

# Introduction to International Economics

# Introduction

- International economics is about how nations interact through trade of goods and services, through flows of money and through investment.
- International economics is growing in importance as a field of study because of the rapid integration of international economic markets. Increasingly, businesses, consumers, and governments realize that their lives are affected not only by what goes on in their own town, state, or country but also by what is happening around the world.

- The growth of international trade and investment has been stimulated partly by the steady decline of trade barriers since the Great Depression of the 1930s. In the post–World War II era, the **General Agreement on Tariffs and Trade**, or GATT, prompted regular negotiations among a growing body of members to reciprocally reduce tariffs (import taxes) on imported goods.
- Another international push for trade liberalization has come in the form of regional free trade agreements.

# International trade and International Finance

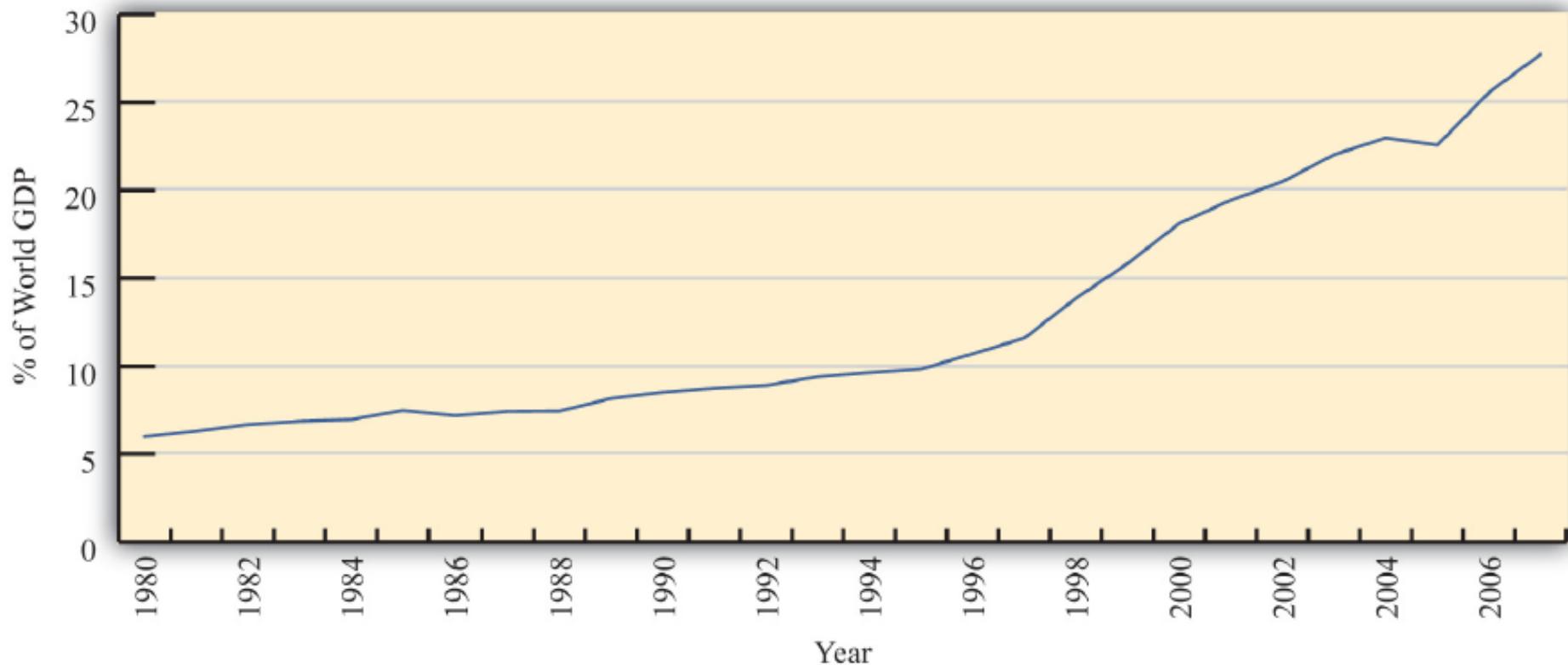
- International trade focuses on transactions of real goods and services across nations.
- These transactions usually involve a physical movement of goods or a commitment of tangible resources like labor services.
- International finance focuses on financial or monetary transactions across nations.
  - For example, purchases of US dollars or financial assets by Indians.

- International trade is a field in economics that **applies microeconomic models to help understand the international economy**. Its content includes basic supply-and demand analysis of international markets; firm and consumer behavior; perfectly competitive, oligopolistic, and monopolistic market structures; and the effects of market distortions. The typical course describes economic relationships among consumers, firms, factory owners, and the government.
- International finance applies **macroeconomic models to help understand the international economy**. Its **focus is on the interrelationships among aggregate economic variables** such as GDP, unemployment rates, inflation rates, trade balances, exchange rates, interest rates, and so on. This field expands basic macroeconomics to include international exchanges. Its focus is on the significance of trade imbalances, the determinants of exchange rates, and the aggregate effects of government monetary and fiscal policies. The pros and cons of fixed versus floating exchange rate systems are among the important issues addressed.

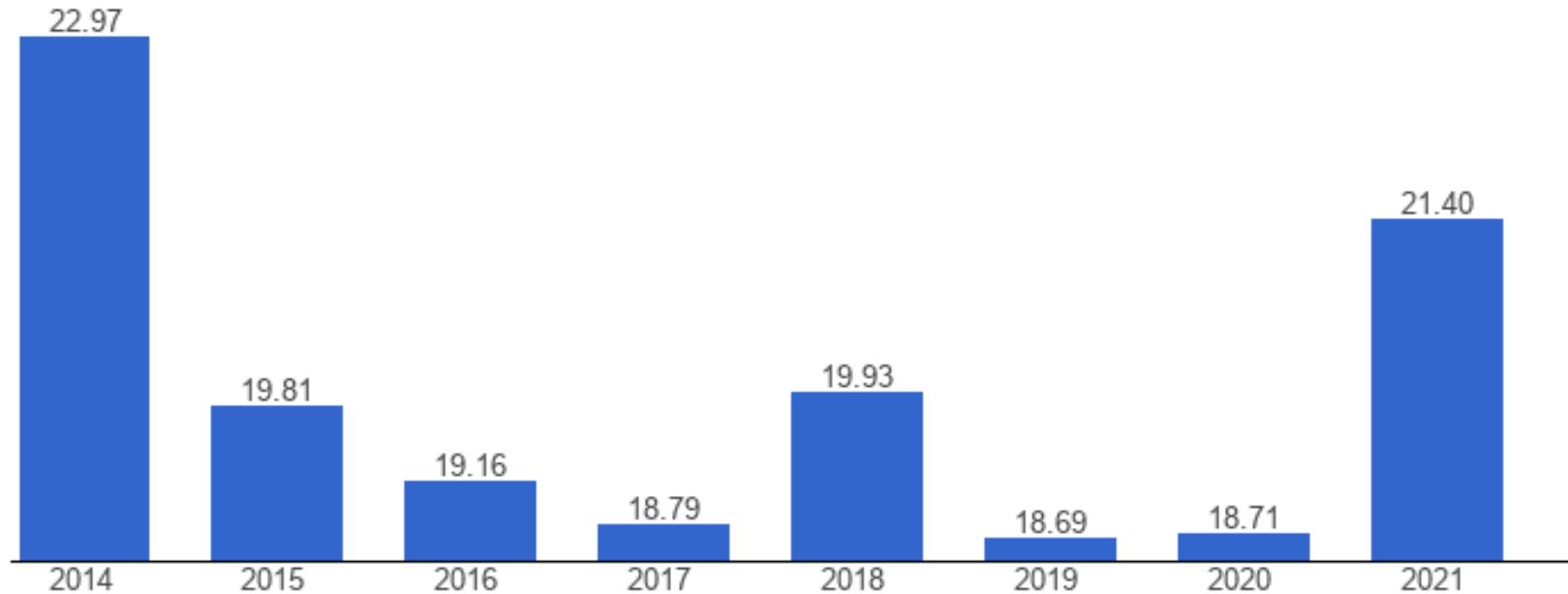
# World exports (as per cent of world GDP)



# World Inward FDI



# India's exports as per cent of GDP



# 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.

# Determinants of international trade

- **Size**- 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.
- **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.
- **Cultural affinity**: if two countries have cultural ties, it is likely that they also have strong economic ties.
- **Geography**: ocean harbors and a lack of mountain barriers make transportation and trade easier.

- *Multinational corporations*: corporations spread across different nations import and export many goods between their divisions.
- *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 or different currencies, either of which may impede trade more.

# 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.
- Relevant questions- which policy to use, how much to restrict, what if foreign governments respond likewise?

# Gravity Model

- The gravity model, first introduced by Walter Isard, 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  $j$

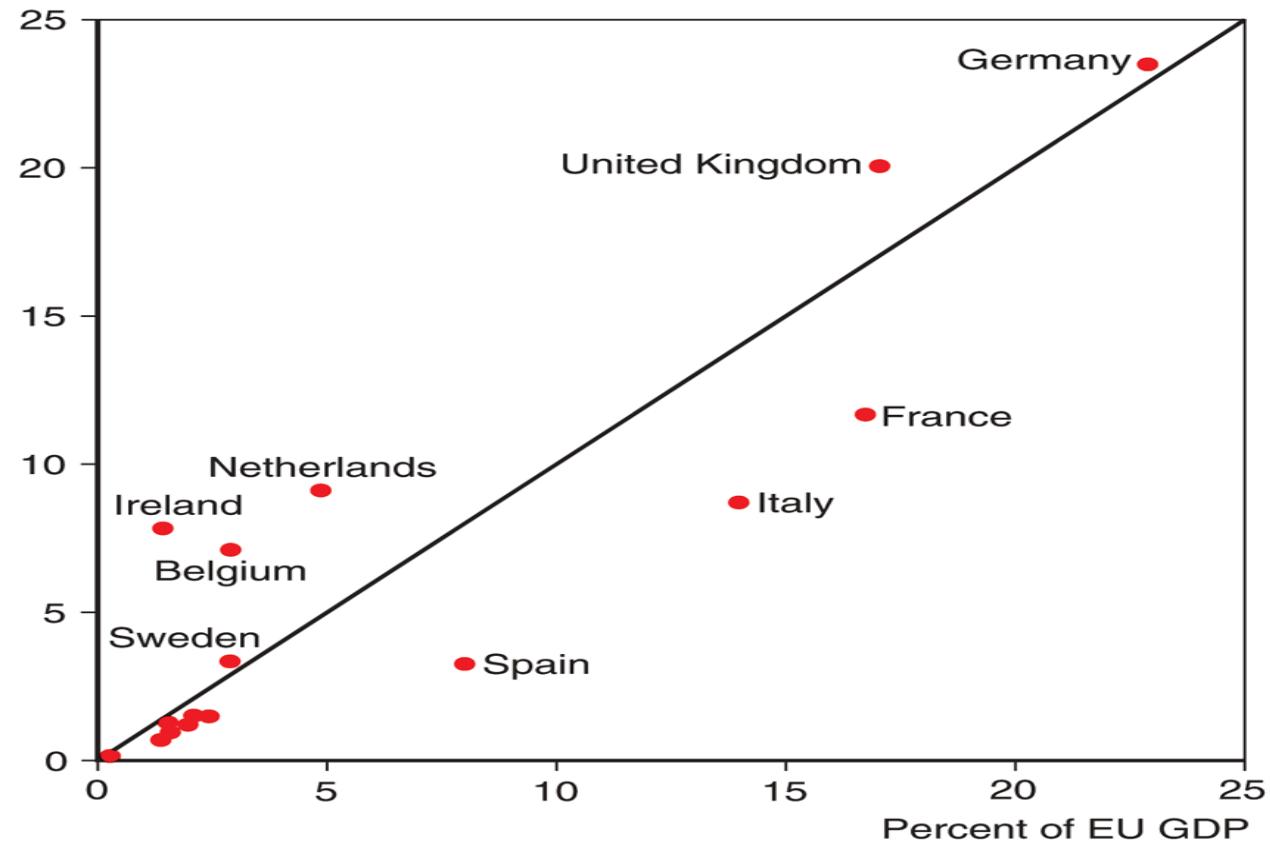
$A$  is a constant

$Y_i$  the GDP of country  $i$ ,  $Y_j$  is the GDP of country  $j$

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

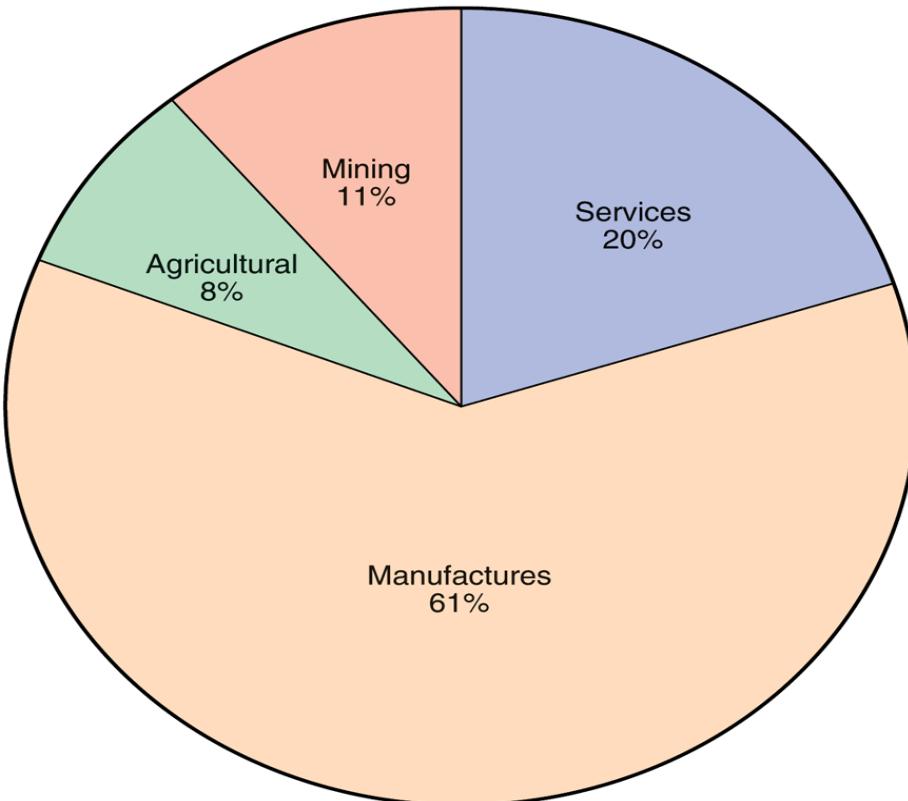
Estimates of the effect of distance from the gravity model predict that a 1% increase in the distance between countries is associated with a decrease in the volume of trade of 0.7% to 1%.

Percent of U.S.  
trade with EU

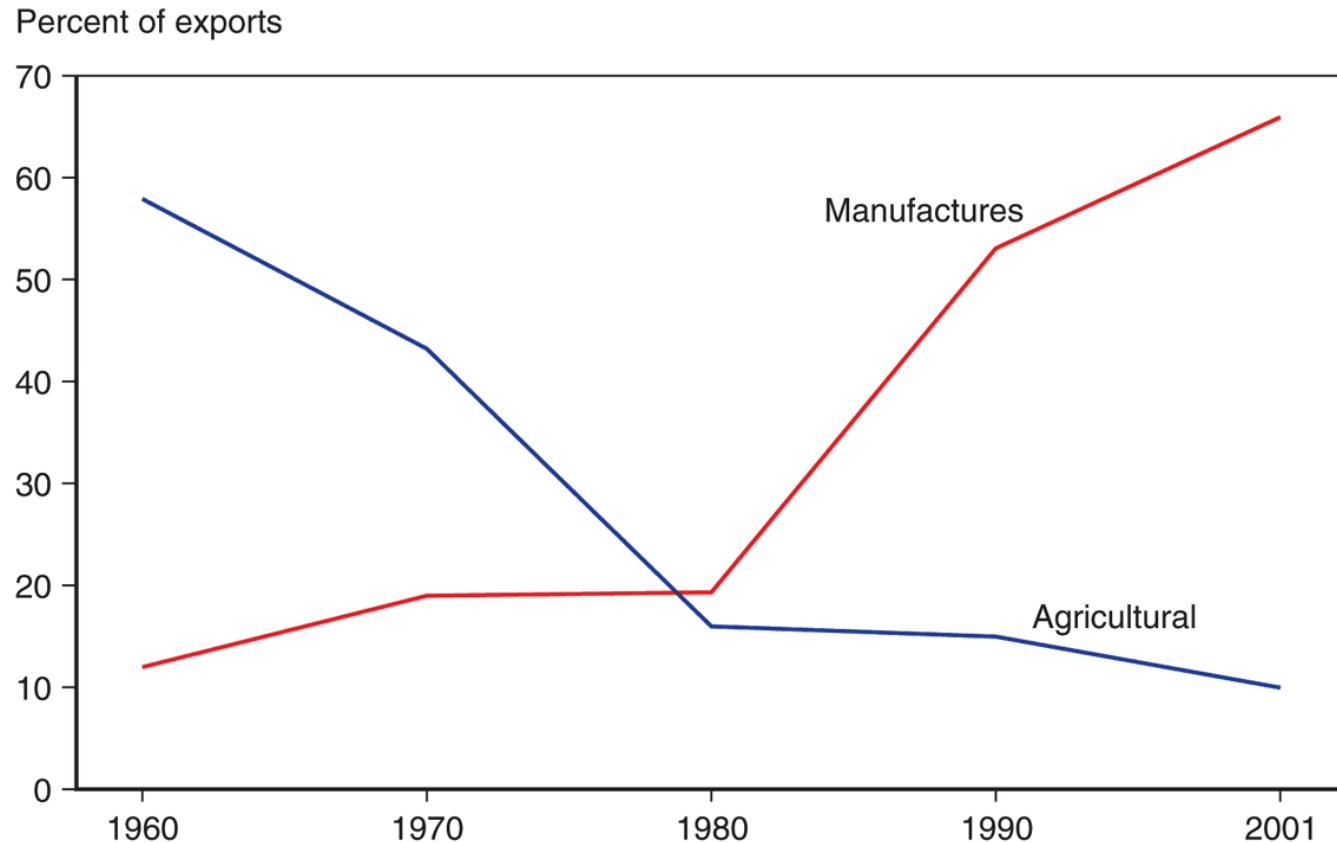


- The negative effect of distance on trade according to the gravity models is significant, but it has grown smaller over time due to modern transportation and communication.
- But history has shown that political factors, such as wars, can change trade patterns much more than innovations in transportation and communication.
- 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.

# Composition of world trade



# Changing composition of developing country exports

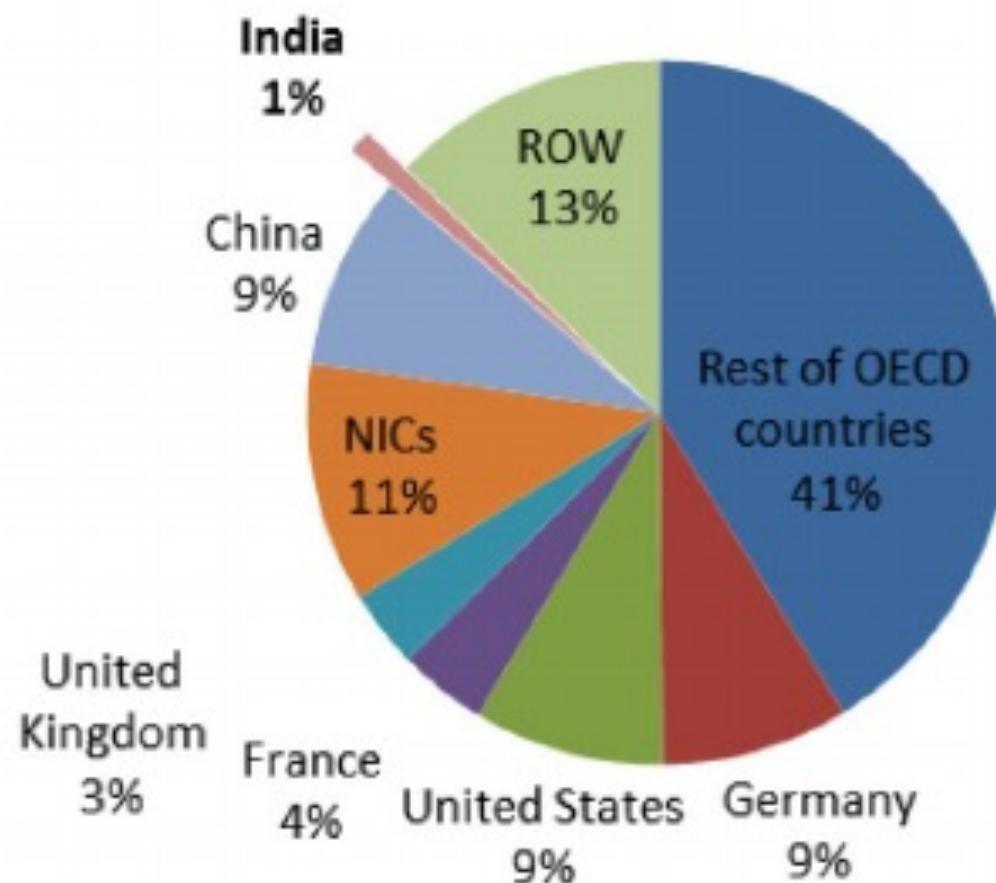


# Outsourcing

- **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.

**Global Value Chains**-International production, trade and investments are increasingly organized within so-called global value chains (GVCs) where the different stages of the production process are located across different countries. Globalization motivates companies to restructure their operations internationally through outsourcing and offshoring of activities. The past decades have witnessed a strong trend towards the international dispersion of value chain activities such as design, production, marketing, distribution, etc.

## Distribution of Value-Added in Exports by GVCs



# Gains from Trade

- When a buyer and a seller engage in a voluntary transaction, both receive something that they want and both can be made better off.
- 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.

- 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.
- When countries specialize, they may also be more efficient due to large scale production.
- 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.

# Labour Productivity and Comparative Advantage

# Mercantilism

- Mercantilism is an economic policy that is designed to **maximize the exports and minimize the imports for an economy**. It promotes imperialism, colonialism, tariffs and subsidies on traded goods to achieve that goal.
- The policy aims to reduce a possible current account deficit or reach a current account surplus, and it includes measures aimed at accumulating monetary reserves by a positive balance of trade, especially of **finished goods**. Historically, such policies frequently led to war and motivated colonial expansion.

# Tariffs

- Tariffs have been applied by countries for centuries and have been one of the most common methods used to collect revenue for governments. Largely this is because it is relatively simple to place customs officials at the border of a country and collect a fee on goods that enter.
- Because tariffs raise the cost of importing products from abroad but not from domestic firms, they have the effect of protecting the domestic firms that compete with imported products. These domestic firms are called import competitors.

- There are two basic ways in which tariffs may be levied: specific tariffs and ad valorem tariffs. A specific tariff is levied as a fixed charge per unit of imports.
- An ad valorem tariff is levied as a fixed percentage of the value of the commodity imported. “Ad valorem” is Latin for “on value” or “in proportion to the value.”
- Different tariffs are generally applied to different commodities. Governments rarely apply the same tariff to all goods and services imported into the country.

- Instead of one tariff rate, countries have a tariff schedule that specifies the tariff collected on every particular good and service.
- Generally speaking, average tariff rates are less than 20 percent in most countries, although they are often quite a bit higher for agricultural commodities. In the most developed countries, average tariffs are less than 10 percent and often less than 5 percent. On average, less-developed countries maintain higher tariff barriers, but many countries that have recently joined the WTO have reduced their tariffs substantially to gain entry.

# Reasons for trade

- The **five basic reasons why trade may take place** are summarized below. The purpose of each model is to establish a basis for trade and then to use that model to identify the expected effects of trade on prices, profits, incomes, and individual welfare.
- Advantageous trade can occur between countries if the countries **differ in their technological abilities** to produce goods and services. Technology refers to the techniques used to turn resources (labor, capital, land) into outputs (goods and services). The basis for trade in the *Ricardian model of comparative advantage* is difference in technology.

- Advantageous trade can occur between countries **if the countries differ in their endowments of resources**. Resource endowments refer to the skills and abilities of a country's workforce, the natural resources available within its borders (minerals, farmland, etc.), and the sophistication of its capital stock (machinery, infrastructure, communications systems). The basis for trade in both the **pure exchange model and the Heckscher-Ohlin model** is differences in resource endowments.
- Advantageous trade can occur between countries if **demands or preferences differ between countries**. Individuals in different countries may have different preferences or demands for various products. For example, the Chinese are likely to demand more rice than Americans, even if consumers face the same price.

- The existence of **economies of scale in production** is sufficient to generate advantageous trade between two countries. Economies of scale refer to a production process in which production costs fall as the scale of production rises. This feature of production is also known as “increasing returns to scale.”
- **Government tax and subsidy programs** alter the prices charged for goods and services. These changes can be sufficient to generate advantages in production of certain products. In these circumstances, advantageous trade may arise solely due to differences in government policies across countries.

# Absolute Advantage

- The concept of absolute advantage is generally attributed to the Scottish economist **Adam Smith** in his 1776 publication ***The Wealth of Nations***, in which he countered mercantilist ideas. “If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage”.
- Smith argued that it was impossible for all nations to become rich simultaneously by following mercantilism because the export of one nation is another nation’s import and instead stated that **all nations would gain simultaneously if they practiced free trade and specialized in accordance with their absolute advantage**. Smith also stated that the wealth of nations depends upon the goods and services available to their citizens, rather than their gold reserves.

# Ricardian Model

- 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 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*.
- In his example, Ricardo imagined two countries, England and Portugal, producing two goods, cloth and wine, using labor as the sole input in production. He assumed that the **productivity of labor (i.e., the quantity of output produced per worker) varied between industries and across countries**. However, instead of assuming, as Adam Smith did, that England is more productive in producing one good and Portugal is more productive in the other, Ricardo assumed that Portugal was more productive in both goods.

Hours of work necessary to produce one unit

Country	Produce	Cloth	Wine
England	100		120
Portugal	90		80

- Note that trade based on comparative advantage does not contradict Adam Smith's notion of advantageous trade based on absolute advantage. If, as in Smith's example, England were more productive in cloth production and Portugal were more productive in wine, then we would say that England has an absolute advantage in cloth production, while Portugal has an absolute advantage in wine.
- If we calculated comparative advantages, then England would also have the comparative advantage in cloth and Portugal would have the comparative advantage in wine. In this case, gains from trade could be realized if both countries specialized in their comparative and absolute advantage goods.

# One factor Ricardian Model- Assumptions

- Labor is the only resource important for production.
- Labor productivity varies across countries, usually due to differences in technology, but labor productivity in each country is constant across time.
- The supply of labor in each country is constant.
- Only two goods are important for production and consumption: wine and cheese.
- 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.
- Only two countries are modelled: domestic and foreign.

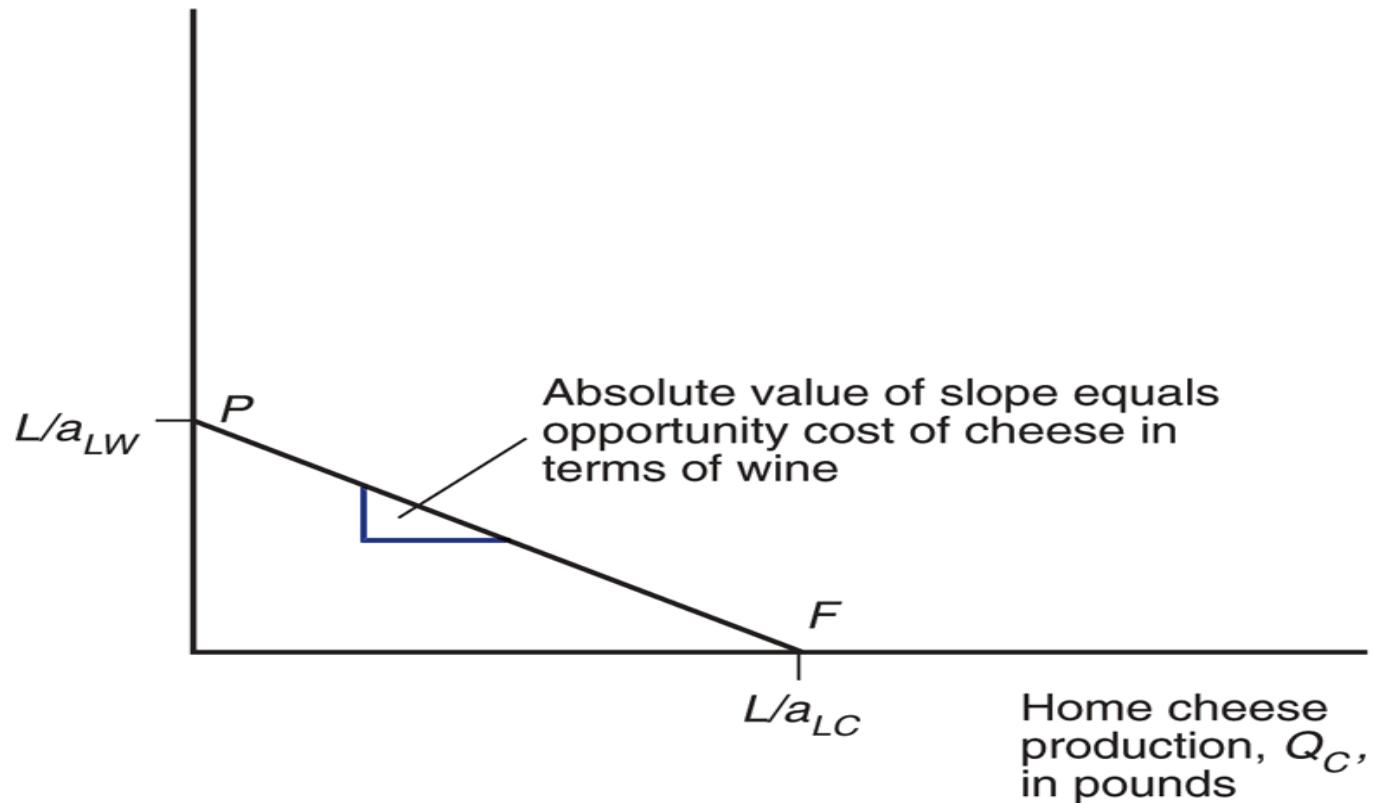
- Because labor productivity is constant, define a **unit labor requirement** as the constant number of hours of labor required to produce one unit of output.
- $a_{LW}$  is the unit labor requirement for wine in the domestic country. For example, if  $a_{LW} = 2$ , then it takes 2 hours of labor to produce one litre 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

$$a_{LC}Q_c + a_{LW}Q_w = L$$

Home wine  
production,  $Q_W$ ,  
in gallons



- 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

$$1 \text{ hour}/(a_{LW} \text{ hours/litre of wine}) = (1/a_{LW}) \text{ litre of wine}$$

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

$$1 \text{ hour}/(2 \text{ hours/litre of wine}) = 1/2 \text{ litre of wine}$$

- The trade-off is the increased amount of cheese relative to the decreased amount of wine:  $a_{LC}/a_{LW}$

# Production, Prices and Wages

- 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.
- 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.
- When  $P_C/P_W = a_{LC}/a_{LW}$ ,
  - 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.

- If 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:

$$a_{LC} < a^*_{LC} \text{ and } a_{LW} < a^*_{LW}$$

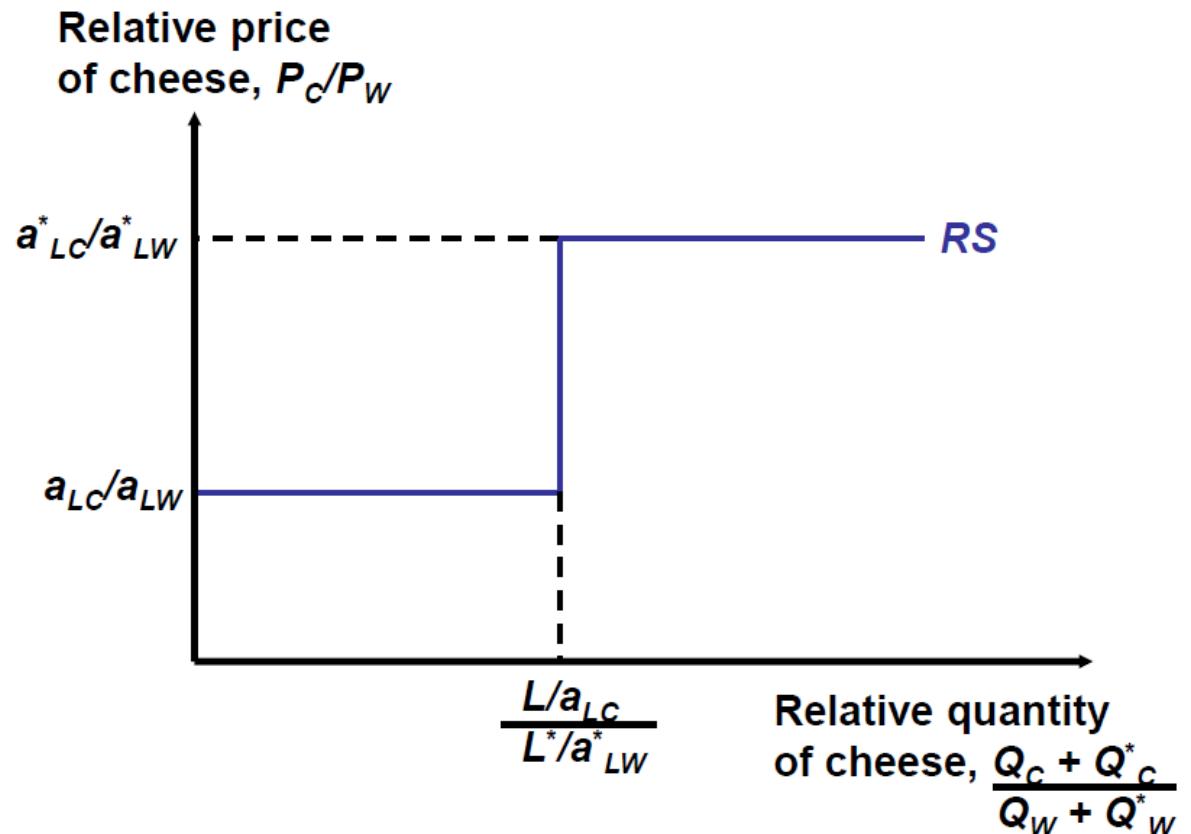
- **A country can be more efficient in producing both goods, but it will have a comparative advantage in only one good**—the good that uses resources most efficiently compared to alternative production.

