The Heckscher-Ohlin Model

Some Background

• Proposed by Swedish economist Eli Heckscher in a 1919 article
• Developed by his student Bertil Ohlin in his 1924 dissertation
• Attempt to explain the first “golden age” of trade from 1890 to 1914
• With the ability to ship technology around the world, technological differences can no longer explain why countries trade

Introduction

In this chapter, we outline the Heckscher-Ohlin model, a model that assumes that trade occurs because countries have different resources.

Our first goal is to describe the Heckscher-Ohlin (HO) model of trade.

• The specific-factors model that we studied in the previous chapter was a short-run model because capital and land could not move between the industries.
• In contrast, the HO model is a long-run model because all factors of production can move between the industries.
Introduction

Our second goal is to examine the empirical evidence on the Heckscher-Ohlin model.

- By allowing for more than two factors of production and also allowing countries to differ in their technologies, as in the Ricardian model, the predictions from the Heckscher-Ohlin model match more closely the trade patterns in the world economy today.

The third goal of the chapter is to investigate how the opening of trade between the two countries affects the payments to labor and to capital in each of them.

Assumptions of the Heckscher-Ohlin Model

**Assumption 1:** Two factors of production, labor and capital, can move freely between the industries.
- Labor must earn the same wage across industries
- Capital must earn the same rent across industries

**Assumption 2:** Shoe production is labor-intensive; that is, it requires more labor per unit of capital to produce shoes than computers, so that $L_S/K_S > L_C/K_C$. 
Labor Intensity of Each Industry  The demand for labor relative to capital is assumed to be higher in shoes than in computers, \( \frac{L_S}{K_S} > \frac{L_C}{K_C} \). These two curves slope down just like regular demand curves, but in this case, they are relative demand curves for labor (i.e., demand for labor divided by demand for capital).

Assumptions of the Heckscher-Ohlin Model

Assumption 3: Foreign is labor-abundant, by which we mean that the labor–capital ratio in Foreign exceeds that in Home, \( \frac{L^*}{K^*} > \frac{L}{K} \). Equivalently, Home is capital-abundant, so that \( \frac{K}{L} > \frac{K^*}{L^*} \).

Assumption 4: The final outputs, shoes and computers, can be traded freely (i.e., without any restrictions) between nations, but labor and capital do not move between countries.

• Is this a realistic assumption?
Assumptions of the Heckscher-Ohlin Model

Assumption 5: The technologies used to produce the two goods are identical across the countries.

- Allows us to focus on a single reason for trade: the different amounts of labor and capital found in each country
- The data fit the model better without this assumption

Assumption 6: Consumer tastes are the same across countries, and preferences for computers and shoes do not vary with a country’s level of income.

- Assume that poorer country will buy fewer shoes/computers, but will buy them in the same ratio as a wealthier country facing the same prices
- Unrealistic, but simplifying

Heckscher-Ohlin Model

No-Trade Equilibrium
Production Possibilities Frontiers, Indifference Curves, and No-Trade Equilibrium Price

FIGURE 4-2 No-Trade Equilibria in Home and Foreign

The Home production possibilities frontier (PPF) is shown in panel (a), and the Foreign PPF is shown in panel (b). Because Home is capital abundant and computers are capital intensive, the Home PPF is skewed toward computers.
1 Heckscher-Ohlin Model

No-Trade Equilibrium
Production Possibilities Frontiers, Indifference Curves, and No-Trade Equilibrium Price

FIGURE 4-2 No-Trade Equilibria in Home and Foreign (continued)

Home preferences are summarized by the indifference curve, $U$.

The Home no-trade (or autarky) equilibrium is at point $A$.

The flat slope indicates a low relative price of computers, $(P_C / P_S)^A$.

Foreign is labor-abundant and shoes are labor-intensive, so the Foreign PPF is skewed toward shoes.

Foreign preferences are summarized by the indifference curve, $U^*$.

