Exam: International Trade

Inga Heiland

08.05.2024

Instructions

- you can answer in Norwegian or in English

- when using graphs, make sure you label all the curves and all the axes

- keep your verbal answers as short as possible, but answer in complete sentences

- if you use notation that corresponds to the lecture or the book, you don't need to define the variables in your graphs or explanations.

- if you use **notation that does not** correspond to the lecture and the book, you need to define the variables in your graphs or explanations.

1 The gains from trade in the Standard Trade Model [20]

Use the Standard Trade Model

a. to show graphically that there are gains from trade whenever relative prices under trade are different from relative prices in autarky. (Hint: use a graph with the PPF, relative price lines, and indifference curves).

Figure 1 shows a country that starts in autarky A, where production equals consumption for both goods, and then faces an increase in the relative price of good 2 due to trade, reflected in a steeper price line. This country will reduce production of good 1 to Q_1^T and increase production of good 2 to Q_2^T and consume at point T, where it reaches a higher indifference curve. Figure 2 shows a country that starts in autarky A, where production equals consumption for both goods, and then faces a decrease in the relative price of good 2 due to trade, reflected in a steeper price line. This country will increase production of good 1 to Q_1^T and decrease production of good 2 to Q_2^T and consume at point T, where it reaches a higher indifference curve. Hence, the country is better off under trade irrespective of whether trade leads to a higher or lower relative price of the two goods.
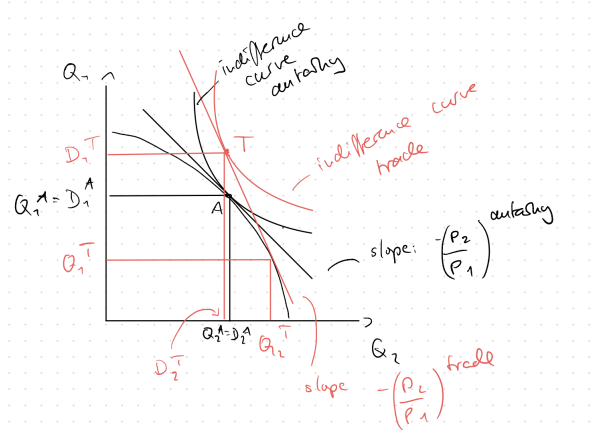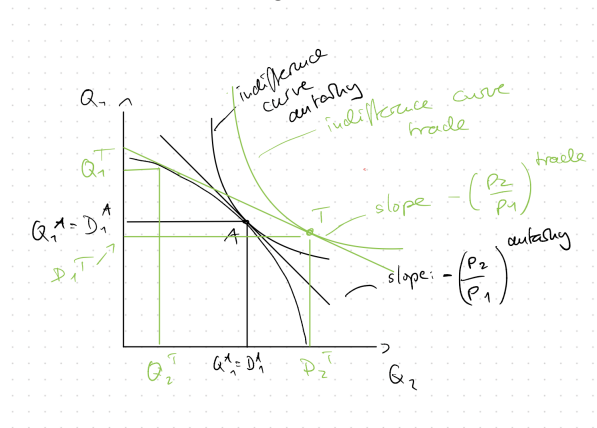
Figure 1:

Figure 2:

b. to show that changes in the terms of trade (the relative price of exports to imports) lead to changes in welfare. Does a country gain from an increase or from a decrease in the terms of

trade?

Figure 3 shows a country that exports good 1 and imports good 2. The initial consumption point is T and the corresponding indifference curve is I. The country's initial terms of trade are $\left(\frac{p_1}{p_2}\right)$. The graph then shows that if the terms of trade increase to $\left(\frac{p_1}{p_2}\right)'$, which is reflected in a flatter price line -$\left(\frac{p_2}{p_1}\right)'$, then the country's welfare increases since it reaches a higher indifference curve I'. Finally, the graph shows that if the terms of trade fall to $\left(\frac{p_1}{p_2}\right)''$, which is reflected in a steeper price line -$\left(\frac{p_2}{p_1}\right)''$, then the country's welfare decreases since it reaches only the lower indifference curve I''.

Explain all important elements of your graphs.

