Chapter 5
The Standard Trade Model

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To Accompany
International Economics: Theory and Policy, Sixth Edition
by Paul R. Krugman and Maurice Obstfeld
Chapter Organization

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- A Standard Model of a Trading Economy
- International Transfers of Income: Shifting the $RD$ Curve
- Tariffs and Export Subsidies: Simultaneous Shifts in $RS$ and $RD$
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Previous trade theories have emphasized specific sources of comparative advantage which give rise to international trade:

- Differences in labor productivity (Ricardian model)
- Differences in resources (specific factors model and Heckscher-Ohlin model)

The standard trade model is a general model of trade that admits these models as special cases.
The standard trade model is built on four key relationships:

- Production possibility frontier and the relative supply curve
- Relative prices and relative demand
- World relative supply and world relative demand
- Terms of trade and national welfare
Production Possibilities and Relative Supply

- Assumptions of the model:
  - Each country produces two goods, food ($F$) and cloth ($C$)
  - Each country’s production possibility frontier is a smooth curve ($TT$)

- The point on its production possibility frontier at which an economy actually produces depends on the price of cloth relative to food, $P_C/P_F$.

- Isovalue lines
  - Lines along which the market value of output is constant
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Figure 5-1: Relative Prices Determine the Economy’s Output
**A Standard Model of a Trading Economy**

**Figure 5-2: How an Increase in the Relative Price of Cloth Affects Relative Supply**

Food production, $Q_F$

Cloth production, $Q_C$

$P_C/P_F^1$ and $P_C/P_F^2$
Relative Prices and Demand

- The value of an economy's consumption equals the value of its production:

\[ P_C Q_C + P_F Q_F = P_C D_C + P_F D_F = V \]

- The economy’s choice of a point on the iso-value line depends on the tastes of its consumers, which can be represented graphically by a series of *indifference curves*.
• **Indifference curves**
  
  – Each traces a set of combinations of cloth ($C$) and food ($F$) consumption that leave the individual equally well off

  – They have three properties:
    – Downward sloping
    – The farther up and to the right each lies, the higher the level of welfare to which it corresponds
    – Each gets flatter as we move to the right
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**Figure 5-3:** Production, Consumption, and Trade in the Standard Model

Food production, $Q_F$

Cloth production, $Q_C$

Indifference curves

Food imports

Cloth exports

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If the relative price of cloth, \( \frac{P_C}{P_F} \), increases, the economy’s consumption choice shifts from \( D^1 \) to \( D^2 \).

- The move from \( D^1 \) to \( D^2 \) reflects two effects:
  - Income effect
  - Substitution effect
- It is possible that the income effect will be so strong that when \( \frac{P_C}{P_F} \) rises, consumption of both goods actually rises, while the ratio of cloth consumption to food consumption falls.
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Figure 5-4: Effects of a Rise in the Relative Price of Cloth

Food production, $Q_F$

Cloth production, $Q_C$

$VV^1(P_C/P_F)^1$

$VV^2(P_C/P_F)^2$
The Welfare Effect of Changes in the Terms of Trade

- **Terms of trade**
  - The price of the good a country initially exports divided by the price of the good it initially imports.
  - A rise in the terms of trade increases a country’s welfare, while a decline in the terms of trade reduces its welfare.
Determining Relative Prices

- Suppose that the world economy consists of two countries:
  - Home (which exports cloth)
    - Its terms of trade are measured by $P_C/P_F$
    - Its quantities of cloth and food produced are $Q_C$ and $Q_F$
  - Foreign (which exports food)
    - Its terms of trade are measured by $P_F/P_C$
    - Its quantities of cloth and food produced are $Q_C^*$ and $Q_F^*$
To determine $P_C/P_F$, one must find the intersection of
world relative supply of cloth and world relative
demand.

- The world relative supply curve ($RS$) is upward sloping
  because an increase in $P_C/P_F$ leads both countries to
  produce more cloth and less food.

