

# INTERNATIONAL ECONOMICS

## PART 1 – Trade Theory



### **International Trade**

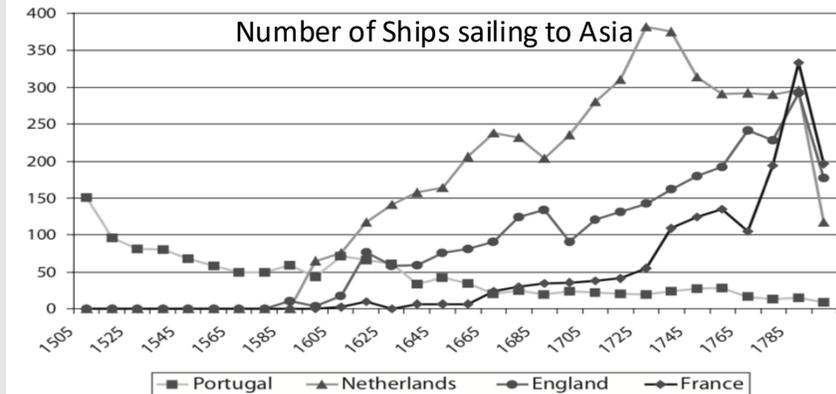
- Why some countries specialize in the production of certain products and others in the production of others? What are the determinants of the pattern of trade?
- If the trade is beneficial to the nations engaged in it why do governments introduce tariffs and limits to trade?
- Are there important income re-distributional effects within each nation?
- Who are the gainers and losers from trade?
- What are the the policy instruments that governments adopt for regulating international trade?

### **International Finance**

- Why are countries interested in setting up international monetary system?
- Why are countries struggling for having exchange rate stability, monetary autonomy and free capital flows?
- Why are these international monetary agreements prone to fall?
- Are better fixed or floating exchange rate agreements?
- What are the causes of the Euro crisis?
- Can the Euro survive?

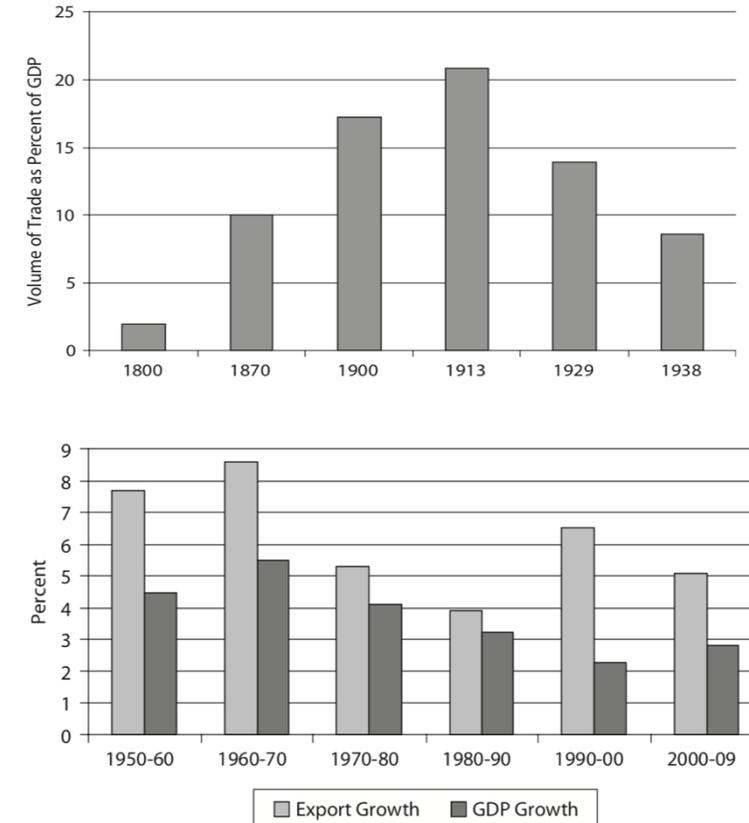
# A Very Brief History of Trade

- Long distance trade became a feature of human affairs after the transition from a society based on gathering and hunting to a society based on domestication of plants and animals (Agriculture Revolution or Neolithic Revolution)) about 11.000 year ago.
- The creation of a surplus above mere subsistence provided the basis for population growth, division of labor, stratification of the society, political structure, and trade.
- The Sumerians were the first civilization recorded in human history. Mesopotamia did not have many resources. Grains, oils and textiles were taken from Babylonia to foreign cities for timber, wine, precious metals and stones.
- The Roman Empire was a great trading area which included three continent: Europe, western Asia and Norther Africa.
- Trade allowed to the citizen of the Roman Empire to have an outstanding standard of living which was not limited to the elites.
- The collapse of the Roman Empire in the 5th century brought these developments to termination.
- Although long distant trade never stopped, The late Middle Age saw a new expansion of Trade with the rise of the city-state (Genoa, Venice, Florence).
- After the discovery of America the number of voyages to the Americas and Indies, trade greatly increased.
- Portugal dominated the route to Asian countries in the 16<sup>th</sup> century to leave the pace to Netherland England and France.



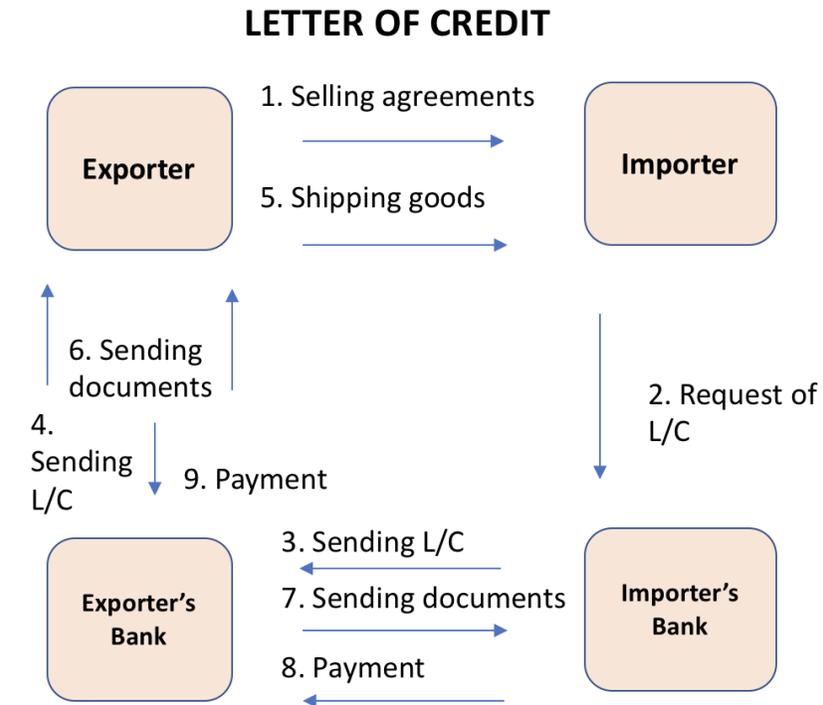
## A Very Brief History of Trade (2)

- Long distant trade in the pre-eighteen century consisted mainly of products not produced in the importing countries, i.e., non-competing goods (spice, silk, woolens).
- During the XIX century trade expanded rapidly from non-competing goods to basic goods.
- Trade was a contributing factor for the industrialization. Cheap coal and high wage induced technological change which then spread to the Northern European countries.
- In the XIX century under the Gold Standard Period trade increased dramatically until the Great War.
- After World War I it started again to be stopped by the 1929 crisis and the Great depression.
- Very high Trade growth is recorded again in the two decades after World War II to slow down again in period of the oil shock and the stagflation (70s). It will pick up again to be halted by the financial crisis of 2007.



# Trade Finance

- Credit devices (Exchange bills, letter of credits) have been used in international trade since 3000 B.C. in Egypt and Babylon.
- During the Roman Empire the banking system was quite sophisticated. The *Argentarius* could receive a sum of money to be paid in the foreign country and draws a bill payable in the foreign city by another local banker there. The *Argentarius* had to know the exchange rate at various locations.
- With the fall of the Roman Empire the role of banks as well as the trade diminished dramatically.
- It was not until the 12<sup>th</sup> and 13<sup>th</sup> century that banks in the city-state of Genoa, Florence, Venice and others were re-established.
- Merchants had to face two problems: (a) travelling with gold was very dangerous; (b) commerce generated currency was not sufficient to satisfy the need of trade.
- It was impossible to conduct commerce without some sort of documentary letter. The problem was solved creating bill of exchanges or letter of credits.
- «...a Florentine merchant who bought wool from an Amsterdam merchant could issue a bill of exchange to the Dutch merchant's agent in Florence directing a third party (the drawee) to pay the sum due for the wool. The agent, having taken the bill in payment for the wool, could travel across Europe or by sea to a commercial center, where he would meet the drawee and ask the drawee for payment. The drawee would pay the draft either by (1) clearing (2) paying in gold (though such payment would be rare) and (3) by accepting the draft and returning to the agent. A means of exchange was created.”

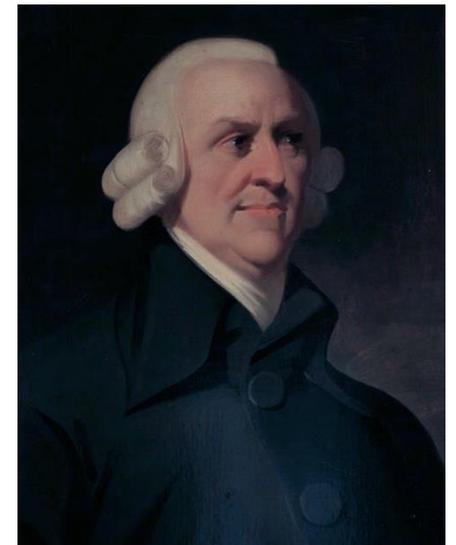


# Mercantilists vs Classical Economists

- Mercantilism was the dominant school of economic thought from the 15<sup>th</sup> to the 18<sup>th</sup> century (absolutistic state). It promotes national policies to discourage imports and increase export to maximize the accumulation of gold and silver.
- It promotes regulations for the purpose of augmenting state power at the expense of rival national powers.
- Policies included: high tariffs, subsidizing exports, forbidding colonies to trade with other nations, monopolizing markets, banning the export of gold and silver, forbidding trade to be carried in foreign ships (Navigation Acts), limiting wages.
- *Mercantilist connection between wealth and national power. Major premise: An increase of wealth of a country is an increase in absolute power. Minor premise: An increase of wealth of a country, if brought by foreign trade, it is necessarily a loss of wealth for other countries. Conclusion: An increase of wealth through foreign trade leads to an increase of power relative to that of our countries.*
- Adam Smith did not question the first premise. He questioned the minor premise that gain of one nation is the loss of other. Trade always benefit all participants. Smith looked at trade from a new perspective:
- **“the division of labor is limited by the extent of the market”** → opening up markets increases productivity
- Trade is positive-sum game, for the Mercantilists instead is a zero-sum game. They do not make a clear distinction between power and wealth. Power is a relative concept.
- Smith is in favor of a globalization without colonialism, slavery and dominance. For Smith the European empires were immoral and economic failures. Trade done with mutual respect strengthen the bond of friendship.
- He advocate free trade, economic growth and rising living of standard for everybody, while mercantilists insist that wages had to be hold down to promote the surplus of the balance of payment.



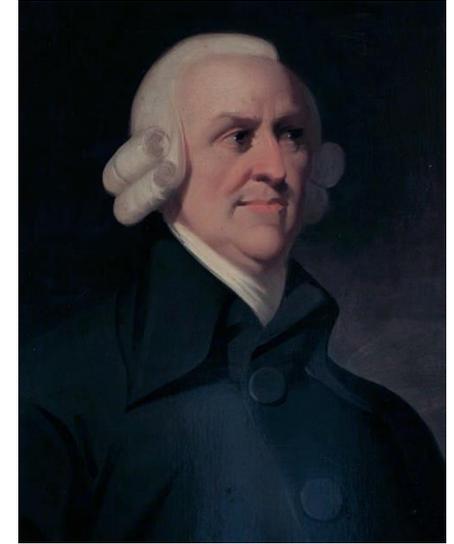
Mercantilist and French Finance Minister Jean Baptiste Colbert (1648-1683)



Adam Smith (1723 – 1790) - Economist and Moral Philosopher

## Mercantilists vs. Classical Economists (2)

- Classical Economists wanted to counter the prevalent mercantilist mind-set. According to Smith mercantilists by avoiding imports forces a country to produce things that its not suited to produce. A country by focusing on what it is more suitable to produce for him he could avoid the costs of mercantilism. Countries should trade simply because they are better off.
- Smith, however, was an advocate of the **absolute advantage**: a country should export those good for which is more productive and import those for which others countries are more productive.
- Ricardo believed that this theory was incorrect: if a country holds more absolute advantage than the others, trade could not take place in many cases . However, economic agents act in term of **opportunity costs**.
- Think of a doctor that is also a very good carpenter (more productive than an average carpenter) and he needs to enlarge his house. Would it make sense for the doctor leave his well paid job for a month and works as carpenter at home? Or would it make more sense to have the job done by a carpenter even though he is not as productive as him? The same reasoning apply to a country. Even if a country has an absolute advantage to all the good it produces, trade would still be advantageous because the cost of producing all of them is higher than the cost of producing only those where it has a **comparative advantage**.
- *“It is here we come to the heart of the matter. The economic principle of **comparative advantage**: a country may, in return for manufactured commodities, import corn even if it can be grown with less labor than in the country from which it is imported.”* (D. Ricardo)



Adam Smith (1723 – 1790) - Economist and Moral Philosopher



David Ricardo (1772 – 1823) Banker and Economist

# Alternative Theories to explain the Determinants of the pattern of Trade

Theories	Authors	Principles
Classical Theory	Ricardo	Comparative advantage
Neoclassical Theory	Heckscher, Ohlin	Factor endowments
“New” Trade Theory	Krugman, Helpman	Economies of scale – monopolistic competition

# Ricardian Model

## Production Possibility Frontier

### Home country

$a_{LW}$  unit of labor (hours) requirement for 1 gallon of wine

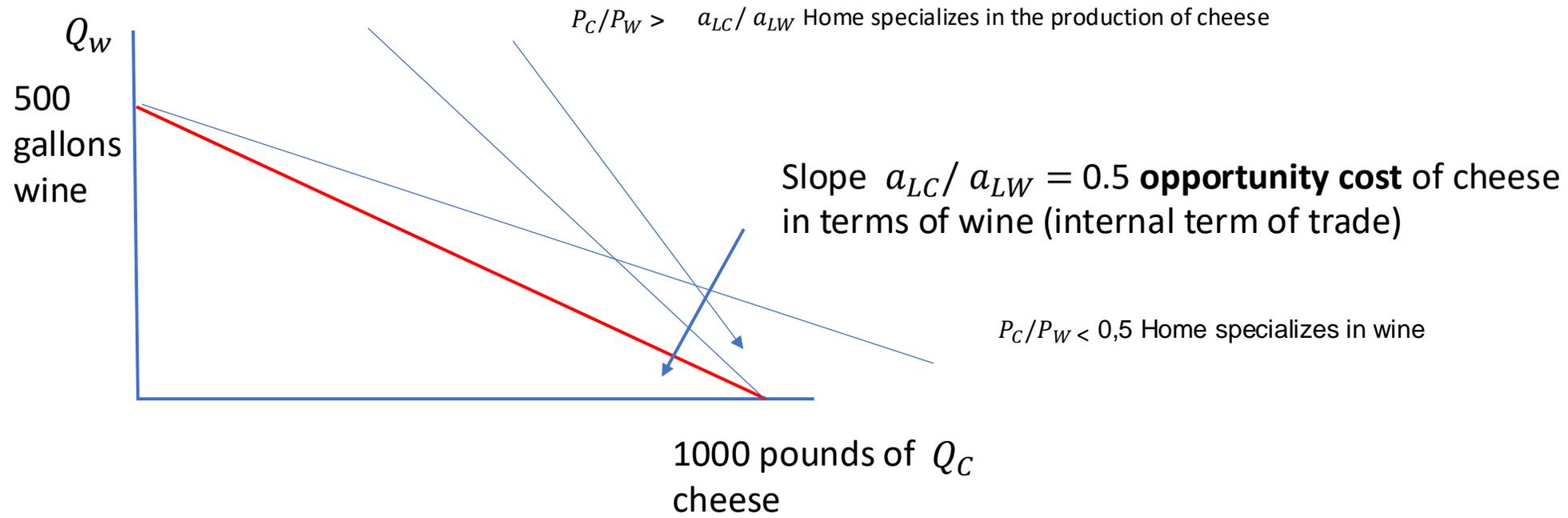
$a_{LC}$  unit of labor (hours) requirement for 1 pound of cheese

$$L = 1000 \text{ h} \quad a_{LW} = 2 \quad a_{LC} = 1 \quad a_{LC}Q_C + a_{LW}Q_W \leq L$$

$$Q_W = L/a_{LW} - a_{LC}/a_{LW} Q_C$$

Let suppose that the trade price is  $P_C/P_W = 1$ . If Home specialize in cheese he can get for each unit of cheese 1 unit of wine. Without trade you get for each unit of cheese that you give up 0,5 unit of wine.

Let suppose that the trade price is  $P_C/P_W = 0,3$ . If Home specialize in wine he can get for each unit of wine 3.3 unit of cheese. Without trade you get for each unit of wine that you give up 2 units of cheese.



# Ricardian Model

## Relative Price and Supply

Example: Suppose that cheese sell for \$4 per pound and wine \$7 per gallon in the international market. Then a cheese industry worker will make \$4 dollar an hour and a wine industry worker will makes \$3.5 dollar an hour. In which production will the worker (country) specialize?

$P_C/P_W > a_{LC}/a_{LW} = 0,5$  specialize in the cheese production  
If  
 $P_C/P_W < a_{LC}/a_{LW} = 0,5$  specialize in the wine production

The economy will specialize in the production of cheese if the relative price of cheese is greater than its opportunity cost in terms of wine; it will specialize in the production of wine if the the relative price of cheese is smaller

In the absence of international trade the relative price of the goods are equal to their relative unit labor requirements

# Ricardian Model

## Relative and absolute comparative advantage

- The Ricardian Model presents some surprising results: a Foreign country that is less productive (more labor input for 1 unit of product) than the Domestic country in a particular production might end up in exporting that product in the Domestic country. What counts is not the absolute advantage of a country with respect to another but the relative advantage
- We assume that: (the \* denotes the Foreign country)

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

$$a_{LC}/a_{LC}^* < a_{LW}/a_{LW}^*.$$

- The Home country has a comparative advantage in producing cheese.
- A country has a comparative advantage in producing a good if the opportunity cost of producing that good in terms of other goods is lower in that country than it is in other countries.

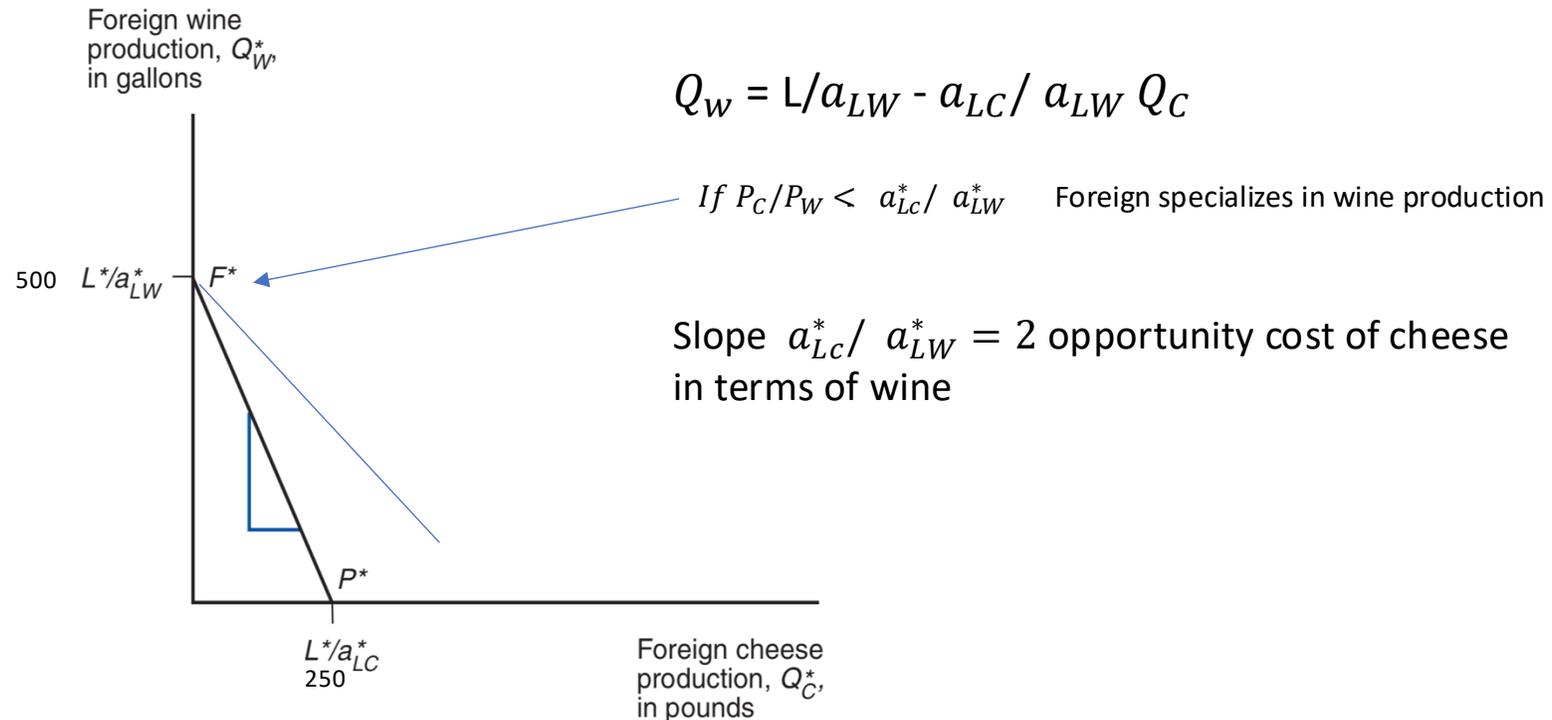
# Ricardian Model

## Foreign country

- We assume that  $L^* = 2000$  h     $a_{LW}^* = 4$      $a_{LC}^* = 8$

Let suppose that the trade price is  $P_C/P_W = 1$ . If Foreign specialize in wine he can get for each unit of wine 1 unit of cheese in the international market. Without trade to produce one unit more of cheese must sacrifice 2 units of wine.

Let suppose that the trade price is  $P_C/P_W = 3$ . If Foreign specialize in cheese he can get for each unit of wine 0,33 unit of cheese in the international market. Without trade to produce one unit more of cheese must sacrifice 2 units of wine.

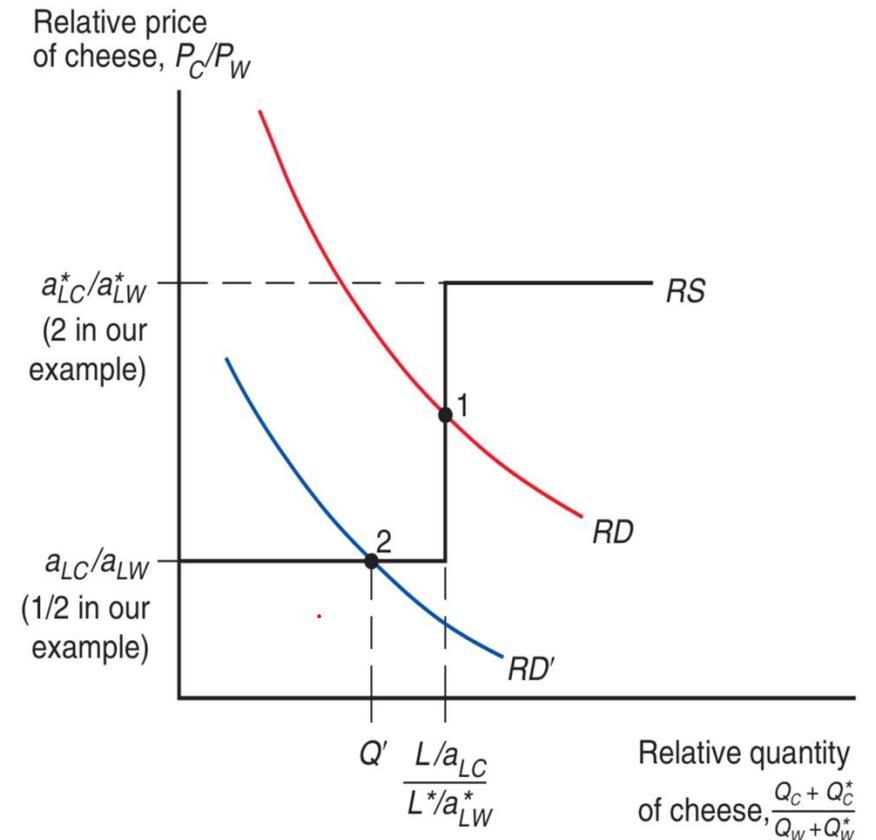


- The Home country has a comparative advantage in producing cheese with respect to the Foreign country.

# Ricardian Model

## World Relative Supply and Demand

- if  $P_C/P_W < 0,5$  both countries will specialize in wine. No production of cheese.
- if  $P_C/P_W = 0,5$  the price is equal of the opportunity cost of producing cheese in the Home Country. Domestic workers are indifferent in producing wine than cheese. Foreign workers will produce wine.
- If  $0,5 < P_C/P_W < 2$  Home country will specialize in cheese and Foreigner in wine.
- if  $P_C/P_W > 2$  the price is greater of the opportunity cost of producing cheese in Home and Foreign Country. Workers make more money in producing cheese than wine. No production of wine. Both country specialize in cheese
- Relative Demand Curve: The relative price of cheese is an inverse function of the relative quantity of cheese. Standard demand curve which depend on workers preferences.
- The Relative Supply and Demand Curve determine the equilibrium price and quantity.

