International College of Economics and Finance
State University – Higher School of Economics

International Economics

Problem book

with suggested solutions

D. Levando, V. Dobrynskaya

2004

Foreword

This problem book is developed for the course "International Economics", which is taught on the 4-th year at International College of Economics and Finance of State University - Higher School of Economics according to the program of London School of Economics and Political Science of London University. The problem book can be used with the textbook of Krugman and Obstfeld "International Economics: Theory and Practice".

The problem book consists of two parts – International Trade and International Finance and covers most sections of the program of the course. The book contains a collection of problems and questions for each topic of the course with suggested answers, solutions and graphs.

The authors are extremely grateful to Geoff Barnard (IMF, a former ICEF teacher of "International Economics") for consultations and kind advices.

Contents

Part I. International Trade

Part II. International Finance

Part I. International Trade

Chapter 1. The Ricardian Model of Comparative Advantage

Comparative advantage is based on opportunity costs of production of one good in terms of another. There are few mechanisms which support it – the mechanisms of international differences in technologies (Ricardian model), the relative differences in factor endowments (Hecksher-Ohlin model) and specific factor model.

The name of Ricardo is used in two contexts – in respect of the principle of comparative advantage and in respect of the model.

Assumptions of the Ricardian model:

A1. Goods are internationally tradable, but factors are immobile. This means that even if there is international factor reward differential, factors can not move internationally.

A2. (2 goods) Each country has two industries each of which produces only one homogenous final good.

A3. (Two countries) There are just 2 countries.

A4. (No transportation costs). There are no transport or transaction costs involved in trade within countries or between them. There are no barriers for international trade.

A5. (Maximizing agents) Consumers are utility maximizers with utility functions that conform to the standard theory of consumer choice and producers are profit maximizers.

A6. (Perfect competition) Markets for goods and factors are perfectly competitive: full employment, flexible prices and trade happens only at equilibrium prices.

A7. (Perfect factor mobility) Factors are perfectly and costlessly mobile between industries. This results in wage equalization between industries.

All the assumptions A1-A7 are quite standard for trade models and will be shared by many models, while in other cases some of them will be relaxed. In addition to these 7, Ricardian model is based on the following assumptions:

A8. There is just one factor of production, which can be called labor.

A9. There are constant returns to scale in every industry, so that marginal and average costs are equalized.

Brief notes on the Ricardian model:
- International trade allows population to consume goods at lower relative prices, thus increasing total consumption.
- Trade does not lead to an increase in income measured in the units of the produced good, but it does, if the income is measured in the units of the imported good. (Real wage rate increases relatively to the imported goods as a result of trade).
- According to Ricardo, welfare rises not due to an increase in income, but due to an increase in the number of cheaper goods available.
- According to this model, trade allows not to produce the good with higher relative unit labour requirements at all. The production of such a good is substituted by the

production of a good which the country can produce relatively more efficiently and gain on exchange.

- If there are more than 2 goods, transportation costs can generate non-tradable goods, i.e. goods which will be unmovable between countries and will be produced/consumed only locally.
- A country gains from trade independently whether it has or has not absolute advantage in production of every good.
- The higher the difference between a country's autarky position and one with trade, the more the country gains from trade.

Problem 1. Explain what you understand by each of the following (indicating in each case the specific meaning of the concept in the context of a standard Ricardian model):
(a) opportunity cost
(b) marginal rate of transformation
(c) absolute advantage
(d) comparative advantage
(e) production possibility frontier
(f) the terms of trade
(g) social indifference curve

Answer.
(a) For two goods X and Y, the **opportunity cost** of X in terms of Y is the number of units of Y that must be given up to get an extra unit of X. In a Ricardian model, the opportunity cost of X in terms of Y in a country with unit labour requirements a_x, a_y is - a_y/a_x. In a Ricardian model opportunity costs are fixed and do not depend on volume of production, relative world prices and so on.

(b) For two goods X and Y, the **marginal rate of transformation** (MRT) of Y into X is the number of units of Y that must be given up to get an extra unit of X. It describes the production facilities of an economy along the production possibility frontier. MRT is the same as the opportunity cost of X in terms of Y. In a Ricardian model, the MRT of Y into X in a country with unit labour requirements a_x, a_y is - a_y/a_x.

(c) For any two countries A and B, country A has an **absolute advantage** in the production of a given good X if it is more efficient than B at producing X. In simple words, this concept compares the absolute volume of output per unit of the factor (labour) of two economies. In a Ricardian model, the home country has an absolute advantage in X if $a_x < a_x^{*}$, where a_x^{*} is the unit labour requirements in the foreign country. Absolute advantage in production of one good does not imply absolute advantage in production of another good.

(d) For any two countries A and B and given two goods X and Y, country A has a **comparative advantage** in the production of X if it is **relatively** more efficient than

B at producing X compared to Y. Relative efficiency is measured in terms of opportunity costs. In a Ricardian model, the home country has a comparative advantage in X if $a_x/a_y < a_x^*/a_y^*$

(e) For a given country, the **production possibility frontier** (PPF) is the locus of maximum feasible production of all goods. In a 2-good Ricardian model, the PPF is a straight line with slope $-a_y/a_x$.

(f) In general, the **terms of trade** (ToT) just denote the relative price of one good in terms of another. Usually the term is used to mean the price ratio of a domestically-produced good vis-a-vis a foreign-produced one, or an index of the ratio of export prices to import prices. In a Ricardian model with goods X and Y the ToT are given by P_x/P_y. NB with trade, $P_x/P_y = P_x^*/P_y^*$, and with trade there is generally complete specialization, so that (assuming that the home country has a comparative advantage in production of good X) P_x/P_y is also the ratio of the price of exports to the price of imports. In a wide understanding ToT measures the ratio of exchange of domestically produced goods for foreign goods. That is why changing ToT is connected to international wealth reallocation.

(g) A **social indifference curve** (SIC) denotes the aggregation of individual indifference curves to represent the consumption preferences of a given country. In order to build a SIC it is sufficient to assume identical consumers with homothetic preferences.

Problem 2. Say whether the following statements are True, False or Uncertain. Explain your answers.

(a) Consider a 2-country, 3-good Ricardian model with the following unit labour requirements:

	Good 1	Good 2	Good 3
Home	$a_1 = 2$	$a_2 = 3$	$a_3 = 6$
Foreign	$a_1^* = 3$	$a_2^* = 4$	$a_3^* = 5$

The Home country has a comparative advantage in, and will produce and export, goods 1 and 2.

(b) In a 2-country, N-good Ricardian model, a country will specialize completely in the one good in which it has greatest comparative advantage.

(c) In a 3-country, 2-good Ricardian model, the relative price of the two goods in the presence of international trade must be equal to the autarkic relative price for one of the 3 countries.

(d) The Ricardian model would suggest that Russia gains nothing from trade with Georgia and Moldova while these two countries gain a great deal.

(e) The Ricardian model predicts that every country has a comparative advantage in something.

(f) The fact that some goods are non-traded does not affect the extent of the possible gains from trade.

Answer.
(a) **Uncertain**. The question does not give the relative wage, which is what determines where the chain of comparative advantages is broken, and so we cannot determine which are the goods in which the home country has a comparative advantage. If the relative wage were given, the home country would produce and export goods for which $a_i/a_i^* < w^*/w$, because in this case the cost of producing good i at home ($a_i w$) is lower than the cost of producing the same good abroad ($a_i^* w^*$).

(b) **False**. In general, in the N-good Ricardian model a country can produce up to N goods (though it can export no more than N-1 goods because the Nth good will be produced in both countries for which $a_i/a_i^* = w^*/w$) depending of the relative wage. Even where N=2, a country may produce both goods, so that even then the statement is false.

(c) **False**. It is easy to illustrate on a relative demand/relative supply diagram (or on a world production possibility frontier (PPF) with 3 faces) that equilibrium may occur on a vertical section of the world relative supply curve (at one of the kinks of PPF), where prices are not equal to the autarky prices of any of the 3 countries. So, although relative prices may be equal to the autarkic relative price for one of the 3 countries, this does not have to be the case.
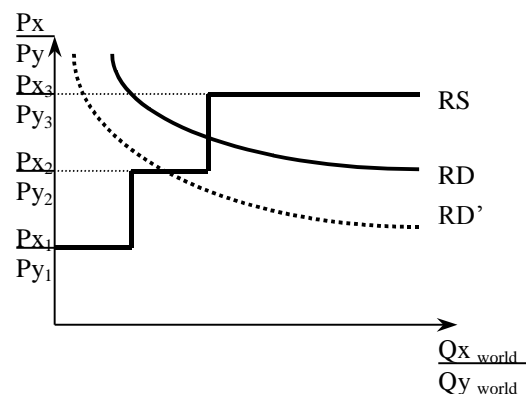
(d) **True**. The case of gains from trade is always true for a small economy. Russia is very large relatively to Georgia and Moldova, so it will affect the relative prices in trade with these countries if the world consists of only these three countries. If we think of the world as being described by a Ricardian model with two goods (we can think of them as Russian importables and Russian exportables), the Ricardian model would suggest that equilibrium is likely to be on the part of the world PPF that coincides with the Russian PPF. So, world prices would be Russian autarky prices, and Russia would gain nothing from trade.

(e) A case can be made here for either **True or False**. If we define the model in such a way that a_i/a_i* is not equal to a_j/a_j*, then every country has a comparative advantage in something, and the statement is true. If the ratios of unit labour requirements are allowed to be the same in different countries, then it can be the case that there is no comparative advantage, in which case the unqualified statement that the model predicts that every country has a comparative advantage in something is false.

(f) **False.** This can be shown by the method of reductio ad absurdum: if the existence of non-traded goods did not affect the extent of possible gains from trade, then the possible gains from trade would not be affected even if all goods were non-traded. That is the same as saying that there are no possible gains from trade. But this we know to be false.

Problem 3. Consider a world which obeys all the assumptions for the Ricardian model discussed in the lecture, and where unit labour requirements and labour forces of the two countries are as follows:

	Italy	Spain
Shoes unit labour requirements	6	8
Wine unit labour requirements	4	4
Labour force	100	120

(a) Does each country enjoy a comparative advantage? If so, for what good in each case?

(b) Draw the PPF for each country. Identify autarky price ratios, and indicate the nature of autarkic equilibrium by means of social indifference curves.

(c) Draw the PPF for the world economy. Describe the different possibilities for relative prices with international trade. With each of these possibilities, say whether there are gains from trade for each country.

(d) Suppose that due to unfavourable weather factors the unit labour requirement for wine in Italy jumped to 12. How does this affect the rationale for trade and the gains from trade for both countries?

Answer.
(a) Yes. $a^I_s/a^I_w = 6/4 = 1.5 < a^S_s/a^S_w = 8/4 = 2$, so, Italy has a comparative advantage in shoes and Spain in wine.

(b) To find the intercepts of a PPF we divide country's labour force by unit labour requirements. This is the maximum amount of a good that can be produced by a country using the whole labour force. PPF is a straight line because the ratio of unit

labour requirements – the opportunity cost of a good – is constant.
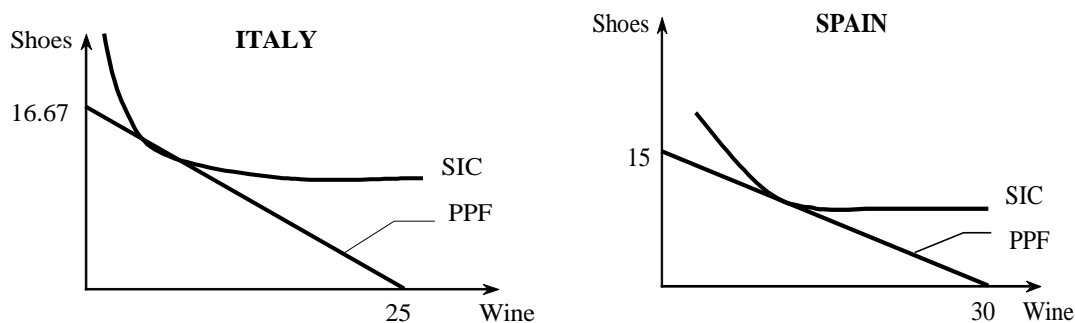
Autarky price ratios are equal to the slope of PPF. Autarky price ratios P_w/P_s equal a_w/a_s in each country, that is 1/2 in Italy and 2/3 in Spain. Production and consumption take place where social indifference curve (SIC) is tangential to autarkic PPF.

(c) The intercepts of the world PPF are calculated by summing the maximum amounts of a good that can be produced using the whole labour force by the two countries.
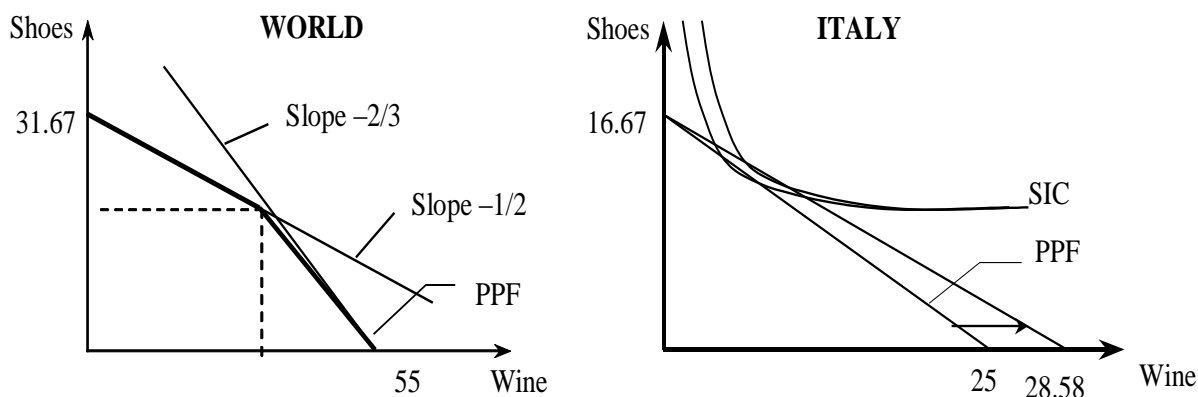

Relative prices can be anywhere between 1/2 and 2/3 depending on supply-demand conditions. Unless they are 1/2 or 2/3, both countries gain because they can buy a good cheaper than produce at home. Gains from trade can be illustrated by PPF. Assume the world price is 7/12. Take an example of Italy. With trade Italy will specialise in shoes because of its comparative advantage. It will produce 16.67 units of shoes and it can exchange each 7 units of shoes for 12 units of wine. Thus, 16.67 units of shoes can yield 16.67:7*12=28.58 units of wine, which is more than Italy could produce itself (25 units of wine). Italian PPF rotates outwards, so that the higher social indifference curve can be reached.

(d) Change in situation is possible only if Italy was previously (with trade) not specializing, but producing both goods. If both countries specialized when unit labour requirement for wine was 4, there is no change in rationale for or gains from trade. Autarky relative price of wine to shoes in Italy is now 2 instead of 2/3, but it is still higher than the relative price in Spain, so Italy will still tend to specialize in shoes

and this will be even more likely. The change does not affect the likelihood of Spain specializing: if it did not specialize before, nothing has changed. So, if Italy was specializing in shoes before, it continues to do so and there are also no changes in Spain. If Spain specialized but Italy produced both goods before, then either both specialize afterwards, or Spain continues to specialize and Italy continues to produce both goods. In general, such a strengthening of the differences in autarkic relative prices may increase the rationale for and gains from trade and cannot reduce them.

Problem 4. Show how a world relative supply curve can be can be constructed for a 2-good, 3-country Ricardian model and how the imposition of a world relative demand curve determines the international prices. What are the possible patterns of specialization?

Answer. World relative supply curve moves up from left to right in three steps with three flat stretches. Let $Px_1/Py_1 < Px_2/Py_2 < Px_3/Py_3$. When the world relative price is below Px_1/Py, no country will produce good X and the relative quantity is zero. When the world relative price is equal to Px_1/Py_1 the first country will be indifferent to trade and will produce both goods. But the other two countries with higher autarky relative prices will still specialize in production of good Y. When the world relative price is above Px_1/Py_1 but below Px_2/Py_2 the first country will specialize in production of good X and the other two countries will produce good Y. When the world relative price is equal to Px_2/Py_2 the second country starts to produce good Y and so forth. In general, as long as the ratio of unit labour requirements for the two goods is different in each country, at most one country produces both goods. The others specialize in production of one good. It is possible for all three countries to specialize, two of them producing one good and the other one producing the other good. The world relative demand curve is downward sloping.
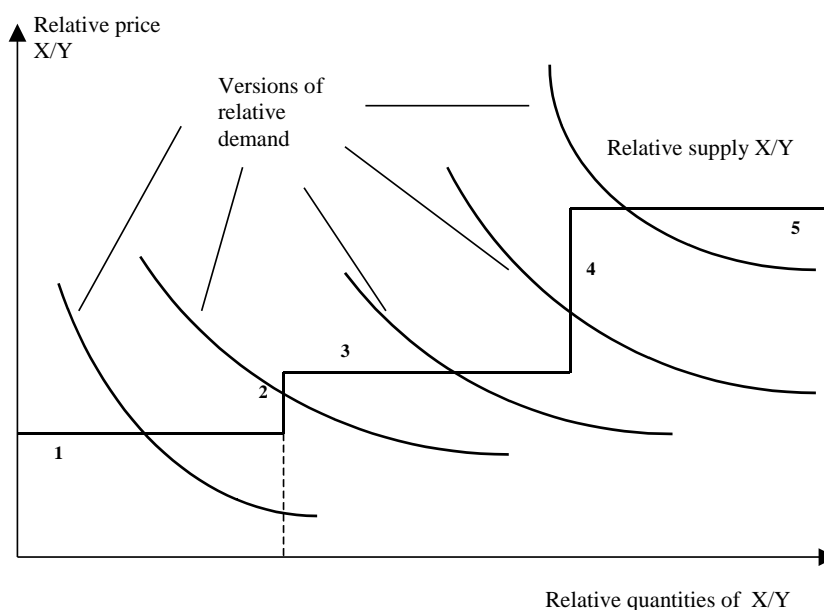
1 – the first country produces X and Y, the two others specialize in Y
2 – the first country produces X, the two others specialize in Y

3 – the first country produces X, the second one produces X and Y, the third one specializes in Y

4 – the first two countries produce X, the third one specializes in Y

5 – the first two countries specialize in X, the third one produces X and Y

In every case gain from specialization comes from increase in the relative prices after trade over the autarky price.

Problem 5. Consider a 2-country, 4-good Ricardian model in which international trade involves transport costs which are equal to T percent of the value of a good being shipped. The unit labour requirements (denoted "a") and values of T for the two countries are as follows:

	Home a	Foreign a	Value of T (in %)
Matrioshkas	1	4	20
Caviar	4	6	25
Vodka	8	9	15
Tractors	12	10	12

(a) If the ratio of home wages to foreign wages is equal to 1.25, which goods will Home export and import?

(b) What would it export and import if (with the same relative wage) there were no transport costs?

Answer.

(a) This part of a problem can be solved by direct use of a condition that the good will not be exported between the countries.

$\dfrac{P_i}{P_i^*} = \dfrac{a_i}{a_i^*} \dfrac{w}{w^*}$ – the ratio of prices in different countries is proportional to the ratio of wages in these countries. The factor of proportionality is equal to relative productivity of corresponding industries.

The good will be exported from country H if costs of its production in country H are relatively lower, than in its trading partner, country F: $\dfrac{a_i w}{a_i^* w^*} \le 1$.

The goods cannot be exported, if transport costs change a sign of this condition, i.e. $\dfrac{P_i}{P_i^*} = \dfrac{a_i w (1+T)}{a_i^* w^*} \le 1$. The good of any country can become non-exportable. Therefore we have two restrictions at once: $(1+T) > P_i/P_i^* > 1/(1+T)$.

The price of a commodity unit i is equal to costs of its production under perfect competition condition $w a_i$, where w is wage. Therefore the double inequality can be rewritten $(1+T) > w a_i / w a_i^* > 1 / (1+T)$.

Let apply it to the problem:

	1+T	wa_i/wa_i^*	1/(1+T)	Non-traded?
Matrioshkas	1.2	0.3125	0.83	No
Caviar	1.25	0.83	0.8	Yes
Vodka	1.15	1.11	0.87	Yes
Tractors	1.12	1.5	0.89	No

So, each country will produce 3 goods: Home will produce Matrioshkas, Caviar and Vodka, and Foreign will produce Caviar, Vodka and Tractors. Caviar and Vodka will be non-traded, and Home will export Matrioshkas and import Tractors.

(b) In the absence of transport costs we have a simple chain of comparative advantages that is broken by the relative wage (w/w*=1.25). All goods for which $w/w^* < a_i^*/a_i$ will be produced and exported by Home and the others will be produced and exported by Foreign. In this example Home will produce and export Matrioshkas and Caviar and import Vodka and Tractors.

Problem 6. A research of the potential of Russian economy revealed that the productivity of labour in Russia in percentage of productivity of US labour (denoted by "α") lower. The results are presented in the following table.

Industry	Oil production	Software	
		Commercial Software	Information technology projects
Productivity (in %)	30	13	72

Does Russia have a comparative advantage in any of these three industries?

Answer.

Industry	Oil production	Software	
		Commercial Software	Information technology projects
Factor input per unit of production (1/α)	0.033	0.077	0.014
Relative demand for labour to produce one unit of oil over one unit of software		0.033/0.077=**0.43<1**	0.033/0.014=**2.36>1**

From the table above you can see that relative cost of labor in Russia in production of oil in terms of software depends on the type of software. So it follows that Russia has

a comparative advantage in production of oil over Commercial Software and in Information technology support projects over oil. There are empirical evidences in favor of this hypothesis. For example, Intel has allocated the development of the software for "Wi-Hi" data transmission system (wireless communication technology) at Nyzhnij Novgorog. This software cannot be sold independently from the special hardware.

Chapter 2. The Hecksher-Ohlin Model

Assumptions of the Hechsher-Ohlin model:
A1. <u>Goods</u> are internationally <u>tradable</u>, but <u>factors</u> are <u>immobile</u> between countries.
A2. (<u>2 goods</u>) Each country has two industries each of which producers only one homogenous final good.
A3. (<u>Two countries</u>) There are just two countries.
A4. (<u>No transportation costs</u>) There are no transport or transaction costs involved in trade within countries or between them.
A5. (<u>Maximizing agents</u>) Consumers are utility maximizers with utility functions that conform to the standard theory of consumer choice and producers are profit maximizers.
A6. (<u>Perfect competition</u>) Markets for goods and factors are perfectly competitive: full employment, flexible prices, trade happens only at equilibrium prices.
A7. (<u>Perfect factor mobility</u>) Factors are perfectly and costlessly mobile between industries.
A8. (<u>Two factors</u>) There are 2 factors of production, which can be thought of as labour and capital. Factors are identical in all industries.
A9. (<u>CRS with diminishing returns to individual factors</u>). There are constant returns to scale in each industry but diminishing marginal returns to each individual factor.
A10. (<u>No factor intensity reversal</u>). If at some given set of prices one good is produced so that it uses a given factor more intensively than the other good, then that will be true for all sets of factor prices.
A11. (<u>Identical technologies</u>). All countries possess the same technologies.
A12. (<u>Identical homothetic preferences</u>) All consumers in each country have the same homothetic preferences.

Main differences in assumptions from the Ricardian model:
- Addition of the second factor.
- Diminishing returns to every individual factor, but still holding constant return to scale for all (both) factors.
- No differences in technologies between countries. This allows to isolate motivation for trade stemmed only from differences in relative factor endowments.
- No factor intensity reversals. This means that order of capital-labor ratios of industries is independent from changes in relative factor prices.

Brief notes on the Hechsher-Ohlin model:
- The role of relative, not absolute figures in determining comparative advantages.
- The motivation of comparative advantage is different relative total factor endowment between countries.
- The use of the production possibilities frontier to compare consumption under autarky and international trade.
- The use of the Edgeworth box to determine changes in factor distribution between industries and relative prices as a result of trade.

- Ability to demonstrate the meaning of the four main theorems of the model informally (i.e. explain the idea) and their results – graphically.
- The difference in results of the Hechsher-Ohlin model from all other models of trade.
- The role of the assumptions of the model in determining the results.
- With international trade, the full specialisation of a country in production of one good is extremely rare. Normally, each country produces both the exported and imported goods. So Hecksher-Ohlin model predicts partial specialization in trade.
- Constant return to scale allows studying only unit cost case of the model. All other cases follow from this assumption.

Problem 1. Say whether the following statements are True, False, or Uncertain. Explain your answers.

(a) Only one of the following production functions is consistent with the assumptions underlying the Heckscher-Ohlin model (Hint: sketch an isoquant for each):
$Q = \min(L,K)$; $Q = 2L+3K$; $Q = L^{1/2} K^{1/2}$

(b) Only one of the following production functions is consistent with the assumptions underlying the Heckscher-Ohlin model (Hint: consider returns to scale):
$Q = L^{1/3}K^{1/3}$; $Q = L^{1/4}K^{3/4}$; $Q = L^{1/2} K^{1/2}$

(c) According to the Heckscher-Ohlin model, small, poor countries will be unable to find anything to export, since they have small endowments of all factors.

(d) If rice production is labour-intensive in India but capital-intensive in the USA, and if India is labour abundant and the USA is capital abundant, then the Heckscher-Ohlin model predicts that both India and the USA will export rice.

(e) Consider a Heckscher-Ohlin model in which the two countries have the following labour and capital endowments:

	Labour	Capital
Home	120	50
Foreign	80	40

If both countries produce vodka and tractors, and if vodka production is labour-intensive and tractor production capital-intensive, Home will export vodka and import tractors.

<u>Answer.</u>
(a) **True**. The isoquants for these functions are as follows:

$$Q = \min(L,K) \qquad Q = 2L + 3K \qquad Q = L^{1/2}\, K^{1/2}$$
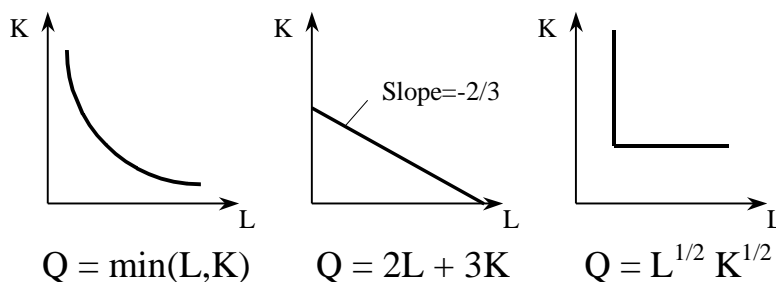
The HO model assumes smoothly diminishing returns to factors, which do not characterize the first two (Leontief and linear), but do characterize the last (Cobb-Douglas). NB. All these production functions do exhibit CRS, however, which is another key assumption of the model.

