Competition Policy and Strategy

Assignment 7

Exercise 7.1 (**Merger of m firms in Cournot (Merger Paradox)**)
Consider a market with demand curve $P(Q) = 6600 - 4Q$. In this market there are n firms, each of which has a cost function of the form $C(q) = 200q$.

a) Show that a merger is only economically viable from $m = 8$ firms when there are $n = 9$ firms in the market. Interpret this result.

b) Now assume that there is a total of $n = 4$ firms in the market and two of the companies merge. The merged company now becomes the Stackelberg leader (index L). This means that the game now takes a sequential form: The merged firm makes its quantity decision first and the two non-merged firms - the Stackelberg followers (index F) - make their quantity decision simultaneously at a second stage. Determine the equilibrium output quantities of the Stackelberg leader q_L^* and the two Stackelberg followers $q_{F,i}^*$, $i \in \{1, 2\}$. Interpret this result. In doing so, also address the situation of the two firms not involved in the merger.

Exercise 7.2 (**Horizontal merger in differentiated Bertrand I**)
In an oligopolistic market with Bertrand competition, two profit-maximizing producers of fruit juices are active. The producer *"Apple-Dream"* (Index A) produces apple juice and *"Banana-Pride"* (Index B) is a supplier of banana juice. The juices are perceived by consumers as differentiated goods. The demand functions for both variants are:

$$q_A(p_A, p_B) = 12 - 2p_A + 0.4p_B$$
$$q_B(p_A, p_B) = 12 - 2p_B + 0.4p_A$$

The two firms have identical constant marginal costs of $c = 2$. There are no fixed costs.

a) Determine the equilibrium price for the two suppliers of fruit $p_i^*, i \in \{A, B\}$.

b) Assume that both companies merge and continue to offer both variations of the good after the merger. Determine the prices that the newly created company $A\&B$ will set $A\&B$.

c) (optional) Determine the *net UPP* for firm A that results from the merger of the two firms $A\&B$. First determine the function $q_B(p_B, q_A)$ and then calculate the implicit tax T_A (*GUPPI*) that firm $A\&B$ would introduce to internalize the negative external effect after the merger.

Exercise 7.3 (**Horizontal merger in differentiated Bertrand II**)
Continue with the task from 7.2. Now another company enters the market offering a third variant of the good fruit juice: The producer *"Citro Juice"* (index C) is a supplier of citrus fruit juice. Accordingly, the demand functions now look like this:

$$q_A(p_A, p_B, p_C) = 12 - 2p_A + 0.4(p_B + p_C)$$
$$q_B(p_A, p_B, p_C) = 12 - 2p_B + 0.4(p_A + p_C)$$
$$q_C(p_A, p_B, p_C) = 12 - 2p_C + 0.4(p_A + p_B)$$

Like the other two firms, A and B, C has constant marginal costs of $c = 2$ and there are no fixed costs in production. Also assume that the three firms in competition will now set a price $p_A = p_B = p_C = 5$.

a) Suppose that the two firms A and B merge again. Firm C continues to (irrationally) set a price $p_C = 5$. Determine the price that the newly formed firm $A\&B$ will set.

b) Now assume that firm C also sets its price optimally. Determine the equilibrium prices $p_j^*, j \in \{A, B\}$ and p_C^*.

c) Interpret the results of task parts a) and b) in comparison to the competitive situation (without merger) with $p_A = p_B = p_C = 5$. In particular, consider the behavior of firm C. Would a competition authority allow the mergers?

Exercise 7.4 (**Vertical Merger with Upstream Competition**)
The electricity sector of a country has two firms, the electricity producer PG (upstream firm) and the distribution company TSO (downstream firm). PG incurs a constant marginal cost of $c = 4$ in electricity generation. TSO does not incur any costs for power distribution. TSO purchases electricity from PG at price w per unit. The end consumer demand for electricity is $P(Q) = 124 - Q$, where Q is the total amount of electricity produced.

a) Assume that PG and TSO maximize their profit independently. Determine the amount of electricity traded in equilibrium and the equilibrium retail price and wholesale price.

b) Now assume that PG and TSO merge. Determine the equilibrium quantity as well as the equilibrium price. Should the merger be allowed?

c) Assume again the vertically-separated industry structure. However, now a new power producer $PGSun$ enters the market whose constant marginal cost is also $c = 4$. The two power producers compete in quantity. Determine the market price, the wholesale price, and the quantities in equilibrium. Would the merger between PG and TSO be approved? What is the market equilibrium after the merger?

d) What type of foreclosure effect is involved here? What aspects must be taken into account when assessing this foreclosure effect in accordance with the EU Commission's *Guidelines on the assessment of non-horizontal mergers*?
(Note: You can access the Guidelines here:
https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:265:0006:0025:en:PDF)

e) Determine the equilibrium of the situation described in c) when PG and $PGSun$ are in Bertrand competition.

Exercise 7.5 ((optional) Vertical Merger with Downstream Competition)
Assume the following situation: A single producer (upstream) is active in the market. At the retail level (downstream), $n = 2$ companies compete on quantity. The demand curve at the retail level is $P(Q) = 220 - 0.25Q$. Retailers purchase the good at a price of w, beyond which they incur no costs. The producer produces the good at a marginal cost of $c = 4$.

a) Determine the equilibrium profits of firms and the total welfare.

b) Assume that the upstream monopolist and one of the downstream duopolists merge. Determine the profits of the firms in the resulting situation.

c) Calculate the resulting welfare in each case. Is it profitable for the second firm to stay in the market? What do you call the effect that plays a role in this?

d) Using the relevant paragraphs in the European guidelines for the assessment of non-horizontal mergers, explain which aspects should be taken into account in the economic analysis of the relevant effect in b).

e) Now assume that n downstream firms compete with each other in quantity. Show how the consumer surplus in the downstream market changes as the number of downstream firms increases. Explain this effect in the light of the problem of double marginalization.