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I

**Глобальная Экономика.
Теория международной торговли.**

Учебное пособие для студентов специальности 080507.65 «Менеджмент
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I

**Global Economics.
International Trade Theory.**

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Chapter 1

Introduction

Preview.

- What is international economics about?
- Gains from trade
- Explaining patterns of trade
- The effects of government policies on trade
- International finance topics
- International trade versus international finance

What Is International Economics About?

- International economics is about how nations interact through trade of goods and services, through flows of money and through investment.
- International economics is an old subject, but it continues to grow in importance as countries become tied to the international economy.
- Nations are more closely linked through trade in goods and services, through flows of money, and through investment than ever before.
- International trade as a fraction of the national economy has tripled for the US in the past 40 years.
- Compared to the US, other countries are even more tied to international trade.

Exports, imports
(percent of U.S.
national income)

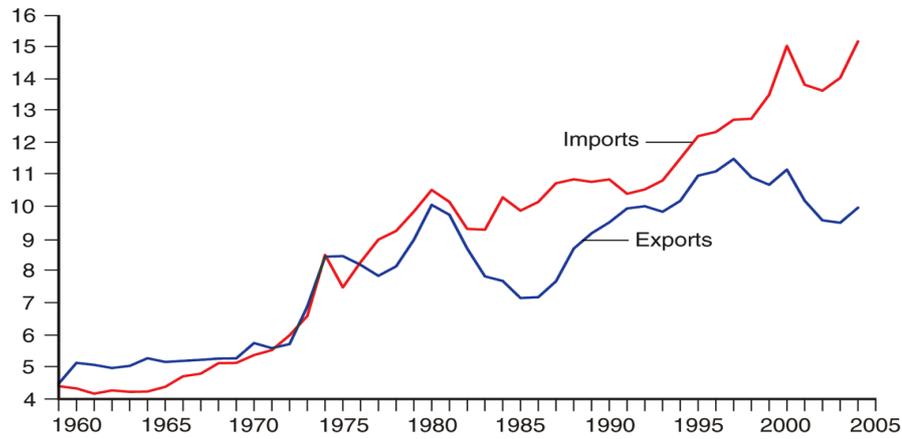


Figure 1-1

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

From the 1960s to 1980, both exports and imports rose steadily as shares of U.S. income. Since 1980, exports have fluctuated sharply.

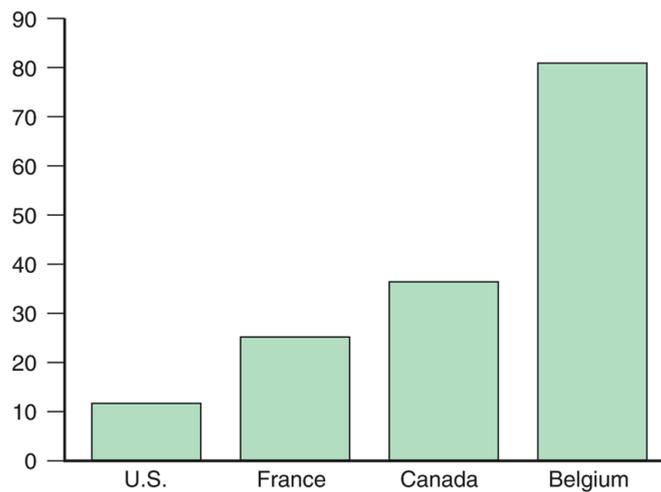
Figure 1-2

Exports and Imports as Percentages of National Income in 2003

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

Source: Organization for Economic Cooperation and Development.

Exports, imports
(percent of
national income)



Gains from Trade

- Several ideas underlie the gains from trade
 1. When a buyer and a seller engage in a voluntary transaction, both receive something that they want and both can be made better off.
 - Norwegian consumers could buy oranges through international trade that they otherwise would have a difficult time producing.
 - The producer of the oranges receives income that it can use to buy the things that it desires.
 2. How could a country that is the most (least) efficient producer of everything gain from trade?
 - ❑ With a finite amount of resources, countries can use those resources to produce what they are most productive at (compared to their other production choices), then trade those products for goods and services that they want to consume.
 - ❑ Countries can specialize in production, while consuming many goods and services through trade.
 3. Trade is predicted to benefit a country by making it more efficient when it exports goods which use abundant resources and imports goods which use scarce resources.
 4. When countries specialize, they may also be more efficient due to large scale production.
 5. Countries may also gain by trading current resources for future resources (lending and borrowing).
 - Trade is predicted to benefit *countries as a whole* in several ways, but trade may harm *particular groups within a country*.
 - ❑ International trade can adversely affect the owners of resources that are used intensively in industries that compete with imports.

- Trade may therefore have effects on the distribution of income within a country.
- Conflicts about trade should occur between groups within countries rather than between countries.

Patterns of Trade

- Differences in *climate and resources* can explain why Brazil exports coffee and Australia exports iron ore.
- But why does Japan export automobiles, while the US exports aircraft?
- Differences in *labor productivity* may explain why some countries export certain products.
- How *relative supplies of capital, labor and land* are used in the production of different goods may also explain why some countries export certain products.

The Effects of Government Policies on Trade

- 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 (e.g., product specifications) that exclude foreign products from the market, but still allow domestic products.
- What are the costs and benefits of these policies?
- Economists design models that try to measure the effects of different trade policies.
- If a government must restrict trade, which policy should it use?
- If a government must restrict trade, *how much* should it restrict trade?

- If a government restricts trade, what are the costs if foreign governments respond likewise?

International Finance Topics

- Governments measure the value of exports and imports, as well as the value of international financial capital that flows into and out of their countries.
- Related to these two measures is the measure of *official settlements balance*, or the balance of payments: the balance of funds that central banks use for official international payments.
- All three values are measured in the government's *national income accounts*.
- Besides international financial capital flows and the official settlements balance, *exchange rates* are also an important financial issue for most governments.
 - ❑ Exchange rates measure how much domestic currency can be exchanged for foreign currency.
 - ❑ They also affect how much goods that are denominated in foreign currency (imports) cost.
 - ❑ And they affect how much goods denominated in domestic currency (exports) cost in foreign markets.

International Trade Versus International Finance

- International trade focuses on transactions of real goods and services across nations.
 - ❑ These transactions usually involve a physical movement of goods or a commitment of tangible resources like labor services.
- International finance focuses on financial or monetary transactions across nations.

For example, purchases of US dollars or financial assets by Europeans.

A Road Map

- International trade topics
 - International trade theory (chapters 2–7)
 - International trade policy (chapters 8–11)
- International finance topics
 - Exchange rates and open economy macroeconomics (chapters 12–17)
 - International macroeconomic policy (chapters 18–22)

Chapter 2

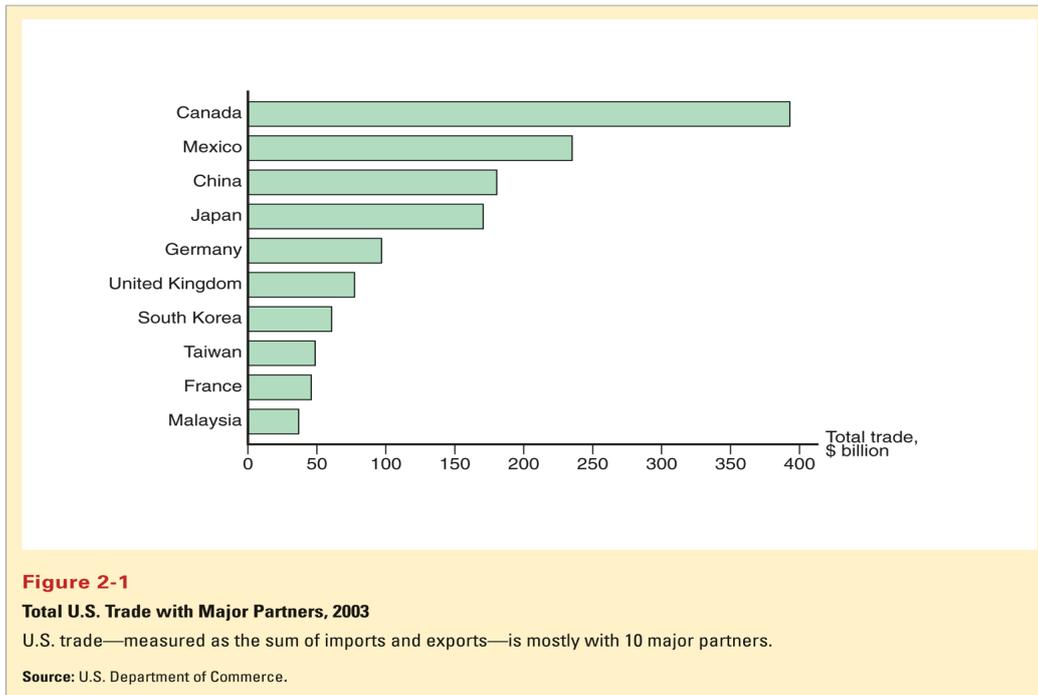
World Trade: An Overview

Preview

- The largest trading partners of the US
- Gravity model:
 - ❑ influence of an economy's size on trade
 - ❑ distance and other factors that influence trade
- Borders and trade agreements
- Globalization, then and now
- Changing composition of trade
- Multinational corporations and outsourcing

Who Trades with Whom?

- The 5 largest trading partners with the US in 2003 were Canada, Mexico, China, Japan and Germany.
- The total value imports from and exports to Canada in 2003 was almost \$400 billion dollars.
- The largest 10 trading partners with the US accounted for 68% of the value of US trade in 2003.



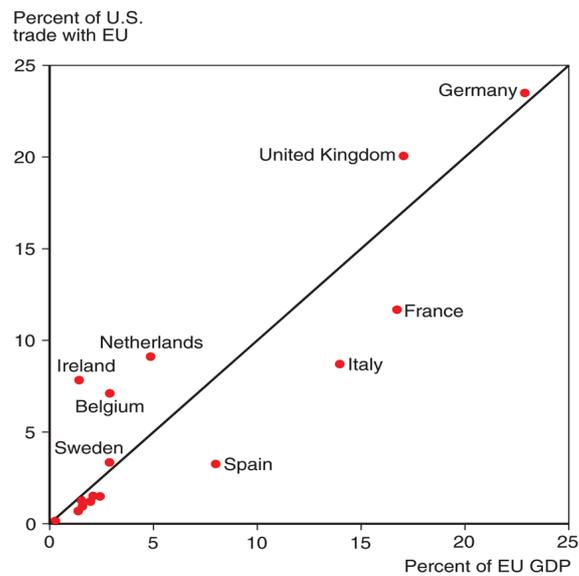
Size Matters: The Gravity Model

- 3 of the top 10 trading partners with the US in 2003 were also the 3 largest European economies: Germany, UK and France.
- These countries have the largest **gross domestic product (GDP)** in Europe.
 - ❑ GDP measures the value of goods and services produced in an economy.
- Why does the US trade most with these European countries and not other European countries?
- In fact, 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 people are able to buy more imports.

Figure 2-2

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

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



The Gravity Model

Other things besides size matter for trade:

1. *Distance* between markets influences transportation costs and therefore the cost of imports and exports.
 - ❑ Distance may also influence personal contact and communication, which may influence trade.
2. *Cultural affinity*: if two countries have cultural ties, it is likely that they also have 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 and perhaps monetary costs like tariffs.
 - ❑ These implicit and explicit costs reduce trade.

□ The existence of borders may also indicate the existence of different languages (see 2) or different currencies, either of which may impede trade more.

- In its basic form, the gravity model assumes that only size and distance are important for trade in the following way:

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

- where

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

A is a constant

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

- In a slightly more general form, the gravity model that is commonly estimated is

$$T_{ij} = A \times Y_i^a \times Y_j^b / D_{ij}^c$$

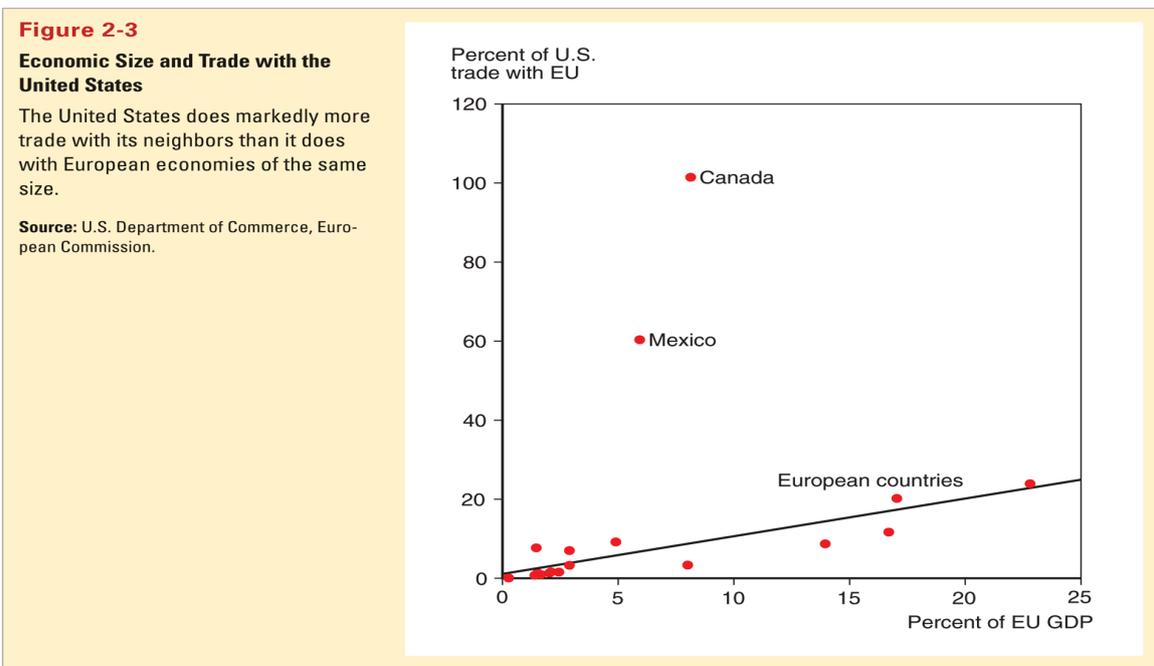
where a , b , and c are allowed to differ from 1.

- Perhaps surprisingly, the gravity model works fairly well in predicting actual trade flows, as the figure above representing US–EU trade flows suggested.

Distance and Borders

- 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.

- The gravity model can assess the effect of trade agreements on trade: does a trade agreement lead to significantly more trade among its partners than one would otherwise predict given their GDPs and distances from one another?
- The US has 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 US, the amount of trade between the US and its northern and southern neighbors as a fraction of GDP is larger than between the US and European countries.



- Yet even with a free trade agreement between the US and Canada, which use a common language, the border between these countries still seems to be associated with a reduction in trade.

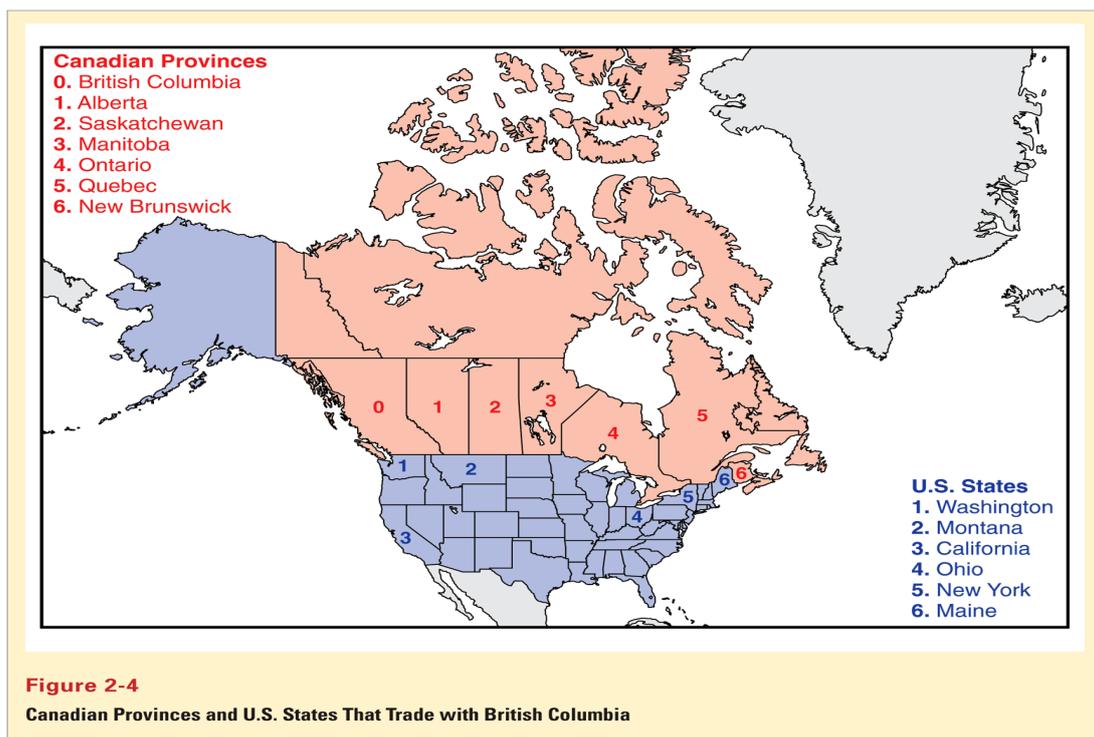


TABLE 2-3 Trade with British Columbia, as Percent of GDP, 1996

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

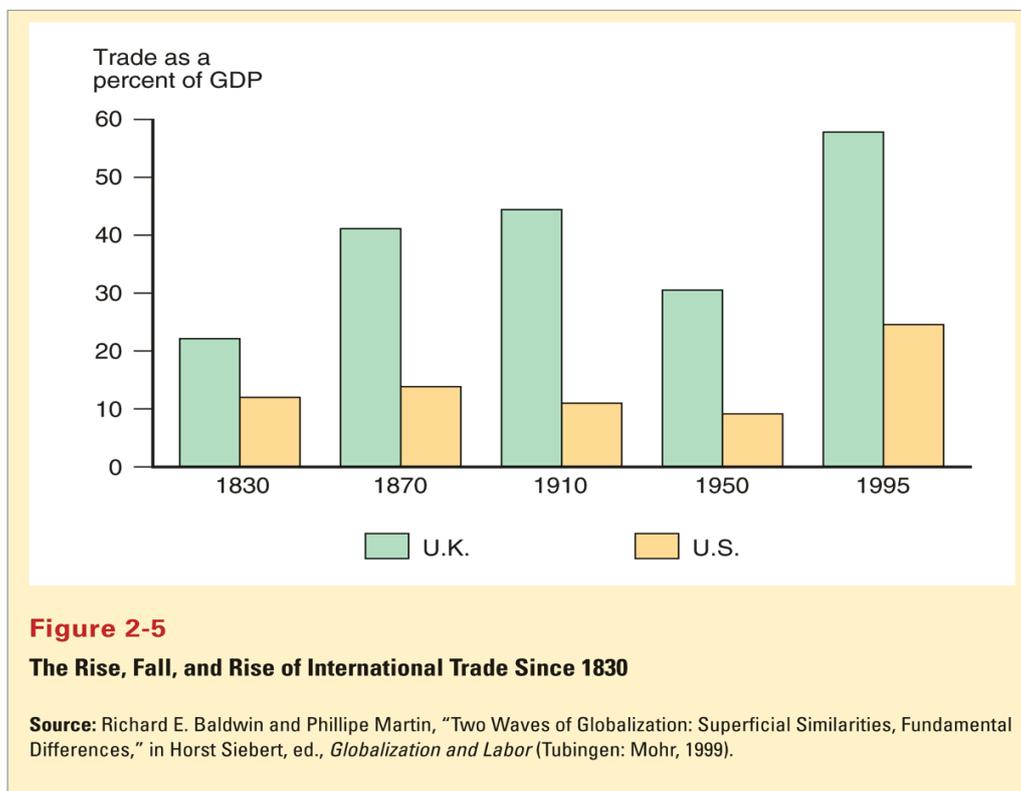
Source: Howard J. Wall, "Gravity Model Specification and the Effects of the U.S.-Canadian Border," Federal Reserve Bank of St. Louis Working Paper 2000-024A, 2000.

Has the World Become “Smaller”?

- The negative effect of distance on trade according to the gravity models is significant, but it has grown smaller over time due to modern transportation and communication.

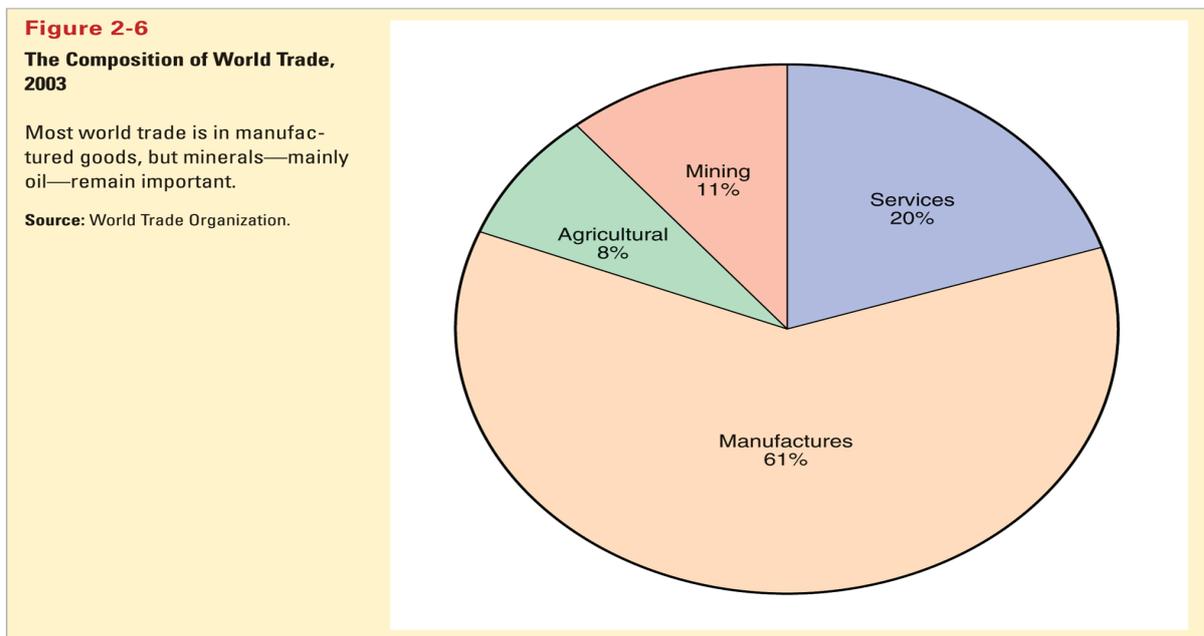
□ Wheels, sails, compasses, railroads, telegraph, steam power, automobiles, telephones, airplanes, computers, fax machines, internet, fiber optics,... are technologies that have increased trade.

- But history has shown that political factors, such as wars, can change trade patterns much more than innovations in transportation and communication.
- There were two waves of globalization.
 - ❑ 1840–1914: economies relied on steam power, railroads, telegraph, telephones. Globalization was interrupted and reversed by wars and depression.
 - ❑ 1945–present: economies rely on telephones, airplanes, computers, internet, fiber optics,...
- Only in the last few decades has international trade become more important to the British economy than it was in 1910.
- Even today, international trade is less important for the US than it was to the UK before 1910.



Changing Composition of Trade

- What kinds of products do nations currently trade, and how does this composition compare to trade in the past?
- Today, most of the volume of trade is in *manufactured products* such as automobiles, computers, clothing and machinery.
 - ❑ *Services* such as shipping, insurance, legal fees and spending by tourists account for 20% of the volume of trade.
 - ❑ *Mineral products* (e.g., petroleum, coal, copper) and *agricultural products* are a relatively small part of trade.



- 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 US 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 2-4 Manufactured Goods as Percent of Merchandise Trade

	United Kingdom		United States	
	Exports	Imports	Exports	Imports
1910	75.4	24.5	47.5	40.7
2002	82.6	80.4	82.1	77.8

Source: 1910 data from Simon Kuznets, *Modern Economic Growth: Rate, Structure, and Speed*. New Haven: Yale Univ. Press, 1966. 2002 data from World Trade Organization.

- Developing countries, or low and middle-income countries, have also changed the composition of their trade.

- ❑ In 2001, about 65% of exports from developing countries were manufactured products, and only 10% of exports were agricultural products.
- ❑ In 1960, about 58% of exports from developing countries were agricultural products and only 12% of exports were manufactured products.

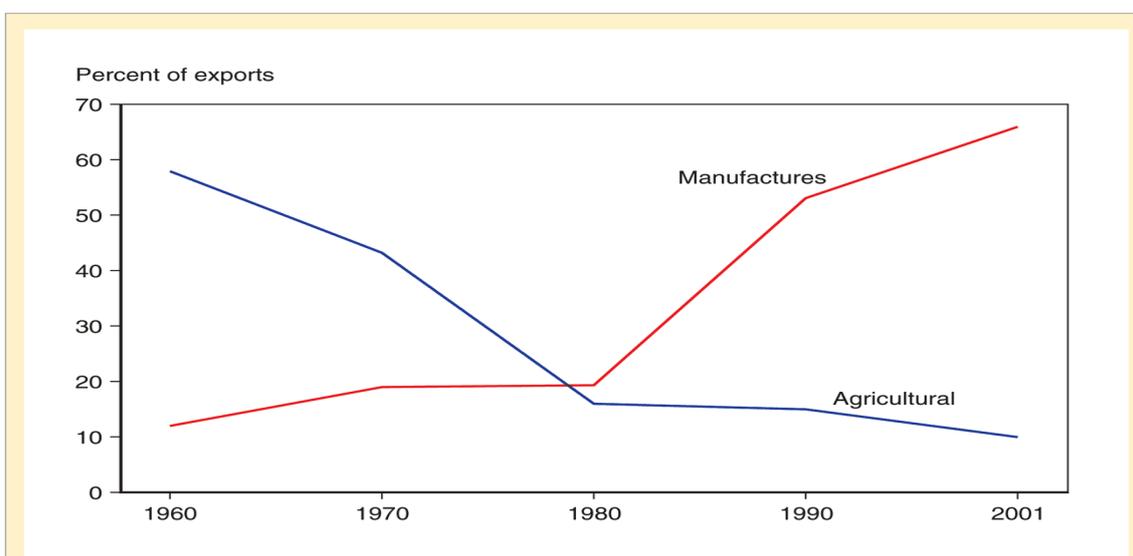


Figure 2-7

The Changing Composition of Developing-Country Exports

Over the past 40 years, the exports of developing countries have shifted toward manufactures.

Source: United Nations Council on Trade and Development.

Multinational Corporations and Outsourcing

- Before 1945, multinational corporations played a small role world trade.
- But today about one third of all US exports and 42% of all US imports are sales from one division of a multinational corporation to another.
- **Outsourcing** occurs when a firm moves business operations out of the domestic country.
 - ❑ The operations could be run by a subsidiary of a multinational corporation.
 - ❑ Or they could be subcontracted to a foreign firm.
- Outsourcing of either type increases the amount of trade.

Summary

1. The 5 largest trading partners with the US are Canada, Mexico, China, Japan and Germany.
2. The largest economies in the EU undertake the largest fraction of the total trade between the EU and the US.
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.
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.