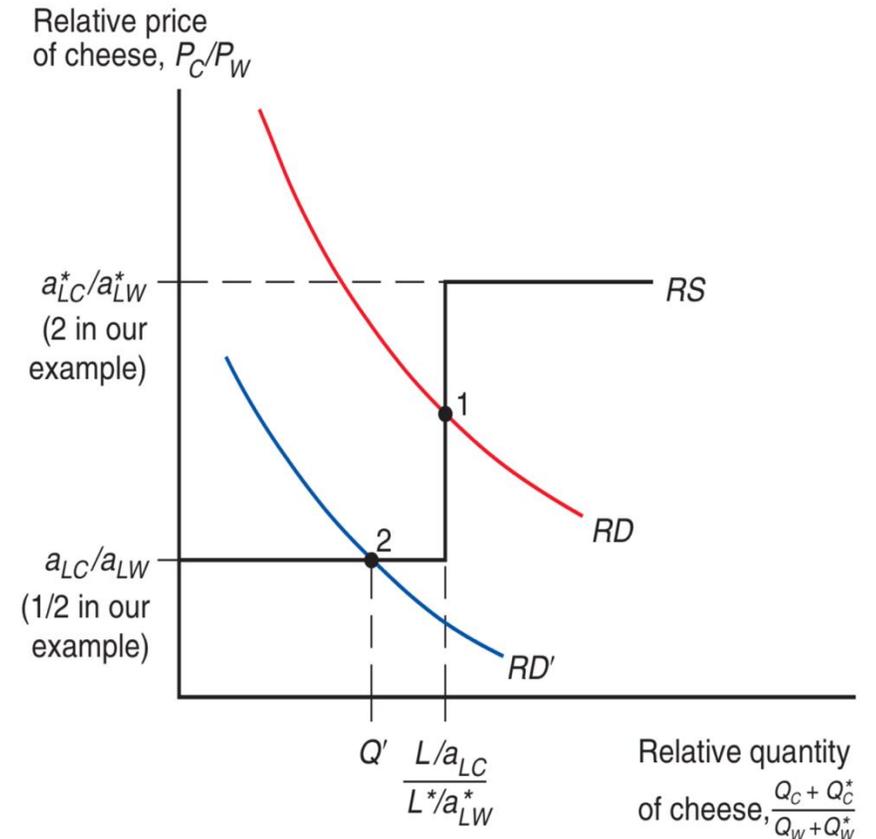


# Ricardian Model

## World Relative Supply and Demand

### A numerical Example

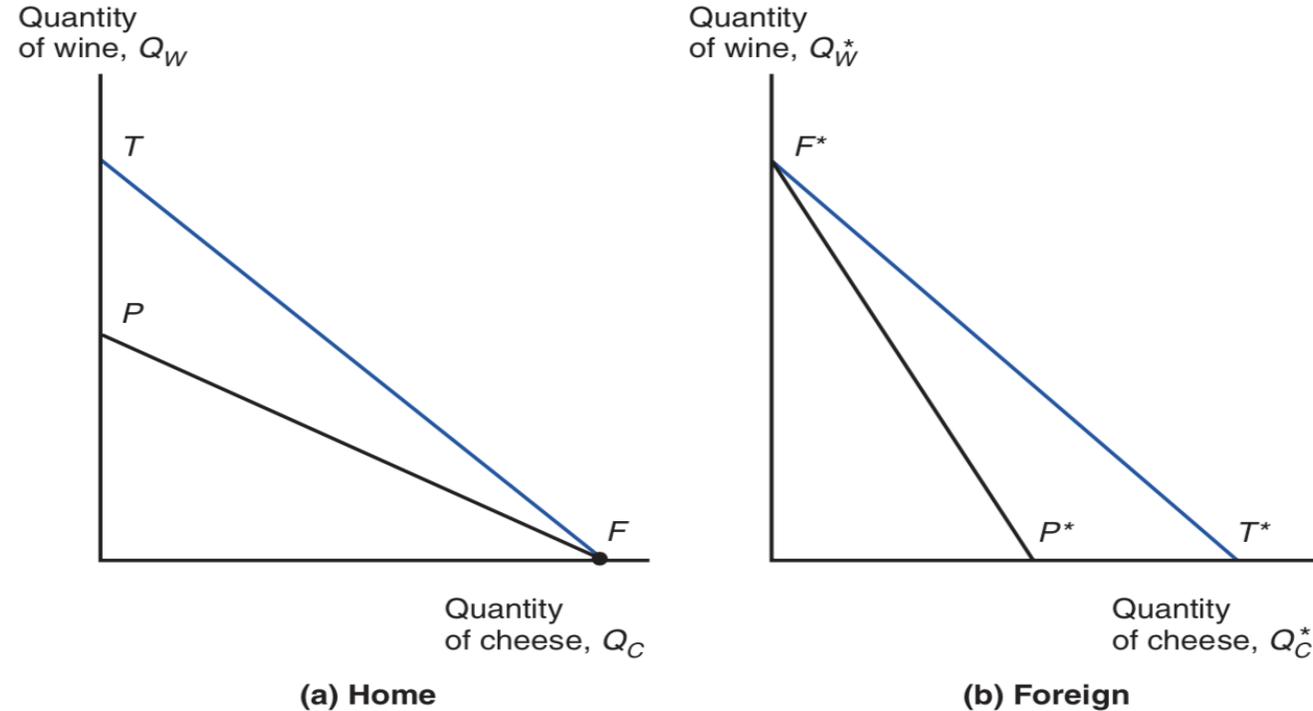
- Let suppose the the demand curve cross the supply curve at  $P_C/P_W = 1$  and also let suppose the price of 1 pound of cheese is equal to \$10. Therefore, the price of of a gallon of wine is equal to \$10.
- At this relative price the workers in the Home country which produce cheese with  $a_{LC} = 1$  have a salary of \$10 per hour, while the workers of the foreign country with  $a_{LW} = 4$  have a salary of \$2.5 per hour.
- Notice that in our example the home country is 8 times more productive in the cheese industry and two time more productive in the wine industry and it ends up with a salary which is 4 times as high as the Foreign's.
- Because its lower wages the Foreign country has a cost advantage in wine even though it has lower productivity. Home has a cost advantage in cheese despite its higher wage, because the higher wage is more than offset by its higher productivity.



# Ricardian Model

## World Relative Supply and Demand

Trade expands Consumption possibilities

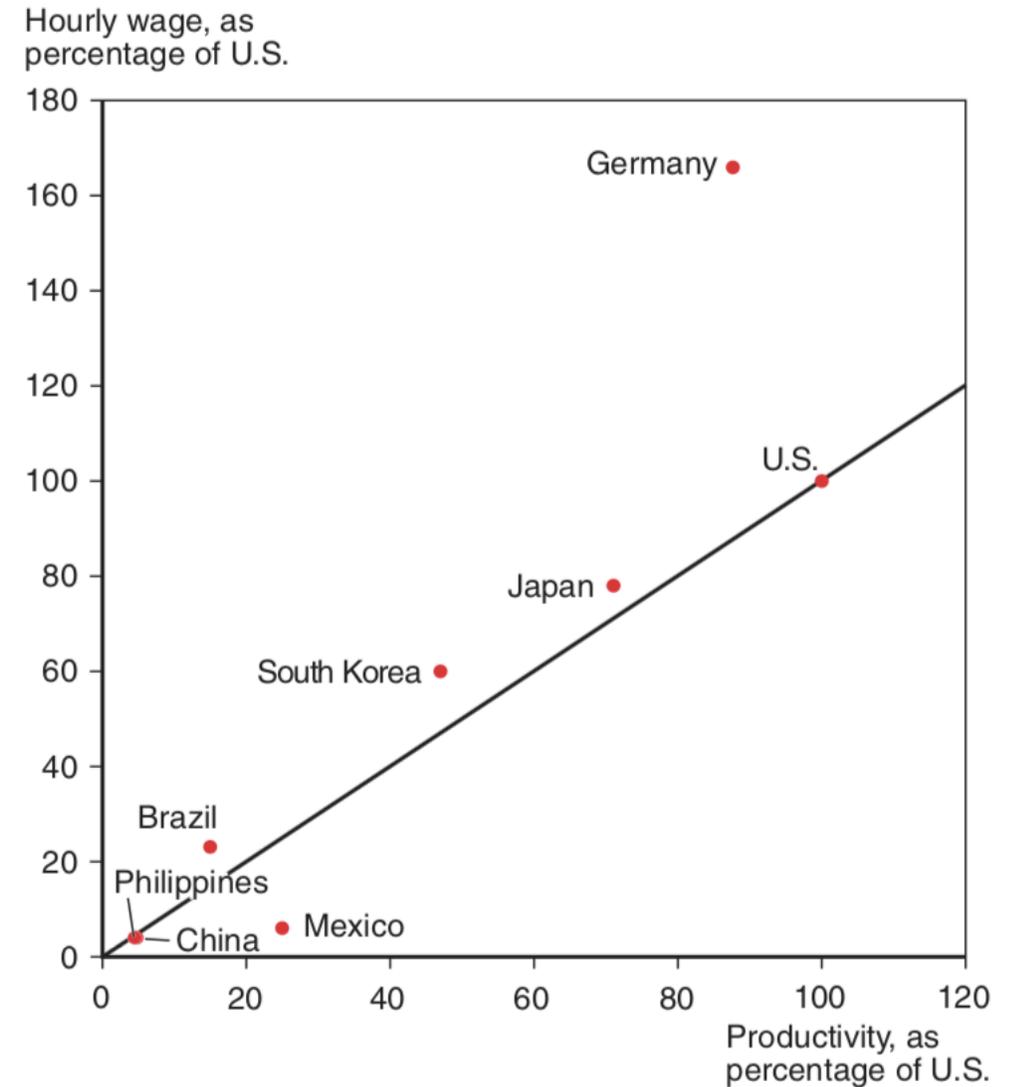


- In our example in the Home country it take 1 h. to produce 1 p. of cheese and 2 h. to produce 1 g. of wine. The opportunity cost of cheese in terms of wine 0.5, but with trade the relative price of cheese is 1. therefore, the Home country instead of using 2 h. to produce a gallon of wine, can spend those 2 h. to produce a pound of cheese and through trade obtain 2 g. of wine.

# Ricardian Model

## Productivity and Wages

- I. *A country's wage is roughly proportional to the country's productivity*
- II. *Germany, U.S. and Japan are high wages and high productivity countries*
- III. *China, Philippines, Brazil and Mexico are low wages and low productivity countries*



# Ricardian Model

## Comparative Advantage with many goods

- Here we look at the pattern of trade in a model in which Home e Foreign can produce more than two goods. We will see that the patter of trade between the two countries depend on only one thing: given the technology, the ratio of the Home to Foreign wages.
- The cost of making a good is given by the unit of labor requirement times the wage rate,  $w a_{Li}$ . To produce the same in Foreign will cost  $w^* a_{Li}^*$ . Goods will be produced in the country where it is cheapest to make them.
- It will be cheaper to produce the good in Home if

$$w a_{Li} < w^* a_{Li}^*,$$

Which can be rearranged to yield

$$a_{Li}^*/a_{Li} > w/w^* .$$

Any good for which the relative home productivity is higher than the wage rate ratio will be produced at home, while any good for which the relative home productivity is lower than the wage rate ratio will be produced in Foreign.

# Ricardian Model

## Comparative Advantage with many goods

- On the other hand, it will be cheaper to produce the good in Foreign if

$$wa_{Li} > w^* a_{Li}^*,$$

Which can be rearranged to yield

$$a_{Li}^*/a_{Li} < w/w^*.$$

Any good for which  $a_{Li}^*/a_{Li} > w/w^*$  will be produced in Home, while any good for which  $a_{Li}^*/a_{Li} < w/w^*$  will be produced in Foreign

# Ricardian Model

## Comparative Advantage with many goods

### A numerical example

	Home Unit labor requirement ( $a_{Li}$ )	Foreign Unit labor requirement ( $a_{Li}^*$ )	Relative Home Productivity advantage ( $a_{Li}^*/a_{Li}$ )
Cheese	2	10	5
Caviar	3	12	4
Wine	6	12	2
Clothes	12	6	0,5

Let suppose that the Home wage rate is three times the Foreign wage rate. Then, Home will import wine and clothes and export cheese and caviar.

Again this pattern of specialization is beneficial for both countries. Home import wine. For 1 gallon of wine, Foreign will need 12 hours which cost  $1/3$  compared to Home. This cost of 12 hours in terms of Home labor is only 4 person hours ( $12/3$ ). For Home, this cost is less than the 6 person-hours necessary to produce 1 gallon of wine.

For Foreign, importing cheese would be advantageous because it will take 10 person-hours to produce 1 pound of cheese, while for Home will take 2 hours although will be 3 times as high as the Foreign's.

# Ricardian Model

## Comparative Advantage with many goods

### Determination of Relative Wages

In the two-good model we determine relative wage first calculating first home wages in terms of cheese and Foreign wages in terms of wine . Then, we deduce the ratio of the two countries wage ratio using the relative price of the two goods. We could do that because we knew the Home would produce cheese and Foreign wine. (for an illustration see the numerical example presented few slides above)

In the many-good model we know who produces what only after we can establish the relative wage.

To determine relative wage in the many-good model we must look behind the relative demand for goods to the implied demand and the supply for labor. The relative demand for home labor will fall when the ratio Home to Foreign wages will rise. As wages rise at Home fewer goods will be produced at Home and more in Foreign.

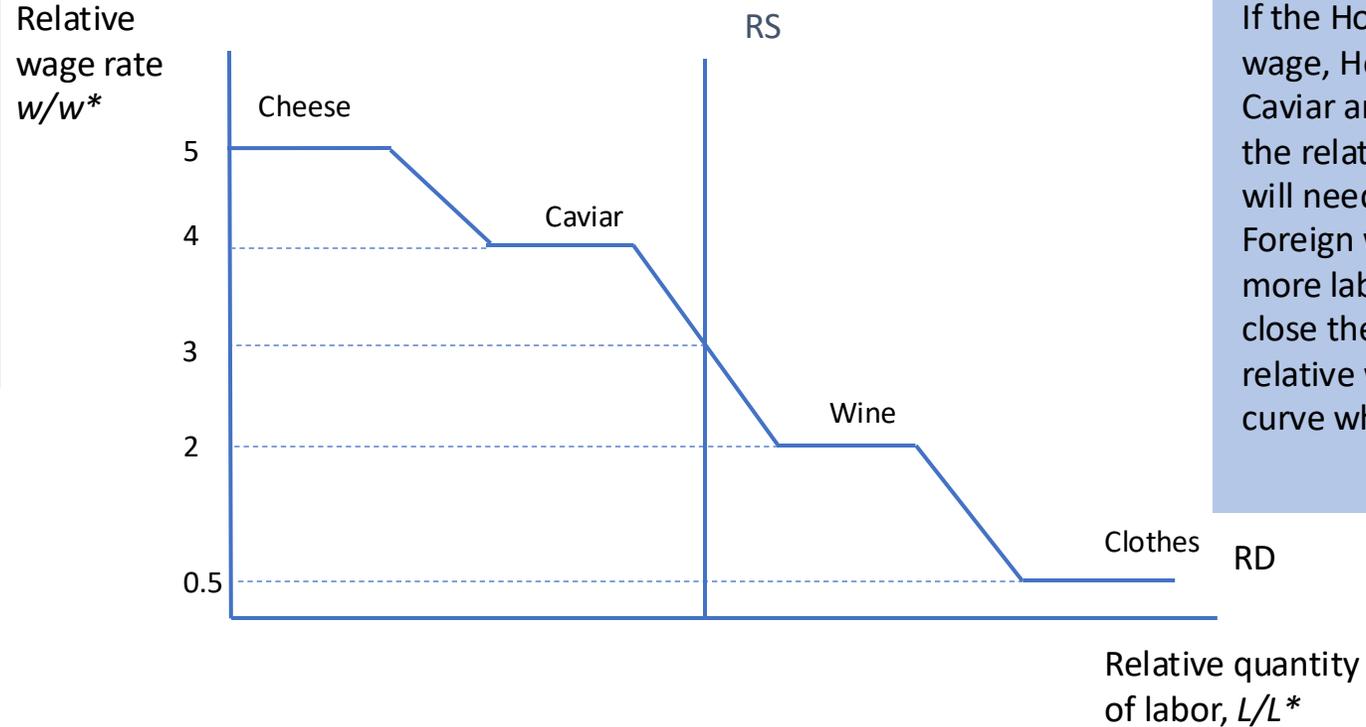
See Graph. In the next slide. At relative wage equal to 3.5 Home will produce cheese and caviar and foreign will produce wine and clothes. If relative wage goes to 3.99, the pattern of specialization between countries will not change. However as good produced at home will be more expensive, the demand for those goods will decline and the demand for labor will decline as well. However, if the price goes from 3.99 to 4.0, we will have a change in the pattern of specialization. Home will produce only chesse and will have an abrupt fall in the demand for labor by this country. This explain the peculiar shape of relative demand for labor. The relative wage will be determined by the intersection of the relative supply and demand curve.

# Ricardian Model

## Comparative Advantage with many goods

### Determination of Relative Wages

To determine relative wage we look behind the relative demand for goods to the implied relative demand for labor. This is a derived demand that results from the demand for goods produced with each country's labor.



If the Home wage is 3.5 times the foreign wage, Home will produce Cheese and Caviar and Foreign Wine and Clothes. As the relative wage rate increases Home will need less and less labor compared to Foreign which, in contrast, will need more labor to produce new goods. To close the model and determine the relative wage, we introduce a supply curve which is given by  $L/L^*$ .

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

# Ricardian Model

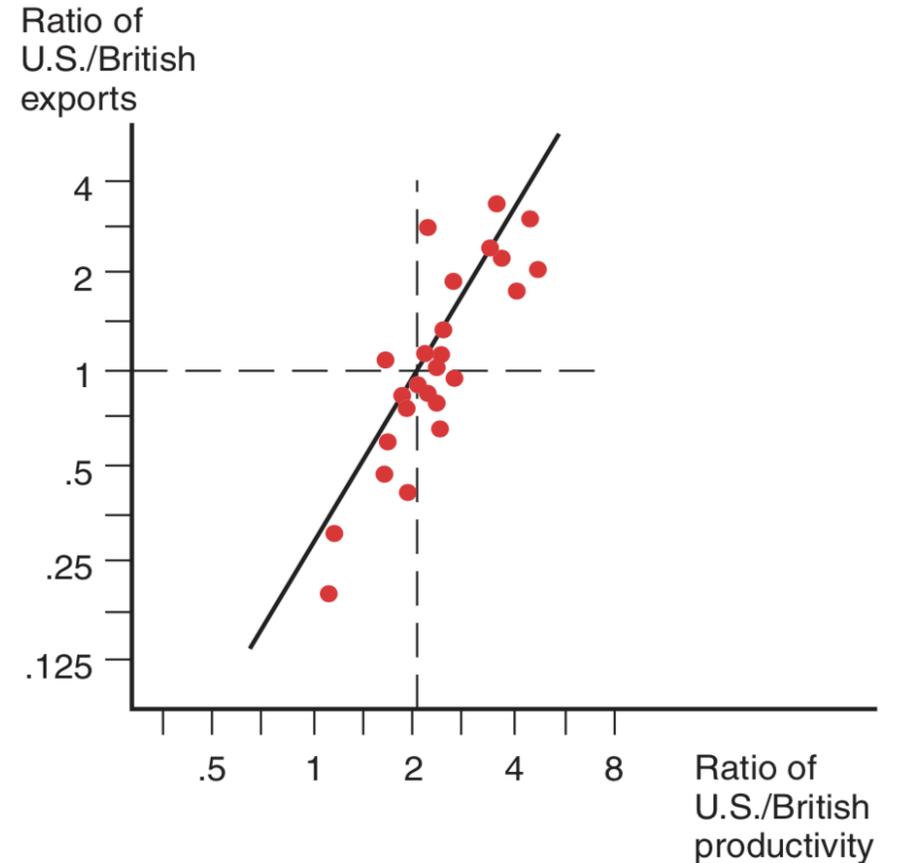
## 3 Miths about Trade

- Mith # 1 – *Free trade is beneficial only if a country is strong enough to stand up to foreign competition*
- Mith # 2 - *Foreign competition is unfair and hurts other countries when is based on low wages.*
- Mith # 3 – *Trade exploits poor countries because makes them worse off if their workers receive a much lower wages than workers in other nations.*

# Ricardian Model

## Limits and merits of the model

- I. The model predicts an extreme degree of specialization that we do not observe in the real world.
- II. The model does assume away distribution effects within a country. Everybody gains. In reality trade involve important distribution effects among capital owners, workers, skill and un-skill workers. No every individuals is made better off with trade at least in the short term.
- III. The model allows no differences in resources among countries as cause of trade. In this respect it is missing an important aspect of the actual trading system.
- IV. Despite these limits , many empirical studies have confirmed that countries tend to export those goods in which their productivity is relative high.



Each dot represents a different industry

# Corn Laws

- I. The **Corn Laws** were tariffs and other trade restrictions on imported food and grain ("corn") enforced in the UK between 1815 and 1846. The word 'corn' in British English denotes all cereal grains, including wheat, oats and barley. They were designed to keep grain prices high to favour domestic producers, and represented British mercantilism. The Corn Laws blocked the import of cheap grain, initially by simply forbidding importation below a set price, and later by imposing steep import duties, making it too expensive to import grain from abroad, even when food supplies were short
  
- II. Advocates of the repealing of Laws argued that: «First, it would guarantee the prosperity of the manufacturer by affording him outlets for his products. Second, it would relieve the [Condition of England question](#) (condition of the working class) by cheapening the price of food and ensuring more regular employment. Third, it would make English agriculture more efficient by stimulating demand for its products in urban and industrial areas. Fourth, it would introduce through mutually advantageous international trade a new era of international fellowship and peace. The only barrier to these four beneficent solutions was the ignorant self-interest of the landlords, the "bread-taxing oligarchy, unprincipled, unfeeling, rapacious and plundering.»



Robert Peel became Conservative Prime Minister in 1841 and his government succeeded in repealing the tariffs against the view of his own party and with the support of the Whigs.

# The Specific Factors Model

## The short-term effects of Trade on Income Distribution

International trade has strong effects on distribution of income among the participants in the production process within a country, so that create losers and winners. This happens mainly for two reasons: (1) factors of production cannot move instantaneously and costlessly from one industry to another, (2) change in the output mix have differential effects on the demand for factors of production.

Consider a model with two goods, Cloth, C, and food, F, and 3 factors of production, labor, (L), capital, (K), and land, (T).

Production  
functions

$$Q_C = Q_C(K, L_C),$$

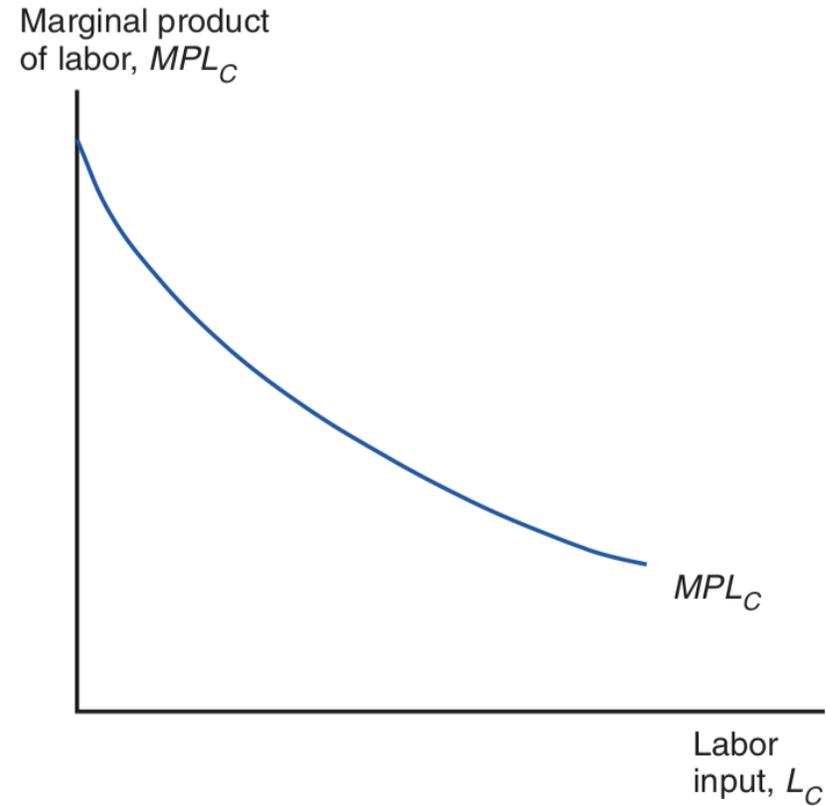
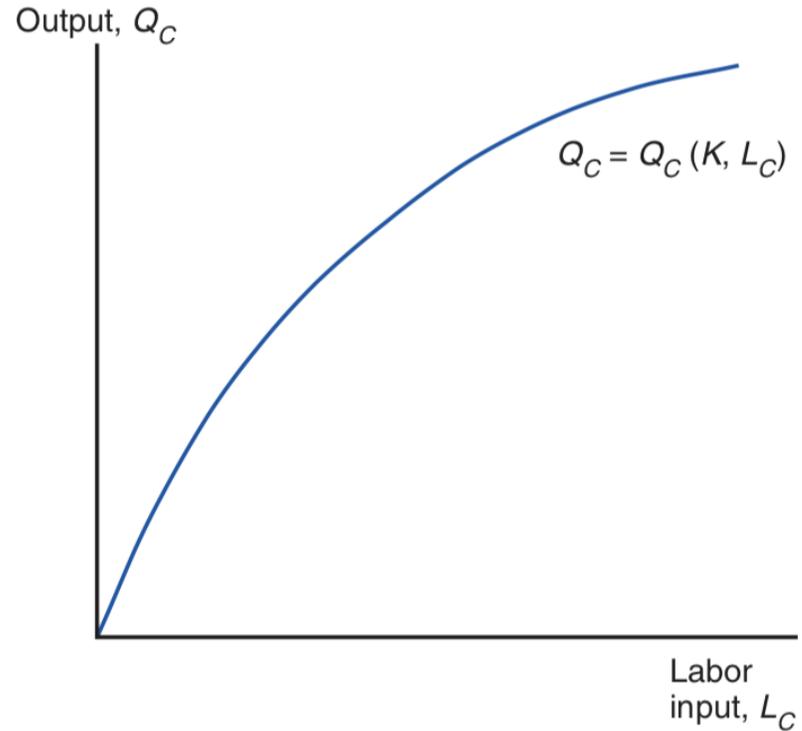
$$Q_F = Q_F(T, L_F),$$

Total supply of labor

$$L_C + L_F = L.$$

# The Specific Factors Model

## Production function and Marginal Product of labor



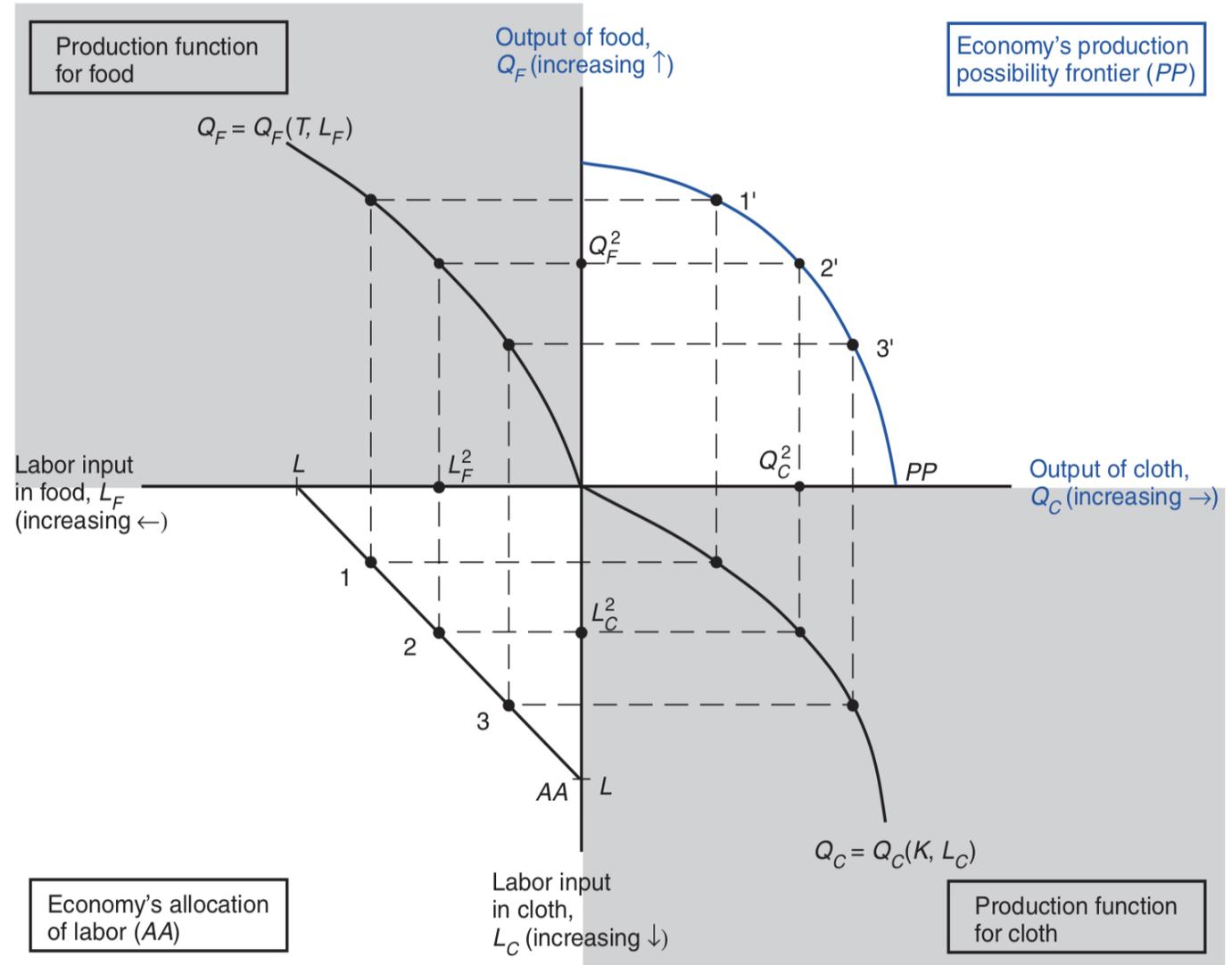
The Production function for cloths which present diminishing returns to labor

The Marginal Product of labor

# The Specific Factors Model

## Production Possibility Frontier

- The upper right quadrant, the PP curve, shows how output of the two varies as the allocation of labor is shifted from food to cloth.
- Because of diminishing returns to labor, the PP curve is bowed-out instead of straight line.
- To increase output of cloth by 1 unit we must increase labor input by  $1/MPL_C$
- Each unit of labor shifted out of food production will lower output in that sector by the marginal product of labor in food,  $MPL_F$ .
- The slope of PP measure the the opportunity cost of cloth in terms of food – the number of units of food output that must be sacrificed to increase cloths output by one unit - is therefore the slope of the Production Possibility Frontier equal to:  
 $- MPL_F/MPL_C$ .



