Topics for Today

1.) Taxes and Labor Supply
   - "Why Do Americans Work So Much More Than Europeans?" (Prescott, 2004)

2.) Unemployment
   - Defining and Measuring Unemployment
   - Theories of Unemployment
     - Search Frictions (the "natural rate of unemployment")
     - Wage Rigidity
Labor Market Equilibrium

What if workers have to pay taxes on their wages?
"Why Do Americans Work So Much More Than Europeans?"


Consider the following 3 facts:

1.) In the 1970s, Americans & Europeans worked about the same amount.

2.) By the late 1990s, Americans were working about 40-50% more than Europeans.

3.) Taxes in Europe during this period rose considerably relative to those in the U.S.

Can increased European taxes explain the relative decline in European labor supply quantitatively?
Prescott assumes preferences are the same across countries, and they are stable over time.

They are given by:

\[ \log c_t + \alpha \log (100 - h_t) \]

where \( h_t \) = weekly hours of labor

\[ \alpha = 1.54 \]

Production is described by Cobb-Douglas

\[ y_t = A_t K_t^\theta h_t^{1-\theta} \quad \theta = 0.32 \]

2 Key FOCs

1) \[ \frac{\alpha}{(1-\theta)} = \frac{1}{c} \]

2) \[ (1-\theta) A K^\theta h^{-\theta} = (1-\theta) \frac{y}{h} = w \]

Combining (1) and (2)

\[ h = \frac{1-\theta}{c/y \frac{\alpha}{1-\theta} + \theta} \]
### Table 1
**Output, Labor Supply, and Productivity**
In Selected Countries in 1983–96 and 1970–74

<table>
<thead>
<tr>
<th>Period</th>
<th>Country</th>
<th>Output per Person*</th>
<th>Hours Worked per Person*</th>
<th>Output per Hour Worked</th>
<th>Relative to United States (U.S. = 100)</th>
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<tbody>
<tr>
<td>1983–96</td>
<td>Germany</td>
<td>74</td>
<td>75</td>
<td>99</td>
<td>74</td>
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<tr>
<td></td>
<td>France</td>
<td>74</td>
<td>69</td>
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<td>105</td>
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<td>64</td>
<td>90</td>
<td>57</td>
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<td></td>
<td>United States</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1970–74</td>
<td>Germany</td>
<td>75</td>
<td>105</td>
<td>72</td>
<td>75</td>
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<td>Japan</td>
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<td>49</td>
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<td>United States</td>
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</tbody>
</table>

*These data are for persons aged 15–64. Sources: See Appendix.*

### Table 2
**Actual and Predicted Labor Supply**
In Selected Countries in 1993–96 and 1970–74

<table>
<thead>
<tr>
<th>Period</th>
<th>Country</th>
<th>Labor Supply*</th>
<th>Differences (Predicted Less Actual)</th>
<th>Prediction Factors</th>
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<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Predicted</td>
<td>Tax Rate t</td>
<td>Consumption/Output (c/y)</td>
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<tr>
<td>1993–96</td>
<td>Germany</td>
<td>19.3</td>
<td>19.5</td>
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<td>17.5</td>
<td>19.5</td>
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<td>Italy</td>
<td>16.5</td>
<td>18.8</td>
<td>2.3</td>
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<td></td>
<td>Canada</td>
<td>22.9</td>
<td>21.3</td>
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<td>United Kingdom</td>
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<td>1970–74</td>
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<td>25.9</td>
<td>24.0</td>
<td>-1.9</td>
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<tr>
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<td>Japan</td>
<td>29.8</td>
<td>35.8</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>United States</td>
<td>23.5</td>
<td>26.4</td>
<td>2.9</td>
</tr>
</tbody>
</table>

*Labor supply is measured in hours worked per person aged 15–64 per week.
Sources: See Appendix.
Cavents

1.) Prescott assumes that tax revenues are rebated lump-sum back to households. This kills off the negative income effect of higher taxes, which would tend to increase labor supply in response to higher taxes.

2.) Prescott picks a pretty high value of the labor supply elasticity parameter \( \alpha = 1.54 \)

3.) Prescott ignores unemployment. Over this period, European unemployment rates rose considerably relative to the U.S.
Unemployment

- So far we have assumed that anyone who wants to work can work. This is not always the case.

- In the real world, most fluctuations in labor input take the form of some people losing or gaining jobs, rather than everyone choosing to work a few less or a few more hours. That is, labor supply is very uneven. There is a lot of heterogeneity.

- Explaining why this occurs is one of the primary questions in macroeconomics.

