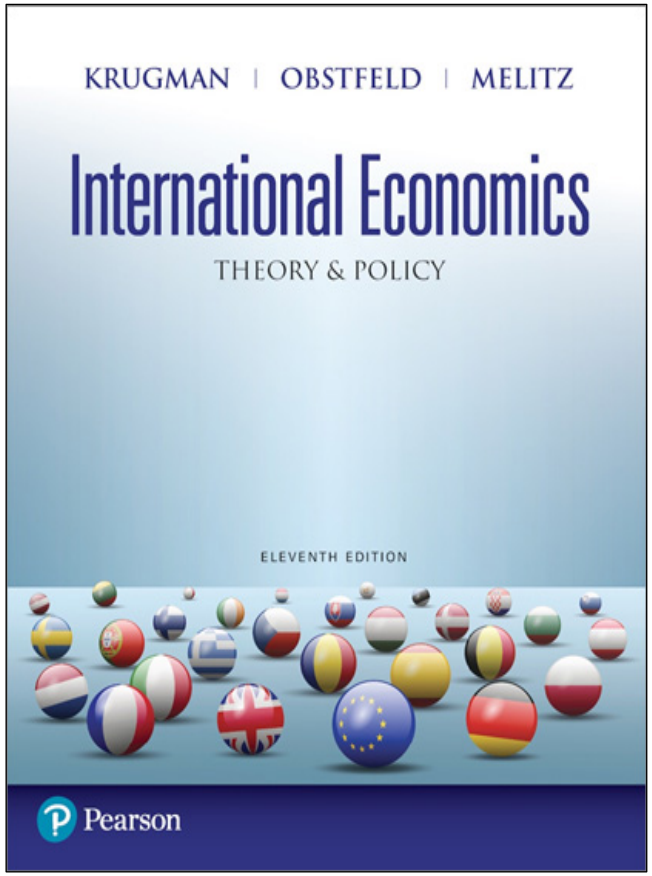
International Economics: Theory and Policy

Eleventh Edition



Chapter 1

Introduction

Pearson

Learning Objectives

1.1 Distinguish between international and domestic economic issues.

1.2 Explain why seven themes recur in international economics, and discuss their significance.

1.3 Distinguish between the trade and monetary aspects of international economics.

Preview

- What is international economics about?
- International trade topics: Gains from trade, explaining patterns and volume of trade, effects of government policies on trade
- International finance topics: Balance of payments, exchange rate determination, international policy coordination, capital markets
- International trade versus finance

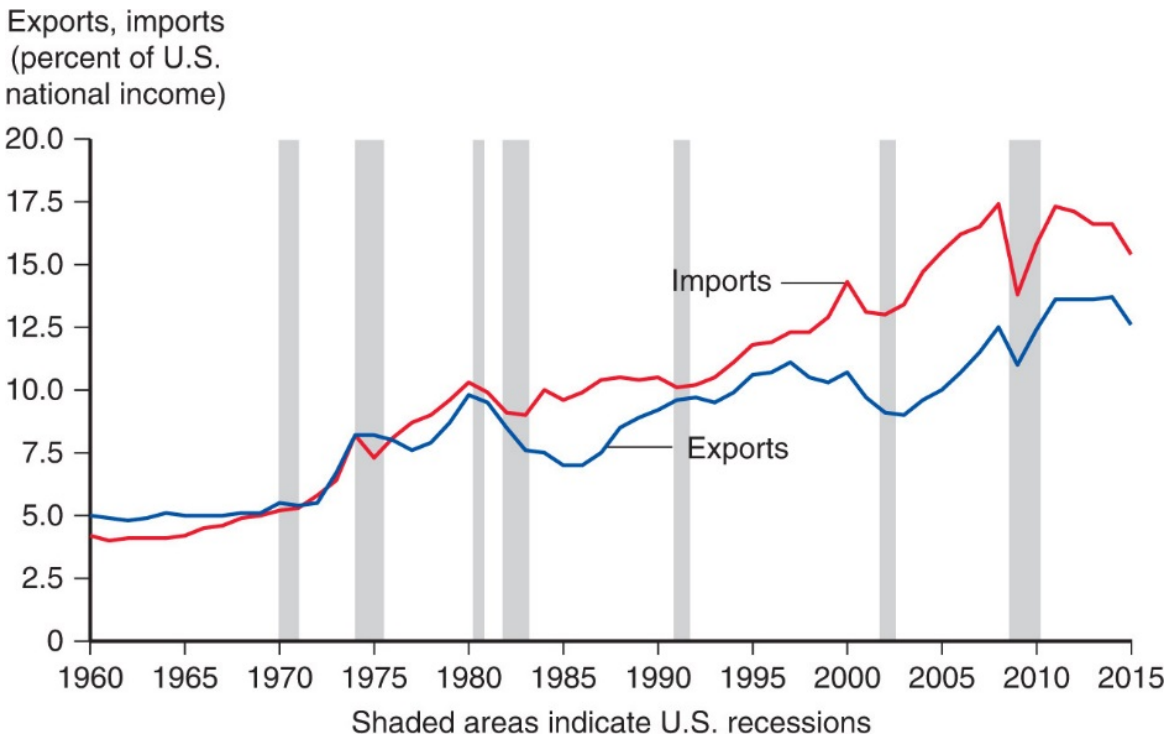
What Is International Economics About? (1 of 3)

- International economics is about how nations interact through trade of goods and services, flows of money, and investment.
- International economics is an old subject, but continues to grow in importance.
- Nations are now more closely linked than ever before.

What Is International Economics About? (2 of 3)

- U.S. exports and imports as shares of gross domestic product have been on an upward trend.
  - International trade has roughly tripled in importance compared to the economy as a whole in the past 50 years.
  - Both imports and exports fell substantially in 2009 due to the recession.

Figure 1.1 Exports and Imports as a Percentage of U.S. National Income



(Shaded areas indicate U.S. recessions.) Both imports and exports have risen as a share of the U.S. economy, but imports have risen more.

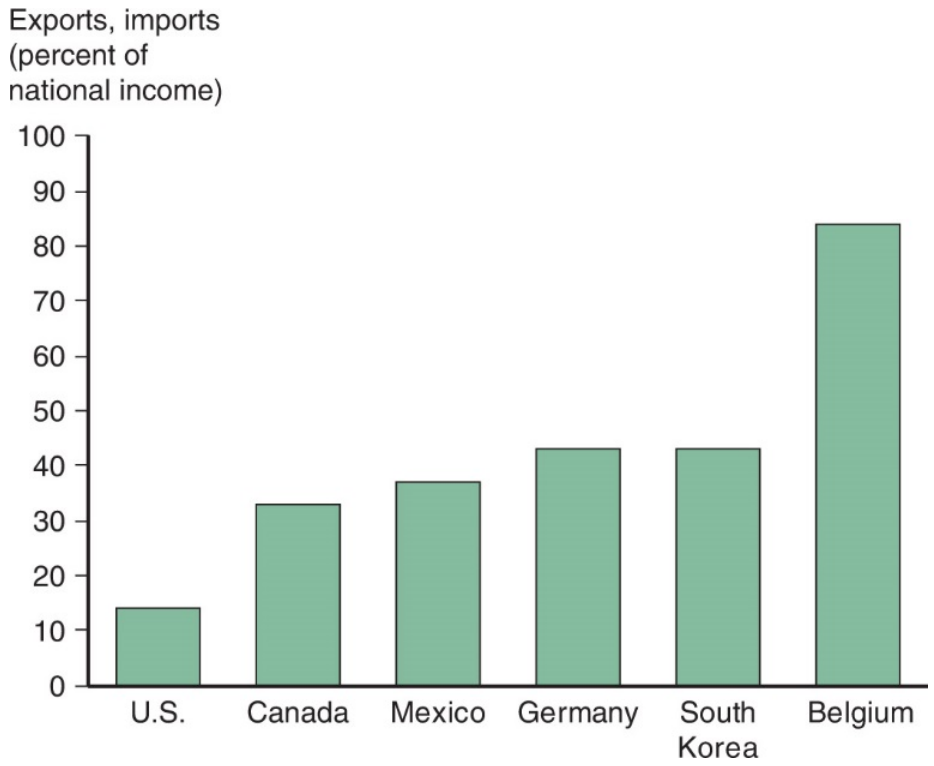
Source: U.S. Bureau of Economic Analysis

Pearson

What Is International Economics About? (3 of 3)

- Compared to the United States, other countries are even more tied to international trade.
  - Their imports and exports as a share of GDP are substantially higher.
  - The United States, due to its size and diversity of resources, relies less on international trade than almost any other country.

Figure 1.2 Average of Exports and Imports as Percentages of National Income in 2015



International trade is even more important to most other countries than it is to the United States.

Source: World Bank

Gains from Trade (1 of 4)

- That there are gains from trade is probably the most important insight in international economics.
- Countries selling goods and services to each other almost always generates mutual benefits.
  1. When a buyer and a seller engage in a voluntary transaction, both can be made better off.
     - Norwegian consumers import oranges that they would have a hard time producing.

Gains from Trade (2 of 4)

2. How could a country that is the most (least) efficient producer of everything gain from trade?
   - Countries use finite resources to produce what most productive at (compared to their other production choices), then trade those products for what they want to consume.
   - Countries can specialize in production, while consuming many goods and services through trade.

Gains from Trade (3 of 4)

3. Trade benefits countries by allowing them to export goods made with relatively abundant resources and imports goods made with relatively scarce resources.
4. When countries specialize, they may be more efficient due to larger-scale production.
5. Countries may also gain by trading current resources for future resources (international borrowing and lending) and due to international migration.

Gains from Trade (4 of 4)

- Trade is predicted to benefit **countries as a whole** in several ways, but trade may harm **particular groups within a country.**
  - International trade can harm the owners of resources that are used relatively intensively in industries that compete with imports.
  - Trade may therefore affect the distribution of income within a country.

Patterns of Trade

- The pattern of trade describes who sells what to whom.
- Differences in **climate and resources** explain why Brazil exports coffee and Saudi Arabia exports oil.
- But why does Japan export automobiles, while the U.S. exports aircraft?
- Why some countries export certain products can stem from differences in:
  - **Labor productivity**
  - **Relative supplies of capital, labor and land** and their use in the production of different goods and services

Effects of Government Policies on Trade (1 of 2)

- Policy makers affect the amount of trade through
  - **Tariffs:** a tax on imports or exports,
  - **Quotas:** a quantity restriction on imports or exports,
  - **Export subsidies:** a payment to producers that export, or
  - Through other regulations (ex., product specifications) that exclude foreign products from the market, but still allow domestic products.
- What are the costs and benefits of these policies?

Effects of Government Policies on Trade (2 of 2)

- If a government restricts trade, what are the costs if foreign governments respond likewise?
- Trade policies are often chosen to cater to special interest groups, rather than to maximize national welfare.
- Governments tend to adopt tariffs, then negotiate them down in exchange for reduction in trade barriers of other countries.

International Finance Topics

- Exchanging risky assets such as stocks and bonds can benefit all countries by diversification that reduces the variability of income – another source of gains from trade.
- Most international trade involves monetary transactions.
- Many monetary events have important consequences for international trade.

Balance of Payments

- Governments measure the value of exports and imports, as well as the value of financial assets that flow into and out of their countries.
  - Trade deficits, where countries import more than they export in value, may be offset by net inflows of financial assets.
- The **official settlements balance,** or the balance of payments, measures the balance of funds that central banks use for official international payments.
- All three values are measured in the government's **national income accounts.**

Exchange Rate Determination

- **Exchange rates** are an important financial issue for most governments.
- Exchange rates measure how much domestic currency can be exchanged for foreign currency and thus affect how much:
  - Goods denominated in foreign currency (imports) cost in the domestic country.
  - Goods denominated in domestic currency (exports) cost in foreign markets.
- Some exchange rates change continually (float) while others are fixed for periods of time.

International Policy Coordination

- In an integrated economy, one country's economic policies usually affect other countries as well, leading to the need for some degree of policy coordination.
  - Depends on type of exchange rate regime.
- Capital markets, where money is exchanged for promises to pay in the future, have special concerns in an international setting:
  - Currency fluctuations can alter the value paid.
  - Countries, especially developing ones, might default on debt.

The International Capital Market

- Capital markets are arrangements by which individuals and firms exchange money now for promises to pay in the future.
- International capital markets cope with special regulations that countries impose on foreign investments.
  - Special risks of currency fluctuations and national default;
  - Sometimes offer opportunities to evade regulations placed on domestic markets.

International Trade Versus Finance

- International trade focuses on transactions involving movement of goods and services across nations.
  - International trade theory (Econ/Trade Chapters 2–8) and policy (Econ/Trade Chapters 9–12).
- International finance focuses on financial or monetary transactions across nations.
  - International monetary theory (Econ Chapters 13–18/ Finance Chapters 2-7) and policy (Econ Chapters 19–22/Finance Chapters 8-11).

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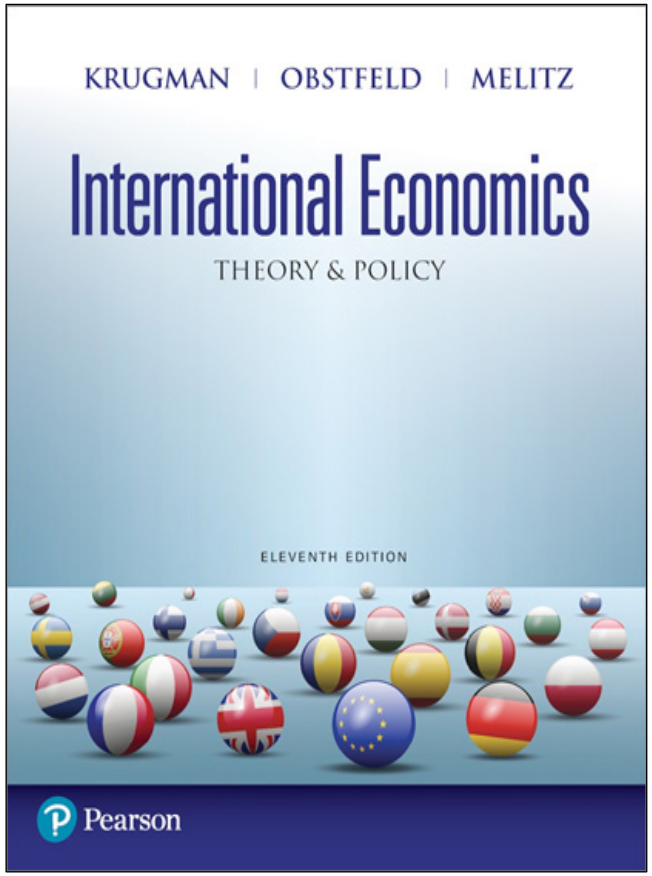


Chapter 2

World Trade: An Overview

Pearson

Learning Objectives

2.1 Describe how the value of trade between any two countries depends on the size of these countries' economies and explain the reasons for that relationship.

2.2 Discuss how distance and borders reduce trade.

2.3 Describe how the share of international production that is traded has fluctuated over time and why there have been two ages of globalization.

2.4 Explain how the mix of goods and services that are traded internationally has changed over time.

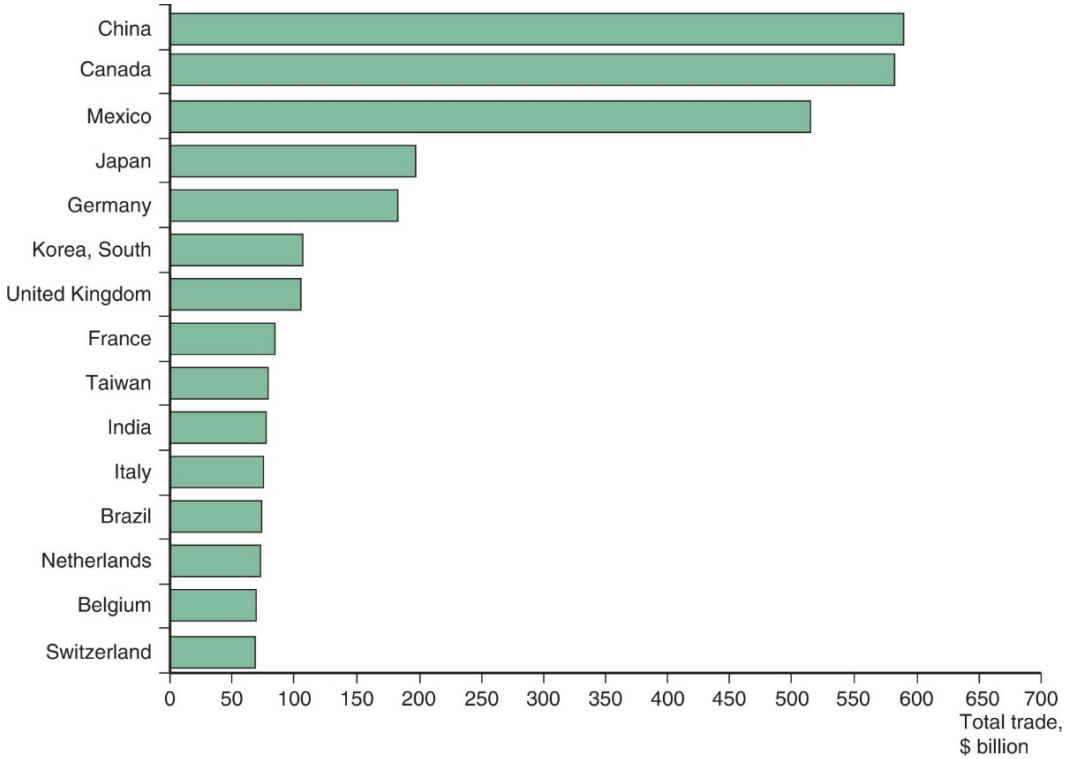
Preview

- Largest trading partners of the United States
- Gravity model: Influence of an economy's size on trade; Distance, barriers, borders and other trade impediments
- Globalization: then and now
- Changing composition of trade
- Service outsourcing

Who Trades with Whom?

- More than 30% of world output is sold across national borders.
  - World trade in goods and services exceeded $21 trillion in 2015.
- The 5 largest trading partners with the U.S. in 2015 were China, Canada, Mexico, Japan, and Germany.
- The largest 15 trading partners with the U.S. accounted for 75% of the value of U.S. trade in 2015.

