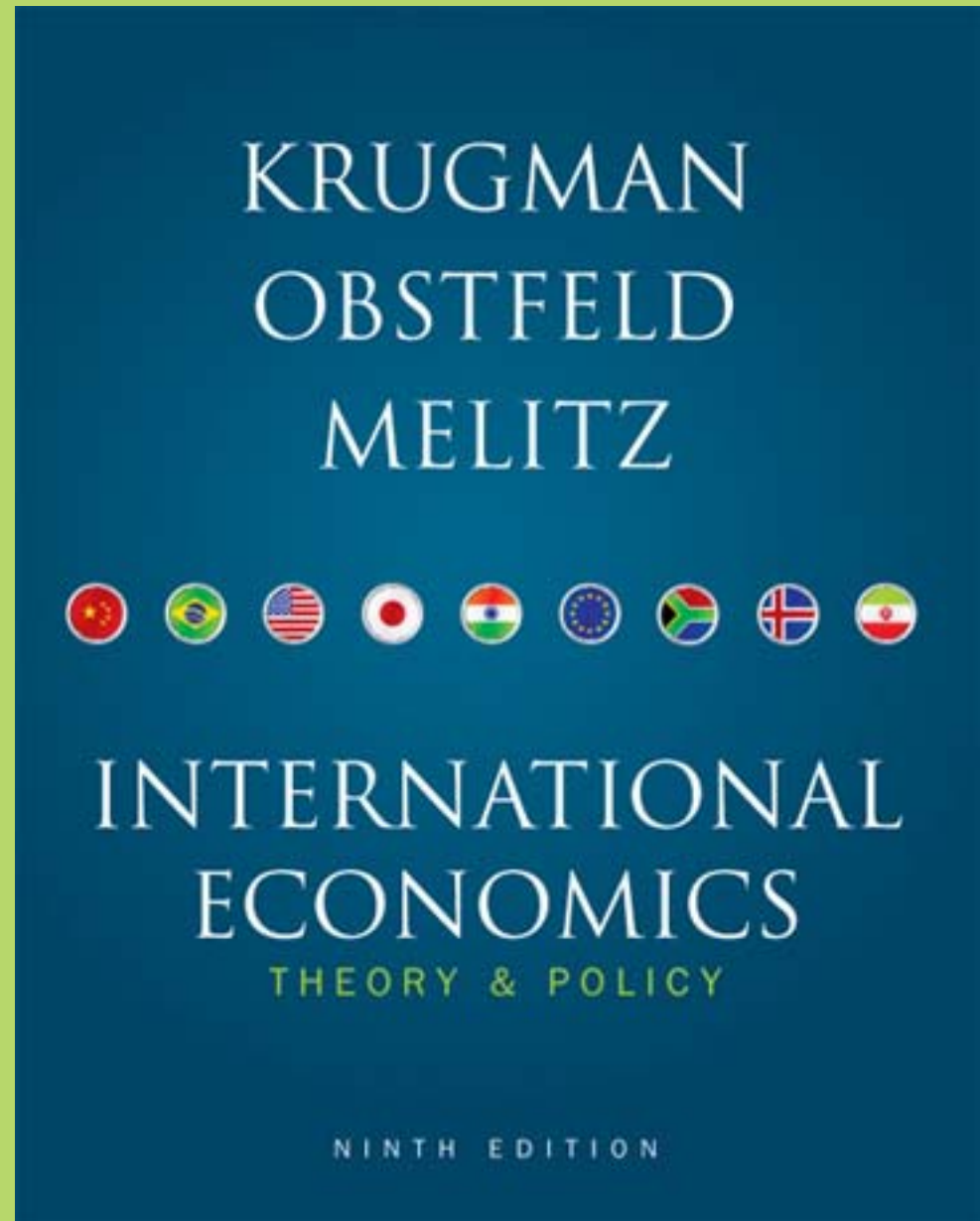


# Chapter 6

## The Standard Trade Model



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# Preview

- Relative supply and relative demand
- The terms of trade and welfare
- Effects of economic growth and international transfers
- 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 curve.

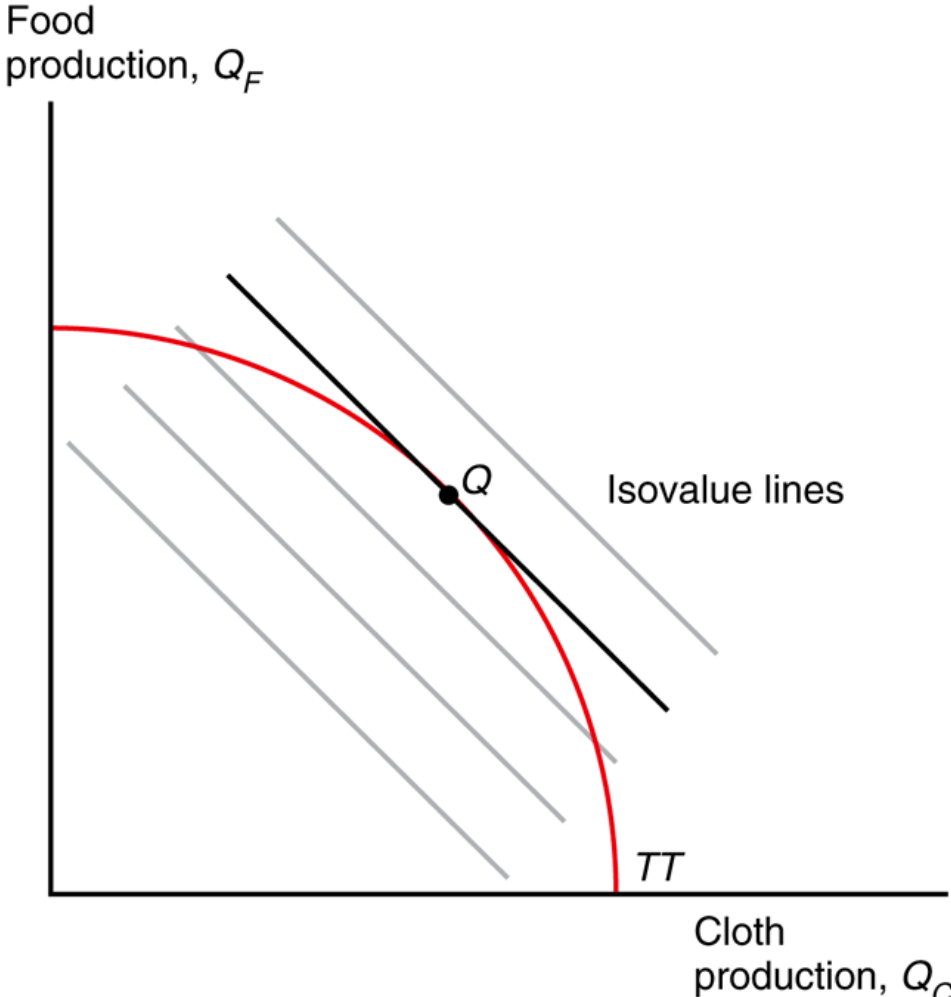
# Introduction

- Differences in *labor services, labor skills, physical capital, land, and technology* between countries cause differences in production possibility frontiers.
- 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.

# Production Possibilities and Relative Supply

- What a country produces depends on the relative price of cloth to food  $P_C/P_F$ .
- 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  $-(P_C/P_F)$
  - Produce at point where PPF is tangent to isovalue line.