The Foreign no-trade equilibrium is at point $A^*$, with a higher relative price of computers, as indicated by the steeper slope of $(P_C^* / P_S^*)^{A^*}$. 

08/10/2013
Free-Trade Equilibrium
Home Equilibrium with Free Trade

FIGURE 4-3
International Free-Trade Equilibrium at Home (continued)

(a) Home Country

Output of shoes, Q_s

Shoe imports

Home production

Home consumption

World price line, slope = (P_C / P_S)^W

Output of computers, Q_C

(b) International Market

Relative price of computers, (P_C / P_S)^W

Home export supply curve for computers

At the free-trade world relative price of computers, (P_C / P_S)^W, Home produces at point B in panel (a) and consumes at point C, exporting computers and importing shoes.

Point A is the no-trade equilibrium. The "trade triangle" has a base equal to the Home exports of computers (the difference between the amount produced and the amount consumed with trade, (Q_C2 - Q_C3)).

Free-Trade Equilibrium
Home Equilibrium with Free Trade

FIGURE 4-3
International Free-Trade Equilibrium at Home (continued)

(a) Home Country

Output of shoes, Q_s

Shoe imports

Home production

Home consumption

World price line, slope = (P_C / P_S)^W

Output of computers, Q_C

(b) International Market

Relative price of computers, (P_C / P_S)^W

Home export supply curve for computers

The height of this triangle is the Home imports of shoes (the difference between the amount consumed of shoes and the amount produced with trade, Q_S3 - Q_S2).

In panel (b), we show Home exports of computers equal to zero at the no-trade relative price, (P_C / P_S)^A, and equal to (Q_C2 - Q_C3) at the free-trade relative price, (P_C / P_S)^W.
Free-Trade Equilibrium
Foreign Equilibrium with Free Trade

FIGURE 4-4  International Free-Trade Equilibrium in Foreign (continued)

At the free-trade world relative price of computers, \((P_C/P_S)^W\), Foreign produces at point \(B^*\) in panel (a) and consumes at point \(C^*\), importing computers and exporting shoes.

Point \(A^*\) is the no-trade equilibrium.
The “trade triangle” has a base equal to Foreign imports of computers (the difference between the consumption of computers and the amount produced with trade, \((Q^*_C - Q^*_{C2})\)).

The height of this triangle is Foreign exports of shoes (the difference between the production of shoes and the amount consumed with trade, \((Q^*_S2 - Q^*_{S3})\)).

In panel (b), we show Foreign imports of computers equal to zero at the no-trade relative price, \((P_C/P_S)^A\), and equal to \((Q^*_C - Q^*_{C2})\) at the free-trade relative price, \((P_C/P_S)^W\).
Free-Trade Equilibrium

Equilibrium Price with Free Trade Because exports equal imports, there is no reason for the relative price to change and so this is a free-trade equilibrium.

The world relative price of computers in the free-trade equilibrium is determined at the intersection of the Home export supply and Foreign import demand, at point D.

At this relative price, the quantity of computers that Home wants to export, \((Q_C^2 - Q_C^3)\), just equals the quantity of computers that Foreign wants to import, \((Q_C^* - Q_C^{*2})\).

Effect of Trade on the Wage and Rental of Home

Economy-Wide Relative Demand for Labor

The economy-wide relative demand for labor, \(RD\), is an average of the \(L_C/K_C\) and \(L_S/K_S\) curves and lies between these curves.

The relative supply, \(L/K\), is shown by a vertical line because the total amount of resources in Home is fixed.

The equilibrium point A, at which relative demand \(RD\) intersects relative supply \(L/K\), determines the wage relative to the rental, \(W/R\).
Effects of Trade on Factor Prices

Effect of Trade on the Wage and Rental of Home
Increase in the Relative Price of Computers

Initially, Home is at a no-trade equilibrium at point A with a relative price of computers of $(P_C/P_S)_A$.

