Trade Under Increasing Returns to Scale

Increasing returns to scale

- The Ricardian and Heckscher-Ohlin theories both assume that the technology for the production of a good is characterized by constant returns to scale
- In the 1970s, economists built formal theories of trade that instead assumed increasing returns to scale

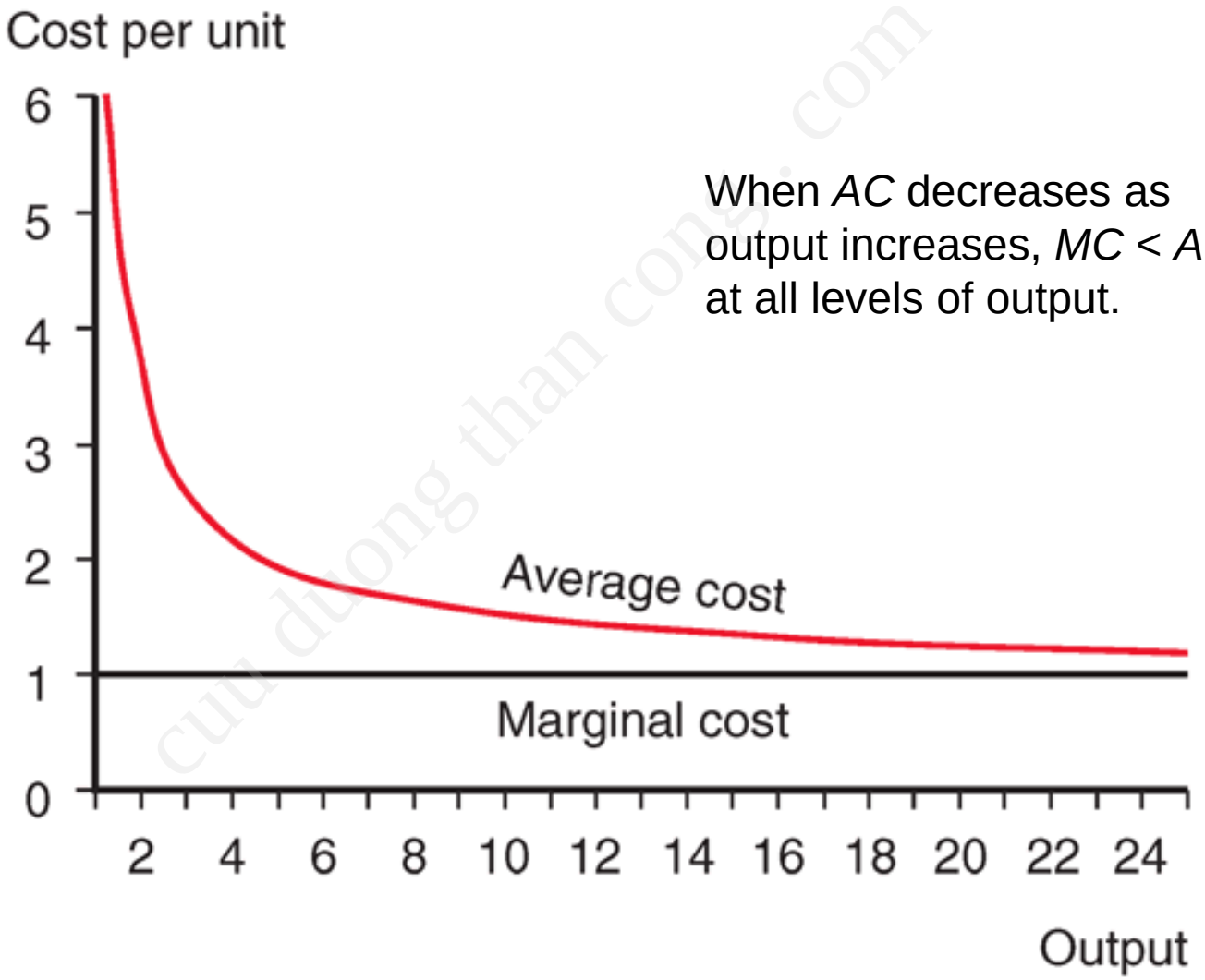
Increasing returns to scale

- Under increasing returns to scale, if quantities employed of all resources are, say, quadrupled, then the quantities produced will *more than* quadruple
- Therefore, when resource costs, say, quadruple, output will more than quadruple
- Therefore, cost per unit produced—also called average cost—decreases as output increases

