GLOBAL EDITION

International Economics
Theory and Policy

TENTH EDITION

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Lecture 3

Specific Factors and Income Distribution

Chapter Organization

- Introduction
- The Specific Factors Model
- International Trade in the Specific Factors Model
- Income Distribution and the Gains from Trade
- Political Economy of Trade: A Preliminary View
- International Labor Mobility
- Summary

Introduction

- If trade is so good for the economy, why is there such opposition?

- Two main reasons why international trade has strong effects on the distribution of income within a country:
  - Resources cannot move immediately or costlessly from one industry to another.
  - Industries differ in the factors of production they demand.

The Specific Factors Model

- The **specific factors model** allows trade to affect income distribution.

- Assumptions of the model:
  - Two goods, cloth and food.
  - Three factors of production: labor (L), capital (K) and land (T for terrain).
  - Perfect competition prevails in all markets.

The Specific Factors Model (cont.)

- – Cloth produced using capital and labor (but not land).
- – Food produced using land and labor (but not capital).
- – Labor is a mobile factor that can move between sectors.
- – Land and capital are both specific factors used only in the production of one good.

The Specific Factors Model (cont.)

- How much of each good does the economy produce?

- The production function for cloth gives the quantity of cloth that can be produced given any input of capital and labor:

$$Q_C = Q_C(K, L_C) \qquad (4\text{-}1)$$

  – Q_C is the output of cloth
  – K is the capital stock
  – L_C is the labor force employed in cloth

The Specific Factors Model (cont.)

- The production function for food gives the quantity of food that can be produced given any input of land and labor:

$$Q_F = Q_F (T, L_F) \qquad \text{(4-2)}$$

- Q_F is the output of food
- T is the supply of land
- L_F is the labor force employed in food

Production Possibilities

- How does the economy's mix of output change as labor is shifted from one sector to the other?

- When labor moves from food to cloth, food production falls while output of cloth rises.

- Figure 4-1 illustrates the production function for cloth.

Fig. 4-1: The Production Function for Cloth

Output, Q_C

$Q_C = Q_C (K, L_C)$

Labor input, L_C
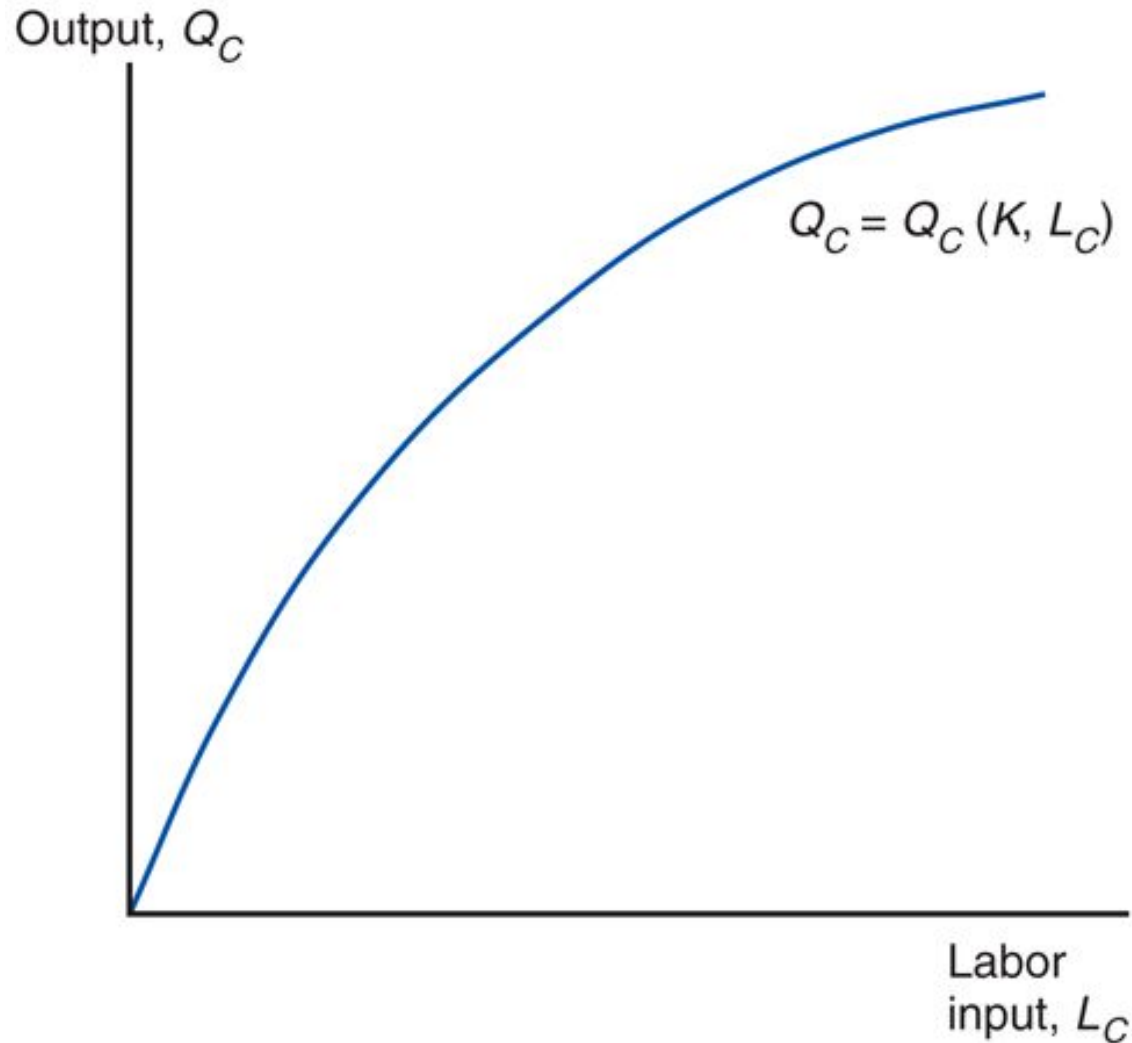
Production Possibilities (cont.)

