

ECONOMICS 220A
INDUSTRIAL ORGANIZATION
PROBLEM SET 1

Handed out: Mon Sep 15
Due: Mon Sep 29

Answers may require one or more assumptions. If so, please state your assumptions and briefly justify them.

1. A publisher of scientific textbooks needs a printing press that can print technical symbols efficiently. A supplier is capable of making the press, but it will require some expensive investment on its part.

(a) With an investment I_S the manufacturer can make a press that has value $V(I_S)$ to the publisher. Assume $V'(I_S) > 0$, $V''(I_S) < 0$, and $V'(0) > 1$. The production cost of the press is C . If the buyer refuses to purchase the press, the manufacturer can sell it on the open market at a price $P = V(0)$.

(i) What is the optimal level of investment in the press?

(ii) Suppose that after the manufacturer invests, the manufacturer and the publisher act as Nash bargainers. Will the manufacturer invest optimally? Why or why not?

(iii) Suppose the manufacturer and the publisher bargain efficiently and split the surplus from trade, with a fraction $0 \leq \theta \leq 1$ of the surplus going to the manufacturer. What value of θ leads to efficient investment by the manufacturer?

(b) Suppose that with an investment I_S the manufacturer can make a press that has a production cost $C(I_S)$ with $C'(I_S) < 0$, $C''(I_S) > 0$, and $C'(0) < -1$. The press has value V_B to the buyer. Alternatively, the manufacturer could sell the press on the open market at a price $P = V_0 < V_B$.

(i) What is the optimal level of investment in the press?

(ii) Suppose that after the manufacturer invests, the manufacturer and the publisher act as Nash bargainers. Will the manufacturer invest optimally? Why or why not?

(iii) Suppose the manufacturer and the publisher bargain efficiently and split the surplus from trade, with a fraction $0 \leq \theta \leq 1$ of the surplus going to the manufacturer. What value of θ leads to efficient investment by the manufacturer?

(c) Suppose that before the manufacturer invests in the press, the manufacturer and the printer agree to a joint venture to make the press. They agree to share equally the net surplus from the investment after deducting the cost of the investment. Suppose the investment either increases value as in case (a) or lowers the production cost as in case (b). Will the joint venture invest efficiently? Why or why not?

2.

(a) Do the following cost functions exhibit economies of scale and/or economies of scope? Are they subadditive?

(i) $C(q) = F + aq^2$

(ii) $C(q_1, q_2) = F_1 + aq_1^2$ if $q_1 > 0, q_2 = 0$
 $= F_2 + bq_2^2$ if $q_1 = 0, q_2 > 0$
 $= F_{12} + aq_1^2 + bq_2^2$ if $q_1 > 0, q_2 > 0$.

(b) A cost function $C(q_1, q_2)$ exhibits "weak cost complementarities" if $d^2C(q_1, q_2)/dq_1dq_2 < 0$. Are weak cost complementarities sufficient for economies of scope? Why? Are weak cost complementarities necessary for economies of scope?

3. An artist sells prints in two time periods, $t = 1, 2$. Potential buyers include 1,000 individuals who will pay up to \$100 for the print. An additional x individuals will pay up to \$60.

(a) Suppose the artist can commit to a single price for prints in both periods. What is the optimal price as a function of x ?

(b) Suppose that in period $t = 1$, the artist knows only that x is uniformly distributed over $[0, 1000]$. The artist does not observe x until after period 1. Discuss why the price in period 1 could be less than \$100, even if the realized value of x is small.

(c) Suppose the artist can offer a "best price" (BP) provision. The seller guarantees that if the price in period 2 is less than the period 1 price, it will refund the difference to anyone who purchased a print in period 1. What is the artist's expected net price with the BP provision as a function of the realized value of x ?

4. Suppose a monopolist sells a good of quality s . A consumer of type θ has an indirect utility function

$$U(\theta, s, p) = \begin{cases} \theta s - p & \text{if the consumer buys the good} \\ 0 & \text{otherwise.} \end{cases}$$

There are a total of N consumers with preferences θ uniformly distributed between 0 and 1. Assume that the good has a fixed cost of F and zero marginal cost.

(a) Solve for the monopolist's profit-maximizing price.

(b) Now suppose that the monopolist can offer two goods, denoted by $i = 1, 2$. Both have a zero marginal production cost. Good i has a quality s_i and a fixed cost F_i . Assume that the monopolist is selling good 1 at a price p_1 . State the conditions that determine the monopolist's optimal price for good 2. Also specify the conditions that must be met for the monopolist to profit from introduction of the second good.