(b) **False**. Both the last two exhibit CRS (and have smoothly diminishing returns to individual factors). The first function exhibits diminishing returns to scale.

(c) **False**. The question claims implicitly that small poor countries have very small absolute quantities of factor endowments. The question concludes that this means that these countries have nothing to offer for international trade. This contradicts to the HO Theorem, which predicts that a country will export the good that uses intensively the factor in which the country has a relative (not absolute) abundance. Relative abundance just means that the ratio of the abundant factor to the other factor is higher than in the other country. Absolute abundance determines quantity of goods which can be produces not their relative prices.

(d) **False**. This question has two lines of reasoning both coming to the same conclusion. Assume rice industry is compared to some other industry the same in both countries. If rice is labour-intensive in India but capital-intensive in the USA, then there are factor intensity reversals, which contradicts a key assumption of the model. So the model makes no prediction in this case. If rice industry is compared to different industries in different countries than no theorem is applicable.

(e) **True**. Home is relatively labour-abundant ($L/K > L^*/K^*$) and so exports the good which uses labour intensively. See HO Theorem.

Problem 2. Suggest three possible assumptions of the Heckscher-Ohlin model which are not plausibly satisfied in the real world and whose failure implies that trade does not in fact equalize factor prices.

<u>Answer.</u> There are more than three assumptions. The most important are:
(i) Non-specialization (both countries produce both goods;) – in the real world would not expect that every country produces every good (in particular, small countries will

be more likely to specialize in a subset of all goods). This was one of the major differences between HO theory and Ricardian model.

(ii) No factor intensity reversals – if this is false then there is no one-to-one mapping of w/r to goods prices – plausibly this assumption is not met in reality;

(iii) Perfect competition not many industries approach perfect competition benchmark, when equalization of prices dictates unique w and r level.

(iv) CRS with diminishing marginal returns to individual factors– some goods plausibly exhibit unexhausted economies of scale (so increasing returns over relevant range), and some technologies.

Problem 3. Say what you understand by the Heckscher-Ohlin Theorem. State the key assumptions underlying the theorem and illustrate the theorem graphically using production possibility frontiers and social indifference curves.

Answer. The HO theorem claims that the pattern of trade depends on relative factor abundance. Difference in relative factor abundance (given assumptions of the theory) determines relative factor prices. Given perfect competition and general equilibrium conditions this determines the autarky price ratio. Usage of the same technology in different countries but with different relative factor abundance allows to isolate the effect of factor prices from the effect of possible difference in marginal productivities due to differences in technologies.
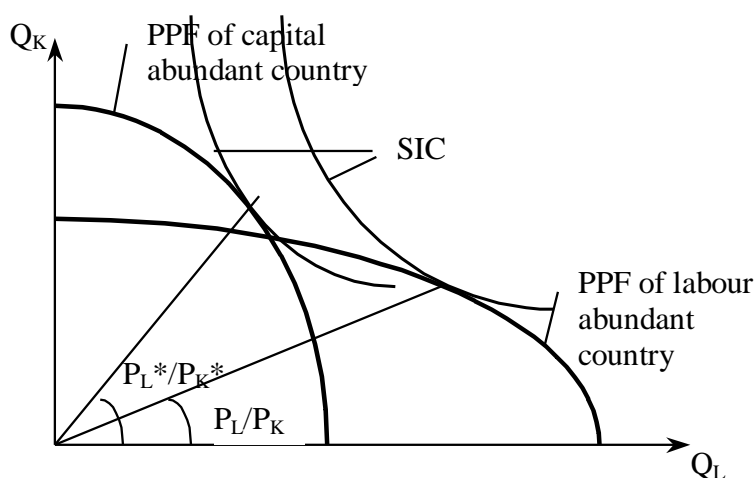
Look at the picture. Assume capital-intensive good is measured on the vertical axis. PPF of capital-abundant country is steeper along any ray from the origin than the PPF of the labour-abundant country. This means that with identical homothetic preferences (same shape of social indifference curves), relative prices must differ in autarky.

With free trade, prices will be between autarky prices of these two economies, and this implies that each country exports the good that uses intensively the factor, which is relatively abundant in that country.

Problem 4. Given the other assumptions of the HO model, can changing the assumption about different countries having identical preferences reverse the HO Theorem? Explain your answer.

Answer. Yes. Suppose preferences are such that demand in the (relatively) labour-abundant country is skewed towards the labour-intensive good to such an extent that its relative price in autarky is higher than in the capital-abundant country (NB with identical homothetic preferences, the autarkic relative price of the L-intensive good must be lower in the L-abundant country). In that case, with free trade, the labour-abundant country will import the labour-intensive good.

Problem 5. Illustrate diagrammatically what you understand by the Rybczynski Theorem.

Answer.
The Rybczynski theorem claims about changes in output structure of a small economy due to changes in relative factor abundancy. Quantity of a factor can increase and decrease. You can show the result using Edgeworth box and PPF.

Edgeworth box has an expansion after exogenous inflow of a factor (here this factor is capital). As an economy is small and can not effect prices of final goods capital ratios in both industries are held constant.

PPF has biased expansion after inflow of a factor. Expansion will be more in the industry, which intensively uses this factor.
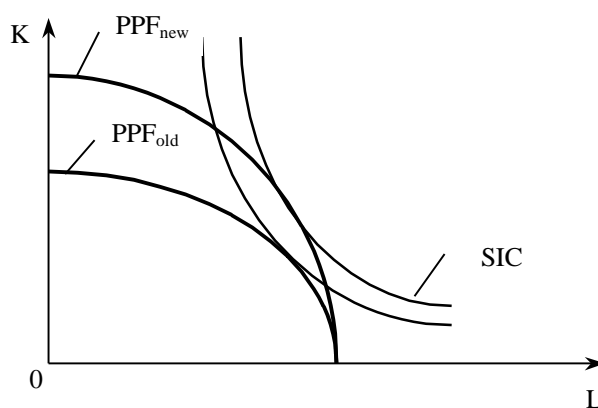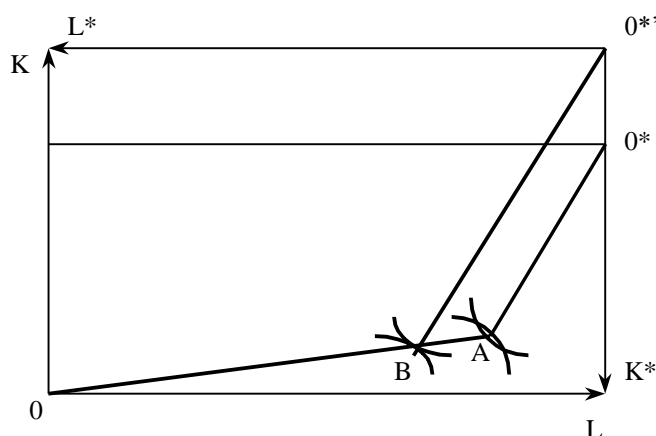
Problem 6. Which of the four main theorems of the HO model are robust with respect to complete specialization? Explain why.

Answer. The HO theorem is the only one of the four which is robust: given other assumptions of the 2x2x2 model, if a country specializes, it will do so in the good that uses intensively the factor which is abundant in that country, so it remains true that the country will export that good and import the other good.
The Stolper-Samuelson Theorem is not robust: if only one good is produced, then the ratio of w/r will be determined by the ratio of the marginal products of labour and

capital with all the economy's stocks of L and K used in production of that good. This remains true even if the relative price P1/P2 changes, so the one-to-one relationship between relative goods prices and relative factor prices breaks down.
FPET is not robust: it is sufficient to note that the S-S Theorem is used in the derivation of the FPET, and as we have seen, S-S is not robust to specialization.
Rybczybski Theorem is not robust: consider case where only capital intensive good produced. Then it is immediately obvious that the output of the L-intensive good **cannot** fall after an increase in the stock of K. Similarly, diminishing returns to individual factors will ensure that the rise in production of the K-intensive good is **less** than proportional to the increase in the K stock.

Problem 7. Suppose fear of the outbreak of war causes an outflux of refugees from a small, labour abundant country, which reduces the stock of labour by 20 percent. What would the HO model predict about the output of carpets and poppies, if cultivation of poppies is capital intensive and carpet-making is labour intensive?

Answer. This is asking for an application of the Rybczynski Theorem. Note that the specification that this is a small country is important, as it allows one to assume that goods prices are fixed (at world levels), but the fact that the country is labour abundant is irrelevant for the answer. The labour stock falls, so output of carpets (the labour-intensive good) falls by more than 20 percent, and output of poppies (the capital-intensive good) actually rises.

Problem 8. Evaluate the following statement: "Trade in goods and factors are substitutes."

Answer. The basic motivation for factors to move is international difference in factor rewards. The answers to this question should make reference to the Factor Price Equalization Theorem, according to which factor returns are equalized by trade. If this occurs, then the statement is true, as free trade in factors (with no transport costs) would similarly equalize factor returns. A good answer should note that the FPET is far from being a good description of reality and suggest why this is so (barriers to trade, transport costs, non-identical technology, etc.). So, the statement is clearly not completely true.

Problem 9. Is the Leontief Paradox really paradoxical? Explain your answer.

Answer. Leontief's results contradicted his conjecture, which he took to be in line with the predictions of Heckscher-Ohlin theory: the US is capital abundant, so US exports should embody relatively more capital than its imports. This was taken as constituting a paradox.
The definition of a paradox. It is a statement that is absurd or self-contradictory, so the Leontief Paradox is only really a paradox if (i) HO Theory is true, (ii) the US was capital abundant, and (iii) the results contradict HO Theory.
There are therefore 3 sorts of reasons why the results may not be paradoxical:

(1) HO Theory is not true (i.e. not a good description of reality in the US in 1947, which was the situation Leontief was analyzing): suggested reasons include unbalanced trade, factor intensity reversals, demand reversals (sufficiently different preferences between countries), imperfect competition, differing technologies;

(2) The results do not contradict predictions of HO theory: suggested reasons include the proposition that Leontief did not measure factor content properly (Kenen's argument that human capital should be added to physical capital); or that with many factors, just measuring K/L ratios is not the correct test of the generalized HO theory (HOV generalization);

(3) The US was not really K-abundant: this has rarely been questioned, but Vanek's argument about the importance of resource-abundance can be seen as a combination of (2) and (3).

An answer should give an idea of the findings of the extensive empirical literature on the Leontief Paradox. As concerns (1), empirical work has given little clear indication that factor intensity reversals or demand reversals are important enough to be responsible for Leontief's finding that US exports were more L-intensive than its imports. It has been argued that the effect of unbalanced trade (the US had a large trade surplus in 1947) could have given rise to the initial paradoxical results, but Leontief's later study and that of Baldwin for 1962 showed that the result persisted, so it is also seen as unlikely that this is responsible.

A good deal of work suggests that technology is not in fact identical between countries, and this could be an important factor in getting "paradoxical" factor content findings. As regards (2), the results of the tests of the generalized version of the HO theory with many goods and factors are no more clearly in line with the theory of Leontief (see results of Bowen et al. 1987). This suggests that even though it may be true that Leontief's own results were not paradoxical (i.e. given the existence of many factors and goods, he was not performing the right test, so that the results should not be taken as contradicting HO theory), the results of the "right" tests are no more encouraging for the theory.

A reasonable conclusion would be that Leontief's own results may or may not have been consistent with a suitably general form of the HO theory (and therefore may or may not have been paradoxical from the perspective of standard trade theory), but that the empirical literature that his work spawned has failed to provide consistent support for the predictions of the theory. From the perspective of standard trade theory, that is paradoxical, but if one accepts that HO (or HOV) is at best a partial explanation of trade patterns, it is not.

Problem 10. Evaluate the statement: "Although neither the Ricardian nor the Heckscher-Ohlin model adequately explains the observed facts of international trade, each is nonetheless useful."

Answer. This question requires discussion of empirical usefulness of two theories and making conclusion about their logical usefulness. Ricardian model can not explain

not complete specialization in production, which is rarely met in reality. HO model claims that a country can produce an imported good as well.

The question asks you to explain patterns of trade predicted by each model and summarize evidence on how far reality conforms with these predictions. Answer to problem 9 gives sense of frequent failures to find support for predictions of HO theory. In addition, there is the evidence that L and K in given industries are frequently allies on trade issues, suggesting that a version of the specific factors model may be a better description of reality than HO, which predicts that the interests of K and L will always be opposed for any given possible change in relative goods prices (S-S theorem).

For Ricardian model, can note that while there is little evidence of the extreme specialization predicted by the model, there is generally supportive evidence on the importance of labour productivity in predicting comparative advantage as revealed by market shares in 3rd markets (MacDougall 1951, Balassa 1963). But Ricardian model has nothing to say about the effects of trade on the distribution of income within countries.

So answer should agree that there is evidence that neither model adequately explains the observed facts of international trade. As regards usefulness, both models seem to work well for describing at least some facts of trade: for example, North-South trade seems broadly to involve the North importing labour-intensive goods and exporting capital-intensive ones, in line with the HO model. In addition, both models involve the use of analytical tools, which are useful constructs for understanding import concepts, such as comparative advantage, non-traded goods, the effects of protection etc. Both models, despite being simple, also allow a range of issues to be considered, making them quite analytically powerful. (Of course, that power is limited if the predictions are not borne out in reality.)

HO theory is part of a broader neoclassical agenda involving the assumptions of free trade, perfect competition, full employment etc. may make it somewhat impervious to empirical criticism. Mainstream economists have proved very reluctant to abandon the standard tools and vocabulary of the discipline in the face of a few inconvenient facts. Part of the reason for this is that there is no comparably general alternative model on offer, while another part of the reason could be that the standard neoclassical analysis (and policy prescriptions) is convenient for economically and politically powerful interests.

Problem 11. After the Black Death hit Europe in the 14th century, wages rose sharply in relation to other factor returns. Does this contradict Heckscher-Ohlin theory? Why or why not? (Hint: consider the Rybczynski and Stolper-Samuelson theorem)

Answer. Let us assume that the Black Death can be thought of as a fall in the labour stock, with the stock of the other factor (probably best thought of as land in this case). The Rybczynski theorem takes relative goods prices as fixed (assumption of small country with free trade with the world), so by the Stolper-Samuelson theorem we know that w/r would be unchanged. So, if relative goods prices in Europe were

unchanged – i.e. if Europe at that time can be thought of as a small open economy – then the observation that w/r rose in Europe would be inconsistent with HO.

On the other hand, Europe in the 14th century is probably best thought of as a large closed economy. In that case, a fall in the labour stock means that both industries will have to use more land-intensive techniques, which means that resources will be shifted out of the labour-intensive industry into the land-intensive industry. A higher ratio of land to labour in both industries would mean (by assumption of diminishing marginal returns to individual factors) that the marginal product of land would be lower than before in both industries and the marginal product of labour would be higher than before. With perfect competition, the ratio w/r is given by the ratio of the marginal product of labour to the marginal product of land, so w/r rises. By Stolper-Samuelson, this would mean that the relative price of the labour intensive good would rise. Thus the observed fact of higher w/r after the Black Death can be seen as consistent with HO analysis generally, though not with the Rybczynski theorem, which assumes fixed goods prices.

Problem 12. Russia mainly exports raw and processed primary commodities (oil, natural gas, ferrous and non-ferrous metals, forest products, etc.) and imports mainly manufactures. Can this pattern be explained by simple Ricardian and/or Heckscher-Ohlin models? Explain why or why not.

Answer. One can indeed think of this trade pattern in terms of both models. If one thinks of two industries, primary commodities and manufactures, the observed pattern could be consistent with the Ricardian model if Russian labour is relatively more efficient in resource extraction than in manufacturing.

One obvious reason why this might be so is just because of the abundance of primary commodities in Russia: it is clearly relatively cheaper to use labour to extract oil where it exists (Russia) than where it doesn't (e.g. Germany). It is not obvious how to rationalize the observed trade pattern using the HO model thinking of only the 2 factors L and K, but one could think of natural resources as a 3rd factor of production which is used intensively in the production of primary commodities, and of which Russia has an abundance.

Chapter 3. The Specific-Factors Model

Assumptions of the model:
Assumptions of the model are mostly the same as in Hecksher-Ohlin framework. The differences are the following.
- There is one factor of production, which is perfectly mobile between industries. The other two factors are immobile. So, there is no constant return to scale property of the production function.
- Immobile factors are called specific factors. They are totally employed in one industry. There are many motivations for the limited usage of factors – very high specialization of factors, long-run contract for factor employment.

Brief notes on the Specific-Factors model:
- The mobile factor usually is called a labour, but it could be called a capital and so on. The point is that it is freely mobile while two other factors are not.
- The results of the model are different from other models of international trade: comparative advantages are exogenous, the income distribution between the owners of the factors is different from that of the Hechsher-Ohlin model.
- If the specific factors become interchangeable or mobile between industries, the results of the model are the same as those of the Hechsher-Ohlin model.
- The factor rewards are rising proportionally, not like in the Hechsher-Ohlin model according to the Stolper-Samuelson Theorem.
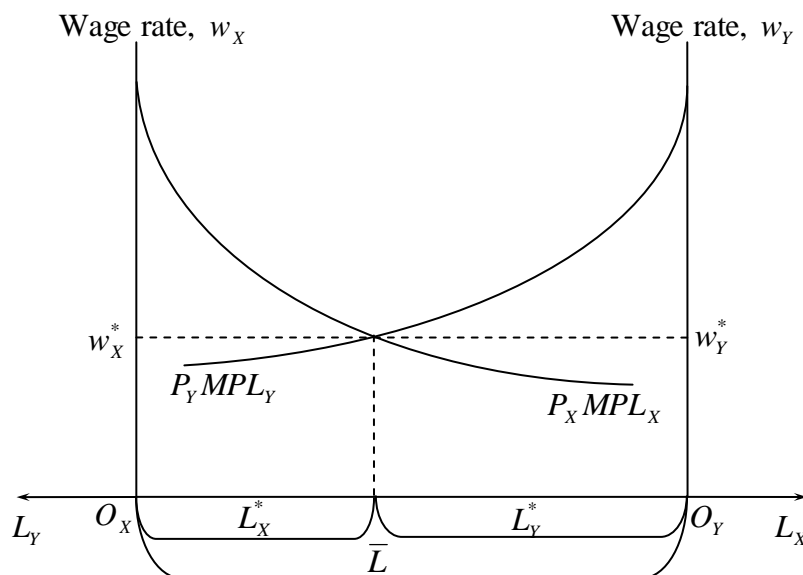

- The main diagram of the model (with two labor demands) allows to discuss wage changes as well as changes in factor rewards and changes in national income. Labor demand has another name here – value of marginal product and is etimate by P*MPL.
- The same model can be used to discuss question of international factor movement when before movement there was difference in rewards for the mobile factor.

Problem 1. Say whether the following statements are True, False or Uncertain. Explain your answers with the use of diagrams.

(a) It is impossible to show the amount of national income graphically in the Specific-Factors model.

(b) In the Specific-Factors model the income of workers changes in the same direction as the income of owners of capital as a result of a change in prices.

(c) An increase in the stock of labour rises the national income and nominal wages.

(d) An increase in the productivity of labour in the import-substituting industry decreases the income of the owners of factors in the export-oriented sector.

(e) Interests of workers and owners of capital always change in the same direction.

(f) A fall in wage rates due to inflow of mobile factor can be compensated by inflow of any specific factor.

Answer.

(a) **False**. In the model there are two types of owners of factors of production distributed between the two industries. Income in each industry (the area below the corresponding demand curve) is distributed among workers and owners of specific capital. Every industry is described by the downward sloping demand for labour. Income of labour is the muptiplication of wage and quantity of hired labour. On the diagram of demand for labour national income will be presented by the area below the two lines: area A+B+C+D.
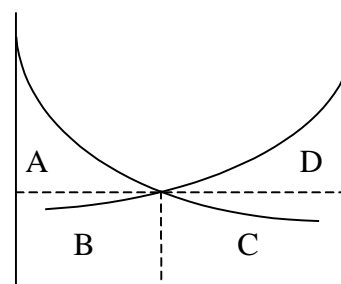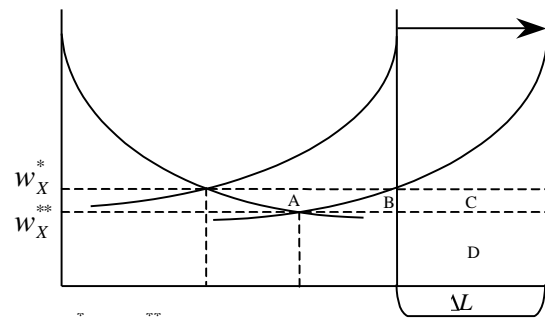

National income (A+B+C+D)

(b) **False**. A change in prices shifts or rotates (this is insignificant) the marginal value of the product. So, nominal incomes of both agents of the industry, in which prices increase, move in the same direction. This is not true for the other industry.
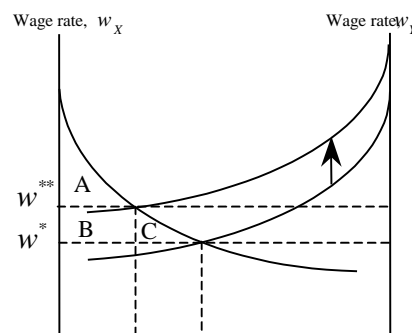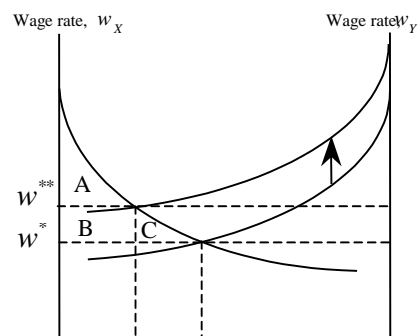
(c) False. An increase in the stock of labour increases the quantity of labour available for both industries and, hence, decreases the wage rate. But the national income will increase by the area B+C+D-A.
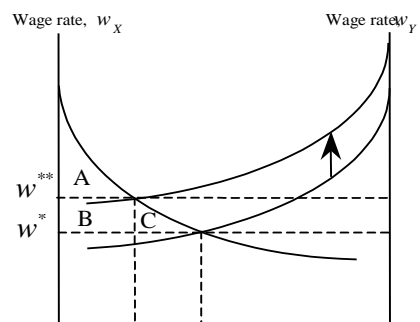

$w^{**} > w^{***}$ – nominal wage will drop; national income will grow by (B+C+D-A)

(d) True. The answer repeats the answer to question (b).

(e) False. The answer is again rephrasing what was said earlier. Interest of any factor owner – is the increase of its nominal income. So, the question asks to compare changes in income of different factor owners.


(f) True . Inflow of <u>any</u> specific factor results in an increase in the nominal wage. Inflow of labor decreases nominal wage. This can be seen from the figure below.
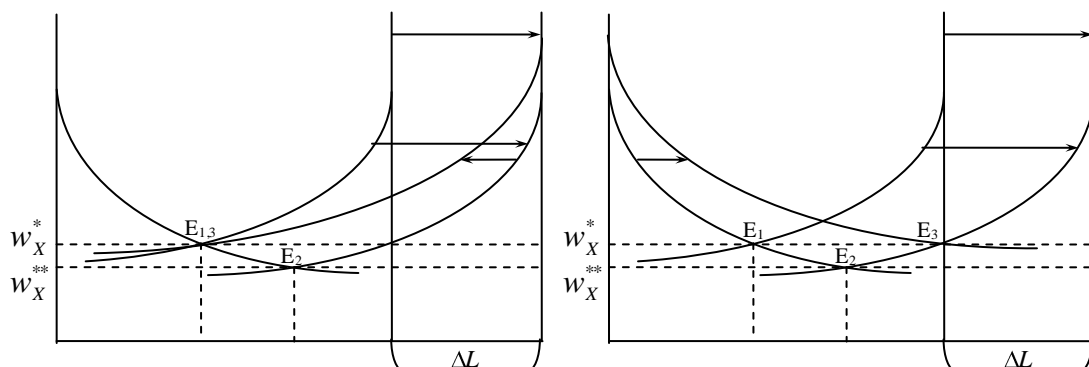
Problem 2. As a result of a government policy the price of the imported good rose. This good was also produced in the home country. How did this change the income distribution between the owners of the factors of production?

Answer. The question poses a problem reverse to the basic model, it describes transition from trade to limited trade. So the mechanism on the problem operates in the opposite direction comparing to the discussing gains from trade. However the picture will be absolutely the same and it is impossible to say what is on the picture unless there is exogenous explanation. Export-oriented industry is in the left part, import substitution industry – in the right. Interests in trade barrier can be described by changes in income of different factor owners.
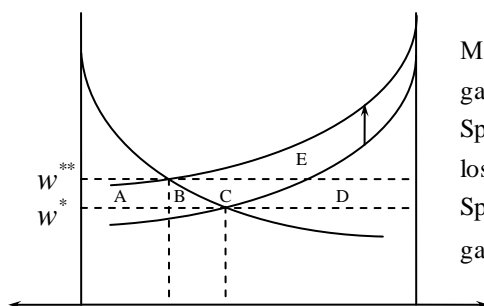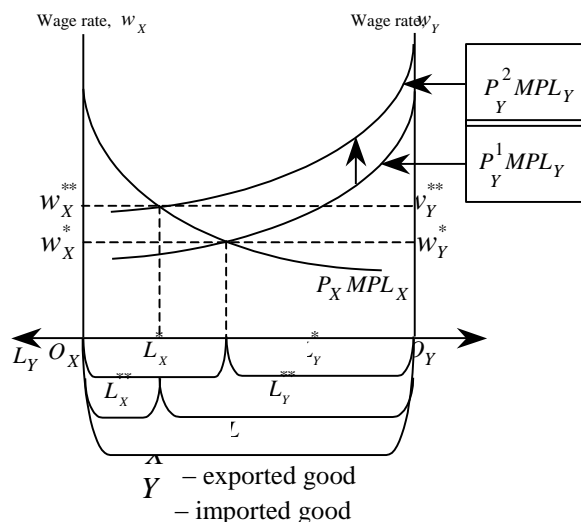
Mobile factor owners'
gain from $P_Y \uparrow$: (A+B+C+D), $w^* < w^{**}$.
Specific factor owners' in prod'n of X
loss from $P_Y \uparrow$: (A+B), $r_X^* < r_X^{**}$.
Specific factor owners' in prod'n of Y
gain/loss from $P_Y \uparrow$: (E-D)/(D-E), $r_Y^* \vee r_Y^{**}$.

Problem 3. Russia and Belarus can produce lorries and food. Lorries are produced with the use of capital and labour, while food uses land and labour. Assume that Russia exports lorries. Will the trade between these two countries equalize the level of wages if the labour of the both countries cannot migrate between them?