- 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

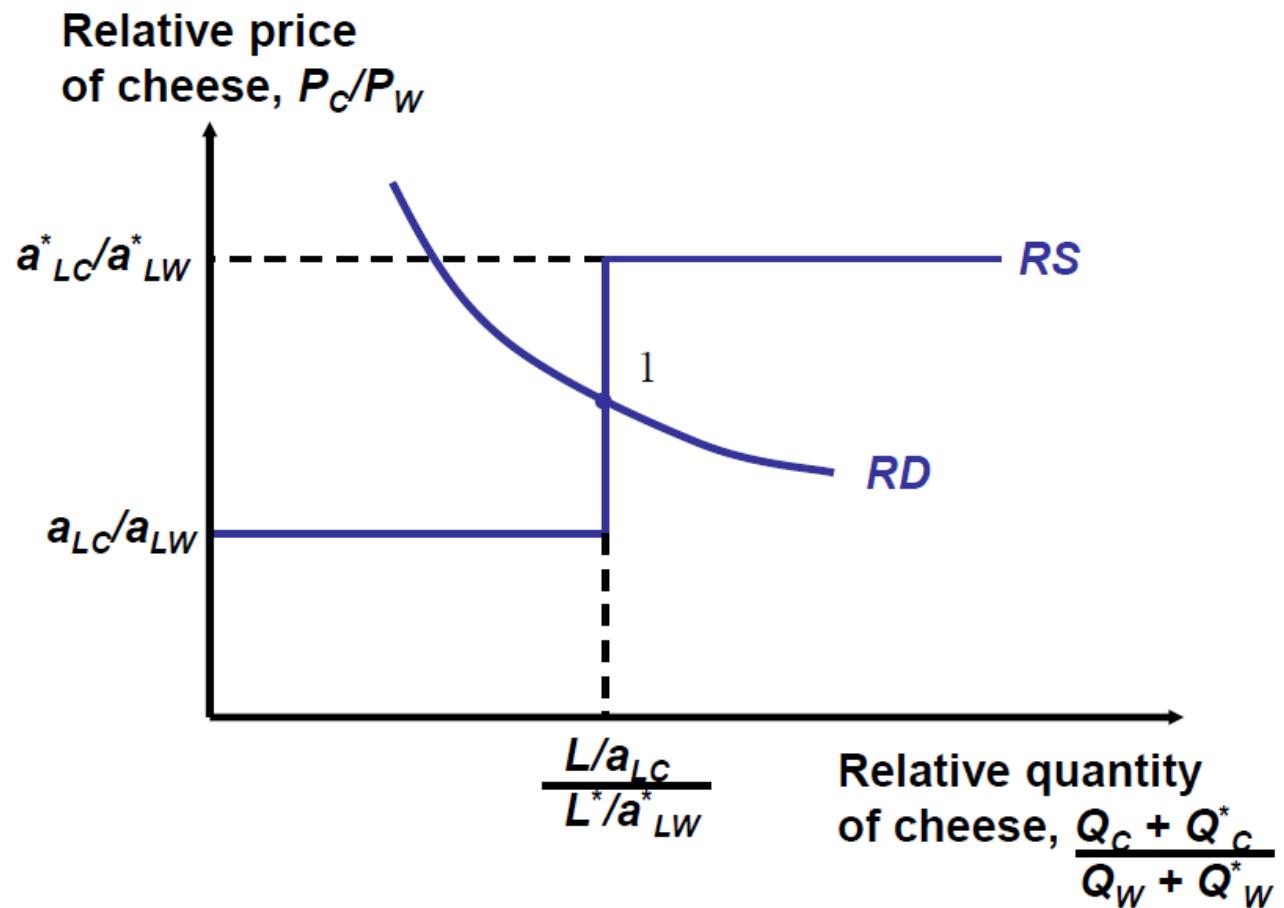
- Consider **relative supply** of cheese: the quantity of cheese supplied by all countries relative to the quantity of wine supplied by all countries at each relative price of cheese,  $P_C/P_W$
- There is no supply of cheese if the relative price of cheese falls below  $a_{LC}/a_{LW}$ .
  - Why? because 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.

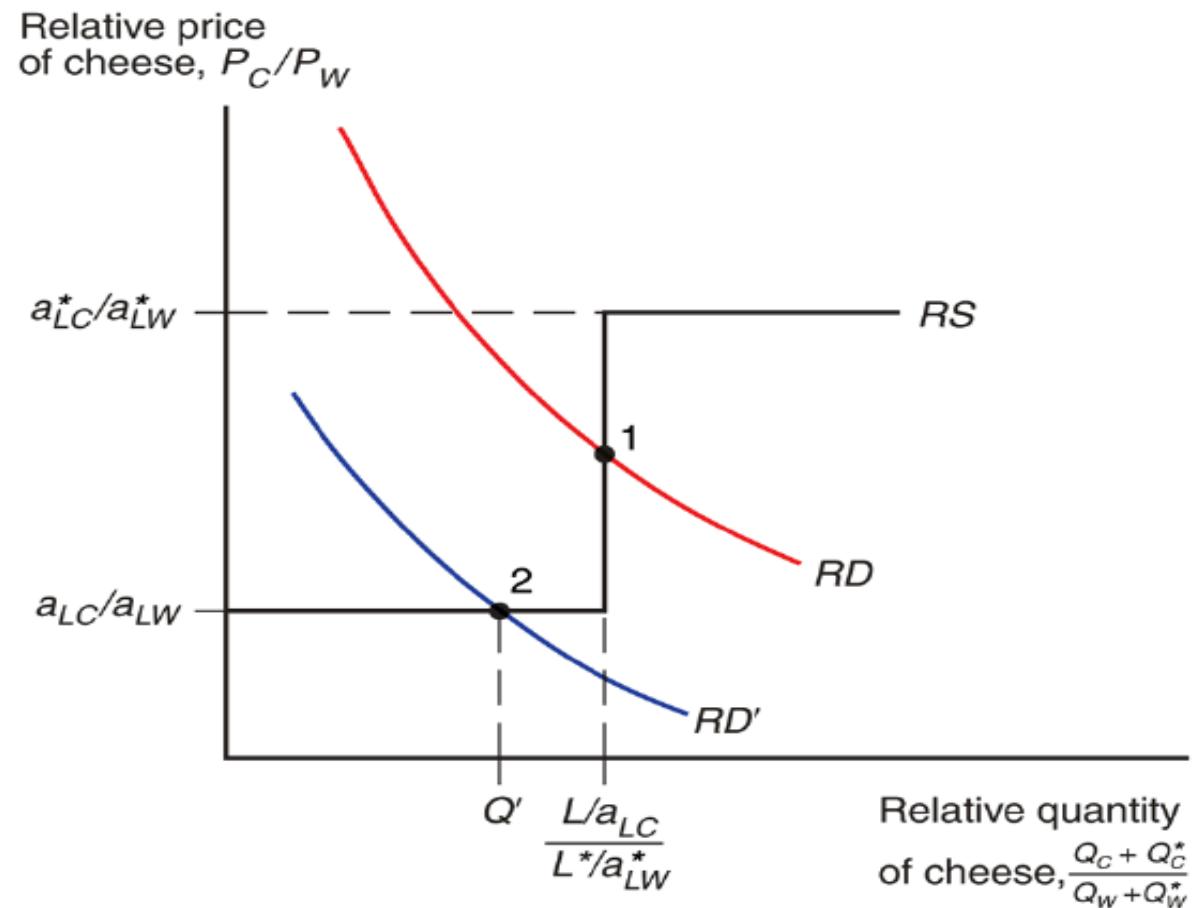


- When  $a^*_{LC} / a^*_{LW} > P_C / P_W > a_{LC} / a_{LW}$ , domestic workers specialize in cheese production because they can earn higher wages, but foreign workers will still produce only wine.
- When  $a^*_{LC} / a^*_{LW} = P_C / P_W$ , foreign workers will be indifferent between producing wine or 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

- 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.



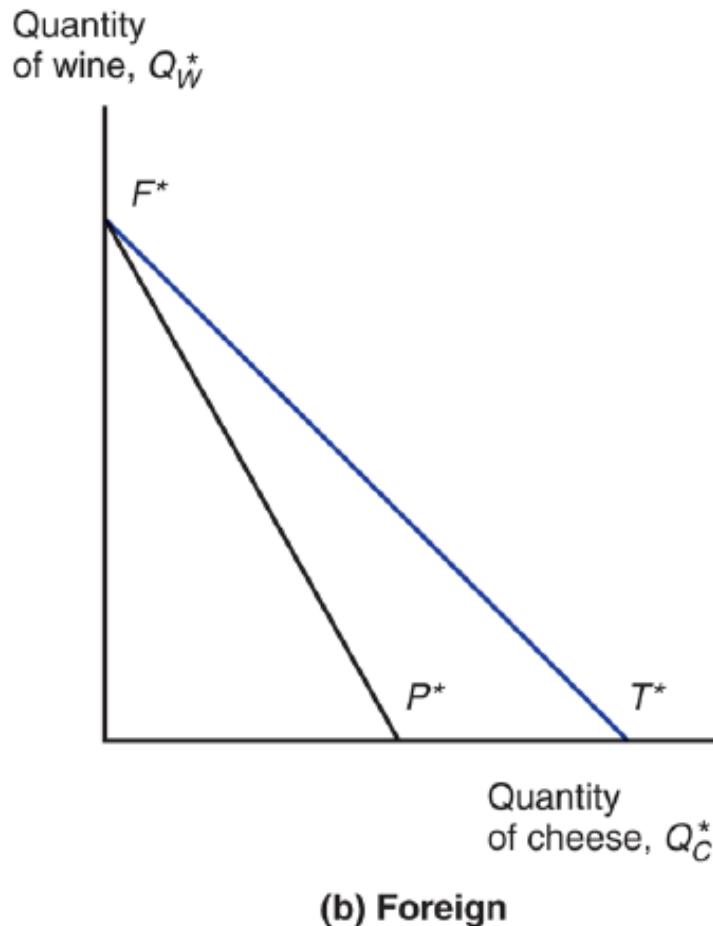
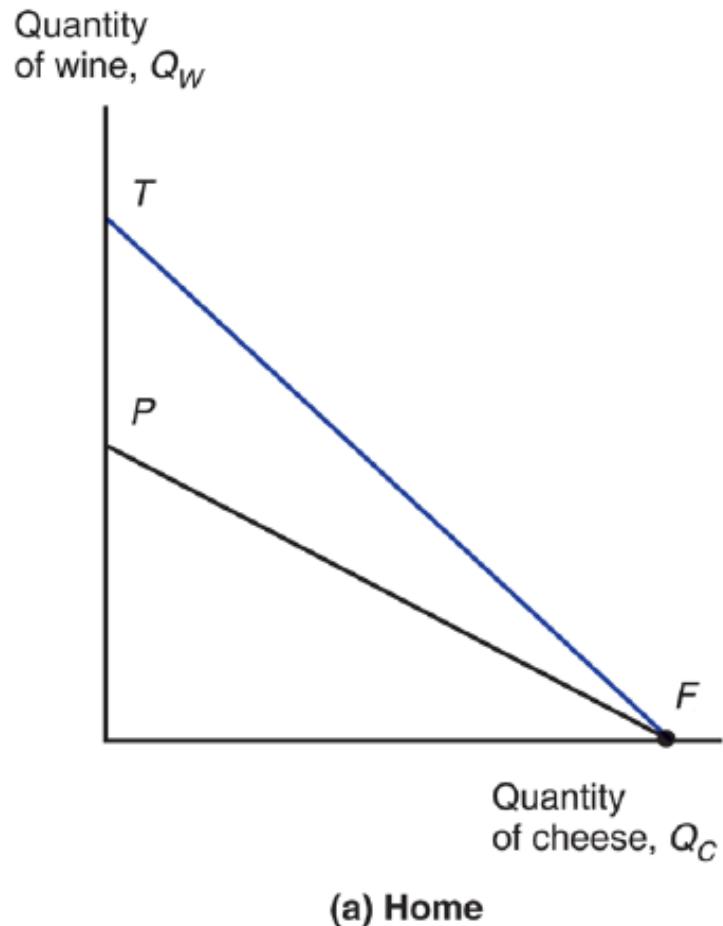


# Gains from Trade

- 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 the products for the goods that it wants to consume.
- 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.

# Trade expands consumption possibilities



# Numerical Example

Hours of work necessary to produce one unit			
Country	Produce	Cheese	Wine
Domestic		$a_{LC} = 1 \text{ hour/kg}$	$a_{LW} = 2 \text{ hours/L}$
Foreign		$a_{LC^*} = 6 \text{ hour/kg}$	$a_{LW^*} = 3 \text{ hours/L}$

- 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.
- 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 litre of wine.

- If the domestic country does not trade, it can use one hour of labor to produce  $1/a_{LW} = 1/2$  litre 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 litre of wine**.
- If the foreign country does not trade, it can use one hour of labor to produce  $1/a^*_{LC} = 1/6$  kg of cheese.
- If the foreign country does trade, it can use one hour of labor to produce  $1/a^*_{LW} = 1/3$  litre 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  $P_C = \text{Rs } 12/\text{kg}$  and  $P_W = \text{Rs } 12/\text{L}$
- Since domestic workers specialize in cheese production after trade, their hourly wages will be

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

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

$$(1/a^*_{LW})P_W = (1/3) \text{ Rs } 12 = \text{Rs } 4$$

- The relative wage of domestic workers is therefore  $\text{Rs } 12 / \text{Rs } 4 = 3$

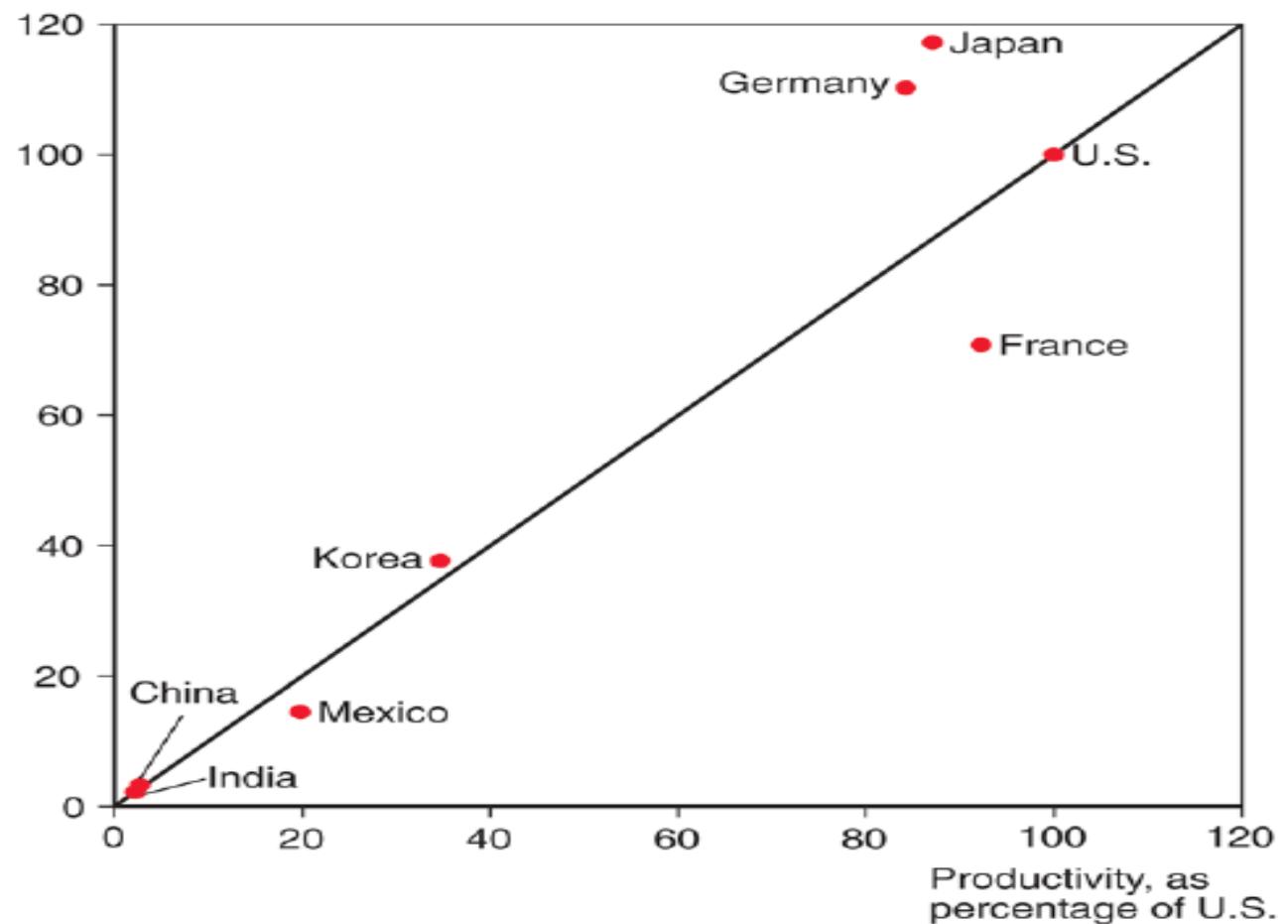
- The relative wage lies between the ratio of the productivities in each industry.
  - The domestic country is  $6/1 = 6$  times as productive in cheese production, but only  $3/2 = 1.5$  times as productive in wine production.
  - The domestic country has a wage rate 3 times as high as that in the foreign 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.

Hourly wage, as  
percentage of U.S.



# Misconceptions about Comparative Advantage

- ❑ 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.

- ❑ 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).

❑ Free trade exploits less productive countries.

- While labour 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  $a_{L_i}$ , and that of the foreign country is  $a^*_{L_i}$
- 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  $wa_{L_1} < w^*a^*_{L_1}$  then only the domestic country will produce good 1, since total wage payments are less there.

Or equivalently, if  $a^*_{L_1}/a_{L_1} > w/w^*$

- 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

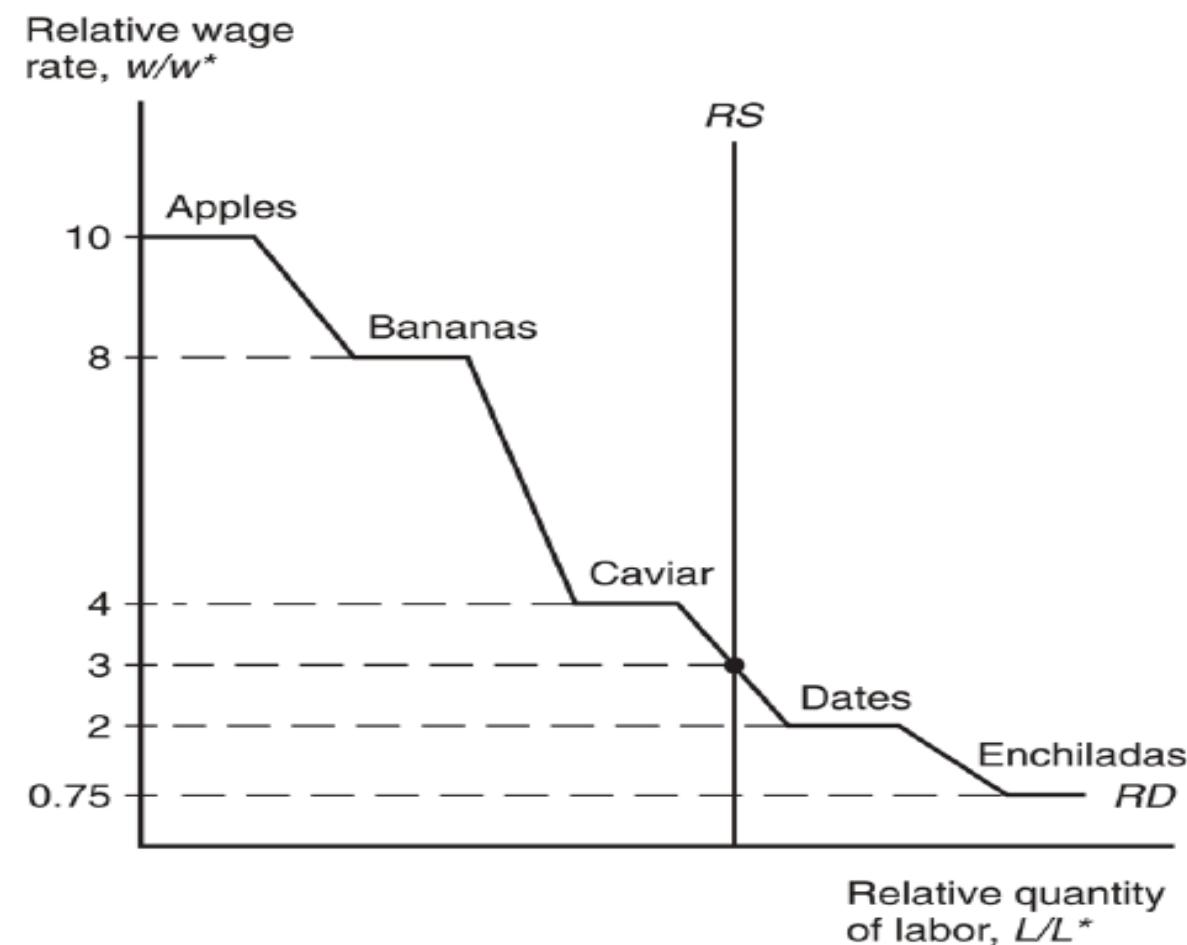
Good	Home Unit Labor Requirement ( $a_{Li}$ )	Foreign Unit Labor Requirement ( $a_{Li}^*$ )	Relative Home Productivity Advantage ( $a_{Lj}^*/a_{Li}$ )
Apples	1	10	10
Bananas	5	40	8
Caviar	3	12	4
Dates	6	12	2
Enchiladas	12	9	0.75

- 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.

# Determination of relative wages

- 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,
  - 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.
- 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.

<b>Good</b>	<b>Home Unit Labor Requirement (<math>a_{Li}</math>)</b>	<b>Foreign Unit Labor Requirement (<math>a_{Li}^*</math>)</b>	<b>Relative Home Productivity Advantage (<math>a_{L*}^*/a_{Li}</math>)</b>
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.

# 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:
  - ❑ More than one factor of production reduces the tendency of specialization
  - ❑ Protectionism
  - ❑ 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.

# Resources, Comparative Advantage and Income Distribution

# Introduction

- If labour were the only factor of production, as the Ricardian model assumes, comparative advantage could arise only because of international differences in labour productivity. In the real world, however, while trade is partly explained by differences in labour productivity, it also reflects differences in countries' *resources*.
- Thus a realistic view of trade must allow for the importance not just of labour, but also of other factors of production such as land, capital, and mineral resources.
- To explain the role of resource differences in trade, we examine a model in which resource differences are the *only* source of trade. This model shows that comparative advantage is influenced by the interaction between nations' resources (the relative **abundance of factors** of production) and the technology of production (which influences the relative **intensity** with which different **factors** of production are used in the production of different goods).

- That international trade is largely driven by differences in countries' resources is one of the most influential theories in international economics. Developed by two Swedish economists, Eli Heckscher and Bertil Ohlin (Ohlin received the Nobel Prize in economics in 1977), the theory is often referred to as the **Heckscher-Ohlin theory**.
- Because the theory emphasizes the interplay between the proportions in which different factors of production are available in different countries and the proportions in which they are used in producing different goods, it is also referred to as the **factor-proportions theory**.

# Model of a two factor economy

- The simplest version of the factor-proportions model, sometimes referred to as “2 by 2 by 2”: two countries, two goods, two factors of production. The two countries Home and Foreign, produce the same two goods, cloth (measured in metres) and food (measured in calories).
- Both cloth and food are produced using capital and labour. The amount of each good produced, given how much capital and labour are employed in each sector, is determined by a production function for each good. Overall, the economy has a fixed supply of capital  $K$  and labour  $L$  that is divided between employment in the two sectors

$$Q_C = Q_C(K_C, L_C)$$

$$Q_F = Q_F(K_F, L_F)$$

- The following expressions that are related to the two production technologies

$a_{KC}$  = capital (machine hours) used to produce one metre of cloth

$a_{LC}$  = hours of labour used to produce one metre of cloth

$a_{KF}$  = capital (machine hours) used to produce one calorie of food

$a_{LF}$  = hours of labour used to produce one calorie of food

- These unit input requirements are very similar to the ones defined in the Ricardian model (for labour only). However, there is one crucial difference: In these definitions, we speak of the quantity of capital or labor *used* to produce a given amount of cloth or food, rather than the quantity *required* to produce that amount.

- Production possibilities are influenced by *both* land and capital (requirements):

$$a_{KF}Q_F + a_{KC}Q_C \leq K$$

$$a_{LF}Q_F + a_{LC}Q_C \leq L$$

- Let's assume that *each unit* of food production uses capital intensively and *each unit* of cloth production uses labour intensively

$$a_{KF}/a_{LF} > a_{KC}/a_{LC} \text{ or } a_{KC}/a_{KF} < a_{LC}/a_{LF}$$

- Or, we consider the *total* resources used in each industry and say that cloth production is **labour intensive** and food production is **capital intensive** if

$$K_F/L_F > K_C/L_C$$

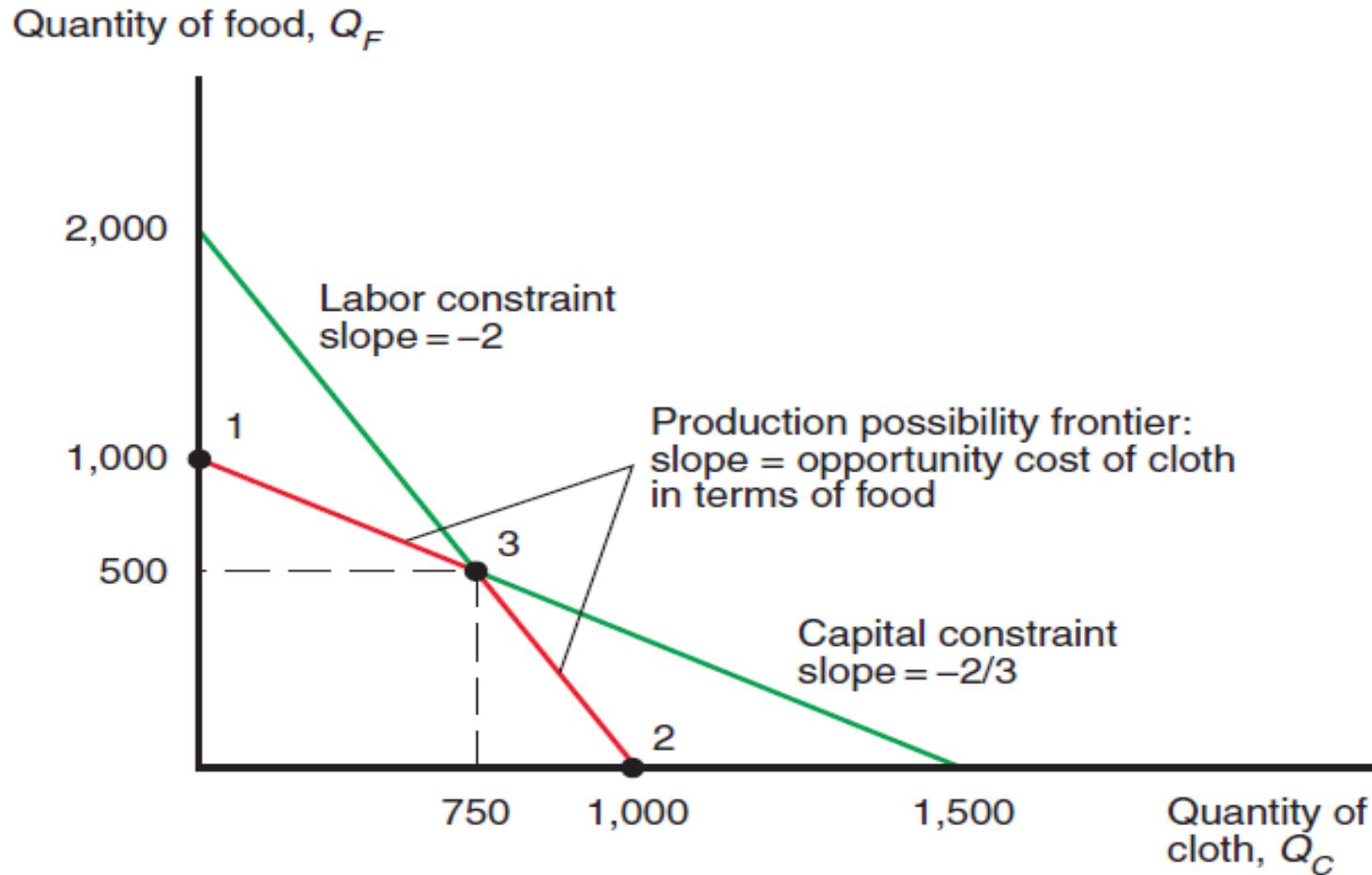
- This assumption influences the slope of the production possibility frontier.

- Consider the following numerical example: Production of one metre of cloth requires a combination of two work-hours and two machine-hours. The production of food is more automated; as a result, production of one calorie of food requires only one work-hour along with three machine-hours. Thus all input requirements are fixed and factor substitution is not possible   $a_{KC} = 2$ ;  $a_{LC} = 2$ ;  $a_{KF} = 3$ ;  $a_{LF} = 1$ ;
- The respective resource constraints are given by:

$$2Q_C + 3Q_F \leq 3,000 \text{ (total K)}$$

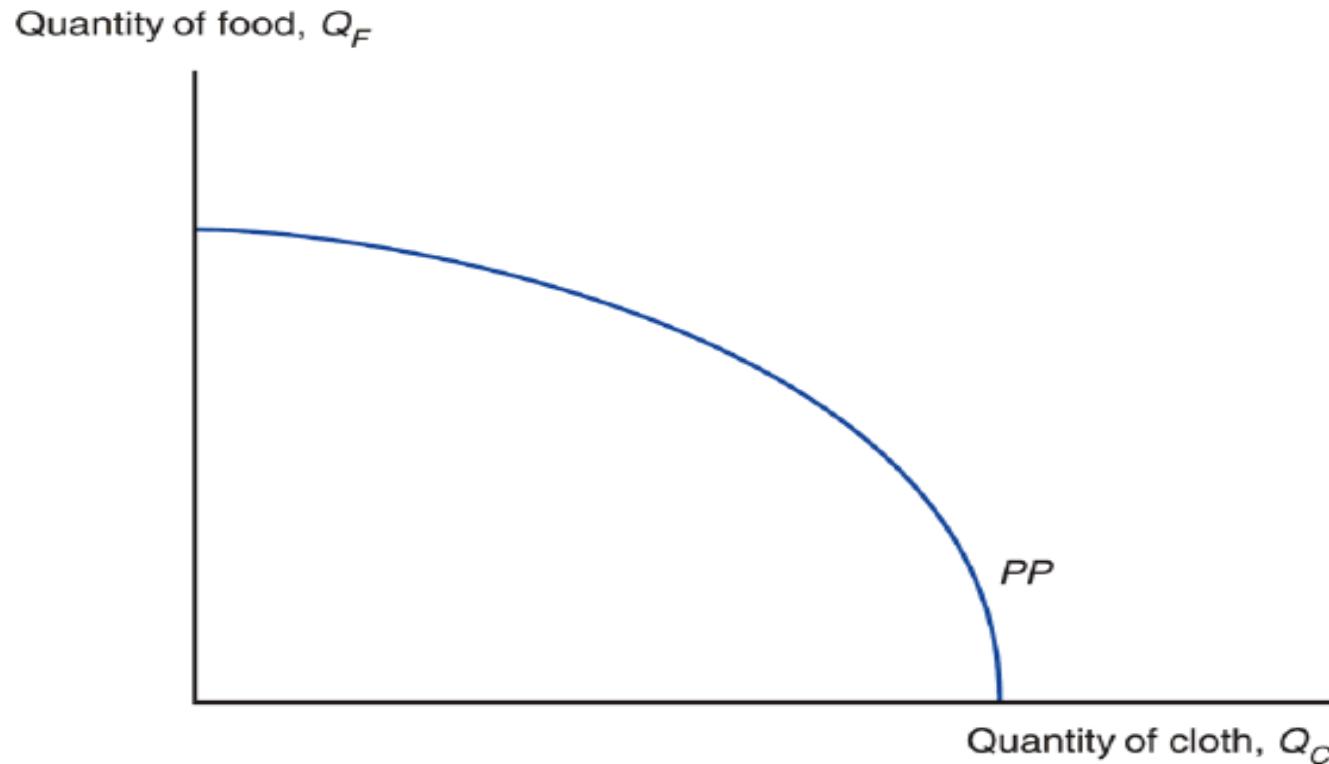
$$2Q_C + Q_F \leq 2,000 \text{ (total L)}$$

# PPF without factor substitution



- Each resource constraint is drawn in the same way that we drew the production possibility line for the Ricardian case. In this case, however, the economy must produce subject to *both* constraints. So **the production possibility frontier is the kinked line shown in red**.
- The important feature of this production possibility frontier is that the **opportunity cost of producing an extra metre of cloth in terms of food is not constant**. When the economy is producing mostly food (to the left of point 3), then there is spare labour capacity. Producing two fewer units of food releases six machine-hours that can be used to produce three metres of cloth: The opportunity cost of cloth is  $2/3$ .
- When the economy is producing mostly cloth (to the right of point 3), then there is spare capital capacity. Producing two fewer units of food releases two work-hours that can be used to produce one metre of cloth: The opportunity cost of cloth is  $2$ . Thus, the opportunity cost of cloth is higher when more units of cloth are being produced.

- Now let's make the model more realistic and allow the possibility of substituting capital for labour and vice versa in production. This substitution removes the kink in the production possibility frontier; instead, the frontier  $PP$  has the bowed shape.