Figure 2.1 Total U.S. Trade with Major Partners, 2015



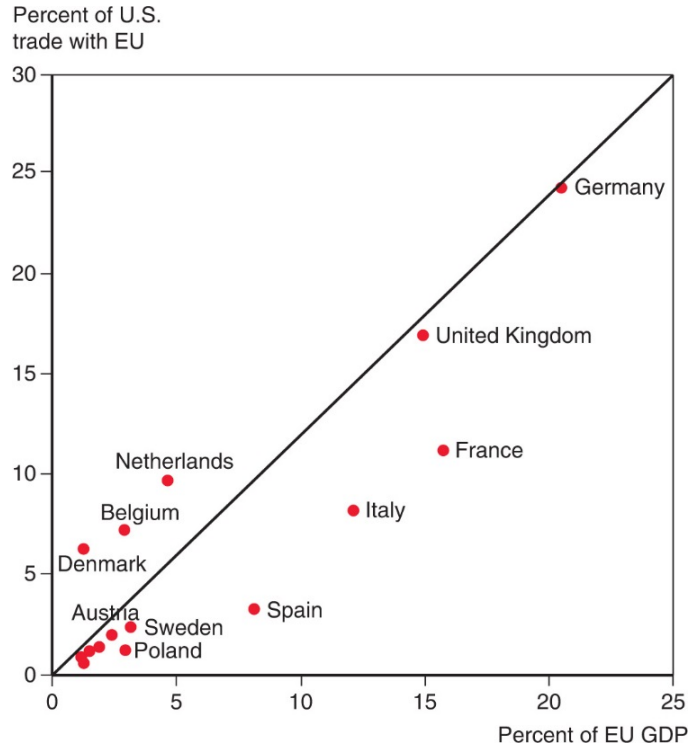
U.S. trade—measured as the sum of imports and exports—is mostly with 15 major partners.

Source: U.S. Department of Commerce.

Size Matters: The Gravity Model (1 of 3)

- 3 of the top 10 trading partners with the U.S. in 2012 were also the 3 largest European economies: Germany, the United Kingdom, and France.
- Why does the United States trade more with these European countries than with others?
  - These countries have the largest **gross domestic product (GDP)**, the value of goods and services produced in an economy, in Europe.
  - Each European country's share of U.S. trade with Europe is roughly equal to its share of European GDP.

Figure 2.2 The Size of European Economies, and the Value of Their Trade with the United States



Shows the correspondence between the size of different European economies and those countries' trade with the United States.

Source: U.S. Department of Commerce, European Commission.

Pearson

Size Matters: The Gravity Model (2 of 3)

- The size of an economy is directly related to the volume of imports and exports.
  - Larger economies produce more goods and services, so they have more to sell in the export market.
  - Larger economies generate more income from the goods and services sold, so they are able to buy more imports.
- Trade between any two countries is larger, the larger is either country.

Size Matters: The Gravity Model (3 of 3)

- The gravity model assumes that size and distance are important for trade in the following way:

$$T_{ij} = \frac{A \times Y_i \times Y_j}{D_{ij}}$$

where A is a constant term

T_{ij} is the value of trade between country *i* and country *j*

Y_i the GDP of country *I*, Y_j is the GDP of country *j*

D_{ij} is the distance between country *i* and country *j*

- Or more generally $T_{ij} = \frac{A \times Y_i^a \times Y_j^b}{D_{ij}^c}$

where *a*, *b*, and *c* are allowed to differ from 1.

Using the Gravity Model: Looking for Anomalies

- A gravity model fits the data on U.S. trade with European countries well but not perfectly.
- The Netherlands, Belgium and Ireland trade much more with the United States than predicted by a gravity model.
  - Ireland has strong cultural affinity due to common language and history of migration.
  - The Netherlands and Belgium have transport cost advantages due to their location.

Impediments to Trade: Distance, Barriers, and Borders (1 of 4)

Other things besides size matter for trade:

1. **Distance** between markets influences transportation costs and therefore the cost of imports and exports.
2. **Cultural affinity:** close cultural ties, such as a common language, usually lead to strong economic ties.
3. **Geography:** ocean harbors and a lack of mountain barriers make transportation and trade easier.
4. **Multinational corporations:** corporations spread across different nations import and export many goods between their divisions.
5. **Borders:** crossing borders involves formalities that take time, often different currencies need to be exchanged, and perhaps monetary costs like tariffs reduce trade.

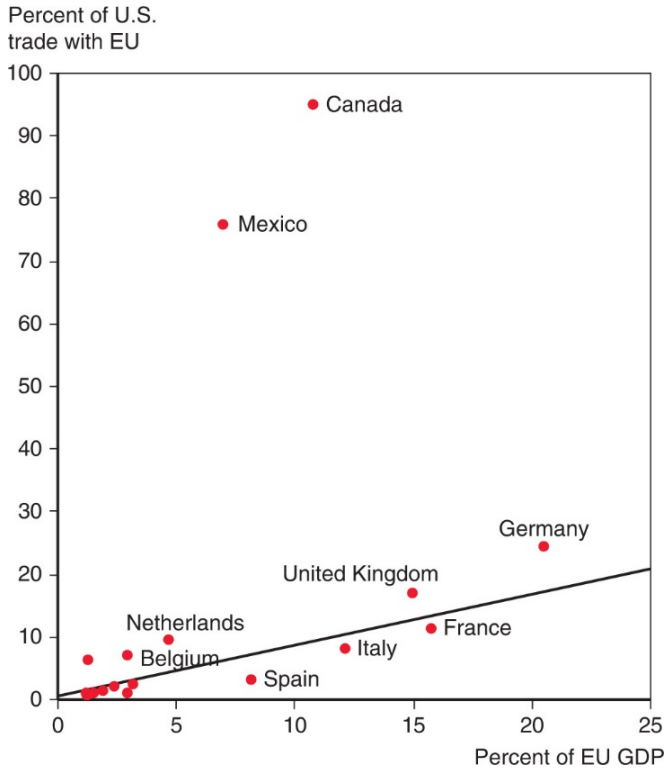
Impediments to Trade: Distance, Barriers, and Borders (2 of 4)

- Estimates of the effect of distance from the gravity model predict that a 1% increase in the distance between countries is associated with a decrease in the volume of trade of 0.7% to 1%.
- Besides distance, borders increase the cost and time needed to trade.
- **Trade agreements** between countries are intended to reduce the formalities and tariffs needed to cross borders, and therefore to increase trade.

Impediments to Trade: Distance, Barriers, and Borders (3 of 4)

- The U.S. signed a free trade agreement with Mexico and Canada in 1994, the North American Free Trade Agreement (NAFTA).
- Because of NAFTA and because Mexico and Canada are close to the U.S., the amount of trade between the U.S. and its northern and southern neighbors as a fraction of GDP is larger than between the U.S. and European countries.
  - Canada's economy is roughly the same size as Spain's (around 10% of EU GDP) but Canada trades as much with the United States as does all of Europe.

Figure 2.3 Economic Size and Trade with the United States



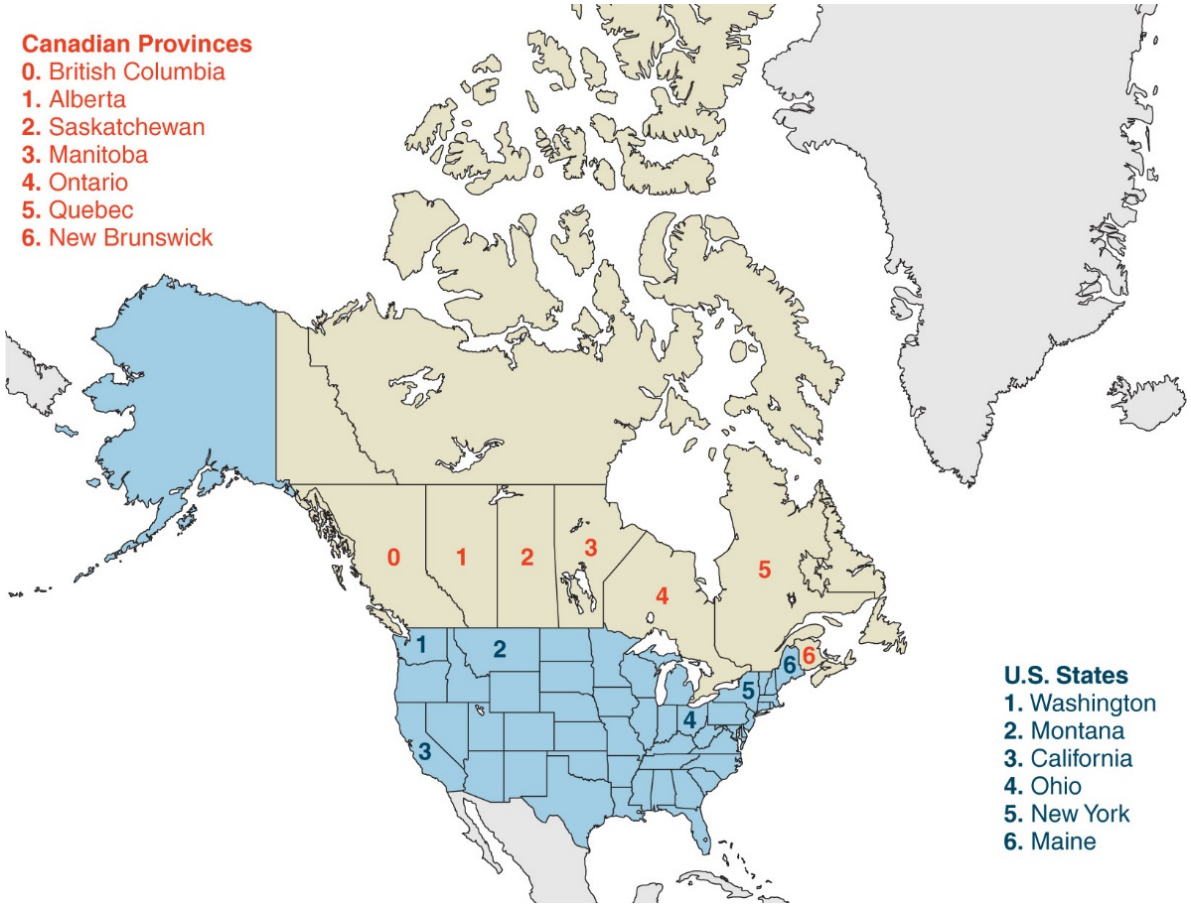
The United States does markedly more trade with its neighbors than it does with European economies of the same size.

Source: U.S. Department of Commerce, European Commission.

Impediments to Trade: Distance, Barriers, and Borders (4 of 4)

- Yet even with a free trade agreement between the U.S. and Canada, which use a common language, the border between these countries still seems to be associated with a reduction in trade.
- Data shows that there is much more trade between pairs of Canadian provinces than between Canadian provinces and U.S. states, even when holding distance constant.
- Estimates indicate that the U.S.-Canadian border deters trade as much as if the countries were 1,500-2,500 miles apart.

Figure 2.4 Canadian Provinces and U.S. States that Trade with British Columbia



Source: Statistics Canada, U.S. Department of Commerce.

Table 2.1 Trade with British Columbia, as Percent of GDP, 2009

Canadian Province	Trade as Percent of GDP	Trade as Percent of GDP	U.S. State at Similar Distance From British Columbia
Alberta	6.9	2.6	Washington
Saskatchewan	2.4	1.0	Montana
Manitoba	2.0	0.3	California
Ontario	1.9	0.2	Ohio
Quebec	1.4	0.1	New York
New Brunswick	2.3	0.2	Maine

Source: Statistics Canada, U.S. Department of Commerce.

The Changing Pattern of World Trade: Has the World Gotten Smaller? (1 of 3)

- The negative effect of distance on trade according to the gravity models is significant, but has grown smaller over time due to modern transportation and communication.
- Technologies that have increased trade:
  - Wheels, sails, compasses, railroads, telegraph, steam power, automobiles, telephones, airplanes, computers, fax machines, Internet, fiber optics, personal digital assistants, GPS satellites…

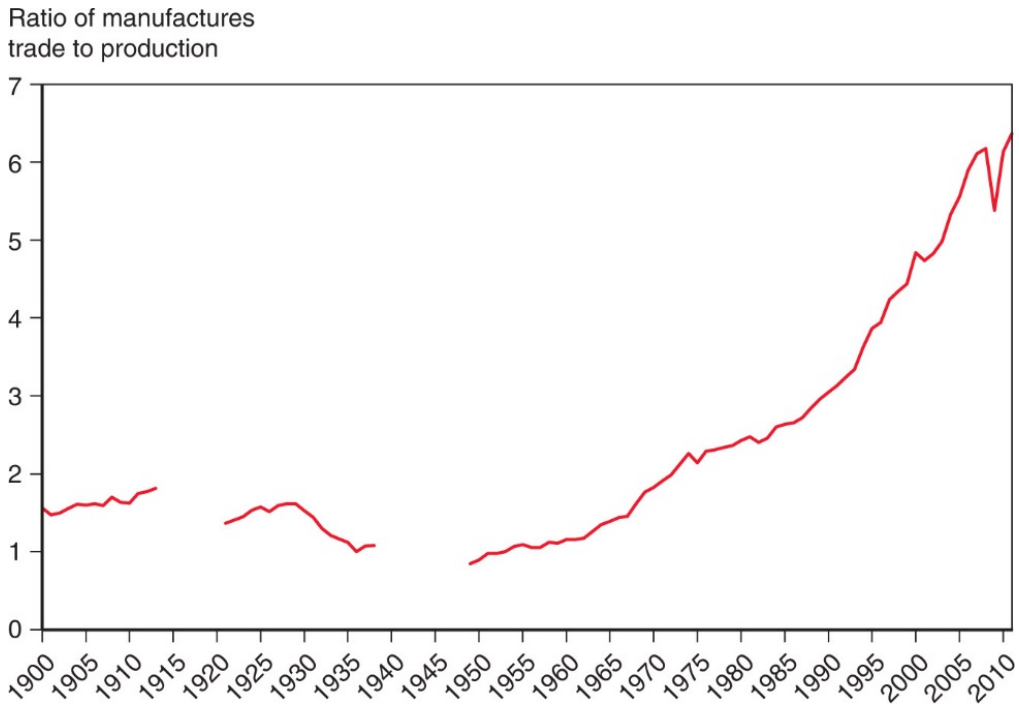
The Changing Pattern of World Trade: Has the World Gotten Smaller? (2 of 3)

- Political factors, such as wars, can change trade patterns much more than innovations in transportation and communication.
- World trade grew rapidly from 1870 to 1913.
  - Then it suffered a sharp decline due to the two world wars and the Great Depression.
  - It started to recover around 1945 but did not recover fully until around 1970.

The Changing Pattern of World Trade: Has the World Gotten Smaller? (3 of 3)

- Since 1970, world trade as a fraction of world GDP has achieved unprecedented heights.
- Vertical disintegration of production has contributed to the rise in the value of world trade through extensive cross-shipping of components.
  - A $100 product can give rise to $200 or $300 worth of international trade flows.

Figure 2.5 The Fall and Rise of World Trade



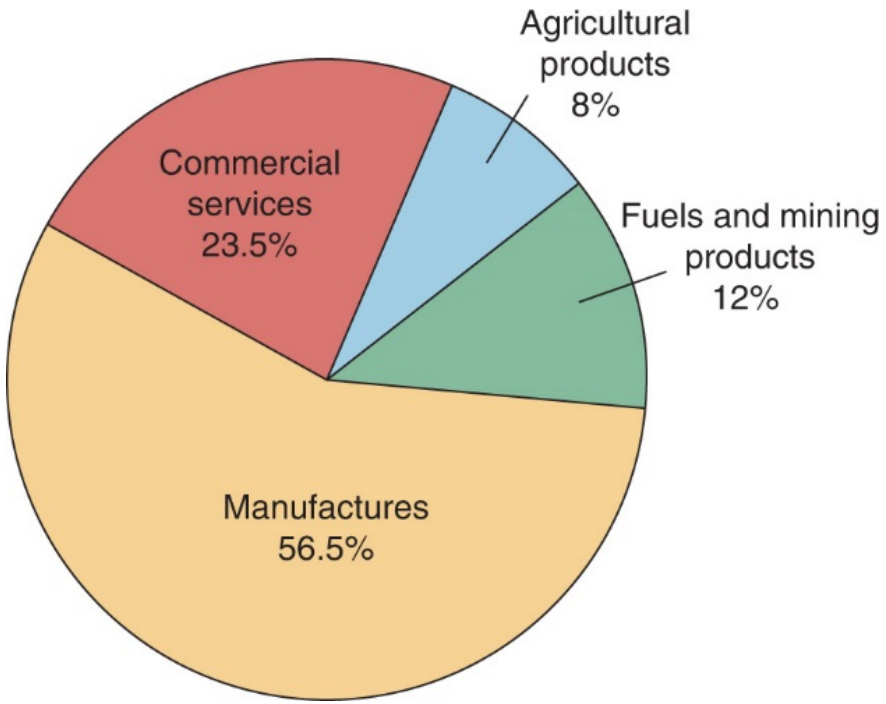
The ratio of world exports of manufactured goods to world industrial production rose in the decades before World War I but fell sharply in the face of wars and protectionism. It didn't return to 1913 levels until the 1970s but has since reached new heights.

Source: UN Monthly Bulletin of Statistics, World Trade Organization.

What Do We Trade? (1 of 3)

- What kinds of products do nations trade now, and how does this composition compare to the past?
- Most (about 57%) of the volume of trade today is in **manufactured products** such as automobiles, computers, and clothing.
  - **Services** such as shipping, insurance, legal fees, and spending by tourists account for about 24% of the volume of trade.
  - **Mineral products** (ex., petroleum, coal, copper) remain an important part of world trade at 12%
  - **Agricultural products** are a relatively small part of trade at 8%.

Figure 2.6 The Composition of World Trade, 2015



Most world trade is in manufactured goods, but minerals—mainly oil—remain important.

Source: World Trade Organization.

What Do We Trade? (2 of 3)

- In the past, a large fraction of the volume of trade came from agricultural and mineral products.
  - In 1910, Britain mainly imported agricultural and mineral products, although manufactured products still represented most of the volume of exports.
  - In 1910, the U.S. mainly imported and exported agricultural products and mineral products.
  - In 2002, manufactured products made up most of the volume of imports and exports for both countries.