Figure 3:
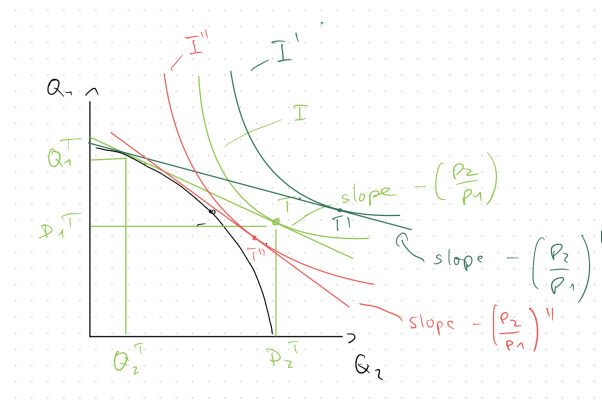
2 Comparative advantage in the Ricardian model [20]

Suppose Norway and Sweden produce two goods, fish and energy. Norway has the better technology for both goods, but its productivity advantage is particularly strong in fishing.

a. Can Norway gain at all from trading with Sweden ? Explain your answer.
   Yes, Norway can gain from trading with Sweden. This is because even though Sweden does not have an absolute advantage in either good, it does have a comparative advantage in energy. This means that Sweden is relatively better in energy than Norway. For Norway, producing energy means that it foregoes a sizeable amount of fish production, because instead of producing energy, it could have produced a lot of fish thanks to its very high productivity in this sector. If Norway instead produces fish, sells it to Sweden and buys energy from Sweden in return, Norway receives more energy per unit of fish than by reducing its own fish production in favour of more energy production.

b. If the two countries trade, which good(s) will Norway produce?
   Norway will produce fish. If Sweden was very small compared to Norway, then it is possible that Norway also produces energy because Sweden is too small to satisfies all of Norway's energy demand plus its own.

   Now suppose that Sweden develops a new technology for energy production which is better than the Norwegian one.

c. Is this good news or bad news for Norway ?

This is good news for Norway. When Sweden produces more energy after its productivity increase, the world market price for energy relative to other goods falls. Since energy is Norway's import goods, this is a terms of trade improvement.

d. Is it possible that this is bad news for Sweden ?

Yes, this is possible. Sweden's welfare is affected by two effects. First, the productivity improvement allows Sweden to produce more in total and therefore reach a higher income level. Second, Sweden's terms of trade change. The terms-of-trade effect for Sweden is the opposite to Norway, i.e. Sweden experiences a terms-of-trade deterioration due to fall in the price of its export good. In theory, it is possible that the negative terms-of-trade effect for Sweden dominates the positive growth effect. However, it is not very likely.

Explain your answers.

3 Gains from market size [20]

Consider the firm-level model with internal increasing returns to scale, differentiated products, monopolistic competition, and free entry. All firms are identical. The industry equilibrium is described by the average cost curve

$$CC = c + \frac{F}{S}n \qquad (1)$$

and the optimal price curve

$$PP = c + \frac{1}{bn} \qquad (2)$$

of a representative firm, where

- c is the constant marginal cost of the firm
- F is the fixed cost of the firm
- S is the total industry output
- n is the number of firms
- b measures how quickly consumer switch to other products when the firm increases its price.

The graphical solution (with linear curves for simplicity) to the equilibrium where firms can freely enter and exit is

Figure 4:
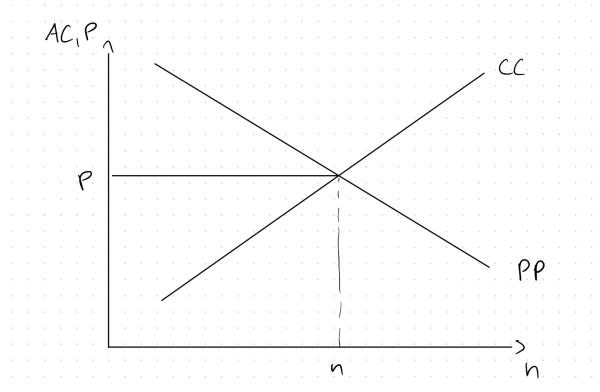
a. Explain why the CC curve is upward sloping in the number of firms. (Hint: remember that because firms are identical, S/n is the output per firm.)
CC is upward-sloping because the more firms there are in the industry, the smaller is the output per firm. And due to increasing returns to scale (here, because of fixed cost), a smaller quantity means a higher average production cost.

b. Explain why the PP curve is downward sloping in the number of firms. (Hint: remember $1/(bn)$ is the price markup)
PP is downward sloping in n because the more firms there are, the higher is the degree of competition in the industry and the lower are firms' markups.