# 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,  $V$ :

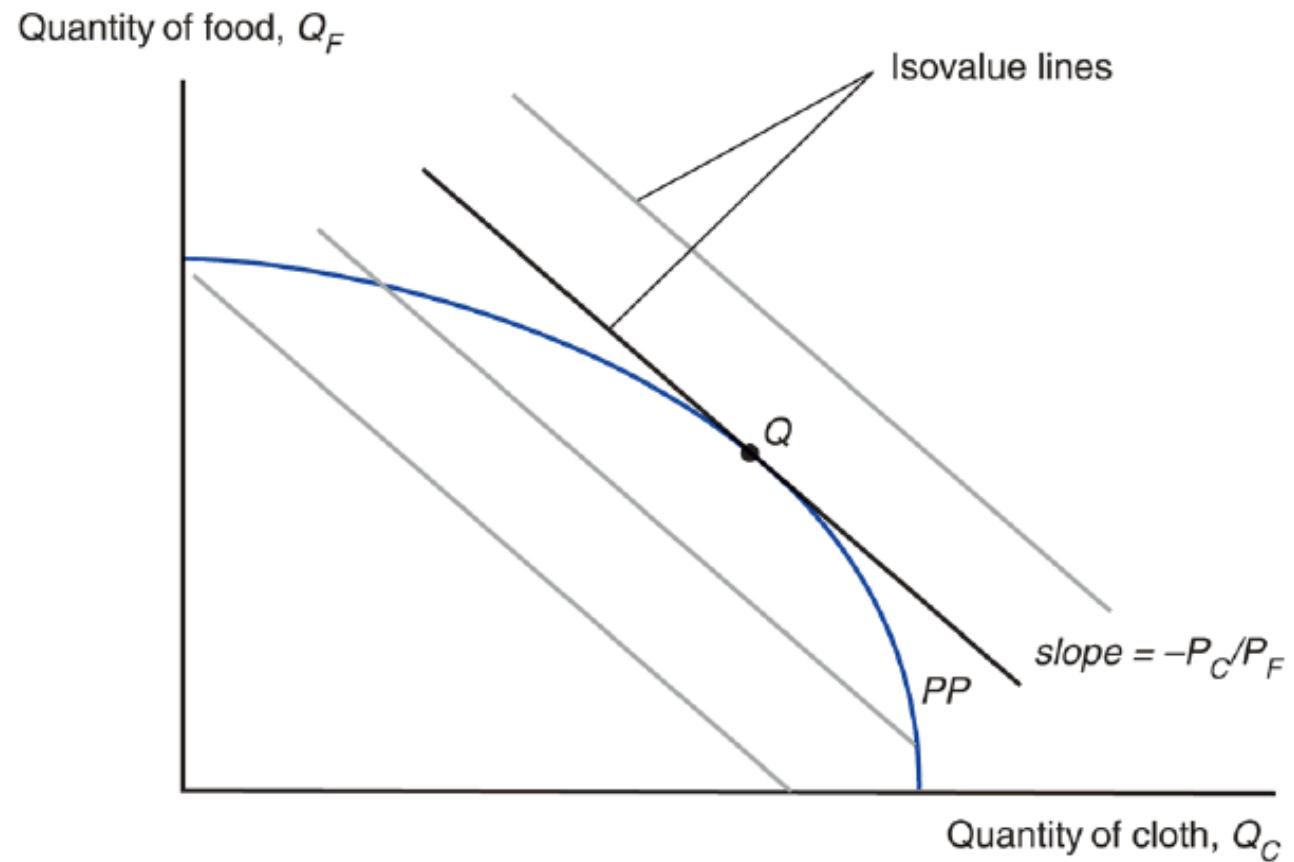
$$V = P_C Q_C + P_F Q_F$$

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.  $\bar{V} = P_C Q_C + P_F Q_F$

$$P_F Q_F = \bar{V} - P_C Q_C$$

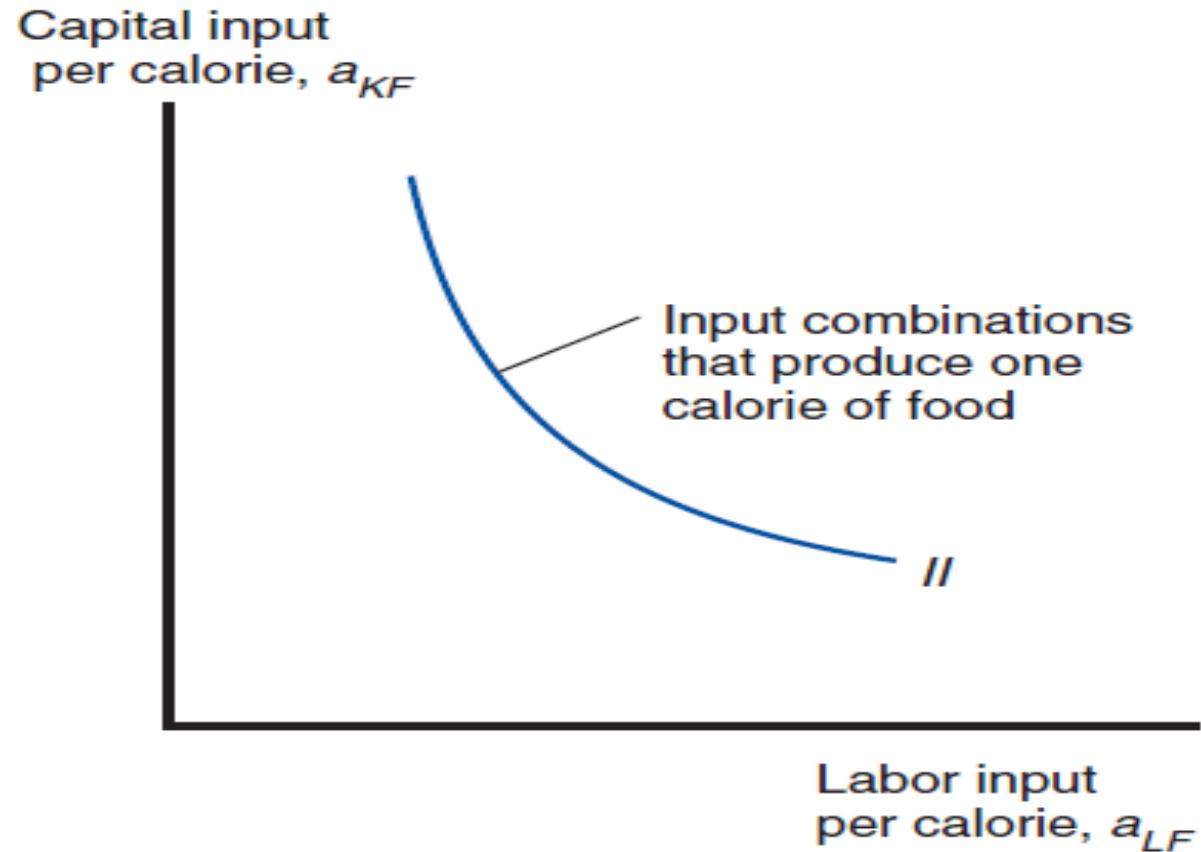
- After rearranging we get that the slope of an isovalue line is  $-P_C/P_F$
- Given prices of output, one isovalue line represents the maximum value of production, say at a point  $Q$ .
- At that point, the slope of the PPF equals  $-(P_C/P_F)$ , so *the opportunity cost of cloth equals the relative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



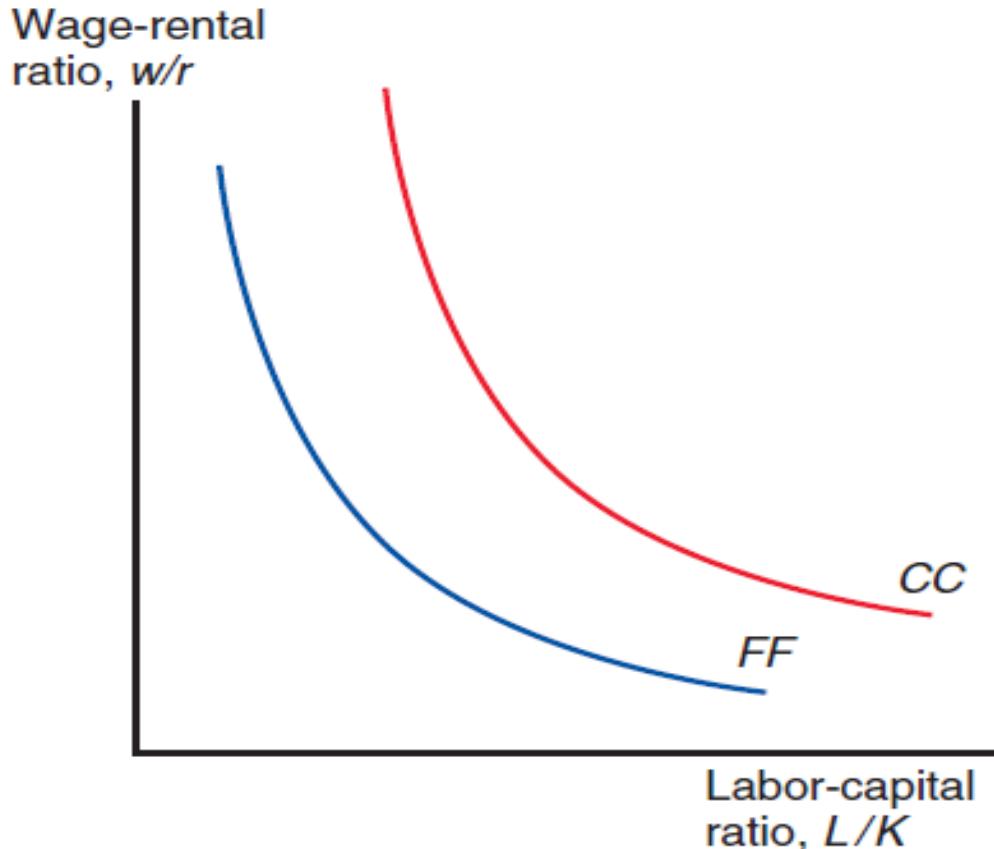
# Choosing the mix of inputs

- In a two-factor model producers may have room for choice in the use of inputs. A farmer, for example, can choose between using relatively more mechanized equipment (capital) and fewer workers, or vice versa.
- What input choice will producers actually make? It depends on the relative costs of capital and labour. If capital rental rates are high and wages low, farmers will choose to produce using relatively little capital and a lot of labour; on the other hand, if the rental rates are low and wages high, they will save on labour and use a lot more capital.

# Isoquants



# Factor prices and input choices



In each sector, the ratio of labour to capital used in production depends on the cost of labour relative to the cost of capital,  $w/r$ . The curve **FF** shows the labour-capital ratio choices in food production, while the curve **CC** shows the corresponding choices in cloth production.

**At any given wage-rental ratio, cloth production uses a higher labour-capital ratio;** when this is the case, we say that cloth production is *labour-intensive* and that food production is *capital-intensive*.

- The  $CC$  and  $FF$  curves are called **relative factor demand curves**; they are very similar to the relative demand curve for goods. Their downward slope characterizes the substitution effect in the producers' factor demand. As the wage  $w$  rises relative to the rental rate  $r$ , producers substitute capital for labour in their production decisions.
- The previous case we considered with no factor substitution is a limiting case, where the relative demand curve is a vertical line: The ratio of labour to capital demanded is fixed and does not vary with changes in the wage-rental ratio  $w/r$ .

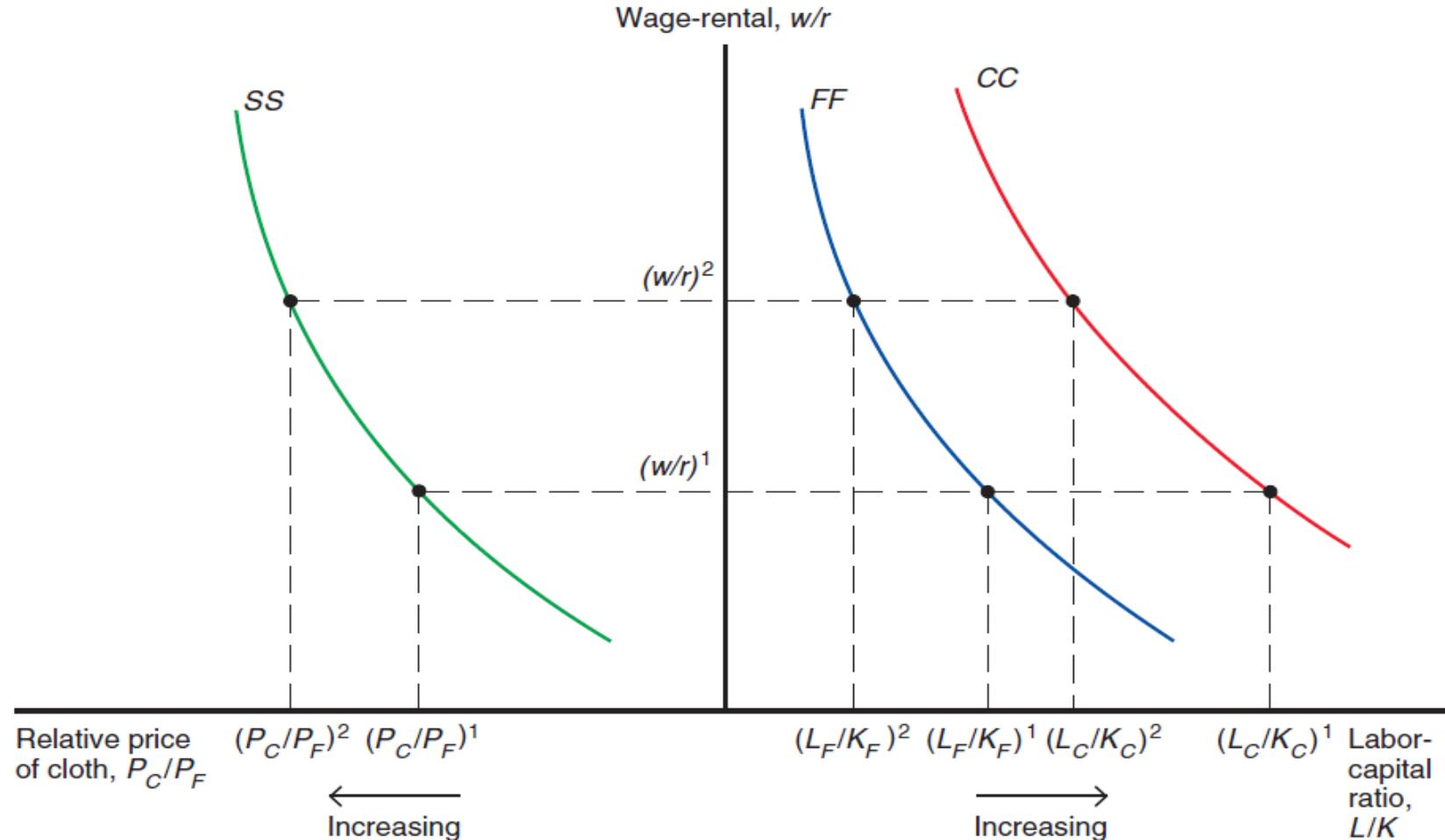
# Factor prices and Goods Prices

- The cost of producing a good depends on factor prices: If wages rise, then other things equal, the price of any good whose production uses labour will also rise.
- The importance of a particular factor's price to the cost of producing a good depends, however, on how much of that factor the good's production involves. If food production makes use of very little labour, for example, then a rise in the wage will not have much effect on the price of food, whereas if cloth production uses a great deal of labour, a rise in the wage *will* have a large effect on the price.
- We can therefore conclude that there is a one-to-one relationship between the ratio of the wage rate to the rental rate,  $w/r$ , and the ratio of the price of cloth to that of food,  $P_C/P_F$



**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.

# From goods prices to input choices



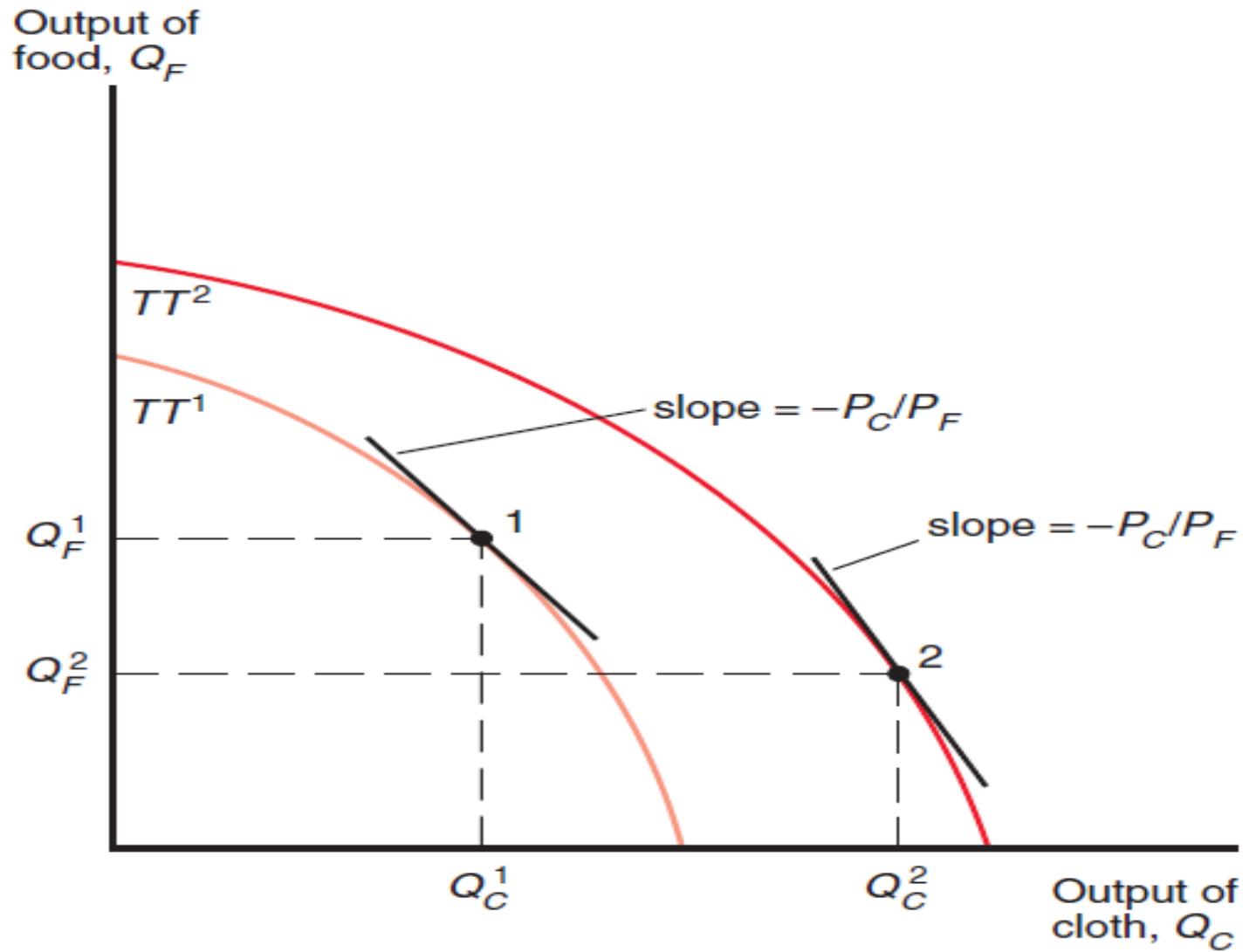
- The left panel in the previous figure shows the *SS* curve turned counterclockwise 90 degrees, while the right panel shows factor prices and input choices. By putting these two diagrams together, we see what may seem at first to be a surprising **linkage of the prices of goods to the ratio of labour to capital used** in the production of each good.
- If the relative price of cloth were to rise to the level indicated by  $(P_C/P_F)^2$  the ratio of the wage rate to the capital rental rate would rise to  $(w/r)^2$ . Because labour is now relatively more expensive, the ratios of labour to capital employed in the production of cloth and food would therefore drop to  $(L_C/K_C)^2$  and  $(L_F/K_F)^2$

- An increase in the price of cloth relative to that of food will raise the income of workers relative to that of capital owners. But it is possible to make a stronger statement: Such a change in relative prices will unambiguously raise the purchasing power of workers and lower the purchasing power of capital owners by raising real wages and lowering real rents in terms of *both* goods.

# Resources and Output

- We investigate how changes in resources (the total supply of a factor) affect the allocation of factors across sectors and the associated changes in output produced.
- A given relative price of cloth, say  $(P_C/P_F)^1$ , is associated with a fixed wage-rental ratio  $(w/r)^1$  (so long as both cloth and food are produced). That ratio, in turn, determines the ratios of labour to capital employed, in both the cloth and the food sectors:  $(L_C/K_C)^1$  and  $(L_F/K_F)^1$ , respectively.
- Now we assume that the economy's labour force grows, which implies that the economy's aggregate labour to capital ratio,  $L/K$ , increases. How can the economy accommodate the increase in the aggregate relative supply of labour if the relative labour demanded in each sector remains constant?

- The labour-capital ratio in the cloth sector is higher than that in the food sector, so **the economy can increase the employment of labour to capital (holding the labour-capital ratio fixed in each sector) by allocating more labour and capital to the production of cloth** (which is labour-intensive). As labour and capital move from the food sector to the cloth sector, the economy produces more cloth and less food.
- The economy can produce more of both cloth and food than before. The outward shift of the frontier is, however, much larger in the direction of cloth than of food—that is, there is a **biased expansion of production possibilities**, which occurs when the production possibility frontier shifts out much more in one direction than in the other.



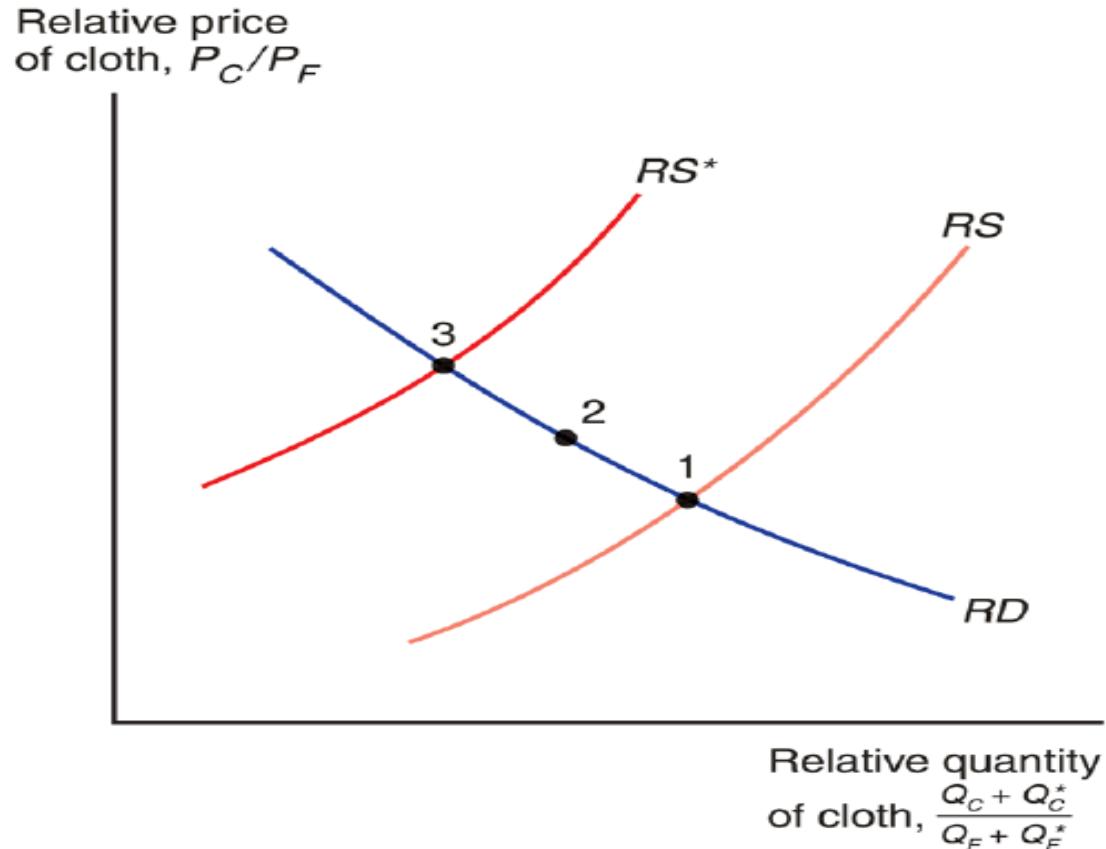
- The biased effect of increases in resources on production possibilities is the key to understanding how differences in resources give rise to international trade. An increase in the supply of labour expands production possibilities disproportionately in the direction of cloth production, while an increase in the supply of capital expands them disproportionately in the direction of food production.
- An economy with a high relative supply of labour to capital will be relatively better at producing cloth than an economy with a low relative supply of labour to capital. *Generally, an economy will tend to be relatively effective at producing goods that are intensive in the factors with which the country is relatively well endowed.*

# Relative Prices and Pattern of trade

- Since Home has a higher ratio of labour to capital than Foreign, Home is *labour-abundant* and Foreign is *capital-abundant*. Note that abundance is defined in terms of a ratio and not in absolute quantities.
- Since cloth is the labour-intensive good, Home's production possibility frontier relative to Foreign's is shifted out more in the direction of cloth than in the direction of food. Thus, other things equal, Home tends to produce a higher ratio of cloth to food.
- Because trade leads to a convergence of relative prices, one of the other things that will be equal is the price of cloth relative to that of food. Because the countries differ in their factor abundances, however, for any given ratio of the price of cloth to that of food, Home will produce a higher ratio of cloth to food than Foreign will: Home will have a larger *relative supply* of cloth.

- The relative supply schedules of Home ( $RS$ ) and Foreign ( $RS^*$ ). The relative demand curve, which we have assumed to be the same for both countries, is shown as  $RD$ . If there were no international trade, the equilibrium for Home would be at point 1, while the equilibrium for Foreign would be at point 3. That is, in the absence of trade, the relative price of cloth would be lower in Home than in Foreign.
- When Home and Foreign trade with each other, their relative prices converge. The relative price of cloth rises in Home and declines in Foreign, and a new world relative price of cloth is established at a point somewhere between the pre-trade relative prices, say at point 2.

# Trade leads to convergence of prices



- Home becomes an exporter of cloth because it is labour-abundant (relative to Foreign) and because the production of cloth is skill-intensive (relative to food production). Similarly, Foreign becomes an exporter of food because it is capital-abundant and because the production of food is capital-intensive.
- These predictions for the pattern of trade (in the two-good, two-factor, two-countries version that we have studied) can be generalized as the following theorem, named after the original developers of this model of trade:
- **Hecksher-Ohlin Theorem:** *The country that is abundant in a factor exports the good whose production is intensive in that factor.*

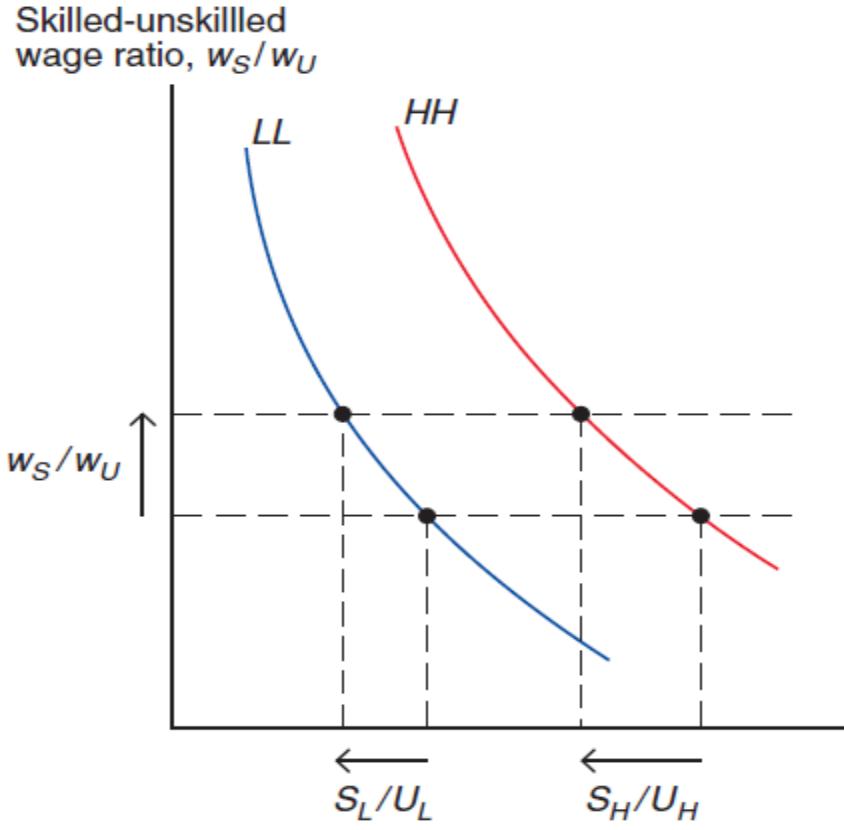
- In the more realistic case with multiple countries, factors of production, and numbers of goods, we can generalize this result as a correlation between a country's abundance in a factor and its exports of goods that use that factor intensively: *Countries tend to export goods whose production is intensive in factors with which the countries are abundantly endowed.*

# Trade and distribution of income

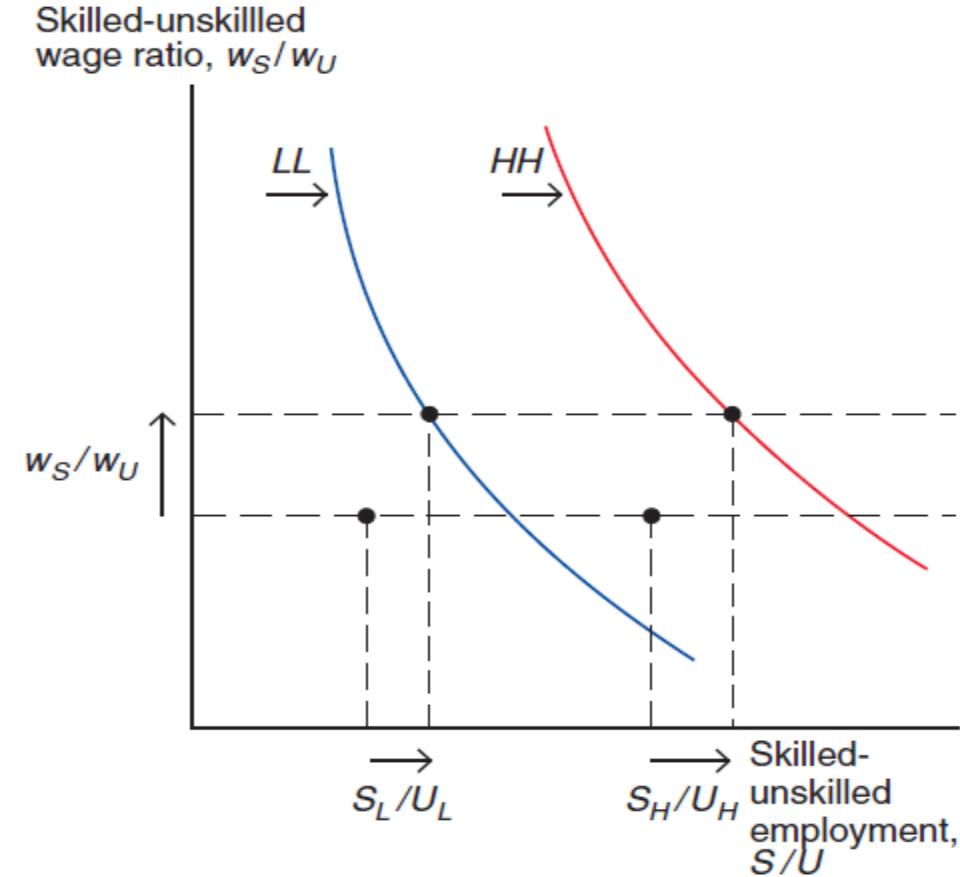
- Changes in relative prices, in turn, have strong effects on the relative earnings of labour and capital. A rise in the price of cloth raises the purchasing power of labour in terms of both goods while lowering the purchasing power of capital in terms of both goods. A rise in the price of food has the reverse effect.
- Thus international trade can have a powerful effect on the distribution of income, even in the long run. In Home, where the relative price of cloth rises, people who get their incomes from labour gain from trade, but those who derive their incomes from capital are made worse off. In Foreign, where the relative price of cloth falls, the opposite happens: Labourers are made worse off and capital owners are made better off.

- The resource of which a country has a relatively large supply (labour in Home, capital in Foreign) is the **abundant factor** in that country, and the resource of which it has a relatively small supply (capital in Home, labour in Foreign) is the **scarce factor**.
- The general conclusion about the income distribution effects of international trade in the long run is: *Owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose.*
- Thus income distribution effects that arise because labour and other factors of production are immobile represent a temporary, transitional problem (which is not to say that such effects are not painful to those who lose). In contrast, effects of trade on the distribution of income among land, labour, and capital are more or less permanent.

# Increased Wage Inequality: Trade or Skill-Biased Technological Change?



(a) Effects of trade



(b) Effects of skill-biased technological change

- The  $LL$  and  $HH$  curves show the skilled-unskilled employment ratio,  $S_L/U_L$ , as a function of the skilled-unskilled wage ratio,  $w_s/w_u$ , in the low-tech and high-tech sectors. The high-tech sector is more skill-intensive than the low tech sector, so the  $HH$  curve is shifted out relative to the  $LL$  curve. Panel (a) shows the case where increased trade with developing countries leads to a higher skilled-unskilled wage ratio. Producers in both sectors respond by *decreasing* their relative employment of skilled workers: and both decrease.
- Panel (b) shows the case where skill-biased technological change leads to a higher skilled-unskilled wage ratio. The  $LL$  and  $HH$  curves shift out (increased relative demand for skilled workers in both sectors). However, in this case producers in both sectors respond by *increasing* their relative employment of skilled workers:  $S_L/U_L$  and  $S_H/U_H$  both increase.

- We can examine the relative merits of the trade versus **skill-biased technological change** explanations for the increase in wage inequality by looking at the changes in the skilled-unskilled employment ratio within sectors in the United States. A widespread increase in these employment ratios for all different kinds of sectors (both skilled-labour-intensive and unskilled-labour-intensive sectors) in the U.S. economy points to the skill-biased technological explanation.

# Factor price Equalization

- When Home and Foreign trade, the relative prices of goods converge. This convergence, in turn, causes convergence of the relative prices of capital and labor. Thus there is clearly a tendency toward **equalization of factor prices**.
- Although Home has a higher ratio of labour to capital than Foreign does, once they trade with each other, the wage rate and the capital rent rate are the same in both countries. Given the prices of cloth and food, we can determine the wage rate and the rental rate without reference to the supplies of capital and labor.
- If Home and Foreign face the same relative prices of cloth and food, they will also have the same factor prices.

- To understand how this equalization occurs, we have to realize that when Home and Foreign trade with each other, more is happening than a simple exchange of goods. **In an indirect way, the two countries are in effect trading factors of production.**
- Home lets Foreign have the use of some of its abundant labour, not by selling the labor directly but by trading goods produced with a high ratio of labour to capital for goods produced with a low labour-capital ratio. The goods that Home sells require more labour to produce than the goods it receives in return; that is, more labour is *embodied* in Home's exports than in its imports.
- Thus **Home exports its labour, embodied in its labour-intensive exports.** Conversely, since Foreign's exports embody more capital than its imports, Foreign is indirectly exporting its capital.

- In the real world, factor prices are *not* equalized. For example, there is an extremely wide range of wage rates across countries. While some of these differences may reflect differences in the quality of labor, they are too wide to be explained away on this basis alone.
- To understand why the model doesn't give us an accurate prediction, we need to look at its assumptions. Three assumptions crucial to the prediction of factor-price equalization are in reality certainly untrue. These are the assumptions that (1) both countries produce both goods; (2) technologies are the same; and (3) trade actually equalizes the prices of goods in the two countries.

# Empirical evidence

- One would expect the United States to be an exporter of capital-intensive goods and an importer of labor-intensive goods. Surprisingly, however, this was not the case in the 25 years after World War II. In a famous study published in 1953, economist Wassily Leontief (winner of the Nobel Prize in 1973) found that U.S. exports were less capital-intensive than U.S. imports. This result is known as the **Leontief paradox**.
- United States may be exporting goods that heavily use skilled labour and innovative entrepreneurship, while importing heavy manufactures (such as automobiles) that use large amounts of capital.

