International trade

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1 Introduction to international trade

Introduction

- The world economy produces goods and services worth $69.7 trillion (in 2011, IMF estimate)

- International trade = $27.6 trillion (= 40%)

		Español	Inglés
10^3	1000	mil	thousand
10^6	$1,000,000$	millón	million
10^9	$1,000,000,000$	mil millones	billion
10^{12}	$1,000,000,000,000$	billón	trillion
10^{15}	$1,000,000,000,000,000$	billardo	quatrillion
10^{18}	$1,000,000,000,000,000,000$	trillón	quintillion

- What are the benefits and the costs?

- What scope is there for trade policy?

But first:

- What is the structure of international trade?

Gravity model

$$T_{ij} = \frac{A \times Y_i \times Y_j}{D_{ij}}, \tag{1}$$

donde

$$
\begin{aligned}
A &:= \text{constant,} \\
T_{ij} &:= \text{value of trade between country } i \text{ and country } j, \\
Y_i &:= \text{GDP of country } i, \\
Y_j &:= \text{GDP of country } j, \\
D_{ij} &:= \text{distance between countries } i \text{ and } j.
\end{aligned} \tag{2}
$$

In estimations, the following equation is often used:

$$T_{ij} = \frac{A \times Y_i^a \times Y_j^b}{D_{ij}^c}. \tag{3}$$

- The model fits the data rather well, yet not perfectly.

- Other factors: cultural affinity, geography, transport costs, barriers to trade, borders, trade agreements.

Examples of free trade agreements:

- North American Free Trade Agreement (NAFTA, TLCAN), since 1994: Canada, United States, Mexico

- Mercado Común del Sur (Mercosur), since 1995: Argentina, Brazil, Paraguay, Uruguay, Venezuela

- European Free Trade Agreement (EFTA, AELC), since 1960: Norway, Liechtenstein, Iceland, Switzerland

- European Union (EU, UE), since 1957, 27 countries in 2012: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom

Border effect:

- The border between the United States and Canada has an discouraging effect on trade that is equivalent to a distance of between 2200 and 3700 kilometres.

Exports of Spain (2004):

- European Union 73.0%

    - France 19.3%

    - Germany 11.8%

    - Portugal 9.6%

    - United Kingdom 9.1%

    - Italy 9.1%

- Latin America 7.0%

- United States 3.9%

Changes in the pattern of international trade

- Two waves of globalization (1840–1914, 1945 until today)

- Great importance of primary products in the past; manufactured goods dominating today; growing significance of services

- Important role of multinational corporations

- Rise in the contracting out of business processes (outsourcing)

2 Labour productivity and comparative advantage: the Ricardian model

Gains from trade and comparative advantage

Why international trade?

- Countries are different

- Economies of scale

Example

Spain can produce:

- 10 million flowers or, with the same resources, 10 thousand cars.

Colombia can produce:

- 10 million flowers or, with the same resources, 5 thousand cars.

Therefore, the opportunity costs of producing 10 million flowers are:

- 10 thousand cars in Spain,

- 5 thousand cars in Colombia.

Trade between Spain and Columbia can be mutually beneficial:

	Flowers	Cars
Spain	- 10 million	+ 10 thousand
Colombia	+ 10 million	- 5 thousand
Total	0	+ 5 thousand

	Flowers	Cars
Spain	- 5 million	+ 5 thousand
Colombia	+ 10 million	- 5 thousand
Total	+ 5 million	0

A country has a **comparative advantage** in the production of a good if the opportunity cost of this good in terms of other goods is lower in this country than in other countries.

A comparative advantage has:

- Spain in the production of cars;

- Colombia in the production of flowers.

An economy with one factor of production

Notation:

$$a_{LC} = \text{unit labour requirements in the production of cheese}$$

$$a_{LW} = \text{unit labour requirements in the production of wine}$$

$$L = \text{total supply of labour}$$

$$P_C = \text{price of cheese}$$

$$P_W = \text{price of wine}$$

$$Q_C = \text{quantity of cheese produced}$$

$$Q_W = \text{quantity of wine produced}$$

Production possibility frontier (PPF):

$$a_{LC}Q_C + a_{LW}Q_W \leq L. \tag{4}$$

The opportunity cost is the number of litres of wine the economy would have to forgo in order to produce one kilogramme of cheese.

$$\text{Opportunity cost} = \frac{a_{LC}}{a_{LW}}$$

$$= \text{absolute value of the slope of the PPF.}$$

In a competitive economy, the wage per hour in the one sector is equal to the value of what a worker can produce in one hour.

- Wage in the cheese sector: $\frac{P_C}{a_{LC}}$.

- Wage in the wine sector: $\frac{P_W}{a_{LW}}$.

Specialization of the economy:

- $\frac{P_C}{a_{LC}} > \frac{P_W}{a_{LW}} \quad \Leftrightarrow \quad \frac{P_C}{P_W} > \frac{a_{LC}}{a_{LW}} \quad \Rightarrow \quad$ only cheese,

- $\frac{P_C}{a_{LC}} = \frac{P_W}{a_{LW}} \quad \Leftrightarrow \quad \frac{P_C}{P_W} = \frac{a_{LC}}{a_{LW}} \quad \Rightarrow \quad$ both products,

- $\frac{P_C}{a_{LC}} < \frac{P_W}{a_{LW}} \quad \Leftrightarrow \quad \frac{P_C}{P_W} < \frac{a_{LC}}{a_{LW}} \quad \Rightarrow \quad$ only wine.

Trade in a world with one factor of production

Suppose our country has a comparative advantage in the production of one good, for example cheese:

$$\frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*} \quad \Leftrightarrow \quad \frac{a_{LC}}{a_{LC}^*} < \frac{a_{LW}}{a_{LW}^*}.$$

Something different is the concept of absolute advantage. Our country has an absolute advantage in the production of cheese if:

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

Simultaneous determination

- of the relative price of the two goods,

- of the supply of both goods in both countries,

- of the demand of both goods in both countries,

- of the international trade.

