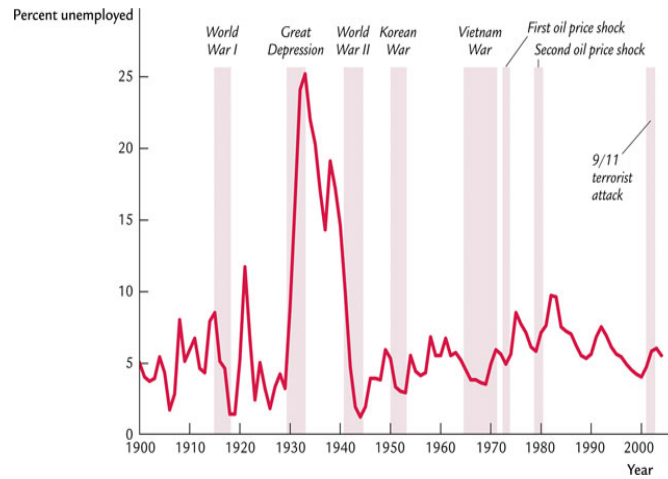


## Chapter 6: Unemployment Rate

Basic facts about unemployment:

(1)

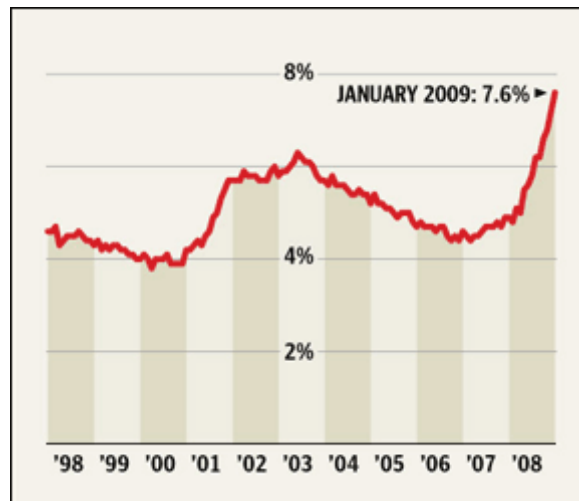
Unemployment varies a lot over time.



<http://www.msnbc.msn.com/id/27913794>

(2) Current status:

Friday, 2/6, unemployment is 7.6% in January 2009.



December 2008:

December 2007

Civilian labor force (in thousand):	154,557	153,836
Employment:	143,388	146,294
Unemployment:	11,108	7,541
Unemployment rate:	7.19%	4.9%

Not in the labor force:	80,588	
% of population over 16:	34.3%	66%

Adult women: 5.9%  
Adult men: 7.2%  
Teenagers: 20.8%

Whites: 6.6%  
Blacks: 11.9%  
Hispanics: 9.2%  
Asians: 5.1%

Across different cities (each city is one dot in the graph).

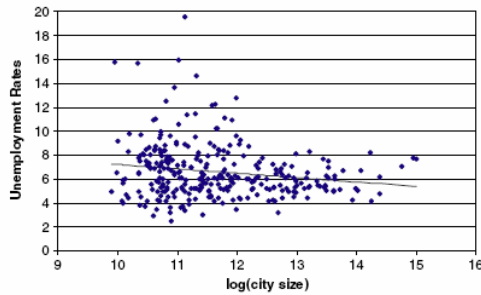


Fig. 2. Logarithm of city size and mean unemployment rates.

The basic facts are: unemployment rates varies across:

time, age groups, races, education countries, genders and cities. They also differ across industries and occupations.

Several questions:

Why unemployment?

Why fluctuations over time?

Why variations across different groups?

Broadly speaking, there are two types of unemployment rates, the frictional unemployment, and the structural unemployment.

The frictional unemployment is also the equilibrium unemployment, the necessary unemployment. It occurs when the matches between employees and employers are not very good, or no longer very good because of shocks.

The structural unemployment occurs when the firms do not lower their wages to hire more workers, when unemployed workers are willing to work for less. This type of unemployment is also called the structural unemployment.

Frictional unemployment:

The basic model: Let  $L$  denote the labor force,  $E$  the number of employed workers, and  $U$  the number of unemployed. We must have:

$$L = E + U$$

We assume the labor force  $L$  is fixed. Let  $s$  denote the rate of job separation, and  $f$  denotes the rate job finding. In the steady state, the number of people finding jobs,  $fU$ , should equal to the number of people losing jobs,  $sE$ .

At steady state, we have:

$$fU = sE = s(L - U).$$

Rearrange this equation, the unemployment rate is given by:

$$u \equiv \frac{U}{L} = \frac{s}{f + s} = \frac{1}{1 + f/s}$$

where  $u$  is the unemployment rate.

