ECON 310 - MACROECONOMIC THEORY

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Chapter 15 - International Trade in Goods and Assets

Topics

- Some Data
- Four Trade Models
  1. Ricardian Trade Model (Comparative Advantage in Labor Productivity)
  2. Specific Factors Model
  3. Factor Proportions Model
  4. The Standard Trade Model (A two-good model of a small open economy)
- Appendix A: A two-period small open economy model: the current account.
- Appendix B: Production, investment, and the current account.

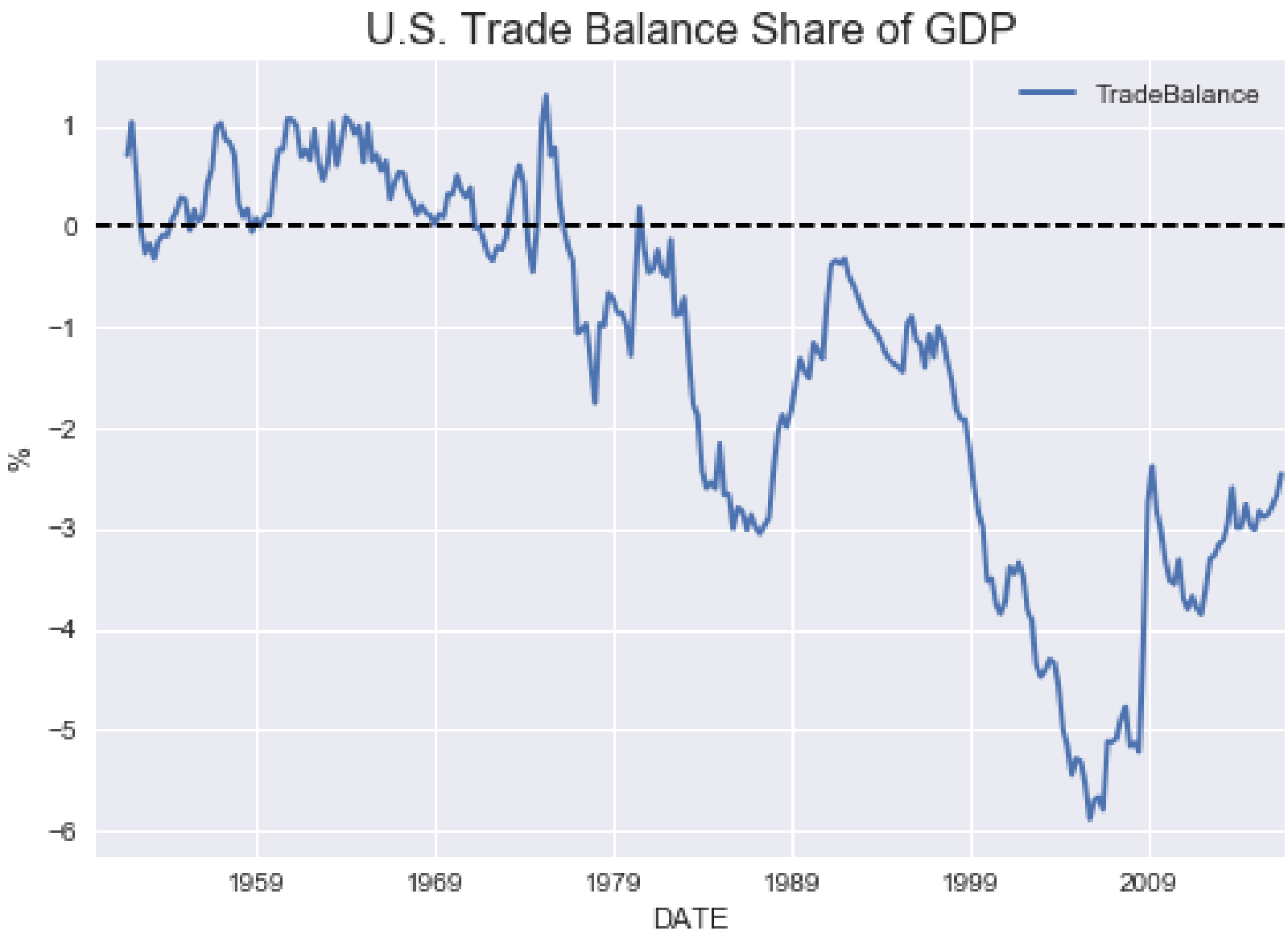
U.S. Trade Data


U.S. Exports and Imports
Exports
Imports
3000000
2500000
2000000
1500000
1000000
500000
0
1959
1969
1979
1989
1999
2009
DATE


U.S. Exports and Imports Shares of GDP
ExportsGDP
ImportsGDP
%
18
16
14
12
10
8
6
4
1959
1969
1979
1989
1999
2009
DATE

Trade Balance or Net Exports

- $NX = Ex - Im$
- $NX < 0 \rightarrow C + I + G > Y$
- $NX > 0 \rightarrow C + I + G < Y$


U.S. Trade Balance Share of GDP
TradeBalance
1
0
−1
−2
−3
−4
−5
−6
%
1959
1969
1979
1989
1999
2009
DATE

How Globalized are we?

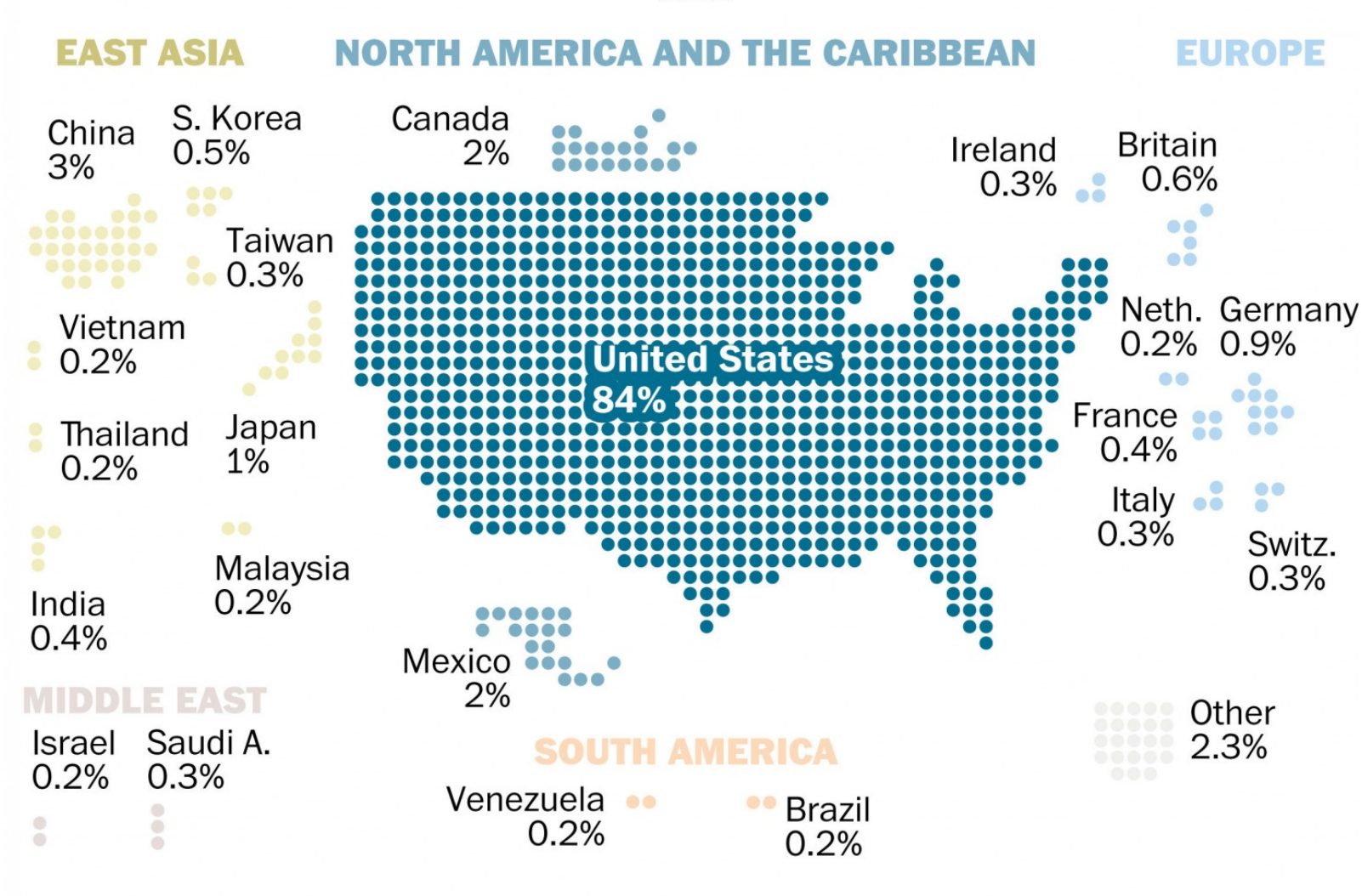
- What percent of purchased output of goods/services is from Mexico?
- What percent of purchased output of goods/services is from China?
- What percent of purchased output of goods/services is from Canada?
- What percent of purchased output of goods/services is from India?

How Globalized are we?

- What is the percentage of (first generation) immigrants from Mexico in the US?
- What is the percentage of (first generation) immigrants from China?
- What is the percentage of (first generation) immigrants from Canada?
- What is the percentage of (first generation) immigrants from India?

Where does output purchased in the U.S. come from?

Origin of goods and services in 2014

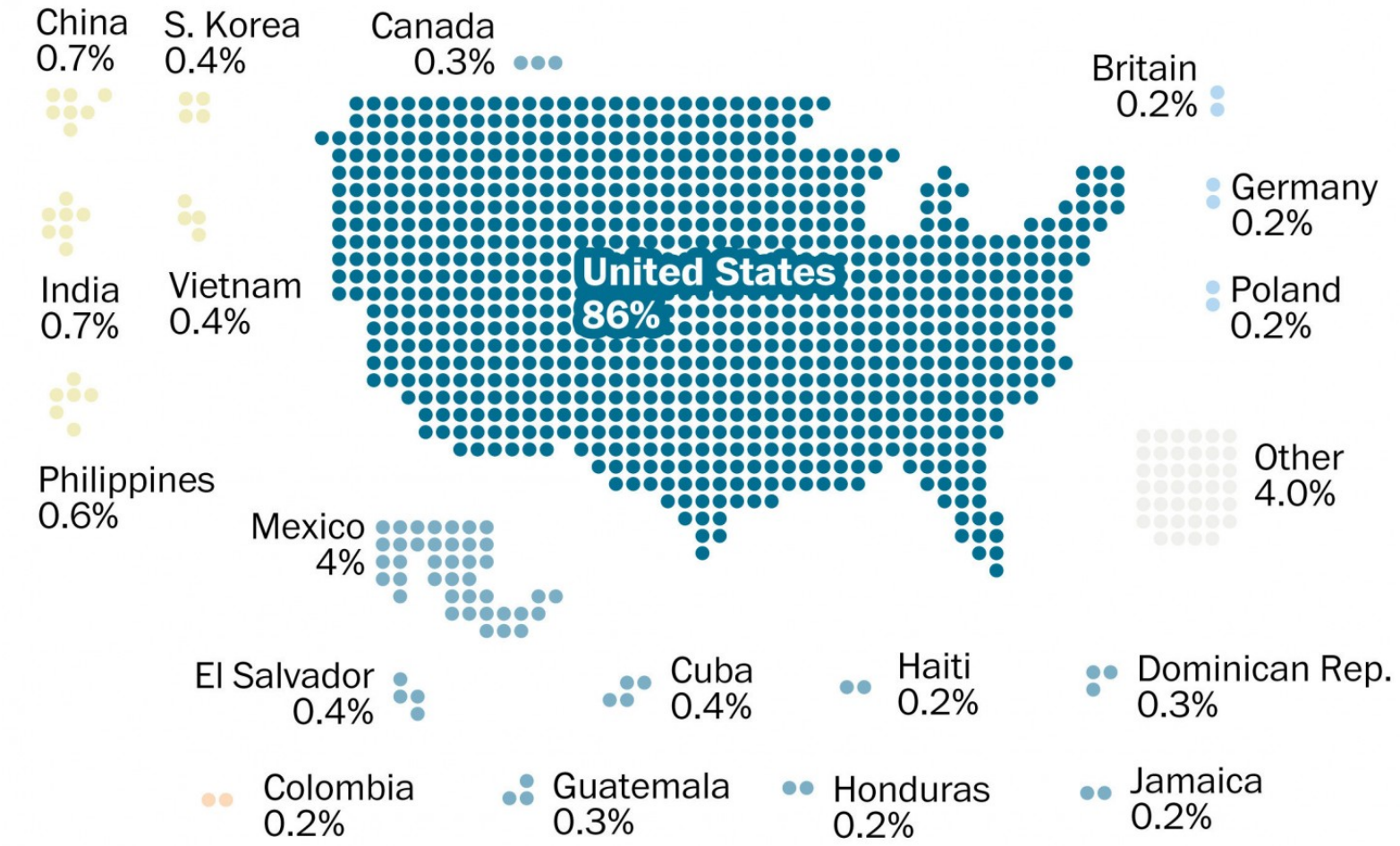


How Globalized are we?

- What percent of purchased output of goods/services is from Mexico?
  - 2%
- What percent of purchased output of goods/services is from China?
  - 3%
- What percent of purchased output of goods/services is from Canada?
  - 2%
- What percent of purchased output of goods/services is from India?
  - 0.4%

Where do people living in the U.S. come from?

Population origin in 2015



Totals may not add up to 100 percent because of rounding.

