Econ 340
Lecture 3
Comparative Advantage and the Gains from Trade

Why Countries Trade

• Price differences
  – If prices differ by more than transport costs
    • Buyers in high-price country will import
    • Sellers in low-price country will export
    • Anybody in any country can profit by doing both:
      – Buying in low-price country
      – Selling in high-price country

Why Countries Trade

– Thus, in all cases:

\[ P_A < P_B \] may lead to: trade \( A \rightarrow B \)

that is, \( A \) exports

\[ P_B < P_A \] will lead to: trade \( A \leftarrow B \)

if \( P_B - P_A > t \)

\( t \) = trade cost

Why Countries Trade: Supply and Demand

Free Trade = No barriers to trade

\( P_F \) is defined by these two distances being equal.
Use areas to measure gains and losses.

Gains and losses from trade:
- A’s demanders lose $-a$
- A’s suppliers gain $+(a+b)$
- Country A gains $+b$
- B’s demanders lose $-(c+d)$
- B’s suppliers lose $-c$

Gain of Consumer Surplus

Loss of Producer Surplus
What Determines Prices, and Thus Trade?

- Prices determined by:
  - Productivity of labor (and other factors)
  - Price of labor (w = wage)
  - Exchange rate (E) (i.e., prices of currencies)
- Since w and E are largely common to all sectors
  - The main determinant of how individual sectors trade (i.e., whether they export or import) is productivity in sectors
  - High (relative) productivity, i.e., output per worker
    - Implies low (relative) price
    - And hence export

Adjustment Mechanism

- What if all of a country’s prices are too high for it to export at all?
  - Then either:
    - Exchange rate (value of currency) will fall
      - Because otherwise nobody would buy its currency,
    Or:
    - Wages will fall
      - Because nobody would hire its labor
  - Either of these will lower the country’s prices

Outline: Comparative Advantage and the Gains from Trade

- Why Countries Trade
  - Price Differences
  - Supply and Demand
  - Determinants of Prices
- Ricardian Model of Trade
  - Examples
  - Wages and Prices in the Ricardian Model
  - Lessons from the Ricardian Model
  - Generality of the Gains from Trade
  - Identifying Comparative Advantage
  - Critiques of Comparative Advantage

Ricardian Model of Trade

- Due to David Ricardo (1772-1823)
- Assumptions:
  - Production uses only labor
  - Technology:
    - Constant unit labor requirements (labor per unit of output)
    - Or equivalently, constant labor productivities (output per unit of labor)
    - “constant” here means “does not vary with output”
### Ricardian Model of Trade

**Example 1 (Absolute Advantage):**

- **2 goods:** Food, Cloth
- **2 countries:** A=US, B=UK

**Data:**

<table>
<thead>
<tr>
<th>Labor requirements per unit</th>
<th>US</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food (hr/lb)</td>
<td>.01</td>
<td>.02</td>
</tr>
<tr>
<td>Cloth (hr/yd)</td>
<td>.02</td>
<td>.01</td>
</tr>
<tr>
<td>Labor endowment (workers)</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Autarky Equilibrium (Example only)

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>.01</td>
<td>.02</td>
</tr>
<tr>
<td>Cloth</td>
<td>.02</td>
<td>.01</td>
</tr>
<tr>
<td>Labor allocations</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Production = Consumption

<table>
<thead>
<tr>
<th></th>
<th>Food</th>
<th>Cloth</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>UK</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Trade

- If countries had the same currency and same wage = $10/hr, then
  
  \[ P_{US}^{Food} = $0.10 \]

  - Thus
    - US produces Food
    - UK produces Cloth
  - Suppose that they both completely specialize
    - (i.e., US produces only food and UK only cloth)

#### Trade Equilibrium

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>.01</td>
<td>.02</td>
</tr>
<tr>
<td>Cloth</td>
<td>.02</td>
<td>.01</td>
</tr>
<tr>
<td>Labor allocations</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Possible Consumption

<table>
<thead>
<tr>
<th></th>
<th>Food</th>
<th>Cloth</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Consumption with Free Trade

<table>
<thead>
<tr>
<th></th>
<th>Food</th>
<th>Cloth</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>UK</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

- Trade permits consumption to be higher, of both goods, in both countries!
- Both countries gain from trade