Answer. Export of any good increases nominal wage in both industries, so wage levels in both countries move in the same direction. There are no grounds to think that initial wage level was the same. That is why there is no labor price equalization between countries in this case. At the figure you can see the graphical illustration of the answer.

Belarus   X – food, Y – lorries   Russia
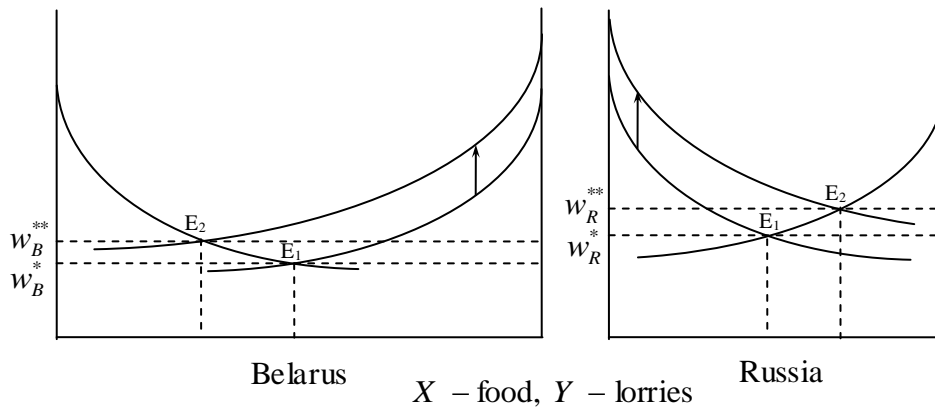
Problem 4. Take two countries: Russia and Poland. Assume that the production in the both countries is described by perfect competition and full employment conditions. There are two factors of production in each country: capital and labour. Assume that in the beginning there is no trade between them and factor prices are different. Consider two cases separately: labour mobility and capital mobility between Russia and Poland. Show, that in the first case a gain of a country depends on where the migrants spend their income, and in the second case both countries gain. Why there will be loosers in both cases?

Answer. International movement of factors is motivated by international differences in income. On the diagram one can see areas of changes in income at different countries. Important are changes. This problem allows to discuss differences between GDP and GNP.

Poland   Russia
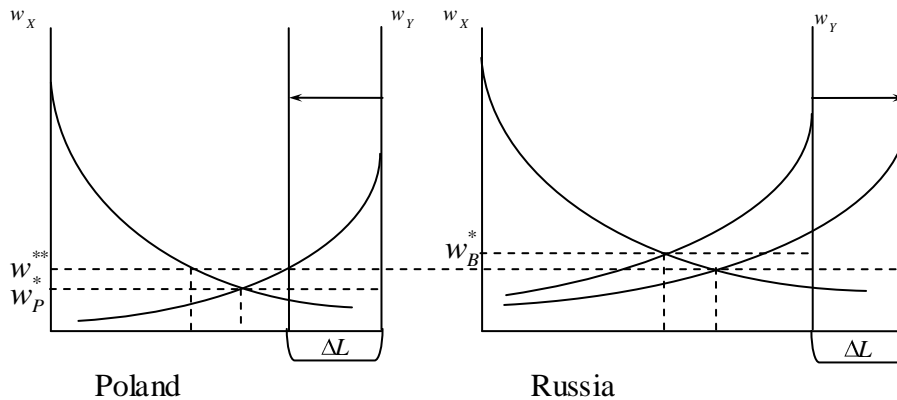
Problem 5. Assume that there are only two industries in Russia – oil extraction and apple production. Oil extraction requires special equipment, apple production – arablland. Assume that there is an adverse shock at the world oil market and world price of oil has dropped by 10% for half a year.

a) Discuss changes in factor returns between industries.
b) Compare your results with the Stolper-Samuelson theorem. What is required that your results be consistent with this theorem?

27

c) Assume that Russian government installs minimum level of nominal wage expected to be paid to all workers. What can specific-factor model argue in this case?

Answer.

a) Relative oil price in terms of apples falls. The demand for labour in oil industry falls. In the short run this hurts nominal income of factor owners of the oil industry. A fall in wages will not be so dramatic as the fall in prices. This means that the real income of workers will rise.
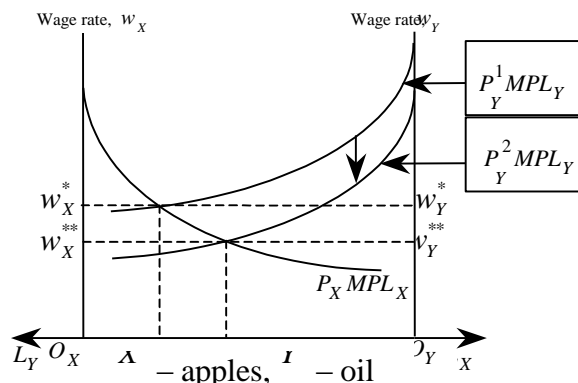
b) Stolper-Samuelson theorem requires free mobility of ALL factors between industries. In this problem we can hardly assume reallocation of land of oil plants to agriculture even in the long run. A possible reason is soil pollution. Inability of factors to move between industries result in factor reward difference between industries. Thus, the result will be different from the Stolper-Samuelson theorem.

c) Both theories: Hechsher-Ohlin and Stolper-Samuelson – assume full employment and flexible prices. The problem imposes a restriction – nominal wages cannot fall below some level. One can demonstrate on the graph that fixing wage will cause unemployment. Labor owners will separate into three groups – workers employed in oil and apple industries and unemployed. Nominal income will fall for every group.
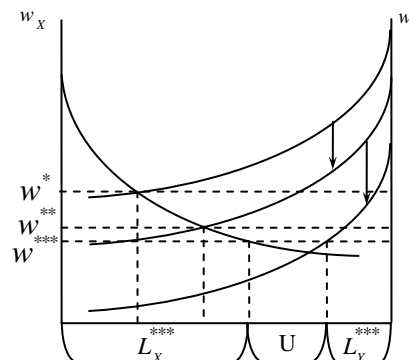
Problem 6. Can Specific Factor model generate the outcome of Ricardo model? Compare and contradict the outcomes.

Answer. The Ricardo outcome can be generated if we assume the same quantities of specific factors across countries, different relevant productivities in industries between countries. Ricardian model demands constant returns to mobile factor (labor). Specific model requires diminishing returns to labor. So the solution will be to incapsulate specific factors into labor productivity in Ricardian model and claim, that there is only one factor.

Problem 7. Compare wealth effects of international factor mobility for cases when there is limited home mobility of some factors and when there is free mobility of all the factors. Are they identical?

<u>Answer.</u> The problem asks to compare two cases – free international mobility of factors within Heckscher-Ohlin framework and free mobility of factors within specific factor approach.

On the standard diagram of the specific factor model one can show that inflow of workers will decrease nominal wage and increase revenue of capital owners. This will result in re-distribution of wealth within a country.
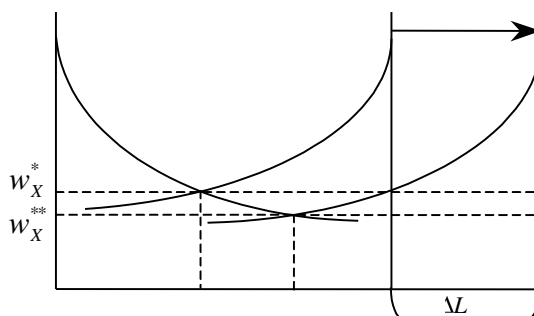
$w^* > w^{**}$ – nominal wage will drop

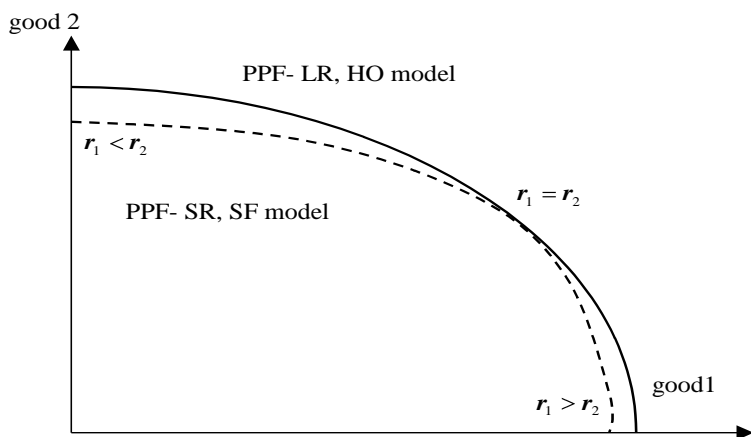Using PPF diagram we can show that total income (GDP from national and migrated factors) of the economy will increase. There will be a difference between the short run effect, when the inflow of labor happens, and the long run effect, when specific factors will reallocate within economy.

The next graph demonstrates how to construct PPF for the specific factor model. In the bottom left part the allocation of labor across industries is demonstrated. Shift in the line is exogenous increase in labor supply. Production functions do not change due to increase of labor supply, but they demonstrate increase in the output. The right top graph demonstrates changes in PPF of the economy.
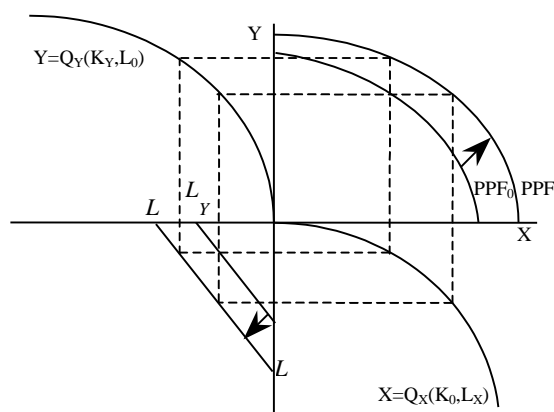
Problem 8. Protection as a trade policy can be beneficial for all factor owners of the protected industry only in the short run. Long run effects can be reversed. True, False or Uncertain?

<u>Answer.</u> **False**. Protection increases income for all factor owners in the industry, except employed in the specific factor on non-protected industry. In the long run protection disturbs home prices and do harms home economy as the allocation of factors is not efficient.
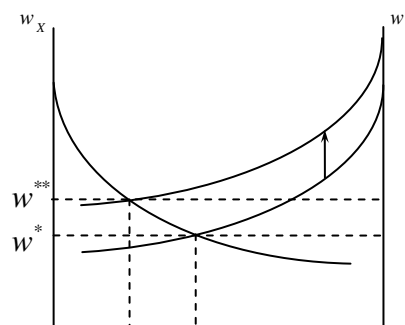
There is one empirical result by Magee[1] (1980), which demonstrates divergence and coincidence of interests of different factor owners (Lobbing on the 1973 trade reform Act: "industry agreement (disagreement) of labor and capital"). These are results of voting in favor of some protectionist law. One can see that in most industries interests of capital owners and labour union coincide. This does not support reasoning of the Heckscher-Ohlin but supports Specific-Factor approach.

|			Trade Unions position	
			Protectionism	Free trade
owners'	Protectio nism		Distilling, Shoes, Chemicals, Textile, Stone products, Apparel, Iron and Steel, Cutlery, Plastics, Hardwire, Rubber soe, Bearings, Leather, Watches	Tobacco
Capital position	Free trade	Oil industry		Paper, machinery, Trucks, Aviation, Tractors

Problem 9. Consider two countries each of which has two factors – labor and capital. Developed country has high skilled labor, developing – low skilled. Labor does not move internationally, however capital does. The motivation for capital to move to the developing country is higher return on capital. Assume that there is free movement of capital between countries. Explain changes in GDP and GNP after.

Answer. See the pictures.

Developed country (A)   Developing country (B)
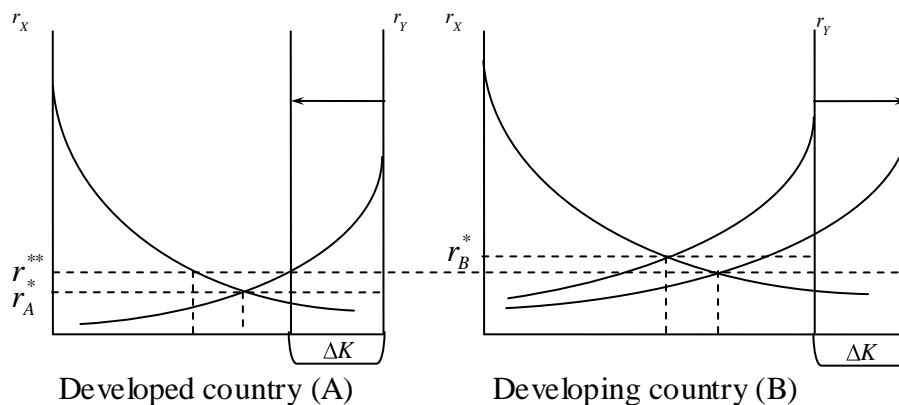
Problem 10. How does the PPF of the specific factor model differ from one of the Heckscher-Ohlin model?

Answer. The most difference between PPF comes at the intercept with axes. These points mean that all factors are concentrated in one industry. In HO model it is possible to concentrate all factors available in the economy. In SF model it is possible to employ only labor and the specific factor of the industry. Specific factor in another

[1] Magee, S.P. (1980) "Three simple tests of the Stolper-Samuelson Theorem" in Oppenheimer, P. (ed.) Issues in International Economics (London: Oriel Press), 138-53.

industry will stay unemployed. This difference in rewards for specific factors is described on the graph with inequalities of returns. The intersection of PPF corresponds to the case when rewards for specific factors are equal between industries. One can see that PPF of HO model is Pareto-improvement in production comparing to PPF of SF model. This gives an illustration why rigidities in factor movements reduce national welfare in terms of general equilibrium model.
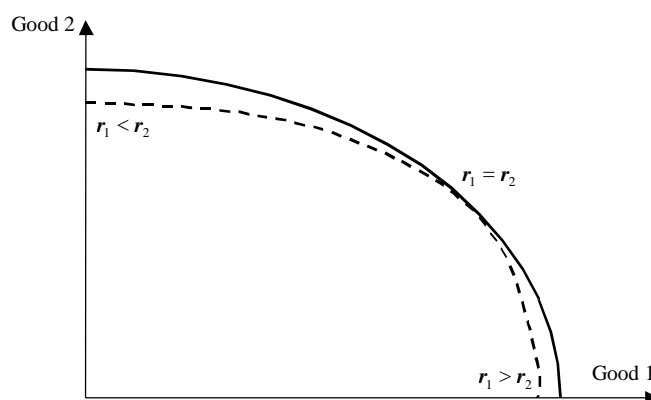
Chapter 4. Imperfect Competition Models

Brief notes on Imperfect Competition models:
- Modern practice of international trade significantly depends on market structure. The variety of approaches to imperfect competition generates different models.
- There is no general theorem which covers all areas of imperfect competition like those in the Hechsher –Ohlin framework
- One needs to understand whether a model of general or partial equilibrium is used
- One needs to know how the models are constructed and how the welfare effects can be calculated.

Problem 1. Say whether the following statements are True, False or Uncertain. Explain your answers.

(a) In the Krugman model, a doubling of the size of the market will result in a doubling of the number of firms in equilibrium.

(b) Opening the economy to trade in the Krugman model results in either an increase of variety or a fall in prices, but not both.

(c) The Krugman model suggests that countries may engage in both inter-industry and intra-industry trade.

(d) Interpreting intra-industry trade as the result of monopolistic competition as in the Krugman model helps resolve the puzzle of why the great expansion of trade in Europe since the Second World War has not resulted in more social conflict within countries.

(e) Moving from autarky to free trade in the Krugman model shifts both the PP curve and the CC curve outward. (Hint: consider the equations of these curves and the effect of opening the market to trade).

Answer.
(a) **False.** Assume S – is the market size. The equation for CC-curve is : $AC = nF/S + c$. The equation for PP-curve is: $P = 1/bn + c$. In equilibrium CC-curve and PP-curve intersect, meaning that AC=P. Therefore, $nF/S + c = 1/bn + c$. After several manipulations we arrive to the expression for n:

$$n = \sqrt{\frac{S}{bF}}$$

Expression for n shows that it rises in proportion to the square root of S, so that a doubling of S will result in an increase in n by a factor of about 1.4.

(b) **False.** It is possible to show both graphically (downward pivoting of CC curve) and algebraically (consider equilibrium expressions for p and n given below) that an

increase in the size of the market S, which is the effect of opening to trade in this mode, results in both lower prices and higher number of varieties n.
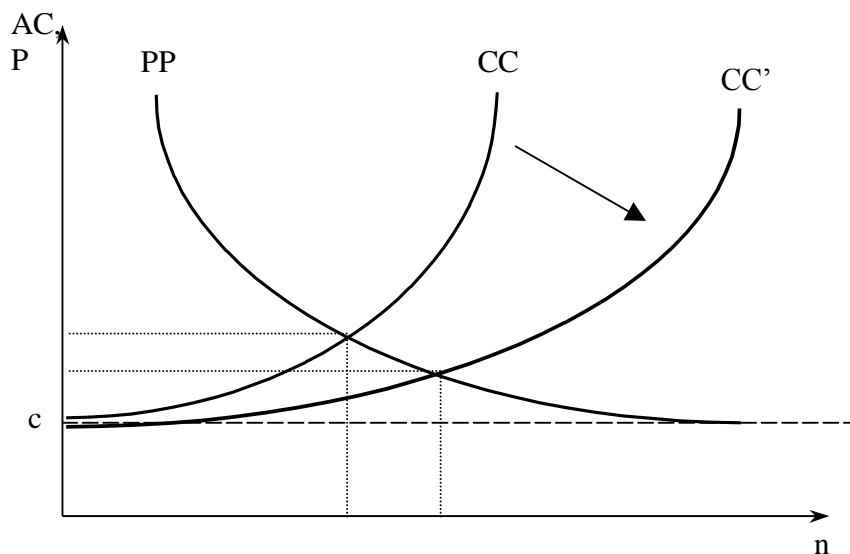
The equilibrium expressions for P and n are:

$$P = c + \sqrt{\frac{F}{bS}} \qquad n = \sqrt{\frac{S}{bF}}$$

They change together.

(c) **True**. The answer depends on the framework. Of the framework is general equilibrium that there is no inter-industry trade. However if Krugman model is combined with the HO framework and they both employ all factors of production, than both types of trade may coexist.

(d) **True**. Both Hechsher-Ohlin and Specific Factors models predict sharp changes in factor returns with greater openness to trade. This is not the case for the Krugman model, which predicts unambiguous increase in real income.

(e) **False**. Moving from autarky to free trade means that only the size of the market increases. According to the equations for CC and PP-curves (see (a)), neither curve actually SHIFTS as such. The CC curve pivots (rotates) around the same point on the vertical axis, while the PP curve is unchanged (see the picture in (b)).

Problem 2. Identify where there is an external or an internal economy of scale. Briefly explain.

(a) Volzhskyj automobile plant is located at the city of Tolljatti.
(b) There is a concentration of expensive restaurants near the hotel of Mezhdunarodnja in Moscow
(c) The State universal Store gives places for different sale firms.
(d) The wall paper stores are concentrated near the metro of Profsojuznaja in Moscow.
(e) Ferein-Bryntzalov pharmaceutical factory in Moscow.

<u>Answer</u>. Internal economy if scale - fall in costs due to increase of output of one firm. External economy of scale – fall in costs due to increase in output of the whole industry.

(a) Internal – high entrance to business costs. Average cost falls with growth of production.

(b) External – there is easy migration of services innovations.

(c) External - clients have very low costs to visit another shop after they have came to the one they wanted

(d) External - the same

(e) Internal economy

Problem 3. In the Krugman model, how can the parameter "b" in individual firms' demand functions be interpreted? What result does the model approach as b tends to infinity?

<u>Answer.</u> The parameter gives a measure of the price elasticity of demand for an individual firm's output (its variety of the good being produced by the industry). As b tends to infinity, marginal revenue converges to p (check the formula for MR) and the model approaches the price-taking, perfectly competitive case. Perfect competition is precisely where the price elasticity of demand for an individual firm's output is infinite.

Problem 4. With perfect competition, firms set price equal to marginal cost. Why does this not happen in the presence of internal economies of scale?

<u>Answer</u>. With internal economies of scale, average costs always fall as production increases. This means that marginal cost is always below average cost.
So, setting price equal to marginal cost implies losses.
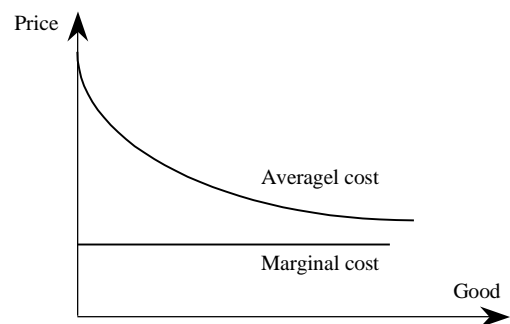
Problem 5. State at least three ways in which the Krugman model uses clearly unrealistic assumptions and three ways in which it nonetheless captures important insights into the nature of modern international trade.

<u>Answer</u>. The examples of unrealistic assumptions are:
- Non-strategic imperfect competition – firms take no account of the behavior of other firms. This is one-shot game without any strategic interaction. Moreover, absence of profit results in no motivation to implement innovations and to develop goods.
- Identical firms all producing exactly one variety. No brands exist in such a framework.
- Industry sales invariant to average price.

- Love of variety for its own sake. This is the question of human behaviors – do people really like variety of goods?

The advantages of the model:

- It offers rationale for intra-industry trade. One of the cases for this is cross boarder trade when people living not far from the boarder with another member of the European Union prefer to buy some goods at the foreign country.
- It captures gains from trade from greater variety, consolidation of production with economies of scale.
- It explains absence of more social upheaval arising from expansion of trade. There were no large-scale upheavals in Europe after the World War II.
- It explains extensive trade between countries with similar resource endowments. Hecksher –Ohlin model claims that if ceteris paribus there is no difference between countries in factor endowments than trade will not occur.

Problem 6. What is an intra-industry-trade?

Answer. Intra-industry trade happens when there is export and import of goods, which belong to one group (produced by the same industry). An example is export of vodka from Russia and import of vodka to Russia. Sometimes the same good is produced by different industries and belong to different classification groups. Sometimes intra-industry trade happens as a consequence of the geographic position. For example, import of coffee to Netherlands by sea and export of it further into continent.

Problem 7. Explain, what you understand by "reciprocal dumping". Does it improves or worsens the world level of economic efficiency?

Answer. Reciprocal dumping occurs when firms of two countries differentiate between home and foreign markets and do not include transportation costs into foreign price of their good. It happens when foreign competitor and national firm follow the same policy. So prices reduction happens at both markets. This has welfare improvement effect.

Problem 8. How far do strategic trade policy arguments undermine the traditional case for free trade?

Answer. Strategic trade policy arises when import or export markets are non-competitive and hence trade policy intervention can improve domestic welfare by shifting profit in the direction of the home firm. This result might be shown either by algebraically, diagrammatically or by means of a pay-off matrix. The problem is that exact optimal policy incentive depends on the precise specification of the competitive situation and an inappropriate intervention can make things worse rather than better.

Problem 9. It is often argued that the existence of increasing returns to scale is a source of a conflict between countries, since each country is better off and it can

increase its production in industries characterized by economies of scale. Evaluate this view in terms of monopolistic competition.

Answer. Coming to foreign market allows to expand output and reduce costs of production. So every firm is interested in it. Gain of consumer will come from increase in variety of cheaper goods. However after trade starts the national market concentration will change – less national firms will stay in the market. Part of the domestic market will be captured by foreign firms.

In the Krugman model only consumers are discussed explicitly, owners of the firms are implicit. Conflicts appear when somebody's position is deteriorated. So, this model is not good to discuss such conflicts.

Problem 10. Evaluate the relative importance of economies of scale and comparative advantage in causing the following:
(a) Most of the world's nikel production is concentrated at Norilsk.
(b) Half of the world's largest aircraft are assembled in Seatle.
(c) Most semiconductors are manufactured at US or Japan.
(d) Most Scotch wisky comes from Scotland.
(e) Much cheap clothes to Russia comes from Turkey.

Answer.
(a) Internal economy of scale. Monopolistic production.

(b) Internal economy of scale. High technological barriers to enter the market.

(c) External economies of scale. High concentration of skills and technology in one geographic region.

(d) External economy of scale. There may be comparative advantage from more efficient technology.

(e) Comparative advantage. Relatively lower cost production.

Problem 11. Briefly evaluate the following statements:

(a) Since some consumers are generally worse off in the preferred variety models of Lancaster, it is ambiguous whether on average countries benefit from trade in these models.

(b) There is no dumping in the reciprocal dumping model.

(c) Models of internal and external economies of scale both offer explanations of why the gains from trade for a country might be negative.

(d) The big increase in oil prices in 1999-2000 gave Russia a comparative advantage in current consumption.

(e) Russia experienced large net migration inflows in the period 1992-1994, even as real wages in Russia fell in absolute terms and relative to Western Europe. These facts cannot be explained using a simple model of migration where labour flows until wages are equalized.

Answer.
(a) While it is true that opening the economy to trade generally makes some consumers worse off in the Lancaster models, on average consumers are better off. With trade there are more firms and therefore more varieties. Even though the "location" of firms and varieties generally change, resulting some consumers finding themselves further away from their preferred variety, more consumers are brought "nearer" to their preferred varieties.

(b) Dumping, as usually conceived of, involves a firm selling at a lower price abroad than it charges domestically. The reciprocal dumping model is a symmetric duopoly model with identical firms and demand conditions in the two countries. Under these conditions, the price charged in each market (by both firms) is the same, so there is no conventionally understood dumping in equilibrium in this model. In that sense, the statement is correct. On the other hand, each firm faces transport costs for international sales, so, since foreign and domestic prices are the same, each firm receives less net of transport costs from international sales. That is the (non-standard) sense in which the model involves dumping by both firms, i.e. reciprocal dumping. It can also be observed that the model is in some sense one of reciprocal attempted dumping, since, while before trade both firms operated as monopolists in their own markets, now see the chance, given the output (and price) of the other firm in its domestic market, of earning some additional profit through export. In fact, the nature of the equilibrium is such that neither firm succeeds in dumping in this way and prices in the two markets are the same.

(c) This is true. Neither internal nor external economies ensure that the gains from trade will be negative (i.e. neither internal nor external economies of scale are sufficient for negative gains from trade), and gains from trade could be negative for other reasons (i.e. neither internal nor external economies of scale are necessary for negative gains from trade) but both features can be consistent with this result. For example, if goods are homogeneous (unlike in the Krugman and Lancaster models) internal economies of scale can give rise to monopolies. The reciprocal dumping model, which involves domestic monopolies in each market behaving as Cournot duopolists, gives ambiguous results as concerns the gains from trade. And external economies can explain why some countries become established in production of a given good (Krugman provides an example of Swiss and watches) even though they are not necessarily inherently more efficient at that activity. This can provide a

justification for protection of "infant industries" in other countries (i.e. countries which could be more efficient at that activity given sufficient scale of production).

