

ECONOMICS 1
Problem Set 3

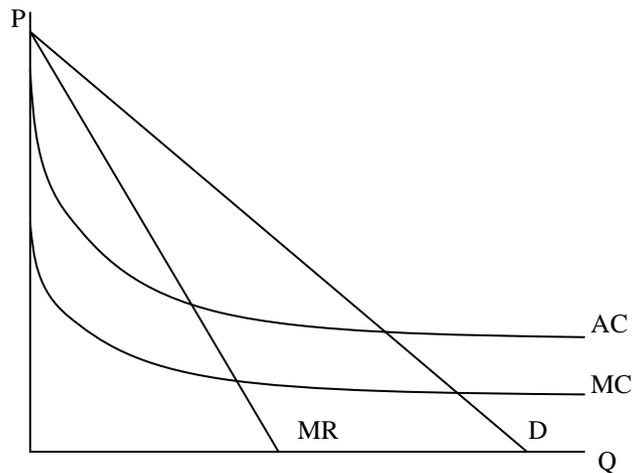
Due in your first section meeting in the week of Oct. 24.

I. Each of the following statements is misguided. Explain what is wrong with the reasoning:

1. It doesn't hurt an unregulated monopolist to have its cost rise since the monopolist can simply raise its price to cover the extra costs.
2. Consider a monopolist that is regulated under price cap regulation and prices at the cap. This regulated monopolist does not benefit from an outward shift in the demand curve since it can't raise its price in response to the higher demand.
3. There is no reason to subsidize private universities since their fees are high enough.
4. In a high fire-risk area like the Berkeley-Oakland hills, there would be no problem to have a fire department run by a private firm because everybody would be willing to pay for it.
5. The costs of National Parks should be covered by charging admission fees, because we shouldn't have National Parks if the people who use them are not willing to pay enough to cover these costs.

II. REGULATION OF NATURAL MONOPOLY

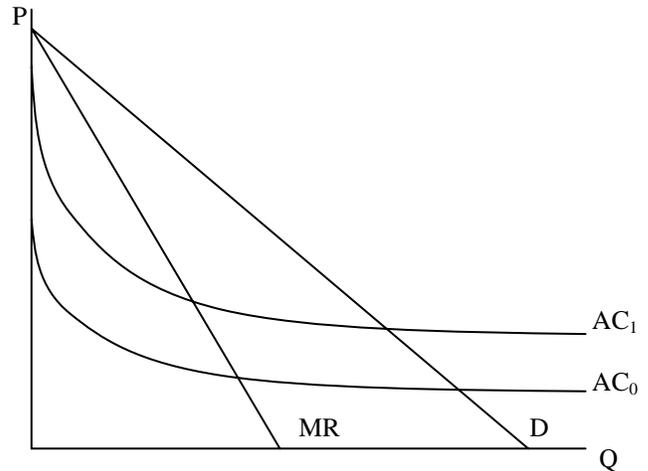
As you well know, food service in campus is a monopoly. Let us suppose that increasing returns to scale (IRTS) exist, such that the provision of food on campus is a natural monopoly. (There are people who believe that IRTS do not exist and that a competitive market could provide food service. That is, lots of vendors could set up operations in dorms and on-campus locations. I actually see no reason this cannot occur. But, for the sake of argument, let's agree with Food Service that IRTS exist.) The relevant curves for Food Service look like the graph on the right. Note that AC is falling because of IRTS, and that MC is below AC because AC is falling. **Trace this graph onto your answer sheet.**



1. Label the price and output that Food Service would choose if it maximized profits. Label them P_m and Q_m .
2. Suppose the University forced Food Service to price at marginal cost. Label the price and output that would result. Label them P_c and Q_c .
3. Food service would have negative profits if it priced at marginal cost. Show the area of loss on the graph.

4. If the University forced Food Service to price at marginal cost, it would have to subsidize Food Service by the amount of loss shown in 3. The University decides that it will not subsidize Food Service. Suppose that the University forced Food Service to price at average cost. **Trace the graph into your answer sheet again.** Label the price and output that would result from pricing at average cost P_a and Q_a . For comparison, put the monopolist's price and output, P_m and Q_m , on this graph too.
5. Show the gain in consumer surplus that arises from lowering the price from P_m to P_a .
6. Show that the gain in consumer surplus exceeds the loss in profits to Food Service.