# The Specific Factors Model

## Price, Wages and Labor Allocation

- Given  $P_F$  and  $P_C$  profit maximizing firms will hire labor up to the point where the value produced by an additional person-hour is equal to the cost, the wage:

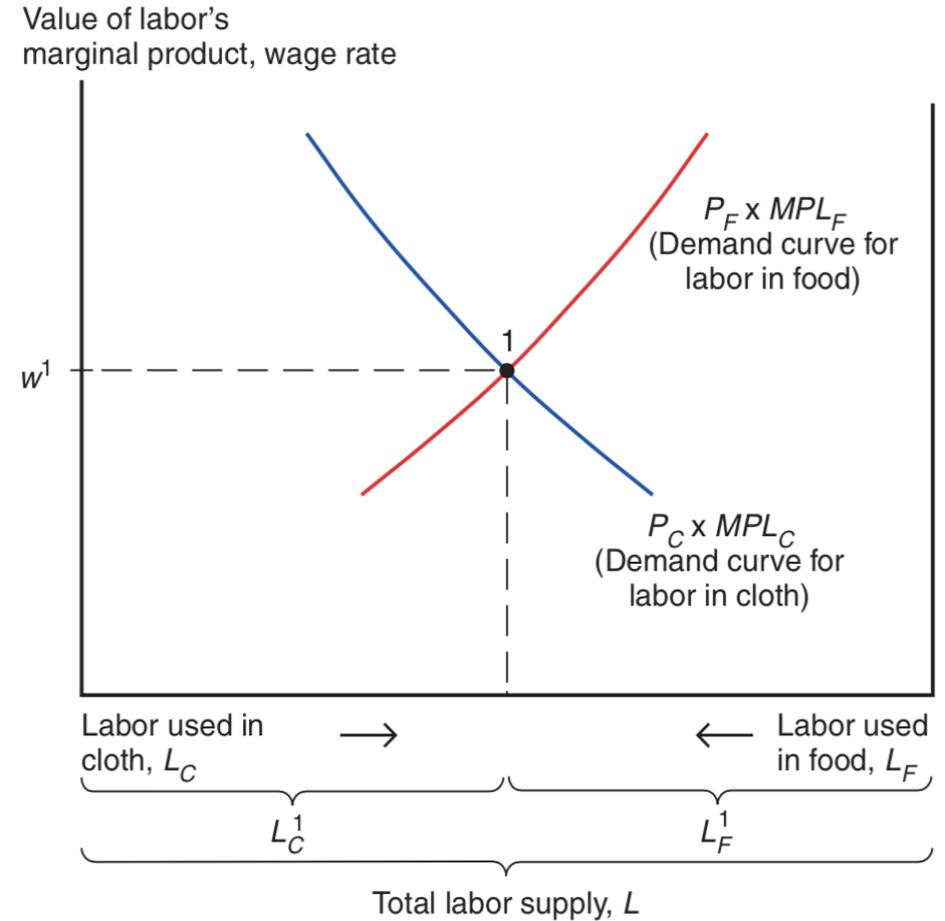
$$MPL_C \times P_C = w.$$

$$MPL_F \times P_F = w.$$

$$MPL_C \times P_C = MPL_F \times P_F = w$$

$$-MPL_F/MPL_C = -P_C/P_F.$$

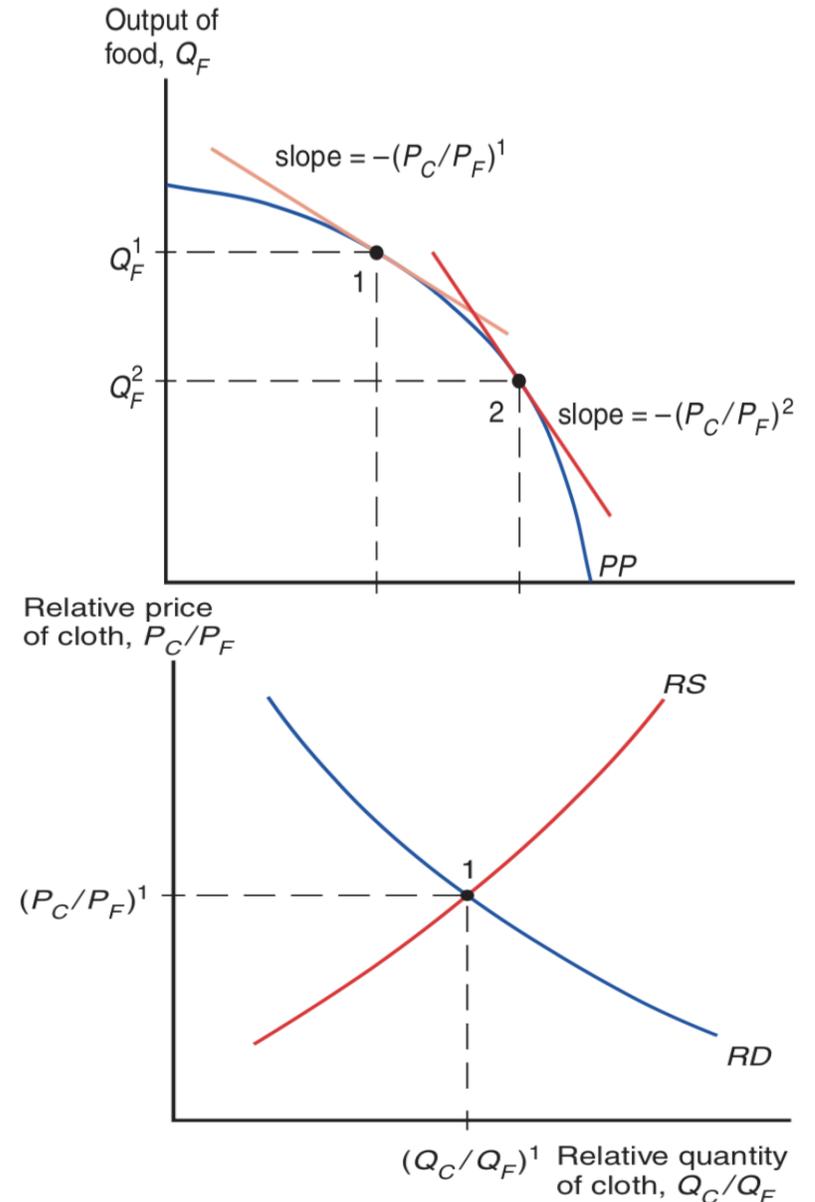
- At the production point the production possibility frontier must be tangent to a line with a slope whose slope is minus the price of cloth divided by that of food



# The Specific Factors Model

## A change in Relative Prices

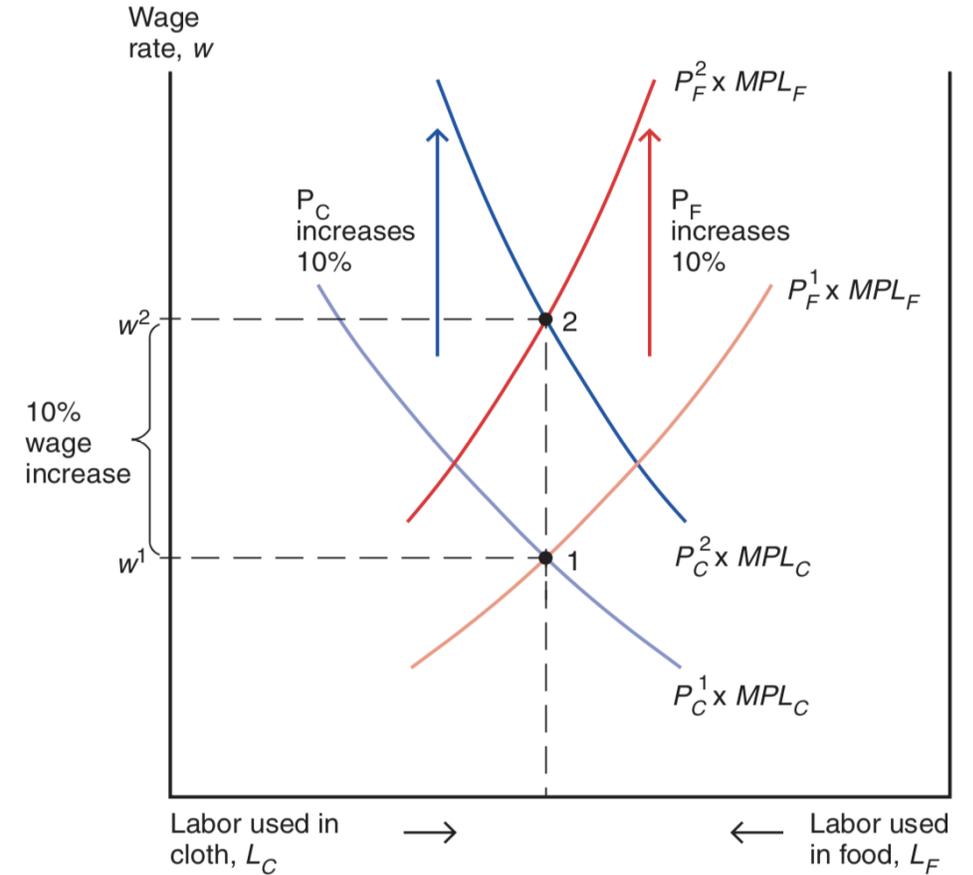
- The effect of a rise in the relative price  $P_C/P_F$  can be seen looking at the PP curve.
- We can also draw a relative supply curve showing  $Q_C/Q_F$  as function of  $P_C/P_F$  (RS) and a relative demand curve (RD) which is downward-sloping.
- In absence of international trade the equilibrium relative prices and output are determined by the intersection of relative supply and demand.



# The Specific Factors Model

## A Equal-Proportion change in Prices

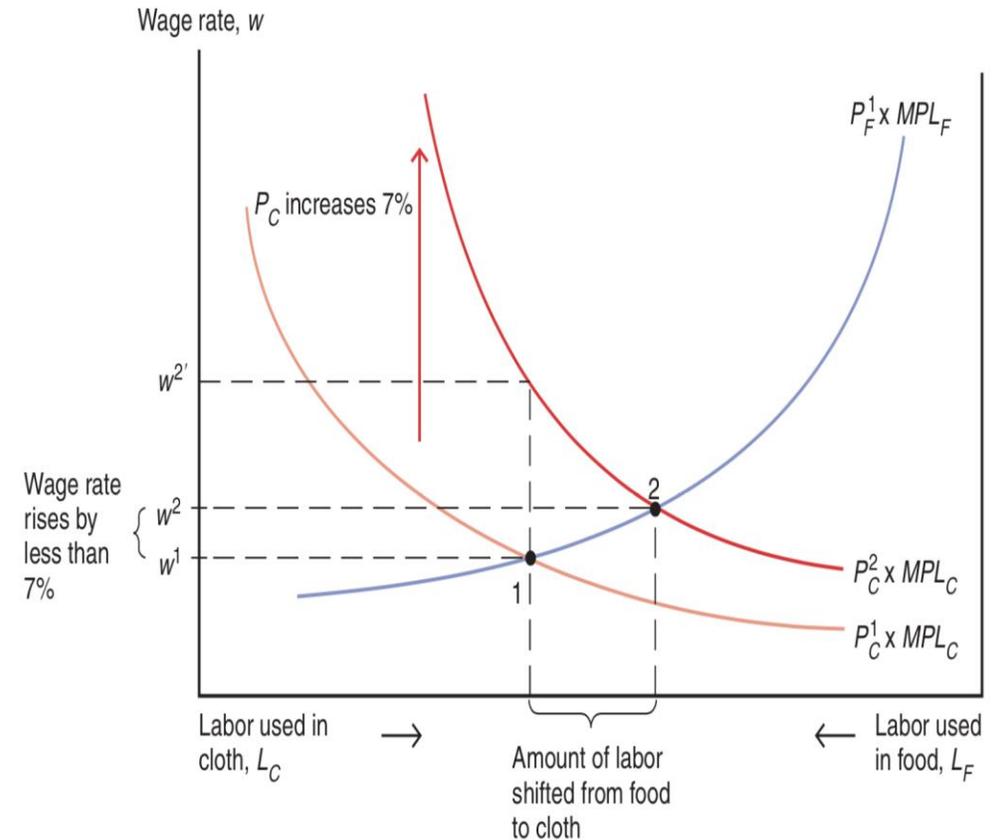
- When  $P_F$  and  $P_C$  change in the same proportion, no real change occurs. Wage rates change in the same proportion so that the real wage are unaffected. Changes in the overall price level have no real effect.
- Only changes in relative prices,  $P_C/P_F$ , affect welfare and the allocation of resources.



# The Specific Factors Model

## A change in Relative Prices

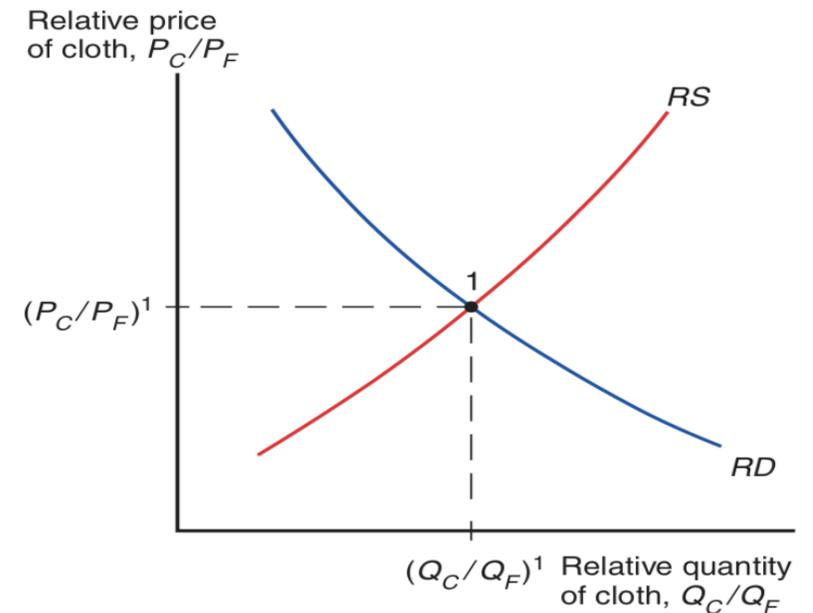
- Consider the effect of change that does affect the relative price. For example, an increase of 7% of  $P_C$ . The cloth labor demand curve shift in the same proportion and shifts the equilibrium point from 1 to 2.
- Wage increase less than  $P_C$ . If wage were risen of the same proportion (7%) it would have been at  $w^{2'}$ .
- Labor shift from food production to Cloth production. Output of cloth rises. Output of food falls.



# The Specific Factors Model

## Relative Prices and Distribution

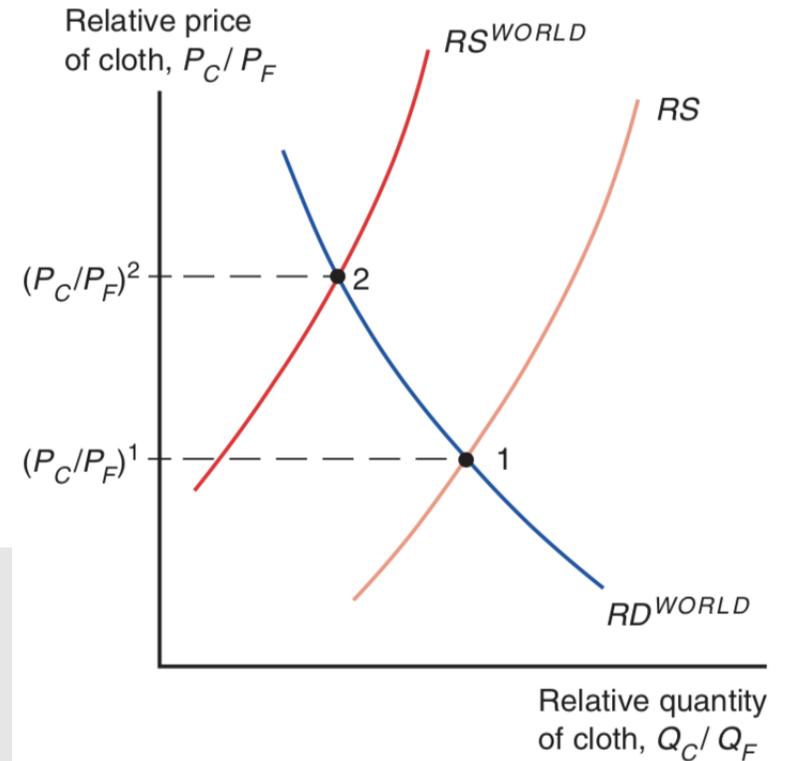
- The effect of a rise in the relative price  $P_C/P_F$  (an increase of 7% of  $P_C$ ) will bring about an increase in the demand for labor in the cloth sector but wage will increase in a less proportion than the increase of the price of the cloth.
- Workers: wage rate has risen but less than in proportion of the increase in  $P_C$ . Thus real wages in terms of cloths are fallen, while real wages in terms of food are risen because  $P_F$  has remained constant. We cannot say if workers are better off or worse.
- Capital Owners: Real wages in terms of cloth has fallen. Thus, profit are higher. The income of capital owner will increase more than proportionally than with a rise in  $P_C$ . They are better off.
- Landowners: Real wages in terms of food rises squeezing their income moreover the increase in cloth price reduce the purchasing power of any given income.



# The Specific Factors Model

## International Trade

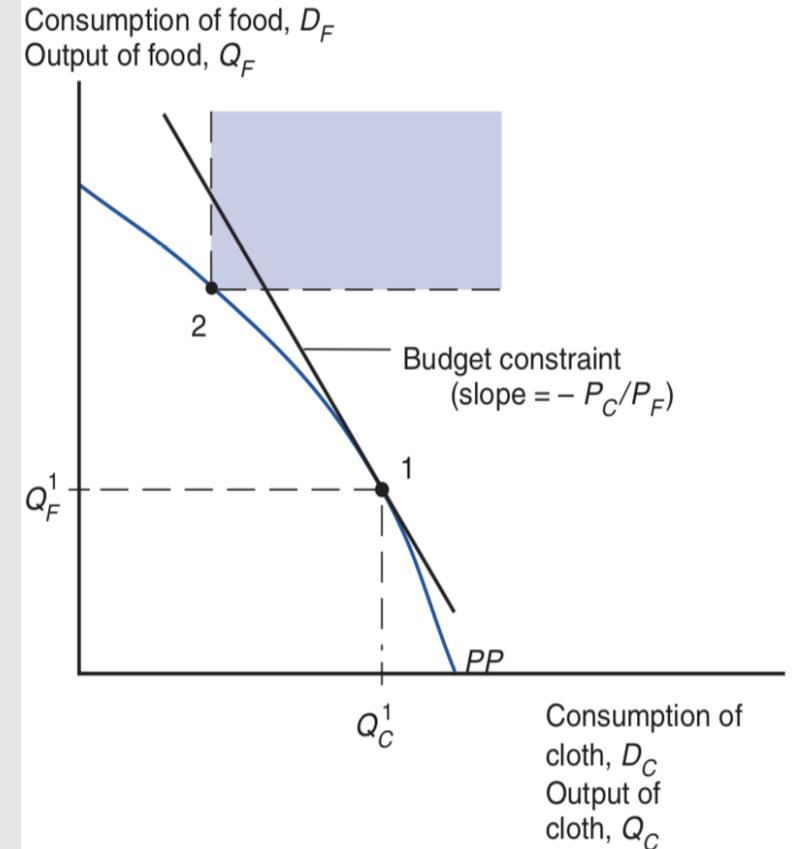
- The economy faces a different relative price when it opens to international trade.
- **As a result of opening up to trade, an economy exports the good whose relative price has increased and imports the good whose relative price has decreased.** When a country opens up, the relative prices will reflect the world supply and demand conditions.
- Who gains and who loses from international trade?
- Trade benefits that factor that is specific to the export sector of each country but hurts the factor specific to the import to-competing sectors with ambiguous effects on the mobile factors.



# The Specific Factors Model

## Gains from Trade

- Do the gains from trade outweigh the losses? One way is to sum up the welfare gains of the winner with the welfare losses of losers (utilitarian approach)
- Could the winner compensate the losers and still be better off?
- Trade is a potential gains for everyone, because there is available more food and more clothes. In the absence of trade the economy would consume what it produces which are all points along the PP curve. If Trade opens up the economy will produce at point 1 and than can consume along the points of the budget constraint.
- Opening up to trade independently of the pre-trade position will always expand *the economy's choices*. This expansion means that it is always possible to redistribute in principle income in a such way that everyone gains from trade.



# The Specific Factors Model

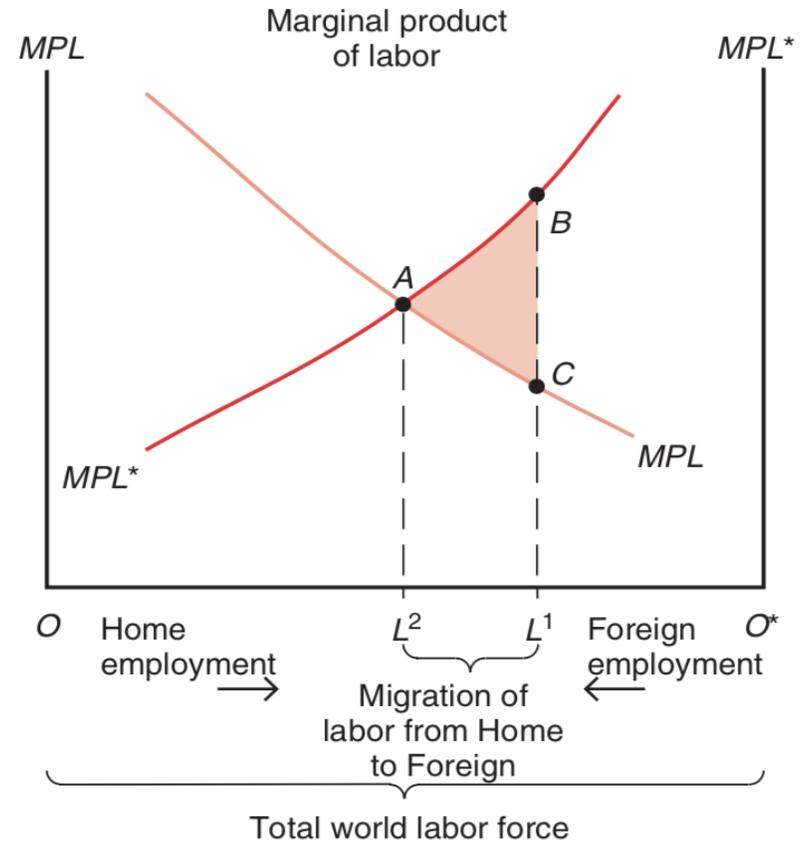
## Income Distribution and Trade Policies

- Groups that lose from Trade have an incentive to lobby their government to restrict trade, as well as those who gain have an incentive to open up Trade. However, farmers both in the US and Europe are able to restrict trade and consumer who could gain from Trade are not doing much. Why? The reason is that farmers are few and organized compared to consumers. Each single consumer loose but not very much, while each farmer might have huge losses from opening up trade. These producers are well organized in trade association that actively lobby and make large campaign contributions. Consumers do not have strong incentive to organize to lobby.
- Most of the gains from import restrictions go to a small group of people. Of course, workers in the import sectors have the advantage of not loosing their jobs. It has been calculated that the loss of consumers due to sugar import restriction cost per job saved about \$800K which is about 30 times the average pay of those workers.

# The Specific Factors Model

## International Labor Mobility

- Labor mobility is less prevalent than capital mobility. States impose many restrictions to labor mobility.
- Let consider a simple model where each country produce the same good with a fix factor (T) and mobile factor (L). Initially, without open borders Home employs  $OL^1$  labor at  $CL^1$  wage ( $MPL$ ). Foreign employs  $O^*L^1$  at  $BL^1$  wage ( $MPL^*$ ). Opening up borders we will have migration of labor from home to Foreign. Wages will be equalized at a level of  $AL^2$ .
  - Wages rise in Home and fall in Foreign.
  - World output increases by the colored area  $ABC$ .
  - Workers that originally have worked in Home gain and those who worked in Foreign lose.
  - Landowners in Home lose because are paying higher wages and Landowners in Foreign gain because are paying lower wages.

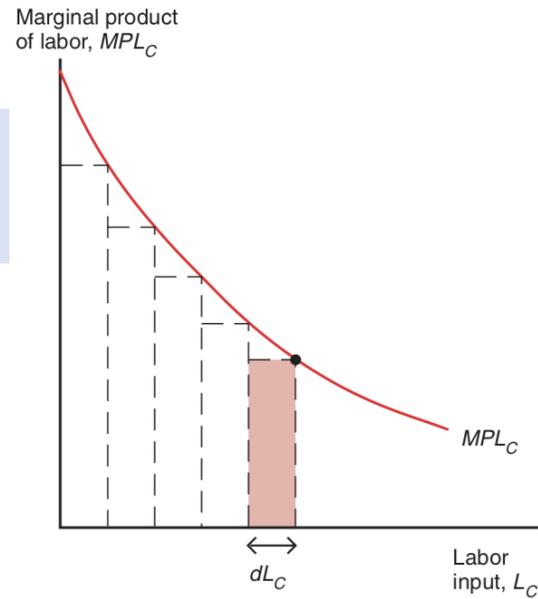


- Gains from trade can in principle make everyone better off, but it might be very difficult in practice.

