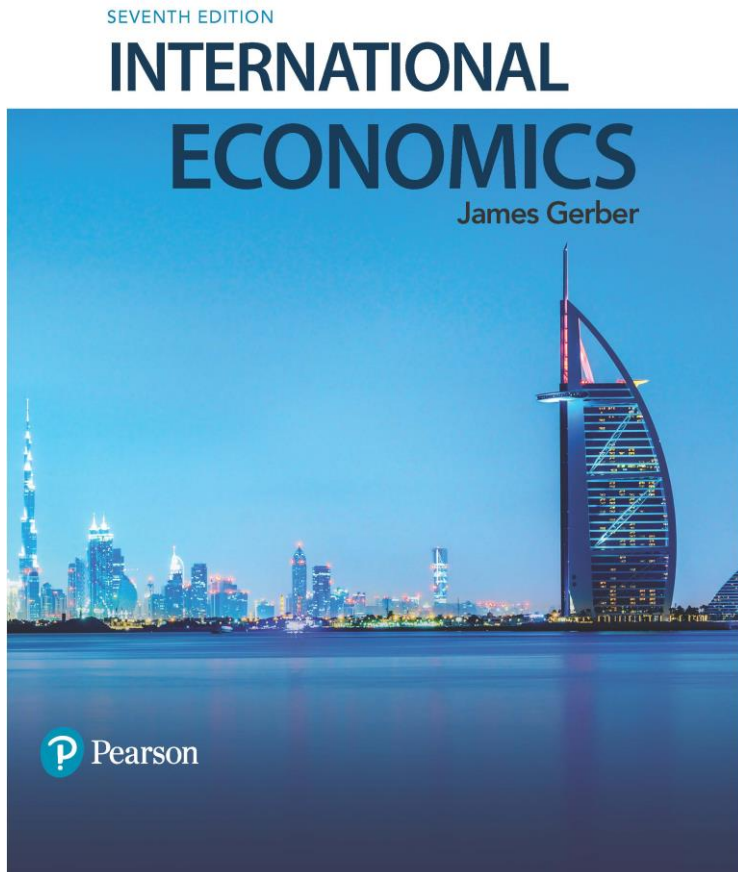


International Economics

Seventh Edition

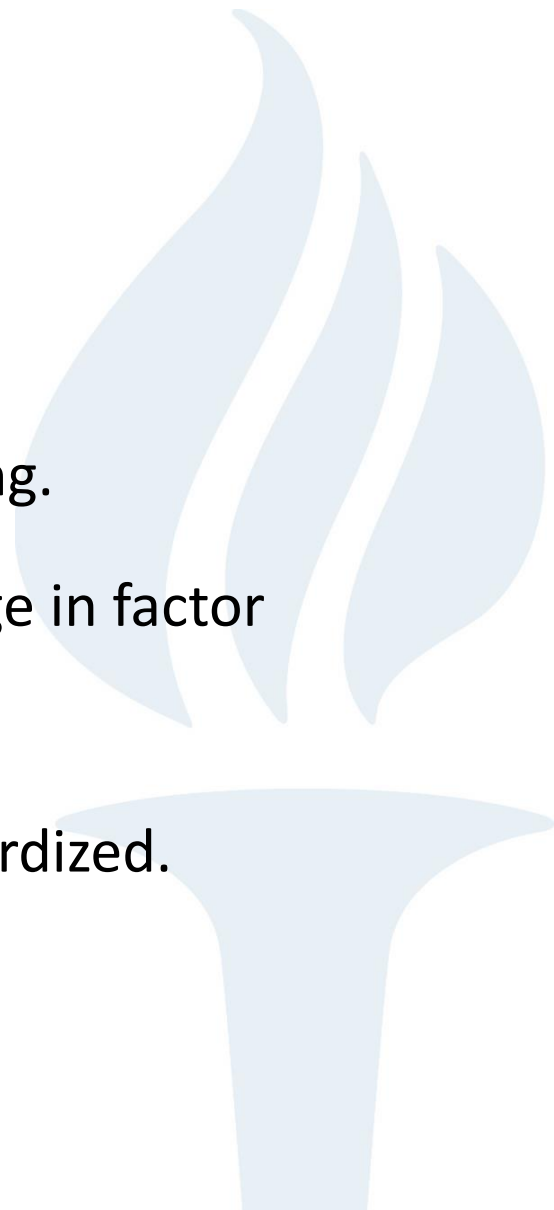


Chapter 4

Comparative Advantage and Factor Endowments

Learning Objectives

- Heckscher-Ohlin Trade Model.
- Diagram and show gains from trade.
- Impacts on different factors of trade-opening.
- Impacts on trade and production of a change in factor endowments.
- The cycle of a product as it becomes standardized.
- Foreign investment and foreign trade.



Modern Trade Theory

- Ricardian: With the **same type of input**, the difference in countries' output productivities leads to comparative advantage.

Labor



Modern Trade Theory


- This lecture: comparative advantage depends on a country's endowment of various **inputs** (factors of production).

Labor

Capital



The Heckscher-Ohlin Trade Model

- Eli Heckscher and Bertil Ohlin: 20th century Swedish economists.
 - Best known for their model explaining patterns of international trade.
 - Also called the factor proportions model.
 - HO Model idea: The relative abundance of different factors of production (inputs) determine which country has a comparative advantage in which goods.
- 

The Heckscher-Ohlin Trade Model

- The HO Model: $2 \times 2 \times 2$
 - 2 inputs, called labor and capital.
 - 2 outputs, called bread and steel.
 - 2 countries, called the U.S. and Canada.
- Relative factor endowments are the ratios of capital to labor.
 - Written: K/L

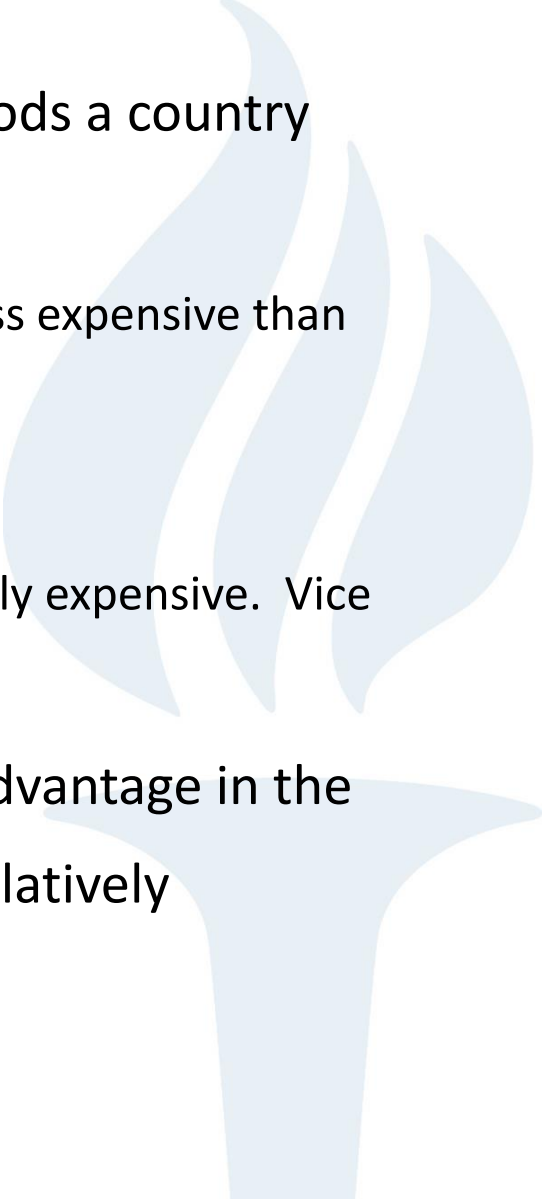


The Heckscher-Ohlin Trade Model

	United States	Canada
Capital	50 machines	2 machines
Labor	150 workers	10 workers

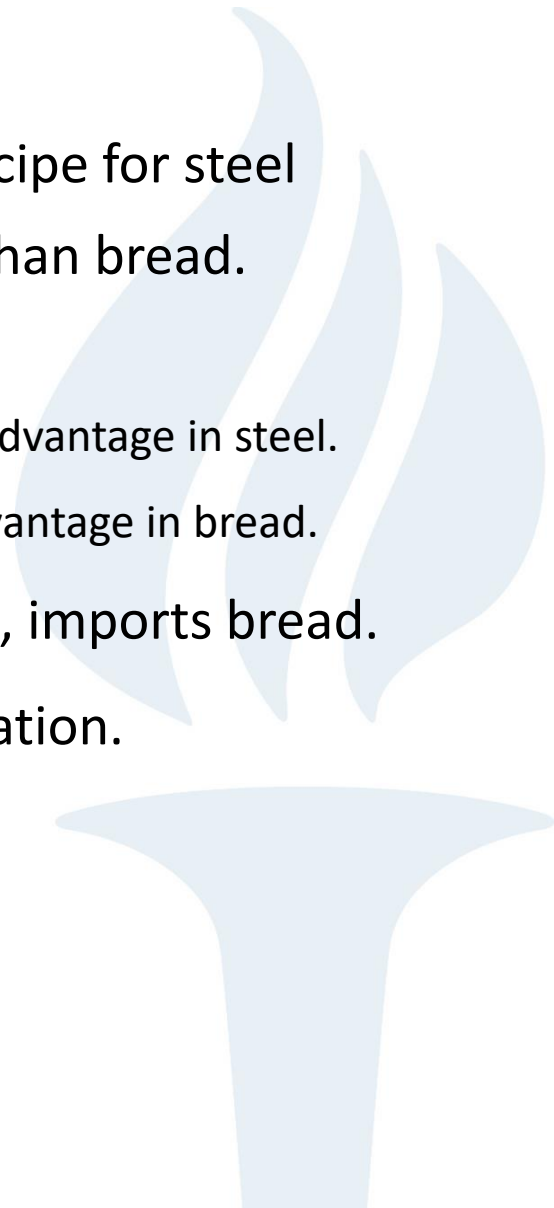
- **Factor abundance** depends on the ratios of K to L.
 - $K_{CA} / L_{CA} = 2 / 10 = 1/5$.
 - $K_{US} / L_{US} = 50 / 150 = 1/3$.
- Since $K_{US} / L_{US} > K_{CA} / L_{CA}$ the US is capital abundant compared to Canada and Canada is labor abundant compared to the U.S.

