LECTURE 13
COMPARATIVE ADVANTAGE AND THE GAINS FROM INTERNATIONAL TRADE
March 5, 2020

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      3. Capital and Labor
   B. Learning

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   B. Terms of trade and world prices
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   C. Consumption possibilities with trade

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LECTURE 13
Comparative Advantage
and the Gains from International Trade

March 5, 2020
Announcement

• We handed out Problem Set 3 last time.

• It is due on Tuesday (March 10).

• Problem Set work session, Thursday (March 5) 4-6 p.m. in 648 Evans.
I. **Overview of International Trade**
U.S. Trade Relative to GNP since 1900

Overview

- Main argument in favor of international trade is that there are gains from specialization.
- World prices play a crucial role in ensuring that both sides benefit.
- Next time we will discuss some of the reasons a country might want to limit international trade (and how it might do it).
II. SOURCES OF COMPARATIVE ADVANTAGE
Factor Abundace

• “Factor” is just another term for inputs to the production process.

• A country will tend to have a comparative advantage in the production of goods that use inputs it has in abundance.
U.S. Mineral Output, 1913: Percentage of World Total

# Shares of Manufacturing Exports, 1879-1929 (Percent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Iron and Steel Products (except Machinery and Vehicles)</th>
<th>Machinery</th>
<th>Automobiles and Parts</th>
<th>SUM (1, 2, 3)</th>
<th>Petroleum Products</th>
<th>SUM (1, 2, 3, 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1879</td>
<td>2.1</td>
<td>3.4</td>
<td>-</td>
<td>5.5</td>
<td>12.1</td>
<td>17.6</td>
</tr>
<tr>
<td>1889</td>
<td>2.4</td>
<td>6.1</td>
<td>-</td>
<td>8.5</td>
<td>13.3</td>
<td>21.8</td>
</tr>
<tr>
<td>1899</td>
<td>7.6</td>
<td>10.7</td>
<td>-</td>
<td>18.3</td>
<td>9.2</td>
<td>27.5</td>
</tr>
<tr>
<td>1913</td>
<td>10.9</td>
<td>14.5</td>
<td>2.3</td>
<td>27.7</td>
<td>10.1</td>
<td>37.8</td>
</tr>
<tr>
<td>1923</td>
<td>8.8</td>
<td>12.4</td>
<td>6.4</td>
<td>27.6</td>
<td>13.1</td>
<td>40.7</td>
</tr>
<tr>
<td>1926</td>
<td>5.6</td>
<td>12.9</td>
<td>11.5</td>
<td>30.0</td>
<td>16.8</td>
<td>46.8</td>
</tr>
<tr>
<td>1927</td>
<td>5.1</td>
<td>13.9</td>
<td>13.3</td>
<td>32.3</td>
<td>14.7</td>
<td>47.0</td>
</tr>
<tr>
<td>1928</td>
<td>5.3</td>
<td>16.4</td>
<td>15.7</td>
<td>37.5</td>
<td>13.9</td>
<td>51.4</td>
</tr>
<tr>
<td>1929</td>
<td>5.4</td>
<td>16.4</td>
<td>15.7</td>
<td>37.5</td>
<td>13.9</td>
<td>51.4</td>
</tr>
</tbody>
</table>

Source: Gavin Wright, ""The Origins of American Industrial Success, 1879–1940.""
Examples of the Role of Factor Abundance

• Minerals and early U.S. industrialization.

• Climate and soil in determining where coffee is produced.

• Capital and skilled labor in determining what the U.S. has a comparative advantage in today.

