Written Exam for the B.Sc. in Economics Summer 2010

Industrial Organization

Final Exam

August 19, 2010

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students’ self-service system.

Attempt all three questions

Question 1

a) Explain briefly the standard reason why, according to economic theory, a monopoly is bad. Also explain briefly what is meant by "rent seeking" and "X-inefficiency".

b) Show that the optimal price charged by a monopoly firm is a non-decreasing function of marginal cost. More precisely, let $C_1(q)$ and $C_2(q)$ be two cost functions for the monopolist, and let p_1^m and p_2^m be the associated profit-maximizing monopoly prices. Suppose that the cost functions are differentiable and that $C_2'(q) > C_1'(q)$ for all $q > 0$. Prove that then $p_1^m \leq p_2^m$.

c) Consider a market with four firms. Their market shares are 10, 20, 30 and 40 percent. Calculate the Herfindahl index and the 2-firm concentration ratio for this market.

d) Explain what is meant by "resale-price maintenance" (RPM). Also, explain verbally the Chicago argument for why RPM should not be illegal.

e) Explain briefly the conjectural-variations approach to modelling an oligopoly.

Question 2

Consider a market with two firms that produce differentiated goods. Firm 1's demand is given by $q_1 = 30 - 2p_1 - p_2$, where q_1 is firm 1's sold quantity, p_1 is firm 1's price, and p_2 is firm 2's price. Firm 2's demand is given by $q_2 = 30 - 2p_2 - p_1$, where q_2 is firm 2's sold quantity. Neither firm has any productions costs. The firms simultaneously choose their respective price, with the objective of maximizing their profits (which here are the same as their revenues). The firms interact only once.

(a) Solve for the Nash equilibrium of the model. Calculate the equilibrium level of the prices, the quantities and the profits of each firm.

(b) Suppose the firms merge and that the merged firm produces and sells both goods, sold at the prices p_1 and p_2, respectively Solve for the prices that maximize the profits (= revenues) of the integrated firm. Also calculate the associated quantities and the equilibrium level of profits of the integrated firm.

(c) *[You are encouraged to attempt part c) even if you have not been able to answer parts a) and b).]* Compare the results under a) and b) above and explain the intuition behind any differences. Relate your answer to so-called double marginalization.

(d) What do economists mean by "strategic substitutes" and "strategic complements"? In the original model above with two separate firms, are the two firms' choice variables strategic substitutes or strategic complements?

Question 3

Consider Tirole's version of the Rotemberg-Saloner model (exactly the same version as we studied in the course). In a market there are two identical firms, firm 1 and firm 2. They produce a homogeneous good and each firm has a constant marginal cost $c \geq 0$. There are infinitely many, discrete time periods t (so $t = 1, 2, 3, \ldots$), and at each t the firms simultaneously choose their respective price, p_1^t and p_2^t. The firms' common discount factor is denoted $\delta \in (0, 1)$. As the good is homogeneous, demand is a function of the lowest price, $p^t = \min\{p_1^t, p_2^t\}$. Demand is stochastic: with probability $\frac{1}{2}$, demand in period t is high, $q^t = D_H(p^t)$ (> 0); and with probability $\frac{1}{2}$, demand in period t is low, $q^t = D_L(p^t)$ — with $D_H(p^t) > D_L(p^t)$ for all p^t. Demand realizations are independent across time. If the firms charge the same price they share the demand equally between themselves.

The firms can observe the rival firm's choice of price once it has been made. Moreover, the firms can observe the current period's demand realization, before choosing their price. However, the demand realizations in future periods are not known to the firms.

a) Let p_s^m be the state s monopoly price, i.e., the price that maximizes $(p - c) D_s(p)$. Consider (exactly as in the course) a grim trigger strategy in which each firm starts out charging the price $p_s^t = p_s^m$ if the period t state is s. However, if there has been any deviation from that behavior by anyone of the firms in any previous period, then each firm plays $p_s^t = c$.

   (i) Derive a (necessary and sufficient) condition for when the above trigger strategy is part of a subgame perfect Nash equilibrium. In particular, state the condition as $\delta \geq \delta_0$, where δ_0 is a function of the maximized industry profits in state s [i.e., of $\Pi_s^m \equiv (p_s^m - c) D_s(p_s^m)$] but not a function of δ.

   (ii) *[You are encouraged to attempt part (ii) even if you have not been able to answer part (i).]* Interpret your results under (i). When is full collusion most difficult to sustain — in a high or a low state? Explain the intuition. Also explain how the possibility of full collusion depends on δ, Π_L^m and Π_H^m and explain the intuition.

b) Explain briefly what is meant by "facilitating practices".

END OF EXAM