Exam 2019

1. 20 % - Up to 6,7 points for each of these three.

   There are two main models used to explain the consequences of trade, when trade is based on comparative advantage. These are the Ricardian model and the Heckscher-Ohlin model (Ricardo-Viner is the short-run version of Heckscher-Ohlin).
   a. Explain, in words, what determines comparative advantage in the Heckscher-Ohlin model, and how this differs from the Ricardian model.

      Answer:

      The student should mention very briefly that the difference is that comparative advantage is based on differences in technology (or productivity) in the Ricardian model and access to resources in the Heckscher-Ohlin model.

   b. In the Ricardian model, trade leads to full specialization. This is not the case in the Heckscher-Ohlin model. Explain, in words, why trade does not lead to _full_ specialization in the Heckscher-Ohlin model.

      Answer:

      The student should explain briefly that we assume a diminishing marginal product (of both factors) and factor substitution in the Heckscher-Ohlin model, and how this impacts the shape of the ppf and the pattern of production.

   c. Explain, in words, why countries gain from trade when they specialize according to their comparative advantage.

      Answer:
      The student should mention briefly that the gains are more efficient use of resources and a separation of production and consumption (increasing welfare due to a higher tangent indifference curve).

2. 25 % - Up to 8,3 points for each of these three. It should be ok if important remarks are mentioned under any of the three exercises.

   Assume that a country produces wine and cars, using labor and capital. Also assume that the country is relatively abundantly equipped with labor and that wine production uses labor more intensively than car production. Furthermore, both factors are assumed to be mobile (we are in the long term).
   a. Explain and illustrate (using one figure) the long run consequence of going from autarky to trade, on production, consumption and welfare.

      Answer:

      Illustrate the figure with concave ppf, cpf and indifference curve. The country's ppf should be skewed towards the wine sector and the student should explain that this is because the country has a comparative advantage in this sector due to relatively abundance of labor. The illustration must show that the pattern of production will become more specialized towards the wine sector with trade and it must be explained that this is because of an increase in the relative price of wine.

b. Explain, in words, the long run consequence of going from autarky to trade on the distribution of income between the two factors of production.

Answer:
This is the Stolper-Samuelson theorem. The real return to labor will increase, and the real return to capital will decrease. The question only asks for the long run consequence, so it is not necessary to explain the transition from short to long term (it shows more understanding and is a bonus if the student "lies" between two grades).

c. Assume that the access to labor increases. Explain and illustrate (using one figure) the long run consequence of increased access to labor on production, consumption and welfare.

Answer:
Increased access to labor will cause an export biased growth in the PPF (as wine production is intensive in labor the increased production possibilities of wine is larger than the increased possibility of producing cars). As the country is small, prices will not be affected by a change in supply. The relative price will be equal as before (terms of trade is unchanged), but consumption possibilities will increase as production possibilities increase. The illustration should clearly show an increase in the production of wine and a tangency point between the CPF and indifference curve that is higher than before.

3. 30 % - Up to 10 points for a) and 6,7 points for each of the three under b). It should be ok if important remarks are mentioned under any of the three exercises.

In addition to comparative advantage, economies of scale can explain patterns of international trade.

a. Explain, in words, the difference between external and internal economies of scale. Provide two examples of each.

Answer:

Economies of scale are characterized by declining average cost when production increase.

- **External economies of scale** is related to the benefits that a firm get from a lower average cost when being part of a larger industry. These benefits are related to:
    1. Easier access to specialized equipment and services (the suppliers of these goods will locate nearby if there are many firms using it in the cluster)
    2. Easier access to qualified labor (labor market pooling, qualified labor will locate where there are firms that demands their competence)
    3. Knowledge spillovers (for example when employees change firm to work for or people talking to each other)

The consequence is an industrial cluster characterized by perfect competition. Examples: Hollywood and ICT at Fornebu

- **Internal economies of scale** is related to the benefits that a firm get from a lower average cost when their own production increase. The average cost fall due to an assumption of fixed cost, making it beneficial to have one (monopoly) or a few (monopolistic competition) firms in the market, as they have the benefit of increasing returns to scale (declining AC when production increases). Many firms would not be able to stay in the market, as the fixed costs makes AC higher than MC. Thus, this market is not characterized by perfect competition. Examples: Railways are a typical example of monopoly and suppliers of smart phones are an example of monopolistic competition/oligopoly.

b. Suppose the market for phones in the US and in China is characterized by monopolistic competition (internal economies of scale). The market can be illustrated by two curves, with the price/cost on the vertical axis and the number of firms on the horizontal axis:

- PP curve: Expresses the correlation between price (P) and the number of firms (N) in the market, when price is given by: $P = C + (1/N)$.
- CC curve: Expresses the relationship between average costs (AC) and number of firms in the market (N), when average cost is given by: $AC = C + N (F/S)$.

C is marginal cost, N is the number of firms in the market, S is the size of the market, and F is the firm's fixed costs.

For both countries, the cost of establishing a phone producing firm is 800 million and the marginal cost is a constant amount of 1000 per phone. The size of the market in the US is 330 million people, while the size of the market in the China is 1 387 million.

  i. Illustrate (using one figure) the autarky equilibrium price and number of firms in each country.

