Ricardain Model and Comparative Advantage

EE451

Chayun Tantivasadakarn

Faculty of Economics, Thammasat University

Outline

- Assumption
- Production Possibility Curves
- Autarky equilibrium
- Comparative advantage
- Free trade equilibrium
- The Balassa Index
- Empirical Tests

Learning Objectives

- Understand the reasons why countries trade
- Distinguish between absolute and comparative advantage
- Understand the Ricardian model which is based on technological differences

No trade conditions

- 2 countries with
  - Identical technology
  - Identical resource endowments
  - Identical preferences
  - Constant returns to scale technology
  - Perfect competition in all sectors
  - No government interventions
- Any differences can generate trade
- Adam Smith's absolute advantage and Ricardian model emphasize on differences in technology

Absolute and Comparative advantage

- Absolute Advantage: When a country has the best technology for producing a good, it has an **absolute advantage** in the production of that good.
- US has an absolute advantage in the production of snowboards.
- Why is it that so many are imported from China then?
  - Absolute advantage is actually not a good explanation for trade patterns.
  - Comparative advantage is the primary explanation for trade among countries.

Ricardian Model and Comparative Advantage

- Use the same set of assumption as Adam Smith's
- Production functions:

$$\text{Home}: \quad X = \alpha L_X, \quad Y = \beta L_Y$$

$$\text{Foreign}: \quad X^* = \alpha^* L_X^*, \quad Y^* = \beta^* L_Y^*$$

where α and β are marginal product of labor

- Unit Labor requirements are:

$$\text{Home}: \quad a = \frac{1}{\alpha}, \quad b = \frac{1}{\beta}$$

$$\text{Foreign}: \quad a^* = \frac{1}{\alpha^*}, \quad b^* = \frac{1}{\beta^*}$$

Ricardian Model and Comparative Advantage

- Full employment requires that labor demand = supply

$$\text{Home}: \quad aX + bY = L$$

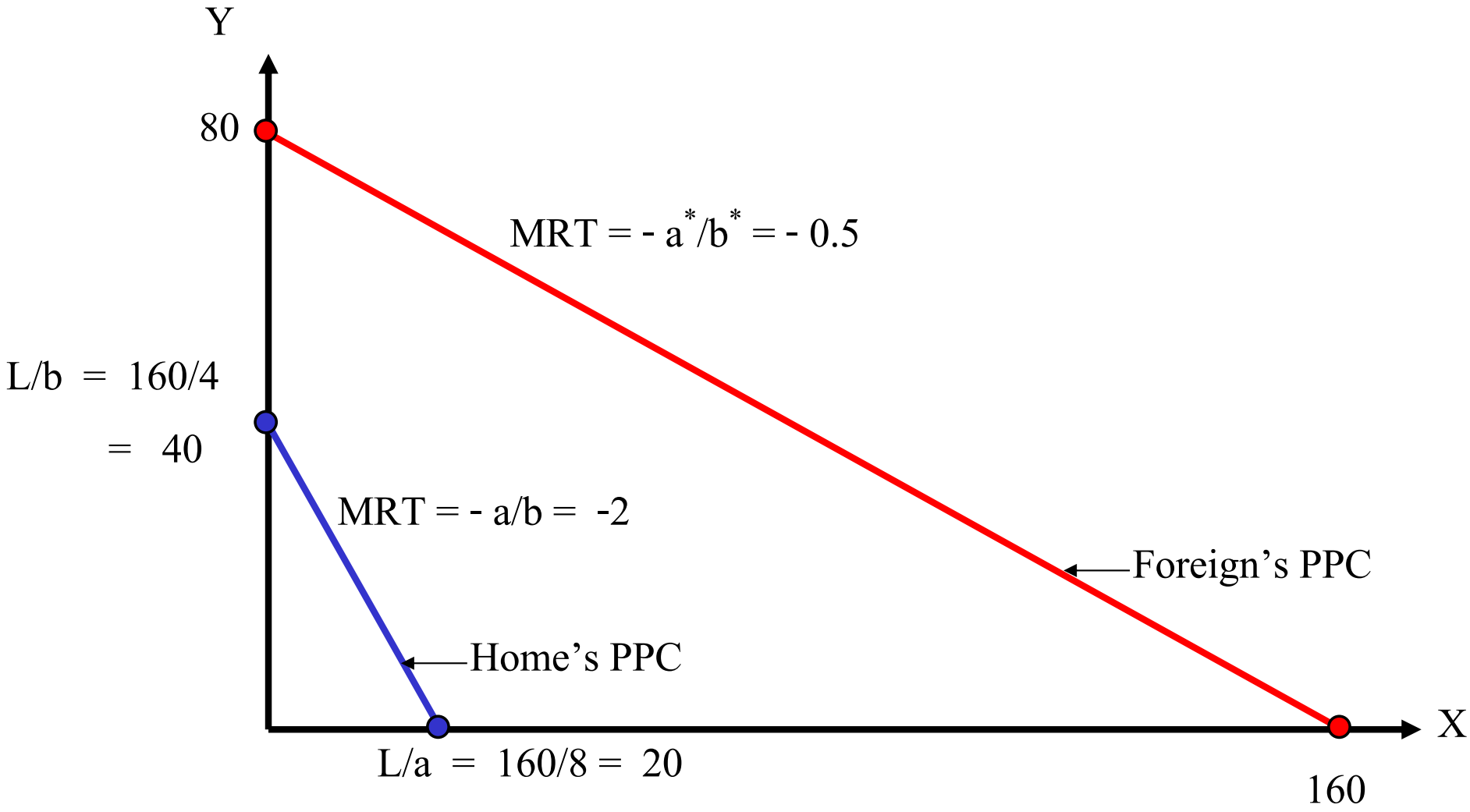
$$\text{Foreign}: \quad a^*X^* + b^*Y^* = L^*$$

where L and L^* are the respective labor supply.

Example:	**X**	**Y**	**Labor supply**
Home	$a = 8$	$b = 4$	$L = 160$
Foreign	$a^* = 1$	$b^* = 2$	$L^* = 160$

This information allows us to construct the Production Possibility Curve for each country

Ricardian Model and Comparative Advantage



Ricardian Model and Comparative Advantage

Why should the |MRT| equals to a/b?

- Each firm that produce X maximizes profit

$$\text{Max} \quad \pi_X = P_X X - wL_X, \quad X = \alpha L_X$$

- This gives $w = VMP = \alpha P_X$ or $P_X = w/\alpha = wa$.
- Similarly $P_Y = w/\beta = wb$.
- Since $|MRT| = MC_X/MC_Y$, perfect competition implies

