Sources and Implications of Comparative Advantage

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Ohlin Lectures

- Lecture 1:

  Defining Comparative Advantage

- Lecture 2:

  Sources of Comparative Advantage

Lecture 1: Defining CA

- Simplest model – Ricardian 2×2
  - Multiple equivalent definitions
  - Implications
  - Purpose
- Impossibility of achieving that purpose
- Weak general result: correlation
- Complications
  - More goods and/or countries, variable costs, trade costs, intermediate inputs, imperfect competition, increasing returns, distortions
- Other drawbacks of definitions

The Message

- Comparative advantage is not as simple as we think.
- It has
  - Multiple definitions,
  - None of which works as well as we'd like.
- This does *not* mean that the benefits of trade are questioned.

The Simplest Case: 2×2

The Ricardian Model:

- 2 goods: 1, 2
- 2 countries: 1, 2
- 1 factor: L = labor
- Constant costs: a_g^c = labor needed to produce one unit of good g in country c
- Perfect competition

Definition: 2×2

Standard definition of CA in terms of ***relative costs***:

A country has comparative advantage in the good whose relative labor cost (compared to the other good) is ***lower*** than in the other country.

Country c_1 has CA in good g_1,

relative to some other good g_2,
compared to another country c_2,

if

$$\frac{a_{g_1}^{c_1}}{a_{g_2}^{c_1}} < \frac{a_{g_1}^{c_2}}{a_{g_2}^{c_2}} \qquad (1)$$

Definition: 2×2

Other interpretations: ***Productivity*** $(1/a_g^c)$

A country has comparative advantage in the industry where relative productivity (compared to the other industry) is ***higher*** than in the other country.

Country c_1 has CA in good g_1,

relative to some other good g_2,

compared to another country c_2,

if

$$\frac{1/a_{g_1}^{c_1}}{1/a_{g_2}^{c_1}} > \frac{1/a_{g_1}^{c_2}}{1/a_{g_2}^{c_2}} \qquad (1a)$$

Definition: 2×2

Other interpretations: ***Autarky price*** ($\hat{p}_g^c = \hat{w}^c a_g^c$)

A country has comparative advantage in the good whose relative autarky price (compared to the other good) is ***lower*** than in the other country.

Country c_1 has CA in good g_1,
relative to some other good g_2,
compared to another country c_2,
if

$$\frac{\hat{p}_{g_1}^{c_1}}{\hat{p}_{g_2}^{c_1}} < \frac{\hat{p}_{g_1}^{c_2}}{\hat{p}_{g_2}^{c_2}} \qquad (1b)$$

Definition: 2×2

Other interpretations: ***World price*** (p_g^w)

A country has comparative advantage in the good whose relative autarky price (compared to the other good) is ***lower*** than in the world. (Small country only.)

Country c_1 has CA in good g_1,
relative to some other good g_2,
compared to another country c_2,

if

$$\frac{\hat{p}_{g_1}^{c_1}}{\hat{p}_{g_2}^{c_1}} < \frac{p_{g_1}^{w}}{p_{g_2}^{w}} \qquad (1c)$$

Definition: 2×2

Other interpretations: ***Ranking goods***

A country has comparative advantage in the good whose autarky price relative to the world price (or other country's price) is ***lowest***.