Supply of cheese and of wine in both countries (5 cases):

	Relative price of cheese	Q_C	Q_C^*	Q_W	Q_W^*
1.	$\frac{P_C}{P_W} < \frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*}$	0	0	$\frac{L}{a_{LW}}$	$\frac{L^*}{a_{LW}^*}$
2.	$\frac{P_C}{P_W} = \frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*}$	$\left[0, \frac{L}{a_{LC}}\right]$	0	$\left[0, \frac{L}{a_{LW}}\right]$	$\frac{L^*}{a_{LW}^*}$
3.	$\frac{a_{LC}}{a_{LW}} < \frac{P_C}{P_W} < \frac{a_{LC}^*}{a_{LW}^*}$	$\frac{L}{a_{LC}}$	0	0	$\frac{L^*}{a_{LW}^*}$
4.	$\frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*} = \frac{P_C}{P_W}$	$\frac{L}{a_{LC}}$	$\left[0, \frac{L^*}{a_{LC}^*}\right]$	0	$\left[0, \frac{L^*}{a_{LW}^*}\right]$
5.	$\frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*} < \frac{P_C}{P_W}$	$\frac{L}{a_{LC}}$	$\frac{L^*}{a_{LC}^*}$	0	0

Demand of cheese and of wine:

$$\frac{P_C}{P_W} \uparrow \quad \Rightarrow \quad \frac{Q_C + Q_C^*}{Q_W + Q_W^*} \downarrow \, .$$

Results:

- Specialization in the production of the good that offers a comparative advantage.

- Absolute advantage irrelevant.

Gains from trade

International trade allows both countries to consume combinations of both goods above their respective PPFs.

Note that our country has two options:

Method to obtain wine	Quantity obtained
1. Produce wine directly	$\frac{1}{a_{LW}}$
2. Produce cheese and exchange it for wine	$\frac{1}{a_{LC}}\frac{P_C}{P_W}$

The second option is better than the first one provided that:

$$\frac{1}{a_{LC}}\frac{P_C}{P_W} > \frac{1}{a_{LW}} \quad \Leftrightarrow \quad \frac{P_C}{P_W} > \frac{a_{LC}}{a_{LW}} \quad \text{(cases 3, 4 y 5 from before).}$$

Numerical example

Suppose that $P_C = P_W = 12$ euros.

	Cheese	Wine	Opportunity cost
Home country	$a_{LC} = 1$ hours per kg	$a_{LW} = 2$ hours per litre	$\frac{a_{LC}}{a_{LW}} = \frac{1}{2}$
Foreign country	$a^*_{LC} = 6$ hours per kg	$a^*_{LW} = 3$ hours per litre	$\frac{a^*_{LC}}{a^*_{LW}} = 2$
Relative productivity	$\frac{a^*_{LC}}{a_{LC}} = 6$	$\frac{a^*_{LW}}{a_{LW}} = \frac{3}{2}$	

	Wage (free trade)	Wages (self-sufficiency)	
		Cheese	Wine
Home country	$\frac{P_C}{a_{LC}} = 12$ euros $= 1$ unit of cheese or wine	$\frac{P_C}{a_{LC}} = 12$ euros	$\frac{P_W}{a_{LW}} = 6$ euros
Foreign country	$\frac{P_W}{a^*_{LW}} = 4$ euros $= \frac{1}{3}$ of a unit of cheese or wine	$\frac{P_C}{a^*_{LC}} = 2$ euros	$\frac{P_W}{a^*_{LW}} = 4$ euros
Relative wage	3	6	$\frac{3}{2}$

Gains from trade in our country:

Method to obtain wine	Quantity obtained
1. Produce wine directly	$\frac{1}{a_{LW}} = \frac{1}{2}$
2. Produce cheese and exchange it for wine	$\frac{1}{a_{LC}}\frac{P_C}{P_W} = 1$

Gains from trade in the foreign country:

Method to obtain wine	Quantity obtained
1. Produce cheese directly	$\frac{1}{a^*_{LC}} = \frac{1}{6}$
2. Produce wine and exchange it for cheese	$\frac{1}{a^*_{LW}}\frac{P_W}{P_C} = \frac{1}{3}$

Common fallacies regarding comparative advantage

- **Productivity and competitiveness:**

  Free trade is beneficial only if your country is strong enough to stand up to foreign competition.

- **The pauper labour argument:**

  Foreign competition is unfair and hurts other countries when it is based on low wages.

- **Exploitation:**

  Trade exploits a country and makes it worse off if its workers receive much lower wages than workers in other nations.

Comparative advantage with many goods

- 2 countries, one factor of production (labour)

- N different goods

Notation:

a_{Li} = unit labour requirements in the production of good $i, i = 1, \ldots, N,$

w = wage rate.

We suppose:

$$\frac{a_{L1}}{a_{L1}^*} < \frac{a_{L2}}{a_{L2}^*} < \ldots < \frac{a_{LN}}{a_{LN}^*}.$$

The goods are produced in the country in which their production is cheapest.

- Good i is produced in the home country provided that:

$$wa_{Li} < w^* a_{Li}^* \quad \Leftrightarrow \quad \frac{a_{Li}^*}{a_{Li}} > \frac{w}{w^*} \quad \Leftrightarrow \quad \frac{a_{Li}}{a_{Li}^*} < \frac{w^*}{w}.$$

- Good i is produced in the foreign country provided that:

$$wa_{Li} > w^* a_{Li}^* \quad \Leftrightarrow \quad \frac{a_{Li}^*}{a_{Li}} < \frac{w}{w^*} \quad \Leftrightarrow \quad \frac{a_{Li}}{a_{Li}^*} > \frac{w^*}{w}.$$

$$\underbrace{\frac{a_{L1}}{a_{L1}^*} < \frac{a_{L2}}{a_{L2}^*} < \ldots < \frac{a_{Lj}}{a_{Lj}^*}}_{\text{production in the home country}} < \frac{w^*}{w} < \underbrace{\frac{a_{Lk}}{a_{Lk}^*} < \ldots < \frac{a_{LN}}{a_{LN}^*}}_{\text{production in the foreign country}} \quad .$$

Good (i)	a_{Li}	a_{Li}^*	$\frac{a_{Li}}{a_{Li}^*}$	Production	
				$\frac{w^*}{w} = \frac{1}{5} = 0.200$	$\frac{w^*}{w} = \frac{1}{3} = 0.333$
Apples (1)	1	10	0.100	Home country	Home country
Bananas (2)	5	40	0.125	Home country	Home country
Caviar (3)	3	12	0.250	Foreign country	Home country
Dates (4)	6	12	0.500	Foreign country	Foreign country
Enchiladas (5)	12	9	1.333	Foreign country	Foreign country

Gains from trade in the home country (supposing that $w^*/w = 1/3$):

Method to obtain dates (relative advantage)	Quantity obtained
1. Produce dates directly	$\frac{1}{a_{L4}} = \frac{1}{6}$
2. Work one hour and exchange wage for foreign dates	$\frac{w}{w^*} \frac{1}{a_{L4}^*} = \frac{3}{12} = \frac{1}{4}$

Method to obtain enchiladas (absolute advantage)	Quantity obtained
1. Produce enchiladas directly	$\frac{1}{a_{L5}} = \frac{1}{12}$
2. Work one hour and exchange wage for foreign enchiladas	$\frac{w}{w^*}\frac{1}{a_{L5}^*} = \frac{3}{9} = \frac{1}{3}$

Let us suppose that the relative wage rate, w/w^*, is determined by the equilibrium between labour demand and labour supply.