Table 2.2 Manufactured Goods as a Percent of Merchandise Trade

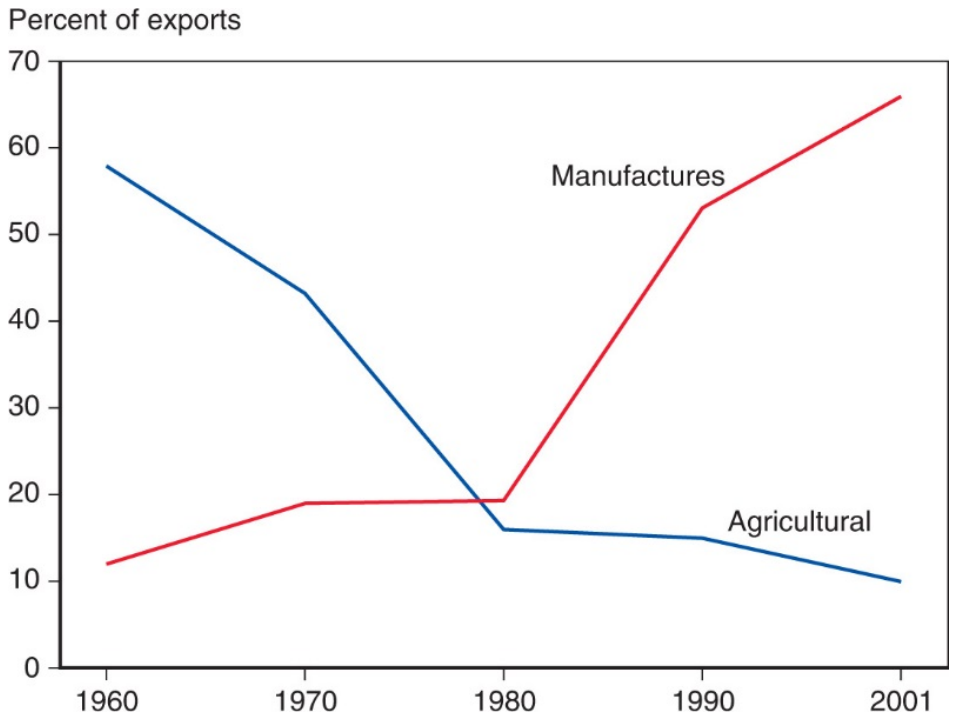
	Exports of United Kingdom	Imports of United Kingdom	Exports of United States	Imports of United States
1910	75.4	24.5	47.5	60.7
2015	72.3	73.6	74.8	78.4

Source: 1910 data from Simon Kuznets, **Modern Economic Growth: Rate, Structure and Speed.** New Haven: Yale Univ. Press, 1966. 2015 data from World Trade Organization.

What Do We Trade? (3 of 3)

- Low- and middle-income countries have also changed the composition of their trade.
  - In 2001, about 65% of exports from low- and middle-income countries were manufactured products, and only 10% of exports were agricultural products.
  - In 1960, about 58% of exports from low- and middle-income countries were agricultural products and only 12% of exports were manufactured products.
- More than 90 percent of the exports of China, the largest developing country and a rapidly growing force in world trade, consist of manufactured goods.

Figure 2.7 The Changing Composition of Developing-Country Exports



Over the past 50 years, the exports of developing countries have shifted toward manufactures.

Source: United Nations Council on Trade and Development.

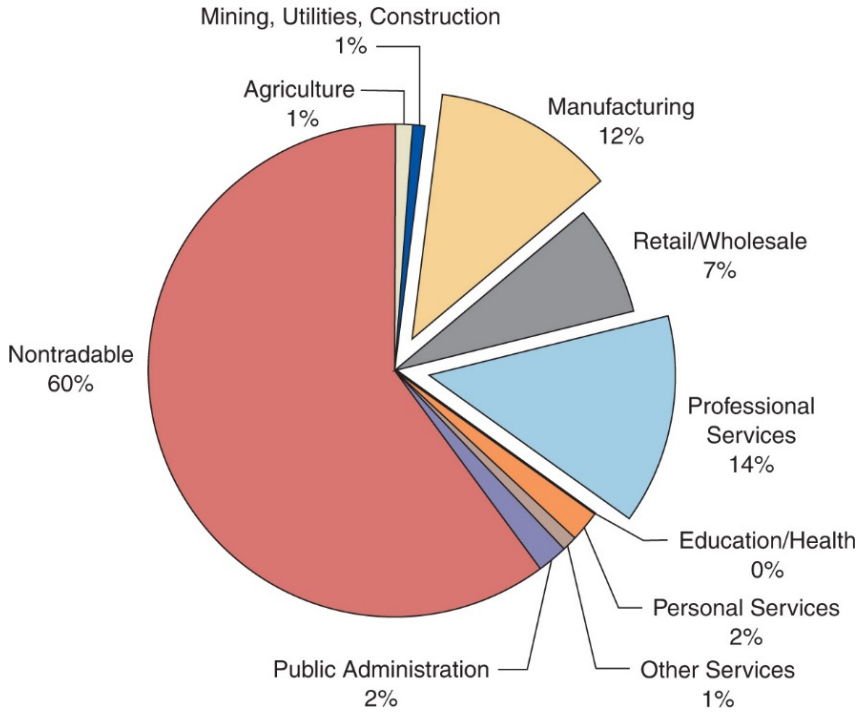
Service Outsourcing (1 of 2)

- **Service outsourcing (or offshoring)** occurs when a firm that provides services moves its operations to a foreign location.
  - Service outsourcing can occur for services that can be transmitted electronically.
    - A firm may move its customer service centers whose telephone calls can be transmitted electronically to a foreign location.
- Other services may not lend themselves to being performed remotely.

Service Outsourcing (2 of 2)

- Service outsourcing is currently not a significant part of trade.
  - Some jobs are “tradable” and thus have the **potential** to be outsourced.
  - Most jobs (about 60%) need to be done close to the customer, making them nontradable.

Figure 2.8 Tradable Industries' Share of Employment



Estimates based on trade within the United States suggest that trade in services may eventually become bigger than trade in manufactures.

Source: J. Bradford Jensen and Lori. G. Kletzer, "Tradable Services: Understanding the Scope and Impact of Services Outsourcing," Peterson Institute of Economics Working Paper 5–09, May 2005.

Summary (1 of 2)

1. The 5 largest trading partners with the U.S. are China, Canada, Mexico, Japan, and Germany.
2. The largest economies in the EU undertake the largest fraction of the total trade between the EU and the U.S.
3. The gravity model predicts that the volume of trade is directly related to the GDP of each trading partner and is inversely related to the distance between them.

Summary (2 of 2)

4. Besides size and distance, culture, geography, multinational corporations, and the existence of borders influence trade.
5. Modern transportation and communication have increased trade, but political factors have influenced trade more in history.
6. Today, most trade is in manufactured goods, while historically agricultural and mineral products made up most of trade.

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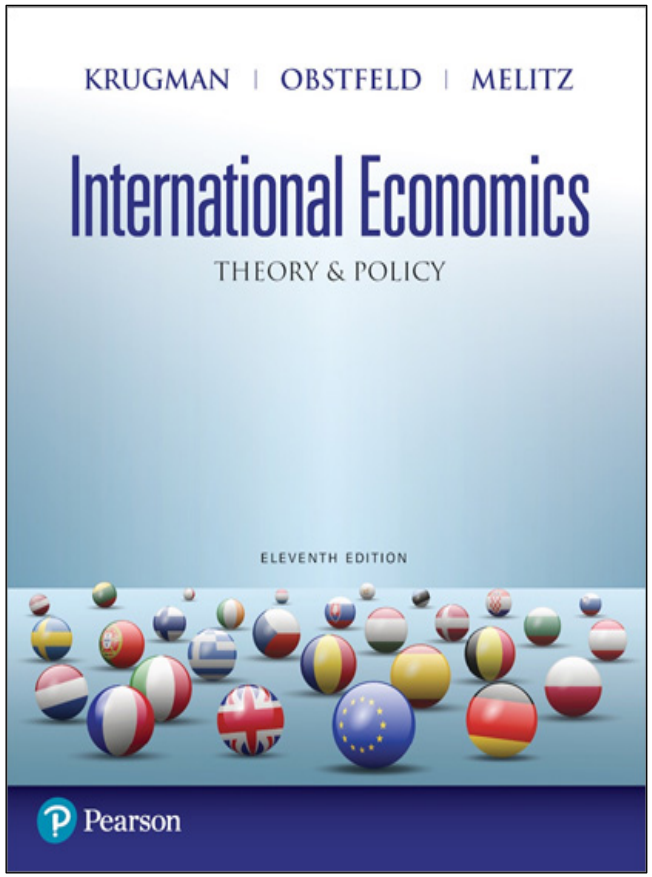


Chapter 3

Labor Productivity and Comparative Advantage: The Ricardian Model

Pearson

Learning Objectives

3.1 Explain how the **Ricardian model,** the most basic model of international trade, works and how it illustrates the principle of **comparative advantage.**

3.2 Demonstrate **gains from trade** and refute common fallacies about international trade.

3.3 Describe the empirical evidence that wages reflect productivity and that trade patterns reflect relative productivity.

Preview

- Opportunity costs and comparative advantage
- A one-factor economy, the Ricardian model
- Production possibilities
- How world relative demand and supply determine the relative price after trade
- Gains from trade; Relative wages and trade
- Misconceptions about comparative advantage
- Transportation costs and non-traded goods
- Empirical evidence

Introduction

- Differences across countries are a key reason why trade occurs:
  - The Ricardian model (Econ/Trade Chapter 3) examines differences in the **productivity of labor** (due to differences in **technology**) between countries.
  - The Specific Factors model (Econ/Trade Chapter 4) and the Heckscher-Ohlin model (Econ/Trade Chapter 5) examine differences in **labor, labor skills, physical capital, land, or other factors of production** between countries.
- Trade may also arise due to economies of scale (larger scale of production is more efficient).

The Concept of Comparative Advantage (1 of 6)

- The opportunity cost of producing something measures the cost of not being able to produce something else with the resources used.
- Comparative advantage will be determined by comparing opportunity costs across countries.

The Concept of Comparative Advantage (2 of 6)

- A simple example with roses and computers explains the intuition behind the concepts of opportunity cost and comparative advantage in the Ricardian model.
- For example, suppose a limited number of workers could produce either roses or computers.
  - The opportunity cost of producing computers is the amount of roses not produced.
  - The opportunity cost of producing roses is the amount of computers not produced.

The Concept of Comparative Advantage (3 of 6)

- Suppose that in the United States 10 million roses could be produced with the same resources as 100,000 computers.
- Suppose that in Colombia 10 million roses could be produced with the same resources as 30,000 computers.
- Colombia has a lower opportunity cost of producing roses: has to stop producing fewer computers in order to free up resources to make a rose.

The Concept of Comparative Advantage (4 of 6)

- A country has a **comparative advantage** in producing a good if the opportunity cost of producing that good is lower in the country than in other countries.
  - The United States has a comparative advantage in computer production.
  - Colombia has a comparative advantage in rose production.

The Concept of Comparative Advantage (5 of 6)

- Suppose initially that Colombia produces computers and the United States produces roses, and that both countries want to consume computers and roses.
- Can both countries be made better off?

Table 3.1 Hypothetical Changes in Production

	Million Roses	Thousand Computers
United States	−10	+100
Columbia	+10	−30
Total	**0**	**+70**

The Concept of Comparative Advantage (6 of 6)

- When countries specialize in production in which they have a comparative advantage, more goods and services can be produced and consumed.
  - Have the United States stop growing roses and use those resources to make 100,000 computers instead. Have Colombia stop making 30,000 computers and grow roses instead.
  - If produce goods in which have a comparative advantage (the United States produces computers and Colombia roses), they could still consume the same 10 million roses, but could consume 100,000 − 30,000 = 70,000 more computers.

A One-Factor Economy (1 of 4)

- We formalize these ideas by constructing a one-factor Ricardian model using the following assumptions:

A One-Factor Economy (2 of 4)

1. Labor is the only factor of production.
2. Labor productivity varies across countries due to differences in technology, but labor productivity in each country is constant.
3. The supply of labor in each country is constant.
4. Two goods: wine and cheese.
5. Competition allows workers to be paid a wage equal to the value of what they produce, and allows them to work in the industry that pays the highest wage.
6. Two countries: home and foreign.

A One-Factor Economy (3 of 4)

- A **unit labor requirement** indicates the constant number of hours of labor required to produce one unit of output.
  - a_{LC} is the unit labor requirement for cheese in the home country. a_{LC} hours of labor produce one pound of cheese in the home country.
  - a_{LW} is the unit labor requirement for wine in the home country. a_{LW} hours of labor produce one gallon of wine in the home country.
- A high unit labor requirement means low labor productivity.
  - Labor productivity is how much output one hour of labor creates.

A One-Factor Economy (4 of 4)

- Labor supply L indicates the total amount of labor resources − the number of hours worked (a constant parameter).
- a_{LC} indicates the amount of labor required for each pound of cheese produced (a constant).
- Cheese production Q_C indicates how many total pounds of cheese that the home country produces.
- a_{LW} indicates the amount of labor required for each gallon of wine produced (a constant).
- Wine production Q_W indicates how many total gallons of wine that the home country produces.

Production Possibilities (1 of 6)

- The **production possibility frontier** (PPF) of an economy shows the **maximum** amount of a goods that can be produced for a fixed amount of resources.
- The production possibility frontier of the home economy is:

$$a_{LC}Q_C + a_{LW}Q_W \leq L$$

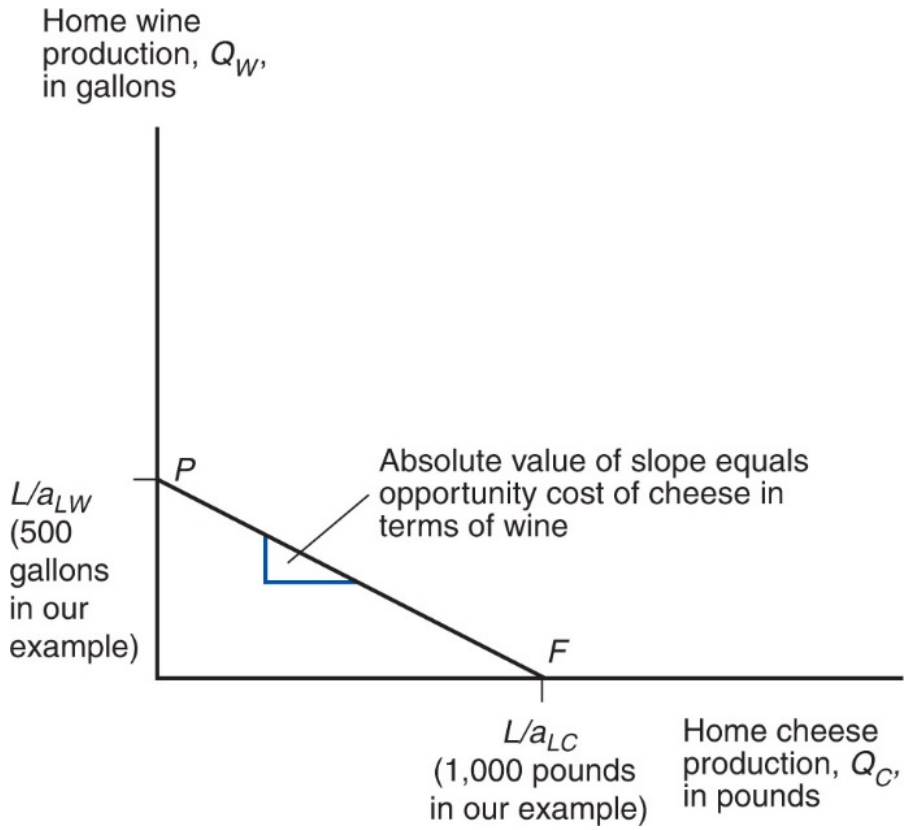
Production Possibilities (2 of 6)

- Maximum home cheese production is $Q_C = \frac{L}{a_{LC}}$ when $Q_w = 0$.
- Maximum home wine production is $Q_w = \frac{L}{a_{Lw}}$ when $Q_c = 0$.

Production Possibilities (3 of 6)

- For example, suppose that the home economy's labor supply is 1,000 hours.
  - a_{LC} = 1 hours/lb, so 1 hour of labor produces one pound of cheese in the home country.
  - a_{LW} = 2 hours/gallon, so 2 hours of labor produces one gallon of wine in the home country.
- The PPF equation $a_{LC}Q_C + a_{LW}Q_W \leq L$ becomes $Q_C + 2Q_W \leq 1{,}000$.
- Maximum cheese production is 1,000 pounds.
- Maximum wine production is 500 gallons.

Figure 3.1 Home's Production Possibility Frontier



The line *PF* shows the maximum amount of cheese Home can produce given any production of wine, and vice versa.

Pearson

Production Possibilities (4 of 6)

- The opportunity cost of cheese is how many gallons of wine Home must stop producing in order to make one more pound of cheese: $\frac{a_{LC}}{a_{LW}}$
  - The opportunity cost is constant because the unit labor requirements are both constant.
  - The opportunity cost of cheese appears as the absolute value of the slope of the PPF.

$$Q_w = \frac{L}{a_{Lw}} - \left(\frac{a_{LC}}{a_{Lw}}\right) Q_C$$

Production Possibilities (5 of 6)

- Producing an additional pound of cheese requires a_{LC} hours of labor.
- **Each** hour devoted to cheese production could have been used instead to produce an amount of wine equal to

$$1 \text{ hour}/(a_{LW} \text{ hours/gallon of wine}) = \left(\frac{1}{a_{LW}}\right) \text{ gallons of wine}$$

Production Possibilities (6 of 6)

- For example, if 1 hour of labor is moved to cheese production, that additional hour could have produced

$$1 \text{ hour}/(2 \text{ hours/gallon of wine}) = \left(\frac{1}{2}\right) \text{ gallon of wine.}$$

- Opportunity cost of producing one pound of cheese is $\frac{1}{2}$ gallon of wine not produced.

Relative Prices and Supply (1 of 7)

- P_C is the price of cheese; P_W is the price of wine.
- w_C is the wage paid to workers who make cheese, and w_W is the wage paid to workers who make wine.
- Due to competition in the labor and goods markets:
  - Hourly wages of cheese makers will equal the value of the cheese produced in an hour: $W_C = \frac{P_C}{a_{LC}}$
  - Hourly wages of wine makers will equal the value of the wine produced in an hour: $W_w = \frac{P_w}{a_{Lw}}$

Relative Prices and Supply (2 of 7)

- Workers will choose to work in the industry that pays the higher wage.
- If the price of cheese relative to the price of wine exceeds the opportunity cost of producing cheese

$$\frac{P_C}{P_W} > \frac{a_{LC}}{a_{LW}},$$

  - Then the wage paid when making cheese will exceed the wage in wine

$$W_C = \frac{P_C}{a_{LC}} > \frac{P_W}{a_{LW}} = W_W$$

  - So workers will make only cheese (the economy specializes in cheese production).

Relative Prices and Supply (3 of 7)

- If the price of cheese relative to the price of wine is less than the opportunity cost of producing cheese

$$\frac{P_C}{P_W} < \frac{a_{LC}}{a_{LW}},$$

  - Then the wage in cheese will be less than the wage in wine

$$W_C = \frac{P_C}{a_{LC}} < \frac{P_W}{a_{LW}} = W_W$$

  - So workers will make only wine (the economy specializes in wine production).