- The shape of the production function reflects the law of **diminishing marginal returns**.

    - Adding one worker to the production process (without increasing the amount of capital) means that each worker has less capital to work with.

    - Therefore, each additional unit of labor adds less output than the last.

- Figure 4-2 shows the **marginal product of labor,** which is the increase in output that corresponds to an extra unit of labor.

Fig. 4-2: The Marginal Product of Labor
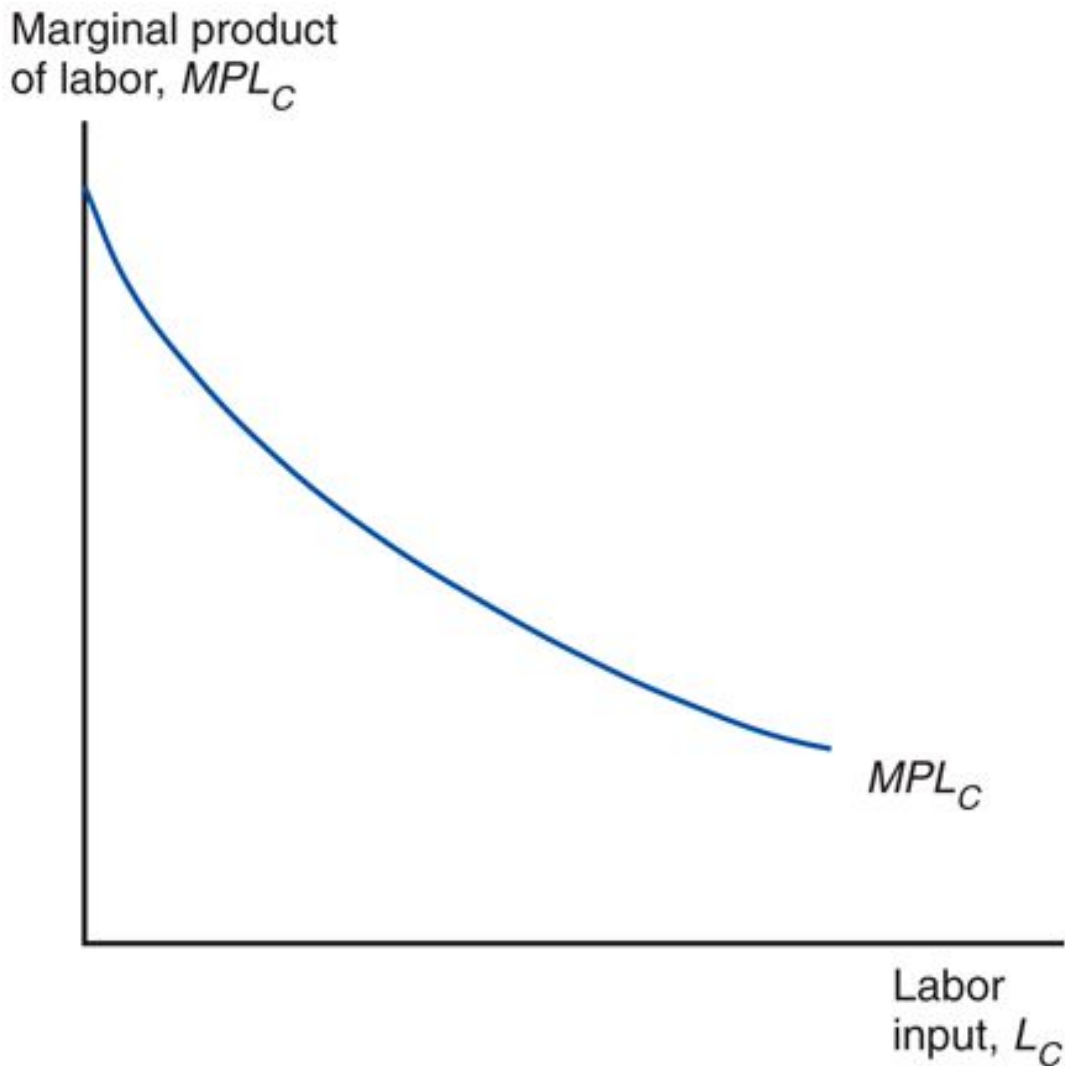
Production Possibilities (cont.)

- For the economy as a whole, the total labor employed in cloth and food must equal the total labor supply:

    $$L_C + L_F = L \qquad (4\text{-}3)$$

- Use these equations to derive the **production possibilities frontier** of the economy.
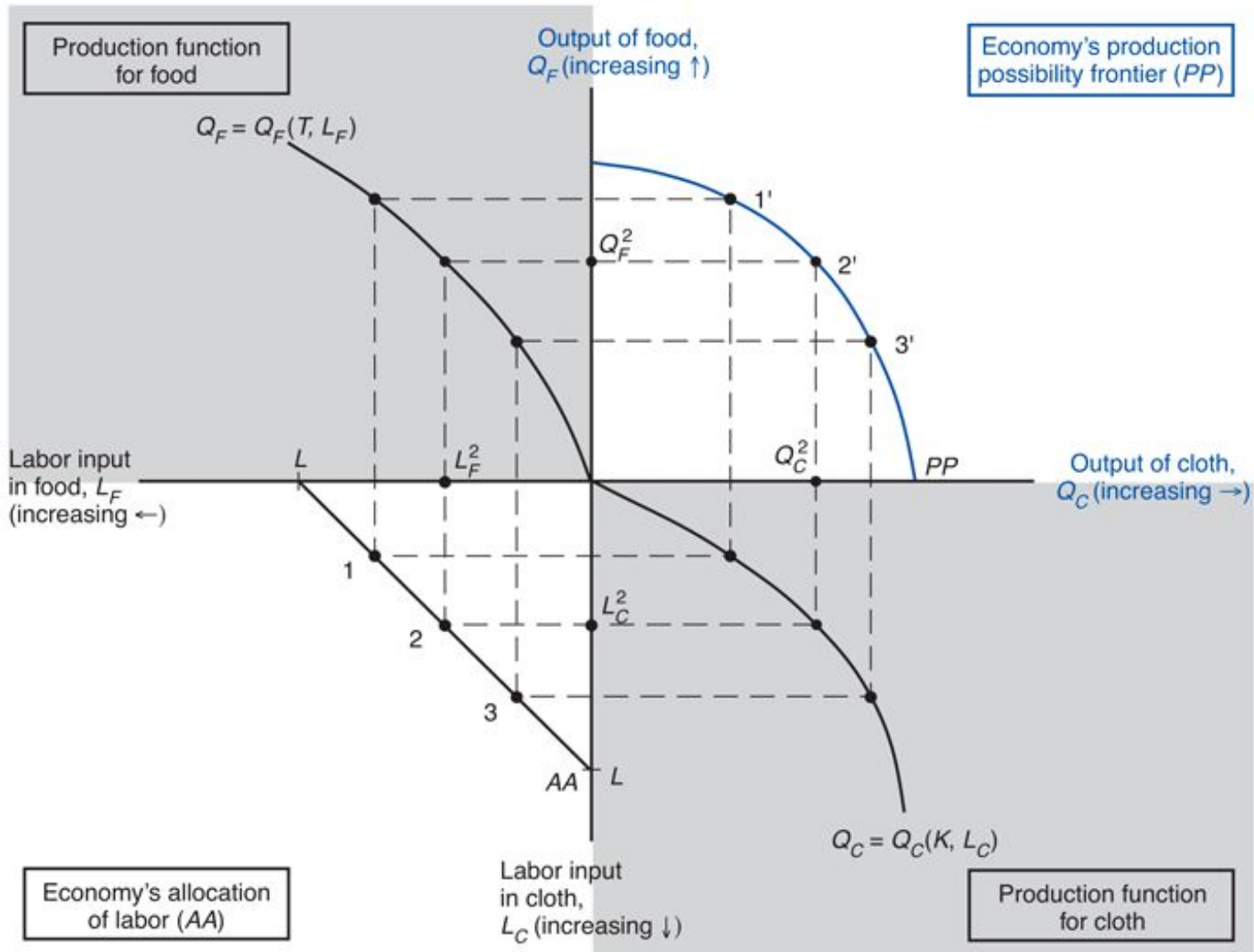
Production Possibilities (cont.)

- Use a four-quadrant diagram to construct production possibilities frontier in Figure 4-3.

  - Lower left quadrant indicates the allocation of labor.
  - Lower right quadrant shows the production function for cloth from Figure 4-1.
  - Upper left quadrant shows the corresponding production function for food.
  - Upper right quadrant indicates the combinations of cloth and food that can be produced.

Fig. 4-3: The Production Possibility Frontier in the Specific Factors Model

Production Possibilities (cont.)

- Why is the production possibilities frontier curved?
  - Diminishing returns to labor in each sector cause the opportunity cost to rise when an economy produces more of a good.
  - Opportunity cost of cloth in terms of food is the slope of the production possibilities frontier – the slope becomes steeper as an economy produces more cloth.

Production Possibilities (cont.)

- Opportunity cost of producing one more yard of cloth is MPL_F/MPL_C pounds of food.
  - To produce one more yard of cloth, you need $1/MPL_C$ hours of labor.
  - To free up one hour of labor, you must reduce output of food by MPL_F pounds.
  - To produce less food and more cloth, employ less in food and more in cloth.
    - The marginal product of labor in food rises and the marginal product of labor in cloth falls, so MPL_F/MPL_C rises.

Prices, Wages, and Labor Allocation

- How much labor is employed in each sector?
  - Need to look at supply and demand in the labor market.
- Demand for labor:
  - In each sector, employers will maximize profits by demanding labor up to the point where the value produced by an additional hour equals the marginal cost of employing a worker for that hour.

Prices, Wages, and Labor Allocation (cont.)

- The demand curve for labor in the cloth sector:

$$MPL_C \times P_C = w \qquad (4\text{-}4)$$

  - The wage equals the value of the marginal product of labor in manufacturing.

- The demand curve for labor in the food sector:

$$MPL_F \times P_F = w \qquad (4\text{-}5)$$

  - The wage equals the value of the marginal product of labor in food.

Prices, Wages, and Labor Allocation (cont.)

- Figure 4-4 represents labor demand in the two sectors.
- The demand for labor in the cloth sector is MPL_C from Figure 4-2 multiplied by P_C.
- The demand for labor in the food sector is measured from the right.
- The horizontal axis represents the total labor supply L.

Prices, Wages, and Labor Allocation (cont.)

- The two sectors must pay the same wage because labor can move between sectors.

- If the wage were higher in the cloth sector, workers would move from making food to making cloth until the wages become equal.

  - Or if the wage were higher in the food sector, workers would move in the other direction.