(d) This statement is an application of the analogy between a standard 2-good trade model and trade involving the goods like present consumption and future consumption, which students should explain answering to problem 9, point 3. The situation for Russia in 1999-2000 (and most of 2001) is similar to that discussed in KO (p.169) for oil exporters in the 1970s. A sudden windfall of high oil prices means that oil exporting countries like Russia have more income without any change in their domestic investment opportunities. That gives them a comparative advantage in current consumption and leads them to "export" some of that current consumption by lending abroad. (The oil windfall can be seen as bringing an increase in the supply of funds for investment, while the demand for such funds for domestic investment is assumed not to increase, or not by the same extent. This means that the price of such funds – that is, the real interest rate – will decline unless the excess funds are directed abroad.)

The facts suggest that this is (part of) what happened in Russia in 1999-2000. Russia's current account balance swung from deficits in 1997 and 1998 to surpluses equivalent to 12 percent of GDP in 1999 and 18 percent of GDP in 2000. Both the swing and the extent of the surplus are virtually without parallel for a large country in recent times. The large current account surpluses were largely reflected in similarly large capital outflows; that is, Russian residents were lending abroad or otherwise increasing their net foreign assets. These simple facts are consistent with the characterization of Russia as having been given a comparative advantage in current consumption by the oil price boom. If so, the recent sharp fall in oil prices, if sustained, should indicate that lending to nonresidents will also decline rapidly.

(e) On the face of it, the statement is true. If migration is driven by the desire to seek higher wages, the economic developments in Russia following the collapse of the Soviet Union should have led to net outward migration. But when one takes into account the fact that immigration into Western Europe and other advanced economies is strictly limited, while it was much easier for residents of the other Former Soviet Republics to move to Russia, the simple model may look more useful. Although quite low in dollar terms and falling in absolute terms, Russian wages were higher than in most other FSU republics, so, again assuming that other alternatives were lacking, inflows of labour to Russia is less surprising.

In reality, there was also no doubt a good deal of immigration for reasons other than the desire to earn a higher wage, especially perhaps ethnic Russians leaving the newly independent FSU republics to come to Russia.

Problem 12. Discuss the following statement: "The concept of strategic trade policy provides a potentially valid justification for protection, but is impossible to make operational."

<u>Answer.</u> The phrase "strategic trade policy" refers to a strand of the economic literature that goes back to the work of Brander and Spencer in the early 1980s. The key insight is that if product markets are imperfectly competitive, then there is potential for firms to act strategically in order to capture the largest possible share of rents (capital rents) available in the market. The share of rents captured by firms in different countries depends not only on their strategic behaviour but also on policy actions of the governments of the different countries. The simple Brander-Spencer model assumes two firms, which are each domestic monopolists. With the possibility of trade, the situation becomes one of duopoly, where each firm can export to the other market (or to a 3rd market). Brander and Spencer examined what would happen if firms behaved as Cournot duopolists, each maximizing its profits taking the sales in each market of the other firm as given.

This can be analyzed in terms of reaction functions, as explained in one of the lectures. If the initial situation is symmetric, with identical firms and countries, then each firm will capture half the market in each country. In such a situation, a government policy that makes sales more profitable for the domestic producer than for the foreign one will result in profits being shifted to the domestic firm. The result can be that the country undertaking such a policy is better off (in the sense that residents or nationals of that country have, on average, higher incomes than otherwise). In general, given imperfectly competitive product markets, there is generally some policy intervention (typically a subsidy) that can make a country better off than it would be with free trade. Note that protection can be defined as any policy that shields a domestic firm from international competition, whether that be via a subsidy, an import tariff or a non-tariff barrier to imports.

The above paragraphs explain how it is that the concept of strategic trade policy provides a potentially valid justification for protection. There are several reasons why it may be difficult to make the concept operational. First, the particular policy conclusions are not robust to small changes in assumptions. For example, if the duopolists engage in Bertrand competition rather than Cournot competition, then a tax rather than a subsidy is the optimal policy. Second, it is empirically difficult to identify industries that meet the conditions under which a given policy intervention would be optimal (or an improvement on free trade). What is the market structure? What are the threats of new entry? What strategic rule are firms using? What are the costs of the distortion caused by financing a subsidy or imposing a tariff? All these questions tend not to have precisely quantifiable answers in the world, which we (and policy-makers) inhabit. Third, there is the question of whether excess profits of domestic firms will even be to the benefit of the country. If, for example, they just provide a source of capital flight (e.g. non-repatriated export proceeds), it is questionable whether a subsidy financed by all tax payers would constitute a welfare-improvement. More generally, there are questions of the distributions of the gains, which have policy relevance. Even if lump-sum transfers were possible to make all residents (or nationals) of a country better off under a strategic trade policy, the fact that no such transfers are likely to be made means that the distributional aspects of the policy are properly taken into account. Finally, and perhaps most importantly, it is

hard to assess the probability of retaliation, and thereby to ensure that the use of strategic trade policy does not wind up being counterproductive.

There are therefore reasons to support both parts of the statement. Indeed, the first part is unambiguously true. The second part can also be argued the other way, and credit may be given for relevant arguments in either direction.

Chapter 5. International Factor Mobility

Brief notes on the models:
- This set of problems discusses different issues of international migration of factors, technologies and FDI.
- There is no special model in this section except for FDI.
- All models are studied in the previous sections of the problem book.

Problem 1. Russia experienced large net migration inflows in the period 1992-1994, even as real wages in Russia fell in absolute terms and relative to Western Europe. These facts cannot be explained using a simple model of migration where labour flows until wages are equalized. True or False?

Answer. On the face of it, the statement is **true**. If migration is driven by the desire to seek higher wages, the economic developments in Russia following the collapse of the Soviet Union should have led to net outward migration. But when one takes into account the fact that immigration into Western Europe and other advanced economies is strictly limited, while it was much easier for residents of the other Former Soviet Republics to move to Russia, the simple model may look more useful. Although quite low in dollar terms and falling in absolute terms, Russian wages were higher than in most other FSU republics, so, again assuming that other alternatives were lacking, inflows of labour to Russia is less surprising. So the question compares migration from third countries to Russia and to Western Europe.

In reality, there was also no doubt a good deal of immigration for reasons other than the desire to earn a higher wage, especially perhaps ethnic Russians leaving the newly independent FSU republics to come to Russia.

Problem 2. For the case of migration of labour from one country to another, illustrate the gains and losses for the originating and recipient countries if:
(a) none of the gains for the migrants are remitted to the originating country;
(b) all migrants' gains are remitted. (Hint: use either back to back labour demand - labour supply diagram as in SR Fig 13-2, or MPL diagram as in KO Fig 7-3)

Answer. This problem is the application of the specific factor model. Very similar model can be found in the end of the specific factor section of the problem book. The initial step in application of this model is the identification, which factor is immobile and which is internationally mobile. Next migration of the factor changes the nominal reward for this factor. This changes GDP and GNO of the country. The country of spending the reward of the mobile factor is important as it allows to construct GDP and GNP.

Problem 3. Say which of the following are correctly classified as FDI, and briefly explain your answer in each case: (Hint: refer to handout from IMF Balance of Payments Manual)

(a) The IMF grants a stand-by loan to Indonesia.

(b) The Russian government sells a 3 percent stake of Gazprom to Ruhrgas of Germany.

(c) The European Bank for Reconstruction and Development (EBRD: a multilateral institution set up at the beginning of the 1990s to help transition economies) buys a 25 percent stake in Vneshtorgbank from the Central Bank of Russia.

(d) IBM makes a long-term loan to its wholly-owned Canadian subsidiary.

(e) Royal Dutch Shell buys a concession from the Russian government to explore for oil in Sakhalin.

(f) The Ford Motor Company of the US acquires 30 percent of the shares of Mazda of Japan, while at the same time Mazda acquires 10 percent of Ford.

Answer.
(a) This is not FDI. The IMF is not an FDI enterprise, holding no ownership in any entity in any part of the world. In fact, under standard balance of payments accounting, this is not even a capital flow, but rather a transaction in reserve assets and liabilities.

(b) This could be FDI, if Ruhrgas already has at least a 10 percent stake in Gazprom. Otherwise it is inward portfolio investment.

(c) This is FDI. The EBRD does take ownership stakes in companies, and when those stakes are more than 10 percent, the investment is properly classified as FDI.

(d) This is FDI. Even though the capital flow is not a purchase of equity or real assets, lending between the source of FDI and its foreign subsidiary is FDI.

(e) Uncertain. Clearly Shell has no ownership stake in the Russian government, but if we think of the concession to explore for oil as a real asset that will generate future returns for the company (analogous to a drilling platform, for instance), then this could be considered FDI. Certainly the purchase of plant and equipment, and capital costs for setting up a local subsidiary (if this is done) will be FDI.

(f) This is an example of 2-way FDI. Both Japan and the US would register inward and outward FDI as a result of these transactions.

Problem 4. Give at least 4 reasons why a firm may wish to engage in foreign direct investment rather than some other form of investment abroad.

Answer. The reasons include:

- willingness to get behind tariff barriers. This assumes that custom and possible informal costs can be avoided by movement of the plant to another country.
- overcoming high transport costs transportation. Idea is essentially the same.
- gaining a strategic advantage over a competitor (e.g. Coca Cola wanting to get a foothold ahead of Pepsi or vice versa). If two firms compete at the international market than the will both penetrate to the new local market. Actually location of the plant does not need to be in this country. This is the special problem for MNE – how to supply market – from the local plant or import.
- inability otherwise to overcome problems with licensing technology (lessened control over licensed technology, informational asymmetries preventing market transactions, etc.). Control over usage of licensed production may be very difficult, making FDI is an alternative.
- taking advantage of low factor prices (e.g. low wages, cheap finance). A country may be very attractive location for FDI if it has comparative advantage in costs of factors. Moving FDI does not necessarily mean supply only to the local market.
- willingness to exploit tax differences, or gain subsidies. This motivation is similar to transportation or trade barrier reasons.
- advantages from vertical integration (e.g. less uncertainty about the price of raw materials inputs). This allows to reduce costs of production in multistage production cycle. For example. IBM has a division at Nyzhnyj Novgorod, which develops software for Wi-Fi communication technology.

Problem 5. Explain and illustrate the analogy between Heckscher-Ohlin trade in two goods and intertemporal trade. (Hint: consider what, in the intertemporal case, corresponds to the concepts of the two goods, relative goods prices, and the determinant of comparative advantage.)

Answer. The two goods are current and future consumption. The relative goods price is the real interest rate.
A country with a low real interest rate (before "trade") is less efficient (at the margin) at producing future consumption. It has a comparative advantage in current consumption and will "export" current consumption by lending abroad.

Problem 6. Use Dunning's OLI paradigm to explain why so much FDI in the 1990s went to China and so little to Russia.

Answer. To answer this question, first, OLI paradigm should be explained, setting out the 3 factors: Ownership, Location, Internalisation - and stating that all 3 have to be present to provide a rationale for FDI. To address the Russia-China comparison, the key is locational issues (the L in OLI) since we can assume that it essentially the same set of FDI enterprises that might wish to invest in China or Russia, so that company advantages and internalisation gains are likely to be similar. Some of the main ones in this case are differences in investor perceptions as concerns: economic growth potential (higher in China because Russia contracted for most of the 1990s while China grew rapidly, as it had in the 1980s), enforcement of contracts (less

certain in Russia), macroeconomic stability (better in China), track record of market reforms (going back to 1980 in China), and potential market size (about 7 times more consumers in China than in Russia).

Problem 7. Specify three plausible effects of FDI in Russia. Can you think of any evidence for these effects? Explain briefly why you think Russia should or should not limit inward FDI.

Answer. Examples of expected effects would include (but not be limited to):
- <u>Higher wages</u> (than otherwise). Remember the marginal product of capital diagram and recall that FDI should have an impact like other capital inflows, raising the return to domestic labour. Evidence at least suggestive of this (though not conclusive) would be if MNEs paid higher wages in Russia, which does tend to be the case.
- <u>Technology transfer</u>. Think of mobile phones: all the mobile operators involve FDI, and almost certainly resulted in the more rapid transfer of modern mobile technology to Russia (not so much the handsets, which can be transferred by importation, but more the technology associated with creating the network).
- <u>Pro-competitive effect</u>. Could be argued, for instance, that foreign-owned hotels have lowered prices and raised service levels at Moscow hotels.

Problem 8. Consider two countries characterized by perfect competition and full employment, with two factors, capital and labour. Suppose there is no trade in goods between the countries, and factor prices differ between the two countries. Considering separately the possibility of labour migration or portfolio investment, show that in the first case the net gains depend on where migrants' income is spent, while in the second case both countries are unambiguously better off. Why might there nonetheless be successful lobbying against factor mobility in both countries in each case?

Answer. A value-of-marginal-product diagram (like KO Fig 7-3 or, for a more detailed version, SR Fig 21.4) should be used to identify the gains and losses for capital and labour in each country in each case. For the country engaging in portfolio investment, there are losses to labour (lower real wages, which are smaller than the gains to capital. For the country receiving the portfolio investment, it is the opposite: there are gains to labour, which are larger than the losses to domestic capital. So in the case of portfolio investment, both countries make net gains. In the case of labour migration, the source country has gains for the remaining labour force, which are less than the losses to capital. The recipient country has losses to the original labour force, but larger gains to capital. If the emigrating workers keep and spend their (now higher) wages in the recipient country, then the source country is worse off. If, however, the emigrants send all their income back to the source country, then both countries see net gains from the emigration.

Chapter 6. Standard Trade Policy

Brief notes on the Standard Trade model:
- For a small country and perfect competition there is no way to improve welfare by erecting trade barriers. So, free trade is the first best solution. The objections against it come as trade always has redistribution effects.
- Large country can both gain or loose from its trade policy. It can affect the world's price of a good (terms of trade), so the question of an optimal tariff appears.
- In the case of perfect competition there is no differences in the results of quota or of a tariff. Except in the distribution of gains between home and foreign producers. This is no longer true in for imperfect competition.
- So, the result of the trade policy depends on market structure and ability of a country to affect world price.

Problem 1. Say whether the following statements are True, False or Uncertain. Explain your answers.
(a) Suppose a quota is replaced by a tariff that yields the same domestic price as a tariff. National welfare of the tariff-imposing country will improve.
(b) Efficient protection rate cannot be negative.
(c) A large country can affect world prices by its trade policy and improve its welfare. Such policy will also be beneficial for its trading partners.

Answer.
(a) **False**. There are two lines of reasoning which need to be discussed – small/large economy and market organization.
For a large country case trade impediment can improve welfare as well as deteriorate. Changing quota for a tariff will change rent distribution of a gap between home and foreign producers.
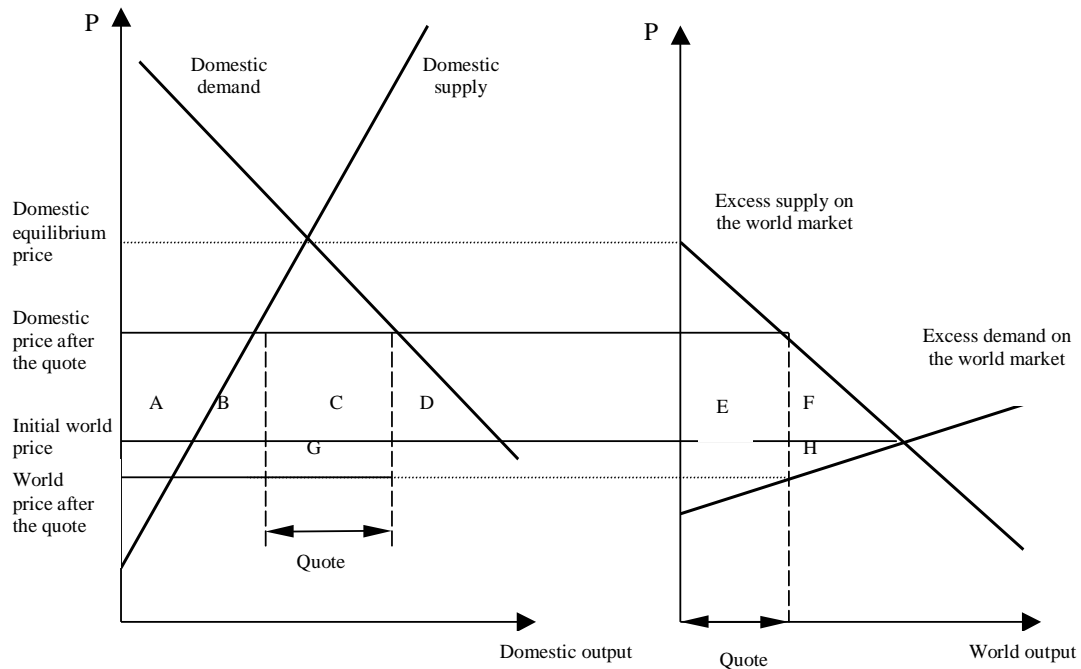
Gain of national producers $\Delta PS = A$.

Loss of home consumers $\Delta CS = A+B+C+D$

Gain of the government $\Delta GR = C+G$

Change in welfare $\Delta W = \Delta PS + \Delta GR - \Delta CS = G-B-D$

So, the final change in welfare is ambiguous.

For the case of a <u>small economy</u> area G is zero (there is no terms of trade effect – change in the relative world price), so the welfare can not improve. So, any impediment to free trade in a small country case will deteriorate welfare.

 (b) **False**. The efficient protection rate shows the return on investments (rate of price change) in the protected industry. That is why it is kind of a signal for attraction of capital in the industry.

The formula is derived as follows:

P_a - the world price of the final good

P_s - the world price of an intermediate good, which is imported and used in production

a – the quantity of the intermediate good used to produce one unit of the final good

The value added under free trade is:

$V = P_a - aP_s$

Now introduce tarrifs:

t_a – the tariff rate on the final good

t_s – the tariff rate on the intermediate good

The value added after introduction of the tariffs is:

$V' = (1+ t_a)P_a - aP_s (1+ t_s) = t_aP_a - a\, t_aP_a -$

By definition the nominal rate of protection on a good equals the change in the price of a good divided by the initial price:

$t_a = ((1+ t_a)P_a - P_a)/ P_a$

Then the relative change in value added is:

$$E_a = (V'-V)/V = ((1+t_a)P_a - aP_s(1+t_s) - P_a + t_aP_a)/V =$$
$$= ([P_a - aP_s] + [P_a t_a - aP_s t_s] - [P_a - aP_s])/V =$$
$$= [P_a - aP_s]t_a/V + aP_s[t_a - t_s]/V =$$
$$\mathbf{= t_a + a(t_a - t_s)P_s/V}$$

There are two cases when it can be negative:

Subsidies can be considered as negative taxes. The formula does not discriminate the origin of the tax. Subsidies can be the reason for negative rate of efficient protection. If an industry enjoys government support new private business can hardly enter the industry.

Tariffs disturb prices of intermediate goods what can lead to change in parameter a – factor requirement for production of one unit of a good.

(c) **False** for perfectly competitive industries. Gain from trade of one country is paid by losses in welfare in another country. In the case of a large improvement the position of a large country follows from terms of trade effect. Assume, a large country imposes an import tariff such that its welfare improves. This will result in a fall in the world price of an imported good. Here two cases are possible. The trading partner may be a small economy and it takes lower price of its export and is exposed to losses in the welfare. Or the trading partner may be a large economy and it will pursue its own trade policy to protect interests of national producers. So, the consequence of one country gain will be loss to another country or a trading policy competition. The statement can not be true anyway.

Problem 2. Describe the effect on equilibrium of introduction of a tariff by a large and by a small economies. Describe consumer surplus, producer surplus, government gain and welfare gain of the whole economy.

Answer.
Consider first the case of a small economy.
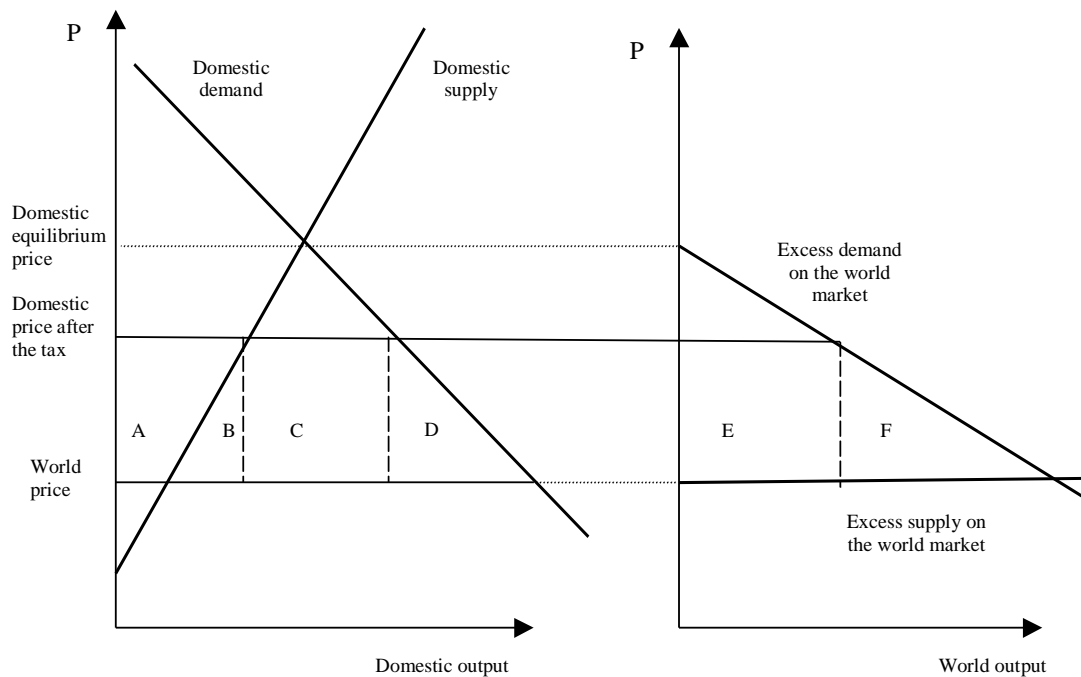
On the left hand side picture one can see analysis of the consequences of a small economy. On the right hand side picture there are consequences for the world market.

Change in consumer surplus is $\Delta CS = -A-B-C-D$. Consumers loose from tariff as the good becomes more expensive for them. This makes them reduce its consumption.

Change in surplus of home producers is $\Delta PS = +A$. Their production is protected by the trade barrier. They can increase output and increase price. So they have the double gain from protection.

Government revenue is $\Delta GR = +C$. Government gain comes from rent over the world price.

Total national gain comes from changes in surpluses of producers, consumers and the government altogether: $\Delta W = \Delta CS + \Delta PS + \Delta GR = -B-D$

So, introduction of a tariff by a small economy, unambiguously leads to loss for a small economy.

Area F – loss of the world economy. Area E=C represent the government revenue. These areas have the same height (tariff) and a base (size of import after trade).

Now consider the case of a large economy.

P

Domestic demand

Domestic supply

P

Domestic equilibrium price

Excess demand on the world market

Domestic price after the tariff

Excess supply on the world market

Initial world price

A | B | C | D

E | F

World price after the tariff

G

H

Domestic output

World output
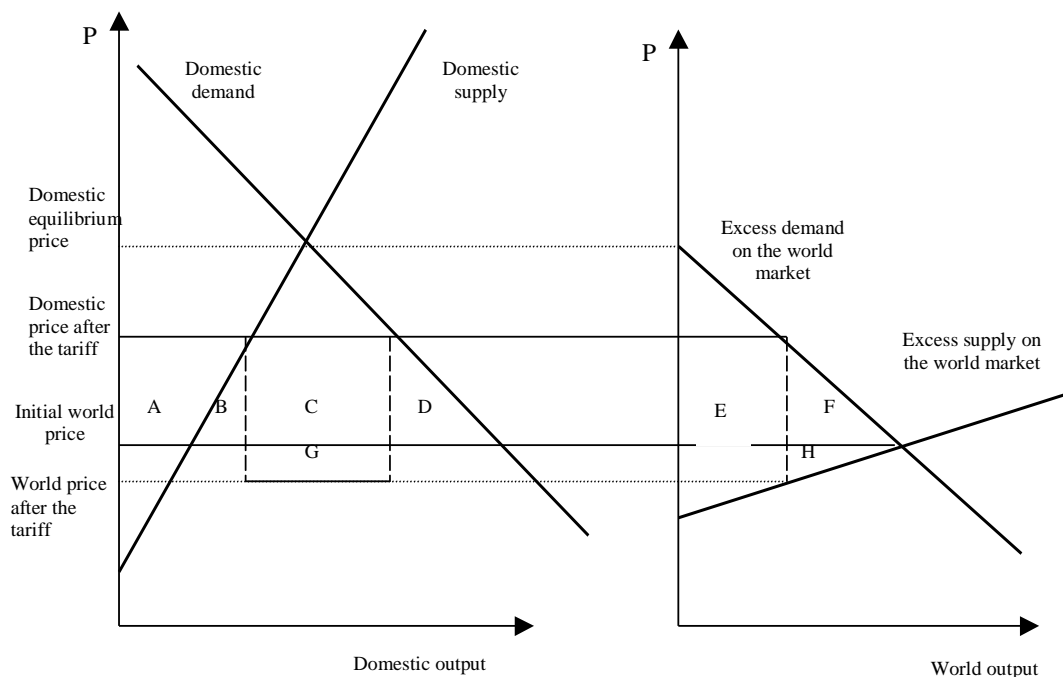
The difference in the large economy case is that the policy affects world market. Reduction of import reduces world price. The effect on internal prices will be the same – trade barriers will decrease total (from home and foreign producers) supply and increase price. However, there will appear a gap between internal and external prices.

Area F is the loss of the world economy from the tariff. But now there is also area H which has the same origin. It comes from the terms of trade effect – reduction of the price of imported good. Terms of trade effect is responsible also for the area G.

So, the change in the total welfare is $\Delta W = \Delta CS + \Delta PS + \Delta GR = -B-D+G$.

Thus, the outcome of the tariff policy of a large economy may increase and may decrease social welfare. This creates the problem of the optimal tariff – how large should a tariff be to maximize welfare.

Problem 3. Effective protection is a compelling concept in theory but rather difficult to make operational. Discuss.

Answer. The question deals with the normative and application part of the concept. There are some informal but important facets in this question. What is "to make operational"? Which formula inputs can be measured (observable)? Do they stay constant?

Operationability. Some protective measures are very difficult to implement. One of the reasons is high costs of testing every unit of incoming/outcoming goods. Exporters and importer know this. So, they have a motivation to undervalue (or re-label) the good in order reduce custom payments.

