

INTERNATIONAL ECONOMICS

Lecture 6 — December 6, 2022

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Last week

- Gains from trade

This week

- Ricardian model of trade
 - Differences in productivity

EVALUATION

**REVEALED
COMPARATIVE
ADVANTAGE**

Revealed Comparative Advantage

Balassa (1965) index of **Revealed Comparative Advantage**

- “Revealed”: based on trade flows
- Specialization index, assuming that countries specialize in production of goods for which they have comparative advantage :

$$RCA_{i,s} = \frac{X_{i,s}/X_i}{X_{R,s}/X_R}$$

- $X_{i,s}$ - exports of country i in sector s
- X_i - total exports of i
- R - reference region (e.g., OECD, EU, RoW...)

→ i has CA in s iff $RCA > 1$

RCA: United States

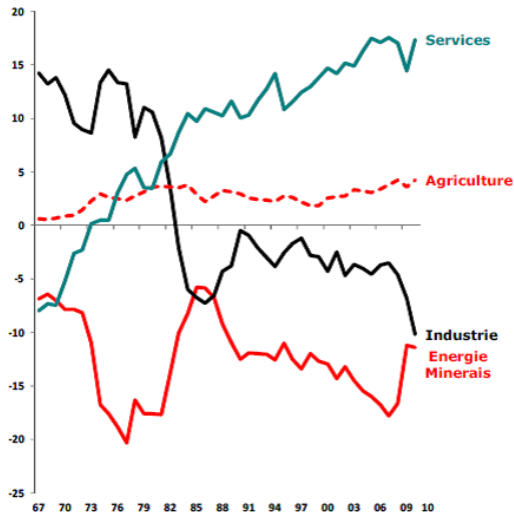


Figure: RCA of USA, Source: CEPII, *Panorama 2013*

RCA: China

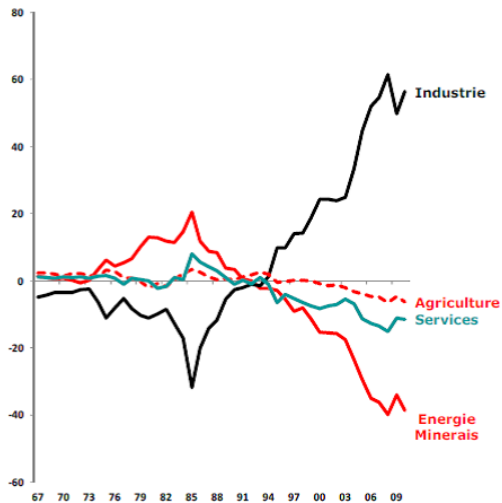


Figure: RCA of China, Source: CEPII, *Panorama 2013*

RCA: Saudi Arabia

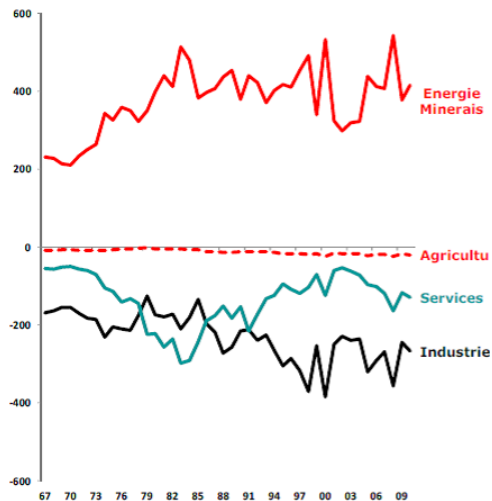


Figure: RCA of Saudi Arabia, Source: CEPII, *Panorama 2013*

R I C A R D O

Ricardo: Setup

- **2 countries:** home H and foreign F
- **2 goods:** X and Y
- **1 factor of production:** labor
 - perfectly mobile across sectors
 - immobile across countries

Ricardo: Setup

- Countries **differ in technologies** of production
- Identical endowments across countries
- Constant returns to scale (CRS)
- Identical preferences across countries
- No distortions, no trade barriers

Production

- Labor unit requirement ("technical coefficient"):

$$a_X = \frac{L_X}{X} \quad a_Y = \frac{L_Y}{Y}$$

→ quantity of labor needed to produce one unit of output

- Production of each good:

$$X = \frac{L_X}{a_X}$$
$$Y = \frac{L_Y}{a_Y}$$

Production

- Labor unit requirement inverse measure of labor productivity
 - the lower the labor unit requirement the more efficient the production
- Example:
 - $\frac{1}{a_X} = 5$ - quantity of cheese produced by a worker per hour
 - $\frac{1}{a_Y} = 10$ - quantity of wine produced by a worker per hour

Labor Market Equilibrium

- Perfect mobility: Same wage w across sectors
- Full employment condition:

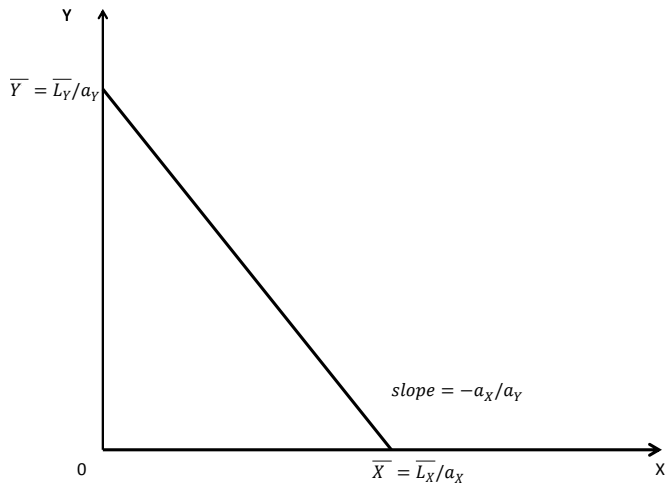
$$L = L_X + L_Y = a_X X + a_Y Y$$

- Production possibility frontier (PPF) of the economy then:

$$X = \frac{L}{a_X} - \frac{a_Y}{a_X} Y$$

→ maximum amount of a goods that an economy can produce given endowments

Production Possibility Frontier



Production Possibility Frontier

Slope equal to Marginal Rate of Technical Substitution (MRTS)

$$MRTS \equiv -\frac{\partial Y}{\partial X} = \frac{a_X}{a_Y} = -\text{slope of PPF}$$

→ Opportunity cost!

Production Possibility Frontier

Perfect competition, so that

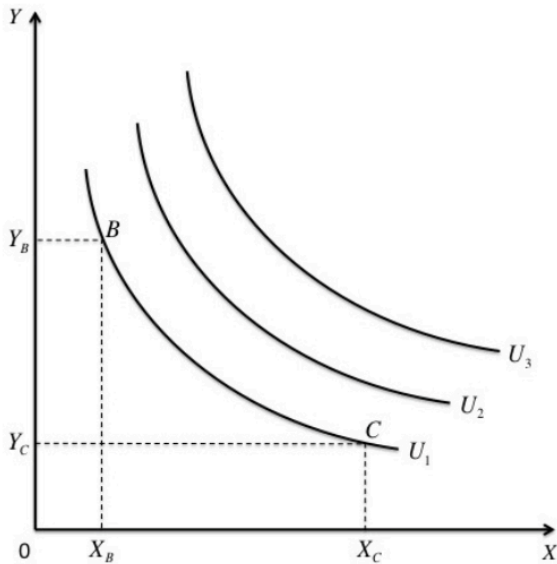
$$\pi_X = p_X X - wL_X = 0$$

$$\Leftrightarrow p_X = w \frac{L_X}{X}$$

$$\Leftrightarrow w = \frac{p_X}{a_X} \quad \text{and accordingly}$$

$$w = \frac{p_Y}{a_Y}$$

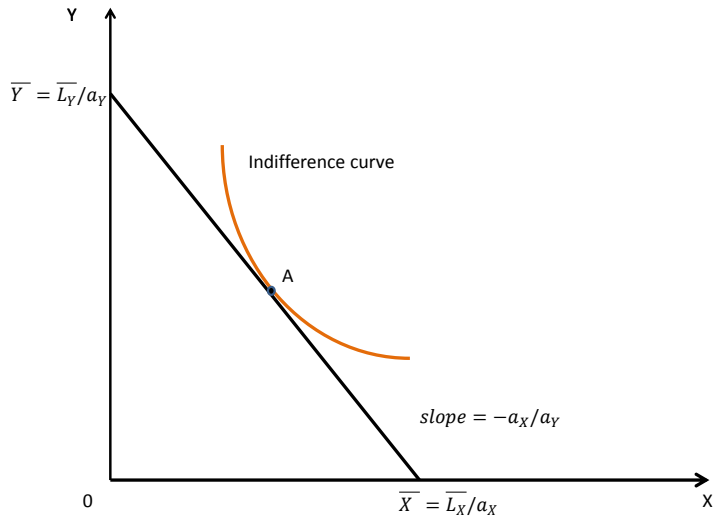
Demand side: Well-behaved utility function



Equilibrium under autarky

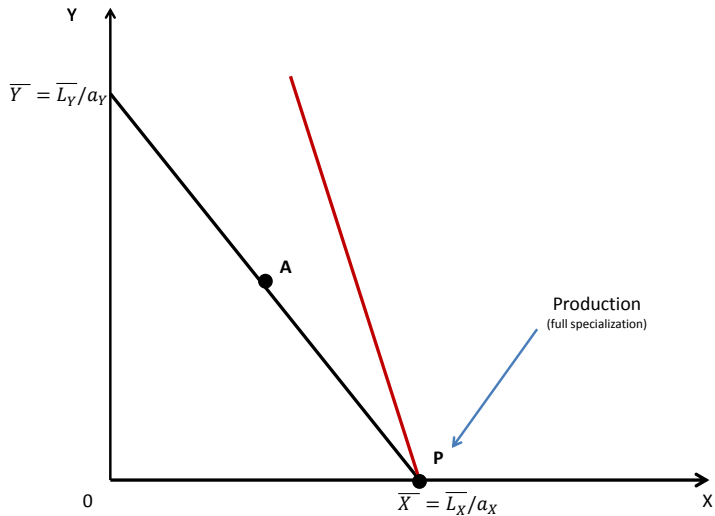
- Production must equal consumption in autarky
 - $MRTS = MRS$
 - Equilibrium is where PPF is tangent to “best” indifference curve
- Slope of PPF reflects **comparative advantage** and relative price in autarky
- Distance from the origin reflects **absolute advantage**