Increasing returns to scale

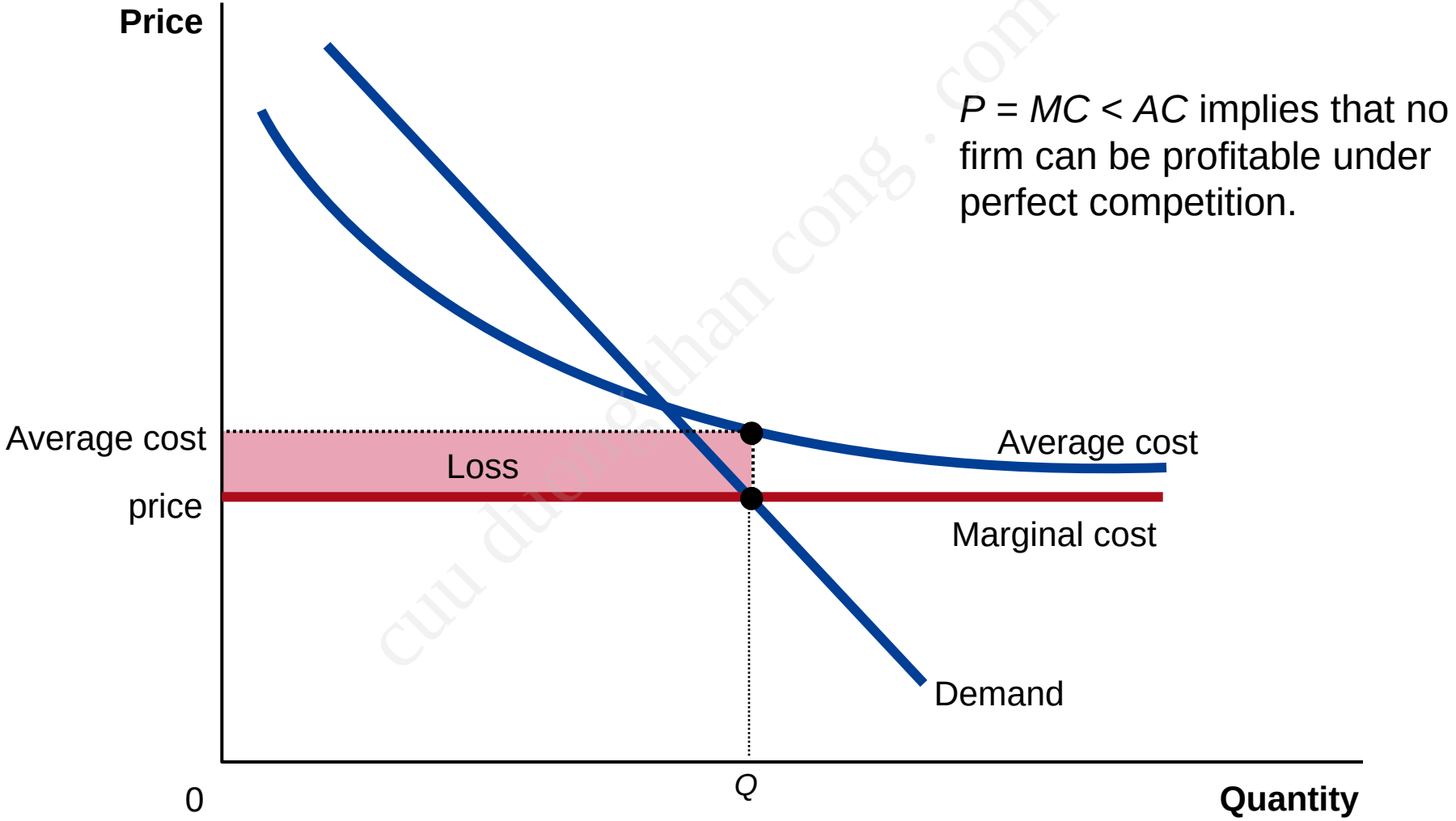
- The technology for the production of a commodity is said to show increasing returns to scale if a doubling of the resources used in production causes production to more than double
- This implies that the *per unit* cost of production will be lower when 20 units are produced than when 10 units are produced
- In other words, increasing returns to scale means that bulk production is cheaper production

Fig. 6-2: Average Versus Marginal Cost



When *AC* decreases as output increases, *MC* < *AC* at all levels of output.

Increasing returns to scale cannot coexist with perfect competition



P = *MC* < *AC* implies that no firm can be profitable under perfect competition.

Monopolistic Competition

- We have assumed increasing returns to scale
- Increasing returns to scale cannot coexist with perfect competition
- Therefore, we must assume imperfect competition

Monopolistic Competition

- Specifically, we assume that
  - there is one differentiated good
  - The industry has many firms
  - each firm produces a unique variety of the differentiated good
- We assume that this industry is characterized by monopolistic competition, which is an important form of imperfect competition

Monopolistic Competition

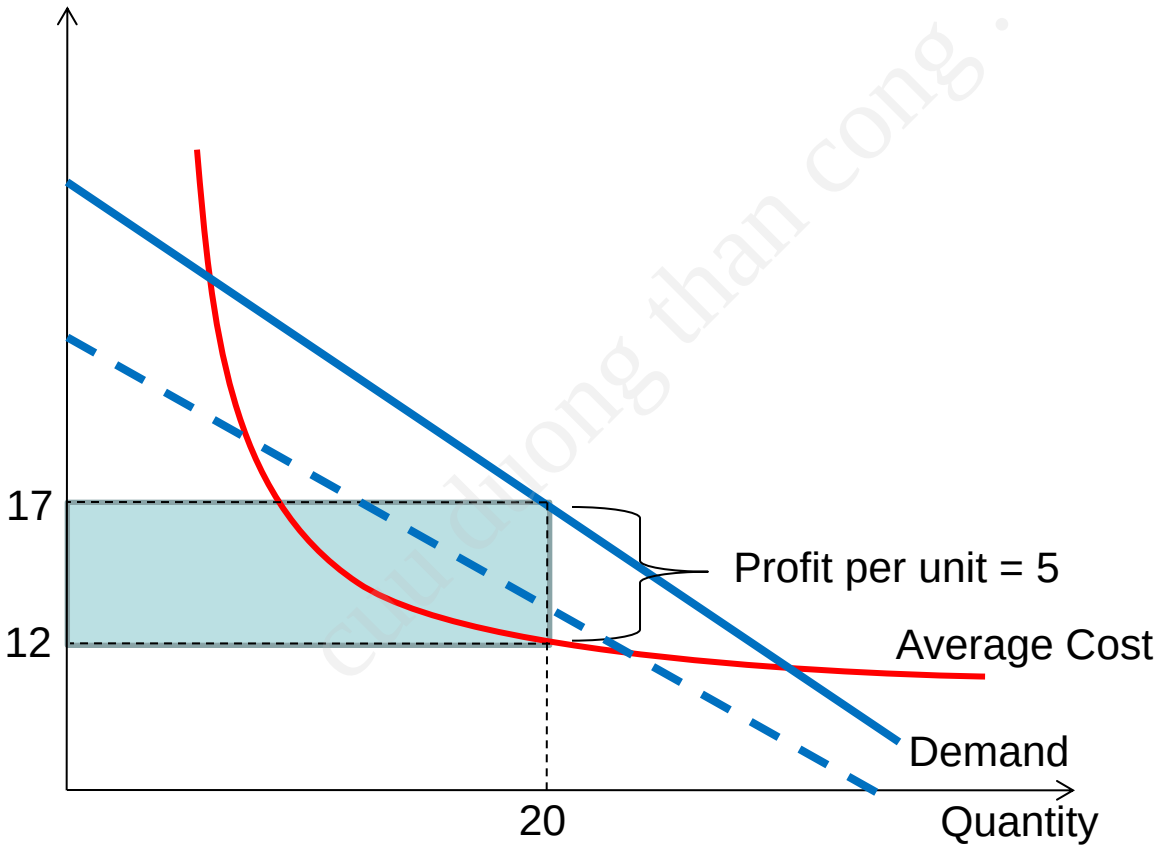
- Under **monopolistic competition,**

1. Each firm in an industry can differentiate its product from the products of its competitors.
   - Each firm sells a product that is somewhat unique
   - Each firm faces a downward sloping demand curve
2. Each firm ignores the impact that changes in its price will have on the prices that competitors set
   - even though each firm faces competition it behaves as if it were a monopolist.