The Heckscher-Ohlin Trade Model

- Relative factor abundance determines which goods a country will export and import.
 - Relative abundance means the input is relatively less expensive than the other input.
 - Relative scarcity means the opposite.
 - Capital is relatively cheap in the US, labor is relatively expensive. Vice versa for Canada.
 - HO Model: Countries will have a comparative advantage in the production of goods that intensively use their relatively abundant factor.
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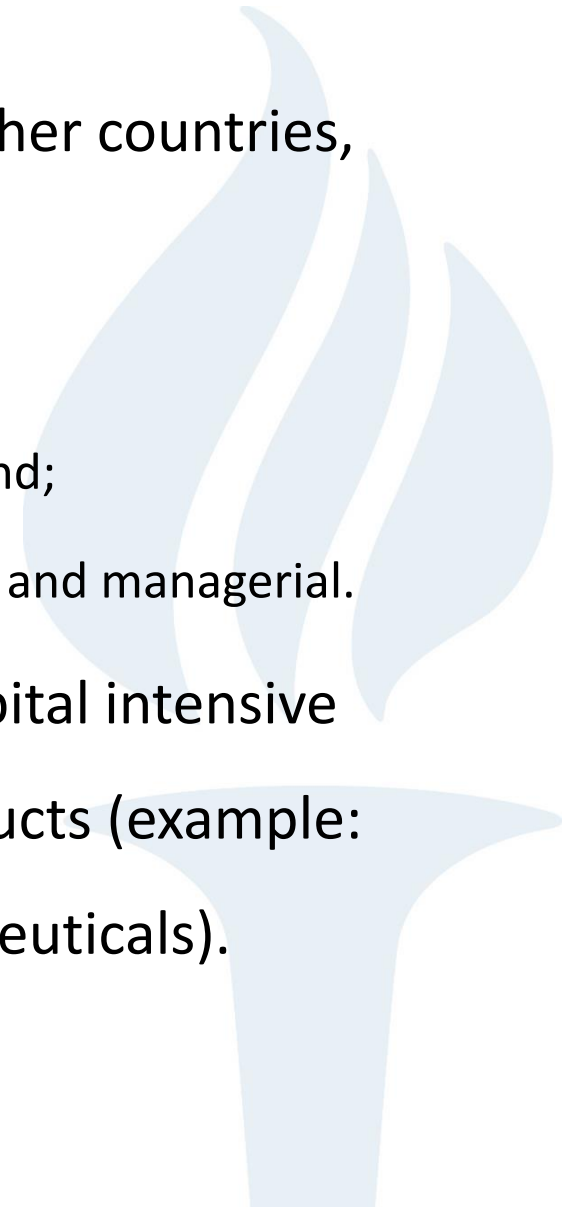
The Heckscher-Ohlin Trade Model

- In our model with bread and steel, assume the recipe for steel requires relatively more capital per unit of labor than bread.
 - Steel is capital intensive, bread is labor intensive.
 - The U.S. is capital abundant, it will have a comparative advantage in steel.
 - Canada is labor abundant, it will have a comparative advantage in bread.
- The HO Model predicts that the U.S. exports steel, imports bread.
- Unlike the Ricardian Model: Incomplete specialization.



The Heckscher-Ohlin Trade Model

- In the real world: The U.S., compared to other countries, is relatively abundant in:
 - Capital;
 - Certain natural resources such as agricultural land;
 - Skilled labor, particularly scientific, engineering, and managerial.
- According to HO, the U.S. should export capital intensive goods (example: aircraft); agricultural products (example: grains); and technology (example: pharmaceuticals).



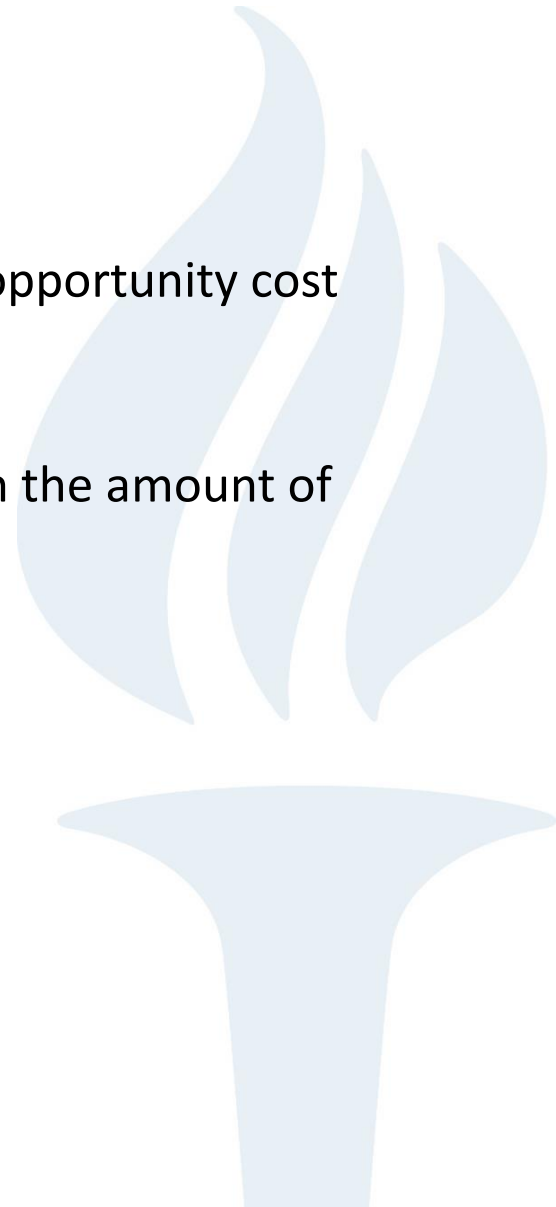
Gains from Trade in the HO Model

- Ricardian model: each country faced a constant set of tradeoffs (e.g., 3 loaves of bread for 1 ton of steel) because labor is the only input.
- HO model assumes:
 1. Multiple inputs—labor and capital
 2. Those inputs are not perfect substitutes
- What new result/flexibility does the new assumption lead to?



Gains from Trade in the HO Model

- Opportunity cost is no longer a constant
 - Under the HO model, each country has a rising opportunity cost for each type of production
 - In other words, the opportunity cost depends on the amount of production
- The PPC is not a straight line anymore.



HO Trade Model: Example

- Two factors: Capital vs. labor
- US (capital abundant) vs. Mexico (labor abundant)
- Smartphones (capital intensive) vs. shoes (labor intensive)

		Capital	Labor
Factor Abundance	United States	180	1200
	Mexico	120	1800
Input required	Smartphone	4	10
	Shoes (pairs)	1	40

- To produce x number of smartphones, we need at least $4x$ unit of capital AND $10x$ unit of labor. So 8 unit of capital and 8 unit of labor yields no smartphone production.

A bit more details

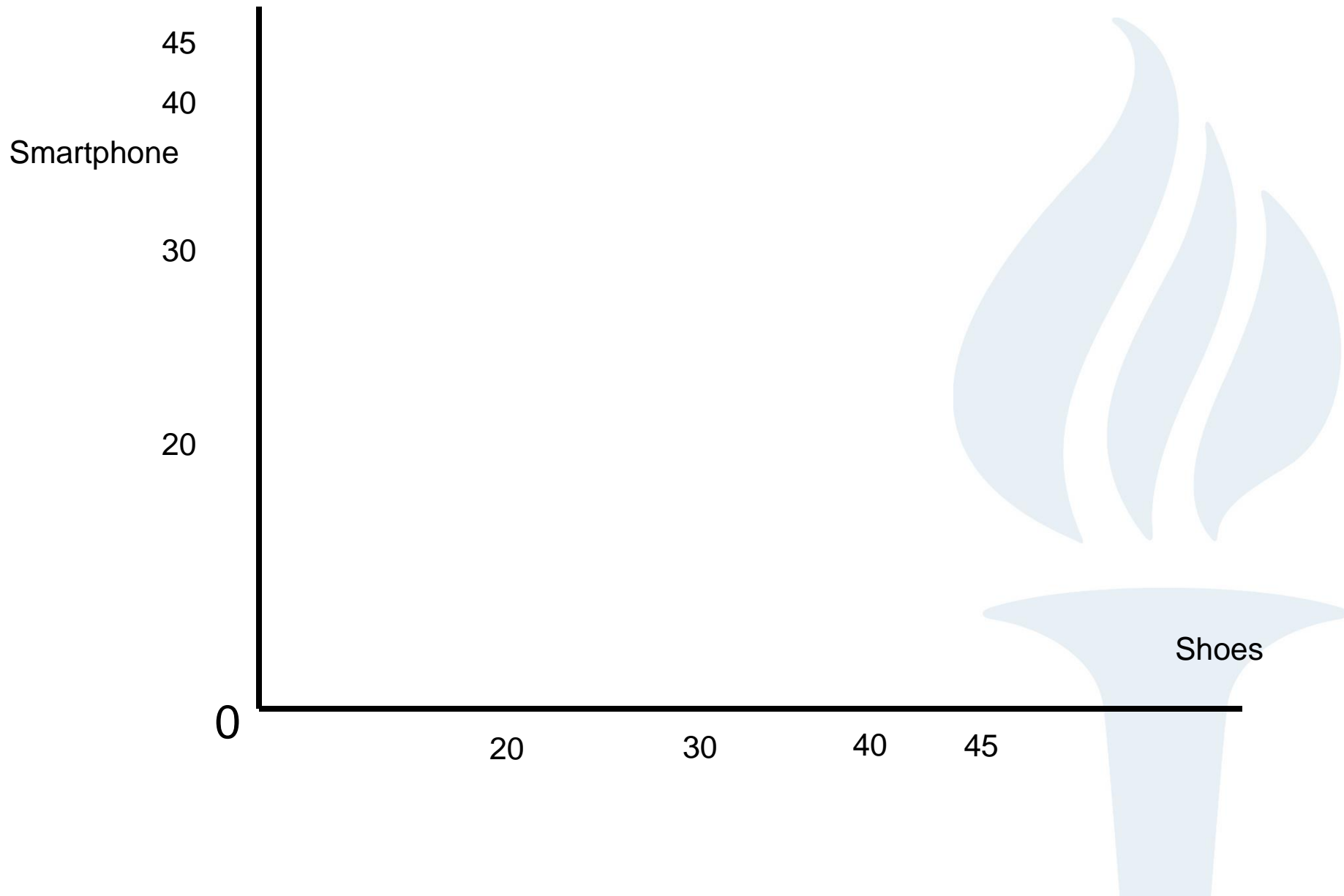
- We call this *Leontief* production function.
 - $Y = \min(\text{Capital}/4, \text{Labor}/10)$, also Y is an integer



