

## Practice problem set 12

### Strategic entry deterrence

This problem set constitutes recommended material for the relevant lab. The choice of tasks to be presented instructionally in every lab is in the discretion of the individual teacher. Students are expected to work on practice problems, however, are not required to submit written solutions. It is non-negotiable policy in this course to not provide hand-outs with the solutions of practice problem sets.

1. Consider an industry with free entry and inverse market demand  $p = a - bQ$ , where  $Q$  is total industry output. Each firm has a constant marginal cost  $c$ . Firms play a two-stage game with entry (at a fixed cost  $F$ ) in the first stage, followed by quantity or price competition in the second stage. Determine the equilibrium number of firms and examine how this number and total output will be affected by a technological change that reduces  $F$  if
  - (a) Firms compete by setting quantities, and
  - (b) Firms compete by setting prices.
  - (c) How would the number of firms be affected if firms colluded in the second stage?

*UoL: 2005 za #3*

2. Suppose there are three identical firms thinking about entering a market in which there is no incumbent firm. There is a small but positive cost of entry  $F$ . The product is homogeneous, with inverse demand  $p = 1 - Q$ , where  $Q$  is aggregate quantity. Unit cost is zero.
  - (a) Suppose the firms compete in prices if they enter. Determine the number of firms that enter, and compute the equilibrium price and profits per firm.
  - (b) Suppose that firms compete in quantities if they enter. Determine the number of firms that enter, and compute the equilibrium price and profits per firm.
  - (c) How does the equilibrium in (b) change if  $F = 1/10$ ?
3. Comment more generally, and with reference to empirical evidence, on how the equilibrium level of concentration depends on the size of the sunk cost and the intensity of price competition.

*UoL: 2002 za #7*

4. Consider a homogeneous good industry with inverse demand given by  $p = 100 - 2(Q + q)$  where  $Q$  is the output of an incumbent firm and  $q$  is the output of a potential entrant to the market. The incumbent's total cost function is  $C(Q) = 100$ , whereas the cost function of the entrant is  $C(q) = F + 20q$ , where  $F$  is a sunk cost incurred to enter the market. The entrant observes the incumbent producing some units of output and expects this output level to be maintained.
  - (a) Determine the incumbent's optimal output in the absence of entry.
  - (b) Suppose entry occurs and the entrant takes the incumbent's output as given. Show that the entrant's equilibrium profit is decreasing in the incumbent's quantity.
  - (c) Calculate the output that the incumbent should set to deter entry.
  - (d) Discuss how the incumbent's decision to deter entry or not might depend on  $F$  and provide intuition.

*UoL: 2016 zb 8*

5. Answer all parts of this question.
- (a) Two firms, A and B, produce a differentiated product and compete in the same market. Discuss, illustrating your argument with appropriate diagrams, the concepts of 'strategic substitutes' and 'strategic complements' in the context of this competition. What do these concepts mean, and which underlying models of competition are consistent with each of these concepts? You may support your answer with formal expressions as appropriate.
  - (b) Firms A and B play a three-stage game. In the third stage, the firms are Cournot competitors if both are active in the industry, with fixed cost of production  $K$  and marginal costs  $C_A$  and  $C_B$ , respectively. The marginal cost of firm A depends on its choice of innovation investment,  $F$ , in stage 1, with  $C_A$  decreasing in  $F$ . Firm B can observe  $F$  and must decide, in stage 2, whether to enter the industry or not. In such a case, does firm A have an incentive to 'overinvest' in innovation? Explain, using formal modeling or diagrams as appropriate. Make sure to define what you mean by 'overinvestment'.
  - (c) Does it matter to your answer in (b) whether the firms are Bertrand or Cournot competitors in the final stage of the game? Explain, including formal modeling or diagrams as appropriate to illustrate your argument.

*UoL: 2015 za 3*

6. In a formal game the players  $i$  and  $j$  decide on the choice variables  $x_i$  and  $x_j$  respectively.
- (a) Provide a mathematical condition that is sufficient for  $x_i$  and  $x_j$  to be strategic complements.
  - (b) In no more than 20 words explain the intuition of your condition in (a).

*End of 2<sup>nd</sup> Module Examination – 2012*

7. An incumbent monopolist faces a potential entrant in a market that the rule is that competition is in quantities. The incumbent proceeds to investment in order to deter. Without using a graph, answer and shortly explain the following.
- (a) Can this be an effective strategy?
  - (b) What is going to happen to the price (or prices) of the good?

*Semester 1 Exam – 2014*

8. What are the four characteristics that constitute a move or action strategic?

*Semester 1 Exam – 2014*