# International trade

Ricardian model

History

- Merkantilism

- 18th/19th century – classic theory (Smith, Ricardo, Mill)

- 20th century – dynamic theory of comparative advantage (Heckscher, Ohlin, Samuelson and many more)

- Limitations of theories – turbulent and changing environment

World trade development

- From 1890 until WW1 – golden age of international trade

- Great depression (1929) – Smooth-Hawley tarrifs

- Reaction of other countries
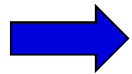
  - Dramatic fall in world trade in interwar period

  - Large costs to the US and the world economy

World trade development

- After WW2 - second „golden age" of trade

- post World War II era - the General Agreement on Tariffs and Trade (GATT, 1948) was an agreement that prompted regular negotiations among a growing body of members to reduce tariffs (import taxes) on imported goods on a reciprocal basis

- 1995 WTO

- Regional free trade agreements

Approach to International Trade

- Active vs. passive approach to IT in a country economy (free trade x autarky)

- Support of export

  - various national institutions (CzechTrade)
  - laws, certificates, advisors, etc.
  - media (Japan – competitions – best exporter)

1,34 milions of snowboards imported to US

Reasons for Trade

- Technology differences

- Different amount of resources

- Different costs of outsourcing

- Proximity of countries

Models of International Trade

- The **Ricardian model** examines differences in the *productivity of labor* (due to differences in *technology)* between countries.

- The **Heckscher-Ohlin model** examines differences in *labor, labor skills, physical capital, land, or other factors of production* between countries.

Opportunity cost

- The opportunity cost of producing something measures the cost of not being able to produce something else with the resources used

- For example, a limited number of workers could produce either roses or computers

The opportunity cost of producing computers is the amount of roses not produced.

The opportunity cost of producing roses is the amount of computers not produced.

Opportunity Cost - Example

- Suppose that in the US 10 milion roses can be produced with the same resources as 100 000 computers.

- Suppose that in Colombia 10 milion roses can be produced with the same resources as 30 000 computers.

- What is the opportunity cost of roses and computer in both countries?

Comparative Advantage

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

Back to the case with roses and computers, which country has the comparative advantage?

Suppose initially that Colombia produces computers (30 000) and the United States produces roses (10 milion), and that both countries want to consume computers and roses.

Can both countries be made better off?

Hypothetical Changes in Production – intuition behind Ricardian model

> *In the US 10 milion roses can be produced with the same resources as 100 000 computers.*
>
> *In Colombia 10 milion roses can be produced with the same resources as 30 000 computers.*

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

A One-Factor Ricardian Model

Assumptions:

1. Labor is the only factor of production.

2. Labor productivity varies across countries due to differences in technology, but labor productivity in each country is constant.

3. The supply of labor in each country is constant.

4. Two goods: wine and cheese.

5. Competition allows workers to be paid a wage equal to the value of what they produce, and allows them to work in the industry that pays the highest wage.

6. Two countries: home and foreign.

A One-Factor Ricardian Model

A **unit labor requirement** indicates the constant number of hours of labor required to produce one unit of output.

a_{LC} is the unit labor requirement for cheese in the home country

a_{LW} is the unit labor requirement for wine in the home country.

A high unit labor requirement means low labor productivity.

A One-Factor Ricardian Model

Labor supply L indicates the total number of hours worked in the home country (a constant number).

Cheese production Q_C indicates how many pounds of cheese are produced.
Wine production Q_W indicates how many gallons of wine are produced.

Production Possibilities

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

The production possibility frontier of the home economy is:

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

What is the maximum home cheese production?

What is the maximum home wine production?