- The relative supply of labour, L/L^*, is determined by the relative amount of labour in both countries.

- The relative demand of labour, L/L^*, depends negatively on the relative wage, w/w^*:

  - Changes in the relative wage affect the direct demand of the consumers and indirectly the relative labour demand.

  - Moreover, whenever changes in the relative wage affect the pattern of specialization, there will be abrupt changes in the relative labour demand.

Transport costs

Example:

Cost of transport of the goods $= 100\%$ of the cost of production

Good (i)	a_{Li}	a^*_{Li}	$\frac{a_{Li}}{a^*_{Li}}$	$\frac{a_{Li}+c_i}{a^*_{Li}}$	$\frac{a_{Li}}{a^*_{Li}+c^*_i}$	Production	
						$\frac{w^*}{w} = \frac{1}{5} = 0.200$	$\frac{w^*}{w} = \frac{1}{3} = 0.333$
Apples (1)	1	10	0.100	0.200	0.050	Home country/self-suff.	Home country
Bananas (2)	5	40	0.125	0.250	0.063	Self-sufficiency	Home country
Caviar (3)	3	12	0.250	0.500	0.125	Self-sufficiency	Self-sufficiency
Dates (4)	6	12	0.500	1.000	0.250	Foreign country	Self-sufficiency
Enchiladas (5)	12	9	1.333	2.667	0.667	Foreign country	Foreign country

Empirical evidence on the Ricardian model

The basic prediction of the model (countries tend to export those goods in which they have a comparative advantage) holds empirically.

Comparison between the United States and the United Kingdom in 1951 (Balassa, 1963):

- Higher labour productivity in the United States in all industrial sectors (twice as high on average, with productivity differences ranging from 11% to 366%)

- However, significant exports of the United Kingdom in 12 sectors

- Significant exports of the United States on in the sectors in which the its productivity advantage was higher than two to one

Problems:

- Degree of specialization not that extreme in reality

- Effects on the income distribution within each country

- Differences in the availability of resources between countries

- Economies of scale (how explain trade between similar economies?)

3 Resources, comparative advantage and income distribution

An economy with two factors

Notation:

a_{LF} = hours of labour used to produce a unit of food

a_{KF} = units of capital used to produce a unit of food

a_{LS} = hours of labour used to produce a semiconductor

a_{KS} = units of capital used to produce a semiconductor

L = supply of labour in the economy

K = supply of capital in the economy

w = wage per hour of work

r = rental income of a unit of capital

Q_F = quantity of food produced

Q_S = quantity of semiconductors produced

P_F = price of food

P_S = price of semiconductors

Prices and production

Let us suppose that there is a **concave production possibility frontier (PPF):**

- The concave form tells us that the opportunity cost in terms of food of producing more semiconductors rises as the economy produces more semiconductors and less food.

Value of production of the economy:

$$V = P_F \times Q_F + P_S \times Q_S$$

$$\Leftrightarrow \quad Q_F = \frac{V}{P_F} - \frac{P_S}{P_F} Q_S.$$

Holding V constant results in a **isovalue line** whose slope is $-P_S/P_F$.

Maximization of the value of production:

- Given the PPF, the isovalue line moves downwards (= V fall) until it reaches the PPF.

Note that now:

  opportunity cost of producing food = relative price of semiconductors.

Conclusion regarding the relationship between prices and production:

$$\frac{P_F}{P_S} \uparrow \qquad \Rightarrow \qquad \frac{Q_F}{Q_S} \uparrow .$$

Isoquants and isocosts

- **isoquant:** combinations of labour and capital used to produce a given quantity of food

- **isocost:** combinations of labour and capital that give rise to the same cost c

$$c = wL_F + rK_F \qquad \Leftrightarrow \qquad K_F = \frac{c}{r} - \frac{w}{r}L_F \qquad \text{(food)},$$

$$c = wL_S + rK_S \qquad \Leftrightarrow \qquad K_S = \frac{c}{r} - \frac{w}{r}L_S \qquad \text{(semiconductors)}.$$

- The slope of the isocost c is $-w/r$. Different isocosts, for example for c_1 and c_2, are parallel. If $c_2 > c_1$, the isocost of c_2 is higher than the isocost of c_1.

Two ways to maximize benefits:

- hold production constant and minimize cost: move the isocost upwards until it reaches the isoquant;

- hold cost constant and maximize production: move the isoquant downwards until it reaches the isocost.

Therefore:

$$\frac{w}{r} \uparrow \qquad \Rightarrow \qquad K_F \uparrow, L_F \downarrow \quad \text{and} \quad K_S \uparrow, L_S \downarrow .$$

Intensity of the factors of production in the sectors

Production of food labour-intensive and production of semiconductors capital-intensive provided that:

$$\frac{K_F}{L_F} < \frac{K_S}{L_S} \quad \text{for any ratio} \quad \frac{w}{r}.$$

In a diagram with w/r on the vertical axis and K_F/L_F and K_S/L_S on the horizontal axis, the curve of the semiconductors is located to the right of the curve of the food.

The different intensities of labour and capital in the production of both goods imply that the ratio P_F/P_S rises as the relative wage increases:

$$\frac{w}{r} \uparrow \quad \Rightarrow \quad \frac{P_F}{P_S} \uparrow.$$

(This relationship can be derived using the Lerner diagram.)

The Stolper-Samuelson theorem

From goods prices to input choices:

$$\frac{P_F}{P_S} \uparrow \quad \Leftrightarrow \quad \frac{w}{r} \uparrow \quad \Leftrightarrow \quad \frac{K_F}{L_F} \uparrow, \frac{K_S}{L_S} \uparrow$$

$$\Leftrightarrow \quad PML_F \uparrow, PML_S \uparrow, PMK_F \downarrow, PMK_S \downarrow \quad \Leftrightarrow \quad \frac{w}{P} \uparrow, \frac{r}{P} \downarrow,$$

where

PML_F = marginal product of labour in the food sector,

PML_S = marginal product of labour in the semiconductor sector,

PMK_F = marginal product of capital in the food sector,

PMK_S = marginal product of capital in the semiconductor sector,

P = price level (weighted average of P_F and P_S).

