Justus Liebig University Giessen
Faculty 02 - Economics and Business Studies
Chair VWL I

Competition Policy and Strategy

Assignment 5

Exercise 5.1 (**Market Power I)**
Consider a Cournot oligopoly with n firms producing a homogeneous good. The total quantity of this good is denoted Q and its demand function is defined as $Q(P) = 250 - P$. All firms have marginal costs of $c = 100$. For now, there is no fixed costs in the production.

a) Find the quantity and price in market equilibrium as a function of the number of firms in the market, n.

b) How many firms will be in the market if there is additional fixed costs in production of $F = 100$?

c) Find a function for welfare $W(n)$ that depends on the number of firms. Calculate welfare for $n \in [5, 6, \ldots, 15]$. Interpret this result in light of the number of companies that will be active in the market if the market is free to enter.

Exercise 5.2 (**Market Power II)**
Proceed from the information in exercise 5.1 with no fixed costs: A Cournot oligopoly with n firms producing a homogeneous good. The total quantity of this good is denoted Q and its demand function is defined as $Q(P) = 250 - P$. All firms have marginal costs of $c = 100$.

a) Calculate the value of F so that exactly $n = 2$ firms are in the market in equilibrium.

b) Calculate the value of F so that welfare is higher in a monopoly than it is in a duopoly.

Exercise 5.3 (Contestable Markets)
Two firms can produce a homogeneous good. The demand function is $Q(P) = 100 - p$ where Q denotes the total quantity. Both firms produce at constant marginal costs of $c = 10$. In addition, firms incur fixed costs of $F = 1001$. There is no capacity constraints. Both firms play the following game:
The *incumbent* firm I is already active in the market and sets a price p_I. After that, the *entrant* firm E chooses whether it enters the market or not as well as the price p_E it sets in case it does enter the market. Subsequently, demand is realized.

a) Assume that the fixed costs are not "sunk´´. Hence, it is a *contestable market*. What price will result in equilibrium. Describe why this particular equilibrium results.

b) Now assume that the entrant firm E will incur additional sunk costs of $s = 124$ in case it enters the market. What price will now result in equilibrium?

c) Interpret these results. In particular, address the market power that accrues to the monopolistic incumbent. Also discuss the practical relevance of concept of contestable markets.

Exercise 5.4 (Switching Costs)
There are two firms, A and B, in a market which both produce a homogeneous good at constant marginal costs $c = 1$. There is no fixed costs in the production of this good. The firms are in a Bertrand competition. Furthermore, there are $N = 1000$ consumers in this market and each consumer has a reservation price of $R = 10$. Assume there are switching costs of $s = 9$ that consumers incur if they first consume a product of firm A and then of firm B and vice versa. Let the initial share of consumers who previously bought the product from firm A be σ_A and the share of consumers who previously bought from firm B be σ_B, where $\sigma_B = 1 - \sigma_A$.
The exact market share of firm A, σ_A, depends on the price setting strategy of both firms and is defined as follows: $\sigma_A = \begin{cases} 1 & p_A < p_B \\ 0.5 & p_A = p_B \\ 0 & p_A > p_B \end{cases}$

Prices below marginal costs are excluded by assumption ($p_i \geq c \; \forall \; i \; \in \{A, B\}$).

a) Interpret the piece wise definition of market shares σ_A as a function of both firms' prices.

b) For now assume that the described market only exists for one single period ($t = 2$). Thus, in this market, shares $\sigma_i \in (0, 1)$ are considered given. Show that in the only equilibrium of this game, both firms choose a price $p_i = R$. (Notice the assumed switching costs of $s = 9$.)

c) Assuming that all consumers in the market can purchase the homogeneous good in periods $t = 1$ and $t = 2$. Note that switching costs do not play a role in $t = 1$, but they arise in $t = 2$ if a consumer wants to switch from the product of company A to that of company B (and *vice versa*). Analyze this game using backward induction and show that, due to the resulting switching costs in $t = 1$, companies will set a price below R. Interpret your result.

d) (optional) Assume now that, by assumption, companies could also set prices below their marginal costs. Explain in words how this possibility could change the market outcome from part c) in period $t = 1$.