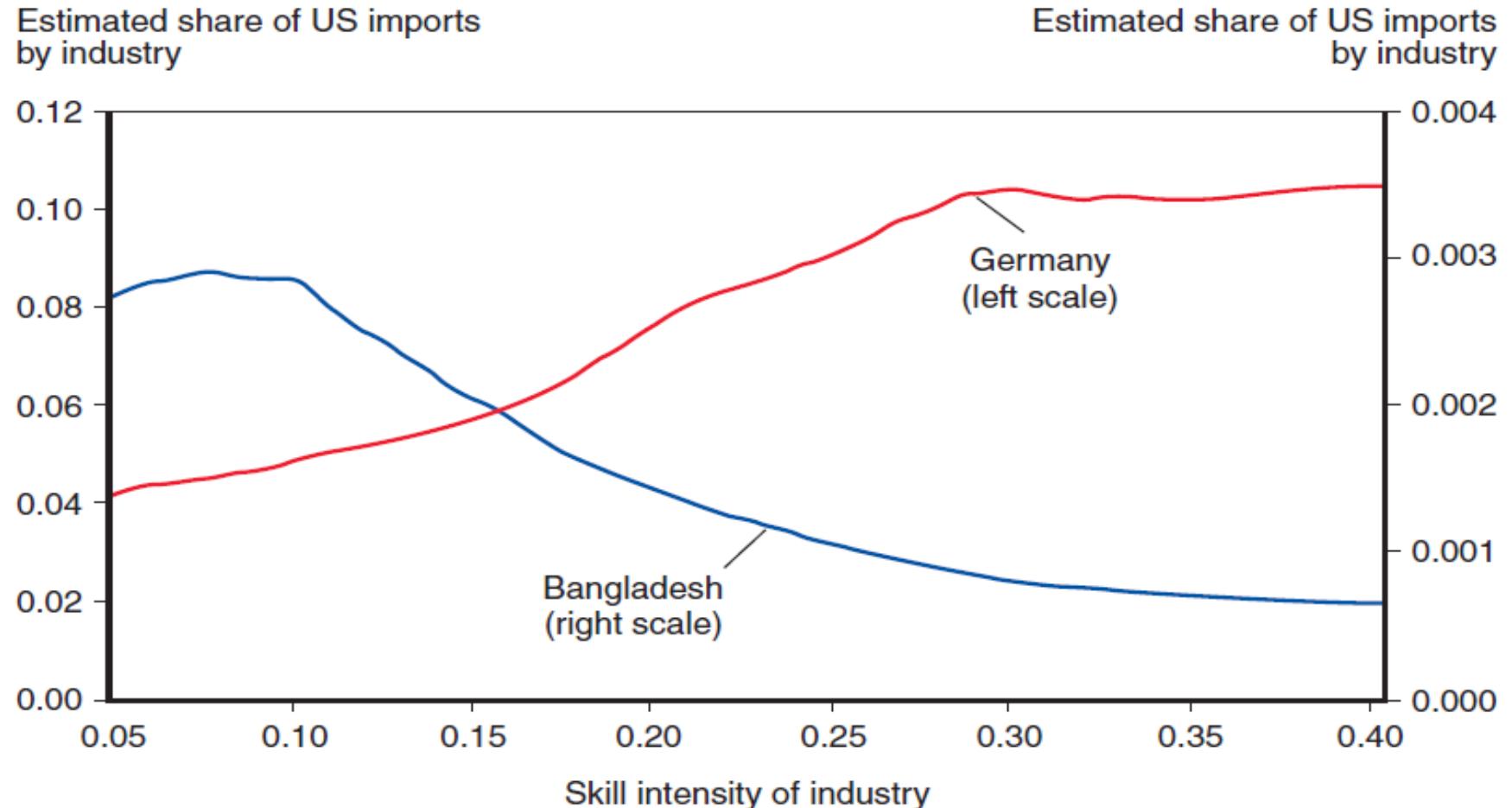
- Bowen et al. calculated the ratio of each country's endowment of each factor to the world supply of that factor. They then compared these ratios with each country's share of world income. If the factor-proportions theory was right, a country would always export factors for which the factor share exceeded the income share, and import factors for which it was less.
- This result confirms the Leontief paradox on a broader level: Trade often does not run in the direction that the Heckscher-Ohlin theory predicts. As with the Leontief paradox for the United States, explanations for this result have centered on the failure of the common technology assumption.

- Consider the United States, on one side, and China on the other. In 2008, the United States had about 23 percent of world income but only about 5 percent of the world's workers; so a simple factor-proportions theory would suggest that U.S. imports of labor embodied in trade should have been huge, something like four times as large as the nation's own labor force. In fact, calculations of the factor content of U.S. trade showed only small net imports of labor.
- Conversely, China had 7 percent of world income but approximately 20 percent of the world's workers in 2008; it therefore “should” have exported most of its labour via trade—but it did not.
- Allowing for technology differences also helps to resolve this puzzle of **“missing trade.”** The way this resolution works is roughly as follows: If workers in the United States are much more efficient than those in China, then the “effective” labour supply in the United States is much larger compared with that of China than the raw data suggest.

# Patterns of exports between developed and developing countries

- Although the overall pattern of international trade does not seem to be very well accounted for by a pure Heckscher-Ohlin model, comparisons of the exports of labour-abundant, skill scarce nations in the third world with the exports of skill-abundant, labour-scarce nations do fit the theory quite well.
- Consider the following figure, which compares the pattern of U.S. imports from Bangladesh, whose work force has low levels of education, with the pattern of U.S. imports from Germany, which has a highly educated labour force.

# Skill intensity and pattern of US imports



# Conclusion

- The empirical testing of the Heckscher-Ohlin model has produced mixed results. The factor content of a country's exports does not always reflect that country's abundant factors; and the volume of trade is substantially lower than what would be predicted based on the large differences in factor abundance between countries. However, the pattern of goods trade between developed and developing countries fits the predictions of the model quite well.
- The Heckscher-Ohlin also remains vital for understanding the *effects* of trade, especially its effects on the distribution of income. Indeed, the growth of North-South trade in manufactures—a trade in which the factor intensity of the North's imports is very different from that of its exports—has brought the factor-proportions approach into the center of practical debates over international trade policy.

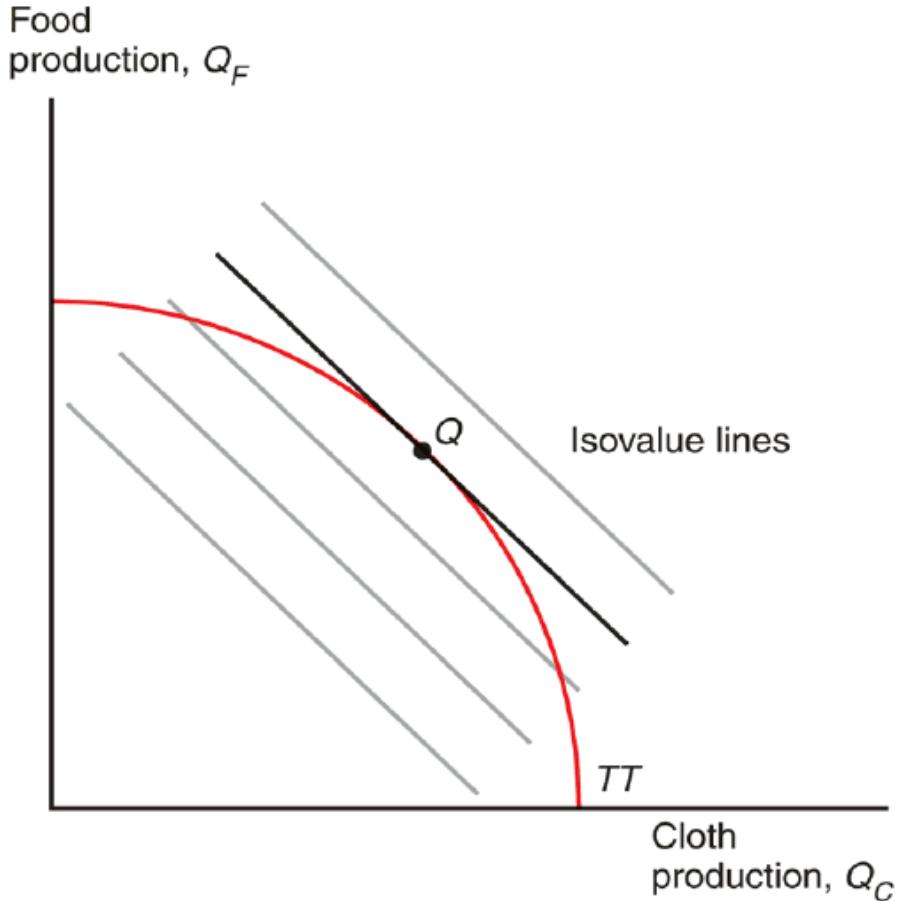
# The Standard Trade Model

# Introduction

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

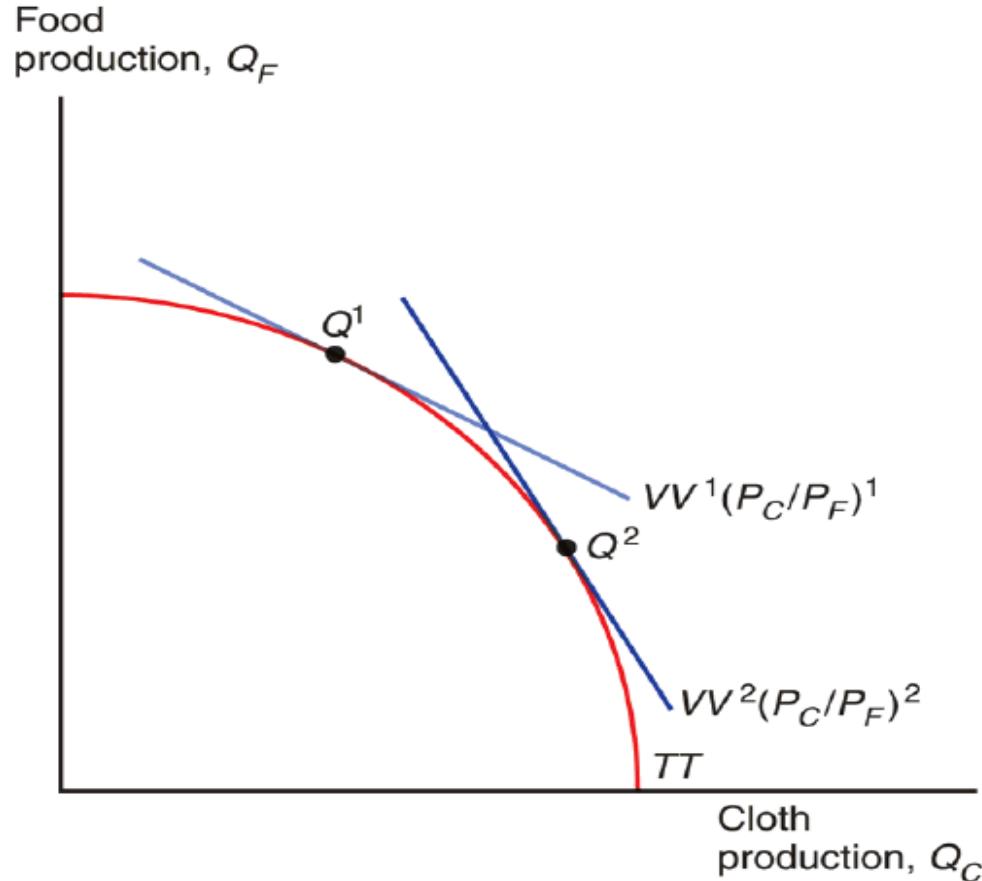
- Recall that when the economy maximizes its production possibilities, the value of output  $V$  lies on the PPF.
- $V = P_C Q_C + P_F Q_F$  describes the value of output in a two good model, and when this value is constant the equation's line is called an isovalue line.
- The slope of any equation's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

# Value of Production



An economy whose production possibility frontier is TT will produce at Q, which is on the highest possible iso-value line.

# How an increase in relative price of cloth affects relative supply?



The iso-value lines become steeper when the relative price of cloth rises from  $(P_C/P_F)^1$  to  $(P_C/P_F)^2$ . As a result, the economy produces more cloth and less food and the equilibrium output shifts from  $Q^1$  to  $Q^2$ .

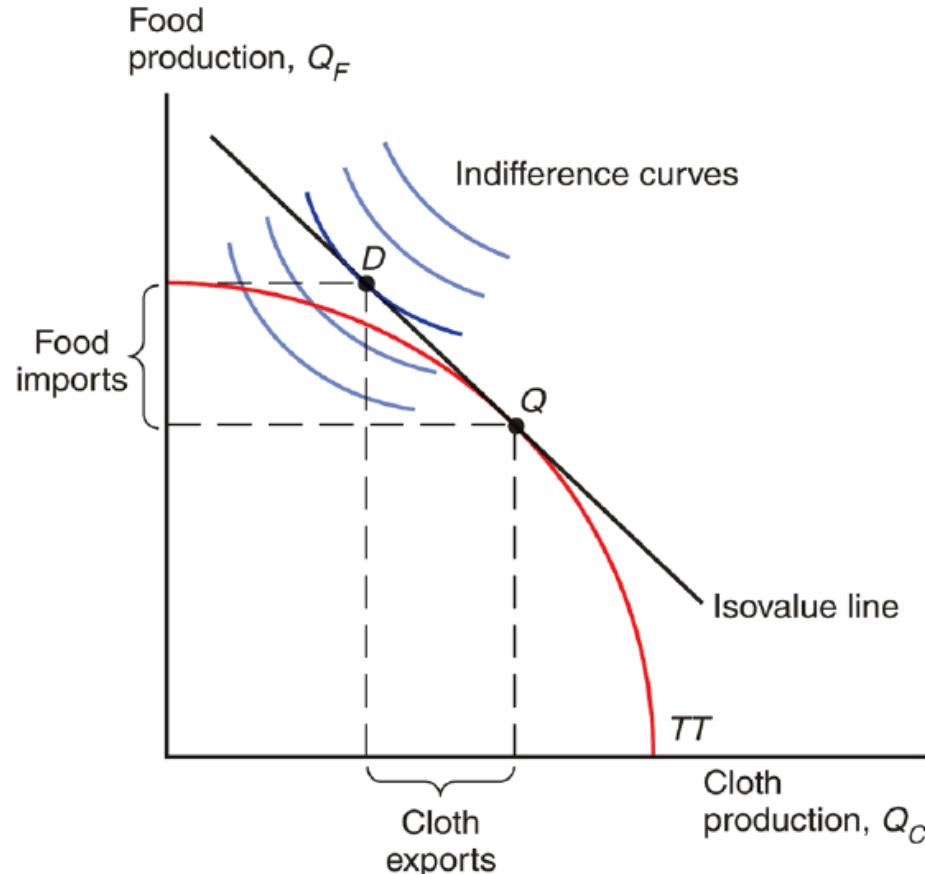
# The Value of Consumption

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

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

- 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).

# Domestic Country Trade



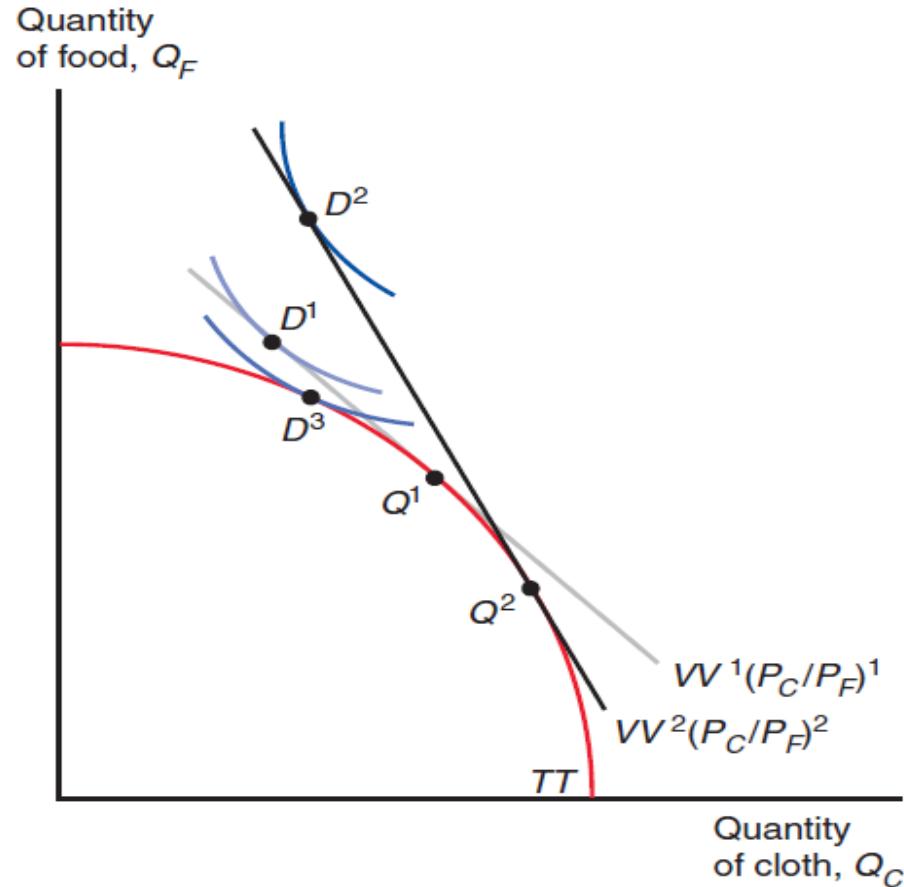
The economy produces at point Q, where the production possibility frontier is tangent to the highest possible iso-value line. It consumes at point D, where the iso-value line is tangent to the highest possible indifference curve. The economy produces more cloth than it consumes and therefore it exports 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 metre of cloth.

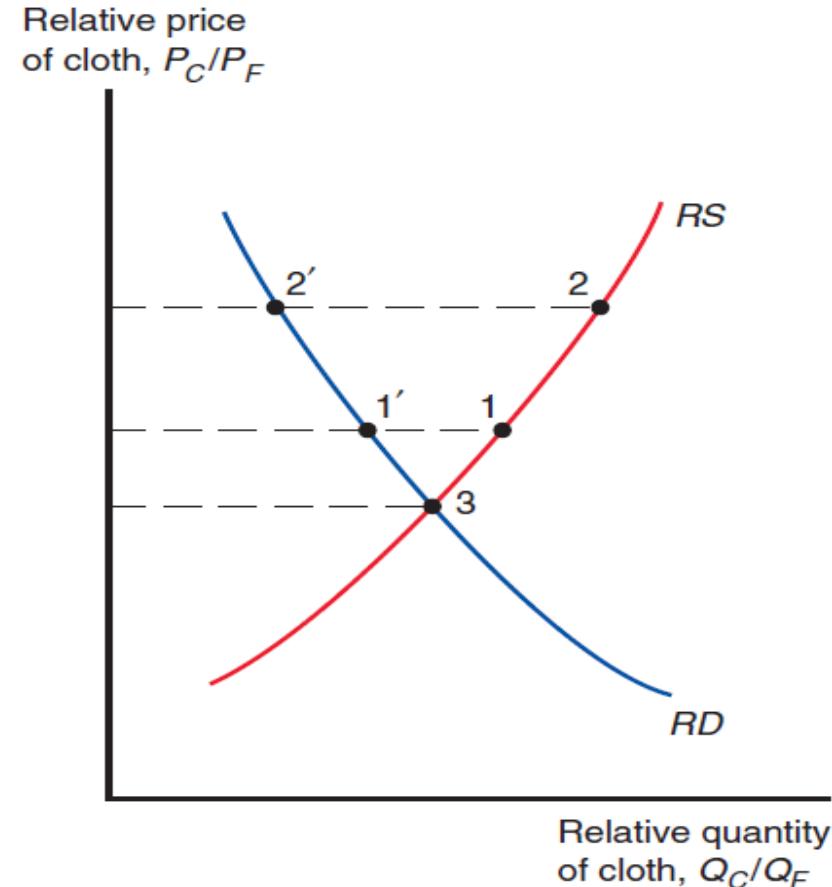
# Prices and the value of consumption

- 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.

# Effects of a rise in the relative price of cloth



(a) Production and Consumption



(b) Relative Supply and Demand

- The slope of the iso-value lines is equal to minus the relative price of cloth  $P_C/P_F$ . When the relative price rises, iso-value lines become steeper. In particular, the maximum iso-value line rotates from  $VV^1$  to  $VV^2$ . Production shifts from  $Q^1$  to  $Q^2$ , consumption shifts from  $D^1$  to  $D^2$ . If the economy cannot trade, then it produces and consumes at point  $D^3$ .
- Panel (b) shows the effects of the rise in the relative price of cloth on relative production (move from 1 to 2) and relative demand (move from 1' to 2'). If the economy cannot trade, then it consumes and produces at point 3.

- 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.

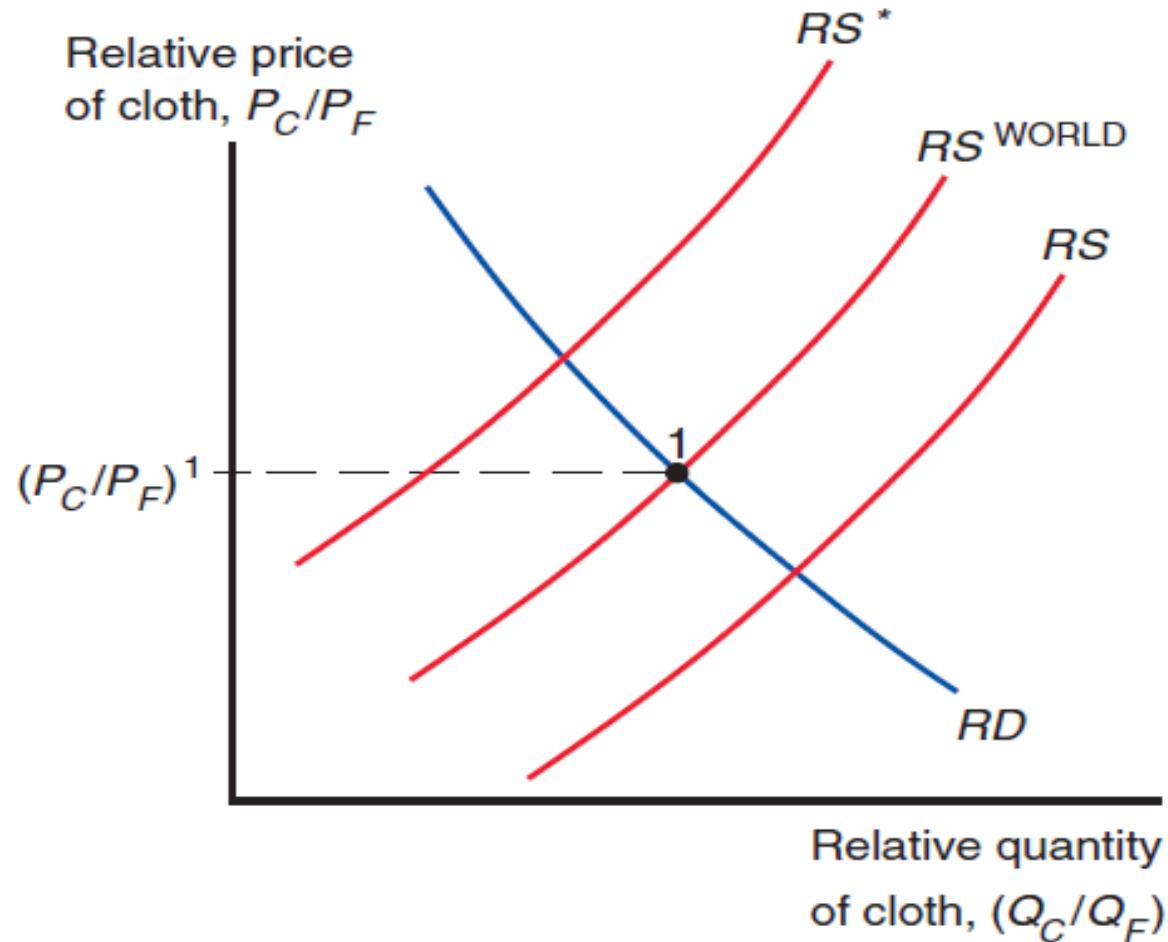
# Welfare and the terms of trade

- 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.

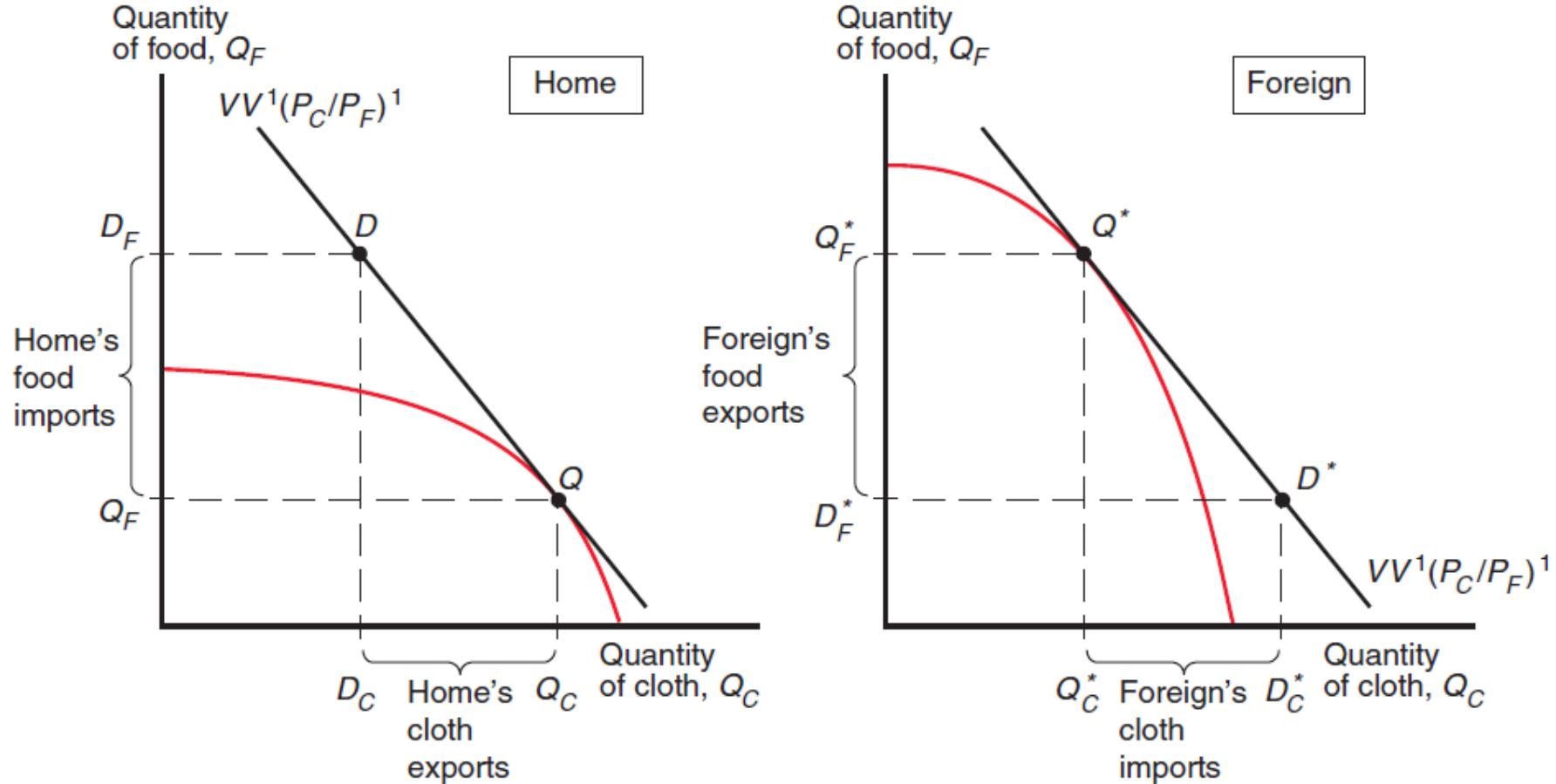
# Determining Relative Prices

- 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.

# Relative Supply and Demand



# Equilibrium relative price and trade flows

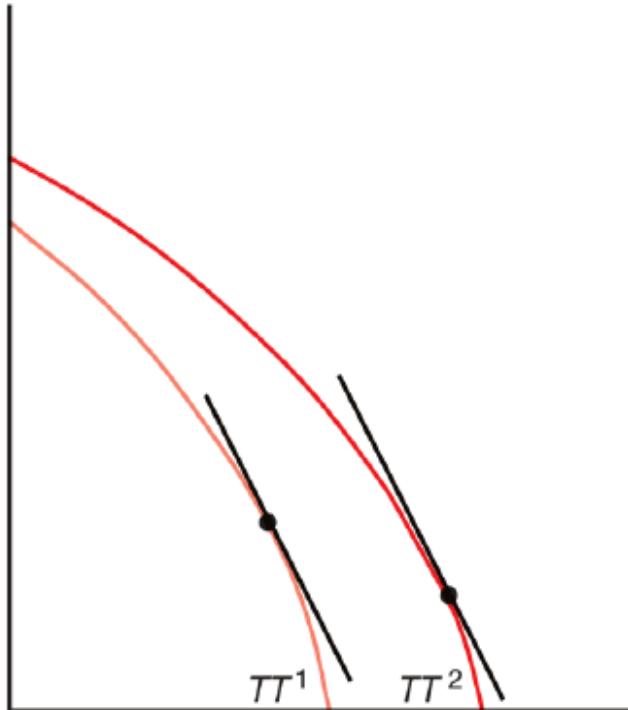


# Effects of Economic Growth

- Economic growth means an outward shift of a country's production possibility frontier. This growth can result either from increases in a country's resources or from improvements in the efficiency with which these resources are used.
- Is growth in a country more or less valuable when it is integrated in the world economy? The standard trade model gives us precise answers to these questions.
- Growth is usually **biased**: it occurs in one sector more than others, causing relative supply to shift.
  - 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 labour force, arable land, or the capital stock) causes biased growth.

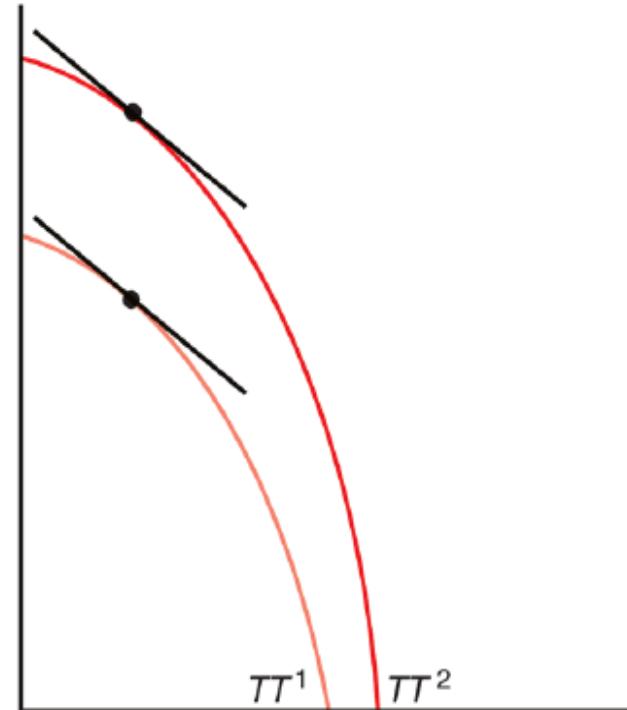
# Biased Growth

Food  
production,  $Q_F$



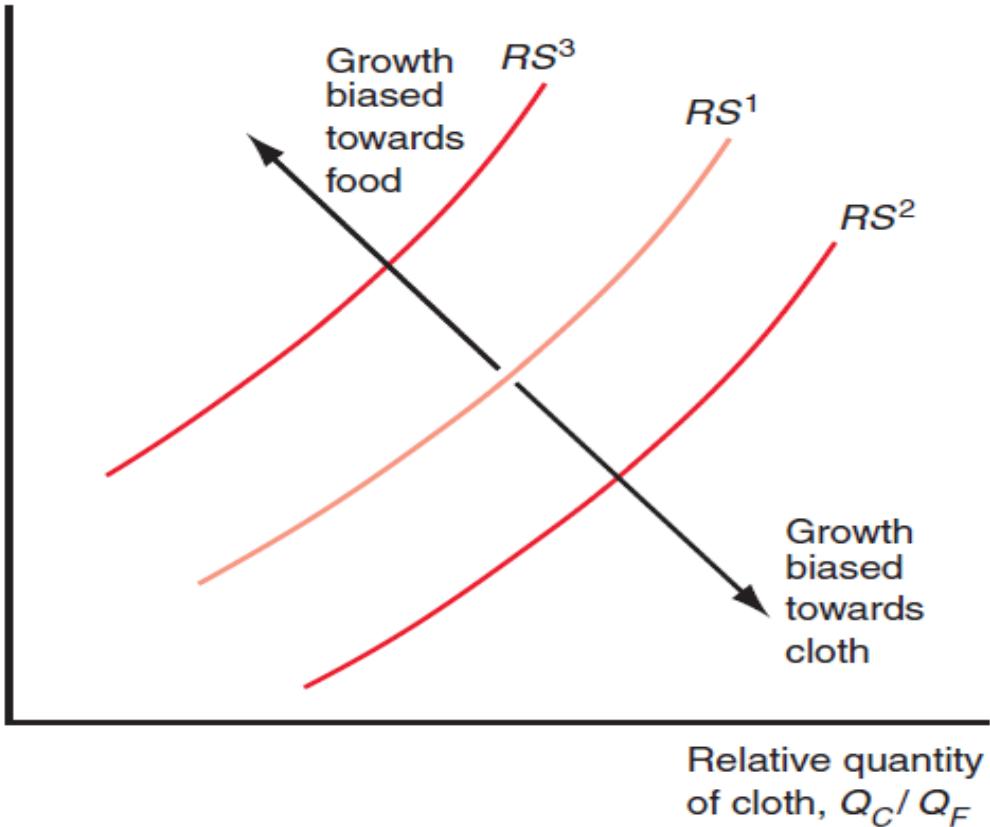
(a) Growth biased toward cloth

Food  
production,  $Q_F$



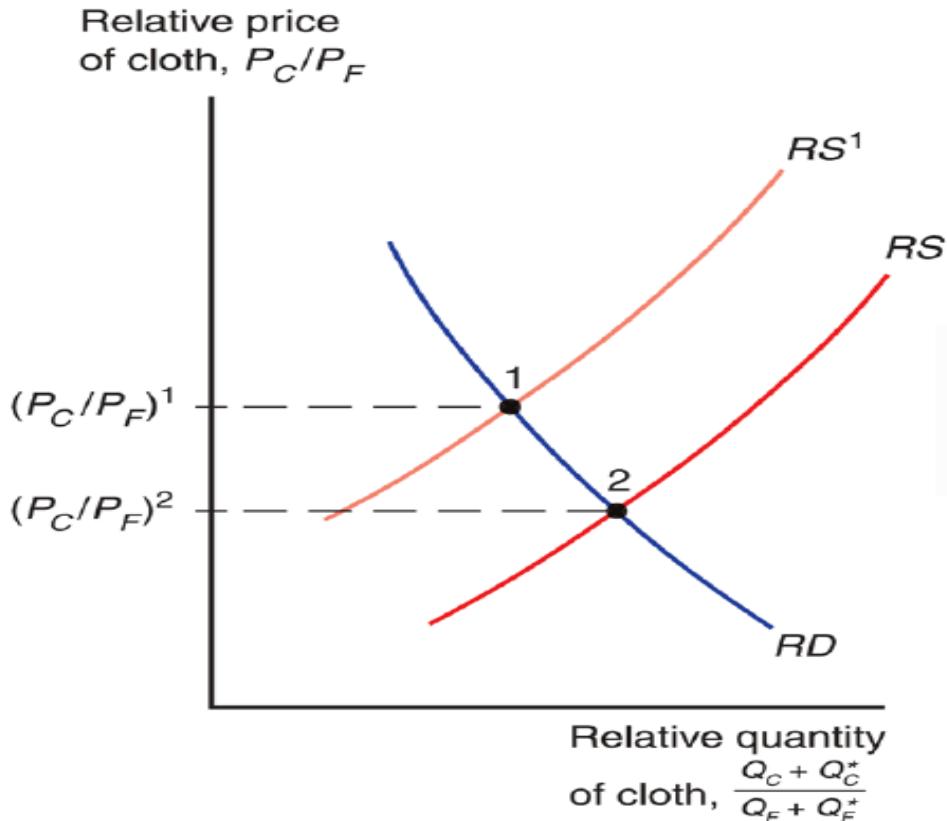
(b) Growth biased toward food

Relative price  
of cloth,  $P_C/P_F$

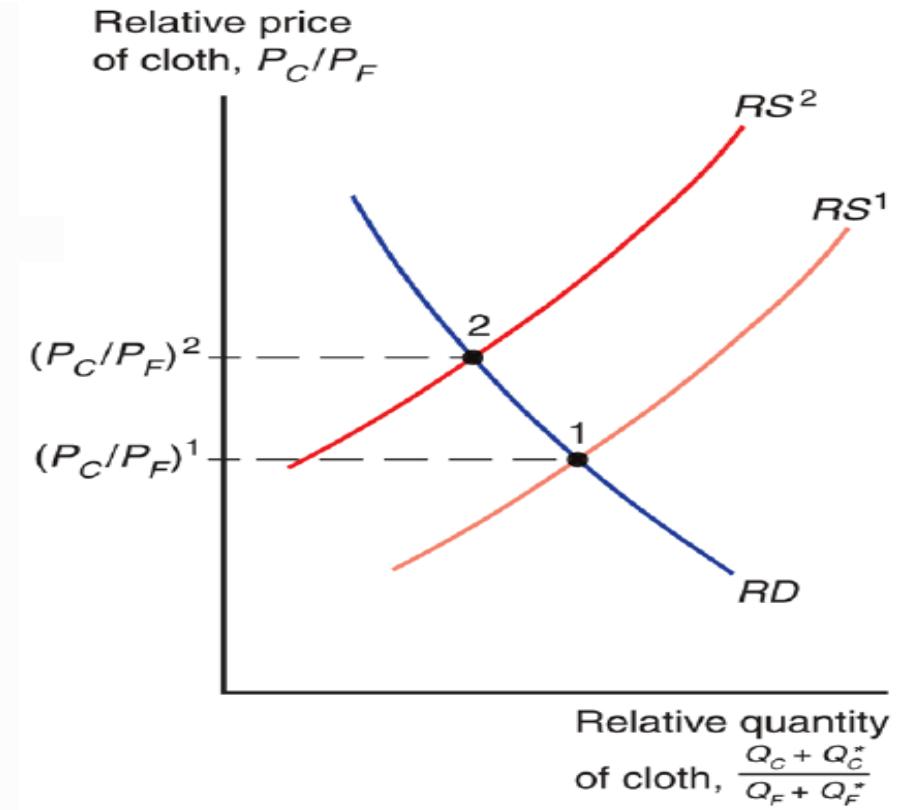


- Biased growth and the resulting shift in relative supply causes a change in the terms of trade.
- Biased growth in the cloth industry (in either the domestic or foreign country) will lower the relative price of cloth and lower the terms of trade for cloth exporters.
- Biased growth in the food industry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

# Growth and World Relative Supply



(a) Cloth-biased growth



(b) Food-biased growth

- Notice that the important consideration here is not *which* economy grows but rather the bias of that growth. If Foreign had experienced growth strongly biased toward cloth, the effect on the world relative supply curve and thus on the terms of trade would have been similar.
- On the other hand, either Home or Foreign growth strongly biased toward food will lead to a *leftward* shift of the *RS* curve for the *world* and thus to a rise in the relative price of cloth.

