International Trade: Theory and Evidence

"... the Prebisch-Singer Thesis is now incorporated, both implicitly and explicitly, in the advice given by the Bretton Woods Institutions to developing countries." Hans Singer (1998)

Fall 2010
Growth of World Trade

- Growth in world exports:

  - 1960–68 7.3%
  - 1968–73 9.7%
  - 1973–80 3.3%
  - 1980–85 2.3%
  - 1985–90 4.5%
  - 1990–07 6.0%

- LDC export growth:
  - rapid in Asia
  - highly variable in Latin America
  - slow in Africa.
Figure 1. Growth of Merchandise Exports, 1970-2000

Source: IMF World Economic Outlook (WEO).

Excluding oil exports.

Figure 2. Developing Countries: Share of Exports Going to Other Developing Countries, 1965-98

Source: Global Trade Analysis Project (GTAP) database, version 5.

Figure 3. World: Product Composition of Merchandise Exports, 1965-98

Source: GTAP database, version 5.
Shares and Composition

- Developing countries’ share of world trade:
  - 20% in 1980
  - 30% in 2005.
  - BUT decline in share of sub-saharan Africa (1% → 0.5%)

- Composition of LDC exports has shifted towards manufacturing
  - now about 70% of total exports
  - mostly due to East Asia (esp. China)
  - a result of deliberate policies?
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b Figures are significantly affected by i) changes in the country composition of the region and major adjustment in trade conversion factors between 1983 and 1993; and ii) including the mutual trade flows of the Baltic States and the CIS between 1993 and 2003.
c Beginning with 1998, figures refer to South Africa only and no longer to the Southern African Customs Union.
e Membership as of the year stated.

Note: Between 1973 and 1983 export shares were significantly influenced by oil price developments.
Figure 4. Developing Countries: Composition of Merchandise Exports, 1965-98

Figure 5. Share of Commercial Services in Total Exports of Goods and Services, 1980-97

Source: GTAP database, version 5.

12. For regions such as SSA, there is concern about continuing dependence on commodity exports. An examination of changes in the composition of exports from SSA shows that, even for these countries, there has been a consistent but less dramatic upward trend in the share of manufactures exports (Figure 6). Nevertheless, three-fourths of SSA’s exports are still concentrated in primary commodities. While this explains part of the decline in SSA’s share of world trade, more than a third of the decline results from the loss of market shares in the goods that SSA produces and exports, rather than from the relatively slow growth of those commodity exports themselves (Figure 7).
Inter-regional Trade Flows

- Standard hypothesis of trade patterns:

<table>
<thead>
<tr>
<th>Primary goods</th>
<th>DCs</th>
<th>Manufactures</th>
<th>LDCs</th>
</tr>
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</table>

- LDCs export proportionately more primary goods
- BUT developed countries do not import proportionately more primary goods
- Why?
- large fraction of DC trade is within DCs and is in manufactured goods
Table I.4

Intra- and inter-regional merchandise trade, 2007

(Billion dollars and percentage)

<table>
<thead>
<tr>
<th>Origin</th>
<th>North America</th>
<th>South and Central America</th>
<th>Europe</th>
<th>CIS</th>
<th>Africa</th>
<th>Middle East</th>
<th>Asia</th>
<th>World</th>
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<td>8.9</td>
<td>16.2</td>
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<td>510.3</td>
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<td>150.4</td>
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| Share of regional trade flows in each region's total merchandise exports |       |       |       |       |       |       |       |       |
| World              | 18.5         | 3.3   | 43.7  | 2.9   | 2.6   | 3.5   | 24.2  | 100.0 |
| North America      | 51.3         | 7.0   | 17.7  | 0.7   | 1.5   | 2.7   | 19.0  | 100.0 |
| South and Central America | 30.3        | 24.4  | 21.2  | 1.3   | 2.7   | 1.8   | 16.1  | 100.0 |
| Europe             | 7.9          | 1.4   | 73.5  | 3.3   | 2.6   | 2.6   | 7.5   | 100.0 |
| Commonwealth of Independent States (CIS) | 4.6          | 1.2   | 56.3  | 20.2  | 1.3   | 3.2   | 11.7  | 100.0 |
| Africa             | 21.7         | 3.4   | 39.5  | 0.2   | 9.5   | 2.5   | 19.1  | 100.0 |
| Middle East        | 11.0         | 0.6   | 14.3  | 0.6   | 3.6   | 12.3  | 52.3  | 100.0 |
| Asia               | 19.9         | 2.4   | 18.8  | 2.1   | 2.4   | 4.0   | 49.7  | 100.0 |

