

Homework for Natural Monopoly pricing

Assume that the market for electricity is a natural monopoly. The utility faces the following market demand: $P = 140 - Q$. The utility's total cost of production is: $TC = 575 + 20Q$.

- i. Find the Marginal Revenue (MR), Average Cost (AC) and Marginal Cost (MC) functions. Graph all these functions (including the Demand). *[Hint: In order to graph the AC curve, find the points in which the AC curve intersects with the Demand curve. Remember that the roots of a quadratic equation $ax^2+bx+c=0$, are given by the quadratic formula*
$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} .]$$
- ii. Explain why the above market is a natural monopoly.
- iii. If marginal cost pricing is imposed, find quantity supplied, price and profits of the regulated monopolist.
- iv. If the market is served by an unregulated monopoly, find quantity supplied, price and profits of the monopolist. Calculate also the dead-weight loss associated with monopoly pricing
- v. If average cost pricing is imposed, find quantity supplied, price and profits of the regulated monopolist. What is the deadweight loss associated with average cost pricing? Calculate it mathematically and show the corresponding area in the graph.
- vi. If the regulator allows the natural monopoly to charge a two-part tariff, with the per unit fee equal to MC, what would the entry fee be if there are 25 customers in the market? (Assuming that the profits will be zero).

Homework in peak-load pricing

We assume that peak and off-peak periods have equal length (12h a day). The demand for electricity during the off-peak period is: $P_o = 60 - 0,3Q_o$ and that during the peak period is: $P_p = 80 - 0,2Q_p$. Variable and marginal cost per unit of output is €15 (MC=AC=15). Capacity costs per unit are €7,5 per period. Capacity must be paid during both periods.

1. If the existing capacity is 200 units,
 - i. Create a diagram showing the Demand curves during the two periods, and the supply curve of the utility.
 - ii. What should be the socially optimal prices during the peak and the off-peak period?
 - iii. How much each group consumes?
 - iv. Does the utility make profits or losses? Calculate the profits (or losses) and show the corresponding area in your graph.
2. In the above setting is the existing capacity optimal? If not, what do you suggest? To what level should capacity be increased? Explain your answer without any calculations.