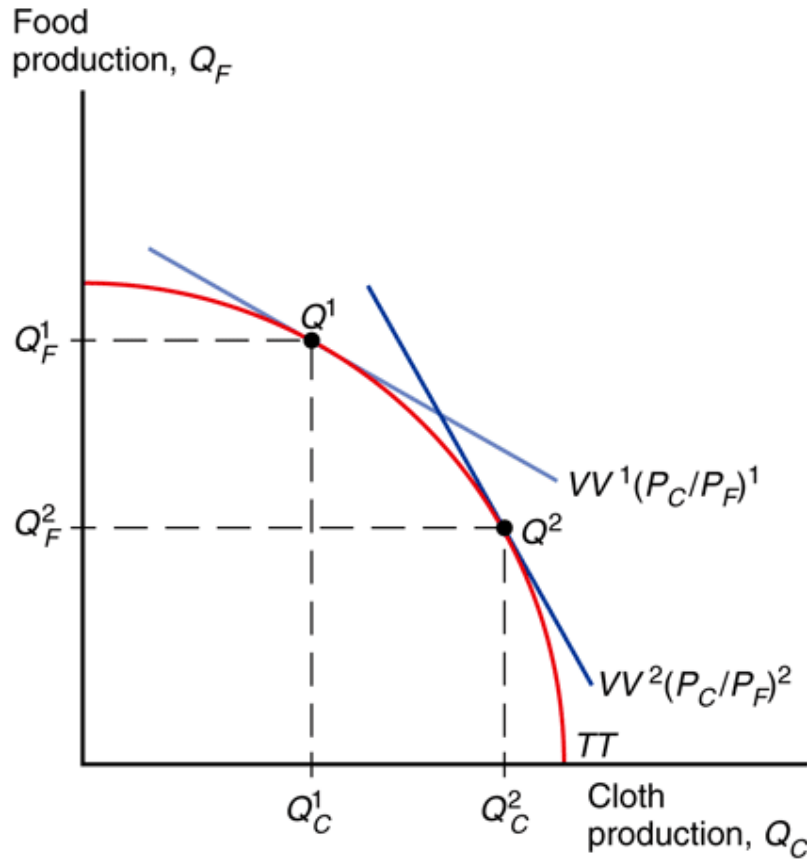
# Fig. 6-1: Relative Prices Determine the Economy's Output



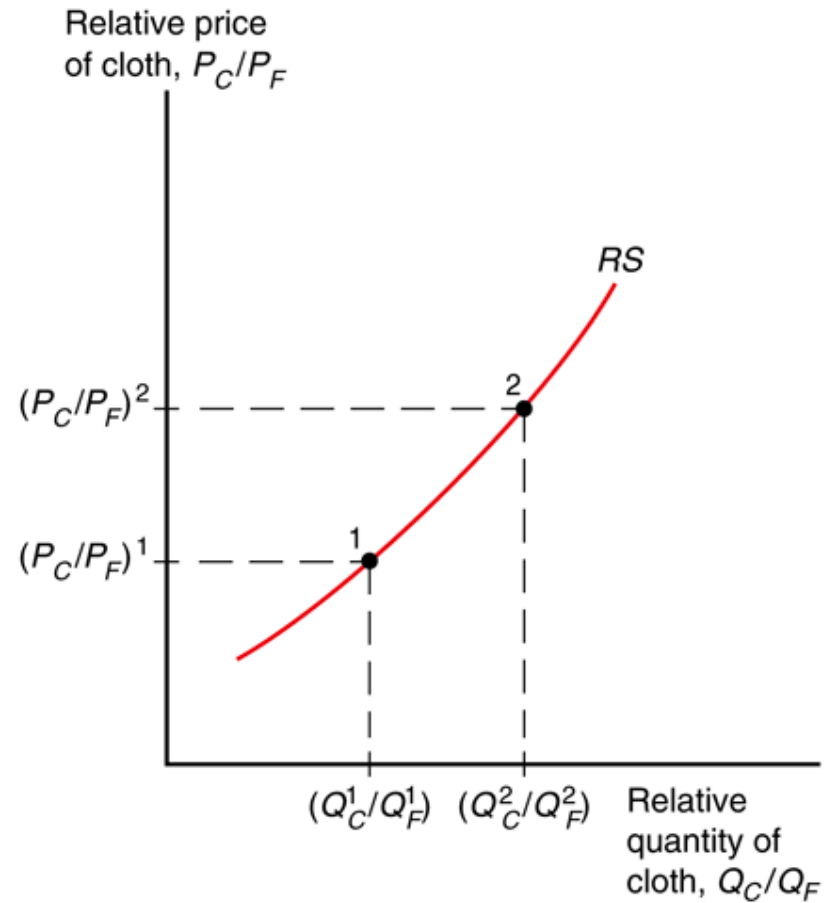
# Production Possibilities and Relative Supply

- Relative prices and 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.

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



(a)



(b)



# 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).

# Relative Prices and Demand

- 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.

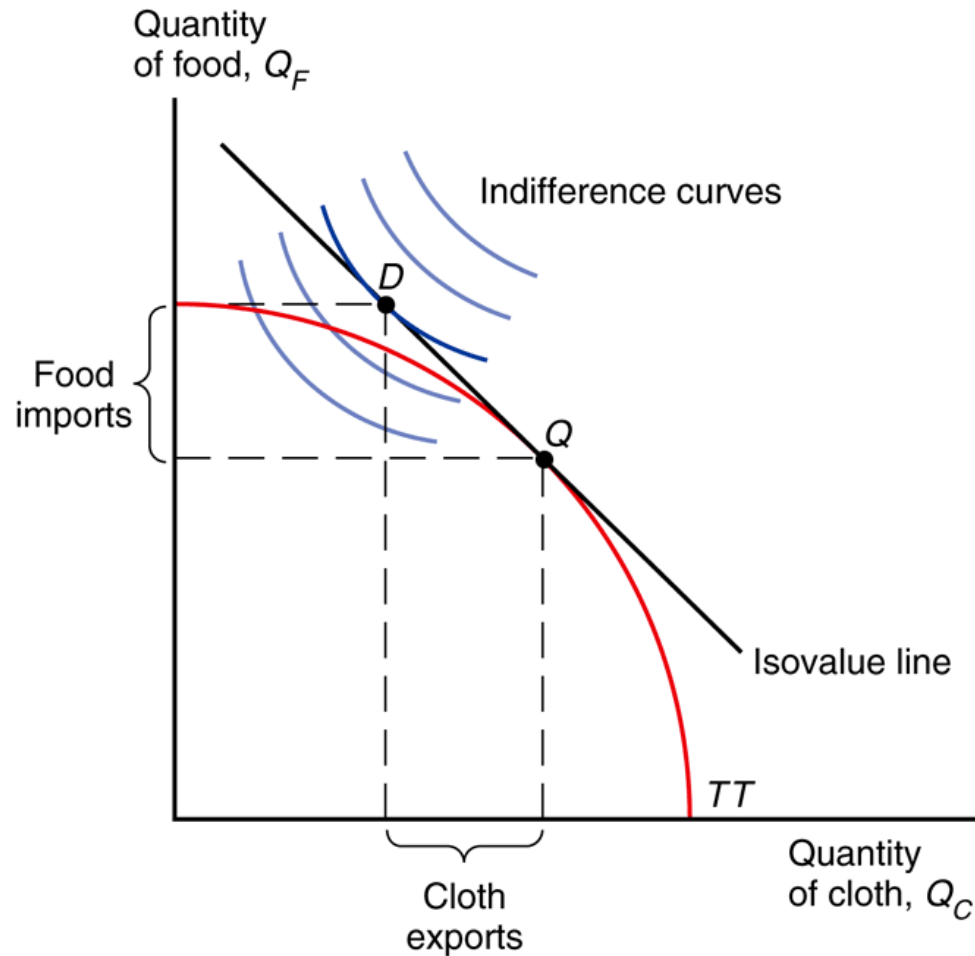
# Relative Prices and Demand

- Consumption choice is based on preferences and relative price of goods:
  - Consume at point  $D$  where the isovalue line is tangent to the indifference curve.
- Economy exports cloth – the quantity of cloth produced exceeds the quantity of cloth consumed – and imports food.

# Relative Prices and Demand

- Relative prices and relative demand
  - An increase in the relative price of cloth  $P_C/P_F$  causes consumption choice to shift from point  $D^1$  to point  $D^2$ .
  - Demand for cloth relative to food  $D_C/D_F$  falls.
  - Relative demand for cloth to food falls as the relative price of cloth to food rises.

