

Chapter 4

The Heckscher-Ohlin Model

How difference in factor endowments influence the direction of trade?

▪ Overview

Ricardo Vs HO:

- ⇒ In Ricardian Model, difference in technology leads to trade between countries
- ⇒ In HO model, uneven distribution of resources leads countries to trade in one another

SFM Vs HO:

- ⇒ SFM is set in the short run, factors cannot move between sectors
- ⇒ HO is set in the long run, factors are completely mobile between sectors, thus no factors are specific

Historical background of HO model

- ⇒ The model was developed to explain the “golden age” of international trade between 1890 and 1914
- ⇒ There was an increase in the ratio of trade to gross domestic product (GDP) coinciding with improvements in transportation during this period.

▪ Key Concepts

Factor Intensity: Compare ratio of L and K across sectors

Factor Abundance: Compare ratio of L and K across countries

▪ Setup of the Model

2 : 2 : 2

2 Factors: Labor (L), Capital (K)

2 Goods: Shoe (S), Computer (C)

2 Countries: Home (H), Foreign (F)

$\bar{K} = K_S + K_C =$ total amount of capital in the economy

$\bar{L} = L_S + L_C =$ total amount of labor in the economy

Wage = Price of labor

Rent = Price of capital

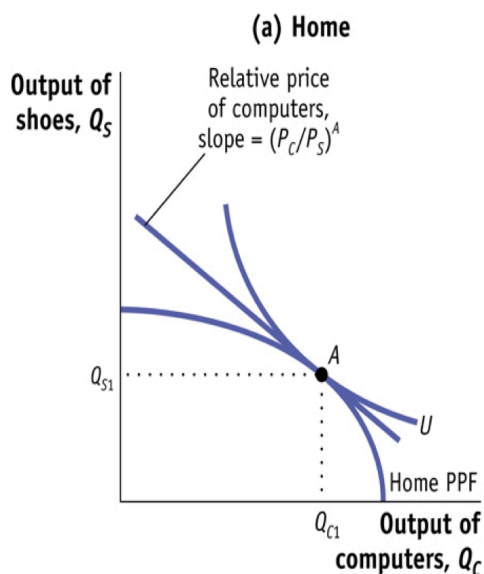
▪ Assumptions

1. Both factors can move freely between the industries.
 - ⇒ Factors are costlessly transferable from sector to sector
2. Production of Shoe is labor-intensive

- ⇒ it requires more labor per unit of capital to produce S than C
- ⇒ $L_S / K_S > L_C / K_C$
- ⇒ the relative demand curve in shoes, L_S / K_S , is to the right of the relative demand curve in computers, L_C / K_C
- 3. Foreign is labor abundant, and Home is capital abundant
 - ⇒ the labor/capital ratio in F exceeds that in H
 - ⇒ $\bar{L}_F / \bar{K}_F > \bar{L}_H / \bar{K}_H$
 - ⇒ Equivalently, the capital/ labor ratio in H exceeds that in F
 - ⇒ $\bar{K}_H / \bar{L}_H > \bar{K}_F / \bar{L}_F$
 - ⇒ Resources are unevenly distributed across the two countries
- 4. The final outputs, Q_S and Q_C , can be traded internationally, but L and K do not move between countries.
- 5. Across the two countries, each good is produced using the same technology
 - ⇒ Technology is very rigid
- 6. Consumer tastes are the same across countries
 - ⇒ Preferences for S and C do not vary with a country's level of income.

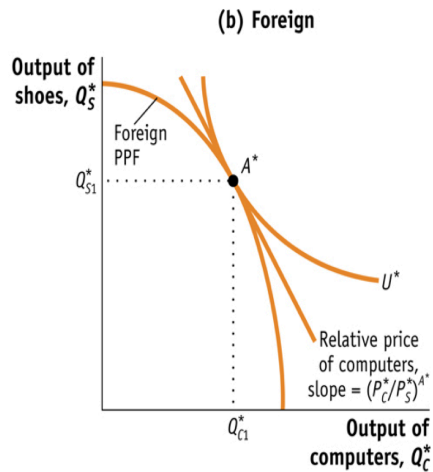
▪ No Trade Equilibrium

For Home:



- ⇒ The bowed-out PPF is biased toward computer (on the horizontal axis) for Home because Home is capital-abundant and the production of computers is capital intensive.
- ⇒ The tangency of the indifference curve and the PPF gives the relative price of computers for Home, $(P_C / P_S)^A$.
- ⇒ The no-trade equilibrium for Home is at point A, with production of computers and shoes given by Q_{C1} and Q_{S1} .

Similarly, for Foreign:



⇒ For Foreign, the PPF skews more toward shoes (on the vertical axis) because shoe production is labor intensive and Foreign is labor abundant.