Answer:
Equilibrium in each country's equilibrium is found where AC=P. If P>AC, more firms will enter until P=AC. If P<AC, some firms will have to leave the market until P=AC.
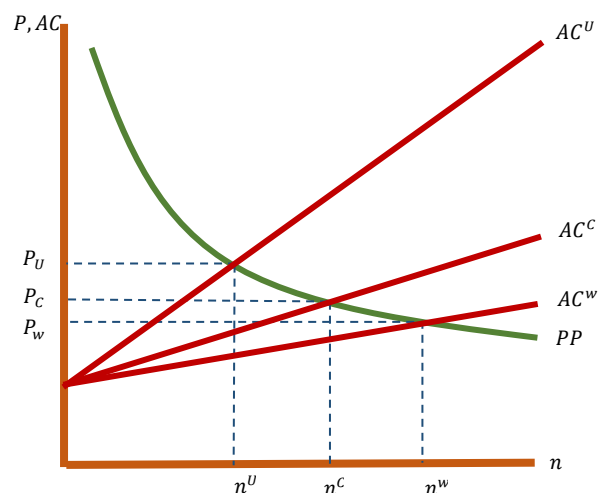
ii. We then open for trade between the two countries. In the same figure, illustrate the impact of going from autarky to trade on the equilibrium price and number of firms in the world market.

Answer:
The CC-curve for the world will have a less steep curve, compared to the two autarky curves. This is because the size of the market is larger with trade. See figure above.

iii. Explain, in words, the impact of trade on prices, average cost, number of firms and the welfare of consumers

Answer:
In equilibrium, the price will equal the average cost of production. The average cost depends on the marginal cost, number of firms, the fixed cost and the size of the market.

When opening for trade, the firms will have access to a bigger market (S^W = S^{us} + S^c). However, not all firms will be able to stay in the market when the competition increases. As the total number of firms in the world is lower than in autarky, each firm that is left have access to a bigger market. As we have internal economies of scale, we have increasing returns to scale, and therefore a lower average cost than before. The price decreases as we open for trade. The lower price, and the increased variety of products cause the consumers welfare to increase.

It is a bonus if the student mentions that if the firms are completely symmetrical, this is random, if they have different marginal cost the more efficient ones with low mc will survive, and the least efficient ones with higher mc will leave the market.

4. 25 % - Up to 6,25 points for each of the four.

Suppose that a fishery is located next to a producer of agricultural products. The agricultural firm uses chemicals (pesticides) to protect its crops. These chemicals increase the production cost of the fishery, because it reduces the number of fish available.
Let the number of fish produced be measured by F and the number of agricultural products be measured by A. The cost functions of the two firms are:
$$c_A(A) = \frac{A^2}{250}$$
$$c_F(F) = \frac{F^2}{200} + A.$$
The market price of agricultural products is $4 and the price of fish is $10.

a. Explain, in words, what is meant by an externality and why this is a form of market failure.

Answer:

An externality is a benefit or loss from production or consumption that affects a third party and can be both positive and negative. A postive externality can for example be the effect bee keeping has by the bee pollinating. An example of a negative effect is pollution from cars effecting air quality and climate change.

An externality is a form of market failure as the benefit or loss is not reflected in the market price. In equilibrium price and quantity in the private market will not equal the socially optimal equilibrium. This will typically cause underproduction of goods with positive externalities, and overproduction of good with negative externalities.

b. Assume first that the two firms operate independently. Calculate the profit-maximizing output of agricultural products (A) and fish (F).

Answer:

$$\pi_A = 4 * A - \frac{A^2}{250}$$
$$\frac{\partial \pi_A}{\partial A} = 4 - \frac{A}{125} = 0$$
$$4 = \frac{A}{125}$$
$$500 = A$$

$$\pi_F = 10 * F - \frac{F^2}{200} - A$$
$$\frac{\partial \pi_F}{\partial F} = 10 - \frac{F}{100} = 0$$
$$10 = \frac{F}{100}$$
$$1000 = F$$

c. Assume now that the two firms merged. Calculate and explain the profit-maximizing output of both goods for the merged firm. Comment on how this differs from the results in 4b.

Answer:

$$\pi_{AF} = 4 * A - \frac{A^2}{250} + 10 * F - \frac{F^2}{200} - A$$
$$\frac{\partial \pi_{AF}}{\partial A} = 4 - \frac{A}{125} - 1 = 0$$
$$3 = \frac{A}{125}$$
$$375 = A$$
$$\frac{\partial \pi_{AF}}{\partial F} = 10 - \frac{F}{100} = 0$$
$$10 = \frac{F}{100}$$
$$1000 = F$$

The optimal quantity of A for the merged firm is lower than when the firms acted independently, because the externality is internalized.

d. If the firms stayed separate, calculate how much agricultural products must be taxed to ensure that the socially optimal output is produced.

Answer:

$$\pi_A = (4 + t) * A - \frac{A^2}{250}$$
$$\frac{\partial \pi_A}{\partial A} = 4 + t - \frac{A}{125} = 0$$

$$\pi_F = 10 * F - \frac{F^2}{200} - A$$
$$\frac{\partial \pi_F}{\partial F} = 10 - \frac{F}{100} = 0$$

$$t = \frac{375}{125} - 4$$
$$t = -1$$

$$10 = \frac{F}{100}$$
$$1000 = F$$

A tax of 1$ per unit of A, paid by the producer of A, will ensure that the socially optimal amount of A=375 will be produced. This is because when the tax is added, the income from each product will decrease, and therefore the optimal amount will be lower.