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



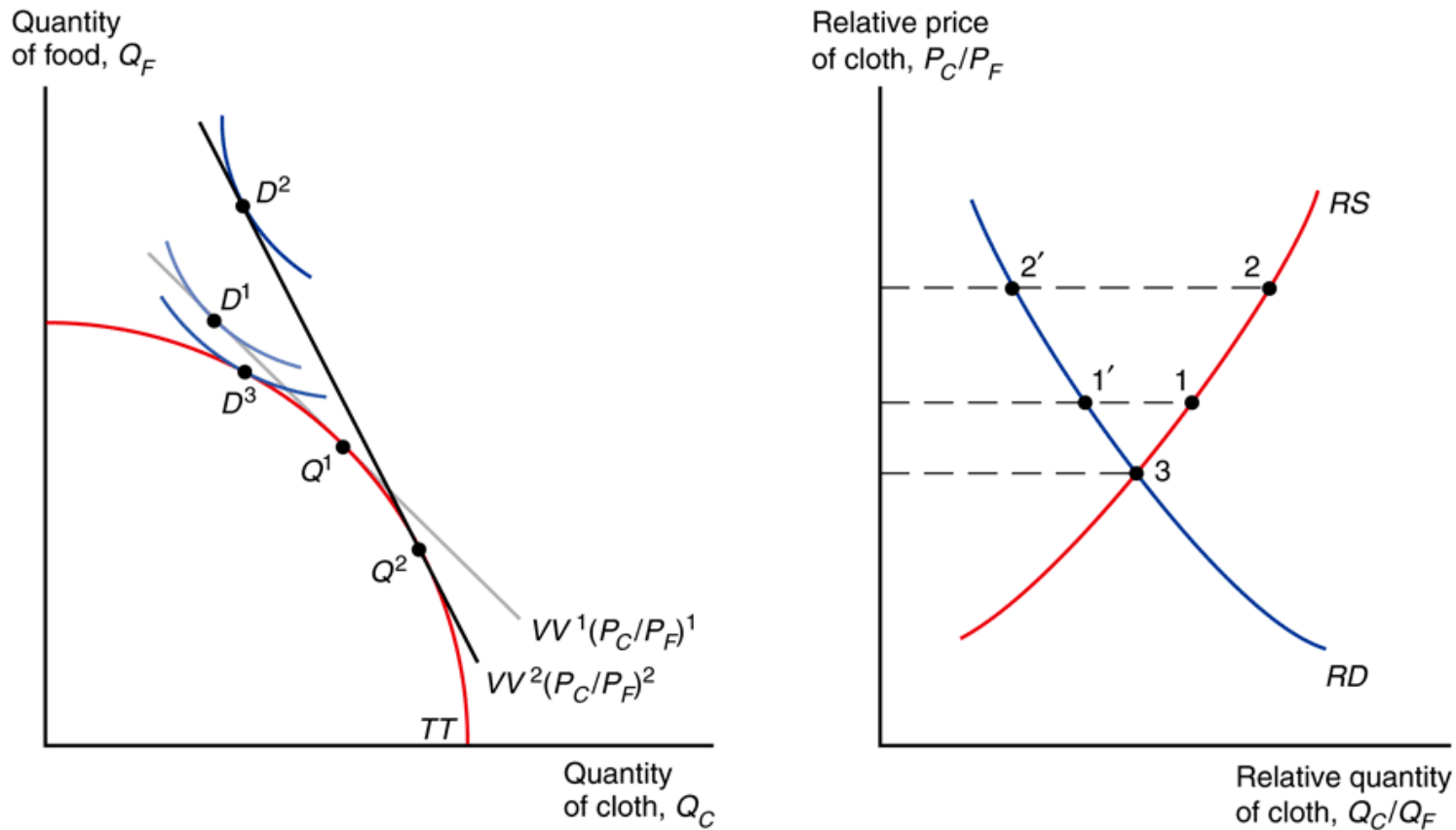
# Relative Prices and Demand

- An economy that exports cloth is better off when the price of cloth rises relative to the price of food:
  - the isovalue line becomes steeper and a higher indifference curve can be reached.
- A higher relative price of cloth means that more pounds of food can be imported for every yard of cloth exported.

# Relative Prices and Demand

- 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.
  - Consume and produce at point  $D^3$  where the indifference curve is tangent to the production possibilities frontier.
- Suppose that the home country exports cloth and imports food when trade occurs.

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



(a) Production and Consumption

(b) Relative Supply and Demand



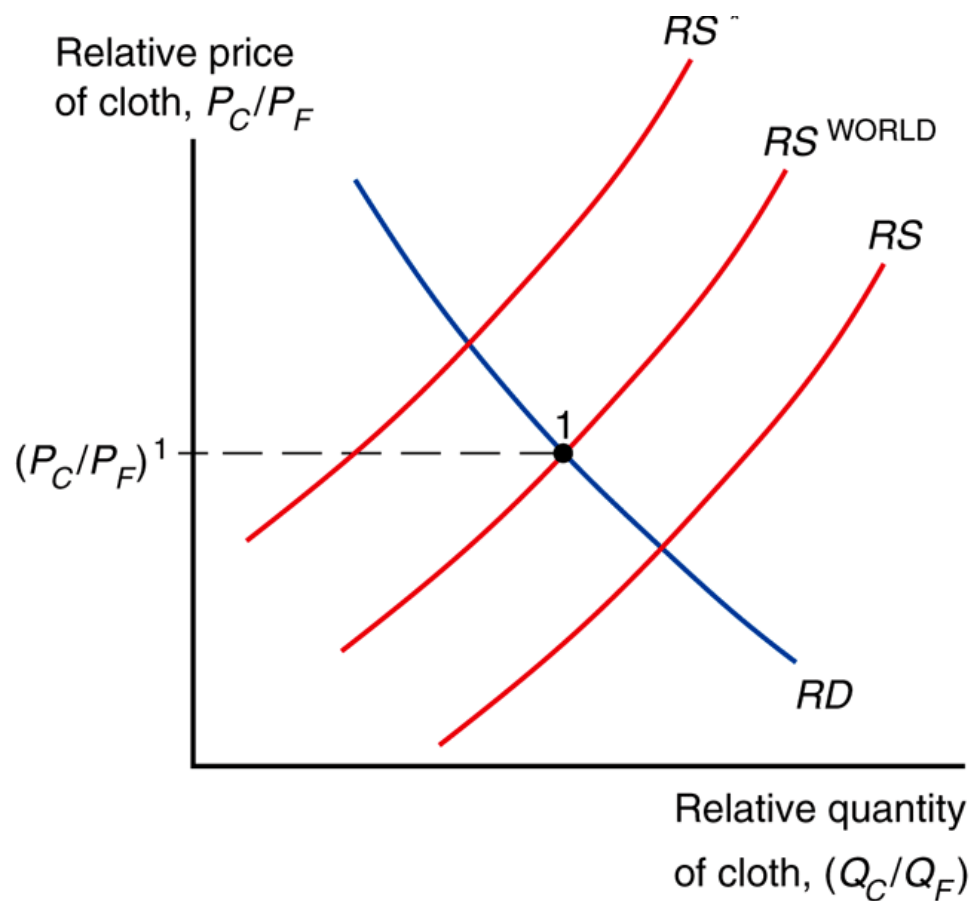
# The Welfare Effects of Changes in the Terms of Trade

- 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.