Example: suppose 1% of the employed lose their jobs each month,  $s = 0.01$ . Suppose 20% of unemployed find jobs. Then the unemployment is:  $u = 1/(1+0.2/0.01) = 0.0476$

Discussions:

- (1) How unemployment rate is related to the rate of finding jobs  $f$ , and the rate of separating from jobs  $s$ .

$$\frac{\partial u}{\partial f} = -\frac{s}{(f + s)^2} < 0$$

$$\frac{\partial u}{\partial s} = \frac{1}{(f + s)} - \frac{s}{(f + s)^2} = \frac{f}{(f + s)^2} > 0$$

Two intuitive results:

- Higher  $f \rightarrow$  lower unemployment rate.
- Higher  $s \rightarrow$  higher unemployment rate.

(2) Why unemployment: it takes time to match workers and jobs. This is called frictional unemployment.

Examples of frictional unemployment:

- Sectoral shift. Consider an example. We have negative shocks to auto industry but positive shocks to the computer industry. The auto industry needs less number of workers while the computer industry needs more workers. However, it takes more time for auto workers to move from auto industry to the computer industry because they may not have adequate experience. Therefore, overall unemployment would rise.

This model (first proposed by David Lilien) suggests that during the period of sectoral shifts (some industries grow while other industries shrink), the unemployment rate would be higher.

- Market size. Gan and Zhang (2006, Journal of Econometrics) show in the following graph that a larger city has a lower unemployment on average.

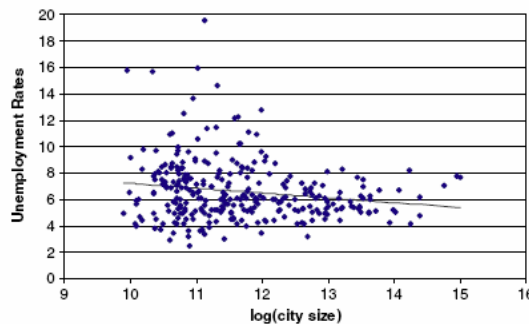


Fig. 2. Logarithm of city size and mean unemployment rates.

The basic story of their model is as following: (i) The matches between employees and employers may only occur when the number of employees and the number of vacancies are large enough. (ii) Suppose each period the same percentage of workers become unemployed and same percentage of jobs become available. It is faster for a larger city to reach the critical market size. As a consequence, a larger city would typically have a lower unemployment rate.

For example, each month 1% workers would leave their jobs; there are also 1% job vacancies. When the number of workers and vacancies reaches 100, the matches between workers and jobs are expected to be good enough. Consider two cities, with 10,000 workers and 50,000 workers. It takes the

10,000-worker city 10 month but only takes the 50,000-worker city 2 month to reach the threshold of 100. So the unemployment duration is less in the larger city, and the unemployment rate is lower in the larger city.

(3) Factors that may affect the frictional unemployment rate.

- monster.com
  - unemployment insurance and unemployment benefits
- (i) If internet sites such as monster.com help increasing the rate of finding jobs, then  $f$  would increase, and unemployment rate will be lower.
- (ii) The unemployment insurance would reduce people's incentives to find jobs, then  $f$  would decrease, leading to a higher unemployment rate.

For example, the Obama stimulus package would extend the length of having unemployment benefits. Currently the length of having unemployment benefit is five years. The senate version of the Obama package would add another 20 weeks for all, and 13 more weeks for those people living in high-unemployment areas. This may potentially increase unemployment.

On the other hand, the Obama plan would pay each worker with income less than \$70,000 a credit of \$400. The earned income tax credit would also be increased. Both measures would possibly increase the incentives of working and hence reduce unemployment.

- (iii) Illinois experiment in 1985: unemployed workers are randomly selected into two groups. The first group would get \$500 bonus if they find jobs within 11 weeks. The second group is not offered this option. In the end, the first group on average gets jobs in 17 weeks, while the second group gets jobs in 18.3 weeks.

Apparently, the first group people exert more effort than the second group. In this case,  $f$  is higher for the first group than the second group.

