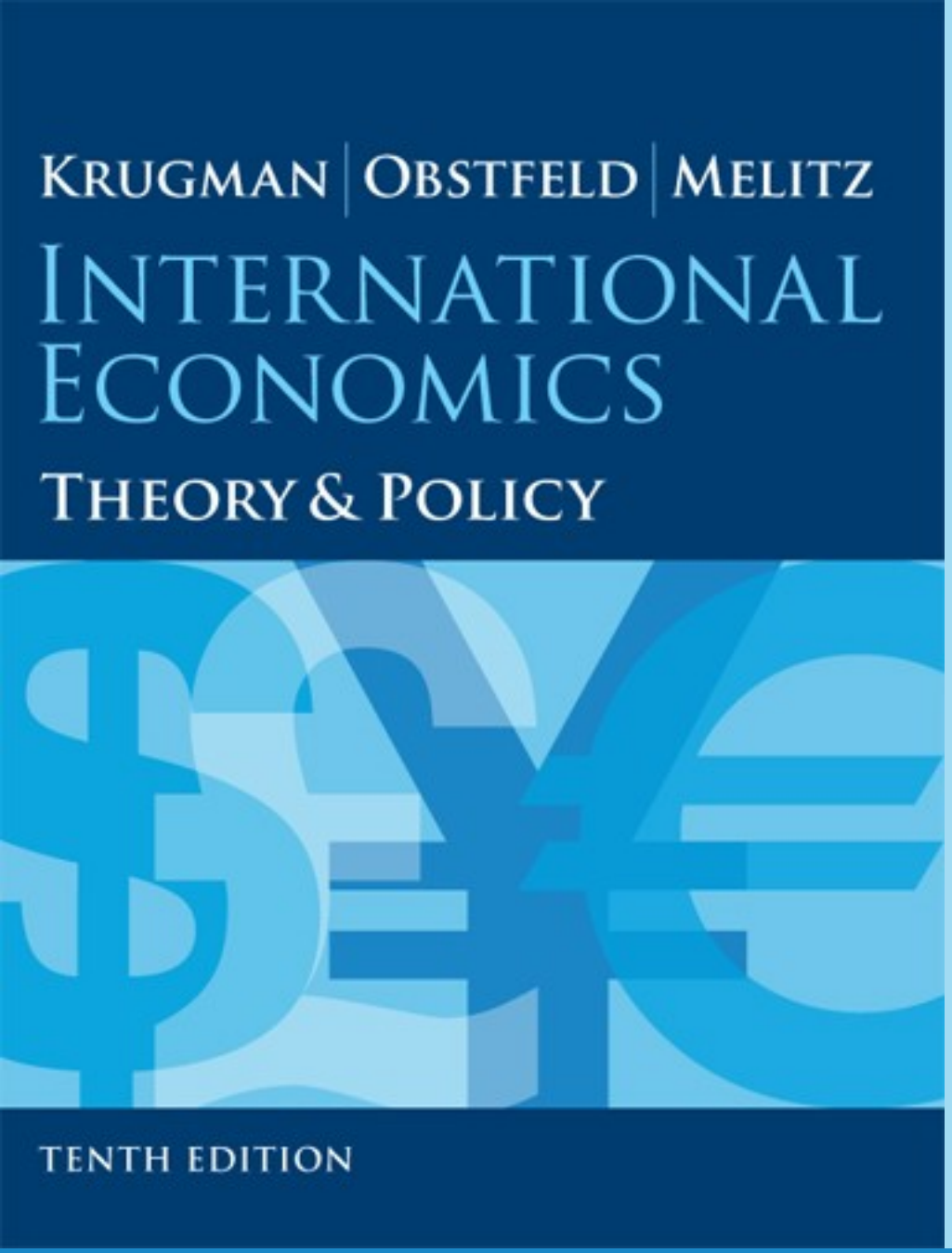


Chapter 6

The Standard Trade Model

Preview

- Production possibilities, relative supply and relative demand
- The terms of trade and welfare
- Effects of economic growth, import tariffs, and export subsidies
- International borrowing and lending

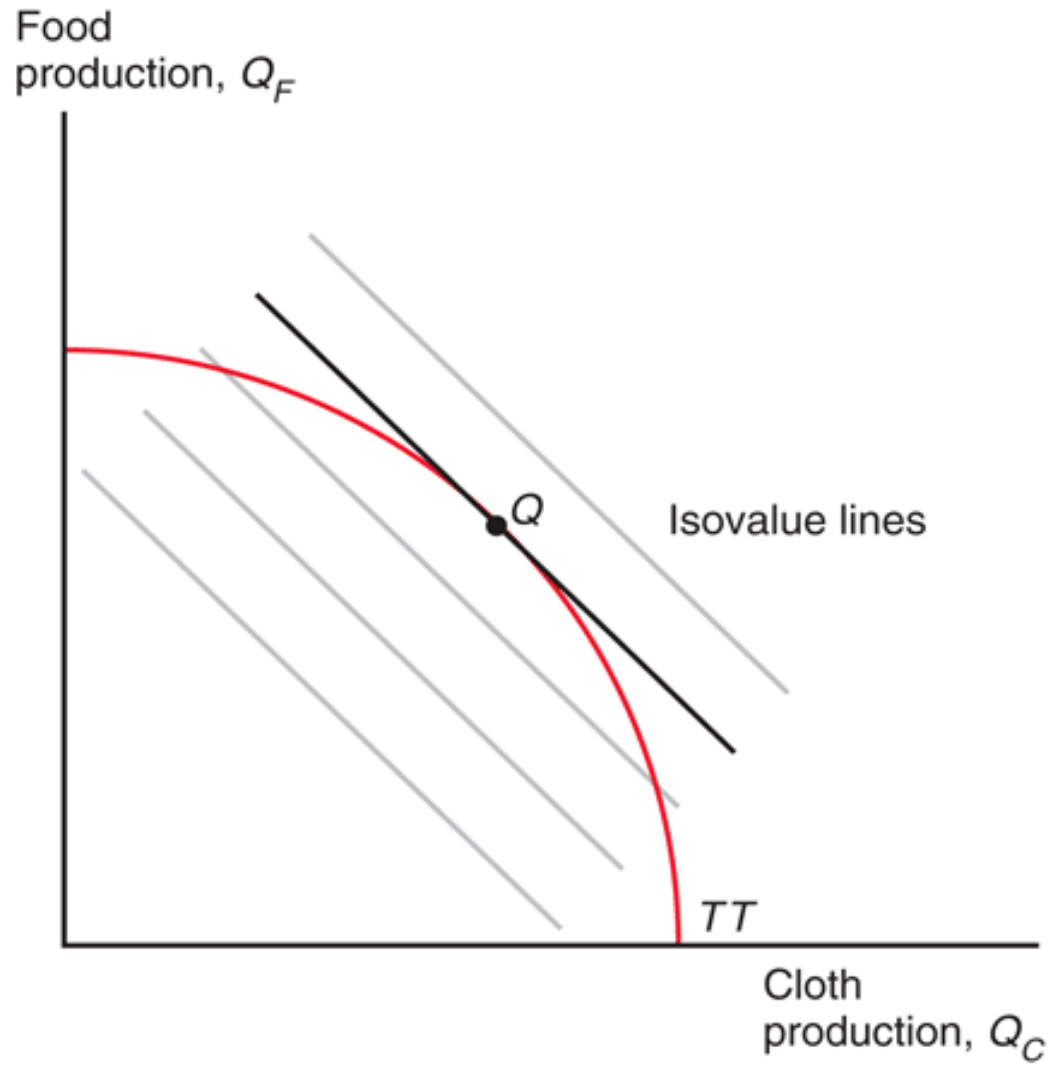
Introduction

- Standard trade model is a general model that includes Ricardian, specific factors, and Heckscher-Ohlin models as special cases.
  - Two goods, food (F) and cloth (C).
  - Each country's PPF is a smooth and bowed-out curve, see Fig. 6-1.
- Differences in *labor services, labor skills, physical capital, land, and technology* between countries cause differences in production possibility frontiers.

Introduction

- A country's PPF determines its relative supply function.
- National relative supply functions determine a world relative supply function, which along with world relative demand determines the equilibrium under international trade.
- What a country produces depends on the relative price of cloth to food P_C/P_F.