| Share of regional trade flows in world merchandise exports |       |       |       |       |       |       |       |       |
| World             | 18.5         | 3.3   | 43.7  | 2.9   | 2.6   | 3.5   | 24.2  | 100.0 |
| North America     | 7.0          | 1.3   | 2.4   | 0.1   | 0.2   | 0.4   | 2.6   | 13.6  |
| South and Central America | 1.1          | 0.9   | 0.8   | 0.0   | 0.1   | 0.1   | 0.6   | 3.7   |
| Europe            | 3.4          | 0.8   | 31.2  | 1.4   | 1.1   | 1.1   | 3.2   | 42.4  |
| Commonwealth of Independent States (CIS) | 0.2          | 0.0   | 2.1   | 0.8   | 0.1   | 0.1   | 0.4   | 3.7   |
| Africa            | 0.7          | 0.1   | 1.2   | 0.0   | 0.3   | 0.1   | 0.6   | 3.1   |
| Middle East       | 0.6          | 0.0   | 0.8   | 0.0   | 0.2   | 0.7   | 2.9   | 5.6   |
| Asia              | 5.6          | 0.7   | 5.2   | 0.6   | 0.7   | 1.1   | 13.9  | 27.9  |
Actual World trade flows

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<th>DCs</th>
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<th>DCs</th>
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LDCs ~ LDCs

However, trade between LDCs has increased to about 10% of world trade.
Why Determines Patterns of Trade?

1. Comparative Advantage (technology differences)
2. Relative Factor Endowments
3. Differing Preferences
4. Economies of Scale
1. Comparative Advantage — Ricardian Trade Theory

- Example:
  - 2 countries: North and South
  - 2 goods: Computers and Rice
  - 1 factor: labour – 600 workers each
  - perfect competition and labour mobility

- Technological assumptions:

<table>
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<th>Labour Required</th>
<th>One Computer</th>
<th>One sack of Rice</th>
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<td>in North</td>
<td>10</td>
<td>15</td>
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<tr>
<td>in South</td>
<td>40</td>
<td>20</td>
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- North has an absolute advantage in both goods,
- but a comparative advantage in computers.
- South has a comparative advantage in rice.
Production possibilities frontier

- In North:
  \[10C_N + 15R_N = 600\]
  can be written as:
  \[R_N = 40 - \frac{2}{3}C_N\]

- In South
  \[40C_S + 20R_S = 600\]
  can be written as:
  \[R_S = 30 - 2C_S\]
Figure: Production Possibilities
Autarky

- If both goods are consumed in North:
  \[
  \frac{p_c^N}{p_r^N} = \frac{10}{15} = \frac{2}{3}.
  \]

- Why?

  \[\rightarrow \text{Competition} \Rightarrow\]

  \[p_c^N = 10w_c \quad \text{and} \quad p_r^N = 15w_r\]

- If \(\frac{p_c^N}{10} > \frac{p_r^N}{15}\), then \(w_c > w_r\) \(\Rightarrow\) all workers flow into computers

- If \(\frac{p_c^N}{10} < \frac{p_r^N}{15}\), then \(w_c < w_r\) \(\Rightarrow\) all workers flow into rice
For both goods to be produced, we need

\[ w_c = w_r \]
\[ \frac{p_c^N}{10} = \frac{p_r^N}{15} \]

Similarly, if both goods are consumed in South:

\[ \frac{p_c^S}{p_r^S} = \frac{40}{20} = 2. \]
Free Trade

- If both goods are going to be produced:

\[ \frac{2}{3} < \frac{p_c}{p_r} < 2. \]

- Why?