# Appendix

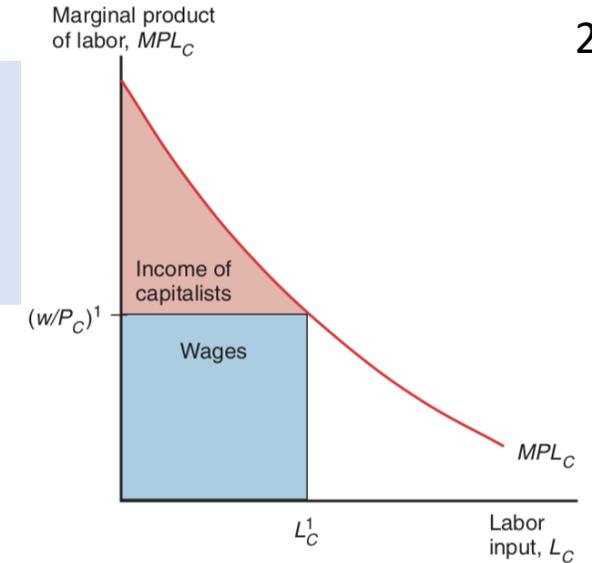
## Relative Prices and Distribution of Income

The total output is equal to the area below the MPL curve



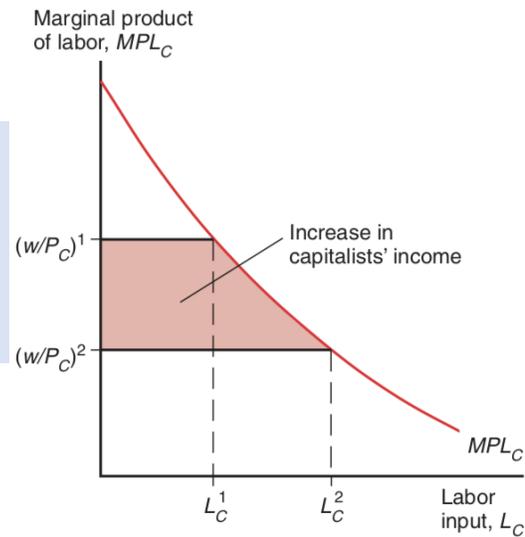
1

Labor income is equal  $(w/P_C) \times L_C^1$  and the capitalist income is the red area



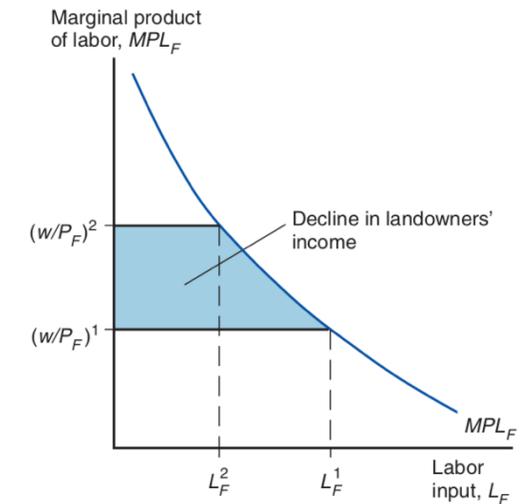
2

A rise in  $P_C$  benefits the capitalist: real wage in terms of cloths falls, leading to a rise in the income of capitalists



3

A rise in  $P_C$  hurts land owner: real wage in terms of food rises reducing the income of lands



4

# The Heckscher-Ohlin Model

## Price and Production

- This model shows that that the comparative advantage, and thus , the pattern of trade is is determined by the relative abundance of factors of production. It is also referred to as the **factor-proportions theory**.
- The amount of each good is determined by a production function for cloth (C) and food (F) with the usual notations:

$$Q_C = Q_C(K_C, L_C),$$
$$Q_F = Q_F(K_F, L_F),$$

$a_{KC}$  = capital used to produce one yard of cloth

$a_{LC}$  = labor used to produce one yard of cloth

$a_{KF}$  = capital used to produce one calorie of food

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

# The Heckscher-Ohlin Model

## Price and Production

Quantity of labor and capital **used** to produce a give amount of cloth or food:

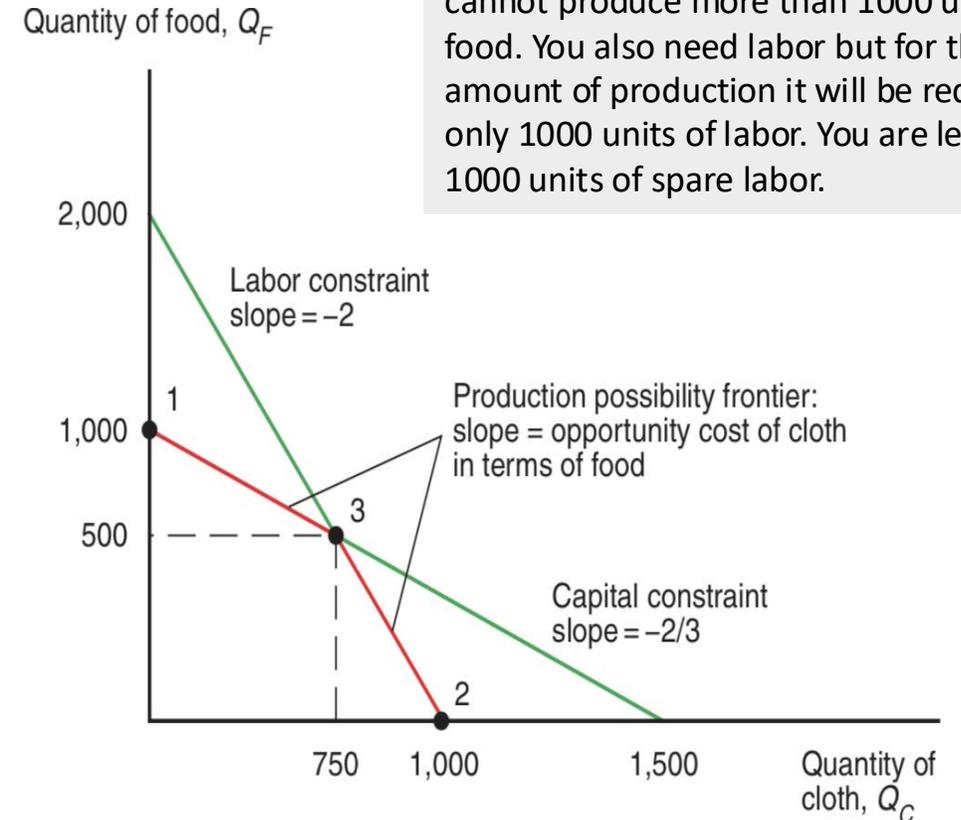
$$a_{KC} = 2; a_{LC} = 2; a_{KF} = 3; a_{LF} = 1;$$

Total supply of capital (machine-hours):

$$a_{KC} \times Q_C + a_{KF} \times Q_F \leq K, \text{ or } 2Q_C + 3Q_F \leq 3,000$$

Total supply of labor (work-hours):

$$a_{LC} \times Q_C + a_{LF} \times Q_F \leq L, \text{ or } 2Q_C + Q_F \leq 2,000$$



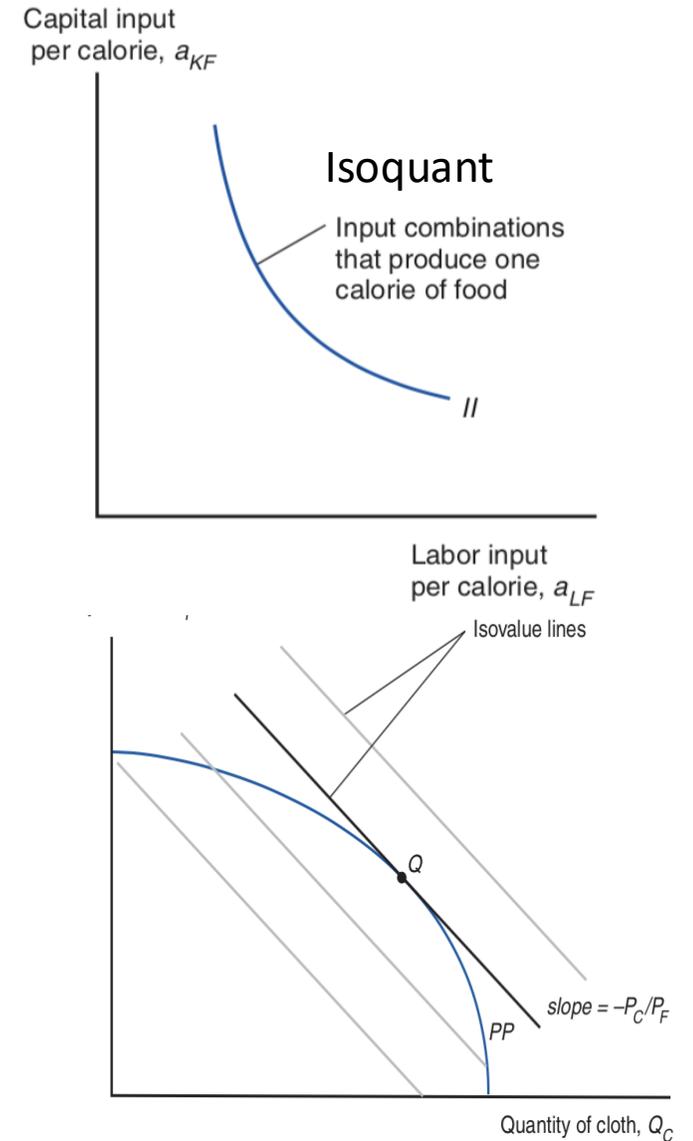
Notice that if you produce only food with only 3000 units of capital you cannot produce more than 1000 units of food. You also need labor but for that amount of production it will be required only 1000 units of labor. You are left with 1000 units of spare labor.

The economy is subject to both constraints. The PP curve is the red kinked line. If the the economy specialized in food it can produce 1000 units of food. In this case there is spare for 1000 work-hours. If specialized in in cloth it can produce 1000 units of cloth. In this case there is spare for 1000 machine-hours. At point 3 there is not spare capacity. To produce 500 unit of food are required 1500 machine-hours and 500 work-hour. To produce 750 units of cloth are required 1500 machine-hours and 1500 machine hours.

# The Heckscher-Ohlin Model

## Choosing Mix of Inputs

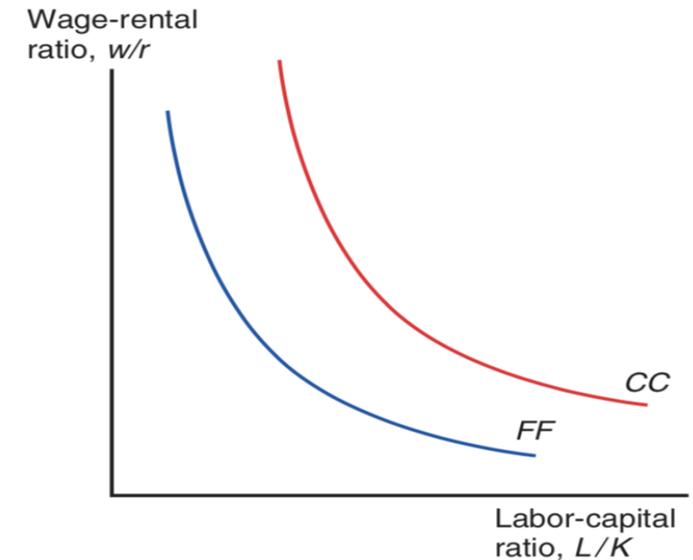
- Now a farmer can produce one unit of food using less labor if uses more capital and viceversa.
- The producer will choose the combination of capital/labor depending on the relative costs of the of those production factors
- If capital can be substituted for labor and viceversa, PP no longer has a kink shape. The opportunity cost of cloth in terms of food rises as the economy's production shift from food to cloth.



# The Heckscher-Ohlin Model

## Choosing the mix of input

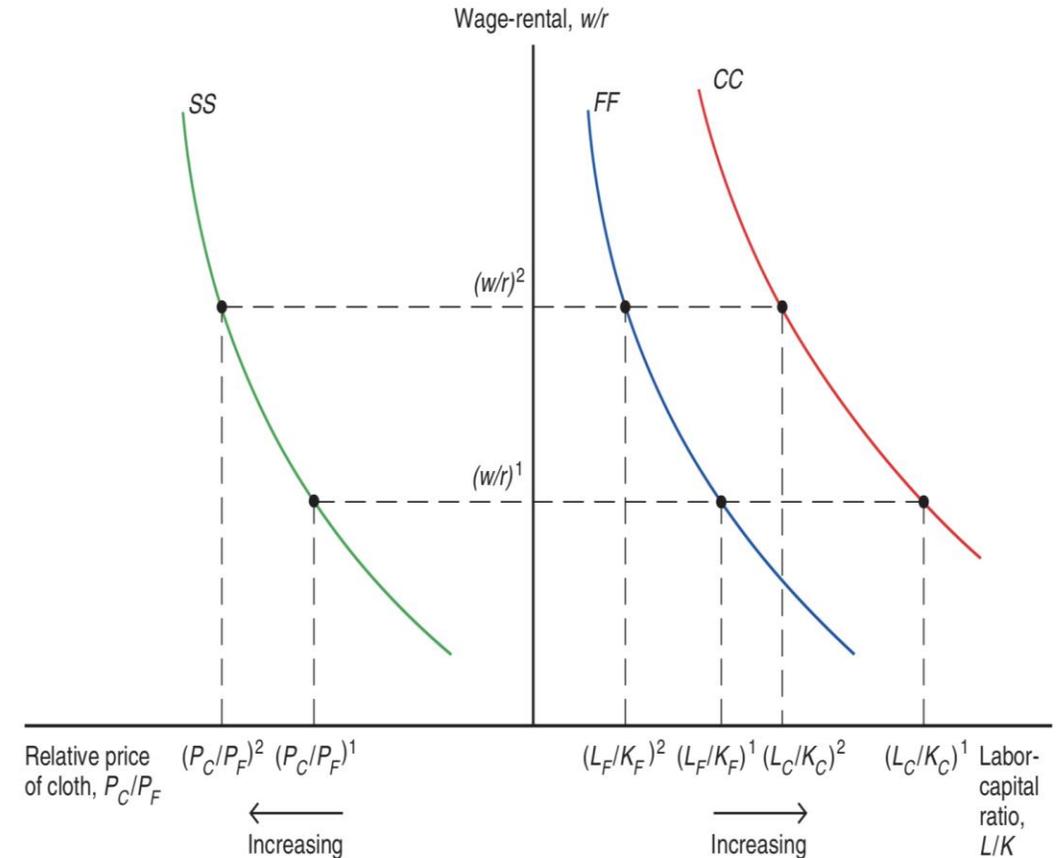
- Let us assume that producers can choose how much labor or capital to use per unit of output. It will depend on the relative costs of capital and labor.
- The relation between  $w/r$  (wage/rental rate) and labor capital ratio is indicated in the figure. We can see that the production of cloth is labor intensive compared to the production of food. These curves represent the relative factor demand curves.
- Because cloth production is labor-intensive while food production is capital-intensive there is one to one relationship between  $w/r$  and  $P_C/P_F$ .
- The higher the relative cost of labor, the higher the relative price of the labor intensive good. See curve SS.



# The Heckscher-Ohlin Model

## Factor Price and good price – Income Distribution

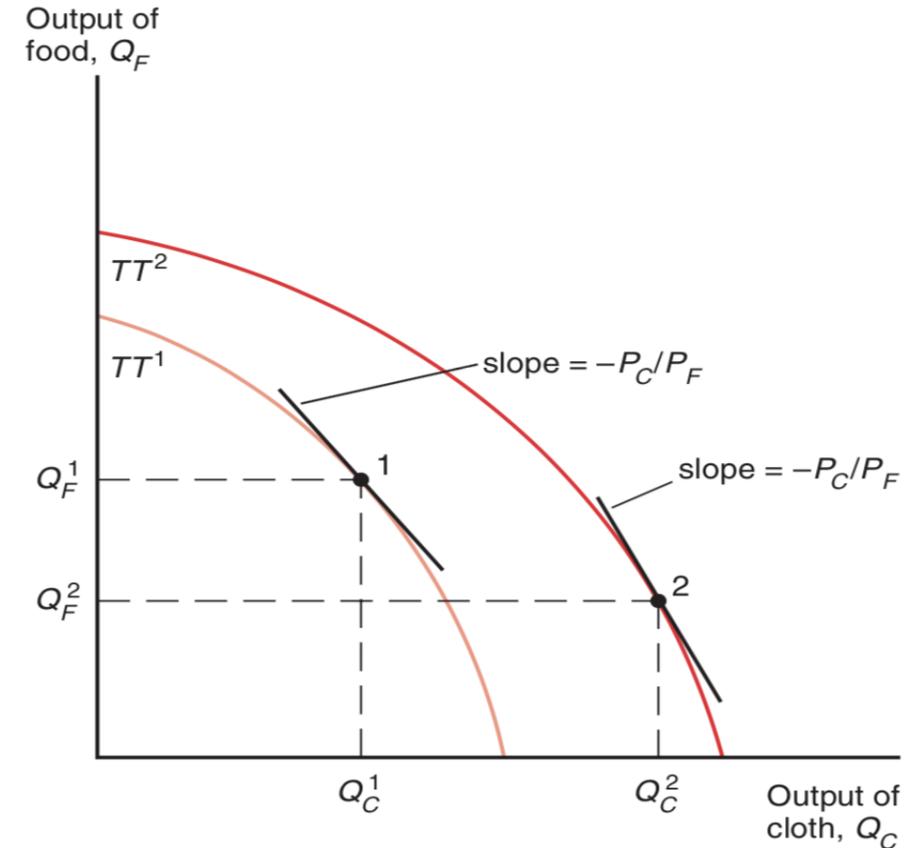
- If the relative price  $P_C/P_F$  of clothes increases the wage-rental ratio must rise ( $w/r$ ). This will cause the labor-capital ratio used in the production of both goods to drop.
- The left panel says that an increase in the price of cloth relative to that of food will rise the income of workers relative to capital owners. Such a change will rise unambiguously real wage and lower real rent of capital owners. Notice that in each industry the marginal product of labor in terms of that good increase and the marginal product of capital decrease (*Stopper-Samuelson Effect*). So a change in the relative prices ( $P_C/P_F \uparrow$ ) will unambiguously raise the purchasing power of workers and lower the purchasing power of capital owners
- Change in relative price have strong effect in income distribution. The owners of one factor of production gain while owner of the other are made worse off.



# The Heckscher-Ohlin Model

## Resources and Output

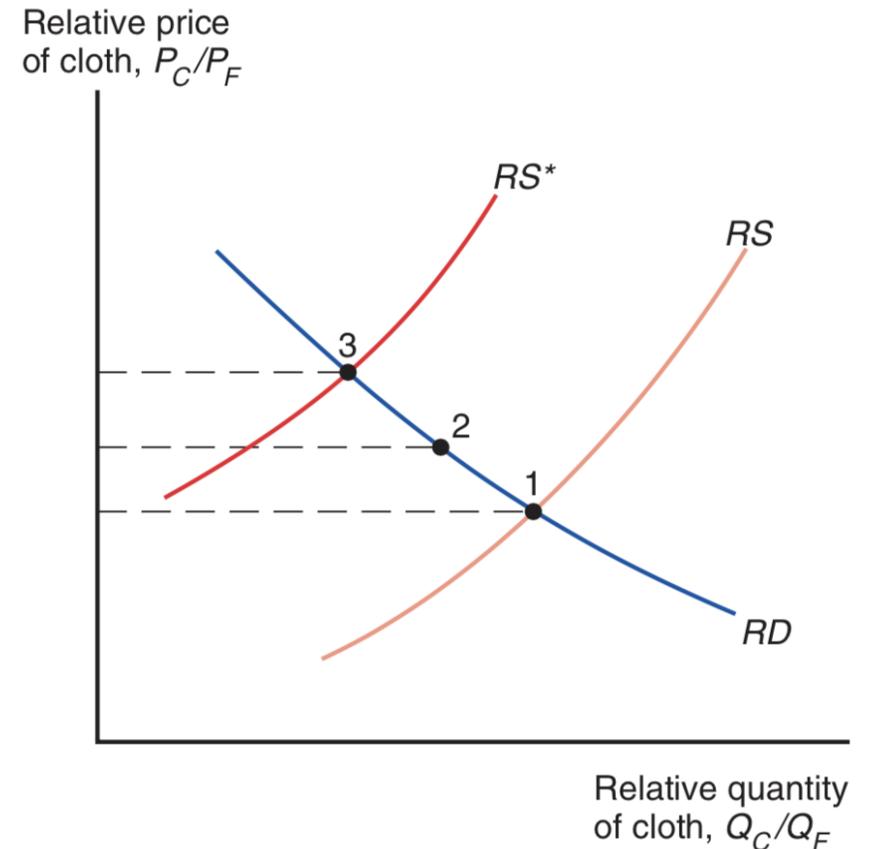
- Let assume that for given  $P_C/P_F$  we have an increase in the supply of labor. We know that for each relative price of cloth there is a fixed ratio  $w/r$ . That ratio, in turn, determine the ratio  $L_C / K_C$  and  $L_F / K_F$ . If overall  $L/K$  increase to maintain those ratios constant resources it is necessary a shift to the cloth sector which is labor intensive from the food sector that is capital intensive. That means that there is a contraction of the production of food and an expansion of the production of cloth.
- We look this at PPF we see an outward shift of frontier larger in the direction of cloth than of food (**biased expansion of production possibility**).
- An increase of the supply of labor expands production in the direction of cloth production, while an increase in the supply of capital will expand production in the direction of food.
- Generally, an economy will be relatively effective at producing goods that are intensive in the factors with which the country is relatively well endowed.



# The Heckscher-Ohlin Model

## Relative Prices and the Pattern of Trade

- We assume that Home and Foreign have similar technology, similar tastes, i. e, similar demand. The only difference is in their resources. Home is labor abundant compare to Foreign. The RD curve is the same for both countries.
- Before trading opens up Home produces a higher ratio of cloth to food. Remember that Home has a PPF more outward in direction of cloth, while Foreign in the direction of food.
- Trade will leads to a convergence of  $P_C/P_F$  as shown in the Graph. Home will end with a higher relative price of cloth (from point 1 to point 2) and Foreign to a lower relative price of cloth (from point 3 to point 1).
- Home becomes an exporter of cloth because is labor abundant, and Foreign an exporter of food because is capital abundant.
- **Heckscher-Ohlin Theorem:** The country that is abundant in a factor exports the good whose production is intensive in that factor.

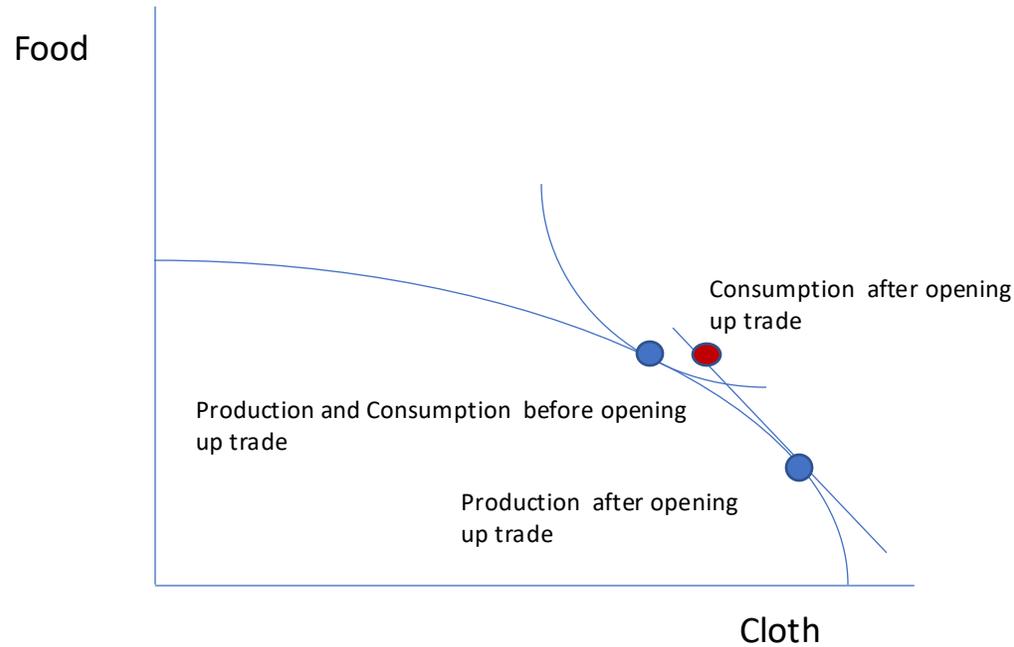


# The Heckscher-Ohlin Model

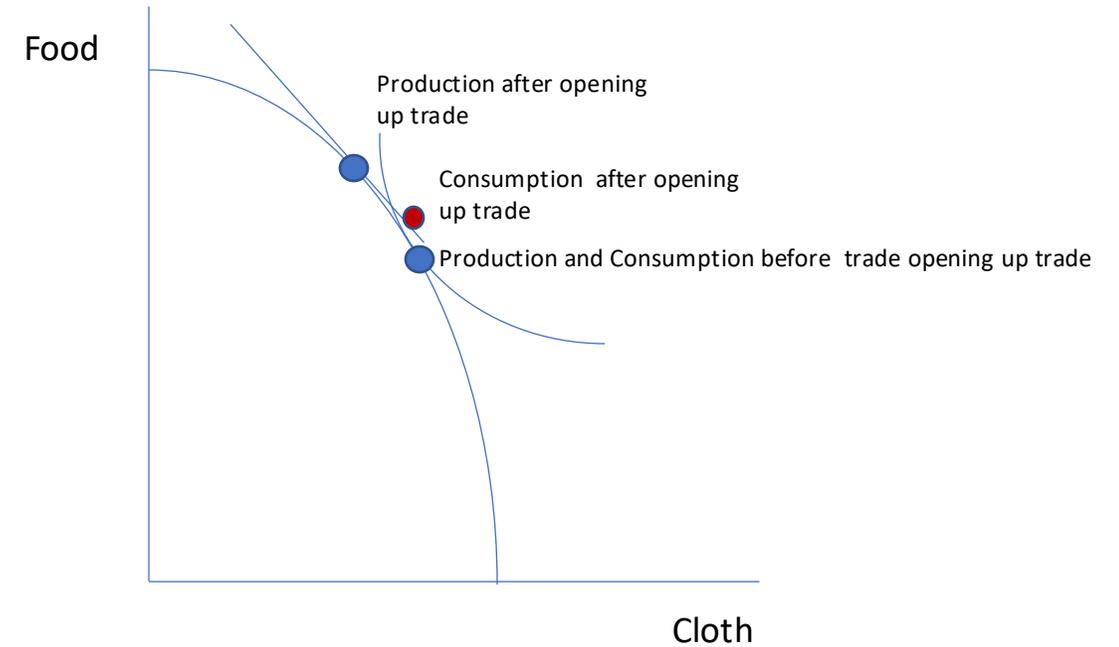
## Price, Production and Consumption before and after opening up trade

$$(P_{C1}/P_{F1}) < (P_{C2}/P_{F2})$$

$$(P_{C1}/P_{F1}) > (P_{C2}/P_{F2})$$



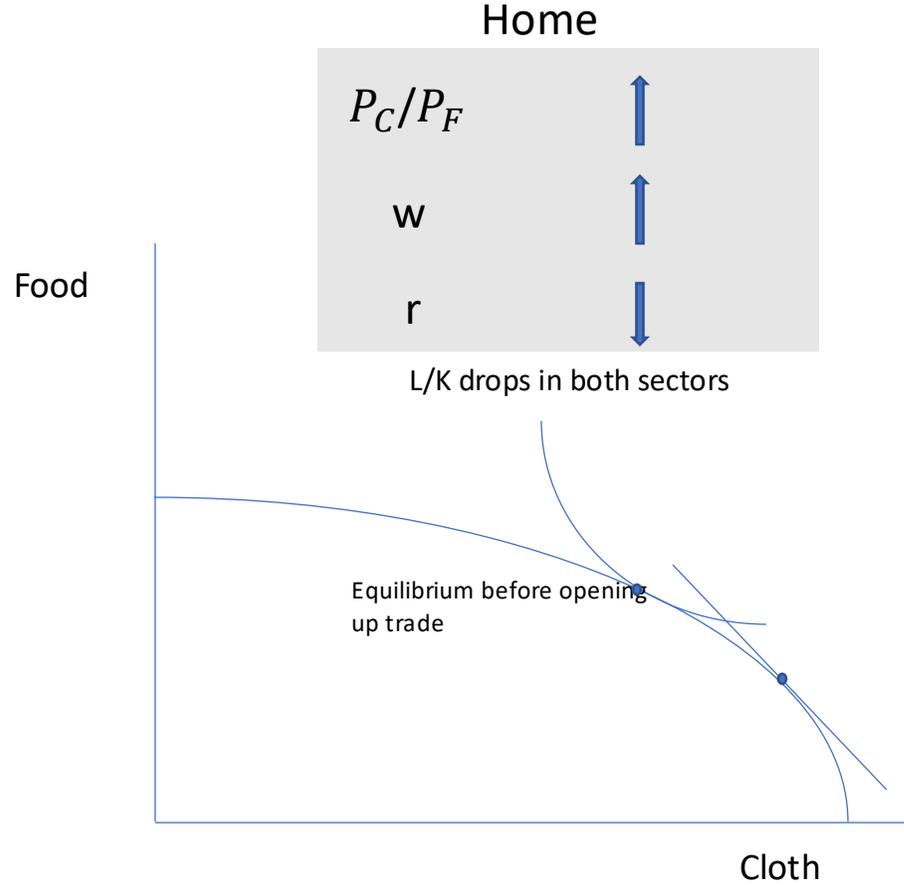
Home – Labor Abundant



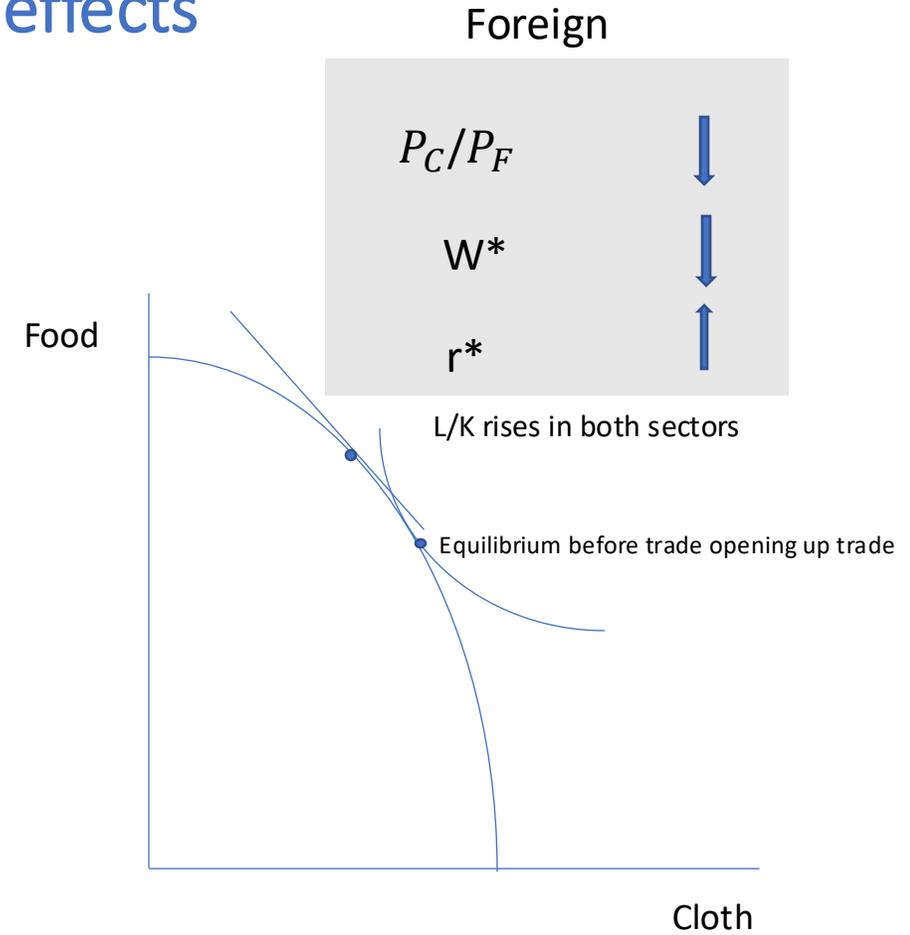
Foreign - Capital Abundant

# The Heckscher-Ohlin Model

## Redistribution effects



Home – Labor Abundant



Foreign - Capital Abundant

# The Heckscher-Ohlin Model

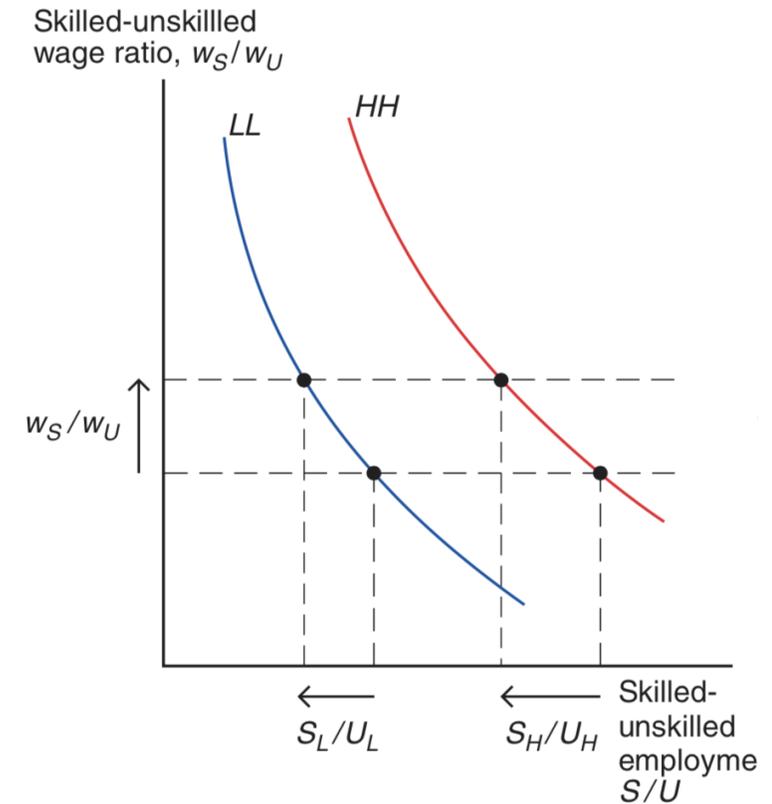
## Trade and the Distribution of Income

- Trade induce a convergence of relative prices. This has powerful and durable effects on distribution. The price of cloth raises the purchasing power of labor both in terms of cloth and food and lower the purchasing power of capital owners in both goods.
- In Home where the relative price of clothes rises, workers gain from from trade, but capital owners are made worse off. In Foreign where the relative price of clothes falls , works are worse off and capital owners are better off.
- *Owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose.*
- The model suggests that with the opening up of trade there are probably temporary frictions in shifting resources from one sectors to an another, but once these frictions are overcome permanent distribution effects among the resources owner persist.
- However the theoretical argument regarding the aggregate gains from trade is identical to the factor model: opening up trade expand an economy's consumption possibility so there is way to make everybody better off.