Fig. 6-1: Relative Prices Determine the Economy's Output



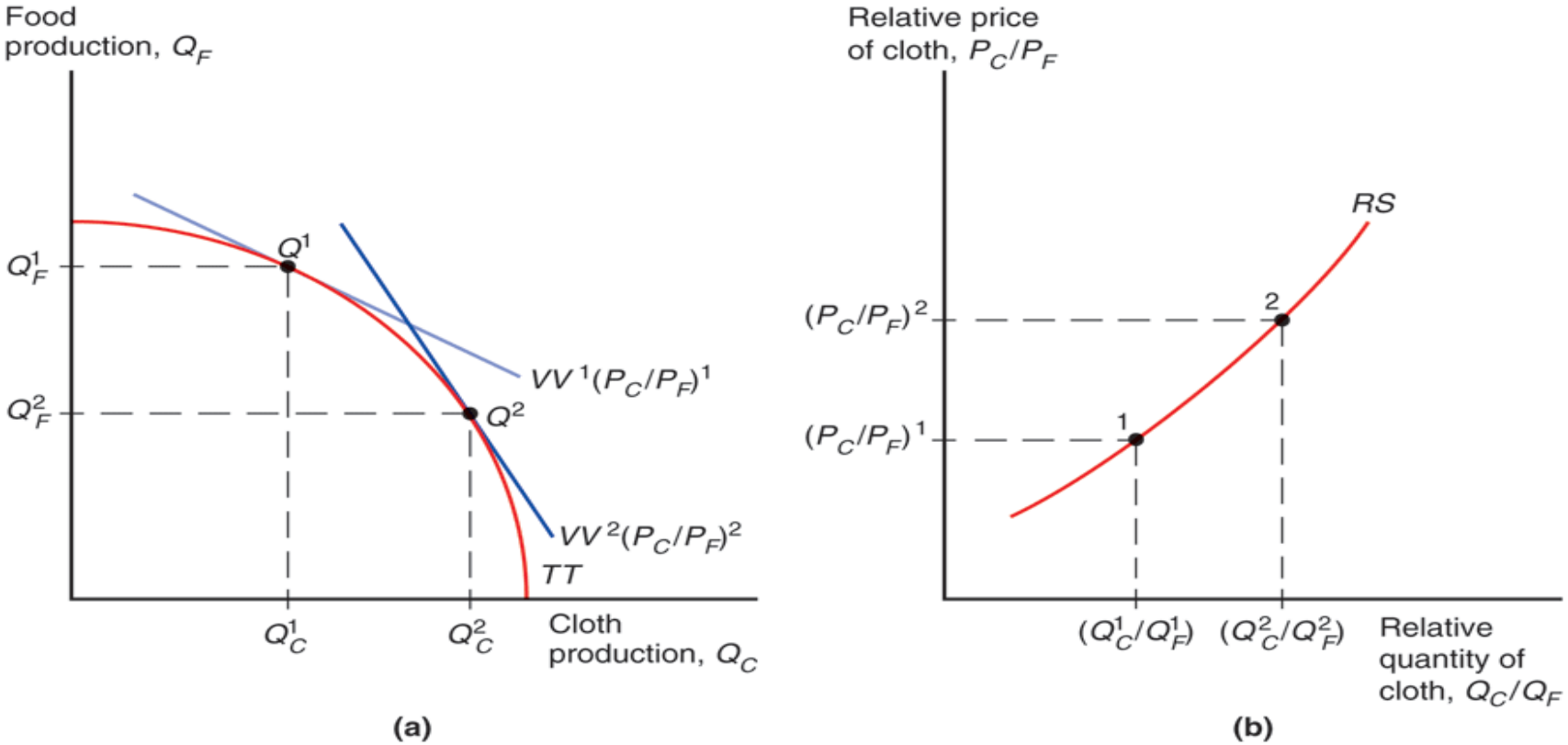
An economy chooses its production of cloth Q_C and food Q_F to maximize the value of its output $V = P_C Q_C + P_F Q_F$, given the prices of cloth and food.

The slope of an isovalue line equals $-(P_C / P_F)$.

An economy produces at point where PPF is tangent to the highest possible isovalue line.

The opportunity cost of cloth equals its relative price.

Fig. 6-2: How an Increase in the Relative Price of Cloth Affects Relative Supply



An increase in the price of cloth relative to food P_C/P_F makes the isovalue line steeper. Production shifts from point Q^1 to point Q^2.

Supply of cloth relative to food Q_C/Q_F rises. Relative supply of cloth to food increases with the relative price of cloth to food.

Relative Prices and Demand

- The value of the economy's consumption must equal the value of the economy's production.

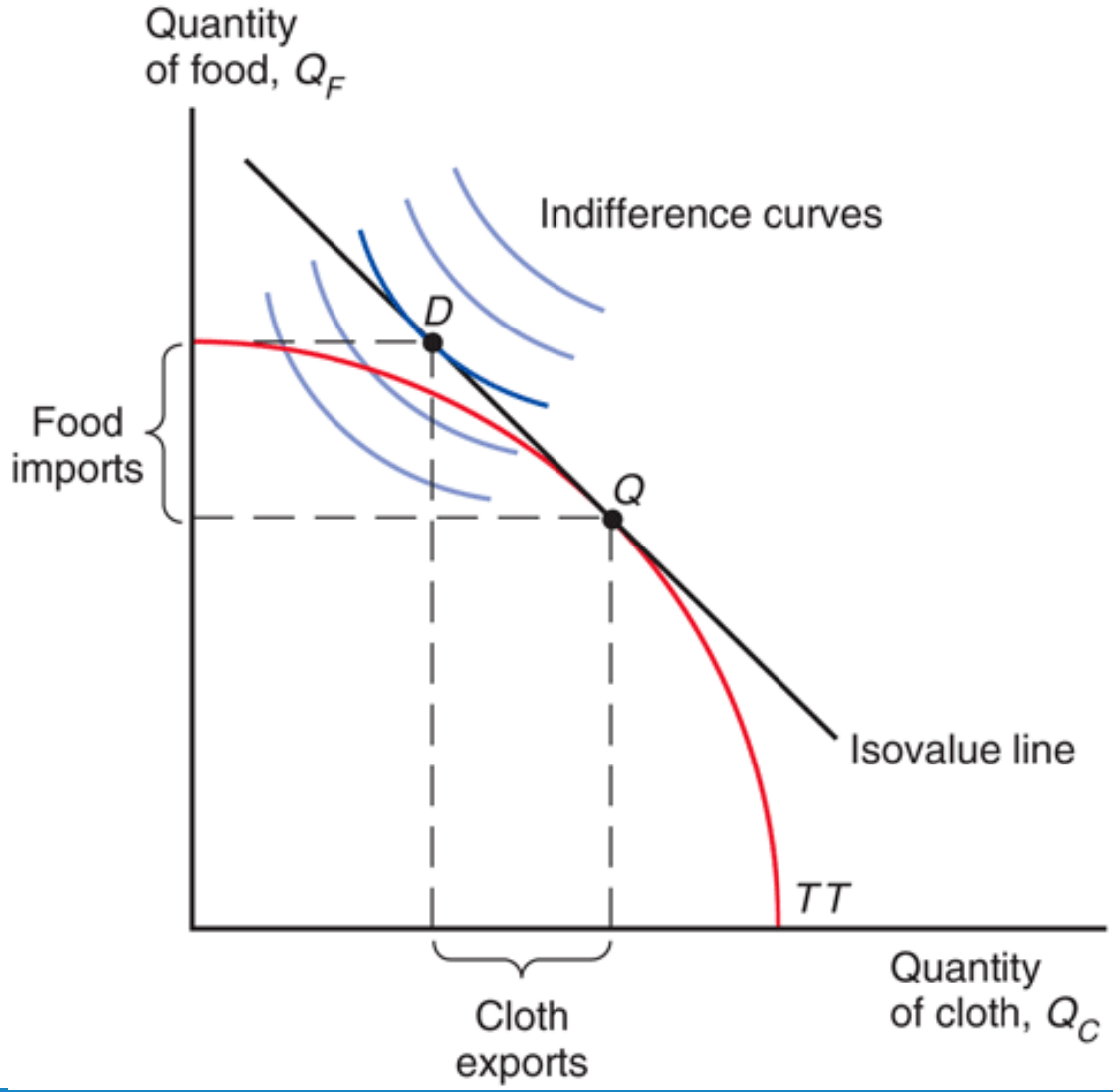
$$P_C D_C + P_F D_F = P_C Q_C + P_F Q_F = V$$

- Assume that the economy's consumption decisions may be represented as if they were based on the tastes of a single representative consumer.
- An **indifference curve** represents combinations of cloth and food that leave the consumer equally well off (indifferent).

Properties of Indifference Curves

- Indifference curves
  - are downward sloping — if you have less cloth, then you must have more food to be equally satisfied.
  - that lie farther from the origin make consumers more satisfied — they prefer having more of both goods.
  - become flatter when they move to the right — with more cloth and less food, an extra yard of cloth becomes less valuable in terms of how many calories of food you are willing to give up for it.

Fig. 6-3: Production, Consumption, and Trade in the Standard Model

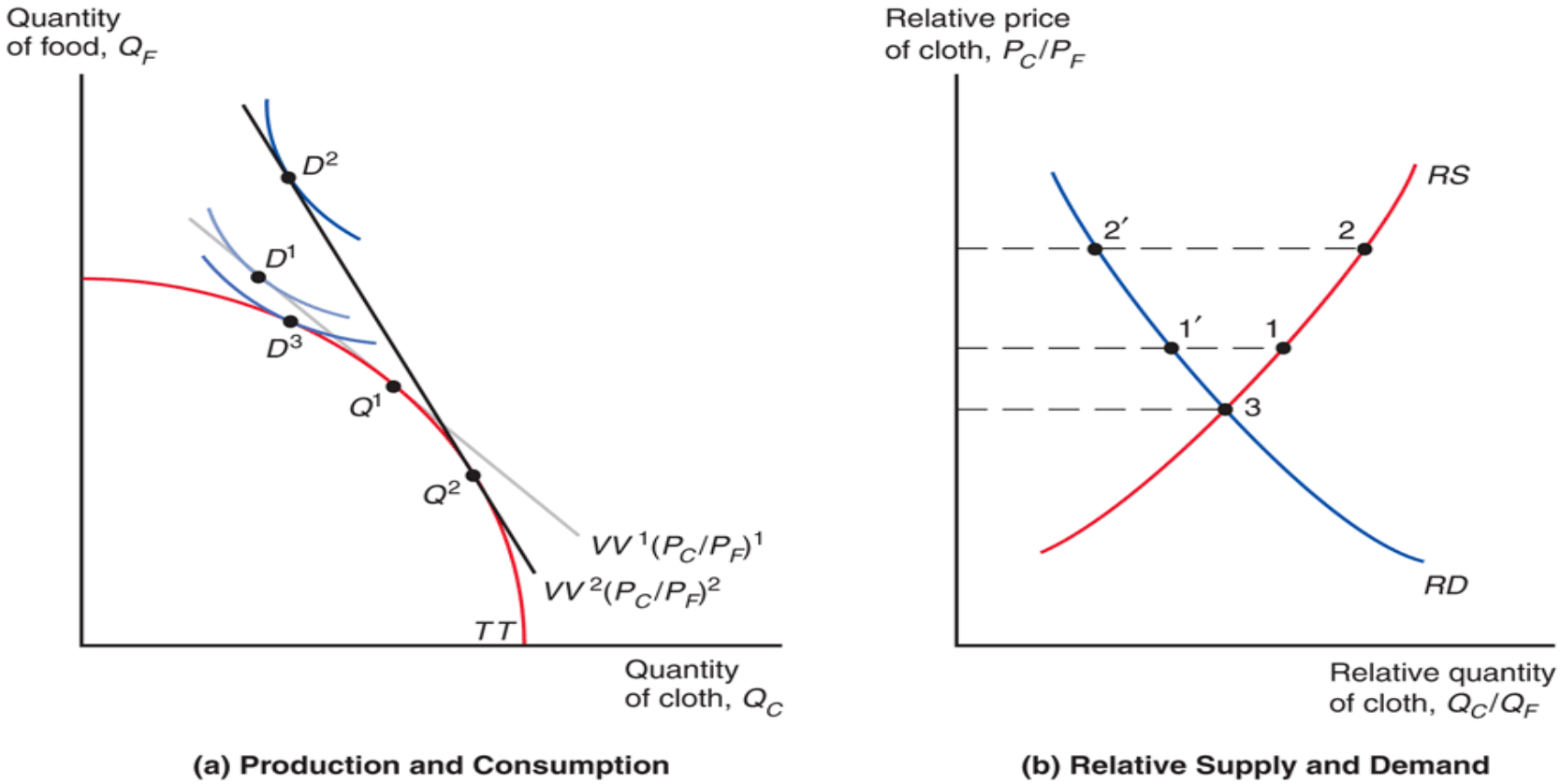


Consumption choice is based on preferences and relative price of goods:

Economy consumes at point *D* where the isovalue line is tangent to the highest possible indifference curve.