$$|MRT| = \frac{P_X}{P_Y} = \frac{a}{b} = \frac{\beta}{\alpha}$$

Indifference Curve

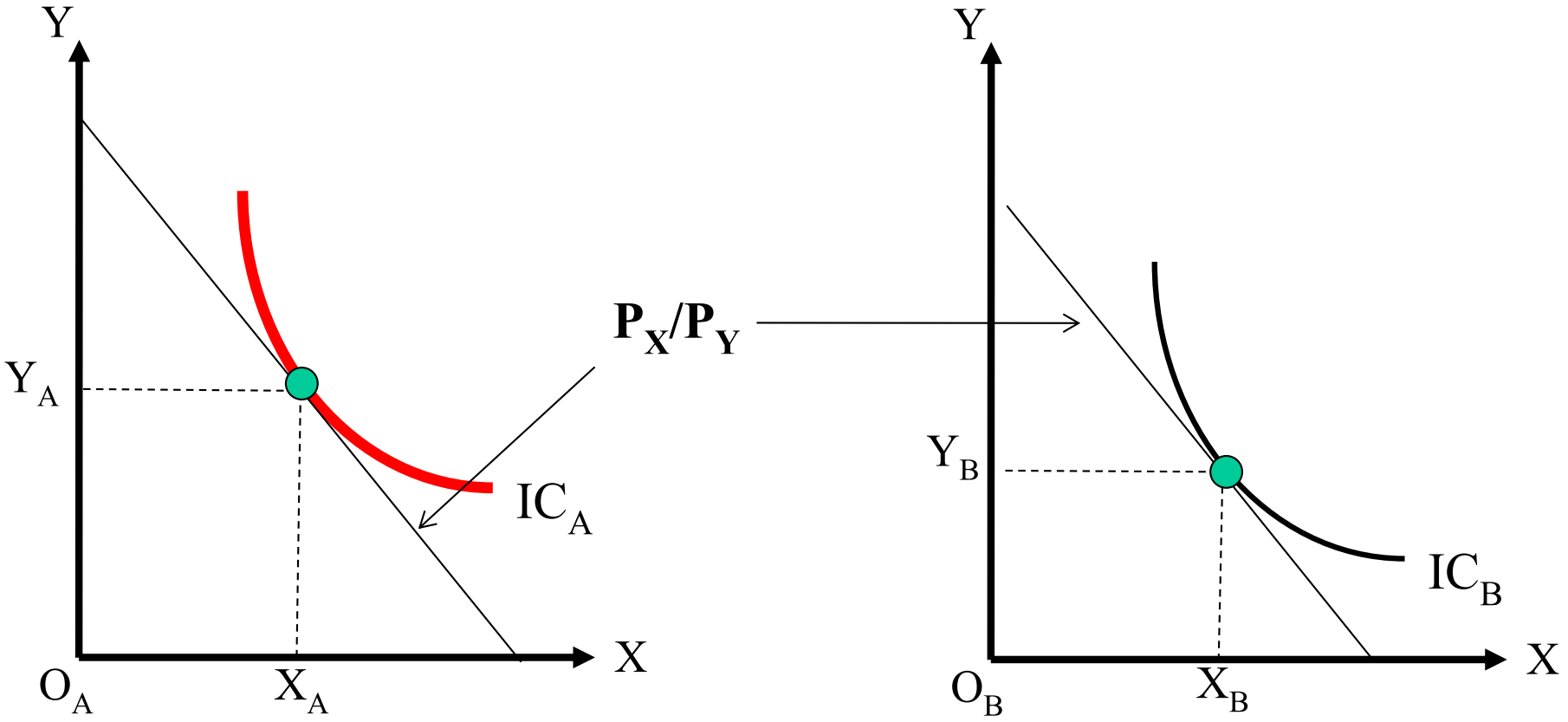
- Given Home's PPC, how much X and Y will each country actually produce depends on demand.
- Demand can be represented with indifference curve.
- An indifference curve shows the combinations of two goods that the country can consume and be equally satisfied.

Indifference Curve

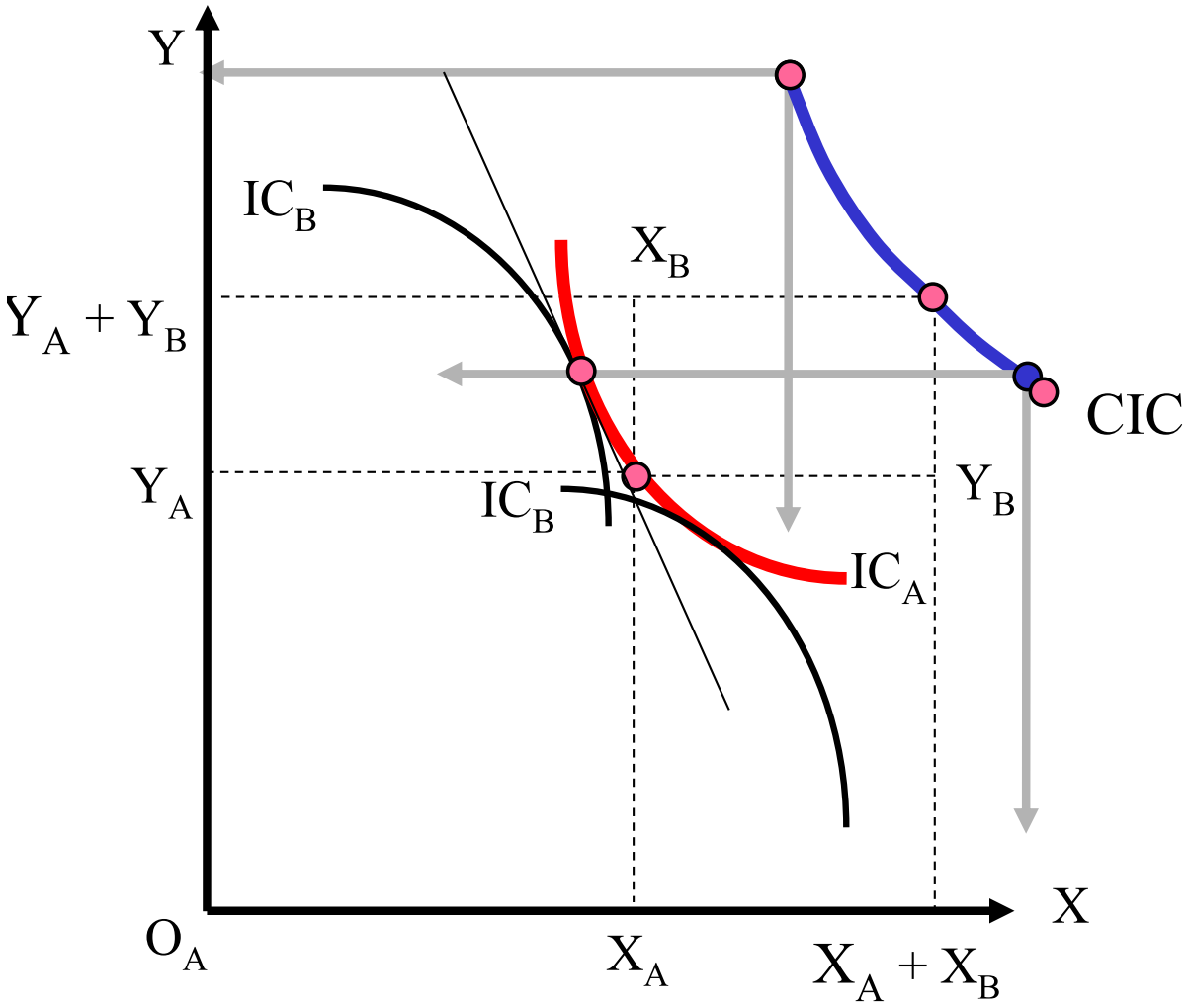
- All points on an indifference curve have the same level of utility.
- Points on higher indifference curves have higher utility.
- Indifference curves are often used to show the preferences of an individual.
- But we use indifference curves to show the preferences of an entire country.

Deriving Community Indifference Curves

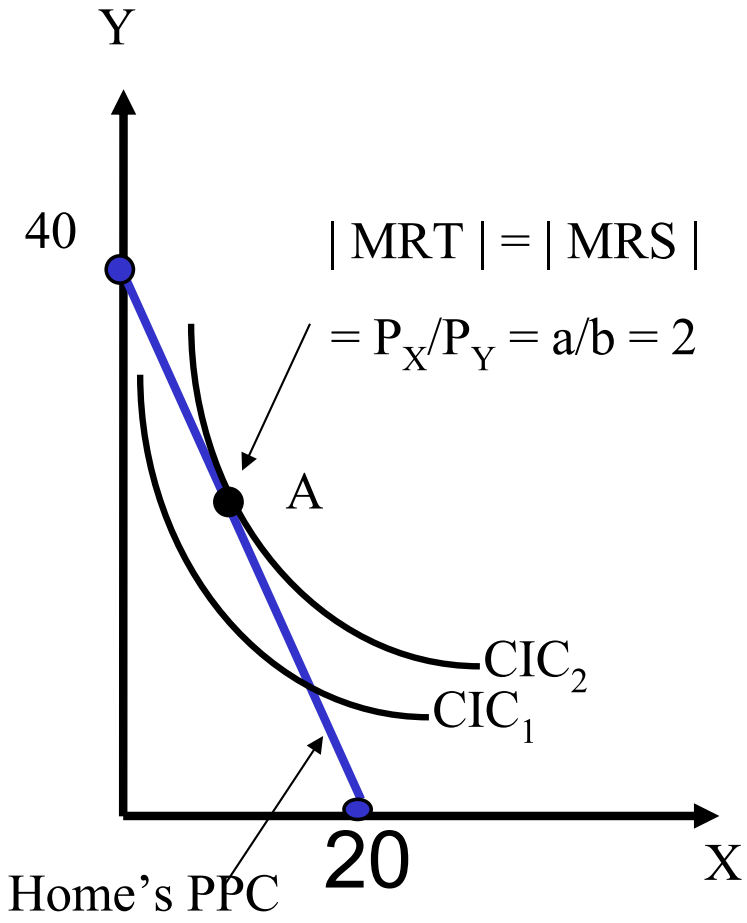
- Similar to the summation of demand curve which is done at the same price level, adding two ICs is done at the same price ratio or at the same |MRS|.