Stolper-Samuelson theorem:

- When the relative price of the labour-intensive good rises, the real wage rises and the real income of capital falls.

- When the relative price of the capital-intensive good rises, the real wage falls and the real income of capital rises.

Relevance of the Stolper-Samuelson theorem:

- Previous conclusion: a change of the relative prices gives rise to benefits from trade.

- New insight: a change of the relative prices has an effect on the income distribution; not all the factors of production derive the same benefit from free trade.

The Rybczynski theorem

The theorem of Rybczynski says that if the supply of capital increases (= biased expansion of the PPF) and the relative price does not change (= relative price, P_F/P_S, constant), then

- the production of the capital-intensive good will rise and

- the production of the labour-intensive good will fall.

One reaches the same conclusion if the *relative* supply of capital increases and the relative price does not change.

In general, an economy tends to be relatively efficient in the production of goods that are intensive in the factors the country is most amply endowed with.

International trade between economies with two factors

Two regions:

- European Union (EU): home country, capital-abundant (= relatively more capital)

- Eastern Europe (EE): foreign country ($*$), labour-abundant (= relatively more labour)

Production possibility frontier:

- EU: more expanded in the direction of the semiconductors

- EE: more expanded in the direction of the food

If there is no trade between the regions:

- The relative supplies in both countries (RS, RS^*) have to fulfil the following condition:

$$\frac{Q_F}{Q_S} < \frac{Q_F^*}{Q_S^*} \quad \text{for any ratio} \quad \frac{P_F}{P_S}.$$

- Let us suppose that the relative demand of food is equal in both countries ($RD = RD^*$).

- As a consequence:

$$\left(\frac{P_F}{P_S}\right)_{\text{autarky}} > \left(\frac{P_F^*}{P_S^*}\right)_{\text{autarky}}.$$

The Heckscher-Ohlin theorem

When the regions trade among themselves, the prices of the goods converge:

$$P_F = P_F^*, \qquad P_S = P_S^*.$$

The relative prices converge in such a way that:

$$\left(\frac{P_F}{P_S}\right)_{\text{autarky}} > \left(\frac{P_F}{P_S}\right)_{\text{trade}} = \left(\frac{P_F^*}{P_S^*}\right)_{\text{trade}} > \left(\frac{P_F^*}{P_S^*}\right)_{\text{autarky}}.$$

Heckscher-Ohlin theorem:

- The countries (regions) tend to export the goods whose production is intensive in the factors they are most amply endowed with.

The effect of trade on the income distribution

The Stolper-Samuelson theorem thus implies:

Region	$\frac{P_F}{P_S}$	$\frac{w}{P}$	$\frac{r}{P}$
European Union	↓	↓	↑
Eastern Europe	↑	↑	↓

Example of the United States:

- Relatively abundant in high-skilled labour

- Relatively poorly endowed with unskilled labour

International trade tends to worsen the situation of the unskilled workers.

The factor price equalization theorem

When there is free trade, the convergence of the goods causes the convergence of the relative wages.

$$\left(\frac{w}{r}\right)_{\text{autarky}} > \left(\frac{w}{r}\right)_{\text{trade}} = \left(\frac{w^*}{r^*}\right)_{\text{trade}} > \left(\frac{w^*}{r^*}\right)_{\text{autarky}} .$$

It can be shown that there is even an equalization of the absolute wage and of the absolute income in both countries:

$$w = w^*, \qquad r = r^*. \tag{5}$$

The factor price equalization theorem:

- In a Heckscher-Ohlin world without barriers to trade, without technological differences between the two regions and where the two regions continue to produce both goods, the factor prices of both regions become equal.

Intuition:

- The European Union exports to Eastern Europe goods that require more capital and less labour for their production than the goods that it imports in exchange.

- Indirectly then, the European Union exports capital (incorporated in its products) and imports labour (incorporated in the products of Eastern Europe).

The Lerner diagram

The Lerner diagram shows the isovalue lines for the two goods:

- The isovalue line of the food represents the possible combinations of capital, K, and labour, L, that are needed in the production of food of a value of 1 euro. The isovalue line of the semiconductors is defined in an analogous way. Since the production of semiconductors is capital-intensive, the isovalue line of the semiconductors is located to the northwest of the isovalue line of the food.

- In a competitive economy, the cost to produce a quantity of food of a value of 1 euro has to be equal to the cost of producing a quantity of semiconductors of the same value. The minimal combinations of capital and labour that produce, respectively, food of a value of 1 euro and semiconductors of a value of 1 euro have to be found on the same isocost curve. This curve is a straight line with slope $-w/r$ and is tangential to the two isovalue curves.

- The slope of the straight line that passes the origin and the point of tangency between the food curve and the isocost line is equal to the ratio K_F/L_F. Analogously, the slope of the straight line that passes the origin and the point of tangency between the semiconductor curve and the isocost line is equal to the ratio K_S/L_S.

The Lerner diagram can be used, for example, to show that an increase in the price of food, P_F, results in an increase of the wage, w.

The Lerner diagram also helps us to explain why $w = w^*$ and $r = r^*$:

- Given that the technologies are the same, the isovalue curves are equal in both regions. If the two regions continue to produce the two goods, the isocost line that is tangential to the two isovalue lines has to be identical in both regions, too.

- As a consequence, not only is the relative wage in both regions equalized, the absolute wage and the absolute national income also become equal across the regions. If we define K_1 as the intercept of the isocost line with the vertical axis and L_1 as its intercept with the horizontal axis, we see that:

$$rK_1 = r^* K_1^* = 1 \text{ euro}, \qquad K_1 = K_1^* \qquad \Rightarrow \qquad r = r^*,$$
$$wL_1 = w^* L_1^* = 1 \text{ euro}, \qquad L_1 = L_1^* \qquad \Rightarrow \qquad w = w^*.$$

Factor price differences in reality

In reality, the prices of different factors of production are not equal in reality. One possible cause is that one or several of the following assumptions of the factor price equalization theorem do not hold:

- The two regions produce both goods.

- The technologies are identical in both regions.

- Barriers to trade do not exist.

Total specialization in one of the regions:

- Relative endowments of capital are very different int the EU and Eastern Europe.

