

EUROPA-UNIVERSITÄT VIADRINA FRANKFURT (ODER)



**Discussion Paper Series
in International Economics**

Discussion Paper No. 07

Trade Theory

**Dr. Behailu Shiferaw Benti (Frankfurt/Oder)
Prof. Dr. Georg Stadtmann (Frankfurt/Oder)**

October 2026

Georg Stadtmann, European University Frankfurt/Oder
Behailu Shiferaw Benti, European University
Frankfurt/Oder

Trade Theory

The subject “International Economic Relations” is divided into a monetary and a real part. The monetary part uses macroeconomic models to analyze the effects of monetary and fiscal policy or other exogenous shocks. In particular, the effects of these shocks on Gross Domestic Product (GDP), the exchange rate and the subsets of the balance of payments are examined.

In real foreign trade, a distinction is made between the two blocks of trade theory and trade policy. Within the framework of trade policy, we analyze how trade-restrictive and protectionist measures, such as tariffs, quotas or subsidies, affect the national economy and which groups (producers, consumers, state) profit or suffer losses from the introduction of such an instrument (see Pierdzioch/Stadtmann and Pierdzioch/Rülke/Stadtmann). Within the framework of trade theory, we investigate how a policy change from a closed economy (autarky situation) to free trade affects the welfare of the country under consideration. One aim is to show that international trade usually brings welfare gains for a country. However, certain groups can also - under certain conditions - be negatively affected by international trade.

In this paper, four different approaches, which are relatively often presented in a lecture on trade theory, are presented.

1 Mercantilism

Hereafter, we present mercantilism following Appleyard, Field, and Cobb (2005). This term refers to a collection of economic ideas from the period 1500 to 1750, which, through their influence on government policy, dominated economic thinking at the time and the further course of history. A central idea in mercantilist thinking was to measure national wealth by a country’s stock of precious metals (gold and silver). It was also assumed that these resources were constant in the world. Thus, economic activities could be seen as a zero-sum game in which the profit of one country is balanced by the loss of another country. In this situation, the acquisition of precious metals was seen as the single most effective route to ensure the wealth and prosperity of a state.

The economic system had three components: a production sector, an agricultural sector (domestic) and the colonies (foreign). Labor was considered as the most vital

factor of production as the value of goods was measured relative to the amount of labor required for production. Unregulated individual decisions were deemed inconsistent with the main goal of wealth accumulation and thus, economic activities were highly regulated. To achieve the main goal of accumulating wealth through precious metal acquisitions, the mercantilists emphasized achieving a current account surplus through a greater value of exports over imports, i.e. positive trade balance was favored. Furthermore, this emphasis was based on the assumption that the domestic economy was in underemployment instead of full employment. There was an increase in the inflow of capital since foreigners paid for the excess supply from the domestic market with gold and silver. This increased supply of money which then boosted the economy and led to a growth in production and employment without inflation. A positive trade balance was thus economically beneficial to the domestic economy.

This can be summarized by the following quotation:

“The ordinary means therefore to increase our wealth and treasure is by foreign trade, wherein we must ever observe this rule; to sell more to strangers yearly than we consume of theirs in value.”
Thomas Mun, 1664

The regulation of economic activities has been achieved through:

- Capital controls (the government controlled the use and exchange of precious metals, so-called bullionism),
- Exclusive trading rights (the government granted trading rights for certain routes or areas to certain companies - these trade monopolies enabled higher profits than monopoly and monopsony which were due to market power. These trade monopolies, in turn, led directly and indirectly to a positive trade balance),
- Export subsidies (the government promoted these to enhance exports),
- and import restrictions (the government levied quotas and tariffs on imports of consumer goods).

Furthermore, the mercantilists followed the approach of keeping wages low. As mentioned earlier, labor was the most important factor of production. Thus, low wages indicate low production costs which resulted in domestic goods that were more competitive with foreign products. Wages were not set by the market but were determined in such a way that they corresponded to the traditional status of the workers. Hence the lower classes in society were kept poor.

These doctrines led to a paradox: the low-income population of rich nations would have a more prominent share. Moreover, the accumulation of precious metals was at the expense of current consumption.