• Many developing countries have an abundance of less-skilled labor and have a comparative advantage in low-tech manufactured goods.
## Top U.S. Exports of Goods, December 2019

<table>
<thead>
<tr>
<th>Item</th>
<th>Millions of $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>6976</td>
</tr>
<tr>
<td>Industrial machines, other</td>
<td>5000</td>
</tr>
<tr>
<td>Other petroleum products</td>
<td>4945</td>
</tr>
<tr>
<td>Engines—civilian aircraft</td>
<td>4943</td>
</tr>
<tr>
<td>Pharmaceutical preparations</td>
<td>4669</td>
</tr>
<tr>
<td>Semiconductors</td>
<td>4574</td>
</tr>
<tr>
<td>Passenger cars</td>
<td>4379</td>
</tr>
<tr>
<td>Other parts and accessories of vehicles</td>
<td>4369</td>
</tr>
<tr>
<td>Civilian aircraft</td>
<td>4149</td>
</tr>
<tr>
<td>Electrical apparatus</td>
<td>3527</td>
</tr>
<tr>
<td>Medicinal equipment</td>
<td>3018</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau and Bureau of Economic Analysis.
Dynamic Comparative Advantage

• Some comparative advantage isn’t inherent, but acquired.

• By doing something or getting an early start, a country may become the low-opportunity-cost producer of a good.

• We sometimes refer to this as “dynamic comparative advantage.”

• Examples?
III. THE GAINS FROM INTERNATIONAL TRADE: THE SPECIAL CASE OF LINEAR PPCs
Example of the U.S. and China

Output per Day of a Typical Worker:

<table>
<thead>
<tr>
<th></th>
<th>Tons of Soybeans</th>
<th>Washing Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Opportunity Cost of a Ton of Soybeans:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>1 washing machine</td>
</tr>
<tr>
<td>China</td>
<td>2 washing machines</td>
</tr>
</tbody>
</table>

Opportunity Cost of a Washing Machine:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>1 ton of soybeans</td>
</tr>
<tr>
<td>China</td>
<td>½ ton of soybeans</td>
</tr>
</tbody>
</table>
## World Soybean Production (2017/18)

(Million Metric Tons)

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (Million Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>119.52</td>
</tr>
<tr>
<td>Brazil</td>
<td>112.00</td>
</tr>
<tr>
<td>Argentina</td>
<td>54.00</td>
</tr>
<tr>
<td>China</td>
<td>14.20</td>
</tr>
<tr>
<td>India</td>
<td>9.50</td>
</tr>
<tr>
<td>Paraguay</td>
<td>9.20</td>
</tr>
<tr>
<td>Canada</td>
<td>8.00</td>
</tr>
<tr>
<td>Ukraine</td>
<td>3.89</td>
</tr>
<tr>
<td>Russia</td>
<td>3.50</td>
</tr>
<tr>
<td>Uruguay</td>
<td>2.52</td>
</tr>
<tr>
<td>Bolivia</td>
<td>2.60</td>
</tr>
<tr>
<td>Other</td>
<td>21.8</td>
</tr>
<tr>
<td>World</td>
<td>346.92</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Agriculture.
Production Possibilities Curve for Each Country (Per Worker, Per Day)

**United States**

- **Slope of the PPC = −1**

**China**

- **Slope of the PPC = −2**
Terms of Trade

• The terms at which the goods trade in world markets.

• For example, if the world price of a ton of soybeans is $400 and the world price of a washing machine is $300 (in the same currency), then the terms of trade are $1\frac{1}{3}$ washing machines per ton of soybeans.
Terms of Trade and the World Relative Price

• Because the terms of trade depend on world prices, we sometimes call it the world relative price.

• For example, the world relative price of soybeans is:

\[
\frac{P_{\text{Soybeans}}}{P_{\text{Washing Machines}}}
\]
When Will Both Countries Want to Trade?

- The terms of trade must be between the opportunity cost of producing the good in the two countries.
- In our example, for both countries to want to trade, the terms of trade must be between 1 and 2 washing machines per ton of soybeans.
Market Forces Will Tend to Move World Prices So That Both Countries Will Want to Trade

- Suppose $P_{\text{Soybeans}}$ is $200$ and $P_{\text{Washing Machine}}$ is $300$.

- Then 1 ton of soybeans trades for $\frac{2}{3}$ washing machine in world markets.

- China would love to buy soybeans from the US at this relative price, but the US would not like to supply them.