- Complete specialization in one of the regions. For example, Eastern Europe produces only food; as it opens up its market to international trade, it employs all its resources in the food sectors:
  $$\frac{K_F^*}{L_F^*} = \frac{K^*}{L^*}, \qquad K_S^* = L_S^* = 0.$$

- As Eastern Europe specializes in the production of food, we know that:
  $$\frac{K_F^*}{L_F^*} < \frac{K_F}{L_F}.$$

In the Lerner diagram, the slope of the isocost line that is tangential to the isovalue curve of the food at the point of intersection with $\frac{K_F^*}{L_F^*}$ will therefore be less than the slope of the isocost line that is tangential to the isovalue curve of the food in the point of intersection with $\frac{K_F}{L_F}$.

- Implications for the factor incomes:

$$rK_1 = r^*K_1^* = 1 \text{ euro}, \qquad K_1 > K_1^* \qquad \Rightarrow \qquad r < r^*,$$
$$wL_1 = w^*L_1^* = 1 \text{ euro}, \qquad L_1 < L_1^* \qquad \Rightarrow \qquad w > w^*.$$

Moreover, relative wages converge only partially in Eastern Europe:

$$\left(\frac{w}{r}\right)_{\text{autarky}} > \left(\frac{w}{r}\right)_{\text{trade}} > \left(\frac{w^*}{r^*}\right)_{\text{trade}} > \left(\frac{w^*}{r^*}\right)_{\text{autarky}}.$$

Technological differences:

- Let us suppose that the EU uses better technologies in the production of both goods than Eastern Europe.

- In the Lerner diagram, the isovalue curves of the EU are located to the southwest of those of Eastern Europe.

- The EU needs less capital and less labour than Eastern Europe to produce food and semiconductors, with the consequence that the factor incomes of both regions diverge:

$$rK_1 = r^*K_1^* = 1 \text{ euro}, \qquad K_1 < K_1^* \qquad \Rightarrow \qquad r > r^*,$$
$$wL_1 = w^*L_1^* = 1 \text{ euro}, \qquad L_1 < L_1^* \qquad \Rightarrow \qquad w > w^*.$$

- The relative salary, w/r, can diverge in both regions.

Barriers to trade:

- Transport costs and other obstacles to trade can lead to differences in the goods prices in the EU and in Eastern Europe.

- As the isovalue curves are no longer identical, we see that neither the relative nor the absolute incomes have to be equal in the two regions.

Empirical evidence on the Heckscher-Ohlin model

Tests:

- Leontief paradox: Despite being the most capital-abundant country, the exports of the United States are less capital-intensive than its imports. This paradox has been confirmed at the international level.

- North-south trade: It appears that the north-south trade in manufactured goods fits the theory much better. However, it only accounts for ca. 10% of world trade.

Income inequality in the United States:

- In the United States, an increasing inequality in the income distributions has been observed (between 1979 and 2001, wages of the 95th percentile rose by 29% in real terms, whereas those of the 10th percentile rose only by 0.2%).

- At the same time, exports from the newly industrialized countries (NIC) to the United States have increased.

- There could be a link between both developments, but there are also doubts:

  - There is no evidence that the price of goods that are intensive in skilled labour would have risen in relation to the price of goods that are intensive in unskilled labour (as the model would predict).

  - There is also no evidence that the relative factor prices would have converged (growing wage inequality also in Mexico).

  - Trade between the advanced economies and the NIC accounts for a very small share of advanced economies' total spending.

4   Trade, growth and international transfers

A standard model of a trading economy

Production possibilities and relative supply

- Two goods: food and semiconductors

- PPF: concave curve

- Isovalue lines: slope $= -\dfrac{P_F}{P_S}$

- Maximization of the production value:

$$\text{opportunity cost of producing food} = \frac{P_F}{P_S}$$

- $\dfrac{P_F}{P_S} \uparrow \quad \Rightarrow \quad \dfrac{Q_F}{Q_S} \uparrow$

Relative prices and demand

- Budget constraint:

$$V_{\max} = P_F D_F + P_S D_S = P_F Q_F + P_S Q_S$$

- Production and consumption on the same isovalue line

- Choice of D_F and D_S: indifference curves

- Net exports: $D_F - Q_F$, $D_S - Q_S$

- $\frac{P_F}{P_S} \uparrow \quad \Rightarrow \quad \frac{Q_F}{Q_S} \uparrow, \frac{D_F}{D_S} \downarrow$

  - Wealth and substitution effects
  - Also possible, but less frequent: $\frac{D_F}{D_S} \downarrow$

World equilibrium

In a world of two countries, the relative prices of the goods are determined by the equilibrium between the world-wide relative supply (RS) and the world-wide relative demand (RD).

In a diagram with P_F/P_S on the vertical axis and $(Q_F + Q_F^*)/(Q_S + Q_S^*)$ on the horizontal axis:

- RS: positive slope

- RD: negative slope

The wealth effect of changes in the terms of trade

Definition:

$$\text{Terms of trade} := \frac{P_{\text{good that the country exports initially}}}{P_{\text{good that the country imports initially}}}.$$

A rise in the terms of trade increases a country's welfare, while a decline in the terms of trade reduces its welfare.

Economic growth

Economic growth in our country and in other countries:

- What are the effects for our terms of trade and for our welfare?

- Given those effect, what is better: free trade or protectionism?

Analysis using the standard model

Growth implies an outward shift of the PPF of a country. Normally the PPF expands more in one direction than in the other. For any relative price of food, P_F/P_S:

Growth bias	$\frac{Q_F}{Q_S}$	$\frac{Q_F+Q_F^*}{Q_S+Q_S^*}$	RS curve
Towards semiconductors	$\downarrow$	$\downarrow$	$\leftarrow$
Towards food	$\uparrow$	$\uparrow$	$\rightarrow$

Effects of trade on the terms of trade and welfare:

Country	Growth bias	Terms of trade		Welfare
		Home country	Foreign country	Home country
1. Home country	towards exports	$\downarrow$	$\uparrow$	$\uparrow\downarrow$
2. Home country	towards imports	$\uparrow$	$\downarrow$	$\uparrow\uparrow$
3. Foreign country	towards exports	$\uparrow$	$\downarrow$	$\uparrow$
4. Foreign country	towards imports	$\downarrow$	$\uparrow$	$\downarrow$

International effects of growth

Immiserizing growth of the poorest countries:

- Popular theory during the 1950s

- Combination of cases 1 and 4

  – Growth of the poorest countries marked by an expansion of raw materials (rather than a movement towards industrialization)

  – Growth of the industrialized countries marked by an increasing development of synthetic substitutes for raw materials

- Today more a theoretical debate than a real-world issue

Growth of the newly industrializing countries:

- Threat to the prosperity of advanced economies according the theory (case 4)

- Lack of empirical evidence:

  – Terms of trade of the advanced economies have improved

  – Terms of trade of the newly industrializing countries of Asia have worsened

Average annual percentage change of the terms of trade:

	1986–1995	1996–2005
Advanced economies	0.8	-0.1
Developing countries in Asia (mainly China)	-0.4	-1.1

International transfers of income

Examples of transfers of income between countries:

- War reparations:

  – Franco-Prussian War, 1870–1871

  – First World War, 1914–1918

- Marshall plan after the Second World War

- Development aid

- International loans

Effects of a transfer on the terms of trade

A transfer of part of the home country's income to the foreign country implies:

- a reduction of the home country's expenditure and

- an increase of the foreign country's expenditure.