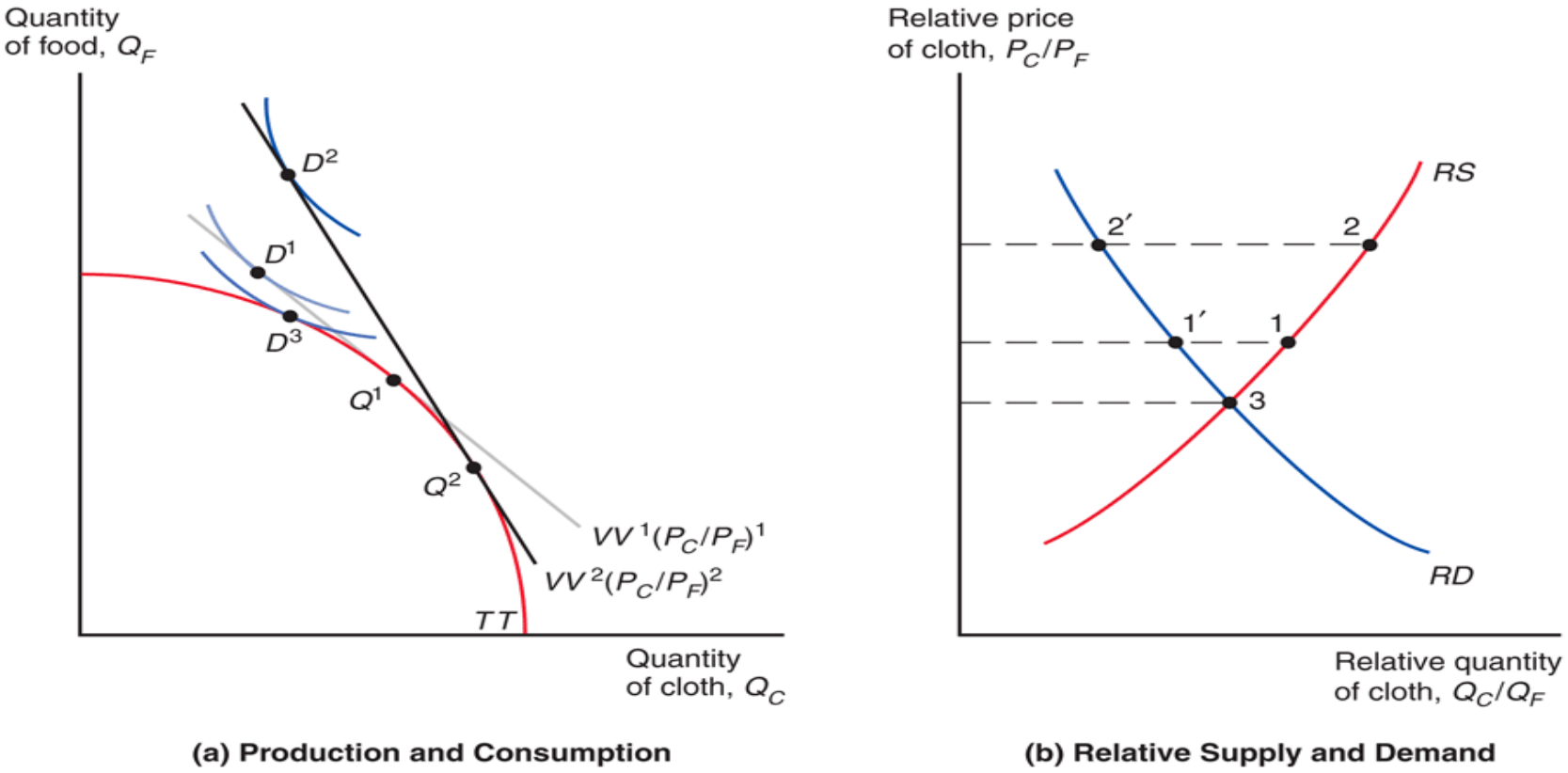
Economy exports cloth — the quantity of cloth produced exceeds the quantity of cloth consumed — and imports food.

Fig. 6-4: Effects of a Rise in the Relative Price of Cloth and Gains from Trade



An increase in the relative price of cloth P_C/P_F causes consumption choice to shift from point D^1 to point D^2. Relative demand for cloth to food falls as the relative price of cloth to food rises. An economy that exports cloth is better off when the price of cloth rises relative to the price of food. The isovalue lines become steeper and a higher indifference curve can be reached.

Fig. 6-4: Effects of a Rise in the Relative Price of Cloth and Gains from Trade

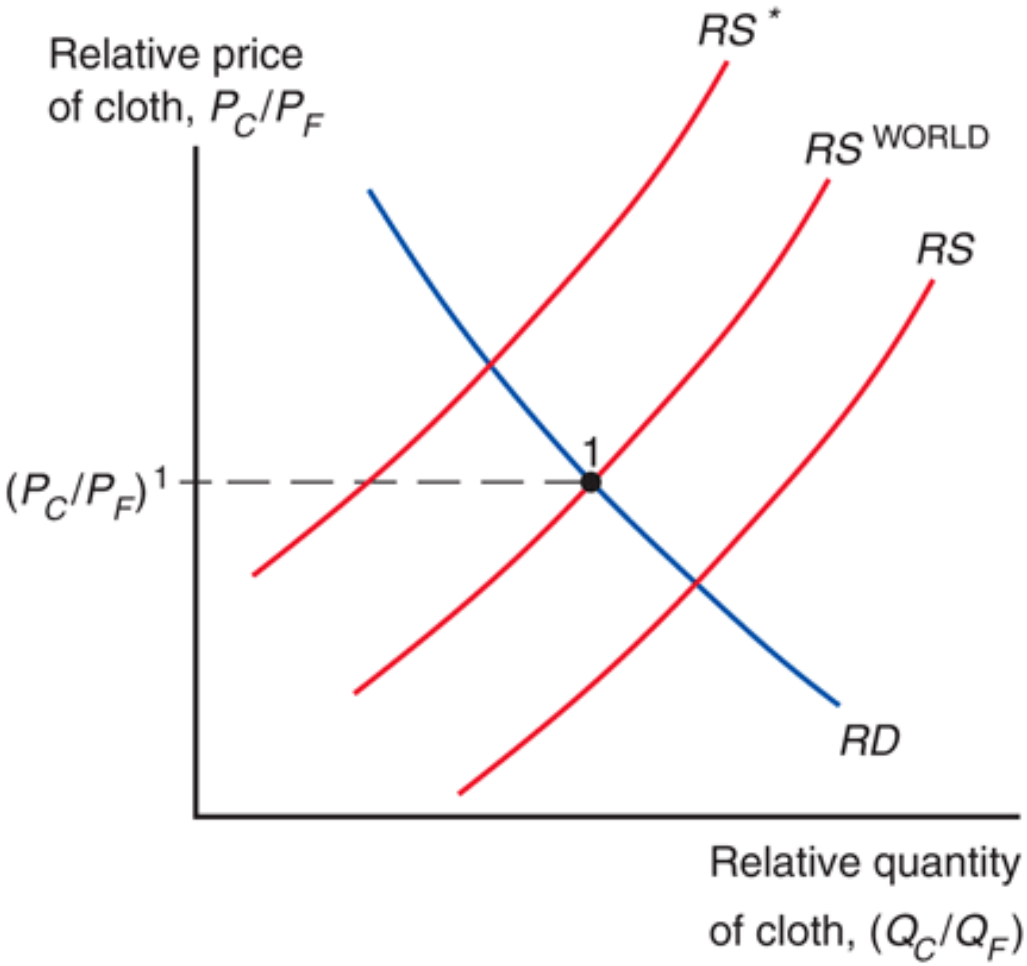


If the economy cannot trade, the relative price of cloth to food is determined by the intersection of relative demand and relative supply for that country. Economy consumes and produces at point D^3 where the indifference curve is tangent to the production possibilities frontier. This indifference curve lies below those that are possible under free trade.

The Welfare Effects of Changes in the Terms of Trade

- The **terms of trade** refers to the price of exports relative to the price of imports.
  - When a country exports cloth and the relative price of cloth increases, the terms of trade rise.
- Because a higher relative price for exports means that the country can afford to buy more imports, an increase in the terms of trade increases a country's welfare.
- A decline in the terms of trade decreases a country's welfare.

Fig. 6-5a: Equilibrium Relative Price with Trade and Associated Trade Flows



(a) Relative Supply and Demand

To determine the price of cloth relative to the price food, use relative supply and relative demand.