Deriving Community Indifference Curves



Ricardian Model and Comparative Advantage



Autarky or no-trade equilibrium

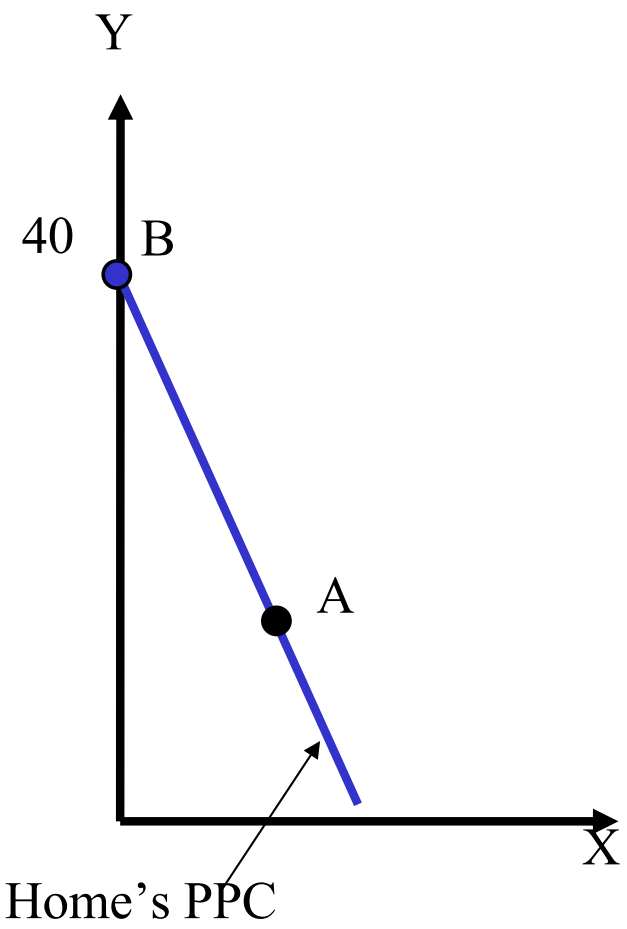
- Equilibrium occurs at the tangency between CIC and PPC or when |MRT| = |MRS| = P_X/P_Y.
- Note: if all goods are consumed in the equilibrium, preferences play no role on determining the equilibrium price ratio.

Before trade: Home price $P_X/P_Y = 2$, Foreign price $P^*_X/P^*_Y = 0.5$.

Comparative Advantage

- $|MRT| = P_X/P_Y = 2$ implies that to get one more unit of X Home needs to give up 2 units of Y.
- The opportunity cost of X in terms of Y in Home country equals to 2.
- Similarly $P^*_X/P^*_Y = 0.5$ implies that the opportunity cost of X in terms of Y in foreign country equals to 0.5.
- Foreign has comparative advantage in X and should specialize and export X.
- With two goods, Home must have comparative advantage in Y and should specialize and export Y.

Production and GDP

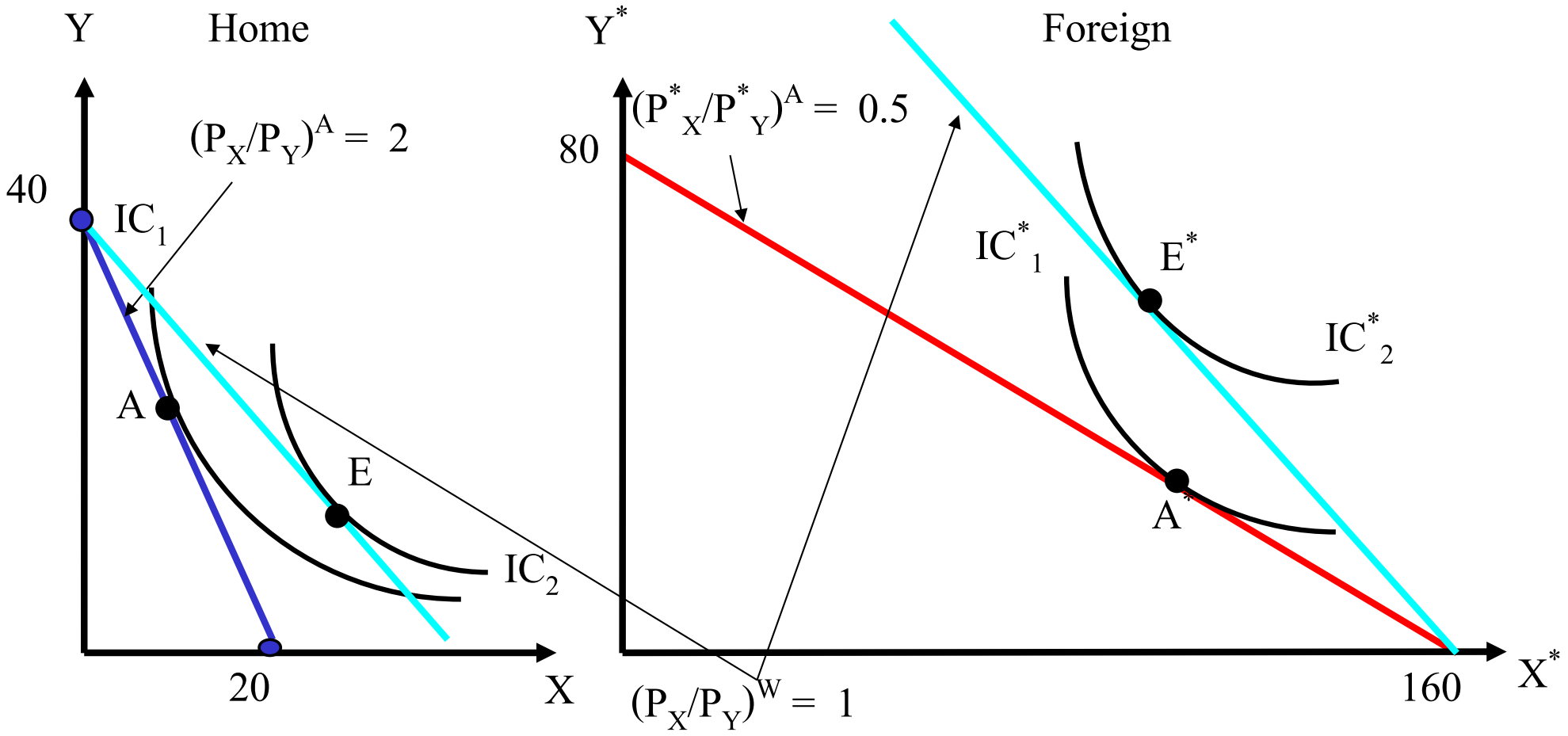


- GDP in autarky is given by the budget line which coincide with the PPC

  $= P_X^A X_A + P_Y^A Y_A$

- Since Home imports cheaper X and receives more expensive Y, P_X/P_Y after trade must be lower.
- The GDP after trade will be maximized if Home specializes in Y and the value is given by budget line BC

Gains from trade



Trade expand the Consumption Possibility Frontier.

H can export and gain from trade even it has no absolute advantage in any good.