TABLE 2-1 Hypothetical World Spending Shares and GDP

Country	Percentage Share of World Spending	GDP (\$ trillion)
A	40	4
B	40	4
C	10	1
D	10	1

TABLE 2-2 Values of Exports (\$ trillion)

To:	A	B	C	D
A	—	1.6	0.4	0.4
B	1.6	—	0.4	0.4
C	0.4	0.4	—	0.1
D	0.4	0.4	0.1	—

Chapter 3

Labor Productivity and Comparative Advantage: The Ricardian Model

Preview

- Opportunity costs and comparative advantage
- A one factor Ricardian model
- Production possibilities
- Gains from trade
- Wages and trade
- Misconceptions about comparative advantage
- Transportation costs and non-traded goods
- Empirical evidence

Introduction

- Theories of why trade occurs can be grouped into three categories:
- Market size and distance between markets determine how much countries buy and sell. These transactions benefit both buyers and sellers.
- Differences in labor, physical capital, natural resources and technology create productive advantages for countries.
- Economies of scale (larger is more efficient) create productive advantages for countries.
- The Ricardian model (chapter 3) says differences in *productivity of labor* between countries cause productive differences, leading to gains from trade.

- Differences in productivity are usually explained by differences in *technology*.
- The Heckscher-Ohlin model (chapter 4) says differences in *labor, labor skills, physical capital and land* between countries cause productive differences, leading to gains from trade.

Comparative Advantage and Opportunity Cost

- The Ricardian model uses the concepts of *opportunity cost* and *comparative advantage*.
- The opportunity cost of producing something measures the cost of not being able to produce something else.
- A country faces opportunity costs when it employs resources to produce goods and services.
- For example, a limited number of workers could be employed to 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.
 - A country faces a trade off: how many computers or roses should it produce with the limited resources that it has?
- Suppose that in the US 10 million roses can be produced with the same resources that could produce 100,000 computers.
- Suppose that in Ecuador 10 million roses can be produced with the same resources that could produce 30,000 computers.
- Workers in Ecuador would be less productive than those in the US in manufacturing computers.

- Quick quiz: what is the opportunity cost for Ecuador if it decides to produce roses?
- Ecuador has a lower opportunity cost of producing roses.
- Ecuador can produce 10 million roses, compared to 30,000 computers that it could otherwise produce.
- The US can produce 10 million roses, compared to 100,000 computers that it could otherwise produce.
- The US has a lower opportunity cost in producing computers.
 - ❑ Ecuador can produce 30,000 computers, compared to 10 million roses that it could otherwise produce.
 - ❑ The US can produce 100,000 computers, compared to 10 million roses that it could otherwise produce.
 - ❑ The US can produce 30,000 computers, compared to 3.3 million roses that it could otherwise produce.
- A country has a **comparative advantage** in producing a good if the opportunity cost of producing that good is lower in the country than it is in other countries.
- A country with a comparative advantage in producing a good uses its resources most efficiently when it produces that good *compared to producing other goods*.
- The US has a comparative advantage in computer production: it uses its resources more efficiently in producing computers compared to other uses.
- Ecuador has a comparative advantage in rose production: it uses its resources more efficiently in producing roses compared to other uses.
- Suppose initially that Ecuador produces computers and the US produces roses, and that both countries want to consume computers and roses.
- Can both countries be made better off?

Comparative Advantage and Trade

	Millions of Roses	Thousands of Computers
U.S.	-10	+100
Ecuador	+10	-30
Total	0	+70

- In this simple example, we see that when countries specialize in production in which they have a comparative advantage, more goods and services can be produced and consumed.
 - ❑ Initially both countries could only consume 10 million roses and 30 thousand computers.
 - ❑ When they produced goods in which they had a comparative advantage, they could still consume 10 million roses, but could consume $100,000 - 30,000 = 70,000$ more computers.

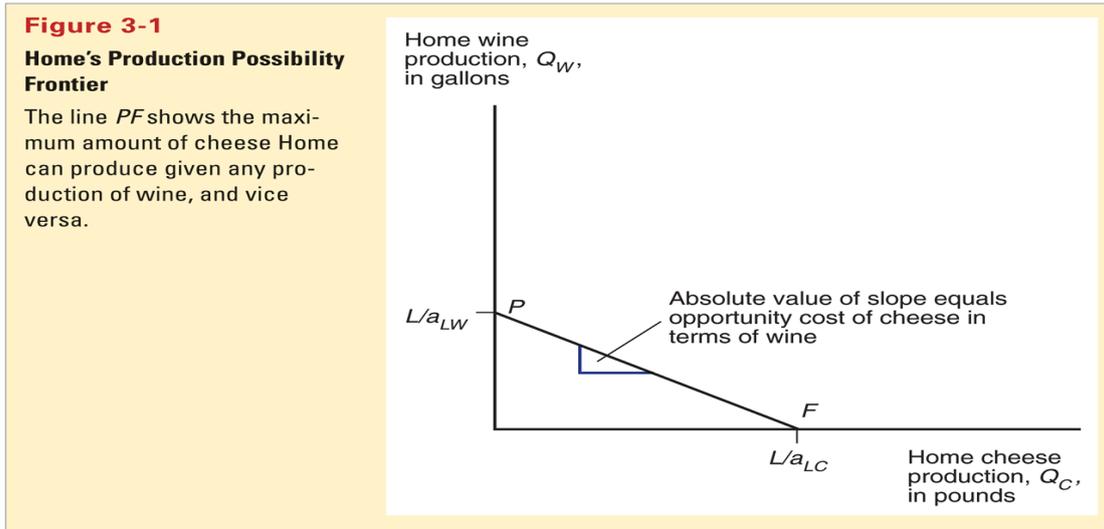
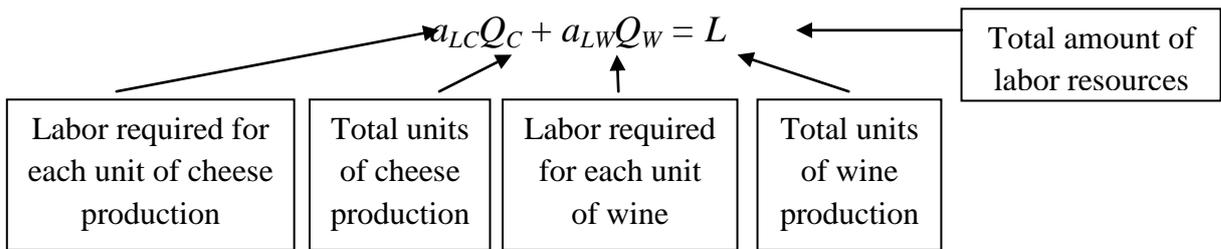
A One Factor Ricardian Model

- The simple example with roses and computers explains the intuition behind the Ricardian model.
- We formalize these ideas by constructing a slightly more complex one factor Ricardian model using the following simplifying assumptions:
 1. Labor is the only resource important for production.
 2. Labor productivity varies across countries, usually due to differences in technology, but labor productivity in each country is constant across time.
 3. The supply of labor in each country is constant.

4. Only two goods are important for production and consumption: wine and cheese.
 5. Competition allows laborers to be paid a “competitive” wage, a function of their productivity and the price of the good that they can sell, and allows laborers to work in the industry that pays the highest wage.
 6. Only two countries are modeled: domestic and foreign.
- Because labor productivity is constant, define a **unit labor requirement** as the constant number of hours of labor required to produce one unit of output.
 - a_{LW} is the unit labor requirement for wine in the domestic country. For example, if $a_{LW} = 2$, then it takes 2 hours of labor to produce one liter of wine in the domestic country.
 - a_{LC} is the unit labor requirement for cheese in the domestic country. For example, if $a_{LC} = 1$, then it takes 1 hour of labor to produce one kg of cheese in the domestic country.
 - A high unit labor requirement means low labor productivity.
 - Because the supply of labor is constant, denote the total number of labor hours worked in the domestic country as a constant number L .

Production Possibilities

- 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.
- If Q_C represents the quantity of cheese produced and Q_W represents the quantity of wine produced, then the production possibility frontier of the domestic economy has the equation:



$$a_{LC}Q_C + a_{LW}Q_W = L$$

- $Q_C = L/a_{LC}$ when $Q_W = 0$
- $Q_W = L/a_{LW}$ when $Q_C = 0$
- $Q_W = L/a_{LW} - (a_{LC}/a_{LW})Q_C$: the equation for the PPF, with a slope equal to $-(a_{LC}/a_{LW})$
- When the economy uses all of its resources, the opportunity cost of cheese production is the quantity of wine that is given up (reduced) as Q_C increases: (a_{LC}/a_{LW}) .
- When the economy uses all of its resources, the opportunity cost is equal to the absolute value of the slope of the PPF, and it is constant when the PPF is a straight line.
- To produce an additional kg of cheese requires a_{LC} hours of work.
- *Each* hour devoted to cheese production could have been used to produce a certain amount of wine instead, equal to $1 \text{ hour}/(a_{LW} \text{ hours/liter of wine}) = (1/a_{LW})$ liter of wine

- For example, if 1 hour is moved to cheese production, that additional hour of labor could have produced $1 \text{ hour} / (2 \text{ hours/liter of wine}) = 1/2$ liter of wine.
- The trade-off is the increased amount of cheese relative to the decreased amount of wine: a_{LC}/a_{LW} .
- In general, the amount of the domestic economy's production is defined by $a_{LC}Q_C + a_{LW}Q_W \leq L$
- This describes what an economy can produce, but to determine what the economy does produce, we must determine the prices of goods.

Production, Prices and Wages

- Let P_C be the price of cheese and P_W be the price of wine.
- Because of competition,
 - hourly wages of cheese makers are equal to the market value of the cheese produced in an hour: P_C/a_{LC}
 - hourly wages of wine makers are equal to the market value of the wine produced in an hour: P_W/a_{LW}
- Because workers like high wages, they will work in the industry that pays a higher hourly wage.
- If $P_C/a_{LC} > P_W/a_{LW}$ workers will make only cheese.
 - If $P_C/P_W > a_{LC}/a_{LW}$ workers will only make cheese.
 - The economy will specialize in cheese production if the price of cheese relative to the price of wine exceeds the opportunity cost of producing cheese.
- If $P_C/a_{LC} < P_W/a_{LW}$ workers will make only wine.
 - If $P_C/P_W < a_{LC}/a_{LW}$ workers will only make wine.
 - If $P_W/P_C > a_{LW}/a_{LC}$ workers will only make wine.

- The economy will specialize in wine production if the price of wine relative to the price of cheese exceeds the opportunity cost of producing wine.
- If the domestic 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 $P_C/a_{LC} = P_W/a_{LW}$ workers will have no incentive to flock to either the cheese industry or the wine industry, thereby maintaining a positive amount of production of both goods.
 - $P_C/P_W = a_{LC}/a_{LW}$
 - Production (and consumption) of both goods occurs when relative price of a good equals the opportunity cost of producing that good.

Trade in the Ricardian Model

- Suppose that the domestic country has a comparative advantage in cheese production: its opportunity cost of producing cheese is lower than it is in the foreign country.

$$a_{LC}/a_{LW} < a^*_{LC}/a^*_{LW}$$

When the domestic country increases cheese production, it reduces wine production less than the foreign country does because the domestic unit labor requirement of cheese production is low compared to that of wine production.

- where “*” notates foreign country variables
- Suppose the domestic country is more efficient in wine and cheese production.
- It has an *absolute advantage* in all production: its unit labor requirements for wine and cheese production are lower than those in the foreign country:
 - $a_{LC} < a^*_{LC}$ and $a_{LW} < a^*_{LW}$

- A country can be more efficient in producing both goods, but it will have a comparative advantage in only one good—the good that uses resources most efficiently compared to alternative production.
- Even if a country is the most (or least) efficient producer of all goods, it still can benefit from trade.
- To see how all countries can benefit from trade, we calculate relative prices when trade exists.

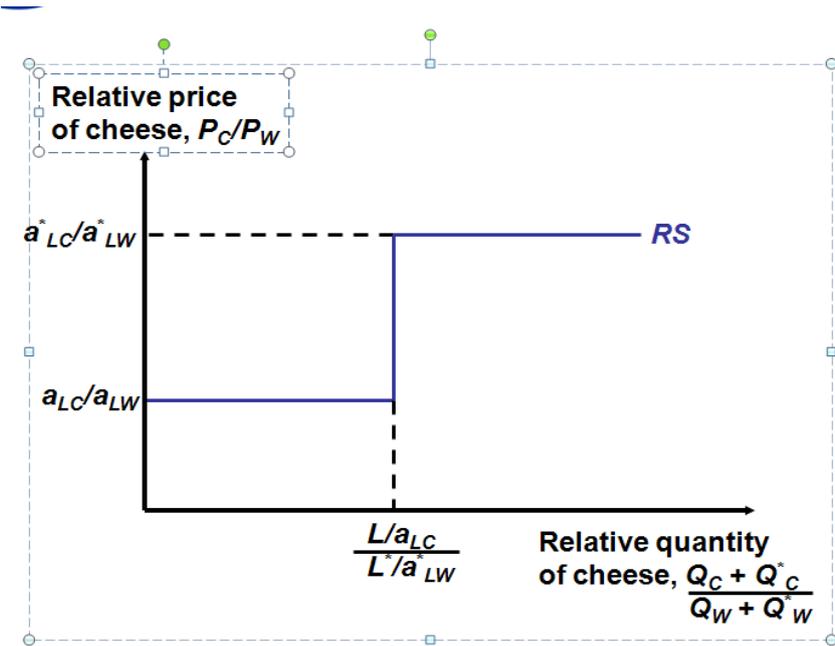
□ Without trade, relative price of a good equals the opportunity cost of producing that good.

- To calculate relative prices with trade, we first calculate relative quantities of *world* production:

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

Relative Supply and Relative Demand

- Next we consider **relative supply** of cheese: the quantity of cheese supplied by all countries relative to the quantity of wine supplied by all countries at each relative price of cheese, P_C/P_W .



There is no supply of cheese if the relative price of cheese falls below a_{LC}/a_{LW} .

□ Why? because the domestic country will specialize in wine production whenever $P_C/P_W < a_{LC}/a_{LW}$

□ And we assumed that $a_{LC}/a_{LW} < a^*_{LC}/a^*_{LW}$ so foreign workers won't find it desirable to produce cheese either.

- When $P_C/P_W = a_{LC}/a_{LW}$, domestic workers will be indifferent between producing wine or cheese, but foreign workers will still produce only wine.
- When $a^*_{LC}/a^*_{LW} > P_C/P_W > a_{LC}/a_{LW}$, domestic workers specialize in cheese production because they can earn higher wages, but foreign workers will still produce only wine.
- When $a^*_{LC}/a^*_{LW} = P_C/P_W$, foreign workers will be indifferent between producing wine or cheese, but domestic workers will still produce only cheese.
- There is no supply of wine if the relative price of cheese rises above a^*_{LC}/a^*_{LW}
- Relative demand of cheese is the quantity of cheese demanded in all countries relative to the quantity of wine demanded in all countries at each relative price of cheese, P_C/P_W .
- As the relative price of cheese rises, consumers in all countries will tend to purchase less cheese and more wine so that the relative quantity of cheese demanded falls.

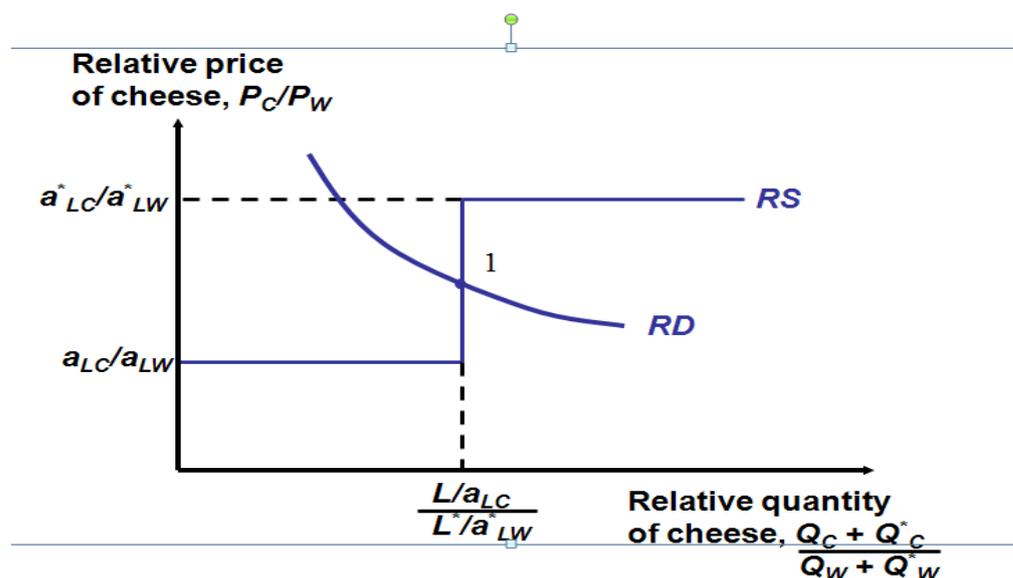
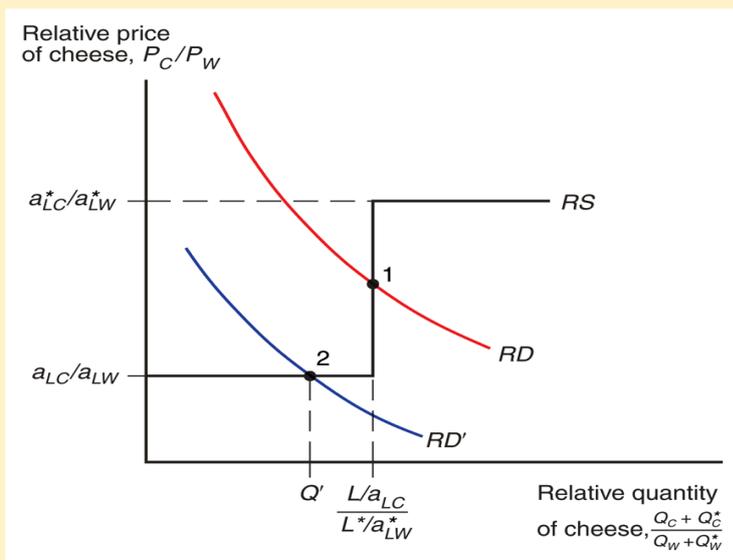


Figure 3-3

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.



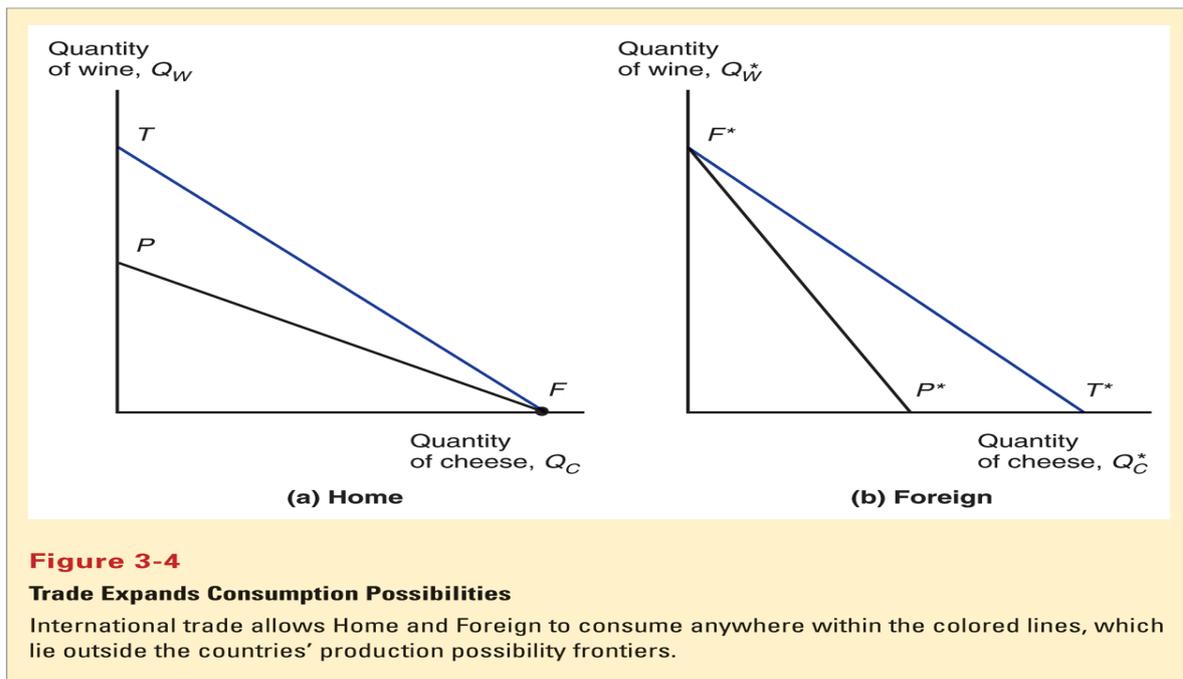
Gains From Trade

- Gains from trade come from specializing in production that use resources most efficiently, and using the income generated from that production to buy the goods and services that countries desire.

□ where “using resources most efficiently” means producing a good in which a country has a comparative advantage.

- 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.
- Think of trade as an indirect method of production or a new technology that converts cheese into wine or vice versa.
- Without the technology, a country has to allocate resources to produce all of the goods that it wants to consume.
- With the technology, a country can specialize its production and trade (“convert”) the products for the goods that it wants to consume.

- We show how consumption possibilities expand beyond the production possibility frontier when trade is allowed.
- Without trade, consumption is restricted to what is produced.
- 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.



A Numerical Example

Unit labor requirements for domestic and foreign countries		
	Cheese	Wine
Domestic	$a_{LC} = 1$ hour/kg	$a_{LW} = 2$ hours/L
Foreign	$a_{LC}^* = 6$ hours/kg	$a_{LW}^* = 3$ hours/L

- $a_{LC}/a_{LW} = 1/2 < a_{LC}^*/a_{LW}^* = 2$
- The domestic country is more efficient in both industries, but it has a comparative advantage only in cheese production.

- The foreign country is less efficient in both industries, but it has a comparative advantage in wine production.
- Quick quiz: what is its opportunity cost of producing wine? what is its opportunity cost of producing cheese?
- With trade, the equilibrium relative price of cheese must be between $a_{LC}/a_{LW} = 1/2$ and $a^*_{LC}/a^*_{LW} = 2$
 - Suppose that $P_C/P_W = 1$ in equilibrium.
 - In words, one kg of cheese trades for one liter of wine.
- If the domestic country does not trade, it can use one hour of labor to produce $1/a_{LW} = \underline{1/2}$ liter of wine.
- If the domestic country does trade, it can use one hour of labor to produce $1/a_{LC} = 1$ kg of cheese, sell this amount to the foreign country at current prices to obtain **1 liter of wine**.
- If the foreign country does not trade, it can use one hour of labor to produce $1/a^*_{LC} = \underline{1/6}$ kg of cheese.
- If the foreign country does trade, it can use one hour of labor to produce $1/a^*_{LW} = 1/3$ liter of wine, sell this amount to the domestic country at current prices to obtain **1/3 kg of cheese**.

Relative Wages

- **Relative wages** are the wages of the domestic country relative to the wages in the foreign country.
- Although the Ricardian model predicts that relative prices equalize across countries after trade, it does not predict that relative wages will do the same.
- Productivity (technological) differences determine wage differences in the Ricardian model.

□ A country with absolute advantage in producing a good will enjoy a higher wage in that industry after trade.

- Suppose that $P_C = \$12/\text{kg}$ and $P_W = \$12/\text{L}$
- Since domestic workers specialize in cheese production after trade, their hourly wages will be

$$(1/a_{LC})P_C = (1/1)\$12 = \$12$$

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

$$(1/a_{LW}^*)P_W = (1/3)\$12 = \$4$$

- The relative wage of domestic workers is therefore

$$\$12/\$4 = 3$$

- The relative wage lies between the ratio of the productivities in each industry.

□ The domestic country is $6/1 = 6$ times as productive in cheese production, but only $3/2 = 1.5$ times as productive in wine production.

□ The domestic country has a wage rate 3 times as high as that in the foreign country.

- These relationships imply that both countries have a *cost advantage* in production.

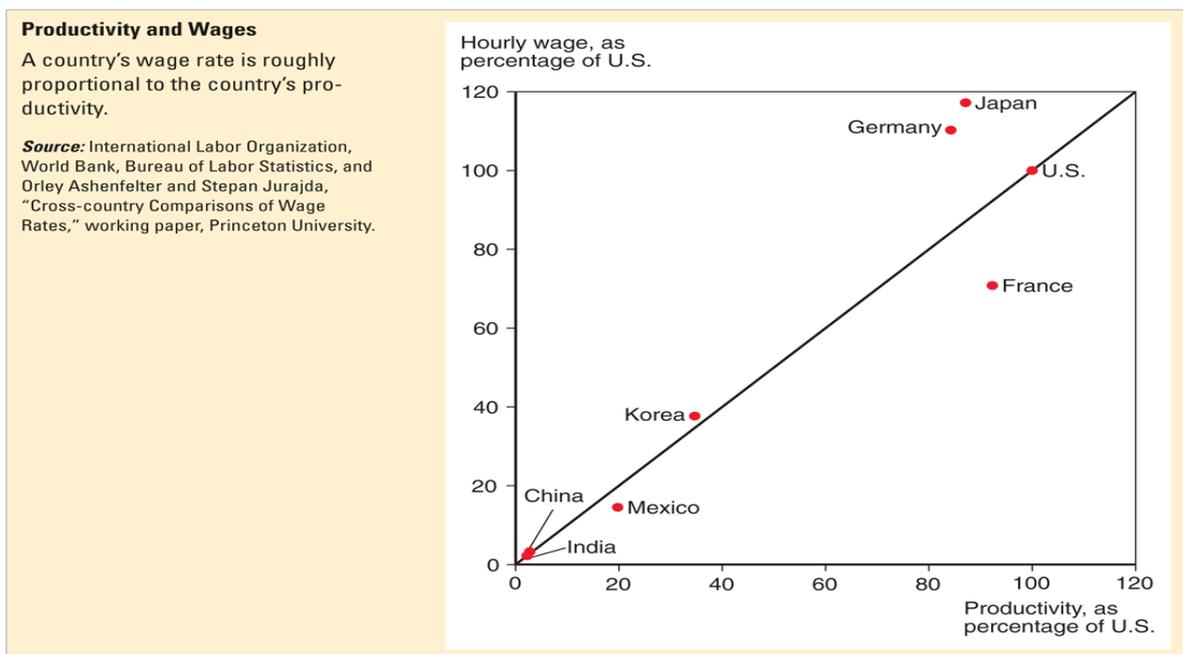
□ The cost of high wages can be offset by high productivity.

□ The cost of low productivity can be offset by low wages.

- Because foreign workers have a wage that is only $1/3$ 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, despite high wages.

Do Wages Reflect Productivity?

- In the Ricardian model, relative wages reflect relative productivities of the two countries.
- Is this an accurate assumption?
- Some argue that low wage countries pay low wages despite growing productivity, putting high wage countries at a cost disadvantage.
- But evidence shows that low wages are associated with low productivity.



- Other evidence shows that wages rise as productivity rises.
 - ❑ In 2000, South Korea's labor productivity was 35% of the US level and its average wages were about 38% of US average wages.
 - ❑ After the Korean War, South Korea was one of the poorest countries in the world, and its labor productivity was very low. In 1975, average wages in South Korea were still only 5% of US average wages.

Misconceptions About Comparative Advantage

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.

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 (more wine in exchange for cheese).
- Producers/workers benefit by earning a higher income (by using resources more efficiently and through higher prices/wages).

3. Free trade exploits less productive countries.

- 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 (e.g., involuntary prostitution) 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

- Suppose now there are N goods produced, indexed by $i = 1, 2, \dots, N$.
- The domestic country's unit labor requirement for good i is a_{Li} , and that of the foreign country is a_{Li}^*
- Goods will be produced wherever it is cheaper to produce them.
- Let w represent the wage rate in the domestic country and w^* represent the wage rate in the foreign country.
 - If $wa_{Li} < w^*a_{Li}^*$ then only the domestic country will produce good i , since total wage payments are less there.
 - Or equivalently, if $a_{Li}^*/a_{Li} > w/w^*$
 - 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.
- Suppose there are 5 goods produced in the world:

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

- If $w/w^* = 3$, the domestic country will produce apples, bananas, and caviar, while the foreign country will produce dates and enchiladas.
 - The relative productivities of the domestic country in producing apples, bananas and caviar are higher than the relative wage.

