1 Introduction

Question: Why is there unemployment?

Question: How come wages do not fall?

- Union power? (Next lecture)

- Could it be in the firm’s interest not to lower wages?
  - Motivate/Induce effort
  - Retain workers
  - Recruit workers

Definition. Efficiency wage: A wage that affects productivity.

Question: Suppose we accept these arguments, can this lead to unemployment?

- Yes!

Question: Does the theory have any empirical support?

2 Basic Theory

2.1 Effort/Motivation

- Higher pay ⇒ More effort by workers.

Two possible reasons:

- “Gift exchange” – a notion of fairness (Akerlof, 1982)
  - Increase the workers’ identification with the firm and willingness to co-operate
  - “I treat you well and you treat me well”
  - Especially when there are high profits
• Shirking (Shapiro and Stiglitz, 1984)
  – Effort cannot be monitored and is “costly” to the worker
  – Worker is fired if detected as shirking
  – A wage above market clearing generates unemployment, and thus a loss to the worker who becomes fired.
• Let effort be $e = e(w)$. Fig 2.1

2.2 The Solow Condition
• Ignore unemployment for now and consider just wage-setting by a firm.
• Solow (1979) wanted to understand wage-stickiness.
• Firm’s profits are
  \[ \pi = pF(eE) - wE \]
  where $E$ is the number of workers employed, $p$ is the product price, and $e$ is effort per worker.
• The firm chooses (i) how many workers to hire, $E$, and (ii) the wage $w$, to maximize $\pi$.
• The first order conditions are:
  \[ pF'(eE)e = w \]
  \[ pF'(eE)e'(w) = 1 \]
• Combining the two yields the “Solow condition”:
  \[ \frac{w}{e}e'(w) = 1 \]

Result: “Solow condition”: The elasticity of effort with respect to the wage is unity.

Question: What is the intuition behind the Solow condition?
• A one percent increase in the wage $\Rightarrow$ a one percent increase in effort.
• The efficiency wage minimizes cost per unit of effort, $w/e(w)$.
• This can easily be seen graphically. Fig 2.2
• The “wrong” wage $w_1$ yields effort $e_1 = e(w_1)$ and cost/unit of effort $w_1/e_1$, indicated by the slope of ray from the origin through $(e_1, w_1)$.
• But increasing $w$ beyond $w_1$ reduces the cost/unit of effort.
The efficiency wage satisfies $w/e = 1/e'(w)$ – minimizing the cost/unit of effort.

**Question:** Why is this interesting?

- Shows that wage depends *only* of the wage-effort relationship $e(\cdot)$.
- Suppose e.g. that $p$ increases $\Rightarrow$ larger scope for profits

**Question:** Will the firm expand by (i) hiring more workers, or (ii) increase effort by existing workers?

**Answer:** It will simply hire more workers (leaving $w_e$ unchanged).

- Similarly, if $p$ decreases – due to contracting demand – the firm will simply lay off workers (not reduce the wage).

### 2.3 Unemployment Equilibria

- Shapiro and Stiglitz (1984) sought to explain unemployment (Shirking model).

Some simplifying assumptions:

- Fixed supply $L$ of identical workers
- Effort $e$ is either $e = 0$ or some fixed $e > 0$.
- Shirkers ($e = 0$) are detected with probability $q$ (per unit of time)
- Workers are risk neutral: utility $u = w - e$
- Unemployment benefit $b$

**Question:** When will a worker put in effort?

- A “shirker” alternates between employment and unemployment
- Suppose the fraction of time that a shirker is employed is $\theta$.

Utility to a non-shirker $= u^N = w - e$

Utility to shirker $= u^S = \theta w + (1 - \theta) b$

- The worker will not shirk if $u^N > u^S$; i.e. if the following “no-shirking condition” holds:

$$w - e > \theta w + (1 - \theta) b \Leftrightarrow w > b + \frac{e}{(1 - \theta)}$$

- The wage must be higher than unemployment benefits $b$.
- Moreover, the difference $w - b$ must be larger the larger is $\theta$. 