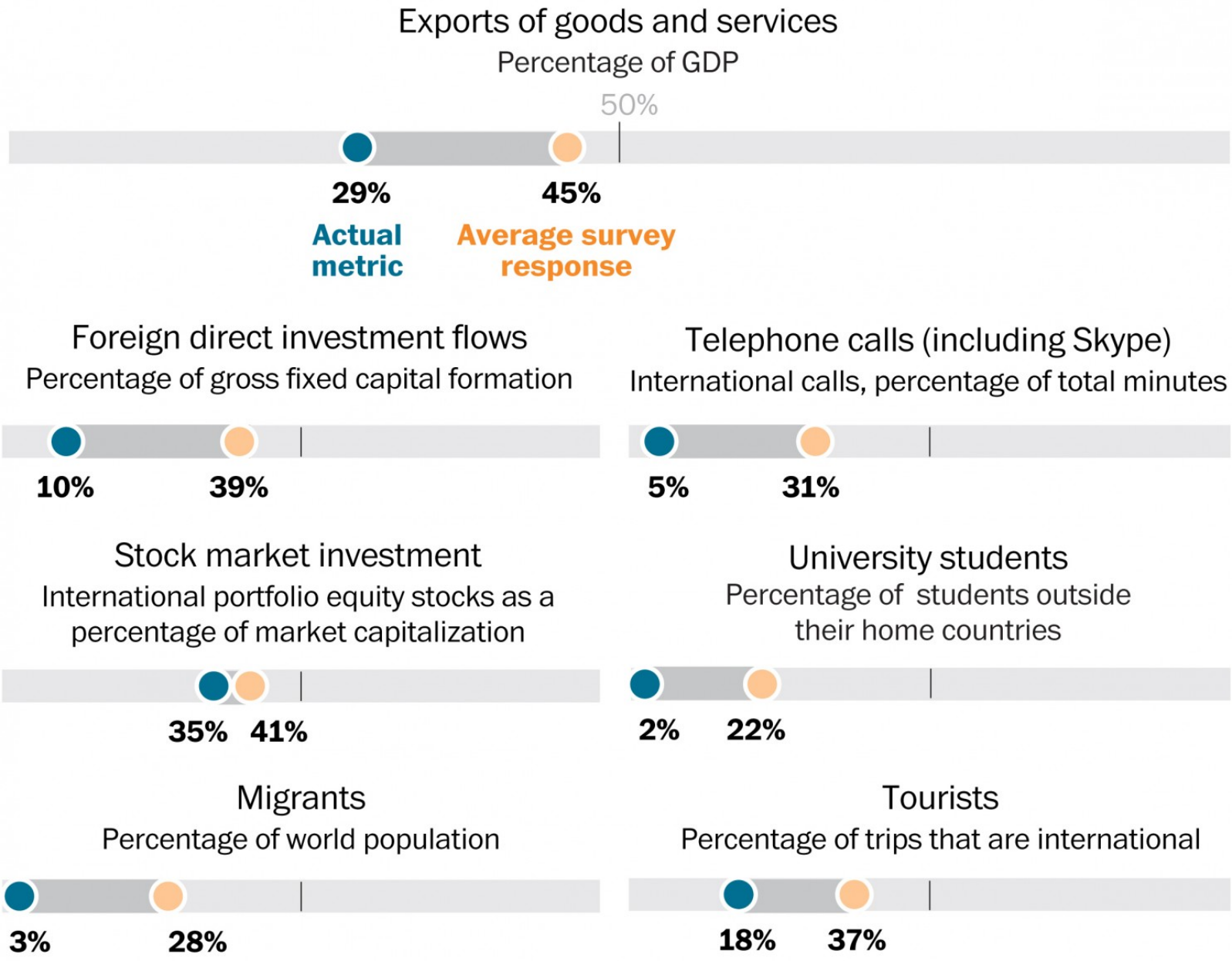
Sources: International Monetary Fund, U.N. Department of Economic and Social Affairs

THE WASHINGTON POST

How Globalized are we?

- What is the percentage of (first generation) immigrants from Mexico in the US?
  - 4%
- What is the percentage of (first generation) immigrants from China?
  - 0.7%
- What is the percentage of (first generation) immigrants from Canada?
  - 0.3%
- What is the percentage of (first generation) immigrants from India?
  - 0.7%

How globalized do Americans think the world is in terms of ...



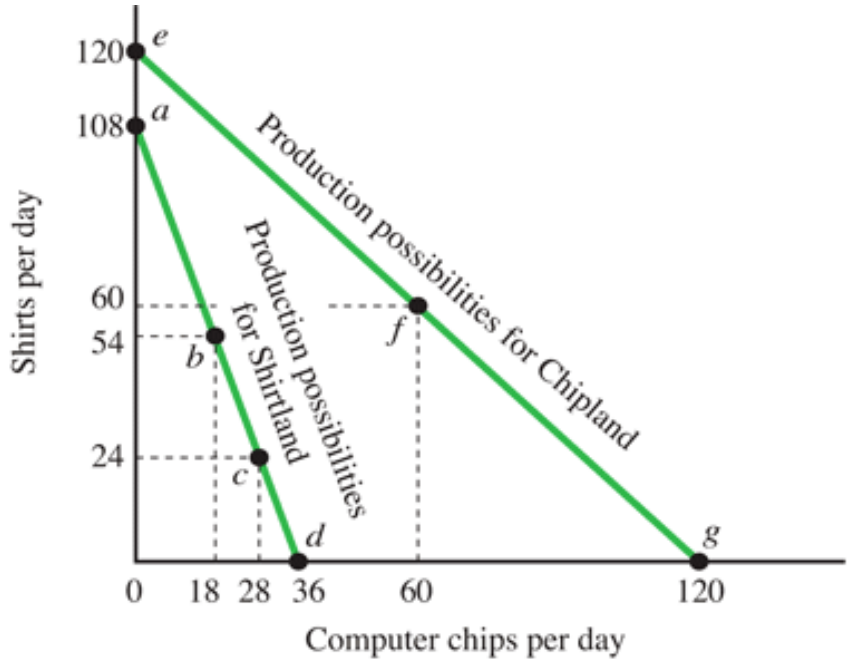
Source: Pankaj Ghemawat and Steven A. Altman, "DHL Global Connectedness Index 2016"

1. Ricardian Trade Model

Benefits from Specialization

TABLE 18.1 Output and Opportunity Cost			
	Quantity Produced Per Day	**Opportunity Cost of Shirts**	**Opportunity Cost of Chips**
Shirtland	108 shirts 36 chips	1/3 chip	3 shirts
Chipland	120 shirts 120 chip	1 chip	1 shirt

Benefits from Specialization (cont.)



Shirtland Possibilities

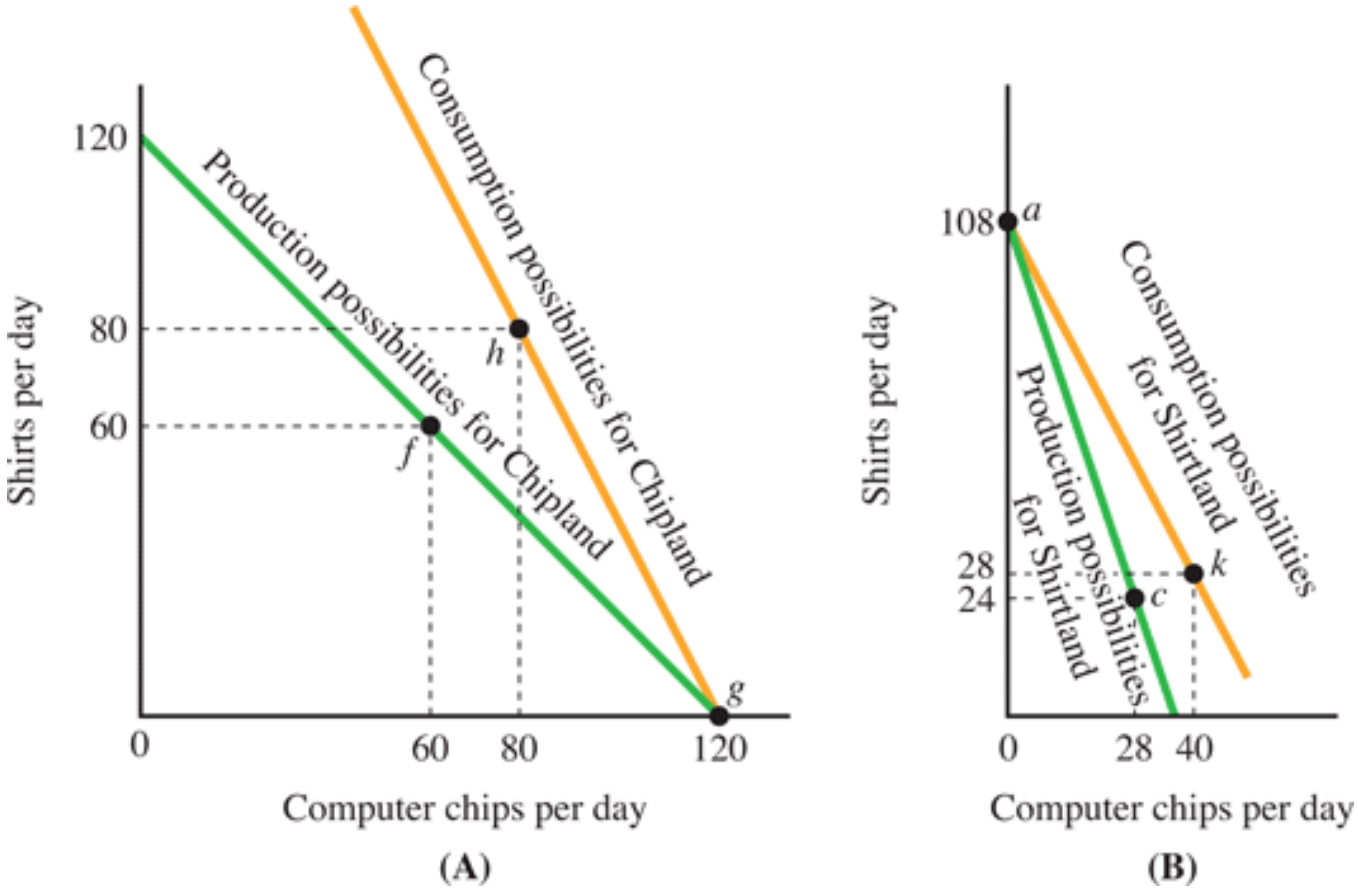
Point	Shirts	Chips
a	108	0
b	54	18
c	24	28
d	0	36

Chipland Possibilities

Point	Shirts	Chips
e	120	0
f	60	60
g	0	120

Benefits from Specialization (cont.)

- The consumption possibilities curve shows the combinations of computer chips and shirts that can be consumed if **each country specializes** and **trades**



Benefits from Specialization (cont.)

- Each consumption possibilities curve lies above the nation's production possibilities curves, meaning that each nation has more options about how much to consume under specialization and trade

Empirical Evidence on the Ricardian Model

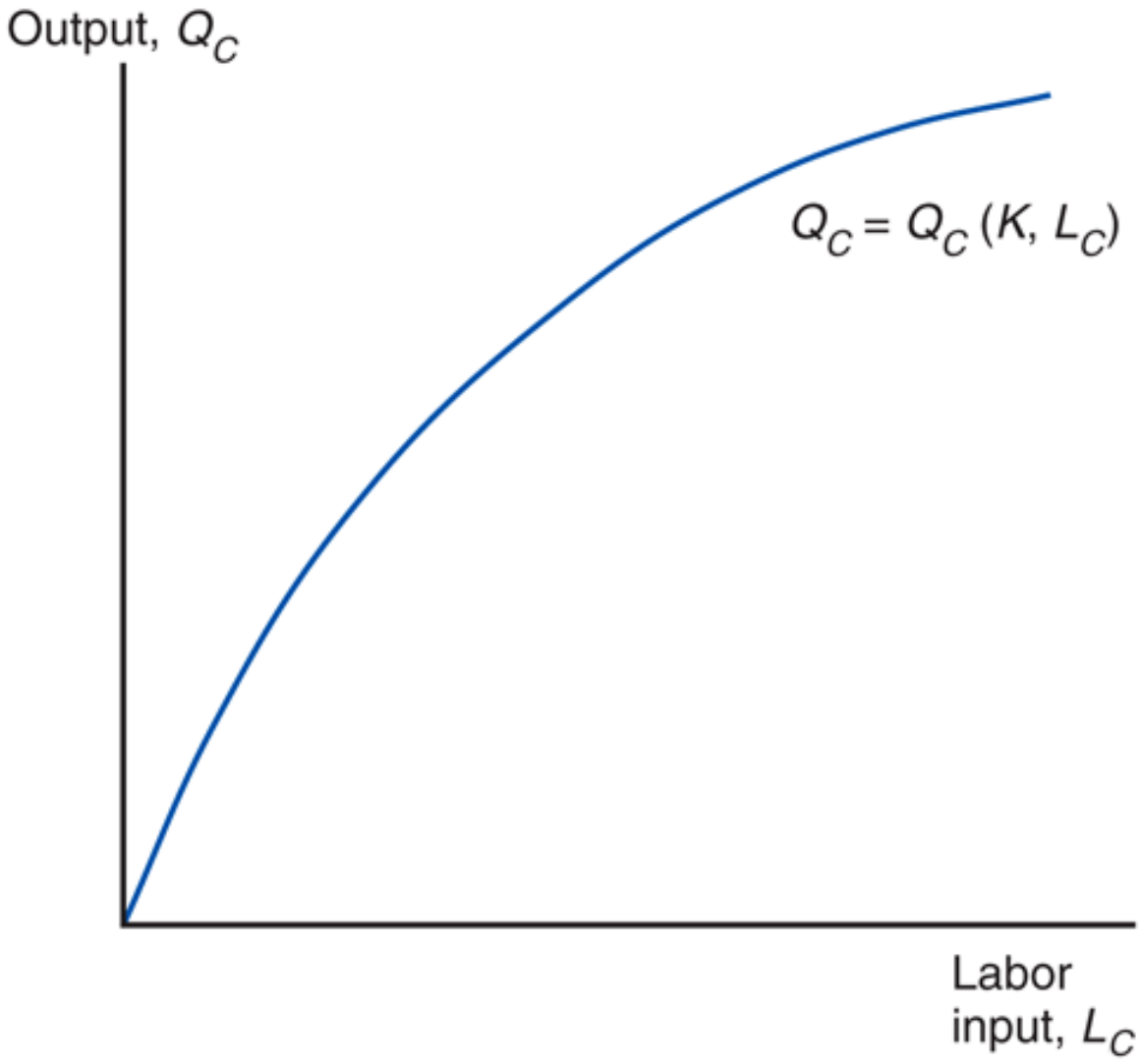
- Yes
  - The ratio of U.S. to British exports in 1951 compared to the ratio of U.S. to British labor productivity in 26 manufacturing industries suggests yes.
  - At this time the U.S. had an **absolute advantage** in all 26 industries, yet the ratio of exports was low in the least productive sectors of the U.S.
- But
  - Model predicts extreme degree of specialization $\rightarrow$don't see this in data
  - Assumes away effects of trade on distribution of income within the country $\rightarrow$ trade is always good
  - No role for differences in resources among countries as cause of trade (everything is in relative labor productivity)
  - Neglects economies of scale as reasons for trade between countries with similar productivities