- 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 domestic 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 dates.

- How is the relative wage determined?

- By the relative supply and relative (derived) demand for labor services.

- The relative (derived) demand for domestic labor services falls when w/w^* rises. As domestic labor becomes more expensive relative to foreign labor, fewer goods will be produced in the domestic country, further reducing the demand for domestic labor.

- goods produced in the domestic country become more expensive, and demand for these goods and the labor to produce them falls.

- Fewer goods will be produced in the domestic country, further reducing the demand for domestic labor.

TABLE 3-3 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

- Suppose w/w^* increases from 3 to 3.99:

- The domestic country would produce apples, bananas, and caviar, but the demand for these goods and the labor to produce them falls as the relative wage rises.

- Suppose w/w^* increases from 3.99 to 4.01:

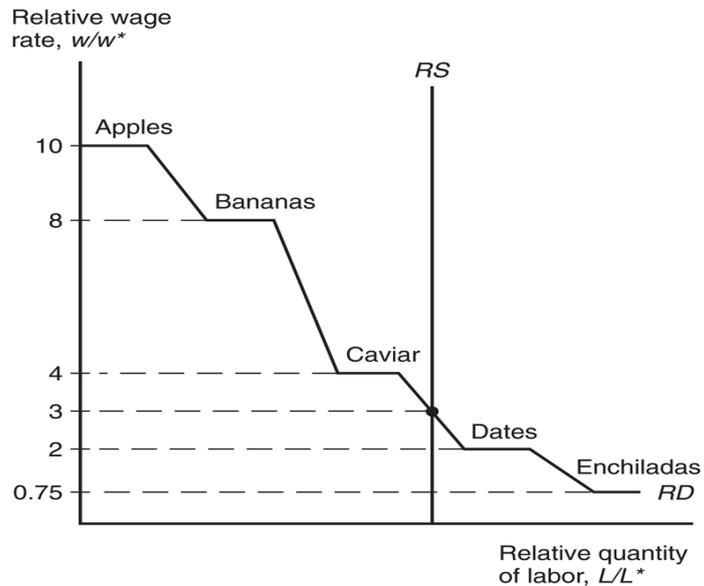
- Caviar is now too expensive to produce in the domestic country, so the caviar industry moves to the foreign country, causing a discrete (abrupt) drop in the demand for domestic labor.

- Consider similar effects as 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 .

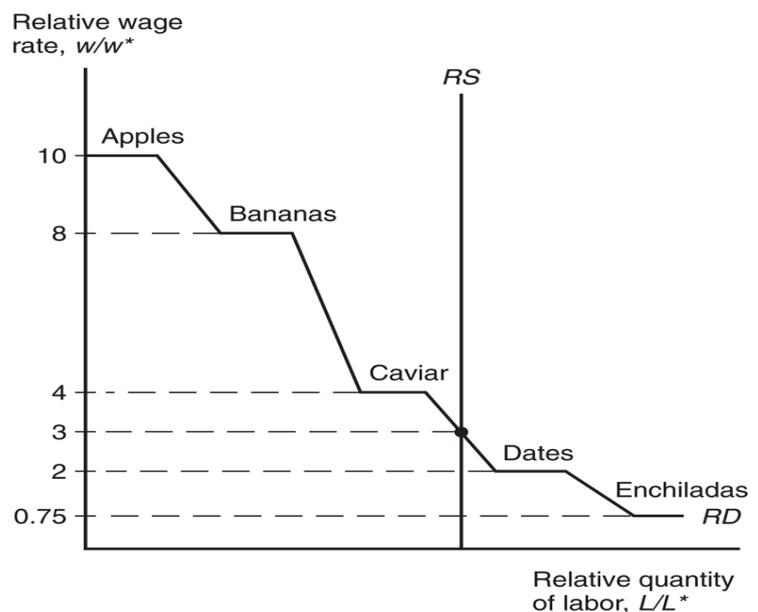


- Finally, suppose that relative supply of labor is independent of w/w^* and is fixed at an amount determined by the populations in the domestic and foreign countries.

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 .



Transportation Costs and Non-traded Goods

- The Ricardian model predicts that countries should completely specialize in production.
- But this rarely happens for primarily 3 reasons:
 1. More than one factor of production reduces the tendency of specialization (chapter 4)
 2. Protectionism (chapters 8–11)
 3. Transportation costs reduce or prevent trade, which may cause each country to produce the same good or service
- Non-traded goods and services (e.g., haircuts and auto repairs) exist due to high transportation costs.
 - ❑ Countries tend to spend a large fraction of national income on non-traded goods and services.
 - ❑ This fact has implications for the gravity model and for models that consider how income transfers across countries affect trade.

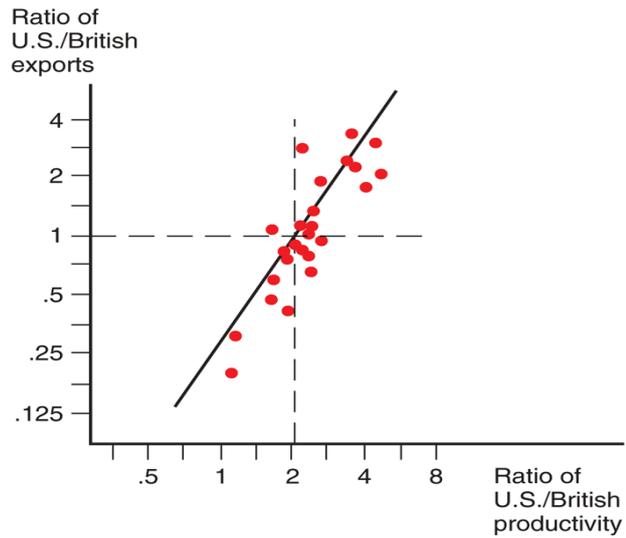
Empirical Evidence

- Do countries export those goods in which their productivity is relatively high?
- The ratio of US to British exports in 1951 compared to the ratio of US to British labor productivity in 26 manufacturing industries suggests yes.
- At this time the US had an absolute advantage in *all* 26 industries, yet the ratio of exports was low in the least productive sectors of the US.

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.



Summary

1. A country has a comparative advantage in producing a good if the opportunity cost of producing that good is lower in the country than it is in other countries.

- A country with a comparative advantage in producing a good uses its resources most efficiently when it produces that good compared to producing other goods.

2. The Ricardian model focuses only on differences in the productivity of labor across countries, and it explains gains from trade using the concept of comparative advantage.

3. When countries specialize and trade according to the Ricardian model; the relative price of the produced good rises, income for workers rises and imported goods are less expensive for consumers.

4. Trade is predicted to benefit both high productivity and low productivity countries, although trade may change the distribution of income within countries.

5. High productivity *or* low wages give countries a cost advantage that allow them to produce efficiently.

6. Although empirical evidence supports trade based on comparative advantage, transportation costs and other factors prevent complete specialization in production.

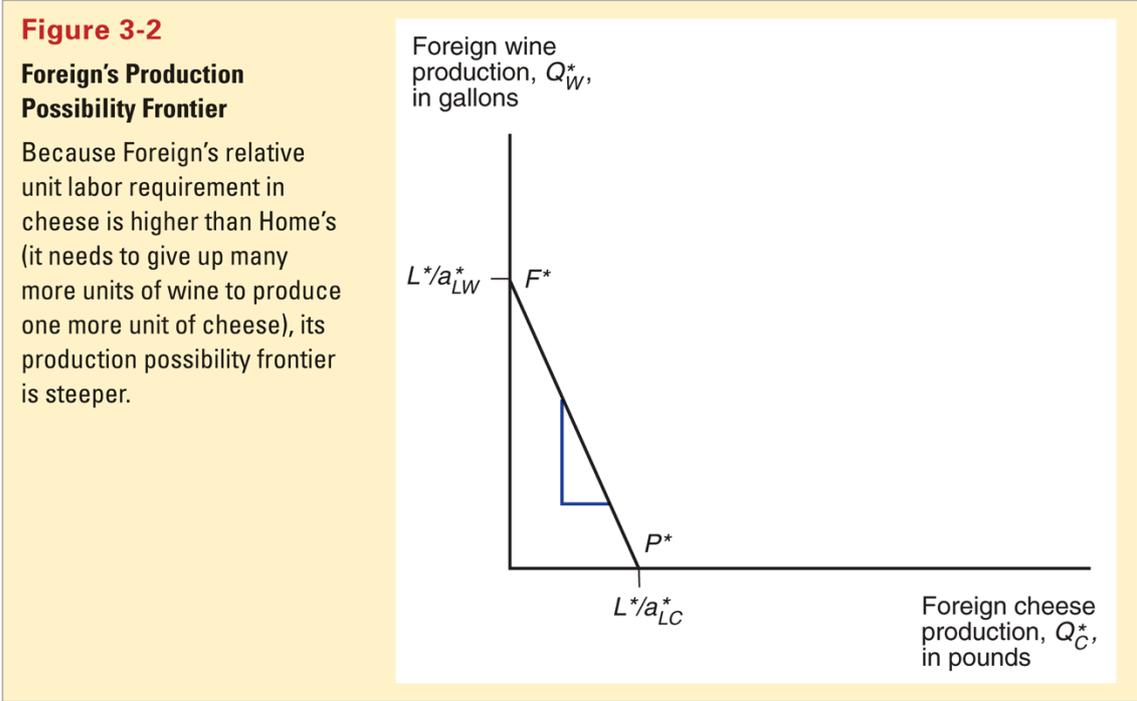


TABLE 3-1 Hypothetical Changes in Production

	Million Roses	Thousand Computers
United States	-10	+100
South America	+10	-30
Total	0	+70

TABLE 3-2 Unit Labor Requirements

	Cheese	Wine
Home	$a_{LC} = 1$ hour per pound	$a_{LW} = 2$ hours per gallon
Foreign	$a_{LC}^* = 6$ hours per pound	$a_{LW}^* = 3$ hours per gallon

Chapter 4

Resources, Comparative Advantage and Income Distribution

Preview

- Production possibilities
- Relationship between goods prices, factor prices and factor levels
- Relationship between goods prices, factor prices, factor levels and output levels.
- Trade in the Heckscher-Ohlin model
- Factor price equalization
- Income distribution and income inequality
- Empirical evidence

Introduction

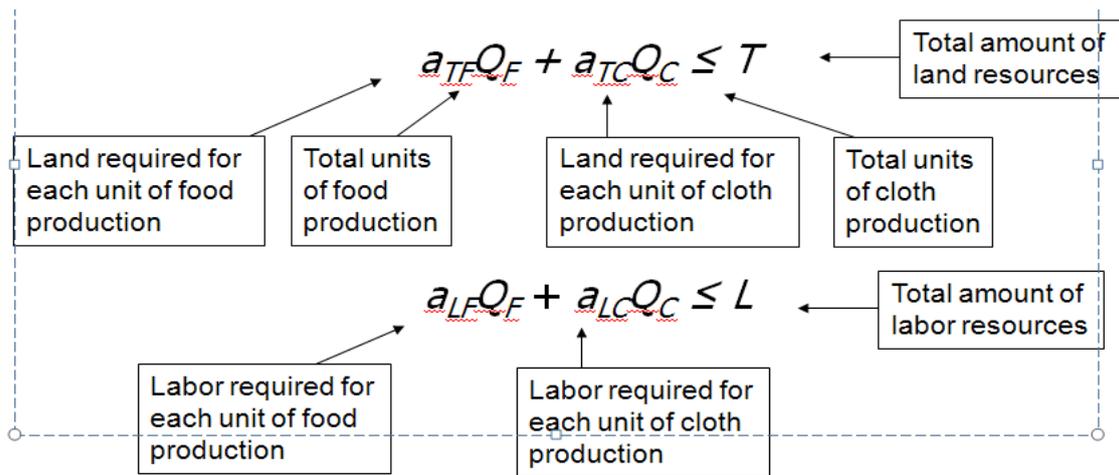
- While trade is partly explained by differences in labor productivity, it also can be explained by differences in resources across countries.
- The Heckscher-Ohlin theory argues that international differences in labor, labor skills, physical capital or land (factors of production) create productive differences that explain why trade occurs.
 - Countries have *relative abundance* of factors of production.
 - Production processes use factors of production with *relative intensity*.

Two Factor Heckscher-Ohlin Model

1. Labor and land are resources important for production.
2. The amount of labor and land varies across countries, and this variation influences productivity.
3. The supply of labor and land in each country is constant.
4. Only two goods are important for production and consumption: cloth and food.
5. Competition allows factors of production to be paid a “competitive” wage, a function of their productivities and the price of the good that it produces, and allows factors to be used in the industry that pays the highest wage/rate.
6. Only two countries are modeled: domestic and foreign

Production Possibilities

- When there is more than one factor of production, the PPF (opportunity cost in production) is no longer a straight line. Why?
- Let’s expand the previous chapter’s model to include two factors of production, labor and land.
 - a_{TC} = hectares of land used to produce one m² of cloth
 - a_{LC} = hours of labor used to produce one m² of cloth
 - a_{TF} = hectares of land used to produce one calorie of food
 - a_{LF} = hours of labor used to produce one calorie of food
 - L = total amount of labor available for production
 - T = total amount of land (terrain) available for production
- Production possibilities are influenced by *both* land and labor (requirements):



- Let's assume that *each unit* of cloth production uses labor intensively and *each unit* of food production uses land intensively:

$a_{LC}/a_{TC} > a_{LF}/a_{TF}$

Or $a_{LC}/a_{LF} > a_{TC}/a_{TF}$

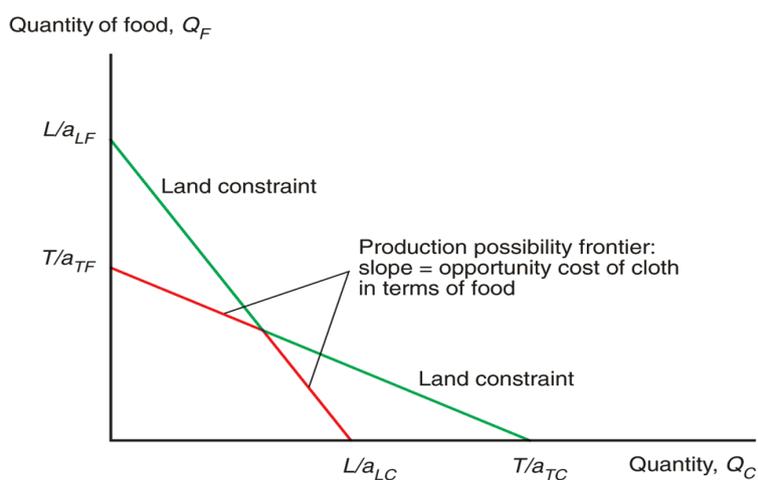
- Or, we consider the *total* resources used in each industry and say that cloth production is **labor intensive** and food production is **land intensive** if $L_C/T_C > L_F/T_F$.

- This assumption influences the slope of the production possibility frontier:

Figure 4-1

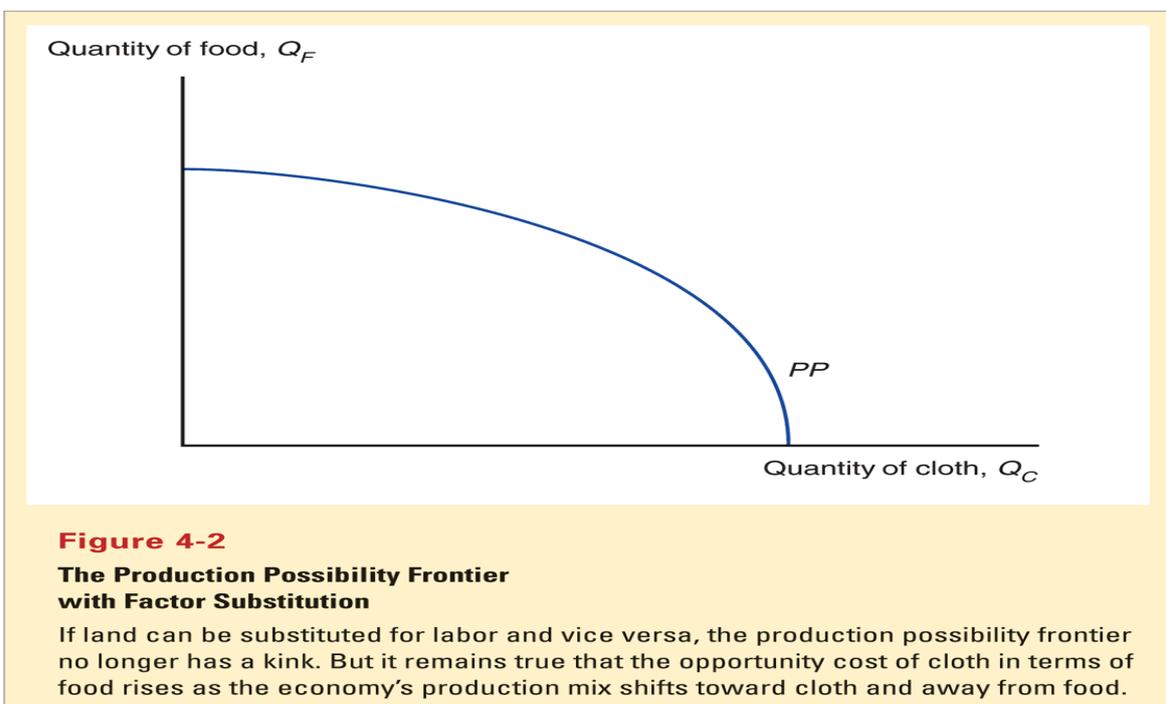
The Production Possibility Frontier Without Factor Substitution

If land could not be substituted for labor or vice versa, the production possibility frontier in the factor proportions model would be defined by two resource constraints: The economy can't use more than the available supply of labor or land. So the production possibility frontier is defined by the red line in this figure. The important feature of this frontier is that the opportunity cost of cloth in terms of food isn't constant: It rises as the economy's mix of production shifts toward cloth.



- The opportunity cost of producing cloth in terms of food is not constant in this model:

- ❑ it's *low* when the economy produces a *low amount of cloth* and a high amount of food
 - ❑ it's *high* when the economy produces a *high amount of cloth* and a low amount of food
- The above PPF equations do not allow substitution of land for labor in production or vice versa.
 - ❑ Unit factor requirements are constant along each line segment of the PPF.
- If we allow substitution of inputs, then the PPF becomes curved.
 - ❑ For example, many laborers could work on a small plot of land or a few labors could work on a large plot of land to produce the same amount of output.
 - ❑ Unit factor requirements are not constant at *every* quantity of cloth and food produced.

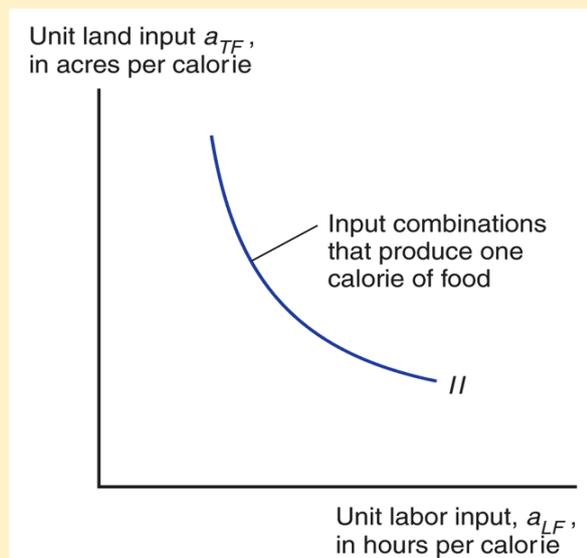


Input Possibilities

Figure 4-4

Input Possibilities in Food Production

A farmer can produce a calorie of food with less land if he or she uses more labor, and vice versa.



Production and Prices

- The production possibility frontier describes what an economy can produce, but to determine what the economy does produce, we must determine the prices of goods.
- In general, the economy should produce at the point that maximizes the value of production, V :

$$V = P_C Q_C + P_F Q_F$$

□ where P_C is the price of cloth and P_F is the price of food.

- Define an **isovalue** line as a line representing a constant value of production.
 - $V = P_C Q_C + P_F Q_F$
 - $P_F Q_F = V - P_C Q_C$
 - $Q_F = V/P_F - (P_C/P_F) Q_C$
 - The slope of an isovalue line is $-(P_C/P_F)$

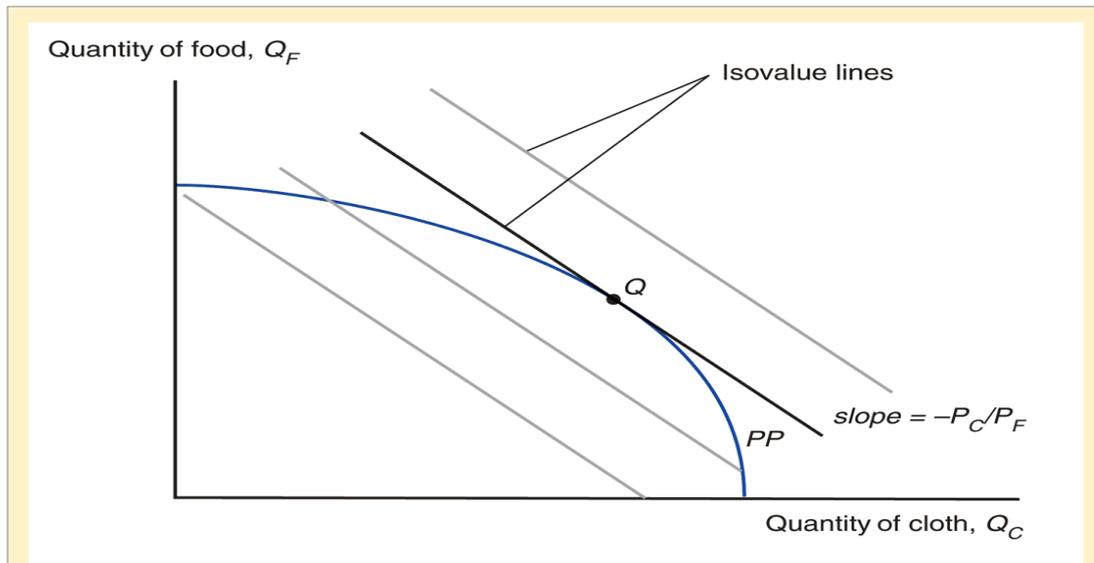


Figure 4-3

Prices and Production

The economy produces at the point that maximizes the value of production given the prices it faces; this is the point that is on the highest possible iso-value line. At the point, the opportunity cost of cloth in terms of food is equal to the relative price of cloth, P_C/P_F .

- Given prices of output, one iso-value line represents the maximum value of production, say at a point Q .
- At that point, the slope of the PPF equal $-(P_C/P_F)$, so *the opportunity cost of cloth equals the relative price of cloth.*

Factor Prices, Goods Prices and Factor Levels

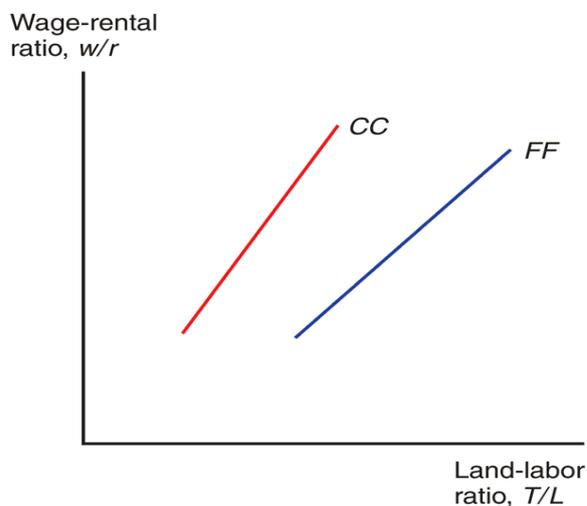
- Producers may choose different amounts of factors of production used to make cloth or food.
- Their choice depends on the wage rate, w , and the (opportunity) cost of using land, the rental rate r .
- As the wage rate increases relative to the rental rate, producers are willing to use more land and less labor in the production of food and cloth.

- Recall that food production is land intensive and cloth production is labor intensive.

Figure 4-5

Factor Prices and Input Choices

In each sector, the ratio of land to labor used in production depends on the cost of labor relative to the cost of land, w/r . The curve FF shows the land-labor ratio choices in food production, the curve CC the corresponding choices in cloth production. At any given wage-rental ratio, food production uses a higher land-labor ratio; when this is the case, we say that food production is *land-intensive* and that cloth production is *labor-intensive*.



- Under competition, the price of a good equals the cost of production, and the cost of production depends on the wage rate and the rental rate.
- The effect of the rental rate of land on the price of cloth depends on the intensity of land usage in cloth production.
 - An increase in the rental rate of land will affect the price of food more than the price of cloth.
- Under competition, changes in w/r are therefore *directly related* to changes in P_C/P_W .

Figure 4-6

Factor Prices and Goods Prices

Because cloth production is labor-intensive while food production is land-intensive, there is a one-to-one relationship between the factor price ratio w/r and the relative price of cloth P_C/P_F : the higher the relative cost of labor, the higher must be the relative price of the labor-intensive good. The relationship is illustrated by the curve SS .



- We have a relationship among factor prices and good prices and the levels of factors used in production:
- **Stolper-Samuelson theorem:** if the relative price of a good increases, then the real wage or rate of return of the factor used intensively in the production of that good increases, while the real wage or rate of return of the other factor decreases.
 - Under competition, the real wage/return is equal to the marginal productivity of the factor.
 - Marginal productivity of a factor increases as the level of that factor used in production decreases.

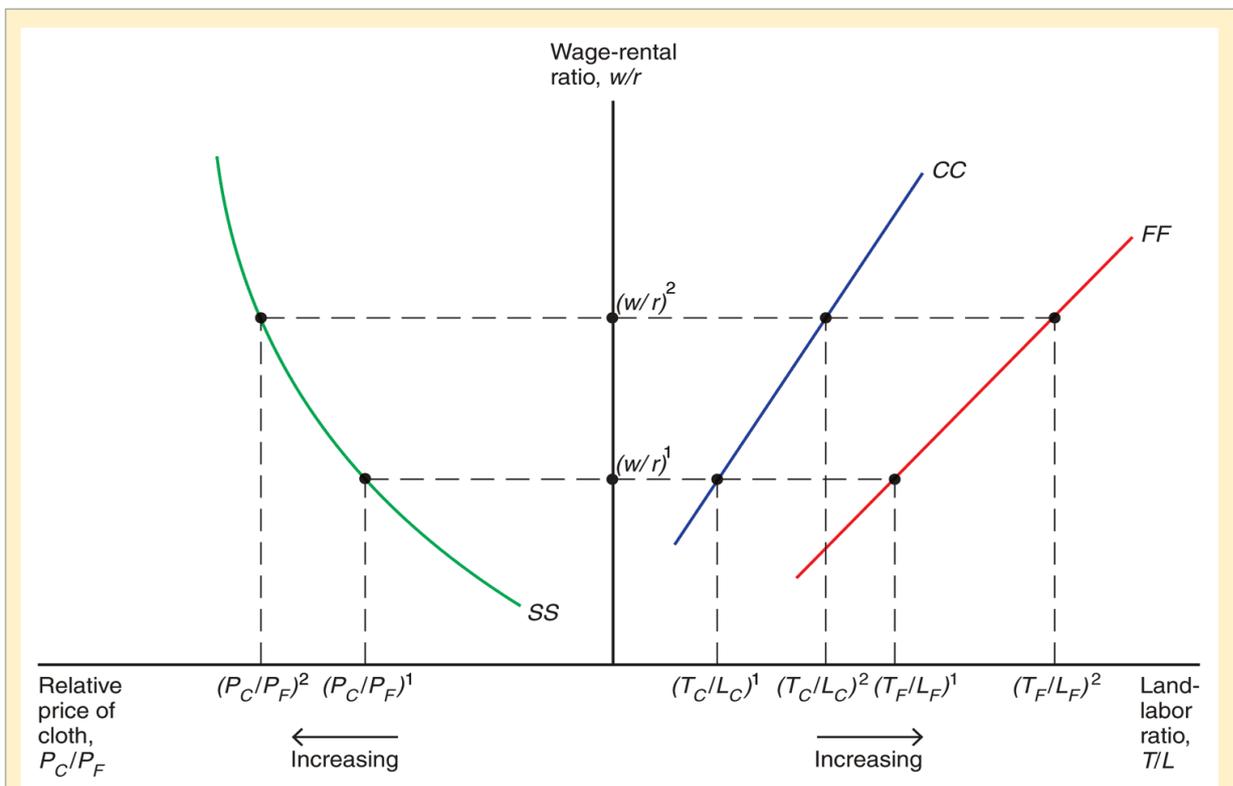


Figure 4-7

From Goods Prices to Input Choices

Given the relative price of cloth $(P_C/P_F)^1$, the ratio of the wage rate to the rental rate on land must equal $(w/r)^1$. This wage-rental ratio then implies that the ratios of land to labor employed in the production of cloth and food must be $(T_C/L_C)^1$ and $(T_F/L_F)^1$. If the relative price of cloth rises to $(P_C/P_F)^2$, the wage-rental ratio must rise to $(w/r)^2$. This will cause the land-labor ratio used in the production of both goods to rise.