- Where the labor demand curves intersect gives the equilibrium wage and allocation of labor between the two sectors.
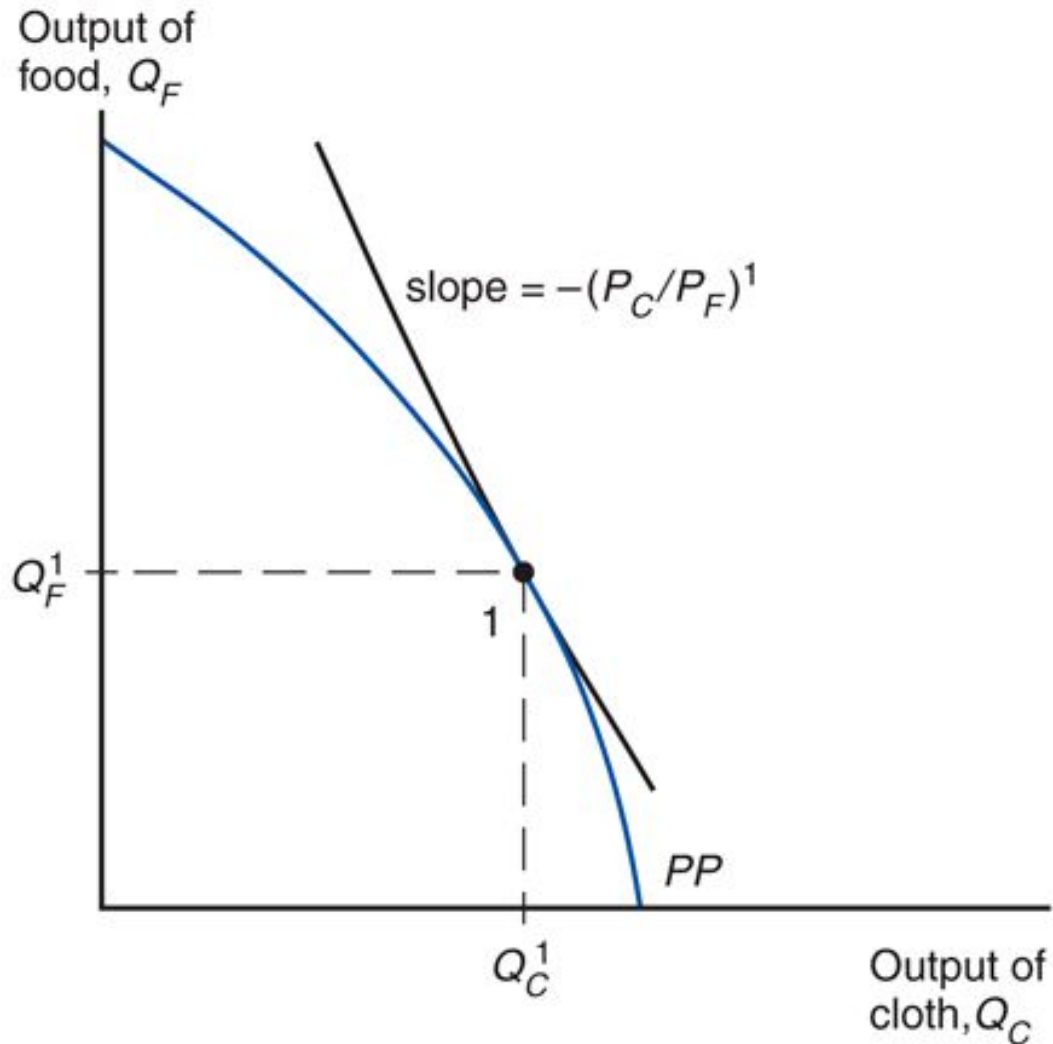
Fig. 4-4: The Allocation of Labor
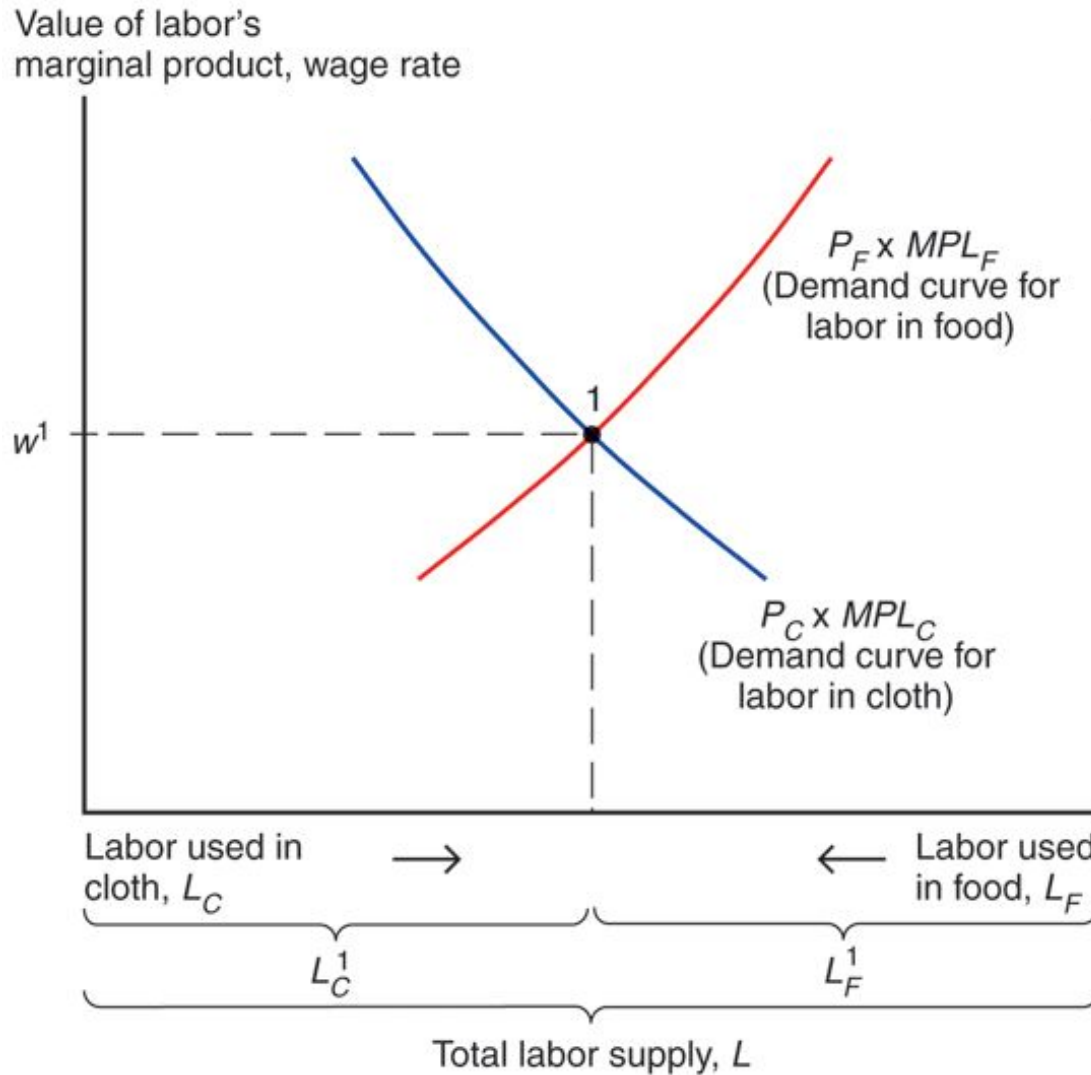
Prices, Wages, and Labor Allocation (cont.)

