

Exam - Solution Manual

ECON 2610 - Strategy, Competition and Trade

Fall 2024

Each question is weighted as indicated. Subquestions within each question are weighted equally. Many answers in this manual is collected from the textbook *International Economics Theory and Policy* (Krugman, Obsfeld and Melitz, 2023)

Question 1 (20%)

Explain the following:

In each of these exercises, the candidate is supposed to at least give the formal definition. Some candidates may also give an example. An answer without an example, but with a correct definition, gives full score. An answer with a wrong definition, but a correct example, does not give full score, but some score. The formal definition does not need to be the exact wording of this manual.

(a) Comparative advantage

Definition: The country with the lowest opportunity cost of producing a good has a comparative advantage in that good. Opportunity cost is defined as the lowest loss of other alternatives when one alternative is chosen.

A good candidate may also point out that; A country must have a comparative advantage in something; A country can't have a comparative advantage in both goods. As well as give an example.

(b) The Stolper-Samuelson theorem

Definition: If the relative price of a good increases, then the real wage or rental rate of the factor used intensively in the production of that good increases, while the real wage or rental rate of the other factor decreases.

(c) External economies of scale

Definition: The cost per unit of output depends and specifically is decreasing in the size of the industry. The larger the industry's output, the lower the price at which firms are willing to sell. This leads to a downward-sloping average cost curve, which can be interpreted as a downward-sloping supply curve for the industry.

A (good) candidate may also add: An industry where economies of scale are purely external will typically consist of many small firms and be perfectly competitive. External Economies of Scale can be due to; specialized equipment or services may be needed for the industry, but are only supplied by other firms if the industry is large and concentrated; Labor pooling: a large and concentrated industry may attract a pool of workers, reducing employee search and hiring costs for each firm; Knowledge spillovers: workers from different firms may more easily share ideas that benefit each firm when a large and concentrated industry exists.

(d) Internal economies of scale

Definition: The cost per unit of output depends and specifically is decreasing in the size of a firm. Internal economies of scale imply that a firm's average cost of production decreases the more output it produces. Moreover, Internal Economies of Scale break down perfect competition, because large firms have a cost advantage over small firms, causing the industry to become imperfectly competitive.

Question 2 (20%)

Consider a small economy consisting of two sectors A and B, each producing one good. There are two factors of production, Labor (L) and capital (K). In this question, we will consider the short run, such that capital is assumed to be fixed and cannot be moved between sectors.

For each sector s , the following condition holds:

$$w = p_s \cdot MPL_s(K, L_s)$$

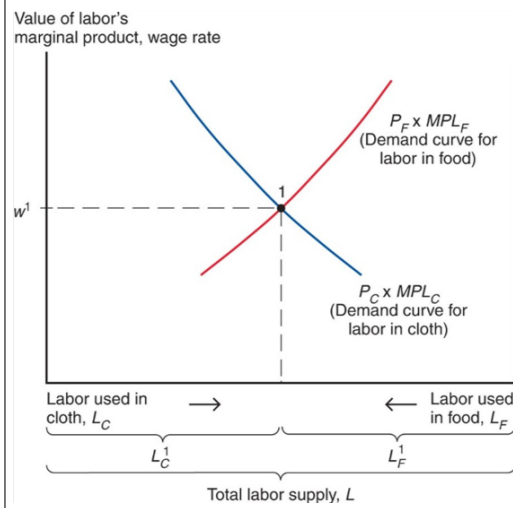
w is the wage, p_s is the output price, and MPL_s is the marginal product of labor. We make standard assumptions, in particular that marginal return of labor is decreasing in labor use.

(a) Use a figure to illustrate the optimal allocation of labor between the two sectors.