Country c_1 has CA in good g_1,

if

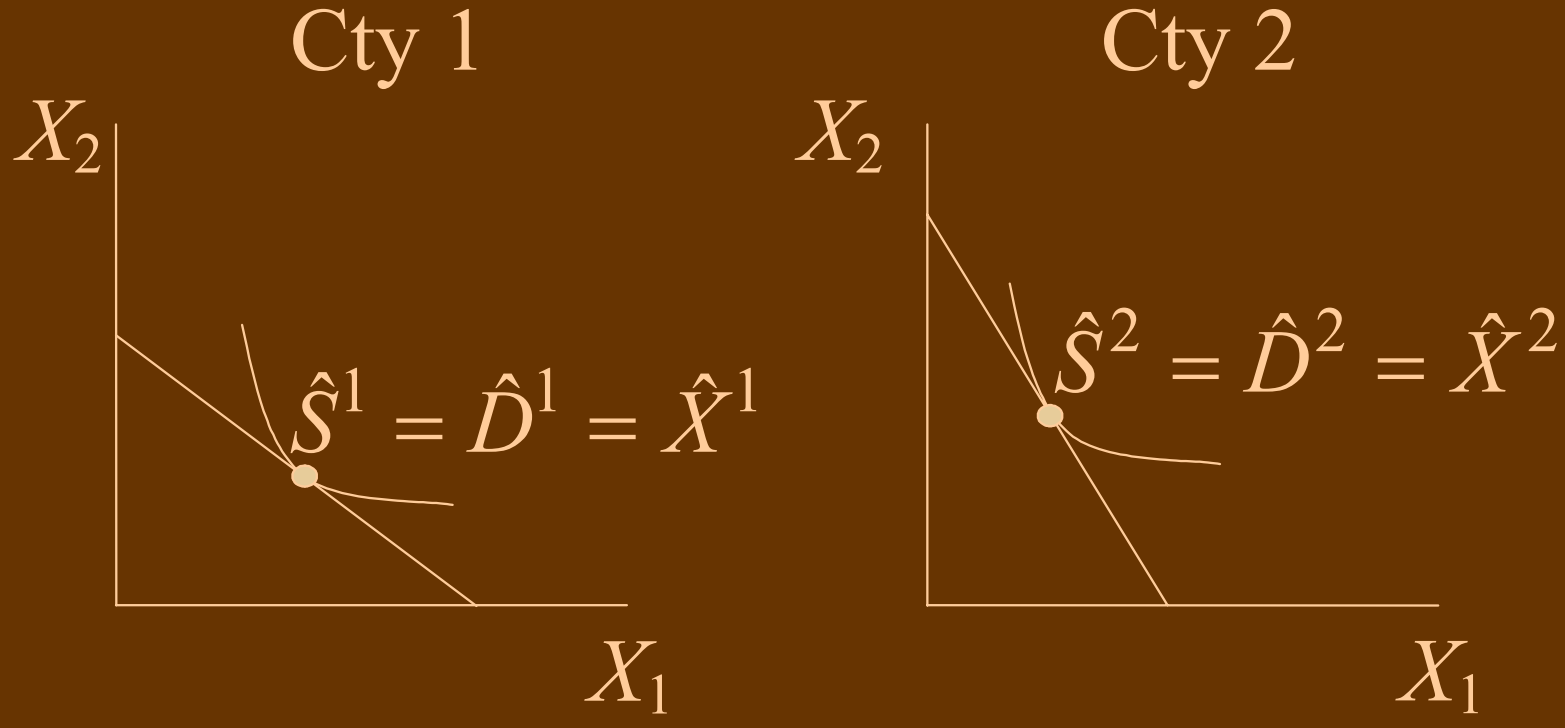
$$\frac{\hat{p}_{g_1}^{c_1}}{p_{g_1}^{w}} < \frac{\hat{p}_{g}^{c_1}}{p_{g}^{w}} \quad \forall g \neq g_1 \qquad (1d)$$