# The Heckscher-Ohlin Model

## Trade and the Growth of Inequality – Skill and Unskilled

- US compared to the rest of the world is endowed with highly skilled workers. Since the late 70s the wage differentials between skilled and unskilled wage has significantly increased which has brought about an huge increase in income inequality. Is this due to trade with countries such as South Korea and China which are abundant of unskilled labor?
- What was happening could be explained as a move toward factor-price equalization. Country abundant in capital and skills or human capital would observe an increase in the return on these factors and a decrease of the wages of the unskilled workers that would tend to converge toward those of the New Industrialized Economies (NIE). The unskilled abundant economies on the other hand would see an increase the the wages of low-skill workers.
- First, as result you would expect that the price of the the skill-abundant goods should increase compared to those of unskilled labor intensive good in the skill-worker abundant country. No strong evidence was found.



(a) Effects of trade

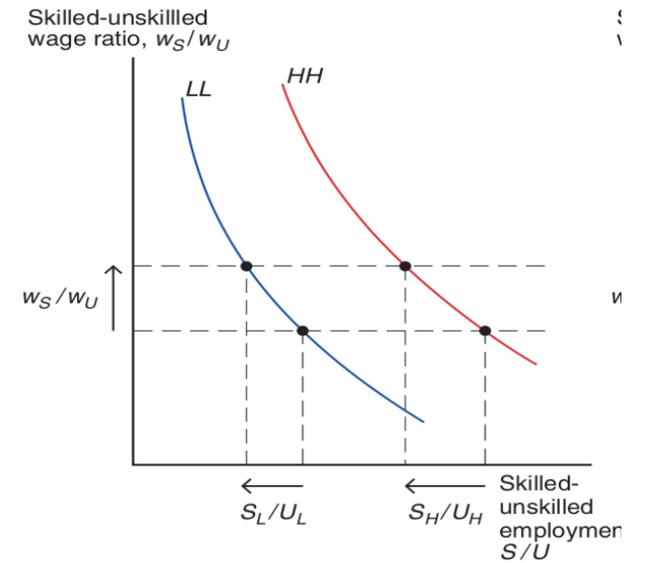
# The Heckscher-Ohlin Model

## Trade and the Growth of Inequality – Skill and Unskilled

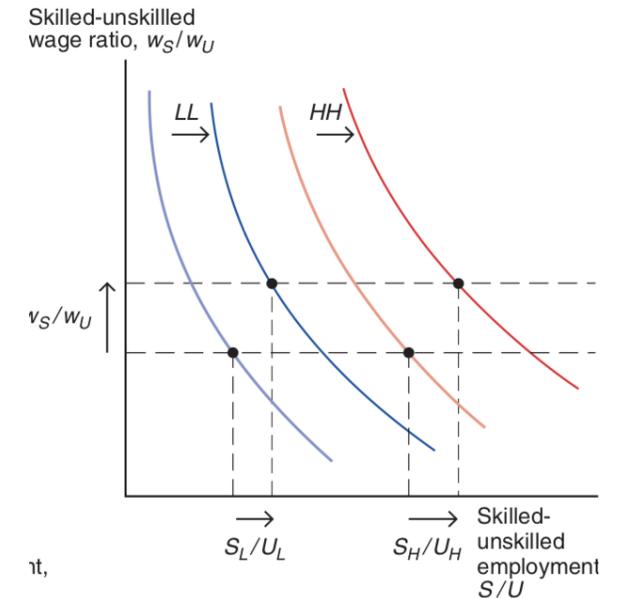
Second, relative factor price should converge. Instead, if ratio of wage of skilled to unskilled rises in in the skill abundant country you should observe the reverse in the labor abundant country. In Mexico, studies have shown that ratio of wage of skilled to unskilled rises contrary to what you would expect.

Third, trade between advanced countries and NIE is still a small part of the total demand of the advance countries.

The view is that the factor responsible of the growing inequality is not trade but **technological change**. What we observe in the advanced economy is an increase of the skilled-unskilled wage and also the ratio of skilled-unskilled employment. This means that due to technical change we have observe across all industrial sectors an increase of the demand of skilled labor relative to unskilled labor.



(a) Effects of trade

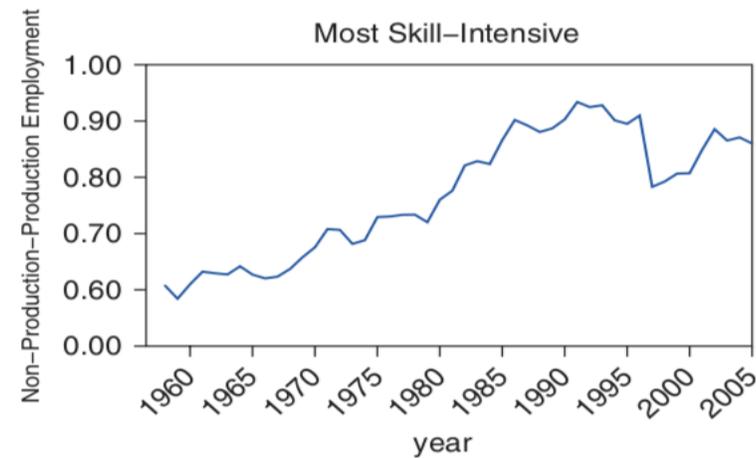
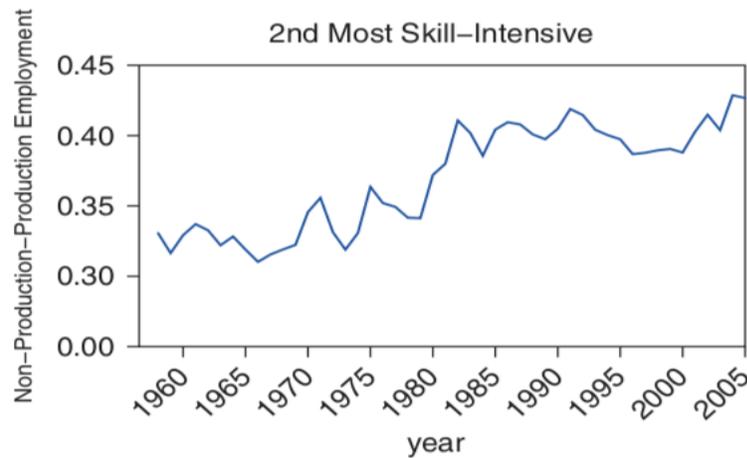
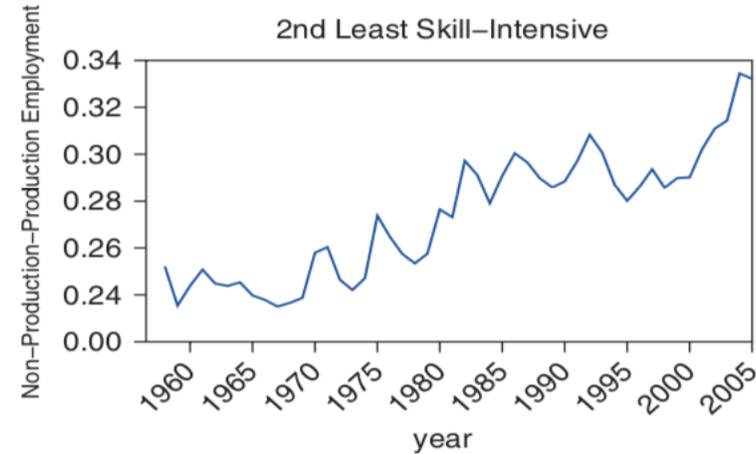
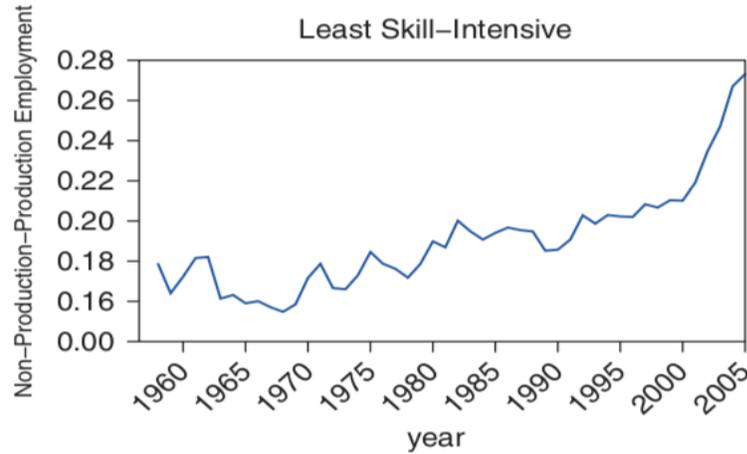


(b) Effects of skill-biased technological change

# The Heckscher-Ohlin Model

## Trade and the Distribution of Income – Skill and Unskilled

The non-production-production employment ratio has increase over time across sector Groups in the US



# The Heckscher-Ohlin Model

## Factor price equalization

- In the absence trade, the relative price of cloth will be higher in Foreign than Home. Labor will earn more in Foreign than Home. The difference in the relative price of goods implies even larger difference in the relative price of factors.
- When trade opens up, the relative price of goods converge. This converge , in turn, causes convergence of the relative prices of capital and labor to point to have **complete equalization of factor prices**.
- The figure on the side show sthat given the relative price we can determine the relative factor price without reference to the supply of K and L.
- When Home and Foreign trade more happen than just an exchange of good.
- Home lets Foreign to use some of their abundant labor , not by selling labor directly | but by trading goods with a high ratio of labor to capital against goods produced with a low ratio of labor to capital. Conversely, Foreign's exports embody more capital than its import. Foreign is indirectly exporting capital.



# The Heckscher-Ohlin Model

## Factor price equalization

- In real world, however, factor price equalization (FPE) does not occur. The main reasons are:

1. To have FPE we need to have both countries to produce both goods. But if countries are very different in their factors endowments, each country might produce only one good.
2. FPE will not hold if there are different technologies of production. A country with superior technology might have higher rental rate and higher wage rate.
3. FPE depends on convergence on the prices of goods, but the presence of transportation costs, tariff, import quotas limit this convergence.

# The Heckscher-Ohlin Model

## Factor price equalization

### Comparative International Wage Rate

(Annual wage – 2020)

United States	69392	100
Germany	53745	77
Japan	38515	56
South Korea	41960	60
Italy	37769	54
Portugal	28410	41
Mexico	16230	23
China	15000	22

# The Heckscher-Ohlin Model

## Empirical Evidence

- H-O model predicts that trade is driven by differences in factor abundance across countries.
- **The Leontief Paradox.**

Factor Content of U.S. Exports and Imports (1962)

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

You would expect that US is exporting capital intensive goods and import labor intensive goods. That is not the case. Possible explanation: US export high-tech goods (sophisticated aircraft or chips) that use high-skilled labor and import cars that use large amounts of capital.

# The Heckscher-Ohlin Model

## Empirical Evidence (2)

- **The Bowen-Leamer-Sveikauskas.** This study is based on the factor content of export-import for 27 countries. Based on the factor content of exports and imports, a country should be a net exporter of a factor of production with which is relatively abundantly endowed and a net importer of those with which is relatively poorly endowed. The authors calculated the ratio of each country's endowment of each factor to the world supply of that factor. Then they compared these ratios with each country's share of the world income. If the factor proportion 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. In fact, for 2/3 of the factors of production, trade run in the predicted direction less than 70% of the time. The results in part confirm the Leontief paradox. Trade does not always go in the direction predicted by H-O.

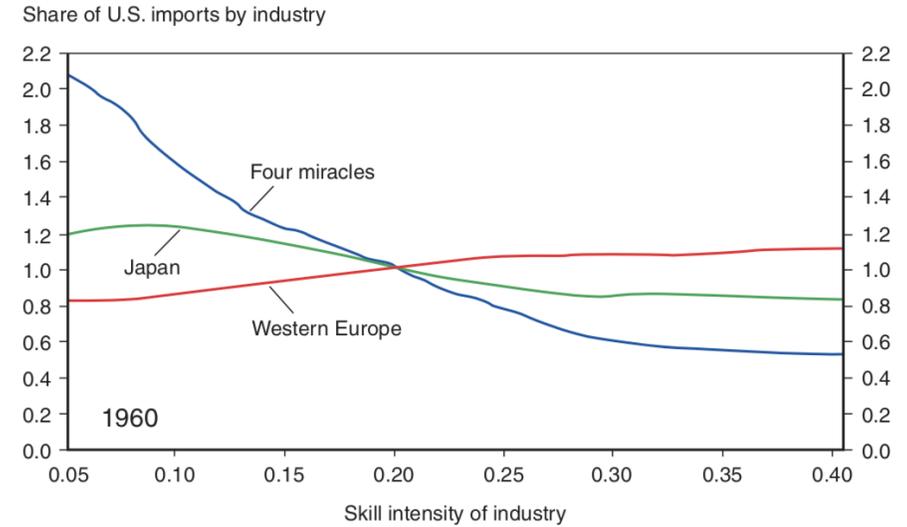
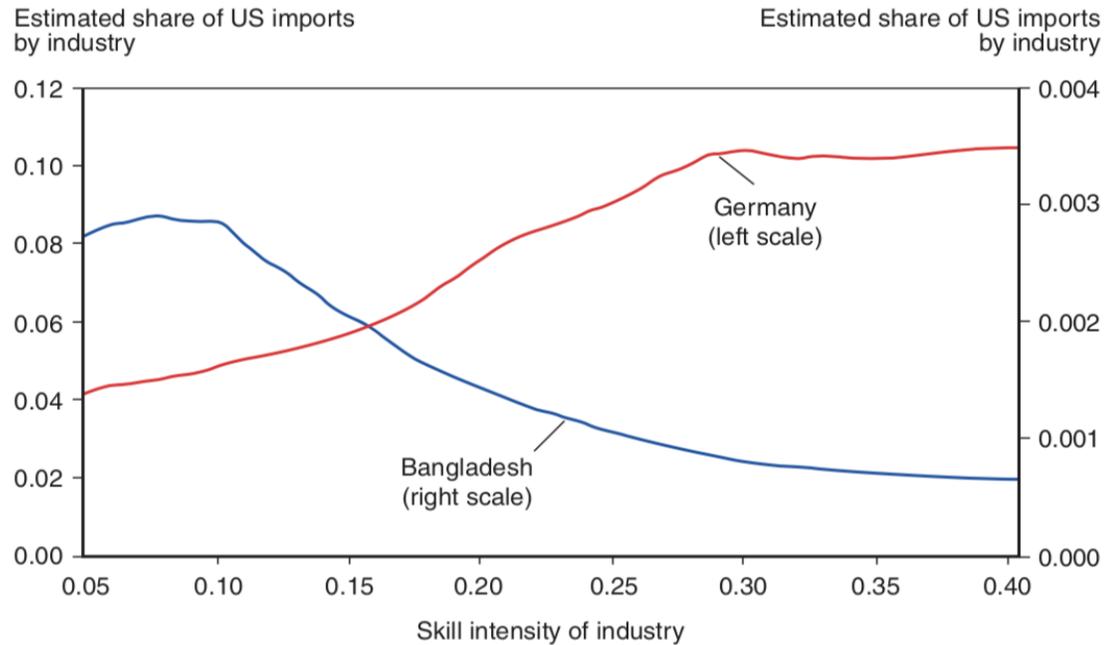
<b>Factor of Production</b>	<b>Predictive Success*</b>
Capital	0.52
Labor	0.67
Professional workers	0.78
Managerial workers	0.22
Clerical workers	0.59
Sales workers	0.67
Service workers	0.67
Agricultural workers	0.63
Production workers	0.70
Arable land	0.70
Pasture land	0.52
Forest	0.70

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

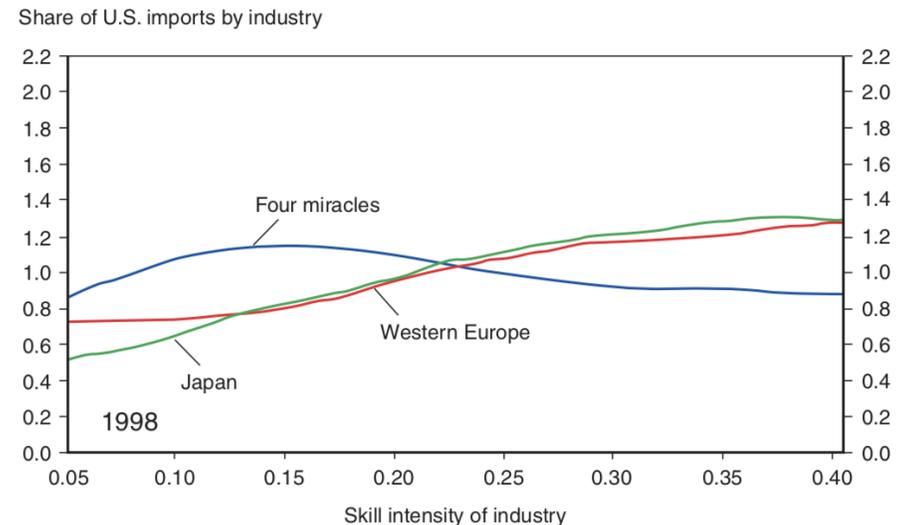
# The Heckscher-Ohlin Model

## Empirical Evidence (3)

- H-O model works better in explaining trade patterns between developed and developing countries. In the Graph we see the pattern of US import from Bangladesh with patter of imports from Germany. In the other graphs US imports from Japan, W. Europe, and the four miracles (Singapore, Hong Kong, Taiwan and S. Korea).



(a) 1960



# The Standard Trade Model

## PPF and Relative supply Curve

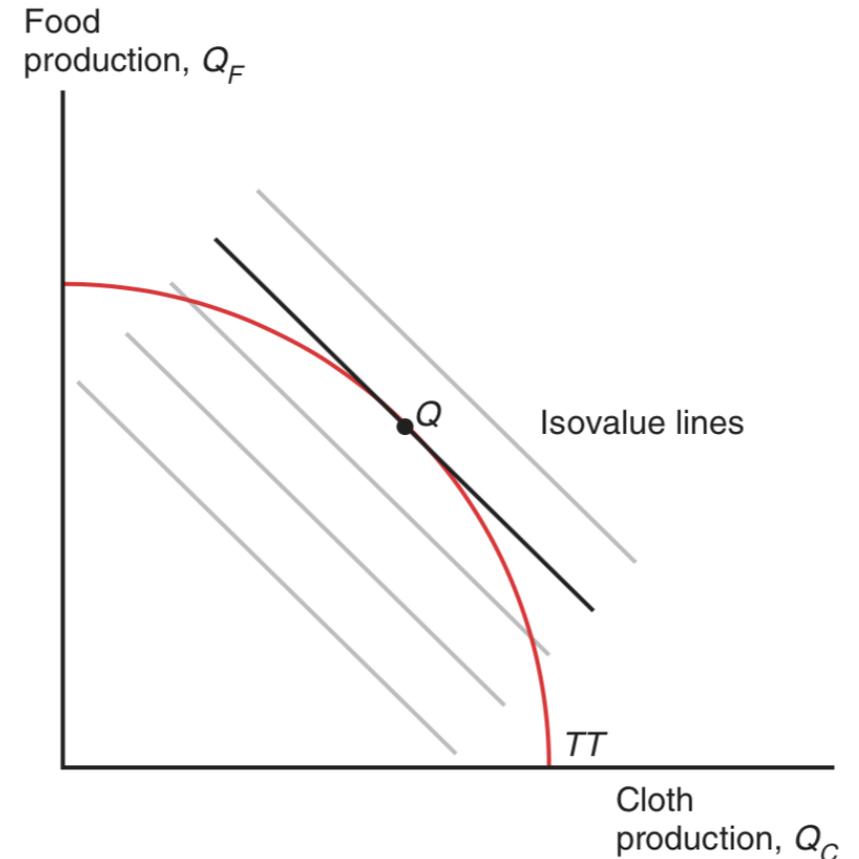
The model is built on 4 blocks: (1) PPF and relative supply curve; (2) PPF and relative demand; (3) determination of world equilibrium (4) the effect of the terms of trade on a nation's welfare.

- The market value of output is indicated by the **isovalue line**. The higher isovalue line is the one which is tangent to the PPF curve.

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

$$Q_F = V/P_F - (P_C/P_F)Q_C,$$

- In order to maximize  $V$  the economy will produce the combination  $Q_C$   $Q_F$  corresponding to point  $Q$

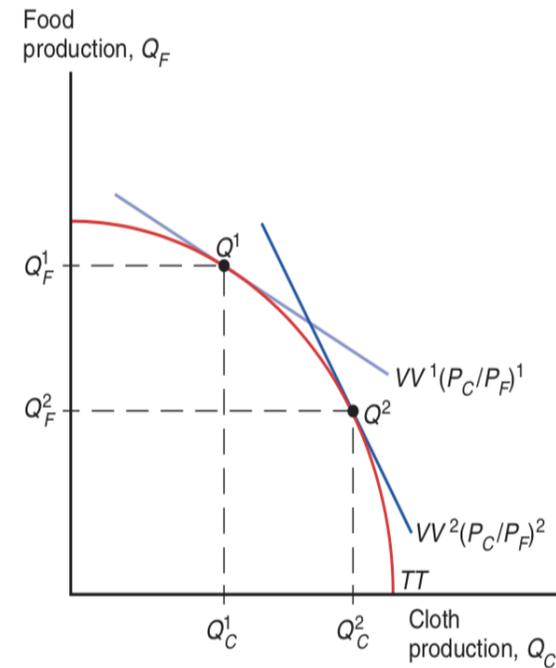


# The Standard Trade Model

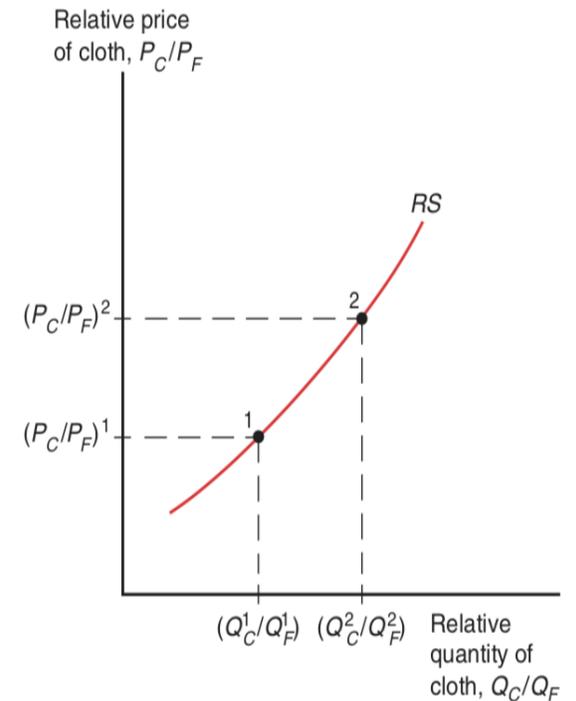
## PPF and Relative supply Curve

The model is built on 4 blocks: (1) PPF and relative supply curve; (2) PPF and relative demand; (3) determination of world equilibrium (4) the effect of the terms of trade on a nation's welfare.

- As the relative price of cloth increase (steeper isovalue line) the production of cloth increase and the production of food decrease.



(a)

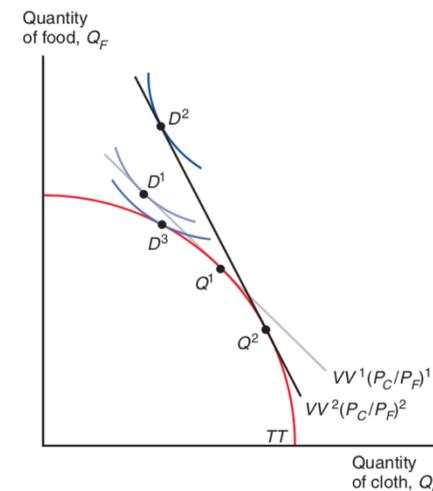
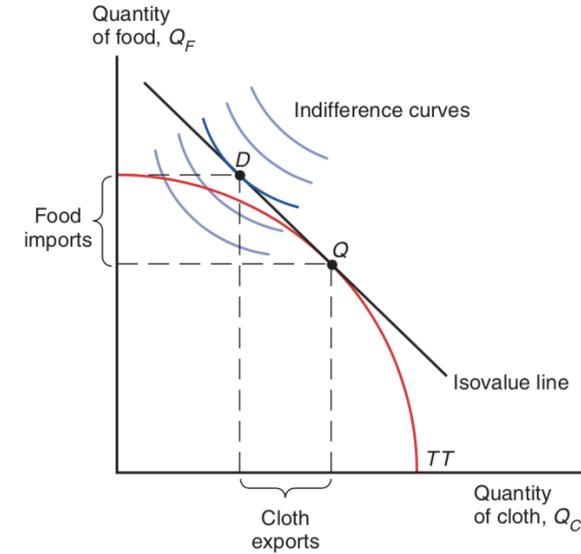


(b)

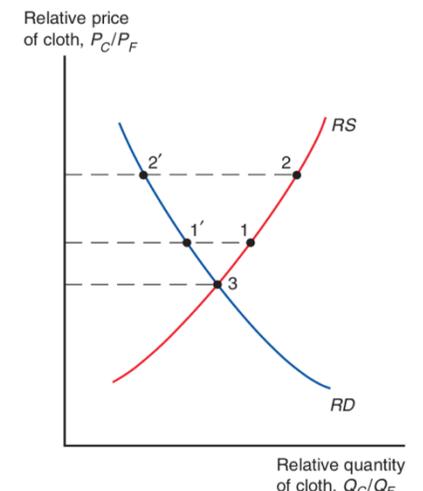
# The Standard Trade Model

## Relative Prices and Demand

- The tastes of individual are represented by an indifference curve. The economy will choose to consume at the point in the highest isovalue line that yields the highest welfare or utility.
- If  $P_C/P_F$  increase the economy produces more cloth, less food and consumes (see  $D^2$ ) more cloth and food. There are two effects at work: the income effect that increase the consumption of both goods and the substitution effect that makes the economy consume more food relative to cloth. The final effect will be either to consume more food and more cloth or more food and less cloth.
- The increase of  $P_C/P_F$  will always reduce the relative quantity of cloth ( $Q_C / Q_F$ ) demanded and increase the relative quantity of cloth ( $Q_C / Q_F$ ) supplied. In graph (b) point 3 indicate the the relative price and the relative quantities with no trade (Q). Point 1 e 1' relative quantities supplied e demanded associated at  $(P_C/P_F)^1$  e point 2 and 2' relatives quantities supplied and demanded associated at point  $(P_C/P_F)''$ .