- We have a theory that predicts changes in the distribution of income when the relative price of goods changes, say because of trade.

- An increase in the relative price of cloth, P_C/P_F , will:
 - ❑ raise income of workers relative to that of landowners, w/r .
 - ❑ raise the ratio of land to labor, T/L , in both industries and raise the marginal product of labor in both industries and lower the marginal product of land in both industries.
 - ❑ raise the real income of workers and *lower the real income of land owners*.

Factor Prices, Goods Prices, Factor Levels and Output Levels

- The allocation of factors used in production determine the level of output at the economy's PPF.
- We summarize the relationship between the levels of factors used in production and output levels, using the following diagram:

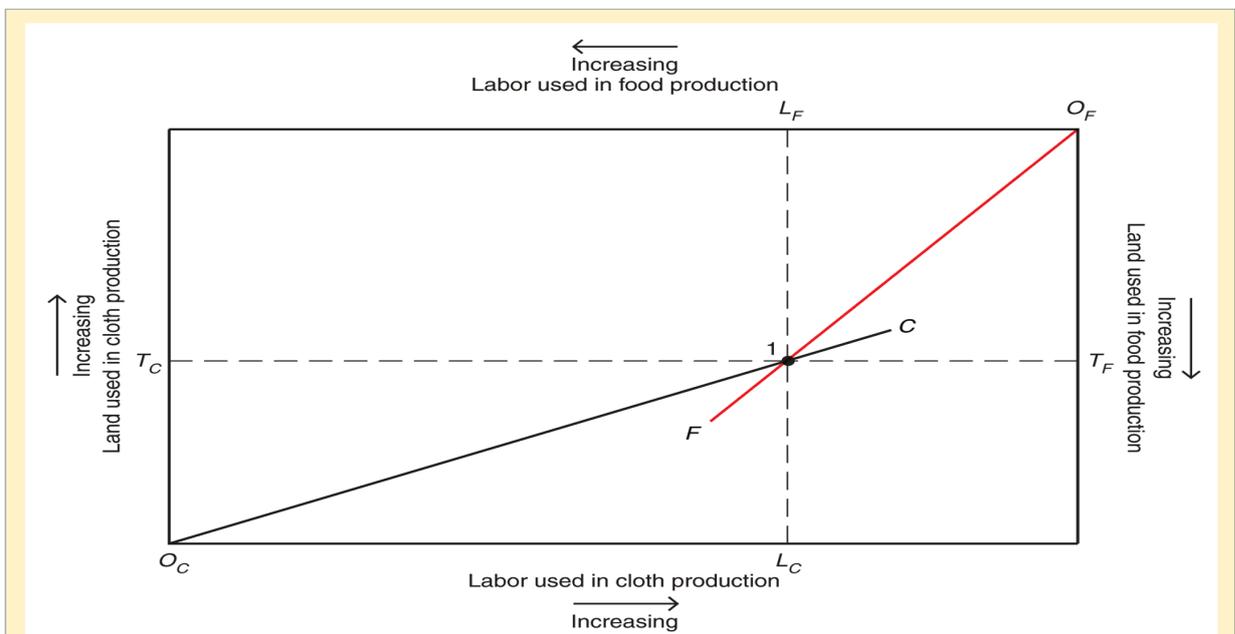


Figure 4-8

The Allocation of Resources

The sides of the box measure the economy's total supplies of labor (horizontal axis) and land (vertical axis). Inputs into cloth production are measured from the lower-left corner; inputs into food production from the upper-right corner. Given the land-labor ratio in cloth production, T_C/L_C , the cloth industry's employment of resources must lie on the line $O_C C$, which is a line drawn from the origin with the slope T_C/L_C . Similarly, the food industry's employment of resources must lie on the line $O_F F$. The allocation of resources can therefore be read off from point 1, where these lines intersect.

- How do output levels change when the economy's resources change?
- If we hold output prices constant as a factor of production increases, then the supply of the good that uses this factor intensively increases and the supply of *the other good decreases*.

□ This proposition is called the Rybczynski theorem.

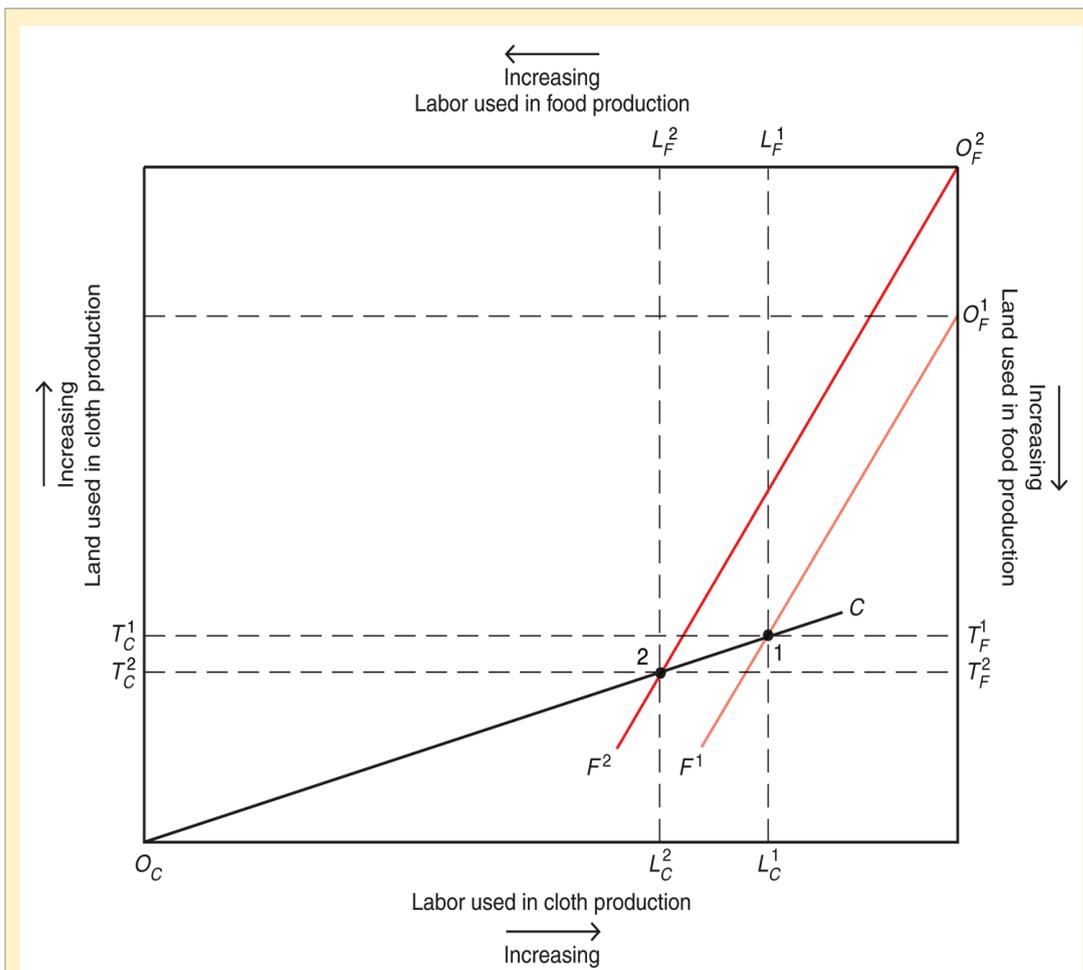


Figure 4-9

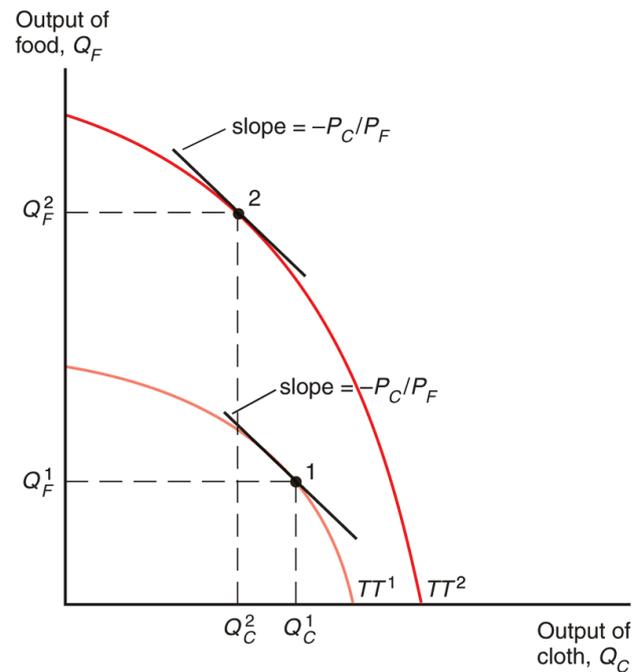
An Increase in the Supply of Land

An increased land supply makes the box representing the economy's resources taller; resources allocated to food production must now be measured from O_F^2 if goods prices remain unchanged, and thus factor prices and land-labor ratios remain the same, resources allocation moves from point 1 to point 2, with more land and more labor devoted to food production. The output of clothing falls, while output of food rises more than proportionately to the increase in land supply.

Figure 4-10

Resources and Production Possibilities

An increase in the supply of land shifts the economy's production possibility frontier outward from TT^1 to TT^2 , but does so disproportionately in the direction of food production. The result is that at an unchanged relative price of cloth (Indicated by the slope $-P_C/P_F$), cloth production actually declines from Q_C^1 to Q_C^2 .



- A economy with a *high ratio of land to labor* is predicted to have a *high output of food* relative to cloth and a *low price of food* relative to cloth.
 - ❑ It will be relatively efficient at (have a comparative advantage in) producing food.
 - ❑ It will be relatively inefficient at producing cloth.
- An economy will be relatively efficient at producing goods that are intensive in the factors of production in which the country is relatively well endowed.

Trade in the Heckscher-Ohlin Model

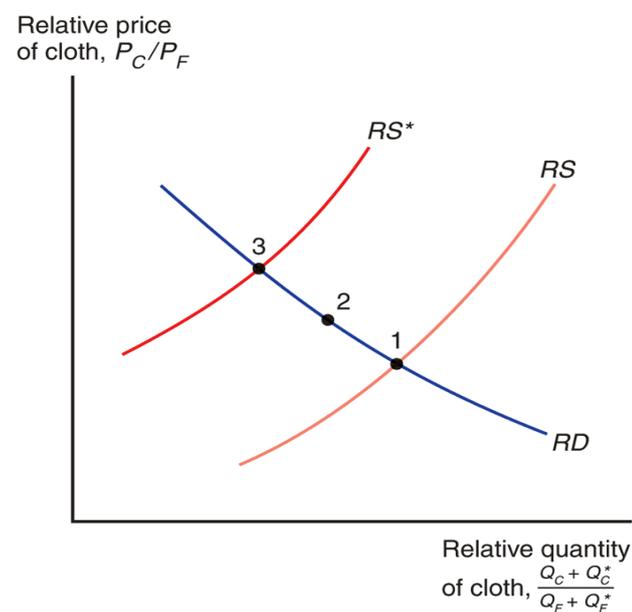
- Suppose that the domestic country has an abundant amount of labor relative to the amount of land.
 - ❑ The domestic country is **abundant** in labor and the foreign country is **abundant** in land: $L/T > L^*/T^*$

- ❑ Likewise, the domestic country is **scarce** in land and the foreign country is **scarce** in labor.
- ❑ However, the countries are assumed to have the same technology and same consumer tastes.
- Because the domestic country is *abundant in labor*, it will be relatively efficient at producing cloth because cloth is *labor intensive*.
- Since cloth is a labor intensive good, the domestic country's PPF will allow a higher ratio of cloth to food relative to the foreign country's PPF.
- At each relative price, the domestic country will produce a higher ratio of cloth to food than the foreign country.
 - ❑ The domestic country will have a higher relative supply of cloth than the foreign country.

Figure 4-11

Trade Leads to a Convergence of Relative Prices

In the absence of trade, Home's equilibrium would be at point 1, where domestic relative supply RS intersects the relative demand curve RD . Similarly, Foreign's equilibrium would be at point 3. Trade leads to a world relative price that lies between the pretrade prices, e.g., at point 2.



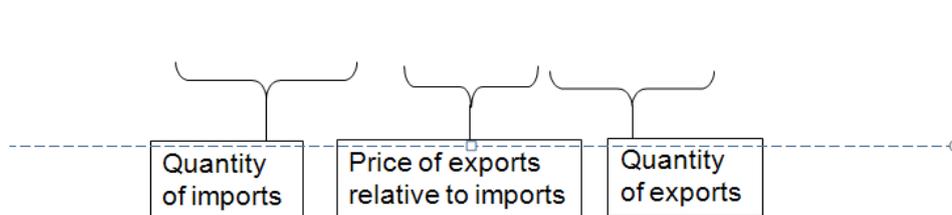
- Like the Ricardian model, the Heckscher-Ohlin model predicts a convergence of relative prices with trade.
- With trade, the relative price of cloth will rise in the domestic country and fall in the foreign country.

- In the domestic country, 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; the domestic country becomes an exporter of cloth and an importer of food.
- The decline in the relative price of cloth in the foreign country leads it to become an importer of cloth and an exporter of food.
- An economy will be relatively efficient at (have a comparative advantage in) producing goods that are intensive in its abundant factors of production.
- An economy will export goods that are intensive in its abundant factors of production and import goods that are intensive in its scarce factors of production.
- This proposition is called the Heckscher-Ohlin theorem
- Over time, the value of goods consumed is constrained to equal the value of goods produced for each country.

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

where D_C represents domestic consumption demand for cloth and D_F represents domestic consumption demand for food

$$(D_F - Q_F) = (P_C/P_F)(Q_C - D_C)$$



$$(D_F - Q_F) = (P_C/P_F)(Q_C - D_C)$$

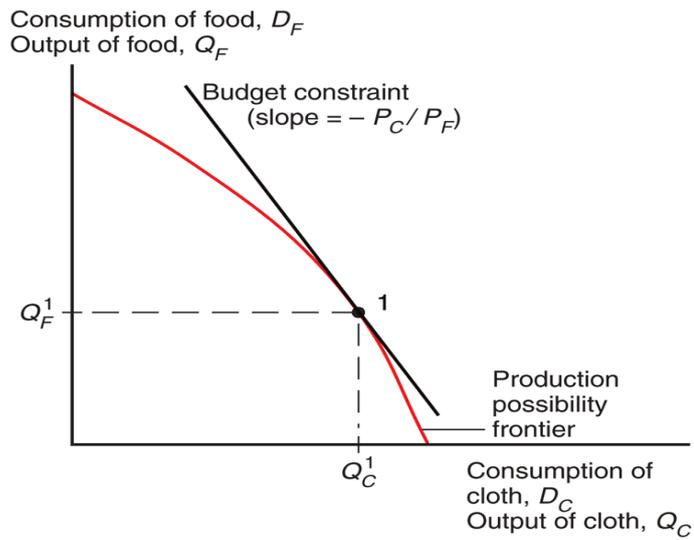
- This equation is the *budget constraint* for an economy, and it has a slope of $-(P_C/P_F)$

$$(D_F - Q_F) - (P_C/P_F)(Q_C - D_C) = 0$$

Figure 4-12

The Budget Constraint for a Trading Economy

Point 1 represents the economy's production. The economy's consumption must lie along a line that passes through point 1 and has a slope equal to minus the relative price of cloth.



- Note that the budget constraint touches the PPF: a country can always afford to consume what it produces.
- However, a country need not consume only the goods and services that it produces with trade.
 - Exports and imports can be greater than zero.
- Furthermore, a country can afford to consume more of both goods with trade.

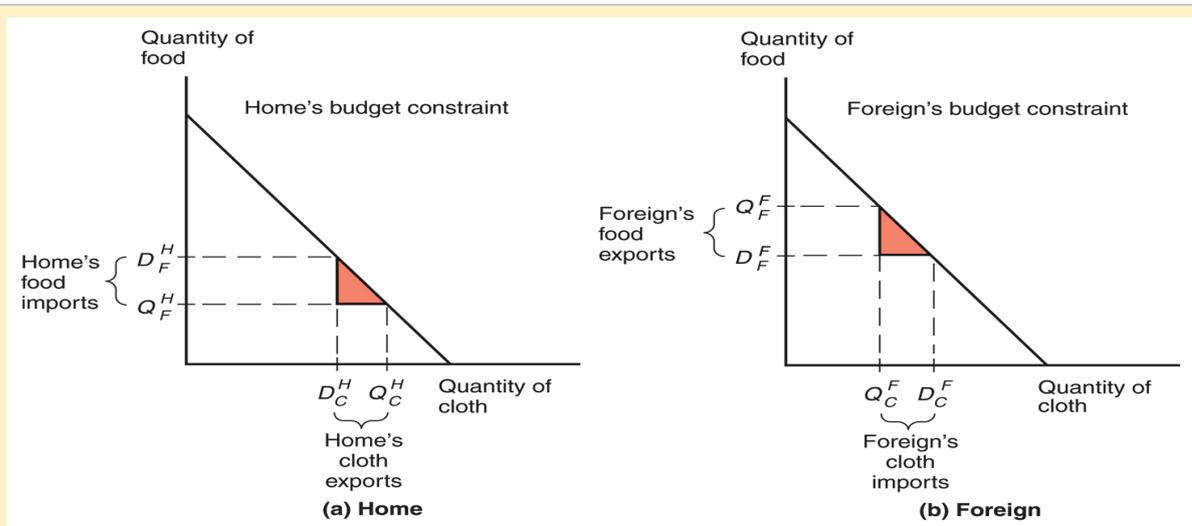


Figure 4-13

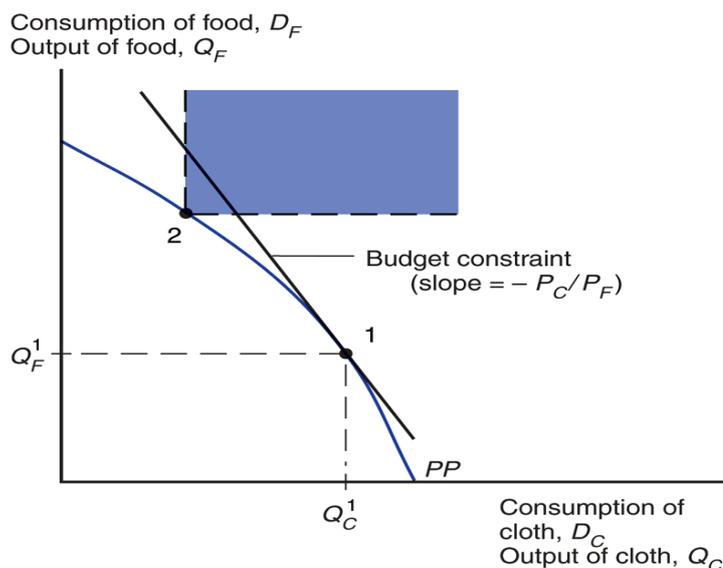
Trading Equilibrium

Home's imports of food are exactly equal to Foreign's exports, and Foreign's imports of cloth are exactly equal to Home's exports.

Figure 4-14

Trade Expands the Economy's Consumption Possibilities

Before trade, economy's production and consumption were at point 2 on its production possibilities frontier (*PP*). After trade, the economy can consume at any point on its budget constraint. The portion of the budget constraint in the colored region consists of feasible posttrade consumption choices with consumption of both goods higher than at the pretrade point 2.



- Because an economy can afford to consume more with trade, the country *as a whole* is made better off.
- But *some* do not gain from trade, unless the model accounts for a redistribution of income.
- Trade changes relative prices of goods, which have effects on the relative earnings of labor and land.
 - A rise in the price of cloth raises the purchasing power of domestic laborers, but lowers the purchasing power of domestic land owners.
- The model predicts that with trade owners of abundant factors gain, but owners of scarce factors lose.

Factor Price Equalization

- Unlike the Ricardian model, the Heckscher-Ohlin model predicts that factor prices will be equalized among countries that trade.

- Because relative prices are equalized and because of the direct relationship between relative prices and factor prices, factor prices are also equalized.
- Trade increases the demand for goods produced by abundant factors, indirectly increasing the demand for the abundant factors themselves, raising the factor prices of the abundant factors across countries.
- But factor prices are not really equal across countries.
- The model predicts that trading countries produce the same goods, so that prices for those goods can equalize, but countries may produce different goods.
- The model assumes that trading countries have the same technology, but different technologies could affect the productivities of factors and therefore the wages/rates paid to these factors.
- Trade barriers and transportation costs may prevent goods prices and factor prices from equalizing.
- After an economy liberalizes trade, factors of production may not quickly move to the industries that intensively use abundant factors.
 - In the short run, the productivity of factors will be determined by their use in their current industry, so that their wage/rate may vary across countries.

Does Trade Increase Income Inequality?

- Over the last 40 years, countries like South Korea, Mexico and China have exported to the US goods intensive in unskilled labor (e.g., clothing, shoes, toys, assembled goods).
- At the same time, income inequality has increased in the US, as wages of unskilled workers have grown slowly compared to those of skilled workers.

- Did the former trend cause the latter trend?
 - The Heckscher-Ohlin model predicts that owners of abundant factors will gain from trade and owners of scarce factors will lose from trade.
 - But little evidence supporting this prediction exists.
1. According to the model, a change in income distribution occurs through changes in goods 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.
 3. Even if the model were exactly correct, trade is a small fraction of the US economy, so its effects on US prices and wages prices should be small.

Trade and Income Distribution

- 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.
- 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.

Empirical Evidence of the Heckscher-Ohlin Model

- Tests on US data
 - ❑ Leontief found that US exports were less capital-intensive than US imports, even though the US is the most capital-abundant country in the world: **Leontief paradox**.
- Tests on global data
 - ❑ Bowen, Leamer, and Sveikauskas tested the Heckscher-Ohlin model on data from 27 countries and confirmed the Leontief paradox on an international level.
- Tests on manufacturing data between low/middle income countries and high income countries.
 - ❑ This data lends more support to the theory.

TABLE 4-2 Factor Content of U.S. Exports and Imports for 1962

	Imports	Exports
Capital per million dollars	\$2,132,000	\$1,876,000
Labor (person-years) per million dollars	119	131
Capital-labor ratio (dollars per worker)	\$17,916	\$14,321
Average years of education per worker	9.9	10.1
Proportion of engineers and scientists in work force	0.0189	0.0255

Source: Robert Baldwin, "Determinants of the Commodity Structure of U.S. Trade," *American Economic Review* 61 (March 1971), pp. 126–145.

TABLE 4-3 Testing the Heckscher-Ohlin Model

Factor of Production	Predictive Success*
Capital	0.52
Labor	0.67
Professional workers	0.78
Managerial workers	0.22
Clerical workers	0.59
Sales workers	0.67
Service workers	0.67
Agricultural workers	0.63
Production workers	0.70
Arable land	0.70
Pasture land	0.52
Forest	0.70

*Fraction of countries for which net exports of factor runs in predicted direction.

Source: Harry P. Bowen, Edward E. Leamer, and Leo Sveikauskas, “Multicountry, Multifactor Tests of the Factor Abundance Theory,” *American Economic Review* 77 (December 1987), pp. 791–809.

TABLE 4-4 Trade Between China and Big 3 Advanced Economies, 2003 (billion dollars)

Type of Product	Chinese Exports to Big 3	Chinese Imports from Big 3
Chemicals	8.57	20.08
Nonelectrical machinery	9.00	31.81
Clothing	25.36	0.32
Other consumer goods	46.80	14.58

Source: World Trade Organization.

- Because the Heckscher-Ohlin model predicts that factor prices will be equalized across trading countries, it also predicts that factors of production will produce and export a certain quantity goods until factor prices are equalized.
 - In other words, a predicted value of services from factors of production will be *embodied* in a predicted volume of trade between countries.
- But because factor prices are not equalized across countries, the predicted volume of trade is much smaller than actually occurs.
 - A result of “missing trade” discovered by Daniel Trefler.

- The reason for this “missing trade” appears to be the assumption of identical technology among countries.
 - ❑ Technology affects the productivity of labor and therefore the value of labor services.
 - ❑ A country with high technology and a high value of labor services would not necessarily import a lot from a country with low technology and a low value of labor services.

Summary

1. Substitution of factors in the production process generates a curved PPF.
 - ❑ When an economy produces a low level of a good, the opportunity cost of producing that good is low.
 - ❑ When an economy produces a high level of a good, the opportunity cost of producing that good is high.
2. When an economy produces on its PPF, the opportunity cost of producing a good equals the relative price of that good.
3. If the relative price of a good increases, then the real wage or rate of return of the factor used intensively in the production of that good increases, while the real wage or rate of return of the other factor decreases.
4. If we hold output prices constant as a factor of production increases, then the supply of the good that uses this factor intensively increases, and the supply of the other good decreases.
5. An economy will export goods that are intensive in its abundant factors of production and import goods that are intensive in its scarce factors of production.
6. The Heckscher-Ohlin model predicts that relative output prices and factor prices will equalize, neither of which occurs in the real world.

7. The model predicts that owners of abundant factors gain, but owners of scarce factors lose with trade.
8. A country as a whole will be better off with trade, even though the model predicts that owners of scarce factors will be worse off without compensation.
9. Empirical support of the Heckscher-Ohlin model is weak except for cases involving trade between high income countries and low/middle income countries.

TABLE 4-1 Comparative International Wage Rates (United States = 100)	
Country	Hourly Compensation of Production Workers, 2000
United States	100
Germany	121
Japan	111
Spain	55
South Korea	41
Portugal	24
Mexico	12
Sri Lanka*	2

* 1999
Source: Bureau of Labor Statistics, *Foreign Labor Statistics Home Page*.

TABLE 4-5 Estimated Technological Efficiency, 1983 (United States = 1)	
Country	
Bangladesh	0.03
Thailand	0.17
Hong Kong	0.40
Japan	0.70
West Germany	0.78

Source: Trefler, *American Economic Review* (December 1995), p. 1037.

Figure 4A-1

Choosing the Optimal Land-Labor Ratio

To minimize costs, a producer must get to the lowest possible isocost line; this means choosing the point on the unit isoquant (the curve *II*) where the slope is equal to minus the wage-rental ratio w/r .