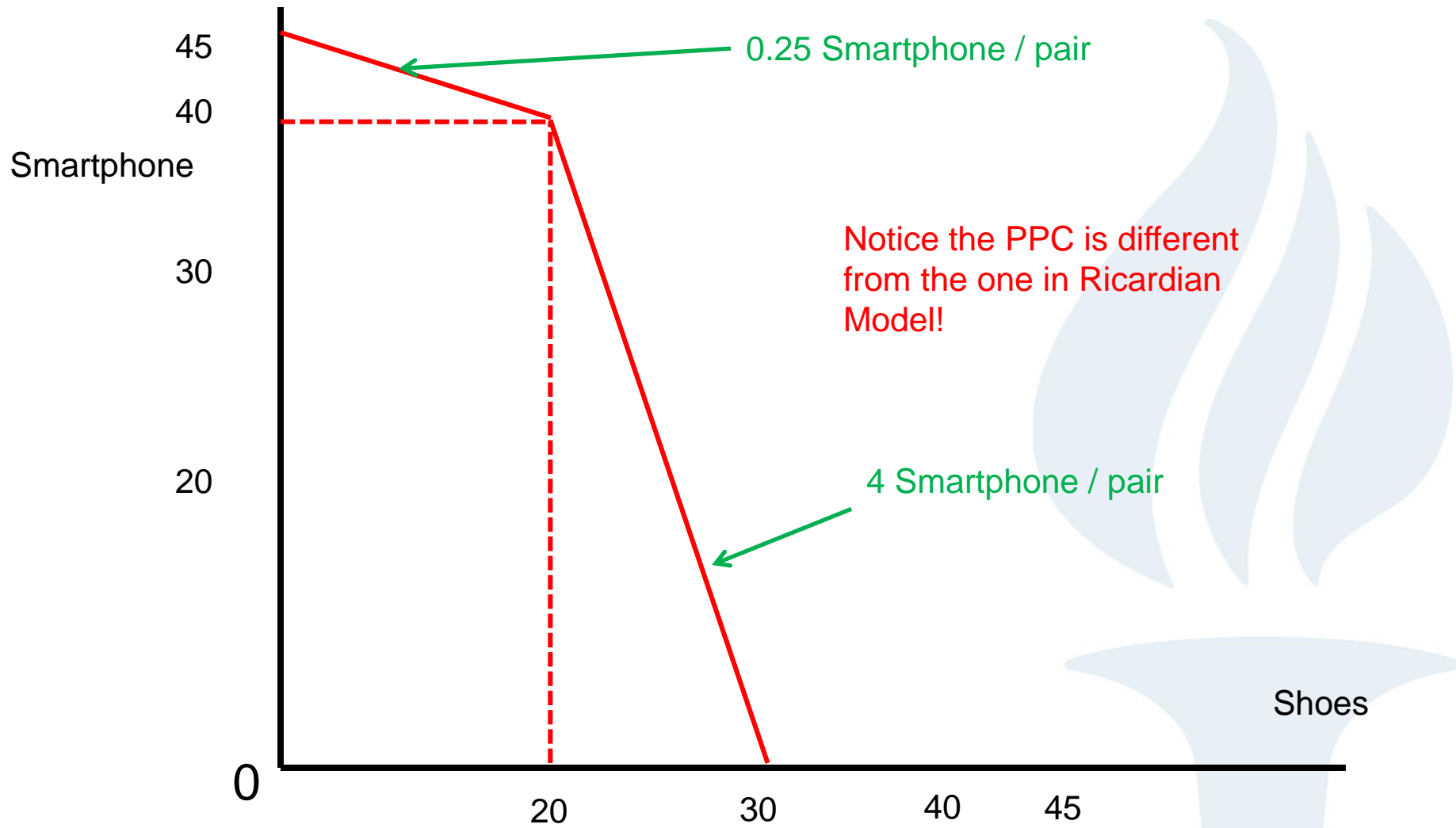
HO Trade Model: Autarky

- US focus on smartphone production
 - How many smartphones can US produce at most? Capital $180 / 4 = 45$ smartphones, only $45 * 10 = 450$ labor used, rest $1200 - 450 = 750$ unemployed.
 - If US produce one less smartphone, and use the capital left for shoe production? Then 4 capital can be used to produce 4 pairs of shoes.
 - Opportunity cost 0.25 smartphone/pair, **when US produce a lot of smartphones.**
- US focus on shoe production
 - How many pairs of shoes can US produce at most? Labor $1200 / 40 = 30$ pairs of shoes, only $30 * 1 = 30$ capital used, rest $180 - 30 = 150$ capital idle.
 - If US produce one less pair of shoes, and use the capital left for smartphone? Then 40 labor can be used to produce 4 smartphones.
 - Opportunity cost 4 smartphone/pair, **when US produce a lot of shoes.**

Production Possibilities Curve (PPC)



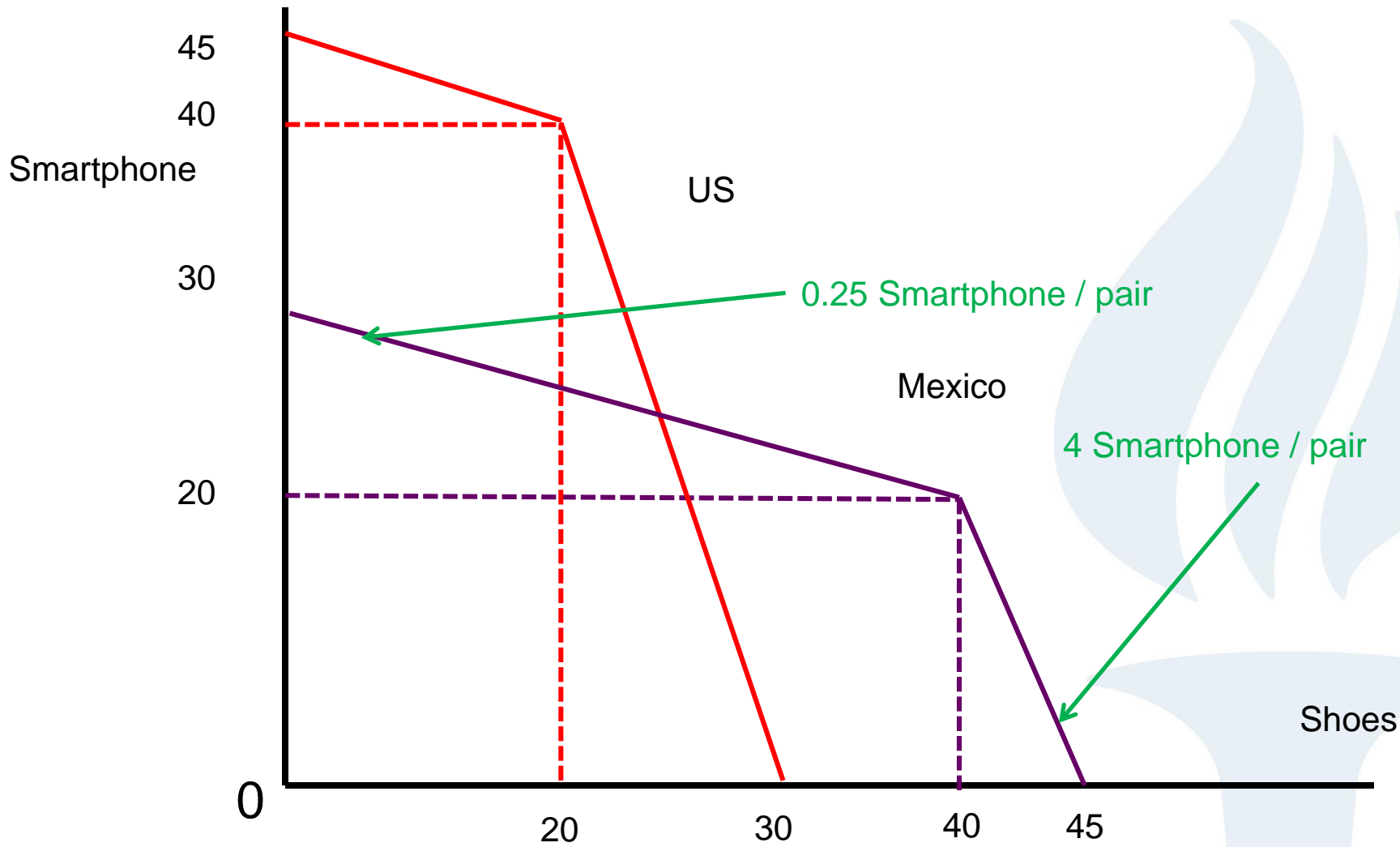
Production Possibilities Curve (PPC)



