Who Gains and Who Loses from Trade?

✧ Gainers and losers within country
   » Short-run vs. long-run
   » “Owners of labor” vs. “Owners of capital”
   » Export (expanding) vs. import (contracting) industries

✧ Three implications of H-O (factor proportions) theory
   » The Stolper-Samuelson Theorem
   » The Factor-Price Equalization Theorem
   » The Specialized-Factor Pattern

✧ Empirical Evidence
   » What are factor endowments in different countries?
   » The Leontief Paradox
   » Do factor prices equalize internationally? If not, why not?
Gainers and Losers Within a Country

Consider earlier example in Figure 3.5:
US is relatively land abundant and exports wheat
ROW is relatively labor abundant and exports cloth

Short-run effects of opening trade
» Demand for US wheat for export ↑; Demand for US cloth ↓
» Demand for ROW cloth for export ↑; Demand for ROW wheat ↓
» US landlords in wheat-growing areas can raise rents; US farm workers (temporarily) get higher wages
» Foreign landlords in cloth-making areas can raise rents; foreign clothing workers can obtain higher wages
» Sellers of factors in declining industries lose income
» Employers, landlords, and workers in declining industries protest
» Short-run effects spark an adjustment in the longer run
Repeat of Figure 3.5: Factor Proportions Model

Figures 3.5A (top) and 3.5B (bottom)
Gainers and Losers: Long-Run Effects

* U.S.
  » Initially, $P_W$ is cheap, $P_C$ expensive (2:1)
  » Opening up trade causes $P_W \uparrow$ and $P_C \downarrow$ as seen by US
  » Yet, demand for US wheat for export $\uparrow$; demand for US cloth $\downarrow$
  » US wheat industry expands (attracts both capital and labor)
  » US cloth industry contracts (releases both capital and labor)
  » **Crucial step**: Because the cloth industry uses more labor than the wheat industry can absorb (and less capital than the wheat industry demands), factor prices change.
  » **US** $P_K$ (rents) $\uparrow$ and $P_L$ (wages) $\downarrow$ in both industries because overall increase in demand for capital and decrease in demand for labor given that national production has shifted into wheat.
  » **Long-run results**: US landowners gain, US workers lose, but value of national production (at world prices) $\uparrow$. 
Gainers and Losers: Long-Run Effects

R.O.W.

» Initially, $P_C$ is cheap, $P_W$ expensive (2/3:1)
» Opening up trade causes $P_C \uparrow$ and $P_W \downarrow$ as seen by ROW
» Yet, demand for ROW cloth for export $\uparrow$; demand for ROW wheat $\downarrow$
» ROW cloth industry expands (attracts both capital and labor)
» ROW wheat industry contracts (releases both capital and labor)
» **Crucial step**: Because the wheat industry uses more capital than the cloth industry demands (and less labor than the cloth industry demands), factor prices change.
» **ROW** $P_K$ (rents) $\downarrow$ and $P_L$ (wages) $\uparrow$ in both industries because overall increase in demand for labor and decrease in demand for capital given that national production has shifted into cloth.
» **Long-run results**: ROW workers gain, ROW landowners lose, but value of national production (at world prices) $\uparrow$. 
## Gainers and Losers: Summary Effects

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Landowners</td>
<td>Laborers</td>
</tr>
<tr>
<td>Wheat</td>
<td>Gain</td>
<td>Gain</td>
</tr>
<tr>
<td>Cloth</td>
<td>Lose</td>
<td>Lose</td>
</tr>
</tbody>
</table>

### Short-Run
- Both factors in the expanding **industry** gain

### Long-Run
- Only the factor in greater national demand gains

**However**: Because value of national income ↑, gainers could compensate losers to make all as least as well off as pre-trade. (Coordination costs)
Implications of H-O (factor proportions) theory

The Stolper-Samuelson Theorem

» Changing from no-trade to free-trade unambiguously raises the returns (and the real income) to the factor used intensively in the export industry (the abundant factor) and lowers the returns (and the real income) to the factor used intensively in the import industry (the scarce factor).

» Mechanics: Trade opens up
  ◆ The abundant factor (once lowly paid) now appears more scarce in a world context, hence its value rises.
  ◆ The scarce factor (once highly paid) now appears more abundant in a world context, hence its value falls.

» Importance:
  ◆ Abundant factor likely to favor free-trade
  ◆ Scarce factor likely to oppose free trade
Implications of H-O (factor proportions) theory

✨ The Factor-Price Equalization Theorem

» Free trade equalizes factor prices (as well as commodity prices) across countries

» Importance:
  ◆ Wages and rental rates equalize across countries even though these factors are immobile. Movement of goods embodies movement of factors of production

» Mechanics:
  ◆ Contracting industry releases more factors than expanding industry can employ. To keep all factors employed, prices must shift.

» Intuition of proof:
  ◆ The same goods (wheat and cloth) are sold in world markets at same price using same technology. Must pay factors the same.
Implications of H-O (factor proportions) theory

The Specialized-Factor Pattern

» The Stolper-Samuelson theorem applied to a world with two factors and two goods, but its results generalize to any number of factors and goods.
» The more a factor is specialized in the production of exports, the more it stands to gain from trade
» The more a factor is specialized in the production of imports, the more it stands to lose from trade
» The specialized factor pattern is likely to hold in both the short and long-run
Empirical Evidence on H-O Theory

- What are factor endowments in different countries?
- The Leontief Paradox
- Do factor prices equalize internationally? If not, why not?
Shares of the World’s Factor Endowments, 1985 (Fig. 4.3)