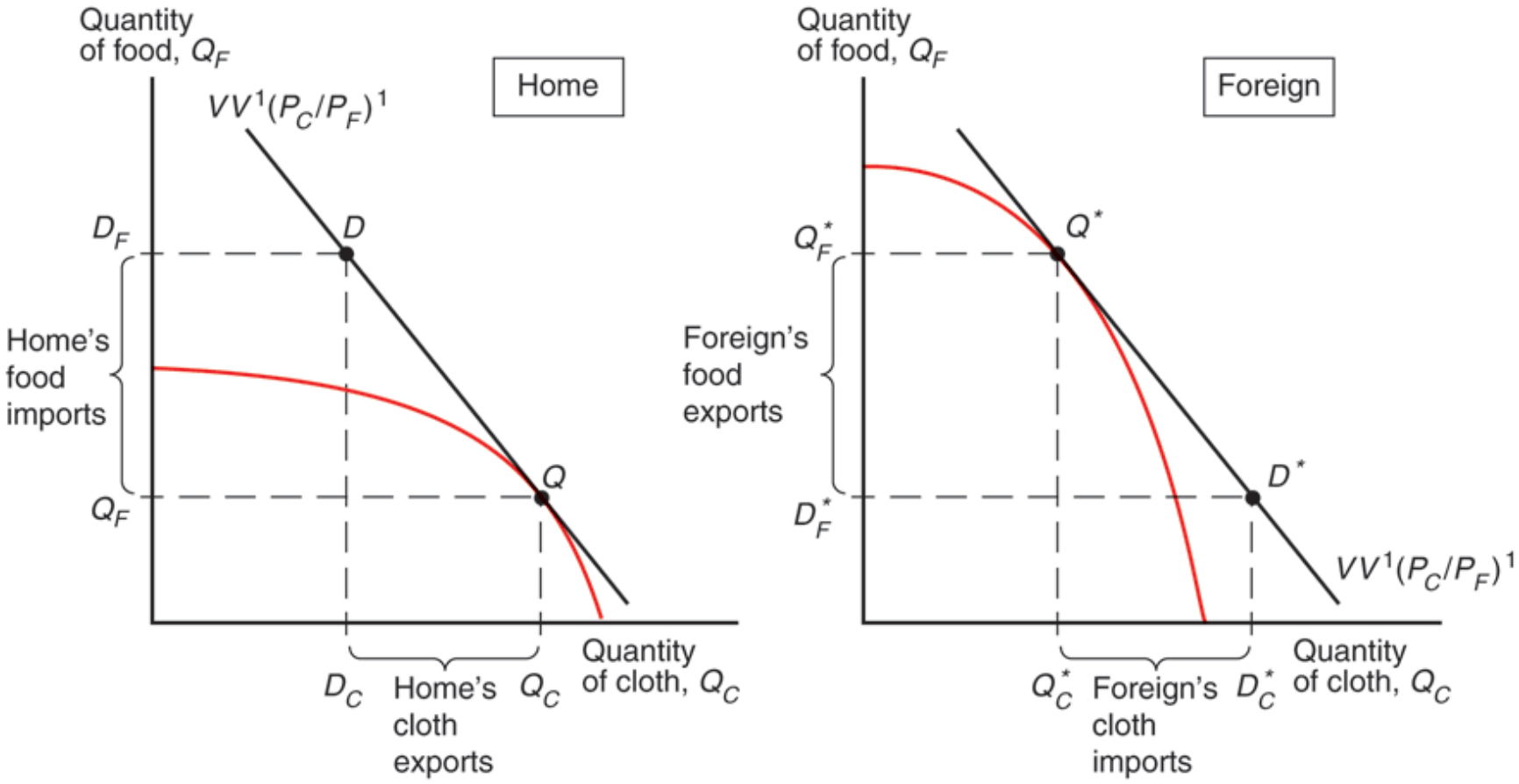
World supply of cloth relative to food at each relative price.

$(Q_C + Q_C^*)/(Q_F + Q_F^*)$

World demand for cloth relative to food at each relative price.

$(D_C + D_C^*)/(D_F + D_F^*)$.

Fig. 6-5b: Equilibrium Relative Price with Trade and Associated Trade Flows (cont.)



(b) Production, Consumption, and Trade

The Effects of Economic Growth

- Is economic growth in China good for the standard of living in the U.S.? Is growth in a country more or less valuable when it is integrated in the world economy?
  - The standard trade model gives us precise answers to these questions.
- Growth is usually **biased**: it occurs in one sector more than others, causing relative supply to change.
  - Rapid growth has occurred in U.S. computer industries but relatively little growth has occurred in U.S. textile industries.
  - In the Ricardian model, technological progress in one sector causes biased growth.
  - In the Heckscher-Ohlin model, an increase in one factor of production causes biased growth.

Fig. 6-6ab: Biased Growth

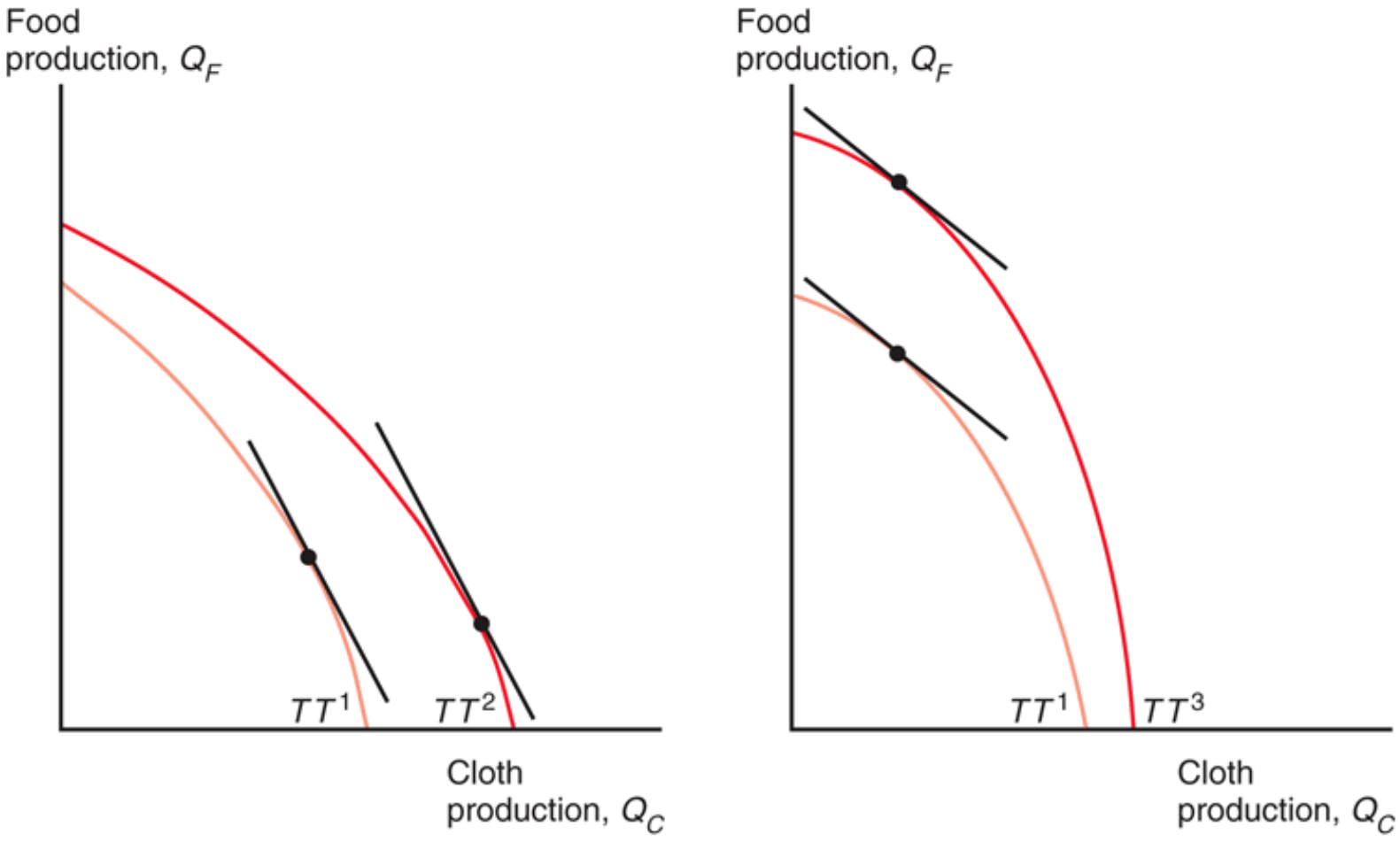
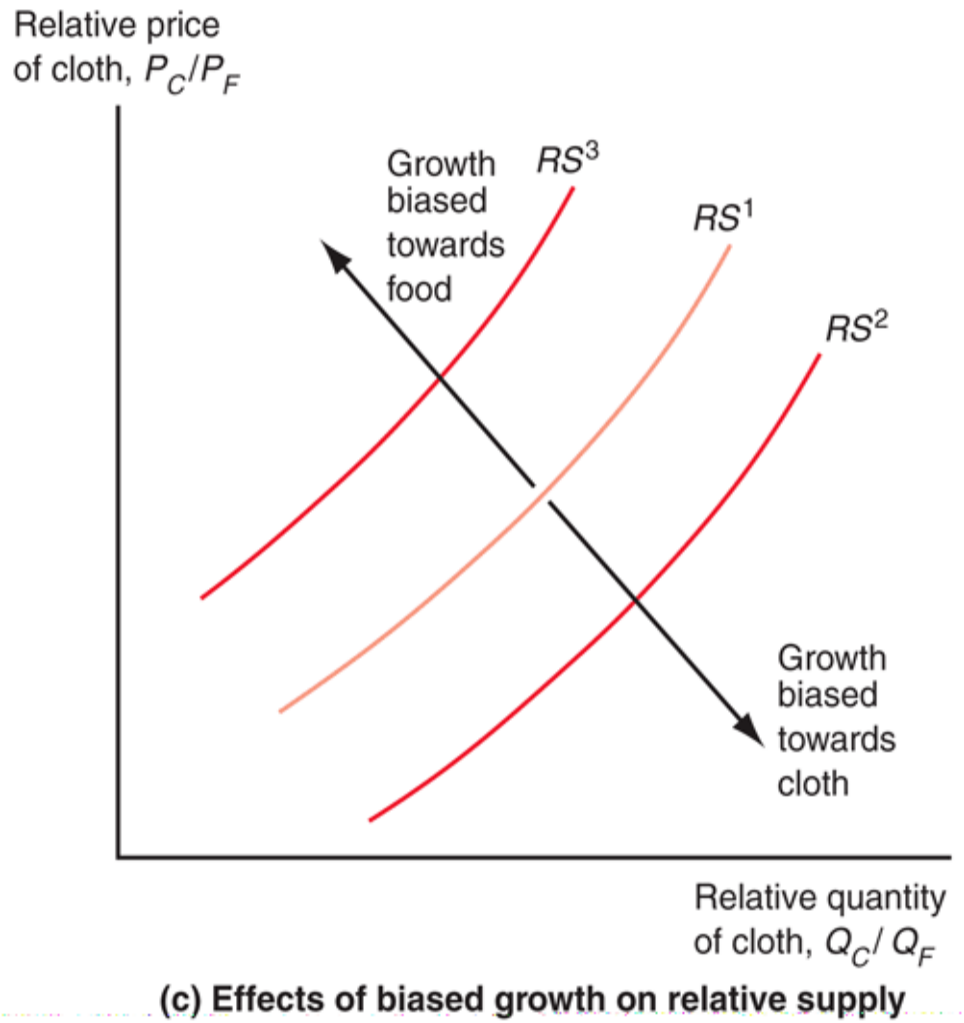


Fig. 6-6c: Biased Growth (cont.)