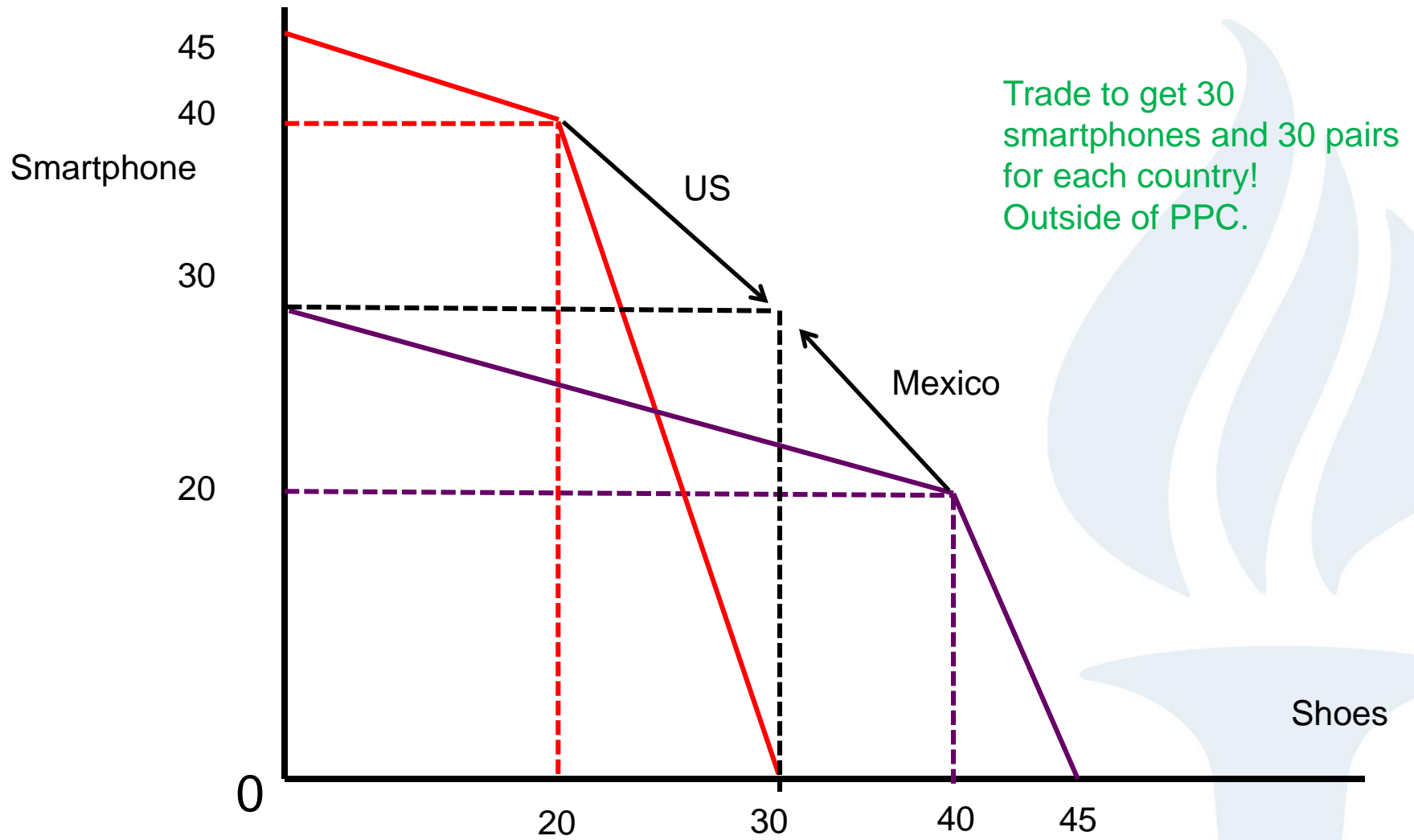
HO Trade Model: Autarky

- Mexico focus on smartphone production
 - How many smartphones can Mexico produce at most? Capital $120 / 4 = 30$ smartphones, only $30 * 10 = 300$ labor used, rest $1800 - 300$ unemployed.
 - If Mexico produce one less smartphone, and use the capital left for shoe production? Then 4 capital can be used to produce 4 pairs of shoes.
 - Opportunity cost 0.25 smartphone/pair, **when Mexico produce a lot of smartphones.**
- Mexico focus on shoe production
 - How many pairs of shoes can Mexico produce at most? Labor $1800 / 40 = 45$ pairs of shoes, only $45 * 1 = 45$ capital used, rest $180 - 45$ capital idle.
 - If Mexico produce one less pair of shoes, and use the capital left for smartphone? Then 40 labor can be used to produce 4 smartphones.
 - Opportunity cost 4 smartphone/pair, **when Mexico produce a lot of shoes.**

Production Possibilities Curve (PPC)



Production Possibilities Curve (PPC)



Summary of HO Model

- Multiple inputs—labor, capital— which are not perfect substitutes, leads to a non-constant opportunity cost.
- A capital abundant country (US) should export capital intensive goods (smartphone)
- A labor abundant country (Mexico) should export labor intensive goods (shoes)



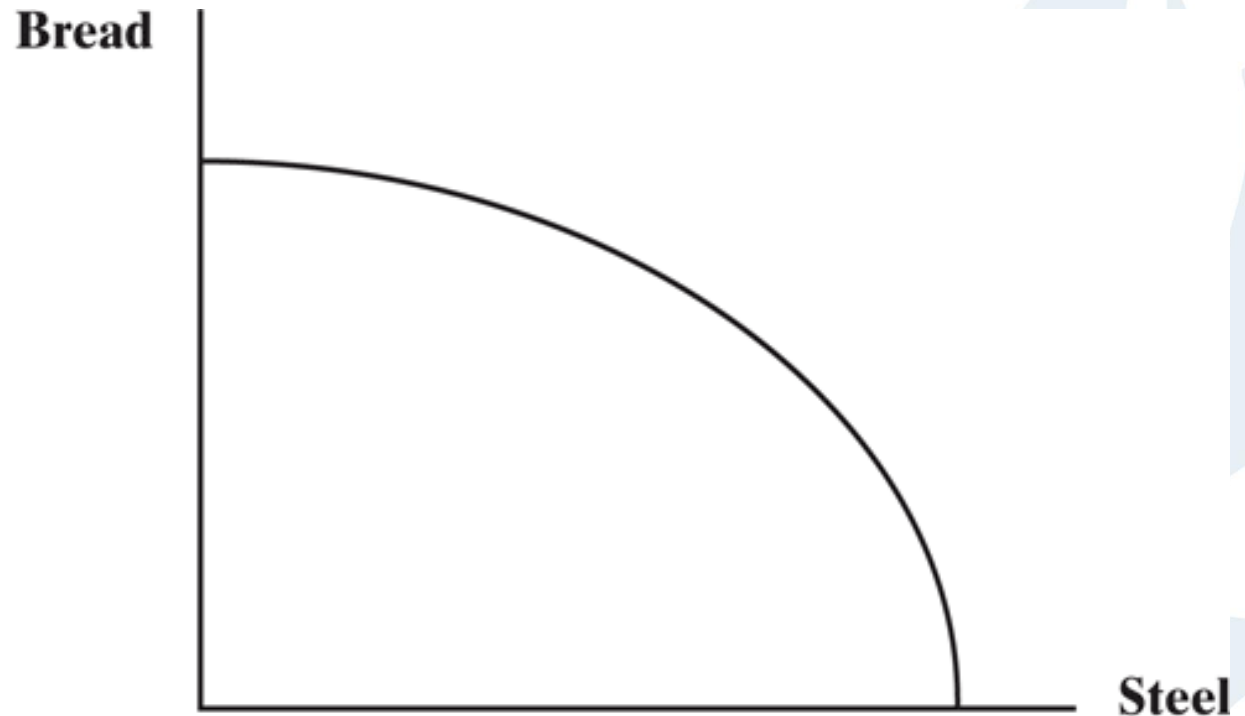
A Bit More (Missed) Details

- We used Leontief production function (assumption): each good has to use a fixed factor proportions (excess resources are wasted)
- Leontief: zero substitution between capital with labor!
- Other production function (assumption): Cobb-Douglas:
Output Y given labor input L and capital input K is