Measurability. The more complicated is an output – the more varieties of intermediate goods are involved. How to calculate total quantity of an intermediate

good actually used in production. For example, concrete. Some of the intermediate input can be imported, some of domestic production. .

<u>Constant factor inputs.</u> The critical point is the coefficient which shows factor requirements for production of a unit of output. Protectionism can make producers change its demand for factors or reverse it. The protectionism may make producers change their suppliers from home to foreign ones.

Problem 4. Why import quota is efficient in protection of local monopoly and import tariff not? What can you claim of conditions of equivalence between a quota and a tariff in this case.

<u>Answer</u>. The answer is based on the differences in market structures. In the case of a local monopoly a quota preserves its ability to pursue pricing policy on the residual demand (total demand is unsatisfied with the size of the quota). So, a quota can not ruin the monopoly power but just reduces profits of local monopolist.

A tariff sets a price, thus a monopoly can no longer run its own pricing policy. However, there are some cases. The size of the price after tariff matters as it could be higher than the monopoly price and local consumer will prefer monopoly price. If the price after tax is lower than the monopoly price then monopoly will need to increase output.

Problem 5. Suppose a small country motivated by reasons of prestigious production implements the policy of export promotion in the industry in which it does not have comparative advantage.

(a) What instrument of export promotion will be chosen?

(b) How the policy will affect the economy's budget constraint?

(c) In the context of the Hecksher-Ohlin framework describe winners, losers and welfare effects of such a policy.

(d) Does the policy differ from the case when the government decides to protect import-substitution sector and implements tariffs on import?

(e) Is there any difference if such a policy will be implemented in another industry where the country does have comparative advantage.

(f) Does the above results depend on the assumption of small/large economy?

(g) Does the results depend on perfect competition framework?

<u>Answer.</u> The problem means that a country will stimulate output of a good, which earlier it has imported. In any case the country does not have comparative advantage in production of this good.

(a) If to compare welfare losses from this trade policy than subsidy is preferable. See the diagram. The subsidy does not generate substitution effects but only income redistribution within an economy. So internal prices do not change. The initial situation under free trade is described as follows: C_0 – consumption and B_0 – production.

Imposition of an <u>import tax</u> distorts the relative price ratio within the country for consumers. Price of the imported good Y becomes $p_y(1+t)$. Then the terms of trade

will be equal $\dfrac{p_x}{p_y(1+t)}$. Under the new conditions the country produces more Y and less X.

In case of a <u>subsidy</u> there are no distortions in relative prices for both consumers and producers. However, the budget constraint changes because of a redistribution of income in favor of the producers of the import-substituting good. As a result, the consumption will be at point C_2. As you can see on the diagram, the welfare of consumers will fall by a smaller amount.
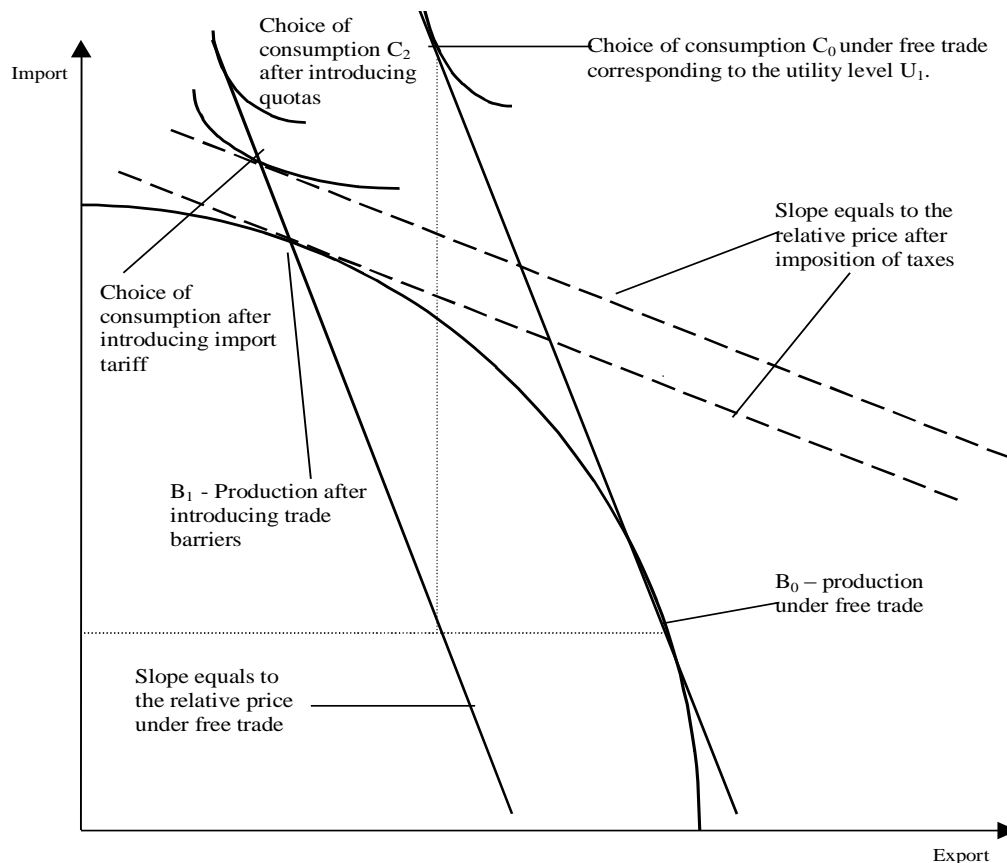
(b) The question asserts that part of the budget will be reallocated to producers of a preferred industry. So, less is left for allocation between consumers and the budget constraint will move inwards.

(c) The answer assumes discussion in terms of changing price in one industry due to trade policy. The logic of discussion is based on the Stolper-Samuelson theorem. It links relative changes in prices and relative changes in factor rewards. So, the first step is to choose which good is produced by relatively labor (capital) intensive technology. The next step is to identify in production of which good a country has a comparative advantage (or disadvantage) and implement policy. Then Stolper-Samuelson theorem will give the answer to relative factor rewards and factor income redistribution.

(d) There is no difference on the effects between a tariff on export good and a subsidy on the import substitution good. This comes from the assumption of general equilibrium – full employment of all factors. Disturbances from trade policy generate reallocation of factors between industries (see efficient rate of protection). Policies do not generate unemployed factors.

(e) Let us consider another country as a small economy. It will not be able to affect world prices, however supply of goods will increase. The opportunity cost of this will be reduction in production of the good in which it has no comparative advantage.

(f) The results significantly depend on the assumptions. Otherwise the policy can effect the terms of trade and a country may gain from this policy. The burden of this successful trade policy will be allocated to a trade partner.

(g) The result depends on the perfectly competitive framework. This assumption allows to use a concave Production Possibility Curve and avoid changes in costs of production due to scale effects.

Problem 6. Describe gains and losses from subsidy policy of a large economy.

Answer.
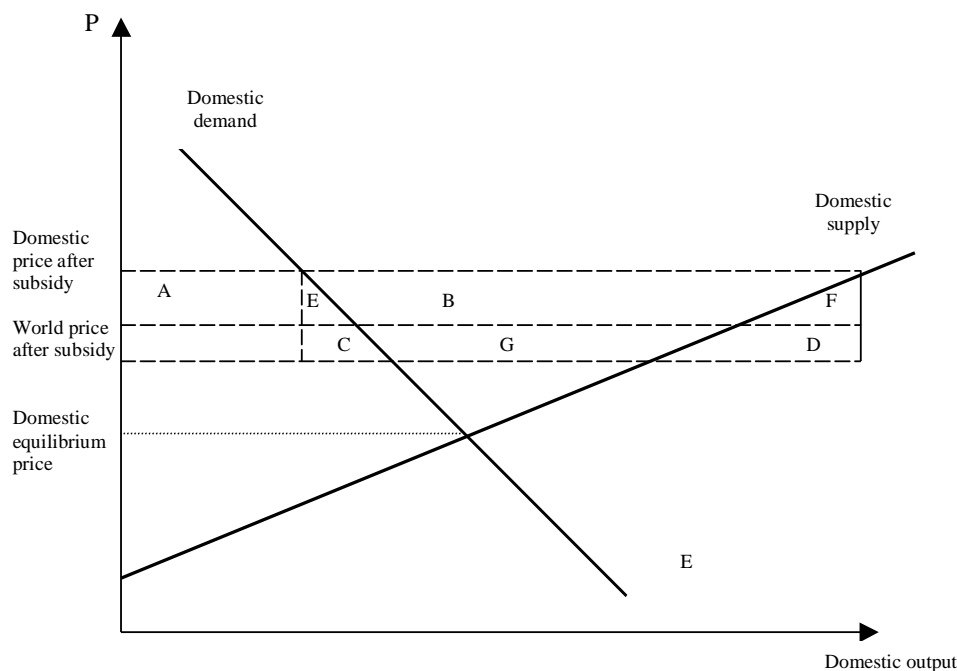
In the world of perfect competition export subsidies operate inversely to import tariff. Home producers obtain extra payment for every produced and sold unit of output. Subsidy increases price received by producers above the world price However, in the case of a large economy extra supply to the world market decreases world price of the good.

Home producers' gain is equal to $\Delta PS = A+E+B$. The size of government subsidy is equal to $\Delta G = -E-B-F-D-G-C$. Areas C, G, B arise from the terms of trade effect – reduction in the world price.[2]

Consumers surplus is $\Delta CS = -A-E$. Consumers will face an increase in home prices as the total cost of production of exported good has increased. Usually subsidizing is used to promote foreign sales. So, this makes it unprofitable for a firm to sell inside the country. This pushes the home price up.

The total change in welfare is $\Delta W = -E-C-G-D-F$. Thus, the welfare of an economy will decrease, but producers will gain from subsidizing.

Problem 7. Show that in the perfect competition tariff on import is equivalent to quote barriers.

Answer.
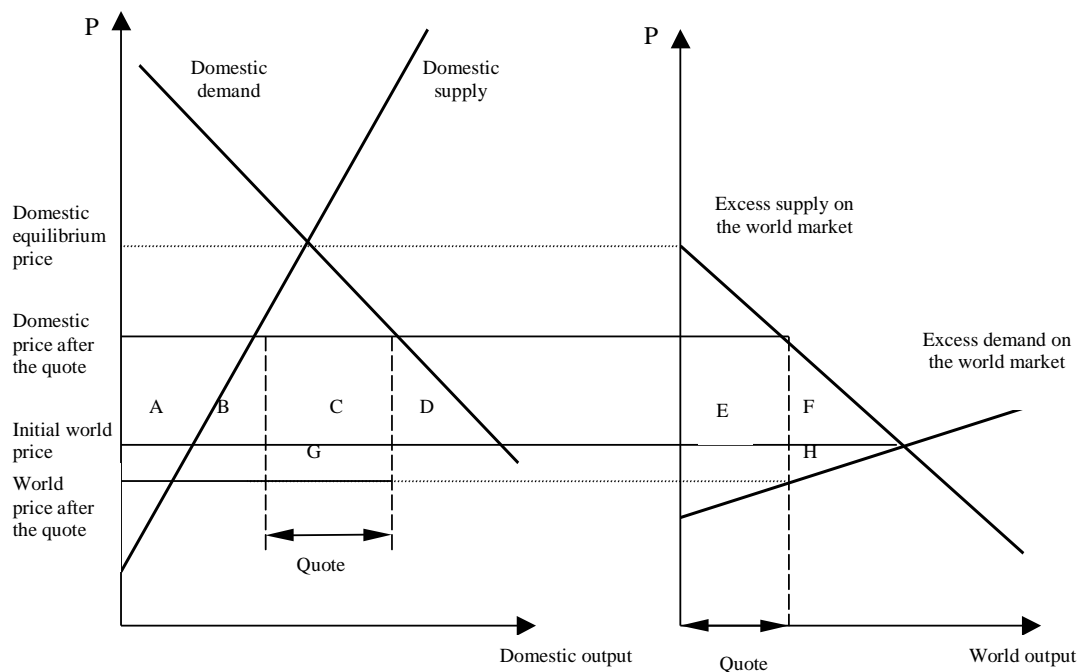
The right hand diagram describes the world market. The left hand one - the home market. Areas, labeled as "quota", are equal on the both diagrams.

This graph is analogous to introduction of a tariff by a large economy in all respects (positions of producers and consumers are the same) except one – in gains distribution of rents C and G. Quote policy gives few variants of distribution of these gains. They can be taken by the government. If the government sells the quota, the gains can go to home located importers or to foreign producers. They will get the rent coming from the differences between home and foreign prices.

---

[2] Terms of trade can also increase world price. For example, when there is shift in demand for foreign goods from a large economy or a group of small economies.

So, a tariff is completely equivalent to a quota in the perfect competitive framework except for distribution of gains from rent.

Problem 8. What you understand by a "retaliation policy"?

Answer. If a country observes that its trade partner implements a trade policy, which affects its trade (usually negatively), it may introduce its own trade policy to improve its trade position. This policy will be a "retaliation policy" and will reduce the losses which the country could have suffered from the trade policy of the partner.

Problem 9. A quota will always be preferred to a tariff as an instrument of protection because its effect is more certain. Discuss.

Answer. **Uncertain**. There is no unique method of comparing effects of a quota and a tariff. The differences come from different market structures, different methods of selling quotas and so on.
For example, in the case of a perfectly competitive market for every quota there exists a tariff, which generated the same price and quantity effect. However, their welfare effects in general case will be different (see Problem 7).
In the case of a monopoly a tariff will be able to undermine the monopoly power, although a quota will hold the monopoly power effective (see Problem 4).

Problem 10. What are the welfare effects of reducing tariffs?

Answer. The welfare effects expand to changes in consumer' surplus, producers's surplus and government revenue. The analysis for partial or complete reduction of tariffs is the same. So, we will demonstrate the results of eliminating trade barriers.
Small economy case.
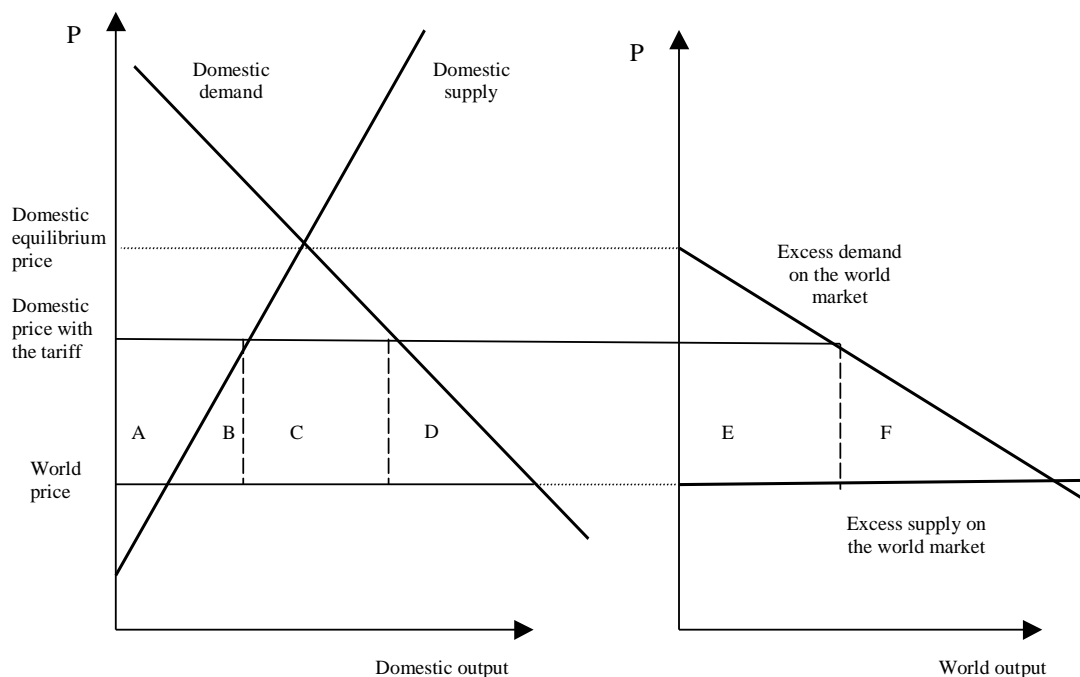
Change in consumer surplus is $\Delta CS = A+B+C+D > 0$.

Change in surplus of home producers is $\Delta PS = -A < 0$. Reduction of trade barriers increases competition with foreign producers, which leads to lower market share of domestic producers.

Government revenue is $\Delta GR = -C$. Government is exposed to losses from reduction in tariff revenue.

Total national gain comes from changes in surpluses of producers, consumers and the government: $\Delta W = \Delta CS + \Delta PS + \Delta GR = B+D$

A small economy unambiguously gains from reduction in tariff and eliminating trade barriers. However producers in the economy will be in opposition.

<u>Large economy</u> case is just the same except that the gain is not sure.

Problem 11. Assume initially import of chocolate is restricted to one million bars, and a bar of domestically produced chocolate is sold at the local price of 20 monetary units. Now assume that the government removes the import restriction but imposes an import tariff of 50%. As it happens, the volume of import remains at one million bars and the domestic price remains at 20 monetary units. So, economic welfare is unchanged.

<u>Answer.</u> The outcome depends on the distribution of rent from a quota. If the government captures the rent, welfare would be unchanged. If the government auctions import licenses, the rent may go to domestic importers or foreign suppliers and welfare will change.

Problem 12. Examine the causes and consequences of the increased use of non-tariff trade restrictions.

Answer. Non-tariff barriers to trade (NTB) encompass all actions except tariffs that impede transactions between foreign and domestic residents. GATT explicitly prohibits many types of NTB. Non-tariff trade restriction are those which affect prices in an indirect way.

The variety of such measures is very large – different types of quotas, different types of restrictions. Sometimes these restrictions have very reasonable basics - health protection, eligibility with local standards and so on.

A good answer should list some types of non-tariff barriers, describe how do they protect national producers and say about General Agreements on industry standards, adopted by WTO.

Problem 13. Why have so many developing countries adopted protectionist economic policies?

Answer. There is no single answer for this question. Anywhere trade policies result in redistribution of income within countries. Possible answers can be based on difference in bargaining power for trade policy by factor owners in export-oriented and import-substitution industries. For example, producers of imported good will be in opposition to free trade as it will increase competition in this industry and ruin social importance of these people. You can refer here to studied social theories.

Problem 14. Why would an exporting country agree for VER and what are the welfare effects on the exporting country?

Answer. VER – is voluntary export reduction, which assumes quantity restrictions for exporting to a country, which implements VER. It generates positive welfare effects for the exporting country, as supply of good is increase, price falls. In some sense, it is equivalent to the case when trading partner imposes an import tariff. This is accompanied by an increase in consumer's surplus for exporting country. The reason is that it reaps benefits from reduction in export – its home agents can consume more goods now. Home price of exporting good falls and world price of this good increases.
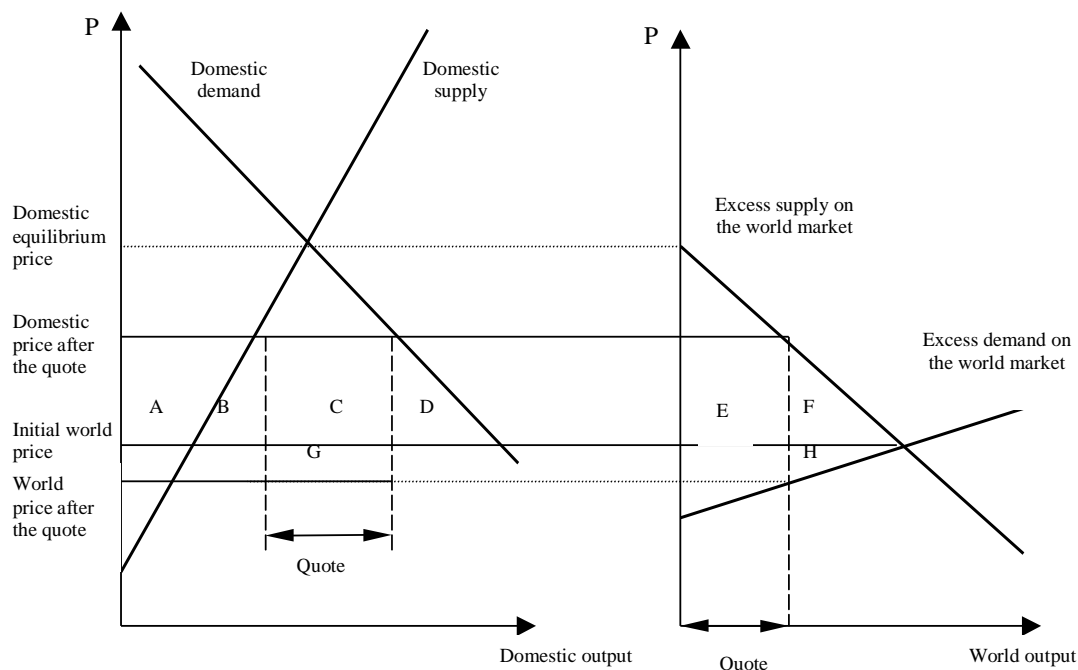
Area C equal to the area E, is the benefit of the importing country, which it will get as a gain from VER of the importer.

Problem 15. Why can ad valorem tariff be preferable to specific ones?

Answer. This question asks you to compare operationability of the two types of taxes on trade - ad valorem and specific.

A tariff is a tax levied on imports/export of a good. A tariff rate can be ad valorem or specific. Ad valorem rate is stated as a percentage of the import value of a good. Specific rate is a fixed amount per unit of the good.

Ad valorem tariffs are the most widely used instrument for restricting trade. GATT recommends to use ad valorem tariff. There are some reasons for this:

- Ad valorem tariffs are transparent in the sense that their effect on price is easily calculated.
- Ad valorem rates are directly comparable across countries as it is stated in percentage terms.

However, there are problem with ad valorem tariffs. It is applied to "the value for duty" which is subject for negotiation.

So, the advantages of ad valorem tax are considered as more important than it's disadvantages.

Problem 16. What do you understand by a prohibitive tariff?

Answer. A prohibitive tariff is one that results in no trade in the good. International operations become very expensive and do not cover efforts (costs) of importers/exporters.

Problem 17. Evaluate arguments for trade protectionism.

Answer. There are many different explanations for trade policy. Among them are:
- Terms of trade
- Trade protectionism as a retaliating policy.
- Infant industry argument.

Chapter 7. Economic Integration

Problem 1. Given the theoretical case for free trade, why is it that virtually all countries have tended to maintain significant trade barriers? To what extent has multilateral negotiation managed to reduce these trade barriers since the Second World War? What reasons explain your answer to the second question?

Answer. Theoretical case for trade: given perfect competition and the absence of other distortions, free trade is optimal for a small country in the sense that the sum of incomes of residents/nationals of the economy will be higher than under any other trade policy. Consideration of a large country (optimum tariff argument) or other distortions (e.g. wage differentials, imperfect competition in product markets, imperfect capital markets) can qualify this result, but in general any deviation from free trade is vulnerable to retaliation by other countries and to the point that the information required to be sure that a deviation from trade will be welfare-enhancing is rarely available. And even if a deviation from free trade is welfare-enhancing for the country pursuing the policy, it is almost invariably welfare-reducing for other countries. For these reasons, most economists strongly support the presumption in favor of free trade. Indeed, it is one of the policy issues on which there is the greatest degree of consensus among economists.

The main explanation for the persistence of widespread trade barriers in practice lies in the political economy of trade. While the basic theory predicts that the gains from free trade could be allocated (via lump sum transfers from gainers to losers) in such a way that everyone is at least as well off as in any other situation, losers are rarely compensated in practice. Moreover, the typical result is that the gains from trade are spread widely, while the losses are concentrated. As a result, losers from free trade tend to lobby heavily in favor of protection. If the gains form free trade for a particular good for the average voter are sufficiently small, s/he may not even be aware of them, let alone moved to lobby against tariffs as a result. In this case, anti-free trade lobbies may prevail. This will be more likely in the presence of "log-rolling", where different anti-free trade lobbies agree to support each other to pass the necessary legislation to protect their industries.

Since World War II, there have been successive rounds of multilateral negotiations, mostly in the framework of the GATT, to lower trade barriers. These rounds have overall been quite successful, with the average weighted tariffs of developed countries in particular falling spectacularly from the 1940s through the 1990s. Partly as a result, the growth of world trade has been much more rapid than the growth of world income over the last 50 years. On the other hand, the process has not been an unqualified success, since there has, since the 1970s, been a resurgence of non-tariff barriers, including VERs and trade-inhibiting regulation. In addition, the world has tended to split into a number of preferential trading agreements, of which the most notable are the EC and NAFTA. This has led some to see a trend towards the creation of large trading blocs with substantial trade barriers between blocs. This would be counter to the spirit of true worldwide multilateralism that underlies the GATT (and now the WTO).

The success, on balance, of multilateral negotiations to reduce trade barriers is due to a number of factors. One important one is the legacy of the experience of the 1930s, when countries got involved in tariff wars and world trade fell sharply. Some attribute much of the Great Depression to the trade wars of that time. It is also the case that multilateral negotiations tend to allow lobbies to be more balanced: exporters lobby for free trade, those competing with imports lobby against. This makes victory of anti-free trade forces less likely than when they address issues one tariff and one country at a time.

Problem 2. What would be the main benefits and costs for Russia of joining the World Trade Organization (WTO)? Do you think the benefits would outweigh the costs? Explain your answer.

Answer. The topic is very broad. So, it is important to concentrate on few issues.
Benefits:
- Would entail faster reduction than otherwise in tariffs, and therefore in import prices. Gain for consumers.
- Would provide mechanism – now lacking – for Russia to resolve trade disputes with its trading partners, particularly the EU and the US. For example, many penalties now imposed on Russian steel exports on the grounds Russia is dumping steel. As a member of WTO, Russia would be able to challenge these findings and force the withdrawal of the penalties if they are not valid.
- Would allow Russia to be treated on a most favored nation (MFN) basis by all WTO members.
- Harmonization of standards with WTO members should produce savings in documentation etc.
- Less tangible gains: being full part of international community; potential for leadership role in international institutions; signal of reform for markets.
Costs:
- Will require dismantling of currently existing protection for some Russian industries. Possible examples include agriculture, communications, and banking. Likely to have at least some transition costs as capital and labour move out of protected industries. Difficult issues can arise, such as where there is high rural unemployment and significant rural-urban migration is needed to re-employ the workers released from non-viable agriculture.
- One condition of WTO entry will be strengthened efforts to protect intellectual property rights. This will mean more expensive (i.e. non-counterfeit) Western software, music, videos etc. This probably represents a significant (gross) welfare loss for many Russians (the net gain may still be positive).

Chapter 8. General Questions on International Trade

Problem 1. How well does international trade theory explain the observed pattern of trade and specialization?

Answer. Below is presented a list of major facts on international trade and a list of relevant theories which explain these facts.