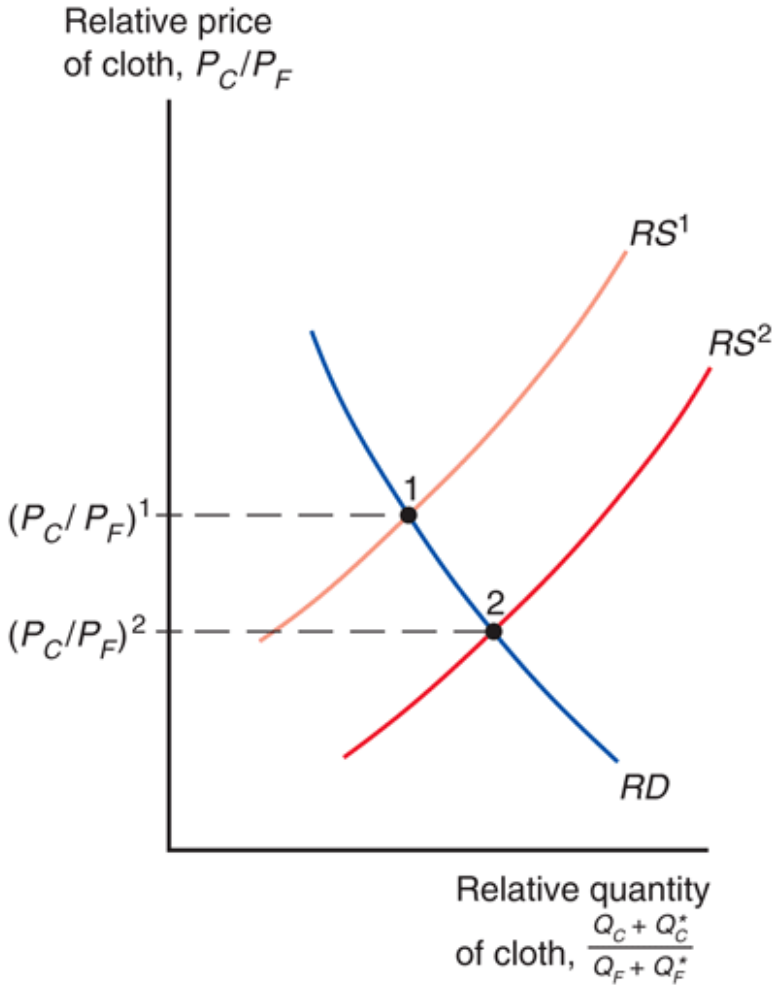
(c) Effects of biased growth on relative supply

Biased growth and the resulting change in relative supply causes a change in the terms of trade.

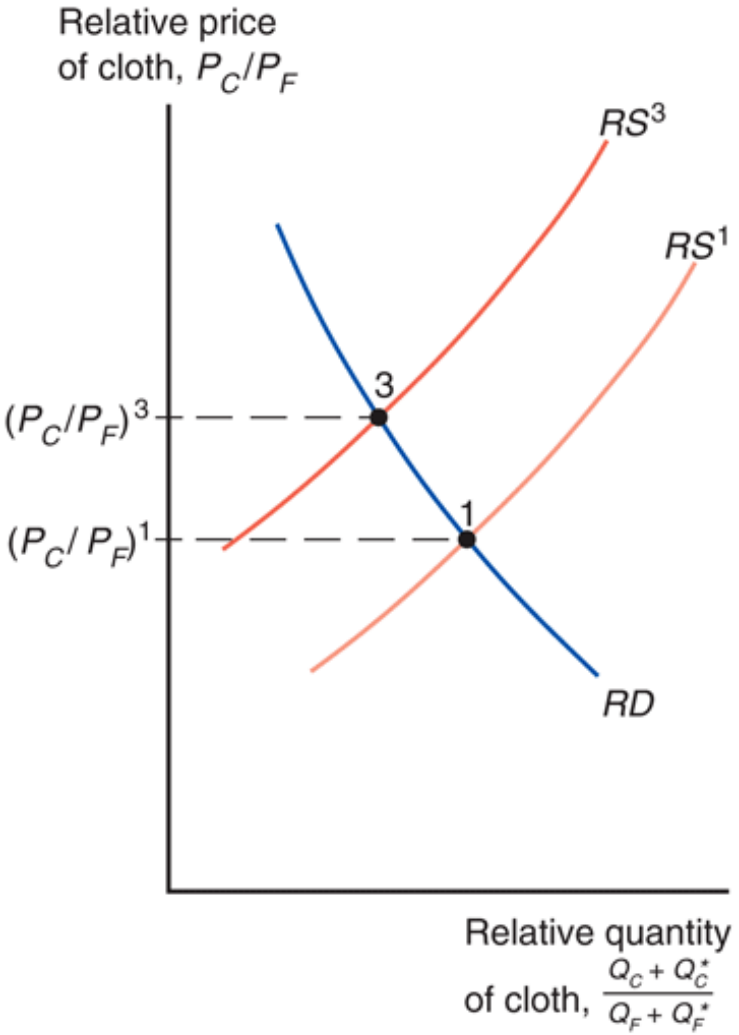
Biased growth in the cloth industry (in either the home or foreign country) will lower the price of cloth relative to the price of food and lower the terms of trade for cloth exporters.

Biased growth in the food industry (in either the home or foreign country) will raise the price of cloth relative to the price of food and raise the terms of trade for cloth exporters.

Fig. 6-7ab: Biased Growth and World Relative Supply



(a) Cloth-biased growth



(b) Food-biased growth

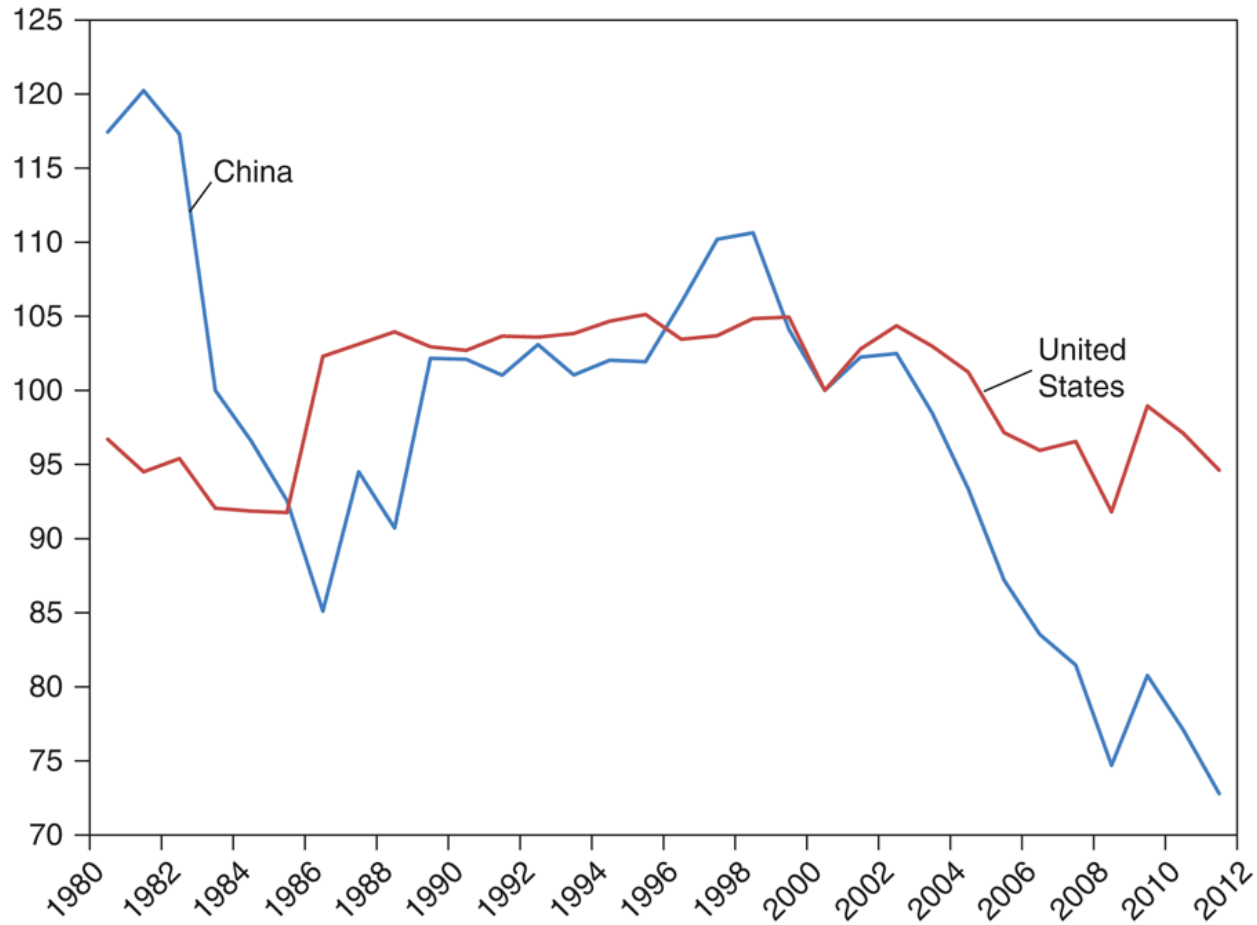
The Effects of Economic Growth

- **Export-biased growth** is growth that expands a country's production possibilities disproportionately in that country's export sector.
- Export-biased growth reduces a country's terms of trade, reducing its welfare and increasing the welfare of foreign countries.
- **Import-biased growth** is growth that expands a country's production possibilities disproportionately in that country's import sector.
- Import-biased growth increases a country's terms of trade, increasing its welfare and decreasing the welfare of foreign countries.