Relative Prices and Supply (4 of 7)

- If the price of cheese relative to the price of wine equals the opportunity cost of producing cheese

$$\frac{P_C}{P_W} = \frac{a_{LC}}{a_{LW}},$$

  - Then the wage in cheese will equal the wage in wine

$$W_C = \frac{P_C}{a_{LC}} = \frac{P_W}{a_{LW}} = W_W$$

  - So workers will be willing to make both wine and cheese.

Relative Prices and Supply (5 of 7)

- For example, suppose cheese sells for P_C = \$4/pound and wine sells for P_W = \$7/gallon.
  - Wage paid producing cheese is

$$\frac{P_C}{a_{LC}} = (\$4/\text{pound})(1 \text{ pound/hour}) = \$4/\text{hour}.$$

  - Wage paid producing wine is

$$\frac{P_w}{a_{Lw}} = (\$7/\text{gallon})\left(\frac{1}{2} \text{ gallon/hour}\right) = \$3.50/\text{hour}.$$

  - Workers would be willing to make only cheese (the relative price of cheese $\frac{4}{7}$ exceeds the opportunity cost of cheese of $\frac{1}{2}$).

Relative Prices and Supply (6 of 7)

- If the price of cheese drops to P_C = \$3/pound:
  - Wage paid producing cheese drops to

$$\frac{P_C}{a_{LC}} = (\$3/\text{pound})(1 \text{ pound/hour}) = \$3/\text{hour}.$$

  - Wage paid producing wine is still \$3.50/hour if price of wine is still \$7/gallon.
  - Now workers would be willing to make only wine (the relative price of cheese $\frac{3}{7}$ is now less than the opportunity cost of cheese $\frac{1}{2}$).

Relative Prices and Supply (7 of 7)

- If the home country wants to consume both wine and cheese (in the absence of international trade), relative prices must adjust so that wages are equal in the wine and cheese industries.
  - If $\frac{P_C}{a_{LC}} = \frac{P_W}{a_{LW}}$ workers will not care whether they work in the cheese industry or the wine industry, so that production of both goods can occur.
  - Production (and consumption) of both goods occurs when the relative price of a good equals the opportunity cost of producing that good:

$$\frac{P_C}{P_W} = \frac{a_{LC}}{a_{LW}}$$

Trade in the Ricardian Model (1 of 4)

- Use "*" to indicate foreign country variables.
- When one country can produce a unit of a good with less labor than another country, we say that the first country has an **absolute advantage** in producing that good.
- If $a_{LC} < a^*_{LC}$, Home labor is more efficient than Foreign in producing cheese.
- Does that guarantee that Home should export cheese?

Trade in the Ricardian Model (2 of 4)

- Comparative advantage, not absolute advantage, determines the pattern of trade (more about this distinction later).
- Suppose that the home country has a comparative advantage in cheese production: its opportunity cost of producing cheese is lower than in the foreign country.

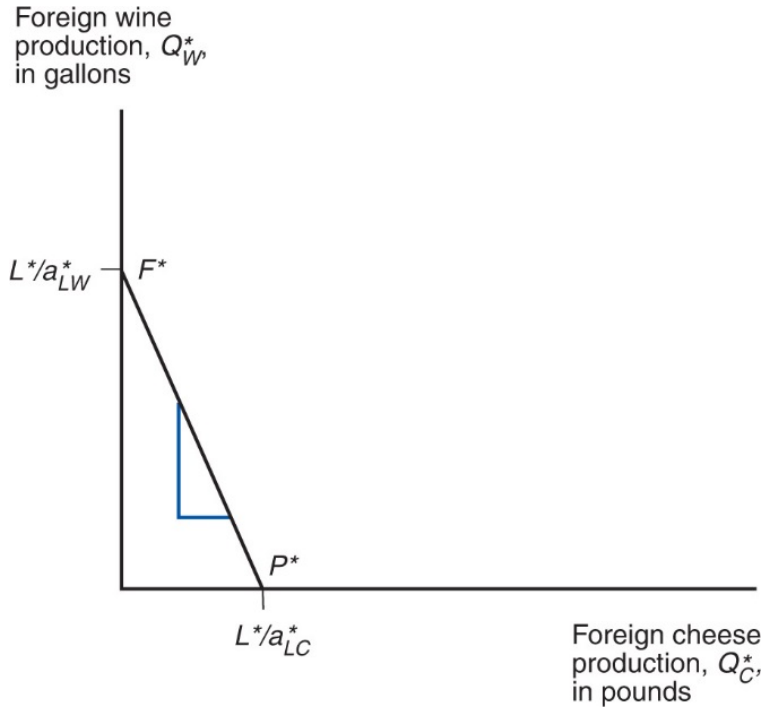
$$\frac{a_{LC}}{a_{LW}} = \frac{a^*_{LC}}{a^*_{Lw}}$$

  - When the home country increases cheese production, it reduces wine production less than the foreign country would.

Trade in the Ricardian Model (3 of 4)

- Since the slope of the PPF indicates the opportunity cost of cheese in terms of wine, Foreign's PPF is steeper than Home's.
  - To produce one pound of cheese, must stop producing more gallons of wine in Foreign than in Home.

Figure 3.2 Foreign's Production Possibility Frontier



Because Foreign's relative unit labor requirement in cheese is higher than Home's (it needs to give up many more units of wine to produce one more unit of cheese), its production possibility frontier is steeper.

Trade in the Ricardian Model (4 of 4)

- Before any trade occurs, the relative price of cheese to wine reflects the opportunity cost of cheese in terms of wine in each country.
- In the absence of any trade, the relative price of cheese to wine will be higher in Foreign than in Home if Foreign has the higher opportunity cost of cheese.
- It will be profitable to ship cheese from Home to Foreign (and wine from Foreign to Home) – where does the relative price of cheese to wine settle?

Determining the Relative Price after Trade (1 of 8)

- To see how all countries can benefit from trade, need to find relative prices when trade exists.
- First calculate the world **relative supply** of cheese: the quantity of cheese supplied by all countries relative to the quantity of wine supplied by all countries

$$RS = \frac{Q_C + Q^*_C}{Q_W + Q^*_W}$$

Determining the Relative Price after Trade (2 of 8)

- If the relative price of cheese falls below the opportunity cost of cheese in both countries

$$\frac{P_C}{P_W} < \frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{Lw}},$$

  - No cheese would be produced.
  - Domestic and foreign workers would be willing to produce only wine (where wage is higher).

Determining the Relative Price after Trade (3 of 8)

- When the relative price of cheese equals the opportunity cost in the home country

$$\frac{P_C}{P_W} = \frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{Lw}},$$

  - Domestic workers are indifferent about producing wine or cheese (wage when producing wine same as wage when producing cheese).
  - Foreign workers produce only wine.

Determining the Relative Price after Trade (4 of 8)

- When the relative price of cheese settles strictly in between the opportunity costs of cheese

$$\frac{a_{LC}}{a_{LW}} < \frac{P_C}{P_W} < \frac{a^*_{LC}}{a^*_{Lw}},$$

  - Domestic workers produce only cheese (where their wages are higher).
  - Foreign workers still produce only wine (where their wages are higher).
  - World relative supply of cheese equals Home's maximum cheese production divided by Foreign's maximum wine production

$$\frac{L/a_{LC}}{L^*/a^*_{LW}}.$$

Determining the Relative Price after Trade (5 of 8)

- When the relative price of cheese equals the opportunity cost in the foreign country

$$\frac{a_{LC}}{a_{LW}} < \frac{P_C}{P_W} = \frac{a^*_{LC}}{a^*_{Lw}},$$

  - Foreign workers are indifferent about producing wine or cheese (wage when producing wine same as wage when producing cheese).
  - Domestic workers produce only cheese.

Determining the Relative Price after Trade (6 of 8)

- If the relative price of cheese rises above the opportunity cost of cheese in both countries

$$\frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{Lw}} < \frac{P_C}{P_W},$$

  - No wine is produced.
  - Domestic and foreign workers are willing to produce only cheese (where wage is higher).

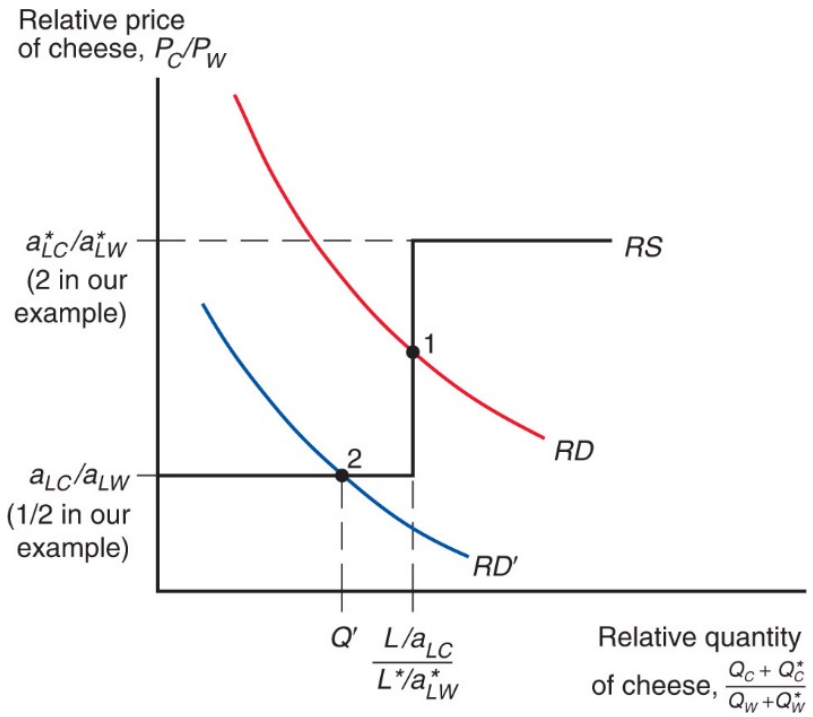
Determining the Relative Price after Trade (7 of 8)

- World relative supply is a step function:
  - First step at relative price of cheese equal to Home's opportunity cost $\frac{a_{LC}}{a_{LW}}$, which equals $\frac{1}{2}$ in the example.
  - Jumps when world relative supply of cheese equals Home's maximum cheese production divided by Foreign's maximum wine production $\frac{L/a_{LC}}{L^*/a^*_{LW}}$, which equals 1 in the example.
  - Second step at relative price of cheese equal to Foreign's opportunity cost $\frac{a^*_{LC}}{a^*_{LW}}$, which equals 2 in the example.

Determining the Relative Price after Trade (8 of 8)

- Relative demand of cheese is the quantity of cheese demanded in all countries relative to the quantity of wine demanded in all countries.
- As the price of cheese relative to the price of wine rises, consumers in all countries will tend to purchase less cheese and more wine so that the relative quantity demanded of cheese falls.

Figure 3.3 World Relative Supply and Demand



The *RD* and *RD*' curves show that the demand for cheese relative to wine is a decreasing function of the price of cheese relative to that of wine, while the *RS* curve shows that the supply of cheese relative to wine is an increasing function of the same relative price.

Pearson

Gains from Trade (1 of 4)

- Gains from trade come from specializing in the type of production which uses resources most efficiently, and using the income generated from that production to buy the goods and services that countries desire.
  - "Using resources most efficiently" means producing a good in which a country has a comparative advantage.

Gains from Trade (2 of 4)

- Domestic workers earn a higher income from cheese production because the relative price of cheese increases with trade.
- Foreign workers earn a higher income from wine production because the relative price of cheese decreases with trade (making cheese cheaper) and the relative price of wine increases with trade.

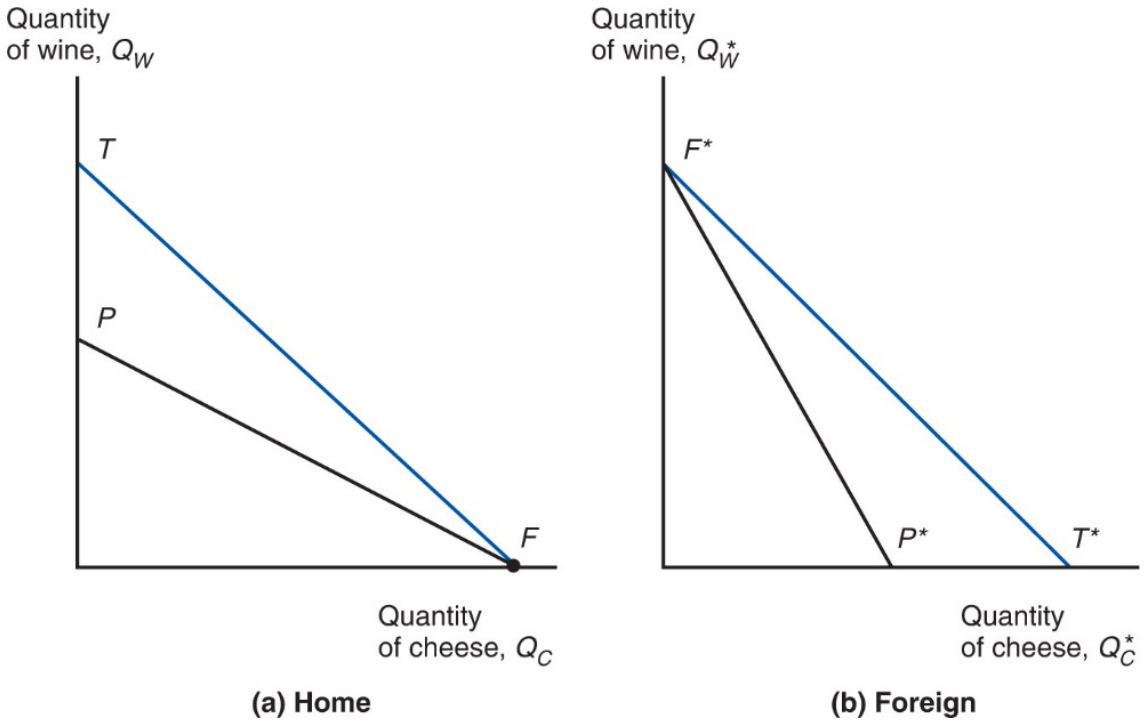
Gains from Trade (3 of 4)

- Think of trade as an indirect method of production that converts cheese into wine or vice versa.
- Without trade, a country has to allocate resources to produce all of the goods that it wants to consume.
- With trade, a country can specialize its production and exchange for the mix of goods that it wants to consume.

Gains from Trade (4 of 4)

- Consumption possibilities expand beyond the production possibility frontier when trade is allowed.
- With trade, consumption in each country is expanded because world production is expanded when each country specializes in producing the good in which it has a comparative advantage.

Figure 3.4 Trade Expands Consumption Possibilities



International trade allows Home and Foreign to consume anywhere within the colored lines, which lie outside the countries' production frontiers.

A Numerical Example (1 of 5)

Unit labor requirements	Cheese	Wine
Home	$a_{LC} = 1$ hour/lb	$a_{LW} = 2$ hours/gallon
Foreign	$a^*_{LC} = 6$ hours/lb	$a^*_{LW} = 3$ hours/gallon

- What is the home country's opportunity cost of producing cheese? $\frac{a_{LC}}{a_{LW}} = \frac{1}{2}$, to produce one pound of cheese, stop producing $\frac{1}{2}$ gallon of wine.

A Numerical Example (2 of 5)

- The home country is more efficient in both industries, but has a comparative advantage only in cheese production.

$$\frac{1}{2} = \frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{LW}} = 2$$

- The foreign country is less efficient in both industries, but has a comparative advantage in wine production.

A Numerical Example (3 of 5)

- With trade, the equilibrium relative price of cheese to wine settles between the two opportunity costs of cheese.
- Suppose that the intersection of RS and RD occurs at $\frac{P_C}{P_W} = 1$ so one pound of cheese trades for one gallon of wine.
- Trade causes the relative price of cheese to rise in the home country and fall in foreign.

A Numerical Example (4 of 5)

- With trade, the foreign country can buy one pound of cheese for $\frac{P_C}{P_W}$ = one gallon of wine,
  - instead of stopping production of $\frac{a^*_{LC}}{a^*_{LW}}$ = 2 gallons of wine to free up enough labor to produce one pound of cheese in the absence of trade.
  - Suppose L^* = 3,000. The foreign country can trade its 1,000 gallons maximum production of wine for 1,000 pounds of cheese, instead of the 500 pounds of cheese it could produce itself.

A Numerical Example (5 of 5)

- With trade, the home country can buy one gallon of wine for $\frac{P_W}{P_C}$ = one pound of cheese,
  - instead of stopping production of $\frac{a_{LW}}{a_{LC}}$ = 2 pounds of cheese to free up enough labor to produce one gallon of wine in the absence of trade.
- The home country can trade its 1,000 pounds maximum production of cheese for 1,000 gallons of wine, instead of the 500 gallons of wine it could produce itself.

Relative Wages (1 of 5)

- **Relative wages** are the wages of the home country relative to the wages in the foreign country.
- Productivity (technological) differences determine relative wage differences across countries.
- The home wage relative to the foreign wage will settle in between the ratio of how much better Home is at making cheese and how much better it is at making wine compared to Foreign.
- Relative wages cause Home to have a cost advantage in only cheese and Foreign to have a cost advantage in only wine.

Relative Wages (2 of 5)

- Suppose that P_C = \$12/pound and P_W = \$12/gallon.
- Since domestic workers specialize in cheese production after trade, their hourly wages will be

$$\frac{P_C}{a_{LC}} = \frac{\$12}{1} = \$12$$

- Since foreign workers specialize in wine production after trade, their hourly wages will be

$$\frac{P_W}{a^*_{LW}} = \frac{\$12}{3} = \$4$$

- The relative wage of domestic workers is therefore

$$\frac{\$12}{\$4} = 3$$

Relative Wages (3 of 5)

- The relative wage lies between the ratio of the productivities in each industry.
  - The home country is $\frac{6}{1} = 6$ times as productive in cheese production, but only $\frac{3}{2} = 1.5$ times as productive in wine production.
  - The home country has a wage 3 times higher than the foreign country.

Relative Wages (4 of 5)

- These relationships imply that both countries have a **cost advantage** in production.
  - High wages can be offset by high productivity.
  - Low productivity can be offset by low wages.
- In the home economy, producing one pound of cheese costs $12 (one worker paid $12/hr) but would have cost $24 (six paid $4/hr) in Foreign.
- In the foreign economy, producing one gallon of wine costs $12 (three workers paid $4/hr) but would have cost $24 (two paid $12/hr) in Home.