Equilibrium under autarky

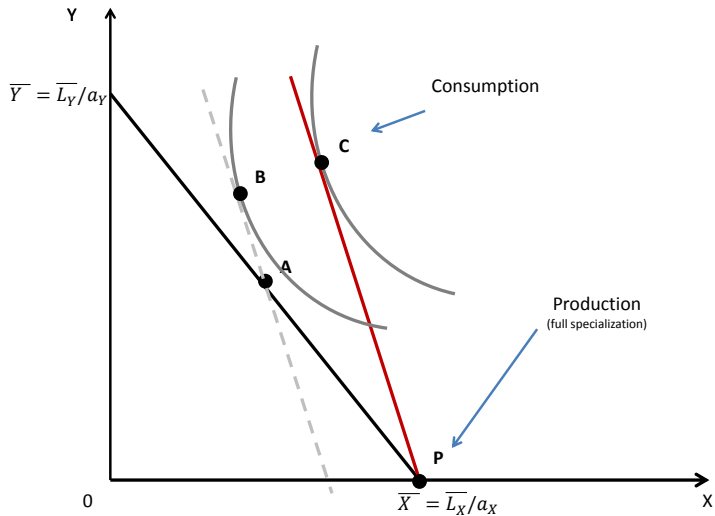


TRADE

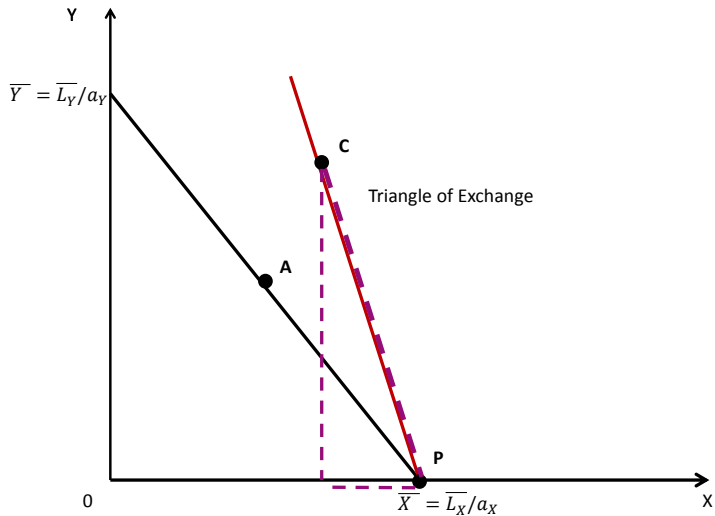
Full specialization



Gains from trade



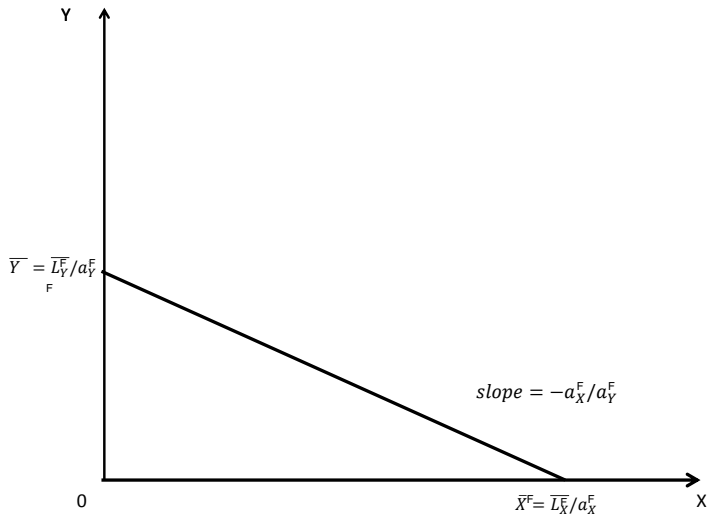
Triangle of Exchange



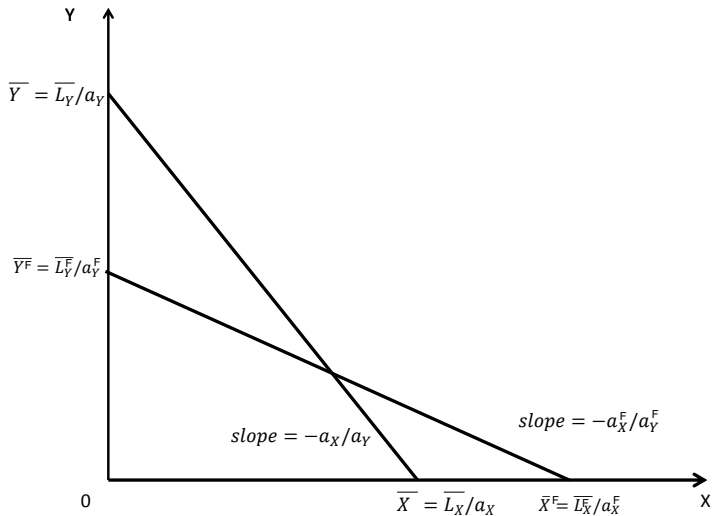
Prices under free trade

- for $P^* \neq P^i, i \in H, F$, trade can increase both production and welfare
 - $P^* > P^i$: country specializes completely in the production of X
 - $P^* < P^i$: country specializes completely in the production of Y