Has the Growth of Newly Industrializing Countries Hurt Advanced Nations?

- The standard trade model predicts that *import*-biased growth in China would occur in sectors that compete with U.S. exports and reduce the U.S. terms of trade.
  - And thus reduce welfare in the U.S.
- But the data indicates that changes in the U.S. terms of trade have been small with no clear trend over the last few decades.
- The terms of trade for China have deteriorated over the past decade, suggesting their recent growth may have been export-biased.

Fig. 6-8: Evolution of the Terms of Trade for the United States and China (1980–2011, 2000 = 100)

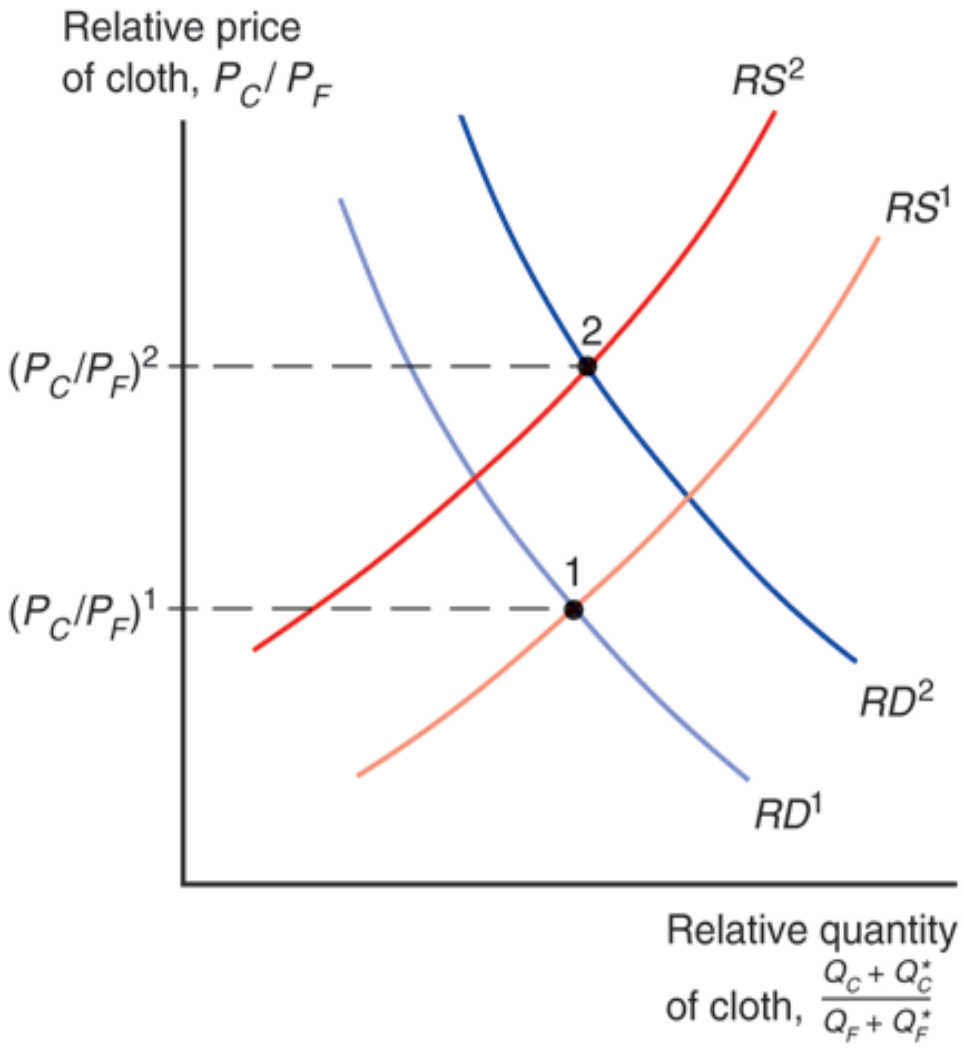


Source: World Development Indicators, World Bank.

Import Tariffs and Export Subsidies: Simultaneous Shifts in *RS* and *RD*

- **Import tariffs** are taxes levied on imports.
- **Export subsidies** are payments given to domestic producers that export.
- Both policies influence the terms of trade and therefore national welfare.
- Import tariffs and export subsidies drive a wedge between prices in world markets and prices in domestic markets.

Fig. 6-9: Effects of a Food Tariff on the Terms of Trade

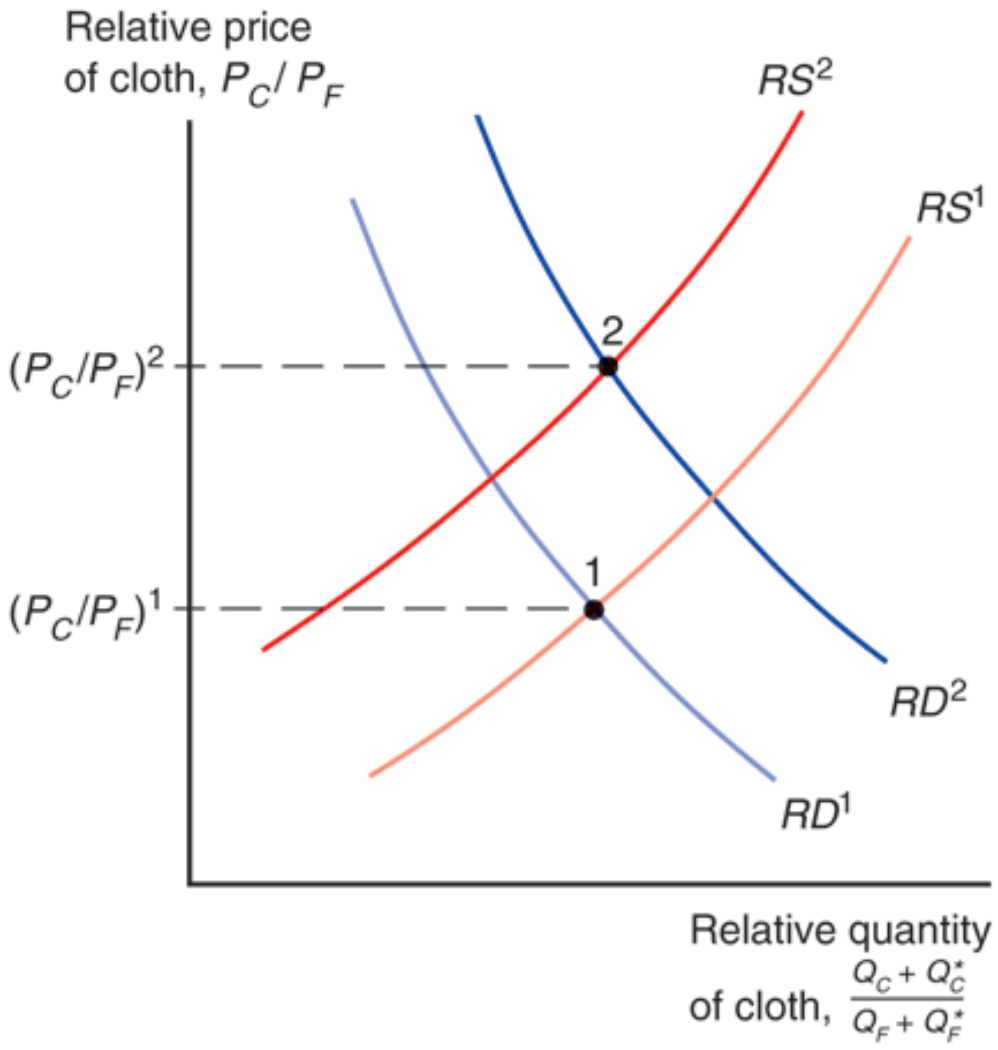


If the home country imposes a tariff on food imports, the price of cloth relative to the price of food falls for domestic consumers.

Domestic producers of cloth will receive a lower relative price of cloth, and therefore will be more willing to switch to food production: relative supply of cloth will decrease.

Domestic consumers will pay a lower relative price for cloth, and therefore will be more willing to switch to cloth consumption: relative demand for cloth will increase.