Monopolistic Competition (cont.)

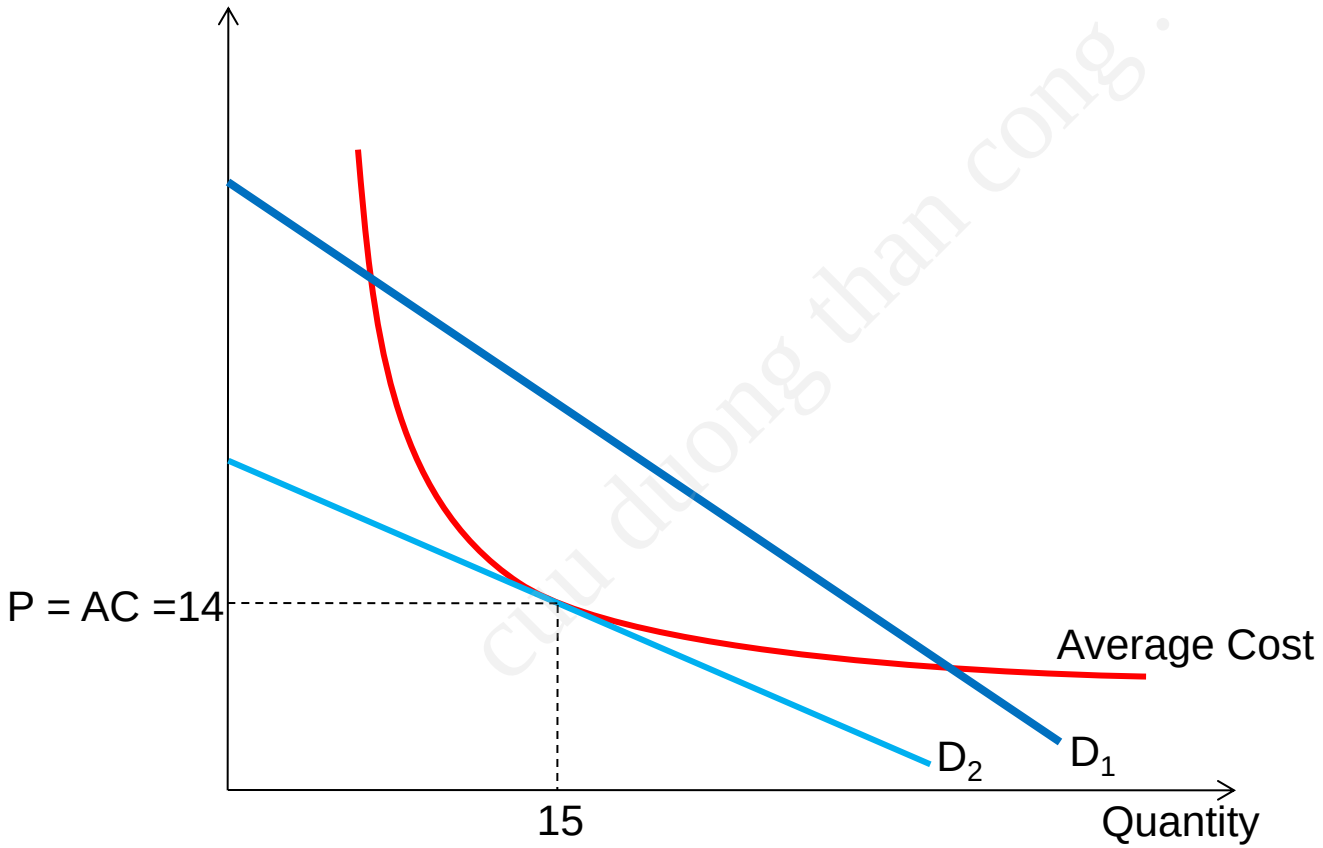
- A firm in a monopolistically competitive industry is expected:
  - to sell more as total sales in the industry increase and as prices charged by rivals increase.
  - to sell less as the number of firms in the industry decreases and as its price increases.
- Each firm's demand curve becomes more elastic (flatter) as the number of competitors (firms in the same industry) increases

