Labor Markets and Unemployment

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Civilian Unemployment Rate: Percent: SA

Economic Chart Dispenser http://www.Economagic.com/

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Labor Markets and Unemployment
US employment

1 unemployment very high during depressions (1980-82); much lower during booms (1994-2000)

2 unemployment far from zero even when economy is doing well

- We need to study what factors change the quantity of labor demanded and supplied.
Labor demand

- \( Y = AK^\alpha N^{1-\alpha} \); hold \( A \) and \( K \) fixed; \( MPN > 0 \); \( MPN \) falls as \( N \) rises

![Graph showing labor demand]

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Labor Markets and Unemployment
Labor demand: Supply shocks

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Labor Markets and Unemployment

Technical change and wage inequality

Unemployment

The Labor Market

Labor Demand

Labor Supply

Labor Market Equilibrium
Labor market

Imagine a world where

1. all workers are identical,
2. large number of firms; each pay going nominal (in $) market wage ($W$); competitive
3. firms are only interested in maximizing profits when it comes to hiring/firing workers, and
4. there is only one good and all firms sell this good at per unit price $P$. 

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Labor Markets and Unemployment
Notation

\[ MPN = \text{marginal product of labor} \]
\[ P = \text{price of output} \]
\[ MRPN = \text{marginal revenue product of labor} = P \times MPN \]
\[ W = \text{nominal wage} \]
\[ w = \text{real wage} = \frac{W}{P} \]
Optimum

- What does $MPN$ measure? the extra benefit of employing an additional worker in terms of extra output produced.
- What does $MRPN$ measure? the extra benefit in $\$ of employing an additional worker in terms of extra revenue produced.
- What is the $\$ cost associated with employing an additional worker? the wage $W$.
- Therefore, optimal employment (from the point of view of the firm) occurs when $MRPN = W$, or

$$MPN = \frac{W}{P}$$

which defines the labor demand curve in the labor market.

- To maximize profits, the firm should increase employment if $MRPN > W$. Why?
### SUMMARY 2
Comparing the Benefits and Costs of Changing the Amount of Labor

<table>
<thead>
<tr>
<th>To maximize profits, the firm should:</th>
<th>Increase employment if, for an additional worker</th>
<th>Decrease employment if, for the last worker employed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real terms</strong></td>
<td>$MPN &gt; w$</td>
<td>$MPN &lt; w$</td>
</tr>
<tr>
<td></td>
<td>$(MPN &gt; W/P)$</td>
<td>$(MPN &lt; W/P)$</td>
</tr>
<tr>
<td><strong>Nominal terms</strong></td>
<td>$P \times MPN &gt; W$</td>
<td>$P \times MPN &lt; W$</td>
</tr>
<tr>
<td></td>
<td>$(MRPN &gt; W)$</td>
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$w = \text{real wage} = W/P$
Optimal employment is at $N^*$. 
Cobb-Douglas example

Fix $K = \hat{K}$, $A = \hat{A}$. Then,

$$Y = \hat{A} (\hat{K})^\alpha N^{1-\alpha}$$

$$MPN = (1 - \alpha) \left[ \hat{A} (\hat{K})^\alpha \right] N^{-\alpha}$$

$$N^* = \left( \frac{(1 - \alpha) \left[ \hat{A} (\hat{K})^\alpha \right]}{w} \right)^{\frac{1}{\alpha}}$$
Labor supply

- Compare the costs and benefits of working: cost of working an extra hour is the loss of an hour of leisure; benefit is an increase in real income of $W/P$. If benefits exceed the cost, then increase the amount of time you work.
Increase in wage

Two opposite effects on labor supply:

1. substitution effect: an increase in real wages raises the benefit of working which makes the worker want to supply more labor (and substitute away from leisure)

2. income effect: an increase in real wages makes people “wealthier”: same amount of work earns them a higher real income means they can now afford to buy more leisure.
Examples

- Example: \( U(c, z) = c^{0.5}z^{0.5}; c = wl; l = \text{labor supply}, z = \text{leisure}; l + z = 1; \) result: inelastic labor supply

- Example: \( U(c, z) = 1000c + 10000z - c^2; c = wl; 10 < w < 20, w > 20 \)

- backward-bending labor supply?
Trend in hours worked
Cross country evidence

- income effect of wage change on labor supply explains why rich
Equilibrium

why is it an equilibrium? because wages are flexible in both directions.
Equilibrium