- **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.

- 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.

# Import Tariffs and Export Subsidies

- **Import tariffs** are taxes levied on imports. **Export subsidies** are payments given to domestic producers that export. These government interventions in trade usually take place for income distribution, for the promotion of industries thought to be crucial to the economy, or for balance of payments.
- Both policies influence the terms of trade and therefore national welfare
- The terms of trade refers to the relative value of a country's exports and a country's imports.

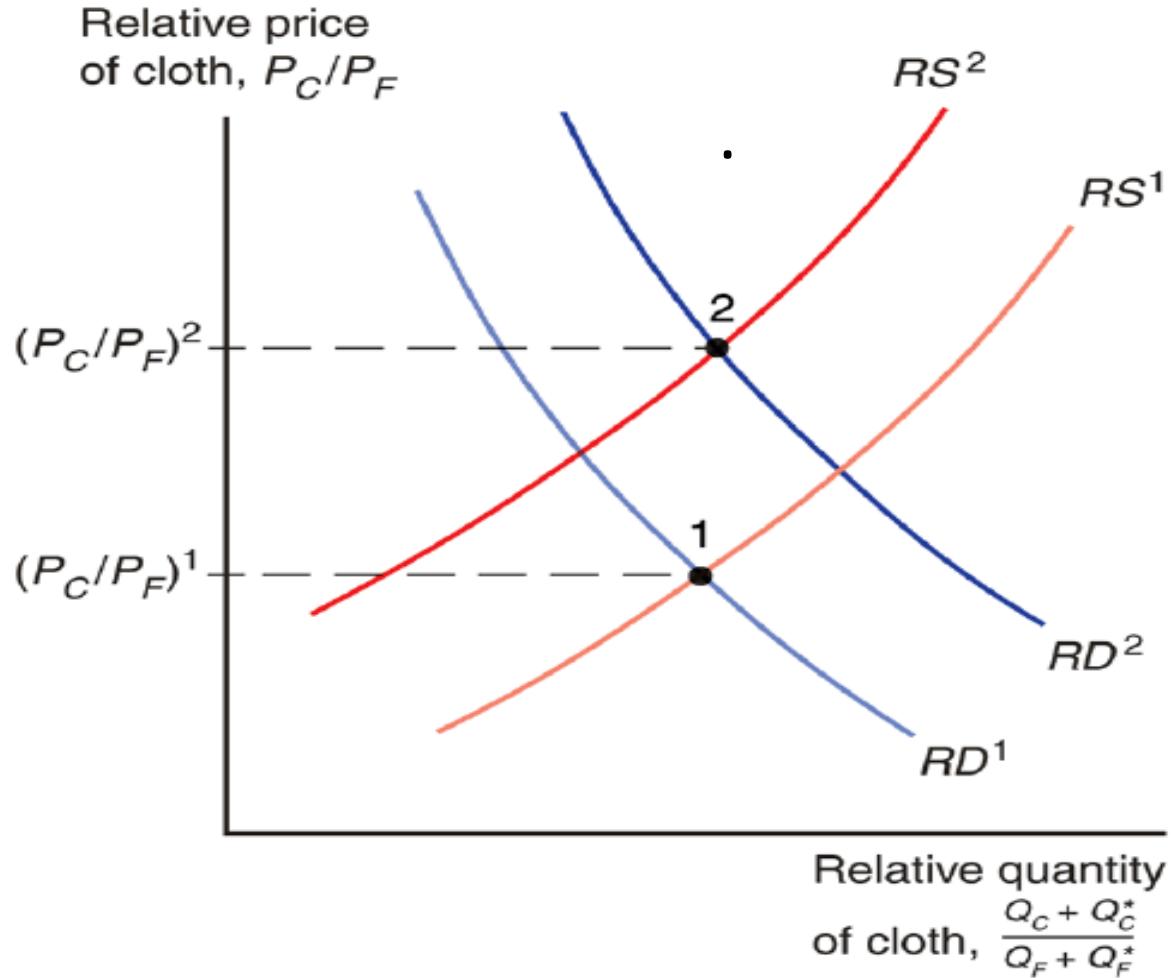
- The distinctive feature of tariffs and export subsidies is that they create a difference between prices at which goods are traded on the world market and prices at which those goods can be purchased within a country.
- **The direct effect of a tariff is to make imported goods more expensive inside a country than they are outside the country.** An export subsidy gives producers an incentive to export. It will therefore be more profitable to sell abroad than at home unless the price at home is higher, so **such a subsidy raises the prices of exported goods inside a country.**
- When countries are big exporters or importers of a good (relative to the size of the world market), the price changes caused by tariffs and subsidies change both relative supply and relative demand on world markets. The result is a shift in the terms of trade, both of the country imposing the policy change and of the rest of the world.

# Relative Demand and Supply effects of a tariff

- Tariffs and subsidies drive a wedge between the prices at which goods are traded internationally (**external prices**) and the prices at which they are traded within a country (**internal prices**).
- This means that the terms of trade correspond to external, rather than internal, prices. When analyzing the effects of a tariff or export subsidy, therefore, we want to know how that tariff or subsidy affects relative supply and demand *as a function of external prices*.
- If Home imposes a 20 percent tariff on the value of food imports, for example, the internal price of food relative to cloth faced by Home producers and consumers will be 20 percent higher than the external relative price of food on the world market. Equivalently, the internal relative price of cloth on which Home residents base their decisions will be lower than the relative price on the external market.

- At any given world relative price of cloth, then, Home producers will face a lower relative cloth price and therefore will produce less cloth and more food. At the same time, Home consumers will shift their consumption toward cloth and away from food.
- From the point of view of the world as a whole, the relative supply of cloth will fall while the relative demand for cloth will rise.
- Clearly, the world relative price of cloth rises and thus **Home's terms of trade improve at Foreign's expense.**

# Effects of an import tariff on terms of trade

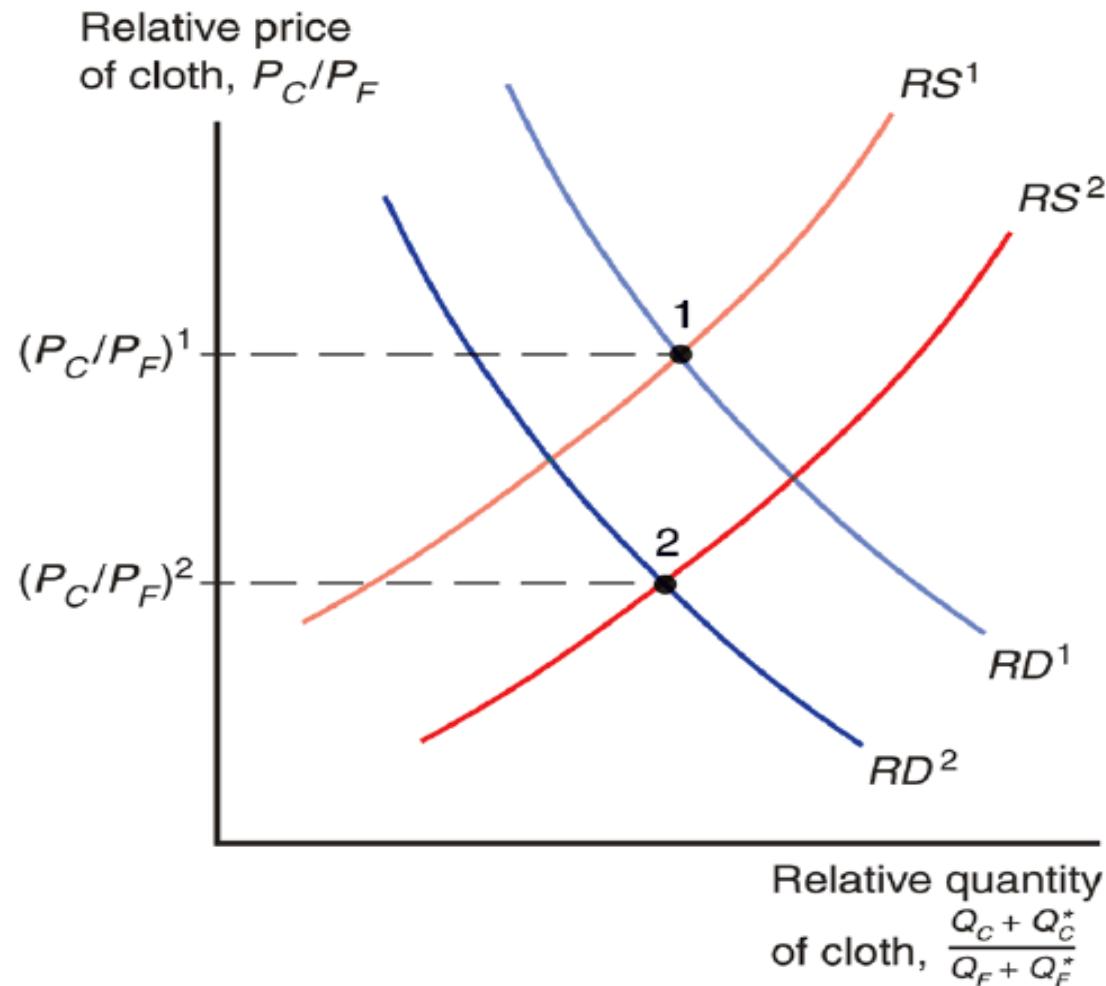


- When the domestic country imposes an import tariff, the terms of trade increases and the welfare of the country may increase.
- The magnitude of this effect depends on the size of the domestic country relative to the world economy.
  - If the country is small part of the world economy, its tariff (or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

- Tariffs and export subsidies are often treated as similar policies, since they both seem to support domestic producers, but they have opposite effects on the terms of trade.
- Suppose that Home offers a 20 percent subsidy on the value of any cloth exported. For any given world prices, this subsidy will raise Home's internal price of cloth relative to that of food by 20 percent. The rise in the relative price of cloth will lead Home producers to produce more cloth and less food, while leading Home consumers to substitute food for cloth.
- The subsidy will increase the world relative supply of cloth and decrease the world relative demand for cloth, shifting equilibrium from point 1 to point 2. **A Home export subsidy worsens Home's terms of trade and improves Foreign's.**

# Effects of an export subsidy on terms of trade



- 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 by foreign countries on goods that
  - India exports *reduce the world price of India's exports* and decrease India's terms of trade.
  - India also imports *reduce the world price of India's imports* and increase India's terms of trade.
- ❑ Export subsidies by foreign countries on goods that
  - India imports *reduce the world price of India's imports* and increase India's terms of trade.
  - India also exports *reduce the world price of India's exports* and decrease India's terms of trade.

- 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.

# Economies of Scale, Imperfect Competition and International 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.

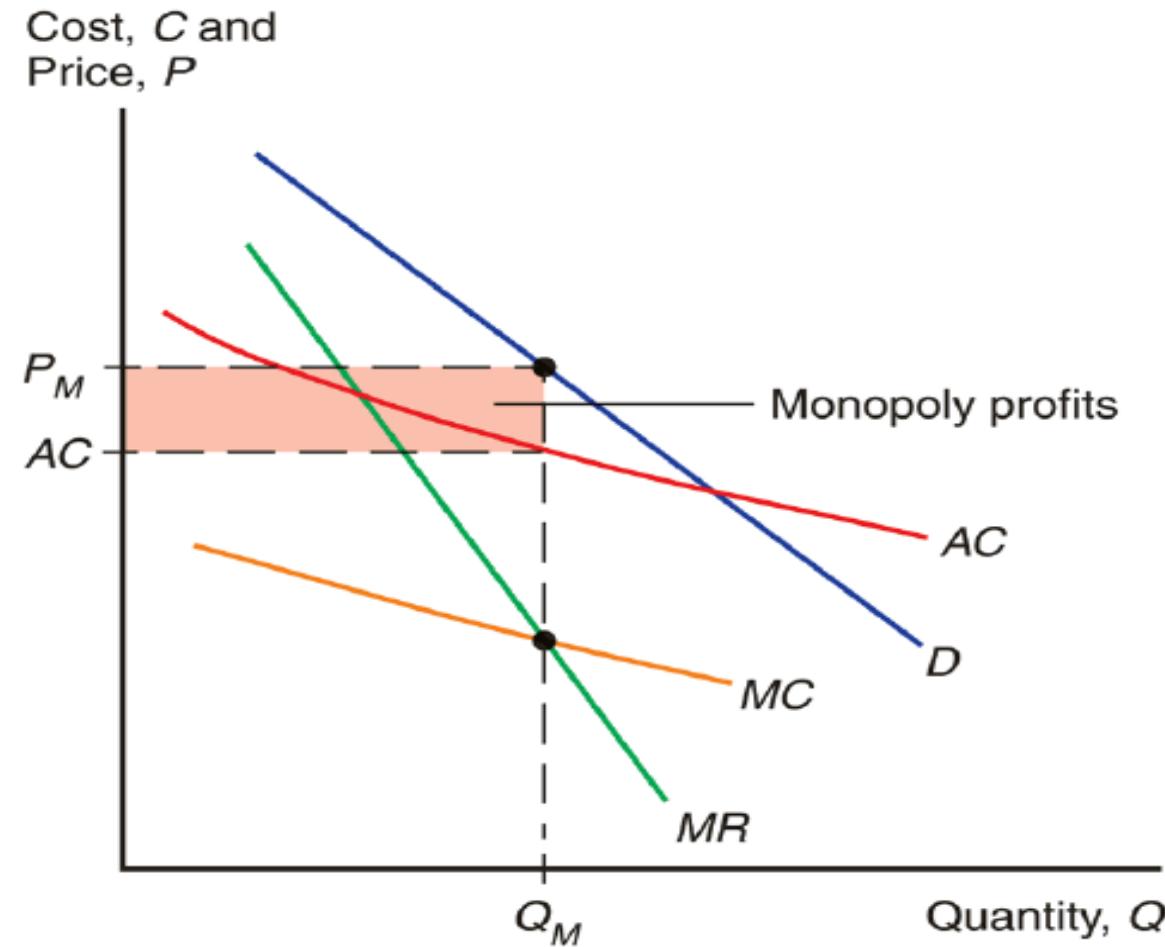
# Types of Economies of Scale

- 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 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).

# Monopolistic pricing and production decisions



- If monopolistic firms have linear demand curves, then the relationship between price and quantity may be represented as:

$$Q = A - B.P \text{ where } A \text{ and } B \text{ are constants}$$

and marginal revenue may be represented as

$$MR = P - Q/B$$

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

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

- **Average cost** is the cost of production ( $C$ ) divided by the total quantity of output produced ( $Q$ ) at a time.

$$AC = C/Q$$

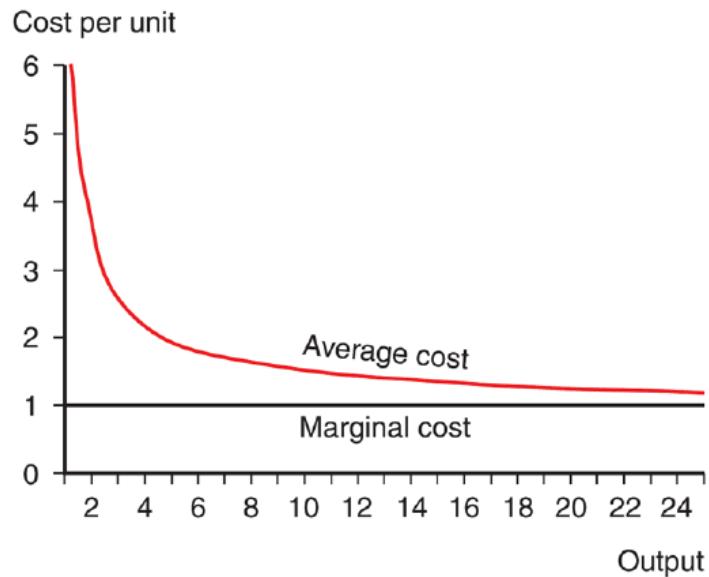
- **Marginal cost** is the cost of producing an additional unit of output.

- Suppose that costs are measured by  $C = F + c.Q$ , 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.**

# 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 costs decline as output rises.

# Monopolistic Competition

- **Monopolistic competition** is a model of an imperfectly competitive industry which assumes that
  - Each firm can differentiate its product from the product of competitors.
  - 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

$$Q = S[1/n - b(P - \bar{P})]$$

$Q$  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

$\bar{P}$  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:  $\bar{P} = P$ . In equilibrium,

$$Q = S/n + 0$$

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

## □ *The Number of Firms and Average Cost*

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

- 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.

## □ *The Number of Firms and the Price*

$$Q = S[1/n - b(P - \bar{P})]$$

$$Q = S/n - Sb(P - \bar{P})$$

$$Q = S/n + Sb\bar{P} - SbP$$

Let  $A = S/n + Sb\bar{P}$  and  $B \equiv Sb$

$$Q = A - BxP$$

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

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

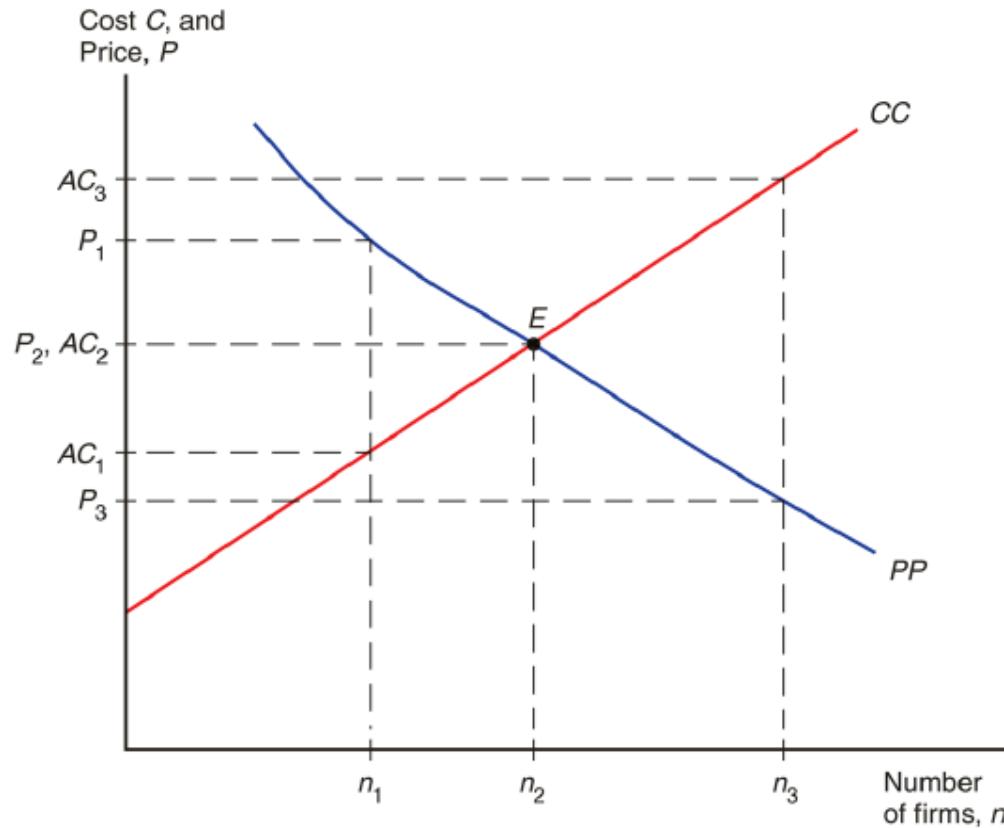
$$P = c + Q/Sb$$

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

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

- 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.

# Equilibrium in a monopolistically competitive market

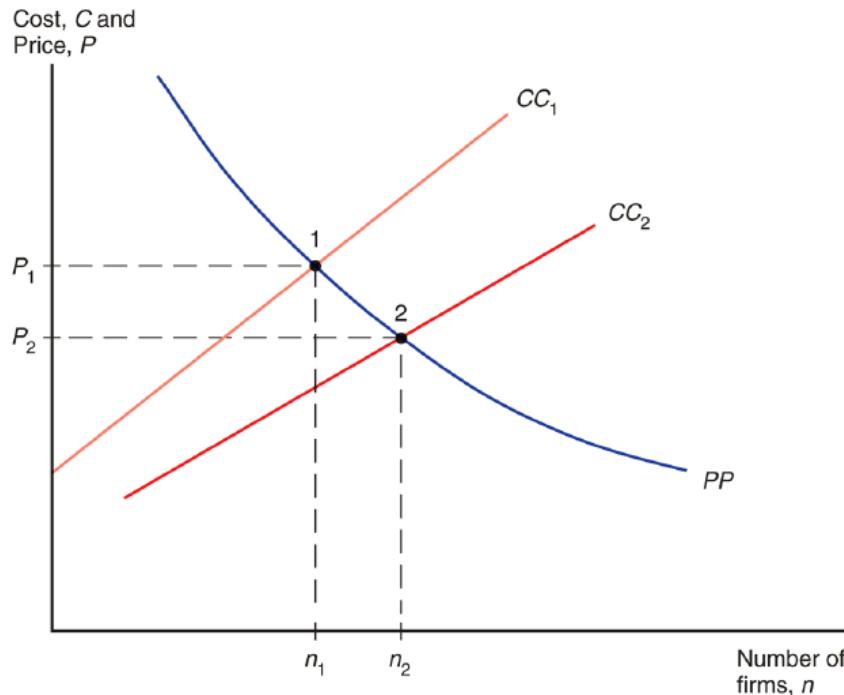


The number of firms in a monopolistically competitive market, and the prices that they charge are determined by two relationships. On the one hand, the more firms there are, the more intensely they compete, and hence lower is the industry price. This relationship is described by  $PP$ . On the other side, more firms there are, the less each firm sells and therefore higher is its average cost. This relationship is described by  $CC$ . If price exceeds average cost, industry will be making profits and new firms will enter; if  $PP$  lies below  $CC$  industry will be making losses and firms will exit.

- If the number of firms is greater than or less than  $n_2$ , then the 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).

- 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.

# 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

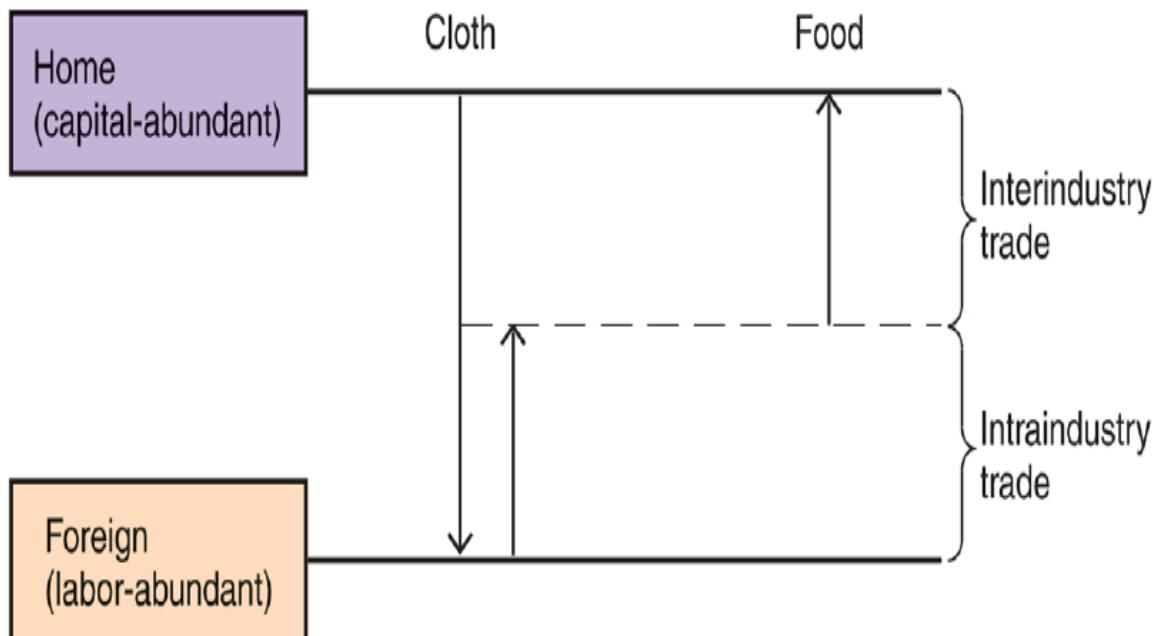
# Inter-industry Trade

- 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 labour abundant foreign economy specializes in the production of labour 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 should therefore export more cloth than it imports.
- Suppose that the trade in the food industry continues to be determined by comparative advantage.

# 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 intra industry trade.

# Inter-industry trade and intra-industry trade

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

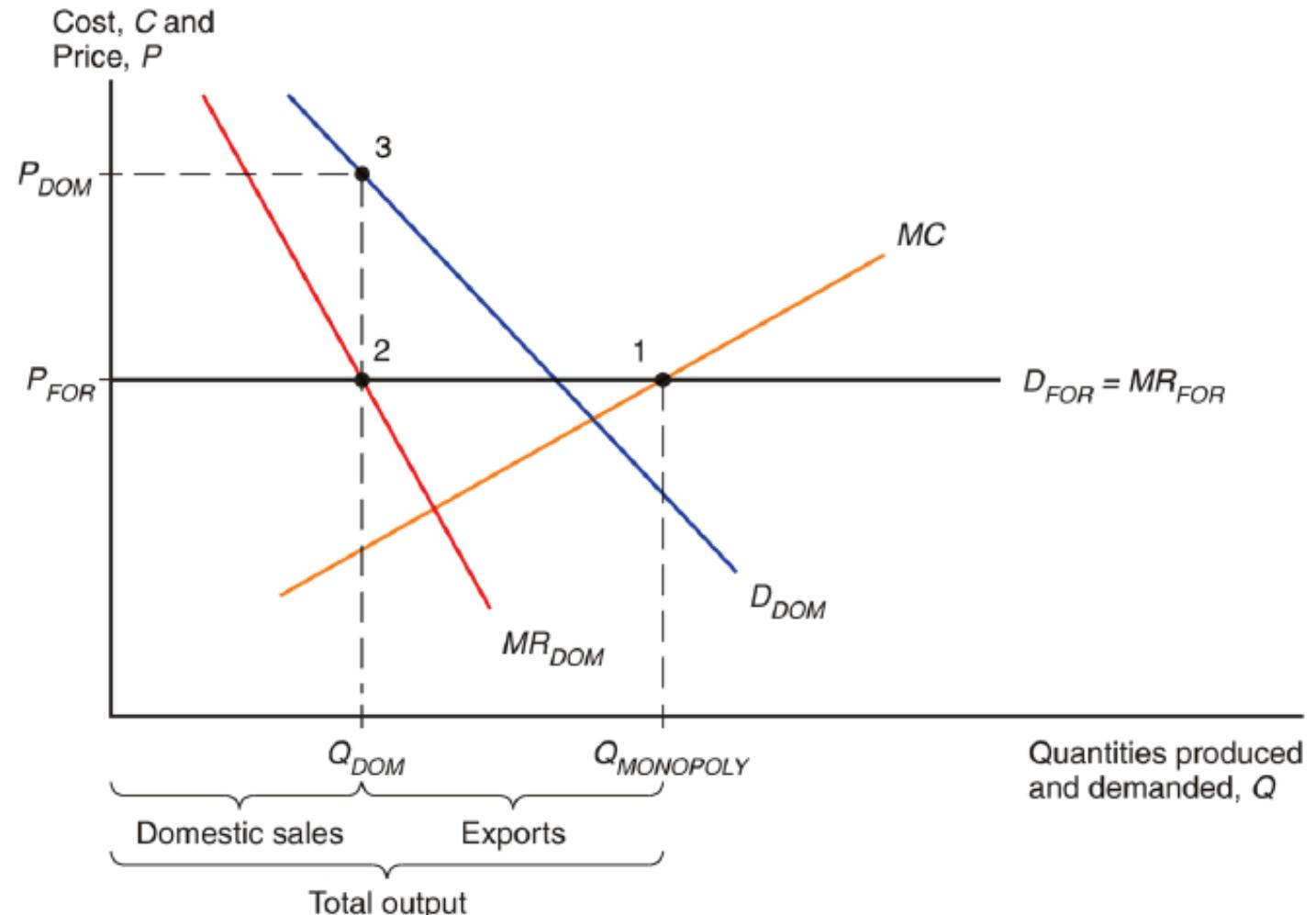
- Unlike inter-industry trade in the Heckscher-Ohlin model, income distribution effects are not predicted to occur with intra-industry trade.
  - About 25% of world trade is intra-industry trade according to standard industrial classifications.
  - But some industries have more intra-industry trade than others: those industries requiring relatively large amounts of skilled labour, technology and physical capital exhibit intra-industry trade.
  - Countries with similar relative amounts of skilled labour, technology and physical capital engage in a large amount of intra-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 can see 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



- 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 item 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 in the domestic market upto 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

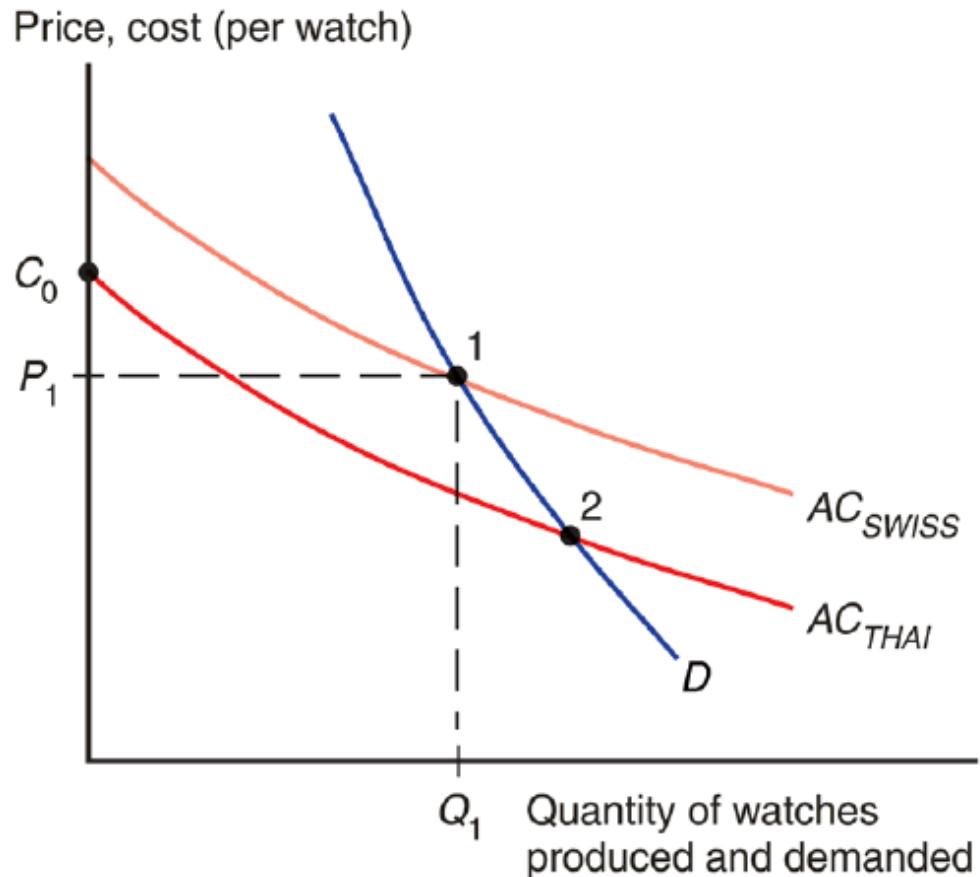
- Dumping (as well as price discrimination in domestic markets) is widely regarded as unfair.
- The Commerce Department may impose an “anti-dumping duty”, or tax, as a precaution against possible injury.
- This tax equals the difference between the actual and “fair” price of imports, where “fair” means “price the product is normally sold at in the manufacturer's domestic market ”.

# 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:
  - **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 of 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.