▪ Trade exists. Any trade theory can explain existence of trade. The simplest is the Ricardian model. Empirical testing of the Ricardian model sometimes does not allow to reject this hypothesis (pre-World War II trade between USA and Great Britain). The main outcome of this fact is that there is no gains from trade.

▪ Some countries specialize in production of one good. Some countries do have very specialized export, like Saudi Arabia. Such countries support the prediction of the Ricardian model. But most countries do not have complete specialization.

▪ Very often countries produce the good they import. This is the outcome of the Hecksher-Ohlin theory. Leontieff paradox makes the predictions of the theory not so clear as the assumptions of the theory are very restrictive. This fact contradicts the predictions of the Ricardian theory. Much of the XIX-th century trade could be described by this pattern. The consequence of such a trade is factor price convergence, which is described by Williamson for the time after XIX-th century development of vapor machines for trains and vessels. Nowadays most trade between developed countries is intra-industry trade and goes beyond the Hechsher-Ohlin framework.

Specific factor model is very difficult to test. However, its outcomes are logically consistent and serve as a useful toolkit. In some circumstances this theory converges to the Hechsher-Ohlin theory.

The theories of international trade which are based on perfect competition are competing with each other.

▪ Intra-industry trade forms a significant part of the world trade. This can not be explained in terms of the perfectly competitive production environment. This kind of trade can be explained by the so called "New trade theory". It is based on imperfect competition and there are plenty of varieties of firm's policies. Sometimes these theories may be combined with the Hechsher-Ohlin theory.

▪ Regional trade grows very fast. There is no special theory of intra-regional trade. There are some theories of economic geography but they are beyond the course.

Problem 2. What are the sources of gains from trade? Show that different models give rise to different mechanisms by which trade yields gains. Also indicate that in some theories trade is mutually beneficial, but in others – not.

Answer. In the case of the Ricardian model gains from trade arise from an increase in real national income measured in terms of the imported goods, which are relatively more expensive when they are produced in the country. Trade makes such goods cheaper.

We can separate gains for consumers and producers. Consumers can get more goods and usually at lower prices than those in autarky or with protectionists trade policy. National producers can expand output in the industry in which the country has the comparative advantage. In this way the economy can use its resources more efficiently.

Sometimes we can separate gains for factor owners. In the general equilibrium case these effects are described by the Heckscher-Ohlin theorem.

Loss from trade can occur (within the course models) for a large economy if it erects "wrong" trade barriers or for its trading partners, who will suffer from the "correct" trade barriers of a large economy. Another option for losses is the area of external economies of scale.

National gain comes from the notion of an increase in national welfare described by social utility function. It assumes that total national utility increases without references to redistribution problems.

Problem 3. The principle problem facing primary commodity exporters is not deteriorating terms of trade but failing to diversify export. Comment.

Answer. Terms of trade is the ratio of the price of the exported good to the price of the imported one. The idea behind it is how much foreign good we can get for a unit of home good. In most cases raw commodities have very low value added. In contrast, the imported goods (for example, machinery) have very high value added which permanently increases. This increase comes from the growth of quality of the machinery. There is no possibility to improve quality of raw commodities, but it is possible to improve the varieties of goods produced with the use of these commodities. This can allow commodity exporters to diversify export.

Problem 4. One man named Bill Gates claimed that poor countries would be even poorer if there were no international trade. Provide arguments in favor of and against this claim. Explicitly specify assumptions for your reason.

Answer. The question argues that welfare effects from trade are positive for poor countries. Arguments in favor could be based on any model, which assumes perfectly competitive environment. As the small economy assumption seem reasonable, you can take world prices exogenous. What matters here is the source of comparative advantage:

International difference in relative productivities – Ricardian model.

International difference in relative factor endowments – Heckscher-Ohlin approach.

International difference in industry specific factors – limited mobility of factors inside a country.

The common feature of the models is that trade cannot deteriorate welfare but can improve it. But it should be kept in mind that they make different predictions on welfare gains from trade comparing different ex ante trade cases.

Ricardian model: the more economies differ before trade - the higher the gains from trade.

Heckscher-Ohlin model (long-run specific factor model): the closer are the autarky equilibria – the more gains from trade.

Specific factors model: the long run effect is the same as in the Heckscher-Ohlin model; the short run effect - the more is the difference in immobile factor, the higher are the gains. This follows from existence of losers in the economy. However, total economy gains exceed loses. Here the problem is in redistribution of the gains.

Arguments against the claim are based on imperfect competition in output markets. Krugman's model and Cournot and Bertrand models claim that international trade can be beneficial. But this analysis is partial equilibrium.

What is more applicable is discussion in terms of the Kemp's model. The model assumes one competitively produced good and one produced under economies of scale. The reason for deterioration in terms of trade is a change in exchange ratio between export and import. The Kemp's model allows few equilibria – multiple good production, full specialization and full specialization or one country and partial for an another. The country, which is able to produce with economies of scale, will gain from trade. According to this model deterioration in terms of trade is the key reason for wealth reallocation from poor countries to rich ones. However, a poor country can do nothing with production of this kind of goods – it requires developed technologies. But they could gain indirectly by attraction of FDI. Low labor costs could be attractive in reallocation of new enterprises.

Problem 5. What is a safeguard policy? Does it agree with WTO principles and is it allowed? Which incentives does safeguard policy assume to generate?

Answer. The goal of a safeguard policy is creating such an environments where the local producers have better conditions for expansion of production and less competitors in the home market.

According to WTO regulations, safeguard policy leads to temporary deviations from WTO principles to protect home producers. So, formally, safeguard policy contradicts WTO principles.

Non-discrimination. The non-discrimination or "Most favoured nation" principle requires that products imported from different trading partners are treated on the same basis. The GATT (General Agreement on Tariffs and Trade) permits exceptions to "Most favoured nation" principle. For example, custom unions or safeguard policies are non-restricted.

A country can impose temporarily import restrictions to protect home producers. It is assumed that, this time will be spent by home producers to adjust output to foreign competitors' production. A country can restrict all it's import to deal if there is a serious balance of payments deficit or restrict import, which threatens public safety.

Safeguard policy creates monopoly rent for home producers and they do not have incentive to expand their output. That is why there will be a coalition between home producers to prolong safeguard policy. More competitive environment could become disastrous for home producers. Home consumers are exposed to losses as they buy at less competitive market.

Example of this industry is Soviet production of TV-sets. After opening the market it decline in few years.

GATT 1994 prohibits the use of VER as a mean of protection for safeguard policy. GATT allows to use other quota restrictions. This allows protecting country to benefit of gains from restrictions. However GATT policy is not consistent.

Restrictions imposed by a safeguard provision can last at most eight years: only four years initially but then extended if injury persists. If safeguard policy lasts for more than 3 years foreign exporters to this country can demand compensation.

Problem 6. "International trade is beneficial only for large economies like ones in G7 as it allows them to increase real wage at home and to discriminate the rest of the world. Steady improvement in their terms of trade proves this". Are there arguments in favour or against the statement?

Answer. The question claims that:

1) only large industrial economies gain from trade;

2) gains come in the form of an increase in nominal wage due to growth of labor productivity. These are the consequences of permanent growth of the real wage in terms of trade for developed countries.

G7 is an informal group of industrial countries. Their pattern of export consists of capital-intensive goods with sophisticated technologies. Variety and quality of their production permanently improves.

We can think in two ways here:

1. Framework of Heckscher-Ohlin model assumes perfectly competitive markets. G7 countries are relatively capital abundant, the rest of the world is relatively labor abundant. According to the theorem of Heckscher-Ohlin pattern of trade is determined by intensive exploitation of relatively abundant factor. Price equalization theorem claims nominal wage equalization between these countries. Stolper-Samuelson theorem determines benefits from trade for factor owners. At G7 countries gains will be harvested by capital owners (as the owners of the factor intensively used in production of exporting good) and at the rest of the world – by labor exploited in labor-intensive production. The labor-intensive good will be imported by G-7 countries. The result will be nominal factor price equalization. For the rest of the world there will be one more benefit - wages income of labor participated in labor-intensive sector will increase comparing to one participated in capital-intensive sector. As this country is labor abundant this is partial gain.

For the rest of the world (excluding G7 countries) terms of trade historically steadily decrease - G7 countries sell capital-intensive goods more and more expensive.

In the HO framework we can claim that at no-G-7 country relative price of export will increase comparing to pre-trade position. Terms of trade deterioration cannot happen after trade has started. HO approach allows us to claim that both sides of the story – both G7 and the rest of the world – will be better off after the free trade.

Within the frame of the problem we need to admit that it implicitly assumes protective trade policy of G-7 countries against the rest of the world. But this will result in worse off for them not for benefits. That is why the claim is incorrect.

Problem with application of H-O model:
a) Real wages in economy do not increase for both sectors.
b) Model assumes no transportation costs, which can prevent trade.
c) G7 countries usually export goods producers under economy of scale.

2. Another way of thinking can be based on <u>economy of scale trade models</u> or <u>models of multinational enterprises</u> (MNE). These models have different conclusions about the outcome of free trade between developing and developed countries. One of the main objectives to free trade is the loss for producers of traditional goods, which will compete with foreign ones. Owners of specific factors used for production of such goods will be in opposition.
Anyway, international trade results in strong redistribution effects within a country.

Problem 7. Critically evaluate the argument, that the outward orientation leads to improved economic performance.

<u>Answer</u>. Also discuss the opposite result of inward orientation growth.
The case of export-oriented growth is presented on the diagram below. Due to some policy (inflow of intensively exploited factor or new technology) the country increased its potential production. This diagram assumes that: 1) the country is large as relative price of exported good in terms of imported has decreased; 2) both factors can be used in production of both goods.
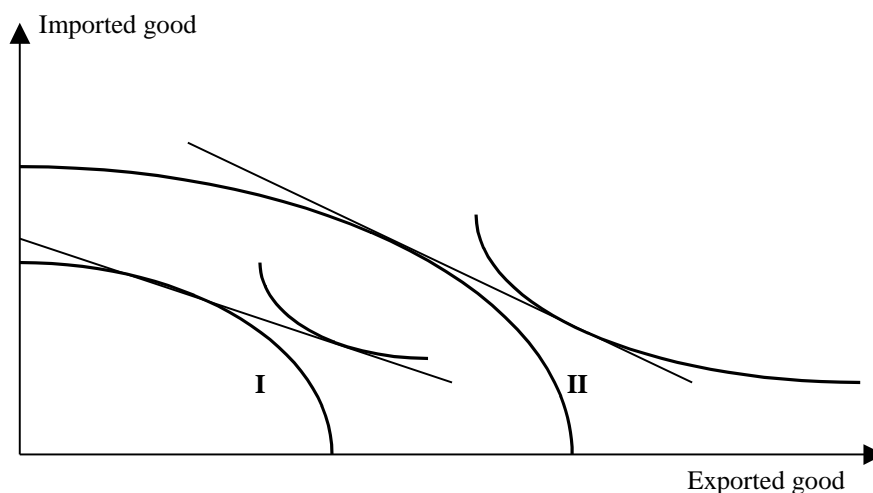
This policy happened without subsidy interventions of the government. This diagram illustrates gains from export-oriented growth. There is a marginal case, immesirizing growth, when economic growth can deteriorate international position of the economy, formalized by Bhagwati. It requires very inelastic demand and supply and is considered to be only a theoretical case.

Imported good on vertical scale

I

II
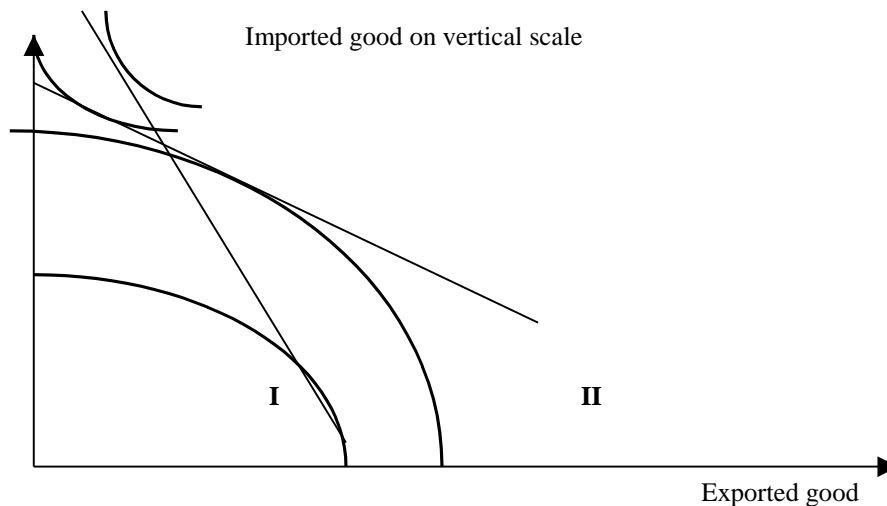
Exported good

The inward oriented growth is depicted on the diagram above. Developing of the import substitution industry results in decline in income measured in terms of imported good and decline in welfare.

Problem 8. Evaluate the arguments for South-South trade and regional trading agreements to support economic growth in developing countries.

Answer. Gains from economic integration appear from the same sources as gains from international trade.
- Gain from international specialization (possibly partial) in production of some goods.
- Forming a custom union by some small countries create mutual terms of trade for these countries with the rest of the world. Thus a custom union can affect all other countries by terms of trade effect as if it was one large economy.
- Free Trading Area (FTA) allows to exploit economy of scale with the FTA. Economic integration reduces trade barriers for countries within a FTA.
- Home producers start operations in more competitive environment, with firms from other countries from FTA.
- Many "South" countries attract FDI from North countries. This allows MNE to reach new markets from one location in a country within a FTA. This is one of the mechanisms for economic growth in South-South countries.

Problem 9. Compare and contrast income distribution effects of imposition of a tariff in the Specific-Factors and Heckscher-Ohlin models.

Answer. In the Heckscher-Ohlin framework the result is described by the Stolper-Samuelson theorem. The results are more undetermined in the Specific-Factors model when factors may be limited in allocation. Assume, a country has a comparative advantage in production of relative labor intensive good, labeled 1. In the table below one can see relative changes in gains of different factor owners in different industries. Comparison of returns to different factors of production on different time intervals:

Time span	Changes in factor returns	Net gain	Net Loss
Only labor is mobile	$f_2 > f_2 > f > f_1 = 0 > f_1$	$K_2, L_1, ,L_2$	K_1
All factors are mobile	$f > f_2 > f_1 = 0 > f$	L_1, L_2	K_1, K_2

One can see than limited mobility significantly affects nominal income in comparence with the case of full mobility.

Problem 10. What does it mean that trade is an engine of growth?

Answer. International trade allows to increase income of an economy in the simplest way: sell the good you have comparative advantage in to one who has comparative disadvantage in it.

At the same time international trade substitutes competition between local producers for competition between producers of different countries. This accelerates dissemination of technologies and have some positive externalities – improvement of life quality.

Part II. International Finance

Chapter 9. The BoP and the Foreign Exchange Market

Brief notes on the topic:
- BoP – a record of all international transaction of a country per period. Main sections – current account, capital account, financial account, changes in net foreign reserves, errors and omissions. Construction of BoP is standardized by IMF (www.imf.org). This construction allows to compare different countries consistently.
- Volume of FOREX is many times greater than the volume of international trade.
- The exchange rate in this problem book is measured in units of home currency vs. a unit of foreign currency.
- Nominal exchange rate is the value of one currency in terms of another.
- Real exchange rate – is the ratio of price (may be aggregated good) of a good of one country over one of another, by definition $q = \dfrac{EP^*}{P}$.
- Arbitrage is the risk free profit. Triangular arbitrage assumes participation of three currencies. The result of it is the fact that for three (N) currencies an independent exchange rate may be quoted only for two (N-1).
- Interest rate parity and Law of one price – implications of the non-arbitrage principle to financial and to goods markets.
- Uncovered Interest rate parity – difference in interest rates is equal to the rate of expected rate of changes in nominal exchange rate $i = i^* + \dfrac{E^e - S}{S}$. The owner of the contract is exposed to unlimited currency risk, which can happen by the day of the contract expire.
- Covered interest rate parity assumes buying a contract, which includes fixed exchange rate on the time, when the credit contract matures. Currency risk is limited or "covered".
- Depreciation is the market-run increase in the value of an exchange rate.
- Devaluation – is the policy of Central Bank when home currency becomes weaker against foreign one (increase in value).
- Appreciation is the opposite to depreciation.
- Revaluation is the opposite of devaluation.
- Marchall-Lerner condition – is the reaction of current account to changes in nominal exchange rate.

Problem 1. Given the following data, calculate Russia's current account balance in billions of US dollars for each year. What does the sectoral decomposition of national savings-investment balances suggest about the cause of the big increase in Russia's current account surplus from 1998 to 2000?

Answer.

	1998	1999	2000
General government deficit/GDP (percent)	8.0	3.2	
Private sector national savings/GDP (percent)	11.1	22.0	23.7
Private sector investment/GDP (percent)	3,6	6.4	9,3
GDP (billions of US$)	316,0	183,4	251,5
CA = (general government balance/GDP + private sector savings/GDP – private investment/GDP)*GDP,	-1,6	22.7	45.3

The CA balance can be decomposed into sectoral components: the public sector surplus or deficit plus the private savings-investment balance. So, the CA in $bln is given by (general government balance/GDP + private sector savings/GDP – private investment/GDP)*GDP.

The numbers tell us that the bulk of the improvement in the CA balance corresponds to an increase in the general government balance, which swung from a large deficit of 8 percent of GDP in 1998 to a surplus of 3.6 percent of GDP in 2000. But much of what the numbers are revealing – is the influence of the increase in oil and natural gas prices between 1998 and 2000.

	1998	1999	2000
Price of oil BRENT	12,72	17,70	28,31

Source: International Financial Statistics, 2002

This sharply raised before-tax corporate profits. Part of this was taxed away, contributing to the improvement in the fiscal balance, and part was saved, showing up as a big increase in private saving. The higher energy prices also helped to encourage private investment, which almost tripled as a percentage of GDP. The main point is to note is that the sectoral breakdown, while analytically useful for some purposes, may tell us little about causality.

Problem 2. Explain how each of the following transactions generates two entries – a credit one and a debit one – in the Russian BoP accounts, and describe how each entry would be classified:

(a) A Russian company sells oil abroad, depositing the proceeds in a Swiss bank account (NB This would be against the rules governing repatriation of export proceeds, and therefore of course never happens in real life).

(b) An oligarch buys a villa in Spain, paying by writing a cheque on his foreign currency account with a Russian commercial bank.

(c) An American tourist exchanges rubles for dollars at a Moscow bank.

(d) The bank above sells the dollars bought from the tourist to the Central Bank of Russia.

(e) A fruit trader resident in Moscow sends part of the proceeds of his sales in euro cash to his family in Azerbaijan.

(f) The Government makes a coupon (interest) payment on a eurobond, acquiring the necessary foreign exchange from the Central Bank.

Answer.
(a) The selling of oil abroad is an export, a credit item in the current account. The increase in deposits in Swiss banks would be a debit item in the financial and capital account, under "Other investment" (it is neither direct nor portfolio). If the deposit were not reported and captured in the official BoP, it would show up as a negative contribution to net errors and omissions.

(b) The acquisition of the villa would be outward FDI, a debit item in the financial and capital account. The Russian bank would run down its correspondent account balance with a foreign bank, which would be a credit item in the financial and capital account under "Other investment."

(c) The problem implies that the tourist was selling dollars for rubles. If so, the acquisition of dollar cash by the resident (bank) is a debit item under "Other investment" in the financial and capital account. Until the rubles are spent, they represent a credit in the financial and capital account, also under "Other investment", where there is an item for increases or declines in non-resident holdings of domestic currency (think: if foreigners willingly hold our currency, that offsets what would otherwise contribute to a payments deficit).

(d) The purchase of the dollars by the CBR is an increase in its gross reserves (a debit in the BoP), which is a stand-alone item. The fall in foreign assets on the part of the commercial bank is a credit in "Other investment".

(e) The remittance of income to Azerbaijan is an outward current transfer, a debit in the current account. If we assume that the money is sent in cash, then the fall in Russian residents' holdings of foreign currency cash is a credit in the "Other investment" item of the financial and capital account.

(f) The payment of interest (though only to non-residents – payments to any resident holders of the bonds would not appear in the BoP) is a debit item in the "Investment income" item of the current account. The sale of the necessary foreign exchange from the CBR is a rundown of reserves, a credit item.

Problem 3. Record the following transactions in the UK Balance of Payments:

(a) A US tourist visits London and spends 500 Pounds on hotel bills and guided tours.

(b) Rover UK exports a car to France and receives in exchange a payment of 20,000 Pounds into its bank account at a French bank in Paris.

(c) The UK government pays 50000 Pounds to a foreign government as a part of the foreign aid program.

(d) A UK firm pays 3000 Pounds to a foreign shareholder as dividends.

(e) The Bank of England spends 10000 Pounds to buy US Dollars from a London bank.

Answer.
(a) Current Account (Invisible Balances): credit (+500); Capital Account (Short Term Capital Flows): debit (-500).

(b) Trade balance: credit (+20000); Capital Account (Short Term Capital Flows): debit (-20000).

(c) Current Account (Unilateral Transfers): debit (-50000); Capital Account (Short Term Capital Flows): credit (+50000).

(d) Current Account (Interest Income): debit (-3000); Capital Account (Short Term Capital Flows): credit (+3000).

(e) All movements take place within the Capital Account. Official Reserves Account: debit (-10000); Short Term Capital Flows: credit (+10000). The Bank of England's net debt relative to other Central banks has decreased, which is a debit, and the private sector's net foreign debt has increased, which is a credit.

Problem 4. Say whether each of the following is best classified as an autonomous ("above the line") or accommodating (financing) transaction and why:

(a) The Paris Club grants Russia a rescheduling of its debt.

(b) Deutsche Bank rolls over (renews) a credit to Gazprom that is coming due.

(c) The CBR sells dollars in the interbank market.

(d) The EBRD takes 20 percent stake in Vneshtorgbank.

(e) The IMF grants Russia a stand-by credit.

(f) The Government of the Russian Federation issues a Eurobond

Answer.

(a) **Accommodating**. Debt rescheduling is one of the ways in which a BoP deficit can be financed.

(b) **Autonomous**. For a transaction to be classified as accommodating, it must involve official action of some kind. Deutsche and Gazprom are both private entities (although the Russian government has a large minority stake in Gazprom).

(c) **Accommodating**. This is use of central bank reserves, which is the standard means of financing a BoP deficit.

(d) **Autonomous**. This is an FDI transaction, which is almost never best classified as accommodating. Also, in the actual circumstances, this transaction is being undertaken with a large overall BoP surplus. So it is not needed to mitigate a rundown of reserves, and there is all the less reason to consider it accommodating.

(e) **Accommodating**. Resort to IMF finance is an alternative to running down reserves as a way of financing the BoP.

(f) **Autonomous** (though arguable in some circumstances). Generally, if a transaction is freely entered into by private sector agents, it is not best classified as accommodating. The Russian government's issuance of Eurobonds in July 1998 could be seen as a possible counterexample. There the government offered eurobonds in return for holdings of domestic securities (GKOs) – it can be argued that the holders of GKOs felt at least semi-compelled to accept the eurobonds, when their preference might have been simply to have been paid in full and on time on their GKOs (the government defaulted on remaining GKOs a month later).

In general, accommodating transactions ("below the line" in the analytical presentation of the BoP) are of two main types: changes in (net) international reserves and "exceptional financing". Exceptional financing in turn can take several forms, including drawing on balance of payments assistance loans from the World Bank or other international financial institutions (excluding the IMF), running up payment arrears, and securing debt relief (rescheduling or forgiveness). Note that any transactions with the IMF are actually part of movements in net international reserves: the drawings from the IMF contribute to gross reserves, and the liabilities to the IMF are classified as gross international reserve liabilities.

Problem 5. What do you understand by the Marshall-Lerner condition? What is the expression for the Marshall Lerner condition in the case of a small country? What does that indicate about the effect of a devaluation on the current account of a small country?

Answer. Marshall-Lerner condition states that real devaluation causes improvement in net export. If prices are held constant, than the same result is true for nominal devaluation. Marshall-Lerner condition is the condition for a depreciation improving the trade balance (when trade is balanced initially). In the case of a small country (where the foreign elasticities are infinite), the Marshall-Lerner condition reduces to the condition that the sum of the domestic price elasticities of supply of exports and demand for imports exceeds zero. As the elasticities are defined to be positive, this is always satisfied. In the general case there is no requirement for trade balance.

Problem 6. Say whether the following statements are True, False or Uncertain. Explain your answer.

(a) If during 2002 the euro appreciates against the US dollar while the ruble/dollar (and every other) exchange rate is unchanged, the ruble will have appreciated in nominal effective terms.

(b) If during 2002 the ruble depreciates against all other currencies by 10 percent, and the inflation rate in Russia is 20 percent while in the rest of the world it is 3 percent, then the ruble will have appreciated in real effective terms.

(c) If the current spot ruble/dollar exchange rate is 30, the rates on 1 year domestic currency deposits in Russia and the US are 11 percent and 2 percent respectively, and if a risk-neutral Russian investor expects that the ruble/dollar exchange rate will be 33 in a year's time, he will sell rubles for dollars and deposit the dollars in the US.

(d) The same Russian investor has a time horizon of two years, and considers a Russian corporate ruble bond yielding 20 percent a year or a German corporate bond yielding 8 euros a year. Expecting the ruble/euro exchange rate (which is now 27) to be 33 in two years, the investor will sell rubles for euro and buy and hold the German corporate bond.

Answer.
(a) **False**. If the ruble/dollar rate is unchanged but the euro appreciates against the US dollar, then the euro has also appreciated against the ruble. So, the ruble has depreciated vis-a-vis the euro and held its value vs all other currencies, therefore it has depreciated in nominal effective terms.
There is one misleading aspect of the question. It said that "the ruble/dollar (and every other) exchange rate is unchanged" whereas in fact of course the euro/ruble rate cannot be unchanged given the other assumptions. This was assumed, but the wording was unhelpful.

(b) **False**. If we normalize the real effective exchange rate to be equal to 1 initially, its value at end of 2002 will be given by [(1.1x1.03)/1.2] < 1, so the ruble will have appreciated in real effective terms.

(c) **True**. If the investor has 3,000 roubles and sells them for dollars, receiving $100, s/he can then deposit that, receiving $102 at the end of a year, which will be expected to be worth 3,366 roubles. This is 12.2 percent, better than the 11 percent obtainable on the ruble deposit.

(d) **False**. If the Russian investor has 2,700 roubles and sells them for euros, receiving 100 euros, which s/he uses to purchase the German corporate bond, after two years s/he receives (100*1.08*1.08)=116.64 euros. At the expected exchange, this will be worth 3,849 roubles, a two year return of 42.6 percent. Meanwhile, the Russian corporate ruble bond would have yielded a two-year return of 1.2*1.2 = 1.44 i.e. 44 percent.