At the beginning of the 18th century, the ideas concerning economic activities changed. This also changed the view of wealth. Adam Smith, in his work “The Wealth of Nations” (1776), challenged the idea of Wealth being the sum of accumulated precious metals. Rather, wealth should be observed in the production potential and thus consumption opportunities of the economy, i.e. in the ability to produce end products and services. Therefore, rather than precious metal accumulations, the production of goods and services should be increased. Smith also believed that growth in production is promoted in an environment where people are free to pursue their own interests. This persisted against the mercantilist conviction that economic activity should be controlled.

Question 1: Why do mercantilistic ideas show a paradox?

2 Ricardo model: absolute and comparative advantages

The British economist David Ricardo (1772 – 1823) published the work: “The Principles of Political Economy and Taxation” in 1817. He intended to provide the British government with convincing arguments why Portugal and England should form international trade relations. At that time Portugal was superior to the British economy in many areas and was also much more productive in the cloth industry (cf. Binswanger).

2.1 The assumptions

We consider two countries (England & Portugal), two goods (cloth & wine) and one factor of production (labor, L =Labor). At that time, capital did not play a major role as a factor of production. In 1817, when the work was published, the steam engine of James Watt (1765) had only been in use for a few decades and it would, for example, take another 62 years before the light bulb was invented!

The relationship between the input factor (Labor= L) and the output factor (quantity of goods q) can be described by the following relationship, where the parameter a which is defined as the unit of labor required to produce one unit of output).

$$(1) \quad L = a * q$$

A certain unit of labor is necessary to produce one unit of output. The underlying production function has a constant returns to scale i.e. to double the quantity

produced, the labor input has to be doubled. A difference in technology between the two countries exists and since there is no Internet yet, technological knowledge does not diffuse perfectly and not every country can produce with the most efficient technology. This is why there are (still) differences in the production functions. These differences in the production functions lead to different relative prices in the autarkic situation (both countries are closed, no international trade). If, however, relative prices differ, then there is the possibility of generating welfare gains by establishing international trade relations.

Table 1: Labor per one unit of output in the two countries and the two industries

	Cloth	Wine	Opportunity costs of wine production
England	3 hr/yd	6 hr/bbl	2 C/W
Portugal	2 hr/yd	1 hr/bbl	0.5 C/W

The abbreviations are defined as follows: hr stands for hour, yd stands for yard (1 yard is approx. 0.9 meter) and bbl stands for barrel (1 barrel as historical wine measure corresponds to approx. 139.75 liters). C stands for cloth and W for wine.

As can be seen from Table 1, Portugal has an absolute advantage in both cloth and wine production: in Portugal, a smaller amount of labor (2 units of labor) is required to produce one unit of cloth compared to that of England (3 units of labor). Units of labor could be for example measured in hours (hr). Portugal enjoys an advantage in wine production as well: in England, it takes 6 hours to produce one unit of wine, while in Portugal it takes only 1 hour. Portugal is, therefore, more productive in both sectors. So why should Portugal establish trade relations with England? This is the question Ricardo wanted to answer.

Opportunity costs play a central role in David Ricardo's chain of arguments: the opportunity cost of wine production in England is 2 units of cloth. If England wants to produce a bottle of wine, it needs 6 units of labor, which are then moved from the cloth production. If you take 6 units of labor out of the cloth sector, the output is reduced by 2 units of cloth given that required labor per one unit of cloth is 3 (i.e. $a = 3$ hr/yd) in the British cloth sector.

On the other hand, if one more bottle of wine is produced in Portugal, 1 unit of labor is required which should be withdrawn from the cloth sector and corresponds to a reduction by 0.5 units of cloth in the cloth sector since $a = 2$.

This indicates that in Portugal, a bottle of wine costs only 0.5 units of cloth while in

England, wine costs 2 units of cloth. Thus, wine is relatively cheap in Portugal and relatively expensive in England. England should, therefore, specialize in cloth production, while Portugal should specialize in wine production. First, however, Table 2 quantifies the production possibilities that exist in when there is no international trade – the autarky situation.

Table 2: **Production volumes and consumption possibilities in Autarky**

	Cloth	Wine
England	100 yd	50 bbl
Portugal	150 yd	300 bbl
World	250 yd	350 bbl

The following assumptions are made: Both countries have $L = 600$ units of labor available. In the initial situation, the factors are divided equally (50:50) between both sectors. Form this arrangement, the production quantities in Table 2 are formulated for both sectors. As there is no international trade, the production quantities also correspond to the consumption in each country. Dividing the 600 units of labor equally among the sectors avails 300 units of labor in each sector. In England, 300 units of labor can produce 100 units of cloth ($300/3$). The remaining 300 units of labor would thus produce 50 units of wine ($300/6$). In Portugal, the same amount of labor can be used to produce 150 ($300/2$) units of cloth and 300 ($300/1$) bottles of wine. In the last row of Table 2, the overall production quantities in the world have been added.