■ No Trade Relative Prices for Home and Foreign

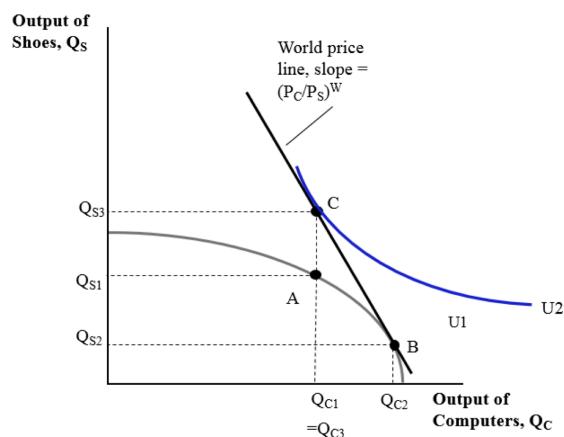
The slope of the price line is relatively steeper for Foreign than for Home, reflecting the higher relative price of computers in the labor-abundant country.

$$\Rightarrow (P_C / P_S)_{H^{NT}} < (P_C / P_S)_{F^{NT}}$$

■ Free Trade Equilibrium

With free trade, the equilibrium relative price of computers is between the no-trade relative prices found at Home and Foreign.

$$\Rightarrow (P_C / P_S)_{H^{NT}} < (P_C / P_S)_{W^{FT}} < (P_C / P_S)_{F^{NT}}$$



- C: trade consumption point
- B: trade production point
- A: autarky equilibrium
- Export: $Q_{C2} - Q_{C3}$
- Import: $Q_{S3} - Q_{S2}$

- Note: Q_{C1} and Q_{C3} don't necessarily overlap
 - ⇒ At the world relative price of computers, the quantity of computers imported by Foreign is exactly equal to the quantity exported by Home,
 - ⇒ This implies that the trade triangles of the two countries are of identical size.

▪ Pattern of Trade

Heckscher-Ohlin Theorem

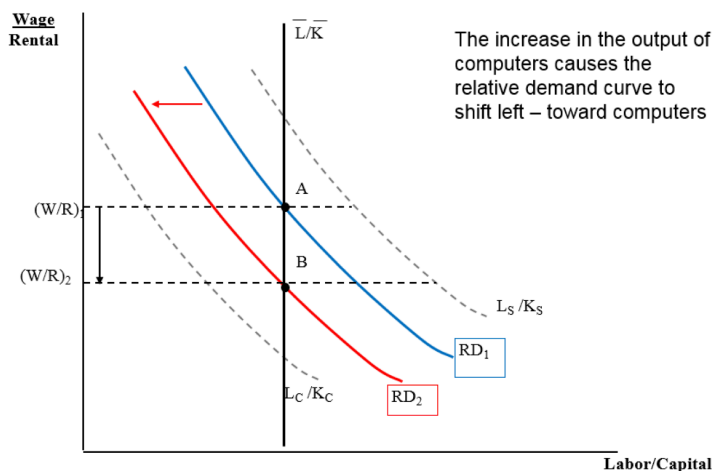
Under assumptions 1-6:

With two goods and two factors, each country will export the good that uses intensively the factor of production it has in abundance and will import the other good.

- ⇒ K abundant country will export K intensive goods and import L intensive goods.
- ⇒ L abundant country will export L intensive goods and import K intensive goods.

▪ Effect of Trade on the Wage

- ⇒ The relative demand or demand for labor relative to capital is a weighted average of the labor/capital ratio in each industry.
- ⇒ The equilibrium relative wage at Home is determined by the intersection of the relative supply and relative demand curves at point A
- ⇒ Because the relative supply curve depends on the total amount of factor resources in the economy and not on the relative wage, it is represented by a vertical line.



Under free trade, Home faces a higher relative price of computers

- ⇒ H specialize in the production of computers
- ⇒ H shifting away resources from the production of shoes.
- ⇒ Since more weight is put toward computers, and less weighted toward the shoe industry as capital has shifted to the computer industry.
- ⇒ The relative demand curve shift to the left from RD_1 to RD_2
- ⇒ The new equilibrium is now at point B.
- ⇒ This causes a decrease in the relative wage from $(W/R)_1$ to $(W/R)_2$
- ⇒ The rise in the labor/capital ratio in both shoes and computers results from labor being “freed up” as production shifts from shoes to computers.

$$W = P_C * MPL_C$$

$$W = P_S * MPL_S$$

The law of diminishing returns tells us:

- ⇒ increase in L/K ratio (i. e. , more labor per unit of capital) will lead to a decrease in MPL in both industries.
- ⇒ $MPL_C = W / P_C \downarrow$ and $MPL_S = W / P_S \downarrow$

▪ Effect of Trade on the Rental of Home

$$R = P_C * MPK_C$$

$$R = P_S * MPK_S$$

- ⇒ Because the labor/capital ratio increases in both industries due to the higher world relative price of computers
- ⇒ The marginal product of capital also increases in both shoes and computers
- ⇒ The real rental on capital increases in terms of shoes and computers.
- ⇒ $MPK_C = R / P_C \uparrow$ and $MPK_S = R / P_S \uparrow$

▪ 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.

▪ General Equation for the Long-Run Change in Factor Prices

- ⇒ $\Delta W / W < 0 < \Delta P_C / P_C < \Delta R / R$, when $P_C \uparrow$
- ⇒ $\Delta R / R < 0 < \Delta P_S / P_S < \Delta W / W$, when $P_S \uparrow$

The preceding equations relating the changes in product prices to changes in factor prices are called the “magnification effect,” because changes in prices of goods have magnified effects on the earning of factors of production.

Reference

Feenstra and Taylor, International Trade, 3rd Ed.