- At the production point, the production possibility frontier must be tangent to a line whose slope is minus the price of cloth divided by that of food.

- Relationship between relative prices and output:

$$-MPL_F/MPL_C = -P_C/P_F \quad (4\text{-}6)$$

Fig. 4-5: Production in the Specific Factors Model

Prices, Wages, and Labor Allocation (cont.)

- What happens to the allocation of labor and the distribution of income when the prices of food and cloth change?

- Two cases:
  1. An equal proportional change in prices
 2. A change in relative prices

Prices, Wages, and Labor Allocation (cont.)

- When both prices change in the same proportion, no real changes occur.
  - The wage rate (*w*) rises in the same proportion as the prices, so real wages (i.e., the ratios of the wage rate to the prices of goods) are unaffected.
  - The real incomes of capital owners and landowners also remain the same.

Fig. 4-6: An Equal-Proportional Increase in the Prices of Cloth and Food
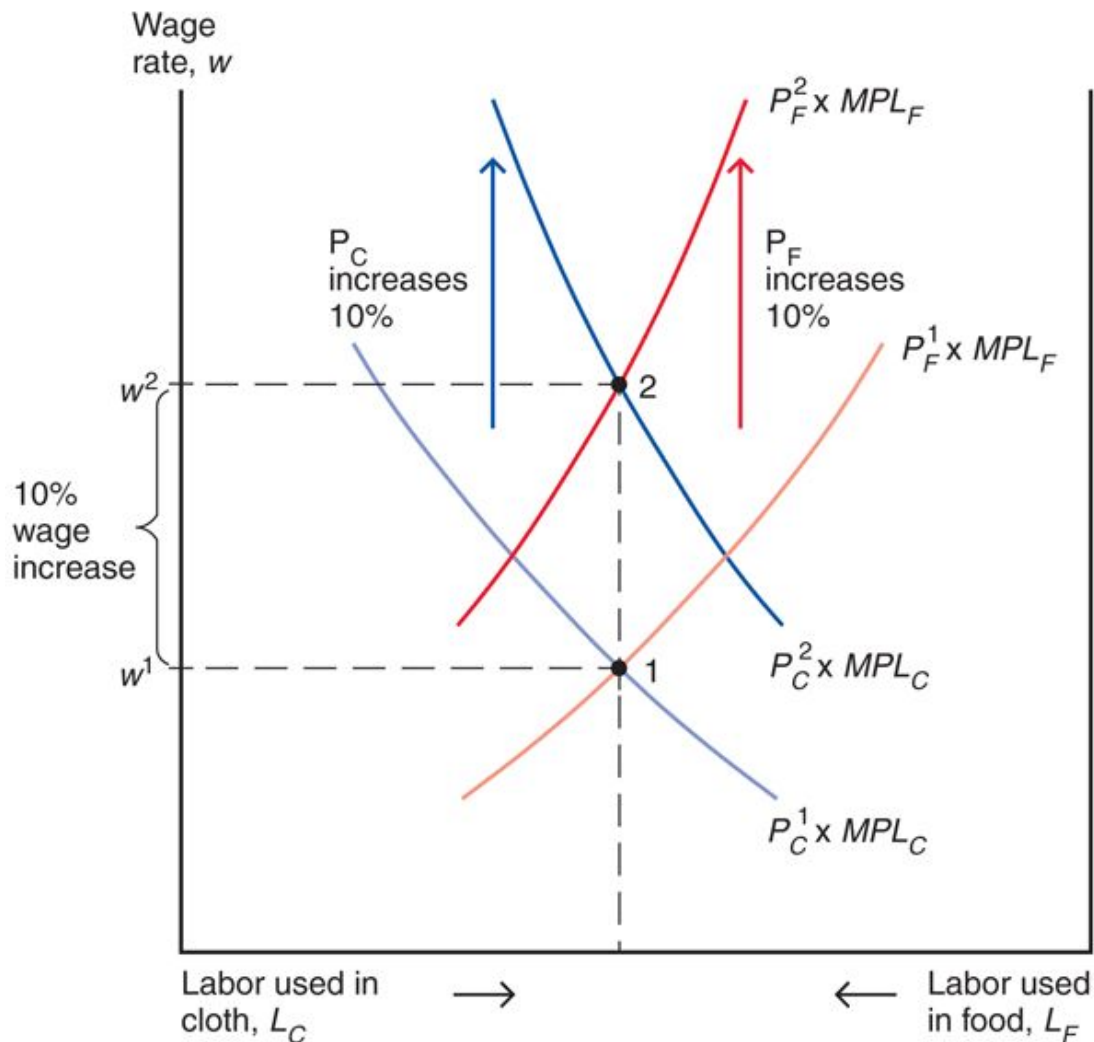
Prices, Wages, and Labor Allocation (cont.)