- For many years, macroeconomists argued amongst themselves about whether unemployment is "voluntary" or "involuntary". This proved not to be a useful distinction. Surely, it's both! An unemployed carpenter could probably get a job pretty quickly at McDonalds. In that sense, his unemployment is voluntary. On the other hand, skilled workers often lose their jobs involuntarily, and even if they could find unskilled jobs, there is a sense in which their "search" for a similarly skilled job is involuntary.
Costs of Unemployment

1.) Foregone Output. Wasted Resources


3.) Inequality
Measuring Unemployment

Population
  - Children Institutionalised
  - Not in Labor Force (NL)
  - Labor Force (L)
    - Employed (E)
    - Unemployed (U)

1. Participation Rate = \( \frac{L}{L + NL} \)

2. Unemployment Rate = \( \frac{U}{L} = \frac{U}{E + U} \)
Note,

1.) To be considered unemployed, you must be in the labor force, meaning that you are "actively" looking for a job.

2.) The unemployment rate can (and does) change even when there is no change in the number of unemployed people. This occurs when the participation rate changes.

3.) There are large gross flows between these categories.

**Average Monthly Flows**

- **Not in Labor Force**: 7.45 million
  - 257,484 to **Unemployed**
  - 245,883 from **Unemployed**

- **Unemployed**: 1.5 million
  - 258,236 from **Not in Labor Force**
  - 352,242 to **Employed**
  - 326,746 from **Employed**

- **Employed**: 13 million
  - 195,690 to **Unemployed**
LFS estimates duration of unemployment by sex and age group; Canada

- Total unemployed, all weeks [v2349180]
- 1 to 4 weeks [v2349181]
- 27 weeks or more [v2349185]

Source: Statistics Canada, CANSIM table 282-0048.
Labour force survey estimates (LFS), by sex and detailed age group

Canada; Unemployment rate; 15 years and over

Source: Statistics Canada, CANSIM table 282-0002.
Labour force survey estimates (LFS), by sex and detailed age group

Source: Statistics Canada, CANSIM table 282-0002.
Unemployment Rate for Canada, Japan, United Kingdom, and United States

Percent

Research Division
Federal Reserve Bank of St. Louis
Sources of Persistent Unemployment

1.) Search Frictions / Job Matching

2.) Wage Rigidity
Search Frictions / Job Matching

The "bathtub model"

Employment \rightarrow \text{Job separations, } S \rightarrow \text{Unemployment} \rightarrow \text{Job finding, } f

\[ s \]: separation rate
\[ s = \text{Fraction of those employed who lose or quit their job each period} \]

\[ f \]: finding rate
\[ f = \text{Fraction of those unemployed who find a job each period} \]

Note, if \( f \) and \( s \) are constant then \( \frac{1}{s} = \text{Expected duration of a job} \)
\[ \frac{1}{s} = \text{Expected duration of an unemployment spell} \]
Steady-State Balance Condition: \( fU = SE \)

Note: \( L = E + U \)

\[ \Rightarrow fU = S(L - U) \]

\[ \Rightarrow \frac{U}{L} = \frac{S}{S + f} \]

Ballpark Numbers,

\( S = 0.01 \quad f = 0.125 \)

\[ \Rightarrow \frac{U}{L} = \frac{0.01}{0.135} = 7.4\% \]
Sources of (Persistent) Wage Rigidity

1. Minimum Wage Laws
2. Labor Unions
3. Efficiency Wages
4. Risk-Sharing / Implicit Contracts
Efficiency Wages

Usual interpretation of wage/productivity correlation:

higher productivity $\Rightarrow$ higher wages

In some cases, it could be:

higher wages $\Rightarrow$ higher productivity

Why?

1. Health & Nutrition
2. Improved Morale
3. Shirking
4. Selection Effects
The Morale/Health Model

Let $e(w)$ be the "effort function"

$$e = e(w)$$

Note: $e(w) \cdot L = \text{Labor input measured in efficiency units}$

Revised Profit-Max Problem

$$\max_{w, L} F(e(w) L) - w \cdot L$$

FOCs

1.) $F'e - w = 0 \quad (L)$
2.) $F'e'L - L = 0 \quad (w)$

$$\Rightarrow \frac{e'}{e} w = 1 \quad \text{or} \quad \frac{de}{e} = \frac{dw}{w} \Rightarrow w^*$$

*L then determined by $F'(e(w^*) L) = w^*$
The Shirking Model

Let

\[ S = \text{exogenous separation rate} \]
\[ g = \text{probability of getting caught shirking} \]
\[ E = \text{effort cost} \]
\[ W = \text{wage rate} \]

Note,

\[ \frac{1}{S} = \text{expected job duration if you don't shirk} \]
\[ \frac{1}{S+g} = \text{expected job duration if you shirk} \]

Firms want to keep their workers from shirking!
\[ V_{\text{work}} = \frac{W - E}{S} \]

\[ V_{\text{shirk}} = \frac{W}{S + q} \]

Firm chooses \( W \) so that \( V_{\text{work}} = V_{\text{shirk}} \)

\[ \frac{W - E}{S} = \frac{W}{S + q} \]

\[ \Rightarrow W^* = E + \frac{S}{q} E \]
Criticisms of Shirking Model

1.) General Equilibrium.
   Everyone can’t pay above average wages!
   
   Soln: Unemployment becomes the disincentive

2.) More efficient ways to handle potential shirking