Production Possibilities - Example

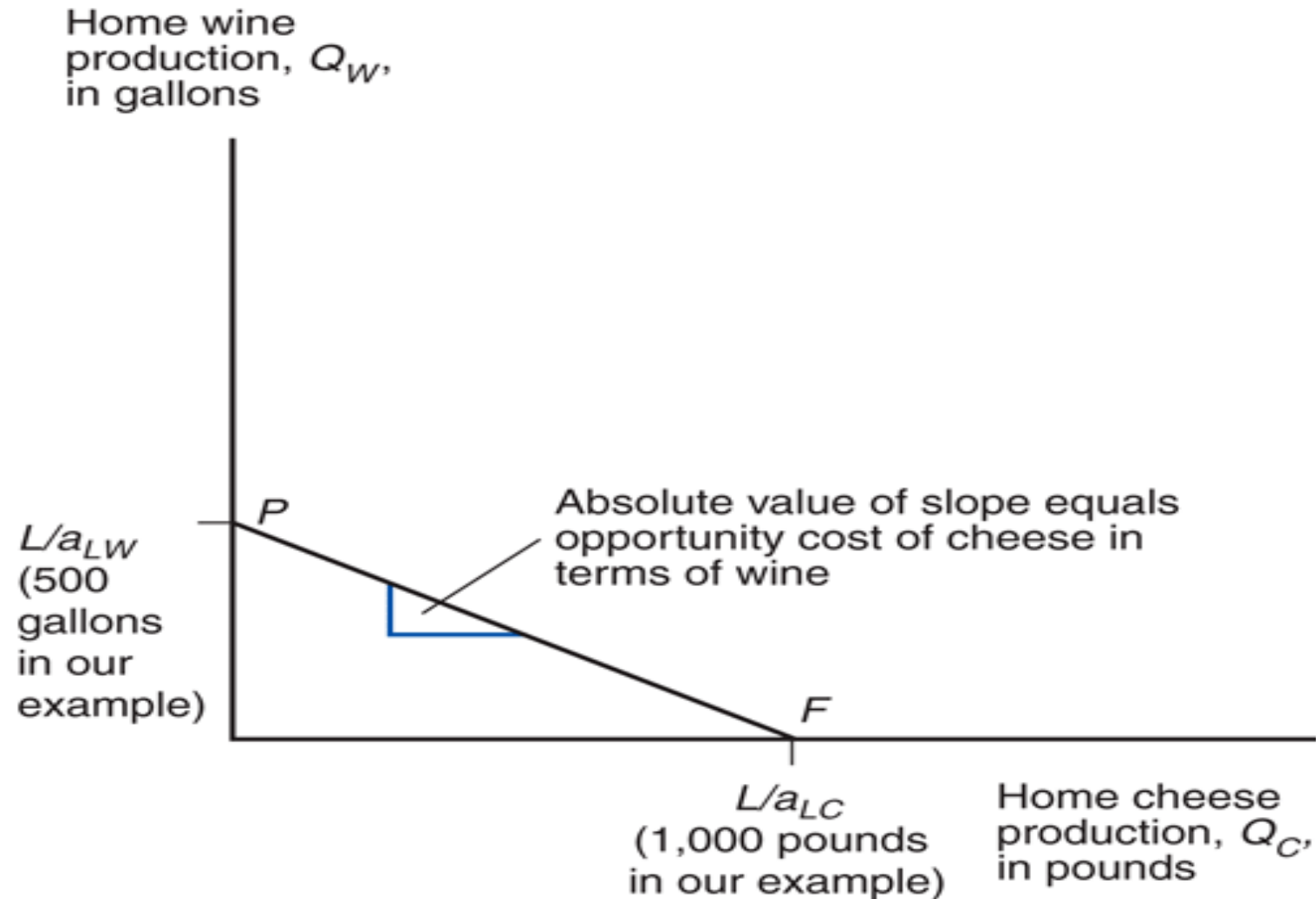*Suppose that the economy´s labor supply is 1000 hours.*
1 hour of labor produces one pound of cheese.
2 hours of labor produce one gallon of wine.

1. What is the PPF equation?
2. What is maximum cheese production?
3. What is maximum wine production?

Home's Production Possibility Frontier

Production Possibilities

- The opportunity cost of cheese is how many gallons of wine Home must stop producing in order to make one more pound of cheese:

$$a_{LC}/a_{LW}$$

- This cost is constant because the unit labor requirements are both constant

- The opportunity cost of cheese appears as the absolute value of the slope of the PPF

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

Relative Prices, Wages, and Supply

Let P_C be the price of cheese and P_W be the price of wine.

Due to competition,

- hourly wages of cheese makers equal the value of the cheese produced in an hour: P_C/a_{LC}

- hourly wages of wine makers equal the value of the wine produced in an hour: P_W/a_{LW}

Workers will choose to work in the industry that pays the higher wage.

Example

Suppose that cheese sells for $4/pound and wine for $7/gallon

Wage paid in cheese industry?

Wage paid in wine industry?

What will workers do?

Relative Prices, Wages, and Supply

If the price of cheese relative to the price of wine exceeds the opportunity cost of producing cheese

$$P_C/P_W > a_{LC}/a_{LW},$$

> *The relative price of cheese 4/7 exceeds the opportunity cost of cheese of ½*

- then the wage in cheese will exceed the wage in wine

$$w_C = P_C/a_{LC} > P_W/a_{LW} = w_W$$

> $w_C = 4 > 3{,}5 = w_W$

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

? What if the price of cheese drops to $3/pound?