- The world relative demand curve ($RD$) is downward
  sloping because an increase in $P_C/P_F$ leads both
  countries to shift their consumption mix away from
  cloth toward food.
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Figure 5-5: World Relative Supply and Demand

Relative price of cloth, $P_C/P_F$

$RD$

$RS$

Relative quantity of cloth, $\frac{Q_C + Q'_C}{Q_F + Q'_F}$

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Economic Growth: A Shift of the RS Curve

- Is economic growth in other countries good or bad for our nation?
  - It may be good for our nation because it means larger markets for our exports.
  - It may mean increased competition for our exporters.

- Is growth in a country more or less valuable when that nation is part of a closely integrated world economy?
  - It should be more valuable when a country can sell some of its increased production to the world market.
  - It is less valuable when the benefits of growth are passed on to foreigners rather than retained at home.
Growth and the Production Possibility Frontier

- Economic growth implies an outward shift of a country’s production possibility frontier ($TT$).

- **Biased growth**
  - Takes place when $TT$ shifts out more in one direction than in the other
  - Can occur for two reasons:
    - Technological progress in one sector of the economy
    - Increase in a country’s supply of a factor of production
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**Figure 5-6: Biased Growth**

(a) Growth biased toward cloth

(b) Growth biased toward food
Relative Supply and the Terms of Trade

- **Export-biased growth**
  - Disproportionately expands a country’s production possibilities in the direction of the good it exports.
  - Worsens a growing country’s terms of trade, to the benefit of the rest of the world.

- **Import-biased growth**
  - Disproportionately expands a country’s production possibilities in the direction of the good it imports.
  - Improves a growing country’s terms of trade at the rest of the world’s expense.
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Figure 5-7: Growth and Relative Supply

Relative price of cloth, $P_C/P_F$

Relative quantity of cloth, $\frac{Q_C + Q'_C}{Q_F + Q'_F}$

(a) Cloth-biased growth

(b) Food-biased growth

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International Effects of Growth

- Export-biased growth in the rest of the world improves our terms of trade, while import-biased growth abroad worsens our terms of trade.
- Export-biased growth in our country worsens our terms of trade, reducing the direct benefits of growth, while import-biased growth leads to an improvement of our terms of trade.
• **Immiserizing growth**
  - A situation where export-biased growth by poor nations can worsen their terms of trade so much that they would be worse off than if they had not grown at all.
  - It can occur under extreme conditions: Strongly export-biased growth must be combined with very steep $RS$ and $RD$ curves.
  - It is regarded by most economists as more a theoretical point than a real-world issue.
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Table 5-1: Average Annual Percent Changes in Terms of Trade

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Advanced countries</td>
<td>1.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Oil-exporting developing countries</td>
<td>−7.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Non-oil-exporting developing countries</td>
<td>−0.6</td>
<td>−0.2</td>
</tr>
</tbody>
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International Transfers of Income: Shifting the $RD$ Curve

- International transfers of income, such as war reparations and foreign aid, may affect a country’s terms of trade by shifting the world relative demand curve.

- Relative world demand for goods may shift because of:
  - Changes in tastes
  - Changes in technology
  - International transfers of income

- The Transfer Problem
  - How international transfers affect the terms of trade
Effects of a Transfer on the Terms of Trade

- When both countries allocate their change in spending in the same proportions (Ohlin’s point):
  - The $RD$ curve will not shift, and there will be no terms of trade effect.

- When the two countries do not allocate their change in spending in the same proportions (Keynes’s point):
  - The $RD$ curve will shift and there will be a terms of trade effect.
    - The direction of the effect on terms of trade will depend on the difference in Home and Foreign spending patterns.
Figure 5-8: Effects of a Transfer on the Terms of Trade

Relative price of cloth, $P_C/P_F$

$(P_C/P_F)^1$

$(P_C/P_F)^2$

Relative quantity of cloth, $\frac{Q_C + Q_C^*}{Q_F + Q_F^*}$
Presumptions about the Terms of Trade Effects of Transfers

- A transfer will worsen the donor’s terms of trade if the donor has a higher marginal propensity to spend on its export good than the recipient.
- In practice, most countries spend a much higher share of their income on domestically produced goods than foreigners do.
  - This is not necessarily due to differences in taste but rather to barriers to trade, natural and artificial.
Import tariffs and export subsidies affect both relative supply and relative demand.