**Compare consumption in autarky and trade:**

<table>
<thead>
<tr>
<th>Consumption in Autarky</th>
<th>Food</th>
<th>Cloth</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>UK</td>
<td>300</td>
<td>400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consumption with Free Trade</th>
<th>Food</th>
<th>Cloth</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>UK</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>
Ricardian Model of Trade

• This example had “absolute” advantage; that is
  – US used less labor to produce food than UK
  – UK used less labor to produce cloth than US
• But results don’t depend on that
• Change the example
  – UK → UK’ (United Klutzes)
    • Assume UK’ needs ten times as much labor to do anything
    • And also has ten times as much labor

- US Uk
  Food .01 .02
  Cloth .02 .01

• Example 2 (Comparative Advantage):  
  • Data:
    
      | Labor requirements | US | UK’ |
      |---------------------|----|-----|
      | Food (hr/lb)        | .01| .20 |
      | Cloth (hr/yard)     | .02| .10 |
      | Labor endowment (workers) | 10 | 100 |

  Now US has absolute advantage in both goods (i.e., it needs a lot less labor)

• Does this matter for production, consumption, or trade?  NO!
  – In autarky, UK could produce 300 food and 400 cloth, by allocating 6 workers to food and 4 to cloth.
  – So can UK’: by allocating 60 workers to food and 40 to cloth.

- US Uk Uk’
  Wage of Labor $10.00 $1.50
  Costs
  Food $0.10 $0.30
  Cloth $0.20 $0.15

  This works!
  Free trade prices

One possible trade equilibrium for US and UK’

- With trade, UK could produce 1000 cloth by allocating all 10 workers to cloth.
  – So can UK’, by allocating all 100 workers to cloth.
  – With trade, UK could consume 500 food and 500 cloth, by exporting 500 cloth.
  – So can UK’, by trading as before!

Ricardian Model of Trade

• How does this happen? Through prices and wages
  • Suppose initial wage is $10 in both US and UK’.
    Then prices are:

      | Prices | US | UK’ |
      |--------|----|-----|
      | Food   | .10| 2.00|
      | Cloth  | .20| 1.00|

  • Disequilibrium!
    – Nobody would buy from UK’
    – No labor demand in UK’
    – Wage in UK’ must fall

How far?
  – At least to $2.00
  – (so PC = $.20)
  – At most to $0.50
  – (so PF = $.10)
Ricardian Model of Trade

• Implications for Fears of Trade
  – Low productivity country (UK') can still compete, because of its low wage
  – High wage country (US) can still compete because of its high productivity

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• Critiques of Comparative Advantage

Gain from Trade in General

• This is a very simple model
• But it does generalize to less restrictive assumptions (trust me!)
  – Many goods (not just 2)
  – Many countries (not just 2)
  – Many other assumptions can also be relaxed

Gain from Trade in General

• Sources of gain from trade
  – Most sources of gain are analogous to how individuals gain from trade
  – Comparative advantage focuses on
    • Differences in ability to produce goods
  – Other sources of gain, not in this model
    • Differences in tastes
    • Economies of scale

Gain from Trade in General

• What trade does not do:
  – Trade does not help everybody
    • There are losers from trade
      – (We'll see later in the course who they are)
  – Trade does not reduce inequality
    • At least not necessarily; it could, in some cases
    • But there are also good reasons why it may increase inequality

Gain from Trade in General

• What trade does not do:
  – Trade may not cause countries to grow faster
    (There is debate on that)
  – Trade certainly does not fix all problems
    • Weak or corrupt government
    • Failure to save
    • Poor technology
    (Look at UK'. It gains from trade, but it is still very poor.)
Gain from Trade in General

• Implications for Trade Policies
• Autarky is not realistic, but "protection" (i.e., tariffs, quotas, etc.) is very realistic
• Result that there is gain from trade does extend to reducing protection
  – There are exceptions – we’ll see later
  – But in most cases, countries (as a whole) do gain from reducing their tariffs
    • Even if other countries do not reduce tariffs
  – Countries also gain when other countries liberalize

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Identifying Comparative Advantage

• Definition: A country has a **comparative advantage** in a good, relative to another good and another country, if its relative cost of producing the good is lower than the other country’s

(This comparison should be done in **autarky**, i.e., when they do not trade, because costs may change as a result of trade)

