14 Unemployment

Why unemployment?

- So far we have studied models where labor market clears.
- Is that a good assumption?
- Why is unemployment important?
  1. Reduces income
  2. Increases inequality.
- How can we think about unemployment in an equilibrium model?

Concepts and Facts from the Labor Market

- The labor force is the number of people, 16 or older, that are either employed or unemployed but actively looking for a job. We denote the labor force at time t by P_t.

- Note that actively looking for a job is an ambiguous term.

- Let WP_t denote the total number of people in the economy that are of working age (16 - 65) at date t . The labor force participation rate f_t is defined as the fraction of the population in working age that is in the labor force, i.e. $f_t = \frac{P_t}{WP_t}$.

- The number of unemployed people are all people that don't have a job. We denote this number by U_t. Similarly we denote the total number of people with a job by N_t. Obviously $P_t = N_t + U_t$. We define the unemployment rate u_t by

$$u_t = \frac{U_t}{P_t} = \frac{U_t}{N_t + U_t}$$

- The job losing rate s_t is the fraction of the people with a job which is laid off during a particular time, period, say one month (it is crucial for this definition to state the time horizon).

- The job finding rate e_t is the fraction of unemployed people in a month that find a new job.

Basic Facts

- U.S. Labor Force in feb 2002: 142 million people
- U.S. working age population in 1994: 212 million people
- Labor force participation rate of about 67.0%.
- Between 1967 and 1993 the average job losing rate was 2.7% per month
- Average job finding rate was 43%.
- Average unemployment rate during this time period was about 6.2%

Job Creation and Destruction

- The gross job creation Cr_t between period $t-1$ and t equals the employment gain summed over all plants that expand or start up between period $t-1$ and t.

- The gross job destruction Dr_t between period $t-1$ and t equals the employment loss summed over all plants that contract or shut down between period $t-1$ and t.

- The net job creation Nc_t between period $t-1$ and t equals $Cr_t - Dr_t$.

- The gross job reallocation Ra_t between period $t-1$ and t equals $Cr_t + Dr_t$.

Main Findings of Davis, Haltiwanger and Schuh (1996)

- Data from all manufacturing plants in the US with 5 or more employees from 1963 to 1987. In the years they have data available, there were between 300,000 and 400,000 plants.

- Gross job creation Cr_t and job destruction Dr_t are remarkably large. In a typical year 1 out of every ten jobs in manufacturing is destroyed and a comparable number of jobs is created at different plants.

- Most of the job creation and destruction reflects highly persistent plant-level employment changes. Most jobs that vanish at a particular plant fail to reopen at the same location within the next two years.

- Job creation and destruction are concentrated at plants that experience large percentage employment changes. Two-thirds of job creation and destruction takes place at plants that expand or contract by 25% or more within a twelve-month period. About one quarter of job destruction takes place at plants that shut down.

- Job destruction exhibits greater cyclical variation than job creation. In particular, recessions are characterized by a sharp increase in job destruction accompanied by a mild slowdown in job creation.

Unemployment and the Business Cycle

- Gross job creation is relatively stable over the business cycle, whereas gross job destruction moves strongly countercyclically: it is high in recessions and low in booms.

- In severe recessions such as the 74-75 recession or the 80-82 back to back recessions up to 25% of all manufacturing jobs are destroyed within one year, whereas in booms the number is below 5%.

- Time a worker spends being unemployed also varies over the business cycle, with unemployment spells being longer on average in recession years than in years before a recession.

- Length of unemployment spells:

Unemployment Spell	1989	1992
$<$ 5 weeks	49%	35%
5 - 14 weeks	30%	29%
15 - 26 weeks	11%	15%
$>$ 26 weeks	10%	21%

- Other countries: in Germany, France or the Netherlands about two thirds of all unemployed workers in 1989 were unemployed for longer than six months!!