Implications: 2×2

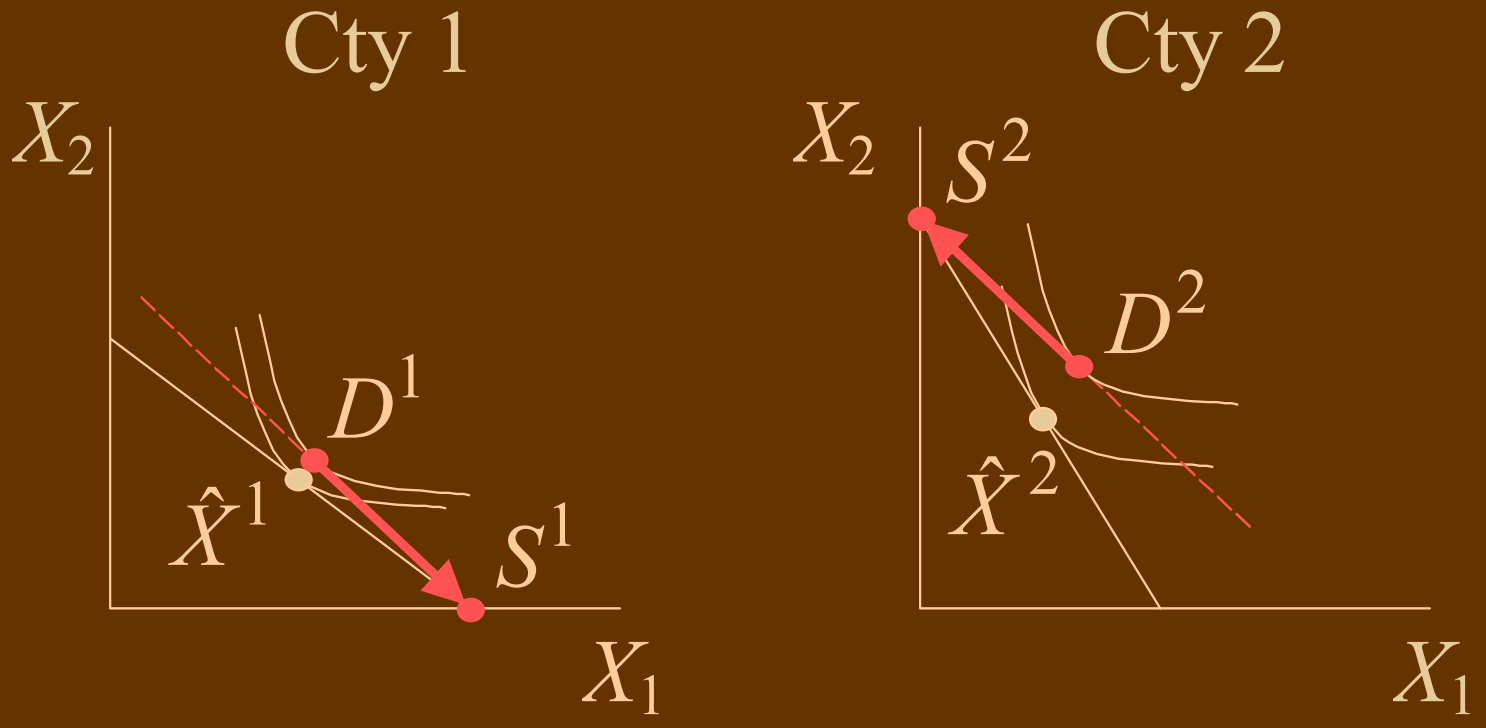
- Trade, if not distorted, will necessarily entail
  - c_1 exporting g_1
  - c_2 exporting g_2.
- For trade to be beneficial to the two countries, this ***must*** be the pattern of their trade.
- The size of this total benefit will be larger the more resources (in this case labor) each is able to reallocate into the industry in which it has comparative advantage.

- Thus, CA is both
  - Predictor of the trade pattern
  - Guide to resource allocation
- Note though that trading in accordance with CA is necessary but not sufficient for gains from trade,
  - Thus CA is *not* a guarantee of gains.