Question: Can we relate $\theta$ to unemployment?

- Let $a$ be the probability (per unit of time) of finding a new job.
- Then we have that for shirkers

$$\text{Expected duration of a job} = \frac{1}{q}$$
$$\text{Expected duration of an unemployment spell} = \frac{1}{a}$$

Thus

$$\theta = \frac{1/q}{1/q + 1/a}$$

or $1/(1 - \theta) = 1 - a/q$. Replacing in the no-shirking condition we have

$$w > b + e \left(1 - \frac{a}{q}\right) \equiv w^e$$

**Insight at this stage**: Efficiency wage $w^e$ is high when

1. Unemployment benefits are high
2. The probability of finding a new job, $a$, is high
3. The probability of detecting a shirker, $q$, is low.

- Suppose there are some exogenous turnover rate $\lambda$
- Number of unemployed workers $L - E$
- Number of vacancies (per unit of time) $\lambda E$

- This gives that

$$a = \frac{\text{No. Vacancies}}{\text{No. Unemployed}} = \frac{\lambda E}{L - E}$$

- Using this to replace $a$ we can write the no-shirking condition as

$$w > w^e = b + e - \frac{e\lambda}{q} \frac{E}{L - E}$$

- This constraint is shown in Fig 2.3

Fig 2.3

- Note: the efficiency wage increases as employment $E$ increases.
- In the limit as $E \rightarrow L$ (no unemployment) $w^e \rightarrow \infty$: no wage can prevent shirking since there is no unemployment!
Add to this a standard labour demand curve. Fig 2.4.

Equilibrium wage \( w^* \), equilibrium employment \( E^* \), equilibrium unemployment \( L - E^* \).

**Result:** Any equilibrium has some unemployment \( E^* < L \! \).

**Question:** What are the properties of this equilibrium?

1. Unemployment is involuntary.
2. Unemployment benefits increase unemployment (Fig 2.5)
3. Wages are “sticky” over the business cycle (Fig 2.6)

### 3 Evidence on Efficiency Wages

- Two types of evidence: Direct and Indirect

#### 3.1 Direct Evidence

**Empirical Strategy:** Link wages to various productivity-aspects.

- Higher wages have been found to lead to:
  - Lower quit rates
  - Less absenteeism
  - Fewer dismissals due to disciplinary reasons

- Efficiency wages relate to problems of monitoring workers – Krueger (1991) looking a fast-food restaurants found that
  - Company-owned restaurants paid about 9 percent more than franchised restaurants.
  - The owner of the local franchise can supervise his/her employees

#### 3.2 Indirect Evidence

**Empirical Strategy:** Find features of wage-structure that cannot be explained any other way.
Interindustry Wage Differentials (Krueger and Summers, 1988)

Empirical finding: Huge interindustry wage differentials (Tab 2.1)

- Two people with the same characteristics (age, gender, education, experience etc.) can receive hugely different pay if they work in different industries.
- Similar across countries (Fig 2.7)

Fig 2.7

Question: Is this compatible with standard supply-demand model?

- Yes – if either
  1. Pay differentials are due either to differences in job-characteristics (Compensating wage differentials)
  2. Workers sort into industries on the basis of their abilities

- Arguments against (1) are:
  - There are fewer quits and longer queues of applicants for high-paying jobs.
  - Even comparing industries with similar characteristics, differences remain.

- Argument against (2):
  - Tracking workers who switch industry shows that their wages change by about half of interindustry wage differential.

The Wage Curve

Empirical finding: Downward-sloping curve that summarizes the relation between wage levels and unemployment.

- Within each country the wage tends to be high (alt. low) in regions where unemployment is low (alt. high). Fig 2.8.

Fig 2.8

- Known as the “wage-curve” (Blanchflower and Oswald, 1995).

Question: Why is this inconsistence with the standard supply-demand model?

- In the standard model, high wages are associated with unemployment

Question: How is it consistent with efficiency wage theory?

- A firm located in a region with high unemployment does not need to pay high efficiency wages since unemployment reduces shirking and quitting.
References