(a) Production and Consumption

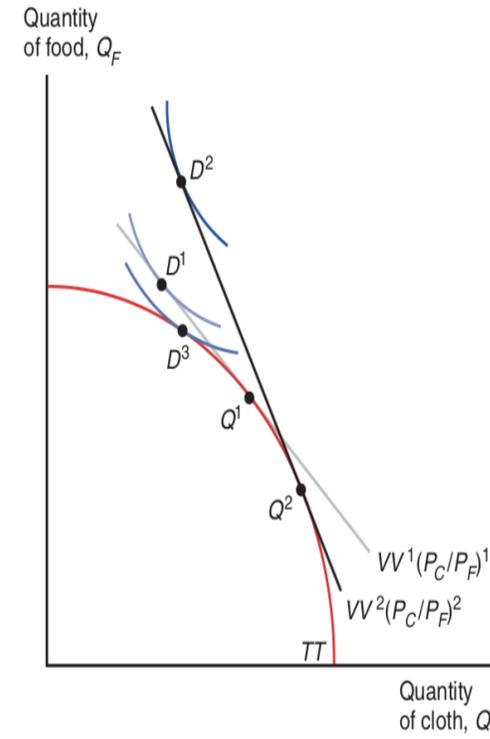


(b) Relative Supply and Demand

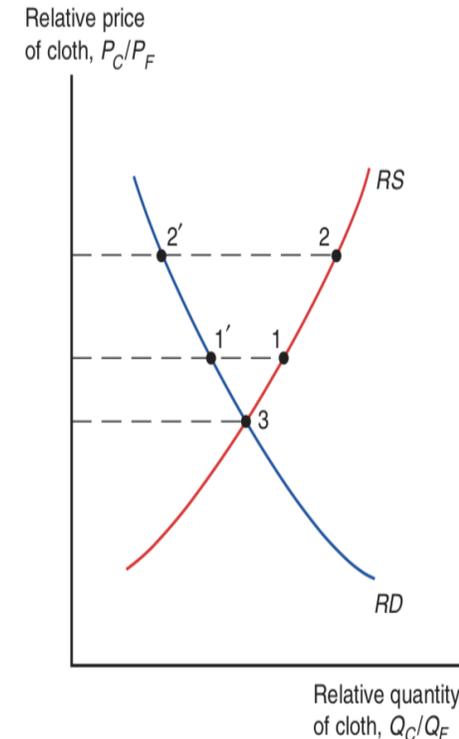
# The Standard Trade Model

## The Welfare effect of Changes in the Terms of Trade (the price of export in terms of import)

- The increase in  $P_C/P_F$  will make the country that export cloth better off shifting consumption from  $D^1$  to  $D^2$ . If the relative price of cloth decline, the country that export cloth will be worse off.
- If the country is an exporter of food, an increase of  $P_C/P_F$ , which will mean a decline of  $P_F/P_C$ , i.e., a decline of the its terms of trade. In this case the country would be worse off.
- A rise in the terms of trade increase a country's welfare, while a decline in the terms of trade reduces its welfare.
- Note that a change in the terms of trade can never decrease the country's welfare below its welfare level in absence of trade ( $D^3$ ).  
**Trade is always beneficial.**



(a) Production and Consumption



(b) Relative Supply and Demand

# The Standard Trade Model

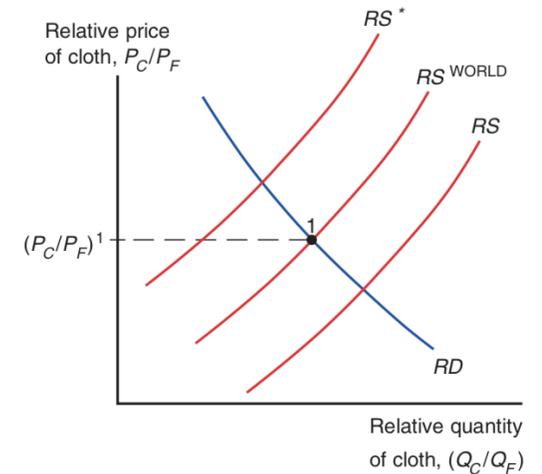
## Economic Growth: A Shift of the RS Curve

- Economic growth in the rest of the world may be good for the Home economy because it can increase the demand for our exports and lower the price of our imports.
- But it can also increase competition for our exports and lower the price, worsening the terms of trade.
- Increased growth at home can be beneficial if it increases the capacity of production, allowing the country to produce more at a given price without changing the terms of trade, but the benefits may be passed to foreigners in the form of lower prices for the country's exports.

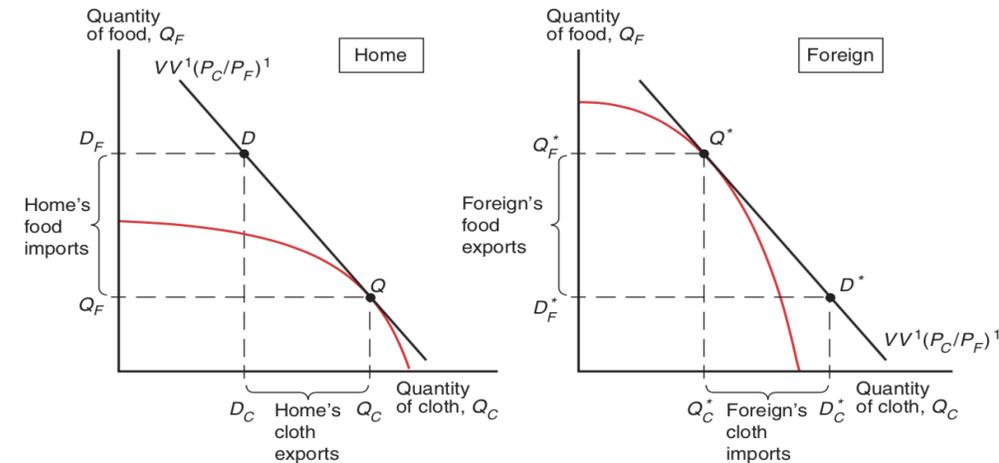
# The Standard Trade Model

## Determining Relative Prices

- Home's terms of trade are measured by  $P_C/P_F$ , while foreign by  $P_F/P_C$ . Trade patterns are induced by differences in production capabilities as shown by PPF. By construction the relative supply curve for the world lie in between the relative supply curve for both countries. We assume no differences in tastes therefore the world relative demand coincides with the relative demand of each country.
- The equilibrium relative price is the intersection of demand and supply. At the equilibrium relative price, Home's exports of cloth equals Foreign's import of cloth and Home's import of food equals Foreign's exports of food.



(a) Relative Supply and Demand

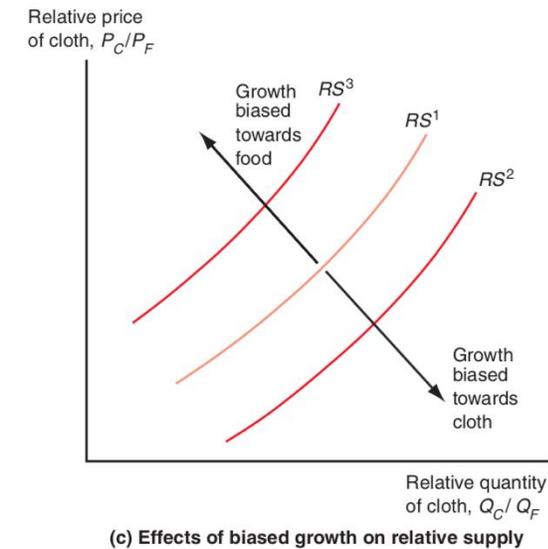
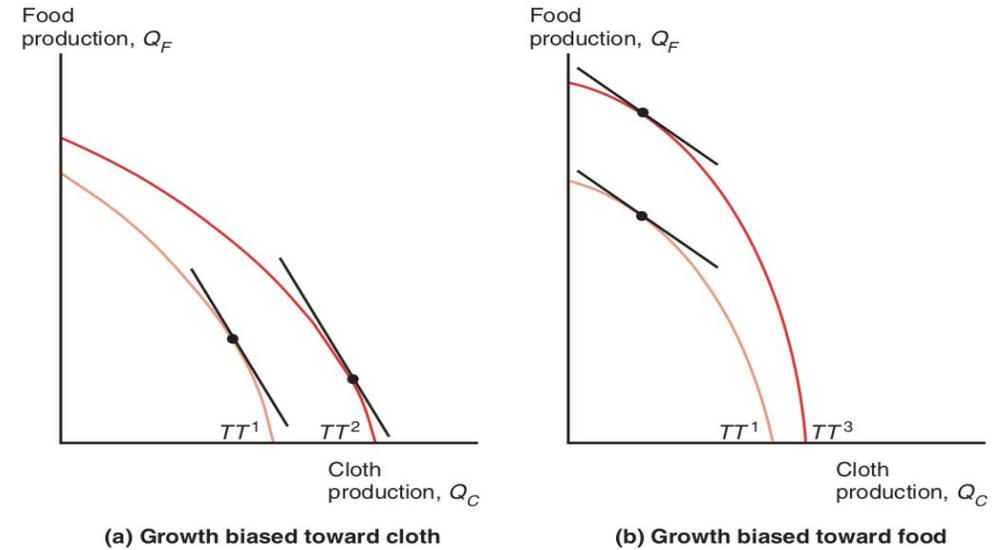


(b) Production, Consumption, and Trade

# The Standard Trade Model

## Growth and the PPF

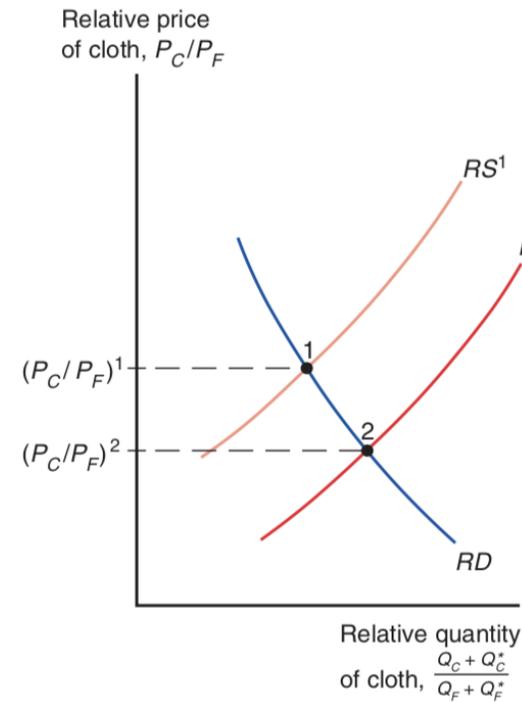
- Economic growth means an outward shift of a country's PPF.
- Biased growth take place when the shift more in one direction than in others. There are two reason of this biased growth:
  1. Technological improvement in one sector on the lines of the Ricardian Model
  2. An increase in a country's supply of a factor on the lines of the Heckscher-Ohlin model
- In both cases production increases for the two goods, although at given relative prices the production increases more for the good for which the production is biased.



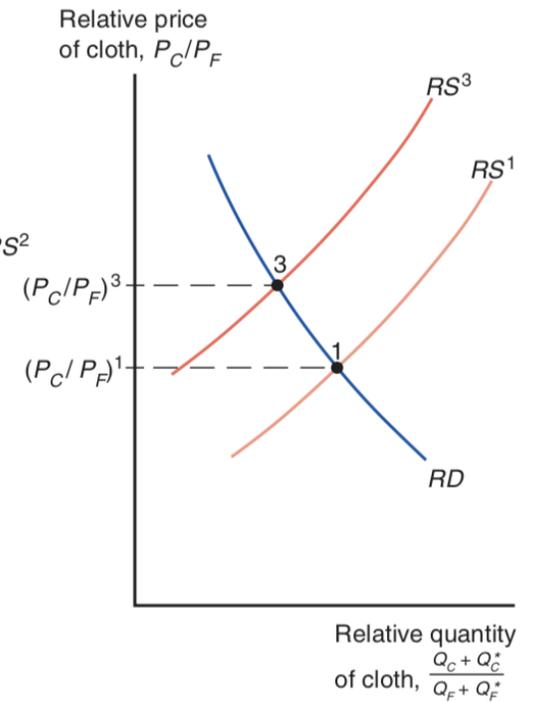
# The Standard Trade Model

## World Relative Supply and the Terms of trade

- Growth biased toward cloth shifts the the RS curve to the right independently that this happens in Home or in foreign countries
- Growth biased toward food shifts the RS to the left independently that this happens in Home or in foreign countries
- Growth that expands the country's PPP in the direction of the good it exports (cloth in Home, food in Foreign) is export-biased growth.
- Growth biased toward the good the country imports is import-biased growth.
- *Export-biased growth tend to worsen a growing country's terms of trade, to the benefit of the rest of the world; import-biased growth tend to improve a growing country's terms of trade at the rest of the world's expense.*



(a) Cloth-biased growth



(b) Food-biased growth

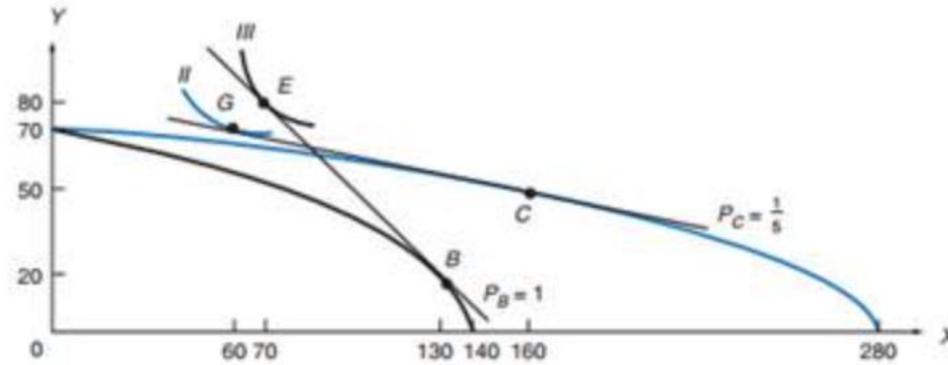
# The Standard Trade Model

## International Effects of growth

- Is growth in the rest of the world good or bad for our country?
- Export-biased growth in the rest of the world is good for us because lead to an improvement of our terms of trade, while import-biased growth worsen our terms of trade.
- Export-biased growth in our country worsen our terms of trade reducing the direct benefits of growth, while import-based growth leads to an improvements of our terms of trade.
- In the 50s economist from poorer countries believed that the the export-biased growth of the poorer country would have worsen their terms of trade so much that they would not have growth at all ( **immiserizing growth**) despite the fact the growth tend to improve the people' welfare.
- Most countries tends to experience mild swing in the terms of trade
- However, developing countries' exports are heavily concentrated in mineral and agricultural sectors leading to large swing in the terms of trade.

# The Standard Trade Model

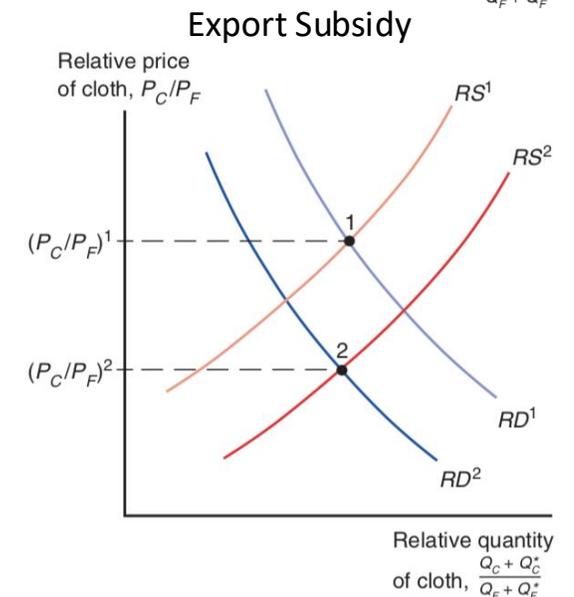
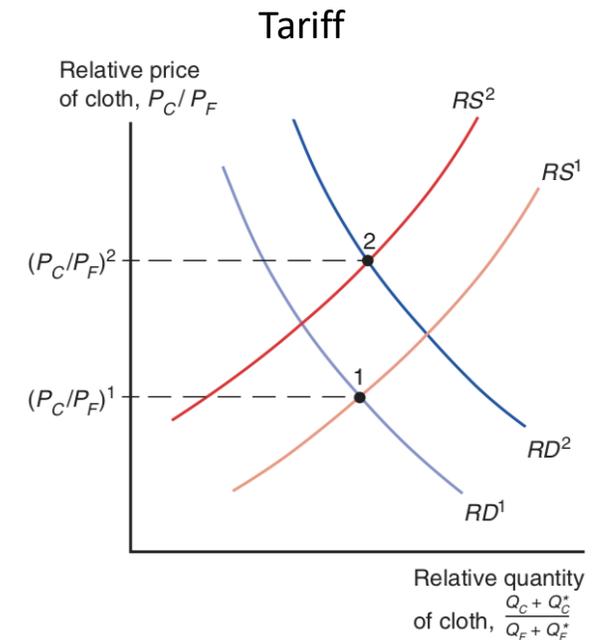
## Immiserizing growth (Bhagwati)



# The Standard Trade Model

## Tariffs and Export subsidies

- Tariff.** If Home impose a tariff (20% tax on imported good) the home producers will face a increase of price of food relative to cloth (**internal price**); this creates a wedge between internal price and external price; production of food will increase and production of cloth will decrease; consumers will shift from food to cloth; the RS will shift on the left and RD will shift on the right at world level. The world relative price of cloth in terms of food increase. The Home terms of trade increase at expenses of the Foreigners. The extent of this terms of trade depends on the size of the country relative to the rest of the world.
- Export Subsidy.** Suppose that Home offers a 20% subsidy on the value of export to export's producers. The rise of the relative price of cloth in terms of food will induce an increase in the production of cloth and a decrease in the production of food; consumers will shift their demand to food from cloth. The world RS will shift to the right and the world RD will shift to the left.  $P_C/P_F$  will decline. A Home export subsidy worsens Home's terms of trade and improve Foreigners's.



# The Standard Trade Model

## Tariffs and Export subsidies: who gains and who loses (welfare effects)

- **Tariff.** If Home imposes a tariff hurts the rest of the world. The internal effect are less clear-cut because the “internal relative price” distorts production and consumption and the economy can end up in a lower level of welfare with respect to the original position. The larger are the effects on the terms of trade, the more likely they will off set the negative effects on welfare due to internal price distortions. The smaller the country the more likely the tariff will have a negative impact on the welfare. For a very small country the optimal tariff is zero. Whenever a small country implements a tariff, national welfare falls.
- **Export Subsidy.** The effect of the subsidy are quite clear. Home loses from terms of trade deteriorations and from the distorting effects on production and consumption of its policy.
- **Are foreign tariffs always bad and foreign export subsidies always good for Home?** In a multi country model a tariff by a foreign country on a good that Home imports that will be beneficial to Home because the international price of the good will be lower. If a Foreign country subsidizes an export good that also Home exports this foreign subsidy will also hurts Home.
- **The view that subsidies to export are good for Home is not a popular one.** It is considered unfair competition. If a country subsidizes the export of agriculture the home farmers and land owners will not be very happy although consumers will benefit by lower agriculture product prices.

# Economies of Scale and Trade

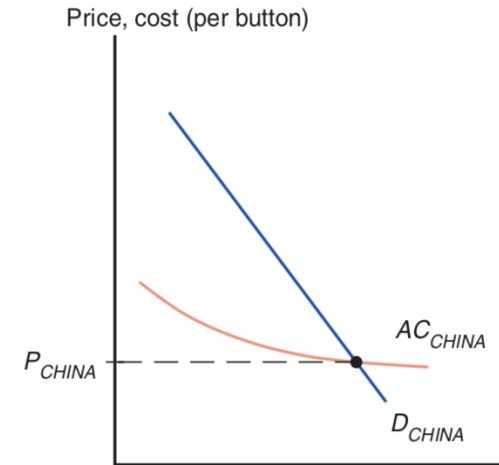
## Overview

- **Economies of scale** (*increasing returns, if you double the inputs, your output more than double*) matter in International trade. To take advantage of economies of scale each countries must concentrate in producing only a limited number of goods. Consumers in each country want on the other hand to have a large varieties of goods.
- **External economies of scale.** Alfred Marshall argued that there are three reasons why a cluster of firms might gain economies of scale: 1) industrial districts provide a large markets to support a wide range of specialized suppliers; 2) labor market pooling of skilled workers is advantageous both for firms and workers; 3) knowledge spillovers take place more easily in a district with informal contacts among members of the industry

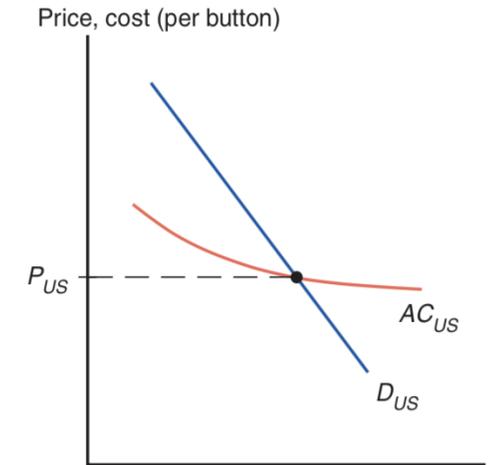
# Economies of Scale and Trade

## Output and Prices

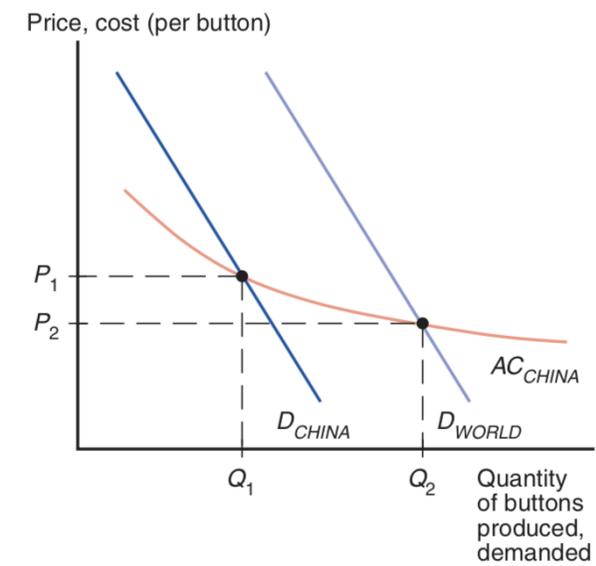
- In China and Us the button industries are subject to economies of scale (forward falling supply curve)
- If we open up trade the Chinese industry will expand and will drive the US industry out of the market.
- This is a very different outcome of the standard model with constant return of scale where prices converge as result of opening up trade.



Chinese button production and consumption



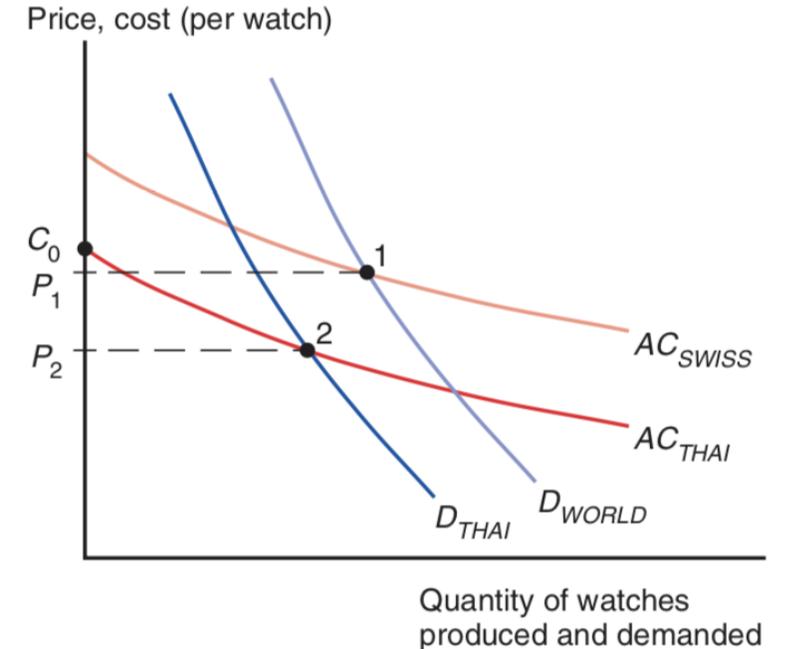
U.S. button production and consumption



# Economies of Scale and Trade

## Trade and welfare with External economies

- With external economies of scale comparative advantage give only a partial explanation for the pattern of trade. For example if China has low cost of unskilled labor is a candidate to develop this industry. But with EES historical contingencies play an important role. Once an industry has started for historical reason in one place, this advantage tend to be “locked in” by economies of scale. New York and London are an example for the financial industry.
- But this does not guarantee that the right country will actually be the producer of a certain good or service. Trade can potentially leave a country worse off than it would be in the absence of trade. For example, Thailand could produce watches at lower price than Switzerland, but a single producers untill an industry is fully develop will face cost above  $P_1$  at  $C_0$ . In order to produce at  $P_2$  is necessary that many firms will decide to enter the markets to create a district to exploit external economies of scale.
- This could justify a protectionist policy in order to give time for an industry to fully develop to get the benefits of the external economies of scale (**infant industry argument** suggested for the first time by J.S. Mill).



# Economies of Scale and Trade

## Internal economies of Scale

- Internal economies of scale implies that the AC of production of the firm declines as output increases. Perfect competition is not compatible with this setting. Most firms will be driven out of the market and as result will obtain an equilibrium of imperfect competition. In modelling imperfect competition we introduce: 1) firms produce good that are differentiated from one another; 2) profits and size vary widely across firms. The better performing firms will prevail and overall efficiency will improve.