Gains from trade

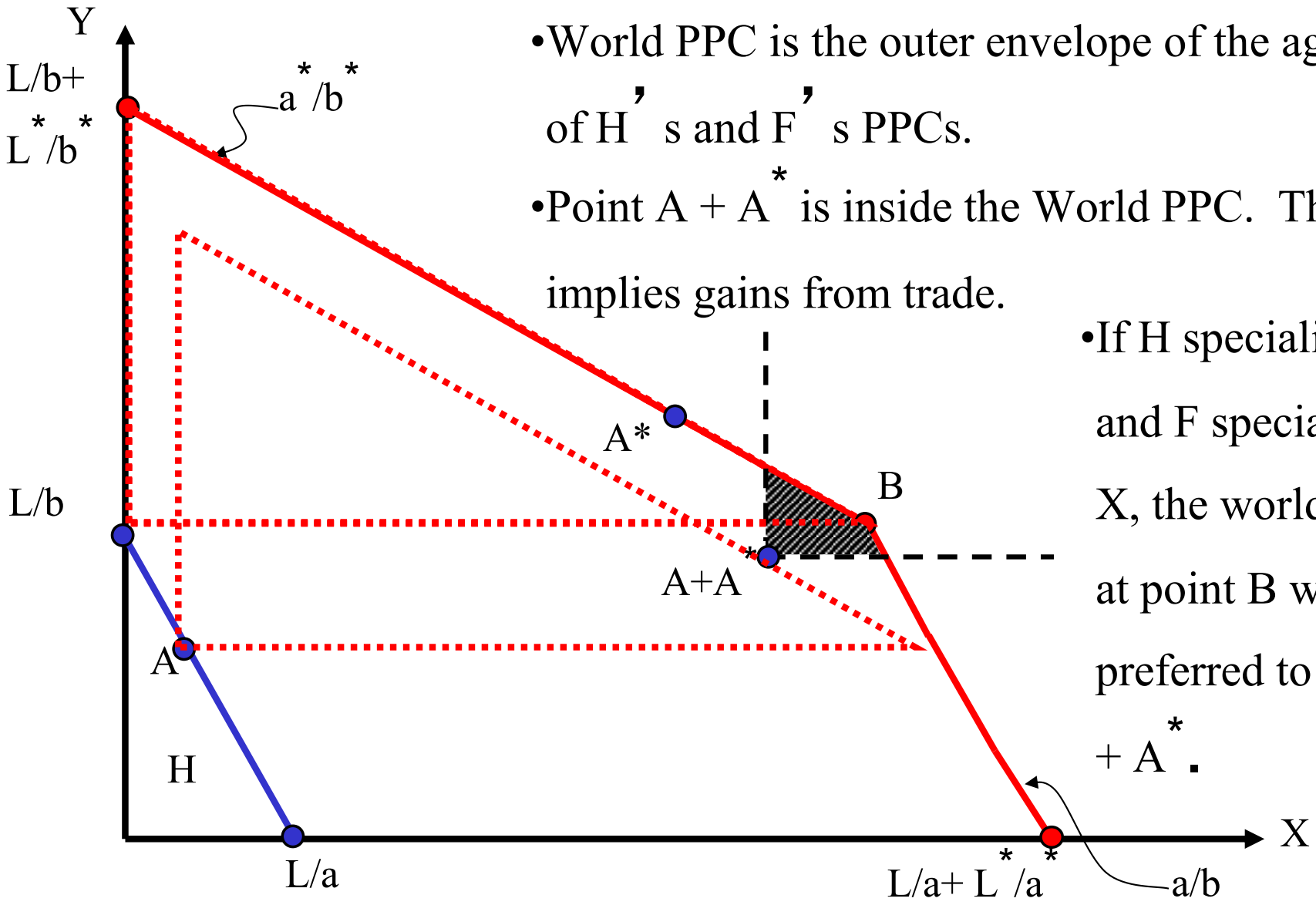
- Suppose after trade the world equilibrium price ratio or terms of trade $(P_X/P_Y)^W = 1$.
- Further assuming that $P^W_X = 16 = P^W_Y$. Since H exports Y and w = VMP implies that $P^W_Y = wb$, H's wage rate $= P^W_Y / b = 16/4 = 4$.
- Similarly, since F exports X and $P^W_X = w^* a^*$, F's wage rate $= P^W_X / a^* = 16/1 = 16$.
- The country with the higher absolute advantage (F) has a higher wage after trade. However, both countries gain from trade.

Free trade equilibrium

There are several ways to solve for free trade equilibrium:

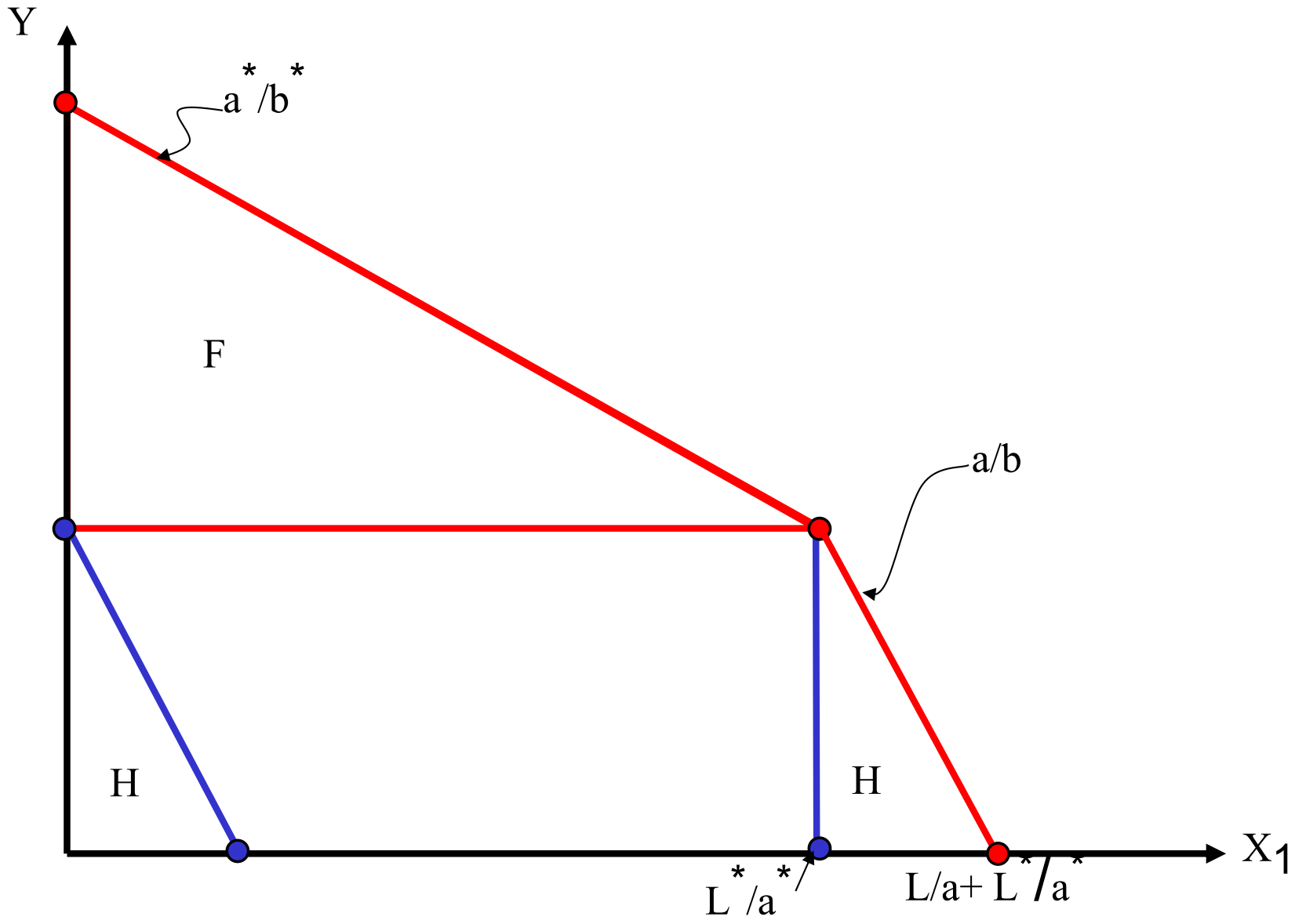
1. World PPC
2. World Relative Supply and Demand I
3. World Relative Supply and Demand II
4. Offer curves