- ❑ **Labour pooling:** a large and concentrated industry may attract a pool of workers, reducing employee search and hiring costs for each firm.
  - ❑ **Knowledge spillovers:** workers from different firms may more easily share ideas that benefit each firm when a large and concentrated industry exists.
- 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.

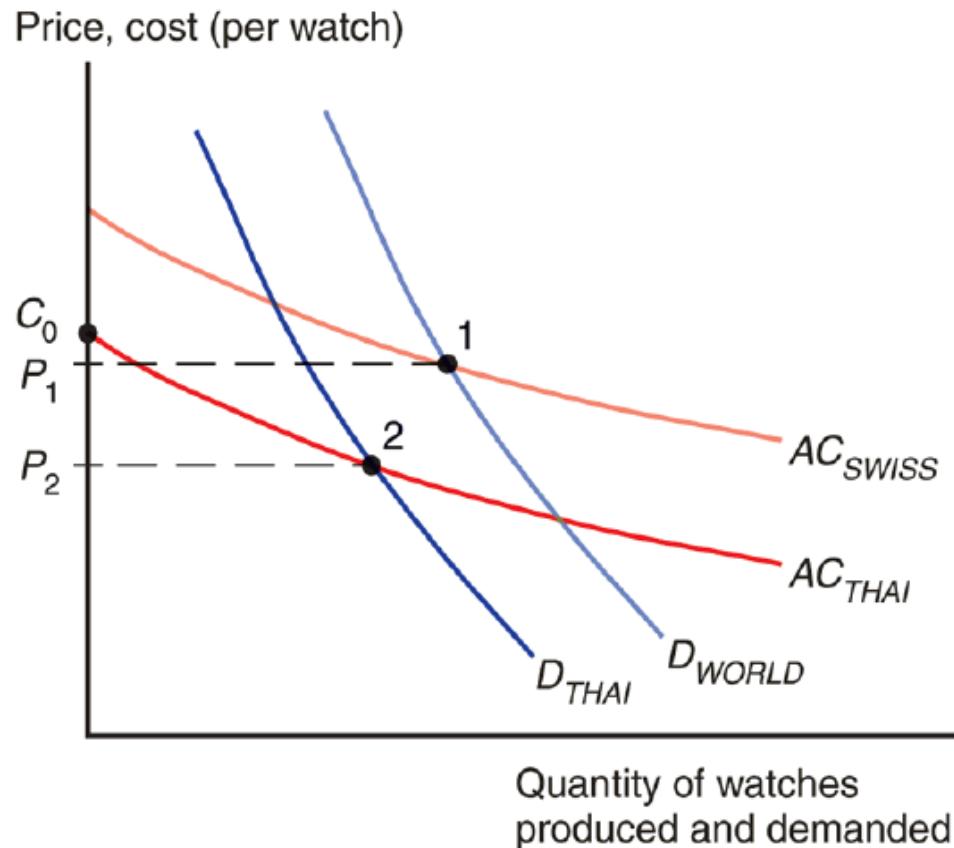
# External economies and specialization



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.

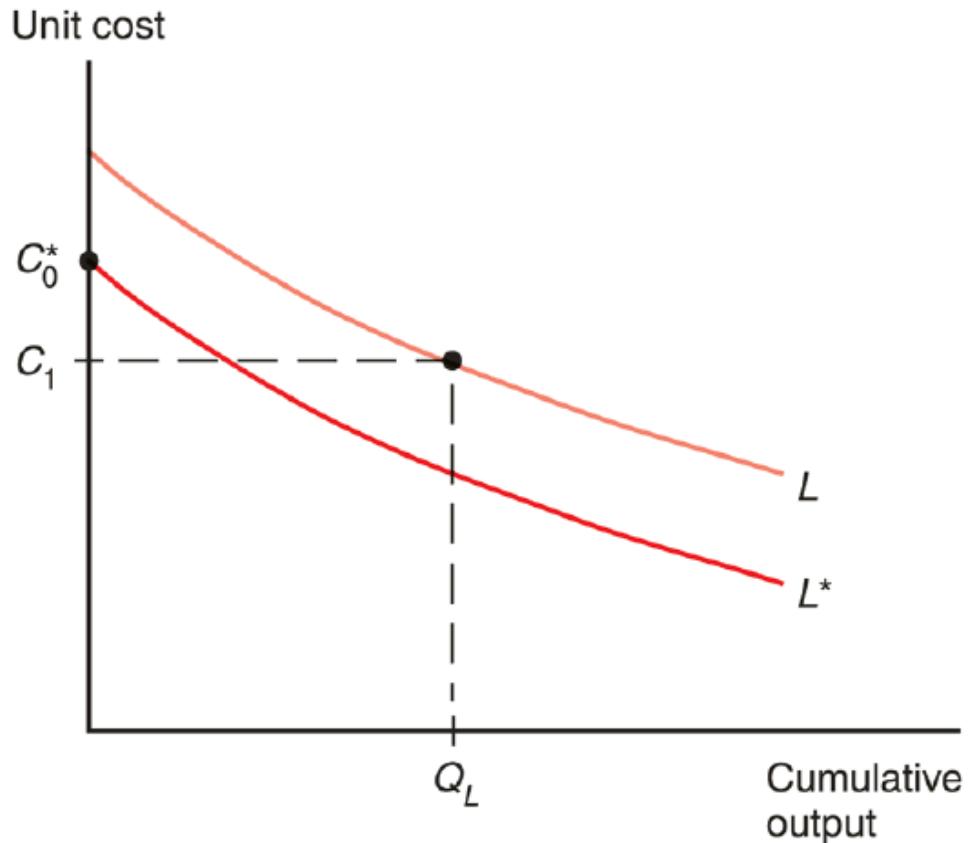
# External economies and losses from trade



When there are external economies, trade can potentially leave a country worse off than it would be in the absence of trade. 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 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 a 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**.

# 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 may have a lower unit cost than other country with little or no work experience, even if the second country's learning curve ( $L^*$ ) is lower 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.

# Instruments of Trade Policy

# Introduction

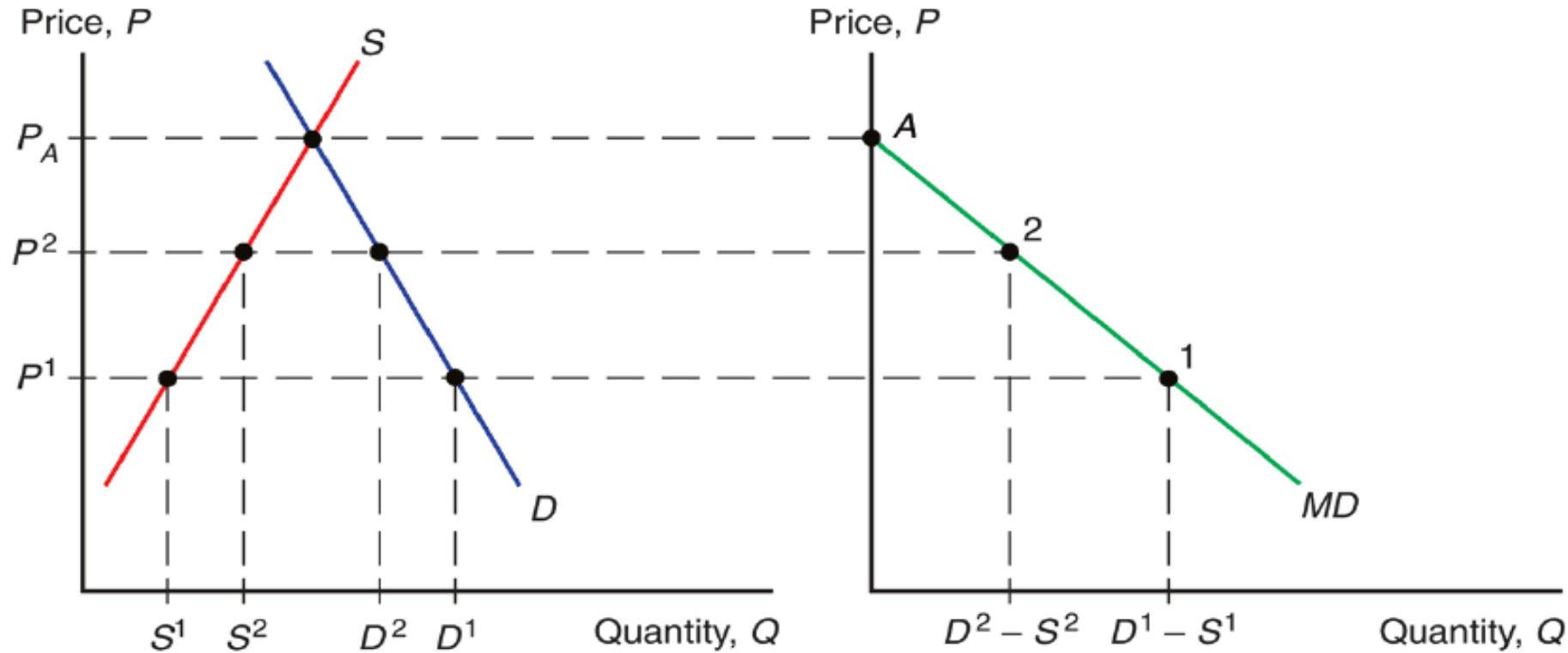
- A **specific tariff** is levied as a fixed charge for each unit of imported goods.  
For example, Rs 1 per kg of cheese
- An **ad valorem tariff** is levied as a fraction of the value of imported goods.  
For example, 25% tariff on the value of imported cars.
- Let's construct a model measuring how a tariff affects a single market, say that of wheat.
- Suppose that in the absence of trade the price of wheat in the foreign country is lower than that in the domestic country.
  - With trade the foreign country will export: construct an export supply curve.
  - With trade the domestic country will import: construct an import demand curve.

- An export supply curve is the difference between the quantity that foreign producers supply minus the quantity that foreign consumers demand, at each price.
- An import demand curve is the difference between the quantity that domestic consumers demand minus the quantity that domestic producers supply, at each price.
- In equilibrium, import demand = export supply  
$$\text{domestic demand} - \text{domestic supply} = \text{foreign supply} - \text{foreign demand}$$
- In equilibrium, **world demand = world supply**

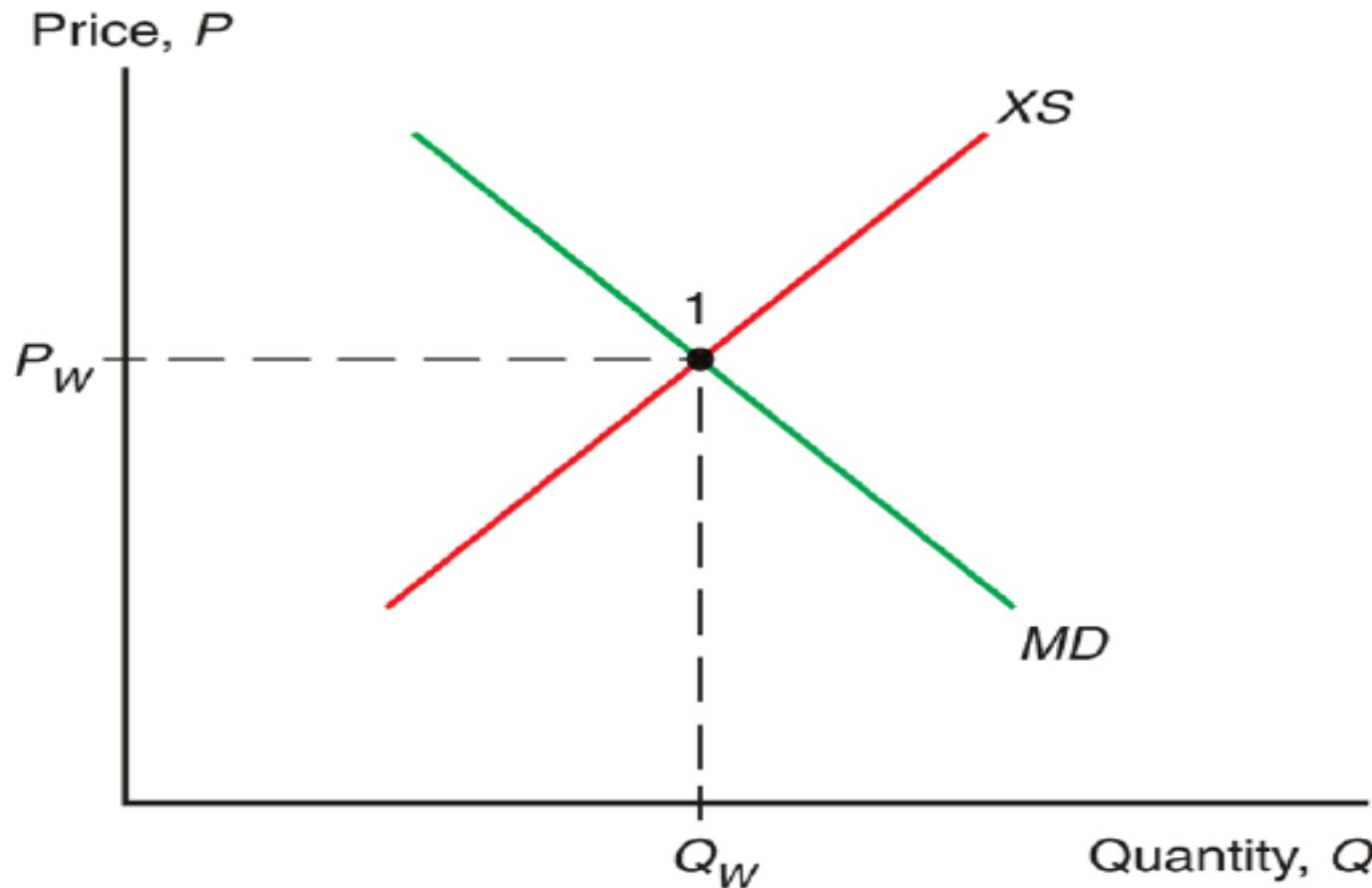
# Deriving Foreign's Export Supply Curve



# Deriving Home's Import Demand Curve



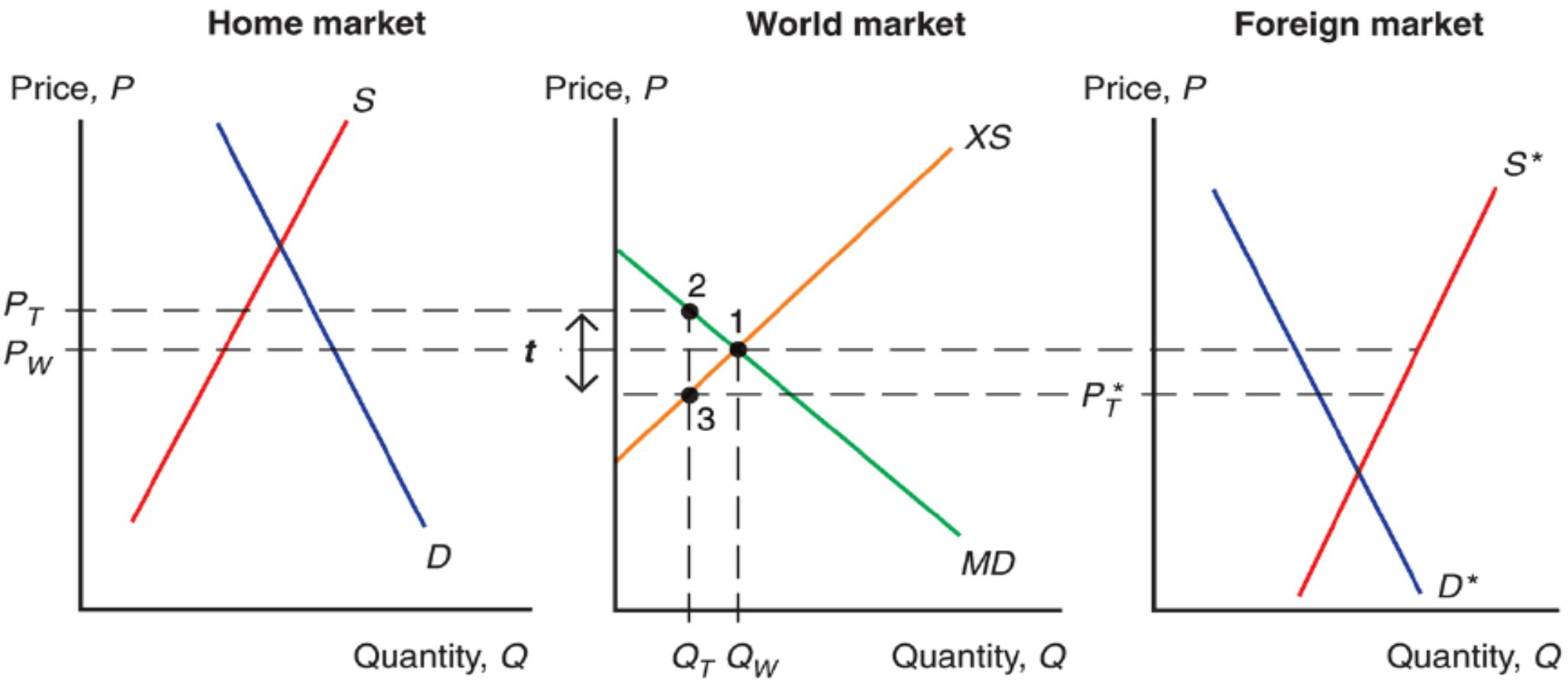
# World Equilibrium



# The Effects of a Tariff

- A tariff acts as an added cost of transportation, making shippers unwilling to ship goods unless the price difference between the domestic and foreign markets exceeds the tariff.
- If shippers are unwilling to ship wheat, there is *excess demand* for wheat in the domestic market and *excess supply* in the foreign market.
  - The price of wheat will tend to rise in the domestic market.
  - The price of wheat will tend to fall in the foreign market.

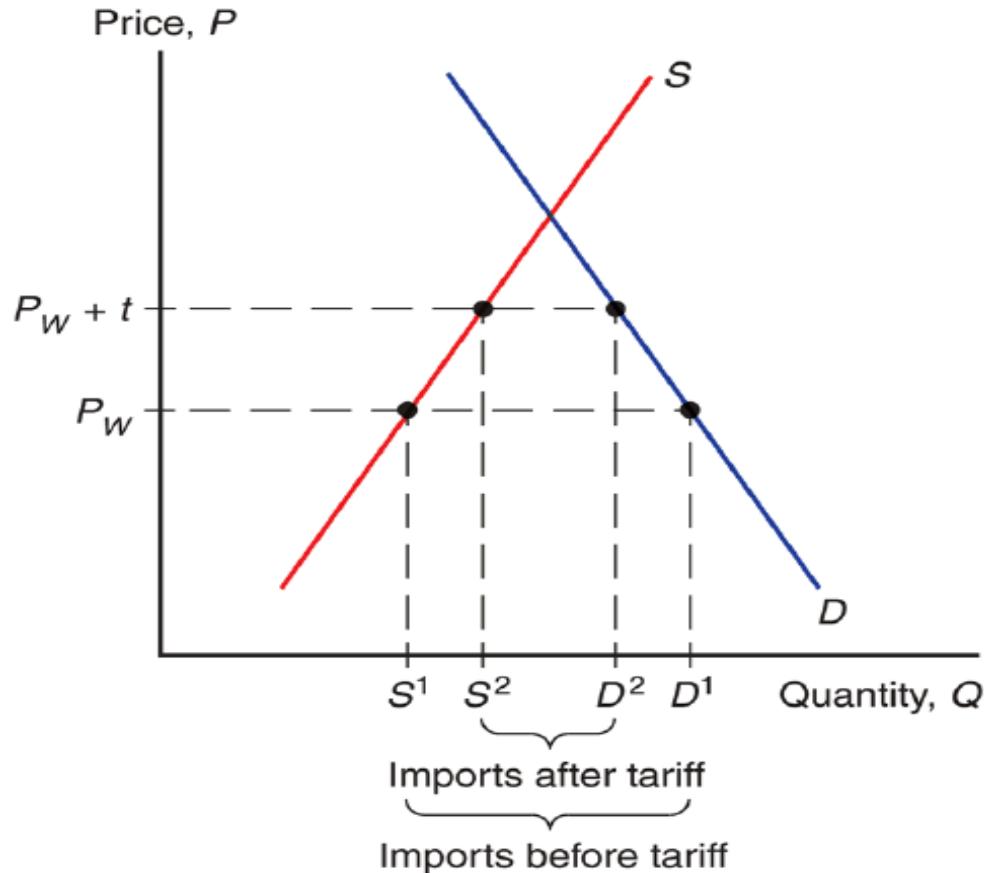
- Thus, a tariff will make the price of a good rise in the domestic market and will make the price of a good fall in the foreign market, until the price difference equals the tariff.
- $P_T - P^*_T = t$  ;  $P_T = P^*_T + t$
- The price of the good in foreign (world) markets should fall if there is a *significant* drop in the quantity demanded of the good caused by the domestic tariff.



- Because the price in domestic markets rises (to  $P_T$ ), domestic producers should supply more and domestic consumers should demand less.
- The quantity of imports falls from  $Q_W$  to  $Q_T$
- Because the price in foreign markets falls (to  $P^*_T$ ), foreign producers should supply less and foreign consumers should demand more.
- The quantity of exports falls from  $Q_W$  to  $Q_T$

- The quantity of domestic import demand equals the quantity of foreign export supply when  $P_T - P^*_T = t$
- In this case, the increase in the price of the good in the domestic country is less than the amount of the tariff.
  - Part of the tariff is reflected in a decline of the foreign country's export price, and thus is not passed on to domestic consumers.

# Effects of Tariff in a small country



When a country is “small”, it has no effect on the foreign (world) price of a good, because its demand for the good is an insignificant part of world demand.

Therefore, the foreign price will not fall, but will remain at  $P_w$

The price in the domestic market, however, will rise to  $P_T = P_w + t$

# Effective Rate of Protection

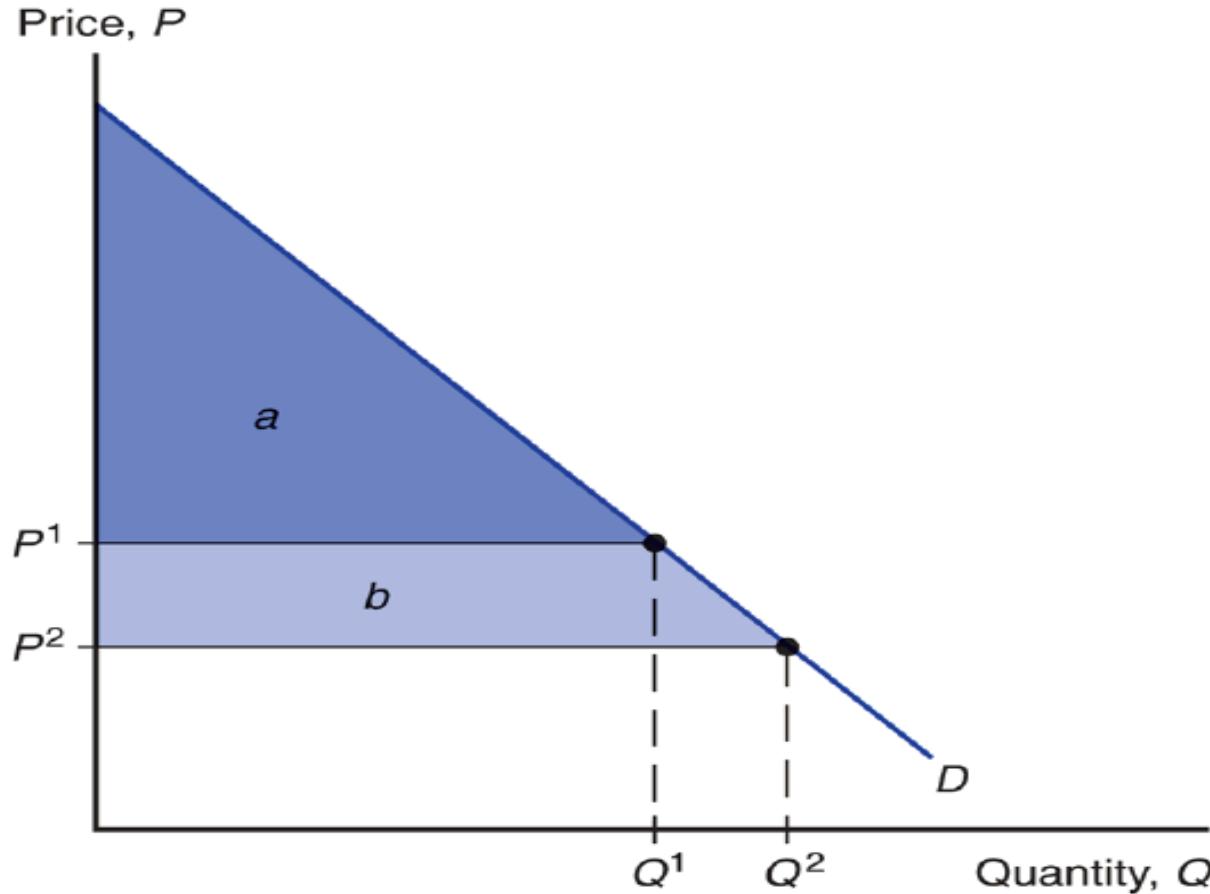
- The **effective rate of protection** measures how much protection a tariff or other trade policy provides domestic producers.
- It represents the change in value that an industry adds to the production process when trade policy changes.
- The change in value that an industry provides depends on the change in prices when trade policies change.
- **Effective rates of protection often differ from tariff rates because tariffs affect sectors other than the protected sector**, a fact which affects the prices and value added for the protected sector.

- For example, suppose that an automobile sells on the world market for Rs 8000, and the parts that made it are worth Rs 6000.
  - The value added of the auto production is Rs 8000- Rs 6000
  - Suppose that a country puts a 25% tariff on imported autos so that domestic auto assembly firms can now charge up to Rs 10000 instead of Rs 8000.
  - Now auto assembly will occur if the value added is up to Rs 10000- Rs 6000.
  - The effective rate of protection for domestic auto assembly firms is the change in value added:  $(\text{Rs } 4000 - \text{Rs } 2000) / \text{Rs } 2000 = 100\%$
- In this case, the effective rate of protection is greater than the tariff rate.

# Costs and Benefits of Tariffs

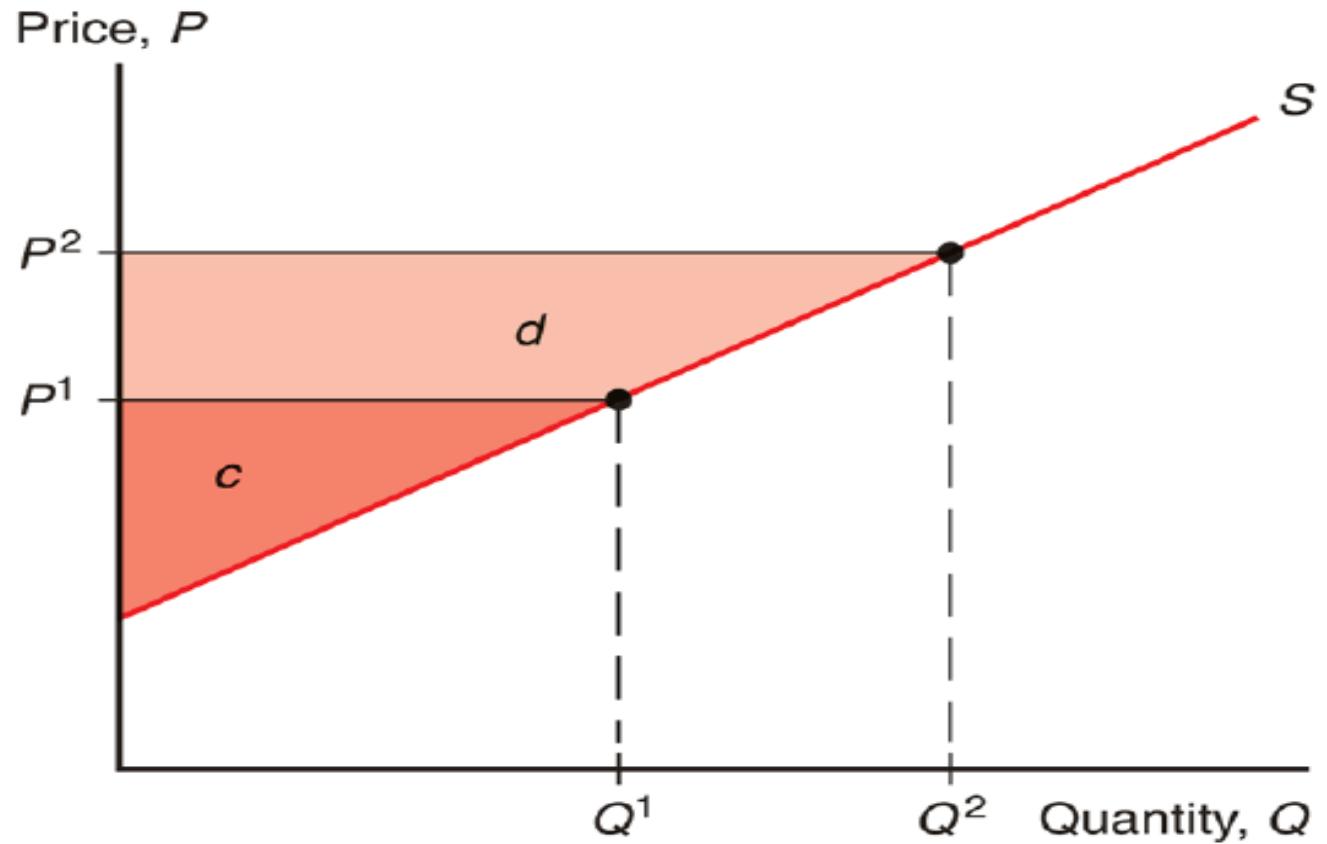
- A tariff raises the price of a good in the importing country, so we expect it to hurt consumers and benefit producers there. In addition, the government gains tariff revenue from a tariff.
- How to measure these costs and benefits? We use the concepts of consumer surplus and producer surplus.
- **Consumer surplus** measures the amount that a consumer gains from a purchase by the difference in the price he pays from the price he would have been willing to pay.
- The price he would have been willing to pay is determined by a demand (willingness to buy) curve.
- When the price increases, the quantity demanded decreases as well as the consumer surplus.

# Consumer Surplus

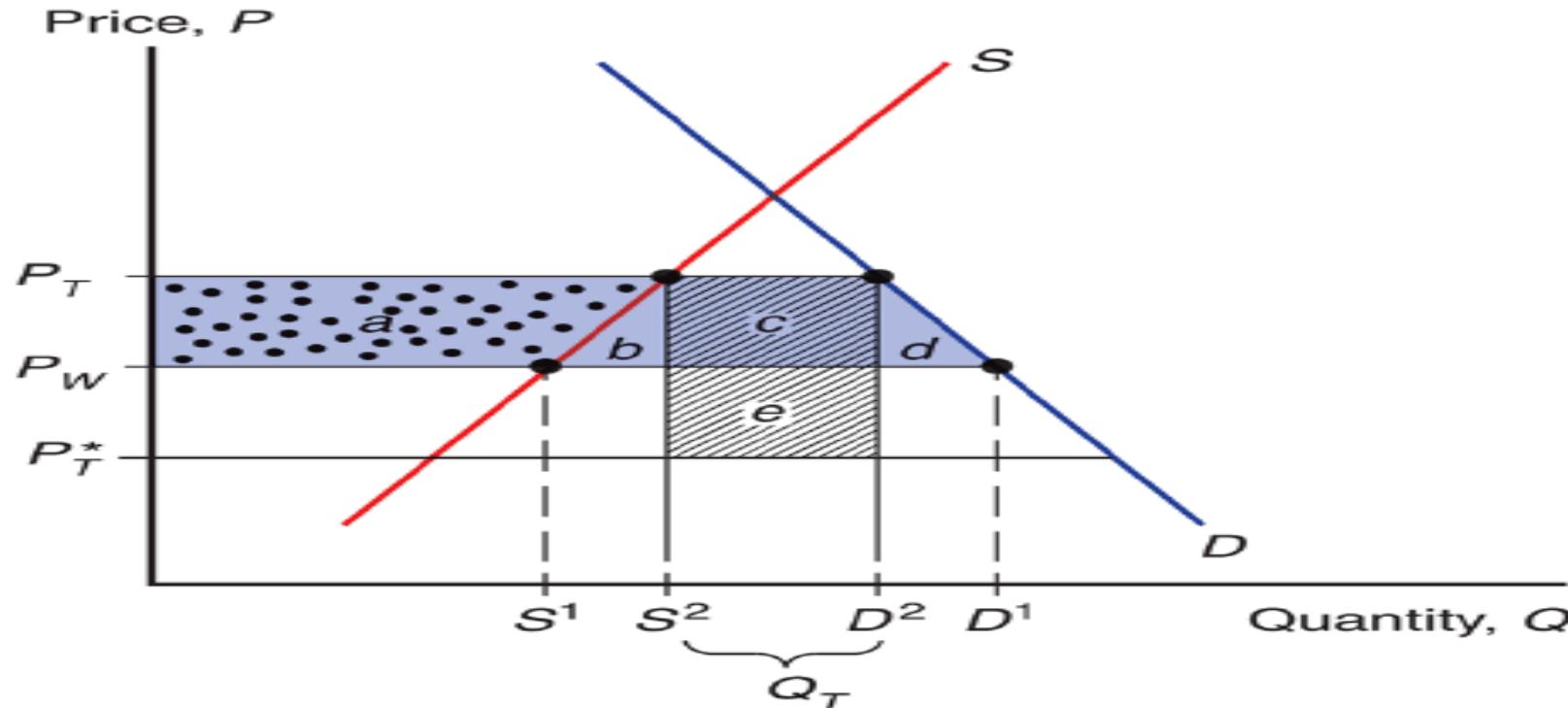


# Producer Surplus

- **Producer surplus** measures the amount that a producer gains from a sale by the difference in the price he receives from the price he would have been willing to sell at.
- The price he would have been willing to sell at is determined by a supply (willingness to sell) curve.
- When price increases, the quantity supplied increases as well as the producer surplus.
- A tariff raises the price of a good in the importing country, making its consumer surplus decrease (making its consumers worse off) and making its producer surplus increase (making its producers better off).
- Also, government revenue will increase



# Costs and benefits of tariffs for an importing country



= consumer loss ( $a + b + c + d$ )



= producer gain ( $a$ )



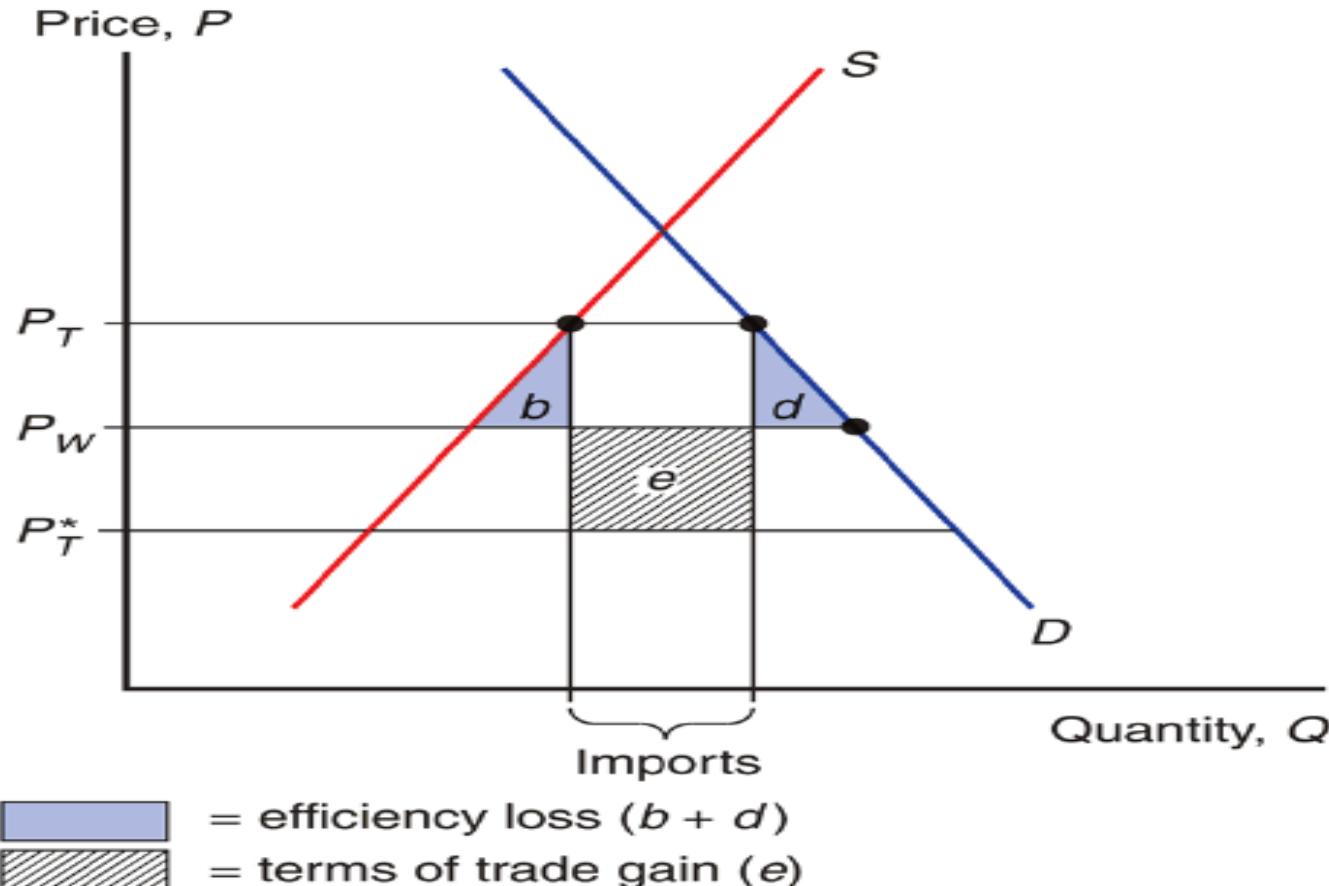
= government revenue gain ( $c + e$ )

- For a “large” country that can affect foreign (world) prices, the welfare effect of a tariff is ambiguous.
- The triangles  $b$  and  $d$  represent the **efficiency loss**.
- The tariff distorts production and consumption decisions: producers produce too much and consumers consume too little compared to the market outcome.
- The rectangle  $e$  represents the **terms of trade gain**.
- The terms of trade increases because the tariff lowers foreign export (domestic import) prices.