# Economies of Scale and Trade

## Pure monopoly

- A profit maximizing monopolistic firm chooses a level of output where  $MR=MC$ .

$$Q = A - B \times P, \quad \text{Demand equation}$$

$$P = A/B - Q/B$$

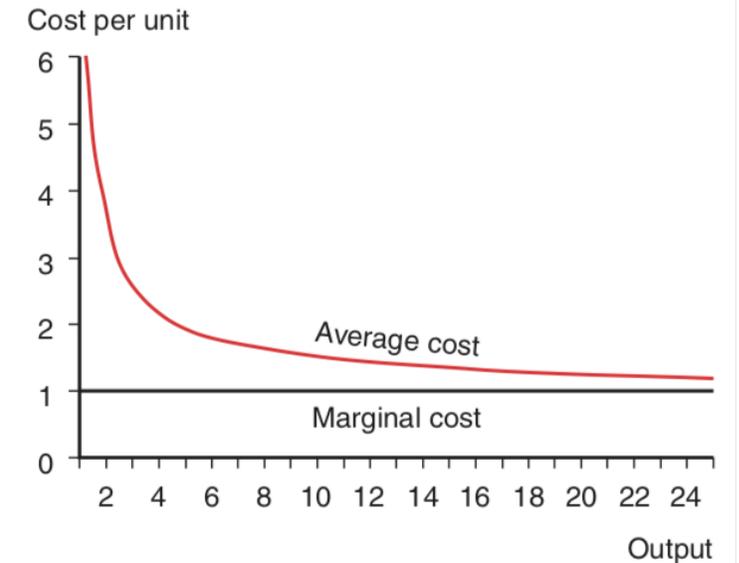
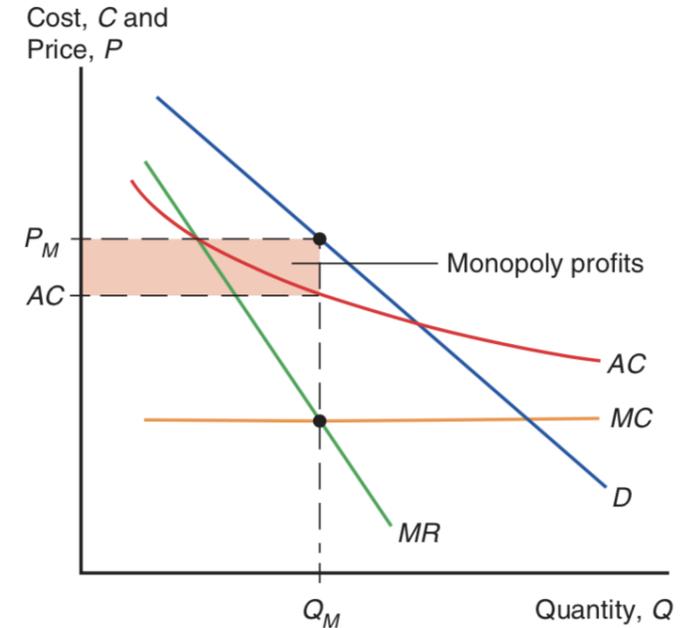
$$R = Q \times P = A \times Q/B - 1/B \times Q^2 \quad \text{Revenue}$$

$$dR/dQ = A/B - 2/B \times Q \quad \text{Marginal Revenue}$$

- Average and Marginal Costs

$$C = F + c \times Q,$$

$$AC = C/Q = (F/Q) + c.$$



# Economies of Scale and Trade

## Pure monopoly – Marginal Revenue

- Marginal Revenue can also be expressed as

$$MR = P ( 1 + 1 / \varepsilon )$$

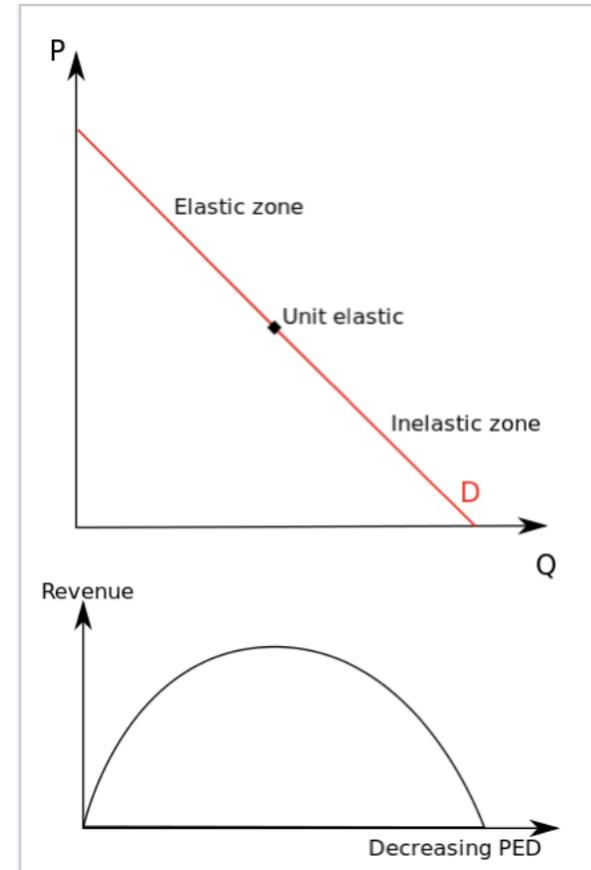
Marginal Revenue

$$\varepsilon = \frac{\frac{dQ}{Q}}{\frac{dP}{P}} = P/Q dQ/dP$$

Price Elasticity of Demand

$$MR = P - Q/B$$

Marginal Revenue



A set of graphs shows the relationship between demand and total revenue (TR) for the specific case of a linear demand curve. As price decreases in the elastic range, TR increases, but in the inelastic range, TR decreases. TR is maximised at the quantity where PED = 1.

# Economies of Scale and Trade

## Marginal Revenue

If the firm face this demand

$$Q = A - B \times P, \quad (1)$$

$$MR = P - (1/B) \times Q. \quad (2)$$

Let's prove this.

Demand can be rearranged:

$$P = (A/B) - (1/B) \times Q. \quad (3)$$

$$R = P \times Q = [(A/B) - (1/B) \times Q] \times Q. \quad (4)$$

Suppose that a firm decide to increase Q, so that new level will be  $Q' = Q + dQ$ . The new level of R will be:

$$\begin{aligned} R' &= P' \times Q' = [(A/B) - (1/B) \times (Q + dQ)] \times (Q + dQ) \\ &= [(A/B) - (1/B) \times Q] \times Q + [(A/B) - (1/B) \times Q] \times dQ \\ &\quad - (1/B) \times Q \times dQ - (1/B) \times (dQ)^2. \end{aligned} \quad (5)$$

Substituting (3) e (4) in (5) we obtain:

$$R' = R + P \times dQ - (1/B) \times Q \times dQ - (1/B) \times (dQ)^2.$$

This tem cancel because very small

$$R' - R = [(P - (1/B) \times Q)] \times dQ.$$

$$MR = (R' - R)/dQ = P - (1/B) \times Q,$$

# Economies of Scale and Trade

## Monopolistic Competition

- Each firm is able to differentiate its product. Each firm takes the price charged by its rivals as given (it ignores the effects of its own price on the actions of the others. It acts as a monopolist in its own market)

$$Q = S \times [1/n - b \times (P - \bar{P})], \quad \text{Demand equation}$$

- Q is the quantity demanded, S is the total output of industry, n the number of firms, b the responsiveness of a firm's sale to its price P, and  $\bar{P}$  is the average price charged by its rivals. S is not affected by  $\bar{P}$ . All the firms face the same demand equation and have the same cost functions.

# Economies of Scale and Trade

## Monopolistic Competition – Market Equilibrium

- **The number of firms and average cost.** In equilibrium the firms will charge the same price. Then,  $Q=S/n$ . As we can see the AC, which has a fix term, depends inversely by on a firm's output:

$$AC = F/Q + c = (n \times F/S) + c.$$

The more the firms there are in the industry, the higher is the average cost of each firm.

- **The number of firms and the price.** The more firms there are, the more intense will be competition among them. Remember that

$$Q = A - B \times P,$$
$$Q = S \times [1/n - b \times (P - \bar{P})],$$
$$Q = [(S/n) + S \times b \times \bar{P}] - S \times b \times P,$$

Profit-maximizing firm will set  $MR = MC$ . The marginal revenue are equal to  $MR = P - Q/B$ . We replace  $B$  with  $S \times b$

$$MR = P - Q/(S \times b) = c,$$

If all firms charge the same price each one will sell  $Q = S/n$ . The relation between the number of firms and price will be:

$$P = c + 1/(b \times n).$$

# Economies of Scale and Trade

## Monopolistic Competition – Market Equilibrium

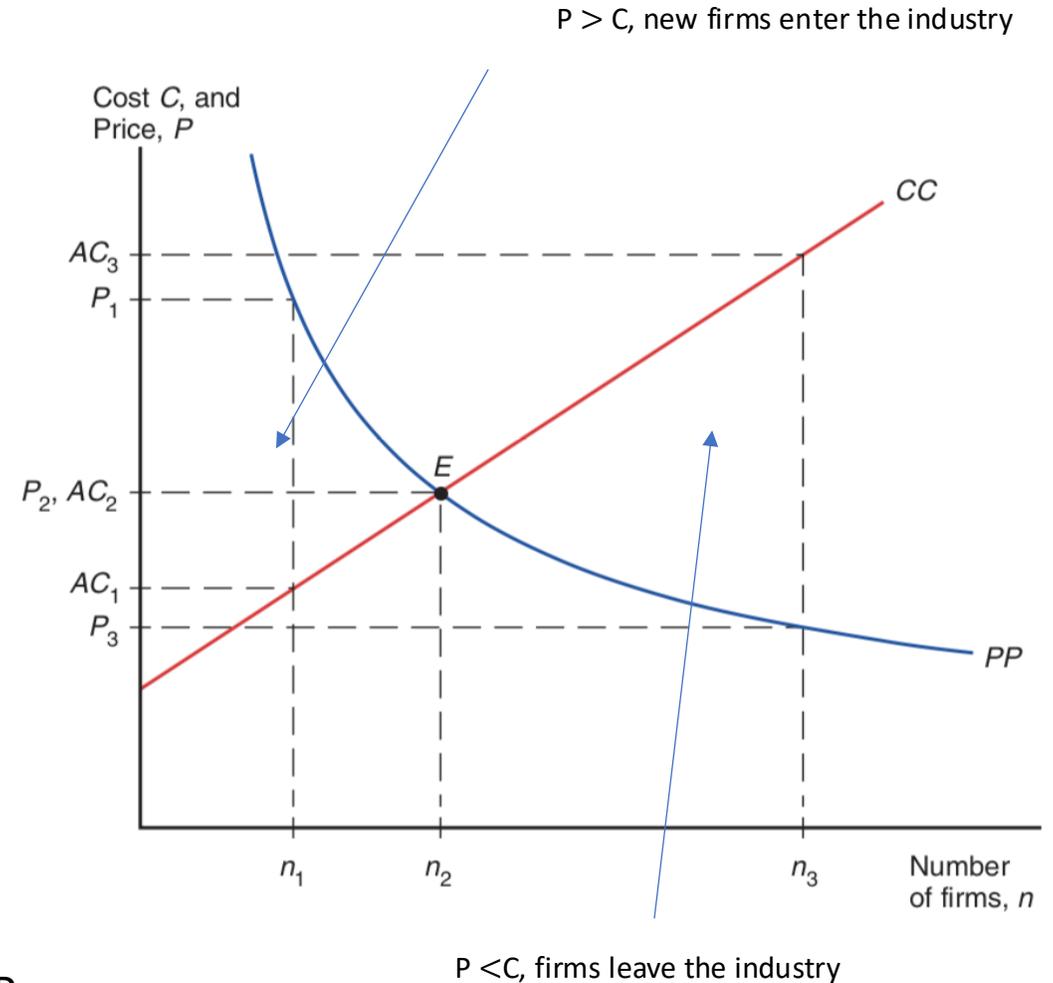
- **The equilibrium number of firms.**

$$AC = F/Q + c = (n \times F/S) + c. \quad \text{CC Curve}$$

$$P = c + 1/(b \times n). \quad \text{PP Curve}$$

**CC CURVE.** The **CC curve** which represents the average cost of the firm is an increase function of the number of firms: with a given size of the market, the more firm there are the smaller are the revenues of each firm. With smaller revenues each firm will have lower economies of scale.

**PP CURVE.** On the other hand, the more firms there are, the more intensively they compete, and the lower is the industry price. This because the **markup** over *MC* decreases,  $P - c = 1/(b \times n)$  as the number of firms increases. This is represented by the **PP Curve**. If the *P* is above *AC* (extra profit) the number of firms increases and *P* is below *AC* the number of firms declines.



# Economies of Scale and Trade

## Monopolistic Competition – The Effects of Increased Market size

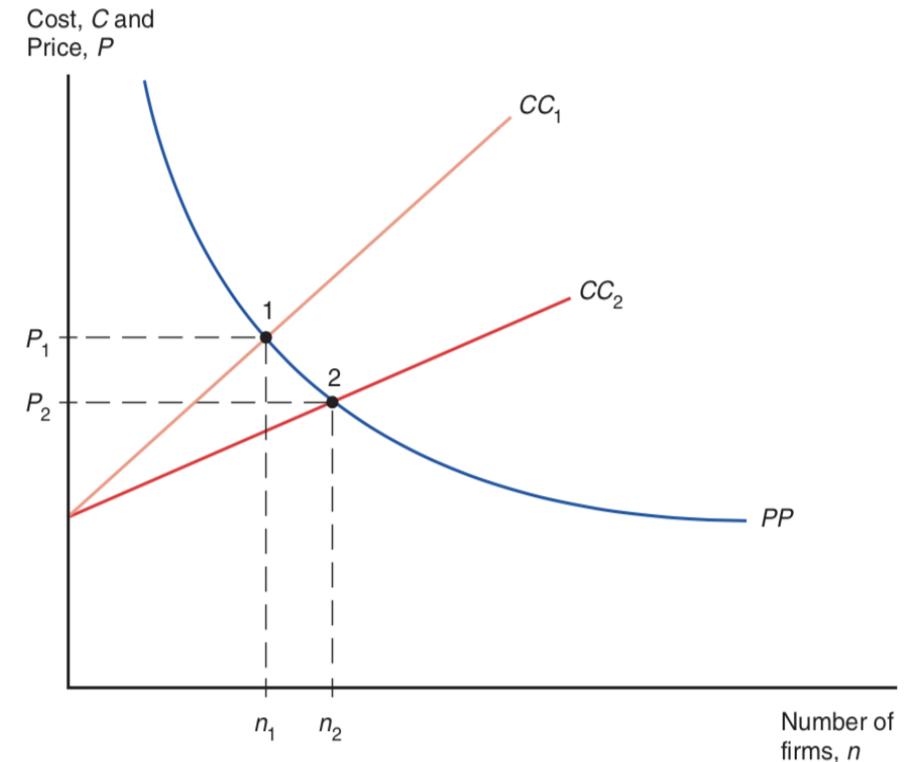
In larger markets there will both more firms and more sales for firms. Looking at the CC curve we see that increasing output,  $S$ , the AC will decrease:

$$AC = F/Q + c = (n \times F/S) + c. \quad \text{CC curve}$$

As output per firm increases, firms will benefit from economies of scale. If we compare two markets, the one with a higher  $S$  will have a CC curve below the one with lower  $S$ . On the other hand, the PP curve will not shift because  $S$  does not enter in the PP equation:

$$P = c + 1/(b \times n). \quad \text{PP curve}$$

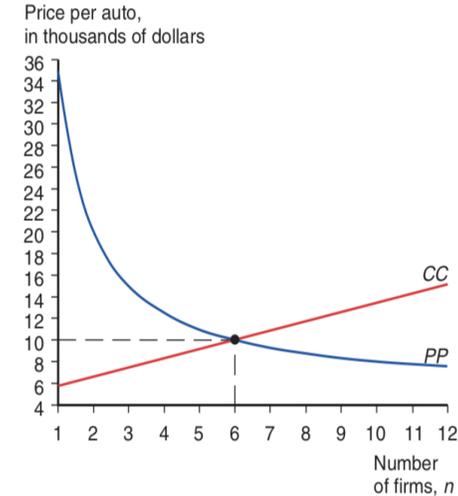
Clearly, consumers will prefer to be in economy with the  $CC_2$  curve because they have more variety of goods (remember that in monopolistic competition each firm is able to differentiate its products at lower costs).



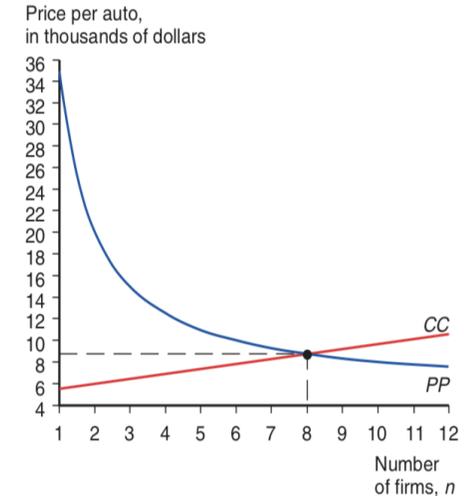
# Economies of Scale and Trade

## Monopolistic Competition – Gains from an integrated market

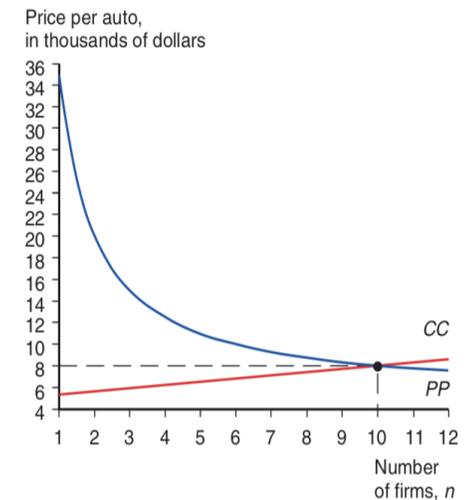
- Home market: size of 900K automobiles. The intersection of the PP curve and CC curve occurs with 6 firms and a price of \$10k per auto.
- Foreign market: size of 1.6 ml automobiles. The intersection occurs with 8 firms and an industry prices of \$8,750 per auto.
- The combined market: integrating the two markets create a market for 2.5 million autos. This market support ten firms and the price of an auto is \$8K per auto.



(a) Home



(b) Foreign



(c) Integrated

# Economies of Scale and Trade

## Monopolistic Competition – The Importance of Intra-Industry Trade

- Strong difference between monopolistic competition and comparative advantage models: product differentiation and internal economies of scale lead to trade between similar countries with no comparative advantage differences between them.
- Intra-Industry Trade has steadily grown in the last half century.
- It is very high for sophisticated products (machineries, chemicals, pharmaceuticals) and low for labor intensive products (cloth, footwear)
- Studies have shown that the increase in variety of products represented a welfare gain equal to 2.5% of GDP.
- This phenomenon has been very prominent in Europe thanks to the EEC.
- The adoption of the euro has led to a substantial increase in the number of products that are traded within the Eurozone.

### Index Intra-Trading Industry (US – 2009)\*

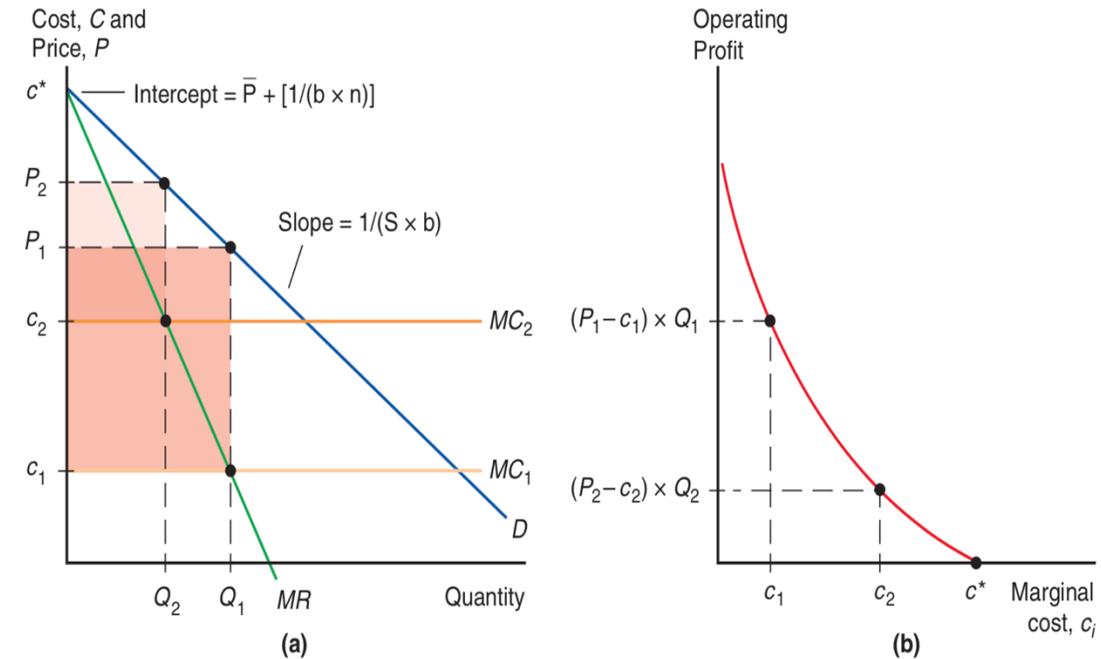
Metalworking Machinery	0.97
Inorganic Chemicals	0.97
Power-Generating Machines	0.86
Medical and Pharmaceutical Products	0.85
Scientific Equipment	0.84
Organic Chemicals	0.79
Iron and Steel	0.76
Road Vehicles	0.70
Office Machines	0.58
Telecommunications Equipment	0.46
Furniture	0.30
Clothing and Apparel	0.11
Footwear	0.10

\* An index of 1 means that the value of exports are equal to the value of imports, a value of zero means that country is only an exporter or importer.

# Economies of Scale and Trade

## Monopolistic Competition – Winner & Losers

- If firms differ in terms of their performance, economic integration generates winner and losers. They face the same demand.
- Firm 1 has lower MC than firm 2. Relative to firm 2, firm 1 sets a lower price and produce more output.
- Operating profit are a decreasing function of marginal costs.
- Any firm with marginal costs above  $c^*$  shut down.



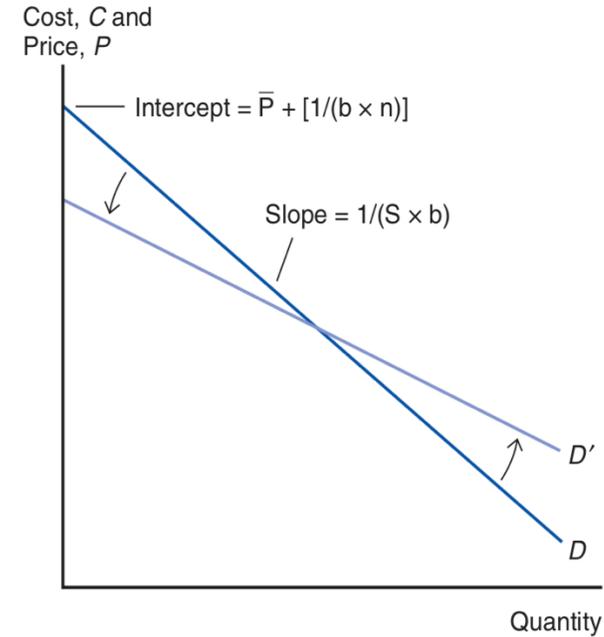
$$Q = S \times [1/n - b \times (P - \bar{P})],$$

$$P = \bar{P} + 1/bn - 1/sb Q$$

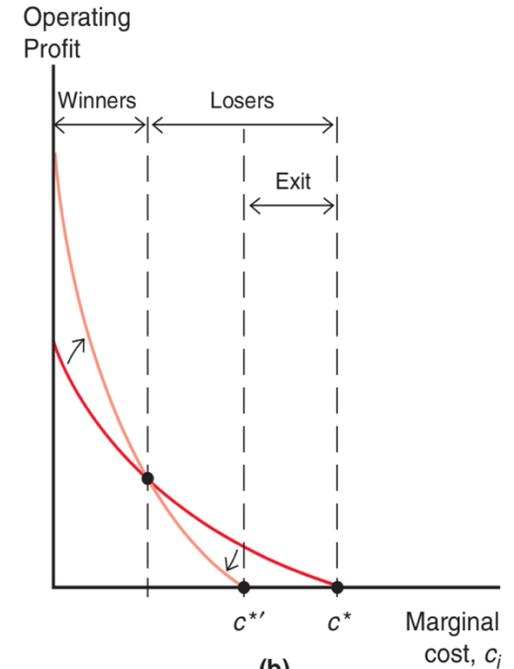
# Economies of Scale and Trade

## The Effects of Increased Market Size – Winner & Losers

- If firms differ in terms of their performance, economic integration generates winner and losers. They face the same demand.
- Flattening of demand curve. Integration increase the number of firm,  $n$ , lower the intercept and the increase of the market size decrease the slope of the curve ( $1/(S \times b)$ ). (see (a))
- Firms with MC between the old cut off  $c^*$  and the new one  $c^{*'}$  are forced to exit (losers). Some firms will benefit from increasing return of scale: the lower marginal costs increase their profits (winners). (see (b))



(a)



(b)

# Economies of Scale and Trade

## Monopolistic Competition – Winner & Losers

### The Long and Short of the Canada-U.S. Free Trade Agreement

By DANIEL TREFLER\*

conclusions emerged from the analysis. First, the FTA was associated with substantial employment losses: 12 percent for the most impacted, import-competing group of industries and 5 percent for manufacturing as a whole. These effects appear in both the industry- and plant-level analyses. Second, the FTA led to large labor productivity gains. For the most impacted, export-oriented group of industries, labor productivity rose by 14 percent at the plant level. For the most impacted, import-competing group of industries, labor productivity rose by 15 percent with at least half of this coming from the exit and/or contraction of low-productivity plants. For manufacturing as a whole, labor productivity rose by about 6 percent which is remarkable given that much of manufacturing was duty-free before implementation of the FTA. Third, the FTA created more trade than it diverted and possibly lowered import prices. Thus, the FTA likely raised aggregate welfare.

The FTA is the wellspring of one of the most heated political debates in Canada. This heat is generated by the conflict between those who bore the *short-run adjustment costs* (displaced workers and stakeholders of closed plants) and those who are garnering the *long-run gains* (stakeholders of efficient plants, consumers, and purchasers of intermediate inputs). One cannot understand current debates about freer trade without understanding this conflict. Unfortunately, much of the academic debate has been fragmented: one set of researchers has focused on the short-run adjustment costs of worker displacement while another has focused on the long-run productivity gains. While this paper

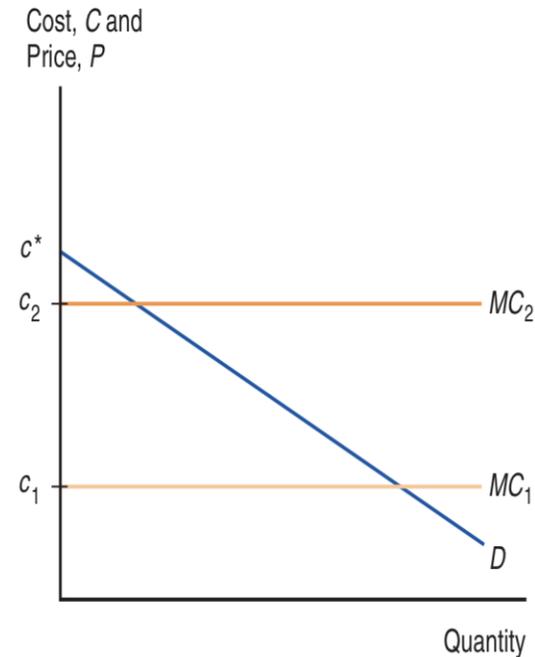
# Economies of Scale and Trade

## Monopolistic Competition – Trade Costs and Export Decisions

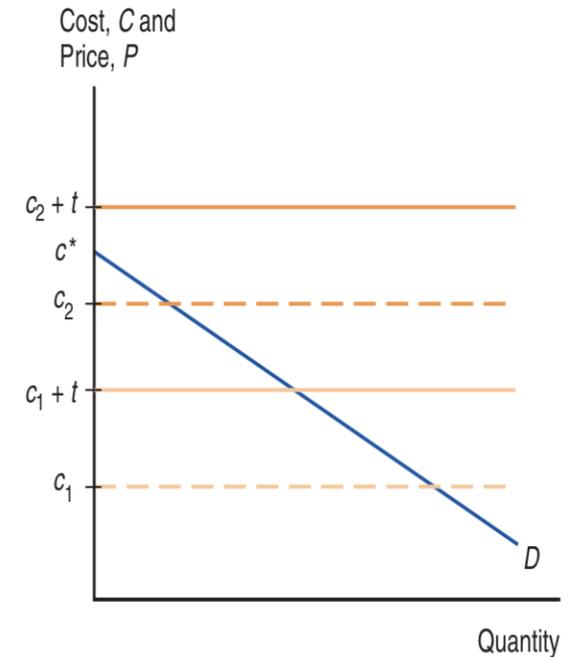
- Firm 1 and Firm 2 both operate in the domestic markets although Firm 1 sell a larger Q than Firm 2.
- Only Firm 1 choose to export to foreign markets because firm's MC when Trade Costs are included are greater than  $c^*$ .
- Only a subset of firms export. They are those than are larger and more productive.