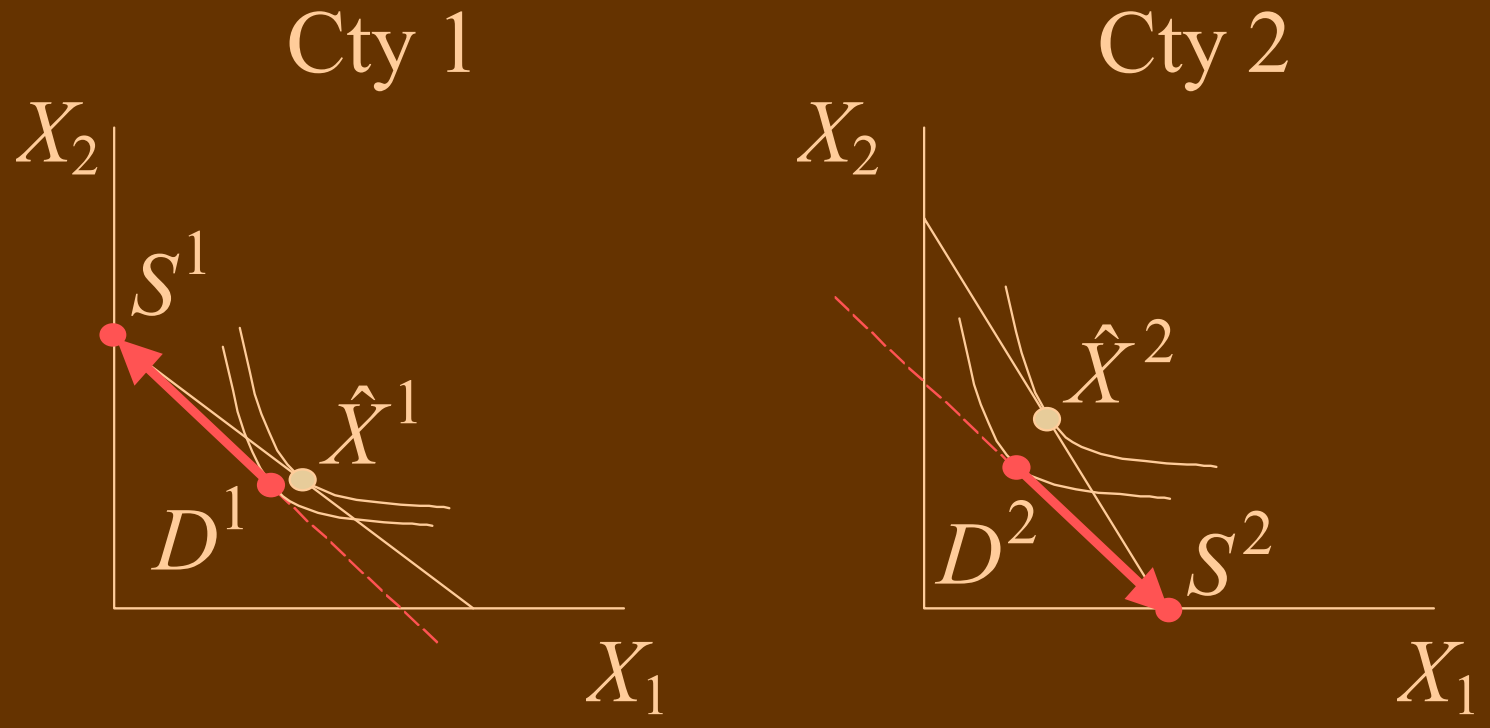
Example



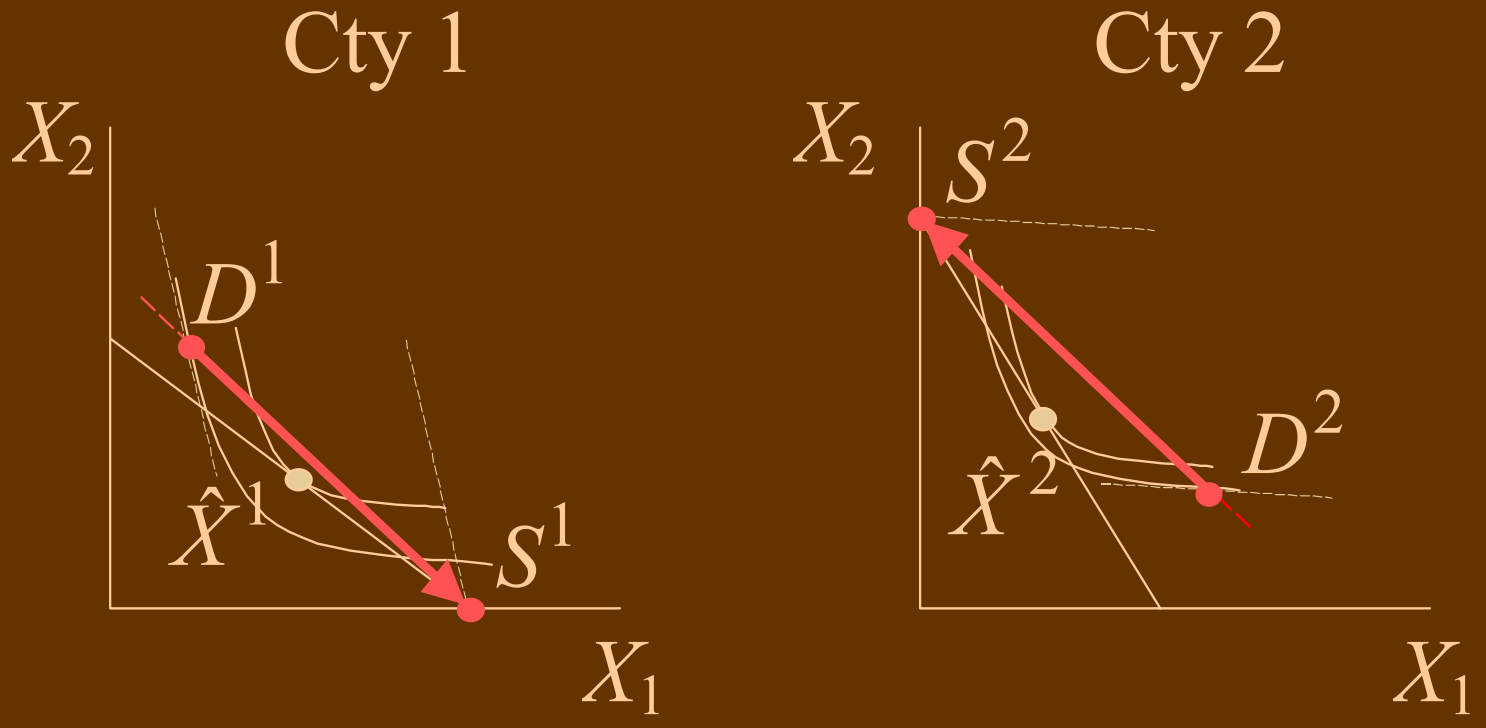
Example: Gainful (Free) Trade