The Evolution of the Unemployment Rate

- $U_t =$ Number of unemployed at t
- $P_t =$ Labor Force in t
- $N_t = P_t - U_t =$ Number of employed in t
- $u_t = \frac{U_t}{P_t} =$ unemployment rate
- $s =$ job losing rate
- $e =$ job finding rate
- Assume that $P_t = (1 + n)P_{t-1}$

• Then we have

$$\begin{aligned} U_t &= (1-e)U_{t-1} + s\, N_{t-1} + (P_t - P_{t-1}) \\ &= (1-e)U_{t-1} + s(P_{t-1} - U_{t-1}) + (P_t - P_{t-1}) \end{aligned}$$

Dividing both sides by $P_t = (1+n)P_{t-1}$ yields

$$\begin{aligned} u_t &= \frac{U_t}{P_t} = \frac{(1-e)U_{t-1}}{(1+n)P_{t-1}} + \frac{s(P_{t-1} - U_{t-1}) + (P_t - P_{t-1})}{(1+n)P_{t-1}} \\ &= \frac{1-e-s}{1+n} u_{t-1} + \frac{s+n}{1+n} \end{aligned}$$

Steady State Rate of Unemployment

- In theory: steady state unemployment rate, absent changes in n, s, e
- Some people call it "Natural Rate":
- Solve for $u^* = u_{t-1} = u_t$

$$
\begin{aligned}
u^* &= \frac{1-e-s}{1+n}u^* + \frac{s+n}{1+n} \\
\frac{n+e+s}{1+n}u^* &= \frac{s+n}{1+n} \\
u^* &= \frac{s+n}{n+e+s}
\end{aligned}
$$

- From data $s = 2.7\%$, $e = 43\%$, $n = 0.09\%$.

Determinants of the Rate of Unemployment

- We just presented an accounting exercise.
- There was no theory on it.
- We want to have a model to think about the different elements of the model (b, e, etc.).
- There are several Models of Unemployment. We will look at one: SEARCH MODEL. Matching is costly (think about getting a date). We can bring our intuition to the job market.

A Basic Search Model

- Two period model. In the second period an employed worker gets whatever its wage is w.

- In the second period, with probability p an unemployed worker gets a job offer. If she does not get it she gets b (includes the value of leisure and unempl insurance).

- If she gets a job offer, she draws a wage from a distribution characterized by function H, where $H(\hat{w})$ is the probability that the wage offer obtained is bigher or equal than $\hat{w}$.

- Note that she takes the job in the second period if and only if the wage obtained is higher than b.

- While an employed worker starts the second period knowing that she will get w that was the job she accepted in the first period. The unemployed worker's expected utility is given by

$$U_u = (1-p)\, b \;+\; p\,[1 - H(b)]b \;+\; p \int_b^{\infty} w\; H(dw)$$

the first term recognizes that she may not get an offer and has to settle for b, in the second term she may get a job offer too bad to accept (so she gets b), and the third term is the expected wage conditional on being good enough to take it.

We we can rewrite this expression as

$$U_u = b\,[(1-p)\ +\ p\,(1-H(b))] + p\ \ H(b)\ E[w|w \geq b]$$

- What to do int the first period?

- A person that does not get an offer obtains

$$b + \beta\ U_u$$

- A person that rejects an offer gets

$$b + \beta\ U_u$$

- A person that accepts an offer w gets

$$w + \beta\ w$$

- The worker will accept an offer the first period, when

$$w + \beta\, w \geq b + \beta\, U_u$$

$$w + \beta\, w \geq b + \ \beta\, \{b\, [(1-p)\ +\ p\, (1 - H(b))] + p\ \ H(b)\, E[w|w \geq b]\}$$

where w^* that makes her indifferent $w^* + \beta\, w^* = b + \beta\, U_u$.

- To compare w^* and b, note that $E[w|w \geq b] > b$.

$$b < \{b\,[(1-p)\ +\ p\,(1-H(b))] + p\ \ H(b)\ E[w|w \geq b]\}$$

$$b + \beta\, b < b + \beta\{b\,[(1-p)\ +\ p\,(1-H(b))] + p\ \ H(b)\ E[w|w \geq b]\} = w^* + \beta\, w^*$$

  And then that $w^* > b$. So the option of a new draw makes workers more picky in the first period than in the second and then makes employment lower in the first period.

What does affect unemployment?

- p
- Unemployment insurance, b.
- Minimum wage. It is illegal to have $w < \bar{w}$. If $b < \bar{w}$ then minimum wage is binding.