Relative Wages (5 of 5)

- Because foreign workers have a wage that is only $\frac{1}{3}$ the wage of domestic workers, they are able to attain a cost advantage in wine production, despite low productivity.
- Because domestic workers have a productivity that is 6 times that of foreign workers in cheese production, they are able to attain a cost advantage in cheese production, despite high wages.

Do Wages Reflect Productivity? (1 of 2)

- Do relative wages reflect relative productivities of the two countries?
- Evidence shows that low wages are associated with low productivity.
  - Wage of most countries relative to the U.S. is similar to their productivity relative to the U.S.

Productivity and Wages

A country's wage rate is roughly proportional to the country's productivity

Source: International Monetary Fund and The Conference Board.

Pearson

Do Wages Reflect Productivity? (2 of 2)

- Other evidence shows that wages rise as productivity rises.
  - As recently as 1975, wages in South Korea were only 5% of those of the United States.
  - As South Korea's labor productivity rose (to about half of the U.S. level by 2007), so did its wages.

Misconceptions about Comparative Advantage (1 of 3)

1. Free trade is beneficial only if a country is more productive than foreign countries.
   - But even an unproductive country benefits from free trade by avoiding the high costs for goods that it would otherwise have to produce domestically.
   - High costs derive from inefficient use of resources.
   - The benefits of free trade do not depend on absolute advantage, rather they depend on comparative advantage: specializing in industries that use resources most efficiently.

Misconceptions about Comparative Advantage (2 of 3)

2. Free trade with countries that pay low wages hurts high wage countries.
   - While trade may reduce wages for **some** workers, thereby affecting the distribution of income within a country, trade benefits consumers and other workers.
   - Consumers benefit because they can purchase goods more cheaply.
   - Producers/workers benefit by earning a higher income in the industries that use resources more efficiently, allowing them to earn higher prices and wages.

Misconceptions about Comparative Advantage (3 of 3)

3. Free trade exploits less productive countries whose workers make low wages.
   - While labor standards in some countries are less than exemplary compared to Western standards, they are so with or without trade.
   - Are high wages and safe labor practices alternatives to trade? Deeper poverty and exploitation may result without export production.
   - Consumers benefit from free trade by having access to cheaply (efficiently) produced goods.
   - Producers/workers benefit from having higher profits/ wages—higher compared to the alternative.

Comparative Advantage with Many Goods (1 of 7)

- Suppose now there are N goods produced, indexed by i = 1,2,…N.
- The home country's unit labor requirement for good i is a_{Li}, and the corresponding foreign unit labor requirement is a^*_{Li}.
- Goods will be produced wherever cheapest to produce them.

Comparative Advantage with Many Goods (2 of 7)

- Let w represent the wage rate in the home country and w^* represent the wage rate in the foreign country.
  - If $wa_{L1} < w^*a^*_{L1}$ then only the home country will produce good 1, since total wage payments are less there.
  - Or equivalently, $\frac{a^*_{L1}}{a_{L1}} > \frac{w}{w^*}$, if the relative productivity of a country in producing a good is higher than the relative wage, then the good will be produced in that country.

Table 3.2 Home and Foreign Unit Labor Requirements

Good	Home Unit Labor Requirement a_{Li}	Foreign Unit Labor Requirement a_{Li}^*	Relative Home Productivity Advantage a_{Li}^*/a_{Li}
Apples	1	10	10
Bananas	5	40	8
Caviar	3	12	4
Dates	6	12	2
Enchiladas	12	9	0.75

Comparative Advantage with Many Goods (3 of 7)

- Suppose there are 5 goods produced in the world: apples, bananas, caviar, dates, and enchiladas.
- If $\frac{w}{w^*} = 3$, the home country will produce apples, bananas, and caviar, while the foreign country will produce dates and enchiladas.
  - The relative productivities of the home country in producing apples, bananas, and caviar are higher than the relative wage.

Comparative Advantage with Many Goods (4 of 7)

- If each country specializes in goods that use resources productively and trades the products for those that it wants to consume, then each benefits.
  - If a country tries to produce all goods for itself, resources are “wasted”.
- The home country has high productivity in apples, bananas, and caviar that give it a cost advantage, despite its high wage.
- The foreign country has low wages that give it a cost advantage, despite its low productivity in date production.

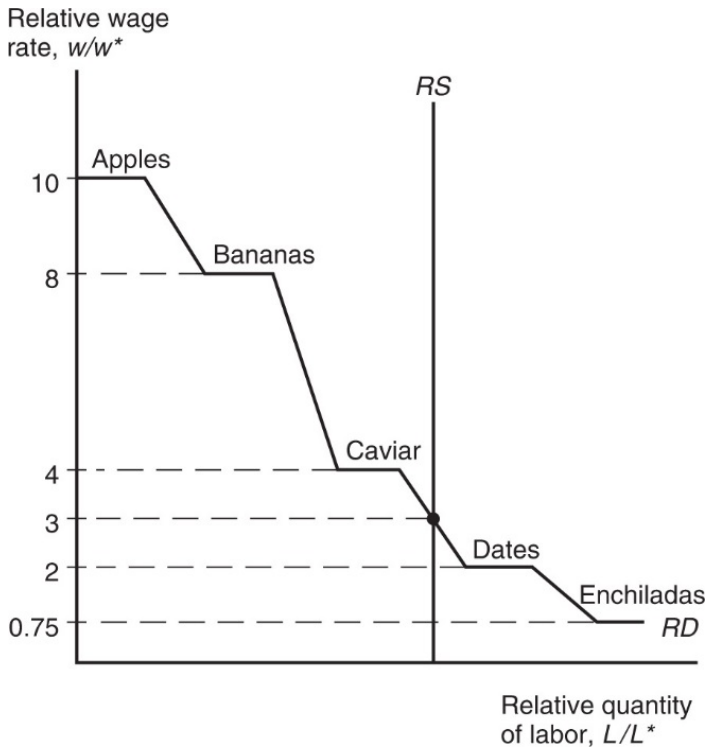
Comparative Advantage with Many Goods (5 of 7)

- How is the relative wage determined?
- By the relative supply of and relative (derived) demand for labor services.
- The relative (derived) demand for home labor services falls when $\frac{w}{w^*}$ rises. As domestic labor services become more expensive relative to foreign labor services,
  - goods produced in the home country become more expensive, and demand for these goods and the labor services to produce them falls.
  - fewer goods will be produced in the home country, further reducing the demand for domestic labor services.

Comparative Advantage with Many Goods (6 of 7)

- Suppose $\frac{w}{w^*}$ increases from 3 to 3.99:
  - The home country would produce apples, bananas, and caviar, but the demand for these goods and the labor to produce them would fall as the relative wage rises.
- Suppose $\frac{w}{w^*}$ increases from 3.99 to 4.01:
  - Caviar is now too expensive to produce in the home country, so the caviar industry moves to the foreign country, causing a discrete (abrupt) drop in the demand for domestic labor services.
- Consider similar effects as $\frac{w}{w^*}$ rises from 0.75 to 10.

Figure 3.5 Determination of Relative Wages



In a many-good Ricardian model, relative wages are determined by the intersection of the derived relative demand curve for labor, *RD*, with the relative supply, *RS*.

Comparative Advantage with Many Goods (7 of 7)

- Finally, suppose that relative supply of labor is independent of $\frac{w}{w^*}$ and is fixed at an amount determined by the populations in the home and foreign countries.

Transportation Costs and Non-traded Goods (1 of 2)

- The Ricardian model predicts that countries completely specialize in production.
- But this rarely happens for three main reasons:
  1. More than one factor of production reduces the tendency of specialization (Econ/Trade Chapters 4-5).
  2. Protectionism (Econ/Trade Chapters 9–12).
  3. Transportation costs reduce or prevent trade, which may cause each country to produce the same good or service.

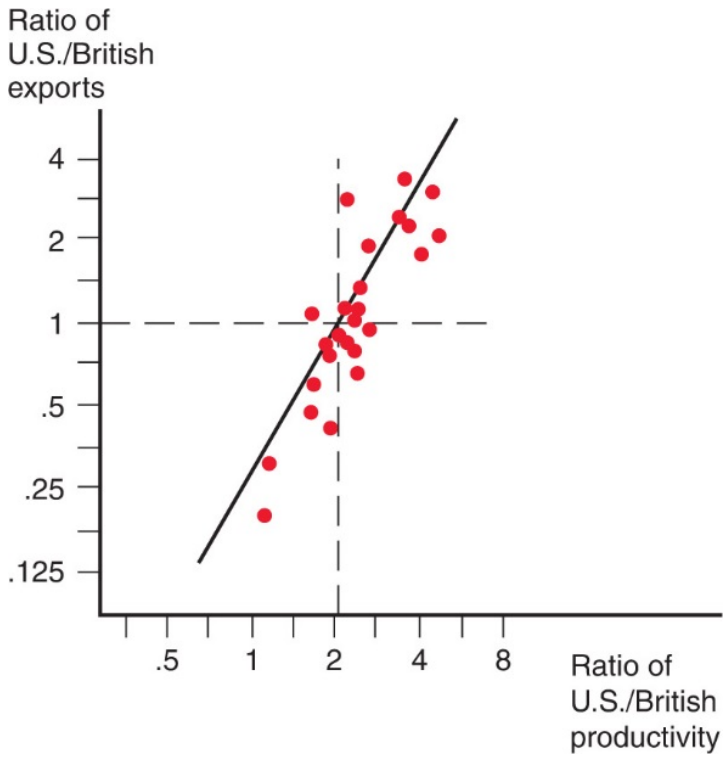
Transportation Costs and Non-traded Goods (2 of 2)

- Nontraded goods and services (ex., haircuts and auto repairs) exist due to high transport costs.
  - Countries tend to spend a large fraction of national income on nontraded goods and services.
  - This fact has implications for the gravity model and for models that consider how income transfers across countries affect trade.

Empirical Evidence (1 of 3)

- Do countries export those goods in which their productivity is relatively high?
- 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.

Figure 3.6 Productivity and Exports



A comparative study showed that U.S. exports were high relative to British exports in industries in which the United States had high relative labor productivity. Each dot represents a different industry.

Pearson

Empirical Evidence (2 of 3)

- A very poor country like Bangladesh can have comparative advantage in clothing despite being less productive in clothing than other countries such as China because it is even less productive compared to China in other sectors.
  - Productivity (output per worker) in Bangladesh is only 28 percent of China's on average.
  - In apparel, productivity in Bangladesh was about 77 percent of China's, creating strong comparative advantage in apparel for Bangladesh.

Table 3.3 Bangladesh versus China, 2011

	Bangladeshi Output per Worker as % of China	Bangladeshi exports as a % of China
All industries	28.5	1.0
Apparel	77	15.5

Source: McKinsey and Company, "Bangladesh's ready-made garments industry: The challenge of growth," 2012; UN Monthly Bulletin of Statistics.

Empirical Evidence (3 of 3)

- The main implications of the Ricardian model are well supported by empirical evidence:
  - productivity differences play an important role in international trade
  - comparative advantage (not absolute advantage) matters for trade

Summary (1 of 2)

1. Differences in the productivity of labor across countries generate comparative advantage.
2. A country has a comparative advantage in producing a good when its opportunity cost of producing that good is lower than in other countries.
3. Countries export goods in which they have a comparative advantage - high productivity **or** low wages give countries a cost advantage.

Summary (2 of 2)

4. With trade, the relative price settles in between what the relative prices were in each country before trade.
5. Trade benefits all countries due to the relative price of the exported good rising: income for workers who produce exports rises, and imported goods become less expensive.
6. Empirical evidence supports trade based on comparative advantage, although transportation costs and other factors prevent complete specialization in production.

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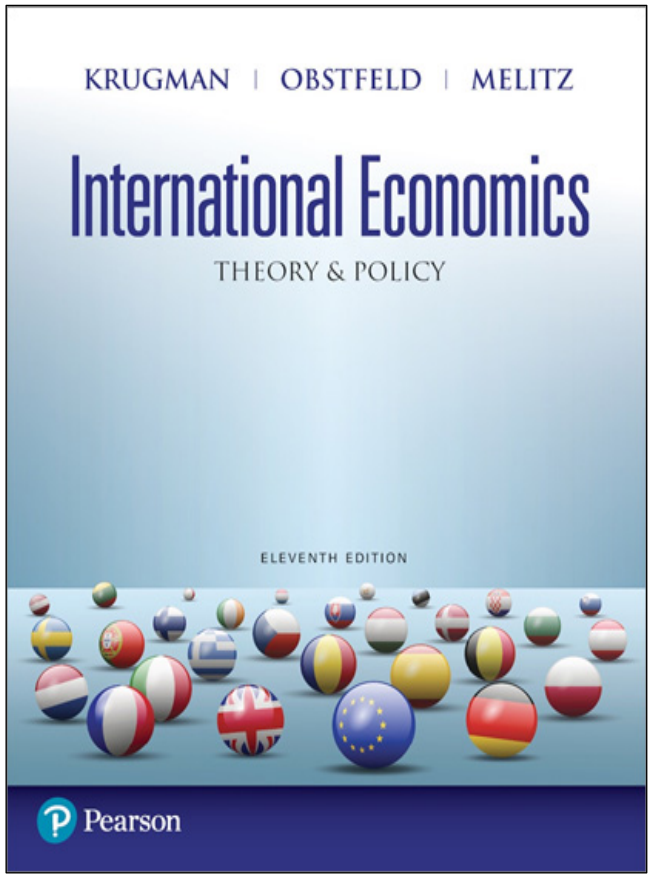
Eleventh Edition



Chapter 4

Specific Factors and Income Distribution

Pearson

Learning Objectives

4.1 Understand how a mobile factor will respond to price changes by moving across sectors.

4.2 Explain why trade will generate both winners and losers in the short run.

4.3 Understand the meaning of gains from trade when there are losers.

4.4 Discuss the reasons why trade is a politically contentious issue.

4.5 Explain the arguments in favor of free trade despite the existence of losers.

Preview

- Introduction
- The Specific Factors Model
- International Trade in the Specific Factors Model
- Income Distribution and the Gains from Trade
- Political Economy of Trade: A Preliminary View
- International Labor Mobility
- Summary

Introduction

- If trade is so good for the economy, why is there such opposition?
- Two main reasons why international trade has strong effects on the distribution of income within a country:
  - Resources cannot move immediately or costlessly from one industry to another.
  - Industries differ in the factors of production they demand.

The Specific Factors Model (1 of 4)

- The **specific factors model** allows trade to affect income distribution.
- Assumptions of the model:
  - Two goods, cloth and food.
  - Three factors of production: labor (*L*), capital (*K*) and land (*T* for terrain).
  - Perfect competition prevails in all markets.

The Specific Factors Model (2 of 4)

- Cloth produced using capital and labor (but not land).
- Food produced using land and labor (but not capital).
- Labor is a mobile factor that can move between sectors.
- Land and capital are both specific factors used only in the production of one good.

The Specific Factors Model (3 of 4)

- How much of each good does the economy produce?
- The production function for cloth gives the quantity of cloth that can be produced given any input of capital and labor:

$$Q_C = Q_C\left(K, L_C\right)$$

  - Q_C is the output of cloth
  - K is the capital stock
  - L_C is the labor force employed in cloth

The Specific Factors Model (4 of 4)

- The production function for food gives the quantity of food that can be produced given any input of land and labor:

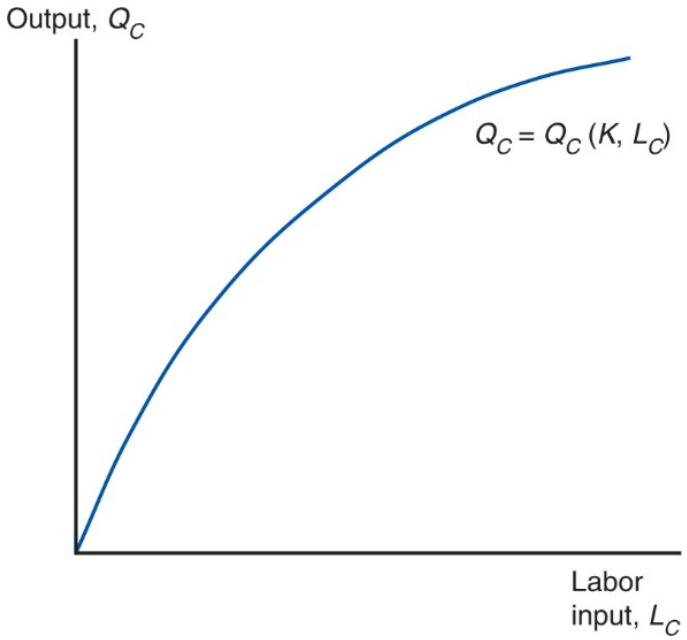
$$Q_F = Q_F\left(T, L_F\right)$$

  - Q_F is the output of food
  - T is the supply of land
  - L_F is the labor force employed in food

Production Possibilities (1 of 6)

- How does the economy's mix of output change as labor is shifted from one sector to the other?
- When labor moves from food to cloth, food production falls while output of cloth rises.
- Figure 4.1 illustrates the production function for cloth.

Figure 4.1 The Production Function for Cloth

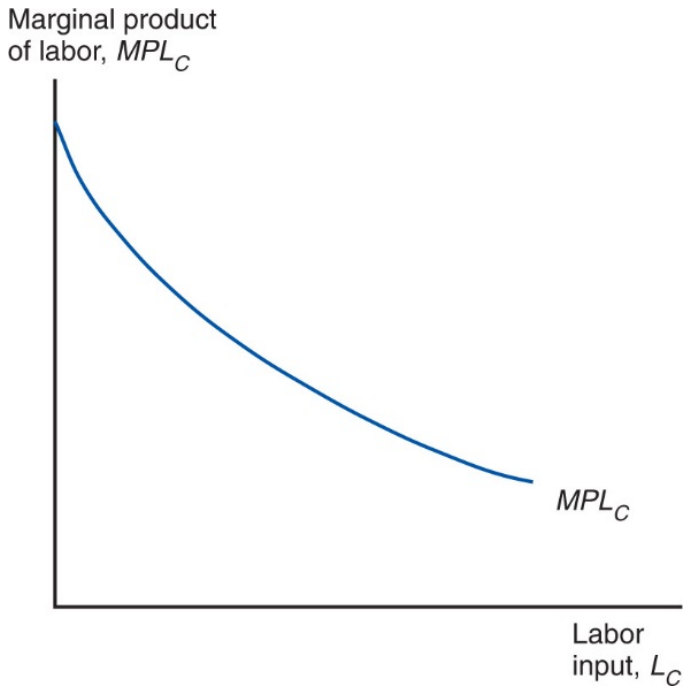


The more labor employed in the production of cloth, the larger the output. As a result of diminishing returns, however, each successive person-hour increases output by less than the previous one; this is shown by the fact that the curve relating labor input to output gets flatter at higher levels of employment.