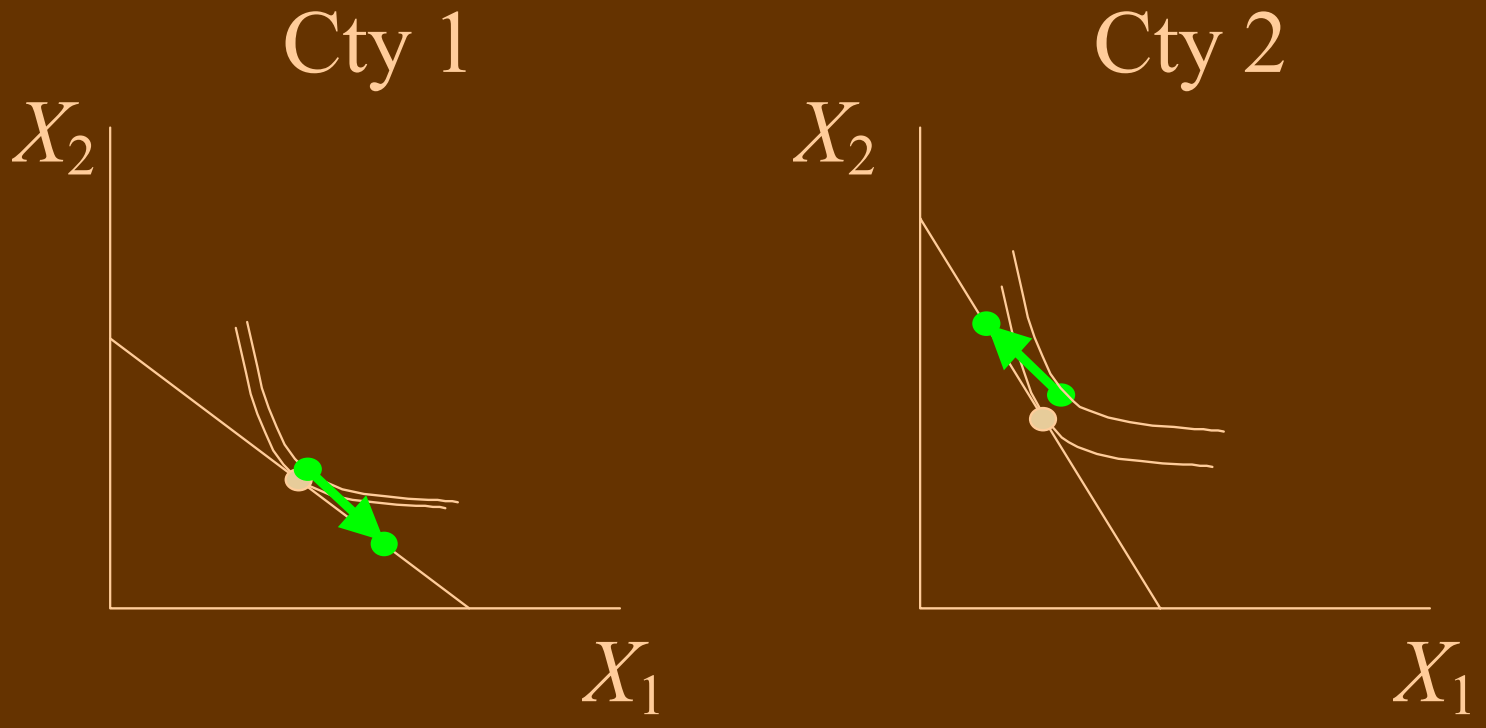
Example: Harmful Trade, Production Subsidies Violating CA