Problem 7. Suppose ruble and US dollar interest rates are initially the same, 10 percent a year. What is the relationship between the current equilibrium exchange rate and its future level? Suppose now that the expected exchange rate in one year is constant at 31 rubles per dollar, but Russian interest rate rises to 20 percent a year. What is the new equilibrium spot exchange rate?

Answer. If interest rates are equal, then, in the absence of risk or other factors that influence the attractiveness of the two currencies, the current exchange rate will be expected to be unchanged. If the Russian interest rate rises to 20 percent, then the current exchange rate will be e, where $31/e = 1.2/1.1$. So, $e = 28.42$.

Problem 8. Suppose the one-year forward ruble/US dollar exchange rate is 33.2 rubles per dollar while the current spot rate is 31.0. What is the forward premium on the dollar? Assuming that rubles and dollars are perfectly substitutable, what is the difference in interest rates between ruble and dollar deposits?

Answer. The forward premium is just $(33.2-31)/31 = 0.071$ i.e. 7.1 percent. The ratio of ruble interest rates to dollar rates is given by:
$F/e = (1+i_R)/(1+i_{US})$.
If US interest rates are, say, 3 percent, this gives a Russian rate of 10.3 percent. (notice that the difference in rates is not, in general, 7.1 percentage points)

Chapter 10. Exchange Rate Determination: PPP and the Monetary Approach

Brief notes on monetary approach to international capital flows:

- Demand for money is determined by income.
- Money market generates nominal interest rate.
- Real supply of money is equal to demand.
- No foreign currency is in circulation inside a country.
- All international transactions take place at FOREX, institutional structure of FOREX does not matter. This means that in order to purchase foreign asset one needs to buy a foreign currency and only than the asset.
- International capital movement is determined by interest rate parity.
- In the monetary model an exchange rate is defined as the price of foreign currency in terms of domestic currency.

$$\frac{M}{P} = L(Y, i)$$

- $$\frac{M^*}{P^*} = L^*(Y^*, i^*)$$

$$E = \frac{P}{P^*} = \frac{M}{M^*} \frac{L^*(Y^*, i^*)}{L(Y, i)} = \frac{P}{P^*} = \frac{M}{M^*} L\left(-i^* \frac{Y^*}{Y}\right)$$

- In the last equation we assumed the same demand for money in the countries and used the covered interest rate parity. The variable $i - i^*$ is the interest rate differential equal to the expected rate of devaluation. The increase in income leads to currency appreciation, the increase in interest rate differential – depreciation. National expansionary monetary policy results in depreciation of the currency.
- Central bank is limited with its instruments of policy – open market operations, FOREX and monetary supply. Only two of these policies are independent.
- Balassa-Samuelson effect describes how productivity affects real exchange rate via price level when there are tradable and non-tradable goods.
- Overshooting is the temporary (in short run) jump of an exchange rate over its long run value.
- The two policies of the Central bank lead to the same result – nominal exchange rate policy and real exchange rate policy.

Problem 1. Say whether the following statements are True, False or Uncertain. Explain your answer.

(a) According to the flexible-price monetary model, a previously unexpected increase in Russian real GDP next year, all other things being equal, would result in a nominal appreciation of the ruble.

(b) According to the flexible-price monetary model, a shift in financial technology that resulted in reduced real money demand in Russia, all other things being equal, would result in a nominal depreciation of the ruble.

(c) The Balassa-Samuelson effect suggests that over the medium term the price of concert tickets in Russia will rise more rapidly than the price of cars.

(d) In the flexible price monetary model, an increase in the rate of expansion of the money supply results not only in an increase in the rate of depreciation of the home currency (supposing it is already depreciating initially) over time, but also a one-off upward jump in the exchange rate.

Answer.
(a) **True.** Part of "other things being equal" means no change in M (money supply) and free capital mobility, so that e must fall (the ruble appreciates).
$$E = \frac{P}{P^*} = \frac{1}{P^*}\frac{M}{L\left(,i\right)}$$

(b) **True**. The shift in money demand can be thought of, for instance, as a fall in the parameter α in equation. $m - p = by - ai$ (logarithmic form of the equilibrium at money market equation) This results in a rise in e (nominal depreciation of the ruble).

(c) **True**. One can consider concert tickets as non-tradable and cars as tradable. The Balassa-Samuelson effect indicates that over time the catch-up in productivity in the tradables sector will result in a rise in the relative price of non-tradables, so a faster rise in the price of concert tickets than cars.

(d) **True**. In the flexible-prices model, an increase in the rate of expansion of the money supply results in a one-for-one increase in expected inflation and depreciation of the currency. This means also a higher nominal interest rate. But a higher nominal interest rate lowers real money demand, so at the initial point, before money has changed, prices have to jump to reduce real money balances. But in the model the exchange rate moves one for one with prices, so the exchange rate also exhibits a one-off upward jump. Mechanically, this can be seen in equation $E = \dfrac{P}{P^*} = \dfrac{1}{P^*}\dfrac{M}{L\left(,i\right)}$.

Problem 2. Consider the Dornbush model.

(a) What is the effect of a change in the interest rate elasticity of money demand on the behavior over time of the exchange rate?

(b) What is the effect of a change in the exogenous component of demand g (e.g. due to a permanent fiscal expansion or to the sudden discovery of natural resources) on the behavior over time of the exchange rate? Will there be overshooting?

Answer.

(a) A fall in the interest rate elasticity of money demand causes a long run appreciation of e with short run overshooting. The disturbance caused in the money market is similar to that caused by fall in m.
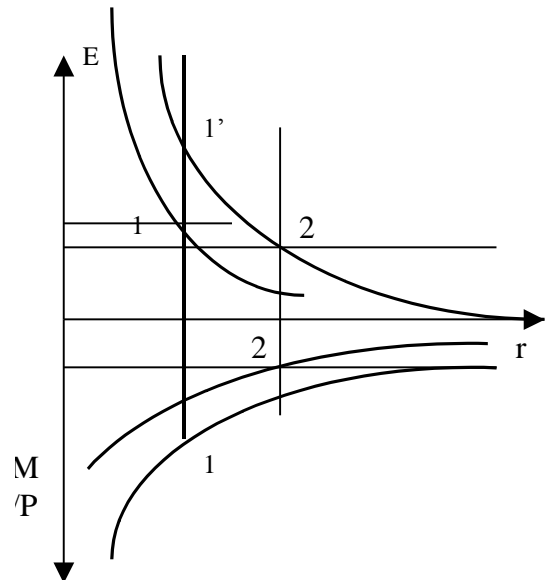
(b) An increase in g (government spending) will cause an immediate appreciation of e that will immediately re-equilibrate the good market (FOREX market equilibrates home markets); neither prices, nor the interest rate (small economy), nor income are affected. This is equivalent to fiscal expansion in the economy with the flexible exchange rate). Before the shock the economy was at the long run level and $y = y^p$; when g increases, e can jump downward to completely offset this change and no change in prices is required. From the LM curve this also implies that no change in r is required either (assuming small open economy). There is no overshooting, because the disturbance is the real disturbance and is taken care of by a real adjustment (real exchange rate); there is no disturbance in the money market and no volatility of r.

Problem 3. In 2001, money supply growth in Russia was about 40 percent. The Central Bank's guidelines for 2002, endorsed by the Duma in November, indicate monetary growth of only 22 percent this year. What would the Dornbusch sticky-price model suggest would be the effect of the announcement of this cut in the growth of the money supply? Suggest at least two reasons why the effect predicted by the Dornbusch model might not in fact be seen in the context of Russia.

Answer. The overshooting effect has two necessary requirements – sticky prices and uncovered interest parity. It is hard to assume that in the short run prices in Russia are sticky. The UIP is driven by devaluation expectations. So, it may make problems to reveal this effect.
The model suggests that there should be an initial large appreciation, followed by subsequent depreciation – an overshooting. There are various reasons why the effect might not be seen in practice, including: expectations that the announced contraction in monetary growth will not occur; expectations that it will occur but be reversed; failure of UIP; failure of asset markets to clear instantaneously; lack of a one-to-one relationship between changes in money growth and expected inflation (there may be an expected change in velocity).

Problem 4. Answer the following questions:

(a) Derive Uncovered Interest Parity.

(b) If the US rate of interest is 6% and the comparable UK interest rate is 9%, what must the consensus view be about the likely future course of the dollar-sterling exchange rate, if Uncovered Interest Parity holds?

(c) Suppose that US interest rate is 8% per year, the UK rate is 12% per year, the spot price of one pound is $2.06 and one-year forward price is $2.00. Are there opportunities for covered interest arbitrage?

(d) Suppose the present exchange rate is $1.5 per pound and that in the US the three-month, six-month and one-year interest rates are respectively 12%, 10% and 8% on a yearly basis. The corresponding UK interest rates are 6%, 10% and 10%. Describe what the market must expect about the future exchange rate if interest rate parity holds.

(e) Assume that investors are risk averse and there is no forward foreign exchange market, so that if they want to invest in a foreign currency they have to buy and sell it on a spot market. Explain why the UIP equation breaks down? Conjecture whether the equality sign becomes a "greater than" or "less than" sign?

<u>Answer.</u>
(a) Let e be the exchange rate as the number of dollars needed to buy one pound. Imagine that you have one dollar to invest. If you invest it in a dollar-denominated bond, you will have (1+ius) at the end of the period. If you invest it in a pound-denominated bond, you will have (1+iuk)E[et+1]/et, where E[et+1] is the expected spot rate at t+1. If investors are risk-neutral non-arbitrage requires this sums to be equal. After some rearrangements and assuming that the exchange change in e is not too great (i.e. E[et+1]/et ~1) we can write the UIP
ius - iuk ~ (E[et+1] - et)/ et

(b) For UIP to hold the dollar must be expected to appreciate by 3%.

(c) Covered interest parity does not hold for these numbers. The interest rate differential is ius - iuk = -4%, whereas the forward exchange rate appreciates by only 3% (i.e. the percentage change in e is –2.9%). There is an opportunity to buy pounds spot, invest them today and sell them on the forward market. This operation is riskless and therefore would bring about a massive sale of dollars today that would bring the interest rates and the exchange rate in line again.

(d) Uncovered Interest Parity has to hold over all three time spans. To work out the implications of UIP for the expected exchange rate in three, six and twelve months time, you first need to convert the quoted interest rates (that are all originally

expressed on a twelve months basis) into three-month and six-month rates. For an exact computation you should use the compound formula and get: $i_{US, \ 3 \ months} = (1.12)^{1/4} - 1 = 0.28$, $i_{US, \ 6 \ months} = 0.049$, $i_{UK, \ 3 \ months} = 0.015$, $i_{Uk, \ 6 \ months} = 0.049$. Taking the difference between the US and the UK interest rates at three, six and twelve months from now, you obtain the expected appreciation/depreciation of the dollar. Using this together with the initial value of $e_0 = 1.5$ you obtain: $e_{3 \ months}$ ~1.52, $e_{6 \ months} = 1.5$, $e_{12 \ months} = 1.47$.

(e) If investors are risk-averse, not only the expected change in the expected exchange rate matters, but also its variance plays a crucial role, because investors do not like fluctuations in their future income. In other words, since the utility function is not linear anymore, you cannot equate the two expected returns as in point (a) and UIP in the simple form derived above breaks down. Intuitively, assuming that all risk is exchange rate risk you have to give a US investor a risk premium if s/he is to invest in bonds denominated in British Pounds. This implies that we would expect:
$iUS \leq iUK + (E[e1] - e0)/e0$.

Problem 5. A vehicle currency is a currency that is widely used in international transactions, even if these do not involve residents of the issuing country and even if the currency is held only with the purpose of facilitating further exchanges and not with the purpose of using it for final consumption.

(a) Could you propose a plausible and important economic mechanism that makes it so that one or very few currencies become vehicle currencies?

(b) Given this mechanism, what economic characteristics of the issuing country do you think might be important in determining whether a currency is used or not as a vehicle currency?

Answer.
(a) People may decide to carry a currency that is widely accepted and traded in world markets (e.g. a US Dollar) even if they will never spend one day of their life in the US. The reason that they might want to do so is that they know that it will be extremely easy to convert this vehicle currency into other currencies or to use it to buy some commodities. If the facility to use a currency for further trade is the main reason that makes a currency become a vehicle, then the number of people willing to accept that currency is a crucial factor. Imagine that N people already accept a given currency, and that the (N+1)th agent also decides to accept it. The (N+2)th agent will find it even more convenient than the (N+1)th agent to accept the currency, since there is one more agent with whom s/he could expect to trade, and so on. This cumulative process leads to a situation where there is scope for very few (basically one) currencies to play the role of vehicle/international currency.

(b) The main factor for a currency to become a vehicle currency seems to be the economic size of the issuing country, because a lot of people involved in international

exchanges (the residents of that country) will accept it to start with. That is why the British Pound was an international currency under the British Empire and the US Dollar is an international currency nowadays. Clearly, other factors, such as the political and inflationary stability of the issuing country, have an important role in promoting the internationalization of a currency.

Problem 6. Assume that the domestic price level P is given by $P=(P_N)^{\alpha}(P_T)^{1-\alpha}$ and the foreign price level P* is given by $P^*=(P^*_N)^{b}(P_T)^{1-b}$ where P_N (P^*_N) is the domestic (foreign) price index for non-traded goods, P_T (P^*_T) is the domestic (foreign) price index for traded goods and α and b are positive parameters. The real exchange rate is defined as $\varepsilon = eP^*/P$.

(a) Show that if the law of one price holds for traded goods and if P^*_N/P^*_T is approximately constant, then variations of the real exchange rate ε can be mainly explained by variations in the ratio P_N/P_T. If the foreign country is a developed country, how reasonable if the assumption on P^*_N/P^*_T?

(b) The real exchange rates of transition economies such as the Baltic countries, Poland, the Czech Republic, have appreciated a lot vis-à-vis the dollar between the beginning of the 90th and now. Using your answer to (a) and what you learned from the Ballasa-Samuelson model, could you propose an explanation for what may happen in these economies? Will the real appreciation last forever? Why or why not?

Answer.
(a) If the foreign currency is a developed country, it is likely to experience slower technological change than some developing counties. If this is the case, then the relative price between its tradable and non-tradable goods will be fairly stable compared to the developing country.

(b) If the foreign country is a developed country, then its technology changes slowly and P^*_N/P^*_T does not vary a lot. If we make a rough approximation that the law of one price holds for traded goods, then all changes in the real exchange rate are caused by changes in P_N/P_T. As transition economies are "catching up", their productivity in the tradable sectors may well increase at a higher rate compared both to the developed world and to the productivity in their own non-tradable sectors. This would imply that P_N/P_T increases over time, which in turn implies real appreciation in these countries.
This appreciation will not last forever. It will stop when the productivity levels in the transition economies will become closer to the levels of developed countries.

Problem 7. The monetary approach to exchange rate determination and to Balance of Payments.
Consider an economy where all prices (including the exchange rate) are perfectly flexible and where the money supply m and the full employment level of output y^p are

constant. Assume that in the rest of the world income is constant over time at the full employment level of output y^{*p}, but money supply m^* might change. Assume that both PPP and uncovered interest parity always hold. Answer the following questions:

(a) Assume that at time t_0 there is a once-and-for-all fall in the foreign level of money supply. Can one unambiguously say what happens to the domestic price level p and to the domestic interest rate r at t_0 and in the future, without making assumptions about what happens to these variables in the foreign country (i.e. without making assumptions about the choice of a numeraire)? Can one unambiguously say what happens to the nominal exchange rate e?

(b) Next, assume that at time t_0 the level of foreign money supply m^* does not change but its growth rate falls for ever. What happens to the domestic price level p and to the domestic interest rate r at t_0 and in the future? What happens to the nominal exchange rate e?

(c) What would happen in (a) and (b) if the exchange rate were fixed at a given arbitrary level e'?

Answer.
(a) Since there is a once-and-for-all decrease in m^*, de = 0 at all times except in t_0. From UIP, this implies that $r = r^*$ at all t. Therefore, e jumps up at t_0. The behaviour of r and e is unambiguous. However, what happens to p depends on the numeraire that we choose. In principle we can only say something about $(p - p^*)$ – it will increase (from PPP). If we take domestic output as the numeraire (that is, if we assume that p does not jump), then p^* will jump downward. If instead we take foreign output as the numeraire (that is, if we assume that p^* does not jump), then p will jump upward.

(b) If we assume that the level of p^* is constant at any moment (i.e. foreign output is the numeraire), a change in the growth rate of m^* (μ^*) causes a jump in p to preserve PPP and a jump in r to preserve UIP.
If we assume that the level of p is constant at any moment (i.e. domestic output is the numeraire), a change in the growth rate of m^* (μ^*) causes a downward jump in p^* and r^*, where as p (by assumption) and r would not jump.
However, in either case the jump in would be that same: it does not matter what numeraire you take. Therefore, strictly speaking, the only variable that we can predict with certainty in this model at the moment of the change in policy is the exchange rate.

(c) If the exchange rate is fixed at e', in (a), a cut in m^* will bring about an equal cut in m. If domestic credit is unchanged, this implies a discrete loss in reserves.
In (b), the decrease in the growth rate of m^* causes a decrease in the growth rate of m. If domestic credit is unchanged, this will imply a continuous loss of reserves that will eventually result in a currency crisis.

Chapter 11. Mundell-Fleming Model – IS-LM-BP

Brief notes on the IS-LM-BP Model:
- This is an addition to the IS-LM (Mundell-Fleming) model.
- Only static effects can be considered with constant prices.
- Consumption refers only to domestically produced goods.
- There are three types of agents – households, firms and government.
- Government consumes only domestic goods.
- IS and LM lines are independent.
- Mobility of capital determines the slope of BoP line. Free capital mobility – horizontal BoP line, capital control – BoP line is vertical and equal to the Trade Balance line.
- For IS line exogenous variable is interest rate, for LM line exogenous variable is income.

Problem 1. Explain briefly why it is assumed (i.e. provide the intuition about economic behaviour underlying the assumption) that:

(a) IS curve is downward sloping in Y-r space;

(b) LM curve is upward sloping in Y-r space;

(c) IS curve shifts right (outward) for an increase in the exchange rate (a depreciation of the home currency);

(d) BP curve can be anything between horizontal and vertical depending on the degree of capital mobility.

(e) Given flexible exchange rates IS, LM and BP curves have to intersect at a single point.

(f) BP curve (if it is not horizontal) shifts right for an increase in the exchange rate.

Answer.
(a) The IS curve describes goods market equilibrium, where the demand for domestic output equals supply. It is assumed that desired investment (and sometimes also consumption) – a part of aggregate demand – depends negatively on the real interest rate. Therefore, given an increase in output (Y), a lower real interest rate (r) is required to increase demand for output and maintain equilibrium. This gives a downward sloping schedule in Y-r space.

(b) The LM curve describes money market equilibrium. Real money demand is assumed to depend positively on real income (we assume transactions demand for money; real income equals output by definition) and negatively on the nominal

interest rate (precautionary and speculative demand for money). Given an increase in Y (real income or output), a given level of M therefore requires that r be higher to choke off what would otherwise be an excess demand for money. This gives an upward sloping LM schedule in Y-r space.

(c) Net exports, one of the components of demand, are assumed to depend positively on the (real) exchange rate. For a given interest rate, therefore, a higher e is associated with a higher level of Y (aggregate demand). So, IS curve shifts to the right. For given exchange rate the national income will be higher.
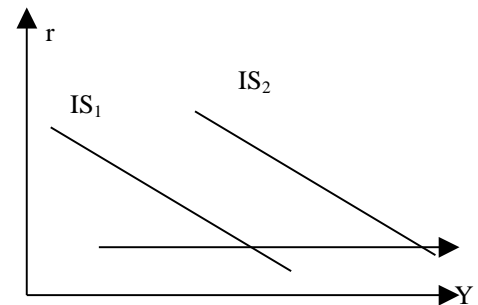
(d) If there is <u>zero capital mobility</u>, then capital account flows are zero and the BoP is entirely made up of the current account, which is assumed to be invariant to the interest rate (although this is typically not exactly correct). In that case the BP curve is vertical in Y-r space.

If there is <u>perfect capital mobility</u>, it is assumed that the BoP can only be in equilibrium if the domestic interest rate is equal to the foreign rate (if the risk premium is zero and the expected rate of change of the exchange rate is zero), so that BP is horizontal.
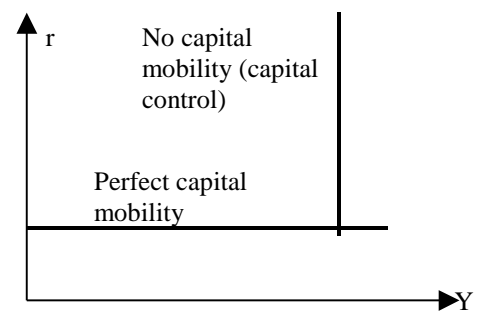
For <u>intermediate levels of capital mobility</u>, higher r produces capital inflows which can only be offset by higher aggregate demand, which raises imports and keeps the BoP = 0. So, for intermediate levels of capital mobility, BP is upward sloping.

(e) With flexible exchange rates, external balance (CA + KA = 0) is assured. So wherever the short run equilibrium (intersection of IS and LM) is achieved, it must be on the BP curve.

(f) For a higher value of e (depreciation of the home currency), net exports will be higher – it is assumed that the Marshall-Lerner condition holds. So, for a given level of r, the BoP can be kept equal to zero only if income (Y) is higher, so that imports increase enough to offset the increase in net exports caused by the depreciation. This means that BP curve shifts to the right.

Problem 2. Say whether the following statements are True, False or Uncertain. Explain your answer.

(a) If capital is perfectly mobile, monetary policy is more effective than fiscal policy.

(b) If the Marshall-Lerner conditions are not satisfied, then the slope of the BP curve is negative rather than positive.

(c) Switching from a fixed to a floating rate regime enhances the effectiveness of monetary policy.

(d) With flexible exchange rates and perfect capital mobility, a fiscal contraction has no effect on output.

Answer.
(a) **Uncertain**. Depends on the exchange rate regime. With flexible rates this is true, while with fixed rates the opposite is true.
Take a case of expansionary monetary policy, which shifts LM curve to the right. This results in a lower domestic interest rate, which causes capital outflow.
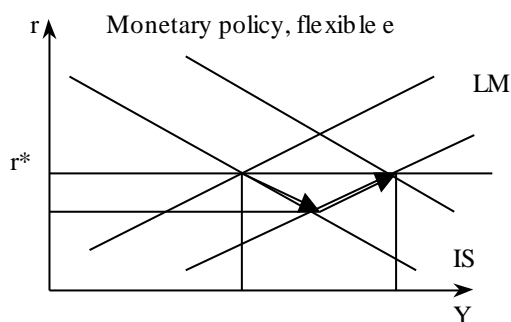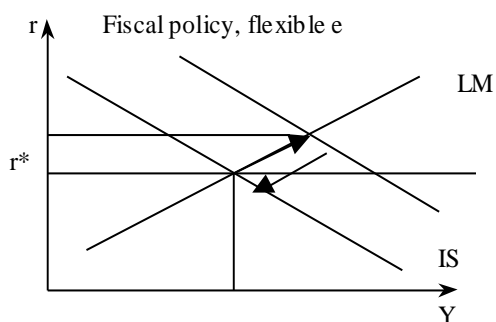
If the exchange rate is flexible, then the increased supply of domestic currency results in depreciation of it. This makes domestic goods more competitive on the world market and net export increase, so, IS curve shifts to the right until the equilibrium interest rate is again equal to the world interest rate. As a result, output increases and monetary policy is effective. But the fiscal policy is ineffective.
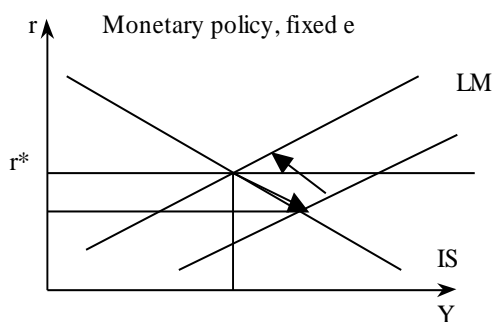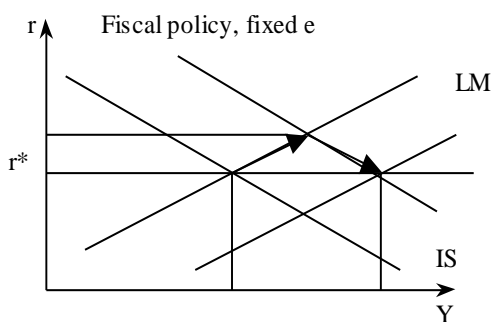

If the exchange rate is fixed, the increased demand for foreign currency causes a pressure on the FOREX market and the Central bank has to increase the supply of the foreign currency to hold the exchange rate fixed. Thus, the central bank accumulates domestic currency and reduces money supply. This leads to a shift of LM curve to the left until the domestic and world interest rates are equalised again. As a result, the

output is the same as before the change. And the monetary policy is ineffective. But the fiscal policy is, on the contrary, effective.

(b) **False**. The Marshall-Lerner condition determines the response of the BP curve to a change in the exchange rate, that is, the direction and extent to which it shifts, but not its slope, which depends on the income elasticity of imports and the interest rate elasticity of the capital account.

(c) **True**. Starting from initial equilibrium, regardless of the degree of capital mobility, a monetary expansion (rightward shift in LM) creates an incipient balance of payments deficit (the intersection of IS and LM is now to the right of, or below, BP) which is choked off via a rise in the exchange rate (depreciation of the home currency). But the rise in e shifts IS to the right, enhancing the initial increase in output brought about by the rightward shift in LM. With fixed rates, the expansion in output in the short term is where the new LM curve cuts the given IS curve, if capital mobility is imperfect, and if there is perfect capital mobility then the increase in money flows out instantly through the balance of payments (loss of reserves) and the LM curve shifts straight back to its original position (with imperfect capital mobility, this will also happen over time unless the authorities sterilize the loss of reserves, which they can do for a limited period, until reserves are run down to zero).

(d) **True**. The leftward shift in IS causes an incipient fall in interest rates (IS cuts LM below the horizontal BP curve) but by the assumption of perfect capital mobility, we know that this leads to instantaneous capital outflows that cause the home currency to depreciate, shifting IS back to its original position.
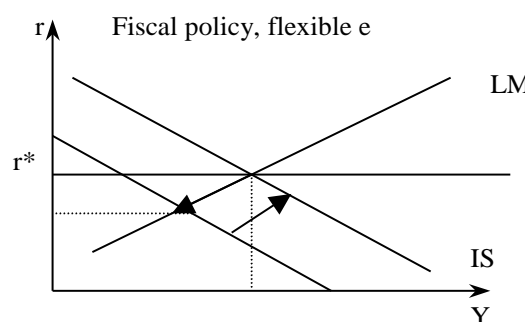

Problem 3. Use the IS – LM model to determine how a fall in the world rate of interest will influence domestic output under fixed and flexible exchange rates.