$$Y = AK^{1-\beta}L^{\beta}$$

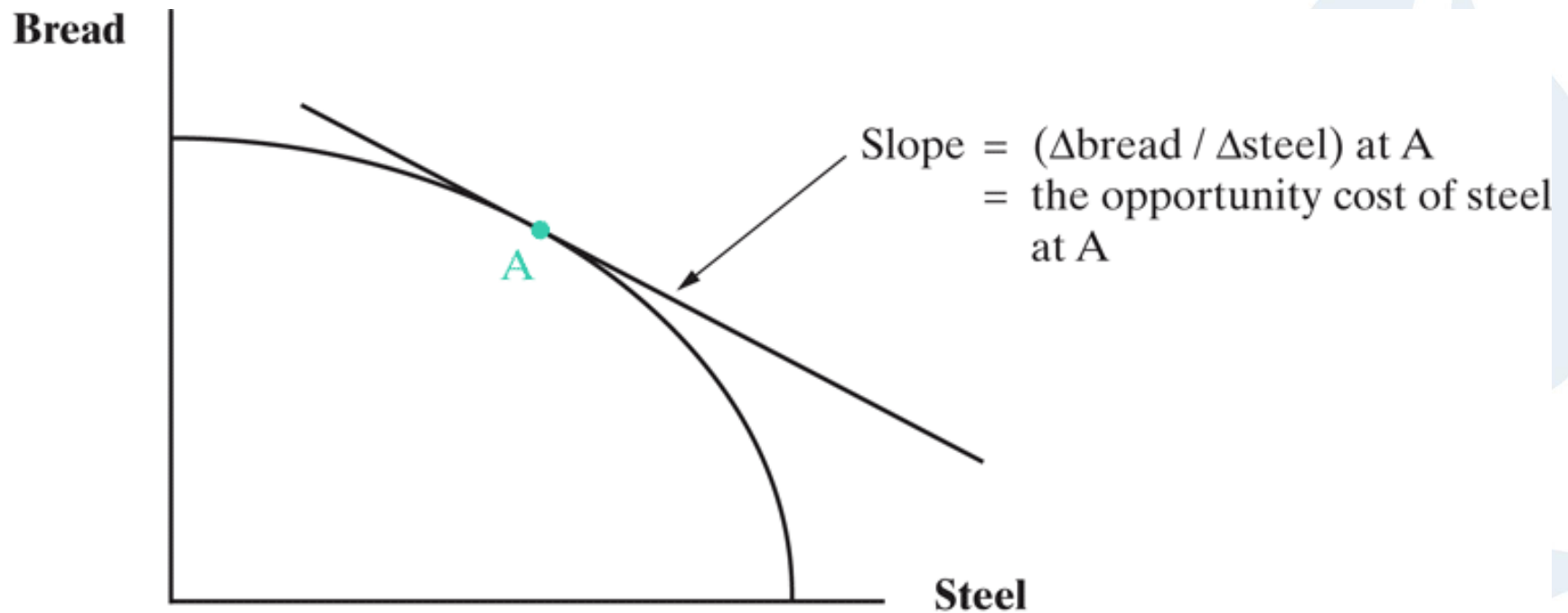
- This gives you a smooth PPC curve as in the textbook.

FIGURE 4.1 U.S. PPC with Diminishing Returns



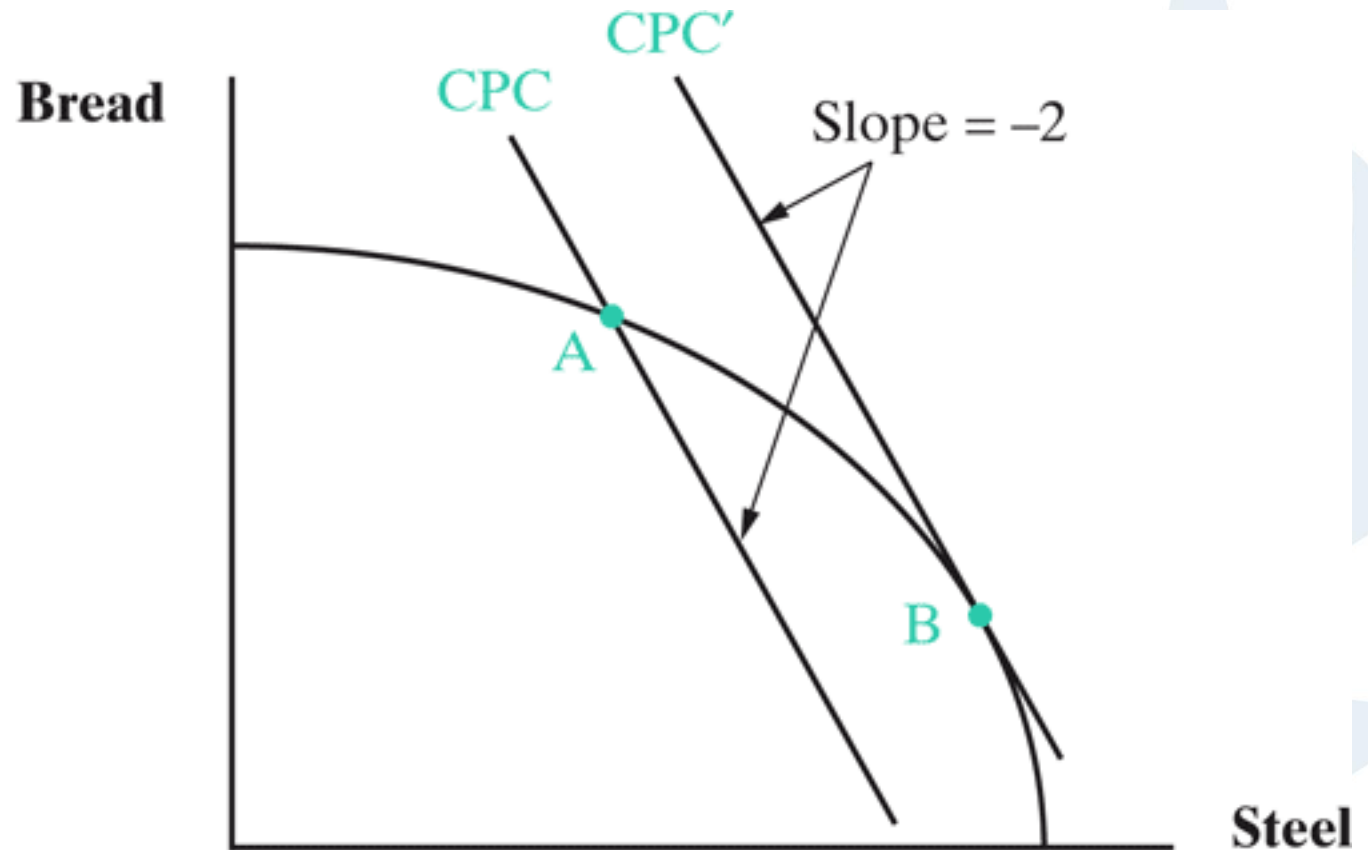
Moving from left to right, the opportunity cost of another unit of steel increases.

FIGURE 4.2 Opportunity Costs and the Slope of the PPC



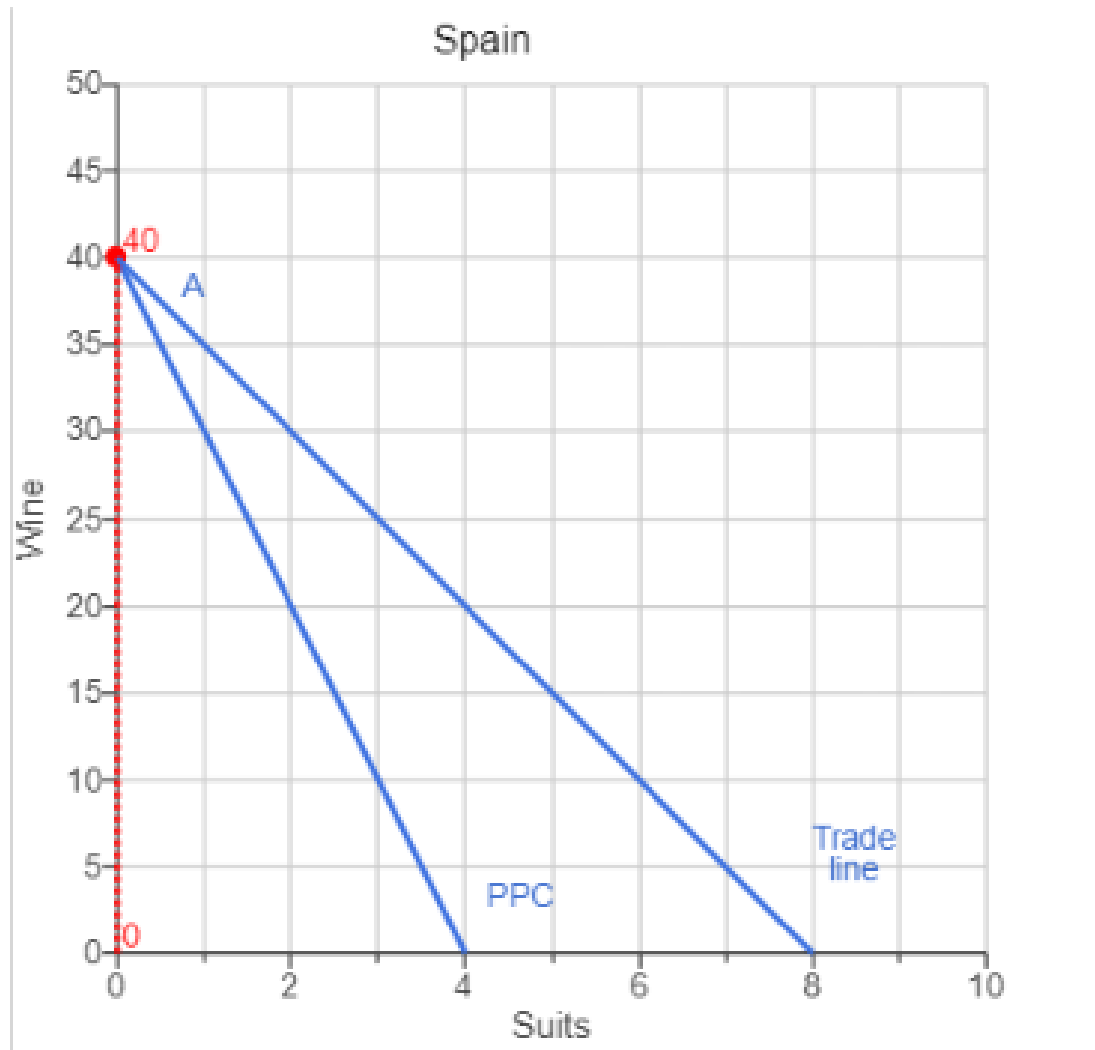
The opportunity cost of steel is measured by the slope of the tangent at the point of production.