Production Possibilities (2 of 6)

- The shape of the production function reflects the law of **diminishing marginal returns**.
  - Adding one worker to the production process (without increasing the amount of capital) means that each worker has less capital to work with.
  - Therefore, each additional unit of labor adds less output than the last.
- Figure 4.2 shows the **marginal product of labor,** which is the increase in output that corresponds to an extra unit of labor.

Figure 4.2 The Marginal Product of Labor



The marginal product of labor in the cloth sector, equal to the slope of the production function shown in Figure 4.1, is lower the more labor the sector employs.

Production Possibilities (3 of 6)

- For the economy as a whole, the total labor employed in cloth and food must equal the total labor supply:

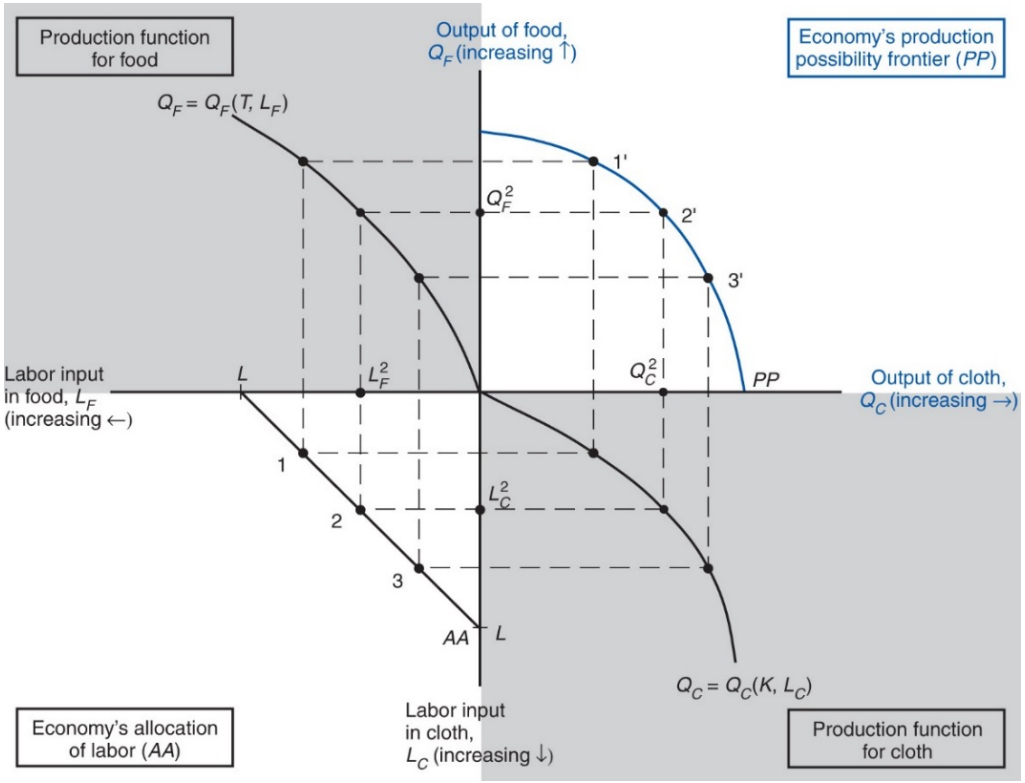
$$L_C + L_F = L$$

- Use these equations to derive the **production possibilities frontier** of the economy.

Production Possibilities (4 of 6)

- Use a four-quadrant diagram to construct production possibilities frontier in Figure 4.3.
  - Lower left quadrant indicates the allocation of labor.
  - Lower right quadrant shows the production function for cloth from Figure 4.1.
  - Upper left quadrant shows the corresponding production function for food.
  - Upper right quadrant indicates the combinations of cloth and food that can be produced.

Figure 4.3 The Production Possibility Frontier in the Specific Factors Model



PP in the upper-right quadrant shows the economy's production possibilities for given supplies of land, labor, and capital. Due to diminishing returns, *PP* is a bowed-out curve instead of a straight line.

Pearson

Production Possibilities (5 of 6)

- Why is the production possibilities frontier curved?
  - Diminishing returns to labor in each sector cause the opportunity cost to rise when an economy produces more of a good.
  - Opportunity cost of cloth in terms of food is the slope of the production possibilities frontier – the slope becomes steeper as an economy produces more cloth.

Production Possibilities (6 of 6)

- Opportunity cost of producing one more yard of cloth is $\frac{MPL_F}{MPL_C}$ pounds of food.
  - To produce one more yard of cloth, you need $\frac{1}{MPL_C}$ hours of labor.
  - To free up one hour of labor, you must reduce output of food by MPL_F pounds.
  - To produce less food and more cloth, employ less in food and more in cloth.
  - The marginal product of labor in food rises and the marginal product of labor in cloth falls, so $\frac{MPL_F}{MPL_C}$ rises.

Prices, Wages, and Labor Allocation (1 of 10)

- How much labor is employed in each sector?
  - Need to look at supply and demand in the labor market.
- Demand for labor:
  - In each sector, employers will maximize profits by demanding labor up to the point where the value produced by an additional hour equals the marginal cost of employing a worker for that hour.

Prices, Wages, and Labor Allocation (2 of 10)

- The demand curve for labor in the cloth sector:

$$MPL_C \times P_C = W$$

  - The wage equals the value of the marginal product of labor in manufacturing.

- The demand curve for labor in the food sector:

$$MPL_F \times P_F = W$$

  - The wage equals the value of the marginal product of labor in food.

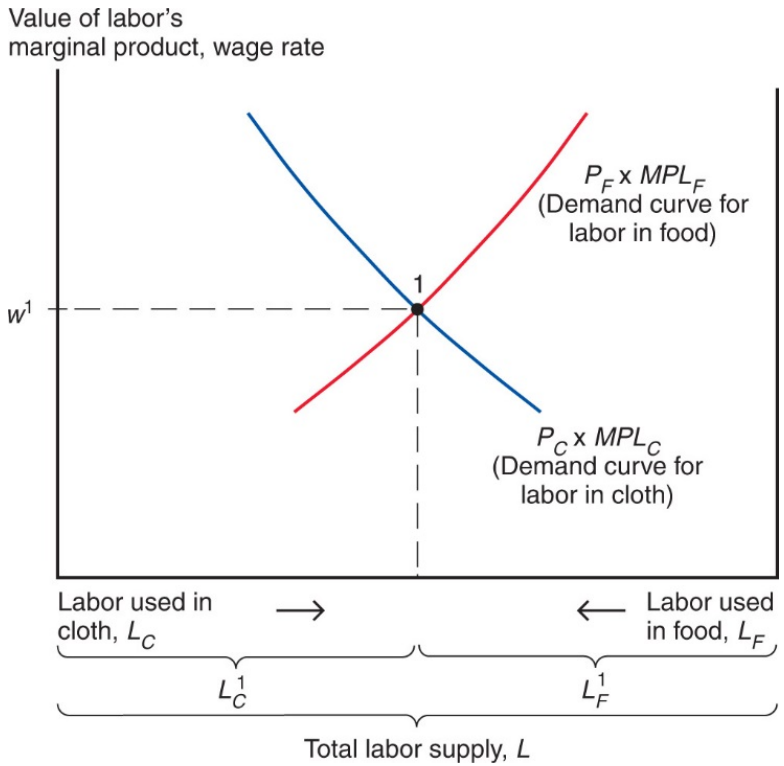
Prices, Wages, and Labor Allocation (3 of 10)

- Figure 4.4 represents labor demand in the two sectors.
- The demand for labor in the cloth sector is MPL_C from Figure 4.2 multiplied by P_C
- The demand for labor in the food sector is measured from the right.
- The horizontal axis represents the total labor supply L.

Prices, Wages, and Labor Allocation (4 of 10)

- The two sectors must pay the same wage because labor can move between sectors.
- If the wage were higher in the cloth sector, workers would move from making food to making cloth until the wages become equal.
  - Or if the wage were higher in the food sector, workers would move in the other direction.
- Where the labor demand curves intersect gives the equilibrium wage and allocation of labor between the two sectors.

Figure 4.4 The Allocation of Labor



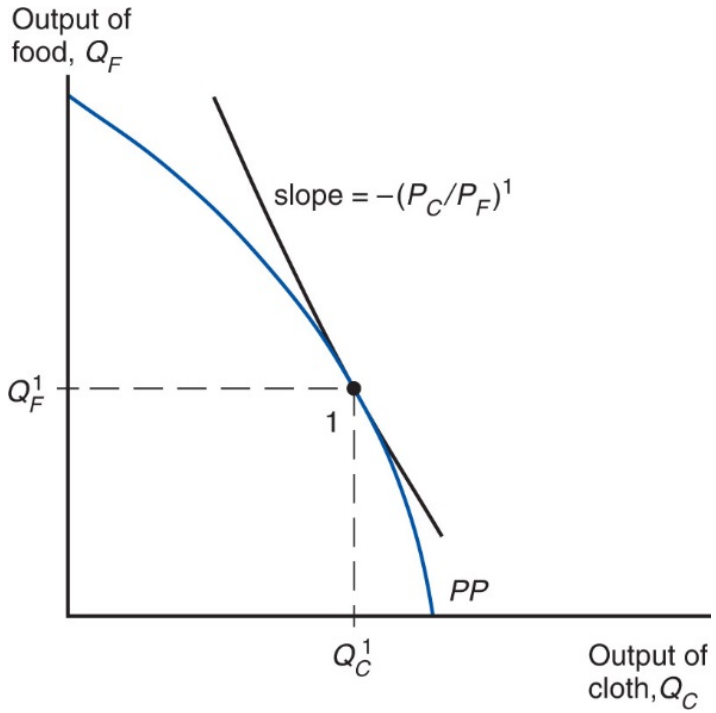
Labor is allocated so that the value of its marginal product ($P \times MPL$) is the same in the cloth and food sectors. In equilibrium, the wage rate is equal to the value of labor's marginal product.

Prices, Wages, and Labor Allocation (5 of 10)

- At the production point, the production possibility frontier must be tangent to a line whose slope is minus the price of cloth divided by that of food.
- Relationship between relative prices and output:

$$-\frac{MPL_F}{MPL_C} = -\frac{P_C}{P_F}$$

Figure 4.5 Production in the Specific Factors Model



The economy produces at the point on its production possibility frontier (*PP*) where the slope of that frontier equals minus the relative price of cloth.

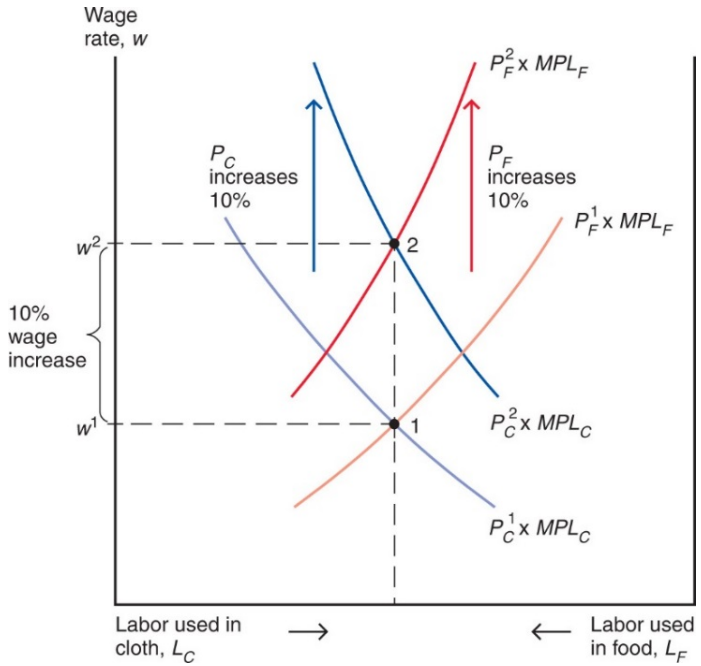
Prices, Wages, and Labor Allocation (6 of 10)

- What happens to the allocation of labor and the distribution of income when the prices of food and cloth change?
- Two cases:
  1. An equal proportional change in prices
  2. A change in relative prices

Prices, Wages, and Labor Allocation (7 of 10)

- When both prices change in the same proportion, no real changes occur.
  - The wage rate (*w*) rises in the same proportion as the prices, so real wages (i.e., the ratios of the wage rate to the prices of goods) are unaffected.
  - The real incomes of capital owners and landowners also remain the same.

Figure 4.6 An Equal-Proportional Increase in the Prices of Cloth and Food



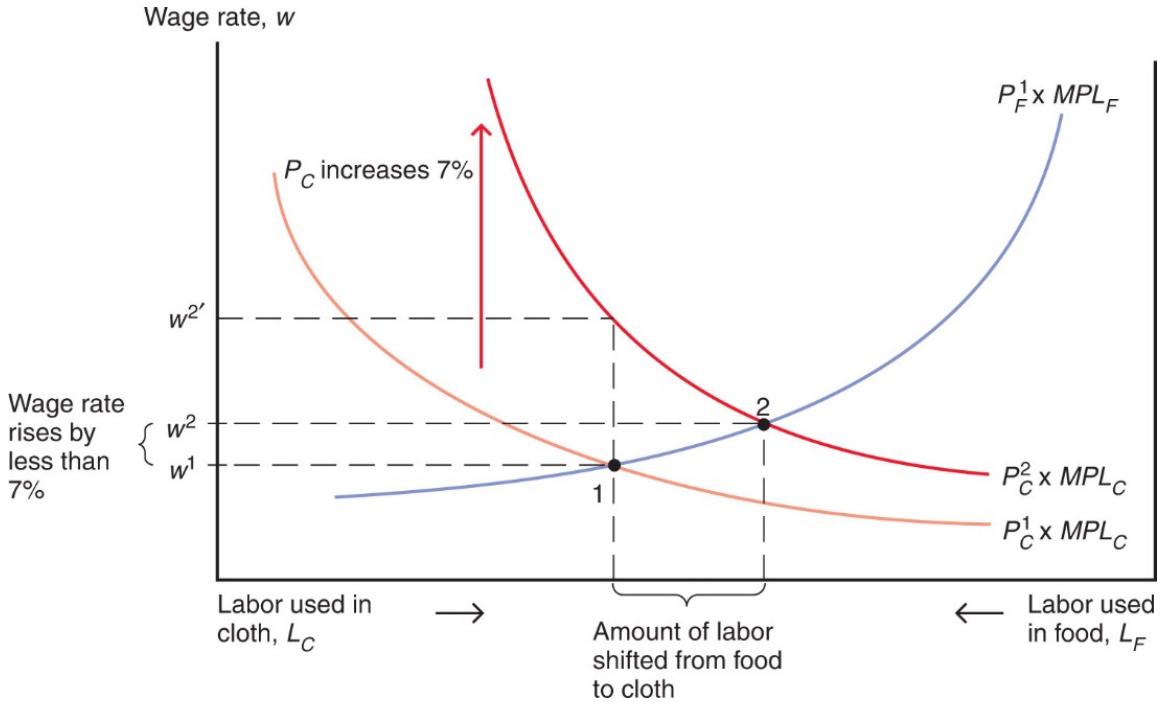
The labor demand curves in cloth and food both shift up in proportion to the rise in P_C from P_C^1 to P_C^2 and the rise in P_F from P_F^1 to P_F^2. The wage rate rises in the same proportion, from W^1 to W^2, but the allocation of labor between the two sectors does not change.

Pearson

Prices, Wages, and Labor Allocation (8 of 10)

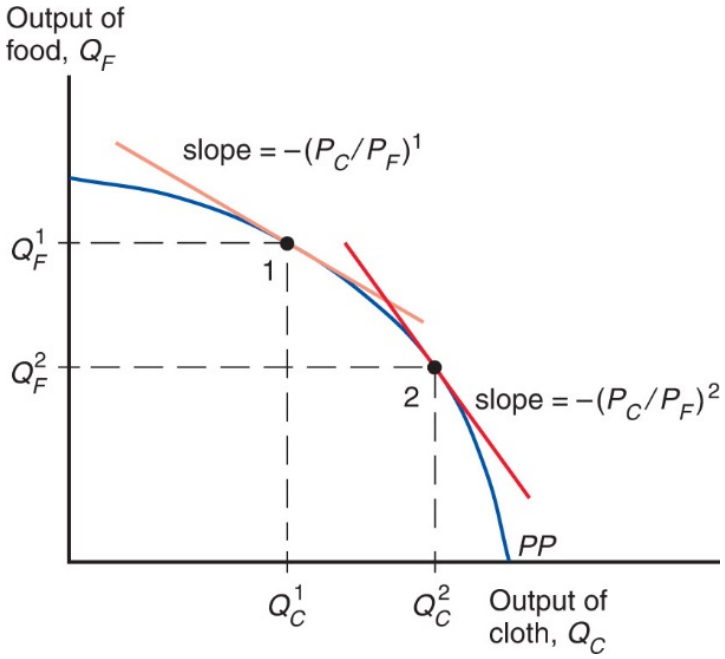
- When only P_C rises, labor shifts from the food sector to the cloth sector and the output of cloth rises while that of food falls.
- The wage rate (w) does not rise as much as P_C since cloth employment increases and thus the marginal product of labor in that sector falls.

Figure 4.7 A Rise in the Price of Cloth



The cloth labor demand curve rises in proportion to the 7 percent increase in P_C, but the wage rate rises less than proportionately. Labor moves from the food sector to the cloth sector. Output of cloth rises; output of food falls.

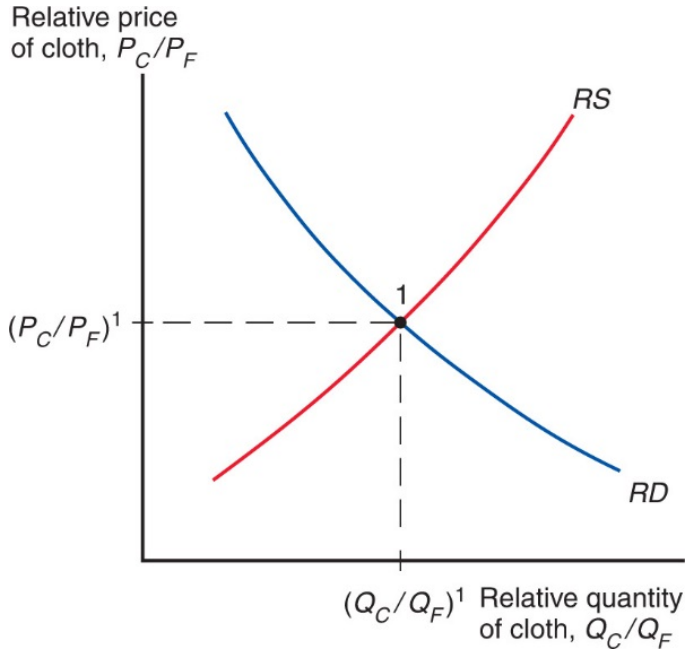
Figure 4.8 The Response of Output to a Change in the Relative Price of Cloth



The economy always produces at the point on its production possibility frontier (*PP*) where the slope of *PP* equals minus the relative price of cloth. Thus, an increase in $P_C > P_F$ causes production to move down and to the right along the production possibility frontier corresponding to higher output of cloth and lower output of food.