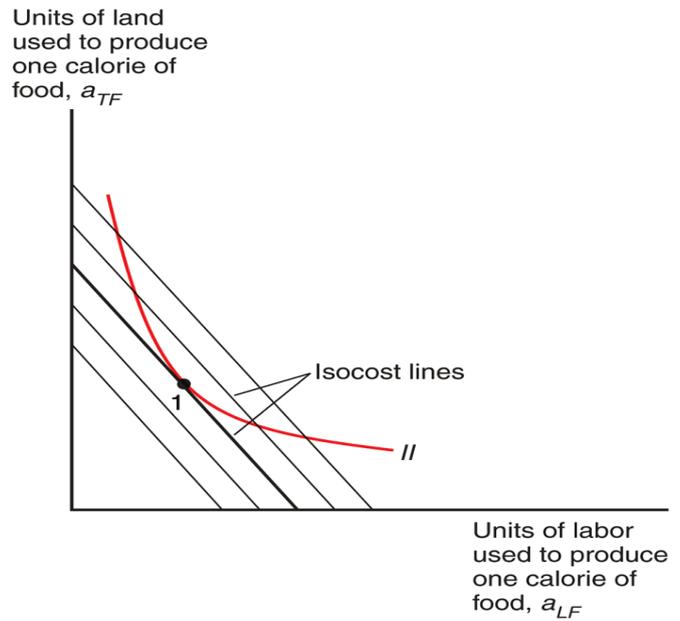


Figure 4A-2

Changing the Wage-Rental Ratio

A rise in w/r shifts the lowest-cost input choice from point 1 to point 2; that is, it leads to the choice of a higher land-labor ratio.

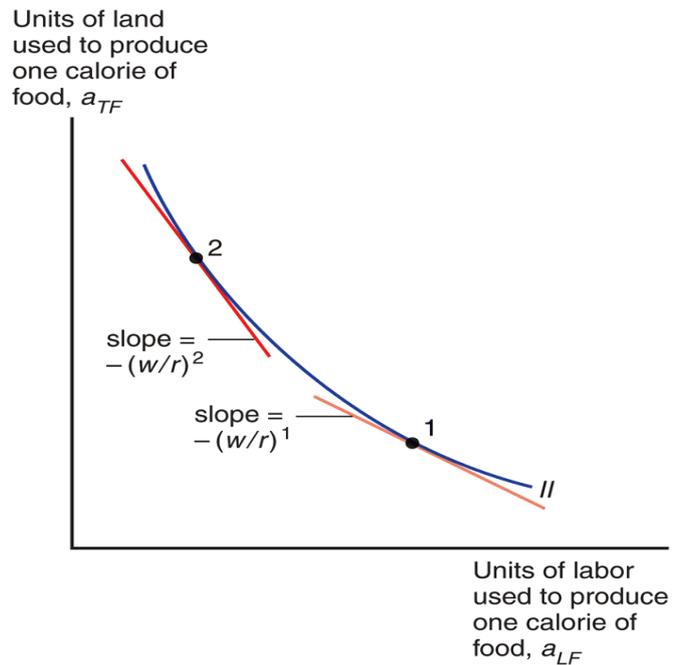


Figure 4A-3

Determining the Wage-Rental Ratio

The two isoquants CC and FF show the inputs necessary to produce *one dollar's worth* of cloth and food, respectively. Since price must equal the cost of production, the inputs into each good must also cost one dollar; this means that the wage-rental ratio must equal minus the slope of a line tangent to both isoquants.

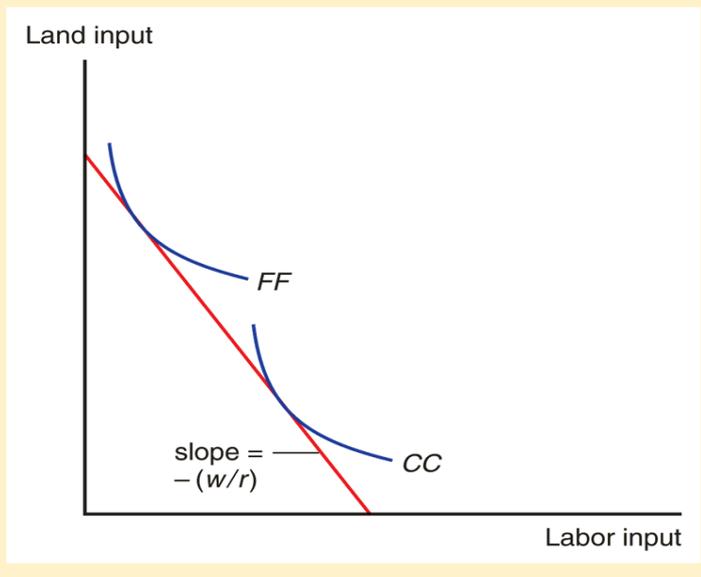
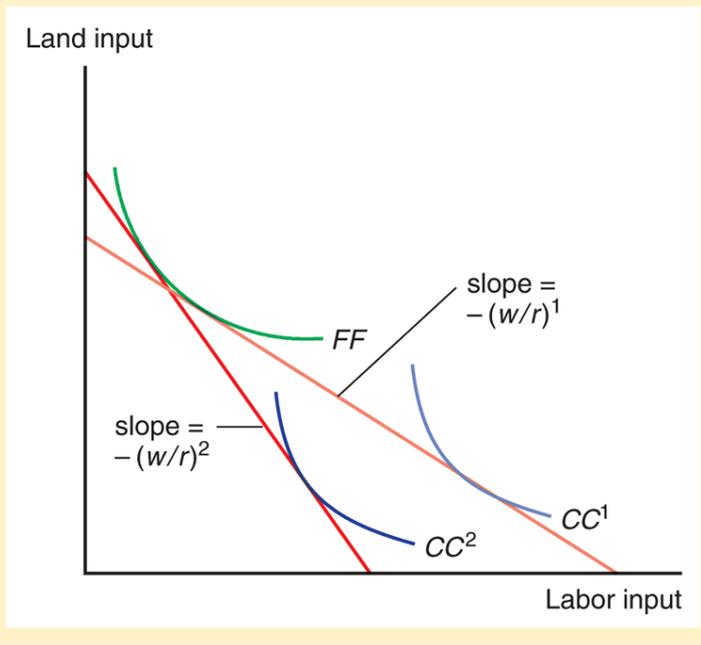


Figure 4A-4

A Rise in the Price of Cloth

If the price of cloth rises, a smaller output is now worth one dollar; so CC^1 is replaced by CC^2 . The implied wage-rental ratio must therefore rise from $(w/r)^1$ to $(w/r)^2$.



Chapter 5

The Standard Trade Model

Preview

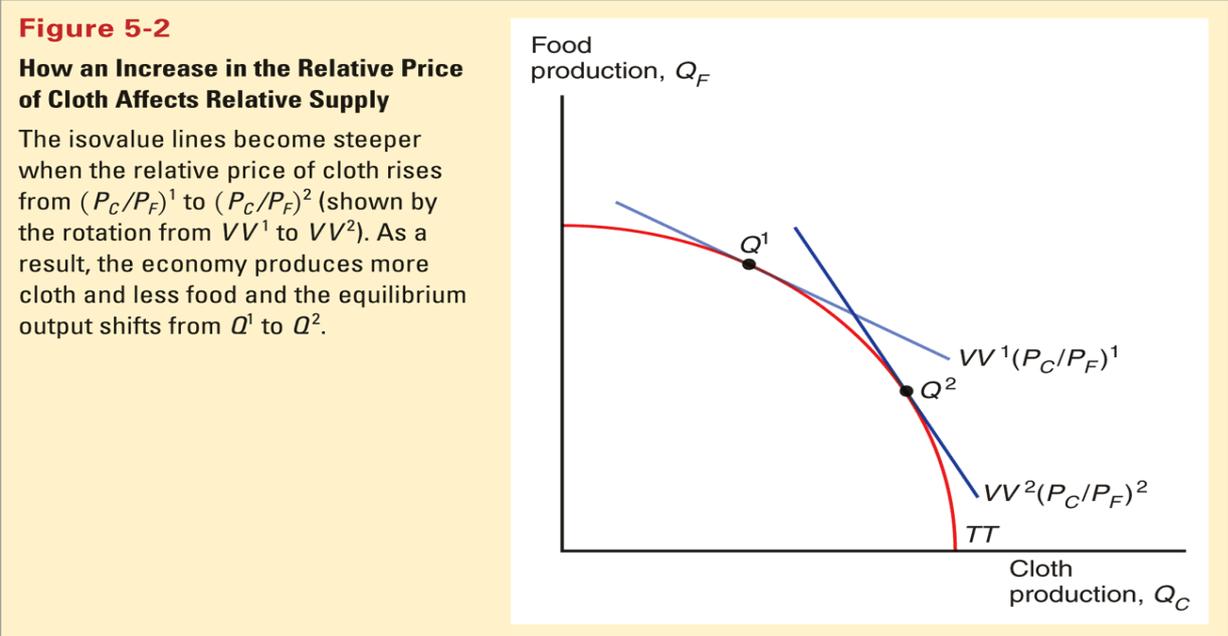
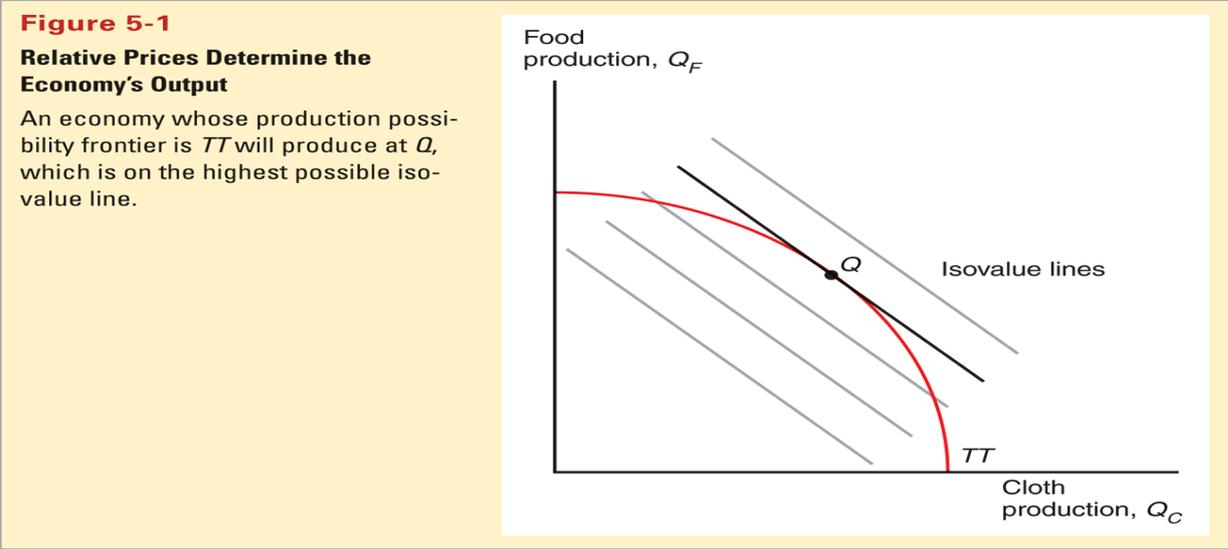
- Measuring the values of production and consumption
- Welfare and terms of trade
- Effects of economic growth
- Effects of international transfers of income
- Effects of import tariffs and export subsidies
- Income distribution

Introduction

- The standard trade model combines ideas from the Ricardian model and the Heckscher-Ohlin model.
 1. Differences in *labor, labor skills, physical capital, land and technology* between countries cause productive differences, leading to gains from trade.
 2. These productive differences are represented as differences in production possibility frontiers, which represent the productive capacities of nations.
 3. A country's PPF determines its relative supply curve.
 4. National relative supply curves determine world relative supply, which along with world relative demand determines an equilibrium under international trade.

The Value of Production

- Recall that when the economy maximizes its production possibilities, the value of output V lies on the PPF.
- $V = P_C Q_C + P_F Q_F$ describes the value of output in a two good model, and when this value is constant the equation's line is called and isovalue line.
 - The slope of any equation's line equals $-(P_C/P_F)$, and if relative prices change the slope changes.



The Value of Consumption

- The value of the economy's consumption is constrained to equal the value of the economy's production.

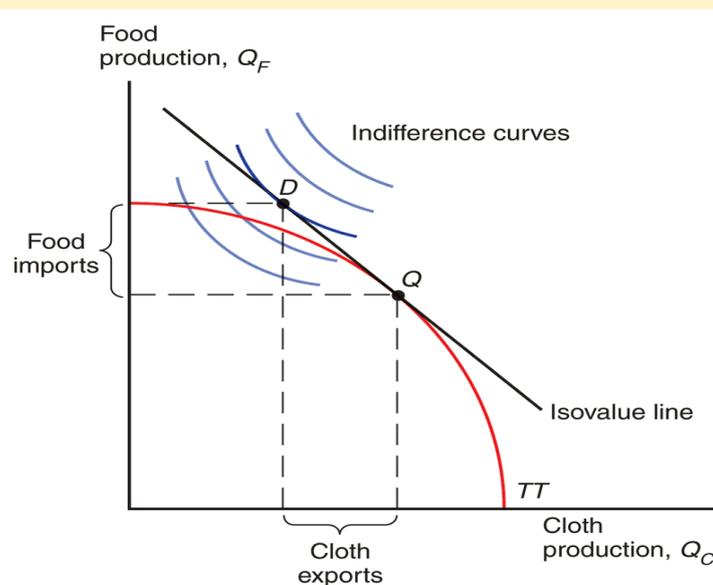
$$\square P_C D_C + P_F D_F = P_C Q_C + P_F Q_F = V$$

- Production choices are determined by the economy's PPF and the prices of output.
- What determines consumption choices (demand)?
- Consumer preferences and prices determine consumption choices.
- Consumer preferences are represented by **indifference curves**: combinations of goods that make consumers equally satisfied (indifferent).

Figure 5-3

Production, Consumption, and Trade in the Standard Model

The economy produces at point Q , where the production possibility frontier is tangent to the highest possible isovalue line. It consumes at point D , where that isovalue line is tangent to the highest possible indifference curve. The economy produces more cloth than it consumes and therefore exports cloth; correspondingly, it consumes more food than it produces and therefore imports food.

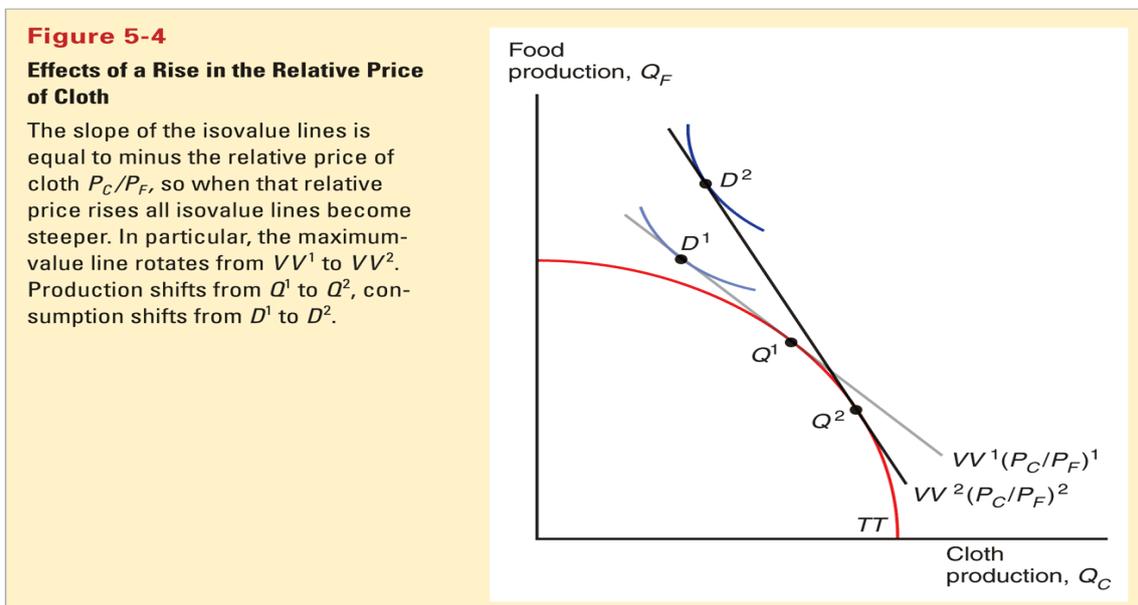


- Indifference curves are downward sloping to represent the fact that if a consumer has more cloth he could have less food and still be equally satisfied.
- Indifference curves farther from the origin represent larger quantities of food and cloth, which should make consumers more satisfied and better off.

- Indifference curves are flatter when moving to the right: the more cloth and the less food that is consumed, the more valuable an extra calorie of food becomes relative to an extra m^2 of cloth.

Prices and the Value of Consumption

- Prices also determine the value of consumption.
 - ❑ When the price of cloth rises relative to the price of food, the economy is better off when it exports cloth: a higher indifference curve results.
 - ❑ A higher price for cloth exports means that more food can be imported.
 - ❑ A higher relative price of cloth will also influence consumption decisions about cloth versus food: a higher relative price of cloth makes consumers willing to buy less cloth and more food.



- The change in welfare (income) when the price of one good changes relative to the price of another is called the **income effect**.
 - ❑ The income effect is represented graphically by shifting the indifference curve.

- The substitution of one good for another when the price of the good changes relative to the other is called the **substitution effect**.
 - ❑ This substitution effect is represented graphically by a moving along a given indifference curve.

Welfare and the Terms of Trade

- The **terms of trade** refers to the price of exports relative to the price of imports.
 - ❑ When a country exports cloth and the relative price of cloth increases, the terms of trade increase or “improve”.
- Because a higher 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 decrease in the terms of trade decreases a country’s welfare.

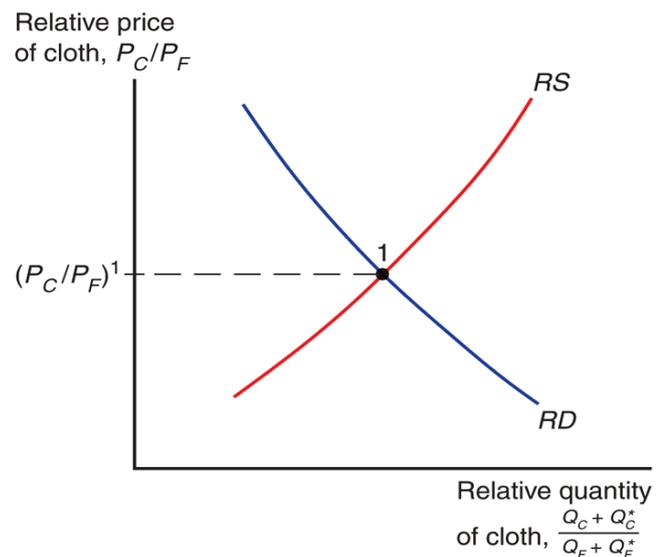
Determining Relative Prices

- To determine the price of cloth relative to the price food in our model, we again use relative supply and relative demand.
 - ❑ relative supply considers *world* supply of cloth relative to that of food at each relative price
 - ❑ relative demand considers *world* demand of cloth relative to that of food at each relative price
 - ❑ In a two country model, world quantities are the sum of quantities from the domestic and foreign countries.

Figure 5-5

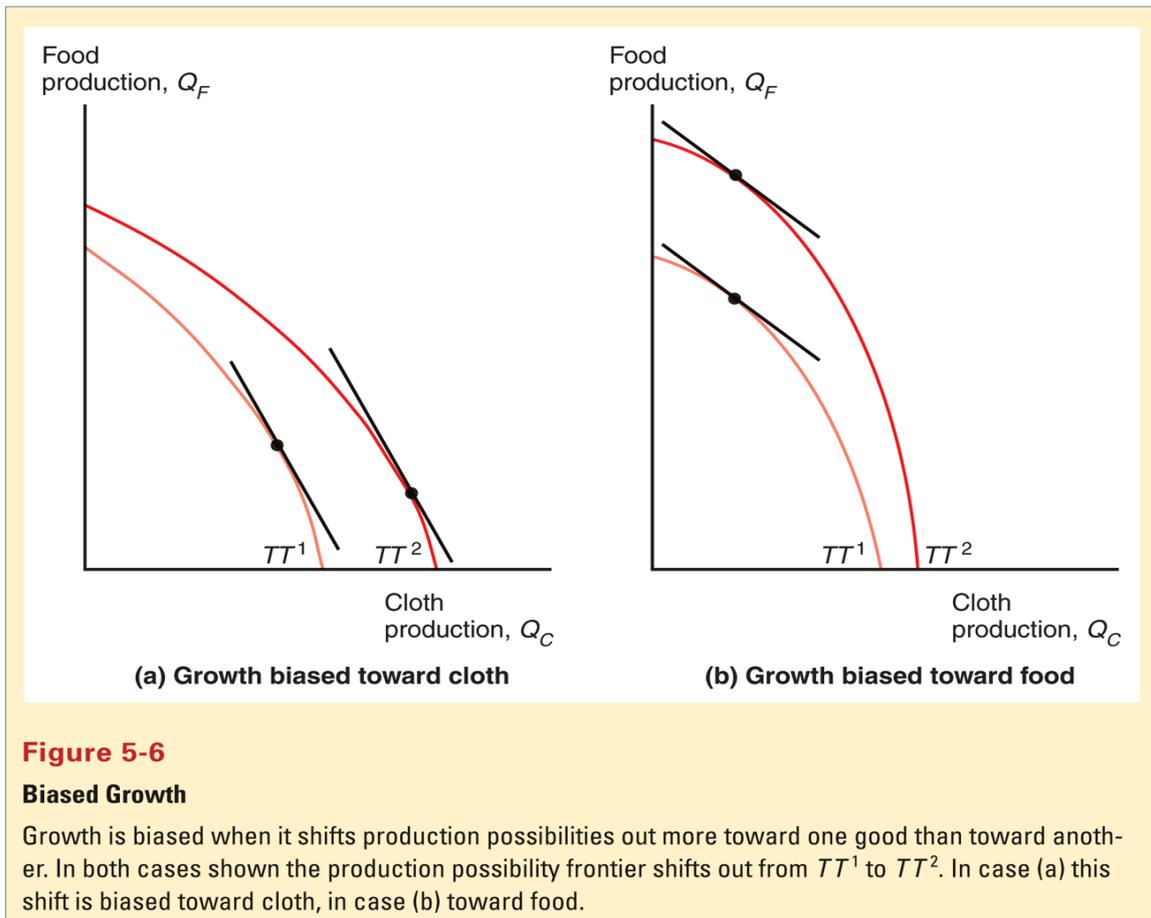
World Relative Supply and Demand

The higher P_C/P_F is, the larger the world supply of cloth relative to food (RS) and the lower the world demand for cloth relative to food (RD). Equilibrium relative price (here, $(P_C/P_F)^1$) is determined by the intersection of the world relative supply and demand curves.



The Effects of Economic Growth

- Is economic growth in China good for the standard of living in the US?
- Is growth in a country more or less valuable when it when it is integrated in the world economy?
- The standard trade model gives us precise answers to these questions.
- Growth is usually **biased**: it occurs in one sector more than others, causing relative supply to shift.
 - ❑ Rapid growth has occurred in US computer industries but relatively little growth has occurred in US textile industries.
 - ❑ According to the Ricardian model, technological progress in one sector causes biased growth.
 - ❑ According to the Heckscher-Ohlin model, an increase in one factor of production (e.g., an increase in the labor force, arable land, or the capital stock) causes biased growth.



- Biased growth and the resulting shift in relative supply causes a change in the terms of trade.
 - Biased growth in the cloth industry (in either the domestic or foreign country) will lower the relative price of cloth and lower the terms of trade for cloth exporters.
 - Biased growth in the food industry (in either the domestic or foreign country) will raise the relative price of cloth and raise the terms of trade for cloth exporters.
 - Suppose that the domestic country exports cloth and imports food.

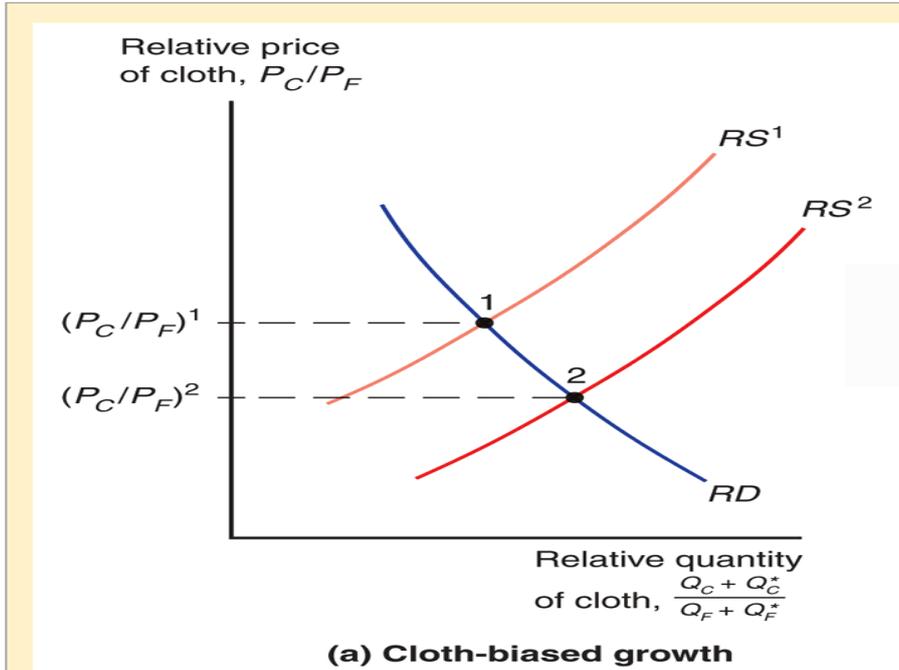


Figure 5-7

Growth and Relative Supply

Growth biased toward cloth shifts the *RS* curve to the right (a), while growth biased toward food shifts it to the left (b).

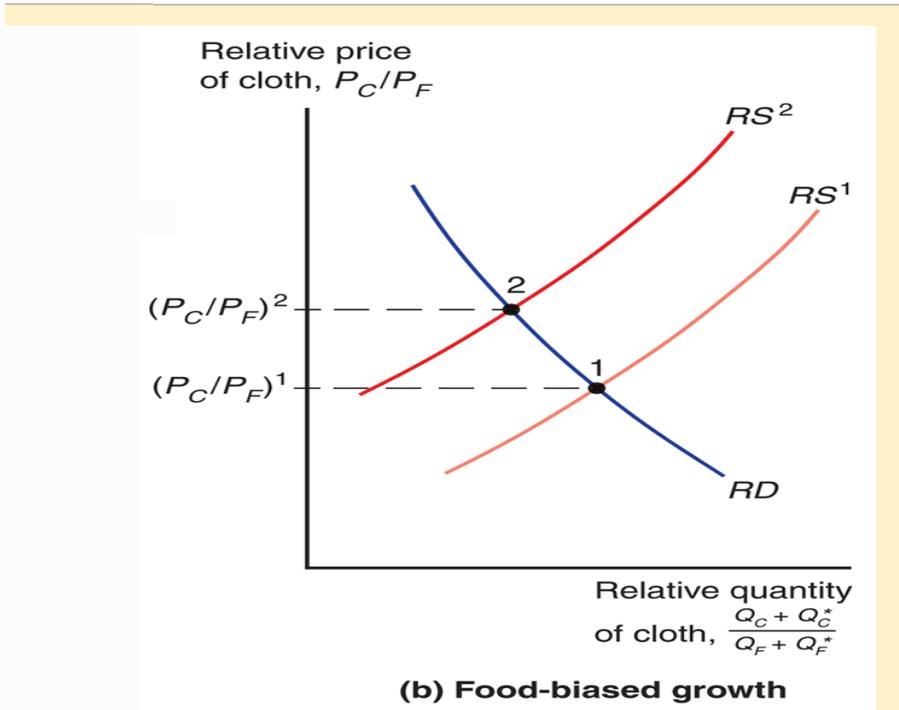


Figure 5-7

Growth and Relative Supply

Growth biased toward cloth shifts the *RS* curve to the right (a), while growth biased toward food shifts it to the left (b).