Now that the situation in autarky has been explained in sufficient detail, the scenario with international trade will be presented. The assumptions are deliberately kept simple and serve the purpose of highlighting the advantages of international trade in the simplest way possible. Here the specialization decisions of the countries are recalled and it is assumed that a country produces one unit less of that good for which it has a comparative disadvantage. The amount of labor made redundant in such a way is then used in the sector in which the country has a comparative advantage.

Considering England, when it produces one unit less of wine, 6 units of labor, which can now be used in cloth production, are released in the wine sector. In this way, 2 more units of cloth can be produced in England. Accordingly, the production of wine decreases from 50 to 49 units and that of cloth increases from 100 to 102 units.

In Portugal, the output of cloth is reduced by one unit and 2 labor units, which

can then produce 2 more units of wine in the wine sector, are released. The output of cloth falls from 150 to 149 and that of wine rises from 300 to 302 units. It can already be observed in the last row of Table 3 that the world output of both goods has increased. Thus, it is finally only a question of distribution that consumption in the two countries could be increased.

Table 3: **Production volumes after specialization**

	Cloth	Wine
England	102 yd	49 bbl
Portugal	149 yd	302 bbl
World	251 yd	351 bbl

We assume that the terms of trade are 1 to 1, i.e. one unit of cloth is exchanged for one unit of wine. The terms of trade are referred to as the relative exchange ratio for an import good, measured in units of the export good. Both countries can benefit from international trade as long as the terms of trade lie between the two opportunity costs in the autarkic situation. It is now assumed that England exports 1.5 units of cloth and receives in exchange 1.5 units of wine from Portugal. If we now compare the consumption possibilities in Table 4 with that of the autarky situation in Table 2, we find that the consumption possibilities in both countries have increased by 0.5 units for both goods. Thus, it would be reflected here that international trade can generate welfare gains for both countries if both countries redistribute the factors of production and specialization in those products for which they enjoy a comparative advantage. Favorable gains for both countries are realized in the case of international trade although Portugal has an absolute advantage in the production of both goods.

It is also important that the terms of trade remain within the range of the above-mentioned scope. If there are, however, completely different proportions (e.g. the USA trades with Luxembourg - other countries do not exist), the large country will dominate the Terms of Trade. If the terms of trade correspond to the opportunity costs of the larger country, then it cannot benefit from international trade. Merely, the small country would benefit: If the terms of trade differ from the opportunity costs of the smaller country, then at least one good can be imported relatively cheaply from abroad. In this respect, the slogan “The importance, of being unimportant” has become common to signal that small countries, in particular, which cannot influence world market prices, can profit most from international trade.

Table 4: **Consumption possibilities with specialization and International Trade**

	Cloth	Wine
England	100.5 yd	50.5 bbl
Portugal	150.5 yd	300.5 bbl
World	251 yd	351 bbl

2.2 Critical analysis of the Ricardo model

Emphasizing the (implicit) assumptions of Ricardo model is here important. First, international trade is balanced: The value of imports and exports are equal so that trade does not result in a trade surplus or deficit. On the other hand, it was assumed that full employment exists both in the autarky situation and in the free international trade scenario. In a short contribution, Binswanger discusses the question of whether these two assumptions were fulfilled in the historical context and arrived at a negative result. He argues that the establishment of trade relations tended to be disadvantageous for Portugal.

Another assumption is that the amounts of labor required to produce one unit of output are constant over time. Theoretically, it is conceivable that international trade could also lead to the diffusion of knowledge regarding the best production technology and that both countries would then produce with similar technology. Within the Ricardo model, international trade would then come to a complete standstill again.

Question 2: Two countries (Germany and Turkey), two sectors (Doner kebab and beer). The labor required per unit of output in Germany: beer = 5, Doner kebab = 10. Turkey: beer = 8, Doner kebab = 12. Which country has a comparative advantage in the Doner kebab industry or the beer industry?