Typical firm's production and pricing



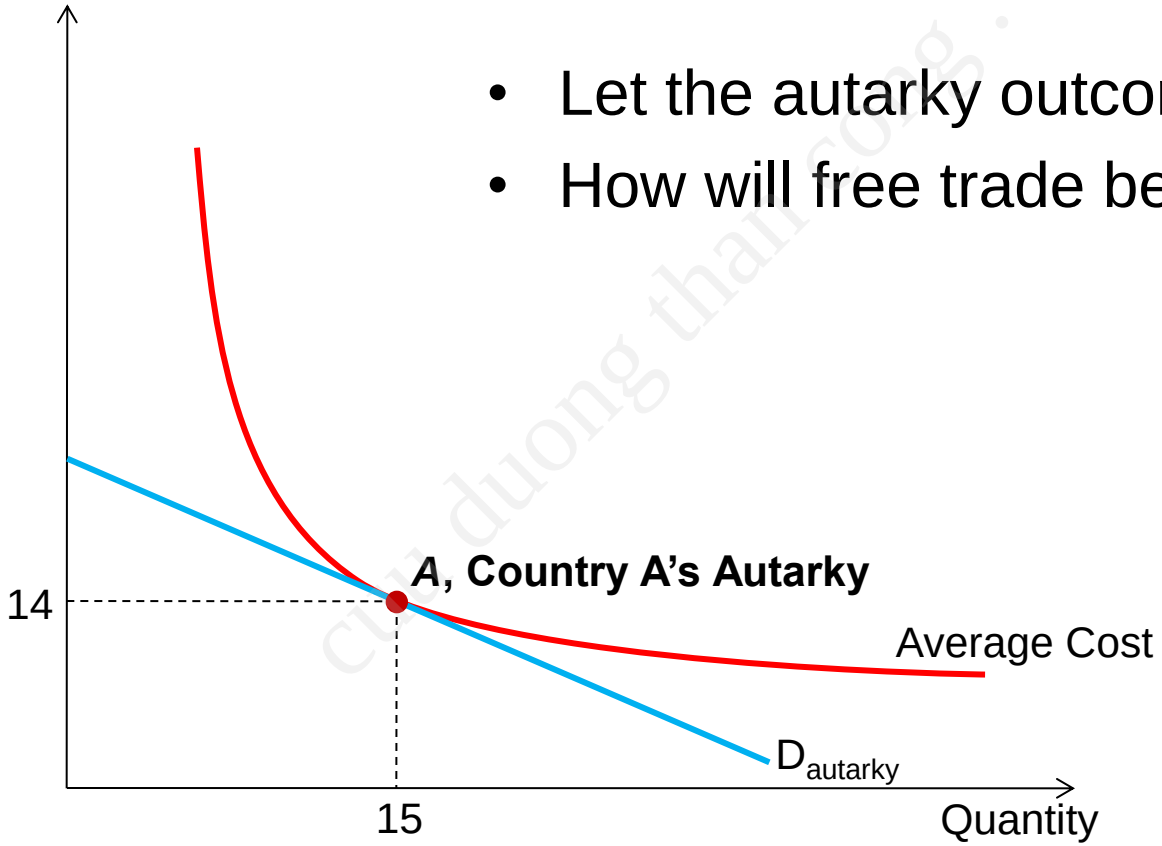
- This diagram proves that whenever a firm's demand curve touches its average cost curve at more than one point, the firm will surely enjoy positive profits
- This will induce the entry of competitors,
- Which will reduce the firm's demand

Typical firm's production and pricing



- The entry of competitors will continue to reduce the firm's demand till demand is tangent to the average cost curve and positive profits are no longer possible
- The entry of competitors will also make demand flatter

Typical firm's production and pricing—autarky

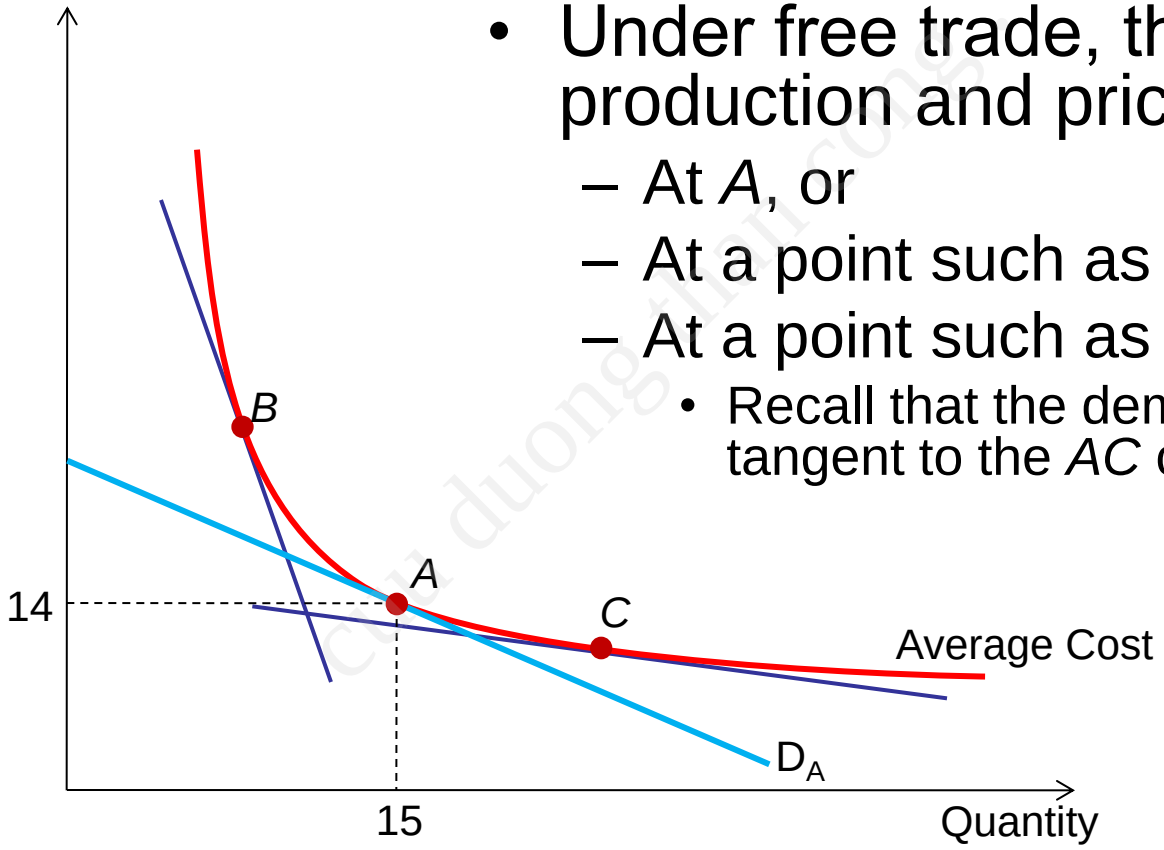


- Let the autarky outcome be as shown
- How will free trade be different?

Free trade

- Under free trade, every firm, irrespective of which country it is located in, will have the same number of competitors
- Therefore, every firm's demand will be just as flat as every other firm's demand
- As each firm's demand must be tangent to its average cost (AC) curve in equilibrium, and as all firms have the same AC curve,
- Under free trade, every firm, irrespective of which country it is located in, will be on the same point on its AC curve
- The question is, Which point will it be?