Effects in the standard model:

- The RS curve does not shift.

- The RD curve can shift if the home country and the foreign country do not allocate their change in spending in the same proportions:

  - If the donor country has a higher marginal propensity to spend on the goods it exports than the recipient country, then a transfer worsens its terms of trade (shift of the RD curve towards the left).

  - If the donor country has a lower marginal propensity to spend on the goods it exports than the recipient country, then a transfer improves its terms of trade (shift of the RD curve towards the right).

Marginal propensity to spend of the home country (donor)	$\frac{Q_F}{Q_S}$	$\frac{Q_F+Q_F^*}{Q_S+Q_S^*}$	RD curve	$\frac{P_F}{P_S}$
Relatively high for semiconductors	↑	↑	→	↑
Relatively high for food	↓	↓	←	↓

Tariffs and export subsidies

Definitions:

- Import tariffs: taxes levied on imports

- Export subsidies: payments given to domestic producers who sell a good abroad

Motives:

- Improvement of the income distribution

- Promotion of industries

- Balance of payments

External and internal prices:

- External prices: prices at which goods are traded internationally

- Internal prices: prices at which goods are traded within a country

The terms of trade correspond to the external prices.

Analysis of tariffs and export subsidies in the standard model

The following effect on the terms of trade are derived supposing that the home country imports food and exports semiconductors.

Measure taken by the home country	RS	RD	$\frac{P_F}{P_S}$	Terms of trade
Tariff on imports of food	$\rightarrow$	$\leftarrow$	$\downarrow$	$\uparrow$
Subsidies on exports of semiconductors	$\leftarrow$	$\rightarrow$	$\uparrow$	$\downarrow$

5   Economies of scale, imperfect competition and international trade

Economies of scale

Benefits of international trade

Example of an hypothetical industry with economies of scale (= increasing returns):

Production	Total labour input	Average labour input
5	10	2.00
10	15	1.50
15	20	1.33
20	25	1.25
25	30	1.20
30	35	1.17

If there are several industries with economies of scale, it is mutually beneficial for countries to specialize in the production of the different goods and to exchange their products.

Market structure

We distinguish between external economies of scale and internal economies of scale:

- External economies of scale: The cost per unit depends on the size of the industry.

- Internal economies of scale: The cost per unit depends on the size of an individual firm.

Economies of scale	Market structure	Firms
External	perfect competition	price takers
Internal	imperfect competition	price setters

Imperfect competition

Review of the theory of the monopoly

Demand function:

$$Q = A - B \times P,$$

$$P = \frac{A}{B} - \frac{1}{B}Q,$$

where

Q = number of units sold by the firm,

P = price per unit received by the firm.

Revenue:

$$R = P \times Q$$

$$= \left(\frac{A}{B} - \frac{1}{B}Q \right) \times Q$$

$$= \frac{A}{B}Q - \frac{1}{B}Q^2.$$

Marginal revenue:

$$MR = \frac{A}{B} - 2\frac{1}{B}Q$$

$$= \underbrace{\frac{A}{B} - \frac{1}{B}Q}_{=P} - \frac{1}{B}Q$$

$$= P - \frac{1}{B}Q.$$

The difference between the price and the initial sales depends on the initial sales of the firm, Q, and the slope of the demand curve (parameter B):

- B is low: an increase in the sales per unit implies a substantial reduction of the price.

- Q is high: the reduction of the price affects not only the last unit produced.

Function of the cost of production:

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

where

$$F = \text{fixed cost},$$
$$c = \text{marginal cost},$$
$$Q = \text{number of units produced by the firm}$$

Average cost:

$$AC = \frac{C}{Q}$$
$$= c + \frac{F}{Q}.$$

The decreasing average cost indicates the existence of economies of scale.

Profit maximization:

$$MC = MR \qquad \Rightarrow \qquad Q_M, P_M.$$

The profits derived from the monopoly are $Q_M \times (P_M - AC)$.

Monopolistic competition

In reality, oligopolies are more frequent than monopolies. Consider a special case of an oligopoly that is relatively easy to analyse: the monopolistic competition.

Definitions:

- Oligopoly: several firms, each of them large enough to affect prices, but none with an uncontested monopoly.

- Monopolistic competition: each firm is assumed to be able to differentiate its product from that of its rivals; and each firm is assumed to take the prices charged by its rivals as given.

Demand function:

$$Q = S \times \left(\frac{1}{n} - b \times (P - \bar{P}) \right),$$

where

Q = sales of the firm,

S = total sales of the industry,

n = number of firms in the industry,

P = price established by the firm,

$\bar{P}$ = price established by the firm's rivals.

Function of the cost of production:

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

Average cost:

$$AC = c + \frac{F}{Q}.$$

Suppose now that all the firms are symmetrical, so that:

$$P = \bar{P} \qquad \text{and} \qquad Q = \frac{S}{n}.$$

The relationship between AC and n:

$$AC = c + \frac{F}{Q} = c + \frac{F}{S} \times n.$$

The more firms there are in the industry, the higher is the average cost (CC curve):

$$n \uparrow \qquad \Rightarrow \qquad AC \uparrow .$$

The relationship between P and n:

$$Q = A - BP = \underbrace{\frac{S}{n} + Sb\bar{P}}_{=A} - \underbrace{Sb}_{=B} P,$$

$$MR = P - \frac{Q}{B} = P - \frac{Q}{Sb} = P - \frac{1}{bn} = c,$$

$$P = c + \frac{1}{bn}.$$

The more firms there are in the industry, the lower will be the price set by each firm (PP curve):

$$n \uparrow \qquad \Rightarrow \qquad P \downarrow .$$

In equilibrium, there is a number of firms, n, where price and average cost are equal.