Production, Prices, and Wages

- If the home country wants to consume both wine and cheese (in the absence of international trade), relative prices must adjust so that wages are equal in the wine and cheese industries.

- If $P_C / a_{LC} = P_W / a_{LW}$ workers will not care whether they work in the cheese industry or the wine industry, so that production of both goods can occur.

- Production (and consumption) of both goods occurs when the relative price of a good equals the opportunity cost of producing that good:

$$P_C / P_W = a_{LC} / a_{LW}$$

Trade in the Ricardian Model

If the home country is more efficient in wine and cheese production, then it has an *absolute advantage* in all production:

its unit labor requirements for wine and cheese production are lower than those in the foreign country

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

where "*" notates foreign country variables.

Trade in the Ricardian Model

A country can be more efficient in producing both goods, but it will have a comparative advantage in only one good.

*Even if a country is the most (or least) efficient producer of all goods, it still can benefit from trade.*

Trade in the Ricardian Model

- Before any trade occurs, the relative price of cheese to wine reflects the opportunity cost of cheese in terms of wine in each country.

- In the absence of any trade, the relative price of cheese to wine will be higher in Foreign than in Home if Foreign has the higher opportunity cost of cheese.

- It will be profitable to ship cheese from Home to Foreign (and wine from Foreign to Home)

Gains from Trade

- Consumption possibilities expand beyond the production possibility frontier when trade is allowed.

- With trade, consumption in each country is expanded because world production is expanded when each country specializes in producing the good in which it has a comparative advantage.

Trade expands consumption possibilities in both countries
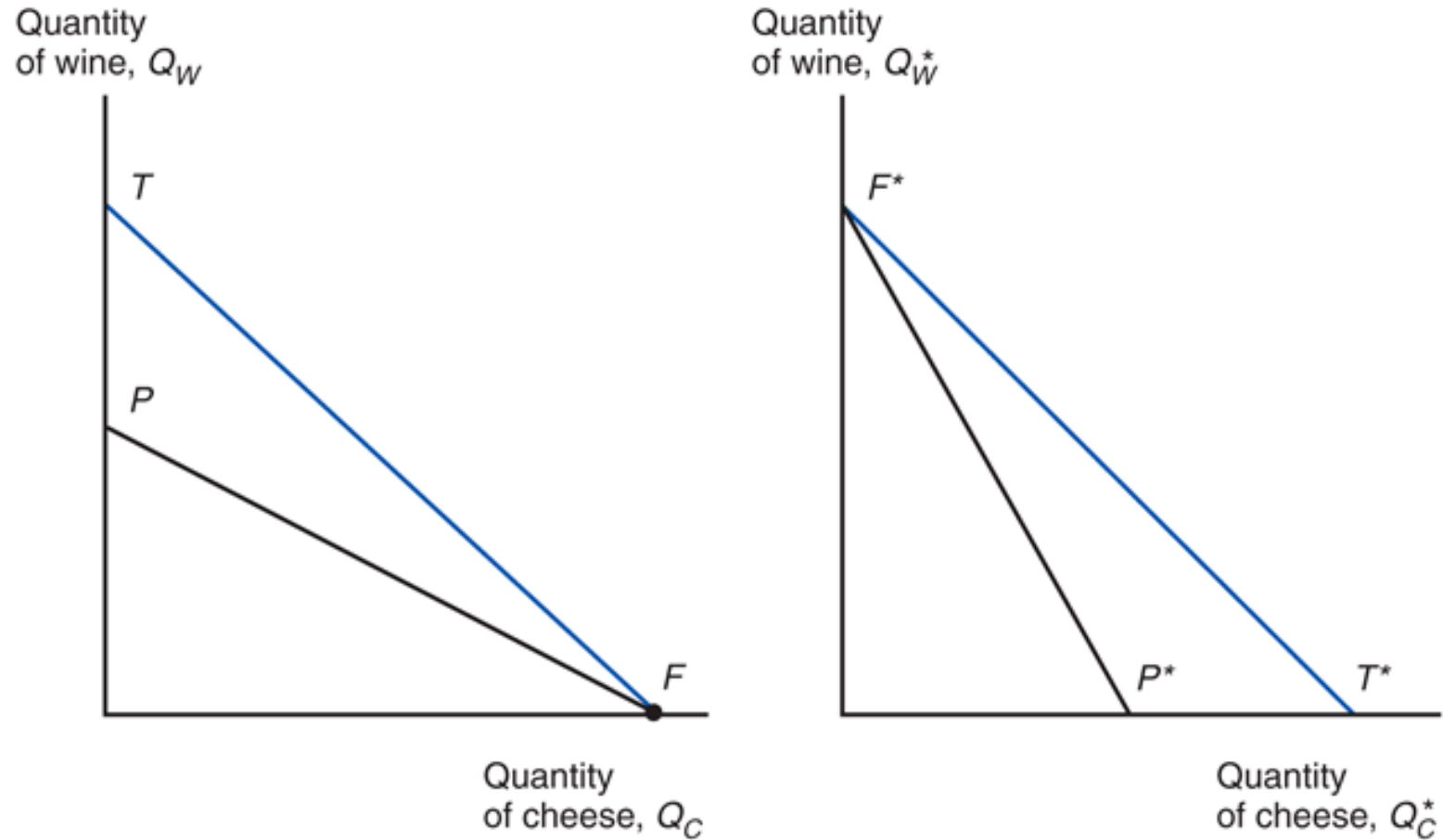
(a) Home