Typical firm's production and pricing—free trade

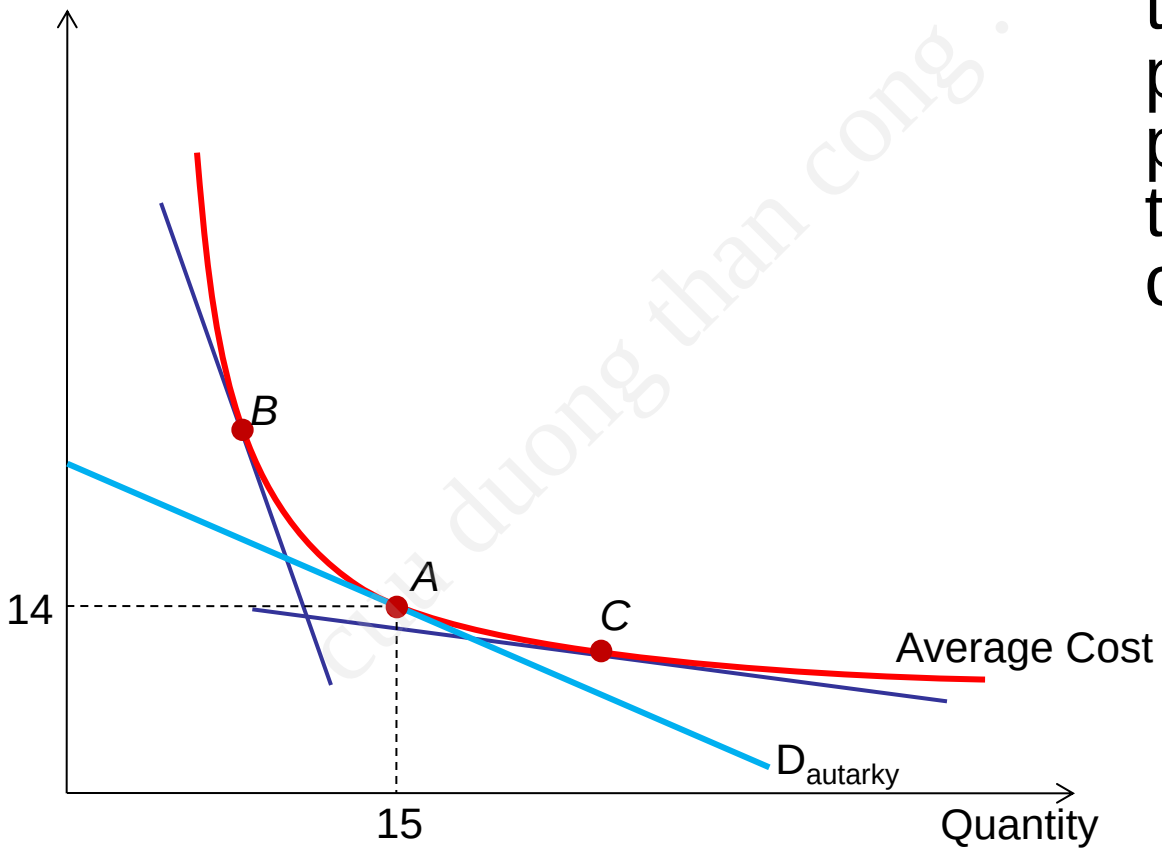


- Under free trade, the typical firm's production and price could be
  - At *A*, or
  - At a point such as *B*, or
  - At a point such as *C*.
    - Recall that the demand curve must be tangent to the *AC* curve in equilibrium

Free trade increases market size—assumption

- It is reasonable to assume that total industry output worldwide will be higher under free trade than under autarky in just one country
  - Total industry output = typical firm's output × number of firms in the industry

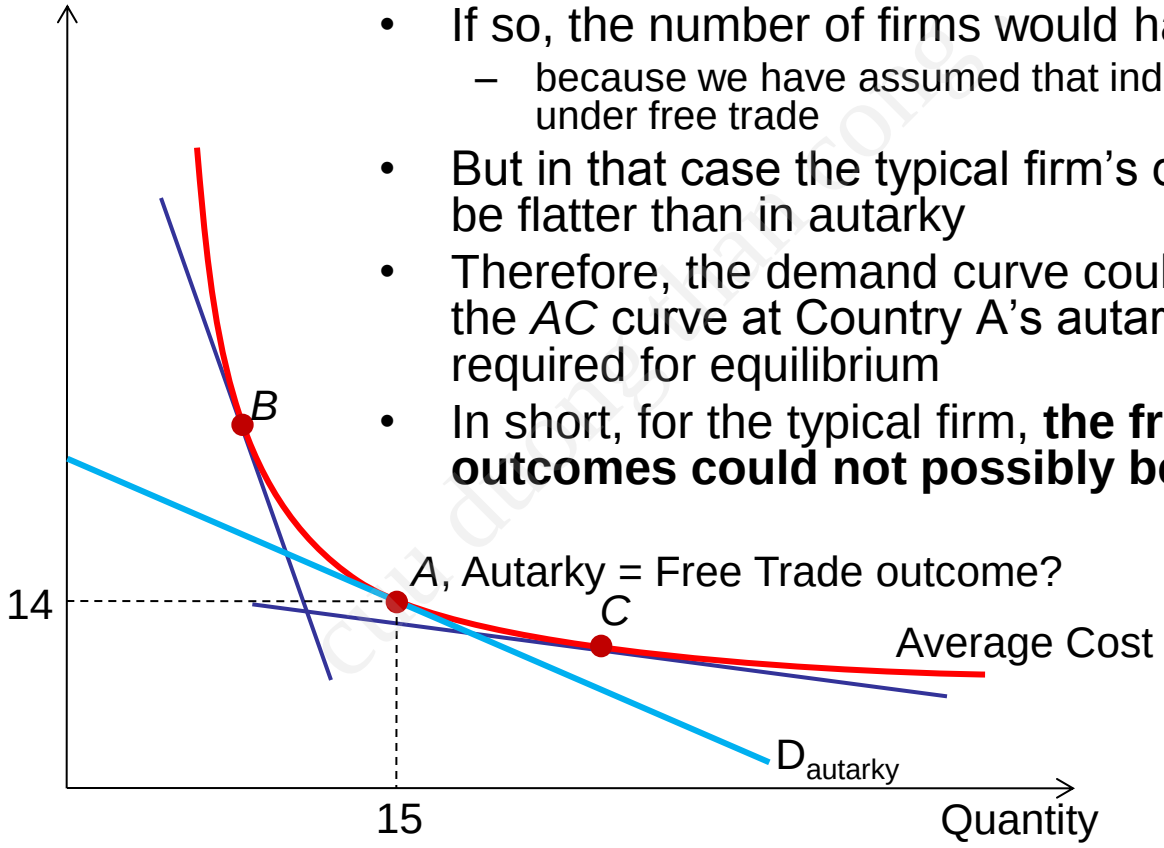
Typical firm's production and pricing—free trade