3 Heckscher-Ohlin

Heckscher-Ohlin theorem, which became significant in explaining international trade, is developed by two Swedish economists Eli Heckscher (1879-1952) and Bertil Ohlin (1899-1979). The theory establishes a relationship between the available proportions of different factors of production and the factor of production proportions

that would be used for production. This theory is therefore also called factor-proportion theory (cf. Krugman/Obstfeld/Melitz 2012, p. 110).

Based on Appleyard/Field/Cobb, the assumptions and results of the Heckscher-Ohlin theorem are hereafter explained using an example. Two countries (Germany and China) are producing two goods (steel and clothing) using two factors of production (labor and capital). While the steel sector is capital intensive, the clothing sector is labor-intensive. The production functions and technology are the same. So what is the difference between countries? Relatively, the two countries have different endowments of the two factors of productions! The domestic sector (Germany) is abundantly endowed with capital, while the foreign sector (China) is abundantly endowed with labor. So it applies:

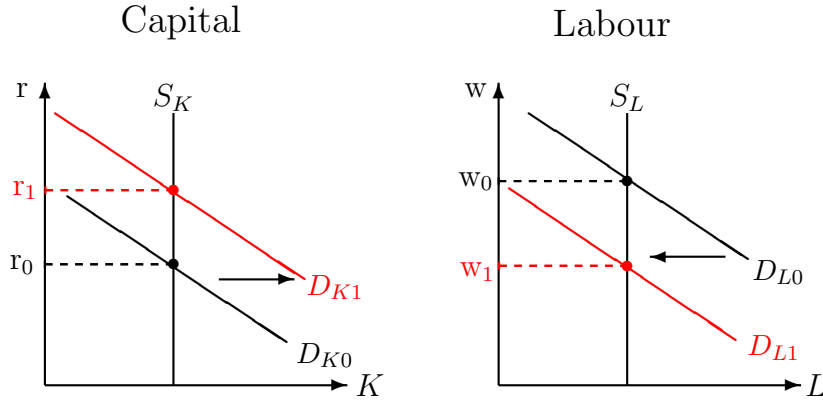
$$(2) \qquad \left(\frac{K}{L}\right)_{Germany} > \left(\frac{K}{L}\right)_{China}$$

In the autarkic situation, since capital is abundant in Germany the price of the capital-intensive good (steel) will be relatively low. On the other hand, China has abounded labor and thus the price of the labor-intensive good (clothing) will be relatively low. In the international trade context, while Germany specializes and exports steel, China would specialize in clothing production and export the same. According to the Heckscher-Ohlin theorem, a country will export the good that intensively uses the relatively abundant factor of production and will import the good that intensively uses the relatively scarce factor of production.

When the situation changes from autarky to free trade, the demand for the factors of production changes. In Germany, the steel sector expands while the clothing sector shrinks. The resources that were previously used in the clothing sector are shifted to the steel sector. However, since the factor of production intensity in the two sectors is different, resources from the clothing sector are different than what is actually required in the steel sector. Since the clothing sector was relatively labor-intensive, relatively significant units of labor will now be released. More capital units are required in the steel sector since steel is a capital-intensive sector. This results in a decrease in demand for labor and an increase in demand for capital in the steel sector.

The introduction of free trade would also result in changes in prices of factors of production in Germany as reflected in the below Figure 1.

Figure 1: Changes in Factor Prices in Germany attributable to trade



The graph on the left depicts the capital market in Germany. As Germany specializes in a capital-intensive good, the demand for capital increases and thus the demand curve shifts upward (D_{K0} to D_{K1}), while the supply curve (S_K) remains the same. With a constant unit of capital (K) available, the price of capital as reflected by the interest rate r increases from r_0 to r_1 .

The graph on the right reflects Germany's market for labor. As the demand for labor decreases, the demand curve shifts to the left (from D_{L0} to D_{L1}), while the supply of labor curve (S_L) remains the same. With a constant unit of labor (L) available, the price of labor as reflected by wage (w) decreases from w_0 to w_1 .

Another aspect of the Heckscher-Ohlin model is the Stolper-Samuelson theorem by the American economists Wolfgang F. Stolper (1912-2002) and Paul Anthony Samuelson (1915-2009). It expresses that the increase in the price of the abundant factor ($r \uparrow$) and the decrease in the price of the relatively scarce factor ($w \downarrow$) means that the real incomes of the owners of the abundant factor (capital) increase while the real incomes of the owners of the relatively scarce factor (labor) decrease. This means that the owners of the abundant factor are in favor of free trade, while the owners of the relatively scarce factor tend to prefer trade barriers!