FIGURE 4.3 Gains from Trade in the HO Model



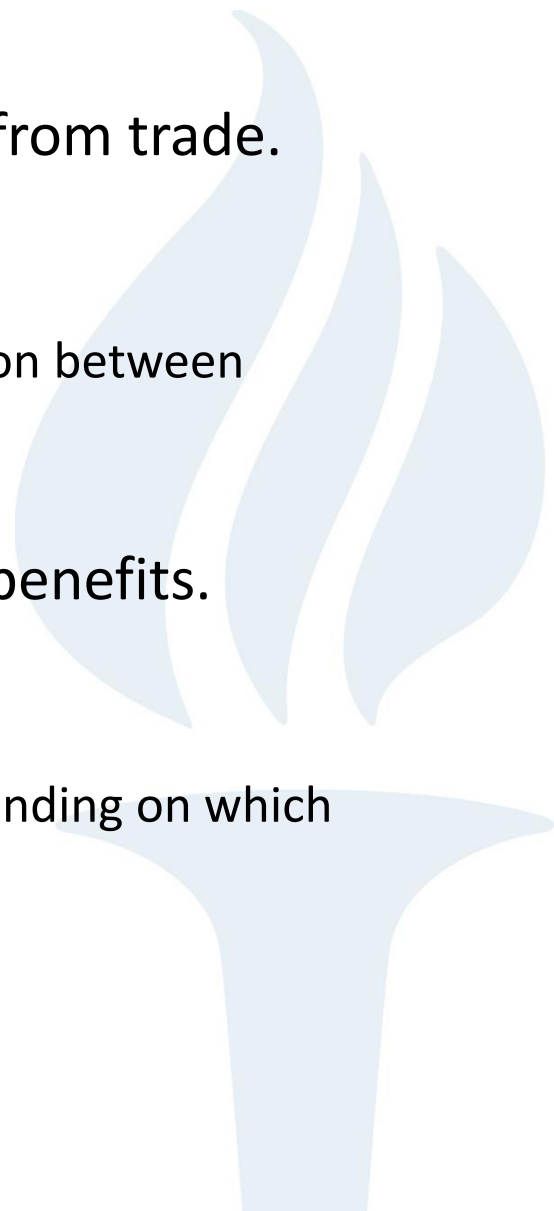
CPC is the trade line if production is at A. Production at B maximizes income.

Review: HW3



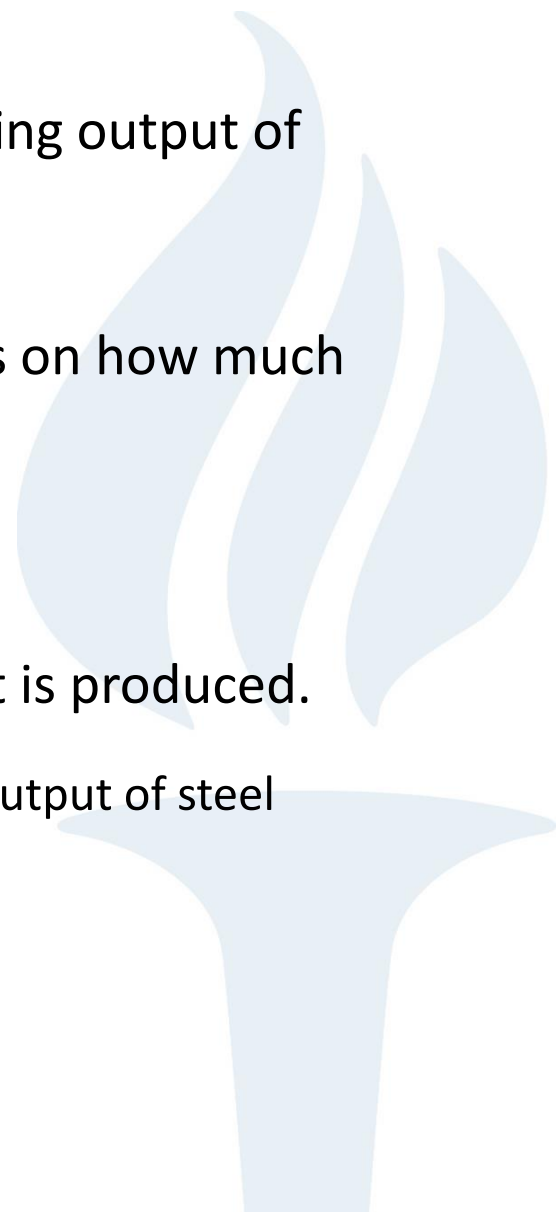
Income Distribution Effects of Trade in the HO Model

- Ricardian Model: Every individual benefits from trade.
 - One input, labor.
 - Labor is homogeneous and moves without friction between sectors.
- HO Model: Not every factor of production benefits.
 - Two inputs, labor and capital
 - Owners of labor or capital may be harmed, depending on which output shrinks when trade begins.



Income Distribution Effects of Trade in the HO Model

- Trade moves an economy along its PPC, increasing output of one good, shrinking output of the other.
- Income for owners of capital and labor depends on how much demand there is for their services.
 - This is called **derived demand**.
- The demand for their services depends on what is produced.
 - In the bread and steel example, the US increased output of steel which uses more capital, less labor.
 - The incomes of both factors will be affected.



Income Distribution Effects of Trade in the HO Model

- In our example, the price of steel increased in the US, bread fell. The opposite was true in Canada.
- The **Stolper-Samuelson Theorem**:
 - An increase in the price of a good raises the income of the factor used intensively in its production.
 - A decrease in the price of a good lowers the income of the factor used intensively in its production.
- US: returns on capital increase, wages fall.
- Canada: returns on capital fall, wages rise.

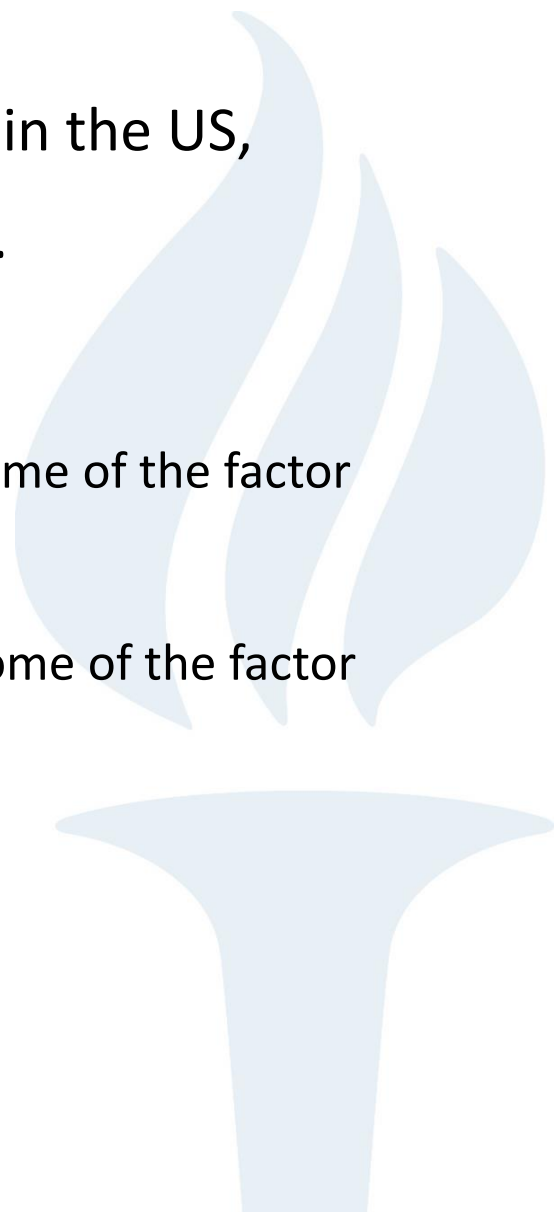
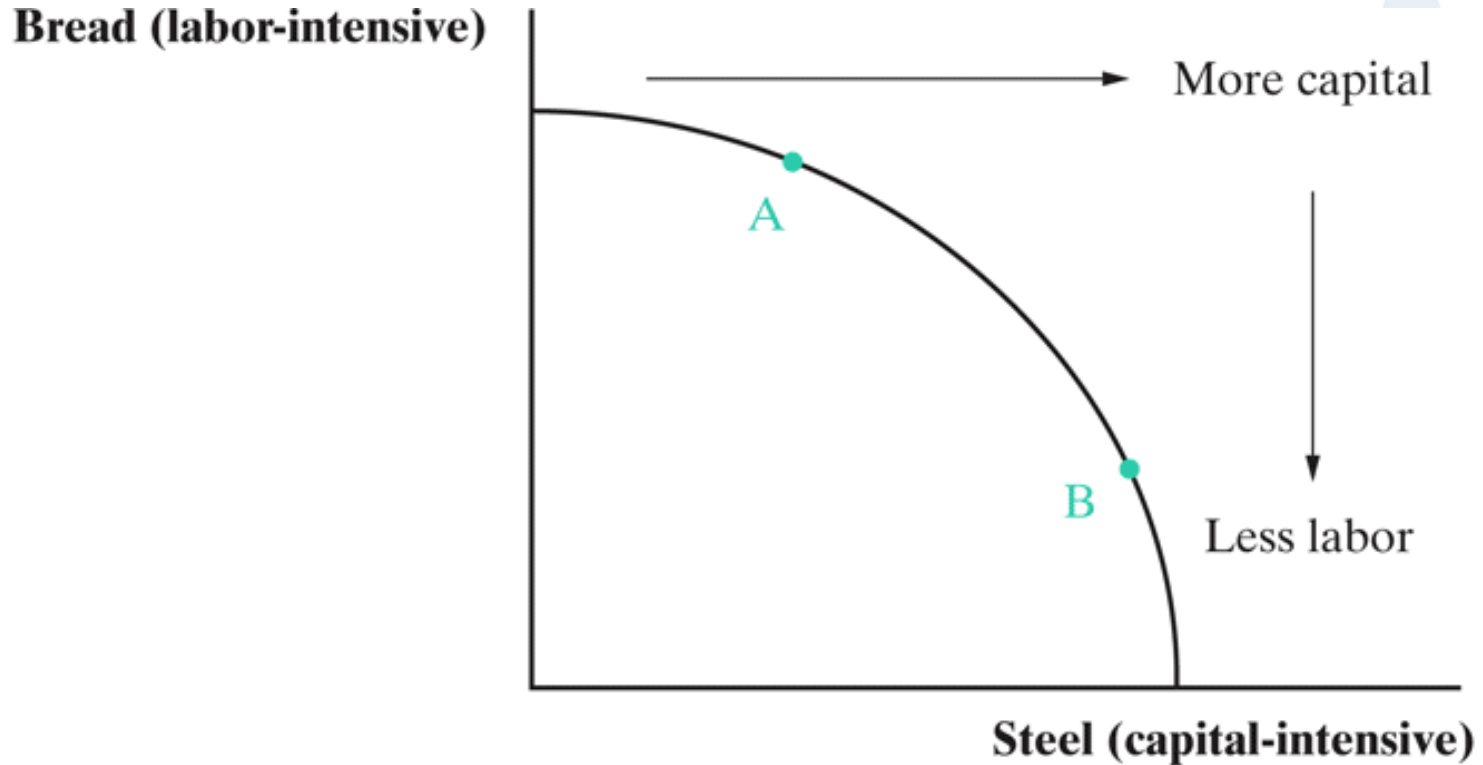