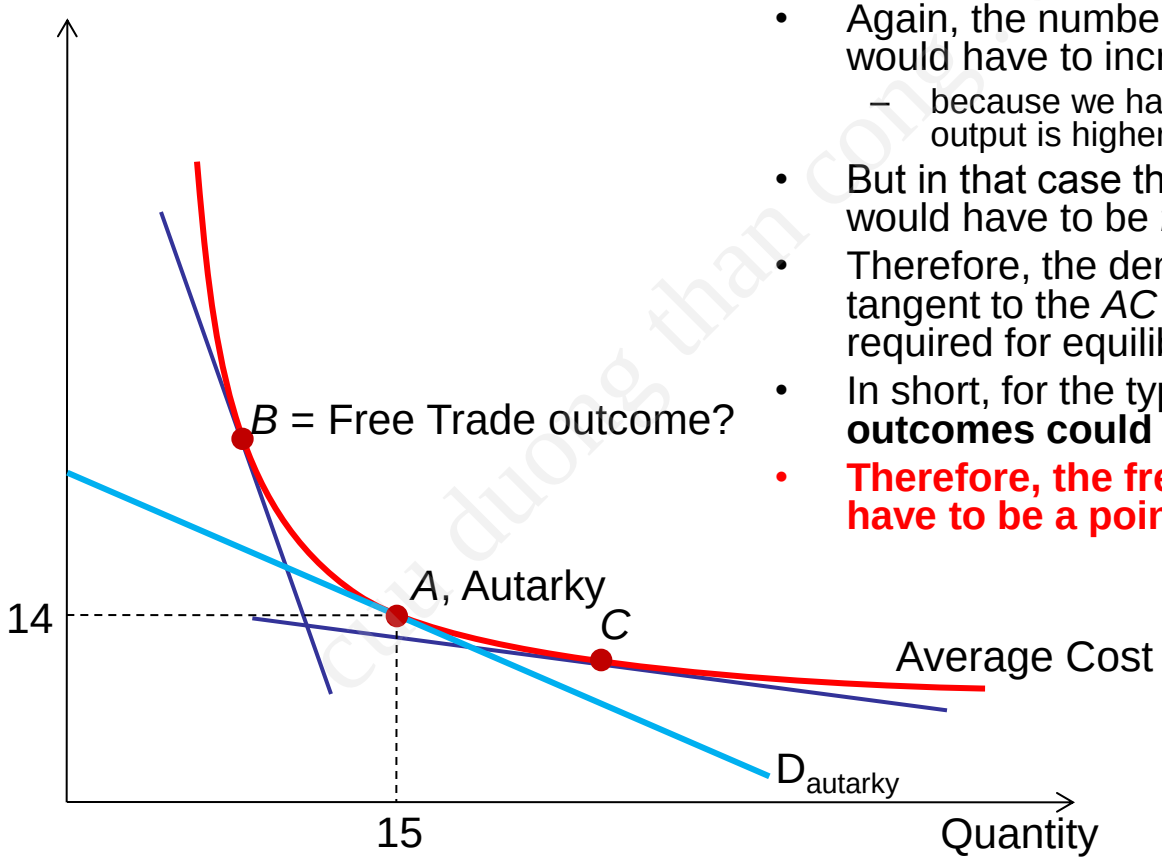
- Under free trade, the production and price for a typical firm could be
  - At *A*, Country A's autarky outcome, or
  - At a point such as *B*, or
  - At a point such as *C*.

Typical firm's production and pricing—free trade

- Could the typical firm's production and price under free trade be at *A*?
- If so, the number of firms would have to increase
  - because we have assumed that industry output is higher under free trade
- But in that case the typical firm's demand would have to be flatter than in autarky
- Therefore, the demand curve could not be tangent to the *AC* curve at Country A's autarky outcome, as is required for equilibrium
- In short, for the typical firm, **the free trade and autarky outcomes could not possibly be identical**