(b) Foreign

Example

Unit labor requirements for home and foreign countries

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

What is the home country's opportunity cost of producing cheese?

Example

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

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

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

Example

- With trade, the equilibrium relative price of cheese to wine settles between the two opportunity costs of cheese.

- Suppose that the intersection of RS and RD occurs at $P_C/P_W = 1$ so one pound of cheese trades for one gallon of wine.

- Trade causes the relative price of cheese to rise in the home country and fall in foreign.

Example

- With trade, the foreign country can buy one pound of cheese for P_C/P_W = one gallon of wine,

- instead of stopping production of a^*_{LC}/a^*_{LW} = 2 gallons of wine to free up enough labor to produce one pound of cheese in the absence of trade.

- Suppose L^* = 3,000. The foreign country can trade its 1,000 gallons maximum production of wine for 1,000 pounds of cheese, instead of the 500 pounds of cheese it could produce itself.

Example

- With trade, the home country can buy one gallon of wine for P_W/P_C = one pound of cheese,

- instead of stopping production of a_{LW}/a_{LC} = 2 pounds of cheese to free up enough labor to produce one gallon of wine in the absence of trade.

- The home country can trade its _____ pounds maximum production of cheese for _____ gallons of wine, instead of the ____ gallons of wine it could produce itself.

Relative Wages

- **Relative wages** are the wages of the home country relative to the wages in the foreign country.

- Productivity (technological) differences determine relative wage differences across countries.

- The home wage relative to the foreign wage will settle in between the ratio of how much better Home is at making cheese and how much better it is at making wine compared to Foreign.

- Relative wages cause Home to have a cost advantage in only cheese and Foreign to have a cost advantage in only wine.

Relative Wages

Suppose that P_C = \$12/pound and P_W = \$12/gallon.

- Since domestic workers specialize in cheese production after trade, their hourly wages will be

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

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

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

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

Relative Wages

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

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

- The home country has a wage 3 times higher than the foreign country.

Relative Wages

- These relationships imply that both countries have a *cost advantage* in production.
    - High wages can be offset by high productivity.
    - Low productivity can be offset by low wages.

- In the home economy, producing one pound of cheese costs $12 (one worker paid $12/hr) but would have cost $24 (six paid $4/hr) in Foreign.

- In the foreign economy, producing one gallon of wine costs $12 (three workers paid $4/hr) but would have cost $24 (two paid $12/hr) in Home.

Relative Wages

Because foreign workers have a wage that is only 1/3 the wage of domestic workers, they are able to attain a cost advantage in wine production, despite low productivity.