<table>
<thead>
<tr>
<th>Country</th>
<th>Physical Capital</th>
<th>Highly Skilled Labor</th>
<th>Medium Skilled Labor</th>
<th>Unskilled Labor</th>
<th>Arable Land</th>
<th>Forest Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>33.4%</td>
<td>22.8%</td>
<td>15.6%</td>
<td>0.4</td>
<td>19.4</td>
<td>13.1</td>
</tr>
<tr>
<td>Canada</td>
<td>3.3</td>
<td>2.6</td>
<td>1.5</td>
<td>0.3</td>
<td>3.5</td>
<td>16.1</td>
</tr>
<tr>
<td>Japan</td>
<td>17.6</td>
<td>7.1</td>
<td>8.5</td>
<td>0.2</td>
<td>0.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Germany</td>
<td>6.6</td>
<td>5.6</td>
<td>4.1</td>
<td>0.1</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>France</td>
<td>5.1</td>
<td>4.7</td>
<td>3.4</td>
<td>0.1</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.9</td>
<td>5.7</td>
<td>3.6</td>
<td>0.1</td>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Other Developed Countries</td>
<td>15.4</td>
<td>14.4</td>
<td>10.0</td>
<td>1.3</td>
<td>26.4</td>
<td>10.9</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>14.7</td>
<td>37.1</td>
<td>53.3</td>
<td>97.5</td>
<td>47.8</td>
<td>57.5</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

- Physical capital relatively abundant in developed countries
- High skilled labor (professional and technical) abundant in developed
- Unskilled labor heavily concentrated in developing countries
- Medium skilled labor, more dispersed world-wide
- Arable and forest land - scarce in Europe and Japan
### U.S. International Trade - Selected Products, 1992 (in Billions of US$)

#### Trade appears consistent with H-O

<table>
<thead>
<tr>
<th>Product</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>$4.5</td>
<td>Small</td>
</tr>
<tr>
<td>Corn</td>
<td>5.0</td>
<td>Small</td>
</tr>
<tr>
<td>Soybeans</td>
<td>4.4</td>
<td>Small</td>
</tr>
<tr>
<td>Coal</td>
<td>4.2</td>
<td>Small</td>
</tr>
<tr>
<td>Petroleum</td>
<td>6.3</td>
<td>$53.9</td>
</tr>
<tr>
<td>Chemicals</td>
<td>43.6</td>
<td>28.3</td>
</tr>
<tr>
<td>Aircraft</td>
<td>36.6</td>
<td>7.5</td>
</tr>
<tr>
<td>Precision Instr.</td>
<td>14.9</td>
<td>7.8</td>
</tr>
<tr>
<td>Clothing &amp; Acc.</td>
<td>4.2</td>
<td>33.2</td>
</tr>
<tr>
<td>Shoes</td>
<td>Small</td>
<td>10.2</td>
</tr>
</tbody>
</table>

#### Trade appears inconsistent with H-O

<table>
<thead>
<tr>
<th>Product</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron &amp; Steel</td>
<td>$4.1</td>
<td>$10.2</td>
</tr>
<tr>
<td>Computers</td>
<td>17.6</td>
<td>22.9</td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>37.9</td>
<td>77.1</td>
</tr>
</tbody>
</table>

Source: Lindert & Pugel, Fig 4.4
Leontief Paradox

🔹 1953 Study using 1947 input/output table of US economy
  » Industries grouped into 50 sectors
  » Factors grouped into either labor or capital
  » Estimated (K,L) mix to produce $1 billion bundle of US exports and US import-competing commodities

🔹 Results:
  » US imports require 30% more K/L than US exports
  » In other words, US appears to import K-intensive goods while exporting L-intensive goods
  » Paradox - By conventional wisdom, US is capital abundant and if H-O is true, should export K-intensive goods

🔹 Importance:
  » As a test of H-O, factor proportions model
  » Policy discussions, do US tariffs protect labor or capital?
Leontief Paradox - Explanations

Real-world does not satisfy the assumptions of the H-O model needed to achieve H-O results

- Tariffs and other government barriers restrict free trade
- Skill differences in labor, “human capital” not considered
- “Factor intensity reversals” - US input-output matrix not appropriate for ROW, *i.e.* US (a K-abundant country) may use K-intensive methods to produce imports that are produced in other countries using L-intensive methods
- Technology gap and product cycle as explanation for trade
- Natural resources of the US
- Consumption pattern differences between US and other developed nations
Leontief Paradox - Importance

- If free-trade benefits the abundant factor, then it follows that restrictions on trade benefit the scarce factor.
  - The Lerner symmetry theorem: “A tax on imports is a tax on exports”
- Leontief’s results (assuming H-O is true) ⇒ US tariffs are protecting capital and not labor
- If Leontief (and H-O) are correct, trade liberalization would help US labor directly without any redistribution schemes.
Empirical Evidence - Factor Price Equalization?

- In its “strong form,” H-O predicts that
  - Wage rates ($P_L$) are equal across countries
  - Rental rates ($P_K$), the real price of capital, are equal across countries

- We can clearly reject the above statements

- Why does FPE fail?
  - The numerous and strong assumptions of H-O theory are not met in practice (See earlier list on Leontief Paradox)

- Is there a “tendency” toward FPE?
  - Opening up trade changes the demand for goods and productive factors, and changes the *prices* of factors
  - These forces do not completely result in FPE. *Implications?*
The Four Trade Questions - Reprise

Why do countries trade?
- Emphasis on difference in production conditions
- H-O theory stresses differences in factor endowments

How does trade effect production and consumption?
- Exporters raise production, importers raise consumption

Which countries gain from trade?
- Both countries gain, in proportion to the price change
- Free trade better for both than no trade (custom union case)

Within a country, who gains or loses from trade?
- Short-run: the expanding industry gains
- Long-run: the abundant factor gains (Stolper-Samuelson)
- Under strict assumptions, FPE ⇒ no cost of factor immobility