The size of the market

An increase in the size of the market, S, has the following effects:

Size of the market	Effect	Curves
$S \uparrow$	$AC \downarrow$	$CC \downarrow$
$S \uparrow$	P does not change	PP does not change

Effects on the equilibrium:

$$S \uparrow \quad \Rightarrow \quad n \uparrow, AC \downarrow, P \downarrow$$

A numerical example:

$$Q = S \times \left(\frac{1}{n} - \frac{1}{30,000} \times (P - \bar{P}) \right),$$

$$C = 750,000,000 + (5,000 \times Q),$$

$$AC = \frac{750,000,000}{Q} + 5,000.$$

	Home market before trade	Foreign market before trade	Integrated market after trade
Total car sales	900,000	1,600,000	2,500,000
Number of firms	6	8	10
Sales per firm	150,000	200,000	250,000
Average cost	10,000	8,750	8,000
Price	10,000	8,750	8,000

Economies of scale and comparative advantage

Intra-industrial trade versus inter-industrial trade:

- intra-industrial trade: international trade of differentiated products of the same sector, reflecting economies of scale

- inter-industrial trade: international trade between different sectors, reflecting comparative advantage

Note that our model does not say anything about the pattern of intra-industrial trade.

The significance of intra-industry trade

About one-fourth of world trade consists of intra-industry trade.

An index that is commonly used to measure the importance of intra-industrial trade is:

$$I = 1 - \frac{|\text{exports} - \text{imports}|}{\text{exports} + \text{imports}}$$

US industries (1993)	I
Inorganic chemicals	0.99
Power-generating machinery	0.97
Electrical machinery	0.96
Organic chemicals	0.91
Medical and pharmaceutical	0.86
Office machinery	0.81
Telecommunications equipment	0.69
Road vehicles	0.65
Iron and steel	0.43
Clothing and apparel	0.27
Footwear	0.00

Dumping

The model of monopolistic competition assumes away many of the issues that can arise when firms are imperfectly competitive. One example is dumping.

The economics of dumping

Definitions:

- Price discrimination: the practice of charging different customers different prices

- Dumping: a pricing practice in which a firm charges a lower price for exported goods than it does for the same goods sold domestically (a special case of price discrimination)

Dumping can occur if two conditions are met:

- Imperfect competition: firms are price setters.

- Segmentation of markets

Numerical example:

- A domestic firms sells in the home country and in the foreign country.

- Suppose that to expand sales by one unit, in either market, would require reducing the price by 0.01 euros.

	Home country	Foreign country
Present sales	$1,000$ units	100 units
Price	20.00 €	15.00 €
Sale of an additional unit	19.99 €	14.99 €
Reduction of profits	-10.00 €	-1.00 €
Total effect	9.99 €	13.99 €

Normally, as in the example, domestic firms have a larger share of the home market than of the foreign market. The main reason is that the markets are imperfectly integrated due to, for example:

- transport costs and

- protectionist trade barriers.

We observe that the reason behind dumping is the difference in the responsiveness of sales to price in the export and domestic markets.

Reciprocal dumping

Reciprocal dumping refers to the situation in which dumping leads to two-way trade in the same product.

Benefits and costs:

- Benefit: increase in competition

- Cost: waste of resources in transportation

The theory of external economies

External economies of scale:

- The economies of scale apply at the level of the industry rather than at the level of the individual firm.

- If competition is perfect, the industry will have a supply curve with negative slope (average cost on the vertical axis, produced quantity on the horizontal axis).

- The production of the industry concentrates in one or a few places, even though the individual firms of the industry continue to be small.

Main reasons for external economies of scale:

- Specialized suppliers

- Labour market pooling

- Knowledge spillovers

External economies and international trade

- Strong external economies tend to confirm the existence of intra-industrial trade patterns.

- There may be gains for the world economy to be derived from the concentration of production in particular industries to obtain external economies.

- Yet there is no guarantee that a good that is subject to external economies is produced in the country that could produce it most cheaply.

- It is possible that trade based on external economies leaves a country worse off than how it would have been without trade.

- Despite the negative aspects, for the world economy as a whole it is still beneficial to make use of the benefits of industrial concentration.

Dynamic increasing returns:

- When costs fall with cumulative production over time, rather than with the current rate of production, this is referred to as a case of dynamic increasing returns.

- Dynamic scale economies potentially justify protectionism (for example, protection of infant industries).

6 International factor movements

International labour mobility

A basic model

Assumptions:

- Two countries: home country, foreign country

- Two factors of production: land (T), labour (L)

- One good

- Production function, $Q(T, L)$:

  - Decreasing marginal returns:
    $$T \uparrow \Rightarrow MPT \downarrow$$
    $$L \uparrow \Rightarrow MPL \downarrow$$

  - $T \uparrow \Rightarrow MPL \uparrow$

  - $L \uparrow \Rightarrow MPT \uparrow$

- Same technology, but different land-labour ratios

The labour movement from the labour-abundant country to the land-abundant country has the following effects:

- There is convergence in real wages. Real wages rise in the home country and fall in the foreign country.

- World output increases.

- Despite this gain, some people are hurt by the change.

Wage convergence in the age of mass migration

Migration at the end of the 19th and the beginning of the 20th century:

- Countries and regions of origin: China (California), Africa (Caribbean), Japan (Brazil), Scandinavia, Ireland, Italy, Eastern Europe

- Countries of destination: United States, Canada, Argentina, Australia

- Innovations: railroads, steamships, telegraph cables

- Incentives: higher real wages in the destination countries

- Economic effect: convergence of real wages (until after the First World War)

International borrowing and lending

International loans can be interpreted as a type of intertemporal trade. Intertemporal trade is the exchange of goods today for goods in the future.

Intertemporal production possibilities and trade

Trade-off:

- Consume today.

- Invest today in order to produce and consume in the future.

Intertemporal production possibility frontier (PPF):

- Shows the possible combinations of present and future production of a good

- Intertemporal rate of substitution between present and future consumption: absolute value of the slope of the intertemporal PPF

$$(1+r)V = (1+r)\,Q_P + Q_F \quad \Leftrightarrow \quad V = Q_P + \frac{1}{1+r}\,Q_F,$$

where

V = value of present and future production, measured in terms of present consumption,

Q_P = present production, measured in terms of present consumption,

Q_F = future production, measured in terms of future consumption,

r = real interest rate.