Because domestic workers have a productivity that is 6 times that of foreign workers in cheese production, they are able to attain a cost advantage in cheese production, despite high wages.
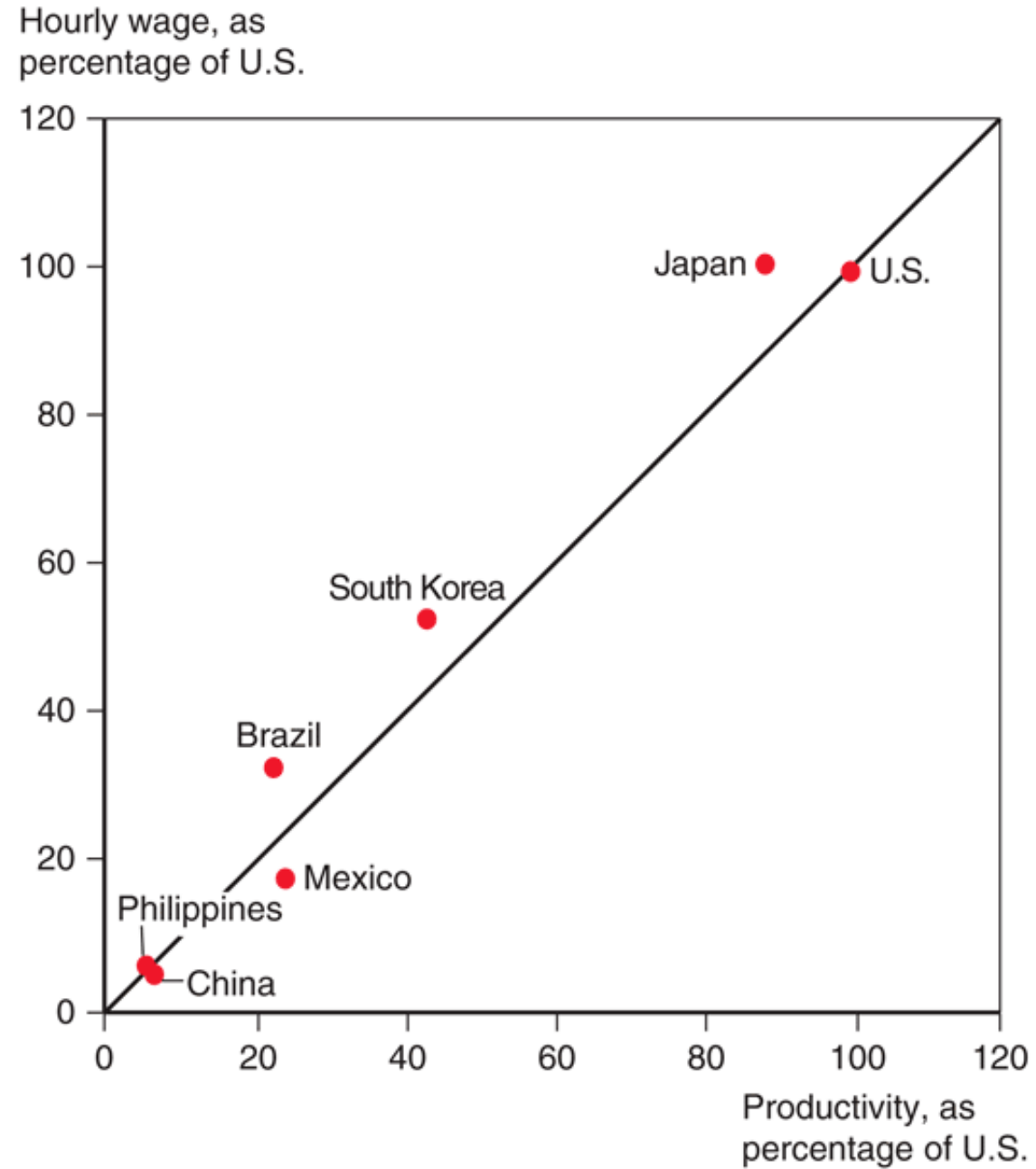
Do wages really reflect productivity?

Do relative wages reflect relative productivities of the two countries?

Evidence shows that low wages are associated with low productivity.

Other evidence shows that wages rise as productivity rises.

Hourly wage, as
percentage of U.S.

Productivity, as
percentage of U.S.

Source: International Monetary Fund, Bureau
of Labor Statistics, and The Conference Board.

Everything clear? ☺

Misconceptions about Comparative Advantage

1. Free trade is beneficial only if a country is more productive than foreign countries.

Misconceptions about Comparative Advantage

2. Free trade with countries that pay low wages hurts high wage countries.

While trade may reduce wages for *some* workers, thereby affecting the distribution of income within a country, trade benefits consumers and other workers.

Consumers benefit because they can purchase goods more cheaply.

Producers/workers benefit by earning a higher income in the industries that use resources more efficiently, allowing them to earn higher prices and wages.

Misconceptions about Comparative Advantage

3. Free trade exploits less productive countries whose workers make low wages.

While labor standards in some countries are less than exemplary compared to Western standards, they are so with or without trade.

Are high wages and safe labor practices alternatives to trade? Deeper poverty and exploitation may result without export production.

Consumers benefit from free trade by having access to cheaply (efficiently) produced goods.