The Employment Effects of Free Trade

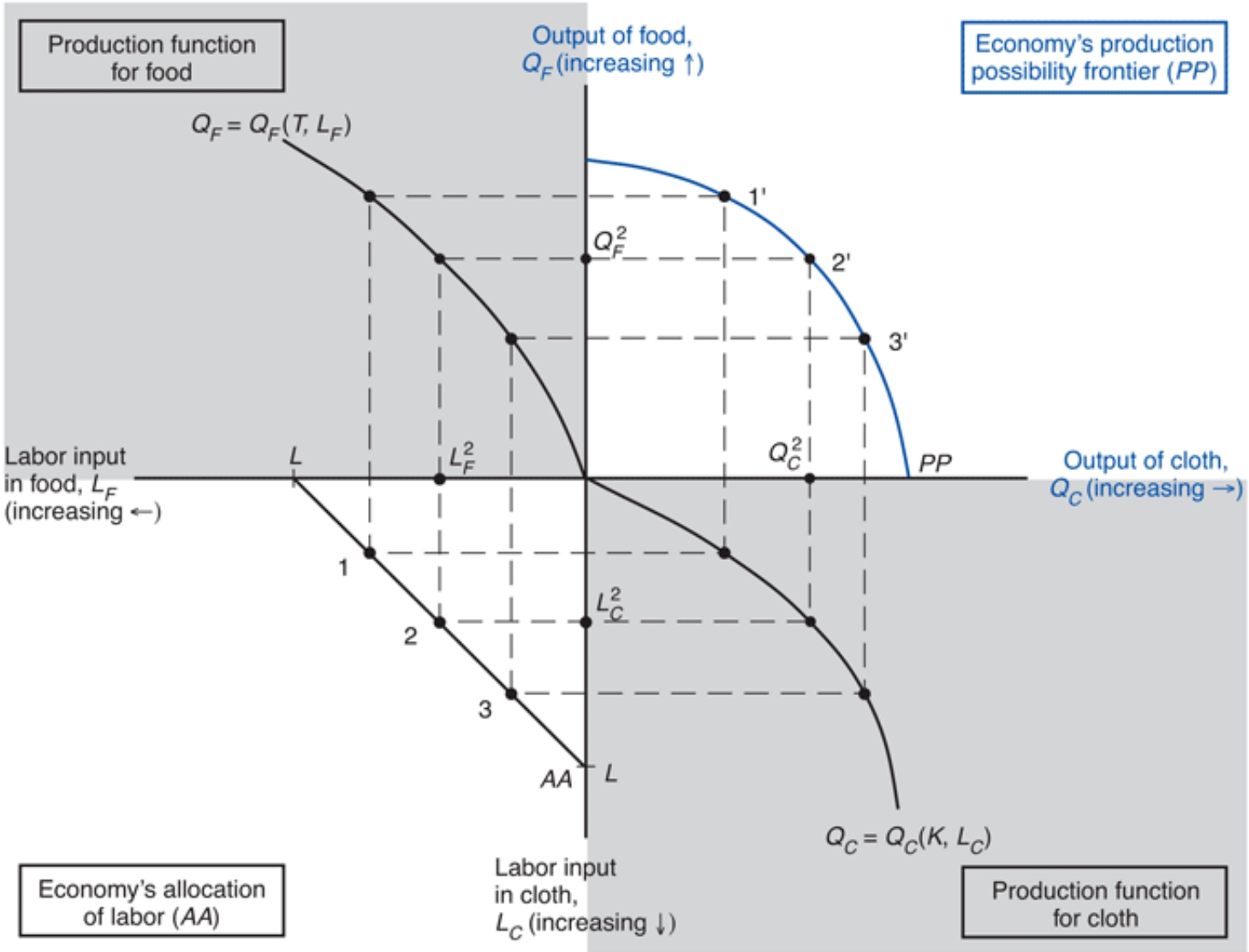
- Some people in both nations will be harmed by free trade
- In Chipland people in the shirt industry will lose their jobs when the shirt industry disappears
- Some workers can "easily" move into the expanding computer-chip industry, but others will be unable to make the move and will be forced to accept lower-paying jobs or face unemployment
- In the U.S. higher skilled workers are more mobile and able to switch to a new industry

2. Specific Factors Model

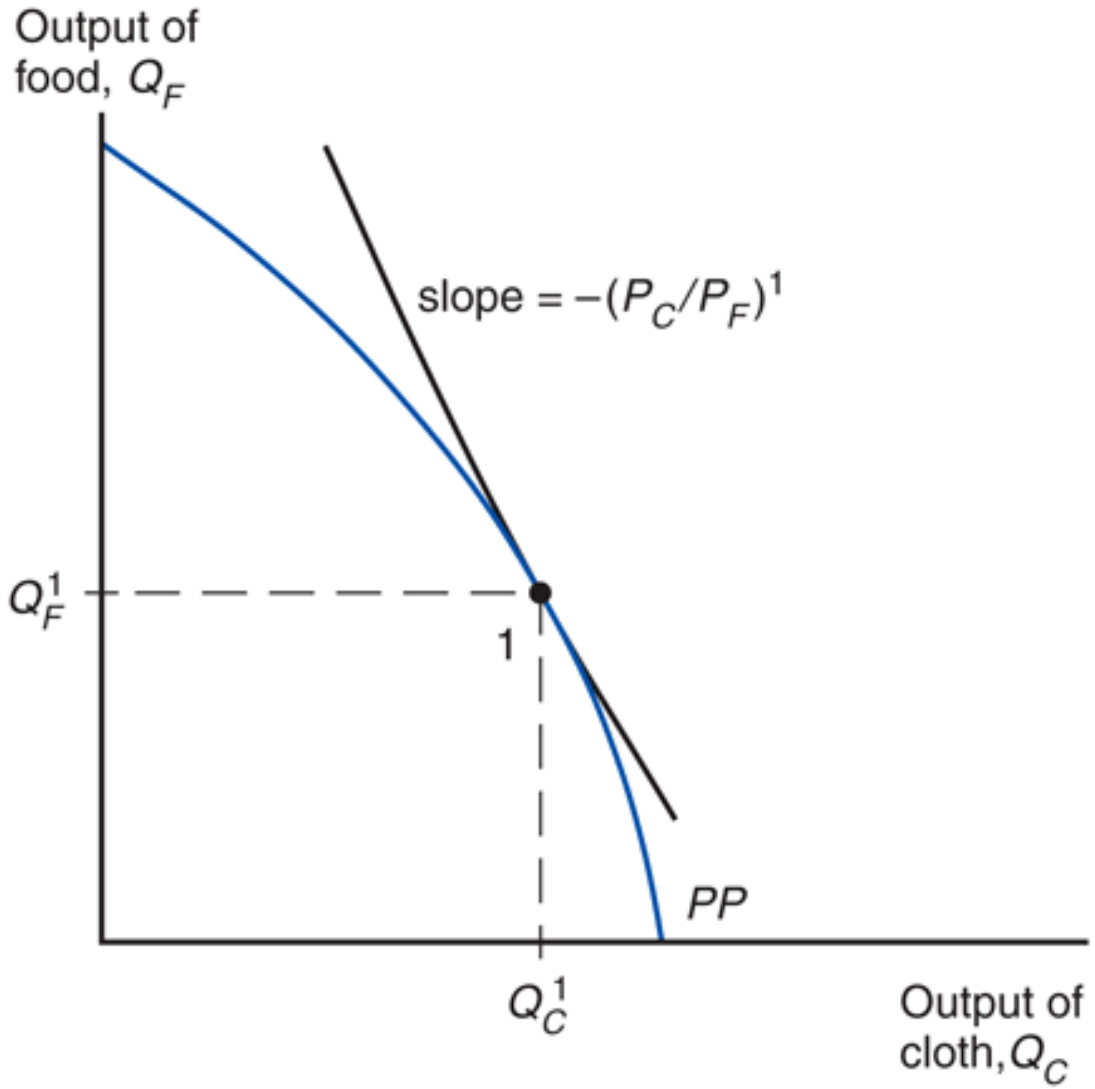
Summary



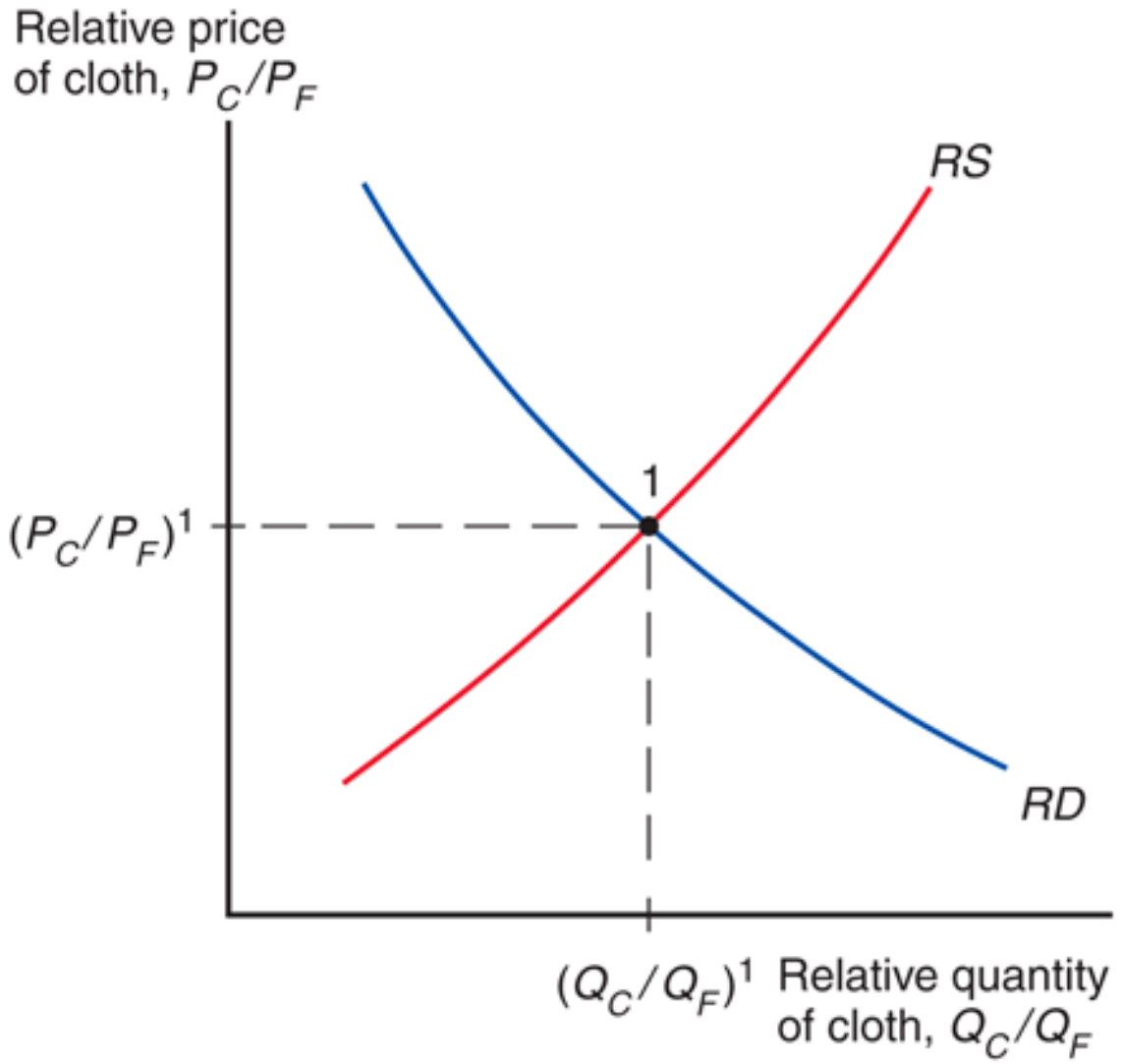
Summary (cont.)



Prices, Wages Labor Allocation



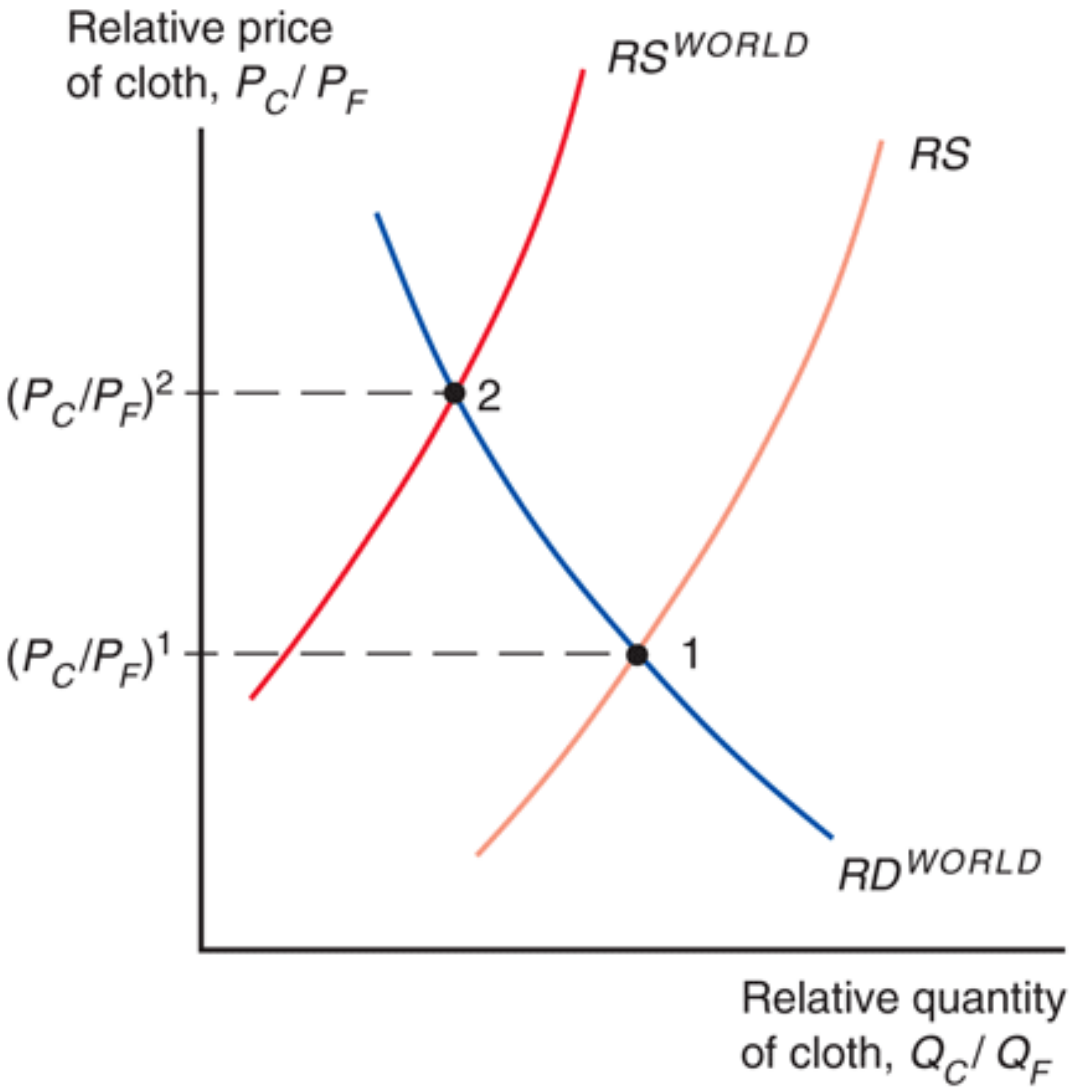
Prices, Wages Labor Allocation (cont.)