  - if \( \frac{p_c}{p_r} < \frac{2}{3} < 2 \), both countries specialize in rice
  - if \( \frac{p_c}{p_r} > 2 > \frac{2}{3} \), both countries specialize in computers

- If \( \frac{2}{3} < \frac{p_c}{p_r} < 2 \),

  - North specializes in computers
  - South specializes in rice.
If it is cheaper to produce rice in North, why don’t people buy rice there?

→ market wages adjust so that rice is not cheaper in the North.

→ as we move from autarky to free trade

\[
\begin{align*}
p_c^N & \uparrow & p_r^N & \downarrow \\
p_c^S & \downarrow & p_r^S & \uparrow
\end{align*}
\]

→ so that

North : \( \frac{p_c^N}{10} = w^N > \frac{p_r^N}{15} \) \( \Rightarrow \) specialize in C

South : \( \frac{p_c^S}{40} < w^S = \frac{p_r^S}{20} \) \( \Rightarrow \) specialize in R

→ effectively nullifies North’s advantage in rice production.
Predictions of Ricardian Theory

- Each country specializes in the production of the goods in which it has a comparative advantage and exports them in return for other goods.

- All households in both countries are unambiguously better off with free trade than in autarky.
  - the wage in both countries rises
  - consumption possibilities lie outside the PPF

- **Caveats**
  - only one factor of production
  - labour is perfectly mobile across sectors
  - competitive markets
Figure: Gains From Trade
2. Factor Endowments — Neoclassical Trade Theory
Eli Heckscher and Bertil Ohlin

- **Example**

  - Two countries: **North** and **South**
  - Two goods: **Cars** and **Textiles**
  - Two factors: Capital \( (K) \) and Labour \( (L) \) — perfectly mobile
  - Labour receives wage \( w \) and capital receives a rent \( r \)
  - Identical preferences across countries

![Graph showing increasing utility with cars and textiles]
North is relatively well endowed with capital:

\[ \frac{K^N}{L^N} > \frac{K^S}{L^S} \]

Car production is **capital intensive** and textile production is **labour intensive**.

given the same \( r/w \), the optimal capital-labour ratio for cars exceeds that for textiles:

\[
\frac{\hat{K}_C^i}{\hat{L}_C^i} > \frac{\hat{K}_T^i}{\hat{L}_T^i} \quad i = S, \ N
\]

\[
k_C^i > k_L^i \quad i = S, \ N
\]

How does the PPF look now?
Figure: Production Possibilities Frontier for North
Why is the PPF bowed out?

- Shift towards more capital-intensive industry $(A \rightarrow B \rightarrow C)$

  - drives up relative demand for capital
  
  - since relative supply is fixed, relative cost of capital, $r/w$, must rise
  
  - capital–labour ratios within each industry $k_C$ and $k_T$ fall in proportion
  
  - productivity of car production falls *relative* to that of textiles
  
  - for every unit of textiles given up, the gain in terms of cars declines
Example:

- Cobb-Douglas production functions for Cars and Textiles
  \[ Y_C = K_C^{\alpha}L_C^{1-\alpha} \text{ and } Y_T = K_T^{\beta}L_T^{1-\beta} \]
  \( \rightarrow \) where cars are more capital intensive \( \Rightarrow \alpha > \beta \)

- Productivity (output per worker):
  \[ y_C = k_C^{\alpha} \text{ and } y_T = k_T^{\beta} \]
  \( \rightarrow \) relative productivity of cars
  \[ \frac{y_C}{y_T} = \frac{k_C^{\alpha}}{k_T^{\beta}} \]

- If \( k_C \) and \( k_T \) fall in proportion, \( k_C^{\alpha} \) must fall more than \( k_T^{\beta} \)
  \( \Rightarrow \) \( y_C \) falls more than \( y_T \)
  \( \rightarrow \) for every unit of textiles given up, the gain in terms of cars declines
Figure: PPF for South
Figure: Disequilibrium in Autarky
Figure: Equilibrium under Autarky
Figure: Autarky in North and South
Figure: Free Trade Equilibrium
Implications of Neoclassical Trade Theory

- Under free trade the price ratio settles at a level between the two autarkic price ratios

- Incomplete specialization — both countries produce both goods

- A country will tend to export the commodities that are intensive in factors that are possessed by that country in relative abundance.