1. A temporary adverse supply shock

2. Real wage falls

2. Employment falls

Labor Market Equilibrium

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Labor Markets and Unemployment
Notion of efficiency wages

- Workers may choose to shirk; unobservable to employer; gets fired if caught but gets re-hired at market clearing wage
- Efficiency wage raises the opportunity cost of shirking; higher wages associated with low labor demand and may cause unemployment
- Induces worker discipline in two ways
- Explains why unemployment does not go to zero even during booms
Wage inequality

- Between 1945-1970, real wages in the US grew at a steady pace. Since 1970,
  1. overall growth in real wages has slowed considerably
  2. real wages have become more unequal

- Figure: takes 1970 as the starting point (0). Then looks at the change in real wages relative to 1970 for all groups of workers.

- Notion of wage distribution.
Wage inequality

- The line 1-10 shows the change in the average real wage of workers whose wages are in the bottom 10% of the wage distribution in any given year.

- Points to note: lowest-paid workers have suffered significant declines in their real wages; even the top-paid 40% of workers have seen only modest gains in real wages. What are some explanations for this?
skill-biased technical change

- To understand this, we introduce the notion of skill-biased technical change.
- Assume there are two types of workers: skilled and unskilled.
- Skill-biased technical change refers to a change in $A$ that raises the productivity of highly trained workers more than that of the unskilled.
The Labor Market

Labor Demand
Labor Supply
Labor Market Equilibrium
Technical change and wage inequality
Unemployment

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(a) Skilled workers

(b) Unskilled workers
- Initial equilibrium: Point A in left figure is higher than point A in right figure.

- Introduction of computers is a beneficial shock to the skilled, and a negative shock to the unskilled.

- It has been seen that workers who can use computers in their jobs enjoy a 10-15% wage premium over similar workers who are not trained to use computers.

- Fact: unskilled workers have responded to the very low wages available to them by significantly reducing the amount of labor they supply; effects on welfare.
### Definitions

- Every body is either employed, unemployed, or not in the labor force.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number (millions)</th>
<th>Share of labor force (percent)</th>
<th>Share of adult population (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed workers</td>
<td>137.4</td>
<td>94.2</td>
<td>62.4 (employment ratio)</td>
</tr>
<tr>
<td>Unemployed workers</td>
<td>8.5</td>
<td>5.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Labor force (employed + unemployed workers)</td>
<td>145.9</td>
<td>100.0</td>
<td>66.3 (participation rate)</td>
</tr>
<tr>
<td>Not in labor force</td>
<td>74.3</td>
<td></td>
<td>33.7</td>
</tr>
<tr>
<td>Adult population (labor force + not in labor force)</td>
<td>220.2</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note: Figures may not add up because of rounding.*

*Source: The Employment Situation, February 2003, Table A.*
Flows

NOT IN LABOR FORCE
74.3 million

UNEMPLOYED
8.5 million

2%
3%
1%
22%

EMPLOYED
137.4 million
22% of unemployed people in a typical month will be employed the following month and 13% of the unemployed people will leave the labor force (say become homemakers or go back to school).

Why is there some unemployment even though the economy may be doing well?

Natural rate of unemployment: the average rate of unemployment around which the unemployment rate in the economy fluctuates.
Natural rate

![Graph showing actual and natural unemployment rates from 1960 to 2000. The graph displays two lines: one for actual unemployment rates (green) and one for natural unemployment rates (pink). The actual rates fluctuate significantly, whereas the natural rates remain relatively stable around 5%.]
Job Loss, Job Finding and the Natural Rate

Let

\[ N = \text{total population} \]
\[ L = \text{labor force} \]
\[ E = \text{number of employed} \]
\[ U = \text{number of unemployed} \]

\[ L = U + E \]  \hspace{1cm} (2)

- Unemployment rate is \( \frac{U}{L} \)
$E = L - U$

- Let $s =$ rate of job separation (fraction of employed workers who lose their jobs every month)
- Let $f =$ rate of job finding (fraction of unemployed individuals who find a job each month)

If the rate of unemployment is not changing, then the number of people losing jobs ($sE$) must equal the number of people finding jobs ($fU$), or

$$fU = sE$$ (3)
Since $E = L - U$, implies

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

(4)

or, the rate of unemployment (i.e., $\frac{U}{L}$) depends on the rate of job finding ($f$), and rate of job separation ($s$).
higher $f$ implies lower $U/L$

higher $s$ implies higher $U/L$

For the US: when unemployment is high, the proportion of unemployed workers finding jobs is low; also, a higher proportion of workers lose their jobs.