(4) Discussions of differences in unemployment across groups:

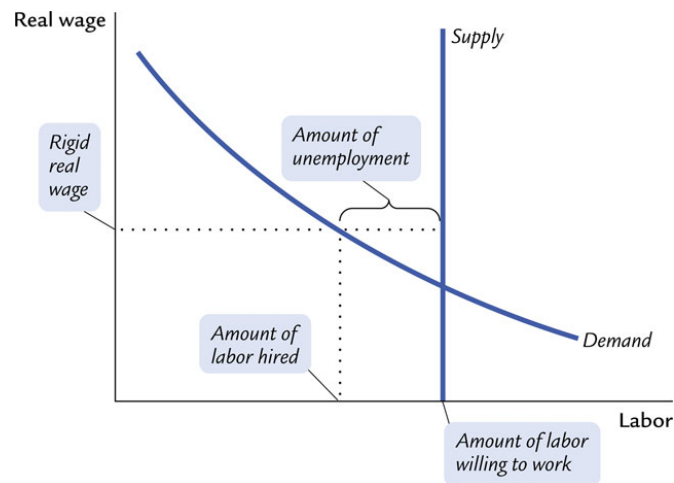
- Older workers are less likely to change jobs because they have already found good match, or because they do not want to change jobs because of families. For them, the rate of separation  $s$  is lower → a lower unemployment rate.

One implication: the society would on average has a lower unemployment when baby boomers are in their middle ages (right now).

- For people with a lower level of education, their job-specific human capital is low. It is easy for them to leave jobs, and the cost of firms to fire them is also low because of very minimum training necessary. Therefore, the rate of separation  $s$  is higher → a higher unemployment rate for people with less education.

### The structural unemployment

The structural unemployment occurs when the wage is not flexible enough.



### Labor Supply

Here the supply of labor is vertical. However, it is not necessary to be vertical. The labor supply could positively depend on wages.

Whether labor supply is vertical or positively sloped is the one of key public policy debates regarding tax policies in the US. Republicans would argue a positively sloped labor supply with the following basic arguments:

A lower tax rate → a higher after-tax wage → people are willing to work more → a higher level of output → a higher tax revenue for the government.

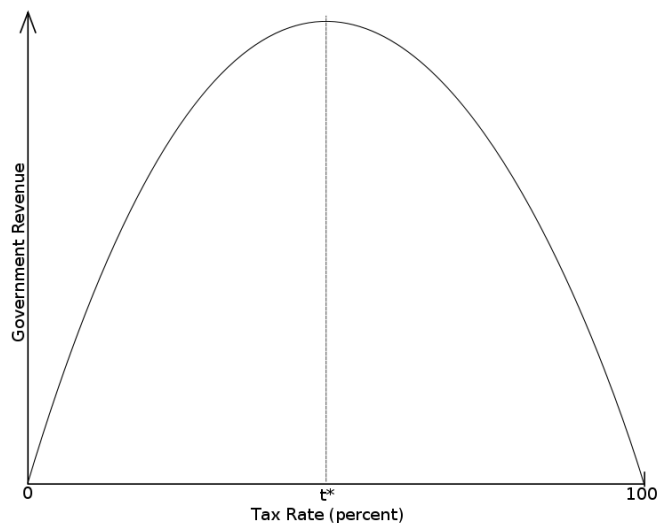
This logic is often referred as Laffer curve. See below. Laffer curve assumes a level of tax rate that would maximize the tax revenue,  $t^*$  at the graph. We are at the tax rate that is higher than  $t^*$ , so a lower tax rate would yield a higher tax revenue.

The key component of this logic is that link between a higher after-tax wage → people are willing to work more, i.e., whether the labor supply curve is positively sloped.

A large body of literature has been devoted to figure if the link between after tax wage and labor supply exists. The basic conclusion is:

- (1) For men, the labor supply elasticity is basically zero. A lower tax rate would NOT lead to a higher supply of labor, either by having more men willing to enter into the labor force, or having people to work more hours. (Obviously this is for the case of a modest increase in wages).
- (2) For women, there is no concensus if women work more when their wages are higher.

So the Laffer curve may exist for women, but definitely not true for men.



### Labor Demand

The demand for labor is downward sloping: from Chapter 3,

$$MPL = W \rightarrow (1 - \alpha)K^\alpha L^{-\alpha} = W$$

Rewrite this equation:

$$L = W^{-1/\alpha} K(1 - \alpha)^{1/\alpha}$$

Therefore, higher the wage  $W$ , lower the demand for labor.

However, wages are often rigid, *i.e.*, wages are NOT flexible enough to adjust. This causes structural unemployment rate.

Reasons for wage rigidity:

- The minimum wage
- Unions and collective bargaining
- Efficiency wage
  - Shapiro and Stiglitz's shirking model
  - George Akerlof's fair wage model
  - Wage influences nutrition.

### Minimum wage

Federal minimum wages:     7/24/2008:     \$6.55  
   7/24/2009:     \$7.25

Texas has the same minimum wage as the federal minimum wage.

*Question:* according to this theory, an increase in minimum wage would lead to a lower employment. This is at the core of the debate of raising the minimum wage.

Card and Krueger (1994): New Jersey raised its minimum wage in 1992 from \$4.25 to \$5.05, while Pennsylvania did not. So do firms who are often hire workers close to minimum wages now hire fewer workers?