1. World PPC

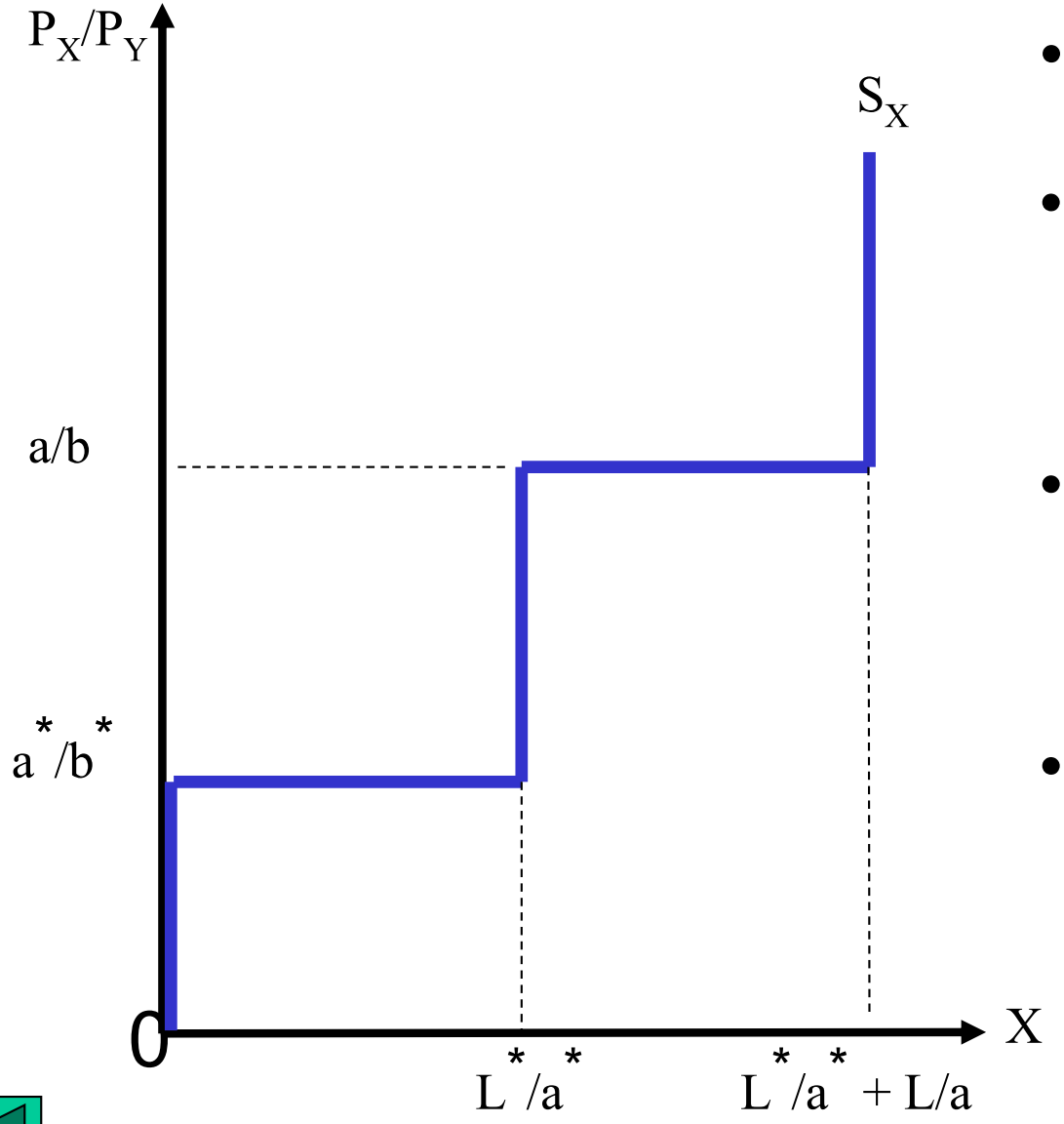


- World PPC is the outer envelope of the aggregation of H's and F's PPCs.
- Point A + A* is inside the World PPC. This implies gains from trade.
- If H specializes in Y and F specializes in X, the world will be at point B which is preferred to point A + A*.