# Determining Relative Prices

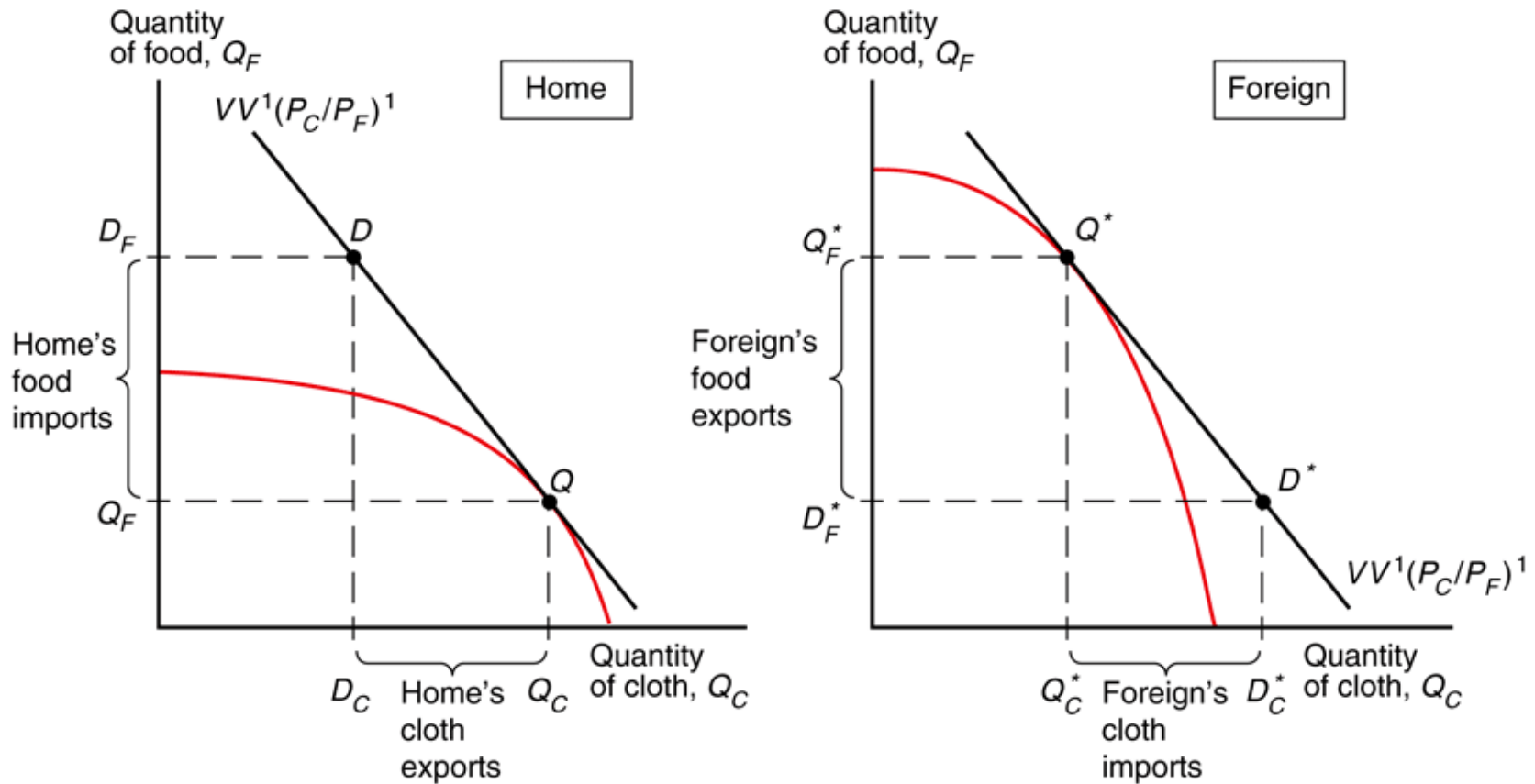
- To determine the price of cloth relative to food, use relative supply and relative demand.
  - *World* supply of cloth relative to food at each relative price.  $RS = (Q_C + Q_C^*) / (Q_F + Q_F^*)$
  - *World* demand for cloth relative to food at each relative price.  $RD = (D_C + D_C^*) / (D_F + D_F^*)$
  - World quantities are the sum of quantities from the two countries in the world.

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



(a) Relative Supply and Demand

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



(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.

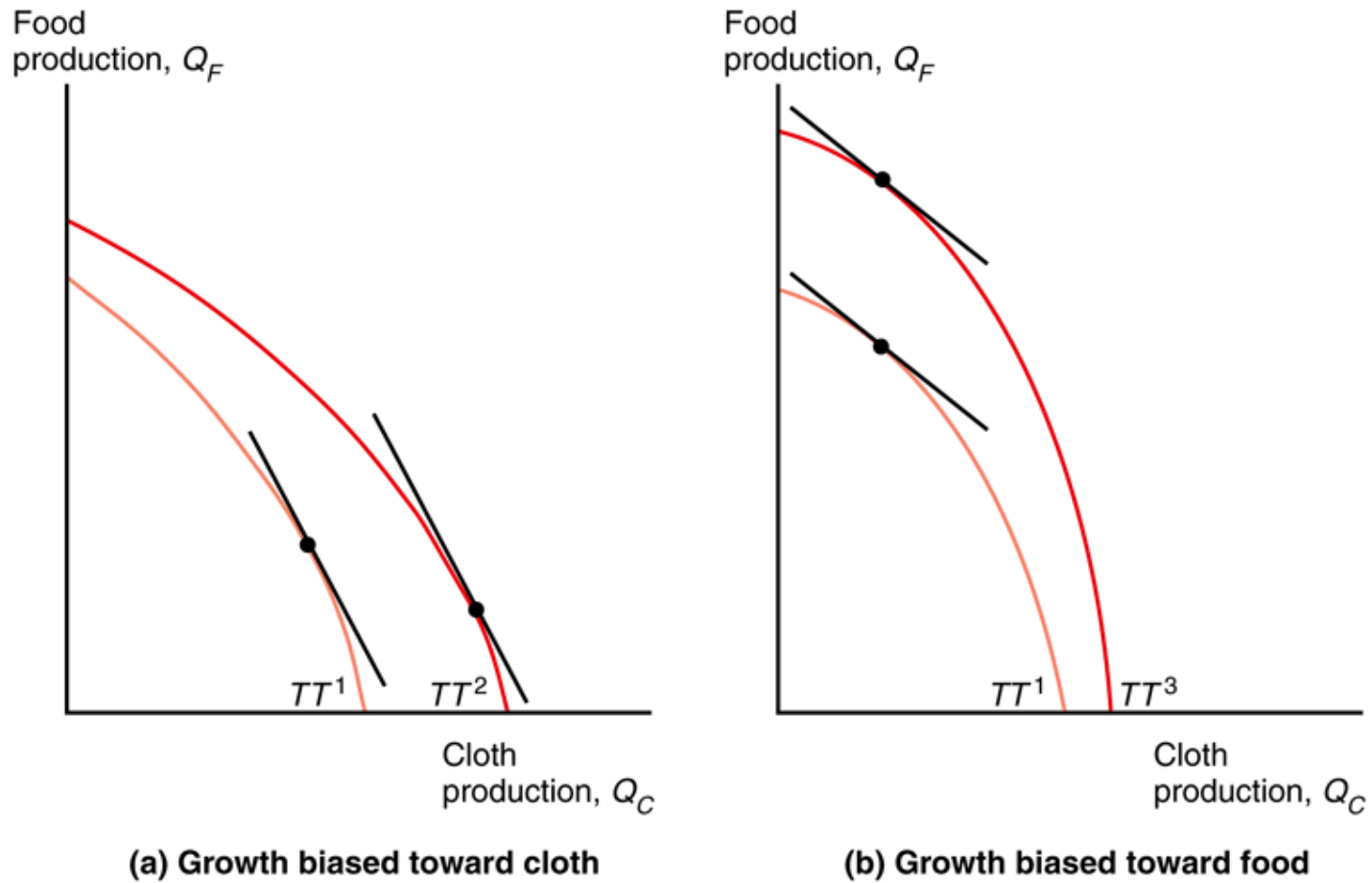
# Effects of Economic Growth

- Growth and production possibilities.
  - Economic growth causes outward shift of a country's production possibility frontier so can produce bundles that could not before.
  - Arises due to productivity improvements or factor accumulation.
- Primary benefit: holding relative prices constant, economic growth is good for a country.

# Effects of Economic Growth

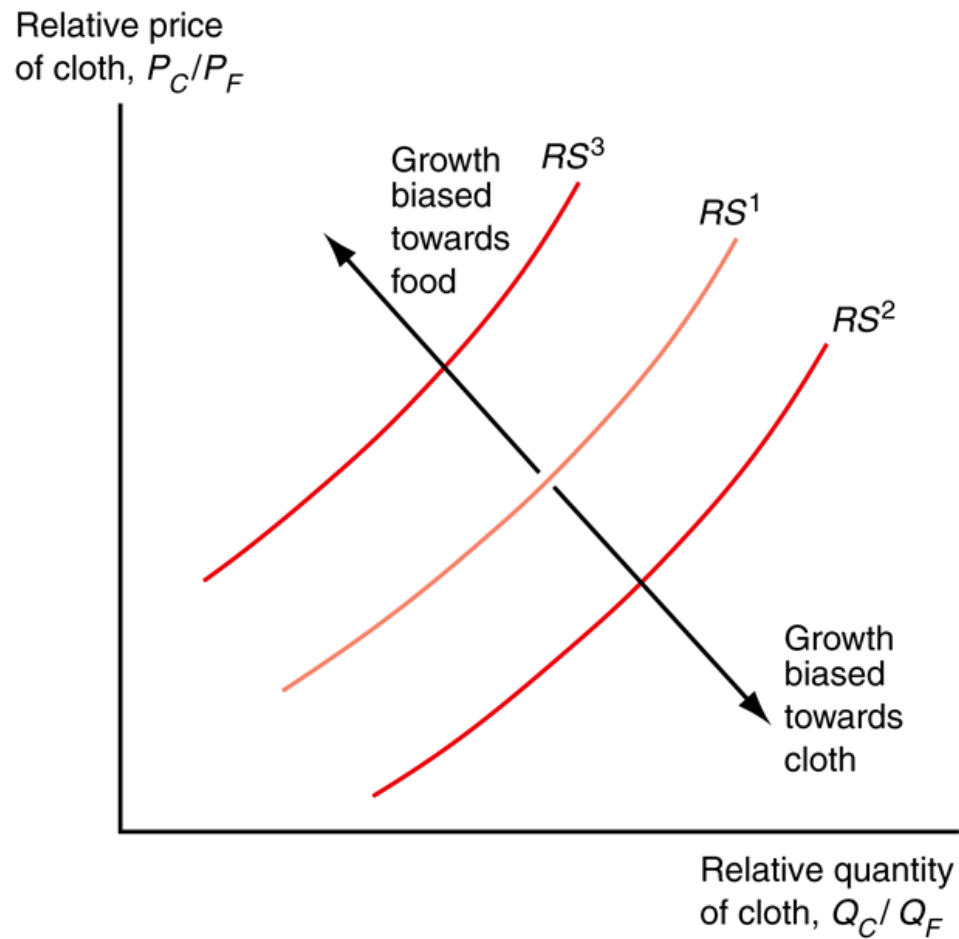
- Growth is usually **biased**: it occurs in one sector more than others, causing relative supply to change.
  - Rapid growth has occurred in U.S. computer industries but relatively little growth has occurred in U.S. textile industries.
  - In the Ricardian model, technological progress in one sector causes biased growth.
  - In the Heckscher-Ohlin model, an increase in one factor of production causes biased growth.

# Fig. 6-6: Biased Growth





# Fig. 6-6c: Biased Growth

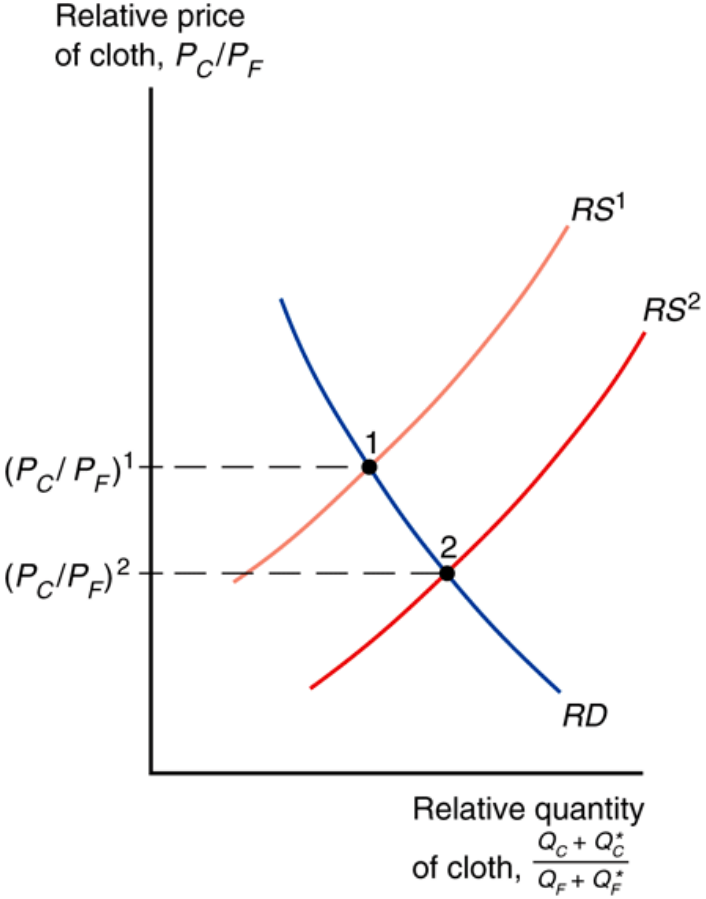


(c) Effects of biased growth on relative supply

# Effects of Economic Growth

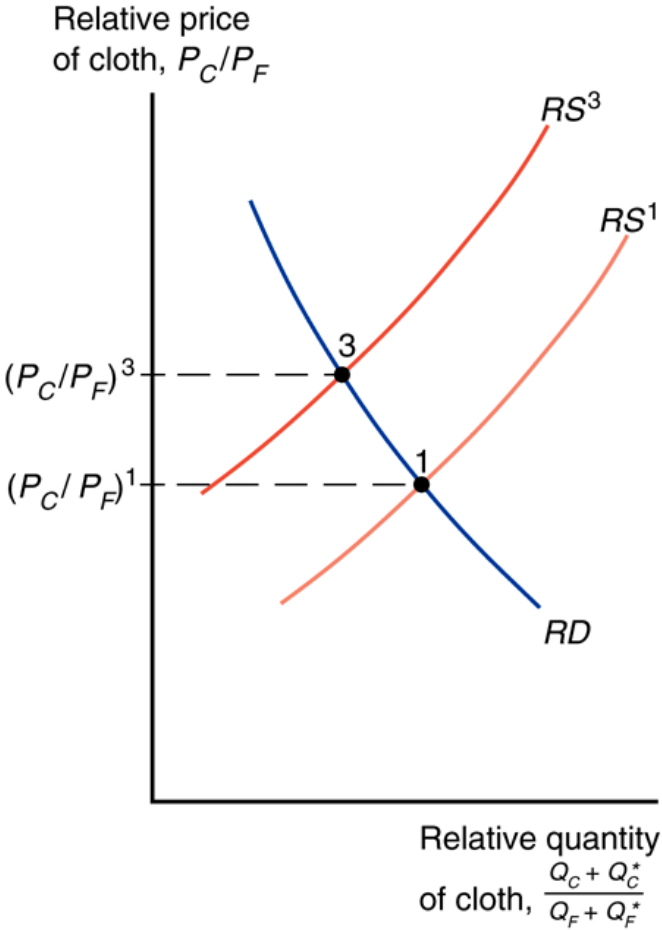
- Biased growth and the resulting change in relative supply causes a change in the terms of trade.
  - Biased growth in the cloth industry (in either the home or foreign country) will lower the price of cloth relative to the price of food and lower the terms of trade for cloth exporters.
  - Biased growth 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. 6-7a: Growth and World Relative Supply



(a) Cloth-biased growth

# Fig. 6-7b: Growth and World Relative Supply



(b) Food-biased growth

# Effects of Economic Growth

- **Export-biased growth** expands a country's production possibilities disproportionately in the good it exports.
  - Secondary burden: worsens a growing country's terms of trade, to the benefit of the rest of the world.
- **Import-biased growth** expands a country's production possibilities disproportionately in the good it imports.
  - Secondary benefit: improves a growing country's terms of trade, while deteriorating the terms of trade of the rest of the world.