An increase in the relative price of computers to the world price, as illustrated by the steeper world price line, $(P_C/P_S)_W$, shifts production from point A to B.

At point B, there is a higher output of computers and a lower output of shoes, $Q_{C2} > Q_{C1}$ and $Q_{S2} < Q_{S1}$.

Effect of a Higher Relative Price of Computers on Wage/Rental

An increase in the relative price of computers shifts the economy-wide relative demand for labor, $RD_1$, toward the relative demand for labor in the computer industry, $L_C/K_C$.

The new relative demand curve, $RD_2$, intersects the relative supply curve for labor at a lower relative wage, $(W/R)_2$. 
Effect of Trade on the Wage and Rental of Home Increase in the Relative Price of Computers

As a result, the wage relative to the rental falls from \((W/R)_1\) to \((W/R)_2\). The lower relative wage causes both industries to increase their labor–capital ratios, as illustrated by the increase in both \(L_C/K_C\) and \(L_S/K_S\) at the new relative wage.

**Effects of Trade on Factor Prices**

**Determination of the Real Wage and Real Rental**

**Change in the Real Rental**

\[
R = P_C \cdot MPK_C \quad \text{and} \quad R = P_S \cdot MPK_S
\]

\[MPK_C = R/P_C \uparrow \quad \text{and} \quad MPK_S = R/P_S \uparrow\]

**Change in the Real Wage**

\[
W = P_C \cdot MPL_C \quad \text{and} \quad W = P_S \cdot MPL_S
\]

\[MPL_C = W/P_C \downarrow \quad \text{and} \quad MPL_S = W/P_S \downarrow\]
Determination of the Real Wage and Real Rental

**Stolper-Samuelson Theorem:** In the long run, when all factors are mobile, an increase in the relative price of a good will increase the real earnings of the factor used intensively in the production of that good and decrease the real earnings of the other factor.

For our example, the **Stolper-Samuelson theorem** predicts that when Home opens to trade and faces a higher relative price of computers, the real rental on capital in Home rises and the real wage in Home falls. In Foreign, the changes in real factor prices are just the reverse.

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### Effects of Trade on Factor Prices

#### Changes in the Real Wage and Rental: A Numerical Example

<table>
<thead>
<tr>
<th>Computers</th>
<th>Shoes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales revenue</strong></td>
<td>( P_1 \cdot Q_1 = 100 )</td>
</tr>
<tr>
<td><strong>Earnings of labor</strong></td>
<td>( W \cdot L_1 = 50 )</td>
</tr>
<tr>
<td><strong>Earnings of capital</strong></td>
<td>( R \cdot K_1 = 50 )</td>
</tr>
</tbody>
</table>

**Percentage Increase in price**

- **Computers:** \( P_2 = P_1 \) for computers
- **Shoes:** \( P_2 = P_1 \) for shoes

**Changes in real wage and rental**

- **Computers:** \( \frac{\Delta W}{W} = \frac{\frac{\Delta P}{P} \cdot Q - \Delta W}{W} \) for computers
- **Shoes:** \( \frac{\Delta R}{R} = \frac{\frac{\Delta P}{P} \cdot Q - \Delta R}{R} \) for shoes

**Subtracting one equation from the other**

- **Equals:** \( 0 = -\frac{\Delta W}{W} - \frac{\Delta R}{R} \) for computers and shoes

**Simplifying the last line, we get**

- \( \frac{\Delta W}{W} = -40\% \) is the change in wages
- \( \frac{\Delta R}{R} = -40\% \) is the change in rental
Changes in the Real Wage and Rental: A Numerical Example

General Equation for the Long-Run Change in Factor Prices

The long-run results of a change in factor prices can be summarized in the following equation:

\[
\frac{\Delta W}{W} < 0 < \frac{\Delta P_c}{P_c} < \frac{\Delta R}{R}, \text{ for an increase in } P_c
\]