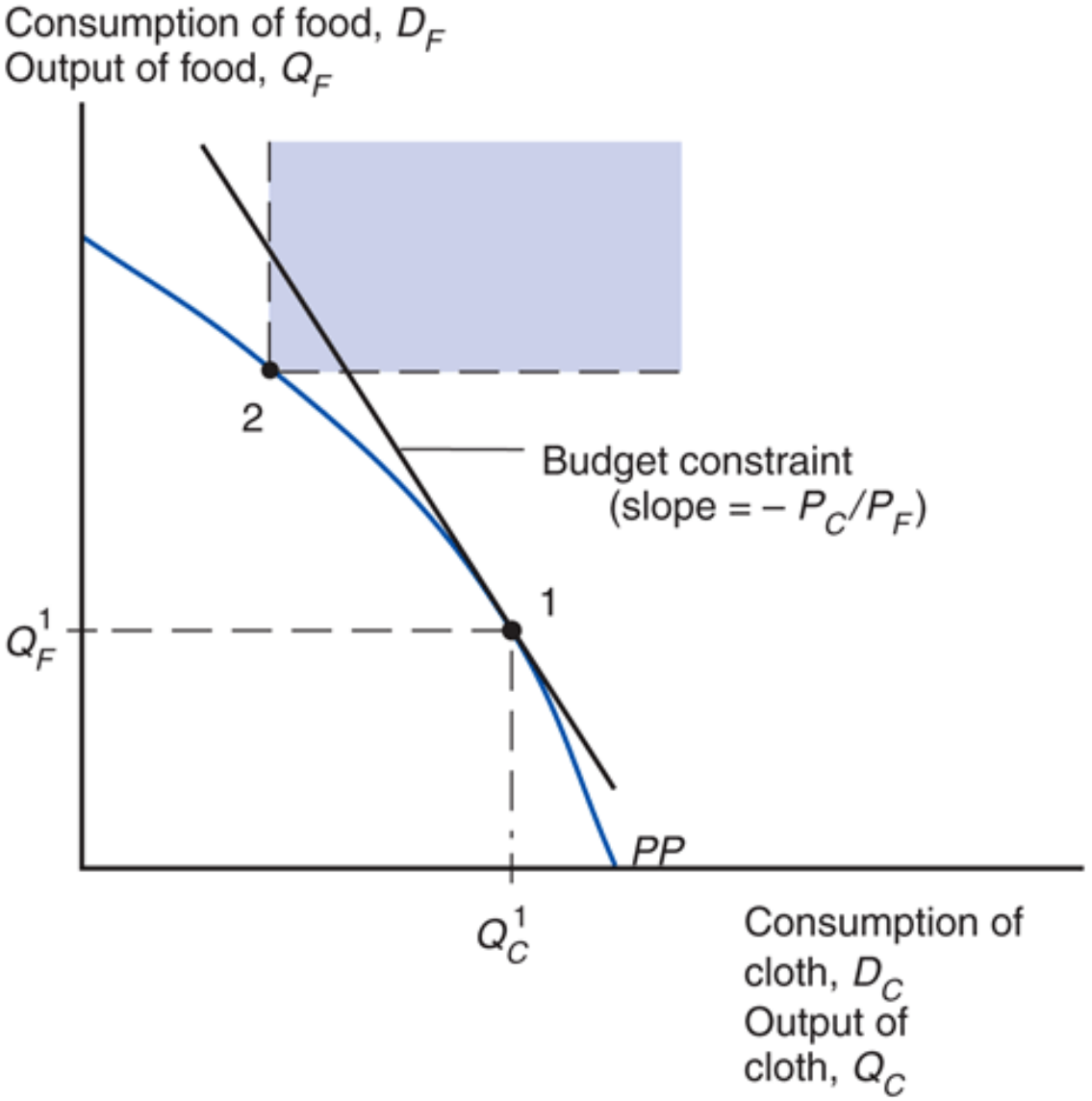
Prices, Wages Labor Allocation (cont.)

- Relative Prices and the Distribution of Income Suppose that PC increases by 10%.
- Then, the wage would rise by less than 10%.
- What is the economic effect of this price increase on the incomes of the following three groups?
  - Owners of capital are definitely better off.
  - Landowners are definitely worse off.
  - Workers: cannot say whether workers are better or worse off:
    - Depends on the relative importance of cloth and food in workers' consumption.

International Trade in Specific Factor Model



International Trade in Specific Factor Model (cont.)



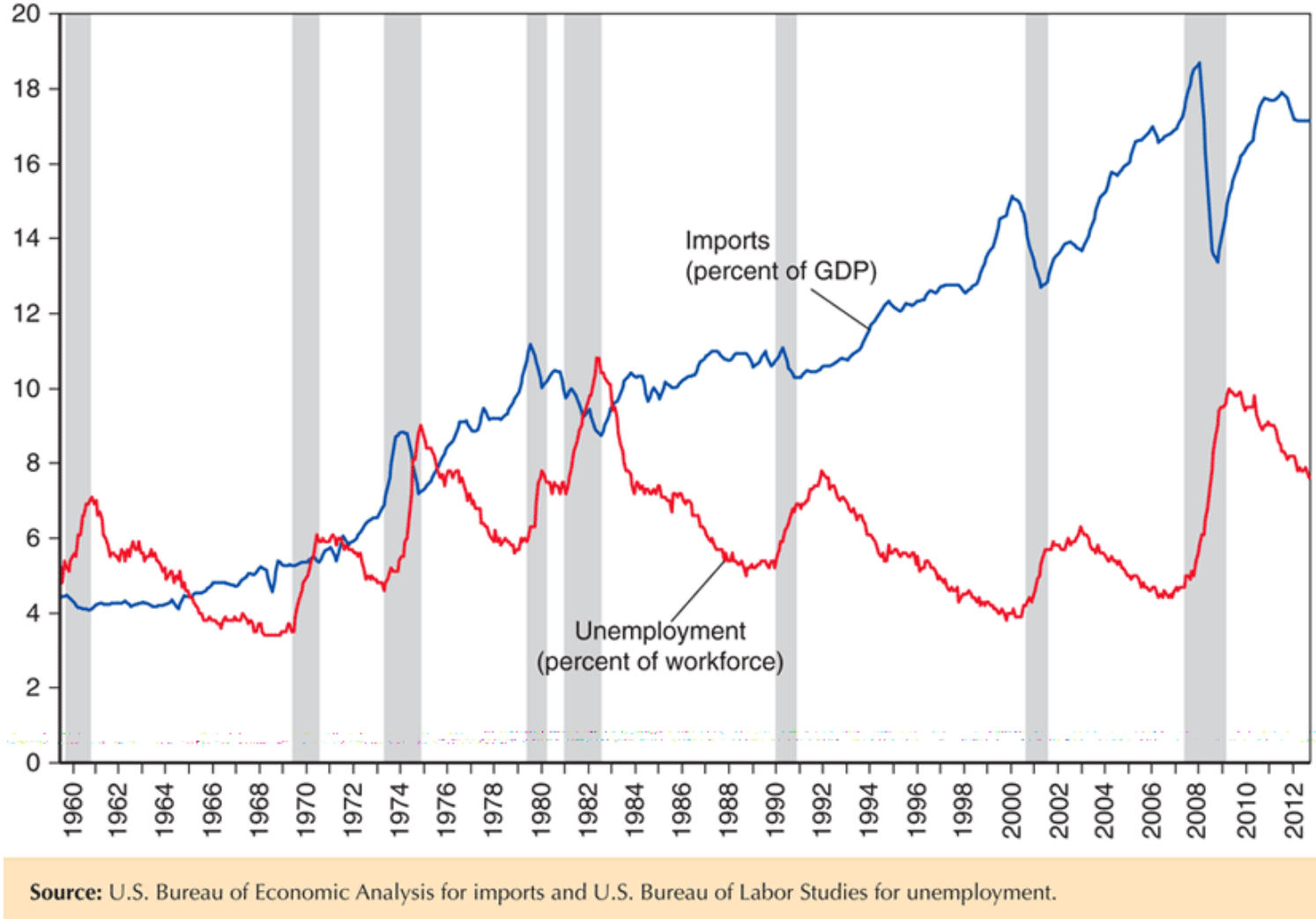
International Trade in Specific Factor Model (cont.)

- International trade shifts the relative price of cloth to food, so factor prices change.
  - Trade benefits the factor that is specific to the export sector of each country, but hurts the factor that is specific to the import-competing sectors.
  - Trade has ambiguous effects on mobile factors.
  - Trade benefits a country by expanding choices.
- Possible to redistribute income so that everyone gains from trade.
  - Those who gain from trade could compensate those who lose and still be better off themselves.
  - That everyone could gain from trade does not mean that they actually do – redistribution usually hard to implement.
- Trade often produces losers as well as winners.
  - Optimal trade policy must weigh one group's gain against another's loss.
  - Some groups may need special treatment because they are already relatively poor (e.g., shoe and garment workers in the United States).
  - Most economists strongly favor free trade.

International Trade in Specific Factor Model (cont.)

- Typically, those who gain from trade are a much less concentrated, informed, and organized group than those who lose.
  - Example: Consumers and producers in the U.S. sugar industry, respectively Governments usually provide a "safety net" of income support to cushion the losses to groups hurt by trade (or other changes).
- Trade shifts jobs from import-competing to export sector.
  - Process not instantaneous – some workers will be unemployed as they look for new jobs.
  - How much unemployment can be traced back to trade?
  - From 2001 to 2010, only about 2% of involuntary displacements stemmed from import competition or plants moved overseas.
  - No obvious correlation between unemployment rate and imports relative to GDP for the U.S.
  - Unemployment is primarily a macroeconomic problem that rises during recessions.

International Trade in Specific Factor Model (cont.)



Source: U.S. Bureau of Economic Analysis for imports and U.S. Bureau of Labor Studies for unemployment.

- The best way to reduce unemployment is by adopting macroeconomic policies to help the economy recover, not by adopting trade protection.

3. Factor Proportion Model (Heckscher-Ohlin Model)

Summary

- The Heckscher-Ohlin theory argues that trade occurs due to differences in labor, labor skills, physical capital, capital, or other factors of production across countries
- Countries have different relative abundance of factors of production
- Production processes use factors of production with different relative intensity
- The Model
  - Two countries: home and foreign.
  - Two goods: cloth and food.
  - Two factors of production: labor and capital.
  - The mix of labor and capital used varies across goods.
    - cloth is capital intensive
    - food is labor intensive

Summary (cont.)

- The supply of labor and capital in each country is constant and varies across countries
  - home is labor abundant
  - foreign is labor scarce
- In the long run, both labor and capital can move across sectors, equalizing their returns (wage and rental rate) across sectors.

Result of Heckscher-Ohlin Model

- Like the Ricardian model, the Heckscher-Ohlin model predicts a convergence of relative prices with trade

- With trade, the relative price of cloth rises in the relatively labor abundant (home) country and falls in the relatively labor scarce (foreign) country

- Relative prices and the pattern of trade:
  - In Home, the rise in the relative price of cloth leads to a rise in the relative production of cloth and a fall in relative consumption of cloth.
  - Home becomes an exporter of cloth and an importer of food.
  - The decline in the relative price of cloth in Foreign leads it to become an importer of cloth and an exporter of food.

Heckscher-Ohlin theorem: The country that is abundant in a factor, exports the good whose production is intensive in that factor.

Result of Heckscher-Ohlin Model (cont.)

- This result generalizes to a correlation: Countries tend to export goods whose production is intensive in factors with which the countries are abundantly endowed.

Trade and Income Distribution in Heckscher-Ohlin Model

- Changes in relative prices can affect the earnings of labor and capital.
  - A rise in the price of cloth raises the purchasing power of labor in terms of both goods while lowering the purchasing power of capital in terms of both goods.
  - A rise in the price of food has the reverse effect.

- Thus, international trade can affect the distribution of income, even in the long run:
  - Owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose.
  - Factors of production that are used intensively by the import-competing industry are hurt by the opening of trade – regardless of the industry in which they are employed.

Trade and Income Distribution in Heckscher-Ohlin Model (cont.)

- Compared with the rest of the world, the United States is abundantly endowed with highly skilled labor while low-skilled labor is correspondingly scarce.
  - International trade has the potential to make low-skilled workers in the United States worse off - not just temporarily, but on a sustained basis.

- Changes in income distribution occur with every economic change, not only international trade.
  - Changes in technology, changes in consumer preferences, exhaustion of resources and discovery of new ones all affect income distribution.
  - Economists put most of the blame on technological change and the resulting premium paid on education as the major cause of increasing income inequality in the US.
  - It would be better to compensate the losers from trade (or any economic change) than prohibit trade.
  - The economy as a whole does benefit from trade.

Trade and Income Distribution in Heckscher-Ohlin Model (cont.)

- There is a political bias in trade politics:
  - potential losers from trade are better politically organized than the winners from trade.
  - Losses are usually concentrated among a few, but gains are usually dispersed among many.
  - Each of you pays about \$8/year to restrict imports of sugar, and the total cost of this policy is about \$2 billion/year.
  - The benefits of this program total about \$1 billion, but this amount goes to relatively few sugar producers.

- Over the last 40 years, countries like South Korea, Mexico, and China have exported to the U.S. goods intensive in unskilled labor (ex., clothing, shoes, toys, assembled goods).
  - At the same time, income inequality has increased in the U.S., as wages of unskilled workers have grown slowly compared to those of skilled workers.
  - Did the former trend cause the latter trend?

Heckscher-Ohlin Predictions

- Owners of relatively abundant factors will gain from trade and owners of relatively scarce factors will lose from trade $\rightarrow$ little evidence
  1. According to the model, a change in the distribution of income occurs through changes in output prices
     - but there is no evidence of a change in the prices of skill-intensive goods relative to prices of unskilled-intensive goods.
  2. According to the model, wages of unskilled workers should increase in unskilled labor abundant countries relative to wages of skilled labor
     - but in some cases the reverse has occurred: Wages of skilled labor have increased more rapidly in Mexico than wages of unskilled labor.
     - But compared to the U.S. and Canada, Mexico is supposed to be abundant in unskilled workers.
  3. Even if the model were exactly correct, trade is a small fraction of the U.S. economy, so its effects on U.S. prices and wages prices should be small.
     - The majority view of trade economists is that the villain is not trade but rather new production technologies that put a greater emphasis on worker skills (such as the widespread introduction of computers and other advanced technologies in the workplace).

Heckscher-Ohlin Predictions (cont.)

- Trade likely has been an indirect contributor to increases in wage inequality, by accelerating the process of technological change.
  - Firms that begin to export may upgrade to more skill-intensive production technologies.
  - Trade liberalization can then generate widespread technological change by inducing a large proportion of firms to make such technology-upgrade choices.
  - Breaking up the production process across countries can increase the relative demand for skilled workers in developed countries similar to skill-biased technological change.

4. Standard Trade Model: A 2-Goods Model of a Small Open Economy

A Two-Good Model of a Small Open Economy

- 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.
  - 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

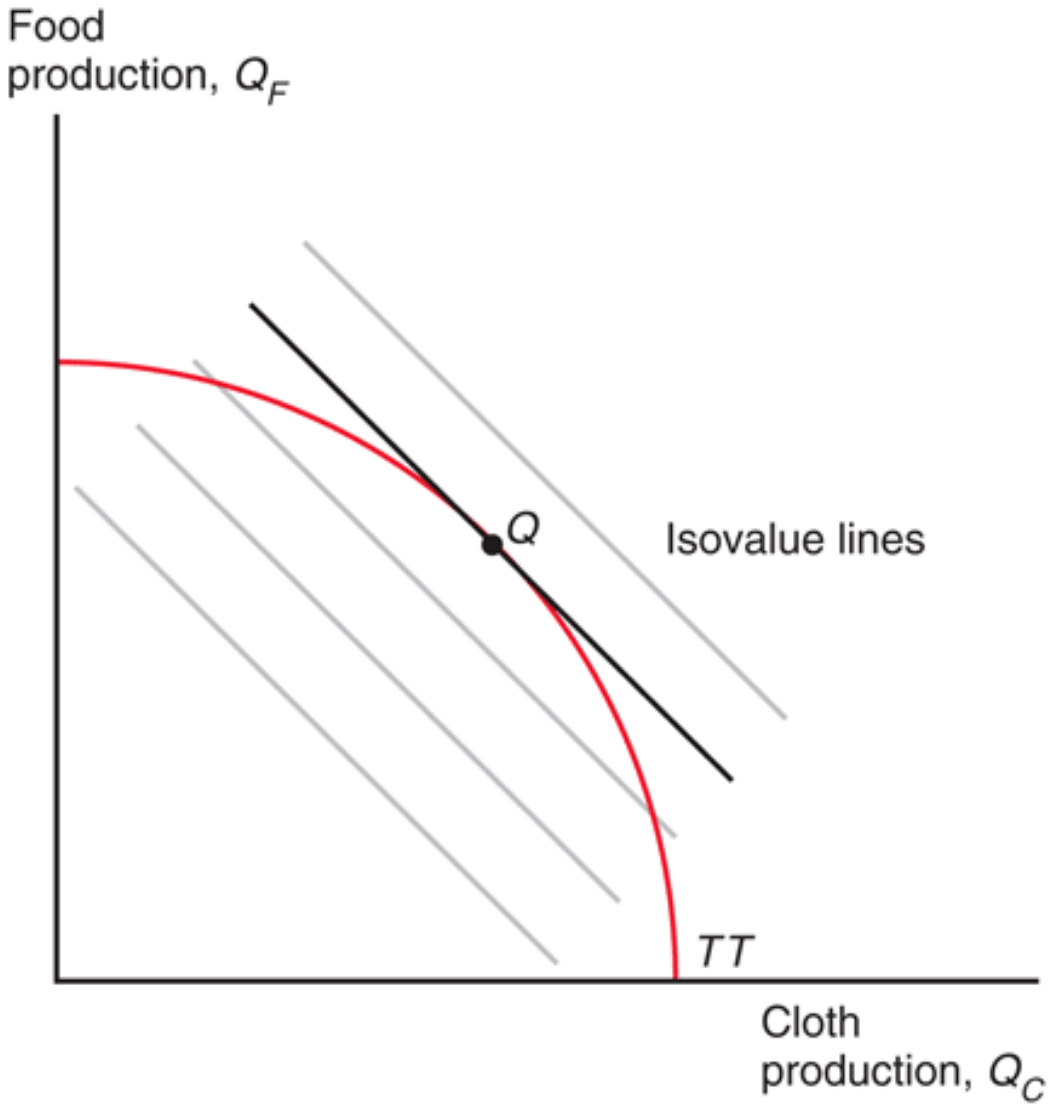
- What a country produces depends on the relative price of cloth to food P_C/P_F.
- An economy chooses its production of cloth Q_C and food Q_F to maximize the value of its output

$$V = P_C \times Q_C + P_F \times Q_F,$$

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.