- **Export-biased growth** is growth that expands a country's PPF disproportionately in production of that country's exports.
 - ☐ Biased growth in the food industry in the foreign country is export-biased growth for the foreign country.
- **Import-biased growth** is growth that expands a country's PPF disproportionately in production of that country's imports.
 - ☐ Biased growth in cloth production in the foreign country is import-biased growth for the foreign country.
- Export-biased growth reduces a country's terms of trade, generally reducing its welfare and increasing the welfare of foreign countries.
- Import-biased growth increases a country's terms of trade, generally increasing its welfare and decreasing the welfare of foreign countries.

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

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

TABLE 5-1 Average Annual Percent Changes in Terms of Trade

	1986–1995	1996–2005
Advanced economies	0.8	−0.1
Developing Asia	−0.4	−1.1

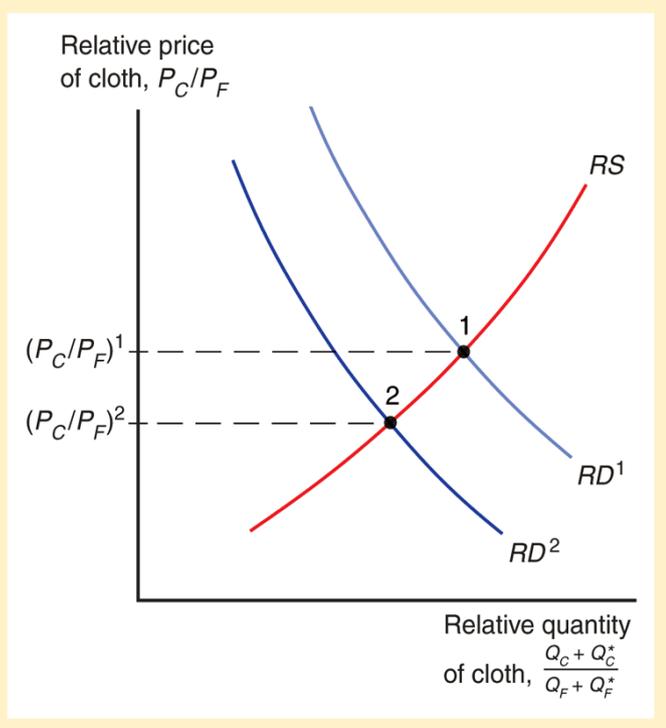
The Effects of International Transfers of Income

- Transfers of income sometimes occur from one country to another.
 - ❑ War reparations or foreign aid may influence demand for traded goods and therefore relative demand.
 - ❑ International loans may also influence relative demand in the short run, before the loan is paid back.
- How do transfers of income across countries affect relative demand and the terms of trade?
- If the domestic country generates national income for transfers by
 - ❑ increasing the price of imports to reduce their purchases and by decreasing the price of exports to increase their sales,
 - ❑ the relative demand curve should shift left and the terms of trade would fall.

Figure 5-8

Effects of a Transfer on the Terms of Trade

If Home has a higher marginal propensity to spend on cloth than Foreign, a transfer of income by Home to Foreign shifts the RD curve left from RD^1 to RD^2 , reducing the equilibrium relative price of cloth.



- But after the transfer of income from the domestic country,
 - ❑ demand for foreign goods could fall in the domestic country and demand for domestic goods could rise in the foreign country,
 - ❑ so the relative demand curve might not shift left and the terms of trade might not fall.
- How much does demand for domestic goods increase in the foreign country when it receives a transfer of income from the domestic country?
 - ❑ If the foreign country has a higher marginal propensity to spend on its own goods than on imports, demand for its own goods will rise more than demand for imports from the domestic country.
- How much does demand for foreign goods decrease in the domestic country when it reduces its income through a transfer?
 - ❑ If the domestic country has a higher marginal propensity to spend on its own goods than on imports, demand for its own goods will fall more than demand for imports from the foreign country.
- If each country has a higher marginal propensity to spend on its own products, the relative demand curve would shift left after a transfer of income from the domestic country.
- In fact, countries spend most of their (marginal) income on their own products.
 - ❑ Americans spend only 11% of national income on imports and 89% on domestically produced goods.
- Transportation costs, tariffs, and other barriers cause domestic residents to favor domestic goods.
- We predict that the relative demand curve will shift left with a transfer of income, decreasing the terms of trade for the donor nation.

- In addition, the existence of non-traded goods and services may cause relative *supply* shifts that reinforce the decrease in the terms of trade for a donor country.
 - ❑ Industries that produce non-traded goods and services compete for resources with industries that produce traded goods.
 - ❑ A transfer of income from a donor country will reduce demand for and production of non-traded goods in the donor country, so that these resources can be used in its export sector.
 - ❑ The supply of exports relative to imports in the donor country increases, reducing the terms of trade for the donor country.
 - ❑ A transfer of income from a donor country will increase demand for and production of non-traded goods in foreign countries, so that fewer resources can be used in its export sector.
 - ❑ The supply of exports relative to imports in the foreign country decreases, reducing the terms of trade for the donor country.

Import Tariffs and Export Subsidies

- **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 (or external prices) and prices in domestic markets (or internal prices).
- The terms of trade refers to the relative value of a country's exports and a country's imports.

- ❑ Since exports and imports are traded in world markets, the terms of trade measures external prices.

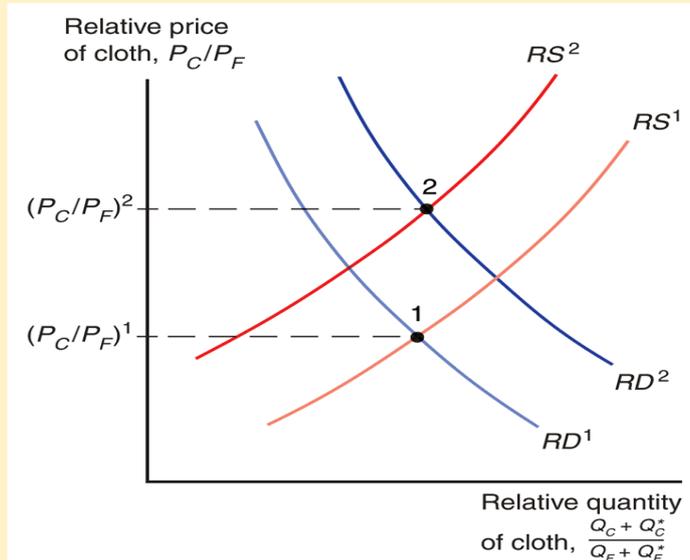
Import Tariffs and Distribution of Income Across Countries

- If the domestic country imposes a tariff on food imports, the price of food relative to price cloth that domestic citizens face is higher.
 - ❑ Likewise, the price of cloth relative to the price of food that domestic consumers and producers pay is lower.
 - ❑ Domestic producers will receive a lower relative price of cloth, and therefore will be more willing to switch to food production: the relative supply curve will shift.
 - ❑ Domestic consumers will pay a lower relative price of cloth, and therefore be more willing to switch to cloth consumption: the relative demand curve will shift.

Figure 5-9

Effects of a Tariff on the Terms of Trade

An import tariff imposed by Home both reduces the relative supply of cloth (from RS^1 to RS^2) and increases the relative demand (from RD^1 to RD^2). As a result, the relative price of cloth must rise.



- When the domestic country imposes an import tariff, the terms of trade increases and the welfare of the country may increase.
- The magnitude of this effect depends on the size of the domestic country relative to the world economy.

- ❑ If the country is small part of the world economy, its tariff (or subsidy) policies will not have much effect on world relative supply and demand, and thus on the terms of trade.
- ❑ But for large countries, a tariff rate that maximizes national welfare at the expense of foreign countries may exist.

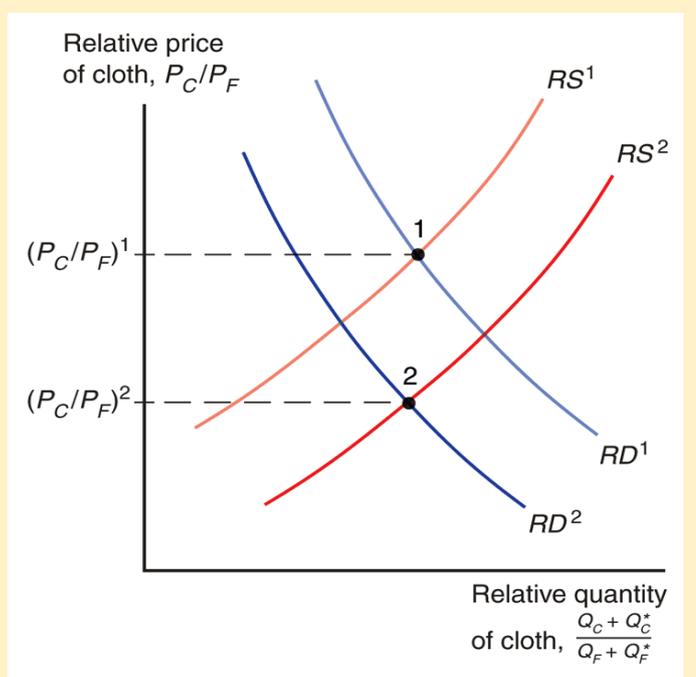
Export Subsidies and Distribution of Income Across Countries

- If the domestic country imposes a subsidy on cloth exports, the price of cloth relative to price food that *domestic citizens* face is higher.
 - ❑ Domestic producers will receive a higher relative price of cloth, and therefore will be more willing to switch to cloth production: the relative supply curve will shift.
 - ❑ Domestic consumers will pay a higher relative price of cloth, and therefore be more willing to switch to food consumption: the relative demand curve will shift.

Figure 5-10

Effects of a Subsidy on the Terms of Trade

An export subsidy's effects are the reverse of those of a tariff. Relative supply of cloth rises, while relative demand falls. Home's terms of trade decline as the relative price of cloth falls from $(P_C/P_F)^1$ to $(P_C/P_F)^2$.



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

Import Tariffs, Export Subsidies and Distribution of Income Across Countries

- The two country, two good model predicts that
 - ❑ an import tariff by the domestic country can increase domestic welfare at the expense of the foreign country.
 - ❑ an export subsidy by the domestic country reduces domestic welfare to the benefit of the foreign country.

Import Tariffs and Export Subsidies in Other Countries

- But we have ignored the effects of tariffs and subsidies that occur in a world with many countries and many goods:
 - ❑ A foreign country may subsidize the export of a good that the US also exports, which will reduce its price in world markets and decrease the terms of trade for the US.
 - 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 US also imports, which will reduce its price in world markets and increase the terms of trade for the US.
- Export subsidies by foreign countries on goods that
 - ❑ the US imports *reduce the world price of US imports* and increase the US terms of trade.

- ❑ the US also exports *reduce the world price of US exports* and decrease the US terms of trade.
- Import tariffs by foreign countries on goods that
 - ❑ the US exports *reduce the world price of US exports* and decrease the US terms of trade.
 - ❑ the US also imports *reduce the world price of US imports* and increase the US terms of trade.

Import Tariffs and Export Subsidies

- 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.
- 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.

Import Tariffs, Export Subsidies and Distribution of Income Within a Country

- Because of changes in relative prices, import tariffs and export subsidies have effects on income distribution among producers *within a country*.
- Generally, a domestic import tariff increases income for domestic import-competing producers by allowing the price of their goods to rise to match increased import prices, and it shifts resources away from the export sector.
- Generally, a domestic export subsidy increases income for domestic exporters, and it shifts resources away from the import-competing sector.

Summary

1. A change in relative prices, say due to trade, causes an income effect and a substitution effect.
2. The terms of trade refers to the price of exports relative to the price of imports in world markets.
3. Export-biased growth reduces a country's terms of trade, generally reducing its welfare and increasing the welfare of foreign countries.
4. Import-biased growth increases a country's terms of trade, generally increasing its welfare and decreasing the welfare of foreign countries.
5. The effect of international transfers of income depend on the marginal propensity to spend on domestic goods, but generally the relative demand curve of donor will shift left leading to a decrease in the donor's terms of trade.
6. When the domestic country imposes an import tariff, the terms of trade increases and the welfare of the country may increase.
7. When the domestic country imposes an export subsidy, the terms of trade decreases and the welfare of the country decreases.
8. Generally, a domestic import tariff increases income for domestic import-competing producers and shifts resources away from the export sector.
9. Generally, a domestic export subsidy increases income for domestic exporters and shifts resources away from the import-competing sector.

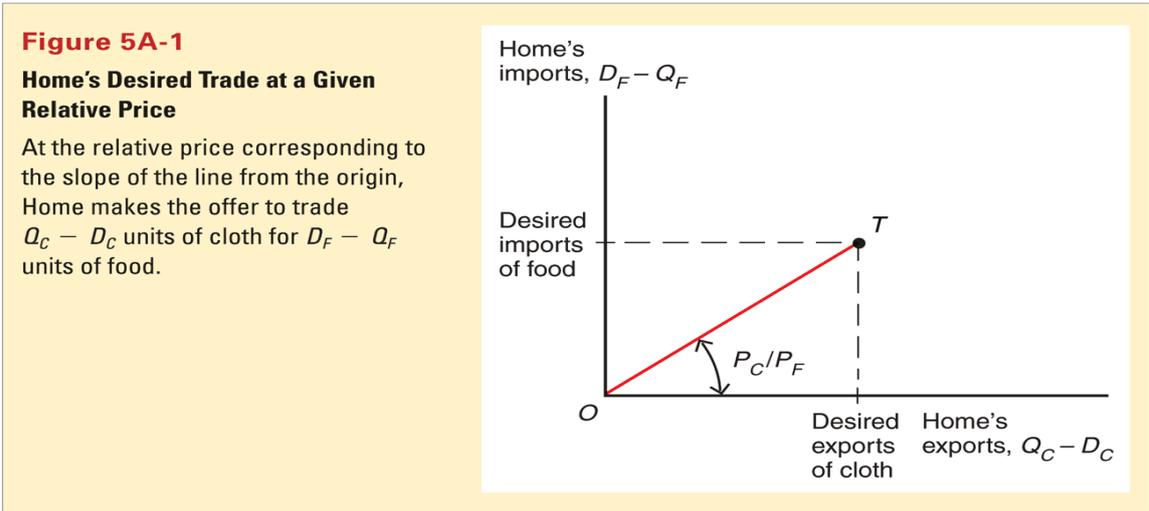


Figure 5A-2

Home's Offer Curve

The offer curve is generated by tracing out how Home's offer varies as the relative price of cloth is changed.

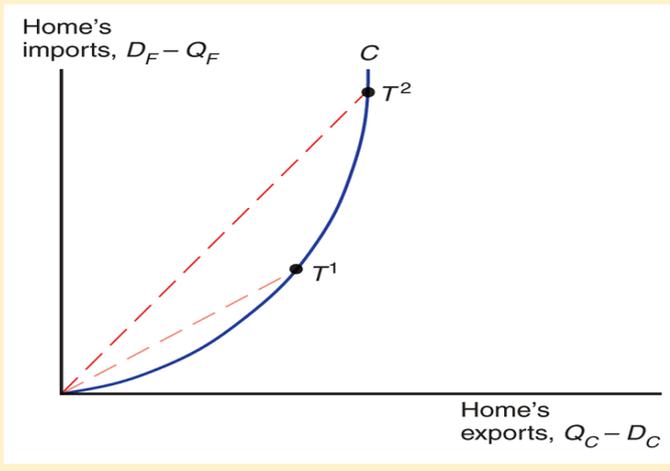


Figure 5A-3

Foreign's Offer Curve

Foreign's offer curve shows how that country's desired imports of cloth and exports of food vary with the relative price.

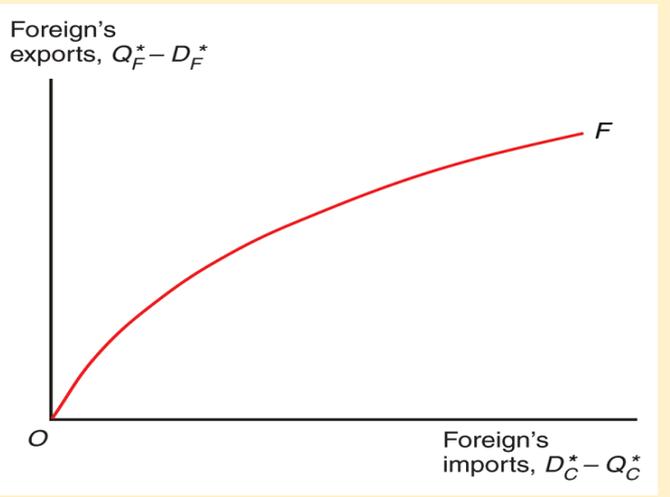
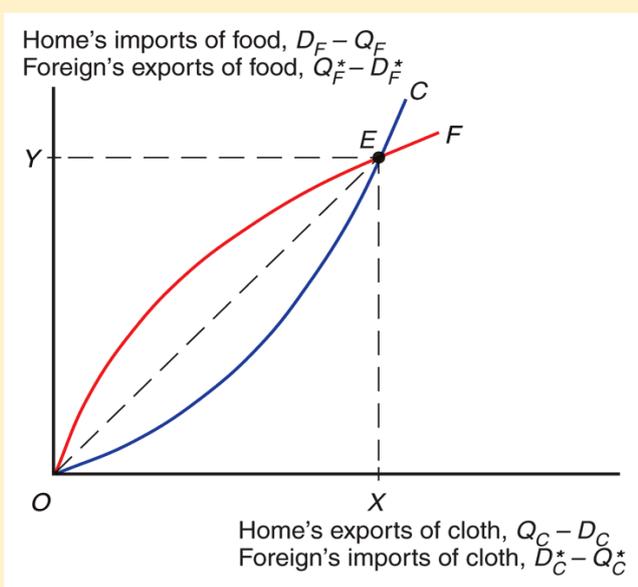


Figure 5A-4

Offer Curve Equilibrium

World equilibrium is where the Home and Foreign offer curves intersect.



Chapter 6

Economies of Scale, Imperfect Competition, and International Trade

Preview

- Types of economies of scale
- Types of imperfect competition
 - ❑ Oligopoly and monopoly
 - ❑ Monopolistic competition
- Monopolistic competition and trade
- Inter-industry trade and intra-industry trade
- Dumping
- External economies of scale and trade

Introduction

- When defining comparative advantage, the Ricardian model and the Heckscher-Ohlin model both assume **constant returns to scale**:
 - ❑ If all factors of production are doubled then output will also double.
- But a firm or industry may have **increasing returns to scale** or **economies of scale**:
 - ❑ If all factors of production are doubled, then output will more than double.
 - ❑ Larger is more efficient: the cost per unit of output falls as a firm or industry increases output.

- The Ricardian and Heckscher-Ohlin models also rely on competition to predict that all income from production is paid to owners of factors of production: no “excess” or monopoly profits exist.
- But when economies of scale exist, large firms may be more efficient than small firms, and the industry may consist of a monopoly or a few large firms.
 - Production may be imperfectly competitive in the sense that excess or monopoly profits are captured by large firms.

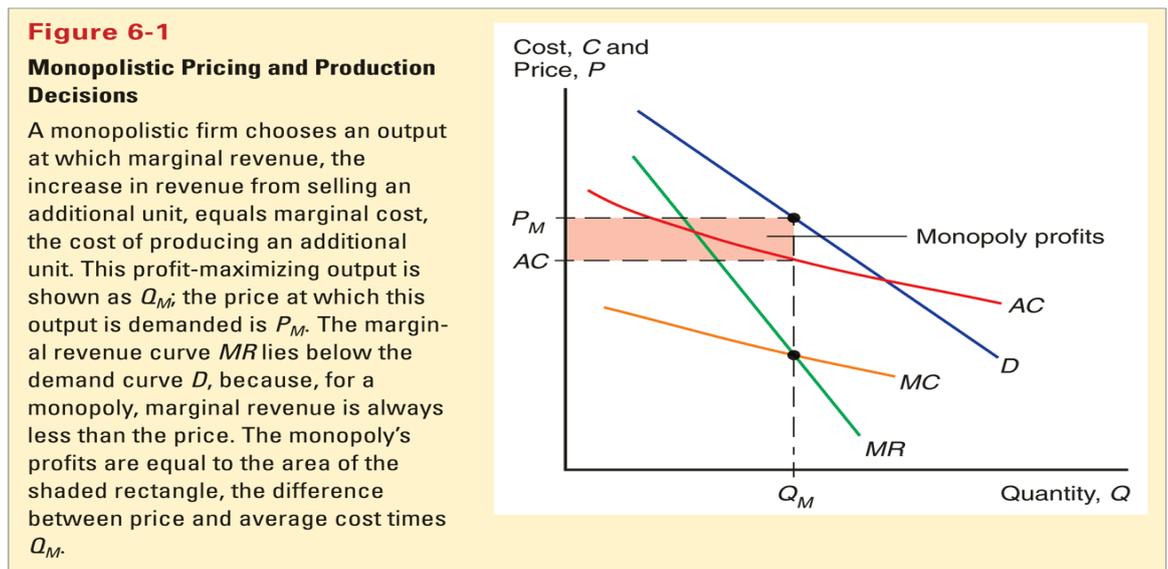
Types of Economies of Scale

- Economies of scale could mean either that larger firms or that a larger industry (e.g., one made of more firms) is more efficient.
- **External economies of scale** occur when cost per unit of output depends on the *size of the industry*.
- **Internal economies of scale** occur when the cost per unit of output depends on the *size of a firm*.
- External economies of scale may result if a larger industry allows for more efficient provision of services or equipment to firms in the industry.
 - Many small firms that are competitive may comprise a large industry and benefit from services or equipment efficiently provided to the large group of firms.
- Internal economies of scale result when large firms have a cost advantage over small firms, which leads to an imperfectly competitive market.

A Review of Monopoly

- A **monopoly** is an industry with only one firm.
- An **oligopoly** is an industry with only a few firms.

- A characteristic of a monopoly (and to some degree an oligopoly) is that the marginal revenue generated from selling an additional unit of output is lower than the price of output.
 - ❑ Without price discrimination, a monopoly must lower the price of an additional unit sold, as well as the prices of other units sold.
 - ❑ The marginal revenue curve lies below the demand curve (which determines the price of units sold).

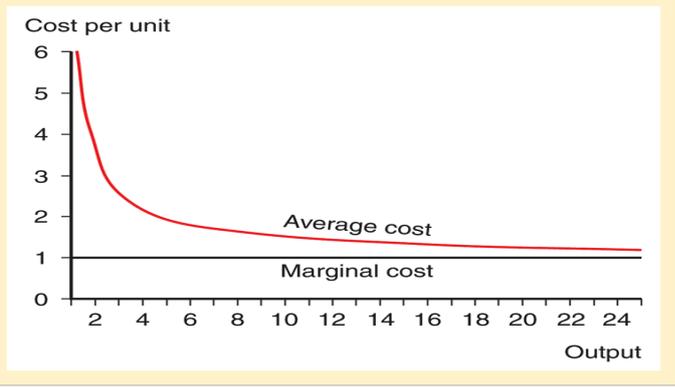


- **Average cost** is the cost of production (C) divided by the total quantity of output produced (Q) at a time.
 - ❑ $AC = C/Q$
- **Marginal cost** is the cost of producing an additional unit of output.
- Suppose that costs are measured by $C = F + cQ$,
 - ❑ where F represents fixed costs, independent of the level of output.
 - ❑ c represents a constant marginal cost: the constant cost of producing an additional unit of output Q .
- $AC = F/Q + c$
- A larger firm is more efficient because average cost decreases as output Q increases: internal economies of scale.

Figure 6-2

Average Versus Marginal Cost

This figure illustrates the average and marginal costs corresponding to the total cost function $C = 5 + x$. Marginal cost is always 1; average cost declines as output rises.



Monopolistic Competition

- **Monopolistic competition** is a model of an imperfectly competitive industry which assumes that
 1. Each firm can differentiate its product from the product of competitors.
 2. Each firm ignores the impact that changes in its own price will have on the prices competitors set: even though each firm faces competition it behaves as if it were a monopolist.
- A firm in a monopolistically competitive industry is expected:
 - ❑ to sell more the larger the total sales of the industry and the higher the prices charged by its rivals.
 - ❑ to sell less the larger the number of firms in the industry and the higher its own price.
- These concepts are represented by the mathematical relationship:

$$Q = S[1/n - b(P - P)]$$

- ❑ Q is an individual firm's sales
- ❑ S is the total sales of the industry
- ❑ n is the number of firms in the industry

□ b is a constant term representing the responsiveness of a firm's sales to its price

□ P is the price charged by the firm itself

□ P is the average price charged by its competitors

- To make the model easier to understand, we assume that all firms have identical demand functions and cost functions.

□ Thus in equilibrium, all firms charge the same price: $P = P$

- In equilibrium,

□ $Q = S/n + 0$

□ $AC = C/Q = F/Q + c = F(n/S) + c$

$$AC = F(n/S) + c$$

- The larger the number of firms n in the industry, the higher the average cost for each firm because the less each firm produces.
- The larger the total sales S of the industry, the lower the average cost for each firm because the more that each firm produces.

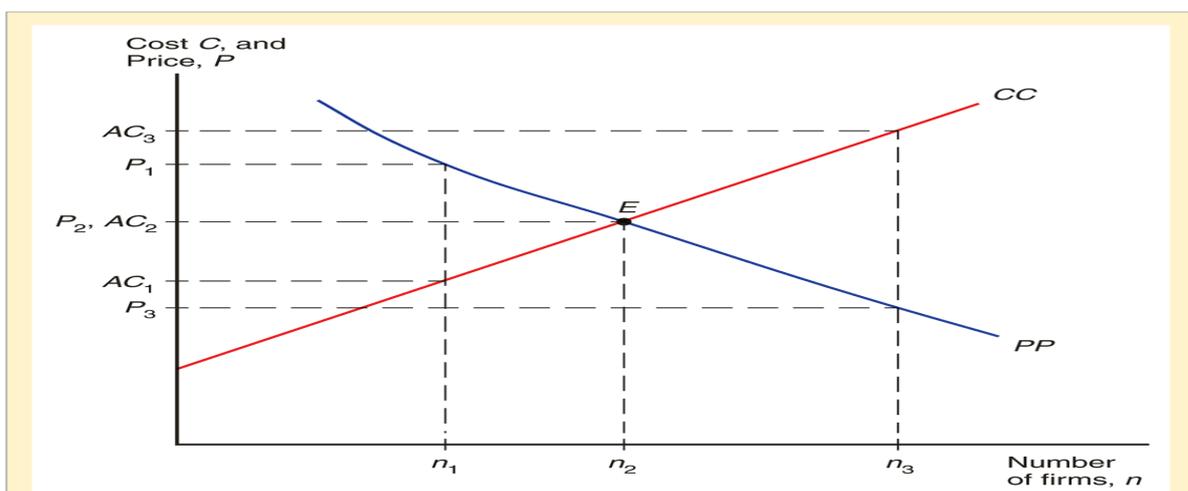


Figure 6-3

Equilibrium in a Monopolistically Competitive Market

The number of firms in a monopolistically competitive market, and the prices they charge, are determined by two relationships. On one side, the more firms there are, the more intensely they compete, and hence the lower is the industry price. This relationship is represented by PP . On the other side, the more firms there are, the less each firm sells and therefore the higher is its average cost. This relationship is represented by CC . If price exceeds average cost (if the PP curve is above the CC curve), the industry will be making profits and additional firms will enter the industry; if price is less than average cost, the industry will be incurring losses and firms will leave the industry. The equilibrium price and number of firms occurs when price equals average cost, at the intersection of PP and CC .