FIGURE 4.4 The Stolper-Samuelson Theorem



Movement along the PPC from A to B reduces the economy's demand for labor and increases its demand for capital.

Specific Factors Model

- HO model assume capital and labor can migrate between sectors (products)
- The specific factors model assumes that:
 - Land and capital are immobile and cannot migrate (specific factors);
 - Labor is fully mobile and can migrate from one sector to another (variable factor).

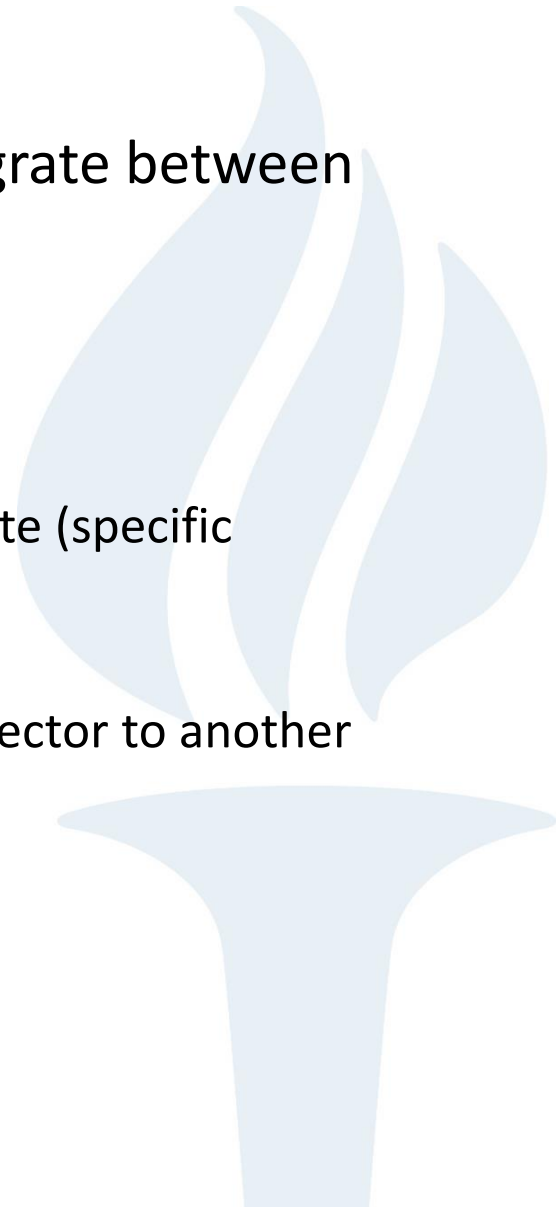


TABLE 4.2 A Specific Factors Model

Outputs

Inputs	Bread	Steel
Specific factors	Land	Capital
Variable factors	Labor	Labor

The specific factors of land and capital can be used to produce only one good. The variable factor of labor is used in both bread and steel production.

Equipment (Capital)

Labor

Farmland (Land)



Specific Factors Model

- After trade begins:
 - US landowners see a decline in the demand for land, incomes fall.
Owners of the specific factor used intensively in the declining industry are hurt.
 - US capital owners see an increase in demand for capital, incomes rise.
Owners of the specific factor used intensively in the expanding industry are better off.
 - Labor?
 - Some move from bread to steel, but since steel is not labor intensive, their wages fall (same as HO).
 - However, bread is cheaper; they are better off in that way.
 - Steel is more expensive; they are worse off from that.
 - Net result is indeterminate.

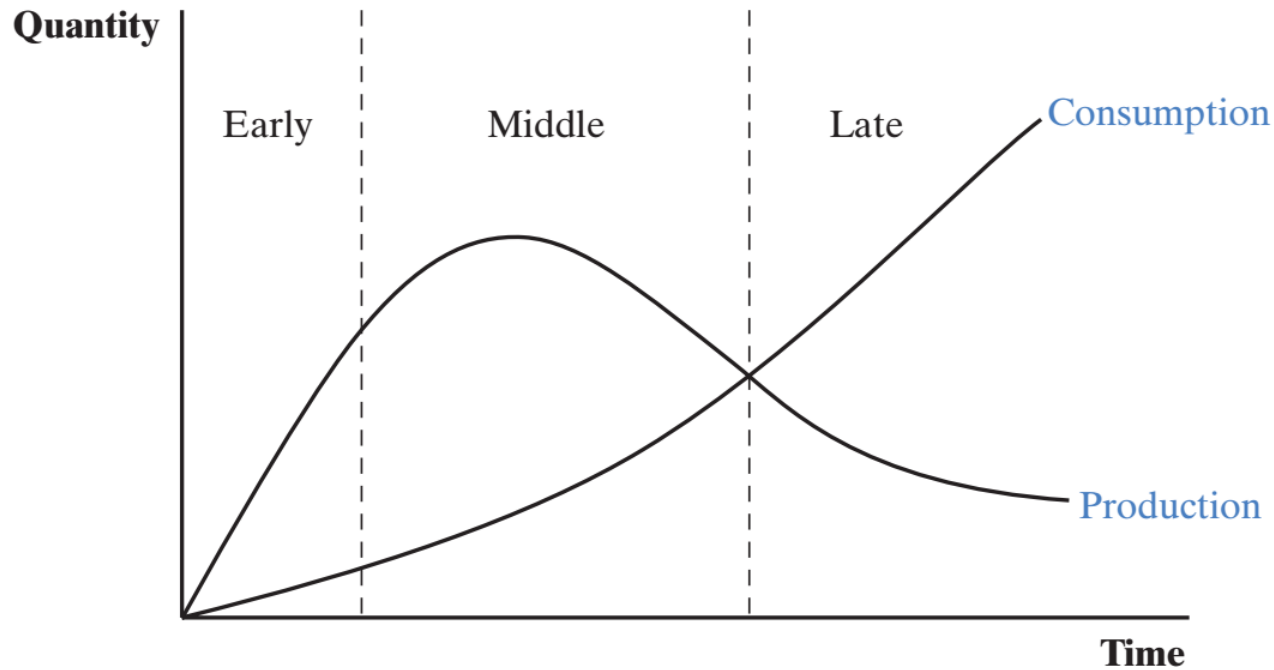
Vernon's Product Cycle

- Production of a good is cyclical
- Early stage of production: Locate in high income country.
 - Need science and engineering skills to develop new product.
 - Need high income consumers to try it out, provide feedback.
- Middle stage of production, location begins to shift.
 - Design and production processes beginning to be standardized.
 - Mass production beginning.
 - Labor costs begin to matter more.
- Late stage:
 - Production moves where labor costs are low.
 - The product is completely standardized.