With help of the figure, explain the condition that determines how labor is allo-

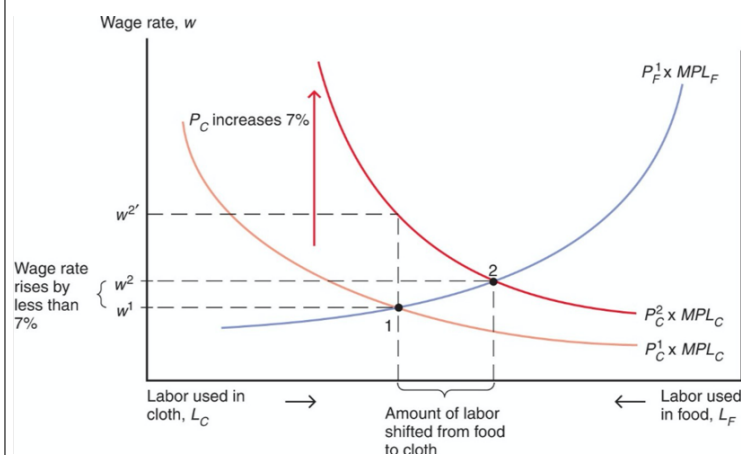
cated in equilibrium and how the wage is determined.

The candidate should draw a figure like the one below, just for the case described in the exercise. The condition for labor allocation is $p_A \cdot MPL_A(K, L_A) = p_B \cdot MPL_B(K, L_B)$. The candidates should explain that the two sectors must pay the same wage because labor can move between sectors. If the wage were higher in one sector, workers would move from the other sector to the one with a higher wage until the wages become equal. Where the labor demand curves intersect gives the equilibrium wage and allocation of labor between the two sectors.



- (b) Assume that sector B is subsidized, leading to an increase in the price of the good produced in sector B. How will the shift change the wage, and the allocation of labor between the two sectors? How is the subsidy affecting the efficient allocation of labor between the two sectors? Use a similar figure as in the last question to explain your answer.

The candidates should use the figure from the last exercise and show a shift in the demand for labor in sector B (similar to the figure below. The figure below is a slightly different setting where there is a change in the price of the C good, but the effect is similar). As a result of the subsidy, the wage goes up and labor is reallocated from A to sector B. A good candidate will explain that the wage will not shift up as much as the subsidy, since there will be a new equilibrium in point 2 in the figure below. This is the point where the new demand curve (with the subsidy) of sector B again is equal to the demand curve of sector A. The candidate should show the efficiency loss given as the triangle from point 1 and up to the new labor supply curve of sector B, and to the new equilibrium point w. This is the deadweight loss. Due to the subsidy, too much labor is allocated to Sector B.

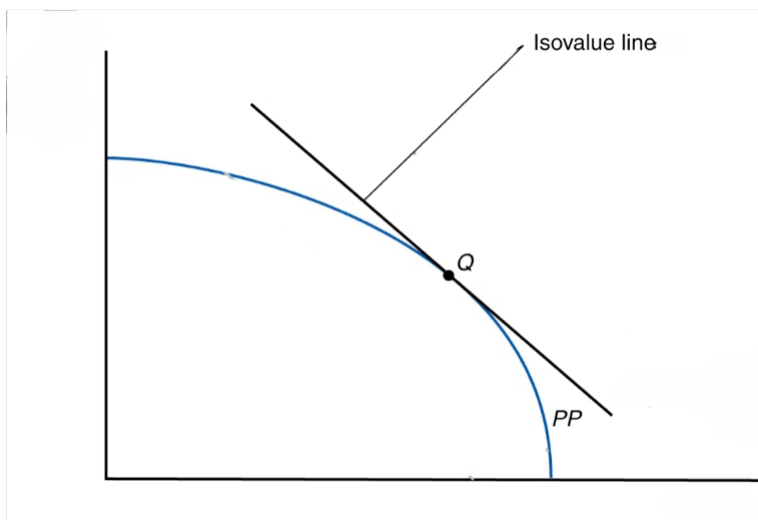


Question 3 (40%)

There are two countries, Home and Foreign, producing two goods, X and Y, using two factors of production: capital and labor. Both countries have access to the same technology and have the same tastes in consumption for the two goods. The country Home is labor-abundant, meaning it has a larger proportion of labor relative to capital compared to the country Foreign. Additionally, good Y is capital-intensive, requiring more capital relative to labor, while good X is labor-intensive.