  - does not explain trade flows amongst developed countries

  - predicts a lot of trade between DCs and LDCs

- Households in both countries are potentially better off with free trade

  - BUT there are distributional consequences
3. Differences in Preferences

- Assume technologies and factor endowments are identical

- How do preferences differ between LDCs and DCs?
  - one hypothesis: DCs spend proportionately more on manufactured goods (luxuries)
  - i.e. as countries get richer, preferences biased away from primary goods
  - drives down relative price of primary goods as DCs get richer
Figure: Trade due to differences in preferences
4. Economies of Scale

- Trade allows concentration of production in some countries to maximize the effects of economies of scale

**Example:**
- 2 identical countries — East and West
- 2 goods — ships and aircraft
- Declining average cost
Figure: Trade and Specialization with Economies of Scale
Distributional Consequences of Trade

- Neoclassical theory $\Rightarrow$ potential gains due to increased goods/services
- BUT not necessarily actual gains to all members of society

- Example (from earlier): Move toward free trade in North
  - increased (capital-intensive) car production
  - reduced (labour-intensive) textile production
  - $r/w$ rises, but $K/L$ is fixed
  - i.e. labour loses, capital gains

- Distribution of gains depends on distribution of factor ownership
Comparative advantage is a **static** concept.

- but technologies and factor endowments change over time

- LDCs could allow trade patterns to change as they accumulate physical / human capital

- “natural” shift from primary to manufacturing

- BUT may get stuck as primary producer and never invest enough to get beyond this stage
The Prebisch–Singer Hypothesis

- As world gets richer, fraction of income spent on primary products declines
- Long-term deterioration in the terms of trade faced by many LDCs:
  \[ T.o.T. = \frac{\text{Export Price Index}}{\text{Import Price Index}} \]
- Real incomes grow less rapidly
- Less capital accumulation / infrastructure

- **Policy implication:** Need to protect / promote domestic manufacturing
- May lower current income by distorting the gains from trade
- But this is an “investment” which will raise future incomes.
Does this hypothesis make any sense?

- Not necessary that world demand will go against primary products
  - slow recovery from 60% decline in early 1980s
  - but recent rapid increase primary product prices (China, speculation?)
  - volatility a problem in itself

- Policy implication assumes capital markets are not working properly
  - high future returns in manufacturing should induce investment flow into it and away from primary production

- BUT there are many market failures
  - imperfect capital markets
  - dynamic gains from investment may involve positive externalities
  - may justify government intervention in the form of trade policy.
exporting countries, the qualitative differences among the indices are even larger, but not surprisingly both indices display relatively little variation in absolute terms. In the next section, we discuss the differences further, in the context of individual countries.

III. IDENTIFYING COMMODITY BOOMS AND BUSTS

The commodity terms of trade (CTOT) are now used to identify country-specific booms and busts over the period 1970–2007. The dating procedure is an application of the Bry-Boschan algorithm for dating business cycles and largely follows Cashin, McDermott, and Scott (2002). It is based on finding turning points (peaks and troughs) in the country-specific CTOT series. These turning points are determined using annual country-specific
data (this implies that cycles can only be identified if they are not too short). For each country, the procedure yields a set of upturns (trough-to-peak) and downturns (peak-to-trough) in the CTOT, that is, a set of CTOT cycles.

Our focus, however, is on identifying large movements in the CTOT, since these are most likely to be related to macroeconomic performance. Hence, for each cycle in the CTOT, the duration and amplitude (that is, the cumulative change in the CTOT) from trough to peak and from peak to trough are computed. Booms (respectively, busts) are then identified as periods of increases (respectively, decreases) in the CTOT with amplitudes that fall into the top (respectively, bottom) 10 percent of all such episodes across the sample. These cutoff amplitudes imply that booms (respectively, busts) are defined as events with net commodity trade gains (respectively, losses) in excess of 7 percent of GDP. This procedure