### Proportion of US firms reporting Export

Printing	5%
Furniture	7%
Apparel	8%
Wood Products	8%
Fabricated Metals	14%
Petroleum and Coal	18%
Transportation Equipment	28%
Machinery	33%
Chemicals	36%
Computer and Electronics	38%
Electrical Equipment and Appliances	38%



(a) Domestic (Home) Market



(b) Export (Foreign) Market

# Economies of Scale and Trade

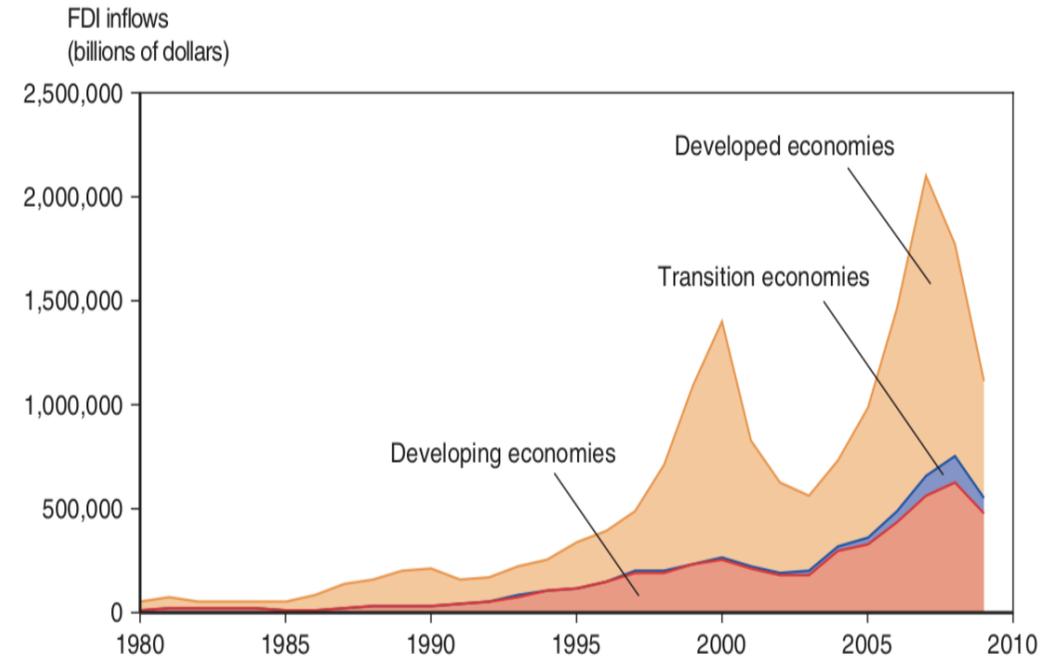
## Dumping

- Dumping is a predatory pricing. It occurs when manufacturers export a product to another country at a price below the normal price. The objective of dumping is to increase market share in a foreign market by driving out competition and thereby create a monopoly situation where the exporter will be able to unilaterally dictate price and quality of the product.
- In the US many complains have been raised against Chinese companies. US ignore Chinese data on costs on the presumption that a communist country subsidies the companies with cheap loans and other means and therefore data are not reliable. On the contrary, government uses data from other developing countries considered market economy. As result China has been subject to many antidumping duties.
- Economists are skeptical about the idea of a “fair price” which can interfere with perfectly normal business practices: a firm may well be willing to sell below cost to break into a new market.

# Multinationals and Outsourcing

## Foreign Direct Investments

- **Foreign Direct Investment.** When a company buy more than 10% of a foreign company or when the company builds a new production facility abroad, that investment is called foreign direct investment (FDI). Brownfield investments are those directed to existing companies and greenfield those directed to new facilities.
- **The Horizontal FDI Decision.** When a firm want to reach customers in a foreign country will either export its products or set up a new company in the foreign country. The higher the Trade costs the more likely will set a new subsidiary. However, this must weighted against the fixed cost involved and the extent of foreign markets (economies of scale). If the size of the market is not big enough they will opt for exports and support the Trade Costs. (see Toyota)
- **The Vertical FDI decision.** Also the decision to break up its production chain and move part of this to a foreign affiliate depend on the economies of scale and the fixed costs involved. In this case the decision is not motivated by saving on shipping costs but by mainly savings in labor costs.
- **Outsourcing.** Offshoring is a relocation of part the production chain abroad. It has increased dramatically in the last decades and is one of the major drivers of the worldwide trade. When the intermediate goods are produced in a multinational network the shipment are classified as intra-firm trade. As a substitute for horizontal FDI and Vertical FDI a company could license an independent firm (outsourcing). It is not clear why a company should opt for offshoring (licensing an independent company) rather than horizontal FDI. The trade-off between outsourcing and vertical FDI is even less clear-cut. Advantages of outsourcing: an independent firm could produce for many different companies and gains large economies of scale. Local ownership can facilitate managerial incentives. Disadvantages: costly renegotiation conflicts after an initial agreement about products quality or other matters.



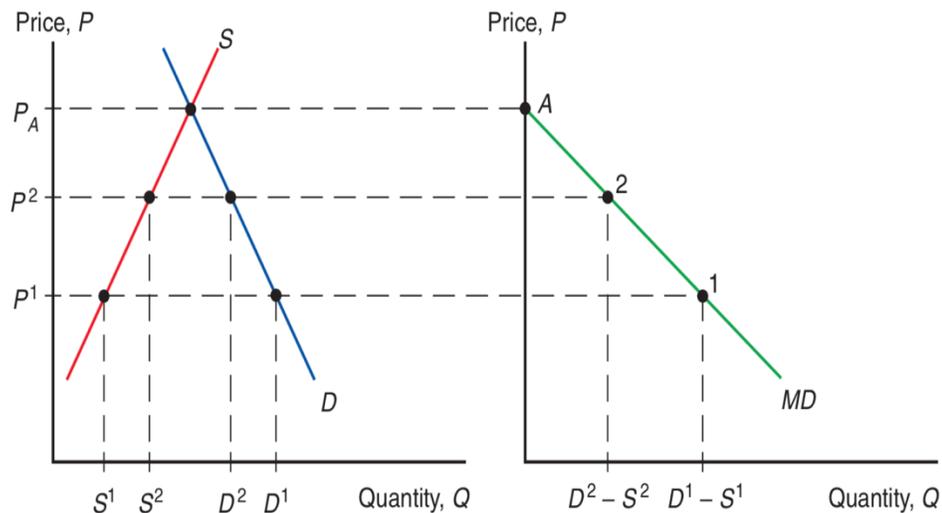
# The Instruments of trade Policy

## Basic Tariff Analysis

- A **tariff** is a tax levied when a good is imported. **Ad valorem tariff** are taxes levied as a fraction of the value of the imported goods. A **specific tariff** is a fixed charge for each unit of goods (\$3 per barrel of oil).
- In the 19<sup>th</sup> century UK used tariffs to protect its agriculture from competitions (the Corn Laws). US and Germany used them to protect their new industrial sectors
- Today government prefer to use **import quotas** and **export restrains** which usually are adopted at the importing country's request.

# The Instruments of trade Policy

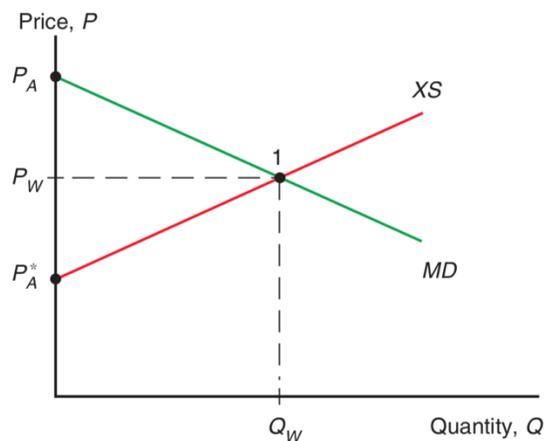
## Supply, Demand and Trade in a Single Industry



**Home's Import Demand**



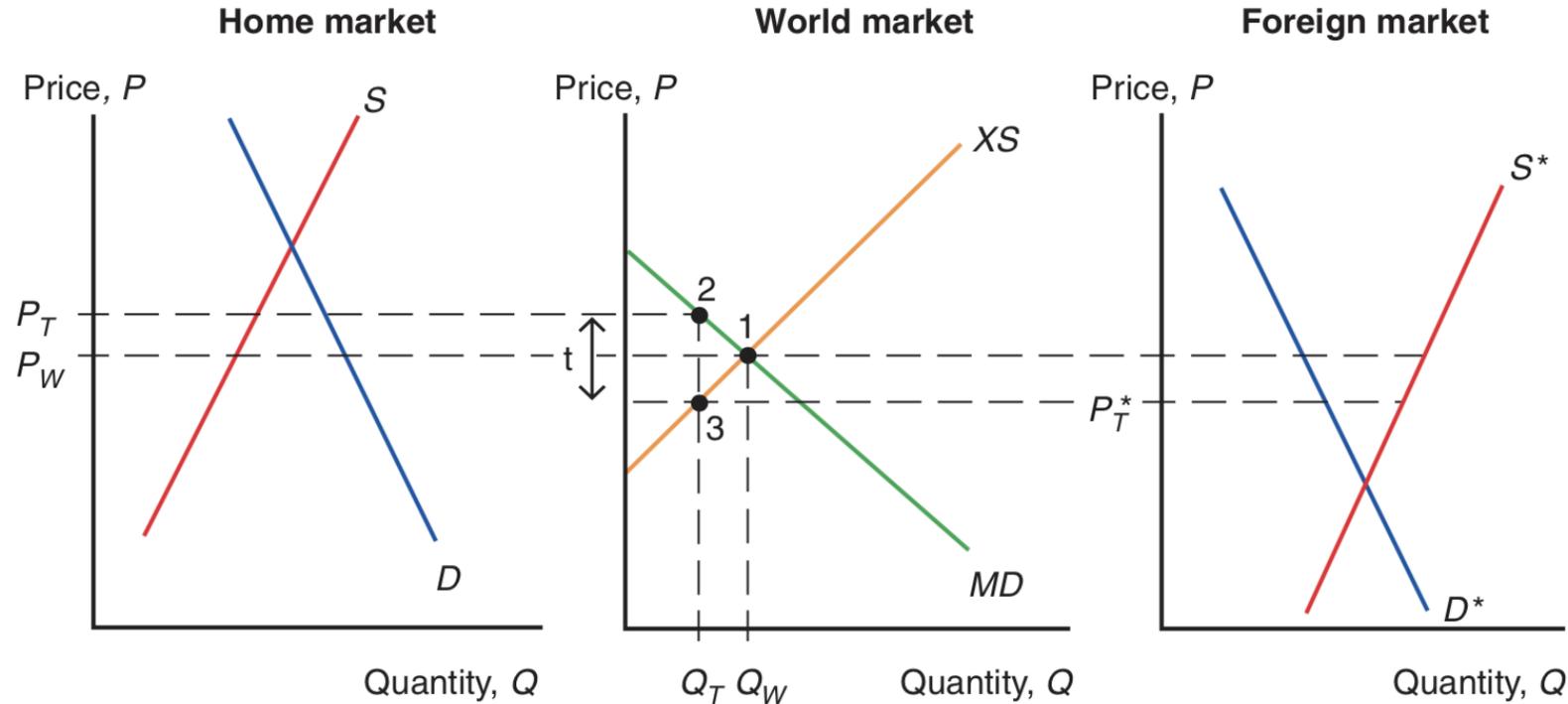
**Foreign's Export supply**



- The equilibrium world price is where Home import demand (MD curve) equals Foreign export supply (XS curve)

# The Instruments of trade Policy

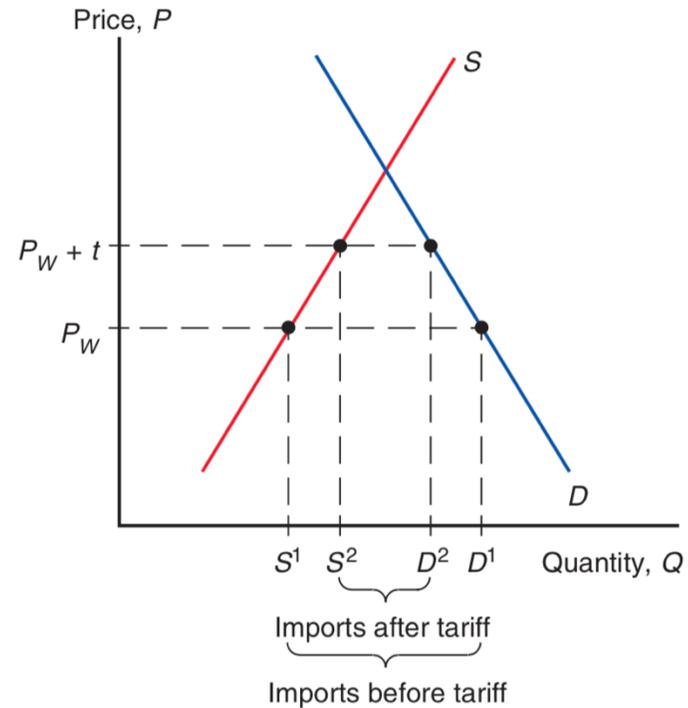
## Effects of a Tariff



- Introducing a tariff drives a wedge between the two markets. It raises the price in the home country and lower the price in the Foreign country. Production increases in the home country because  $P_T > P_W$  and decline in the foreign country because  $P_T^* < P_W$ . The volume traded declines.

# The Instruments of trade Policy

## Effects of a Tariff in a Small Country

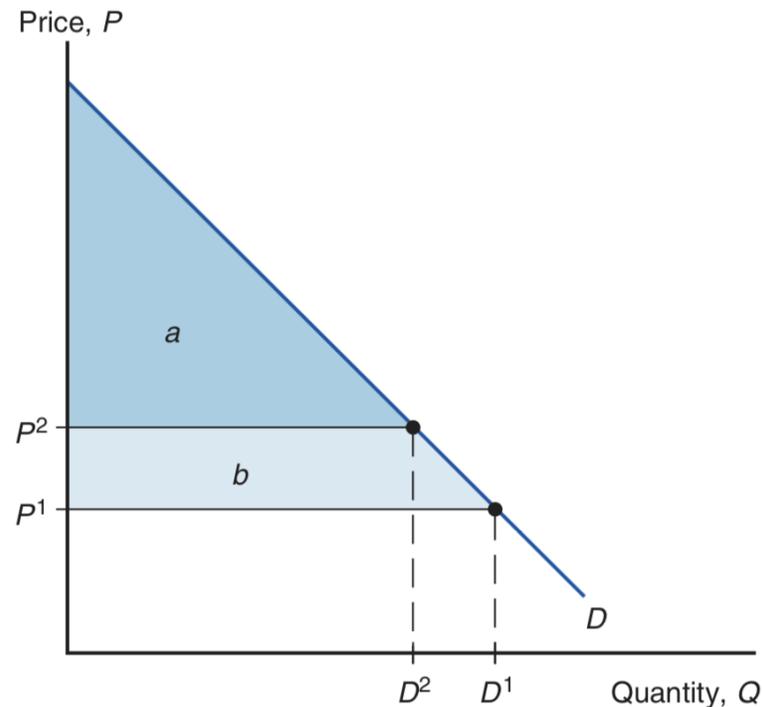


- When a country is small the introduction of a tariff cannot lower the foreign price of the good it imports (the decline of good's demand is negligible respect to the world's supply). As result the price of import rises for the whole amount of  $t$ . On the other hand imports after tariff falls to  $D^2 - S^2$ .

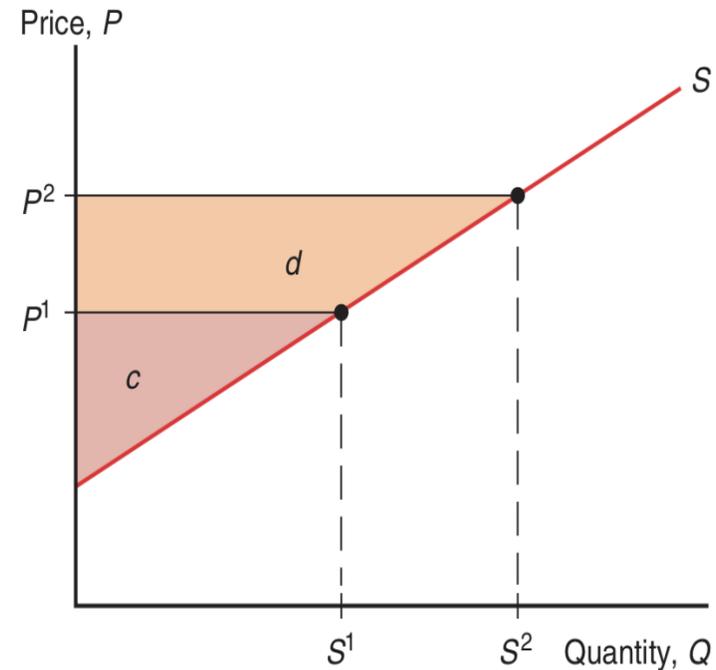
# The Instruments of trade Policy

## Cost and benefits of a Tariff

- A tariff raises the price in the importing country and lowers the price in the exporting country. Consumers lose in the importing country and gain in the exporting country. Producers gain in the importing country and lose in the exporting country. The government gains revenue. To measure these effects we use the concepts of consumer and producer surplus.



**Consumer Surplus**



**Producer Surplus**

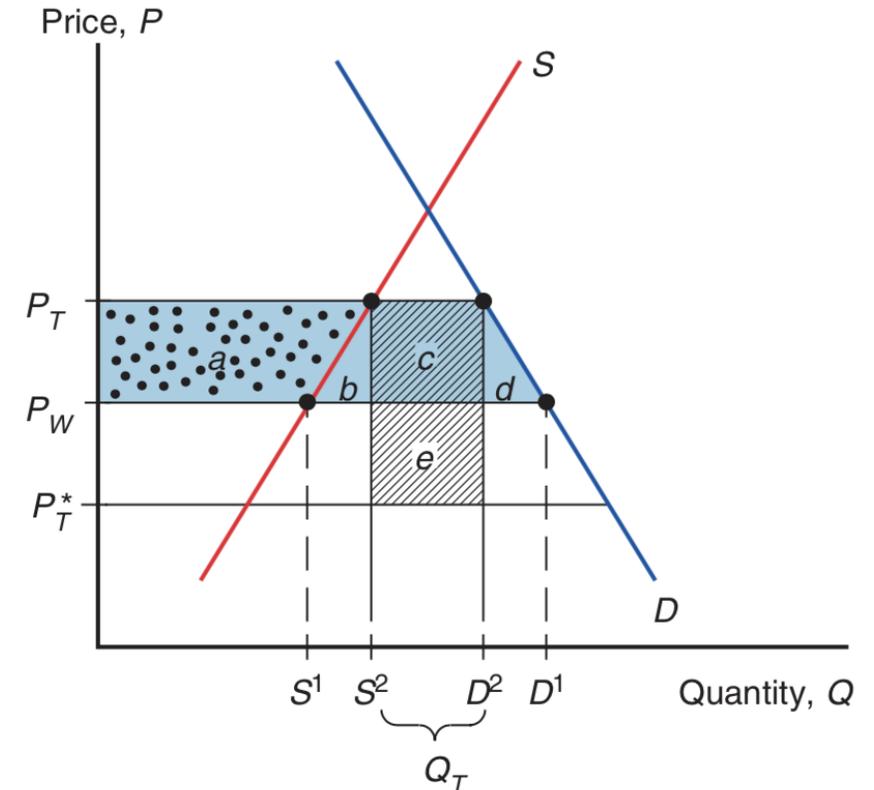
# The Instruments of trade Policy

## Measuring the Costs and Benefits of a Tariff

- The net cost of a tariff is consumer loss – producer gain – government revenues

$$(a + b + c + d) - a - (c + e) = b + d - e$$

- $b$  and  $d$  represent the **efficiency loss (or deadweight loss \*)**  $e$  represents the **terms of trade gain** that arises because a tariff lowers the foreign export prices.
- This gains depends on the ability of the tariff-imposing country to drive down foreign export prices. For a small country which does not affect foreign price  $e$  is zero.
- $b$  is the production distortion loss due to the fact that the tariff induce the producers to produce too much
- $e$  is the consumption distortion loss due to the fact that consumers consume too little of that good.



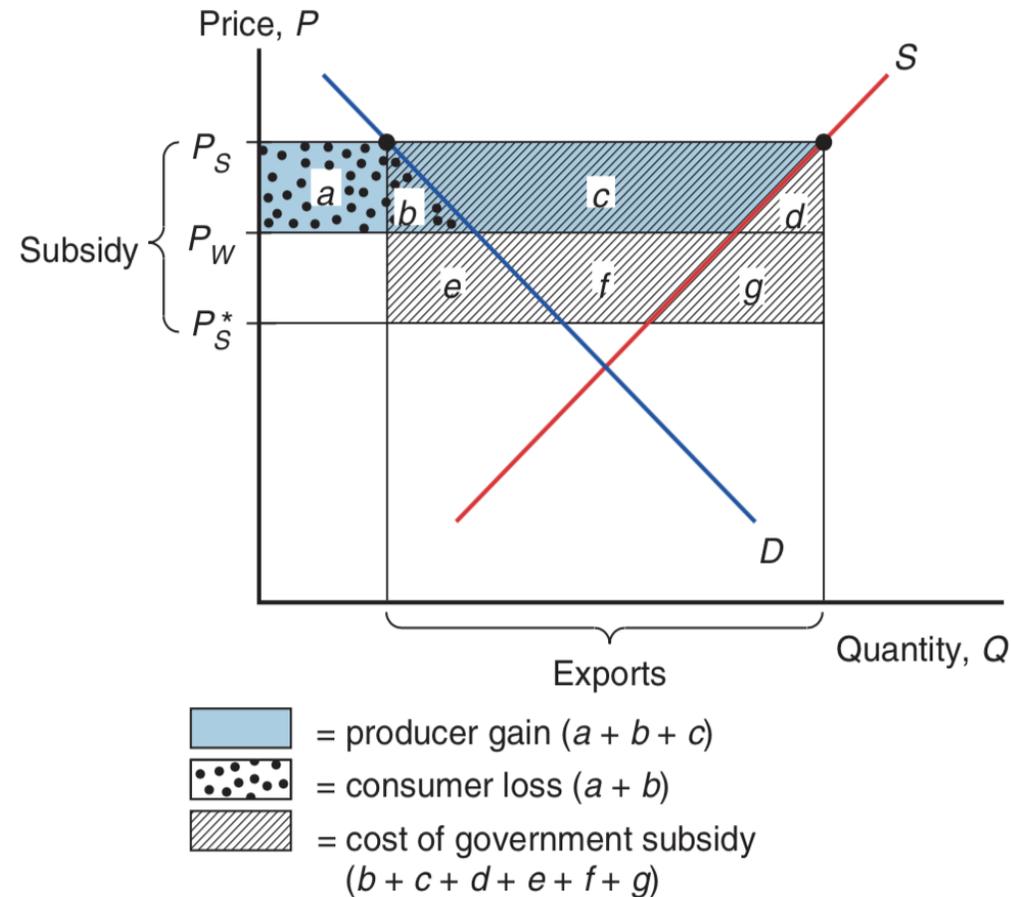
- = consumer loss ( $a + b + c + d$ )
- = producer gain ( $a$ )
- = government revenue gain ( $c + e$ )

\* A deadweight loss is a cost to society created by market inefficiency. All no-lump taxes create these inefficiencies. It is also called the Harberger's triangle.

# The Instruments of trade Policy

## Export Subsidies

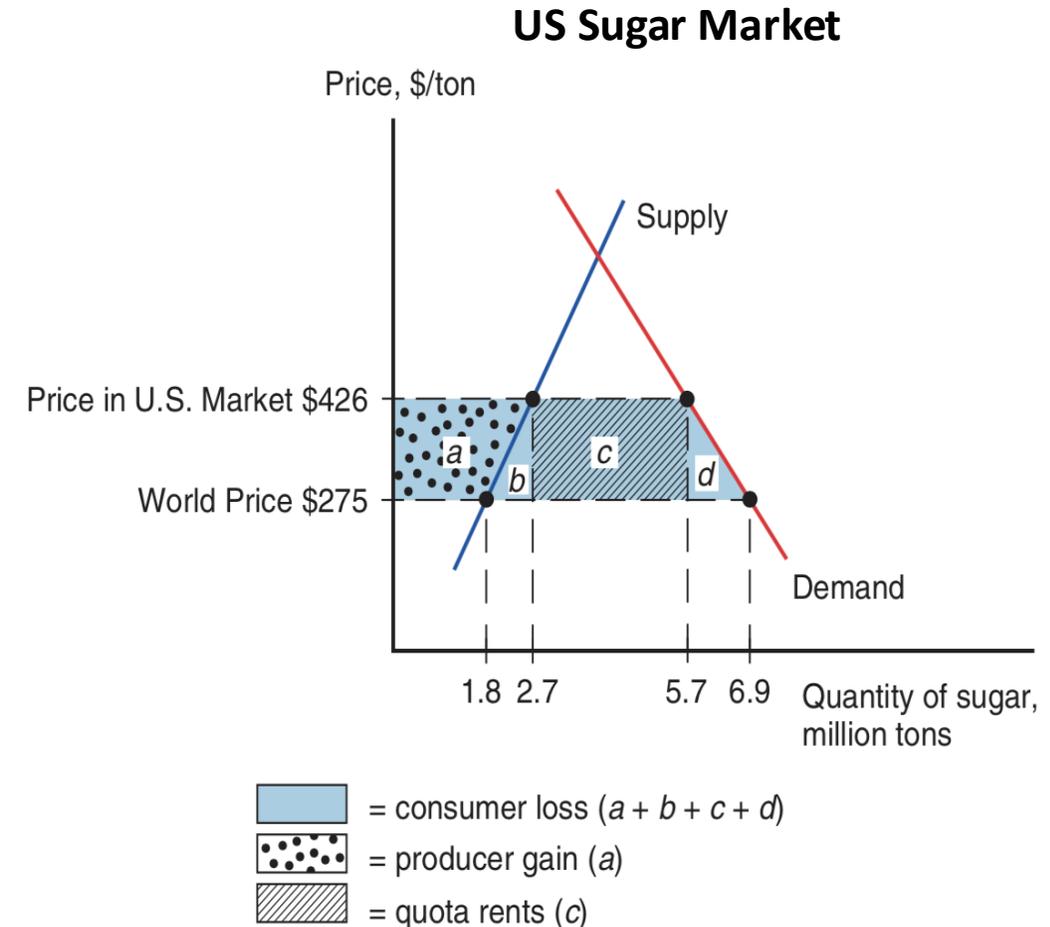
- An export subsidy is a payment to a firm of the “export country” that ships abroad. The subsidy can be either specific or ad valorem.
- The effects of an export subsidy on prices are the reverse of those of tariff. The price in the export country rises from  $P_w$  to  $P_s$ , but because the price in the import country fall from  $P_w$  to  $P^*_s$  the price increase is less than the subsidy.
- Consumer loss is  $a + b$
- Producer gain is  $a + b + c$
- Cost of government subsidy is  $b + c + d + e + f + g$ .
- The net welfare loss is  $b + d + e + f + g$ . Of these  $b$  and  $d$  represent the efficient losses.
- In contrast to a tariff, the export subsidy worsen the term of trade because it lowers the price of the export in the foreign market from  $P_w$  to  $P^*_s$ . This lead to the terms of trade loss of  $e + f + g$ . ( $P_w - P^*_s \times \text{Export}$ ).



# The Instruments of trade Policy

## Import Quotas

- An import quota always raises the domestic prices of the imported goods.
- In contrast with a tariff, the government receive no revenues. This money goes to whoever receives the import license
- The US government has allocated the import quota on sugar to foreign governments. This produce a benefit for a small group of producers and a loss to US consumers.
- The consumer loss is equal  $a + b + c + d$  with a total value of \$884 ml. Part of this loss is a transfer to US producers \$272. Part is the efficiency loss \$149 ml ( $b + d$ ). The rent to foreign governments is  $c$  which is equal to \$453 million.
- There is not offsetting gain because the quota rents are collected by foreign government. The rights to sell sugar to the US are allocated to foreign governments.



# The Instruments of trade Policy

## Voluntary Export Restraints

- A Voluntary Export Restrain is a quota on trade imposed from the exporting country's side instead of the importer's. VER are normally imposed at request of the importer as part of a trading agreement.
- VER is more costly to the importing country than a tariff because what would have been a revenue for the importer now is a rent gained by foreigners. About 2/3 of the loss to consumers of the importing country is a rent gained by foreigners.
- In 1979 as the demand for Japanese cars rose as result of the increase of the oil price US government asked Japan to introduce quotas in order to avoid a trade war.

# The Instruments of trade Policy

## Effects of Alternative Trade Policies

	Tariff	Export Subsidy	Import Quota	VER
Producer Surplus	Increases	Increases	Increases	Increases
Consumer Surplus	Falls	Falls	Falls	Falls
Government revenue	Increases	Falls (government spending rises)	No change (rents to License holders)	No change (rents to foreigners)
Overall National welfare	Ambiguous (falls for small countries)	Falls	Ambiguous (falls for small countries)	Falls