Isovalue line:

- Shows the combinations of present and future production with a given total value, $\bar{V}$

- Function in a diagram with Q_F on the vertical axis and Q_P on the horizontal axis:

$$Q_F = (1 + r)\bar{V} - (1 + r)\,Q_P$$

- Slope: $-(1 + r)$

Given a real interest rate, production in the two periods is maximized when:

- the isovalue line is tangential to the intertemporal PPF and

- the rate of intertemporal substitution is $(1 + r)$.

Budget constraint and intertemporal trade

Intertemporal budget constraint:

- Requires that the value of the consumption of the home country in the two periods is equal to the value of the consumption goods produced in both periods:

$$D_P + \frac{D_F}{1+r} = Q_P + \frac{Q_F}{1+r}$$

- Requires that production and consumption are both situated on the same isovalue line

- Implies that the imports of consumption in the future period are equal to $(1+r)$ times the exports of consumption in the present period:

$$D_F - Q_F = (1+r) \times (Q_P - D_P)$$

Suppose that the intertemporal possibilities of production of our country are biased towards present consumption whereas those of the foreign country are biased towards future consumption. Then our country:

- will export present consumption and import future consumption,

- will lend to the foreign country in the present period and receive the money back from the foreign country in the future period,

- will have a higher price of future consumption than the foreign country and hence a lower real interest rate (in autarky).

International borrowing and lending in the 1970s

Period from 1974 to 1981:

- Spectacular increase in oil prices

- Loans from the oil-exporting country (like Saudi Arabia) to the less developed countries (Brazil, South Korea) — international recycling of petrodollars

Current accounts	Oil-exporting countries	Other developing countries	Industrialized countries
1973–1981	363.8	−410.0	7.3
1982–1989	−135.3	−159.2	−361.1
1990–1997	−73.9	−600.1	79.0
1998–2003	236.5	−12.8	−1,344.3

Multinational firms

Definitions:

- Foreign direct investment (FDI): international capital flows in which a firm in one country creates or expands a subsidiary in another; not only a transfer of resources but also the acquisition of control.

  – Horizontal foreign direct investment (HFDI): a firm duplicates its operations in different countries.

  – Vertical direct foreign investment (VDFI): a firm moves parts of its production to foreign countries, without duplication of its operations.

- Multinational firm: a firm based in one country (parent company) possesses stocks of foreign firms that give it control over those firms (its subsidiaries or daughter companies)

Average worldwide growth rate between 1985 and 1999:

- Direct foreign investment: 17.7%

- Exports: 5.6%

- Real GDP: 2.5%

Note: The sales of industrial products by subsidiaries of EU firms in the US are 3.6 times higher than the exports of the EU towards the US.

Horizontal direct foreign investment:

- Advantages: access to foreign markets

- Disadvantages: economies of scale at the level of the plant (but not at the level of the firm)

- Localization: countries with similar characteristics

Vertical direct foreign investment:

- Advantages: exploitation of cost differences

- Disadvantages: loss of economies of integration

- Localization: countries with different characteristics

7   The instruments of trade policy

Tariffs

Definitions:

- Specific tariff: fixed charge for each unit of goods imported

- Ad valorem tariff: tax levied as a fraction of the value of the imported goods

Relevance:

- Source of government revenue

- Protection of particular domestic sectors

- Of late: preference in favour of non-tariff barriers (import quotas, export restraints)

Analysis of a tariff

Assumptions:

- Two countries: home country and foreign country

- One good: wheat (without transport cost)

- Supply and demand in each country: functions of the price

- Price of wheat: higher in the home country

- Fixed exchange rate

It is useful to define two new curves (in a diagram with the price on the vertical axis and the quantity on the horizontal axis):

- Demand curve for imports in the home country: negative slope

- Supply curve for exports in the foreign country: positive slope

A worldwide equilibrium occurs when:

  Domestic demand − Domestic supply = Foreign supply − Foreign demand
              Demand of imports   =   Supply of exports

The world demand is therefore equal to the world supply:

  Domestic demand + Foreign demand = Domestic supply + Foreign supply
              World demand   =   World supply

Effects of a tariff:

- In the absence of a tariff, the price of wheat will be P_W.

- A fixed tariff of t raises the price in the home country to P_T and reduces the price in the foreign country to $P_T^* = P_T - t$.

- Normally, the increase in the price in the home country, $P_T - P_W$, is less than t because part of the tariff is reflected in a decline in the foreign country's export price.

- In a small country (which cannot affect foreign export prices), the rise in the price, $P_T - P_W$, is equal to t.

Costs and benefits of a tariff

The net effect of a tariff depends on:

- the cost of the consumers (reduction of the consumer surplus),

- the benefit of the producers (increase in the producer surplus),

- the government revenue gain.

This effect can also be interpreted as consisting of:

- the efficiency loss (due to the price increase in the home country, which distorts the incentives to consume and to produce),

- the terms of trade gain (due to the reduction of the export prices abroad).

Other instruments of trade policy

Export subsidies

Definition:

- An export subsidy (specific or ad valorem) is a payment made to a firm or an individual that ships a good abroad.

Effects:

- The producer surplus rises.

- The consumer surplus falls (by less than the increase of the producer surplus).

- Government spending rises.

- National welfare falls.

Export subsidies in Europe:

- The European Union's Common Agricultural Policy (CAP) guarantees high prices to European farmers and subsidizes exports to dispose of surplus production.

- The subsidized exports depress the world prices of agricultural products.

- The public subsidies to European farmers represent approximately 36% of the value of their agricultural production, twice as much as in the United States.

- In order to reduce agricultural prices and production, the European Union wants to offer direct financial assistance to the farmers that is not linked to the quantity produced.

Import quotas

Definition:

- An import quota is a direct restriction on the quantity of some good that may be imported.

Effects:

- The domestic prices rise by the same amount as a tariff that limits imports by the same amount.

- The producer surplus increases.

- The consumer surplus diminishes (by more than the rise in the producer surplus)

- Unlike with a tariff, the government receives no revenue; instead, the import license holders receive the so-called quota rents.

- National welfare can increase or decrease, yet it falls unambiguously in the case of a small country.

Voluntary export restraints

Definition:

- A voluntary export restraint (VER), also known as a voluntary restraint agreement (VRA), is a quota on trade imposed from the exporting country's side instead of the importer's.

- Voluntary export restraints are generally imposed at the request of the importer and are agreed to by the exporter to forestall other trade restrictions.

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