# Has Growth in Asia Reduced the Welfare of High-Income Countries?

- The standard trade model predicts that *import*-biased growth in China reduces the U.S. terms of trade and the standard of living in the U.S.
  - Import-biased growth for China would occur in sectors that compete with U.S. exports.
- But this prediction is not supported by data: there should be negative changes in the terms of trade for the U.S. and other high-income countries.
  - In fact, changes in the terms of trade for high-income countries have been positive and negative for developing Asian countries.

## Table 6-1: Average Annual Percent Changes in Terms of Trade for the United States and China

	<b>TABLE 6-1 Average Annual Percent Changes in Terms of Trade for the United States and China</b>			
	<b>Change by Decade</b>			<b>Overall Change</b>
	<b>1980–89</b>	<b>1990–99</b>	<b>2000–08</b>	<b>1980–2008</b>
U.S.	1.6%	0.4%	–1.0%	0.1%
China	–1.4%	0.2%	–3.3%	–1.3%

# Effects of International Transfers

- Transfers of income sometimes occur from one country to another.
  - War reparations or foreign aid may influence demand for traded goods and therefore relative demand.
- How do transfers of income across countries affect relative demand and the terms of trade?



# Effects of International Transfers

- Terms of trade effects of transfers
  - Donor country gives money to recipient country.
  - International transfers of income may affect terms of trade by shifting world relative demand curve.
  - A transfer worsens the donor's terms of trade if the donor has a higher marginal propensity to spend on its export good than the recipient.
  - Often true due to barriers to trade, both natural and artificial.

# Effects of International Transfers

- In fact, countries spend most of their (marginal) income on their own products.
  - Americans spend only 11% of national income on imports and 89% on domestically produced goods.
- Suppose that we spend 80 cents of each dollar on domestically produced goods and Sri Lanka spends 40 cents of each dollar on imports from the United States.
  - Every dollar we give to Sri Lanka decreases relative demand for our products.

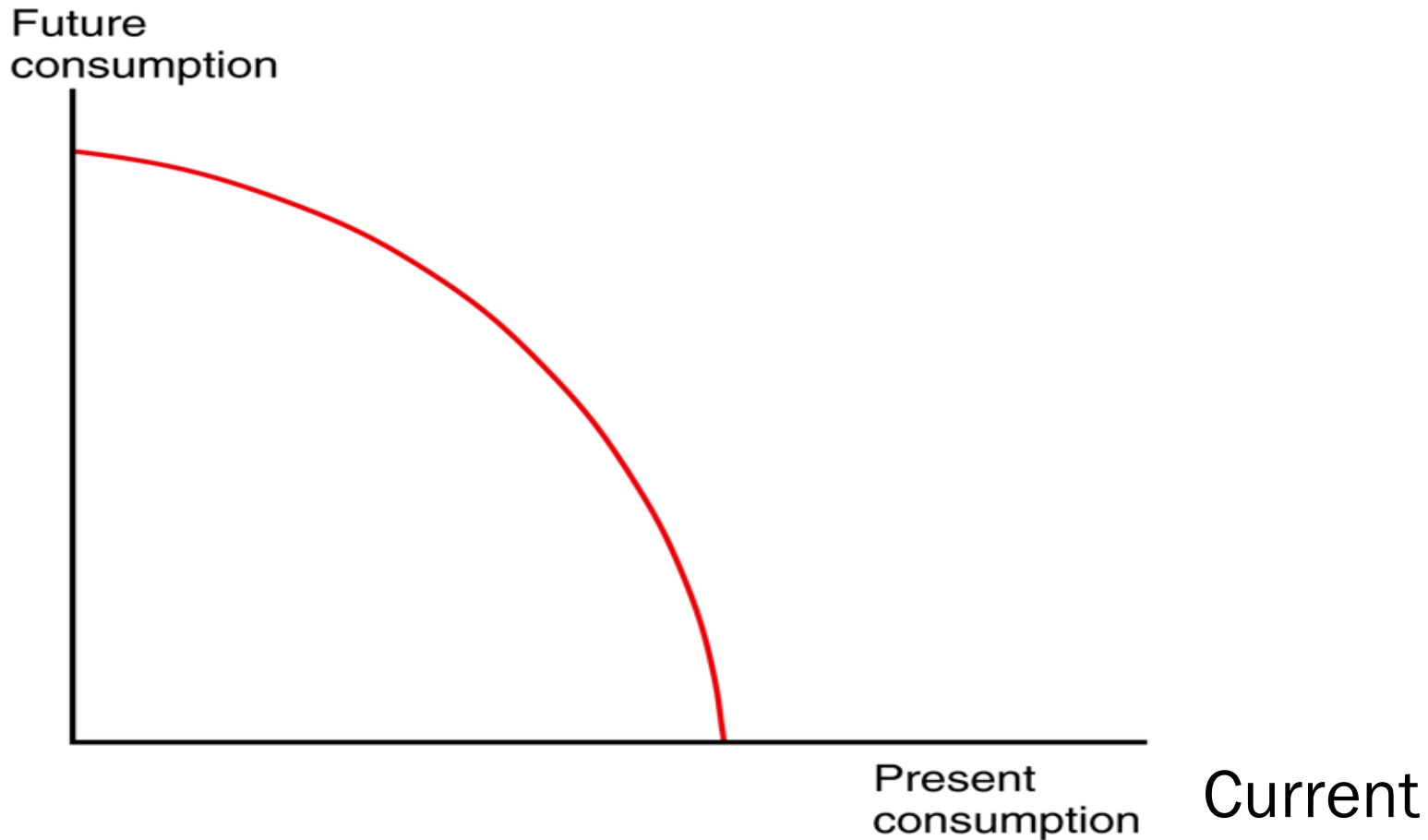
# Effects of International Transfers

- If each country has a higher marginal propensity to spend on its own products, the relative demand curve would shift left after a transfer of income from the domestic country.
- Usually an international transfer of income will deteriorate the donor's terms of trade.
- Means donating say one million dollars will cost in excess of that amount due to adverse terms of trade effects.

# 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.
- An **intertemporal production possibility frontier** depicts different possible combinations of current output and future output.

# Fig. 6-10: The Intertemporal Production Possibility Frontier



# 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 has the lower real interest rate prior to intertemporal trade.

# International Borrowing and Lending

- 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 current consumption relative to future consumption is  $1 + r$ .
  - 1 unit of current consumption is worth  $1 + r$  of future consumption
- The price of future consumption relative to current is  $1/(1 + r)$ .

# International Borrowing and Lending

- Intertemporal budget constraint is similar to a regular budget constraint in restricting expenditure to match income, but in present discounted value terms.
  - Every unit loaned now permits consuming  $1+r$  more in the future (C = current, F = future).