One important aspect that has not been addressed so far is: How are the two production factors (labor and capital) distributed within a society? If there is a representative agent, which implies that all economic agents can offer the same amount of capital and labor in the factor markets, then international trade is always advantageous. However, if a small number of people hold all of the capital and a large number of people can only offer their labor because, for example, this population group has not inherited any capital, then international trade influences these two groups asymmetrically: In the relatively capital endowed domestic market, the own-

ers of capital would profit through international trade, while the workers would lose. In principle, the winners of the globalization process could compensate the losers, for example when the state carries out redistribution through a tax measure. This redistribution could depend on whether international trade takes place or protective measures are taken.

Summary and critique of classical trade theory

Classical trade theory, which includes the models of Ricardo and Heckscher/Ohlin, can explain international trade between two different economies. The differences between the countries arise from the assumptions made: Ricardo assumed that the two countries differ with respect to their production functions. The difference between the countries in the Heckscher/Ohlin model occurred through the different factor endowments. Trade between different countries is also called "North-South Trade".

Furthermore, it is important to understand that the exchange of goods took place in different product categories: Wine is exchanged for cloth (Ricardo) or steel for textiles (Heckscher/Ohlin). This trade structure has also been described as inter-industrial trade.

However, most of the actual international trade of the 1980s occurred between economies that were at a similar level of development and possibly had similar factor endowments.

The classical models were completely inadequate to explain why trade takes place between France and Germany and why, for instance, both countries import and export cars (Peugeot and Citroen versus VW and Mercedes). Paul Krugman tried to develop models that could better explain the actual trade of the 1980s. He, therefore, concentrated on so-called "North-North models", which modeled international trade between similar countries. Furthermore, he also attempted to identify the justification for the so-called intra-industrial trade, in which similar product classes are both exported and imported.

Question 3: What is the major difference between classical trade theory and new trade theory?

4 New trade theory (Krugman)

A model approach by Krugman/Obstfeld/Melitz (pp. 138 - 139) is presented below, which can be attributed to the model class of the new trade theory. At the very outset, it should be emphasized that this model approach can explain North-North trade between similar and identical economies, but that intra-industry trade does not

take place. The assumptions are as follows: There is only one factor of production (labor). The input-output relationship is described by the following function:

$$(3) \quad L = a * q + b$$

Where the variable L again reflects the amount of labor, a is the unit of labor required for one unit of output and $b > 0$ is a constant.

Because of the existence of the variable b , some authors argue that the production function has increasing returns to scale. However, the existence of variable b could also be interpreted as fixed costs, which, due to fixed cost degression, lead to larger firms to have a better cost position.

Equation 3 differs by the variable b from the input-output relationship in the Ricardo model (equation 1), where $b = 0$ applied and therefore production was at constant returns to scale.

One could imagine a university in which lectures are produced with $b = 5$ and $a = 1$ to give the equation 3 more life. A professor can produce a lecture based on $a = 1$. However, to ensure the operation of a university, one needs a president, three vice presidents and a chancellor ($b = 5$), who do not produce any output but just have to devote themselves to administrative matters in order to manage the university.

So if you want to create an output of 5 lectures, you need 5 professors and 5 extras. If you want to double the output to $q = 10$, you only need to hire 5 more professors. Thus the input/output ratio reduced from 2.0 to 1.5, which leads to a fixed cost degression.

Output (q)	Input (Labour=L)	Input/Output Relation
5	10	2.000
10	15	1.500
15	20	1.333
20	25	1.250
25	30	1.200
30	35	1.167

Now that the production function has been introduced, the assumptions regarding the rest of the economic structure will be specified in more detail below:

- There are two countries (USA and UK),
- two sectors (cars and universities),

- each country has $L = 30$ labor units in the autarkic situation,
- which are again divided 50:50 between the two sectors.
- In both countries and both sectors production is carried out with the above-mentioned function ($a = 1$, $b = 5$).