Answer. A decrease in the world interest rate will initially trigger a capital inflow and therefore increase the demand for domestic currency. The real consequences of this change in the demand for domestic currency depend on the exchange rate regime in operation.

Fixed exchange rate: money supply will increase and the domestic interest rate will decrease, fostering investment and promoting an increase in income.
It is important to understand the practical relevance of this exercise: it shows why in a currency union like the EMU, the monetary and fiscal policies of member countries need
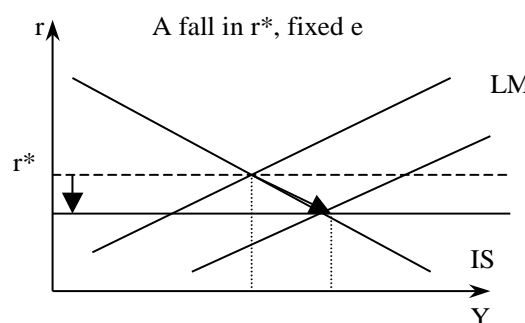
to be tightly coordinated. If one of the countries runs a large government budget deficit or follows too tight a monetary policy, it will have a very high interest rate and this will decrease income also in other member countries. Even a decrease in the interest rate in one of the member countries can have undesirable consequences for the rest of the countries if the latter are already near full capacity utilization, since it would spur inflation. This is one of the mail policy debates surrounding the creation of EMU.

Flexible exchange rates: money supply will not change and the nominal (and, with fixed prices, real) exchange rate will appreciate, creating a trade balance deficit (decreasing net export) and reducing output.


A fall in r*, flexible e
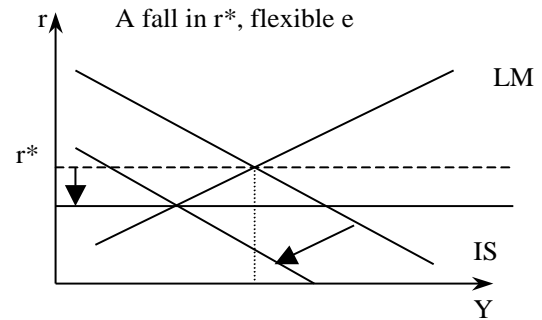
Problem 4. Use the IS-LM-BP diagram in (Y, r) space to draw an aggregate demand curve in (Y, P) space both under fixed and flexible exchange rates.

Answer.
Flexible exchange rates: a decrease in prices shifts the LM curve outwards, the IS curve follows (since its position is endogenous under flexible exchange rates) due to increased net export, and the economy ends up with higher level of output. Therefore, the AD curve is downward sloping.
Fixed exchange rates: a decrease in domestic prices shifts the IS curve to the right due to increased net export (because the country is more competitive), the LM curve follows (since its position is endogenous under fixed exchange rates) due to increased money supply, and the economy ends up with higher level of output. Therefore, the AD curve is downward sloping. The graph is generally the same. The difference comes in reasons, why IS and LM lines moves.
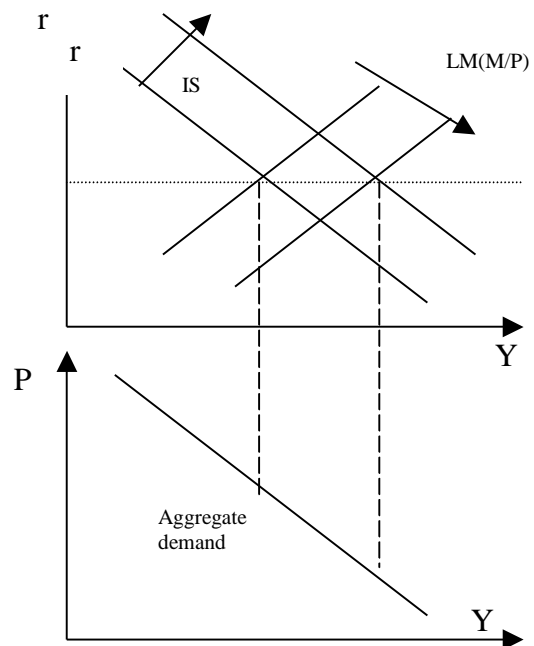

Problem 5. Suppose that there is perfect capital mobility and a fixed exchange rate regime. The government increases public spending (G) permanently. What are your predictions for output and the current account, if you use the IS-LM model?

Answer. An increase in government spending shifts the IS curve to the right. Since the domestic interest rate is above the world interest rate now, there is capital inflow given perfect capital mobility. This rises the demand for domestic currency (and rises the supply of foreign currency) and, hence, there is pressure on the FOREX market, but since the exchange rate is fixed, the government had to buy the excess supply of foreign currency (accumulate foreign currency reserves) by increasing the supply of domestic currency. As a result, the LM curve will shift to the right as well. So, there will be a higher level of output and no change in current account due to fixed exchange rate (capital account surplus is offset by the change in net foreign reserves of the government).
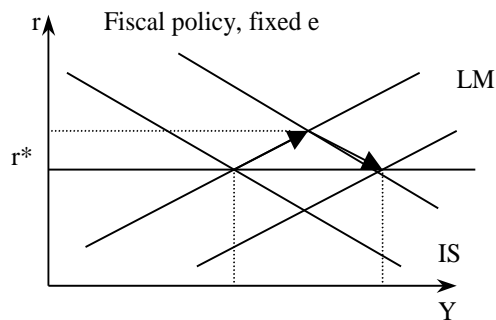
Problem 6. Suppose Russia can be characterized by fixed prices, low capital mobility, a flexible exchange rate regime, and loose monetary policy with tight fiscal policy after August 1998. Use the Mundell-Fleming model to explain whether these assumptions are consistent with the large increase in output, current account surpluses and capital account deficits seen in 1999-2001.

Answer. The subtle thing in thins problem that balance of payment line should be flatter, than IS, in spite of the claimed low capital mobility. In this case it is possible to make a draw, which is consistent with the problem. But this requires very steep LM line, what make restrictions on the demand for money.
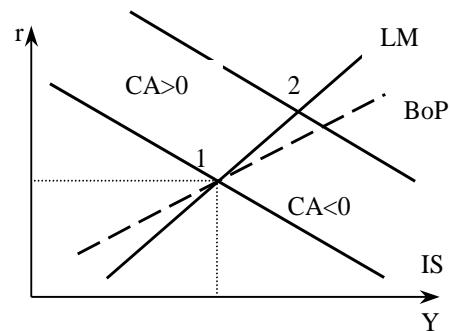
Chapter 12. The AA-DD model

Problem 1. A decline in investment reduces aggregate demand for any given exchange rate, so, DD curve shifts left. True, false or uncertain?

Answer. **True.** The model AA-DD assumes only autonomous investments, which are independent of the interest rate and nominal exchange rate. So, a fall in I will not change the slope but will reduce the aggregate demand. This means that DD curve will shift to the left.
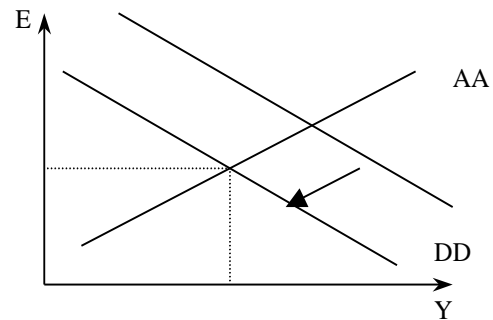
Problem 2. Assume that the government follows balanced budget al the time. This means that changing government spending requires the same change in taxes. Does this mean that the government can no longer use the fiscal policy to adjust output and unemployment?

Answer. A balanced expansion of government expenditure and taxation to finance it will result in higher aggregate demand. This is because the increase in taxation reduces after-tax income by T, but only reduces consumption by cT, where c is the marginal propensity to consume (c<1). This is the multiplication effect of income, when public does not only consume, but also invests.
As a result, government spending will increase by more than consumption decreases. So, the aggregate expenditures will increase which leads to increased output and reduced unemployment.

Problem 3. How does a permanent cut in taxes affect the current account? What about a permanent increase in government spending?

Answer. The both actions represent fiscal expansionary policy. A permanent fiscal expansion both shifts the DD curve out (right) and the AA curve down.
If the initial equilibrium is characterized by a zero current account balance, then XX curve passes through that initial point and does not shift. As a result, the new equilibrium is below the XX curve and the new short run equilibrium is characterized by a current account deficit. If the expansion is temporary, only DD shifts, but it remains true that there is a current account deficit in the new short run equilibrium.
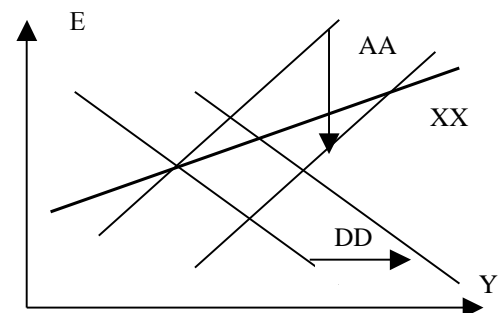
Problem 4. There is an observation that when currency depreciates the current account worsens at the same time. What data do you need to claim that this is the J-effect? What other effects can generate the same effect, even if there is no J-effect?

Answer. A combination of currency depreciation and deterioration of the current account balance is not necessarily a reflection of a J-curve. For example, a worsening of demand for domestic goods relative to foreign goods shifts the XX and DD curves upward, resulting in a new SR equilibrium in which exchange rate is higher and the current account is negative.

To distinguish between a J-curve effect and this sort of case, one could look at trade volumes. The J-curve is characterized by falling import volumes and rising export volumes (with the initial worsening of the current account explained by the rising price of imports), while in the case described above, export volumes would be falling and import volumes rising.
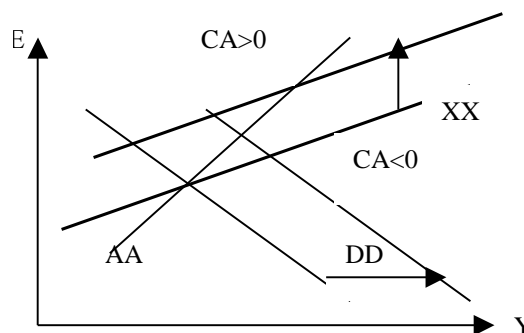
Problem 5. Many economists put part of the blame for the persistent US current account deficit of the late 1980-s on the apparently small size of the relative price change between US import ant exports. However we can link the slow current account adjustment to private and government saving behaviour. Give a unified account of the current account data, reconciling both price and expenditure effects.

Answer. The two effects described – lower public and private net savings on the one hand and the lack of relative price adjustment on the other – can be combined to explain the large persistent current account deficits of the US in the late 1980s. Lower public saving represents a fiscal expansion, which can be analysed using AA-DD in the usual way – DD shifts out to D'D' (see 3rd diagram in attachment) generating higher income and an appreciation of the currency.

At the same time, if there is a lack of relative price adjustment, this means that D'D' becomes steeper: aggregate demand is less sensitive to the exchange rate. Thus with the steeper DD, the short-run equilibrium is "further" from the XX curve: the exchange rate is lower and income higher. So the current account deficit can be higher than it would be if the slope of the DD curve had not increased. Thus the effect of the lack of relative price adjustment can be seen as adding to the effect of the lower public and private savings in creating and sustaining a current account deficit.
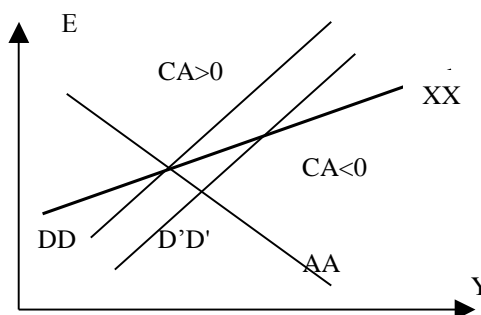
Problem 6. What does the Marshall-Lerner condition look like if the country whose real exchange rate changes does not start out with the current account of zero?

Answer. Define a variable z such that $z = eX^*/X$, that is, the ratio of imports to exports measured in common currency. You can totally differentiate the equation $CA = X - eX^*$ and show that $dCA/de > 0$ if $\eta_x + z\,\eta_m > z$. The standard simplified Marshall-Lerner condition is the special case of this when $z = 1$. If $\eta_m < 1$, then a depreciation is less likely to improve the current account the larger is the initial deficit. Conversely, it is more likely to improve the current account the larger is the initial current account surplus, again if $\eta_m < 1$.

Problem 7. Suppose that interest rate parity does not hold exactly but the true relationship is $R = R^* + \dfrac{E^e - E}{E} + \rho$, where ρ is a term measuring the differential risk of domestic versus foreign deposits. Suppose, a permanent rise in domestic government spending by creating the prospect of future government deficits also raises ρ, making domestic currency deposits more risky. Evaluate the policy's effect on output in this situation.

Answer. A permanent increase in government spending shifts both AA and DD down (AA because the long-run e is lower, DD because the increase in G increases aggregate demand). In the absence of the risk premium, these shifts are such as to leave output unchanged at its full employment level, if that was the initial equilibrium. An increase in the risk premium, however, shifts AA upward (for given e,

investors require higher r, so higher Y and associated money demand). So, given a combination of a permanent fiscal expansion and an increase in the risk premium, AA does not shift downward by as much as DD. Thus, the short run equilibrium is at a point with higher output (and e).
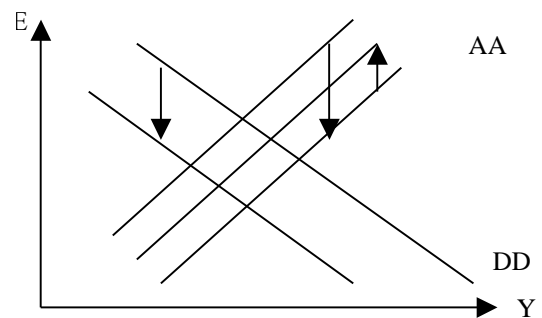
Chapter 13. The International Monetary System

Problem 1. Explain what is meant by the following:

(a) External balance;
(b) Internal balance;
(c) A currency board;
(d) The price-specie flow mechanism;
(e) The Bretton Woods Agreement;
(f) The N-1 problem;
(g) An optimum currency area.

Answer.
(a) Originally, <u>external balance</u> was conceived of as a zero current account balance (CAB). But there is in fact no magic to a zero CAB, no reason to expect it uniquely to correspond to equilibrium at any point in time, although it is the case that the net present value of all future CABs should be zero, otherwise there is an unrequited (uncompensated) transfer of resources from one economy to another over time. So, a country can run a temporary external balance deficit, but it cannot run it forever. More generally, therefore, external balance corresponds to some level of the CAB that is targeted by the authorities, perhaps because they think that this is the level that corresponds to fundamental equilibrium.

(b) <u>Internal balance</u> refers to the attainment of full employment output, together with price stability. Theory suggests that if demand is greater than its full employment level, the price level will tend to increase (at an increasing rate), while if it is lower prices will tend to fall (at an increasing rate). By maintaining internal balance, the authorities both prevent welfare losses arising from under- or over-employment of resources, as well as those arising from an unstable price level.

(c) A <u>currency board</u> is a type of fixed exchange rate regime in which there is a rigid rule (often implemented in a law) preventing any expansion of domestic credit by the monetary authorities. In addition, the stock of currency outstanding is generally fully "backed" by international reserves held by the monetary authorities, giving full confidence that all currency in circulation can be exchanged at the mandated exchange rate on demand. This means that if the monetary authority holds $10m and the mandated exchange rate is 1, then there are exactly 10m units of domestic currency in circulation. Under a currency board, the change in the monetary stock is entirely dependent on the balance of payments: since M = NIR + NDA, and changes in NDA are ruled out, then changes in M correspond to changes in NIR. At the moment currency board policy in implemented at Lithuania, Bulgaria. It used to be implemented at Argentina, however, this policy did not prevent the country from the currency crisis.

(d) <u>The price-specie flow mechanism</u> is the mechanism by which external balance is

established under the gold standard. "Specie" is an archaic term for money in metallic form. Under the gold standard, if a country had a Balance of Payments deficit, then there would be an outflow of gold. Thus, the money supply would decline, and the price level would be forced down. This would make goods of that country more competitive, so that imports would fall and exports rise. That would tend to correct the original Balance of Payments deficit. Likewise, a surplus country would see its money supply increase.

(e) The Bretton Woods Agreement refers to the 1944 agreement reached at the Bretton Woods Conference (BW is a place in the north-eastern US state of New Hampshire) establishing the post-war international monetary system. The agreement established the International Monetary Fund (IMF) as the institution to monitor and police the new system. Under the agreement, the US would peg the dollar to gold at $35 an ounce, and all other currencies would be pegged to the dollar. The system is therefore variously referred to as a gold exchange or dollar exchange system.

You may wish to note that the Bretton Woods conference also established the World Bank, and discussed Keynes' idea of an International Trade Organization (which was scaled down to become the GATT, which eventually became the WTO, something close to what Keynes wanted).

Originally the Soviet Union was present at Bretton Woods and almost signed. Eventually, however, Stalin refused to participate, and other communist countries followed suit.

The failure of the Bretton Wood agreement happened after US expansionary fiscal expenditure in the Vietnam war, what undermined the market exchange rate of US dollar to other currencies.

(f) The N-1 problem occurs when an exchange rate system is based on one currency, as the Bretton Woods system was. Then if there are N countries, only N-1 exchange rates are independent. (Note that there are more total exchange rates than this: N(N-1)/2 in fact. So, if there are 4 countries, there are 6 exchange rates, but only 3 independent exchange rates). This means that at least one country has to forego using the exchange rate to achieve external balance. The problem appears from arbitrage and free international movements of goods and capital.

(g) The term "an optimum currency area" was invented by Mundell of Mundell-Fleming fame to designate the area within which it is optimal for a currency to be shared. The basic insight of Mundell was that the greater are some features of an area, the more desirable it is for it to have a single currency. These features include mobility of labour and capital within the area, as well as intra-region trade integration. In general, the more similar are the movements in output and prices between different units of the area, and the more flexible are markets, the more likely there are to be net gains from adoption of a single currency.

(g) One interesting point is that some of these features may be endogenous: that is, adopting a common currency may lead to greater integration, "creating" an optimal

currency area, where before there was none.

Problem 2. Explain how the Russian government's target for external balance should be affected by the following events and why:

(a) Due to one of those minor and temporary wars in the Middle East, the price of oil rises.

(b) Due to the introduction of new alternative energy sources, the price of oil falls.

(c) A major new field of natural gas is discovered in the Caspian Sea (the part on Russian territory).

Answer.
(a) If the price rise is temporary, then the effect on permanent income will be small, and almost all of the windfall gain from the price rise should be saved. In that case, absorption should not be increased in line with the increase in income, so that the government will have a higher target for external balance. However, there are some problems with implementation of this policy: it takes time to implement the policy and there may be lobbies, who will oppose the policy. So, if the price increase is temporary the government target may not change.

(b) In this case, the fall in price can be considered permanent. That means that permanent income falls, and domestic absorption should fall by a similar amount, so that the target for external balance is unchanged. The fall of domestic absorption may fall slower due to lags in dissemination of new technologies. So, in the short-run no-change-policy will be suboptimal.

(c) In this case, we have an increase in permanent income without, in the short run, any increase in current income, since the gas fields will take time to develop. Since permanent income rises, however, absorption should rise, and so the government's external balance target should be lower.

Problem 3. A simple model of capital flight. Assume that a country maintains its exchange rate pegged to the Dollar by intervening in the foreign exchange market if necessary. Let i be the domestic interest rate, i* be the US interest rate (exogenously given), E be the nominal exchange rate (defined as the domestic price of one unit of foreign currency) and E_0 be the level at which the exchange rate is pegged. There is perfect capital mobility and prices are completely flexible.

(a) Draw the equilibrium on the domestic money market (domestic interest rate i on the horizontal axis and the real money holdings on the vertical axis). The real money supply will be denoted by M/P and the real money demand by L.

(b) Can the domestic country peg its exchange rate at E_0 and pursue an independent monetary policy (i.e. can it fix M/P arbitrarily on the graph)?

(c) What can happen if market participants suddenly expect the domestic currency to depreciate by a very large amount? What could trigger this change in expectations?

(d) Assume the domestic country had to devalue its currency. What happens if it was heavily indebted in Dollars? Does heavy foreign debt make things worse?

(e) What is the main difference between the capital flight model analysed here and the classical balance of payments crisis model (Krugman model)?

Answer.
(a) The money market diagram has a downward sloping money demand curve and a horizontal money supply curve.

(b) No, it is possible to do either, but not both. If the peg is credible UIP implies that i = i* and therefore the money stock is determined by i*.

(c) The shift in expectations triggers an increase in the domestic interest rate and, for the need to re-establish equilibrium in the money market, a drop in the money supply through a fall in reserves (i.e. the horizontal money supply curve has to shift down). At the old interest rate the new expectations of devaluation increase the expected return of foreign assets relative to domestic assets and, therefore, trigger capital outflows. As the central bank defends the exchange rate it will be loosing reserves and thus contracting the domestic money supply, which in turn will drive up the domestic interest rate until UIP is satisfied again. Such a shift in expectations could, for example, be caused by unfavourable political events.

(d) The value of foreign currency debt in terms of domestic currency goes up, which in turn could cause a banking crisis as banks face insolvency (this seems to be a very important effect in the Asian crisis). Therefore, the presence of high foreign debt can actually make things worse.

(e) In the classical BOP crisis model the crisis is driven by fundamentals. There is a clear policy inconsistency (between the peg and the continuous expansion in the domestic credit) which results in the continuous loss in reserves. Speculators attack the peg before it would break down anyway by itself and are in that sense "not guilty". In the model in this question the shift in expectations is completely arbitrary. If the speculators do not expect devaluation, everything is fine and the peg continues. If they, however, loose confidence in the currency, domestic interest rates will have to rise to defend the peg. If this rise in interest rates is sufficiently costly for the government in terms of reducing demand in the economy or triggering bank failures, the government will validate the expectations and devalue.

Problem 4. Discuss the following statement: "Fixed exchange rate systems are inherently prone to crises, and so inferior to flexible rate systems".

Answer. A good answer might first assess whether being crisis prone necessarily means that fixed exchange rate systems are inferior. The answer is no. Currency crises are clearly best avoided, but in principle the net benefits from a fixed exchange rate regime could outweigh the costs of occasional currency crises. You should then go on to discuss the more general arguments in the fixed versus flexible rates debate: for example, whether floating rates are accompanied by destabilizing speculation and/or excess volatility; whether misalignments under floating rates lead to an increase in protectionist pressures; whether credibility of the monetary authority's commitment to price stability is enhanced by a fixed exchange rate; whether floating rates add to the costs of international trade (via the need to engage in hedging, which has associated costs); etc.

It could be mentioned that a strong form of the argument stated in the question is that, in a world of free capital movements, fixed rate systems are not even feasible, since they cannot be credibly defended and therefore eventually come under successful attack.

Problem 5. Outline and discuss the problems involved in designing a sustainable system of fixed exchange rates.

Answer. Fixed rate systems face problems of real shocks (e.g. permanent deterioration in a country's terms of trade or a shift in demand to another country's goods) that require deflation, devaluation or a system of fiscal transfers to adjust. Deflation tends to be costly in terms of output and employment, given lack of downward flexibility of wages and prices. Fiscal transfers are hard to design and get agreement on.

Given costs of deflation, absolute commitment to fixed parities (as under the Gold Standard) may not be credible – markets may bet that authorities will prefer to leave system rather than accept necessary deflation. Speculative attacks worsen deficits of deficit countries, hasten process.

If some flexibility is included to allow countries to change exchange rate in case of such shift in "fundamentals", there is the problem of deciding when this will be permitted. As ER is often taken as symbol of authorities' commitment to responsible policies, often wait too long to change ER. Prone to speculative attacks – as markets see conditions for devaluation gathering, face "one-way bet" on selling currency. In modern world, with high international capital mobility, vast sums are available for such attacks (leveraged hedge funds etc.).

If the fixed exchange rate system is asymmetric, have n-1 problem – anchor country has to maintain desired level of inflation for the system. Bretton Woods largely broke down because US monetary policy was perceived as too inflationary for other members (especially Germany).

Problem of how wide to set "intervention bands". Trade-off – wider bands easier to

defend, less likely to provoke speculative attack, but give less advantages from fixity (stable price signals, reduced risk from exchange rate variability). Under Bretton Woods, +/-1%. In early EMS, +/-2.5%. At end of EMS, had to widen to +/-15%. Function of greater international capital mobility referred to above.

If system is symmetric, need mechanism to ensure symmetric response to shocks. Surplus and deficit countries each have to adjust. Coordination can be hard to organize – often has aspects of a Prisoner's Dilemma strategic game where one or more of the players has an incentive to choose the non-cooperative solution.

Taken together, problems make it hard to envisage a feasible system of fixed exchange rates today.

Problem 6. Discuss the possible costs and benefits of Russia joining the European Monetary Union.

Answer. Theory of optimal currency unions suggests that net benefits depend on:
- extent to which Russia and EMU are subject to asymmetric shocks. Greater divergence of shocks means lower benefits from Russia joining EMU. There is a significant difference between Russia and European countries – Russia is a big oil exporter, while all EMU members are oil importers.
- degree of price and wage flexibility. More flexible means lower costs to dealing with asymmetric shocks. Russia is considered to have low wage flexibility, though this is arguable.
- similarity of legal systems. Even similar shocks get transmitted differently with different legal systems. Russia is probably not too different from most EMU members in substance of systems, but there are major doubts about how property rights are actually enforced in Russia. So, there are greater differences in practice.
- similarity of labour market institutions. The same as with legal systems. Russia does not have similar labour market institutions to Western Europe.
- degree of trade integration. Greater integration means higher net benefits to Russia joining EMU. Russia is as integrated with the EMU in trade as some EMU members (e.g. Greece).

Other considerations:
- Preferences over inflation/use of segniorage. At the beginning of 00-s Russia had higher inflation, but lower money base, so there is still low segniorage.
- If exchange rate changes are thought to be ineffective or effective only in the very short term in adjusting to shocks, then costs to losing the exchange rate mechanism are not great. Note that experience of Russia after 1998 suggest that the effects of nominal depreciation can be large and quite lasting.
- According to the EMU entry criteria (some of which Russia already meets), Russia would have to reduce inflation and interest rates before joining. Depending on speed and other circumstances, such disinflation could be costly in terms of output.
- Participating in EMU would bring Russia share of segniorage from Euro's use as an international currency.