Real wage falls

Real rental increases

The equations relating the changes in product prices to changes in factor prices are sometimes called the “magnification effect” because they show how changes in the prices of goods have magnified effects on the earnings of factors:

\[
\frac{\Delta R}{R} < \frac{\Delta P_c}{P_c} < 0 < \frac{\Delta W}{W}, \text{ for a decrease in } P_c
\]

Real rental falls

Real wage increases

\[
\frac{\Delta R}{R} < \frac{\Delta P_s}{P_s} < 0 < \frac{\Delta W}{W}, \text{ for an increase in } P_s
\]

Real rental falls

Real wage increases

Heckscher-Ohlin Model

Free-Trade Equilibrium

Pattern of Trade

- Home exports computers, the good that uses intensively the factor of production (capital) found in abundance at Home.
- Foreign exports shoes, the good that uses intensively the factor of production (labor) found in abundance there.
- This important result is called the Heckscher-Ohlin theorem.
Heckscher-Ohlin Model

Assumption 1: Labor and capital flow freely between industries – a long-run assumption.

Assumption 2: The production of some goods is relatively labor-intensive, as compared with other goods which are capital-intensive.

Assumption 3: The relative amounts of labor and capital found in the two countries is the only difference,

Assumption 4: There is free international trade in goods, with no transportation costs and no savings.

Assumption 5: The technology for producing any good is the same across countries, and there are no differences in the productivity of labor and capital.

Assumption 6: Tastes are the same across countries.

Testing the Heckscher-Ohlin Model

The first test of the Heckscher-Ohlin theorem was performed by economist Wassily Leontief in 1953, who developed a method of accounting for inputs and outputs.

Leontief assumed (correctly) that in 1947 the United States was capital-abundant relative to the rest of the world.

Thus, from the Heckscher-Ohlin theorem, Leontief expected that the United States would export capital-intensive goods and import labor-intensive goods.

What Leontief actually found, however, was just the opposite: the capital–labor ratio for U.S. imports was higher than the capital–labor ratio found for U.S. exports!

This finding came to be called Leontief’s Paradox.
Leontief’s Paradox

Leontief used the numbers in this table to test the Heckscher-Ohlin theorem. Each column shows the amount of capital or labor needed to produce $1 million worth of exports from, or imports into, the United States in 1947. As shown in the last row, the capital–labor ratio for exports was less than the capital–labor ratio for imports, which is a paradoxical finding.

<table>
<thead>
<tr>
<th></th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital ($ millions)</td>
<td>$2.55</td>
<td>$3.1</td>
</tr>
<tr>
<td>Labor (person-years)</td>
<td>182</td>
<td>170</td>
</tr>
<tr>
<td>Capital/labor ($/person)</td>
<td>$14,000</td>
<td>$18,200</td>
</tr>
</tbody>
</table>

Testing the Heckscher-Ohlin Model

Leontief’s Paradox

Explanations

- Technologies are not the same across countries, in contrast to what the HO theorem and Leontief assumed. Similarly, labor and capital are not the same across countries.
- There are many more factors. Leontief ignored land abundance in the United States, and did not distinguish between skilled and unskilled labor.
- Goods that are capital-intensive in the US may be labor-intensive elsewhere, making measurement hard.
- The year 1947 was unusual.
- The world is not engaged in completely free trade, and transportation costs can be significant.
Examining Factor Endowments

To determine whether a country is abundant in a certain factor, we compare the country’s share of that factor with its share of world GDP.

If its share of a factor exceeds its share of world GDP, then we conclude that the country is **abundant in that factor**, and if its share in a certain factor is less than its share of world GDP, then we conclude that the country is **scarce in that factor**.