Example: Harmful Trade, Export Subsidies Consistent with CA



Example: Gain from Further Resource Reallocation



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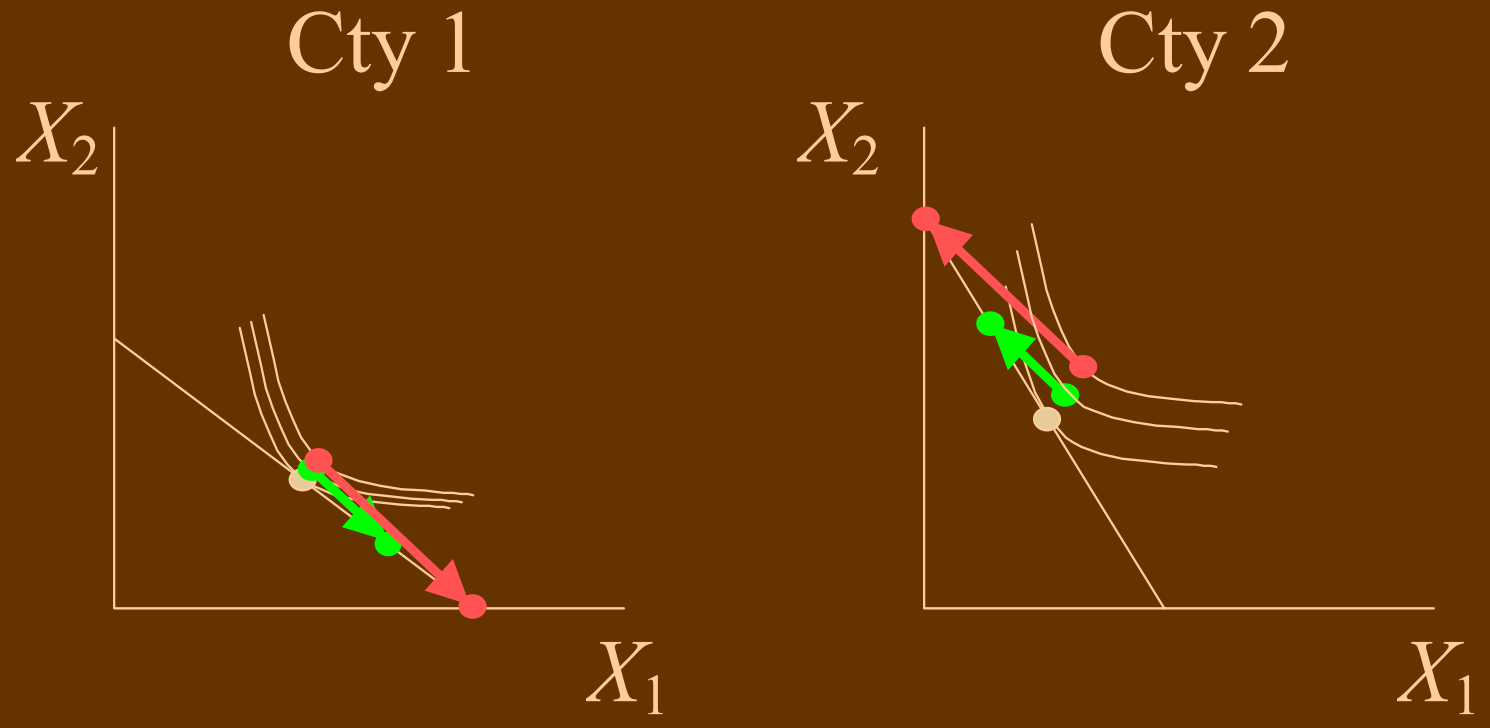

What Do We Want?