c. Why is the equilibrium number of firms and the equilibrium price determined by the intersection of the CC curve and the PP curve ?
This is because if firms if the price is above the average cost, firms make positive profits. This will lead new firms to enter the industry. As they enter, average cost increase and prices go down. Firm entry thus happens until $PP = CC$. Similarly, if the price is below average cost, firms make negative profits and will exit the industry. As they exit, prices increase and average cost fall. Firm exit thus happens until $PP = CC$. Hence, $PP = CC$ is the equilibrium.

d. Now suppose that total industry output S ("market size") increases. What happens to prices and to the number of firms and what is the intuition behind these adjustments ?
An increase in S shifts the CC curve down (see figure 5). This leads to a larger number of firms and lower prices. The intuition is that in a larger market, firms can produce larger quantities. This lowers their average cost. At unchanged prices, firms would now make positive profits. This induces new firms to enter. Hence, the number of firms increases and prices fall due to more competition. Firm entry stops when prices are again equal to average cost.
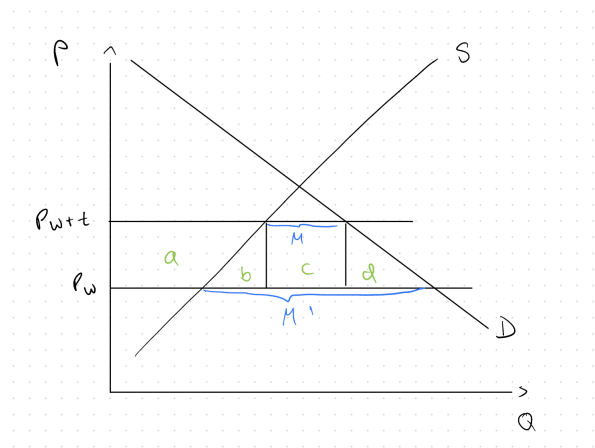
Figure 5:
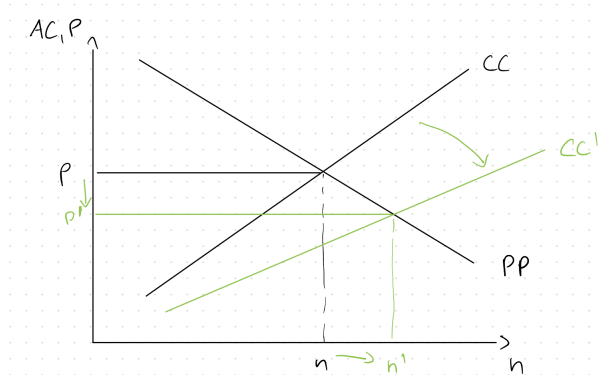
4 The instruments of trade policy [20]

Consider the trade policy of a small country which has a tariff on imports in place.

a. Would the country be better off by abolishing the tariff? Would consumers or producers be in favour of this policy change?
The country will be better off if the tariff is abolished. The figure shows that without the tariff, consumers would consume a larger quantity at the world market price. Imports increase from M to M′. Consumers gain in consumer surplus by an amount corresponding to the areas a, b, c, d. Domestic producers lose producer surplus equal to area a, because some domestic output is replaced by imports. Moreover, the government loses all its tariff income, which was equal to the area c (the tariff multiplied by the imported quantity in the initial equilibrium.) The net gain is areas b + d, which is positive. Moreover, consumers will be in favour of abolishing tariffs, whereas producers will be against it.

Figure 6:

b. As an alternative policy, it is suggested to replace the tariff with a quota in order to keep consumer prices low without hurting domestic producers. Do you think this is a good idea?
The figure shows that a quota of size $\bar{M}$ (chosen such as to yield the same protection to domestic producers as the tariff) does not lower the price for consumer. In fact, it leads to the same

equilibrium as the tariff. The reason is that the tariff made it possible for inefficient domestic producers to compete with foreign firms that could sell the same good at the lower world market price. The quota does not change the fact that domestic producer can only sell a larger quantity than the one under free trade if they charge higher prices. Hence, the protection of producers via a quota leads to the same high prices for consumers as the tariff. Moreover, an argument against replacing the tariff with a quota is that the government loses the tariff revenue (area c). Instead, the firms who receive the quota earn income c from buying the imported quantity at the world market price and selling it to domestic consumers at a higher price. Only if the government manages to sell the quotas at the right price, will it receive the same income as with the tariff.

Explain your answers. You may but don't have to use graphs for illustration.

Figure 7: