Ricardian Model

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Outline

- Ricardian Model setup
- Autarky and free trade Budget constraints
- Comparative Advantage
- Autarky solution
- Free trade solution
- Gains from trade

Model

- Two countries: N(orth), S(outh) : say US and China, ...
- Two commodities: C(omputer), T(extile)
- Identical preferences:

$$U(C, T) = \log(C) + 3\log(T)$$

- One immobile factor: Labor

	Labor force
N	200
S	1000

Labor Requirement

- CRS prodution: Labour required to produce one unit of...

	a_T	a_C
N labor required	4	4
S labor required	5	10

- Perfect competition

Absolute advantage

- The N has absolute advantage for both goods: it's more productive in producing either good (less labor required).
- So, why would it ever import anything from the S?
- Let's start w/ autarky and move to free trade.

Comparative advantage

- Opportunity costs

	T relative to C	C relative to T
N	1	1
S	$\frac{1}{2}$	2

- N has comparative advantage in producing C. It produces C relatively more cheaply.
- S has comparative advantage in producing T. It produces T relatively more cheaply.

Trade and specialization

- We'll assume the law of one price holds: identical goods in different location should have the same price if there are no trade barriers $\rightarrow$ no tariffs, quotas, transaction costs, etc.
- Let P_T = world price of Textile, P_C = world price of Computer.
- The North and South take the world prices as given.

Trade and specialization

- North's Choice
  - one unit of North labor can produce:
    - $\frac{1}{4}$ unit of Textile worth $\frac{P_T}{4}$.
    - $\frac{1}{4}$ unit of Computer worth $\frac{P_C}{4}$

$\Rightarrow$

- North will specialize in Textile if $\frac{P_T}{4} > \frac{P_C}{4}$ or $\frac{P_T}{P_C} > 1$ and specialize in Computers vice versa.
- North prduce both goods if $\frac{P_T}{P_C} = 1$.

Trade and specialization

- South's Choice
  - one unit of South labor can produce:
    - $\frac{1}{5}$ unit of Textile worth $\frac{P_T}{5}$.
    - $\frac{1}{10}$ unit of Computer worth $\frac{P_C}{10}$.

$\Rightarrow$

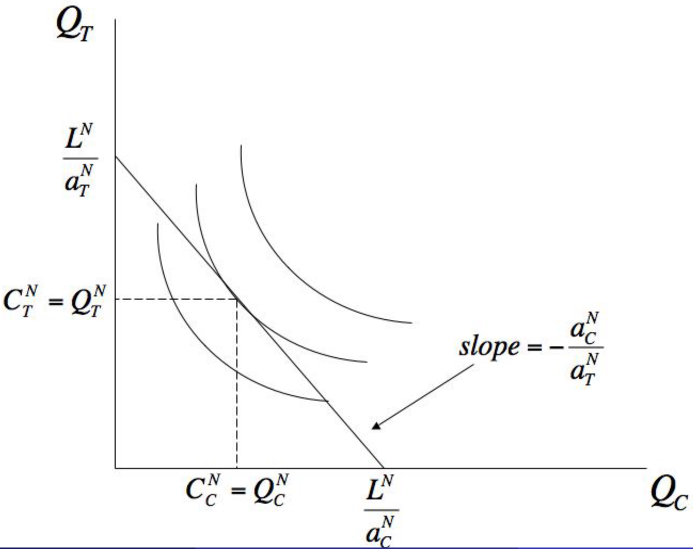
- South will specialize in Textile if $\frac{P_T}{5} > \frac{P_C}{10}$ or $\frac{P_T}{P_C} > \frac{1}{2}$ and specialize in Computers vice versa.
- South prduce both goods if $\frac{P_T}{P_C} = \frac{1}{2}$.

Trade and specialization

- If $0 < \frac{P_T}{P_C} < \frac{1}{2}$ both North and South specialize in Computers. $\Rightarrow$ No trade
- If $\frac{P_T}{P_C} = \frac{1}{2}$ North specializes in Computers and South produces both goods.$\Rightarrow$ Trade.
- If $\frac{1}{2} < \frac{P_T}{P_C} < 1$ North specializes in Computers and South specializes in Textiles.$\Rightarrow$ Trade.
- If $\frac{P_T}{P_C} = 1$ North produces both goods and South specializes in Textile$\Rightarrow$ Trade.
- If $1 < \frac{P_T}{P_C}$ both North and South specialize in Textiles.$\Rightarrow$ No trade

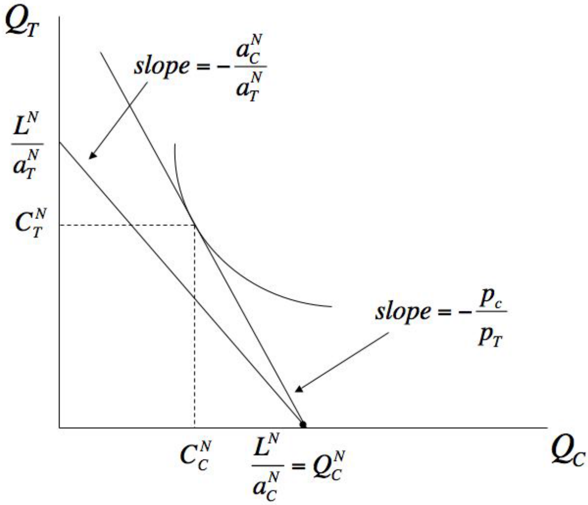
Autarky PPF

- North in Autarky



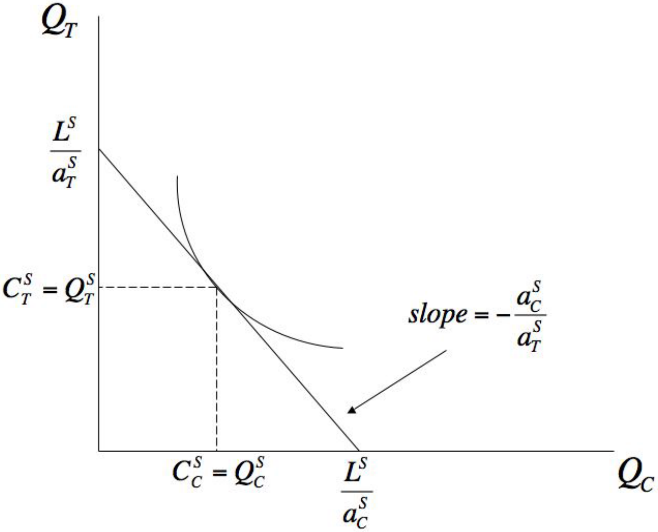
Budget constraint in free trade

- North in trade



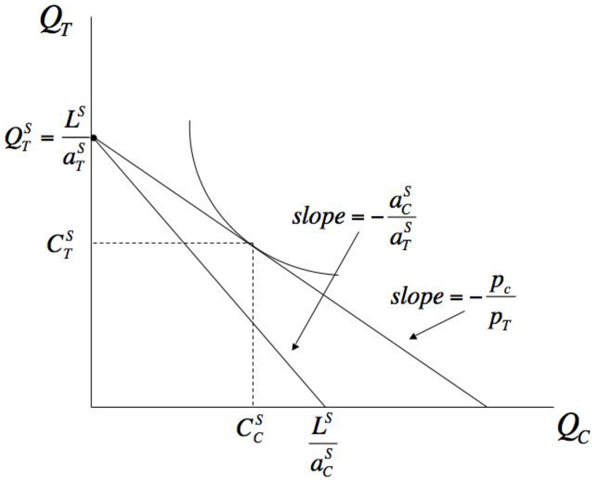
Autarky PPF

- South in Autarky



Budget constraint in free trade

- South in trade



Autarky Solution

$$\max_{C,T} \log(C) + 3\log(T)$$

$$\text{s.t. } C = \frac{L_C}{a_C}$$

$$T = \frac{L_T}{a_T}$$

$$L = L_C + L_T$$

Free Trade solution

- Assume $\frac{1}{2} < \frac{P_T}{P_C} < 1$
- North specialzies in Computers.
  - It produces $\frac{200}{4} = 50$ computers.
  - North's income $= 50P_C$
- South specializes in Textile.
  - It produces $\frac{1000}{5} = 200$ Textiles
  - South's income $= 200P_T$

Free Trade solution

- Problem (I = Income):

$$\max_{C,T} \log(C) + 3\log(T)$$

$$\text{s.t. } P_C C + P_T T = I$$

- FOCs$\Rightarrow$

$$P_C C = \frac{1}{4} I$$
$$P_T T = \frac{3}{4} I$$

Free Trade solution

- North:

$$C^N = \frac{1}{4} * 50$$
$$T^N = \frac{3}{4} * 50 \frac{P_C}{P_T}$$

- South:

$$C^S = \frac{1}{4} * 200 \frac{P_T}{P_C}$$
$$T^S = \frac{3}{4} * 200$$

Free Trade solution

- Market Clearing

$$\begin{aligned} C^N + C^S &= 50 \\ T^N + T^S &= 200 \end{aligned}$$

$\Rightarrow$

$$\frac{1}{4} * 50 + \frac{1}{4} * 200 \frac{P_T}{P_C} = 50$$

$\Rightarrow$

$$\frac{P_T}{P_C} = 0.75$$

- It is confirmed that: $\frac{1}{2} < \frac{P_T}{P_C} < 1$

Free Trade solution

$$
\begin{aligned}
C^N &= 12.5 \\
C^S &= 37.5 \\
T^N &= 50 \\
T^S &= 150 \\
\frac{P_T}{P_C} &= 0.75
\end{aligned}
$$