- When only P_C rises, labor shifts from the food sector to the cloth sector and the output of cloth rises while that of food falls.

- The wage rate (w) does not rise as much as P_C since cloth employment increases and thus the marginal product of labor in that sector falls.
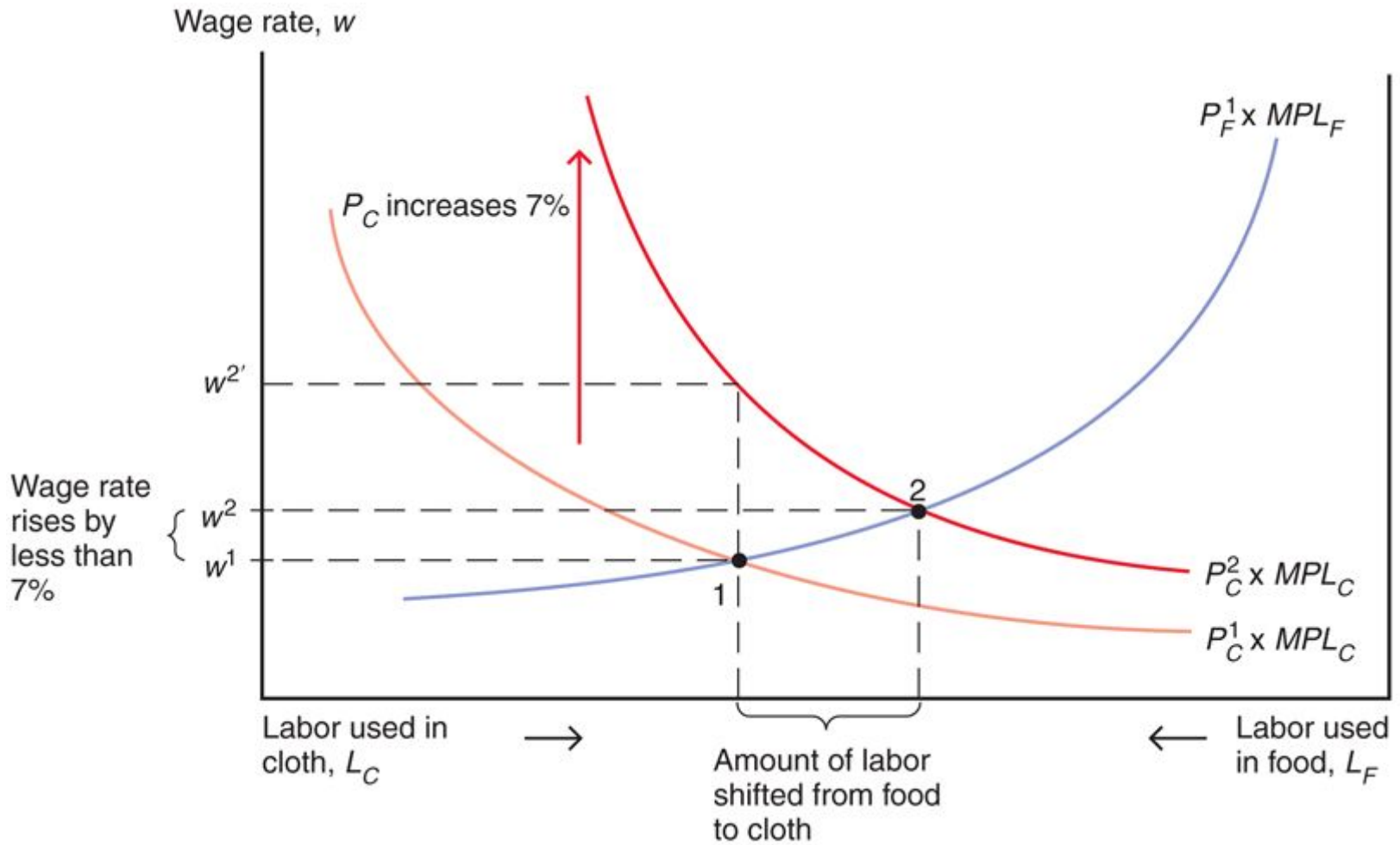
Fig. 4-7: A Rise in the Price of Cloth