Pearson

Figure 4.9 Determination of Relative Prices



In the specific factors model, a higher relative price of cloth will lead to an increase in the output of cloth relative to that of food. Thus, the relative supply curve *RS* is upward sloping. Equilibrium relative quantities and prices are determined by the intersection of *RS* with the relative demand curve *RD.*

Prices, Wages, and Labor Allocation (9 of 10)

- Relative Prices and the Distribution of Income
  - Suppose that P_C 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?
  - Workers, owners of capital, and owners of land

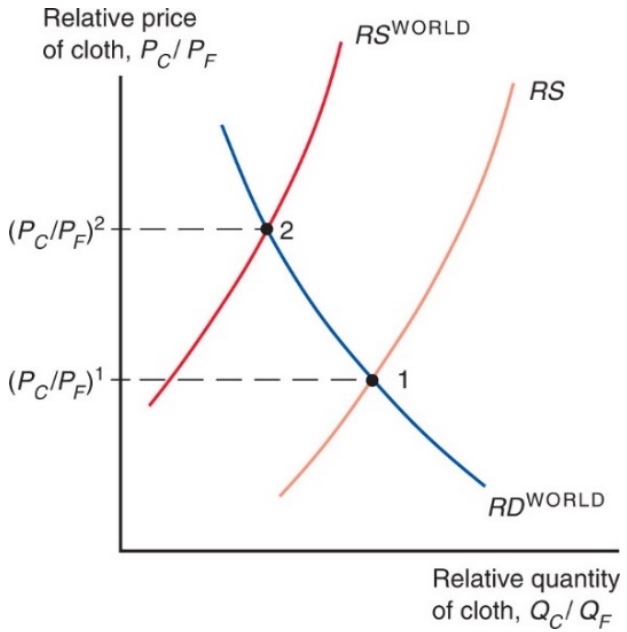
Prices, Wages, and Labor Allocation (10 of 10)

- 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 the Specific Factors Model (1 of 3)

- Trade and Relative Prices
  - The relative price of cloth prior to trade is determined by the intersection of the economy's relative supply of cloth and its relative demand.
  - Free trade relative price of cloth is determined by the intersection of world relative supply of cloth and world relative demand.
  - Opening up to trade increases the relative price of cloth in an economy whose relative supply of cloth is larger than for the world as a whole.

Figure 4.10 Trade and Relative Prices



The figure shows the relative supply curve for the specific factors economy along with the world relative supply curve. The differences between the two relative supply curves can be due to either technology or resource differences across countries. There are no differences in relative demand across countries. Opening up to trade induces an increase in the relative price from $(P_C > P_F)^1$ to $(P_C > P_F)^2$.

Pearson

International Trade in the Specific Factors Model (2 of 3)

- Gains from trade
  - Without trade, the economy's output of a good must equal its consumption.
  - International trade allows the mix of cloth and food consumed to differ from the mix produced.
  - The country cannot spend more than it earns:

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

International Trade in the Specific Factors Model (3 of 3)

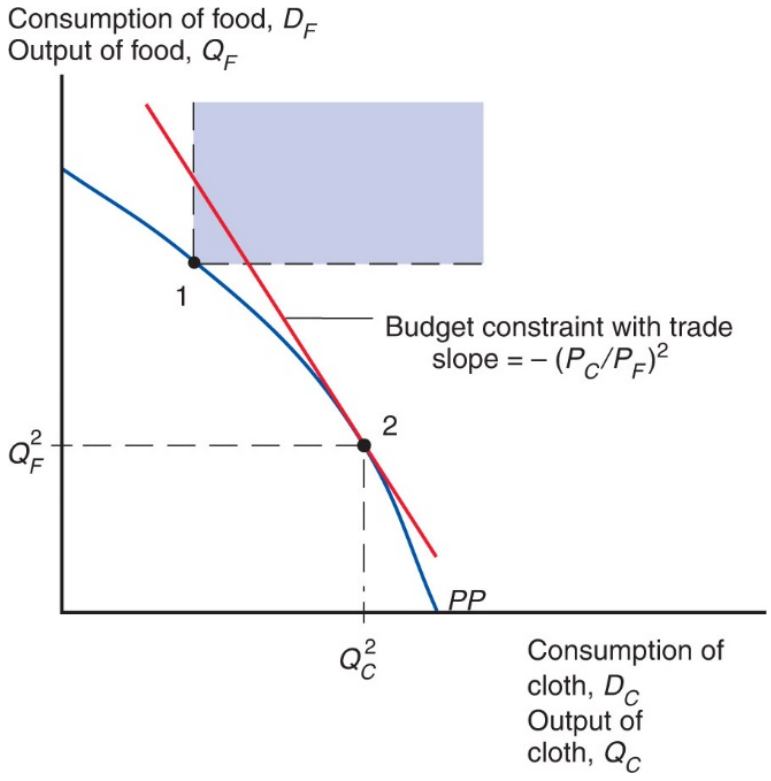
- The economy as a whole gains from trade.
  - It imports an amount of food equal to the relative price of cloth times the amount of cloth exported:

$$D_F - Q_F = \left(\frac{P_C}{P_F}\right) \times \left(Q_C - D_C\right)$$

  - It is able to afford amounts of cloth and food that the country is not able to produce itself.
  - The budget constraint with trade lies above the production possibilities frontier in Figure 4.11.

Figure 4.11 Budget Constraint for a Trading Economy and Gains from Trade

Point 2 represents the economy's production. The economy can choose its consumption point along its budget constraint (a line that passes through point 2 and has a slope equal to minus the relative price of cloth). Before trade, the economy must consume what it produces, such as point 1 on the production possibility frontier (*PP*). The portion of the budget constraint in the colored region consists of feasible post-trade consumption choices, with consumption of both goods higher than at pretrade point 1.



Income Distribution and Trade Politics (1 of 4)

- 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.

Income Distribution and Trade Politics (2 of 4)

- 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.

Income Distribution and Trade Politics (3 of 4)

- 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.

Income Distribution and Trade Politics (4 of 4)

- 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).

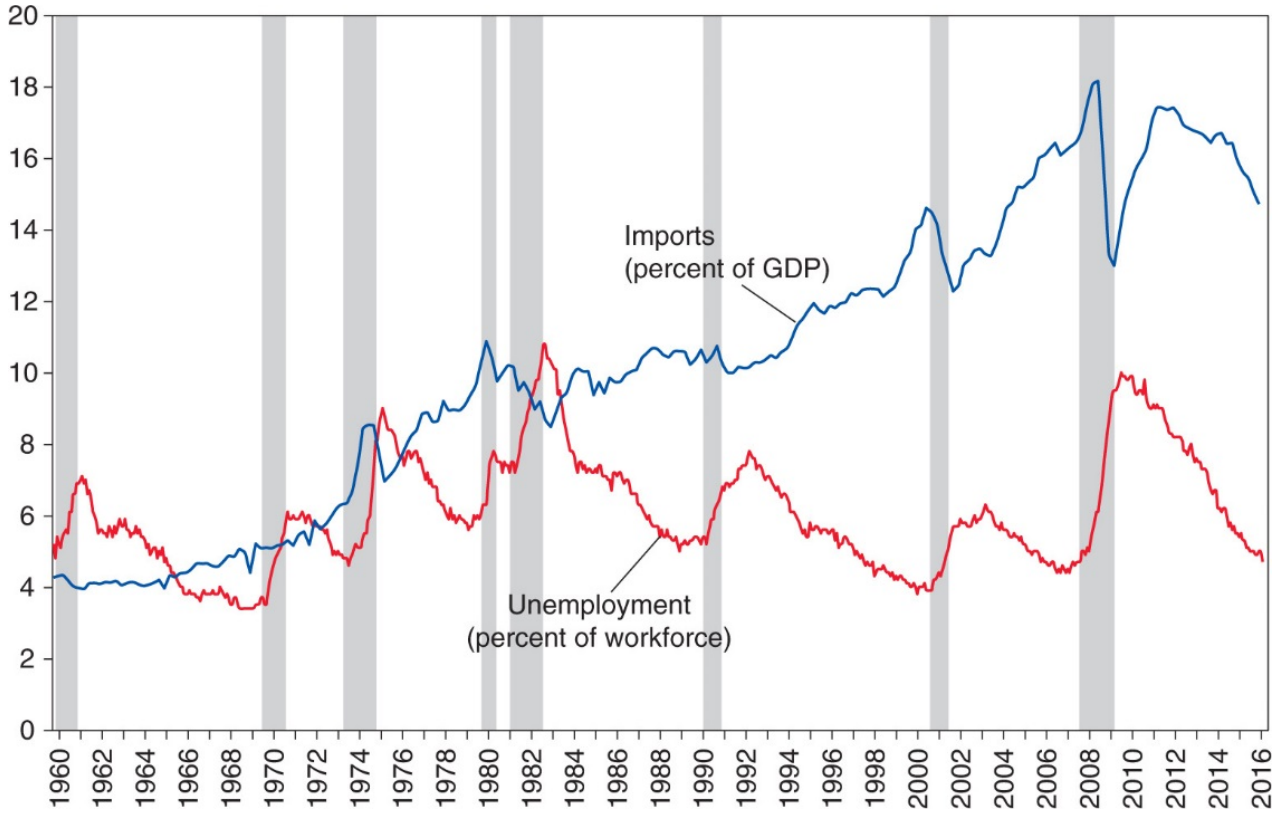
Trade and Unemployment (1 of 2)

- 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.

Trade and Unemployment (2 of 2)

- Figure 4.12 shows that there no evidence of a positive correlation between unemployment and imports (relative to U.S. GDP) for the U.S.
  - After 2012, both imports and unemployment do drop significantly; However, the drop in imports was driven by falling oil prices. Non-oil imports as a share of U.S. GDP remained stable in those years.
- Unemployment is primarily a macroeconomic problem that rises during recessions.
  - The best way to reduce unemployment is by adopting macroeconomic policies to help the economy recover, not by adopting trade protection.

Figure 4.12 Unemployment and Import Penetration in the United States



The highlighted years are recession years, as determined by the National Bureau of Economic Research.

Manufacturing Employment and Chinese Import Competition (1 of 3)

- Is import competition from developing countries—especially from China—at fault for declines in manufacturing employment in the United States?
  - Would closing off the United States from trade with China increase the share of employment in U.S. manufacturing?
- Some workers in sectors that compete with Chinese imports may lose their jobs and take time to find new jobs.
  - Meanwhile, jobs are opening up in the export sectors of the economy.
  - What is the net effect of increase import competition on manufacturing employment?

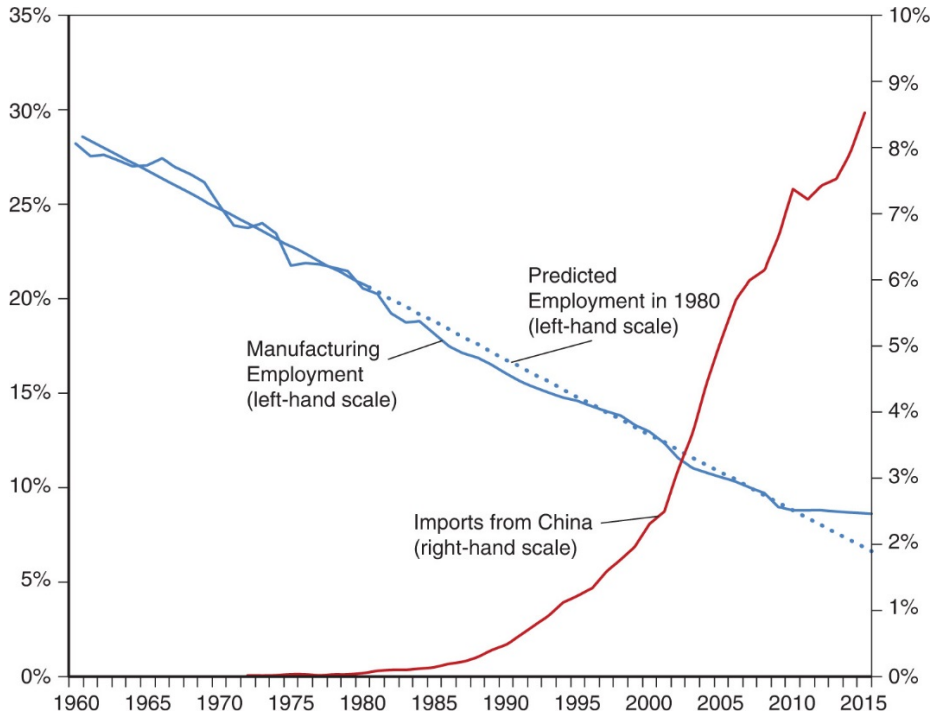
Manufacturing Employment and Chinese Import Competition (2 of 3)

- Figure 4.13 shows that this manufacturing employment share has been steadily decreasing over the last half-century.
- U.S. manufacturing was still producing the same quantity of goods, but was using fewer and fewer workers (due to increase productivity).
- Estimate share of manufacturing employment using data from before China became a major source of U.S. imports.
  - Accurate fit to manufacturing employment now.
  - China appears to have little, if any, effect.

Manufacturing Employment and Chinese Import Competition (3 of 3)

- **U.S. Trade Adjustment Assistance program** provides extended unemployment coverage (for an additional year) and tuition reimbursement (for new job skill acquisitions) to workers who are displaced by a plant closure.
  - To qualify, the plant closure must be due to import competition or an overseas relocation to a country receiving preferential access to the United States.

Figure 4.13 U.S. Manufacturing Employment and Imports from China



Manufacturing employment is measured as a percent of total U.S. non-farm employment. Imports from China are measured as a percent of the U.S. manufacturing production.

Pearson

International Labor Mobility (1 of 6)

- Movements in factors of production include
  - Labor migration
  - The transfer of financial assets through international borrowing and lending
  - Transactions of multinational corporations involving direct ownership of foreign firms
- Like movements of goods and services (trade), movements of factors of production are politically sensitive and are often restricted.

International Labor Mobility (2 of 6)

- Why does labor migrate and what effects does labor migration cause?
- Workers migrate to wherever wages are highest.
- Consider movement of labor across countries instead of across sectors.
- Suppose two countries produce one non-traded good (food) using two factors of production:
  - Land cannot move across countries but labor can.

International Labor Mobility (3 of 6)

- Figure 4.13 finds the equilibrium wage and labor allocation with migration across countries.
  - Similar to how Figure 4.4 determined the equilibrium allocation of labor between sectors.
- Start with OL^1 workers in Home earning a lower real wage (point C) than the L^1O^* workers in Foreign (point B).
  - Lower wage due to less land per worker (lower productivity).
- Workers in the home country want to migrate to the foreign country where they can earn more.

International Labor Mobility (4 of 6)

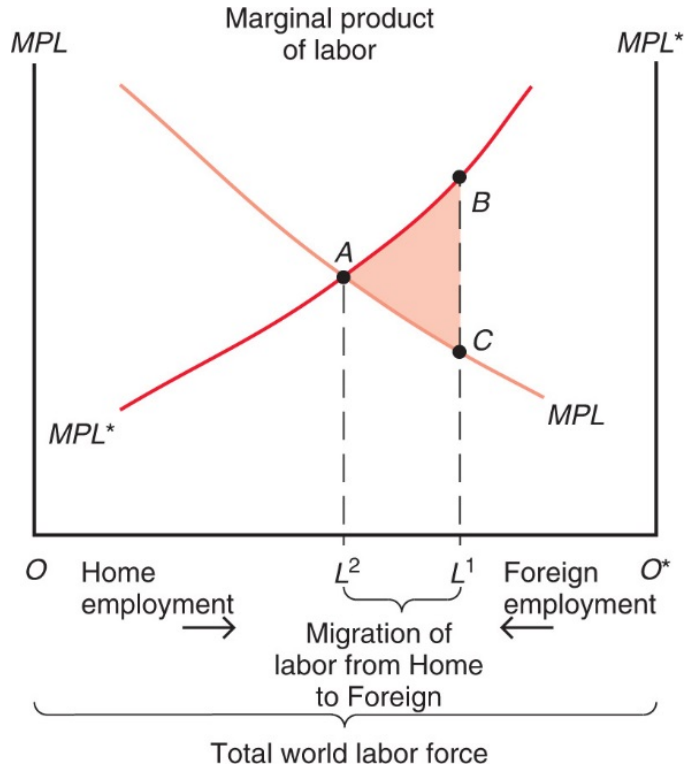
If no obstacles to labor migration, workers move from Home to Foreign until the purchasing power of wages is equal across countries (point *A*), with OL^2 workers in Home and L^2O^* workers in Foreign.

- Emigration from Home decreases the supply of labor and raises real wage of the workers who remain there.
  - Workers who start in the Home country earn more due to emigration regardless if they are among those who leave.
- Immigration into Foreign increases the supply of labor and decreases the real wage there.

- Wages do not actually equalize, due to barriers to migration such as policies restricting immigration and natural reluctance to move.

Figure 4.14 Causes and Effects of International Labor Mobility

Initially, OL^1 workers are employed in Home, while L^1O^* workers are employed in Foreign. Labor migrates from Home to Foreign until OL^2 workers are employed in Home, L^2O^* in Foreign, and wages are equalized.