- If monopolistic firms have linear demand curves,

□ then the relationship between price and quantity may be represented as:

$$Q = A - BxP$$

□ where A and B are constants

□ and marginal revenue may be represented as

$$MR = P - Q/B$$

- When firms maximize profits, they set marginal revenue = marginal cost:

$$MR = P - Q/B = c$$

$$Q = S[1/n - b(P - P)]$$

$$Q = S/n - Sb(P - P)$$

$$Q = S/n + SbP - SbP$$

$$Q = A - BxP$$

- Let $A \equiv S/n + SbP$ and $B \equiv Sb$

$$MR = P - Q/B = c$$

$$MR = P - Q/Sb = c$$

$$P = c + Q/Sb$$

$$P = c + (S/n)/Sb$$

$$P = c + 1/(nxb)$$

- The larger the number of firms n in the industry, the lower the price each firm charges because of increased competition.
- At some number of firms, the price that firms charge (which decreases in n) matches the average cost that firms pay (which increases in n).
- This number of firms is the number at which each firm has *zero profits*: price matches average cost.
- This number is the equilibrium number of firms.
- If the number of firms is greater than or less than n_2 , then in industry is not in equilibrium in the sense that firms have an incentive to exit or enter the industry.

- ❑ Firms have an incentive to enter the industry when profits are greater than zero (price > average cost).
- ❑ Firms have an incentive to exit the industry when profits are less than zero (price < average cost).

Monopolistic Competition and Trade

- Because trade increases market size, trade is predicted to decrease average cost in an industry described by monopolistic competition.
 - ❑ Industry sales increase with trade leading to decreased average costs: $AC = F(n/S) + c$
- Because trade increases the variety of goods that consumers can buy under monopolistic competition, it increases the welfare of consumers.
 - ❑ Because average costs decrease, consumers can also benefit from a decreased price.

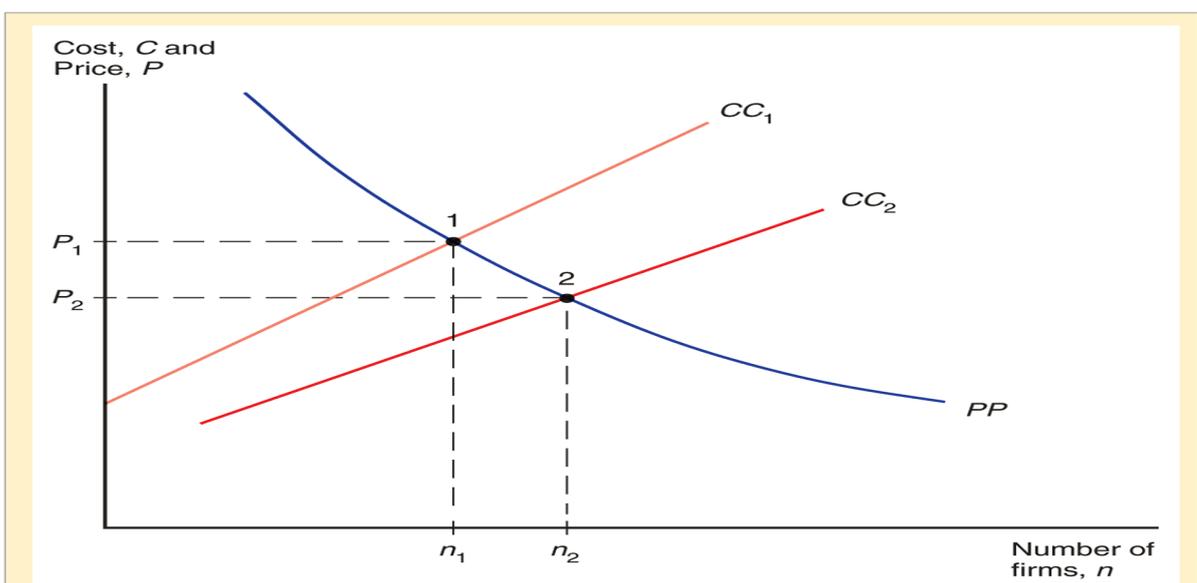


Figure 6-4
Effects of a Larger Market

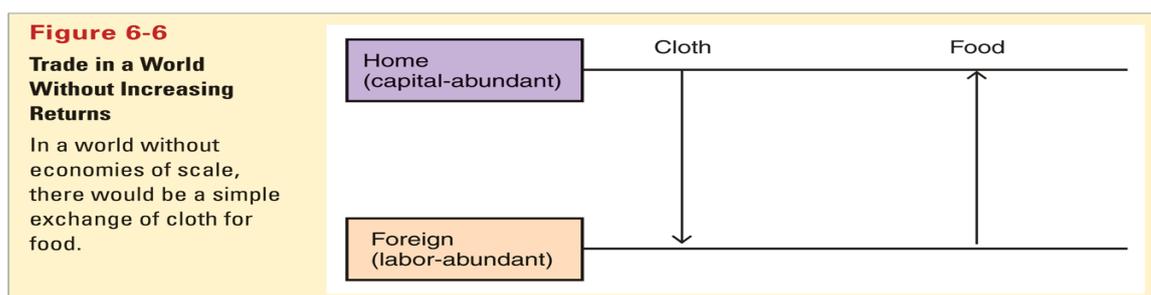
An increase in the size of the market allows each firm, other things equal, to produce more and thus have lower average cost. This is represented by a downward shift from CC_1 to CC_2 . The result is a simultaneous increase in the number of firms (and hence in the variety of goods available) and fall in the price of each.

- As a result of trade, the number of firms in a new international industry is predicted to increase relative to each national market.
 - But it is unclear if firms will locate in the domestic country or foreign countries.

Hypothetical example of gains from trade in an industry with monopolistic competition			
	Domestic market before trade	Foreign market before trade	Integrated market after trade
Industry sales	900,000	1,600,000	2,500,000
Number of firms	6	8	10
Sales per firm	150,000	200,000	250,000
Average cost	10,000	8,750	8,000
Price	10,000	8,750	8,000

Inter-industry Trade

- According to the Heckscher-Ohlin model or Ricardian model, countries specialize in production.
 - Trade occurs only *between* industries: **inter-industry trade**
- In a Heckscher-Ohlin model suppose that:
 - The capital abundant domestic economy specializes in the production of capital intensive cloth, which is imported by the foreign economy.
 - The labor abundant foreign economy specializes in the production of labor intensive food, which is imported by the domestic economy.



Intra-industry Trade

- Suppose now that the global cloth industry is described by the monopolistic competition model.
- Because of product differentiation, suppose that each country produces different types of cloth.
- Because of economies of scale, large markets are desirable: the foreign country exports some cloth and the domestic country exports some cloth.
 - ❑ Trade occurs *within* the cloth industry: **intra-industry trade**
- If domestic country is capital abundant, it still has a comparative advantage in cloth.
 - ❑ It should therefore export more cloth than it imports.
- Suppose that the trade in the food industry continues to be determined by comparative advantage.

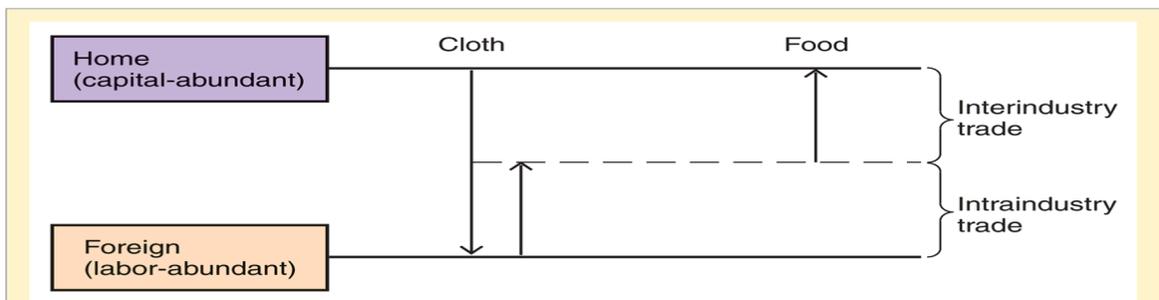


Figure 6-7

Trade with Increasing Returns and Monopolistic Competition

If cloth is a monopolistically competitive industry, Home and Foreign will produce differentiated products. As a result, even if Home is a net exporter of cloth goods, it will import as well as export cloth, giving rise to intraindustry trade.

Inter-industry and Intra-industry Trade

1. Gains from inter-industry trade reflect comparative advantage.
2. Gains from intra-industry trade reflect economies of scale (lower costs) and wider consumer choices.

3. The monopolistic competition model does not predict in which country firms locate, but a comparative advantage in producing the differentiated good will likely cause a country to export more of that good than it imports.
4. The relative importance of intra-industry trade depend on how similar countries are.
 - ❑ Countries with *similar* relative amounts of factors of production are predicted to have *intra-industry trade*.
 - ❑ Countries with *different* relative amounts of factors of production are predicted to have *inter-industry trade*.
5. Unlike inter-industry trade in the Heckscher-Ohlin model, income distribution effects are not predicted to occur with intra-industry trade.
- About 25% of world trade is intra-industry trade according to standard industrial classifications.
 - ❑ But some industries have more intra-industry trade than others: those industries requiring relatively large amounts of skilled labor, technology and physical capital exhibit intra-industry trade for the US.
 - ❑ Countries with similar relative amounts of skilled labor, technology and physical capital engage in a large amount of intra-industry trade with the US.

Inorganic chemicals	0.99
Power-generating machinery	0.97
Electrical machinery	0.96
Organic chemicals	0.91
Medical and pharmaceutical	0.86
Office machinery	0.81
Telecommunications equipment	0.69
Road vehicles	0.65
Iron and steel	0.43
Clothing and apparel	0.27
Footwear	0.00

Note: an index of 1 means that all trade is intra-industry trade.

An index of 0 means that all trade is inter-industry trade.

Dumping

- **Dumping** is the practice of charging a lower price for exported goods than for goods sold domestically.
- Dumping is an example of **price discrimination**: the practice of charging different customers different prices.
- Price discrimination and dumping may occur only if
 - ❑ *imperfect competition* exists: firms are able to influence market prices.
 - ❑ *markets are segmented* so that goods are not easily bought in one market and resold in another.
- Dumping may be a profit maximizing strategy because of differences in foreign and domestic markets.
- One difference is that domestic firms usually have a larger share of the domestic market than they do of foreign markets.
 - ❑ Because of less market dominance and more competition in foreign markets, foreign sales are usually more responsive to price changes than domestic sales.
 - ❑ Domestic firms may be able to charge a high price in the domestic market but must charge a low price on exports if foreign consumers are more responsive to price changes.
- We draw a diagram of how dumping occurs when a firm is a monopolist in the domestic market but a small competitive firm in foreign markets.
 - ❑ Because the firm is a monopolist in the domestic market, the domestic market demand curve is downward sloping, and the marginal revenue curve lies below that demand curve.
 - ❑ Because the firm is a small competitive firm in foreign markets, the foreign market demand curve is horizontal, representing the fact that exports are very responsive to small price changes.

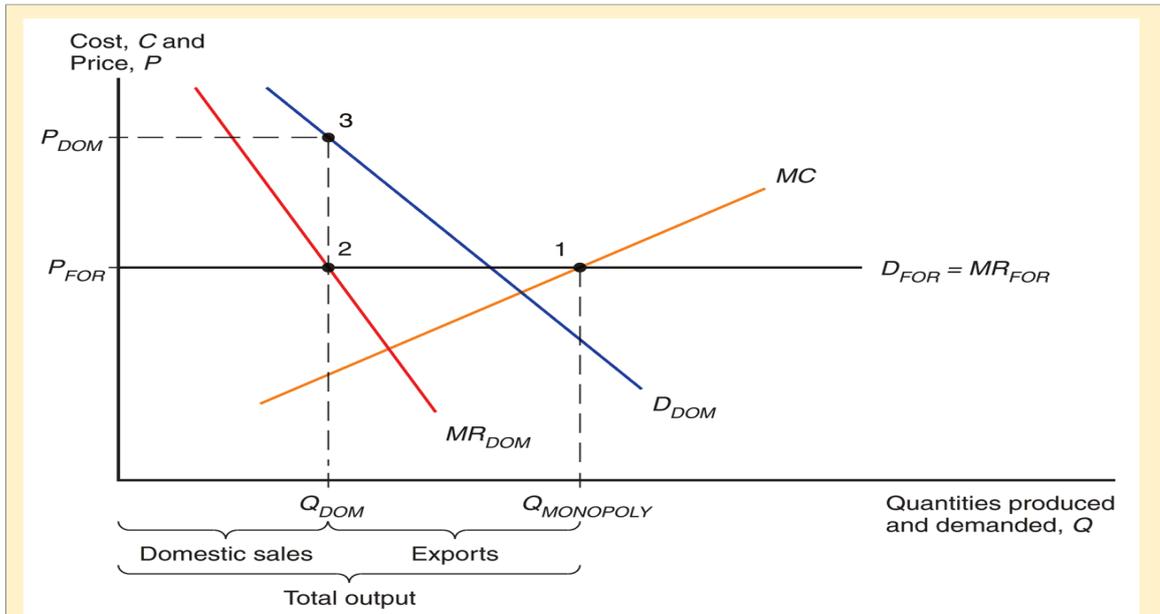


Figure 6-8

Dumping

The figure shows a monopolist that faces a demand curve D_{DOM} for domestic sales, but which can also sell as much as it likes at the export price P_{FOR} . Since an additional unit can always be sold at P_{FOR} , the firm increases output until the marginal cost equals P_{FOR} ; this profit-maximizing output is shown as $Q_{MONOPOLY}$. Since the firm's marginal cost at $Q_{MONOPOLY}$ is P_{FOR} , it sells output on the domestic market up to the point where marginal revenue equals P_{FOR} ; this profit-maximizing level of domestic sales is shown as Q_{DOM} . The rest of its output, $Q_{MONOPOLY} - Q_{DOM}$, is exported.

The price at which domestic consumers demand Q_{DOM} is P_{DOM} . Since $P_{DOM} > P_{FOR}$, the firm sells exports at a lower price than it charges domestic consumers.

- To maximize profits, the firm will sell a low amount in the domestic market at a high price P_{DOM} , but sell in foreign markets at a low price P_{FOR} .
 - Since an additional unit can always be sold at P_{FOR} , the firm will sell its products at a high price in the domestic market until marginal revenue there falls to P_{FOR} .
 - Thereafter, it will sell exports at P_{FOR} until marginal costs exceed this price.
- In this case, dumping is a profit-maximizing strategy.

Protectionism and Dumping

- Dumping (as well as price discrimination in domestic markets) is widely regarded as unfair.

- A US firm may appeal to the Commerce Department to investigate if dumping by foreign firms has injured the US firm.
 - ❑ The Commerce Department may impose an “anti-dumping duty”, or tax, as a precaution against possible injury.
 - ❑ This tax equals the difference between the actual and “fair” price of imports, where “fair” means “price the product is normally sold at in the manufacturer's domestic market ”.
- Next the International Trade Commission (ITC) determines if injury to the US firm has actually occurred or is likely to occur.
- If the ITC determines that injury has occurred or is likely to occur, the anti-dumping duty remains in place.
 - ❑ See http://www.itds.treas.gov/ADD_CVD.htm

External Economies of Scale

- If external economies exist, a country that has a large industry will have low costs of producing that industry’s good or service.
- External economies may exist for a few reasons:
 1. **Specialized equipment or services** may be needed for the industry, but are only supplied by other firms if the industry is large and concentrated.
 - For example, Silicon Valley in California has a large concentration silicon chip companies, which are serviced by companies that make special machines for manufacturing silicon chips.
 - These machines are cheaper and more easily available for Silicon Valley firms than for firms elsewhere.
 2. **Labor pooling:** a large and concentrated industry may attract a pool of workers, reducing employee search and hiring costs for each firm.
 3. **Knowledge spillovers:** workers from different firms may more easily share ideas that benefit each firm when a large and concentrated industry exists.

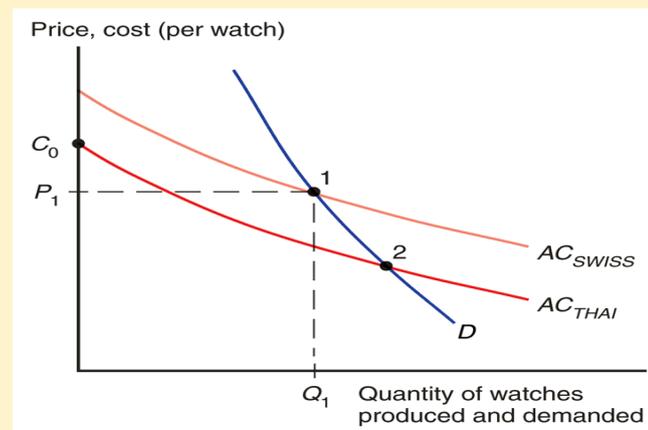
External Economies of Scale and Trade

- If external economies exist, the pattern of trade may be due to historical accidents:
 - ❑ countries that start out as large producers in certain industries tend to remain large producers even if some other country could potentially produce the goods more cheaply.

Figure 6-9

External Economies and Specialization

The average cost curve for Thailand, AC_{THAI} , lies below the average cost curve for Switzerland, AC_{SWISS} . Thus Thailand could potentially supply the world market more cheaply than Switzerland. If the Swiss industry gets established first, however, it may be able to sell watches at the price P_1 , which is below the cost C_0 that an individual Thai firm would face if it began production on its own. So a pattern of specialization established by historical accident may persist even when new producers could potentially have lower costs.

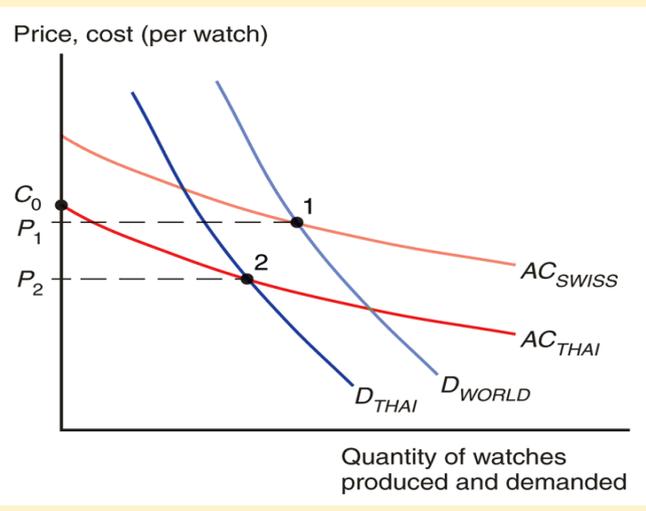


- Trade based on external economies has an ambiguous effect on national welfare.
 - ❑ There may be gains to the *world* economy by concentrating production of industries with external economies.
 - ❑ But there is no guarantee that the right country will produce a good subject to external economies.
 - ❑ It is even possible that a country is worse off with trade than it would have been without trade: a country may be better off if it produces everything for its domestic market rather than pay for imports.

Figure 6-10

External Economics and Losses from Trade

When there are external economies, trade can potentially leave a country worse off than it would be in the absence of trade. In this example, Thailand imports watches from Switzerland, which is able to supply the world market (D_{WORLD}) at a price (P_1) low enough to block entry by Thai producers who must initially produce the watches at cost C_0 . Yet if Thailand were to block all trade in watches, it would be able to supply its domestic market (D_{THAI}) at the lower price P_2 .

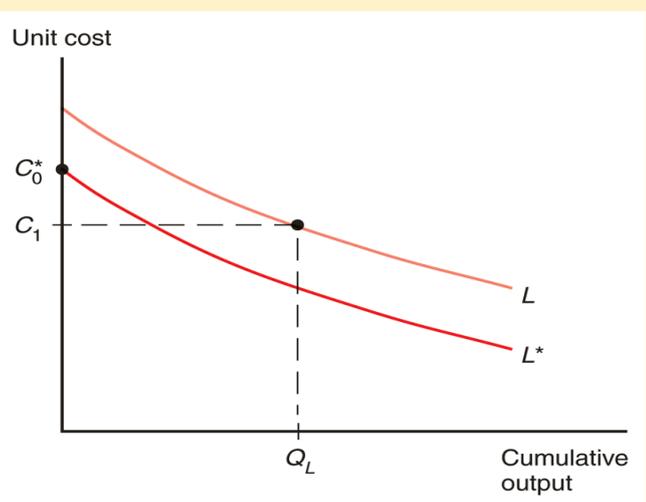


- We have considered cases where external economies depend on the amount of *current output* at a point in time.
- But external economies may also depend on the amount of *cumulative output over time*.
- **Dynamic external economies of scale** (dynamic increasing returns to scale) exist if average costs fall as cumulative output over time rises.
- Dynamic increasing returns to scale could arise if the cost of production depends on the accumulation of knowledge and experience, which depend on the production process over time.
- A graphical representation of dynamic increasing returns to scale is called a **learning curve**.

Figure 6-11

The Learning Curve

The learning curve shows that unit cost is lower the greater the cumulative output of a country's industry to date. A country that has extensive experience in an industry (L) may have lower unit cost than another country with little or no experience, even if the second country's learning curve (L^*) is lower, for example, because of lower wages.

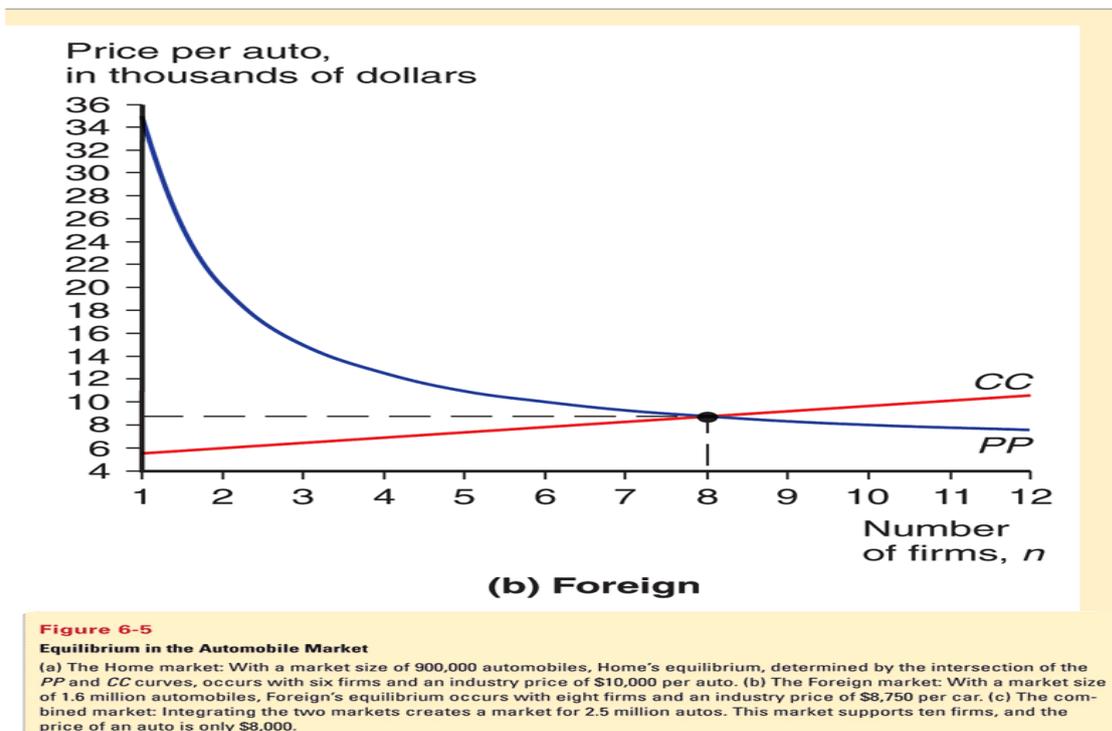
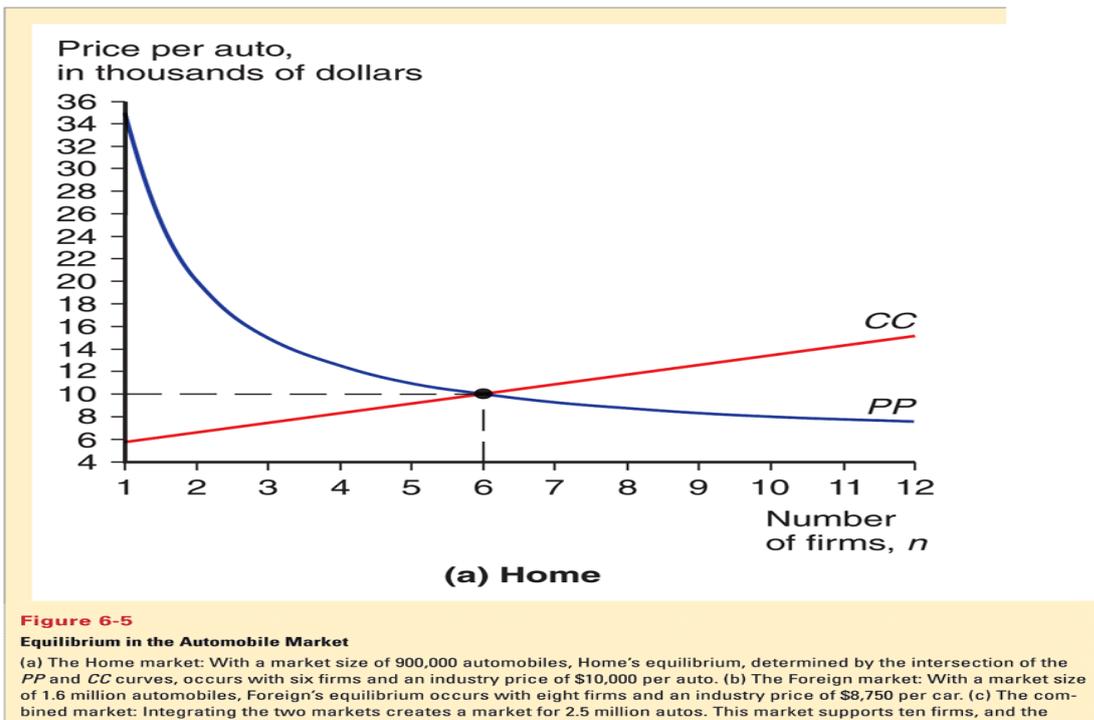


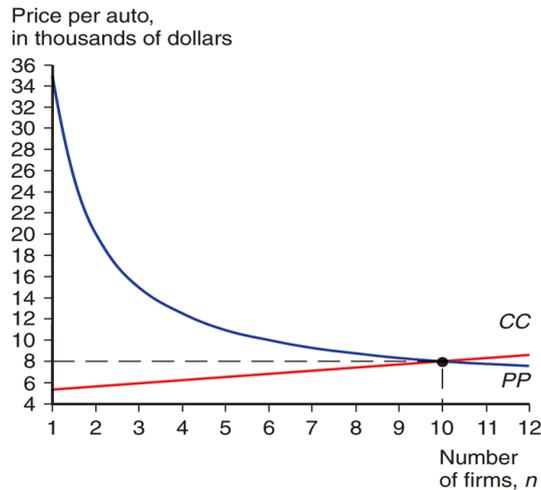
- Like external economies of scale at a point in time, dynamic increasing returns to scale can lock in an initial advantage or head start in an industry.
- Like external economies of scale at a point in time, dynamic increasing returns to scale can be used to justify protectionism.
 - ❑ Temporary protection of industries enables them to gain experience: infant industry argument.
 - ❑ But temporary is often for a long time, and it is hard to identify when external economies of scale really exist.