1. World PPC: Three possible outcomes

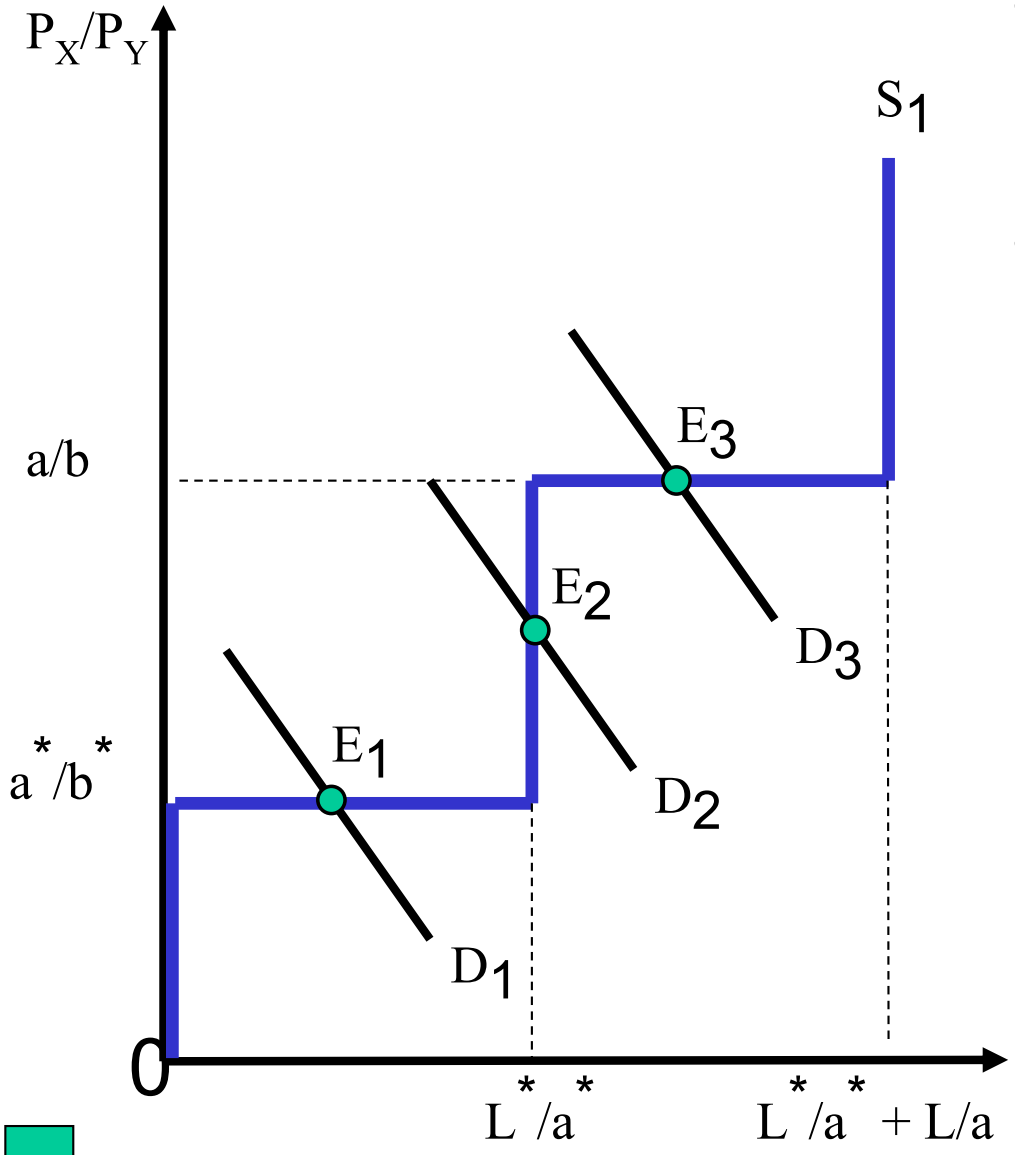


2. World Relative Supply and Demand I



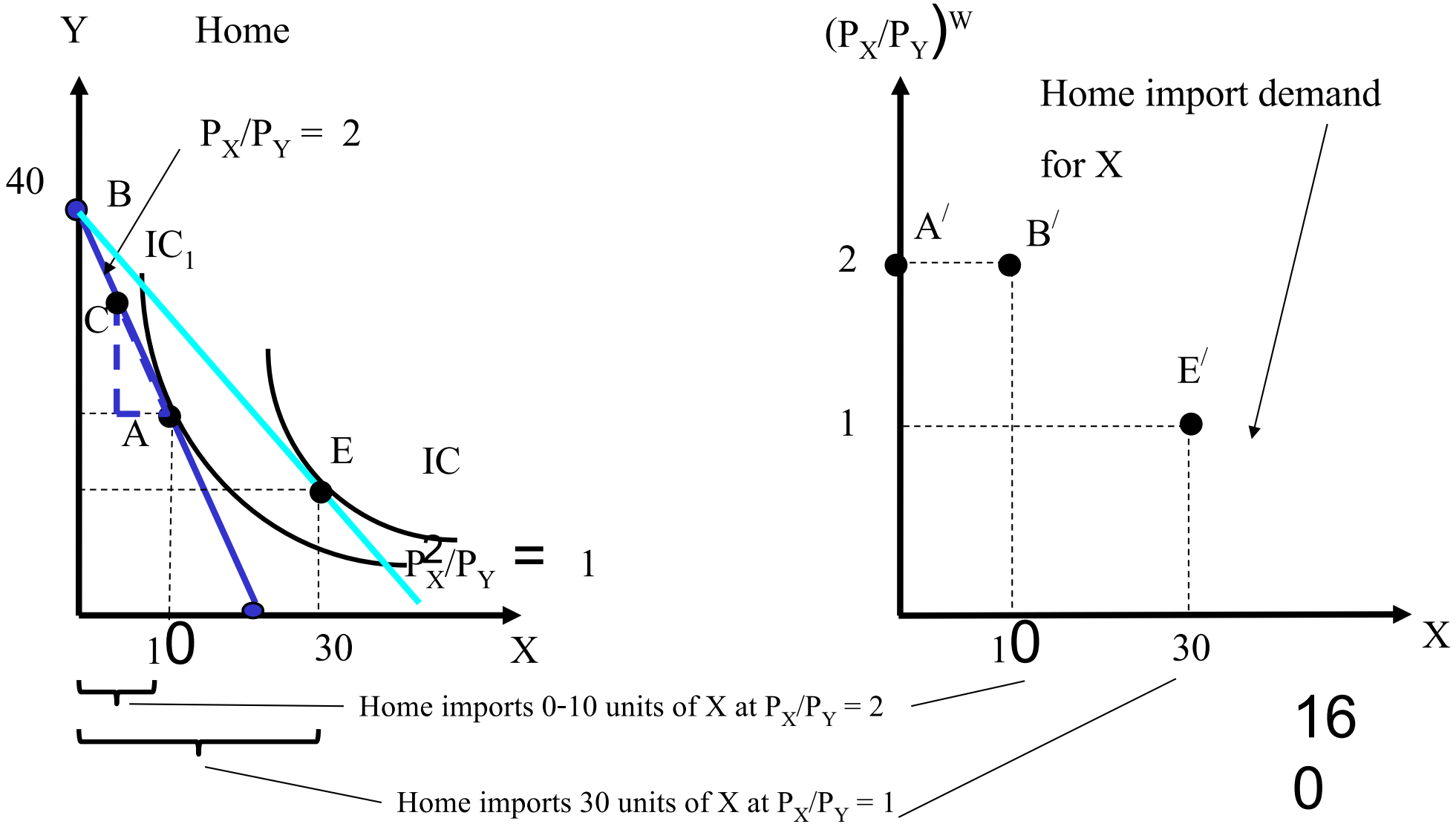
- If $P_X/P_Y < a^*/b^*$, $X = 0$.
- If $P_X/P_Y = a^*/b^*$, X varies from 0 to L^*/a^*.
- If $a^*/b^* < P_X/P_Y < a/b$, X is fixed at L^*/a^*.
- If $P_X/P_Y = a/b$, X varies from L^*/a^* to $L^*/a^* + L/a$.

2. World Relative Supply and Demand I

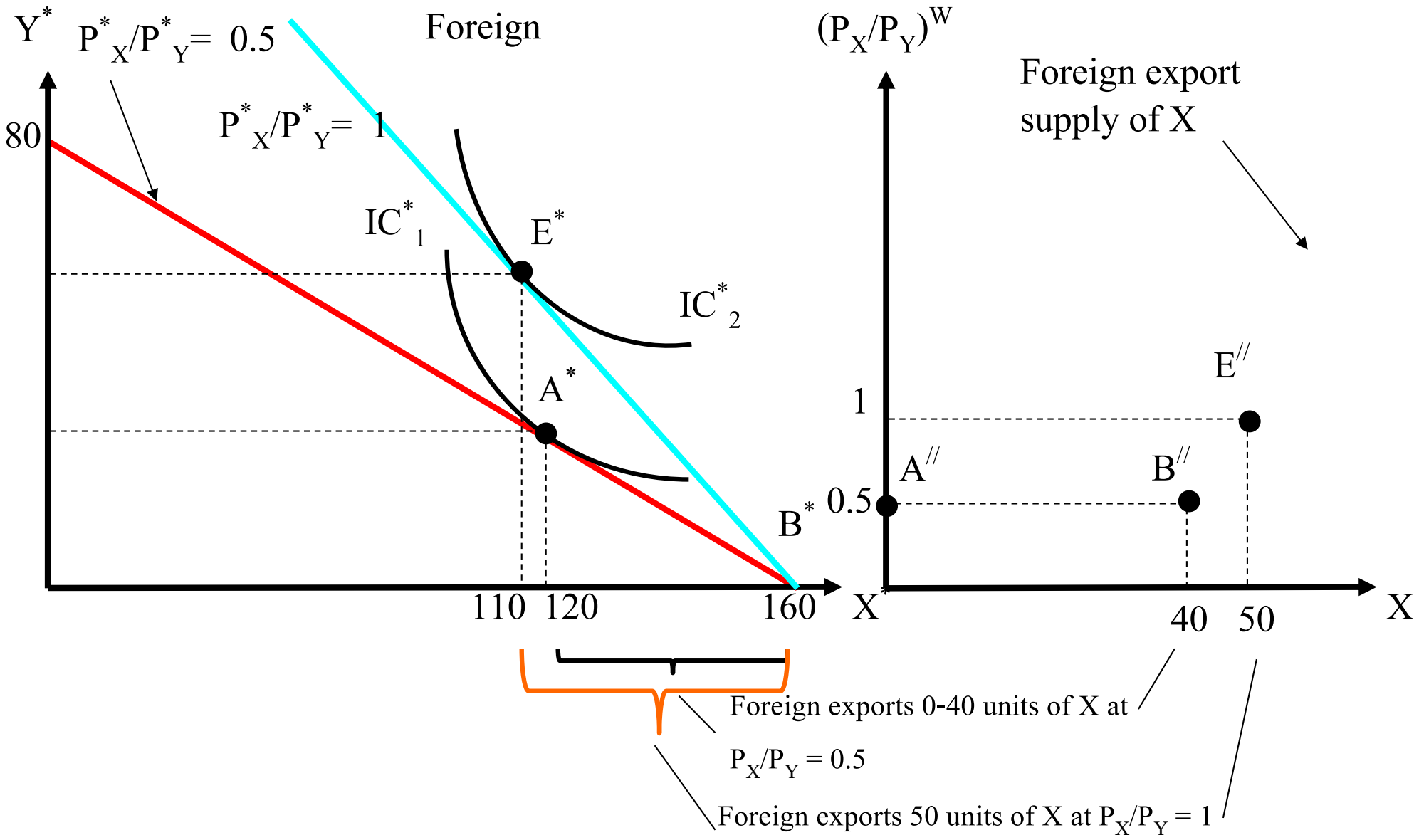


- If $P_X/P_Y < a^*/b^*$, H and F specialize in Y.
- If $P_X/P_Y = a^*/b^*$, H specializes in Y, F diversifies and may produce up to L^*/a^*.
- If $a^*/b^* < P_X/P_Y < a/b$, no change in X; Each specializes in its com. adv.
- If $P_X/P_Y = a/b$, F specializes in X, H diversifies.