Card and Krueger collected data on 400 fast food restaurants in both Pennsylvania and New Jersey before and after the minimum wage was raised in New Jersey. They find: (a) wages do increase more in New Jersey; (b) restaurants do not hire fewer workers in New Jersey. In fact, New Jersey actually added 2.5 workers after the minimum wage went up.

There are two possible reasons for this: (a) the restaurants operate with several vacancies that they often cannot find workers. With an increase in minimum wages, they now can find workers to fill out vacancies. (b) The prices of burgers may go up.

This is a very influential study because it directly affected the public policies. President Clinton, in his State of Union Address in 1/25/1995, said, "*Now, I've studied the arguments and the evidence for and against a minimum wage increase. I believe the weight of the evidence is that a modest increase does not cost jobs, and may even lure people back into the job market.*"

### Unions and collective bargaining

Unions typically bargain for wages and firms decide how many workers to hire. Union workers make more but firms hire less number of workers.

During the bailout discussion of the auto industry, one prominent issue is the pay of the United Auto Workers (UAW).

GM Officials:

Wage: \$39.68, including base pay, cost-of-living adjustment, night-shift premiums, overtime, holidays and vacation pay)

Benefits: \$33.58, including health-care, pension and other benefits.

UAW:

\$27.81 per hour for a typical UAW-represented assembler at GM.

UAW claims that “the highest figures sometimes cited also include the benefit costs of retirees who are no longer on the payroll.”

Comments: the pension system of UAW and many other institutions is called “defined-benefits.” The level of benefits often depends on years of service for this company and salary.

Defined contribution is that the employers put a certain percentage into an employee’s retirement account (401K, 403B etc are all defined contribution plans).

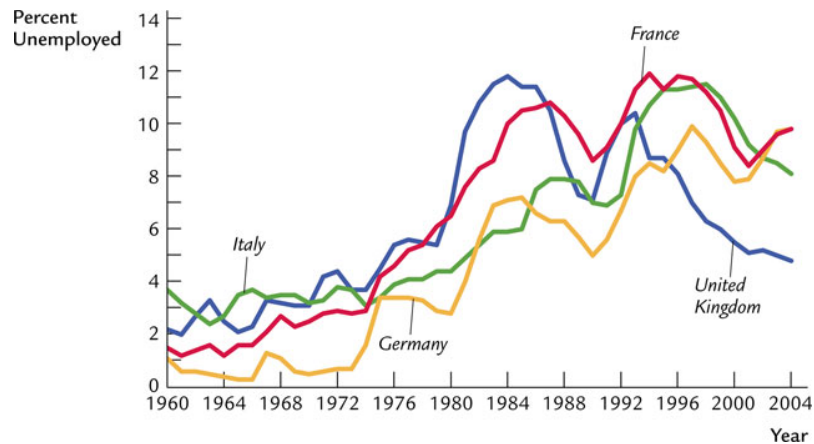
**TABLE 6-1**

**Percent of Workers Covered by Collective Bargaining**

United States	18%
Japan	23
Canada	38
United Kingdom	47
Switzerland	53
New Zealand	67
Spain	68
Netherlands	71
Norway	75
Portugal	79
Australia	80
Sweden	83
Belgium	90
Germany	90
France	92
Finland	95
Austria	98

Source: OECD Employment Outlook 2004, as reported in Alberto Alesina, Edward Glaeser, and Bruce Sacerdote, “Work and Leisure in the U.S. and Europe: Why So Different?” *NBER Macroeconomics Annual* 2005.

A higher percentage of union workers often leads to a higher unemployment rate.



## Efficiency wages

Example: Henry Ford's \$5 workday.

In 1914, the prevailing wage was between \$2 and \$3 per day. Henry Ford raised salary to \$5 per day. The consequence is a higher level of effort from workers.

Solow (1979) introduced the efficiency wage model. In this model, the firm's output depends on capital stock, labor, and effort of the worker. A higher salary would result in a higher level of effort.

There are several Efficiency wage models in the literature. They offer reasons why a higher salary would result in a higher level of effort.

- a) Shapiro and Stiglitz's shirking model. In this model, workers tend to shirk. However, if they are caught shirking, they would be fired. A higher salary would make being fired costly. Therefore, a combination of a higher salary and a probability of being caught shirking would result in less shirking and higher effort by the firm.
- b) George Akerlof's fair wage hypothesis. Each individual would have a perception of how they should get paid – this is called the fair wage in the literature. A lower salary than the fair wage would result in a lower level of effort.
- c) Firms pay higher salary in order to make their workers to have better nutrition – which would result in a higher level of effort. This could be true in poorer countries.