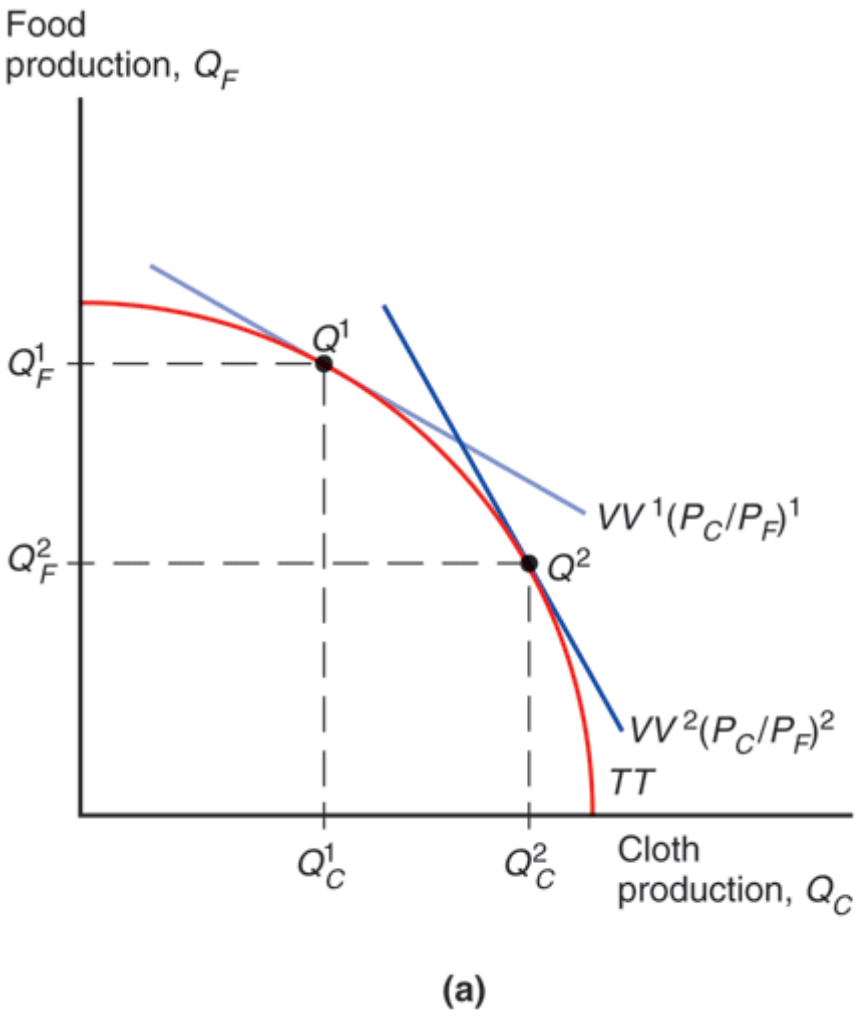
Production Possibilities and Relative Supply (cont.)

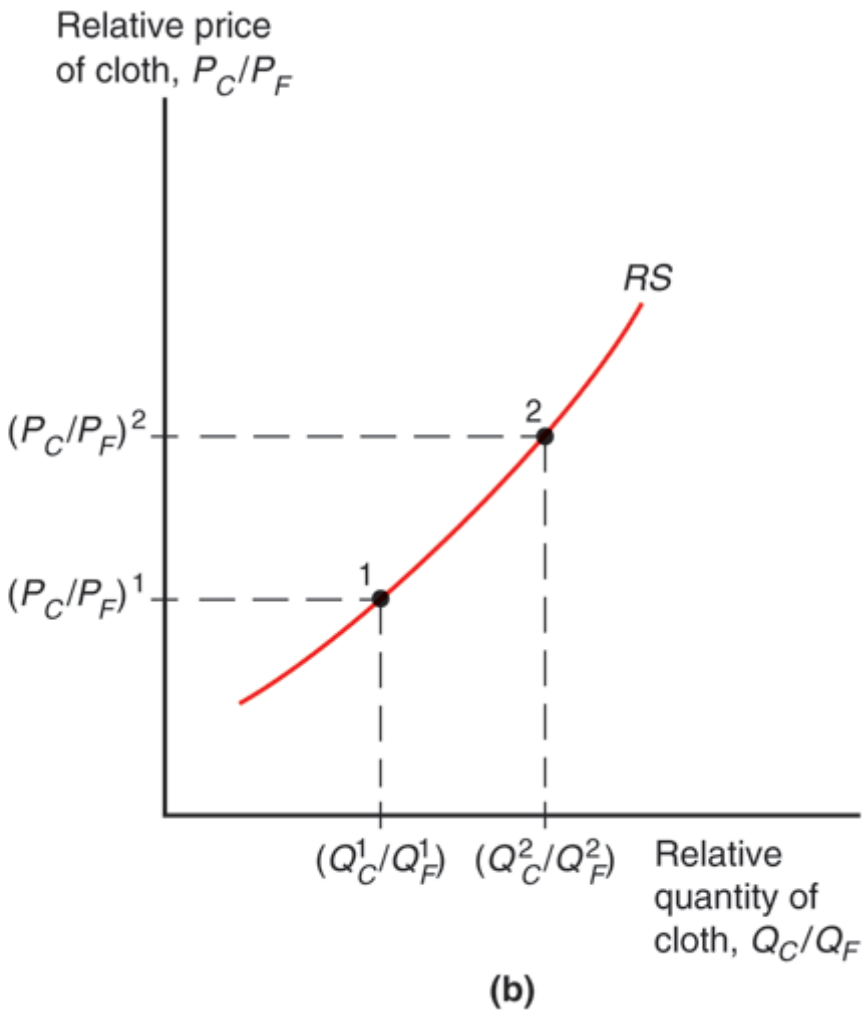


Production Possibilities and Relative Supply (cont.)

- Relative prices and relative supply:
  - An increase in the price of cloth relative to food P_C/P_F makes the isovalue line steeper.

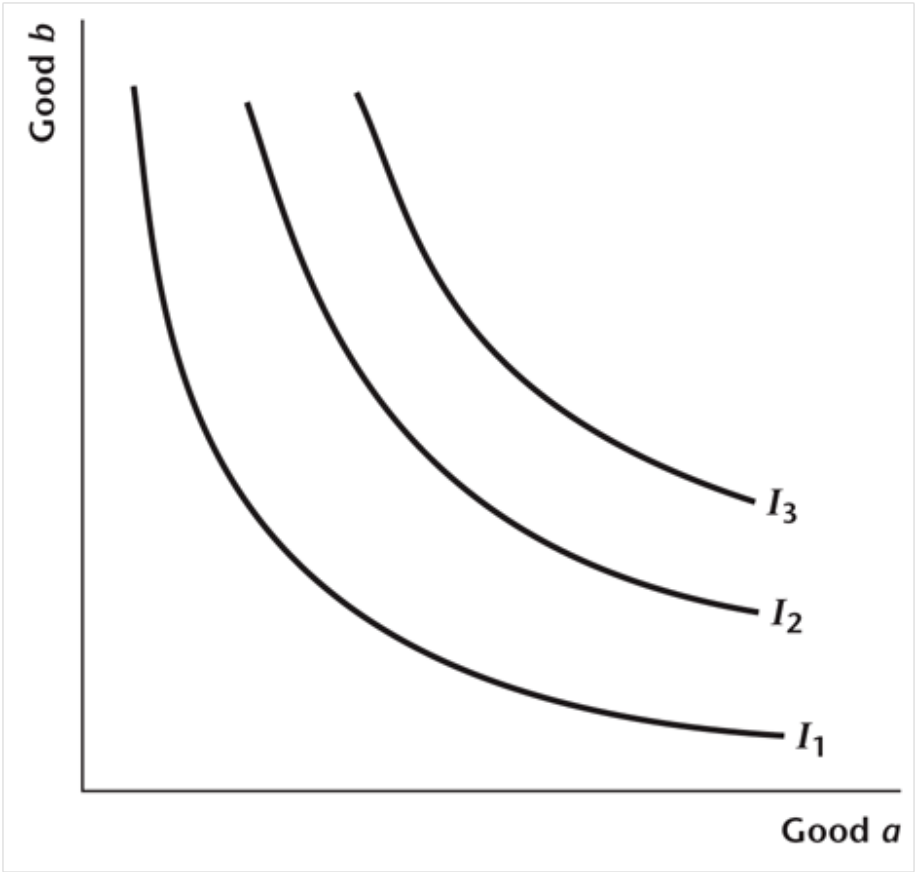
Production Possibilities and Relative Supply (cont.)





Relative Prices and Demand

Figure 1: Indifference Curves of the Representative Consumer in the SOE



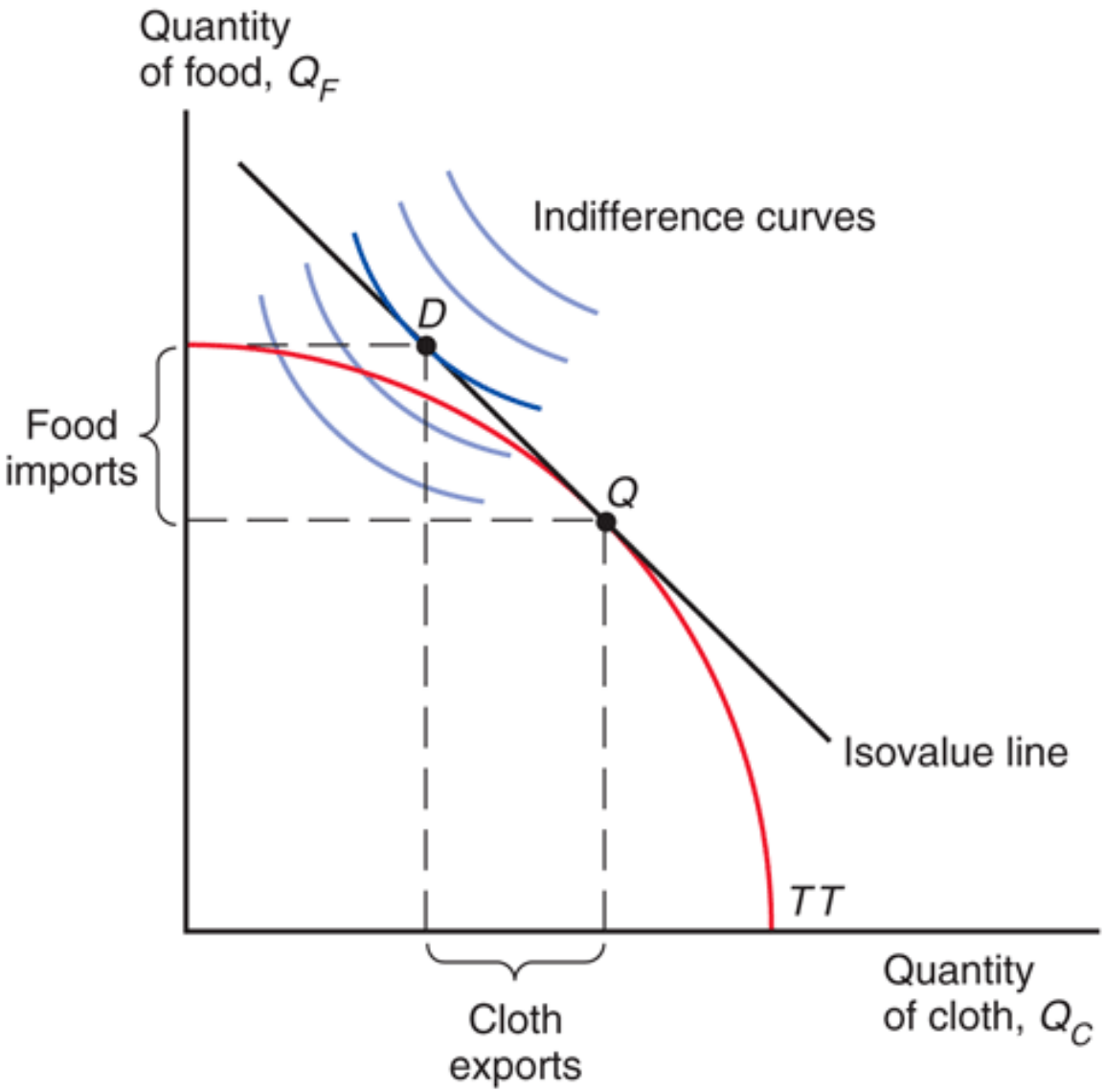
Relative Prices and Demand (cont.)

- 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.
  - For consumers: in equilibrium the consumer maximizes when his or her marginal rate of substitution equals the relative price of the two goods.