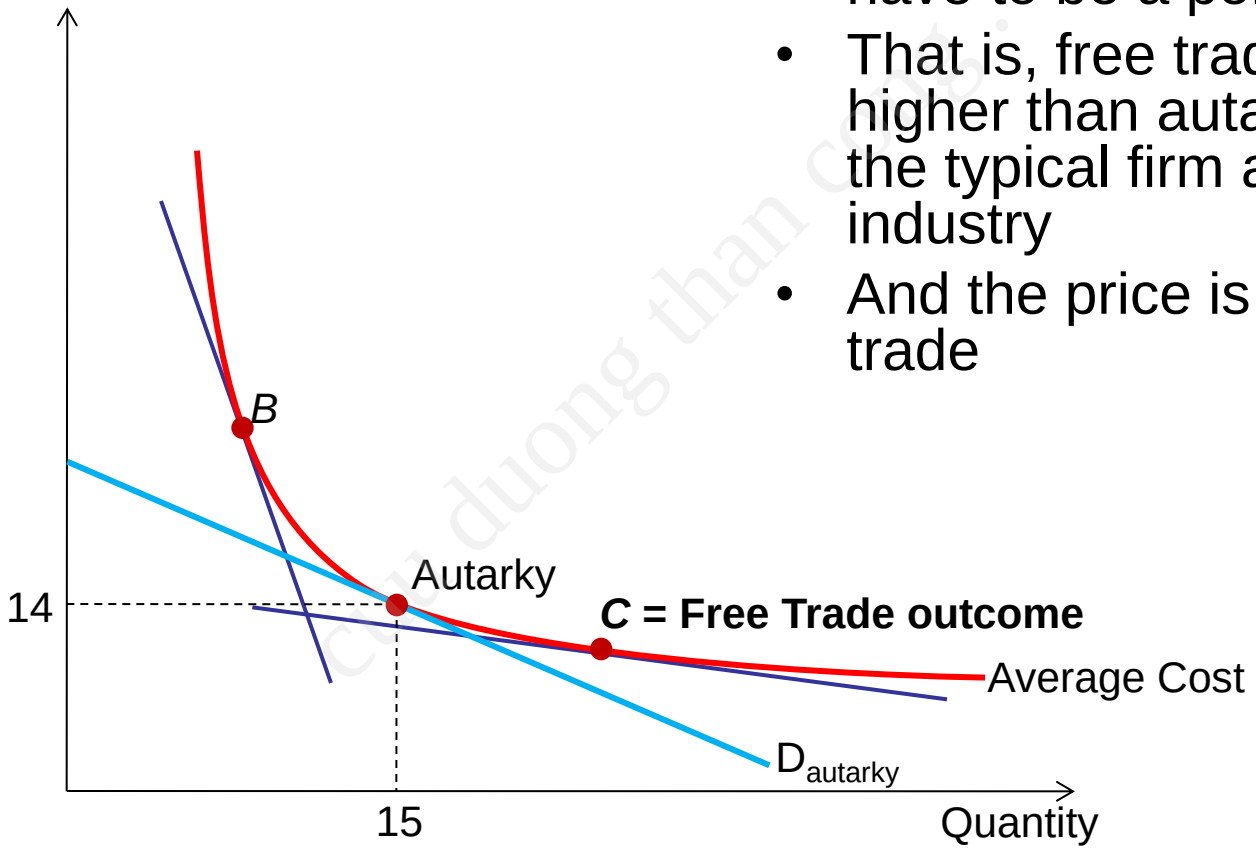
Typical firm's production and pricing—free trade



- Could the typical firm's production and price under free trade be point *B*?
- Again, the number of firms in the industry would have to increase
  - because we have assumed that industry output is higher under free trade
- But in that case the typical firm's demand would have to be *flatter* than in autarky
- Therefore, the demand curve could not be tangent to the *AC* curve at point *B*, as is required for equilibrium
- In short, for the typical firm, **the free trade outcomes could *not* be a point such as *B***
- **Therefore, the free trade outcome would have to be a point such as *C*.**

Typical firm's production and pricing—free trade

- The free trade outcome would have to be a point such as *C*.
- That is, free trade output is higher than autarky output for the typical firm as well as the industry
- And the price is lower in free trade



Trade Leads to Specialization

- IRS means that large-scale production is cheaper than small-scale production. Therefore,
- Trade under IRS generally has one country specializing in the production of one good and the other country specializing in the production of the other good.

Trade = Greater Variety

- In autarky, a country would be able to produce only a few brands of, for instance, cars, because if many brands are produced in autarky, each brand would have to be produced in small-scale and that would usually be very expensive.
- Under free trade, on the other hand, each country can bulk produce just a few brands for customers all over the world and, in this way, more brands of cars would be available to consumers everywhere at prices they can afford

Similarity = Trade

- Even identical countries may trade
- This could happen simply because their technologies may have increasing returns to scale (IRS)

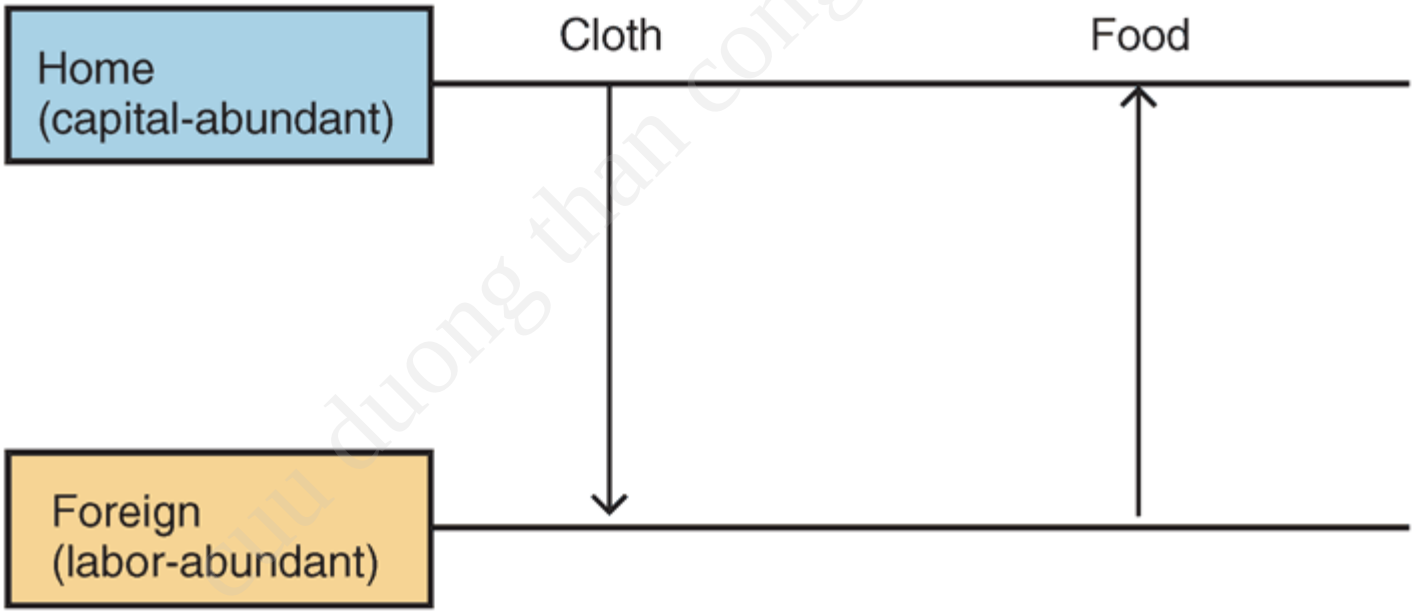
Monopolistic Competition and Trade

- As a result of trade, the number of firms in a new international industry is predicted to increase relative to each national market.
  - But it is unclear if firms will locate in the domestic country or foreign countries.

