International Trade: Lecture 4

Classical Ricardian Trade in General Equilibrium - Part II

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Last Class: Autarky Equilibrium

Variable	United States (US)	Colombia (COL)
Labor endowment L_i	300 million	54 million
Preference parameter α_i	$1/2$	$3/4$
Unit labor requirement for computers $a_{i,C}$	3,000	5,400
Unit labor requirement for roses $a_{i,R}$	30	6
Max computers: $L_i/a_{i,C}$	$300\text{m}/3{,}000 = 100{,}000$	$54\text{m}/5{,}400 = 10{,}000$
Max roses: $L_i/a_{i,R}$	$300\text{m}/30 = 10\text{m}$	$54\text{m}/6 = 9\text{m}$
Opportunity cost $a_{i,C}/a_{i,R}$	$3{,}000/30 = 100$	$5{,}400/6 = 900$
Demand for computers: $\alpha_i L_i/a_{i,C}$	$0.5 \times 300\text{m}/3{,}000 = 50{,}000$	$0.75 \times 54\text{m}/5{,}400 = 7{,}500$
Demand for roses: $(1-\alpha_i)L_i/a_{i,R}$	$0.5 \times 300\text{m}/30 = 5\text{m}$	$0.25 \times 54\text{m}/6 = 2.25\text{m}$

Last Class: Autarky Equilibrium

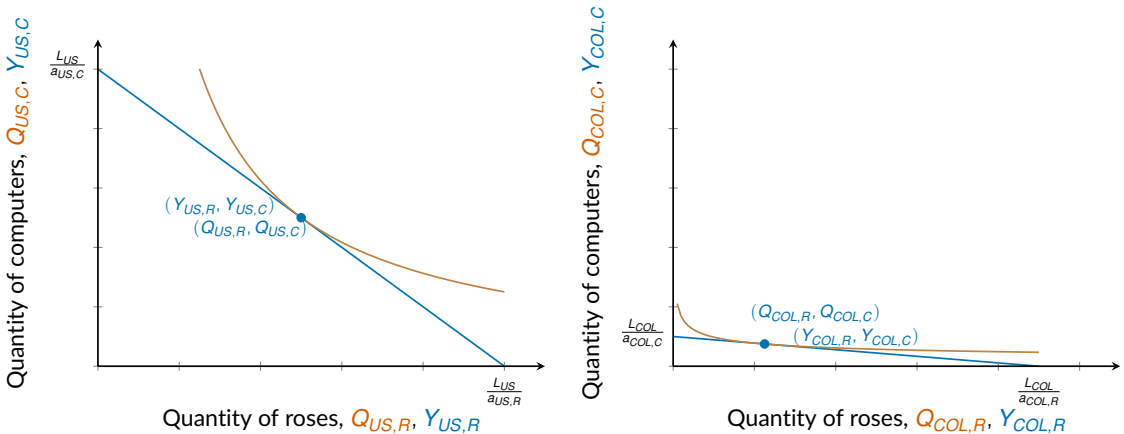

Figure: Autarky equilibrium

Absolute and Comparative Advantage

- We say Colombia has an absolute advantage in the production of good p if $a_{COL,p} < a_{US,p}$
- English: absolute advantage in production = uses less labor to produce one unit
  (i.e., it is more productive)
- Opportunity cost: cost of producing a good, measured in foregone output of all others.
- Comparative advantage: An economy has a comparative advantage in producing a good if its opportunity cost of the good is lower than in the rest of the world.

Absolute and Comparative Advantage

- We say Colombia has an comparative advantage in the production of roses, since:

$$1/900 = a_{COL,R}/a_{COL,C} < a_{US,R}/a_{US,C} = 1/100$$

- We say the US has an comparative advantage in the production of computers, since:

$$900 = a_{COL,C}/a_{COL,R} > a_{US,C}/a_{US,R} = 100$$

Prices under Autarky

- Without trade, prices reflect opportunity cost:
  - In the US: $a_{US,R}/a_{US,C} = P_{US,R}/P_{US,C}$
  - In Colombia: $a_{COL,R}/a_{COL,C} = P_{COL,R}/P_{COL,C}$

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- If $P_R/P_C = a_{COL,R}/a_{COL,C}$, Colombian producers indifferent
  - Production of computers $Y_{COL,C}$ can range from 0 to 10,000
  - Production of roses $Y_{COL,R}$ can range from 0 to 9mi

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- If $P_R/P_C = a_{US,R}/a_{US,C}$, US producers indifferent
  - Production of computers $Y_{US,C}$ can range from 0 to 100,000
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Prices consistent with trade

- In this model, countries specialize in goods in which they have a comparative advantage:
  - Colombia specializes in roses if $a_{COL,R}/a_{COL,C} < P_R/P_C$
  - The US specializes in computers if $a_{US,R}/a_{US,C} > P_R/P_C$

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- Why?

  (relative marginal revenue is greater than its relative marginal cost)

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- Each country specializes in the good in which they have a comparative advantage in if:

$$\frac{a_{US,C}}{a_{US,R}} < \frac{P_C}{P_R} < \frac{a_{COL,C}}{a_{COL,R}}$$

Global Supply Curve

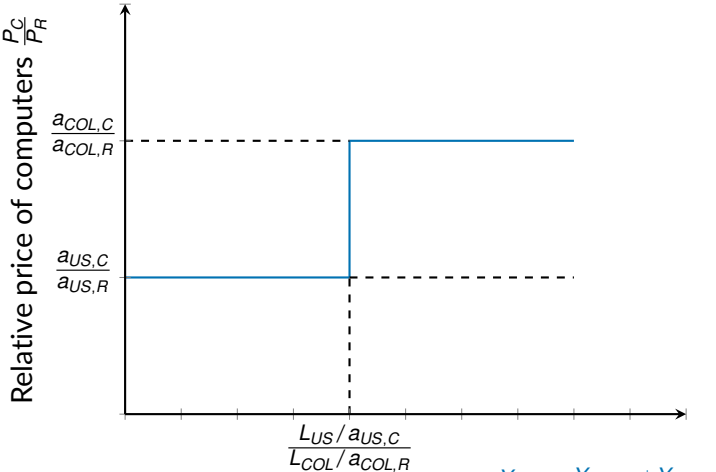

Figure: Relative Supply of Computers as a function of Relative Prices

Price Determination (i)

- How are prices determined in a free trade equilibrium?
  (relative prices will adjust to make sure that the global supply = global demand)

  2-¿ Global supply:
  - US fully specializes in computers: $Y_C^T = L_{US}/a_{US,C} = 100{,}000$
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- Global demand:

$$Q_C \equiv Q_{US,C}^T + Q_{COL,C}^T = \alpha_{US}\frac{w_{US}L_{US}}{P_C} + \alpha_{COL}\frac{w_{COL}L_{COL}}{P_C}$$

$$Q_R \equiv Q_{US,R}^T + Q_{COL,R}^T = (1-\alpha_{US})\frac{w_{US}L_{US}}{P_R} + (1-\alpha_{COL})\frac{w_{COL}L_{COL}}{P_R}$$

- Note that global demand Q_C/Q_R is decreasing in relative prices P_C/P_R

Global Supply and Demand

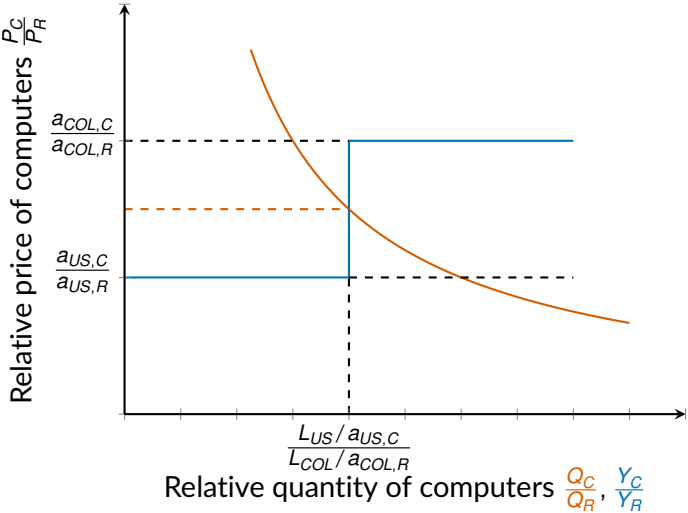

Figure: Relative Supply and Demand of Computers as a Function of Relative Prices

Price determination (ii)

- What is w_{US}, w_{COL}?
- Countries fully specialize: only one sector operating in each country
- Wages = marginal product of each worker in the sector they are working

$$w_{US} = P_C / a_{US,C}, \qquad w_{COL} = P_R / a_{COL,R}$$

Price determination (iii)

- How to get P_C / P_R? Trade balances, so value of exports = value of imports:

$$P_C(Y_{US,C} - Q^T_{US,C}) = P_R(Y_{COL,C} - Q^T_{COL,R})$$

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- Solving for P_C / P_R:

$$\boxed{\frac{P_C}{P_R} = \frac{\alpha_{COL}}{1-\alpha_{US}} \times \frac{L_{COL}/a_{COL,R}}{L_{US}/a_{US,C}} = \frac{3/4}{1/2} \times \frac{54m/9}{300m/3{,}000} = 135}$$

Production Possibilities Frontier + Trade Prices

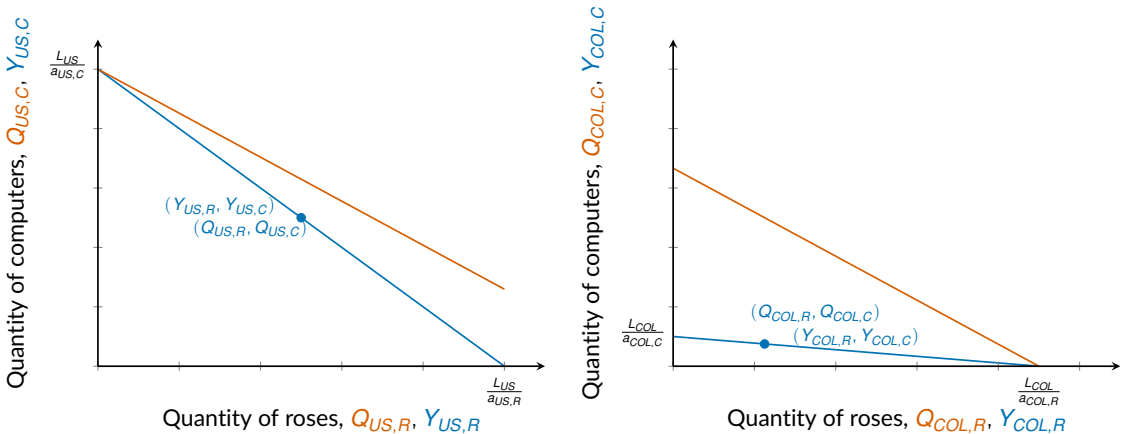

Figure: Autarky Equilibrium + Trade Prices

Production Possibilities Frontier + Trade Prices + Specialization

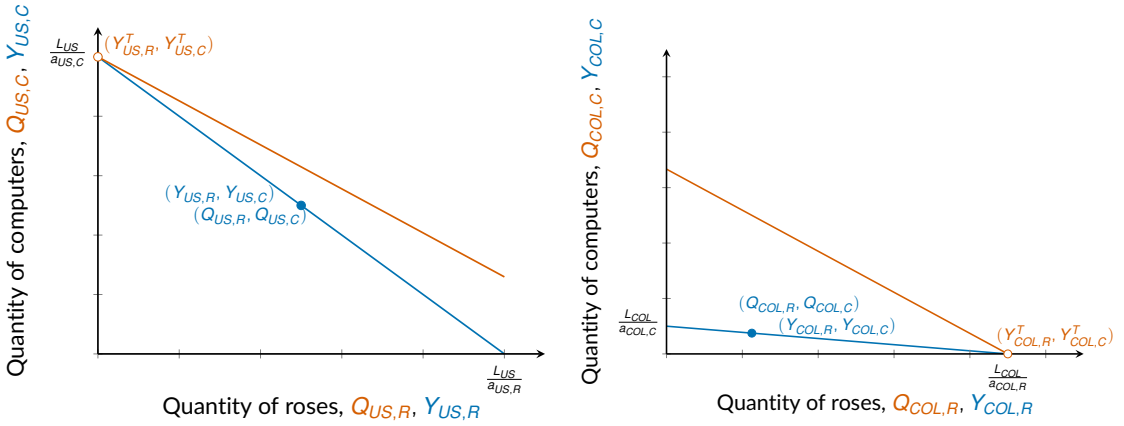

Figure: Production under Free Trade induces Specialization

Optimal demands under free trade

- Recall $w_{US} = P_C / a_{US,C}$, $\quad w_{COL} = P_R / a_{COL,R}$, $\quad P_C / P_R = 135$

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$$Q^T_{US,C} = \alpha_{US} \frac{w_{US} L_{US}}{P_C} = \alpha_{US} \frac{L_{US}}{a_{US,C}} = 1/2 \times \frac{300\text{m}}{100{,}000} = 50{,}000$$

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- Exports/imports of computers:
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- Exports/imports of roses: $Y_{US,R} - Q^T_{US,R} = 9m - 2.25m = 6.75m = Q^T_{US,R}$

Trade Equilibrium

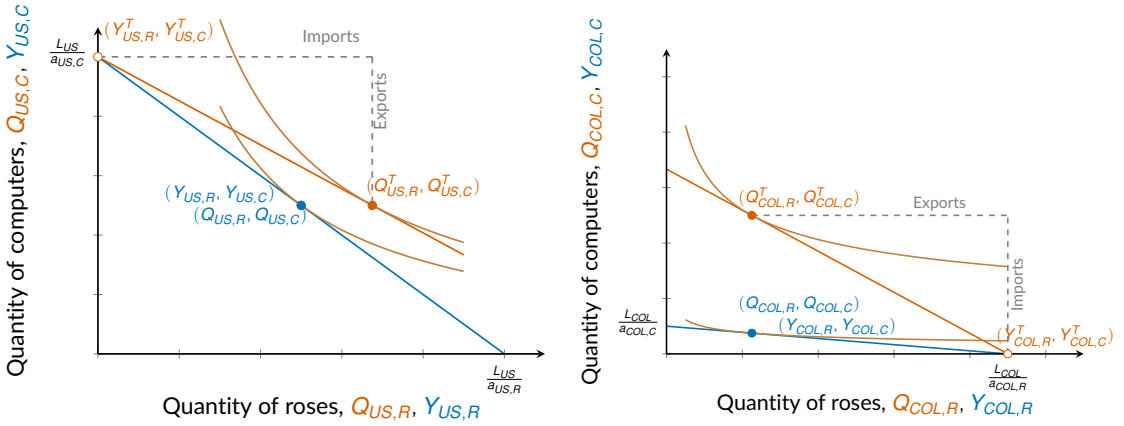

Figure: Specialization + Trade Equilibrium

Some misconceptions about comparative advantage

- “Free trade is only beneficial if a country is productive enough to compete.”
  No. Trade is beneficial if there is a comparative advantage. Absolute disadvantage does not matter.

- “Free trade lowers income in low-wage countries.”
  No. Trade is beneficial if there is a comparative advantage. Absolute wages do not matter.

- “Free trade makes us poorer because we spend money on other countries goods.”
  No. Having access to more affordable goods makes us better off by specializing and trading.

- “Free trade closes the income gap between poor and rich countries.”
  No. Trade raises every country’s welfare beyond autarky welfare. Per capita income differences remain, and depend on a country’s production possibilities.

Is free trade always ideal?

- This model is quite simple. Some things it does not consider:
  - Increasing returns to scale: a country may be competitive in an industry but it requires large initial investment (R&D, ships, planes, etc) – temporary protection?
  - Distributional effects: even if a country benefits in the aggregate, it could be the case that vulnerable groups are very exposed, increasing inequality
  - Price manipulation: if a country is very large relative to the world, it may be able to manipulate the purchase price in its favor using tariffs
  - Environmental externalities: trade policy can be an instrument to internalize some “bads” to the price of “goods”