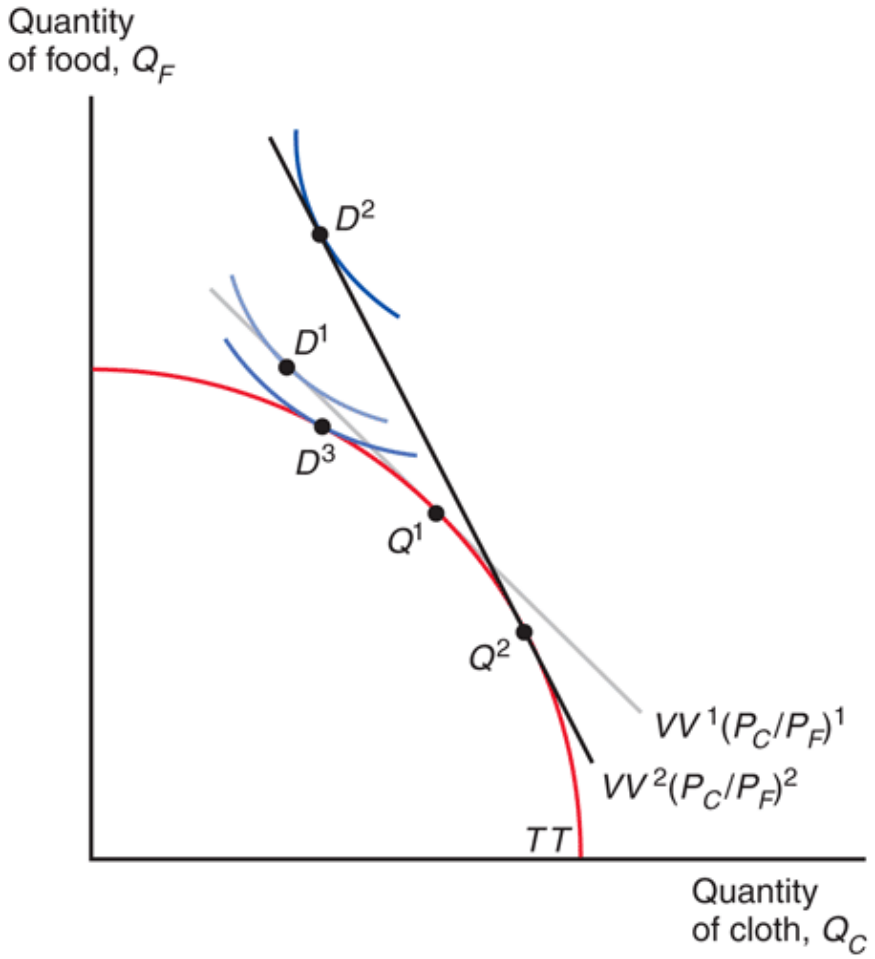
$$-MRS_{C,F} = -\frac{\left(\frac{\partial u(D_C,D_F)}{\partial D_C}\right)}{\left(\frac{\partial u(D_C,D_F)}{\partial D_C}\right)} = -\left(\frac{P_C}{P_F}\right) = -TOT$$

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

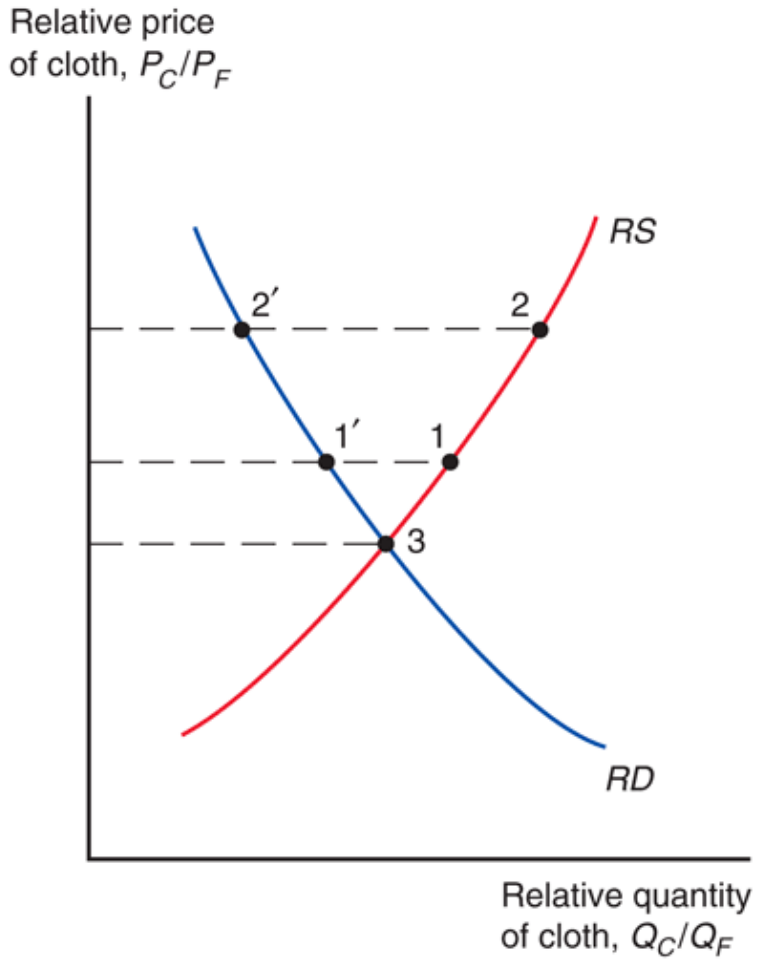
Relative Prices and Demand (cont.)



Relative Prices and Demand (cont.)



(a) Production and Consumption



(b) Relative Supply and Demand

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.

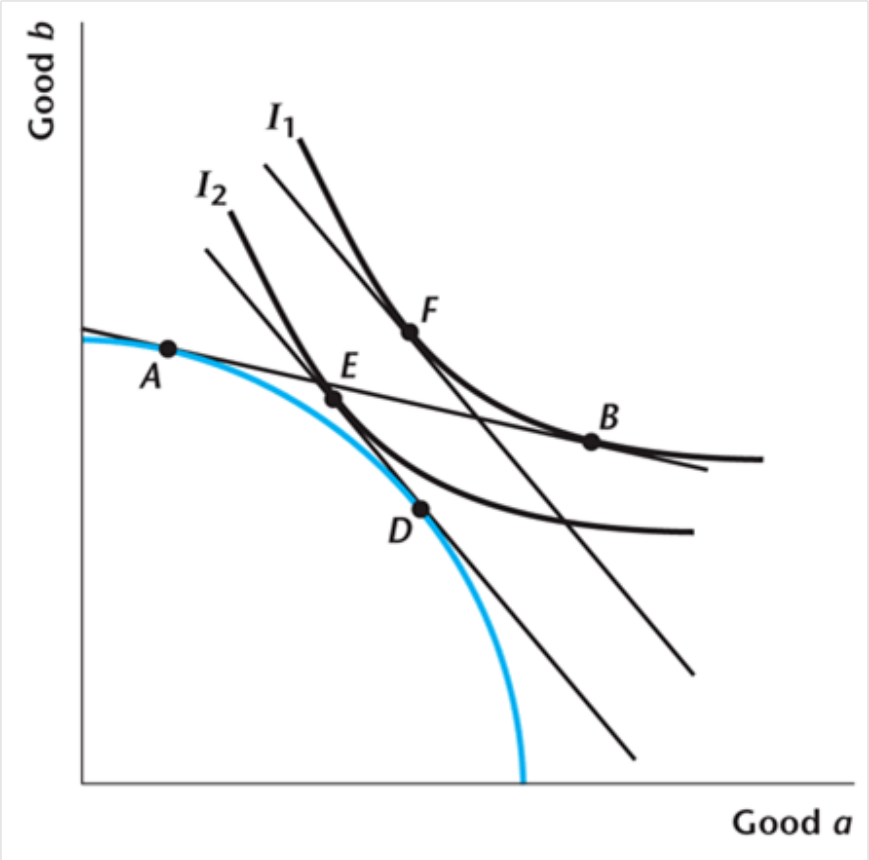
$$TOT = \frac{P_{Exp}}{P_{Imp}}$$

  - When a country exports cloth and the relative price of cloth increases, the terms of trade rise: $\frac{P_C}{P_F} \uparrow$

- 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.

An Decrease in the TOT: $\downarrow \frac{P_b}{P_a}$ or $\uparrow \frac{P_a}{P_b}$

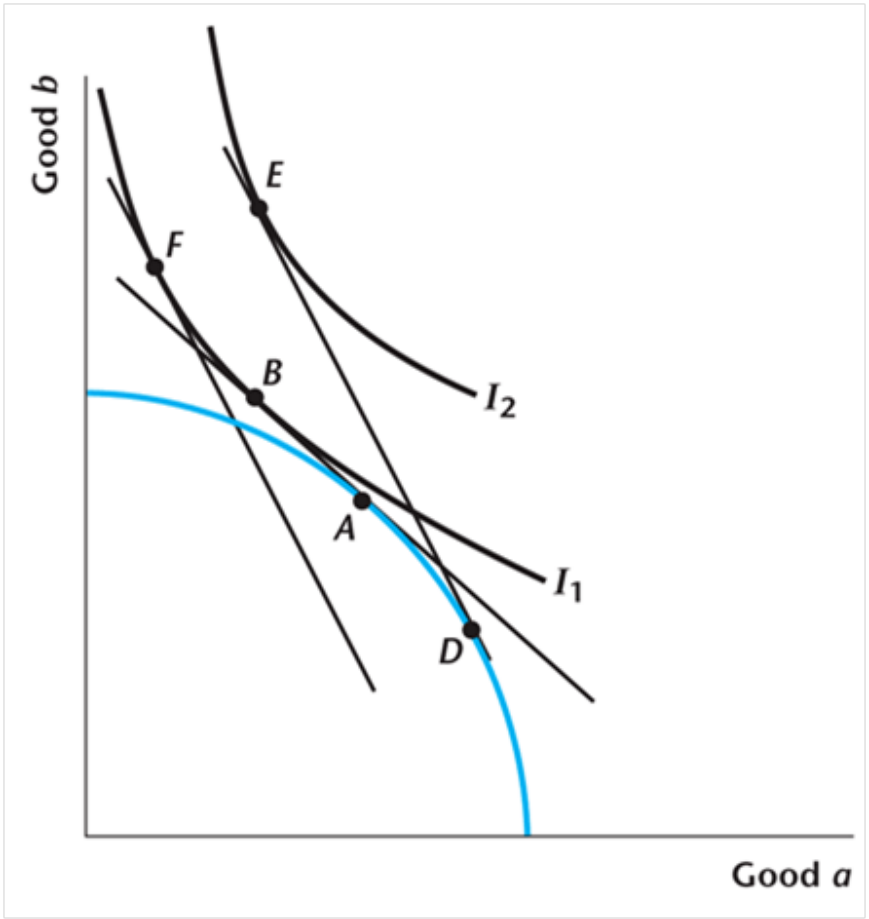
Figure 2: Good (a) is initially imported and (b) is initially exported



Note: Produce (A) and consume (B)

An Increase in the TOT: $\uparrow \frac{P_a}{P_b}$

Figure 3: Good (a) is initially exported and (b) is initially imported



Note: Produce (A) and consume (B)

Determining Relative Prices

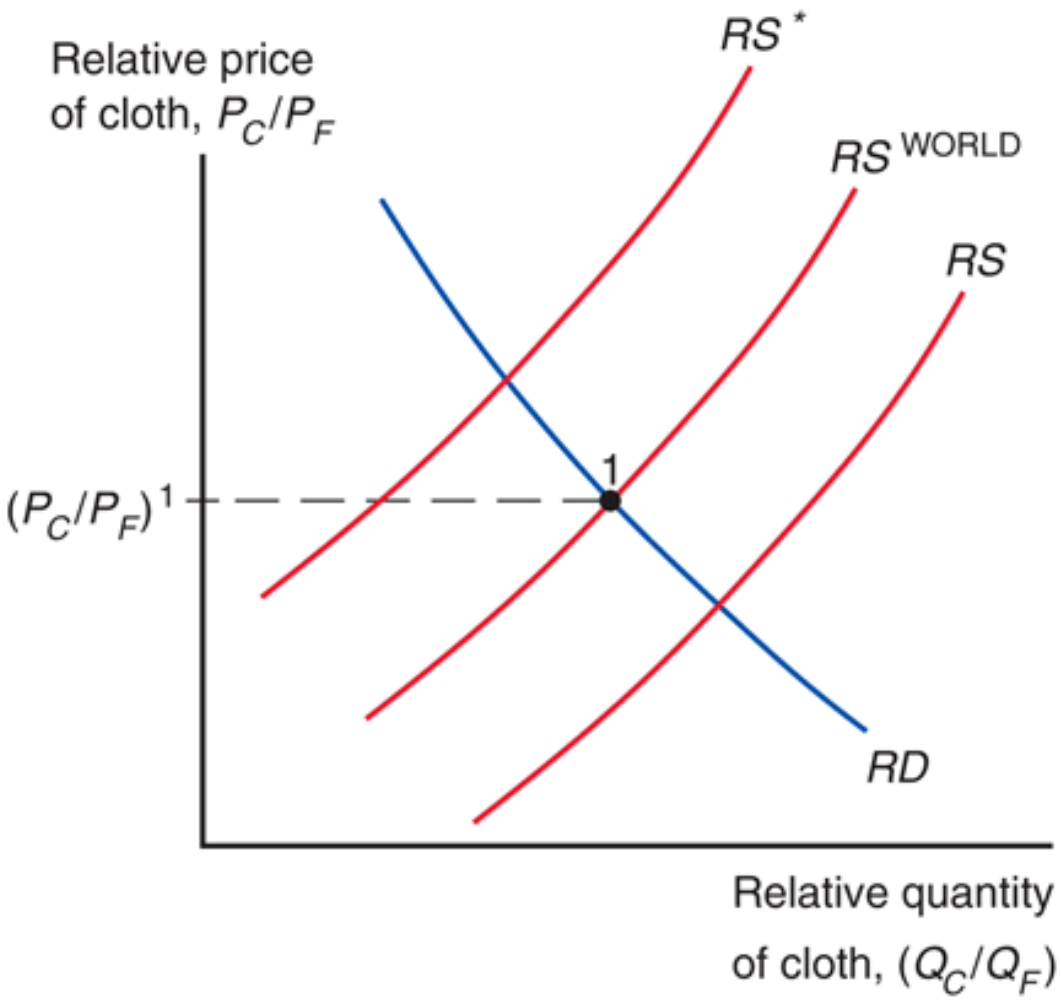
- To determine the price of cloth relative to the price food, use relative supply and relative demand.
  - World supply of cloth relative to food at each relative price.

$$\frac{(Q_C + Q_C^*)}{(Q_F + Q_F^*)}$$

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

$$\frac{(D_C + D_C^*)}{(D_F + D_F^*)}$$

Determining Relative Prices (cont.)



(a) Relative Supply and Demand

Determining Relative Prices (cont.)