Fig. 6-9: Effects of a Food Tariff on the Terms of Trade



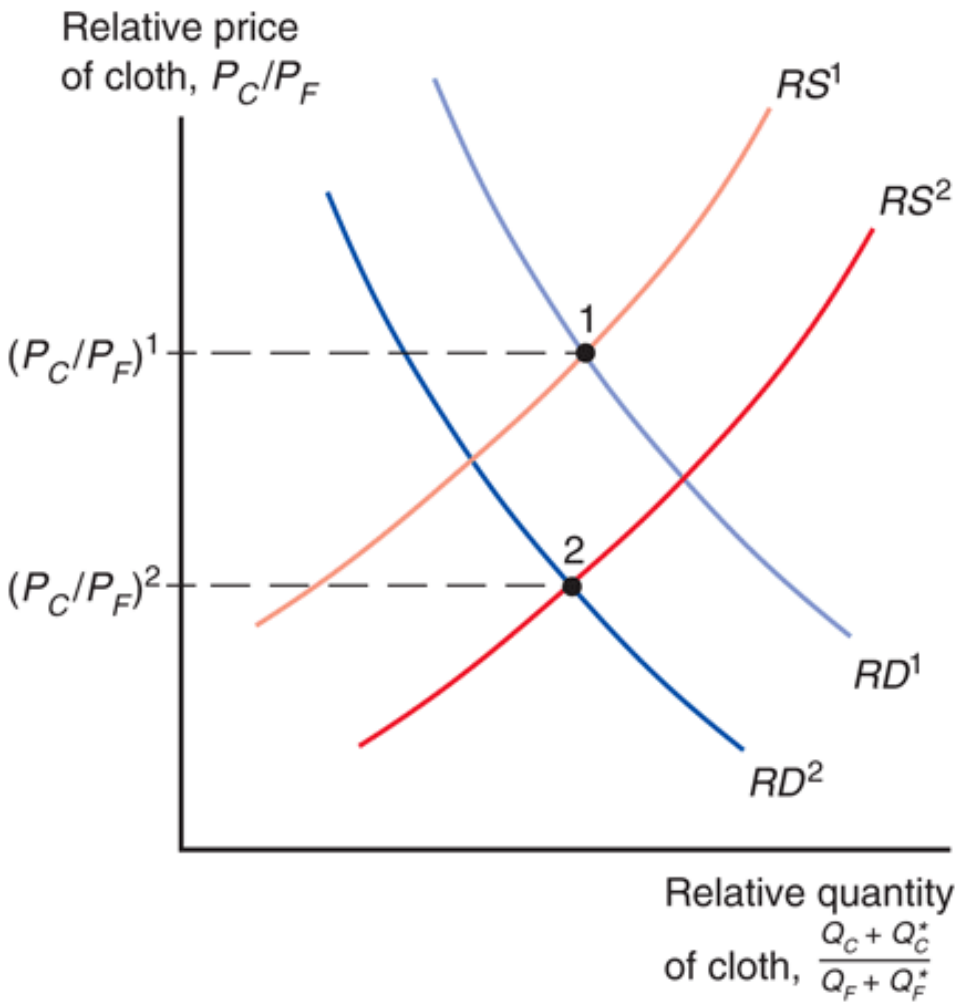
When the home country imposes an import tariff, the terms of trade increase and the welfare of the country may increase.

The magnitude of this effect depends on the size of the home country relative to the world economy.

If the country is a small part of the world economy, its tariff (or subsidy) policies will not have much effect on world relative supply and demand, and thus on the terms of trade.

But for large countries, a tariff may maximize national welfare at the expense of foreign countries.

Fig. 6-10: Effects of a Cloth Subsidy on the Terms of Trade



If the home country imposes a subsidy on cloth exports, the price of cloth relative to the price of food rises for domestic consumers.

Dom. producers will receive a higher relative price of cloth when they export, and will be more willing to switch to cloth production: relative supply of cloth will increase.

Dom. consumers must pay a higher relative price of cloth to producers, and will be more willing to switch to food consumption: relative demand for cloth will decrease.

When the home country imposes an export subsidy, the terms of trade decrease and the welfare of the country decreases to the benefit of the foreign country.

Implications of Terms of Trade Effects: Who Gains and Who Loses?

- The standard trade model predicts that
  - an import tariff by the home country can increase domestic welfare at the expense of the foreign country.
  - an export subsidy by the home country reduces domestic welfare to the benefit of the foreign country.
- Additional effects of tariffs and subsidies that can occur in a world with many countries and many goods:
  - A foreign country may subsidize the export of a good that the U.S. also exports, which will reduce the price for the U.S. in world markets and decrease its terms of trade. (CAP in EU)
  - A foreign country may put a tariff on an imported good that the U.S. also imports, which will reduce the price for the U.S. in world markets and increase its terms of trade.

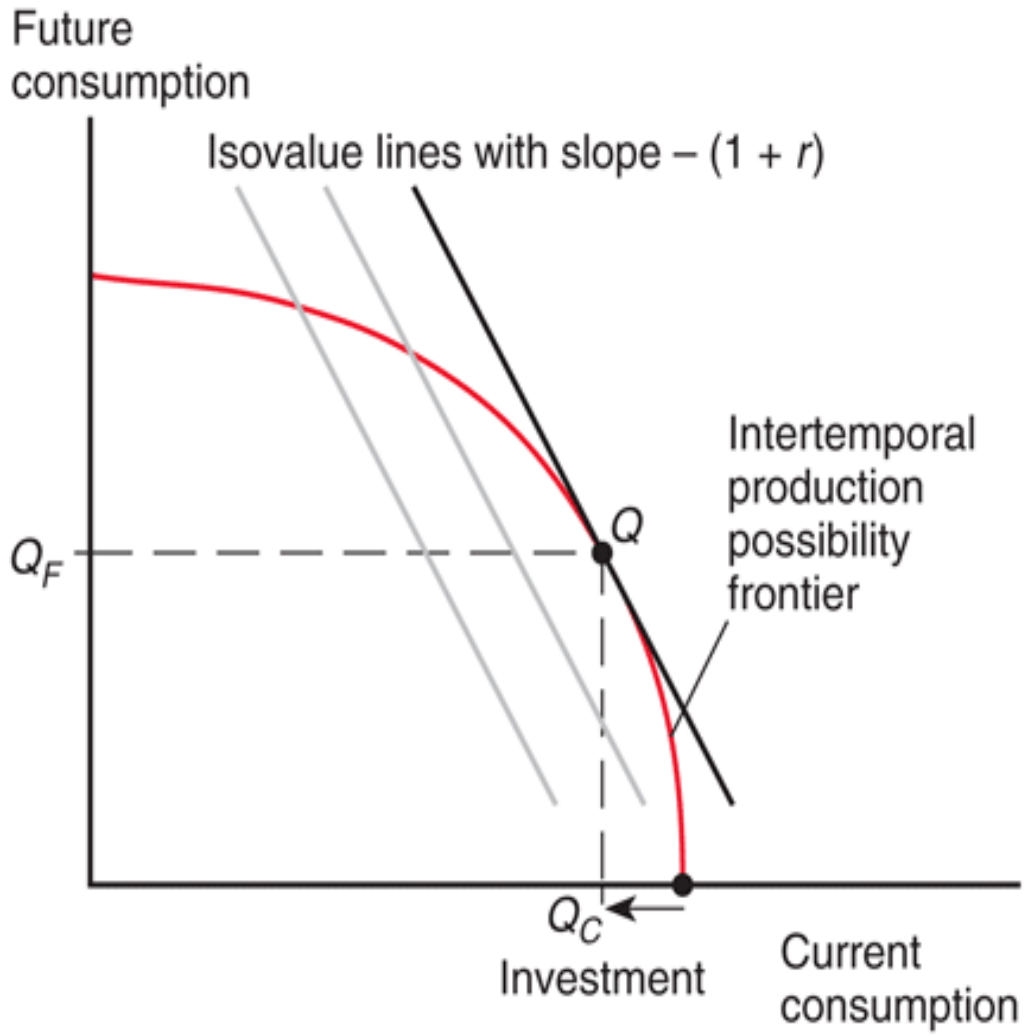
Implications of Terms of Trade Effects: Who Gains and Who Loses?

- Export subsidies by foreign countries on goods that
  - the U.S. imports *reduce the world price of U.S. imports* and increase the terms of trade for the U.S.
  - the U.S. also exports *reduce the world price of U.S. exports* and decrease the terms of trade for the U.S.
- Import tariffs by foreign countries on goods that
  - the U.S. exports *reduce the world price of U.S. exports* and decrease the terms of trade for the U.S.
  - the U.S. also imports *reduce the world price of U.S. imports* and increase the terms of trade for the U.S.

International Borrowing and Lending

- The standard trade model can be modified to analyze international borrowing and lending.
- Two goods are current and future consumption (same good at different times), rather than different goods at the same time.
- Countries usually have different opportunities to invest to become able to produce more in the future.
- A special kind of production possibility frontier, an **intertemporal production possibility frontier**, depicts different possible combinations of current output and future output.

Obr. 6A-1: The Intertemporal Production Possibility Frontier



If you borrow 1 unit of output, you must repay principal + interest = 1 + *r* in the future, where *r* is the **real interest rate.**

The price of future consumption relative to current consumption is 1/(1+*r*).