Identifying Comparative Advantage

• If \( C_{g1} \) is the cost of producing 1 unit of good \( g \) in country \( c \), then country 1 has a C-A in good 1 (compared to good 2 and country 2) if

\[
\frac{C_{11}}{C_{21}} < \frac{C_{12}}{C_{22}}
\]

Identifying Comparative Advantage

• Examples
  – Given data on unit labor requirements, since cost is proportional to these, look for where these are relatively low:

<table>
<thead>
<tr>
<th>Labor per unit output</th>
<th>Country</th>
<th>Iran</th>
<th>Peru</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Ham</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Eggs</td>
<td>9</td>
<td>14</td>
</tr>
</tbody>
</table>

Here, Peru has C-A in ham because
\[
\frac{7}{6} < \frac{2}{3}
\]

And Iran has C-A in eggs because
\[
\frac{9}{14} < \frac{6}{7}
\]

Identifying Comparative Advantage

• In this example, you could also compare across countries:
  – Although Peru’s labor requirement is higher than Iran’s in both goods,
  – It is only 1/6 higher in Ham and it is 5/9 (>1/6) higher in Eggs
**Identifying Comparative Advantage**

- Examples in a different form:
  - Given data on labor productivities (outputs per worker), since cost is inversely proportional to these, look for where these are relatively high:

<table>
<thead>
<tr>
<th>Good</th>
<th>Output per unit labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rugs</td>
<td>Blog: 400</td>
</tr>
<tr>
<td></td>
<td>Slog: 200</td>
</tr>
<tr>
<td>Drugs</td>
<td>Blog: 8</td>
</tr>
<tr>
<td></td>
<td>Slog: 5</td>
</tr>
</tbody>
</table>

Here, Blog has Absolute Advantage in both goods. But Blog has Comparative Advantage in rugs because

\[
\frac{400}{8} > \frac{200}{5}
\]

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**Is the Theory of Comparative Advantage Correct?**

- It’s not easy to test, for reasons explained in Dizikes article
  - Model says countries don’t produce at all where they have no comparative advantage; so how can you measure productivity there?
  - Economists Costinot and Donaldson get around this with data on land characteristics
  - They find support for the theory

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**Critiques of Comparative Advantage**

- Some argue that Ricardian assumptions no longer hold
  - Some say the Ricardian Model assumes
    - Factors are freely mobile within countries
    - Factors are immobile between countries
  - Without these assumptions, they say, countries lose from trade
  - NOT TRUE! Relaxing either assumption does not interfere with the gains from trade

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**Critiques of Comparative Advantage - Bivens**

- See reading by Josh Bivens
- Writes from Economic Policy Institute, which is often critical of free trade
- He doesn’t question that there are gains from trade
- What he questions is the size of the gains
  - He cites authors at the Peterson Institute who quote figures that he says are way too large
  - (Peterson bases its estimates on study by Brown, Deardorff, and Stern)

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**Critiques of Comparative Advantage - Bivens**

- Bivens’s objections to high estimates of gains from trade
  - Much of the gain comes from expanded trade in services
    - Estimates on trade barriers in services are very uncertain (Yes!)
    - Thus he says we should not expect gains from service trade (No!)
  - Estimates ignore the effects of trade on the distribution of income (Yes)
Critiques of Comparative Advantage - Prestowitz

- Prestowitz cites a study by 3 very respected (by me) economists
  - They measures losses from increased trade with China
  - Find them to be significant
- Prestowitz concludes that US may have lost from this trade

Critiques of Comparative Advantage - Prestowitz

- Prestowitz also claims that the case for the gains from trade assumes:
  - Perfect competition, No economies of scale
  - No cross-border flows of investment, technology, or people
  - Full utilization of all resources, No costs of adjustment
  - Fixed exchange rates
  - That losers from trade (who exist, but whose losses are temporary) will be compensated by the winners
- And that these assumptions do not hold.
  - He’s
    - Right that these assumptions do not hold
    - Wrong that the gains from trade require them

Conclusion

- Bottom line from all this
  - Yes, there are losers from trade
  - Gains from trade, especially from comparative advantage, outweigh the losses
  - Note also (see Brooks) that countries have done much better with trade than without, and not just in income – also reduced child mortality and increased education

Next Time

- Modern Theories and Additional Effects of Trade
  - Other theories of trade that are more realistic than the Ricardian Model
  - Effects of trade on other things, such as wages
  - How some will lose from trade