- Relative price determines the slope of the "Budget Constraints" of Home and Foreign

$$P_C \times Q_C + P_F \times Q_F = P_C \times D_C + P_F \times D_F$$
$$\rightarrow \frac{P_C}{P_F} \times Q_C + Q_F = \frac{P_C}{P_F} \times D_C + D_F,$$
$$\rightarrow TOT_{C,F} \times Q_C + Q_F = TOT_{C,F} \times D_C + D_F,$$

where

$$TOT_{C,F} = \frac{P_C}{P_F}$$

- Extreme point if Home only consumed cloth:

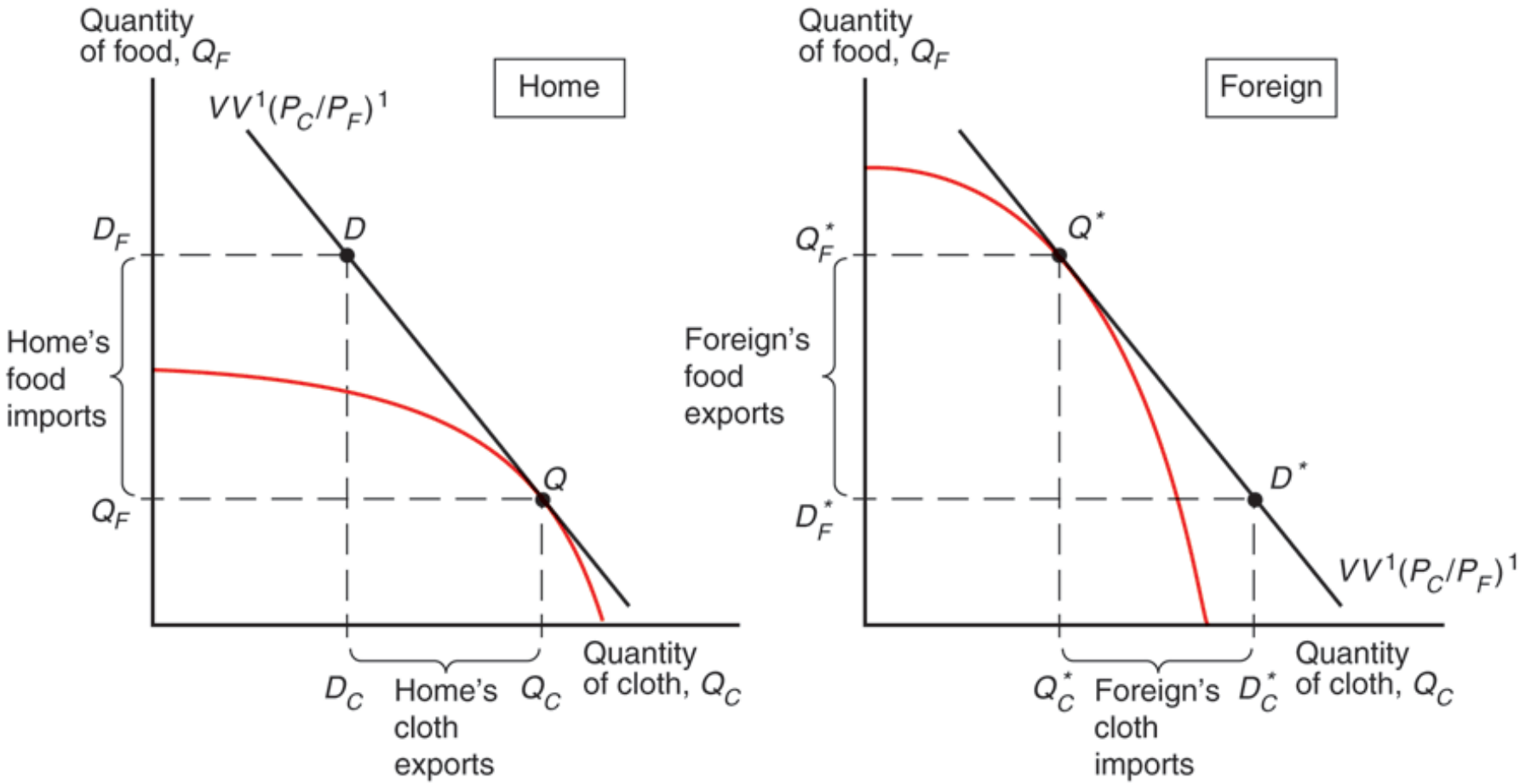
$$D_C = \overbrace{\frac{P_F}{P_C} Q_F}^{\text{export all food and import cloth}} + \overbrace{Q_C}^{\text{own cloth prodcution}}$$

Determining Relative Prices (cont.)

- Extreme point if Home only consumed food:

$$D_F = \overbrace{\frac{P_C}{P_F} Q_C}^{\text{export all cloth and import food}} + \overbrace{Q_F}^{\text{own food production}}$$

Determining Relative Prices (cont.)

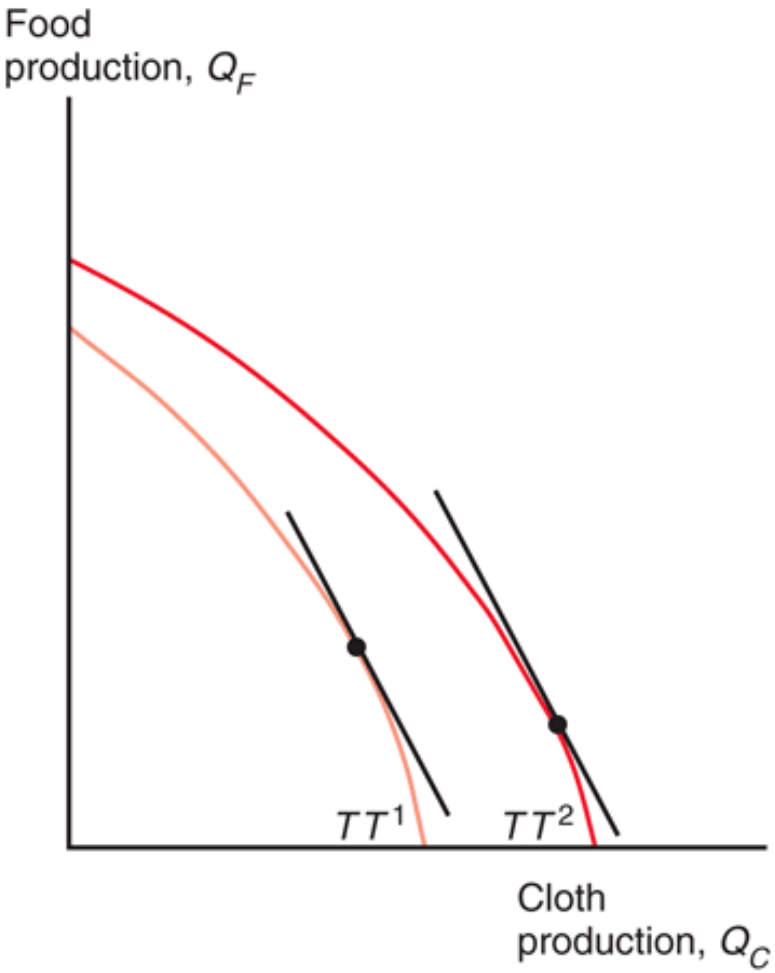


(b) Production, Consumption, and Trade

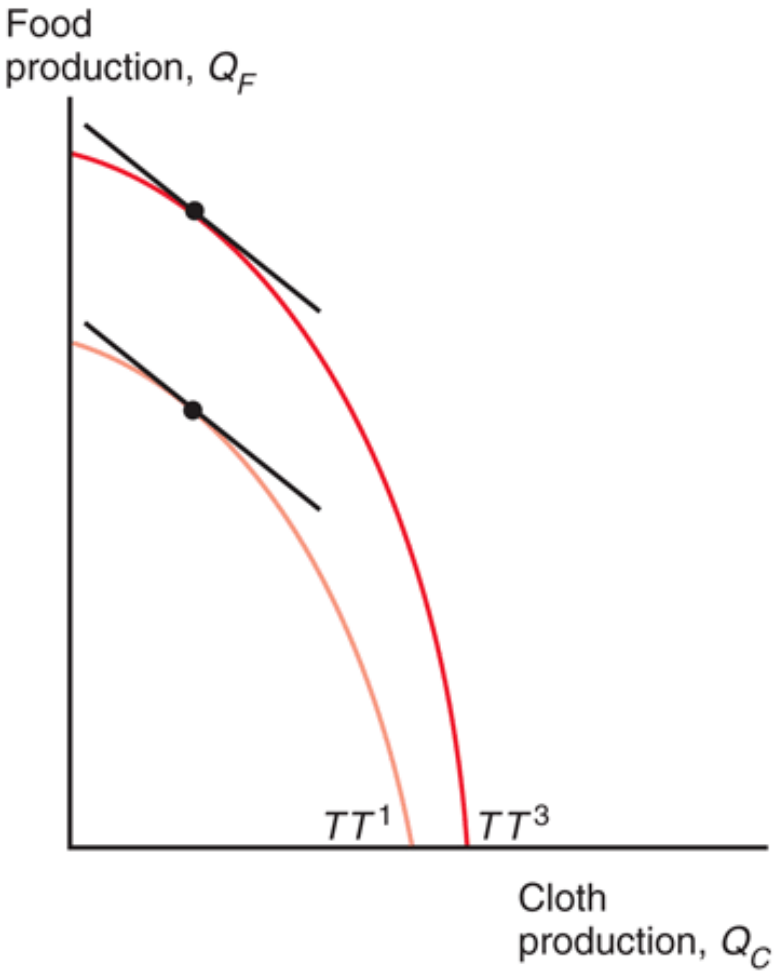
The Effects of Economic Growth

- 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:

The Effects of Economic Growth (cont.)

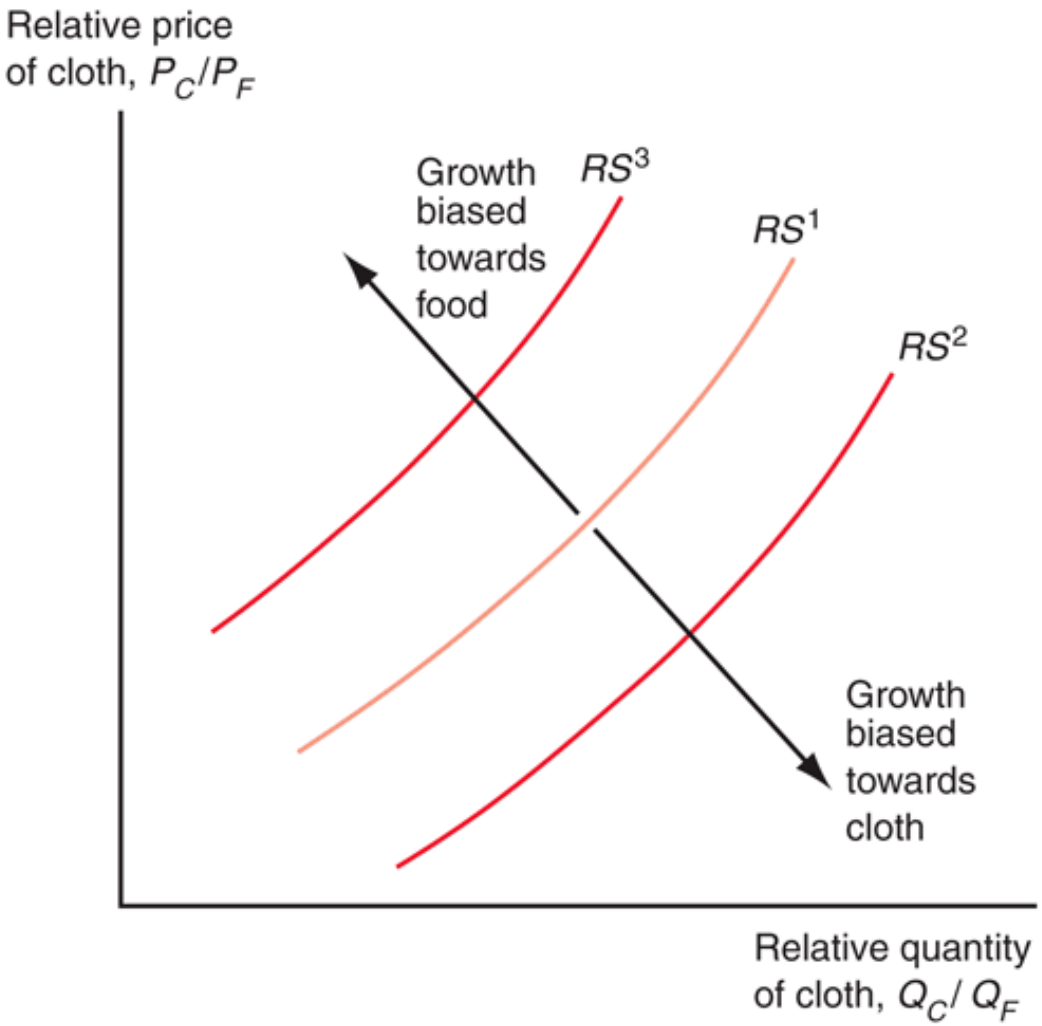


(a) Growth biased toward cloth



(b) Growth biased toward food

The Effects of Economic Growth (cont.)

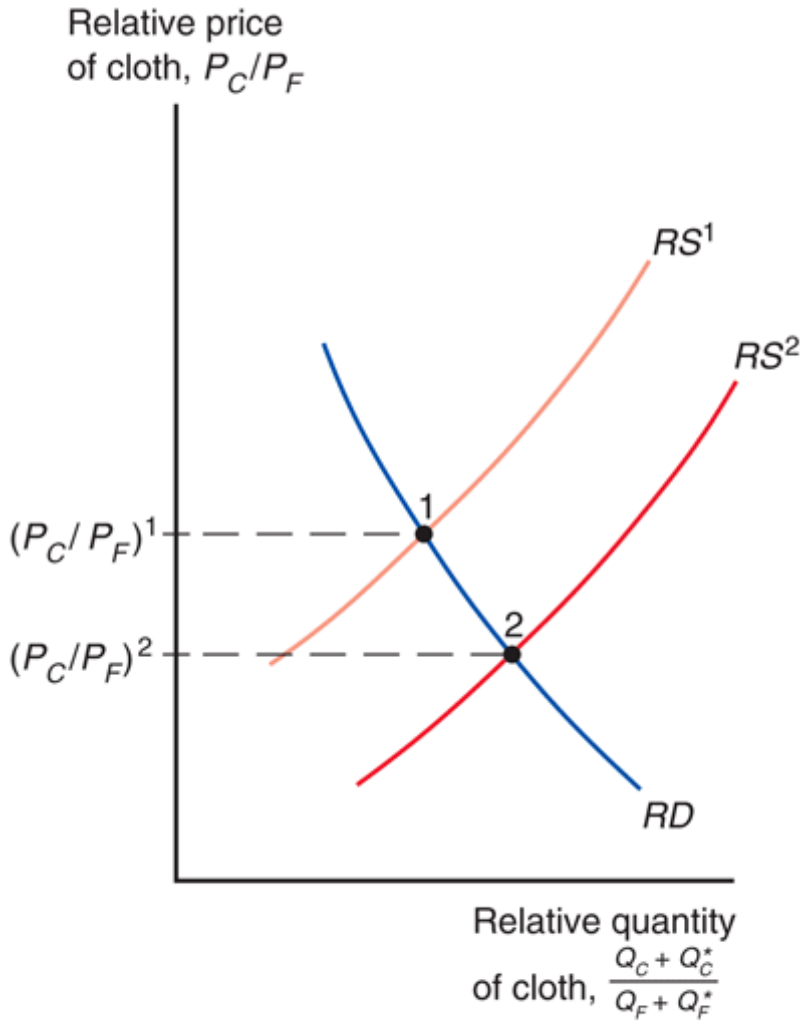


(c) Effects of biased growth on relative supply

The Effects of Economic Growth (cont.)