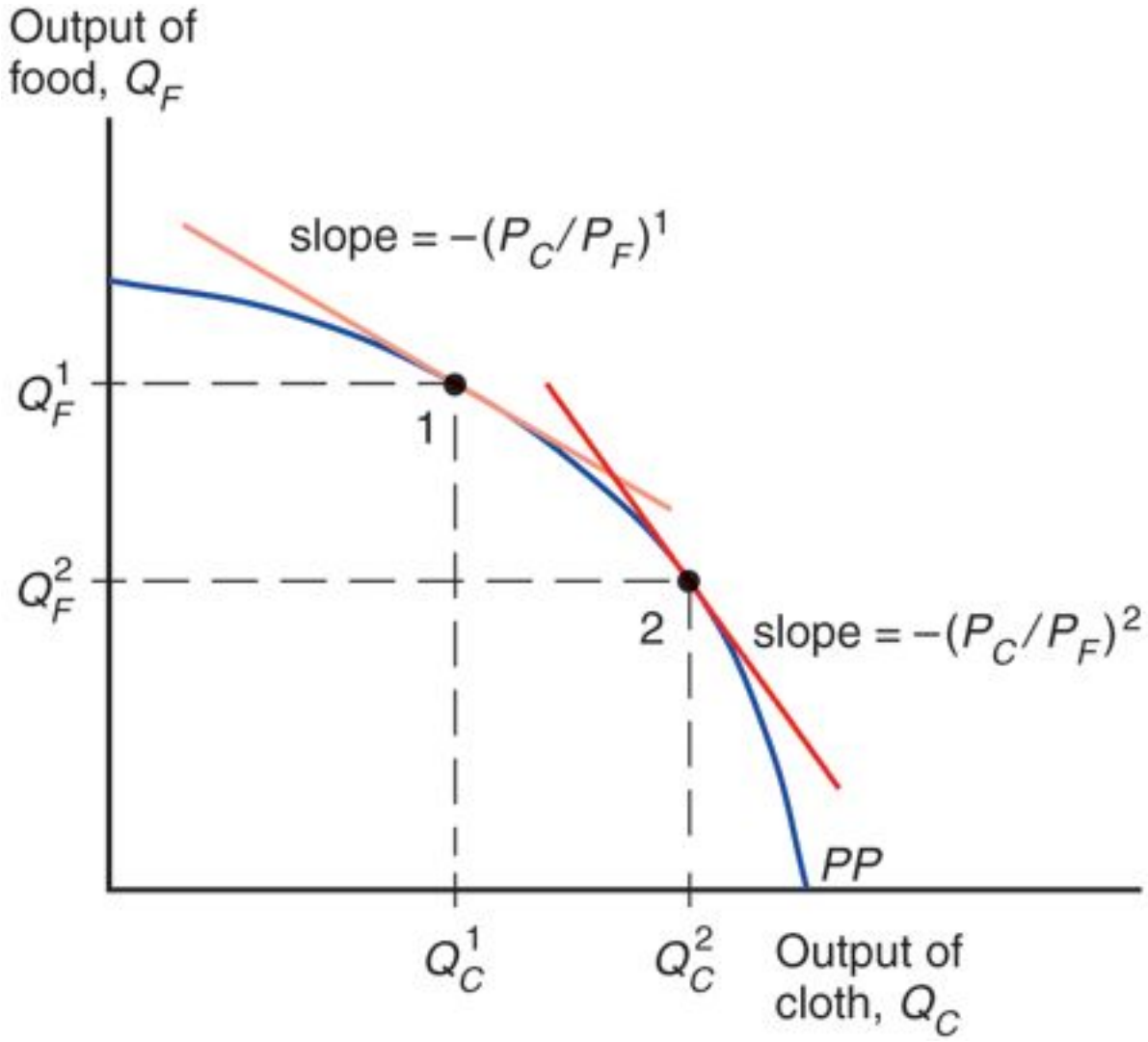# Fig. 4-8: The Response of Output to a Change in the Relative Price of Cloth
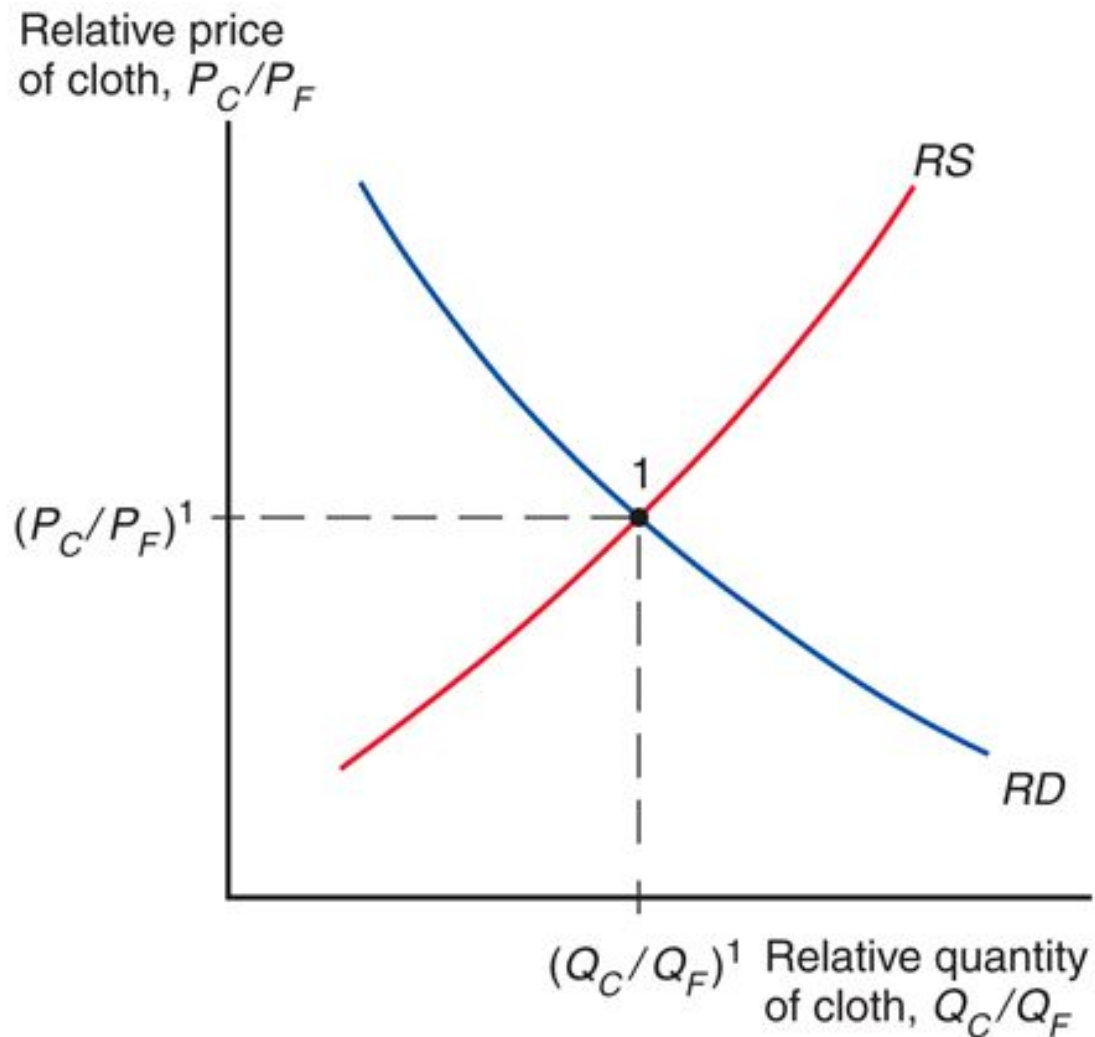
Fig. 4-9: Determination of Relative Prices

Prices, Wages, and Labor Allocation (cont.)