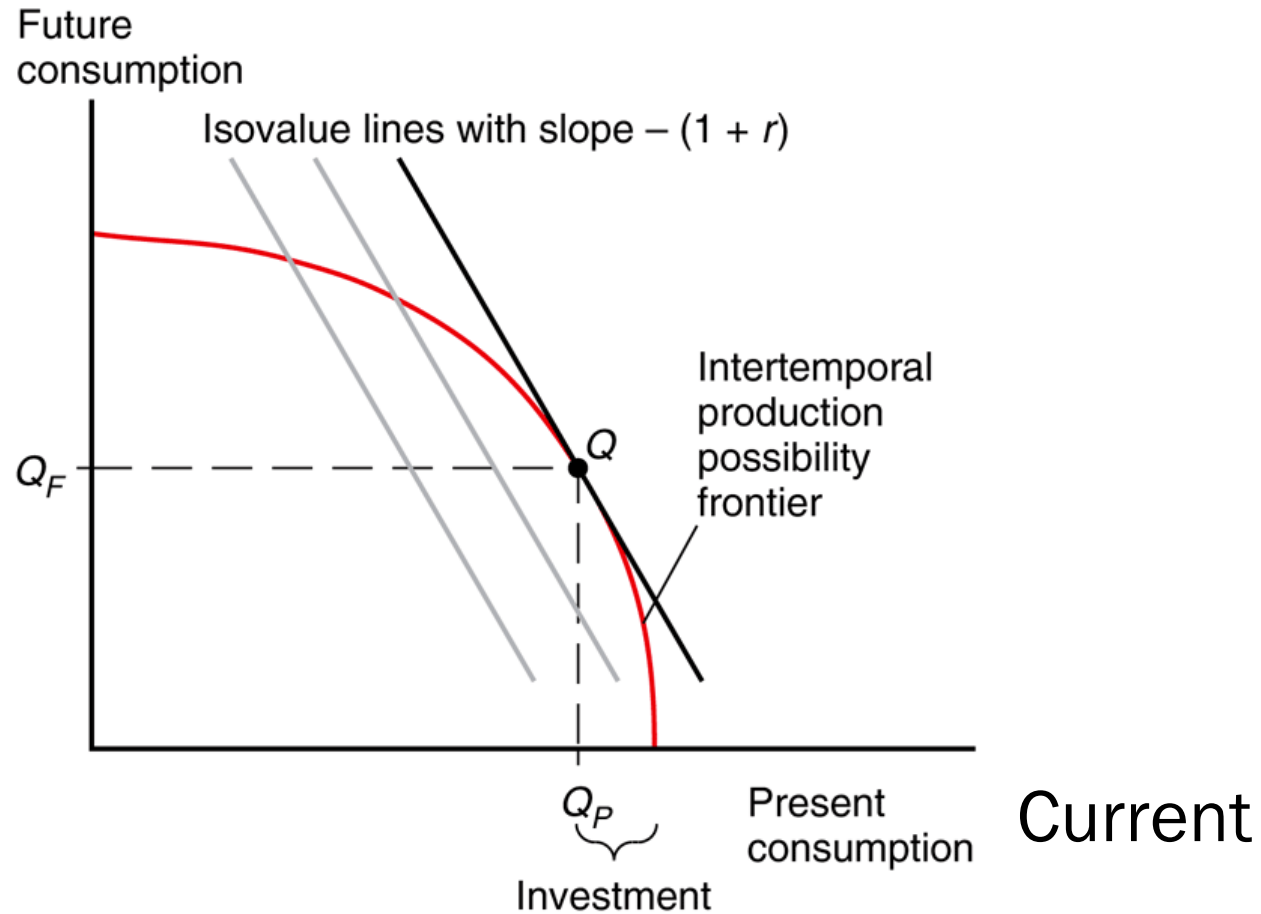
$$\frac{P_C}{P_F} D_C + D_F = \frac{P_C}{P_F} Q_C + Q_F$$