7. As well as pricing too high, Food Service does not keep costs as low as possible. Workers are paid higher than market wages as a way to subsidize them, and workers have little incentive to be as productive as possible. The AC curve is therefore higher than necessary. In the graph on the right, AC_0 is the curve when costs are kept as low as possible; AC_1 is the curve that represents Food Service's costs (including the high wages and less-than-fully productive workers). **Trace this graph onto your answer sheet.** Show:
 - a) The price and output that Food Service will choose if the University forces it to price at its average cost (but the University does not force it to keep costs as low as possible).
 - b) The loss of consumer surplus that arises because Food Service does not keep costs as low as possible.

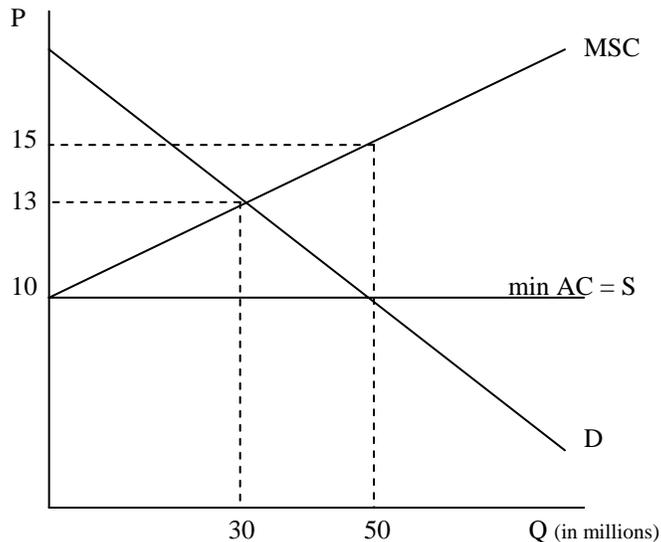


8. Can you think of a way for the University to assure that costs are as low as possible? (There is no correct answer here.) Your answer should recognize that it is difficult for the University to determine market wages and is especially difficult to determine whether workers are fully productive.
9. Finally: Students have to wait in line to get and pay for their food. The opportunity cost of this time is an externality, since Food Service does not have to pay this cost. As a result, Food Service has an incentive to shift costs to students, by hiring fewer workers and making students wait longer. Can you think of any way to correct this problem? (Again, there is no right answer. In fact, I haven't even been able to think of one good solution. Do you have any ideas?)

III. EXTERNALITIES

The production of plastic creates air pollution which, in sufficient quantities, can harm people's health. Assume that the plastic industry is perfectly competitive. We know that the industry will produce more output than is socially optimal, since firms do not bear the costs of pollution (that is, pollution is a negative externality). Without government intervention, the market output will be 50 million units at a price of \$10, where \$10 is the minimum AC of firms in the industry. The marginal social cost of plastic is \$15 at this level of output. Since marginal cost exceeds price, output is too high.

The socially optimal output is 30 million units at a price of \$13. This output can be attained by levying an excise tax of \$3 on each unit of plastic. Assume that the demand and marginal social cost (MSC) curves are linear, as shown in the graph on the right.



1. Calculate the loss of consumer surplus associated with the \$3 tax. This is the loss that buyers of plastic incur when we move to the socially optimal output level.
2. Calculate the reduction in pollution costs that occurs because of the tax.
3. Calculate the government revenues from the tax.
4. Using your answers to 1-3, show that the gains exceed the losses from the tax.
5. The government generally cannot determine the correct tax to levy, since it does not know the demand and marginal social cost curves. Suppose the government levies a \$5 tax, which is the marginal cost of pollution at the level of output that occurs without government intervention (that is, at 50 million units).

Do the gains from this \$5 tax exceed the losses, or vice versa? You can answer this by just looking at the graph, without any calculation.