- Relative Prices and the Distribution of Income
  - Suppose that P_C increases by 10%. Then, the wage would rise by less than 10%.
- What is the economic effect of this price increase on the incomes of the following three groups?
  - Workers, owners of capital, and owners of land

Prices, Wages, and Labor Allocation (cont.)

- Owners of capital are definitely better off.
- Landowners are definitely worse off.
- Workers: cannot say whether workers are better or worse off:
  - Depends on the relative importance of cloth and food in workers' consumption.
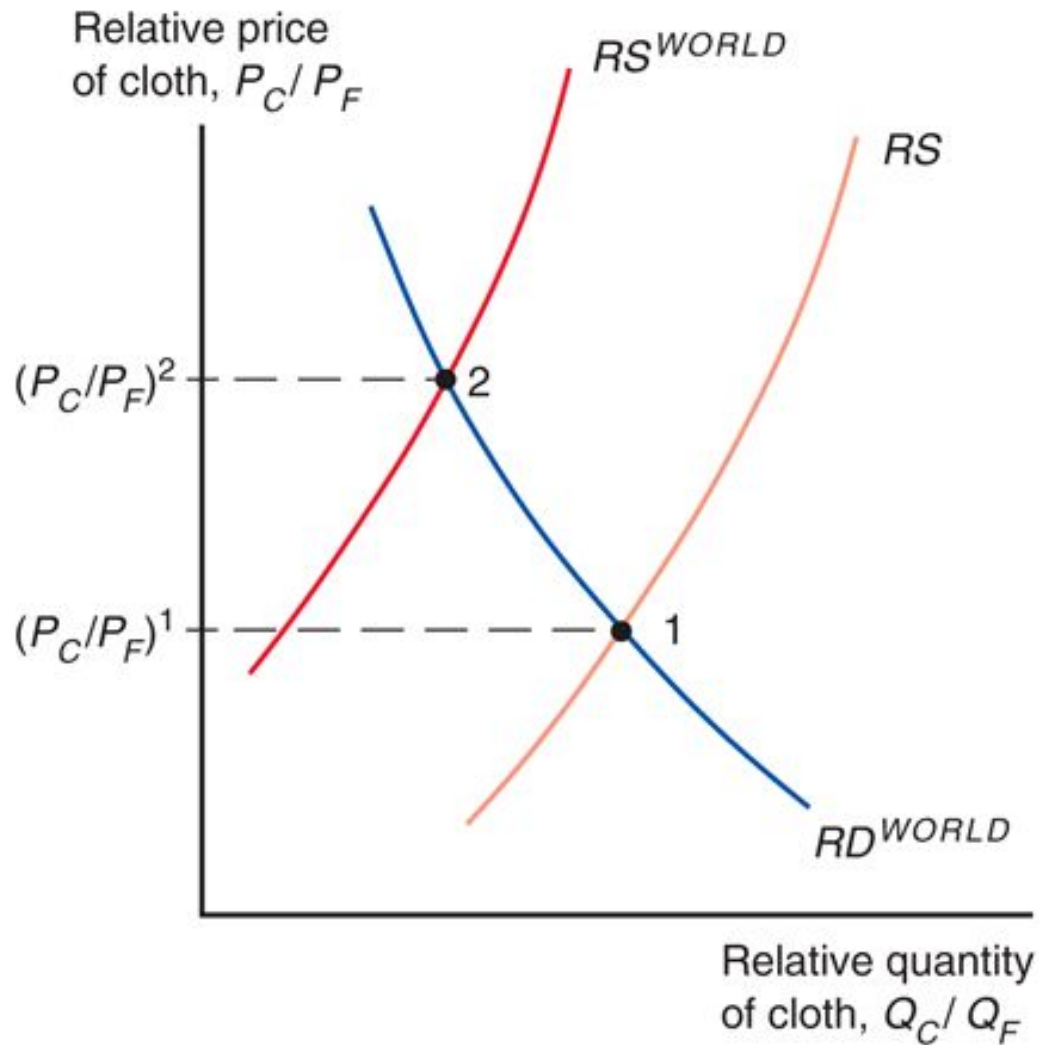
International Trade in the Specific Factors Model

- Trade and Relative Prices
  - The relative price of cloth prior to trade is determined by the intersection of the economy's relative supply of cloth and its relative demand.
  - Free trade relative price of cloth is determined by the intersection of world relative supply of cloth and world relative demand.
  - Opening up to trade increases the relative price of cloth in an economy whose relative supply of cloth is larger than for the world as a whole.

Fig. 4-10: Trade and Relative Prices

International Trade in the Specific Factors Model (cont.)

- Gains from trade
  - Without trade, the economy's output of a good must equal its consumption.
  - International trade allows the mix of cloth and food consumed to differ from the mix produced.
  - The country cannot spend more than it earns:

    $P_C \times D_C + P_F \times D_F = P_C \times Q_C + P_F \times Q_F$

International Trade in the Specific Factors Model (cont.)

- The economy as a whole gains from trade.
  - It imports an amount of food equal to the relative price of cloth times the amount of cloth exported:

    $D_F - Q_F = (P_C / P_F) \times (Q_C - D_C)$

  - It is able to afford amounts of cloth and food that the country is not able to produce itself.
  - The budget constraint with trade lies above the production possibilities frontier in Figure 4-11.

Fig. 4-11: Budget Constraint for a Trading Economy and Gains from Trade