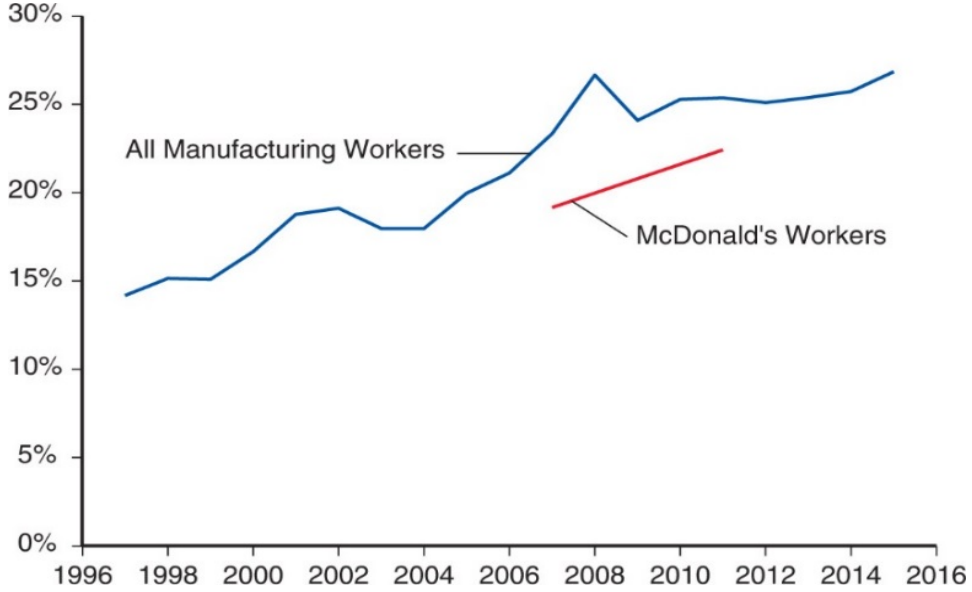
International Labor Mobility (5 of 6)

- Workers initially in Home benefit while workers in Foreign are hurt by inflows of other workers.
  - Landowners in Foreign gain from the inflow of workers decreasing real wages and increasing output.
  - Landowners in Home are hurt by the outflow of workers increasing real wages and decreasing output.

International Labor Mobility (6 of 6)

- Due to higher wages in Western Europe relative to its new EU partners in Eastern Europe, there have been substantial east-to-west migration flows.
  - Has this process been associated with wage convergence as predicted by our model of labor mobility? Yes, it has.
- Figure 4.15 plots the relative wage of manufacturing workers from the new 2004 member countries relative to Western Europe.
  - Large compensation differentials still persist, but the trend is toward convergence.

Figure 4.15 Eastern-Western Europe Relative Compensation 1997–2015



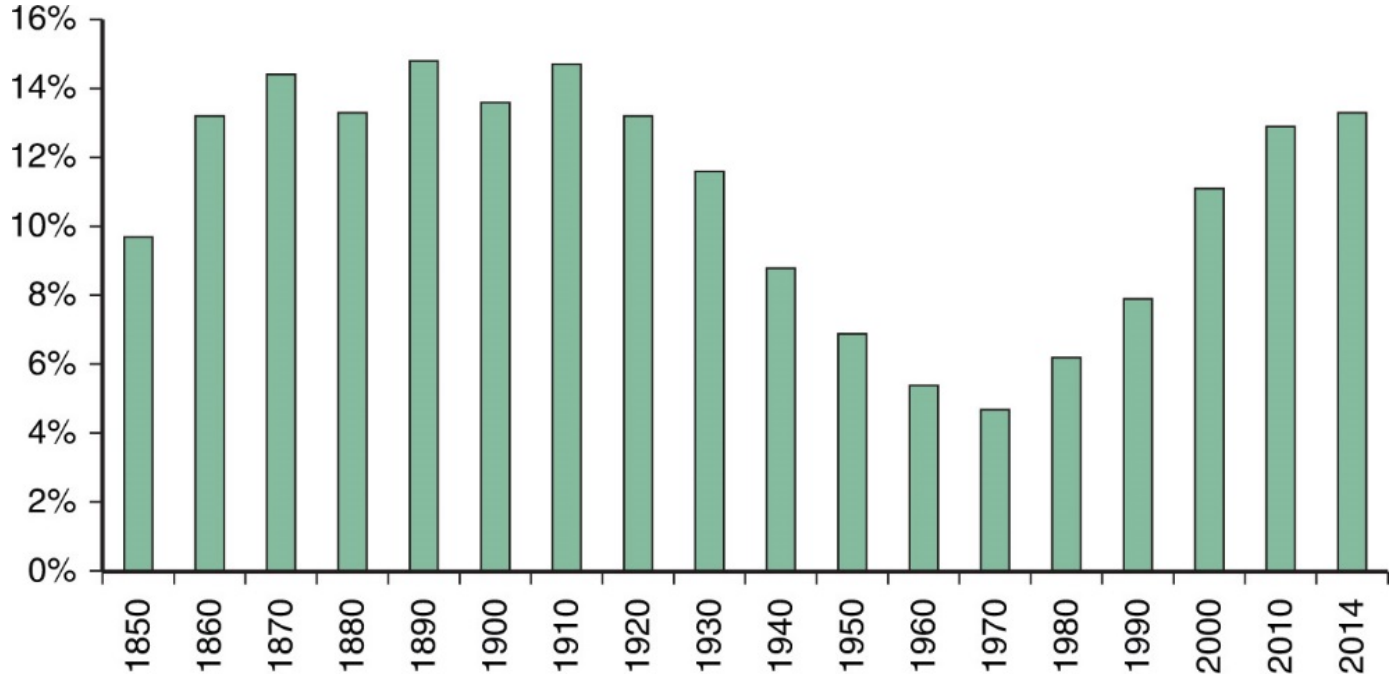
Western Europe includes: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Eastern Europe includes: the Czech Republic, Estonia, Hungary, Poland, Slovakia.

Source: The Conference Board International Labor Comparisons, 2015; and Orley Ashenfelter, "Comparing Real Wage Rates," **American Economic Review** 102 (2012), pp. 617–642.

Immigration and the U.S. Economy (1 of 2)

- In the early 20th century, share of immigrants in the U.S. increased dramatically.
  - Vast immigration from Eastern and Southern Europe.
- Tight restrictions on immigration imposed in the 1920s.
  - Immigrants were a minor force in the U.S. by the 1960s.
- New wave of immigration began around 1970.
  - Mostly from Latin America and Asia.
- As of 2014, 16.7% of the U.S. labor force is foreign-born.

Figure 4.16 Foreign-Born Population as a Percentage of the U.S. Population



Restrictions on immigration in the 1920s led to a sharp decline in the foreign-born population in the mid-20th century, but immigration has risen sharply again in recent decades.

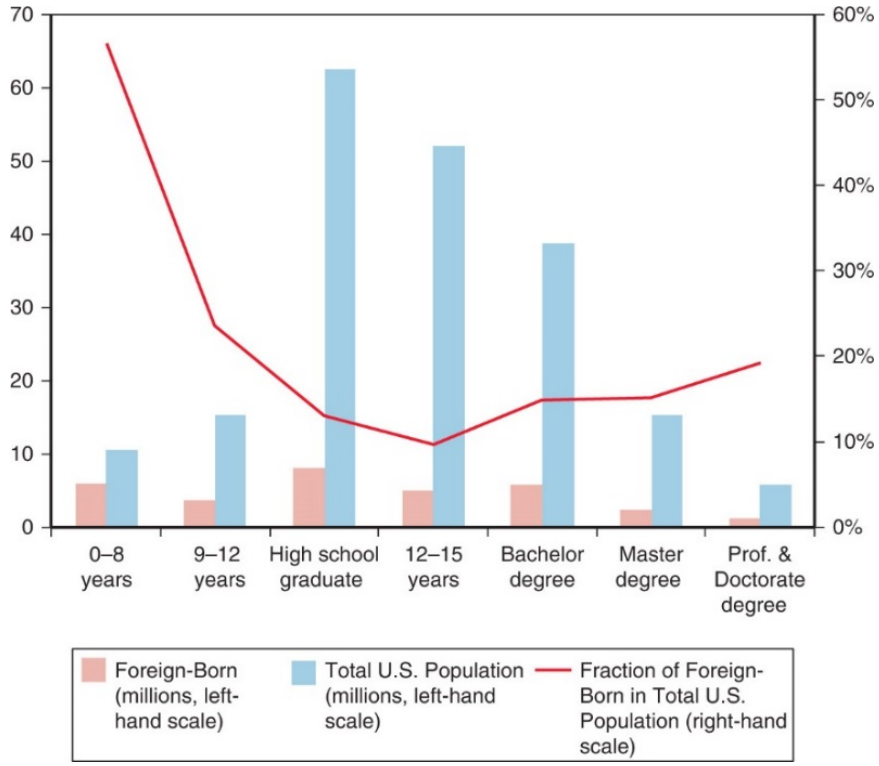
Source: U.S. Census Bureau.

Pearson

Immigration and the U.S. Economy (2 of 2)

- The largest increase in recent immigration occurred among workers with the lowest education levels, making less educated workers more abundant.
  - Possibly reduced wages for native-born workers with low education levels while raising wages for the more educated
  - Widening wage gap between less educated workers and highly educated workers.

Figure 4.17 Foreign-Born and Total U.S. Population Over 25 Years Old by Educational Attainment



Relative to native-born workers, foreign-born workers are concentrated in both the highest and lowest educational groups.

Source: U.S. Census Bureau.

Pearson

Summary (1 of 4)

1. International trade often has strong effects on the distribution of income within countries - produces losers as well as winners.
2. Income distribution effects arise for two reasons:
   - Factors of production cannot move costlessly and quickly from one industry to another.
   - Changes in an economy's output mix have differential effects on the demand for different factors of production.

Summary (2 of 4)

3. International trade affects the distribution of income in the specific factors model.
   - Factors specific to export sectors in each country gain from trade, while factors specific to import-competing sectors lose.
   - Mobile factors that can work in either sector may either gain or lose.

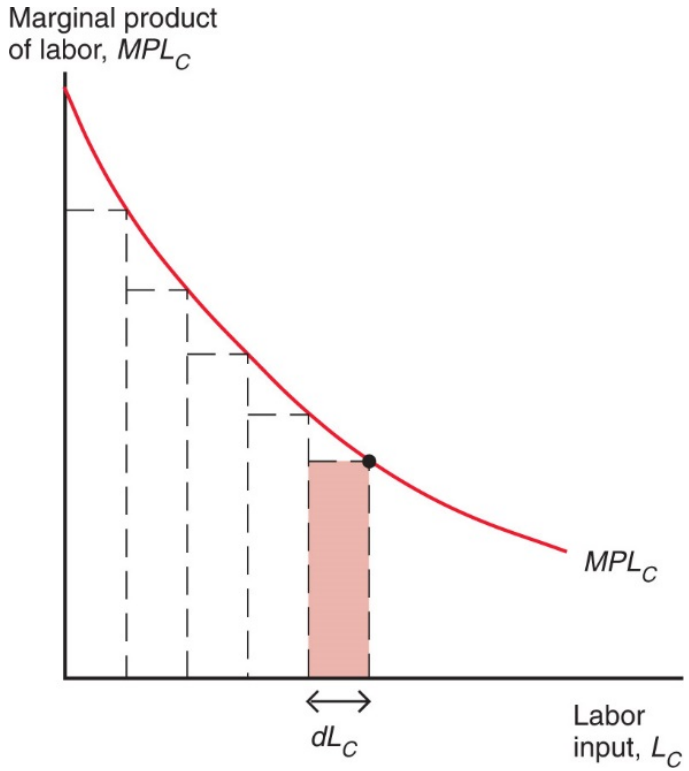
Summary (3 of 4)

4. Trade nonetheless produces overall gains in the sense that those who gain could in principle compensate those who lose while still remaining better off than before.
5. Most economists would prefer to address the problem of income distribution directly, rather than by restricting trade.
6. Those hurt by trade are often better organized than those who gain, causing trade restrictions to be adopted.

Summary (4 of 4)

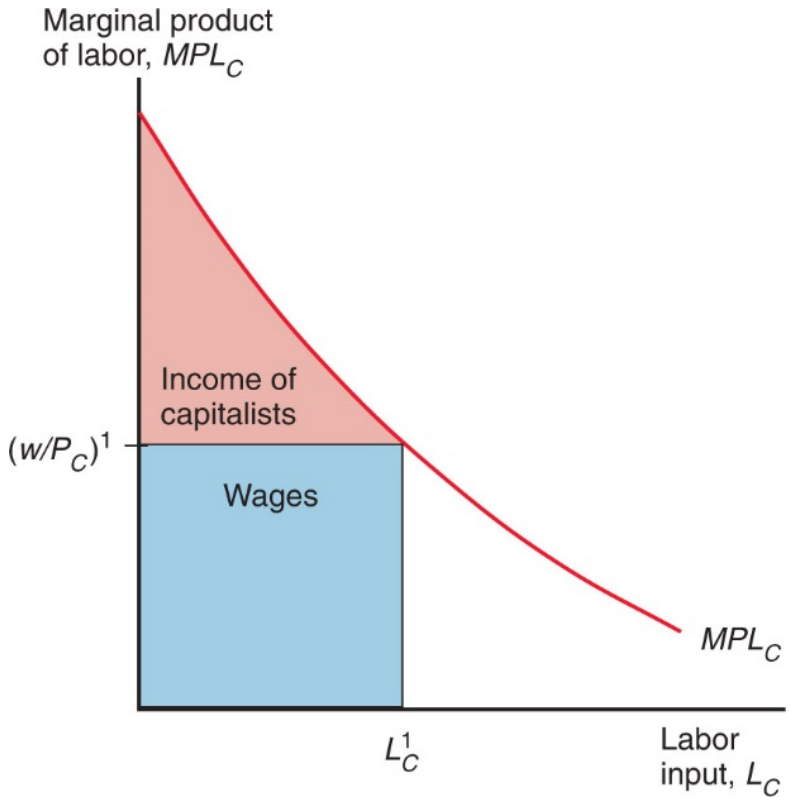
7. Labor migrates to countries with higher labor productivity and higher real wages, where labor is scarce.
   - Real wages fall due to immigration and rise due to emigration.
   - World output increases.
8. Real wages across countries are far from equal due to differences in technology and due to immigration barriers.

Figure 4A.1 Showing that Output Is Equal to the Area under the Marginal Product Curve



By approximating the marginal product curve with a series of thin rectangles, one can show that the total output of cloth is equal to the area under the curve.

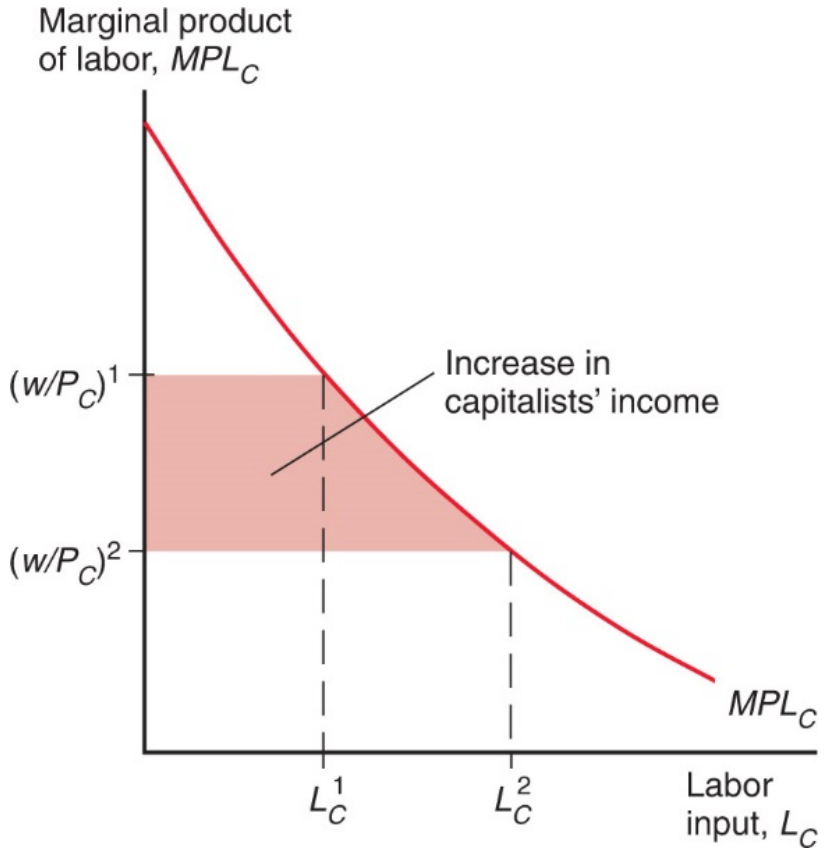
Figure 4A.2 The Distribution of Income within the Cloth Sector



Labor income is equal to the real wage times employment. The rest of output accrues as income to the owners of capital.

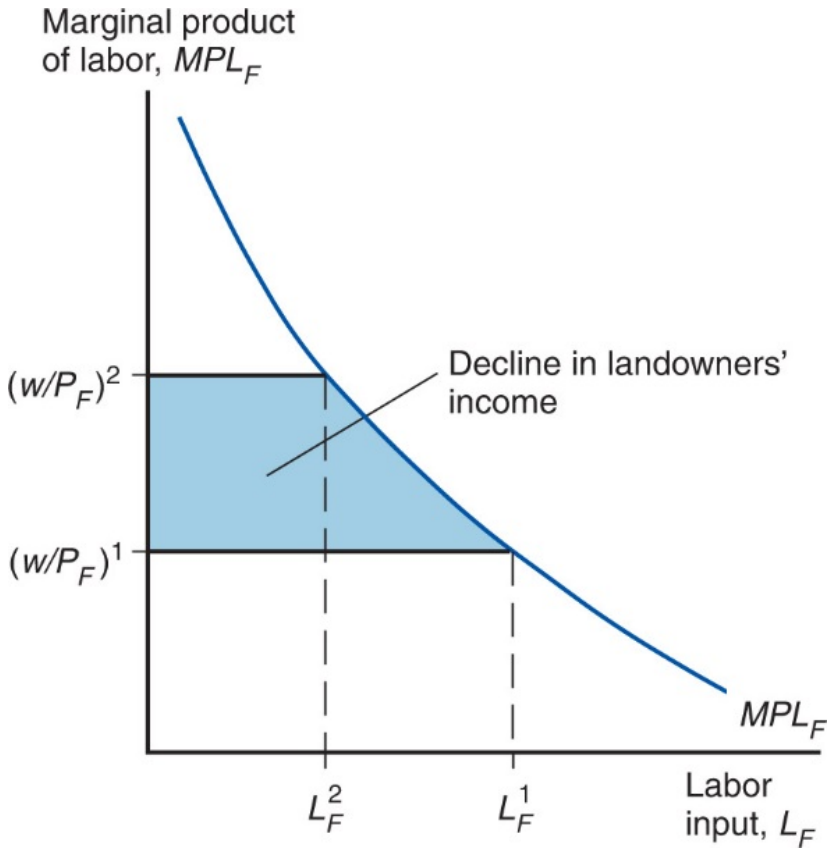
Pearson

Figure 4A.3 A Rise in P_C Benefits the Owners of Capital



The real wage in terms of cloth falls, leading to a rise in the income of capital owners.

Figure 4A.4 A Rise in P_C Hurts Landowners



The real wage in terms of food rises, reducing the income of land.

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