- Excess demand for soybeans in the world market will push up the relative price of soybeans.
Consumption Possibilities Curve

• The CPC shows the combinations of the two goods that a country can have with trade.
Consumption Possibility Curves with Trade
(Assuming 1 ton of soybeans trades for 1⅓ washing machines)

United States

China

Washing Machines

Slope of the CPC = −1⅓

Washing Machines

Slope of the CPC = −1⅓
Consumption Possibility Curves with Trade
(Assuming 1 ton of soybeans trades for 1\(\frac{1}{3}\) washing machines)

United States

China

Washing Machines

Washing Machines

Slope of the CPC = \(-1\frac{1}{3}\)

Gains from Specialization and Trade

Gains from Specialization and Trade
IV. THE GAINS FROM INTERNATIONAL TRADE: 
THE MORE GENERAL CASE
Limitations of the Previous Analysis

• The PPC for a country is almost surely curved; that is, the opportunity cost of producing more of either good rises as more is produced.

• Countries rarely specialize completely.
Optimal Specialization when the PPC is Curved

U.S. PPC

Washing Machines (WM)

Soybeans (S)
Terms of Trade

• Assume (as before) that the world price of soybeans is $400 and the world price of washing machines is $300 (in the same currency).

• The terms of trade (also called the world relative price) is therefore 1½ washing machines per ton of soybeans.
Optimal Specialization when the PPC is Curved

(Slope = (minus) WM per 1 S; in our example it is \(-1\frac{1}{3}\))

At B, the U.S. is exporting soybeans and importing washing machines.
Consumption Possibility Curves with Trade
(Assuming 1 ton of soybeans trades for 1\(\frac{1}{3}\) washing machines)

United States

Washing Machines

\[2^{\frac{2}{3}}\]

\[2\]

\[2^{\frac{1}{3}}\]

Slope of the CPC = \(-1\frac{1}{3}\)

China

Washing Machines

\[1\]

\[1\frac{1}{2}\]

\[2\]

Slope of the CPC = \(-1\frac{1}{3}\)
Consumption Possibilities Curve

- The CPC shows the combinations of the two goods that a country can have with trade.

- It is the line with a slope equal to (minus) the terms of trade (expressed as per 1 of the good on the horizontal axis) that is just tangent to the PPC.

- The point of tangency shows the combination of the two goods that the country can produce that has the largest value in world markets.

- The country can trade the combination of goods at the point of tangency for any other combination along the CPC.
Where We Are

• International trade theory suggests there will be gains from specialization if countries differ in opportunity cost.

• There is a crucial role for world prices in encouraging trade and ensuring that both countries benefit.

• Want to look at empirical evidence to see if the theory is confirmed by the data.
V. EMPIRICAL EVIDENCE ON THE GAINS FROM INTERNATIONAL TRADE
Average Growth of Eight Always Open and Forty Always Closed Economies, 1966-90

Possible Problems in Looking at the Correlation between Trade and Growth?

• Ignores reverse causation: Perhaps being rich makes you want to engage in a lot of trade.

• There might be a systematic relationship between trade and omitted influences on growth. For example, perhaps countries that adopt free trade policies adopt other policies that are good for growth.
Partial Association between Income and the Geographic Component of Trade

Source: Jeffrey Frankel and David Romer, “Does Trade Cause Growth?”
Openness and Growth in Developing Countries

Source: David Dollar and Aart Kraay, “Trade, Growth, and Poverty.”
GDP Growth and Poverty Reduction in Uganda, India, Vietnam, and China, 1992–98, in percent per year

Growth rate of GDP per capita

<table>
<thead>
<tr>
<th>Country</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>3.8</td>
</tr>
<tr>
<td>India</td>
<td>4.4</td>
</tr>
<tr>
<td>Vietnam</td>
<td>6.4</td>
</tr>
<tr>
<td>China</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Rate of poverty reduction

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate of Poverty Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>5.9</td>
</tr>
<tr>
<td>India</td>
<td>7.1*</td>
</tr>
<tr>
<td>Vietnam</td>
<td>7.5</td>
</tr>
<tr>
<td>China</td>
<td>8.4</td>
</tr>
</tbody>
</table>

Source: David Dollar and Aart Kraay, “Spreading the Wealth.”