In this question, starting from (a), the axes were wrongly labeled in the text. In Question 3a it is written “In the figure, the vertical axis measures the quantity of good X, and the horizontal axis measures the quantity of good Y.” This was typo, and it should have been “In the figure, the vertical axis measures the quantity of good Y, and the horizontal axis measures the quantity of good X.” When grading the exam, please take this into account. In particular, for question (a), given the axis, the slope of the isovalue line stated in the question is wrong. Still, in this exercise, the students should be able to explain the figure. For the following exercises, and especially (c) and (d) it should be considered that the typo may have confused the students. Please keep this into account when grading. In (c), the students should still be able to shift the PF curve in the right direction. Even though the slope of the Isovalue line is wrong given the axis, in exercise (c), the slope of this curve does not change, so the students should still be able to find the new production point. For the last part in exercise (d), however, given the wrong slope of the price curve, students may shift the slope in it the wrong direction. This should be considered when grading and not be punished.

- (a) Assume that the country Home is operating in the world market and that the output prices P_X and P_Y are exogenous. The figure below shows the production possibility frontier (PP) in the country Home as well as the Isovalue line. In the figure, the vertical axis measures the quantity of good X, and the horizontal axis measures the quantity of good Y. The slope of the Isovalue line is the relative price of the two goods: $-P_X/P_Y$. Explain what the PP curve and the Isovalue line are showing. Next, what characterizes point Q and what does it imply.



The PPF curve shows all combinations of output where all resources in the economy are used. At the point where the curve is crossing an axis shows how much would be produced if all resources are allocated to produce one of the two goods only. The PPF is bowed/curved since in this case, production can substitute one unit of input for another in the production process. The slope of the curve represents the opportunity cost of producing one of the two goods in the other, and the opportunity cost is increasing in production.

The Isovalue line represents a constant value of production. That is, at all points of the line, the value of a combination of output is the same. The slope of the line represents the relative output prices of the two goods.

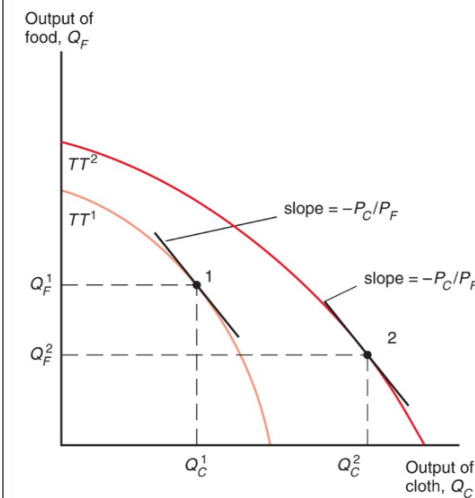
The economy produces at the point that maximizes the value of production given the prices it faces; this is the point on the highest possible Isovalue line given the production possibilities. This point will be where the slope of the Isovalue line is equal to the slope of the PPF, such that the Isovalue line is tangent to the PPF. At that point, the opportunity cost of one good in terms of the other good is equal to the relative price of the two goods. In the figure, this is point Q, which will give the optimal production combination given the output prices.

- (b) The two countries Home and Foreign are trading. Which goods will the two countries export?

The candidate should refer to the Heckscher-Ohlin theorem: The country that is abundant in a factor exports the good whose production is intensive in that factor. Hence, since the Home country is labor-abundant, it will export good X, which is labor intensive. While the Foreign country is capital-abundant, it will export good Y, which is capital intensive.

- (c) Assume an increase in the country Home's labor supply, increasing the stock of labor in the country. For the given set of output prices, use the figure to explain how the increased labor supply changes the supply of goods in the country Home.

The labor force grows, which implies that L/K increases. The candidate should draw a similar figure to the one below, but for the setting in the exercise (the goods are X and Y, not A and B). The candidate should explain that an increase in the supply of labor shifts the economy's production possibility frontier outward disproportionately in the direction of X production (C production in the figure below). This is because X-production is labor intensive. At unchanged relative prices, Y production declines and X production increases. A good candidate should as well as drawing the figure and explaining, refer to the Rybczynski theorem: If you hold output prices constant as the amount of a factor of production increases, the supply of the good that uses this factor intensively increases and the supply of the other good decreases.