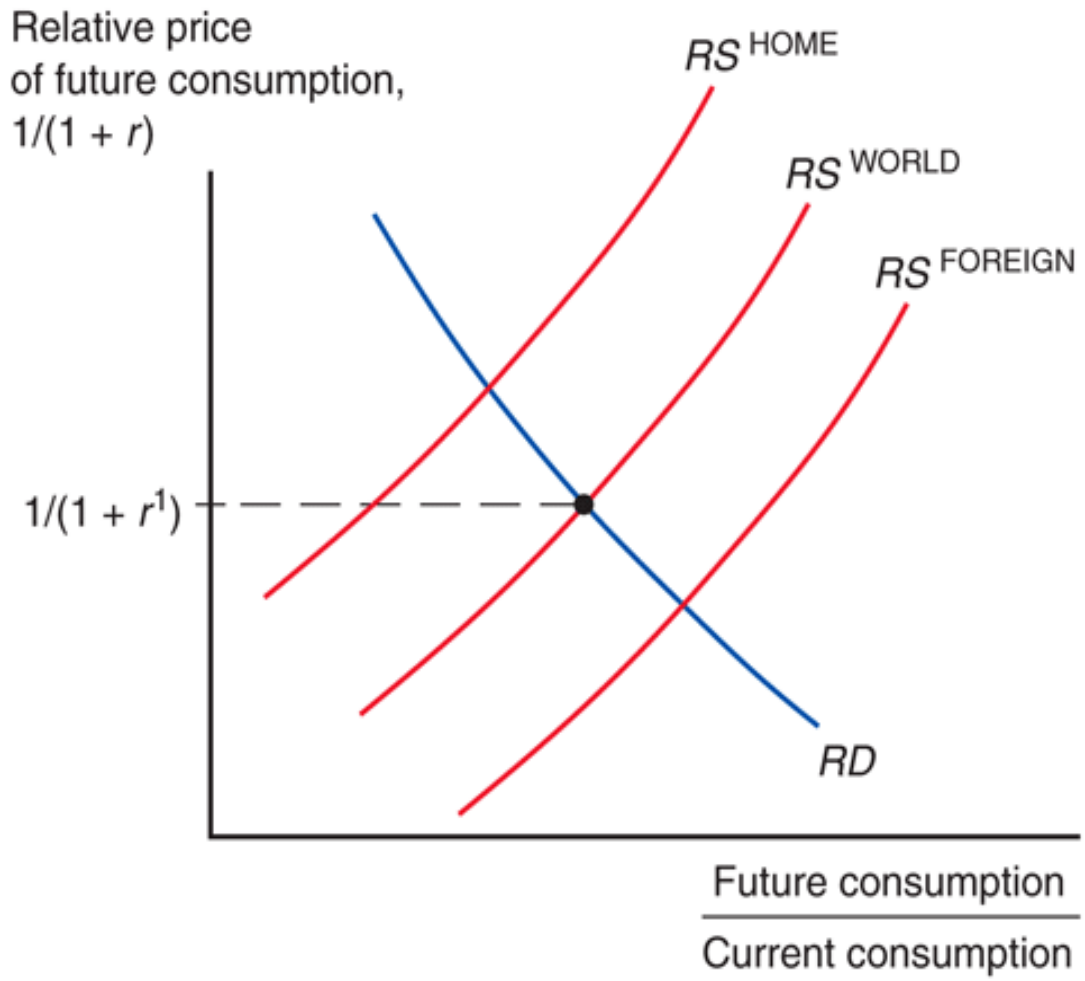
1 unit of current consumption is worth 1 + *r* of future consumption.

At a world real interest rate of *r*, economy should produce at point *Q* where the current value of production is maximized $V = Q_C + Q_F/(1 + r)$.

International Borrowing and Lending

- Suppose that Home has production possibilities biased towards current output, while Foreign has production possibilities biased towards future output.
  - Foreign has better opportunities to invest now to generate more output in the future.
- Home exports current consumption and imports future consumption.
- Home lends to Foreign by consuming less than it produces now.
- Foreign pays back the loan by consuming less than it produces in the future.

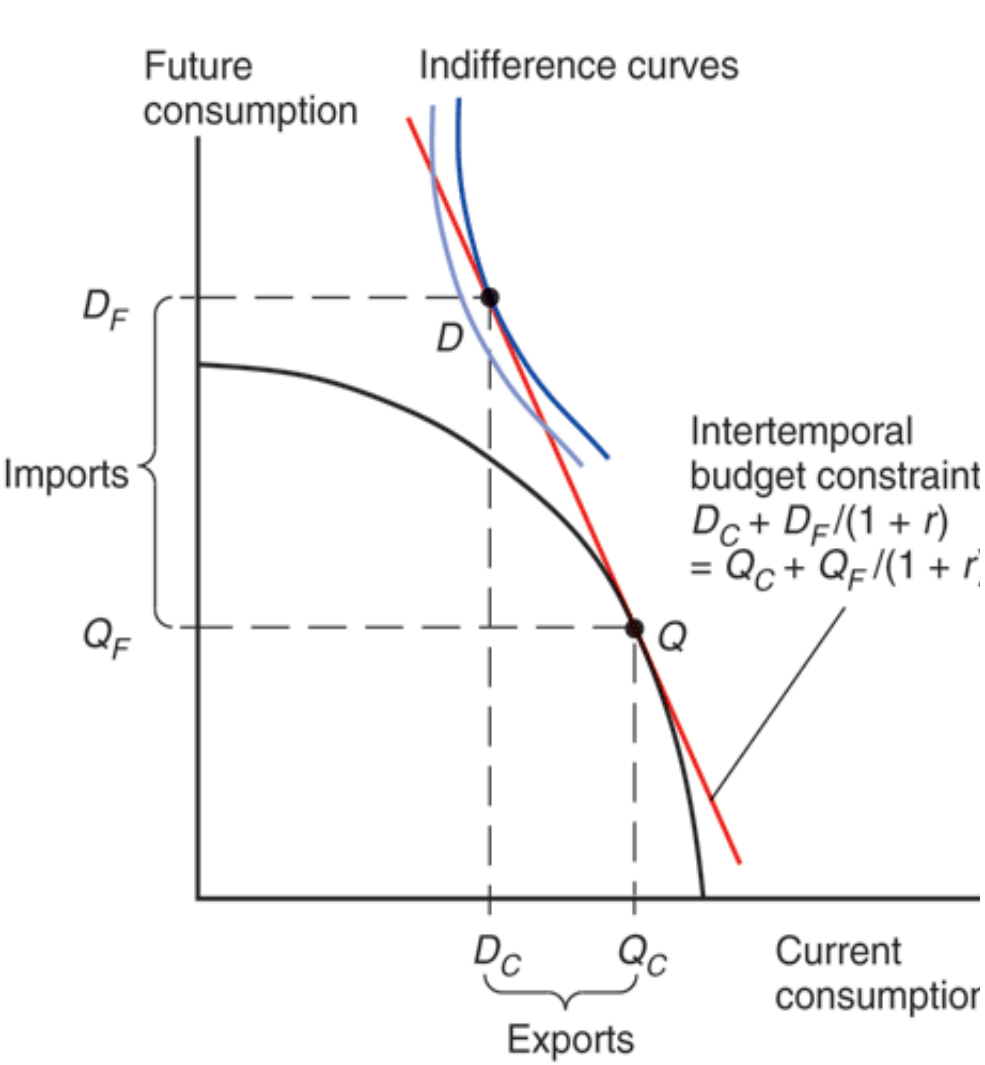
Fig. 6-12: Equilibrium Interest Rate with Borrowing and Lending

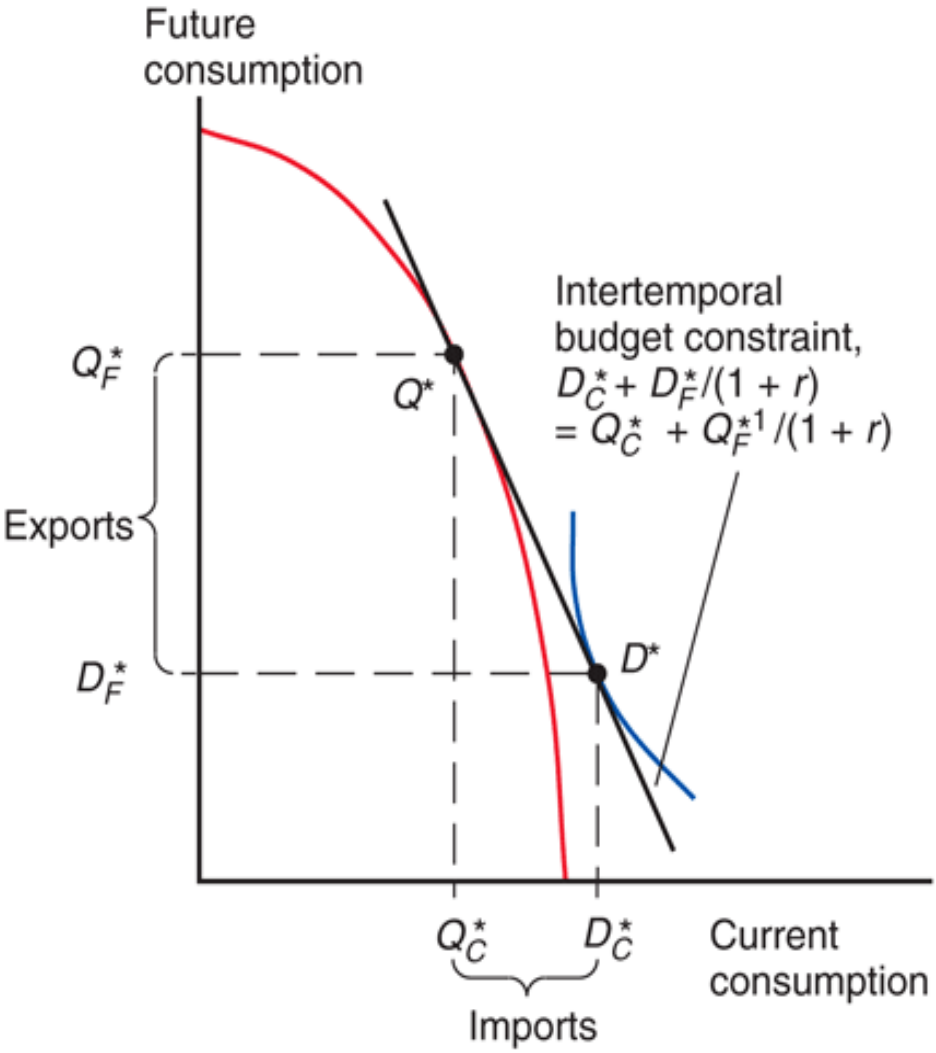


Let's assume that Home and Foreign has the same relative demand. It implies that world relative demand is also the same.

When international borrowing and lending are allowed, the relative price of future consumption — and thus the world real interest rate — is determined by the intersection of world relative demand and world relative supply.

Obr. 6A-2, 6A-3: Determining Intertemporal Consumption Pattern in Domestic and Foreign Economy





Summary

1. The terms of trade refers to the price of exports relative to the price of imports.
2. Export-biased growth reduces a country's terms of trade, reducing its welfare and increasing the welfare of foreign countries.
3. Import-biased growth increases a country's terms of trade, increasing its welfare and decreasing the welfare of foreign countries.

Summary

4. When a country imposes an import tariff, its terms of trade increase and its welfare may increase.
5. When a country imposes an export subsidy, its terms of trade decrease and its welfare decreases.
6. International borrowing and lending is intertemporal trade, where countries with profitable investment opportunities borrow funds today and repay lenders in the future, benefiting both borrowers and lenders.
7. The price of future consumption relative to the price of current consumption, $1/(1 + r)$, is determined like any other relative price.