Testing the Heckscher-Ohlin Model

**Capital, Labor and Land Abundance**

In the first bar graph, we see that 24% of the world’s physical capital in 2000 was located in the United States, with 9% located in China, 13% located in Japan, and so on. In the final bar graph, we see that in 2000 the United States had 22% of world GDP, China had 11%, Japan had 8%, and so on.
Tests of the HO Model

- **North-South Trade:** HO predicts capital-abundant countries would gain the most by trading with labor-abundant countries, but most trade is between developed nations.
- **Bowen, Leamer & Sveikauskas (1987)** tested 27 countries and 12 different factors.
  - The relative proportion of a factor was correlated with the tendency to export goods intensive in that factor.
  - The HO Factor-Proportions Theory works more often than not, but not overwhelmingly. For four factors, the prediction was correct more than 70% of the time, and for seven the prediction was correct between 50% and 70% of the time. For one factor, managerial workers, the prediction was wrong more often than it was right.

Testing the Heckscher-Ohlin Model

**Differing Productivities across Countries**

Remember that in the original formulation of the paradox, Leontief had found that the United States was exporting labor-intensive products even though it was capital-abundant at that time.

One explanation for this outcome would be that labor is highly productive in the United States and less productive in the rest of the world.

If that is the case, then the **effective labor force** in the United States, the labor force times its productivity (which measures how much output the labor force can produce), is much larger than it appears to be when we just count people.
Differing Productivities across Countries

Measuring Factor Abundance Once Again To allow factors of production to differ in their productivities across countries, we define the effective factor endowment as the actual amount of a factor found in a country times its productivity:

\[
\text{Effective factor endowment} = \text{Actual factor endowment} \times \text{Factor productivity}
\]

Testing the Heckscher-Ohlin Model

Using the Effective Factors Approach

• Suppose the US has 160 million workers and $20 trillion in capital, while China has 800 million workers and $5 trillion in capital.
• Since 20/160 > 5/800, US is relatively capital-abundant.
• But suppose US labor is 5 times more productive. The US has an effective labor force of 800 (or China has an effective labor force of 160).
• Since 20/800 = 5/800, the US is still relatively capital-abundant, and free trade will lead to rising W/R in China, falling W/R in US.
• But now Factor Price Equalization means that Chinese wages will converge to 1/5 of US wage, so that one Chinese 40-hour week is equivalent in productivity and wage to 8 hours from a US worker.
**Testing the Heckscher-Ohlin Model**

**Differing Productivities across Countries**

**Measuring Factor Abundance Once Again**

To determine whether a country is abundant in a certain factor, we compare the country’s share of that *effective* factor with its share of world GDP.

If its share of an effective factor exceeds its share of world GDP, then we conclude that the country is **abundant in that effective factor**; if its share of an effective factor is less than its share of world GDP, then we conclude that the country is **scarce in that effective factor**.

**Effective R&D Scientists**

\[ \text{Effective R&D scientists} = \text{Actual R&D scientists} \times \text{R&D spending per scientist} \]

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**Figure 4-7**

*Shown here are country shares of R&D scientists and land in 2000, using first the information from Figure 4.6, and then making an adjustment for the productivity of each factor across countries to obtain the “effective” shares.*

China was abundant in R&D scientists in 2000 (since it had 14% of the world’s R&D scientists as compared with 11% of the world’s GDP) but scarce in effective R&D scientists (because it had 7% of the world’s effective R&D scientists as compared with 11% of the world’s GDP).
Testing the Heckscher-Ohlin Model

Differing Productivities across Countries

FIGURE 4-7 “Effective” Factor Endowments, 2000

The United States was scarce in arable land when using the number of acres (since it had 13% of the world’s land as compared with 22% of the world’s GDP) but neither scarce nor abundant in effective land (since it had 21% of the world’s effective land, which nearly equaled its share of the world’s GDP).

Using the Sign Text for Effective Factors

• Trefler (1995) examined 33 countries and nine factors.

• If a country’s share of the world’s supply of an effective factor is greater than the country’s share of world GDP, then HO predicts the country should export that good. This was tested with a simple sign (+ / -) test.