$$(1+r)D_C + D_F = (1+r)Q_C + Q_F$$

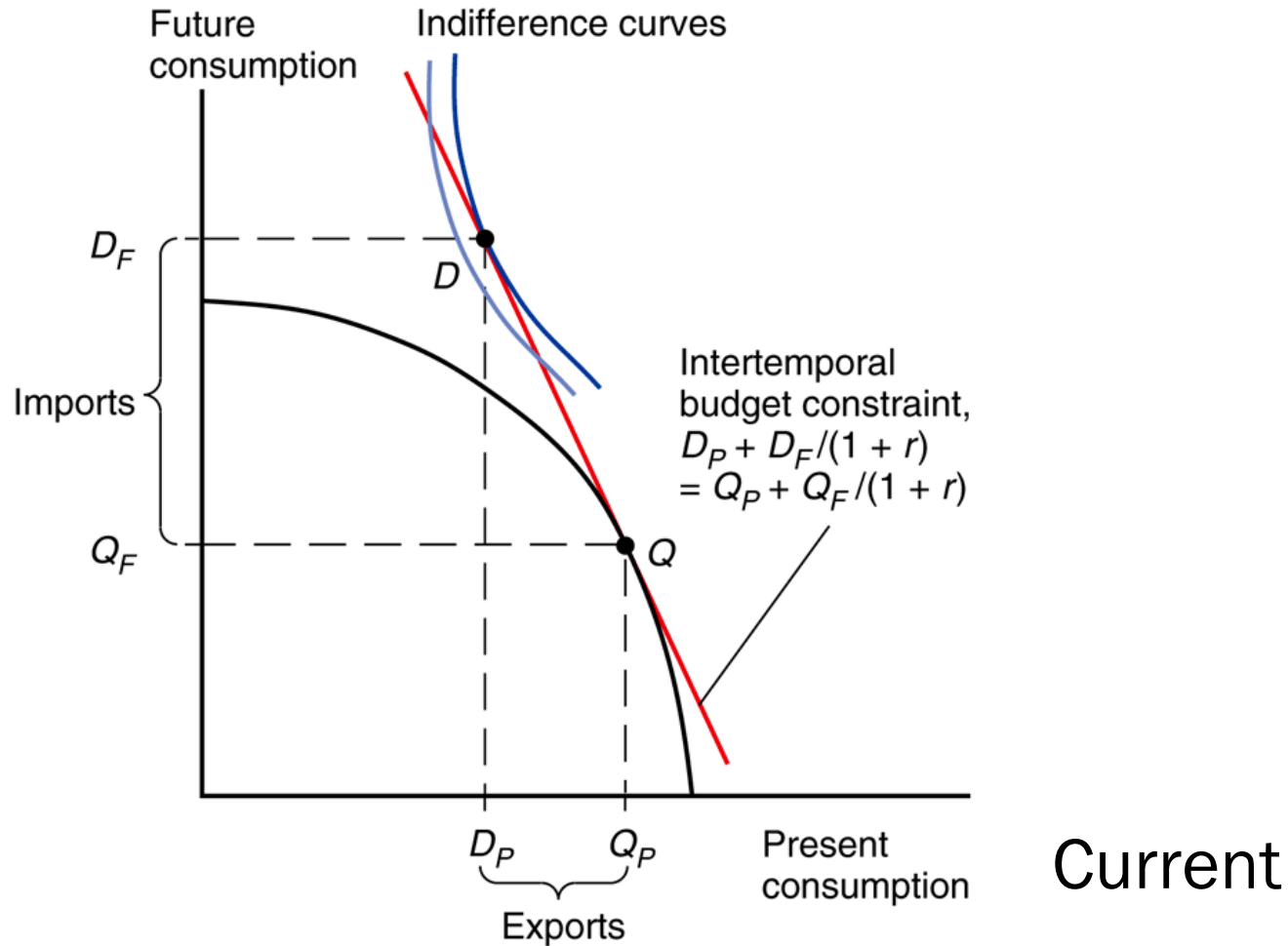
$$D_F = Q_F + (1+r)(Q_C - D_C)$$



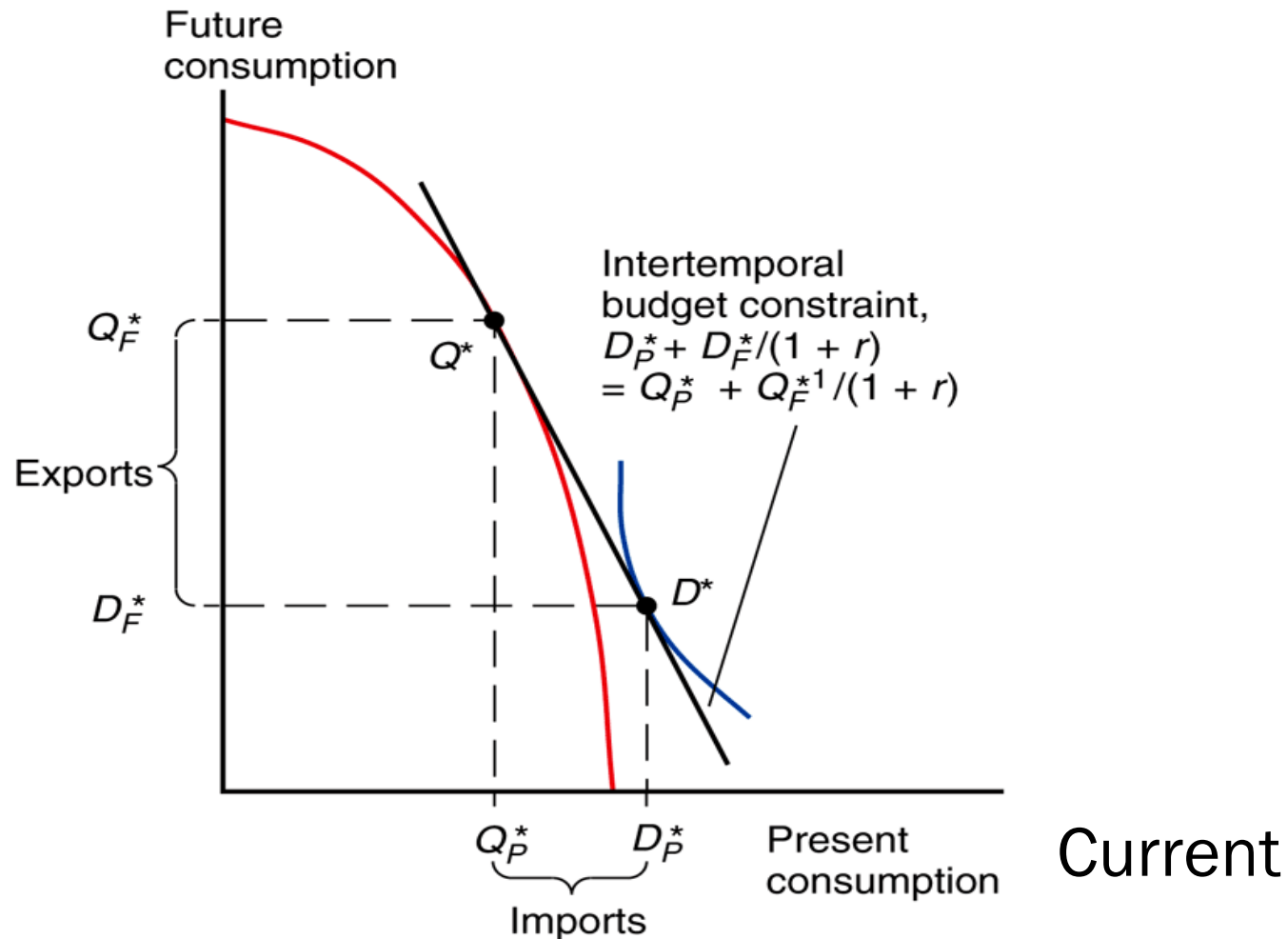
# Fig. 6A-1: Determining Home's Intertemporal Production Pattern



# Fig. 6A-2: Determining Home's Intertemporal Consumption Pattern



# Fig. 6A-3: Determining Foreign's Intertemporal Production and Consumption Patterns



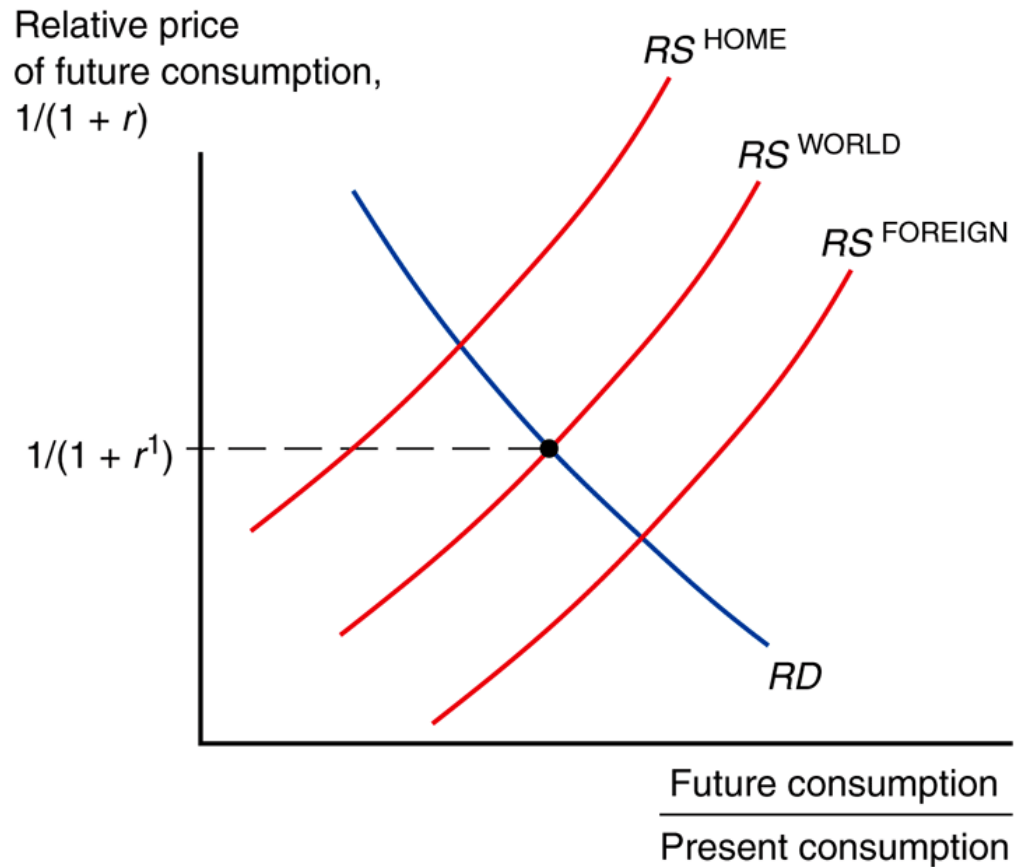
# International Borrowing and Lending

- When international borrowing and lending are allowed, the world real interest rate is determined by the intersection of world relative demand and world relative supply.
  - The world real interest rate will be between the real interest rates that existed in the two country's prior to intertemporal trade.
  - The real interest rate rises in the country that lends (home) and falls in the country that borrows (foreign) due to intertemporal trade.

# International Borrowing and Lending

- Home exports current consumption and imports future consumption.
- Home lends to Foreign by consuming less than it produces now. Home able to consume more than produces in the future when Foreign pays back the loan.
- Foreign borrows to be able to consume more than produces now, and pays back the loan by consuming less than produces in the future.

# Fig. 6-11: Equilibrium Interest Rate with Borrowing and Lending



# International Borrowing and Lending

- Intertemporal trade can also arise due to differences in relative demand.
- Suppose home and foreign have the same relative supply, but foreign has higher demand for current relative to future than home when face the same real interest rate.
  - Foreign is impatient relative to home.
- Home will lend to foreign as before.

# International Borrowing and Lending

- Graph of world relative demand and world relative supply:
  - All share the same relative supply.
  - Home's relative demand lies to the left of foreign's, with world relative demand in between.
  - Home's autarky real interest rate (where home RD and RS intersect) would be lower than foreign's, with the world real interest rate (with intertemporal trade) lying in between.



# 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. International transfers commonly generate terms of trade effects, often deteriorating donors terms of trade and improving that of recipients.
5. 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.
6. The price of current consumption relative to future,  $1 + r$ , and thus the real interest rate, is determined like any other relative price.