Vernon's Product Cycle

FIGURE 4.5 The Product Cycle in High-Income Countries

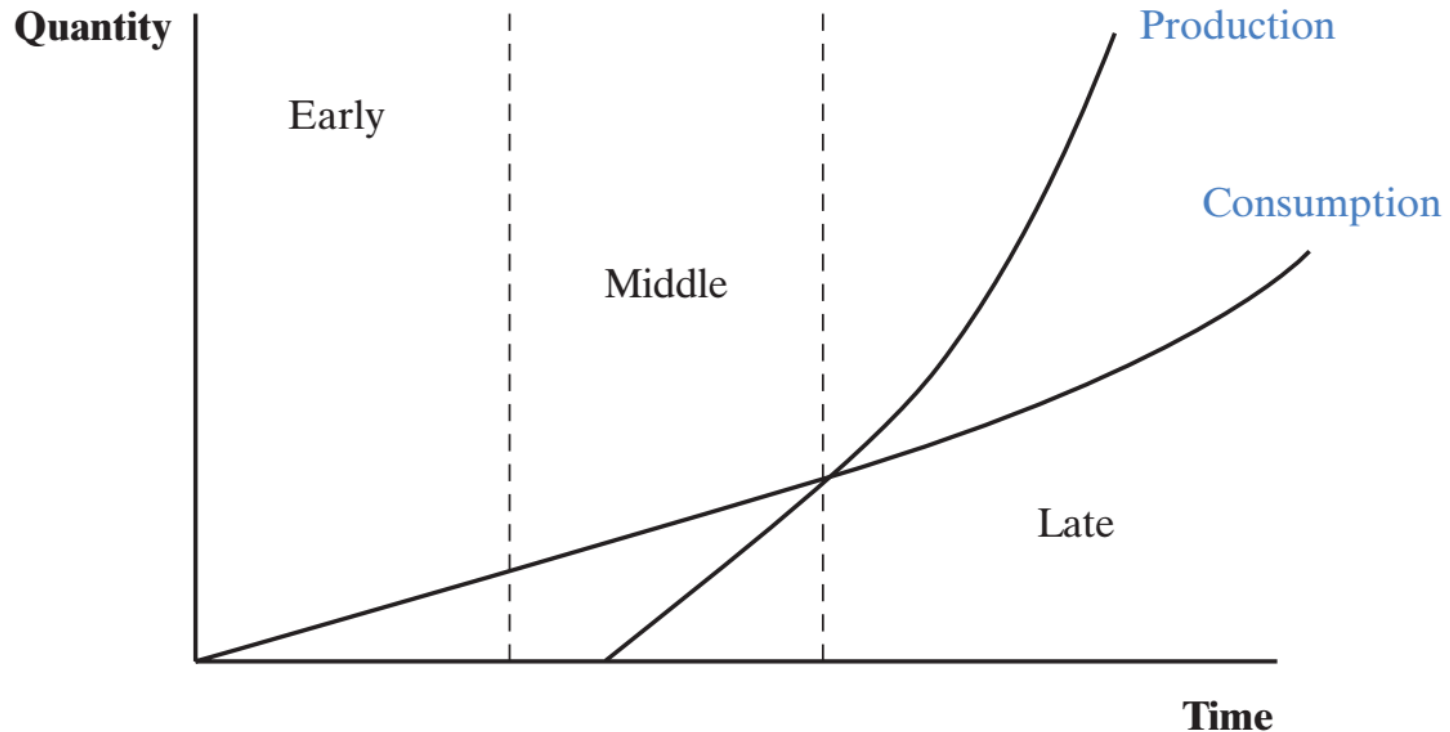


Many manufactured goods experience a product cycle of innovation, stabilization, and standardization.

- When product is new, it is manufactured and consumed in advanced countries

Vernon's Product Cycle

FIGURE 4.6 The Product Cycle in Low-Income Countries



Low-income countries begin producing during the middle period when product design and production techniques begin to stabilize.

- When product is mature it is produced in low-cost countries and traded

Vernon's Product Cycle

- IBM PC in 1984 made in U.S.
- Median household income then: \$20,429 (\$48,874 in 2012)



IBM[®]
**PERSONAL
COMPUTER**

**Special
of the
Month!**

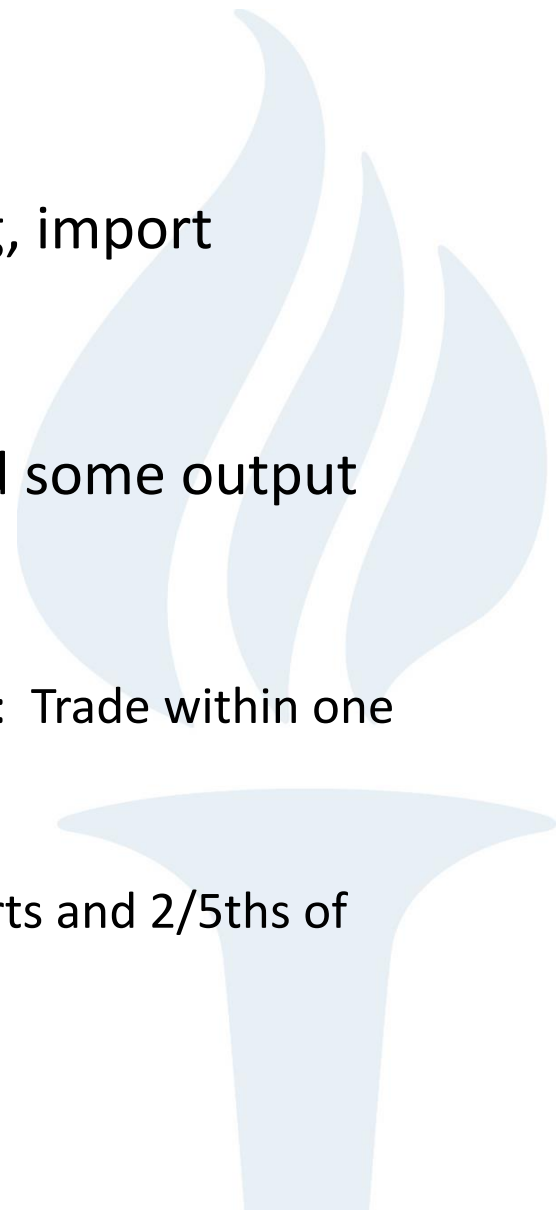
IBM PC[®] COMPLETE LINE

256K RAM, 360KB Disk Drive, FDC, Video
Monitor & Adaptor 10MB Hard Disk
Sub-System **\$2999**

Hard Disk for IBM PC Complete Sub-
System Internal 10MB H. Winchester
Drive **\$875**

Extension of the HO Model: Investing versus Trading

- In the HO Model, countries export one thing, import something different.
- In the product cycle, firms invest abroad and some output may be sent back home.
 - A significant share of imports are **intrafirm trade**: Trade within one firm.
 - In the mid-1990s, around $\frac{1}{3}$ of U.S. goods exports and $\frac{2}{5}$ ths of imports were intrafirm.

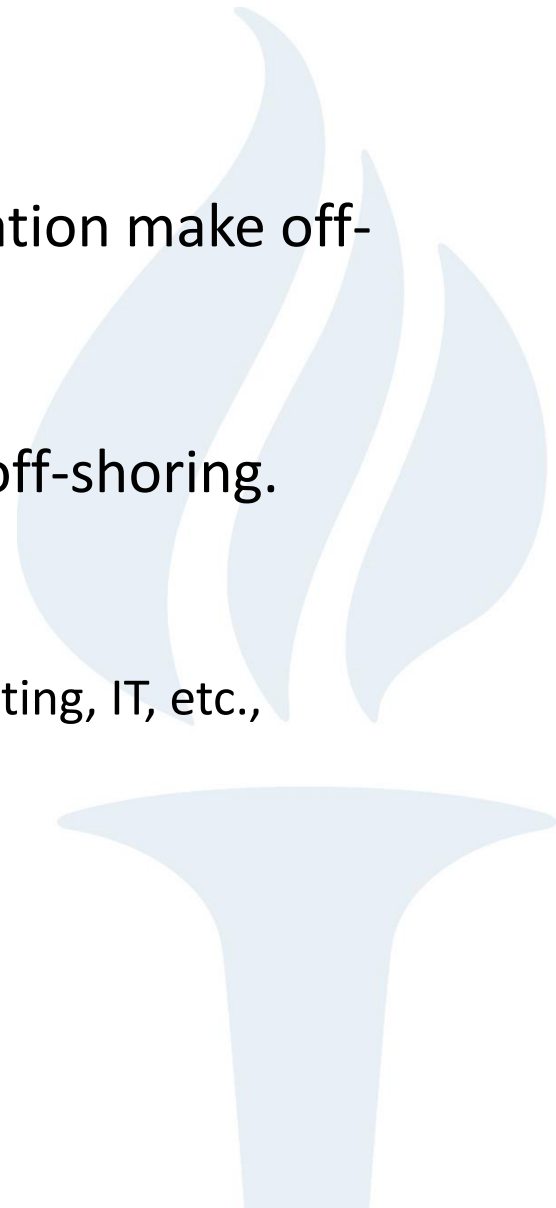


Extension of the HO Model: Investing versus Trading

- **Outsourcing** refers to moving some part of production to another firm, either inside the home country or outside.
- **Off-shoring** refers to moving some or all of production abroad.
 - If a firm off-shores but does not outsource, it is working with a **foreign affiliate**.
 - All combinations of off-shoring and outsourcing are possible.

Extension of the HO Model: Investing versus Trading

- Modern telecommunications and transportation make off-shoring easier today.
- This heightens worries about the effects of off-shoring.
 - The loss of manufacturing jobs.
 - Services might be next: medical services, accounting, IT, etc., delivered over the internet.



Impact of Trade on Jobs

- In medium to long run, trade seems has little or no effect on number of jobs in a country
 - # of jobs depends on population, labor market policies, and business cycle
- In short run, trade does affect # of jobs for certain industries