• Trefler found that all countries had more factors (62%) passing the sign test than failing it, and it was more likely to be true when the country was less developed.

• This suggests that the HO model – adjusted for effective factors – explains over half of international trade, but there are other explanations to consider if we want to explain the rest.
Differing Productivities across Countries
Effective Arable Land

This table shows that U.S. food trade has fluctuated between positive and negative net exports since 2000, which is consistent with our finding that the United States is neither abundant nor scarce in land. Total agriculture trade (including nonfood items like cotton) has positive net exports, however.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. food trade, 2000–2009 (Billions of U.S. dollars)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>43.4</td>
<td>42.5</td>
<td>43.2</td>
<td>43.1</td>
<td>50.0</td>
<td>51.7</td>
<td>57.8</td>
<td>71.4</td>
<td>97.4</td>
<td>82.8</td>
</tr>
<tr>
<td>Imports</td>
<td>41.4</td>
<td>42.0</td>
<td>44.7</td>
<td>50.1</td>
<td>55.7</td>
<td>61.6</td>
<td>98.0</td>
<td>74.0</td>
<td>80.3</td>
<td>73.8</td>
</tr>
<tr>
<td>Net exports</td>
<td>2.0</td>
<td>0.5</td>
<td>1.5</td>
<td>1.6</td>
<td>4.3</td>
<td>5.1</td>
<td>7.8</td>
<td>14.4</td>
<td>17.1</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>U.S. agricultural trade, 2000–2009 (Billions of U.S. dollars)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>53.3</td>
<td>53.7</td>
<td>53.1</td>
<td>59.4</td>
<td>61.4</td>
<td>63.2</td>
<td>70.9</td>
<td>93.0</td>
<td>115.3</td>
<td>98.6</td>
</tr>
<tr>
<td>Imports</td>
<td>39.2</td>
<td>39.5</td>
<td>42.0</td>
<td>47.5</td>
<td>54.2</td>
<td>59.5</td>
<td>65.5</td>
<td>72.1</td>
<td>80.7</td>
<td>71.9</td>
</tr>
<tr>
<td>Net exports</td>
<td>14.1</td>
<td>14.1</td>
<td>11.1</td>
<td>11.9</td>
<td>7.2</td>
<td>3.7</td>
<td>5.5</td>
<td>17.9</td>
<td>34.6</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Testing the Heckscher-Ohlin Model

Leontief’s Paradox Once Again
Labor Abundance

Shown here are the share of labor, “effective” labor, and GDP of the US and the rest of the world in 1947. The US had only 8% of the world’s population, as compared to 37% of the world’s GDP, so it was very scarce in labor. But when we measure effective labor by the total wages paid in each country, then the United States had 43% of the world’s effective labor as compared to 37% of GDP, so it was abundant in effective labor.
Testing the Heckscher-Ohlin Model

Leontief’s Paradox Once Again
Labor Productivity

**FIGURE 4-9 Labor Productivity and Wages**

Shown here are estimated labor productivities across countries, and their wages, relative to the United States in 1990. Notice that the labor and wages were highly correlated across countries: the points roughly line up along the 45-degree line.

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2 Testing the Heckscher-Ohlin Model

Leontief’s Paradox Once Again
Labor Productivity

**FIGURE 4-9 Effective Labor Abundance**

As suggested by Figure 4-9, wages across countries are strongly correlated with the productivity of labor. We use the wages earned by labor to measure the productivity of labor in each country. Then the effective amount of labor found in each country equals the actual amount of labor times the wage.
Differences in Preferences

• The HO model assumes that preferences do not differ between countries, but what if they do?
• Imagine two identical countries, Home and Foreign, producing X and Y.
• Their PPFs look the same.
• If Home has a stronger preference for X than Foreign, then their autarky price ratio $P_x/P_y$ will be higher. This will lead to higher relative factor prices for the X sector’s intensive factor.
• Countries can gain from trade by NOT specializing.