Producers/workers benefit from having higher profits/wages—higher compared to the alternative.

Transportation Costs and Non-traded Goods

The Ricardian model predicts that countries completely specialize in production.

But this rarely happens for three main reasons:

1. More than one factor of production reduces the tendency of specialization
2. Protectionism
3. Transportation costs reduce or prevent trade, which may cause each country to produce the same good or service.

Nontraded goods and services (e.g. haircuts and auto repairs) exist due to high transport costs.

Empirical Evidence

Do countries export those goods in which their productivity is relatively high?
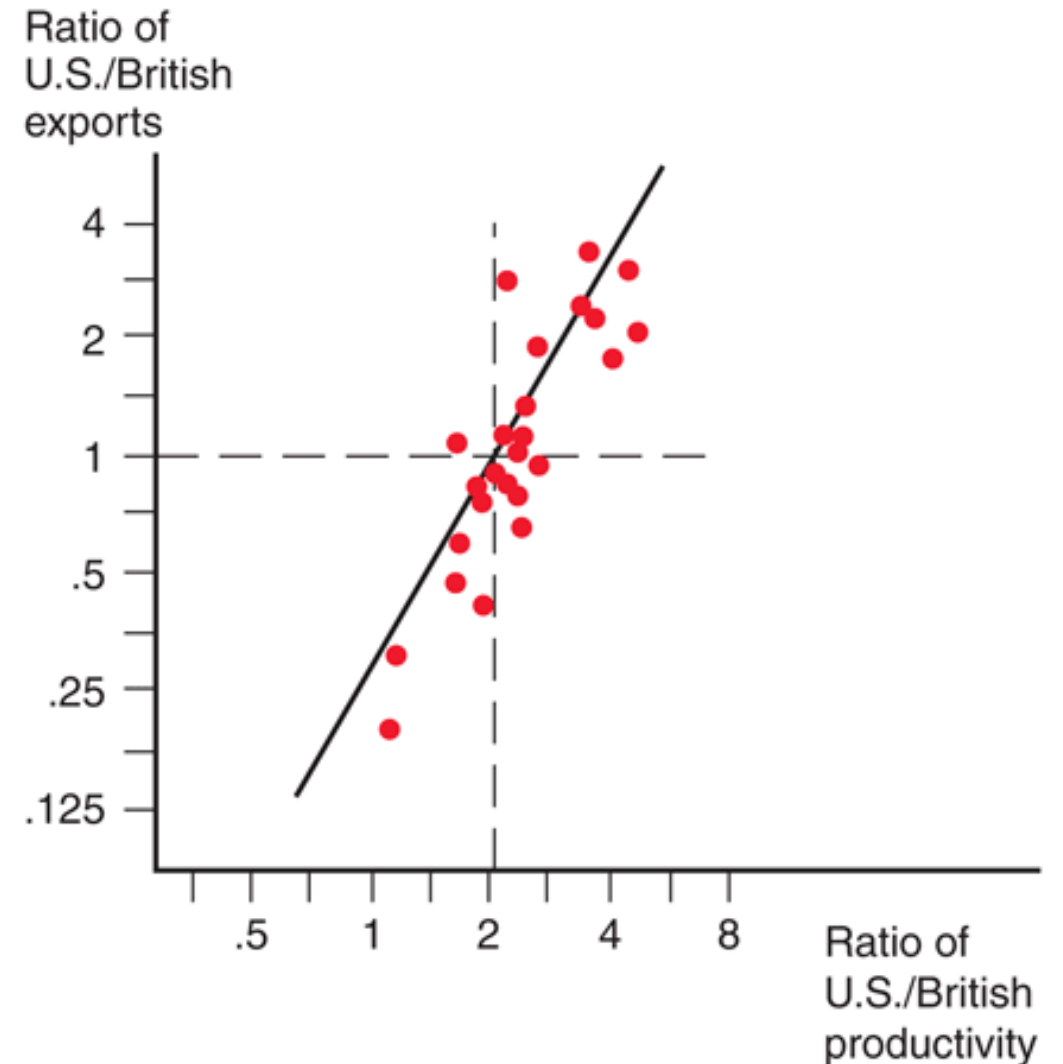
Empirical Evidence

A very poor country like Bangladesh can have comparative advantage in clothing despite being less productive in clothing than other countries such as China because it is even less productive compared to China in other sectors.

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

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

Key points

The main implications of the Ricardian model are well supported by empirical evidence:

productivity differences play an important role in international trade

comparative advantage (not absolute advantage) matters for trade

Questions?