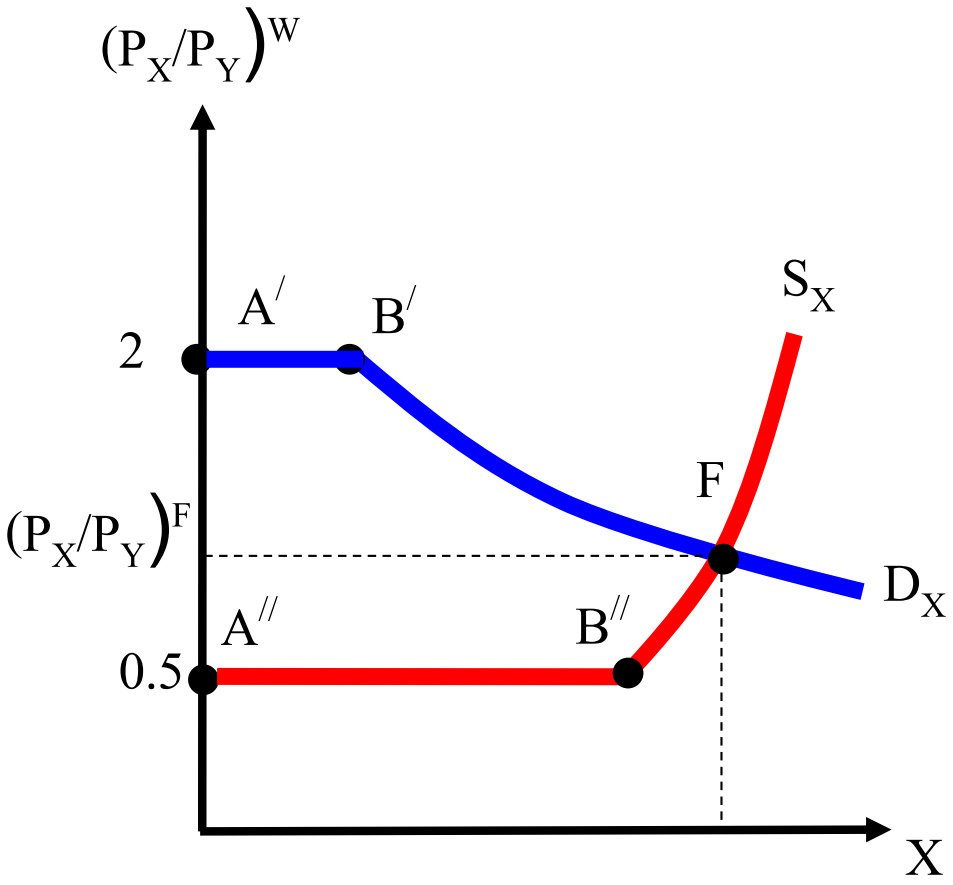
3. World Relative Supply and Demand II



3. World Relative Supply and Demand II

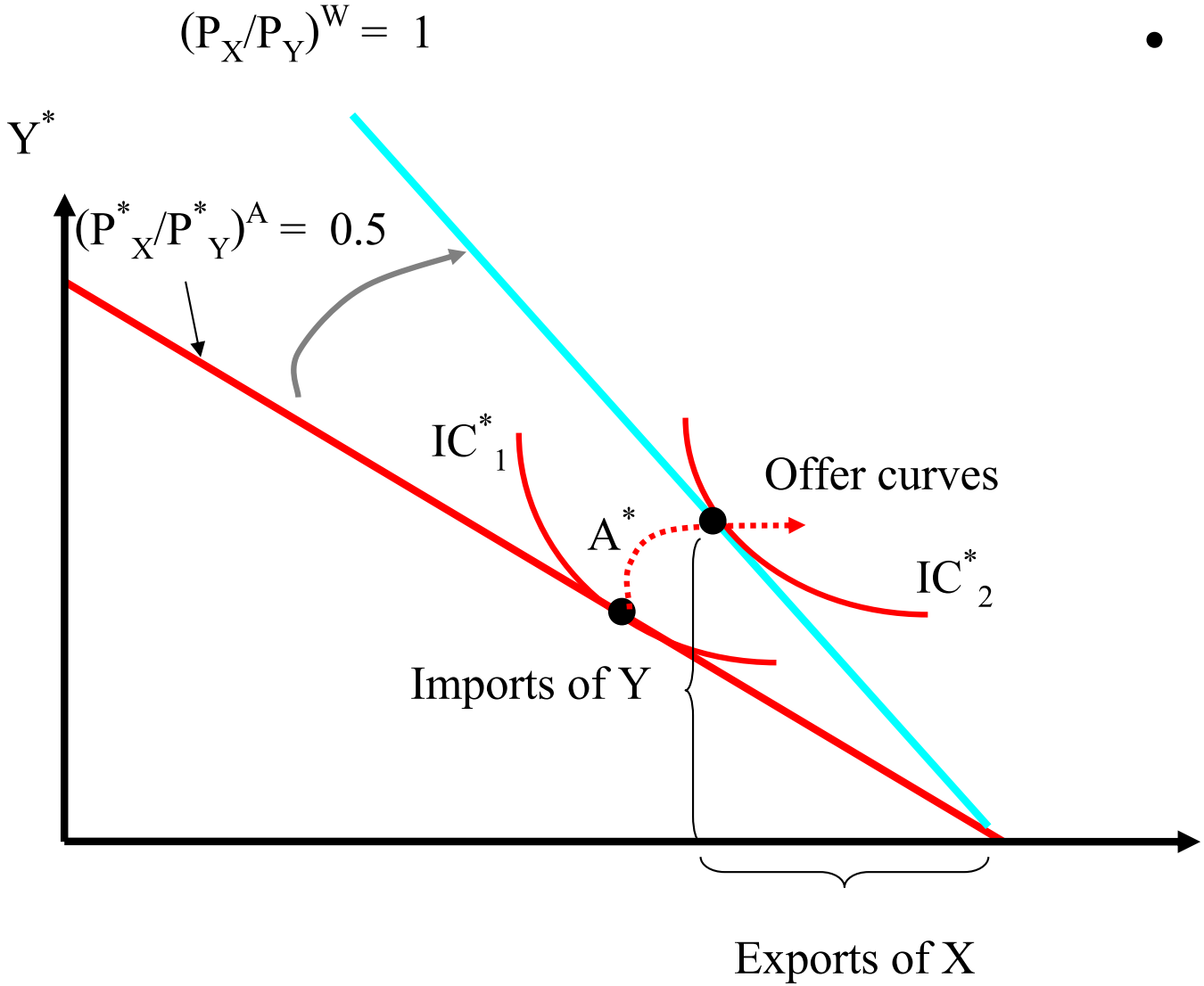


3. World Relative Supply and Demand II



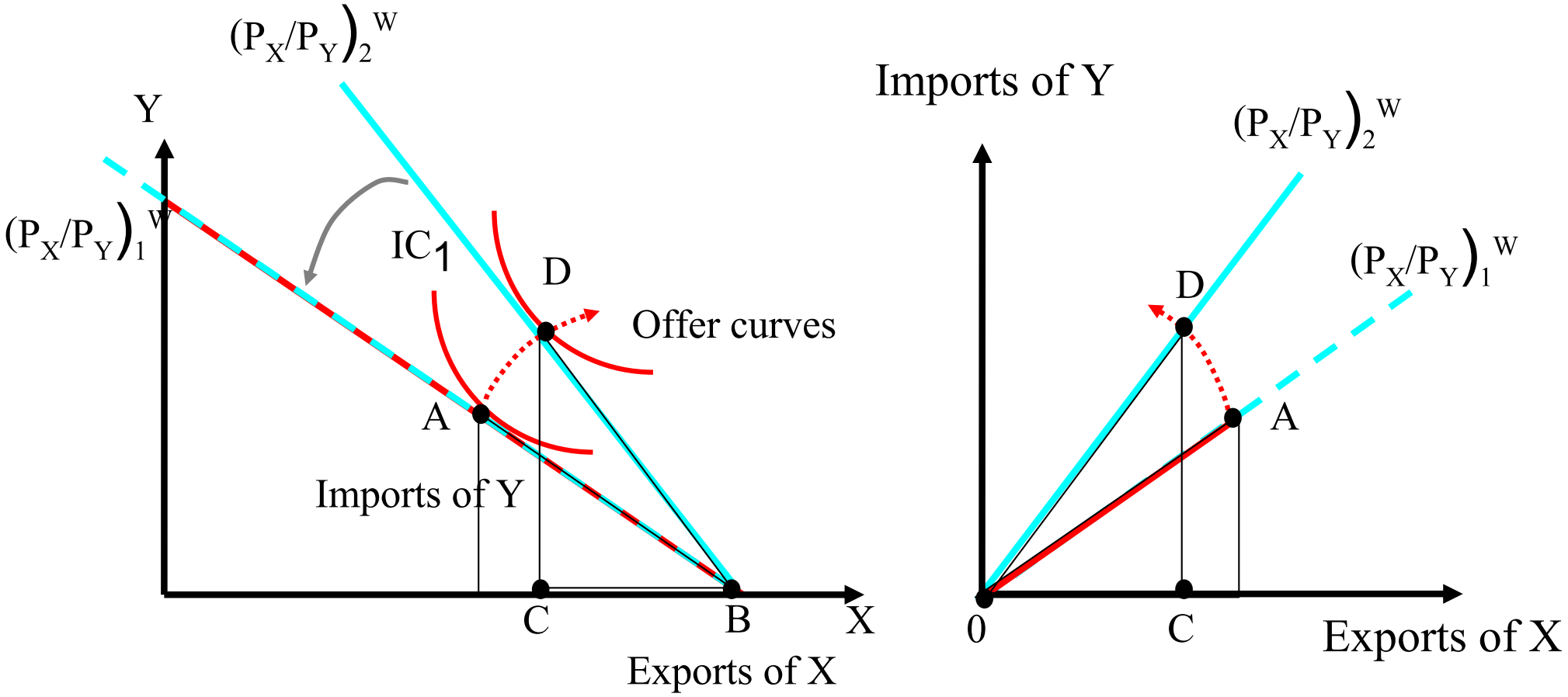
- The intersection of the Home import demand(D_X) and Foreign export supply (S_X) generates the equilibrium world price level $(P_X/P_Y)^F$.

4. Offer curves



- The offer curve is the curve that trace the equilibrium points as the world price changes.

4. Offer curves



Measuring trade advantages: the Balassa index I

How do you determine a country's strong export sectors? Most often used: **Balassa index** or **Revealed Comparative Advantage** (RCA)

$$RCA_j^A = \frac{\text{share of industry j in country A exports}}{\text{share of industry j in world exports}}$$

If $RCA^A_j > 1$, country A has a comparative advantage in j.

If $RCA^A_j < 1$, country A has a comparative disadvantage in j.

Calculation of RCA

2003, Billion Baht	Thailand	World
Export of computer	340	37323
Export of clothes	115	9038
Total export	3326	291755

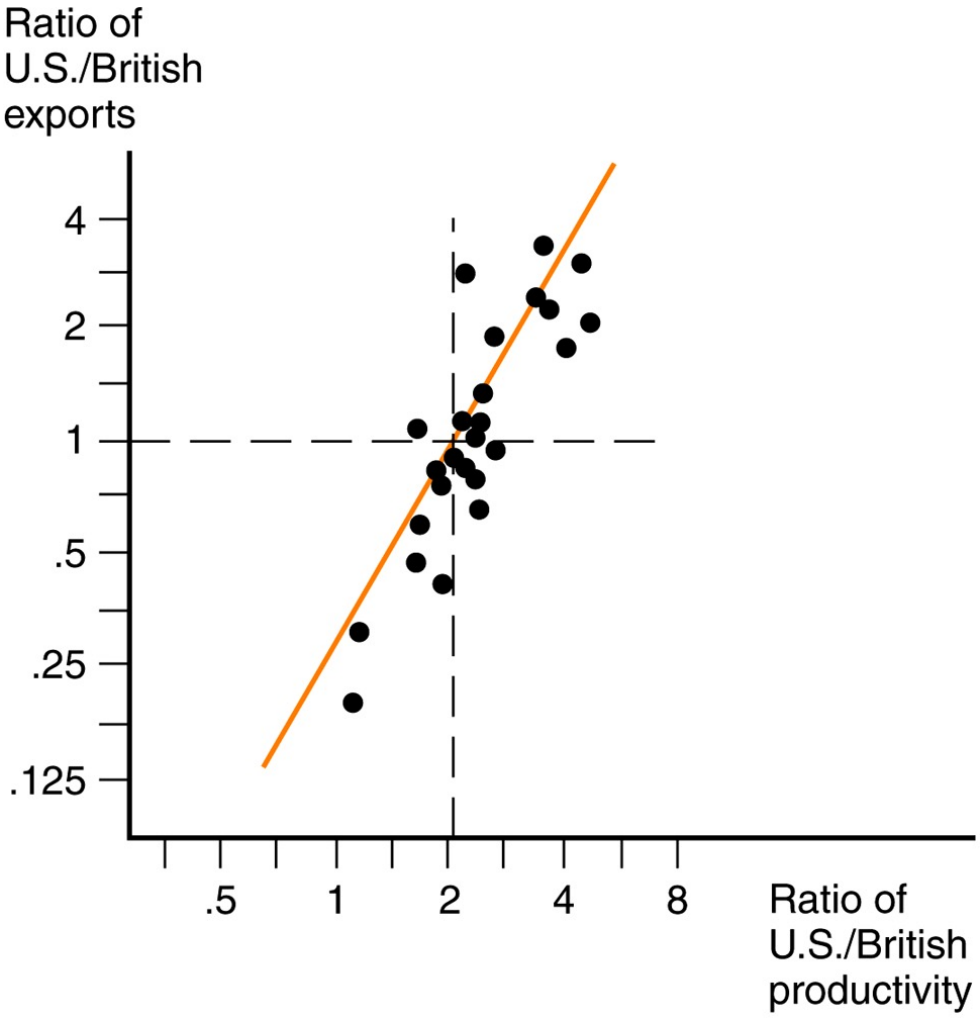
$$RCA = \frac{X_{ik} / X_i}{X_{wk} / X_w}$$

$$RCA_{com} = \frac{340/3326}{37323/291755} = 0.80$$

$$RCA_{tex} = \frac{115/3326}{9038/291755} = 1.12$$

Empirical Evidence on the Ricardian Model

Productivity and Exports



Conclusions

- The Ricardian model was devised to respond to the mercantilist idea that exports are good and imports are bad.
- David Ricardo found this was not true and considered an example where trade between two countries was balanced.
- The pattern of trade is determined by comparative advantage, and both countries gain from trade.
- The Ricardian model is presented with only one factor of production—labor.

Conclusions

- Because wages depend on the marginal products of labor in each country, wages are determined by absolute advantage.
  - Country with better technology will be able to pay higher wages.
- In addition, wages depend on the prices prevailing on world markets for the goods exported by each country.
- The terms of trade is the price of a country's exports divided by the price of its imports.

Questions

What are the main ideas of Ricardian Model?

What are the draw back of the model?

Review:

General equilibrium, Edgeworth Box Diagram, PPC.