Factor Intensity Reversal

• Suppose one industry (e.g., mining, farming) is relatively capital-intensive when wages are high, but relatively labor-intensive when wages are low. The elasticity of substitution is very high, and the isoquant’s slope does not change much.
• This leads to a measurement problem. If the Home country is importing capital-intensive goods, does this mean the good is capital-intensive at Home, or capital-intensive in Foreign?
Are Factor Intensities the Same across Countries?

While much of the footwear in the world is produced in developing nations, the United States retains a small number of shoe factories.

In India, the sewing machine used to produce footwear is cheaper than the computer used in a call center. Footwear production in India is labor-intensive as compared with the call center, which is the opposite of what holds in the United States.

This example illustrates a reversal of factor intensities between the two countries.

In the United States, agriculture and mining are capital-intensive. In many developing countries, they are labor-intensive.

Increasing Returns

- The HO Model assumes that industries have constant returns to scale, and this leads to diminishing returns when one factor increases in proportion to another.
- What if a big industry has increasing returns to scale? The more the industry produces, the lower its MC.
- This can lead to a strange PPF that bends inward.
- Countries can gain from specializing, regardless of whether they have a comparative advantage.
- Increasing returns can come from the size of the firm (internal), the size of the industry (external), or the amount of experience (learning curve).
The Product Life Cycle

- The model is about firms, but can be applied to countries.
- The US is assumed to have a comparative advantage in new product development because it has an effective abundance of R&D scientists, large product and capital markets, and efficient distribution systems. In early stages, the US will tend to export the good when it is skilled-labor intensive.
- As a product matures, production becomes more standardized and capital-intensive. Production shifts to other countries, and the US eventually imports the good it once exported.
The Gravity Model

• Newton’s equation:
  Gravitational force is equal to a constant times the product of the two masses, divided by the distance squared.

\[ F = G \frac{m_1 \times m_2}{r^2} \]

Economic equivalent: The volume of trade between two countries will tend to equal a constant times some function of the product of the two GDPs divided by the distance. Trade policy can affect this.

For example, \( T_{ij} = C \times \frac{GDP^a_i \times GDP^b_j}{D_{ij}} \)

To get GDPs, we could assume a rich = 1.

Overlapping Incomes

• If goods vary in quality, consumers may have certain expectations consistent with their incomes.
• Consider three countries, A, B, and C.
  • A is labor-abundant, capital-scarce, and poor.
  • B is intermediate, with some poor and some rich consumers.
  • C is capital-abundant, and rich.
• The HO Theorem would predict most trade would occur between A and C.
• The Overlapping Incomes Hypothesis predicts trade would occur between A and B, and between B and C.
The Adjusted Heckscher-Ohlin Model

- In sum, the 2-2-2 HO Model – the simple long-run factor-proportions neoclassical trade model – does not predict well.
- However, if we adjust for more factors, more countries, and differences in the effective productivity of those factors, the HO model does a much better job.
- But the HO model still assumes perfect competition with homogenous goods and perfect free trade with no transportation costs, and it ignores the role of capital markets and other institutional differences.
- These things will be explored in later chapters.

APPLICATION
Opinions toward Free Trade

We would expect that workers in export industries will support free trade (since the specific factor in that industry gains), but workers in import-competing industries will be against free trade (since the specific factor in that industry loses).

In the short run, then, the industry of employment of workers will affect their attitudes toward free trade.

In the long-run Heckscher-Ohlin model, however, the industry of employment should not matter.
Opinions toward Free Trade

An increase in the relative price of exports will benefit skilled labor in the long run, regardless of whether these workers are employed in export-oriented industries or import-competing industries.

In the long run, then, the skill level of workers should determine their attitudes toward free trade.

In a survey conducted in the United States by the National Elections Studies (NES) in 1992, workers with lower wages or fewer years of education are more likely to favor import restrictions, whereas those with higher wages and more years of education favor free trade.