- A definition of CA that
  - Is general enough to apply without the assumptions of the 2×2 model.
  - Has all of the implications listed above.
  - Uses information that permits *prediction*:
    - Available in autarky, or
    - Independent of policy choices
- We won't find it!

Impossibility of Strong CA

- Example: Assume…
  - 4 goods:

    Steel, input to Autos

    Wool, input to Cloth

    (1 unit $\rightarrow$ 1 unit, each)
  - 2 countries of equal size
  - Demands for autos and cloth: equal expenditure shares

Direct unit labor requirements	Goods			
	W Wool	A Autos	C Cloth	S Steel
Country 1	1	2	3	4
Country 2	4	3	2	1

Direct+Indirect unit labor requirements	Final Goods	
	A Autos	C Cloth
Country 1	2+4=6	3+1=4
Country 2	3+1=4	2+4=6

If all goods are traded without cost

Direct unit labor requirements	Goods			
	W Wool	A Autos	C Cloth	S Steel
Country 1	1	2	3	4
Country 2	4	3	2	1

Results:

- Country 1 exports autos (and wool)
- Country 2 exports cloth (and steel)

If only final goods are traded

Direct+Indirect unit labor requirements	Final Goods	
	A Autos	C Cloth
Country 1	2+4=6	3+1=4
Country 2	3+1=4	2+4=6

Results:

- Country 1 exports cloth
- Country 2 exports autos

- Results of Example: Summary
  - If all goods are traded without cost
    - Country 1 exports autos
    - Country 2 exports cloth
  - If steel and wool are not traded
    - Country 1 exports cloth
    - Country 2 exports autos
  - Thus, trade in autos and cloth reverse if steel and wool are not traded.

- **Implication:** ***Any*** definition of CA that predicts trade correctly in one case will be wrong in the other.
  - *Unless* the definition itself takes account of trade costs.

What *Can* Be Said?

- Autarky prices do "explain" the pattern of trade, in the very weak sense of a correlation:

  > The correlation across goods between autarky prices and net exports must be negative.

- Thus on average, an economy tends to export goods with low autarky prices and import goods with high autarky prices.

- Formally, let:
  - $\hat{p}^c$ be vector of country c's autarky prices of all goods and p^w a vector of world prices in a trading equilibrium.
  - T^c be vector of country c's net exports

    (+ if export, – if import).
- Deardorff (1980) and Dixit-Norman (1980) show: if country c's trade is nontrivial,

  i.e. if $(\hat{p}^c - p^w)T^c \neq 0$, *

  then $\boxed{\hat{p}^c T^c < 0}$

*Not exactly.

$$\hat{p}^c T^c < 0$$

That is,

- The value of a country's trade, at autarky prices is negative; or
- The autarky value of the country's imports is greater than the value of its exports; or
- On average, the goods that the country exports had lower prices, in autarky, than the goods that it imports.

Corollaries: If trade is nontrivial,

- 1. $\mathrm{cor}_g(\hat{p}_g^c / p_g^w, p_g^w T_g^c) < 0$

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where $\bar{p} = \sum_{g=1}^{G} p_g / G$

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- 3. With 2 countries: $\mathrm{cor}_g(\hat{p}_g^1 / \bar{\hat{p}}^1 - \hat{p}_g^2 / \bar{\hat{p}}^2, T_g^1) < 0$

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- 3. With 2 countries: $\mathrm{cor}_g(\hat{p}_g^1 / \bar{\hat{p}}^1 - \hat{p}_g^2 / \bar{\hat{p}}^2, T_g^1) < 0$
- 4. With many countries: $\mathrm{cor}_{g,c}(\hat{p}_g^c, T_g^c) < 0$

where $\bar{p} = \sum_{g=1}^{G} p_g / G$

- Thus, for predicting the pattern of trade on average,
  - autarky prices compared to either
    - world prices with trade, or
    - other autarky prices

    work well.

