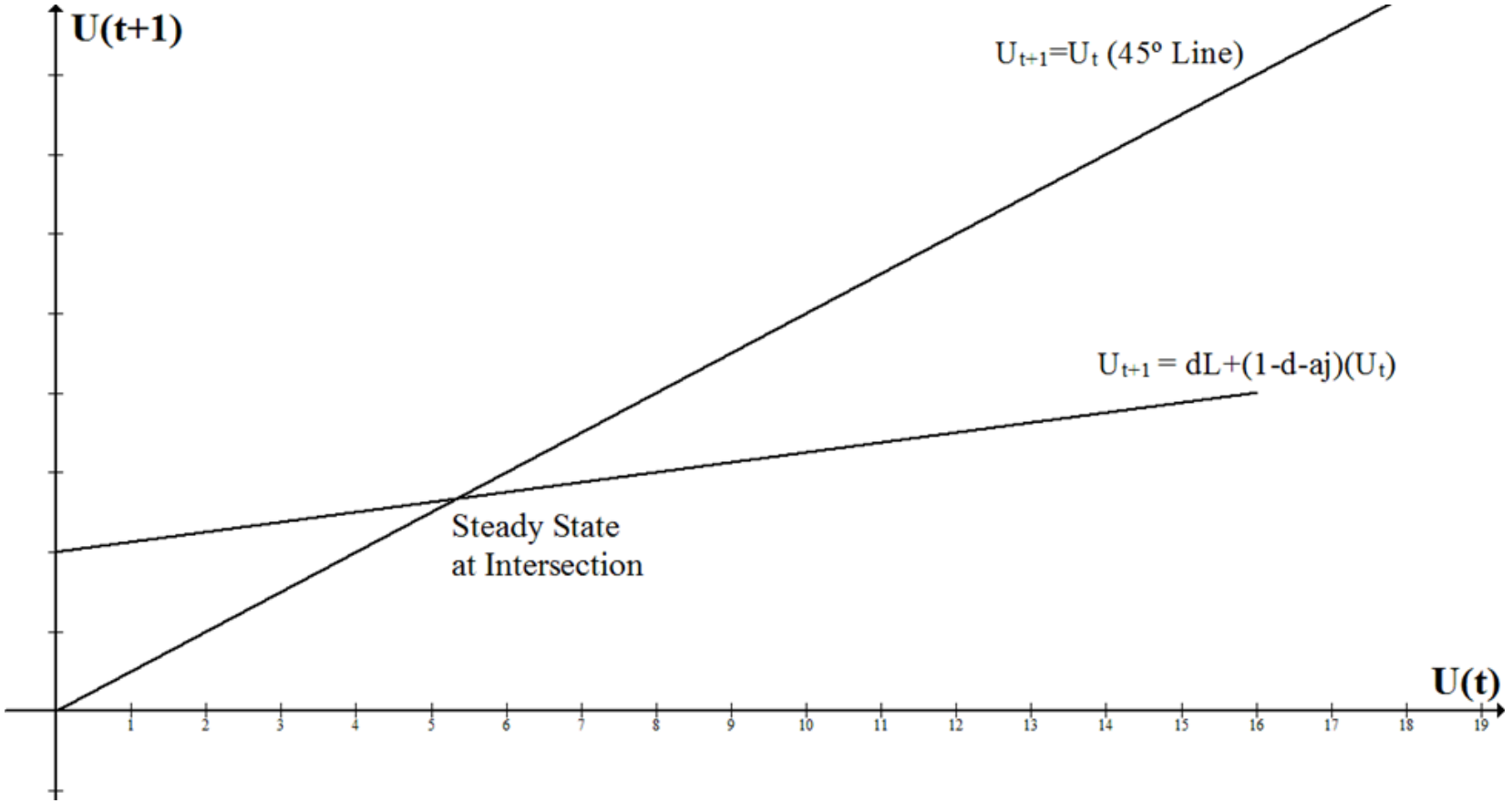
- The three parameters, *a*, *j*, and *d*, can also be interpreted as the results, respectively, of search (*a*), matching (*j*), and sectoral shift (*d*) models.