Summary

1. Economies of scale imply that more output at the firm or industry level causes average cost to fall.
 - ❑ External economies of scale refer to the amount of output by an industry.
 - ❑ Internal economies of scale refer to the amount of output by a firm.
2. With monopolistic competition, each firm has some monopoly power due to product differentiation but must compete with other firms whose prices are believed to be unaffected by each firm's actions.
3. Monopolistic competition allows for gains from trade through lower costs and prices, as well as through wider consumer choice.
4. Monopolistic competition predicts intra-industry trade, and does not predict changes in income distribution within a country.
5. Location of firms under monopolistic competition is unpredictable, but countries with similar relative factors are predicted to engage in intra-industry trade.
6. Dumping may be a profitable strategy when a firm faces little competition in its domestic market and faces heavy competition in foreign markets.

7. Trade based on external economies of scale may increase or decrease national welfare, and countries may benefit from temporary protectionism if their industries exhibit external economies of scale either at a point in time or over time.





(c) Integrated

Figure 6-5

Equilibrium in the Automobile Market

(a) The Home market: With a market size of 900,000 automobiles, Home's equilibrium, determined by the intersection of the *PP* and *CC* curves, occurs with six firms and an industry price of \$10,000 per auto. (b) The Foreign market: With a market size of 1.6 million automobiles, Foreign's equilibrium occurs with eight firms and an industry price of \$8,750 per car. (c) The combined market: Integrating the two markets creates a market for 2.5 million autos. This market supports ten firms, and the price of an auto is only \$8,000.

TABLE 6-1 Relationship of Input to Output for a Hypothetical Industry

Output	Total Labor Input	Average Labor Input
5	10	2
10	15	1.5
15	20	1.333333
20	25	1.25
25	30	1.2
30	35	1.166667

TABLE 6-2 Hypothetical Example of Gains from Market Integration

	Home Market, Before Trade	Foreign Market, Before Trade	Integrated Market, After Trade
Total sales of autos	900,000	1,600,000	2,500,000
Number of firms	6	8	10
Sales per firm	150,000	200,000	250,000
Average cost	10,000	8,750	8,000
Price	10,000	8,750	8,000

Chapter 7

International Factor Movements

Preview

- International labor mobility
- International borrowing and lending
- Foreign direct investment and multinational firms

Movements in Factors of Production

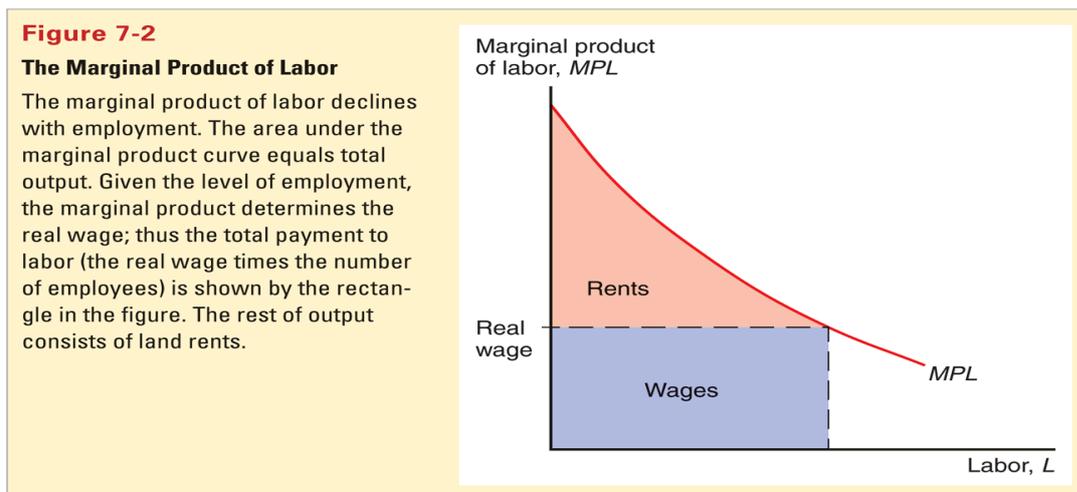
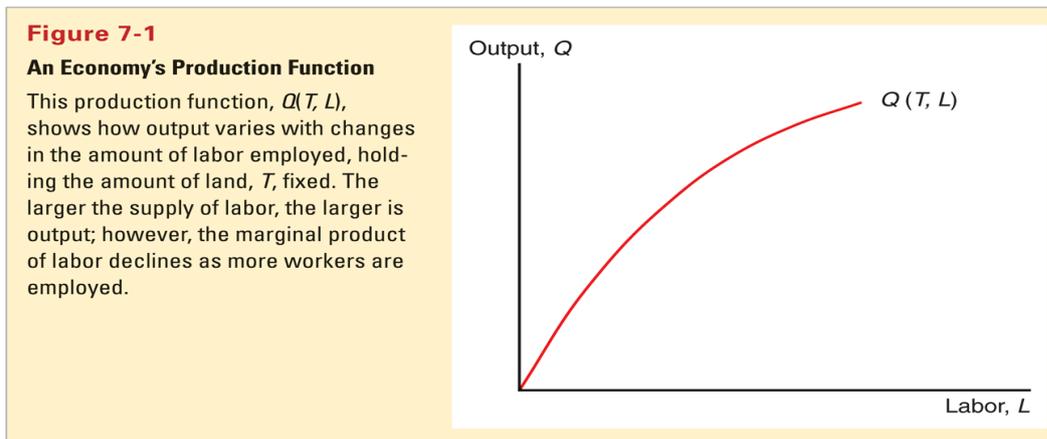
- Movements in factors of production include
 - labor migration,
 - the transfer of financial capital through international borrowing and lending,
 - transactions of multinational corporations involving direct ownership of foreign firms
- Like movements of goods and services (trade), movements of factors of production are politically sensitive and are often restricted.
 - Restrictions on immigration
 - Restrictions on financial capital flows (less common today in Europe and US)
 - Restrictions on the activities of multinational corporations

International Labor Mobility

- To show the effects of labor migration (mobility), let's build a simple model with only one good (output).

- Suppose that there are only two important factors of production: land and labor.
- On a fixed parcel of land, each worker often becomes less productive or efficient as more workers are added to that fixed parcel of land.

□ The **marginal product of labor** often decreases.



- Because of diminishing marginal product, productivity of labor depends on the quantity of labor employed.
 - The marginal product decreases as more workers are employed.
- Because of competition, the real wage paid to workers equals their marginal product.
- The area under the marginal product of labor curve equals the value of output produced, which equals the value of wages and rental income paid to factors of production due to competition.

- If the domestic country is the labor abundant country and the foreign country is the land abundant country,
 - ❑ the marginal product of domestic workers is less and therefore they earn less than those in the foreign country, if technology is the same across countries.
- There is an incentive for domestic workers to move to the foreign country.
- Workers in the domestic country have an incentive to move to the foreign country until the real wages between the countries are equal.
 - ❑ Emigration from the domestic country raises the real wage of the remaining workers there.
 - ❑ It increases the quantity of labor and decreases the real wage in the foreign country.

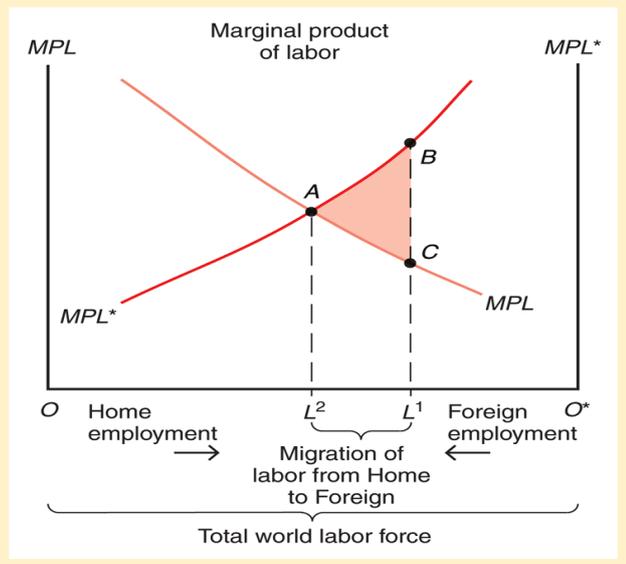
	Real Wage, 1870 (U.S. = 100)	Percentage Increase in Real Wage, 1870–1913
Destination Countries		
Argentina	53	51
Australia	110	1
Canada	86	121
United States	100	47
Origin Countries		
Ireland	43	84
Italy	23	112
Norway	24	193
Sweden	24	250

Source: Jeffrey G. Williamson, “The Evolution of Global Labor Markets Since 1830: Background Evidence and Hypotheses,” *Explorations in Economic History* 32 (1995), pp. 141–196.

Figure 7-3

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.



- Labor migration between the domestic country and the foreign country will also increase world output.
 - ❑ Foreign output rises by the area under its MPL^* curve from OL^1 to OL^2
 - ❑ Domestic output falls by the area under its MPL curve from OL^2 to OL^1
 - ❑ The value of world output is maximized when the marginal product of labor is the same across countries.
- The Heckscher-Ohlin model predicts that trade in goods is an alternative to factor mobility.
 - ❑ Services from factors of production are “embodied” in goods, so that the value of goods reflects the value or productivity of factors of production that produced them.
- But despite real wage differences across countries, complete factor price equalization with labor mobility does not really occur for reasons that are similar to the reasons given in the Heckscher-Ohlin model.
 1. The model assumes that trading countries produce the same goods, but countries may produce different goods so that

marginal product of labor in producing a given good are not comparable.

2. The model assumes that trading countries have the same technology, but different technologies could affect the productivities of factors and therefore the wages/rates paid to these factors.
3. Barriers to immigration and emigration and transportation costs may prevent factor prices from equalizing.

❑ Barriers to movements for other factors of production are also important in the real world (e.g., for land and capital).

Immigration and the US Economy

- In the past generation, immigration in the US has increased substantially, especially among workers with the lowest education levels and the highest education levels.
 - ❑ The largest increase in immigration occurred among workers with the lowest education levels, making less educated worker more abundant,
 - ❑ possibly causing a widening wage gap between low educated workers and high educated workers.

	Immigrants as Percent of Native-Born Workers, 1980	Immigrants as Percent of Native-Born Workers, 1990	Change, 1980–1990
High school dropouts	12.2	26.2	14.0
High school	4.4	6.1	1.7
Some college	5.8	6.9	1.1
College	7.5	9.7	2.2

Source: George Borjas, Richard Freeman, and Lawrence Katz, “Searching for the Effect of Immigration on the Labor Market,” *American Economic Review*, May 1996.

- But immigration can not wholly explain the widening income distribution in the US.
- The fraction of US workers without a high school diploma fell, while that with a college education rose, during 1980–1990.
 - More highly educated workers became more abundant.
- So why did the wage of highly educated workers rise relative to that of low educated workers?
 - Possibly due to technological changes that made education more valuable to employers.

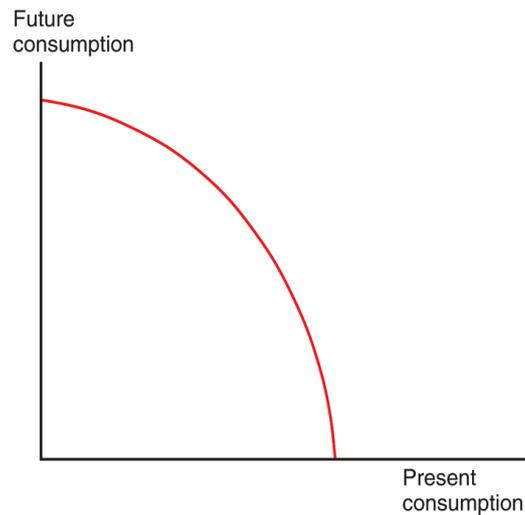
International Borrowing and Lending

- International capital mobility usually refers to mobility in *financial* capital across countries.
 - Financial capital is a source of funds used to build physical capital (e.g., factories and equipment).
- International capital mobility can be interpreted as **intertemporal trade**:
 - trade of goods consumed today by borrowers in return for goods consumed in the future by lenders.
- For any economy, there is a trade-off (opportunity cost) between consuming today and saving for the future: resources can either be consumed or saved.
 - To save and invest more today typically means that economies need to consume less today.
- We represent this concept by drawing a special kind of production possibility frontier, an **intertemporal production possibility frontier**.

Figure 7-4

The Intertemporal Production Possibility Frontier

A country can trade current consumption for future consumption in the same way that it can produce more of one good by producing less of another.



International Borrowing and Lending

- Some countries will have a comparative advantage in spending current output/income (current consumption).
- Others will have one in saving current output/ income (future consumption).
- A comparative advantage in current consumption
 - ❑ would mean a lower opportunity cost of spending current income.
 - ❑ would be reflected in an intertemporal PPF that is biased toward current consumption.
- Suppose that the domestic country has a comparative advantage in (bias towards) current consumption, while the foreign country has a comparative advantage (bias towards) future consumption.
- In the absence of international borrowing and lending, the relative price of current consumption should be lower in the domestic country.
- But what is the relative price of current consumption?

- The price of borrowing 1 unit of output/income today to consume is the output/income that needs to be repaid in the future:
 - ❑ principal + interest = $1+r$, where r is the interest rate
 - ❑ The price of current consumption relative to future consumption is $1/(1+r)$
- The opportunity cost of consuming 1 unit of output/ income today is the output/income that could have be earned by saving it:
 - ❑ principal + interest = $1+r$, where r is the interest rate
- If international borrowing and lending are allowed, the domestic country will “export” current consumption (i.e., borrow).
 - ❑ The domestic country initially has a lower relative price of current consumption $1/(1+r)$
 - ❑ The domestic country initially has a higher interest rate r .
 - ❑ A higher interest rate r implies a higher return to investment: investment is highly productive/ profitable so that the domestic country borrows from foreign lenders.

Foreign Direct Investment

- **Foreign direct investment** refers to investment in which firm in one country *directly controls or owns* a subsidiary in another.
- If a foreign company invests in at least 10% of the stock in a subsidiary, the two firms are typically classified as a **multinational corporation**.
 - ❑ 10% or more of ownership in stock is deemed to be sufficient for direct control of business operations.
 - ❑ In addition, international borrowing and lending sometimes occurs between a parent company and its subsidiary.

Theory of Multinational Corporations

- Why are multinational corporations created and why do they undertake direct foreign investment?
- We rephrase these questions into those dealing with
 1. **Location:** why is a good produced in two countries rather than in one country and then exported to the second country?
 2. **Internalization:** why is production in different locations done by one firm rather than by separate firms?
- Why production occurs in separate location is often determined by
 - the location of necessary factors of production:
 - mining occurs where minerals are;
 - labor intensive production occurs where relatively large pools of labor live.
 - transportation costs and other barriers to trade may also influence the location of production.
 - These factors also influence the pattern of trade.
- Internalization occurs because it is more profitable to conduct transactions and production within a single organization than in separate organizations. Reasons for this include:
 1. **Technology transfers:** transfer of knowledge or another form of technology may be easier within a single organization than through a market transaction between separate organizations.
 - Patent or property rights may be weak or non-existent.
 - Knowledge may not be easily packaged and sold.
 2. **Vertical integration** involves consolidation of different stages of a production process.

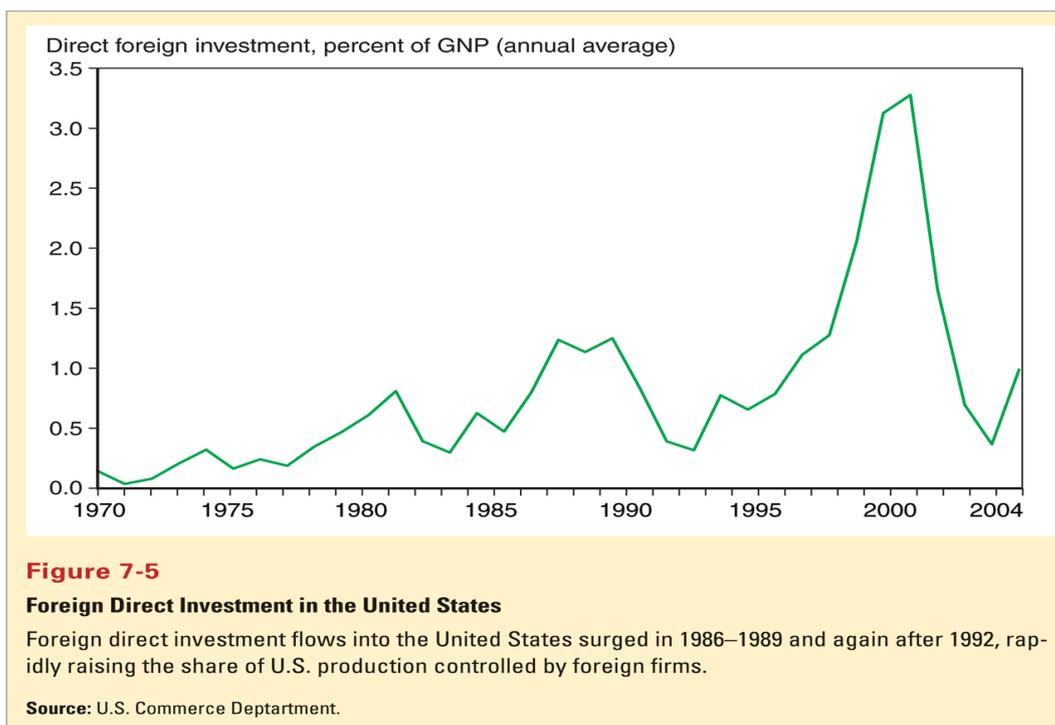
- ❑ Vertical integration would involve consolidation of one firm that produces a good that is used as an input for another firm.
- ❑ This may be more efficient than having production operated by separate firms.
- ❑ For example, having farms and flour mills consolidate into one organization to make flour may be more efficient than having farms and flour mills as separate organizations.

TABLE 7-1 Employment by Foreign-Owned Firms in the United States

	As Percent of Total Nonfarm Employment	As Percent of Manufacturing Employment
1977	1.5	3.8
2002	4.2	14.6

Source: U.S. Commerce Department.

Foreign Direct Investment in the US



Summary

1. A simple model of international labor mobility predicts that labor will migrate to countries with higher labor productivity and higher wage rates.
 - Real wages are predicted to fall due to immigration
 - Real wages are predicted to rise due to emigration
2. Due to the fact that countries do not produce the same goods, due to differences in technology and due to immigration barriers; real wages across countries are far from equal.
3. International borrowing and lending can be described as intertemporal trade, where countries with profitable investment opportunities borrow funds today and repay lenders in the future, benefiting both borrowers and lenders.
4. The price of current consumption relative to the price of future consumption is a function of the interest rate.
5. Multinational corporations undertake foreign direct investment,
 - possibly because locating production in foreign countries is efficient,
 - possibly because internalizing technology transfers is efficient or
 - possibly because vertical integration is efficient.

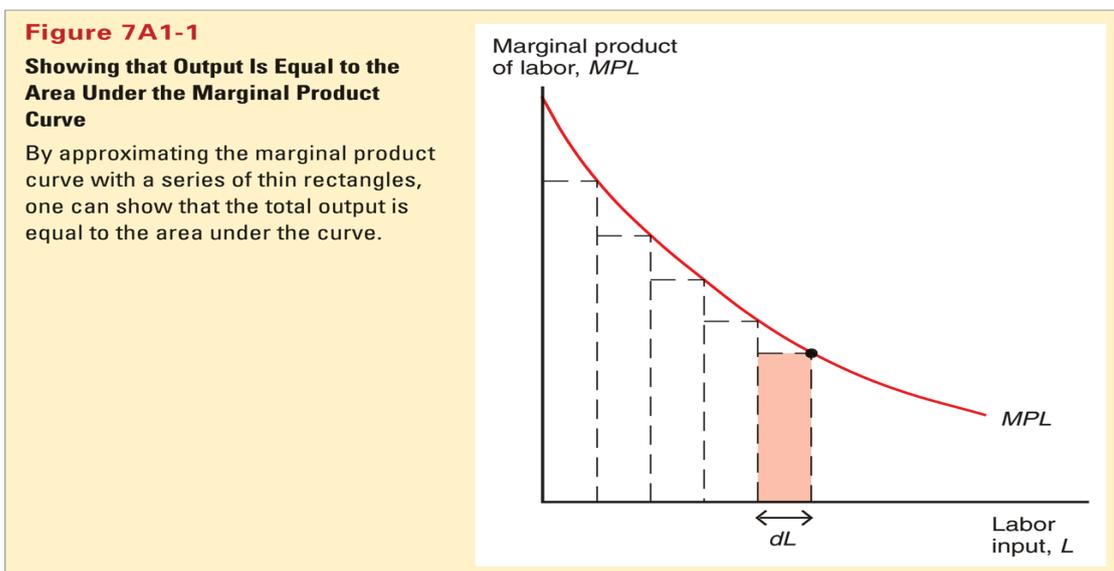


Figure 7A1-2

The Distribution of Income

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

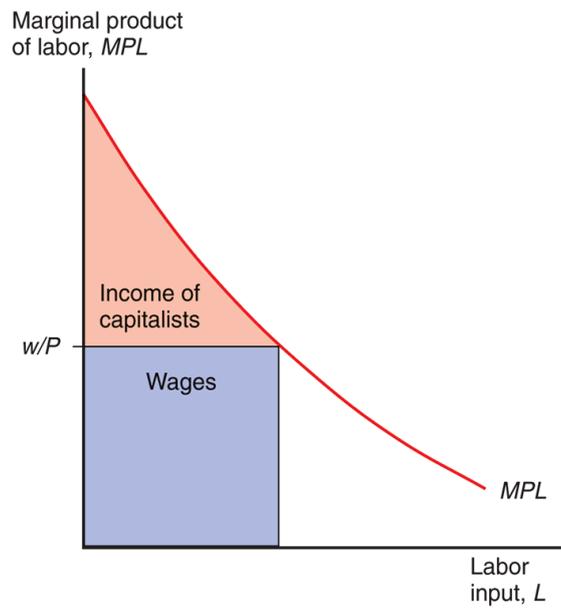


Figure 7A2-1

Determining Home's Intertemporal Production Pattern

At a world real interest rate of r , Home's investment level maximizes the value of production over the two periods that the economy exists.

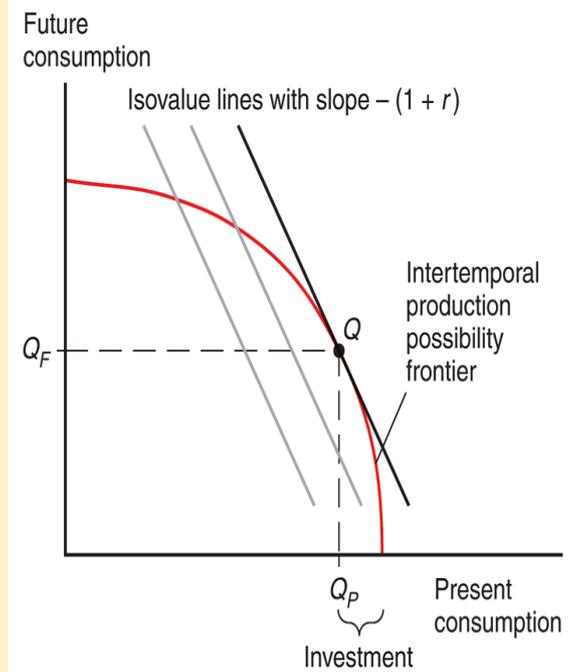


Figure 7A2-2

Determining Home's Intertemporal Consumption Pattern

Home's consumption places it on the highest indifference curve touching its intertemporal budget constraint. The economy exports $Q_P - D_P$ units of present consumption and imports $D_F - Q_F = (1 + r) \times (Q_P - D_P)$ units of future consumption.

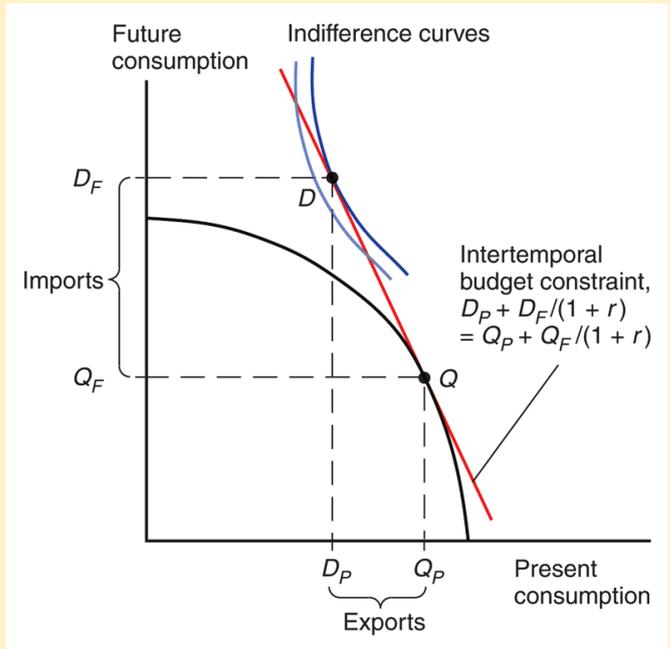


Figure 7A2-3

Determining Foreign's Intertemporal Production and Consumption Patterns

Foreign produces at point Q^* and consumes at point D^* , importing $D_P^* - Q_P^*$ units of present consumption and exporting $Q_F^* - D_F^* = (1 + r) \times (D_P^* - Q_P^*)$ units of future consumption.

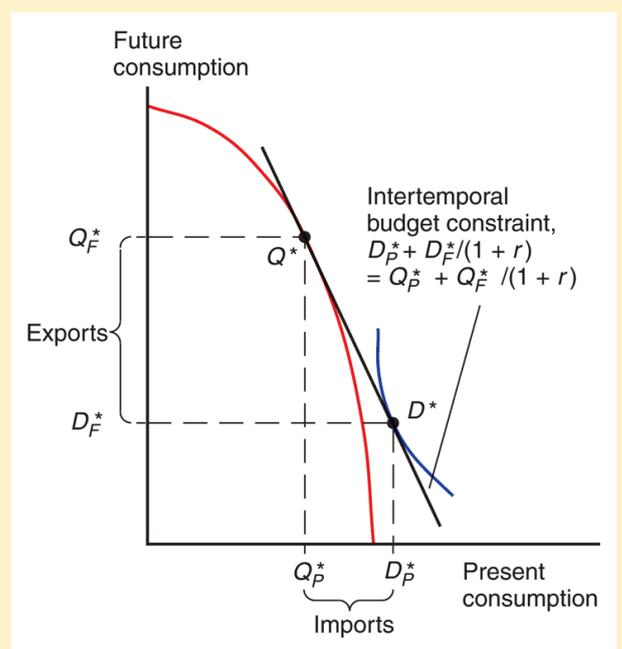


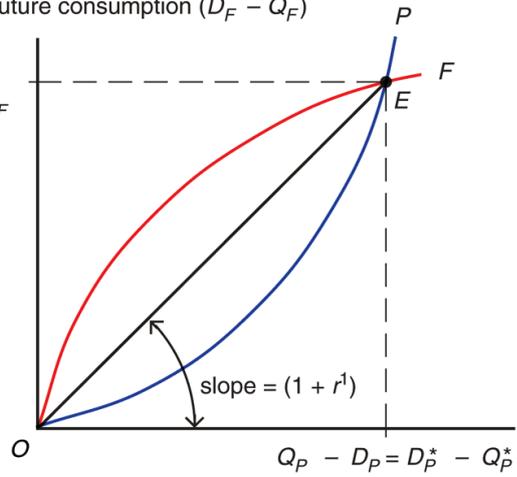
Figure 7A2-4

International Intertemporal Equilibrium in Terms of Offer Curves

Equilibrium is at point E (with interest rate r^1) because desired Home exports of present consumption equal desired Foreign imports and desired Foreign exports of future consumption equal desired Home imports.

Foreign exports of future consumption ($Q_F^* - D_F^*$) and Home imports of future consumption ($D_F - Q_F$)

$$Q_F^* - D_F^* = D_F - Q_F$$



Home exports of present consumption ($Q_P - D_P$) and Foreign imports of present consumption ($D_P^* - Q_P^*$)

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