- Government revenue from the tariff equals the tariff rate times the quantity of imports.
  - $t = P_T - P^*_T$
  - $Q_T = D_2 - S_2$
  - Government revenue =  $t \times Q_T = c + e$
- Part of government revenue (rectangle  $e$ ) represents the terms of trade gain, and part (rectangle  $c$ ) represents part of the value of lost consumer surplus.
- The government gains at the expense of consumers and foreigners.

- If the terms of trade gain exceeds the efficiency loss, then national welfare will increase under a tariff, at the expense of foreign countries.
- However, this analysis assumes that the terms of trade does not change due to tariff changes by foreign countries (i.e., due to retaliation).

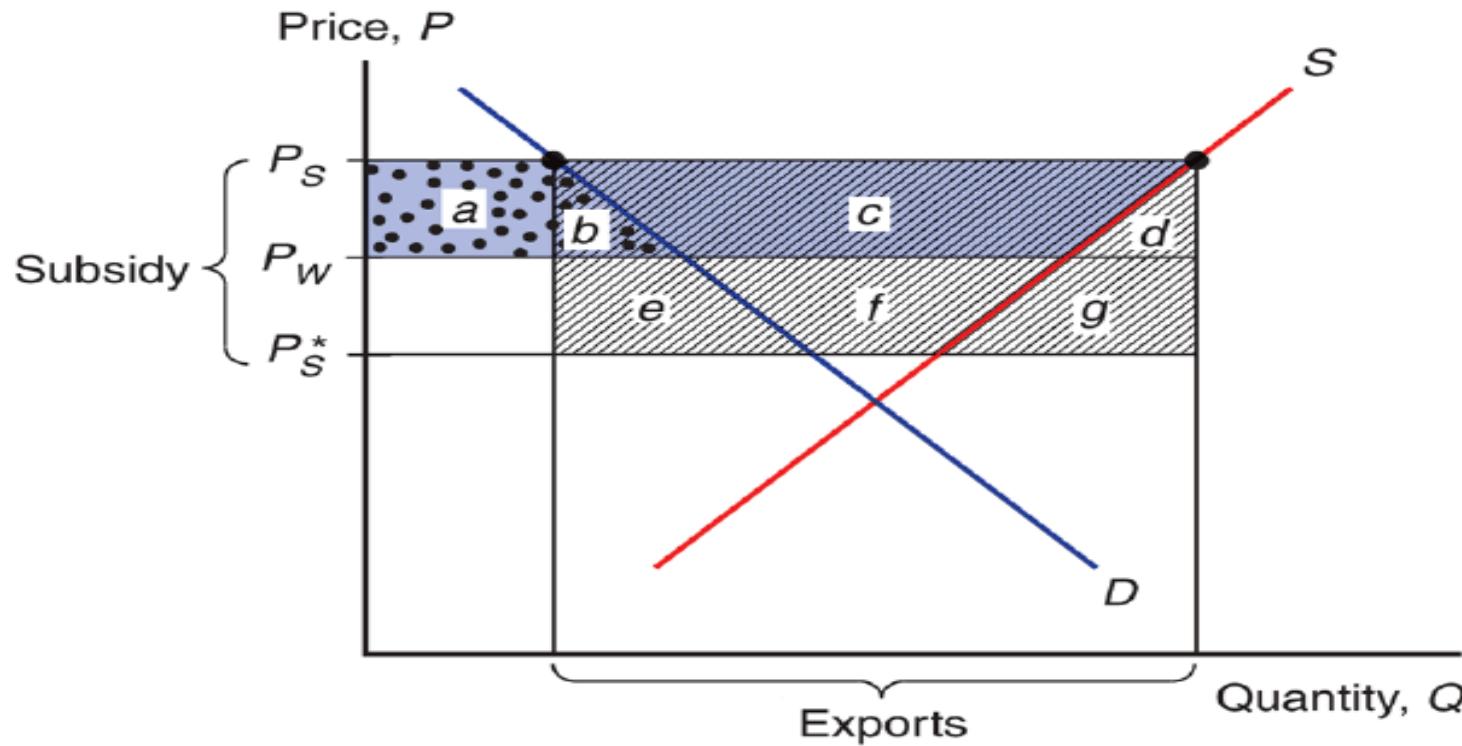
# Net Welfare effects of Tariff



# Export Subsidy

- An export subsidy can also be *specific* or *ad valorem*
- A specific subsidy is a payment per unit exported.
- An ad valorem subsidy is a payment as a proportion of the value exported.
- An export subsidy raises the price of a good in the exporting country, making its consumer surplus decrease (making its consumers worse off) and making its producer surplus increase (making its producers better off).
- Also, government revenue will decrease.

- An export subsidy raises the price of a good in the exporting country, while lowering it in foreign countries.
- In contrast to a tariff, an export subsidy worsens the terms of trade by lowering the price of domestic products in world markets.



= producer gain ( $a + b + c$ )

= consumer loss ( $a + b$ )

= cost of government subsidy  
( $b + c + d + e + f + g$ )

- An export subsidy unambiguously produces a negative effect on national welfare.
- The triangles  $b$  and  $d$  represent the **efficiency loss**.
  - The tariff distorts production and consumption decisions: producers produce too much and consumers consume too little compared to the market outcome.
- The area  $b + c + d + f + g$  represents the **cost of government subsidy**.
  - In addition, the terms of trade *decreases*, because the price of exports falls in foreign markets to  $P_s^*$ .

# Import Quota

- An import quota is a restriction on the quantity of a good that may be imported.
- This restriction is usually enforced by issuing licenses to domestic firms that import, or in some cases to foreign governments of exporting countries.
- A binding import quota will push up the price of the import because the quantity demanded will exceed the quantity supplied by domestic producers and from imports.
- When a quota instead of a tariff is used to restrict imports, the government receives no revenue.
  - Instead, the revenue from selling imports at high prices goes to quota license holders: either domestic firms or foreign governments.
  - These extra revenues are called **quota rents**.

# Voluntary Export Restraint

- A **voluntary export restraint** works like an import quota, except that the quota is imposed by the exporting country rather than the importing country.
  - However, these restraints are usually requested by the importing country.
  - The profits or rents from this policy are earned by foreign governments or foreign producers.
- Foreigners sell a restricted quantity at an increased price.

# Local Content Requirement

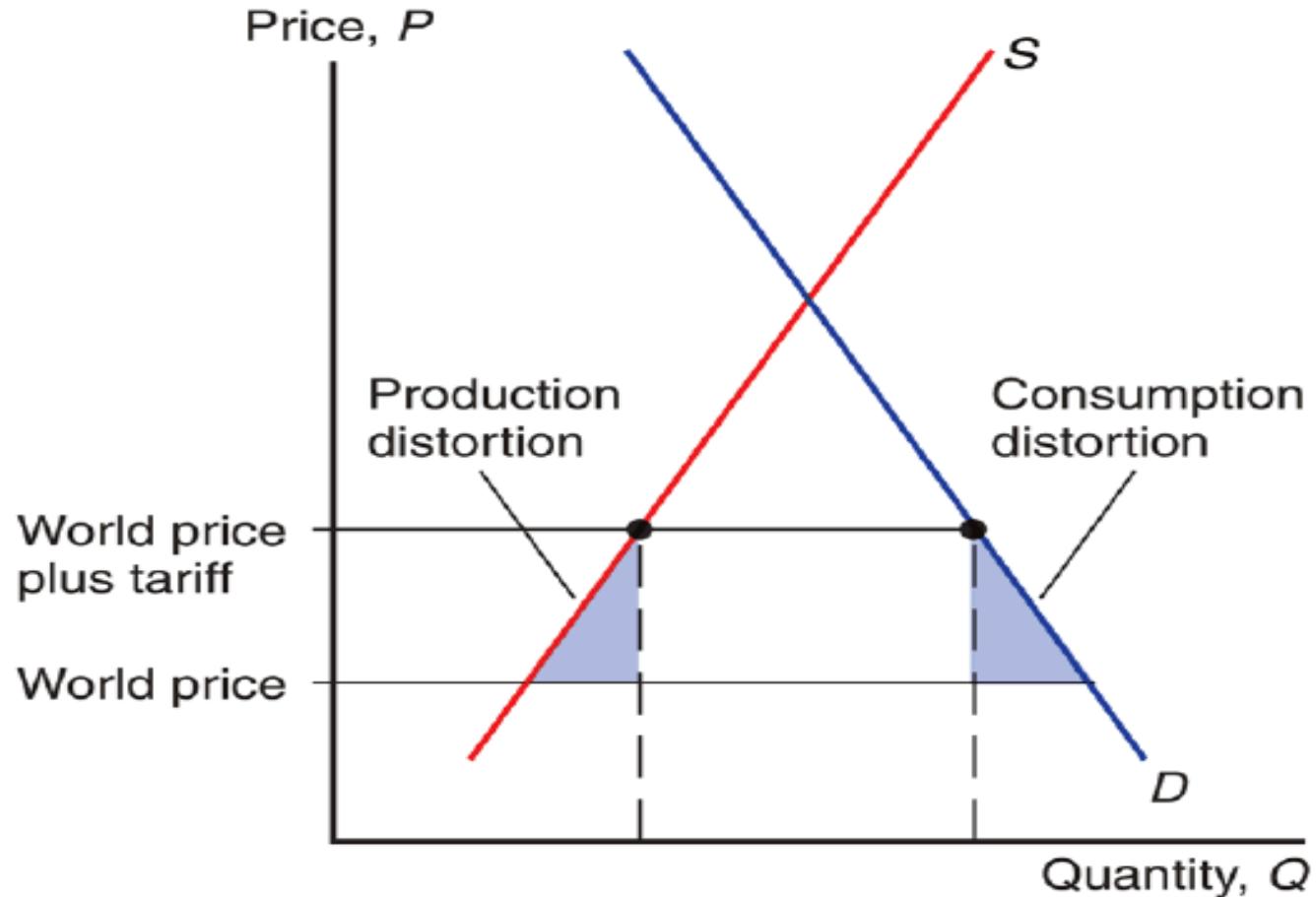
- A **local content requirement** is a regulation that requires a specified fraction of a final good to be produced domestically.
- It may be specified in value terms, by requiring that some minimum share of the value of a good represent domestic valued added, or in physical units.
- From the viewpoint of domestic producers of inputs, a local content requirement provides protection in the same way that an import quota would.
- From the viewpoint of firms that must buy domestic inputs, however, the requirement does not place a strict limit on imports, but allows firms to import more if they also use more domestic parts.

- Local content requirement provides neither government revenue (as a tariff would) nor quota rents.
- Instead the difference between the prices of domestic goods and imports is averaged into the price of the final good and is passed on to consumers.

# Case for Free Trade

- The first case for free trade is the argument that producers and consumers **allocate resources most efficiently** when governments do not distort market prices through trade policy.
  - National welfare of a small country is highest with free trade.
  - With restricted trade, consumers pay higher prices.
  - With restricted trade, distorted prices cause overproduction either by existing firms producing more or by more firms entering the industry.
- However, because tariff rates are already low for most countries, estimated benefits of moving to free trade are only a small fraction of national income for most countries.

# Efficiency case for Free Trade

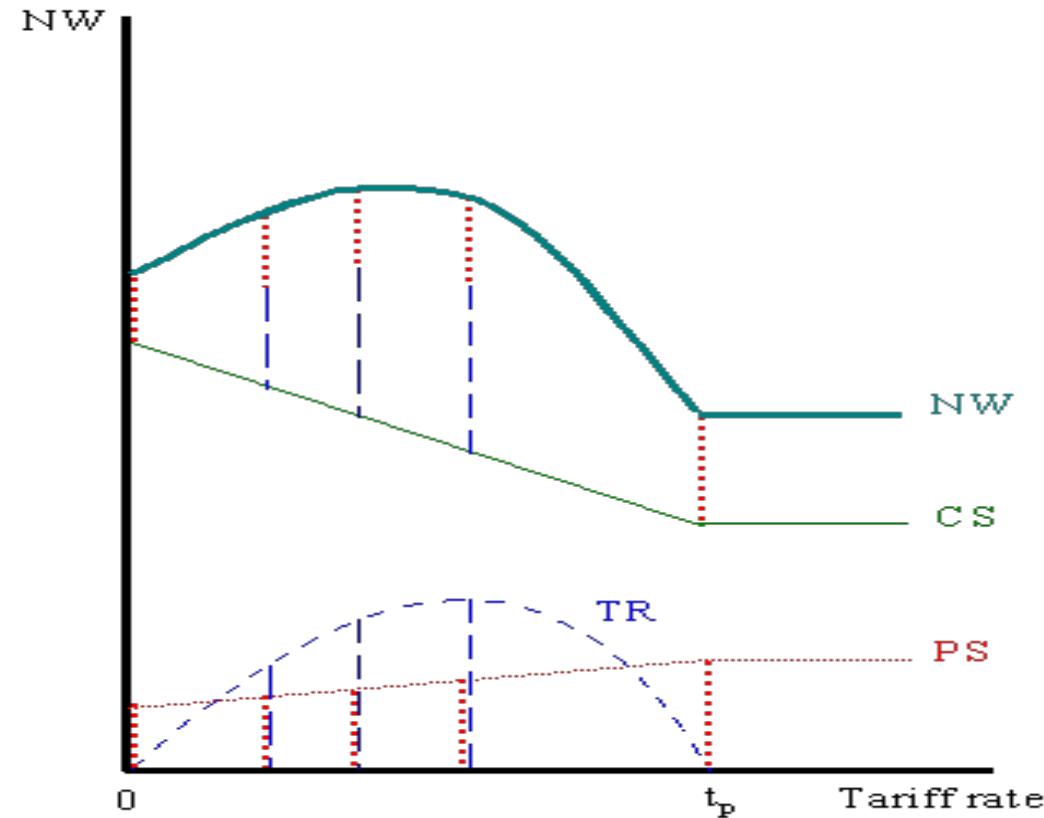


- A second argument for free trade is that it allows firms or industry to take advantage of **economies of scale**.
- A third argument for free trade is that it provides **competition and opportunities for innovation**.
- A fourth argument, called the **political argument for free trade**, says that free trade is the best *feasible* political policy, even though there may be better policies in principle.
- Any policy that deviates from free trade would be quickly manipulated by special interests, leading to decreased national welfare.

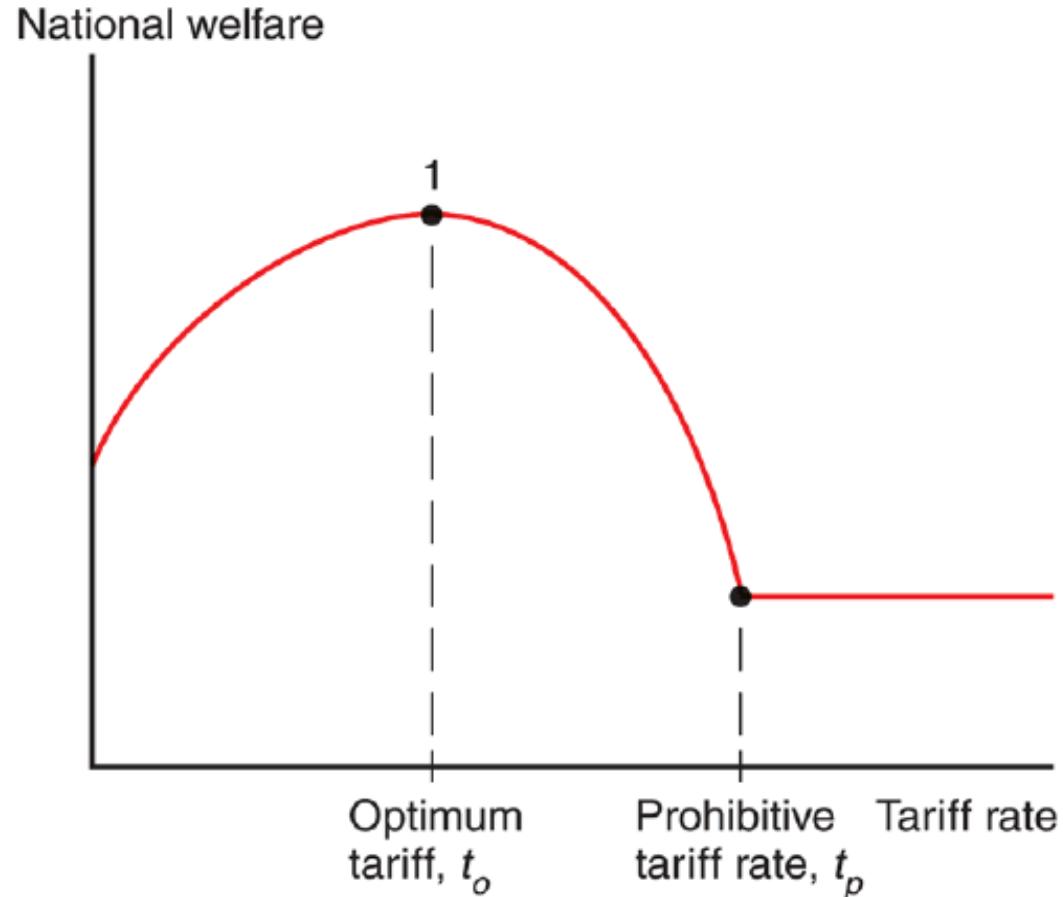
# Case Against Free Trade

- The possibility that a tariff could improve national welfare for a large country in international markets was first noted by **Robert Torrens (1844)**. Since the welfare improvement occurs only if the terms of trade gain exceeds the total deadweight losses, the argument is commonly known as the *Terms of Trade Argument* for protection.
- For a “large” country, a tariff or quota lowers the price of imports in world markets and generates a **terms of trade gain**.
  - This benefit may exceed production and consumption distortions.
- In fact, a small tariff will lead to an increase in national welfare for a large country.
  - But at some tariff rate, the national welfare will begin to decrease as the economic efficiency loss exceeds the terms of trade gain.

# Components of Welfare and Tariff

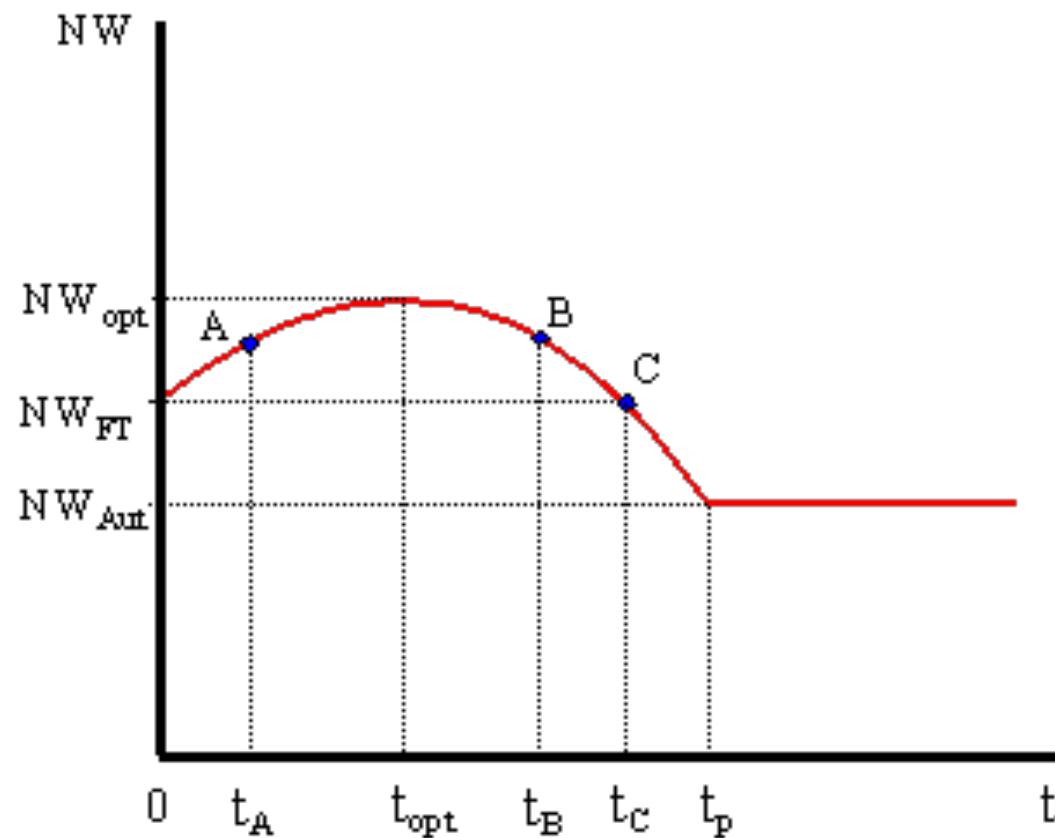


# Optimum Tariff



For a large country, there is an optimum tariff  $t_0$  at which the marginal gains from improved terms of trade just equals the marginal efficiency loss from production and consumption distortion.

# Trade liberalization?



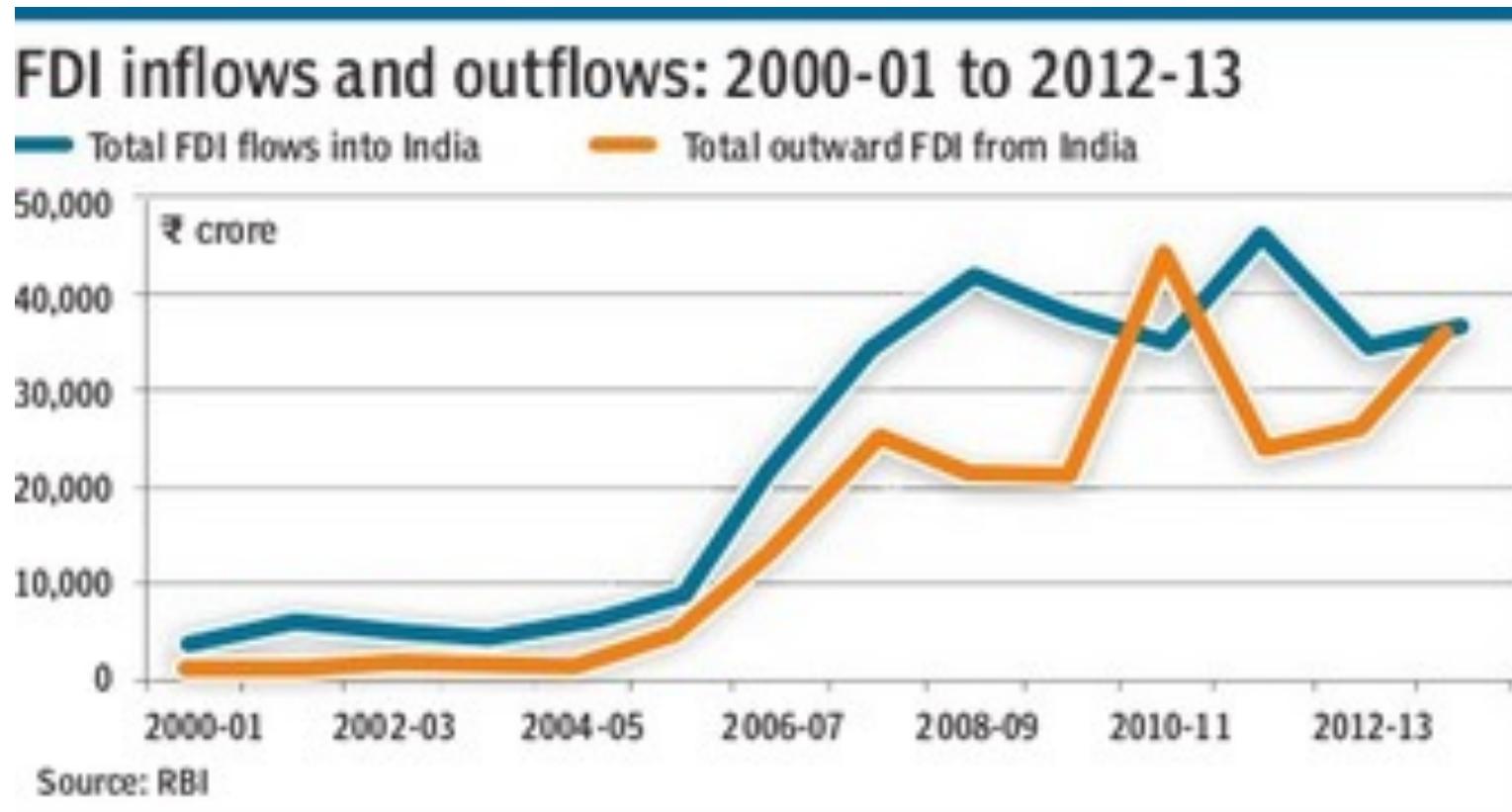
# International Resource Movements and MNCs

# Introduction

- We have dealt almost exclusively with commodity trade and have assumed no international resource movement. However, capital, labor, and technology do move across national boundaries.
- As in the case of international trade, the movement of productive resources from nations with relative abundance and low remuneration to nations with relative scarcity and high remuneration has a tendency to equalize factor returns internationally and generally increases welfare.
- International trade and movements of productive factors, however, have very different economic effects on the nations involved. Since multinational corporations are an important vehicle for the international flows of capital, labor, and technology, we also devote a great deal of attention to this relatively new and crucial type of economic enterprise.

- There are **two main types of foreign investments: portfolio investments and direct investments**. Portfolio investments are purely financial assets, such as bonds, denominated in a national currency. With bonds, the investor simply lends capital to get fixed payouts or a return at regular intervals and then receives the face value of the bond at a pre-specified date. Portfolio or financial investments take place primarily through financial institutions such as banks and investment funds.
- Direct investments, on the other hand, are real investments in factories, capital goods, land, and inventories where both capital and management are involved and the investor retains control over use of the invested capital. Direct investment usually takes the form of a firm starting a subsidiary or taking control of another firm (for example, by purchasing a majority of the stock)

# Inward and Outward FDI India



# Motives for International Capital Flows

- The basic motive for international portfolio investments is to earn higher returns abroad. Thus, residents of one country purchase bonds of another country if the returns on bonds are higher in the other country.
- The explanation that international portfolio investments occur to take advantage of higher yields abroad is certainly correct as far as it goes. The problem is that it leaves one important fact unexplained. It cannot account for *observed* two-way capital flows.
- To explain two-way international capital flows, the **element of risk** must be introduced. That is, investors are interested not only in the rate of return but also in the risk associated with a particular investment.

# Motives for Direct Foreign Investments

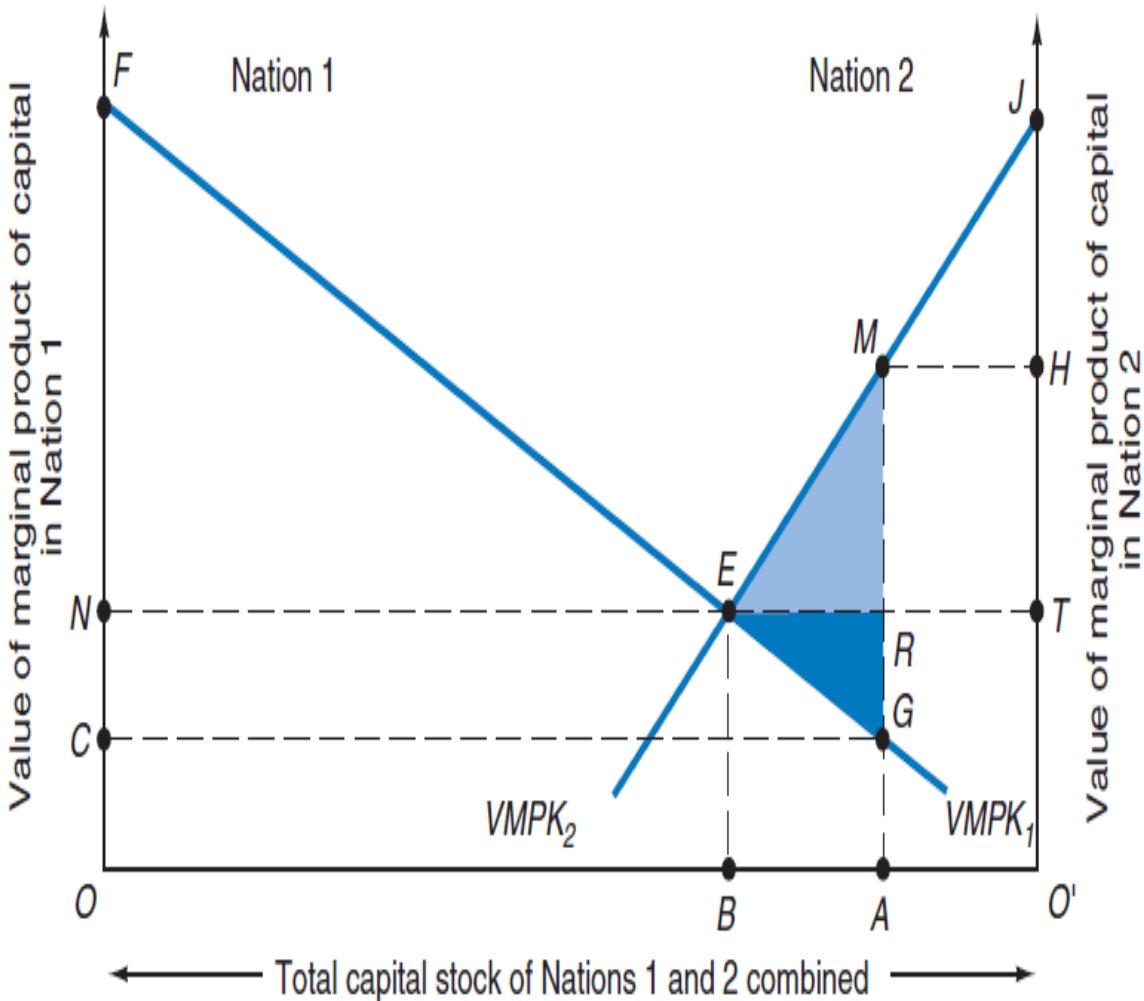
- The motives for direct investments abroad are generally the same as for portfolio investments, that is, to earn **higher returns** (possibly resulting from higher growth rates abroad, more **favourable tax treatment**, or greater availability of infrastructures) and to **diversify risks**.
- Although they cannot explain why the residents of a nation do not borrow from other nations and themselves make real investments in their own nation rather than accept *direct* investments from abroad.
- There are several possible explanations for this. The most important is that many large corporations (usually in monopolistic and oligopolistic markets) often have some unique production knowledge or managerial skill that could easily and profitably be utilized abroad and over which the corporation wants to retain direct control. In such a situation, the firm will make direct investments abroad. This involves **horizontal integration**, or the production abroad of a differentiated product that is also produced at home.

- Another important reason for direct foreign investments is to obtain control of a needed raw material and thus ensure an uninterrupted supply at the lowest possible cost. This is referred to as **vertical integration** and is the form of most direct foreign investments in developing countries and in some mineral-rich developed countries.
- Still other reasons for direct foreign investments are to **avoid tariffs** and other restrictions that nations impose on imports or to take advantage of various government subsidies to encourage direct foreign investments.
- Other possible reasons for direct foreign investments are to enter a foreign oligopolistic market so as to share in the profits, to purchase a promising foreign firm to avoid its future competition and the possible loss of export markets, or because only a large foreign multinational corporation can obtain the necessary financing to enter the market.

- Two-way direct foreign investments can then be explained by some industries being more advanced in one nation (such as the computer industry in the United States), while other industries are more efficient in other nations (such as the automobile industry in Japan).
- Direct foreign investments have been greatly facilitated (in a sense made possible) by the very rapid advances in transportation (i.e., jet travel) and communications (i.e., international telephone lines and international data transmission and processing) that have occurred since the end of World War II.
- These advances permit the headquarters of multinational corporations to exert immediate and direct control over the operations of their subsidiaries around the world, thus facilitating and encouraging direct investments abroad.

# Welfare Effects of International Capital Flows

- We examine the welfare effects of international capital flows on the investing and host countries. In order to isolate the effect of capital flows, we assume here that there is no trade in goods.
- The  $VMPK_1$  and  $VMPK_2$  curves give the value of the marginal product of capital in Nation 1 and Nation 2, respectively, for various levels of investments. Under competitive conditions, the value of the marginal product of capital represents the return, or yield, on capital.