Thus the following production quantities and consumption possibilities arise in autarchy:

Autarky	Number of lectures	Number of cars
USA	10	10
UK	10	10
World	20	20

Both countries are modeled completely symmetrically so that there are no relative price differences and so forth in the autarkies situation. Nevertheless, both countries can benefit from the establishment of international trade relations: If both countries specialize in one industry each and let the other industry disappear completely, the world output can increase due to the increasing economies of scale: If, for example, USA specializes completely in the production of cars and UK in the production of lectures, the following production structure emerges:

Production after specialization	Number of lectures	Number of cars
USA	0	25
UK	25	0
World	25	25

Since the world output of both goods increase, it is simply a question of distribution so that both countries can consume more of both goods. If the USA exports 12.5

cars and imports 12.5 lectures from the UK in return, the following consumption possibilities arise:

Consumption after specialization	Number of lectures	Number of cars
USA	12,5	12,5
UK	12,5	12,5
World	25	25

Compared to the autarky situation, consumption in both countries and both sectors has therefore increased by 2.5 units.

In a world where there are more than two different industries, for example, the following situation could emerge. Assume, for example, there are 100 different industries in the world. The USA could concentrate on the industries that are odd-numbered i.e. 1, 3, 5, ... 99 and UK on the even-numbered industrial classifications 2, 4, 6, ... 100. Each economy ultimately operates only in 50 different industries; specializes in these specified industries and then exports these goods, while it imports products of the other goods from abroad.

In a video clip, which is available on YouTube, Krugman gives an insight into his new trade theory. After about 1:10 minutes he talks about “*very small almost accidental advantages get build into larger advantages that than persists over time*”, which could lead to the birth of a new (export) industry.

Question 4: Systematically compare the three different theories (Ricardo, Heckscher/Ohlin, Krugman)!

Literature

Appleyard, Dennis R., Field, Alfred J., Cobb, Steven L. (2005): International Economics, 5th Edition. Irwin Publishing House.

Binswanger (2001): Wein gegen Tuch: Doch nur einer gewinnt, in: Die Weltwoche, No. 16, 19 April, p. 22.

Krugman/Obstfeld/Melitz (2012): International Economics - Theory & Policy, 9th edition, Pearson Education Limited

Pierdzioch C.; Stadtmann, G. (2017): US-Importzölle und ihre Auswirkungen, Das Wirtschaftsstudium (WiSu), Vol. 46(6), pp. 719 – 723.

Pierdzioch C.; Rülke J.C.; Stadtmann, G. (2011): Handelsbeschränkungen: Wohlfahrtstheoretische Analyse, Das Wirtschaftsstudium (WiSu), Vol. 40(3), pp. 375 – 379.

YouTube: Krugman Rose New Trade Theory <https://www.youtube.com/watch?v=fb6-PIMONtQ&t=13s>

Answer 1:

If a country exports more than what it imports, the surplus is "balanced out" in gold. The king can acquire more gold and expand his power. For a country to be successful in export markets, goods must be produced cheaply. This is, of course, possible if wages are kept artificially low.

A rich country - in the mercantilism sense - thus goes hand in hand with a situation in which large parts of the population live in poverty. This idea shows paradox according to Adam Smith.

Answer 2:

In Germany, a Doner kebab costs $10/5 = 2$ beers. In Turkey, a Doner kebab costs $12/8 = 1.5$ beer. Turkey has a comparative advantage in the Doner kebab industry.

In Germany, a beer costs $5/10 = 0.5$ Doner kebabs. In Turkey, a beer costs $8/12 = 0.667$ Doner kebabs. Germany has a comparative advantage in the beer industry.

Answer 3:

Through classical trade theory, international trade between different countries (North-South Trade) can be explained. In this case, a trade occurs in different product categories (inter-industrial trade) as well.

Through the new trade theory, however, trade between similar countries that are at the same level of development can be explained (North-North Trade). With some approaches, intra-industrial trade in the same product categories can also be explained.

Answer 4:

	Ricardo	Heckscher/Ohlin	Krugman
Factors of production	Labor	Labor & Capital	Labor
Factor endowment	Identical	Different relative factor endowments	Identical
Production function (PF)	Different PF in both countries	PF identical in both countries	PF identical in both countries
Economies of scale	Constant economies of scale	Constant economies of scale	Increasing economies of scale
Relative prices in autarky	Different, as different production functions	Different, as different equipment with production factors	Identical, as both countries model completely identically
Welfare gains	Welfare gains through specialization in comparative advantages	Welfare gains through specialization in that good which uses the relatively abundant factor of production relatively intensively	Welfare gains through the use of economies of scale (fixed cost degression)