Relative Demand and Supply Effects of a Tariff

- Tariffs drive a wedge between the prices at which goods are traded internationally (external prices) and the prices at which they are traded within a country (internal prices).
- The terms of trade correspond to external, not internal, prices.
Tariffs and Export Subsidies: Simultaneous Shifts in $RS$ and $RD$

**Figure 5-9**: Effects of a Tariff on the Terms of Trade

Relative price of cloth, $P_C/P_F$

Relative quantity of cloth, $Q_C + Q_C^*$

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Effects of an Export Subsidy

- Tariffs and export subsidies are often treated as similar policies but they have opposite effects on the terms of trade.
  - **Example:** Suppose that Home offers 20% subsidy on the value of cloth exported:
    - This will raise Home’s internal price of cloth relative to food by 20%.
    - This will lead Home producers to produce more cloth and less food.
    - A Home export subsidy worsens Home’s terms of trade and improves Foreign’s.
Tariffs and Export Subsidies: Simultaneous Shifts in $RS$ and $RD$

**Figure 5-10**: Effects of a Subsidy on the Terms of Trade

Relative price of cloth, $P_C/P_F$

$(P_C/P_F)^1$

$(P_C/P_F)^2$

$RS^1$

$RS^2$

$RD^1$

$RD^2$

Relative quantity of cloth, $\frac{Q_C + Q_C^*}{Q_F + Q_F^*}$
Implications of Terms of Trade Effects: Who Gains and Who Loses?

- **The International Distribution of Income**
  - If Home (a large country) imposes a tariff, its welfare increases as long as the tariff is not too large, while Foreign’s welfare decreases.
  - If Home offers an export subsidy, its welfare deteriorates, while Foreign’s welfare increases.

- **The Distribution of Income Within Countries**
  - A tariff (subsidy) has the direct effect of raising the internal relative price of the imported (exported) good.
  - Tariffs and export subsidies might have perverse effects on internal prices (*Metzler paradox*).
The standard trade model provides a framework that can be used to address a wide range of international issues and admits previous trade models as special cases.

A country’s terms of trade are determined by the intersection of the world relative supply and demand curves.

Economic growth is usually biased. Growth that is export-biased (import-biased) worsens (improves) the terms of trade.
Summary

- International transfers of income may affect a country’s terms of trade, depending if they shift the world relative demand curve.

- Import tariffs and export subsidies affect both relative supply and demand.

- The terms of trade effects of an export subsidy hurt the exporting country and benefit the rest of the world, while those of a tariff do the reverse.
  - Both trade instruments have strong income distribution effects within countries.
Figure 5A-1: Home’s Desired Trade at a Given Relative Price

Desired imports of food

Home’s imports, $D_F - Q_F$

Desired exports of cloth

Home’s exports, $Q_C - D_C$

$P_C / P_F$
Appendix: Representing International Equilibrium with Offer Curves

Figure 5A-2: Home’s Offer Curve

Home’s imports, \( D_F - Q_F \)

Home’s exports, \( Q_C - D_C \)

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Appendix: Representing International Equilibrium with Offer Curves

Figure 5A-3: Foreign’s Offer Curve

Foreign’s exports, $Q^*_F - D^*_F$

Foreign’s imports, $D^*_C - Q^*_C$
Appendix: Representing International Equilibrium with Offer Curves

**Figure 5A-4: Offer Curve Equilibrium**

Home’s imports of food, $D_F - Q_F$
Foreign’s exports of cloth, $Q_F^* - D_F^*$

Home’s exports of cloth, $Q_C - D_C$
Foreign’s imports of cloth, $D_C^* - Q_C^*$

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