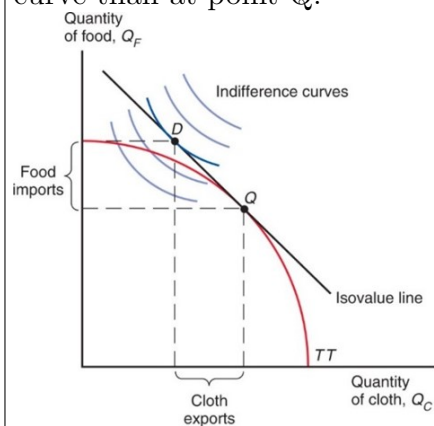


- (d) In this question, we assume that country Home has standard preferences where utility increases with the consumption of both goods X and Y, and marginal utility diminishes with increased consumption of each good. Hence, the indifference

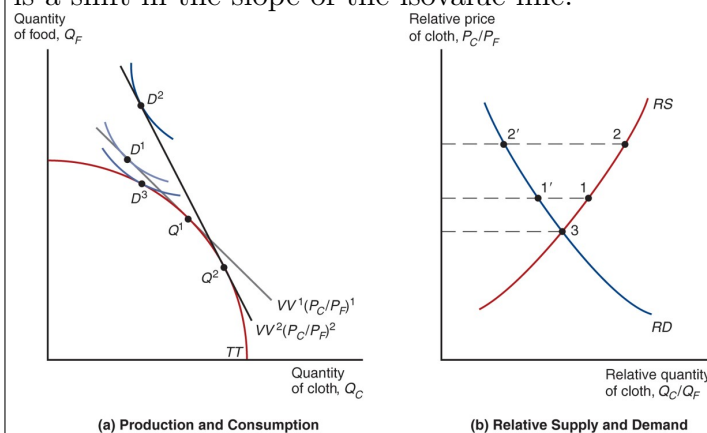
curves are downward sloping.

Country Home obtain utility of consuming the two goods X and Y. Trade makes the country able to separate production from consumption. With the help of a similar figure as earlier, demonstrate and discuss how the separation of consumption and production increases utility. Next, in the same figure, show how a relative increase in the price of good X changes production, consumption, and the utility level of the country Home.

To answer the first part of the question, the candidate should again draw a similar figure to the one below. The economy produces at point Q , where the production possibility frontier is tangent to the highest possible isovalue line. Without trade, consumption needs to be equal to production, hence in point Q . When Home can separate consumption from production, it will consume at point D , where that isovalue line is tangent to the highest possible indifference curve. The economy produces more of good X than it consumes and therefore exports good X ; correspondingly, it consumes more of good Y than it produces and therefore imports good Y . The candidate should point out that point D is at a higher indifference curve than at point Q .



Next, to discuss the price increase of good X and the gains from trade, the candidate should make another figure like the left panel of the figure below where there is a shift in the slope of the isovalue line:



In response to the price change, production shifts from Q_1 to Q_2 , and the country will produce more of good X and less of good Y . Consumption shifts from point D_1 to D_2 . D_2 is at a higher indifference curve than D_1 . The candidate is not expected to draw or make comments according to the right panel of the figure below. However, the intuition is that the effects of the rise in the relative price of X on relative production (move from ⁹1 to 2) and relative demand (move from 1 to 2).

Question 4 (20%)

Consider the following normal-form game.

	L	C	R
U	1,1	4,0	5,0
M	0,4	3,3	6,2
D	0,5	2,6	5,5

Player 1 choose between U, M and D, while Player 2 chooses between L, C, and R. Payoffs are given as (x, y) , where x is Player 1's payoff and y is Player 2's payoff.

- (a) Explain how to determine the set of rationalizable strategies for each player.

Which strategies are rationalizable for each player?

D is strictly dominated by U with a probability of $1/2$ and by M with a probability of $1/2$. R is strictly dominated by L. When D and R are removed, M is strictly dominated by U and C is strictly dominated by L. Therefore: U and L are rationalizable.

- (b) Determine the unique Nash equilibrium in this game.

(U, L) is the unique Nash equilibrium.