Why it's called the steady state

- When the labor market is not in a steady state, E and U adjust to restore the steady state. We can show that whenever you begin from an unemployment level different from $\overline{U}$, the level will gradually change until it returns to $\overline{U}$.
- To illustrate this, consider the following graph called a phase diagram.
  - It contains a 45 degree line that represents all the possible steady states ($U_{t+1} = U_t$) and the equation of motion for U_{t+1}.

$$U_{t+1} - U_t = E_t d - U_t aj \rightarrow U_{t+1} = E_t d + (1 - aj)U_t = dL + (1 - d - aj)U_t$$

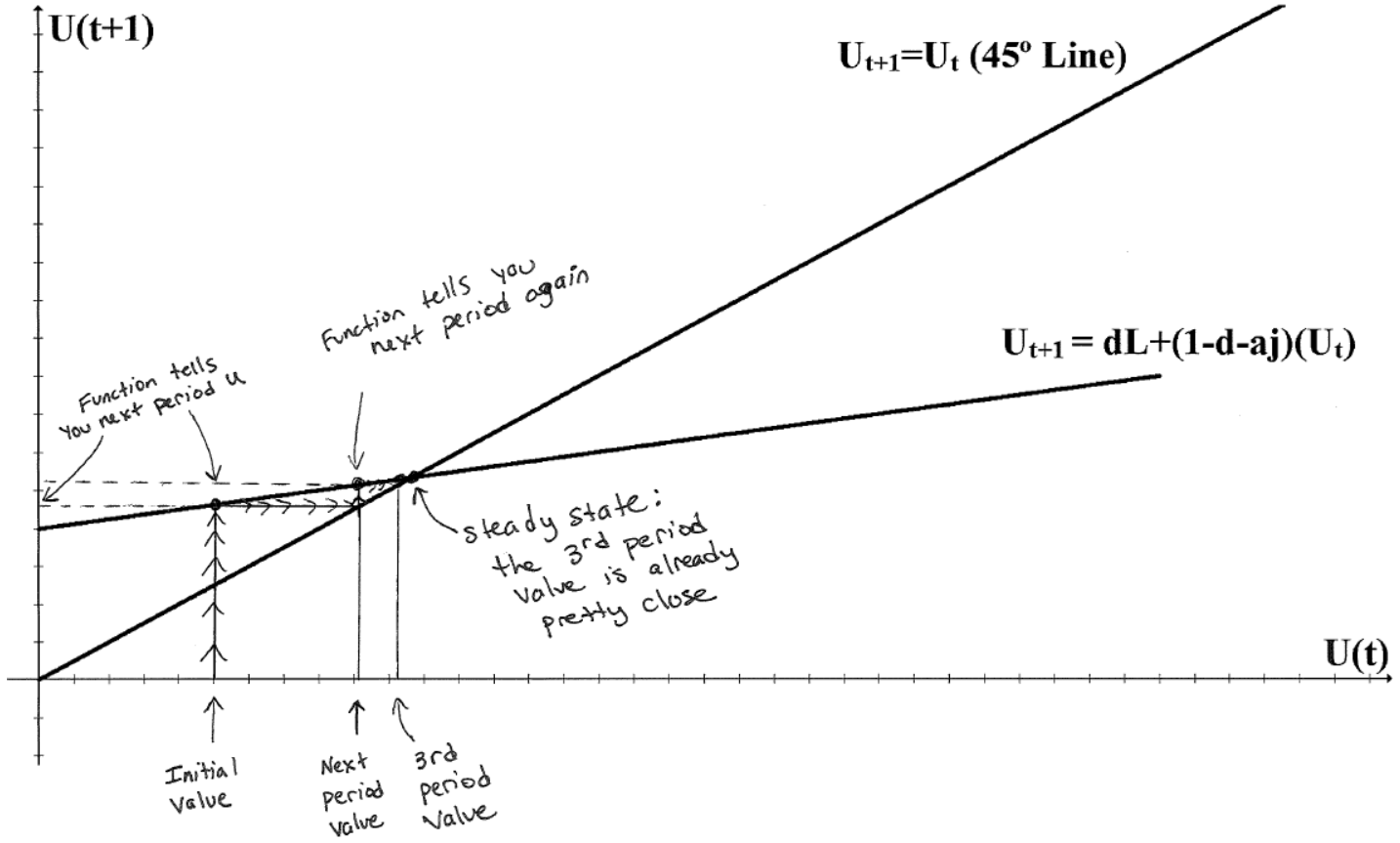
Phase diagram for unemployment



Steady state on the phase diagram

- The particular steady state realized will be at the intersection of the two lines. changes in *a*, *j*, or *d* will either shift the motion equation or change its slope; this is how the steady state can change.
- However keeping the parameters fixed, it is still possible to show how a value of ($U_t \neq \overline{U}$) unemployment that is not the steady state will push U_{t+1} closer to the steady state.

Steady state on the phase diagram, continued



Why it's called the steady state, concluded

- The reason the dynamics push the unemployment level back to a steady state is as follows.
- Say that unemployment is below the steady state level.
  - There is a relatively "large pool" of the labor force that is employed, and *d* fraction loses their jobs—so the inflow to the unemployed is relatively large.
  - Additionally the unemployed is a relatively "small pool" from which *aj* fraction become employed—so the outflow from unemployment is relatively small.
  - These two forces combine to make the flow into unemployment larger than the flow out; this increases the unemployment level until the flows are equal to one another.
- When this happens the market is back in a steady state.