Foreign country



Home and Foreign



Home and Foreign

Comparing now two countries, home H and foreign F . Assume

$$\begin{aligned} \left(\frac{a_X}{a_Y}\right)^H &> \left(\frac{a_X}{a_Y}\right)^F \\ \Leftrightarrow \left(\frac{p_X}{p_Y}\right)^H &> \left(\frac{p_X}{p_Y}\right)^F \\ \Leftrightarrow p^H &> p^F \end{aligned}$$

- H has a *comparative advantage* in the production of Y
→ H is likely to produce and export Y

Free trade prices

Relative price in free trade is determined by relative supply and relative demand

- Preferences are the same in the two countries
- Relative demand curves are the same as well
- Different autarky prices
- Free trade price then

$$P^F \leq P^* \leq P^H$$

→ If $P^F = P^*$, F doesn't fully specialize (analogous for H)

Relative demand and supply: Big country

- If foreign country bigger than home: P^* closer to P^F
- If $P^* = P^F < P^H$
 - H and F trade, but...
 - F doesn't specialize, produces both
 - H specializes in Y
- price convergence: each country specializes in good with lower labor unit requirement

Wage effects

- In autarky, real wage equal to labor productivity:

$$p_X = wa_X \quad \text{or} \quad \frac{w}{p_X} = \frac{1}{a_X}$$

- After opening to trade, relative price equation:

$$p^F < p^* < p^H$$
$$\frac{a_X^F}{a_Y^F} < \frac{p_X^*}{p_Y^*} < \frac{a_X^H}{a_Y^H}$$

Wage effects

- If F specialized in X and H in Y

$$p_X^* = w^F a_X^F \quad \text{and} \quad p_Y^* = w^H a_Y^H$$

- Relative wages then

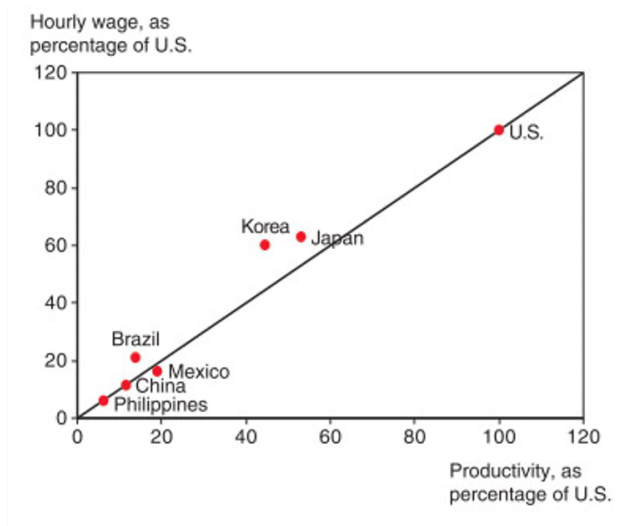
$$\frac{w^F}{w^H} = \frac{a_Y^H p_X^*}{a_X^F p_Y^*}$$

→ rel. wages = rel. productivity · rel. prices of exports (Terms of Trade)

Productivity and wages

- Do relative wages reflect relative productivities of the two countries?
- Evidence shows that low wages are associated with low productivity
 - Wage of most countries relative to the U.S. similar to productivity relative to the U.S.

Productivity and wages



Source: International Monetary Fund and The Conference Board

Productivity and wages

- Other evidence shows that wages rise as productivity rises
- As recently as 1975, wages in South Korea were only 5% of those of the United States
- Then South Korea's labor productivity rose (to about half of the U.S. level by 2007), so did wages

Wage effects

- After openness: the wage ratio depends on
 - Productivity for the exported good relative to the imported good
 - World price of the exporting good relative to the imported good
- In other words, a country can get richer if
 - Labor productivity in the exporting sector increases
 - Price of the exported good increases

Conclusion

- Trade because of relative productivity differences
 - comparative advantage!
- Trade increases world output and welfare
- No one loses: worst outcome is no gain
- Smaller countries gain more

Next week

- Heckscher-Ohlin model of trade
 - Differences in endowments