Inter-industry Trade

- According to the Heckscher-Ohlin model or Ricardian model, countries specialize in production.
  - Trade occurs only *between* industries: **inter-industry trade**
- In a Heckscher-Ohlin model suppose that:
  - The capital abundant domestic economy specializes in the production of capital intensive cloth, which is imported by the foreign economy.
  - The labor abundant foreign economy specializes in the production of labor intensive food, which is imported by the domestic economy.

Fig. 6-6: Trade in a World Without Increasing Returns



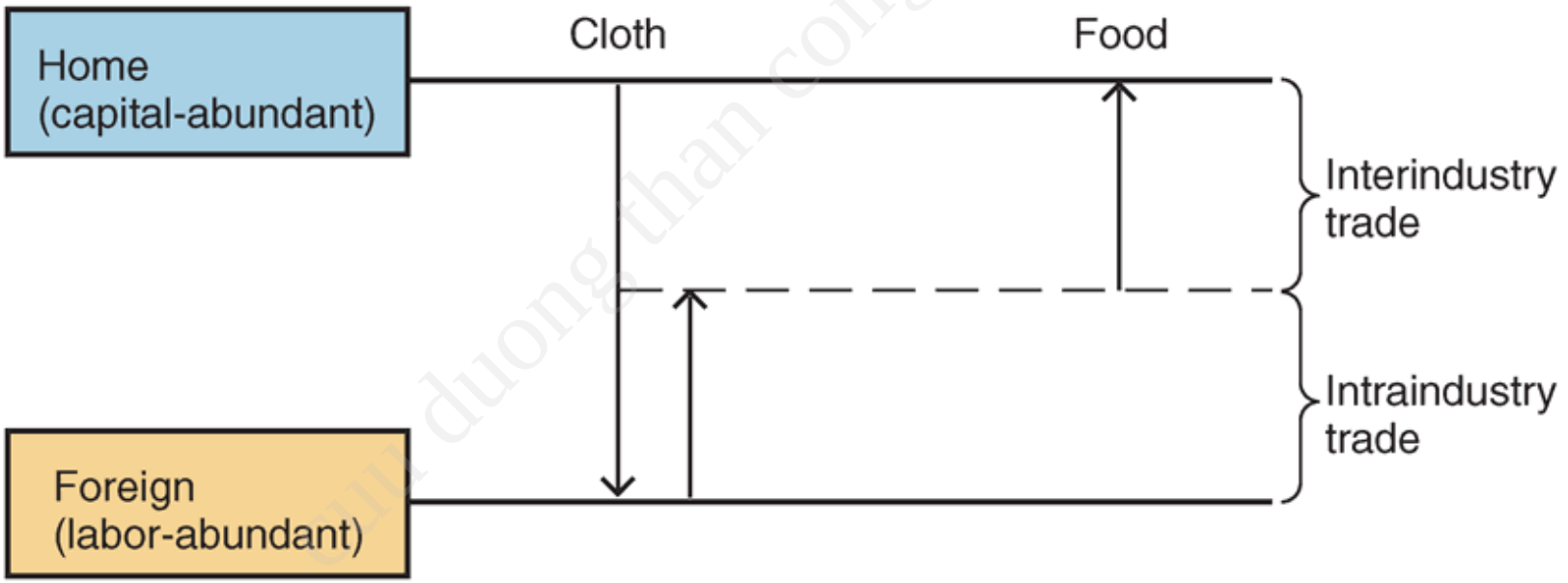
Intra-industry Trade

- Suppose now that the global cloth industry is described by the monopolistic competition model.
- Because of product differentiation, suppose that each country produces different types of cloth.
- Because of economies of scale, large markets are desirable: the foreign country exports some cloth and the domestic country exports some cloth.
  - Trade occurs *within* the cloth industry: **intra-industry trade**

Intra-industry Trade (cont.)

- If domestic country is capital abundant, it still has a comparative advantage in cloth.
  - It should therefore export more cloth than it imports.
- Suppose that the trade in the food industry continues to be determined by comparative advantage.

Fig. 6-7: Trade with Increasing Returns and Monopolistic Competition



Inter-industry and Intra-industry Trade

1. Gains from inter-industry trade reflect comparative advantage.
2. Gains from intra-industry trade reflect economies of scale (lower costs) and wider consumer choices.
3. The monopolistic competition model does not predict in which country firms locate, but a comparative advantage in producing the differentiated good will likely cause a country to export more of that good than it imports.

Inter-industry and Intra-industry Trade (cont.)

4. The relative importance of intra-industry trade depends on how similar countries are.
   - Countries with *similar* relative amounts of factors of production are predicted to have *intra-industry trade*.
   - Countries with *different* relative amounts of factors of production are predicted to have *inter-industry trade*.
5. Unlike inter-industry trade in the Heckscher-Ohlin model, income distribution effects are not predicted to occur with intra-industry trade.

Inter-industry and Intra-industry Trade (cont.)

- About 25% of world trade is intra-industry trade according to standard industrial classifications.
  - But some industries have more intra-industry trade than others: those industries requiring relatively large amounts of skilled labor, technology, and physical capital exhibit intra-industry trade for the U.S.
  - Countries with similar relative amounts of skilled labor, technology, and physical capital engage in a large amount of intra-industry trade with the U.S.