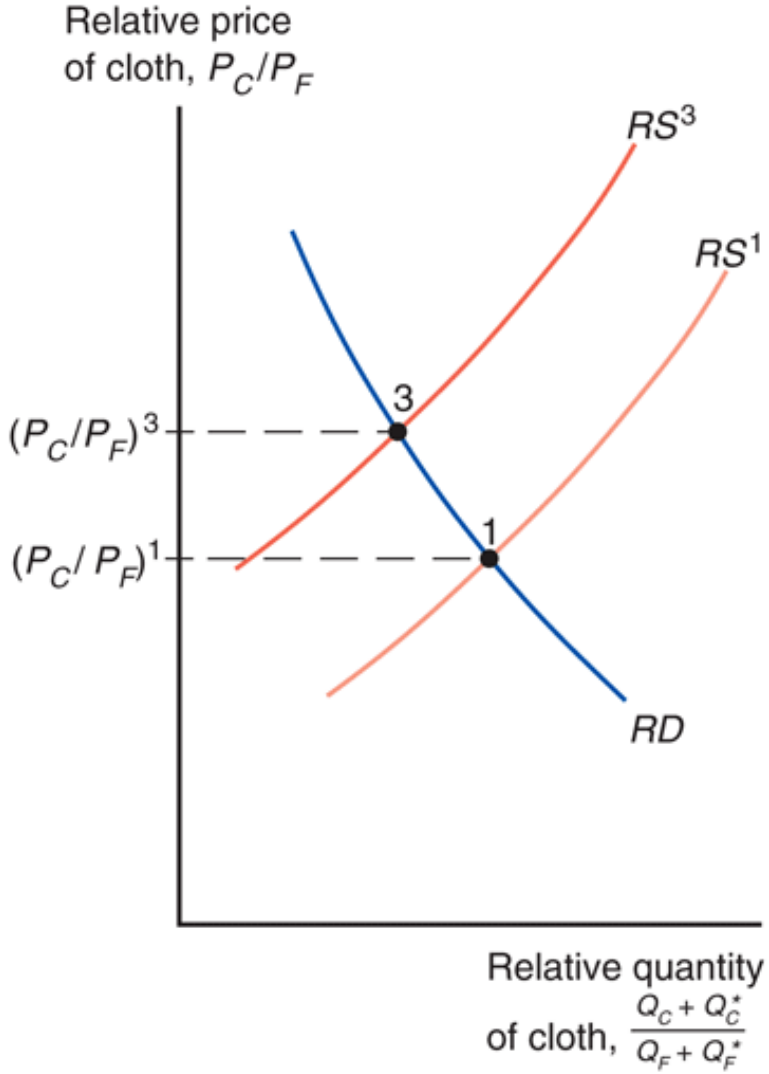
- Biased growth and the resulting change in relative supply causes a change in the terms of trade.
- Suppose that the home country exports cloth and imports food.

The Effects of Economic Growth (cont.)



(a) Cloth-biased growth

The Effects of Economic Growth (cont.)



(b) Food-biased growth

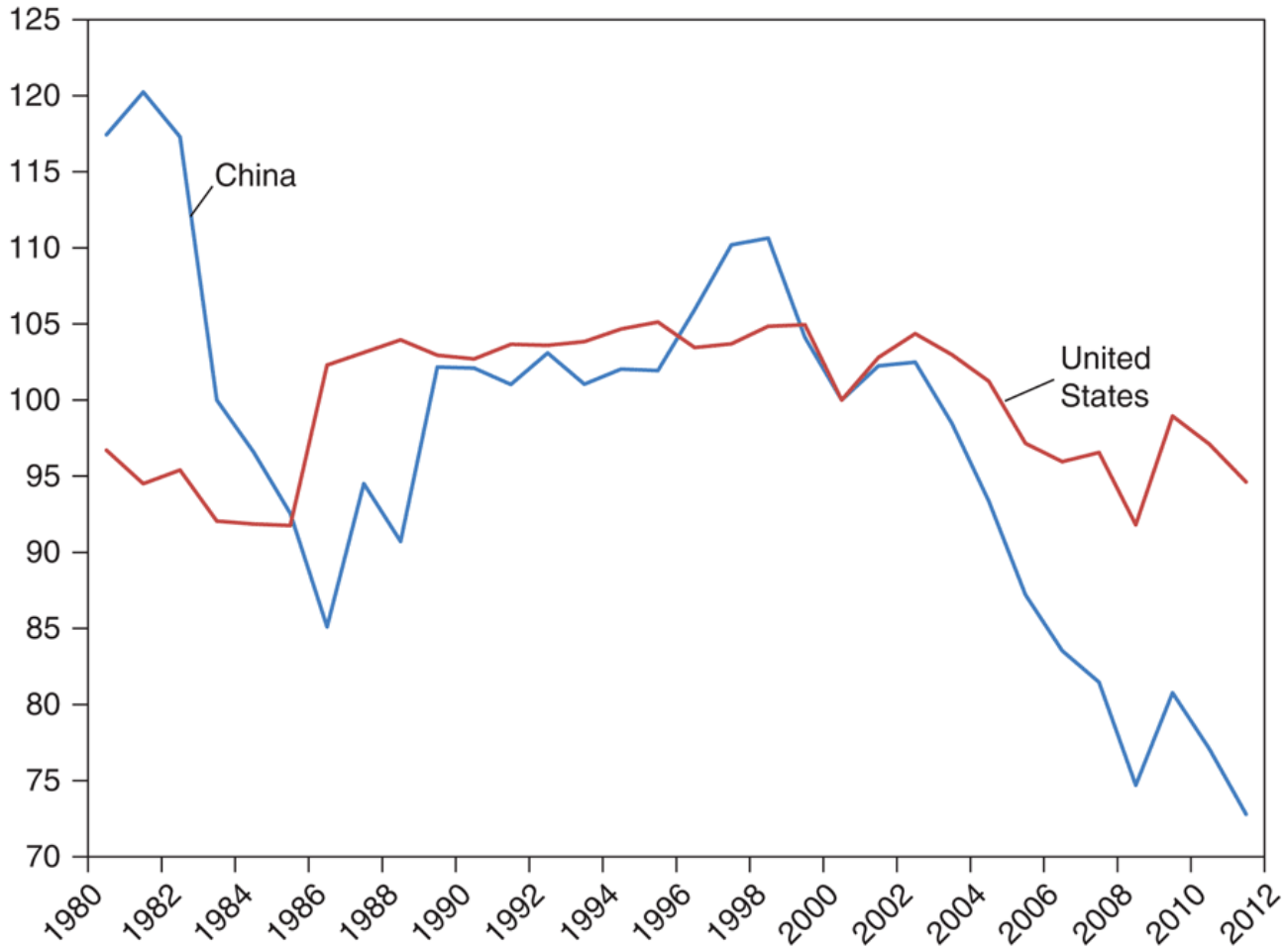
The Effects of Economic Growth (cont.)

- **Export-biased growth** is growth that expands a country's production possibilities disproportionately in that country's export sector.
  - Biased growth in the food industry in the foreign country is export-biased growth for the foreign country.
  - Export-biased growth $\downarrow$ **terms of trade**, $\downarrow$ welfare and $\uparrow$ welfare of foreign countries.
- **Import-biased growth** is growth that expands a country's production possibilities disproportionately in that country's import sector.
  - Biased growth in cloth production in the foreign country is import-biased growth for the foreign country.
  - Import-biased growth $\uparrow$ a country's **terms of trade**, $\uparrow$ welfare and $\downarrow$ 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.
- 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.

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

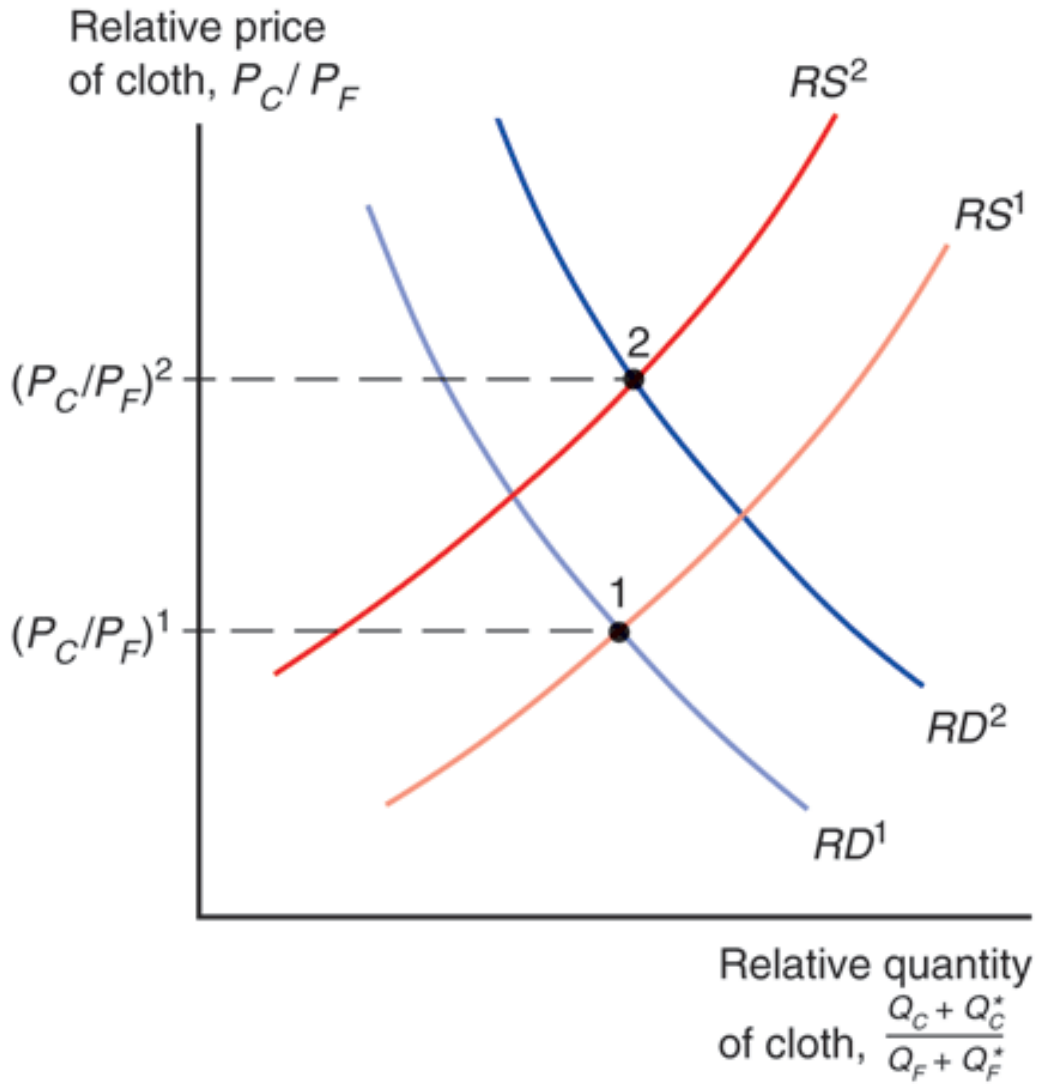
- Import tariffs are taxes levied on imports.
- Export subsidies are payments given to domestic producers that export.
- Both policies influence the terms of trade and therefore national welfare.
- Import tariffs and export subsidies drive a wedge between prices in world markets and prices in domestic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

Relative Price and Supply Effects of a Tariff

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

Relative Price and Supply Effects of a Tariff (cont.)

Figure 4: Effects of Food Tariff on TOT



Relative Price and Supply Effects of a Tariff (cont.)

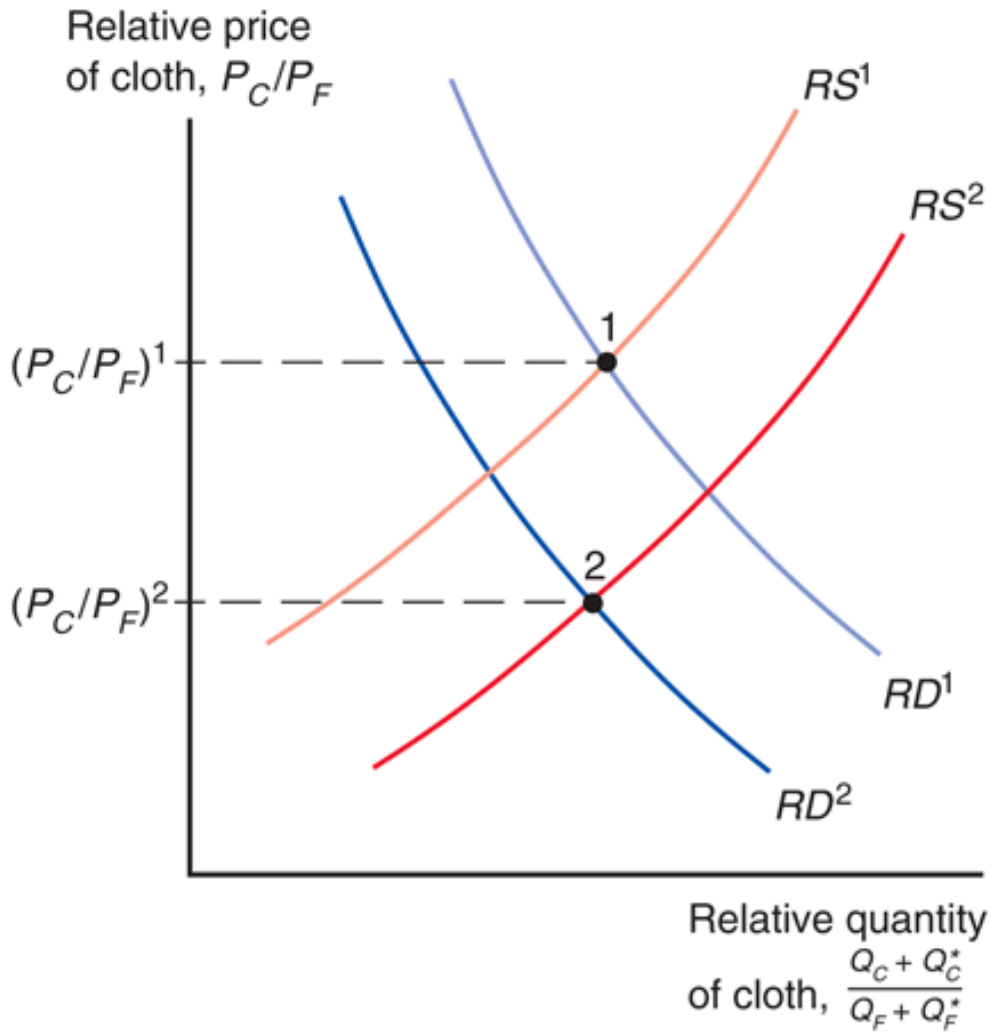
- When the home country imposes an import tariff, the TOT $\uparrow$ and the welfare of the country may increase.

Effects of an Export Subsidy

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

Effects of an Export Subsidy (cont.)

Figure 5: Effects of Cloth Subsidy on TOT



Effects of an Export Subsidy (cont.)

- When the home country imposes an export subsidy, the TOT $\downarrow$ and the welfare of the country $\downarrow$ to the benefit of the foreign country.

Implications of the Standard Trade Model

- The standard trade model predicts that
  - an import tariff by the home country can $\uparrow$ domestic welfare at the expense of the foreign country.
  - an export subsidy by the home country $\downarrow$ 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.
    - The EU subsidizes agricultural exports, which reduce the price that American farmers receive for their goods in world markets.
  - 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 the Standard Trade Model (cont.)

- 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.
- Export subsidies on a good decrease the relative world price of that good by increasing relative supply of that good and decreasing relative demand of that good.

Implications of the Standard Trade Model (cont.)

- Import tariffs on a good decrease the relative world price of that good (and increase the relative world price of other goods) by increasing the relative supply of that good and decreasing the relative demand of that good.