Generality of Correlation Result

- Holds with
  - Any numbers of goods, countries, and factors
  - Variable costs
  - Trade costs, natural and/or artificial
  - Intermediate inputs

Generality of Correlation Result

- Also holds with (see Deardorff 1994)
  - Unbalanced trade
    - Over time, or
    - If preferences homothetic
  - Lumpy countries
- But it does *not* hold with distortions
  - Except under implausibly restrictive conditions

Weakness of Correlation Result

- Does ***not*** predict direction of trade in any particular good.
  - *However,* ***does*** (as in 2-good case) limit outcomes to ½ of those possible (i.e., it excludes all those for which cor>0).
- In example above, does ***not*** tell us pattern of trade in autos and cloth.
  - Both outcomes, with inputs tradable and not tradable, display negative correlation.
  - To see this…

Example: Autarky Prices

Autarky Prices (at wage = 1)	Goods			
	W	A	C	S
Country 1	1	4+2=6	1+3=4	4
Country 2	4	1+3=4	4+2=6	1

Assume: $L^1 = L^2 = 120$

Example: Final Tradable

Production ($L^1 = L^2 = 120$)	Goods			
	W	A	C	S
Country 1	30		30	
Country 2		30		30
Trade				
Country 1		–15	15	
Country 2		15	–15	

$$\hat{p}^1 T^1 = (6)(-15) + (4)(15) = -30 < 0$$

Example: All Tradable

Production ($L^1 = L^2 = 120$)	Goods			
	W	A	C	S
Country 1	40	40		
Country 2			40	40
Trade				
Country 1	40	20	–20	–40
Country 2	–40	–20	20	40

$$\hat{p}^1 T^1 = (1)(40) + (6)(20) + (4)(-20) + (4)(-40) = -80 < 0$$

Connection with Gains from Trade

- Proof of correlation first proves gains from trade (consumption with trade is revealed preferred to consumption in autarky), and from that and WARP derives correlation.
- That is: If there are gains from trade

  Then $\hat{p}^c T^c < 0$
- In other words, in order for there to be gains from trade, trade must be negatively correlated with autarky prices.

Additional Weakness of Correlation Result

- Provides virtually no guide to resource reallocation.
- No answer to question,

  "In what do we have comparative advantage?"

Next Steps

- Return to Ricardian Model and work outward from there, relaxing one assumption at a time.
- Examine possible definitions of CA for their usefulness.
- Seek alternative definitions, less general than correlation, but perhaps more useful.

- Assumptions to relax:
  - 2 goods, 2 countries
  - Constant costs
  - One factor

  } Heckscher-Ohlin Model
  - No intermediate inputs
  - No trade costs
  - Perfect competition
  - Constant returns to scale
  - No distortions

Drawbacks of Definitions

- Relative Costs (Domestic vs. Foreign)
  - Not well defined if costs are variable.
  - Autarky relative costs well defined, but
    - Fails if high-cost inputs are tradable

Drawbacks of Definitions

- Relative Productivities (Domestic vs. Foreign)
  - Labor productivity ignores other factors.
    - In HO Model, K-abundant country may have high relative labor productivity in L-intensive sector
  - Total factor productivity (TFP)
    - May differ, but matter less than factor endowments.

Drawbacks of Definitions

- Relative Autarky Prices (Domestic vs. Foreign)
  - Equal autarky marginal costs with perfect competition: Same failure if high-price inputs are tradable.
  - With imperfect competition, prices don't reflect costs.

Drawbacks of Definitions

- Relative Autarky Prices vs. World Prices
  - Same drawbacks as above.
  - Large country: world prices endogenous
  - World prices may be distorted by policy
    - Examples: foreign subsidies
    - Does this matter?
    - More on this in next lecture

Drawbacks of Definitions

- Ranking Goods
  - Ranking must be based on one of above criteria, sharing their drawbacks
  - No known guarantee that sector with greatest CA is special
    - May be small
    - Need not lead to greatest trade or gains from trade

Conclusions

- CA is an important ***idea***.
- CA may be of limited usefulness as a tool.
- At best, we may have to use different definitions of CA for different purposes and in different contexts.