Of the total capital stock of  $O O'$ , Nation 1 holds  $O A$  and its total output is  $O F G A$ , while Nation 2 holds  $O' A$  and its total output is  $O' J M A$ .

The transfer of  $A B$  of capital from Nation 1 to Nation 2 equalizes the return on capital in the two nations at  $B E$ . This increases world output by  $E G M$  (the shaded area), of which  $E G R$  accrues to Nation 1 and  $E R M$  to Nation 2.

Of the increase in total domestic product of  $A B E M$  in Nation 2,  $A B E R$  goes to foreign investors, leaving  $E R M$  as the net gain in domestic income in Nation 2.

- From the point of view of the world as a whole (i.e., the two nations combined), total product increased from by  $ERG + ERM = EGM$  (the shaded area of the figure). Thus, **international capital flows increase the efficiency in the allocation of resources internationally and increase world output and welfare.**
- Note that the steeper the  $VMPK_1$  and  $VMPK_2$  curves are, the greater is the total gain from international capital flows.

# Other Effects

- Assuming two factors of production, capital and labor, both fully employed before and after the capital transfer, it can be seen that the total and average return on capital increases, whereas the total and average return to labour decreases in the investing country.
- While the investing country as a whole gains from investing abroad, there is a redistribution of domestic income from labour to capital. It is for this reason that organized labour in developed countries is opposed to investments abroad. On the other hand, while the host country also gains from receiving foreign investments, these investments lead to a redistribution of domestic income from capital to labour.
- If we allow for less than full employment, **foreign investments tend to depress the level of employment in the investing country** and increase it in the host country and, once again, can be expected to be opposed by labour in the former and to benefit labour in the latter.

- International capital transfers also affect the balance of payments of the investing and host countries. A nation's balance of payments measures its total receipts from and total expenditures in the rest of the world.
- In the year in which the foreign investment takes place, the foreign expenditures of the investing country increase and cause a balance-of-payments deficit (an excess of expenditures abroad over foreign receipts).
- The initial capital transfer and increased expenditures abroad of the investing country are likely to be mitigated by increased exports of capital goods, spare parts, and other products of the investing country, and by the subsequent flow of profits to the investing country. It has been estimated that the “payback” period for the initial capital transfer is between five and ten years on average.

- Another effect to consider in the long run is whether foreign investments will lead to the replacement of the investing country's exports and even to imports of commodities previously exported. Thus, **while the immediate effect on the balance of payments is negative in the investing country and positive in the host country, the long-run effects are less certain.**
- Since foreign investments for most developed countries are two-way, these short-run and long-run balance-of-payments effects are mostly neutralized, except for the United Kingdom, the United States, Germany, and Japan, with investments abroad greatly exceeding foreign investments received, and for most developing countries that are primarily recipients of foreign investments and chronically face serious balance-of-payments difficulties.

# Multinational Corporations

- One of the most significant international economic developments of the postwar period is the proliferation of multinational corporations (MNCs). These are firms that own, control, or manage production facilities in several countries. Today **MNCs account for about 25 percent of world output**, and *intrafirm* trade (i.e., trade among the parent firm and its foreign affiliates) is estimated to be about one-third of total world trade in manufacturing.
- The basic reason for the existence of MNCs is the competitive advantage of a global network of production and distribution. This competitive advantage arises in part from **vertical and horizontal integration** with foreign affiliates. By vertical integration, most MNCs can ensure their supply of foreign raw materials and intermediate products.
- By horizontal integration through foreign affiliates, MNCs can better protect and exploit their monopoly power, adapt their products to local conditions and tastes, and ensure consistent product quality.

- The competitive advantage of MNCs is also based on economies of scale in production, financing, research and development (R&D), and the gathering of market information. The large output of MNCs allows them to carry division of labor and specialization in production much further than smaller national firms.
- Product components requiring only unskilled labor can be produced in low-wage nations and shipped elsewhere for assembly.
- Furthermore, MNCs and their affiliates usually have greater access, at better terms, to international capital markets than do purely national firms.

- The large corporation invests abroad when expected profits on additional investments in its industry are higher abroad. That is, differences in expected rates of profits domestically and abroad in the particular industry are of crucial importance in a large corporation's decision to invest abroad. This explains, for example, Toyota automotive investments in the United States and IBM computer investments in Japan.
- Finally, by artificially overpricing components shipped *to* an affiliate in a higher-tax nation and underpricing products shipped *from* the affiliate in the high-tax nation, an MNC can minimize its tax bill. This is called **transfer pricing** and can arise in intrafirm trade as opposed to trade among independent firms or conducted at "arm's length."

# Problems with MNCs (at home)

- The most controversial of the alleged harmful effects of MNCs on the home nation is the **loss of domestic jobs** resulting from foreign direct investments. These are likely to be unskilled and semiskilled production jobs in which the home nation has a comparative disadvantage.
- A related problem is the export of advanced technology to be combined with other cheaper foreign factors to maximize corporate profits. It is claimed that this may **undermine the technological superiority** and future of the home nation.
- Another possible harmful effect of MNCs on the home country can result from transfer pricing and similar practices, and from shifting their operations to lower-tax nations, which **reduces tax revenues** and erodes the tax base of the home country.

# In Host countries

- Foreign domination is felt in many different ways in host countries, including
  - the unwillingness of a local affiliate of an MNC to export to a nation deemed unfriendly to the home nation or the requirement to comply with a *home-nation* law prohibiting such exports
  - the borrowing of funds abroad to circumvent tight domestic credit conditions and the lending of funds abroad when interest rates are low at home; and
  - the effect on national tastes of large-scale advertising for such products as Coca-Cola, jeans, and so on.

- In developing nations, foreign direct investments by MNCs in mineral and raw material production have often given rise to complaints of
  - foreign exploitation in the form of low prices paid to host nations
  - the use of highly capital-intensive production techniques inappropriate for labor-abundant developing nations
  - lack of training of local labor
  - overexploitation of natural resources, and
  - creating highly dualistic “enclave” economies.

- Most of these complaints are to some extent true, particularly in the case of developing host countries, and they have led many host nations to regulate foreign investments in order to mitigate the harmful effects and increase the possible benefits. Thus, Canada imposed higher taxes on foreign affiliates with less than 25 percent Canadian interest.
- **India specified the sectors in which direct foreign investments are allowed** and set rules to regulate their operation. Some developing nations allow only *joint ventures* (i.e., local equity participation) and set rules for the transfer of technology and the training of domestic labor, impose limits on the use of imported inputs and the remission of profits, set environmental regulations, and so on.

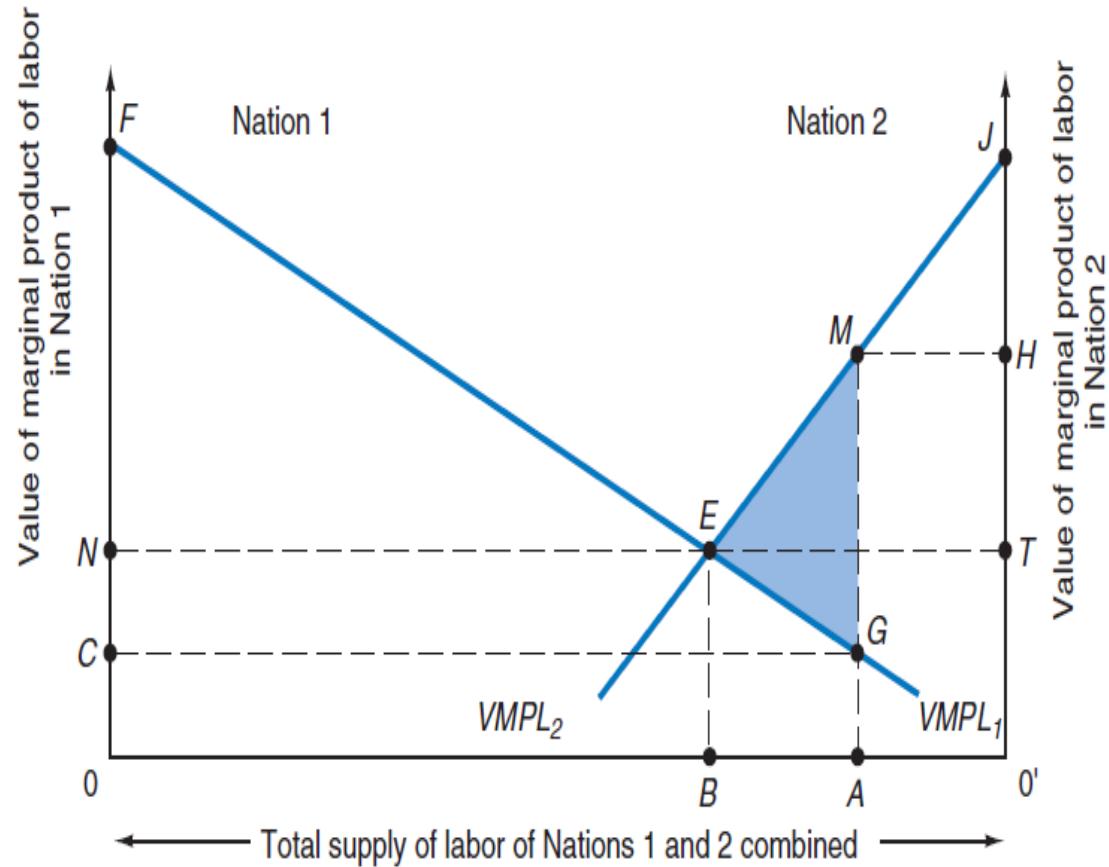
# International Labour Migration

- Some of the international migrations that occurred in the nineteenth century and earlier were certainly motivated by the desire to escape political and religious oppression in Europe.
- However, most international labor migration, particularly since the end of World War II, has been motivated by the prospect of earning higher real wages and income abroad.
- Migration, just like any other type of investment, involves both costs and benefits. The **costs include the expenditures for transportation and the loss of wages during time spent relocating** and searching for a job in the new nation. In addition, there are many other less quantifiable costs.

- The **economic benefits of international migration** can be measured by the higher real wages and income that the migrant worker can earn abroad during his or her remaining working life, over and above what he or she could have earned at home. Other benefits may be greater educational and job opportunities for the migrants' children.
- From the excess of returns over costs, an internal rate of return for the migration decision can be estimated, just as for any other type of investment. If this rate of return is sufficiently high to also overcome the noneconomic costs associated with migration, then the worker will migrate.

# Welfare Effects of International Labour Migration

- We examine the welfare effects of international labour migration on the investing and host countries.
- The welfare effects of international labour migration on the nations of emigration and immigration can be analyzed with the same diagrammatic technique used to analyze the welfare effects of international capital movements.
- The  $VMPL_1$  and  $VMPL_2$  curves give the value of the marginal product of labour in Nation 1 and Nation 2, respectively. Under competitive conditions,  $VMPL$  represents the wages of labour.



With a supply of labor of OA, Nation 1 has a real wage rate of OC and a total output of OFGA. With a supply of labor of O'A, Nation 2 has a real wage rate of O'H and a total output of O'JMA.

The migration of AB of labor from Nation 1 to Nation 2 equalizes real wages in the two nations at BE. This reduces total output to OFEB in Nation 1 and increases it in Nation 2 to O'JEB, for a net increase in world output of EGM (the shaded area).

- The question then arises as to the welfare effects of the migration of a highly skilled worker on the nations of emigration and immigration. These welfare effects are likely to be significantly different from those arising from the migration of unskilled labour.
- Indeed, more and more U.S. high-tech industries, from semiconductors to biotechnology, are depending on immigrant scientists and engineers to remain competitive in the increasingly global marketplace. The problem of the migration of highly skilled workers is vividly conveyed by the term **brain drain**.

# Balance of Payments

# Introduction

- The balance of payments is a summary statement in which, in principle, all the transactions of the residents of a nation with the residents of all other nations are recorded during a particular period of time, usually a calendar year.
- The main purpose of the balance of payments is to inform the government of the international position of the nation and to help it in its formulation of monetary, fiscal, and trade policies.
- Governments also regularly consult the balance of payments of important trade partners in making policy decisions.

- As a *summary statement*, the balance of payments aggregates all merchandise trade into a few major categories. Similarly, only the net balance of each type of international capital flow is included.
- Furthermore, the balance of payments includes some transactions in which the residents of foreign nations are not directly involved—for example, when a nation's central bank sells a portion of its foreign currency holdings to the nation's commercial banks.
- An *international transaction* refers to the exchange of a good, service, or asset (for which payment is usually required) between the residents of one nation and the residents of other nations. However, gifts and certain other transfers (for which no payment is required) are also included in a nation's balance of payments.

- The ***current account*** records trade in goods and services, as well as transfer payments. The *trade balance* simply records trade in goods. Services include freight, royalty payments, and interest payments.
- Services also include *net investment income*, the interest and profits on our assets abroad less the income foreigners earn on assets they own in India. Transfer payments consist of remittances, gifts, and grants. Adding trade in services and net transfers to the trade balance, we arrive at the current account balance.
- The current account is in *surplus* if exports exceed imports plus net transfers to foreigners, that is, if receipts from trade in goods and services and transfers exceed payments on this account.
- The ***capital account*** records purchases and sales of assets, such as stocks, bonds, and land. There is a capital account surplus—also called a net capital inflow—when our receipts from the sale of stocks, bonds, land, bank deposits, and other assets exceed our payments for our own purchases of foreign assets.

# Accounting principles

- International transactions are classified as credits or debits. Credit transactions are those that involve the receipt of payments *from* foreigners. Debit transactions are those that involve the making of payments *to* foreigners. Credit transactions are entered with a positive sign, and debit transactions are entered with a negative sign in the nation's balance of payments.
- The export of goods and services, the receipt of unilateral transfers, and financial inflows are credits (+) because they all involve the receipt of payments from foreigners. On the other hand, the import of goods and services, unilateral transfers to foreigners, and financial outflows are debits (-) because they involve payments to foreigners.
- Financial inflows can take either of two forms: an increase in foreign assets in the nation or a reduction in the nation's assets abroad.

# Double entry bookkeeping

- In recording a nation's international transactions, the accounting procedure known as double-entry bookkeeping is used. This means that **each international transaction is recorded twice**, once as a credit and once as a debit of an equal amount. The reason for this is that in general every transaction has two sides.
- Examples

# External Accounts must balance

- The central point of international payments is very simple: Individuals and firms have to pay for what they buy abroad. If a person spends more than her income, her deficit needs to be financed by selling assets or by borrowing.
- Similarly, if a country runs a deficit in its current account, spending more abroad than it receives from sales to the rest of the world, the deficit needs to be financed by selling assets or by borrowing abroad.
- This selling or borrowing implies that the country is running a capital account surplus. Thus, any current account deficit is of necessity *financed* by an offsetting capital inflow:

$$\text{Current account} + \text{Capital account} = 0$$

- If a country has no assets to sell, if it has no foreign currency reserves to use up, and if nobody will lend to it, the country *has* to achieve balance in its current account, however painful and difficult that may be.

- It is often useful to split the capital account into two separate parts: (1) the transactions of the country's private sector and (2) official reserve transactions, which correspond to the central bank's activities.
- A current account deficit can be financed by private residents selling off assets abroad or borrowing abroad. Alternatively, or as well, a current account deficit can be financed by the government, which runs down its reserves of foreign exchange, selling foreign currency in the foreign exchange market.
- Conversely, when there is a surplus, the private sector may use the foreign exchange revenues it receives to pay off debt or buy assets abroad; alternatively, the central bank can buy the (net) foreign currency earned by the private sector and add that currency to its reserves.
- **The increase in official reserves is also called the overall *balance-of-payments surplus***. We can summarize our discussion in the following statement:

**Balance-of-payments surplus = increase in official exchange reserves**  
=current account surplus + net private capital inflow

- If both the current account and the private capital account are in deficit, then the overall balance of payments is in deficit; that is, the central bank is losing reserves.
- When one account is in surplus and the other is in deficit to precisely the same extent, the overall balance of payments is zero—neither in surplus nor in deficit.

- Several important points must be kept in mind in examining a nation's balance of payments. First, too much attention is generally placed on the balance on goods and on short-term data. The reason may be that data on the quarterly trade balance on goods are the first to become available.
- It is also dangerous to extrapolate for the year based on quarterly data. Even the notion of a positive trade balance on goods being favourable is somewhat misleading because a positive trade balance means that the nation has fewer goods to consume domestically.
- On the other hand, a large and persistent trade deficit (say, in excess of 2 or 3 percent of GDP) may not be sustainable in the long run for an individual country.

# Foreign Exchange Markets and Exchange Rates

# Introduction

- The foreign exchange market is the market in which individuals, firms, and banks buy and sell foreign currencies or foreign exchange. The foreign exchange market for any currency—say, the U.S. dollar—is comprised of all the locations (such as London, Paris, Zurich, Frankfurt, Singapore, Hong Kong, Tokyo, and New York) where dollars are bought and sold for other currencies.
- These different monetary centers are connected electronically and are in constant contact with one another, thus forming a single international foreign exchange market.

- The principal function of foreign exchange markets is the **transfer of funds or purchasing power** from one nation and currency to another. This is usually accomplished by an electronic transfer and increasingly through the Internet.
- A nation's commercial banks operate as ***clearing houses*** for the foreign exchange demanded and supplied in the course of foreign transactions by the nation's residents. In the absence of this function, a Indian importer needing British pounds, for instance, would have to locate a Indian exporter with pounds to sell.
- A nation pays for its tourist expenditures abroad, its imports, its investments abroad, and so on with its foreign exchange earnings from tourism, exports, and the receipt of foreign investments.

- If the nation's total demand for foreign exchange in the course of its foreign transactions exceeds its total foreign exchange earnings, the **rate at which currencies exchange for one another will have to change** to equilibrate the total quantities demanded and supplied. If such an adjustment in the exchange rates were not allowed, the nation's commercial banks would have to borrow from the nation's central bank. The nation's central bank would then act as the "lender of last resort" and draw down its foreign exchange reserves (**a balance-of-payments deficit** of the nation).
- On the other hand, if the nation generated an excess supply of foreign exchange in the course of its business transactions with other nations (and if adjustment in exchange rates were not allowed), this excess supply would be exchanged for the national currency at the nation's central bank, thus increasing the nation's foreign currency reserves (**a balance-of-payments surplus**).

- Four *levels* of transactors or participants can be identified in foreign exchange markets. At the bottom, or at the first level, are such traditional users as tourists, importers, exporters, investors, and so on. These are the immediate users and suppliers of foreign currencies.
- At the next, or second, level are the commercial banks, which act as clearing houses between users and earners of foreign exchange. At the third level are foreign exchange brokers, through whom the nation's commercial banks even out their foreign exchange inflows and outflows among themselves (the so-called *interbank or wholesale market*).
- Finally, at the fourth and highest level is the nation's central bank, which acts as the seller or buyer of last resort when the nation's total foreign exchange earnings and expenditures are unequal. The central bank then either draws down its foreign exchange reserves or adds to them.

- Today the U.S. dollar is the dominant international currency, serving as a unit of account, medium of exchange, and store of value not only for domestic transactions but also for private and official international transactions.
- The US dollar is a **vehicle currency**; that is, the dollar is also used for transactions that do not involve the United States at all, as, for example, when a Brazilian importer uses dollars to pay a Japanese exporter.

# Relative importance of major currencies

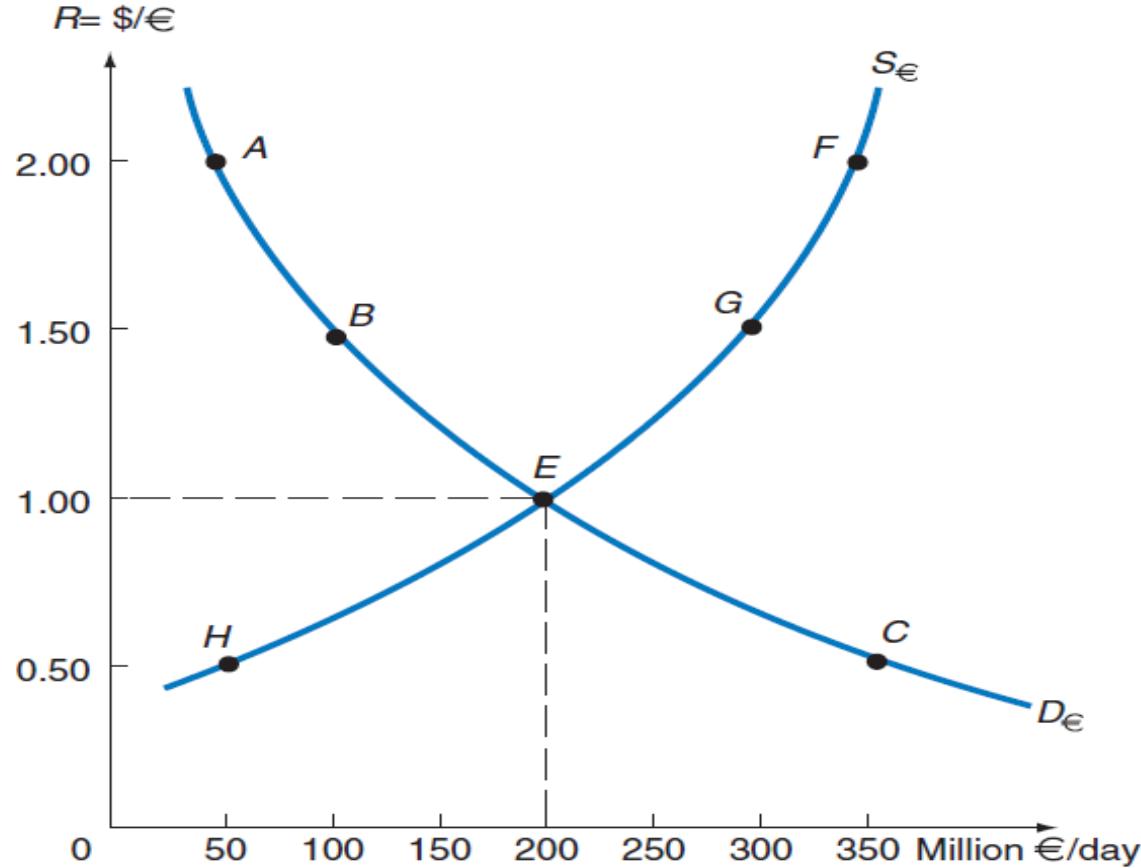
	Foreign Exchange Trading <sup>a</sup>	International Bank Loans <sup>a</sup>	International Bond Offering <sup>a</sup>	Trade Invoicing <sup>b</sup>	Foreign Exchange Reserves <sup>c</sup>
U.S. dollar	42.5	58.2	38.2	52.0	61.5
Euro	19.6	21.4	45.1	24.8	26.2
Japanese yen	9.5	3.0	3.8	4.7	3.8
Pound sterling	6.5	5.5	8.0	5.4	4.0
Swiss franc	3.2	2.1	1.5	na	0.1
Other currencies	18.7	9.8	4.4	13.1	4.4

- Another function of foreign exchange markets is the **credit function**. Credit is usually needed when goods are in transit and also to allow the buyer time to resell the goods and make the payment. In general, exporters allow 90 days for the importer to pay.
- Still another function of foreign exchange markets is to provide the facilities for **hedging and speculation**. Today, about 90 percent of foreign exchange trading reflects purely financial transactions and only about 10 percent trade financing.

# Foreign Exchange Rates

- Assume for simplicity that there are only two economies, the United States and the European Monetary Union (EMU), with the dollar (\$) as the domestic currency and the euro (€) as the foreign currency. The exchange rate ( $R$ ) between the dollar and the euro is equal to the number of dollars needed to purchase one euro.
- Under a flexible exchange rate system of the type we have today, the dollar price of the euro ( $R$ ) is determined, just like the price of any commodity, by the intersection of the market demand and supply curves for euros.

# Exchange rate under flexible rate system



- If the exchange rate were not allowed to rise to its equilibrium level (as under the fixed exchange rate system that prevailed until March 1973), then either restrictions would have to be imposed on the demand for euros of U.S. residents or the U.S. central bank (the Federal Reserve System) would have to fill or satisfy the excess demand for euros out of its international reserves.
- The U.S. demand for euros is negatively inclined, indicating that the lower the exchange rate ( $R$ ), the greater the quantity of euros demanded by U.S. residents.
- On the other hand, the U.S. supply of euros is usually positively inclined indicating that the higher the exchange rate ( $R$ ), the greater the quantity of euros earned by U.S. residents and supplied to the United States.

- If the U.S. demand curve for euros shifted up (for example, as a result of increased U.S. tastes for EMU goods), the dollar is then said to have depreciated. Depreciation thus refers to an increase in the domestic price of the foreign currency.
- Conversely, if the U.S. demand curve for euros shifted down so as to intersect the U.S. supply curve for euros, the dollar is said to have appreciated (because fewer dollars are now required to purchase one euro). Appreciation thus refers to a decline in the domestic price of the foreign currency.
- An appreciation of the domestic currency means a depreciation of the foreign currency and vice versa.

- While we have dealt with only two currencies for simplicity, in reality there are numerous exchange rates, one between any pair of currencies. Once the exchange rate between each of a pair of currencies with respect to the dollar is established, however, the exchange rate between the two currencies themselves, or **cross-exchange rate**, can easily be determined.
- We must also distinguish between the nominal exchange rate and the real exchange rate.
- Since over time a currency can depreciate with respect to some currencies and appreciate against others, an **effective exchange rate** is calculated. This is a weighted average of the exchange rates between the domestic currency and that of the nation's most important trade partners, with weights given by the relative importance of the nation's trade with each of these trade partners.

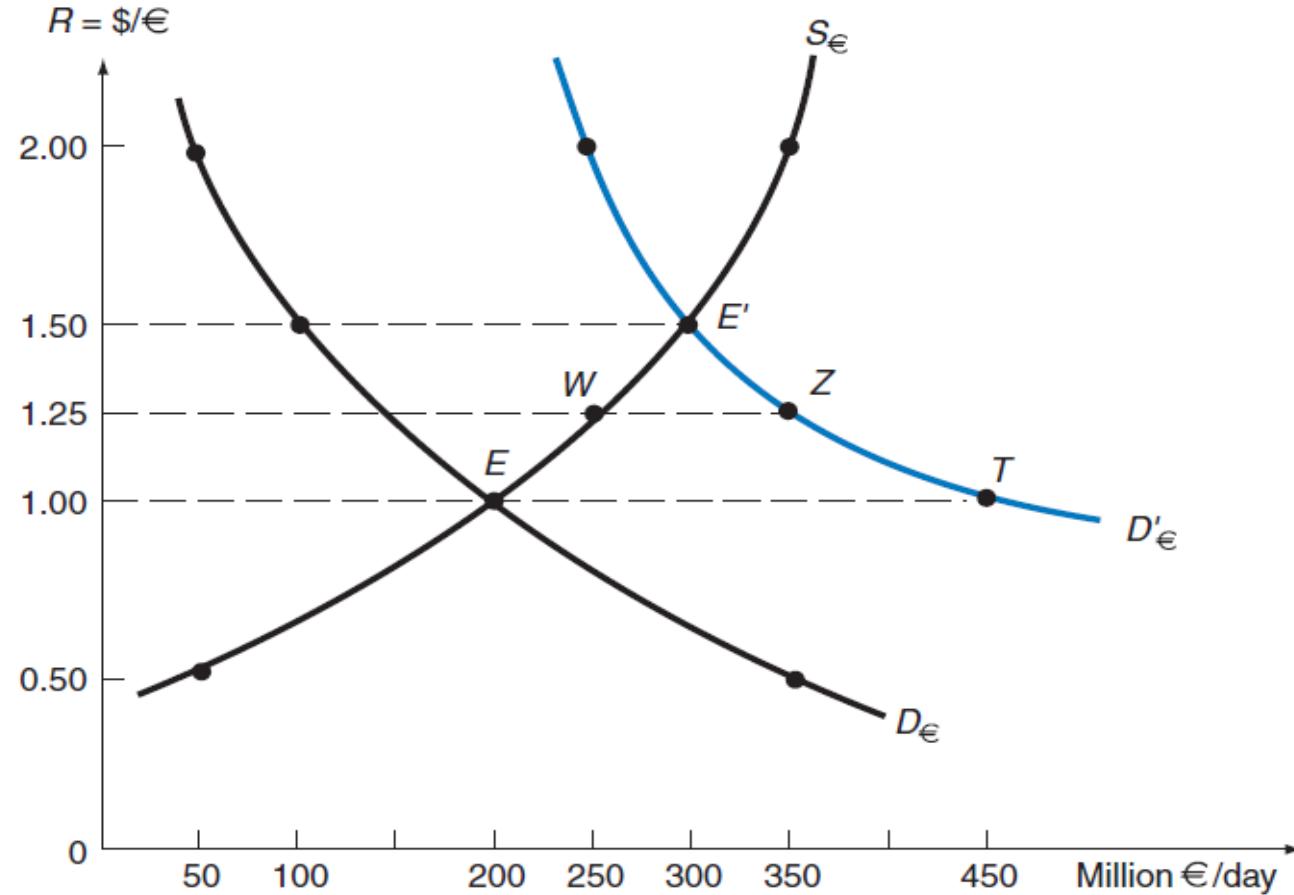
# Arbitrage

- The exchange rate between any two currencies is kept the same in different monetary centers by arbitrage. This refers to the purchase of a currency in the monetary center where it is cheaper, for immediate resale in the monetary center where it is more expensive, in order to make a profit.
- When only two currencies and two monetary centers are involved in arbitrage, as in the preceding example, we have *two-point arbitrage*. When three currencies and three monetary centers are involved, we have *triangular, or three-point, arbitrage*.
- Arbitrage increases the demand for the currency in the monetary center where the currency is cheaper, increases the supply of the currency in the monetary center where the currency is more expensive, and quickly eliminates inconsistent cross rates and the profitability of further arbitrage.

# Exchange rate and Balance of Payments

- We have seen that the U.S. demand for euros arises from the U.S. demand for imports of goods and services from the European Union and from U.S. investments in the European Monetary Union (a capital outflow from the United States). These are the autonomous debit transactions of the United States that involve payments to the European Monetary Union.
- On the other hand, the supply of euros arises from U.S. exports of goods and services to the European Monetary Union and from the EMU investments in the United States (a capital inflow to the United States). These are the autonomous credit transactions of the United States that involve payments from the European Monetary Union.

# Disequilibrium under fixed and flexible systems



- With  $D_\epsilon$  and  $S_\epsilon$ , the equilibrium exchange rate is  $R = \$/\epsilon = 1$  (point  $E$ ) at which  $\epsilon$  200 million are demanded and supplied per day. Now suppose that for whatever reason (such as an increase in U.S. tastes for EMU products) the U.S. autonomous demand for euros shifts up to  $D'_\epsilon$
- If the United States wanted to maintain the exchange rate fixed at  $R = 1$ , U.S. monetary authorities would have to satisfy the excess demand for euros of  $TE$  ( $\epsilon$  250 million per day) out of its official reserve holdings of euros. the U.S. official settlements balance would show a deficit of  $\epsilon$  250 million at  $R=1$

- Under a freely flexible exchange rate system, the exchange rate would rise (i.e., the dollar would depreciate) from  $R = 1.00$  to  $R = 1.50$ , at which the quantity of euros demanded (€ 300 million per day) exactly equals the quantity supplied.
- In this case, the United States would not lose any of its official euro reserves. Indeed, international reserves would be entirely unnecessary under such a system (€ 300 million exactly equals the quantity supplied (point  $E$ ).

- However, under a **managed floating exchange rate system** of the type in operation since 1973, U.S. monetary authorities can intervene in foreign exchange markets to moderate the depreciation (or appreciation) of the dollar. For instance, the United States might limit the depreciation of the dollar to  $R = 1.25$  (instead of letting the dollar depreciate all the way to  $R = 1.50$  as under a freely fluctuating exchange rate system).
- Under such a system, part of the potential deficit in the balance of payments is covered by the loss of official reserve asset, and part is reflected in the form of a depreciation of the currency.

# Spot and Forward Rates

- The most common type of foreign exchange transaction involves the payment and receipt of the foreign exchange within two business days after the day the transaction is agreed upon.
- The two-day period gives adequate time for the parties to send instructions to debit and credit the appropriate bank accounts at home and abroad. This type of transaction is called a ***spot transaction***, and the exchange rate at which the transaction takes place is called the spot rate.
- Besides spot transactions, there are forward transactions. A ***forward transaction*** involves an agreement today to buy or sell a specified amount of a foreign currency at a specified future date at a rate agreed upon today.

- The equilibrium forward rate is determined at the intersection of the market demand and supply curves of foreign exchange *for future delivery*. The demand for and supply of forward foreign exchange arise in the course of hedging, from foreign exchange speculation, and from covered interest arbitrage.
- At any point in time, the forward rate can be equal to, above, or below the corresponding spot rate. If the forward rate is below the present spot rate, the foreign currency is said to be at a **forward discount** with respect to the domestic currency. However, if the forward rate is above the present spot rate, the foreign currency is said to be at a forward premium.

# Foreign Exchange Swaps

- A foreign exchange swap refers to a spot sale of a currency combined with a forward repurchase of the same currency—as part of a single transaction.
- An Foreign Exchange (FX) swap agreement is a contract in which one party borrows one currency from, and simultaneously lends another to, the second party. Each party uses the repayment obligation to its counterparty as collateral and the **amount of repayment is fixed at the FX forward rate** as of the start of the contract. Thus, FX swaps can be viewed as FX risk-free collateralized borrowing/lending.
- For example, at the start of the contract, A borrows  $X \cdot S$  USD from, and lends  $X$  EUR to, B, where  $S$  is the FX spot rate. When the contract expires, A returns  $X \cdot F$  USD to B, and B returns  $X$  EUR to A, where  $F$  is the FX forward rate as of the start

- FX swaps have been employed to raise foreign currencies, both for financial institutions and their customers, including exporters and importers, as well as institutional investors who wish to hedge their positions. They are also frequently used for speculative trading, typically by combining two offsetting positions with different original maturities.
- A **cross-currency basis swap agreement** is a contract in which one party borrows one currency from another party and simultaneously lends the same value, **at current spot rates**, of a second currency to that party. The parties involved in basis swaps tend to be financial institutions, either acting on their own or as agents for non-financial corporations. When the contract expires, A returns  $X \cdot S$  USD to B, and B returns X EUR to A, where S is the same FX spot rate as of the start of the contract.

# Currency Futures and Options

- A foreign exchange futures is a forward contract for standardized currency amounts and selected calendar dates traded on an organized market (exchange).
- The *futures market* differs from a forward market in that in the futures market **only a few currencies are traded**; trades occur in **standardized contracts** only, for a few specific delivery dates, and are subject to daily limits on exchange rate fluctuations; and trading takes place only in a few geographical locations, such as Chicago, New York, London, Frankfurt, and Singapore.
- Futures contracts are usually for smaller amounts than forward contracts and thus are more useful to small firms than to large ones but are somewhat more expensive. **Futures contracts can also be sold at any time up until maturity** on an organized futures market, while forward contracts cannot.

- A foreign exchange option is a contract giving the purchaser **the right, but not the obligation**, to buy (a *call option*) or to sell (a *put option*) a standard amount of a traded currency on a stated date (the *European option*) or at any time before a stated date (the *American option*) and at a stated price (the *strike or exercise price*).