Two Efficiency Wage Models
Perspectives on Economics TA Sessions

Qing Zhang

Columbia University

March 26, 2018

Today

- How do we explain unemployment? Why does labor market not clear?
- Efficiency wage theories: it pays firms to pay workers higher than the market-clearing wage.
- Today we are going to talk about two of these models.
- Akerlof and Yellen, The Fair Wage-Effort Hypothesis and Unemployment:
  Worker effort increases with wage paid.
- Shapiro and Stiglitz, Equilibrium Unemployment as a Worker Discipline Device:
  Unemployment is necessary to prevent workers from shirking.

Akerlof and Yellen: Simplest Model

- Worker effort is given by

$$e = \min(w/w^*, 1)$$

where w^* is the fair wage.

- Production function of the firm

$$Q = \alpha e L$$

- eL is effective labor. This setup implies that the cost of one unit of effective labor is always w^* when $w \leq w^*$.

Equilibrium

- There are two cases.
- If $\alpha < w^*$, marginal product of effective labor (α) is always smaller than marginal cost of effective labor (w^*). It is not profitable for firms to operate. Therefore unemployment rate is one.
- Generate equilibrium unemployment in a very simple model.
- If $\alpha > w^*$, firms want to hire infinite labor. In equilibrium, unemployment is zero, and equilibrium wage is bid up to α.

Shapiro and Stiglitz

- Firm cannot observe workers' effort, and can only caught shirking workers randomly. Need to impose a penalty on shirkers.

- The penalty here is unemployment. Workers are fired if caught shirking.

- They discuss other possible penalties, such as having workers post a bond and forfeit the bond if caught shirking. They argue that these other approaches open up possibilities for dishonest behavior on the part of the employer.

- In this world, unemployment becomes necessary for providing incentives. Full employment means no penalty for shirking because workers who are fired can immediately find a new job.

Worker Effort Decision

- Workers make a single decision: to shirk or not, trading off leisure with possibility of being fired.

- This seems to be a dynamic programming problem, but not really. We assume the environment does not change over time. Then the decision will be the same every period.

- Worker utility per period $U = w - e$. Effort can be either 0 or some fixed level.

- Probability q per period of being caught when shirking. Probability b of exogenous job separation per period.

- Define V_E^S as the expected lifetime utility of an employed shirker, V_E^N as the expected lifetime utility of an employed non-shirker, V_u as the expected lifetime utility of an unemployed worker.

Worker Effort Decision

- For a short period $[0, t]$,
  $V_E^S = wt + (1 - rt)[(b + q)tV_u + (1 - (b + q)t)V_E^S]$

- Solving for V_E^S and taking $t \to 0$, we have $V_E^S = \frac{w + (b+q)V_u}{r + b + q}$.

- Following the same steps, $V_E^N = \frac{w - e + bV_u}{r + b}$.

- Assume workers are risk neutral. Then they will choose not to shirk if $V_E^N \geq V_E^S$.

- This is equivalent to

$$w \geq \bar{w} + e + (a + b + r)e/q$$

No-shirking condition (NSC). $\bar{w}$ is per period unemployment benefit, a is job finding rate.

Firms' Problem

- Assume each firm has the same production function.
- Each firm chooses wage w and unemployment benefit $\bar{w}$, and how much labor to hire. Firms are paying unemployment benefits because government is assumed away in this model.
- First, notice that firms will set $\bar{w}$ to the lowest level possible, since there are no benefits to the firm from paying unemployment benefits - a higher $\bar{w}$ necessitates a higher w, via the NSC.
- So workers are not insured.

Equilibrium

- Equilibrium occurs when each firm, taking as given the wages and employment levels at other firms, finds it optimal to offer the ongoing wage.

- NSC:
$$w \geq \bar{w} + e + (a + b + r)e/q$$

- Employed workers have higher utility than unemployed workers. The difference (in a single period) is $(a + b + r)e/q$. So the unemployed are involuntarily unemployed. They want to work at lower than the equilibrium wage, but firms won't lower wage because that would encourage incumbent workers to shirk.

- Flow into unemployment equals flow out of unemployment:
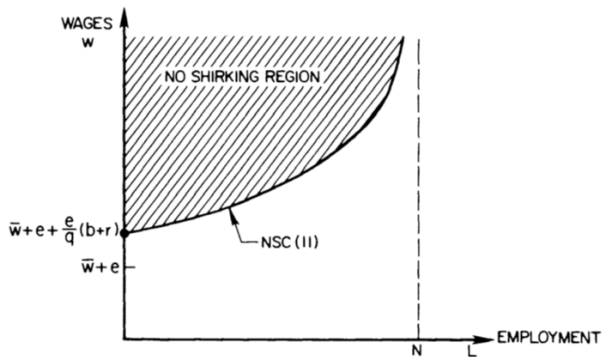$$bL = a(N - L) \implies a = bL/(N - L)$$

Equilibrium

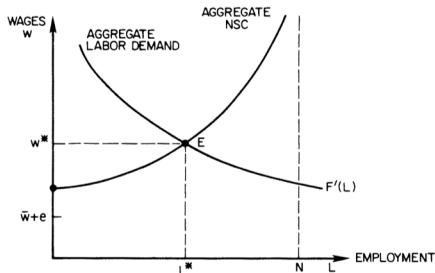FIGURE 1. THE AGGREGATE NO-SHIRKING CONSTRAINT

Equilibrium

FIGURE 2. EQUILIBRIUM UNEMPLOYMENT

- Given that all other firms pay w^*, it is optimal for a firm to pay w^*.
- If the firm pays lower than w^*, workers will shirk (in which case we assume the output is 0).
- No need to pay higher than w^*, because the firm can hire as much labor as it wants at w^* (labor market is competitive).

Discussion

- When employers can select the monitoring intensity q at a cost, they will choose too much monitoring (relative to efficiency), which leads to too much employment (under constant returns to scale technology).

- The idea is that a larger unemployment pool will increase the threat of unemployment and make workers less likely to shirk. When hiring workers, employers do not consider the externality of hiring through its effect on the unemployment pool.

- They could have chosen lower employment, and saved on monitoring (supervision) costs.

- If there are other costs associated with dismissal, such as search costs, moving expenses, loss of job-specific human capital, etc, the need for an efficiency wage will be dampened.